

# Linear Actuators

Linear actuators for industrial, mobile, medical, off ce and domestic applications.

THOMSON®

Linear Motion. **Optimized.**™

www.thomsonlinear.com



# Linear Motion Systems

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*Linear Motion.* ***Optimized.***™

# Thomson - the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

### Quickly Configure the Optimal Mechanical Motion Solution

Thomson has several advantages that makes us the supplier of choice for motion control technology.

- Thomson owns the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

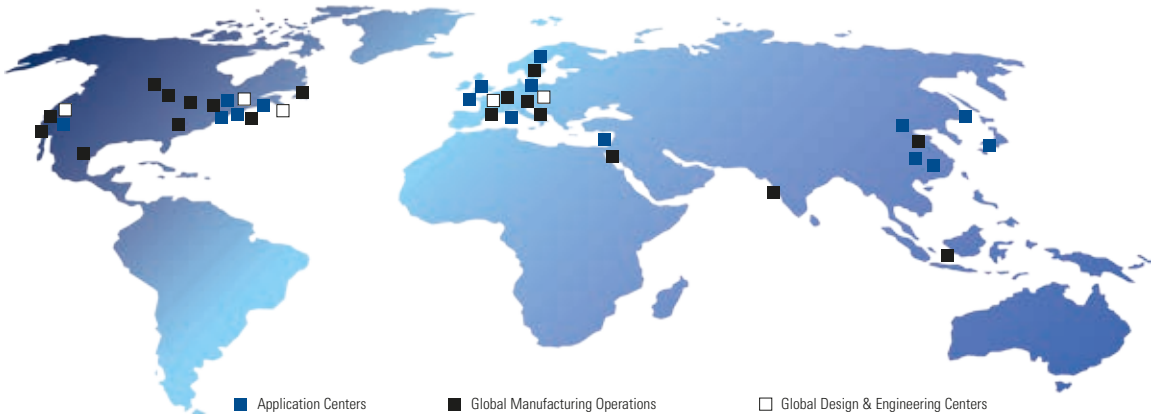
### A Name You Can Trust

A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com/contact_us. Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

### The Danaher Business System

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminates waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

### Local Support Around the Globe



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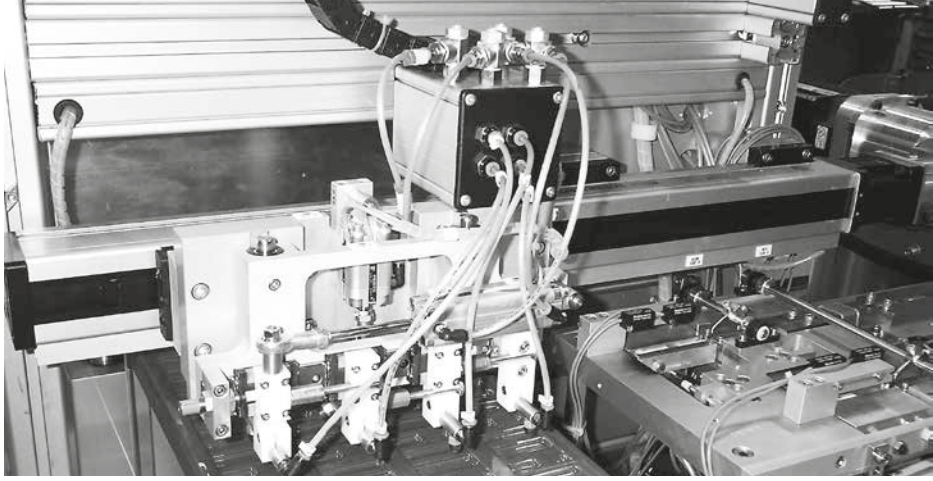
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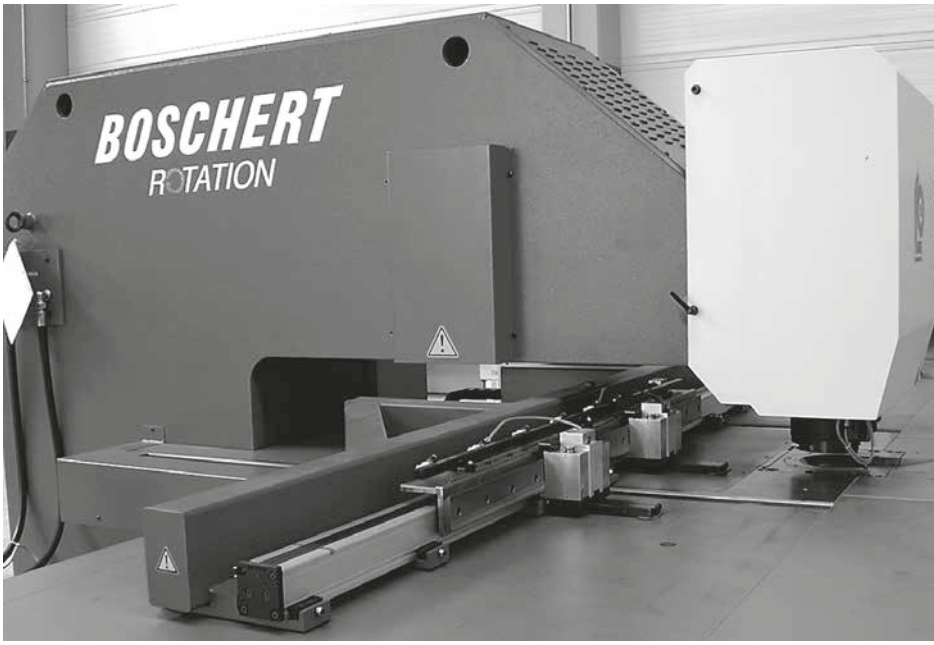
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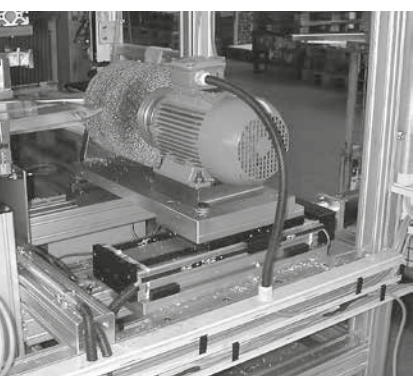


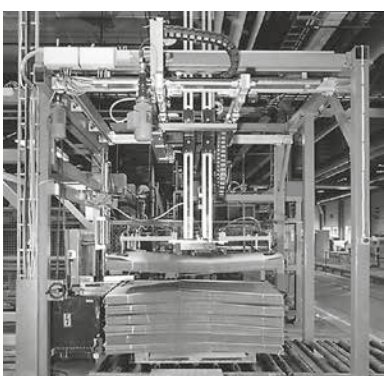


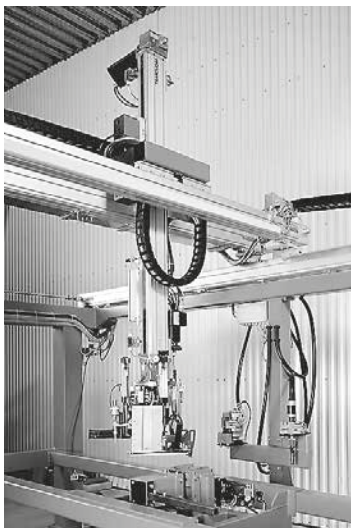

BOSCHERT
ROTATION

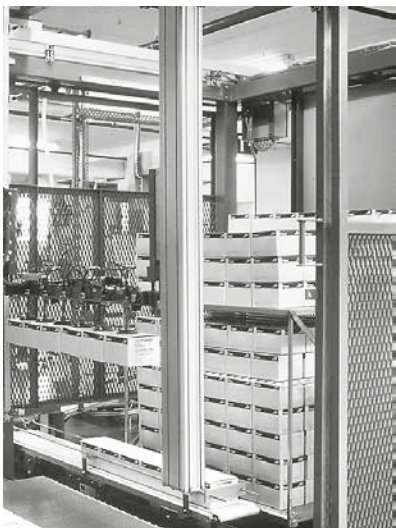

125 KG







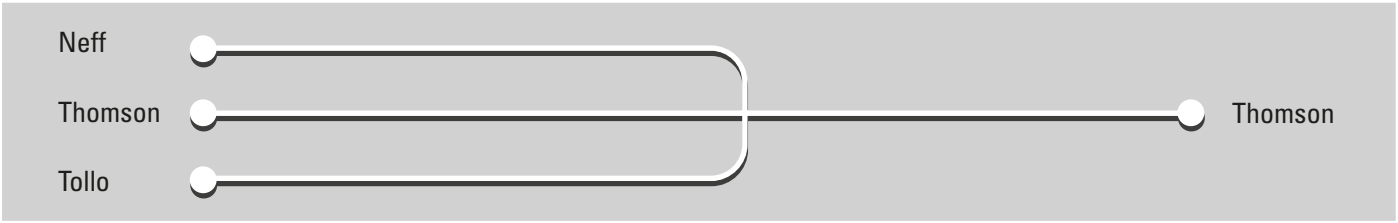




# Thomson

## The optimal balance of performance, life and cost

The unmatched breadth of the Thomson linear motion system product line comes from the consolidation of three world-reknowned brands: Thomson, Neff and Tollo. We are product innovators with decades of application experience. Unbiased ownership of the multiple motion system technologies enables Thomson to provide you with the optimal balance of performance versus installed cost for your application.



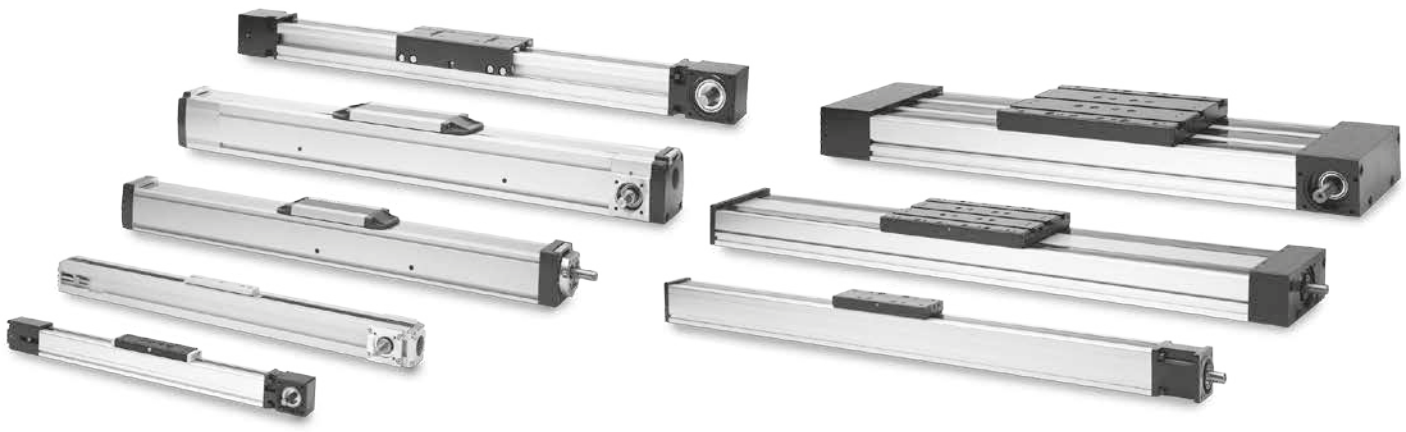

Thomson introduced the first ball screw actuator into an aviation application in 1939 and invented the anti-friction Linear Ball Bushing® Bearing in 1945. Thomson has been a market leader with an increasing portfolio of linear motion technologies ever since.

Founded in 1905, Neff offered products for the linear motion market and, over the decades, became a market leader in ball screw technology. The first linear motion system from Neff was presented in 1981 at the FAMETA show in Stuttgart.

Tollo began in 1981 as a lifting equipment manufacturer. The product line grew rapidly thereafter and, in 1982, Tollo presented their first linear motion system at the Technical Fair in Stockholm.

Thomson has consolidated the most competitive and complementary products from each brand into the most advanced, most comprehensive product portfolio available today. The range covers the smallest and most compact linear motion systems to the biggest and most robust. Our wide range of guide and drive systems can be configured economically and can also work in harsh environments, at high speeds, and in high precision applications.

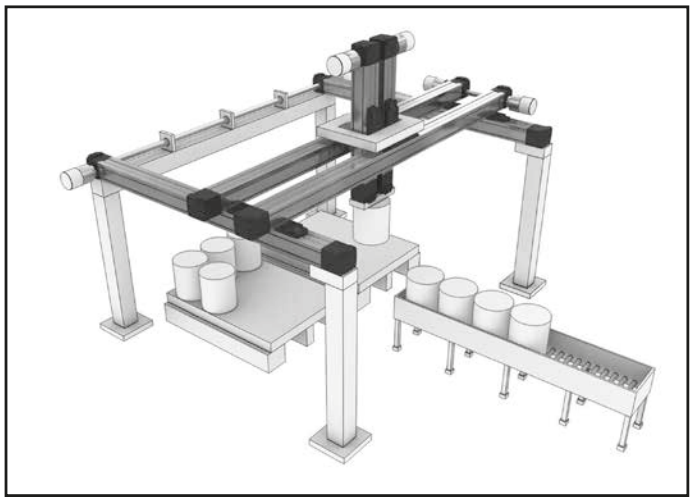
***Thomson is linear motion, optimized.***



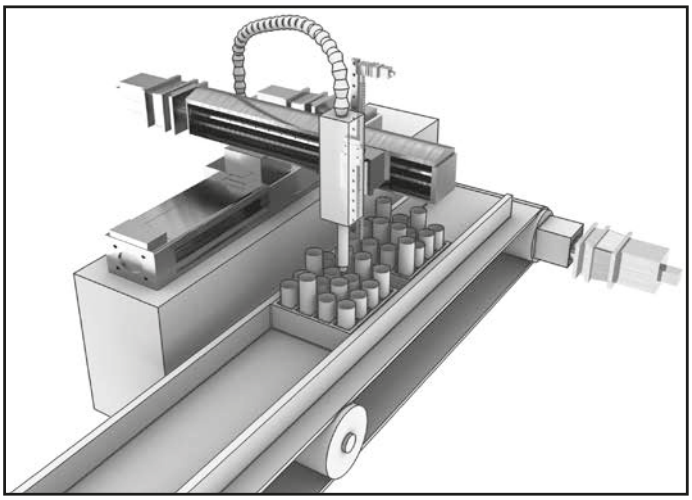
# Linear Motion Systems at Work

## Application Examples

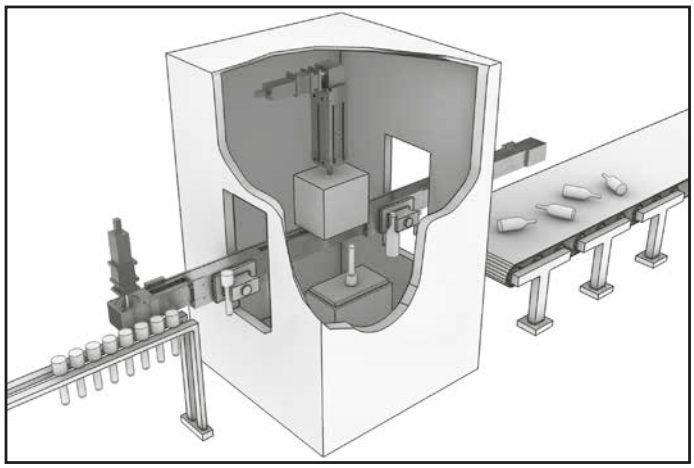
Thomson Linear Motion Systems can be used in almost all industries . The breadth of our range makes it possible to find the optimum solution for most applications imaginable. If the standard range is not enough, Thomson is happy to discuss a custom solution that meets your needs. Below is a small selection of applications where linear motion systems have been used succesfully. Contact us and we can show you many, many more.



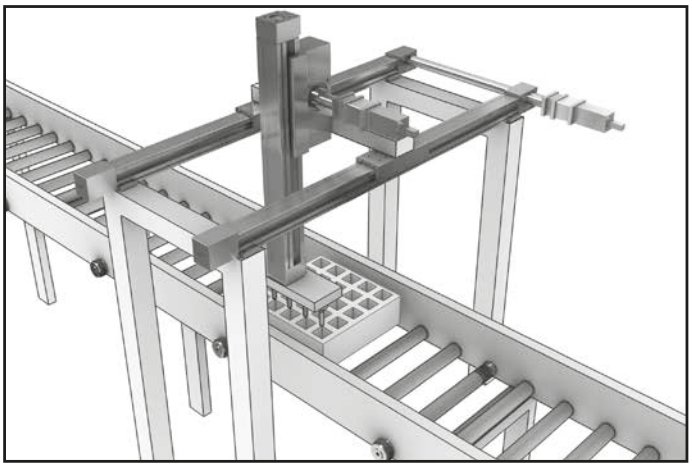
**Handling**
Linear motion systems are ideal for handling applications. Thomson has units suitable for the harsh environments in food and paper industries to the rigorous cleanliness demands found in the medical and electronics industries.



**Medical and laboratory**
In this application a robot made of linear motion systems is used to pick samples from test tubes of different heights. Thomsons has the small, quiet, quick and accurate units you need to build this type of equipment.



**Transportation and transfer**
Whenever you may need to move something from one place to another a linear motion system can be the answer. Here a moulding machine is fed and emptied at high speed.



**Packaging, filling and dispensing**
To fill, close, stack, label or print on boxes or other containers of almost any size and weight is easily done with linear motion systems.

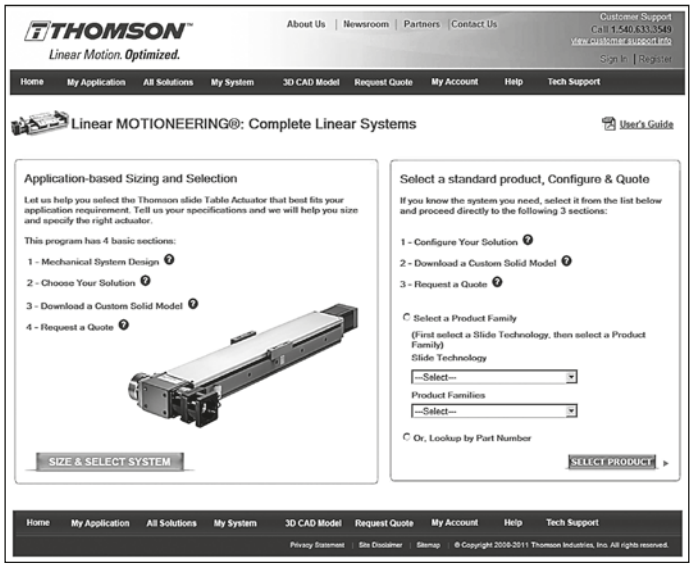
# Simple Product Selection with Linear Motioneering®

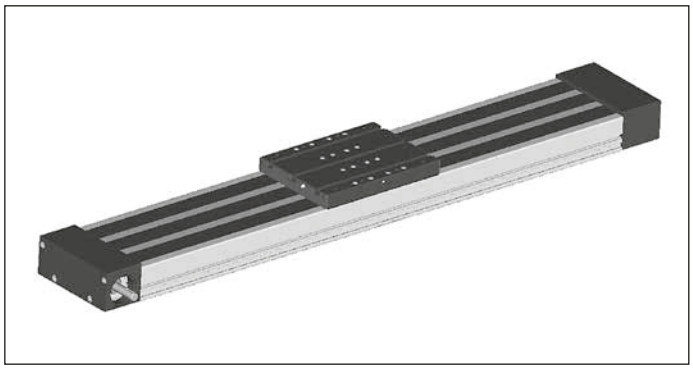
## On-Line Product Selection

The Linear Motioneering sizing and selection tool is designed to make it simple to choose the right linear motion system for your application. Linear Motioneering is very easy to use, just enter the basic paramaters for your application and watch as Linear Motioneering does all the work. Linear Motioneering calculates application parameters through a comprehensive set of algorithms and compares your results to our product database to determine an optimized solution set.

To determine which linear motion system is best suited for your application you just enter the application parameters in seven simple steps into Linear Motioneering. Once a product solution is selected, choose from a wide assortment of accessories, motors, and motor mounts.

The program will output a 2D drawing or an interactive 3D model, list prices, delivery times, and ordering information. In your account you can see your quote history. Please visit www.linearmotioneering.com for more information.



Seven simple steps

1. Visit www.linearmotioneering.com
2. Create an account
3. Enter the system orientation
4. Enter the positioning requirements
5. Enter any environmental conditions
6. Enter the load and the forces
7. Enter the move profile requirements

Outputs

1. 2D drawings or interactive 3D models
2. List prices
3. Delivery times
4. Ordering information

# Linear Motion System Group Selection Chart

How to select appropiate product group

Thomson linear motion systems offers two drive options (screw or belt drive) and three carriage guidance options (ball, slide or wheel guides). The chart below provides reference to the ideal product combination based on the general application type.

## Application Type Group 1

Instrumentation and other low-load applications. Repeatability and/or spatial constraints may be critical.

- Small-scale material handling
- Medical instrumentation
- Lab automation
- Vending machines

Load < 15 kg
Smallest spatial footprint
Repeatability ± 0,005 mm
Stroke up to 0,8 m

→ Type: MS Drive: Screw Guides: Ball



See pages 54 - 61

Repeatability ± 0,05 mm
Speeds up to 3 m/s
Strokes up to 2 m

→ Type: WH40 Drive: Belt Guides: Ball



See pages 82 - 83

## Application Type Group 2

Economical point-to-point transport motion. Speed and/or environmental protection may be critical.

- Packaging
- Filling and dispensing
- Factory automation
- Material handling
- Printing and scanning
- Food processing

Repeatability ± 0,05 mm
Speeds up to 1,6 m/s
Strokes up to 6 m

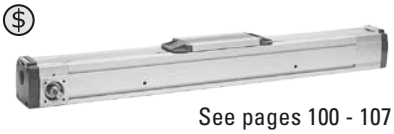
→ Type: M Drive: Screw Guides: Slide



See pages 74 - 79

Repeatability ± 0,2 mm
Speeds up to 5 m/s
Strokes up to 12 m

→ Type: M Drive: Belt Guides: Slide



See pages 100 - 107

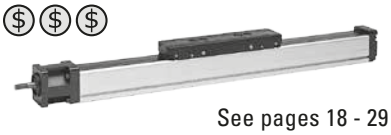
## Application Type Group 3

Motion with tighter accuracy requirements. Stiffness and rigidity may be critical.

- Machine tool material handling
- Machine tool automation
- Test and measurement
- Inspection equipment
- Inspection equipment
- Automotive assembly

Repeatability
< ± 0,02 mm

→ Type: WM Drive: Screw Guides: Ball



See pages 18 - 29

# Linear Motion System Group Selection Chart

## How to select appropiate product group

**How to use the selection chart**

1. Chose the one of the three general application type groups that match your application the best.
2. Move right in the chart until you identified a possible unit type for your needs.
3. Look up the unit type in the catalog and see if there is a size or version among them that match.
4. If you find a match, go to step 5. If not, go back to the chart and identify the next possible unit type and repeat.
5. Confirm the choice by performing the necessary calculations. The Linear Motioneering Sizing and Selection Tool or the Thomson customer support team can help you with this.

| Cost indicator legend | |
|---|---|
| $ | Lowest cost |
| $ $ | |
| $ $ $ | |
| $ $ $ $ | Highest cost |

Repeatability ± 0,01 mm Better stiffness

Type: WM40 Drive: Screw Guides: Ball

$ $

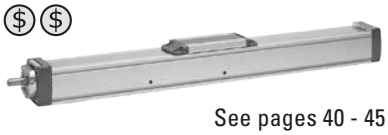


See pages 14 -17

Heavier loads Better stiffness

Type: M Drive: Screw Guides: Ball

$ $



See pages 40 - 45

Higher moment loads

Type: 2DB Drive: Screw Guides: Ball

$ $



See pages 62 - 71

Heavier loads Better stiffness

Type: M Drive: Belt Guides: Ball

$ $

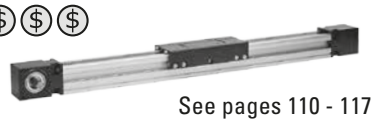


See pages 90 - 95

Speeds up to 10 m/s and/or higher moment loads

Type: WH, MLSH60Z Drive: Belt Guides: Wheel

$ $ $



See pages 110 - 117

Speeds up to 5 m/s and/or higher moment loads

Type: WMZ, MLSM80Z Drive: Belt Guides: Ball

$ $ $

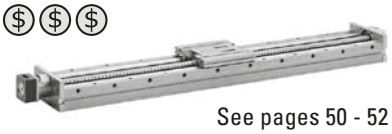


See pages 84 - 89, 96 - 97

Best accuracy Repeatability < ± 0,005 mm

Type: 2RB Drive: Screw Guides: Ball

$ $ $

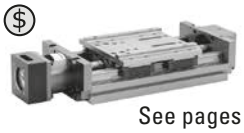


See pages 50 - 52

Best accuracy with higher stiffness and moment load capacity

Type: 2HB Drive: Screw Guides: Ball

$ $ $

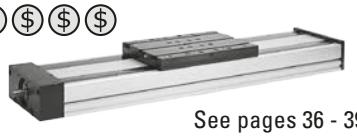


See pages 46 - 49

Heavier loads and/or higher moments

Type: MLSM Drive: Screw Guides: Ball

$ $ $ $



See pages 36 - 39

# Linear Motion Systems with Lead or Ball Screw Drive and Ball Guide

## Overview

### PowerLine WM



WM40

**Features**

- Can be installed in any orientation
- Patented guide system
- Patented self-adjusting plastic cover band
- Patented screw support system

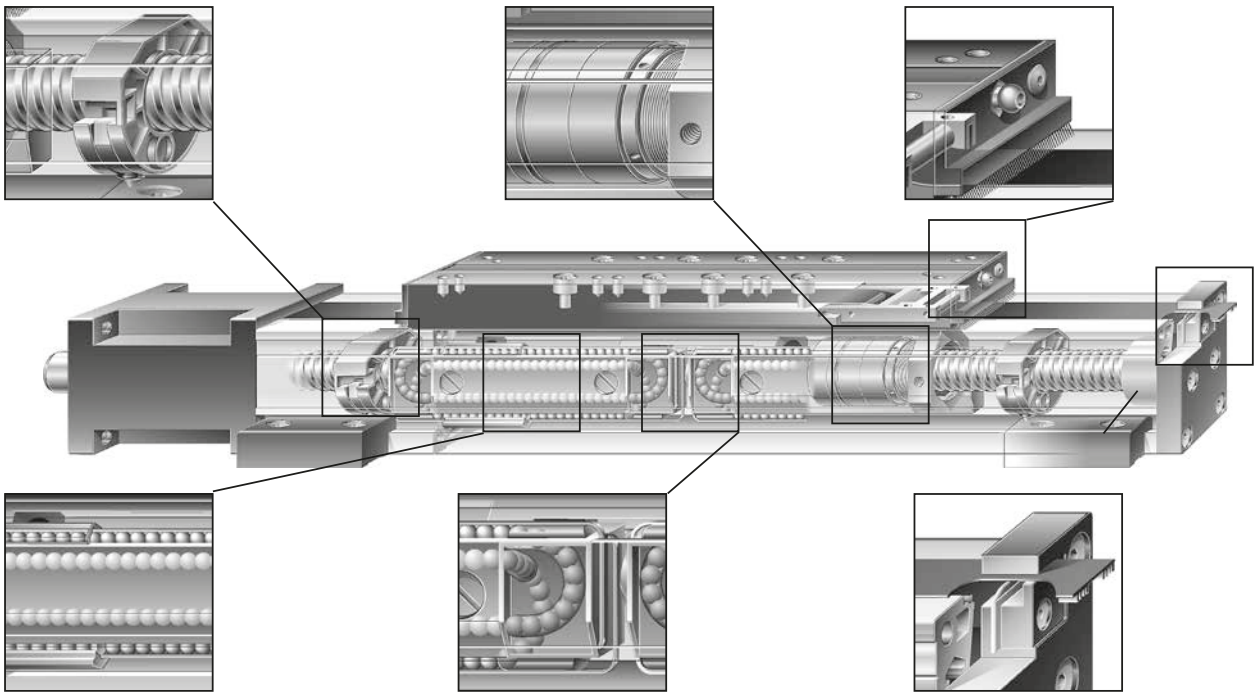
| Parameter | | WM40S | WM40D | WM60D | WM60S | WM60X | WM80D | WM80S | WM120D |
|---|---|---|---|---|---|---|---|---|---|
| Profile size (width × height) | [mm] | 40 × 40 | 40 × 40 | 60 × 60 | 60 × 60 | 60 × 60 | 80 × 80 | 80 × 80 | 120 × 120 |
| Stroke length (Smax), maximum | [mm] | 2000 | 2000 | 11000 | 5000 | 10340 | 11000 | 5000 | 11000 |
| Linear speed, maximum | [m/s] | 0,25 | 0,25 | 2,5 | 2,5 | 0,25 | 2,5 | 2,5 | 2,0 |
| Dynamic carriage load (Fz), maximum | [N] | 600 | 600 | 2000 | 1400 | 2000 | 3000 | 2100 | 6000 |
| Remarks | | single ball nut | double ball nuts | double ball nuts | single ball nut | left/right screw | double ball nuts | single ball nut | double ball nuts |
| Page | | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 |

## WM-Series Technical Presentation

**Screw support**
Patented screw support system permits high speeds at long stroke lengths while reducing the available stroke with a minimum.

**Double ball nuts**
Double pre-tensioned ball nuts improve the accuracy and allow re-tensioning, increasing the lifetime of the unit.

**Central lubrication**
One central lubrication point on the carriage services the entire unit resulting in a minimum maintenace requirement.



**Ball guides**
Integrated patented ball guides with hardened steel tracks for optimum performance.

**Ball cages**
The balls in the ball guides are protected by a ball cage which ensures a long life.

**Cover band**
The patented self-adjusting cover band protect the unit from the penetration of dirt, dust and liquids.

# Linear Motion Systems with Lead or Ball Screw Drive and Ball Guide

## Overview

### PowerLine **WV**



WV80

**Features**

- Can be installed in any orientation
- Patented self-adjusting plastic cover band
- Patented screw support system
- The units require external guides

| Parameter | | WV60 | WV80 | WV120 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 60 × 60 | 80 × 80 | 120 × 120 |
| Stroke length (Smax), maximum | [mm] | 11000 | 11000 | 11000 |
| Linear speed, maximum | [m/s] | 2,5 | 2,5 | 2,0 |
| Dynamic carriage load (Fz), maximum | [N] | - | - | - |
| Remarks | | double ball nuts<br>the units has no guides | double ball nuts<br>the units has no guides | double ball nuts<br>the units has no guides |
| Page | | 30 | 32 | 34 |

### ForceLine **MLSM**



MLSM80D

**Features**

- Can be installed in any orientation
- Patented guide system
- Patented plastic cover band
- Patented screw support system

| Parameter | | MLSM60D | MLSM80D |
|---|---|---|---|
| Profile size (width × height) | [mm] | 160 × 65 | 240 × 85 |
| Stroke length (Smax), maximum | [mm] | 5500 | 5200 |
| Linear speed, maximum | [m/s] | 2,5 | 2,0 |
| Dynamic carriage load (Fz), maximum | [N] | 6000 | 8000 |
| Remarks | | double ball nuts | double ball nuts |
| Page | | 36 | 38 |

# Linear Motion Systems with Lead or Ball Screw Drive and Ball Guide

## Overview

### Movopart M


M75

**Features**
- Can be installed in any orientation
- Self-adjusting stainless steel cover band
- Internal ball guides
- Wash down protected versions available

| Parameter | | M55 | M75 | M100 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 58 × 55 | 86 × 75 | 108 × 100 |
| Stroke length (Smax), maximum | [mm] | 3000 | 4000 | 6000 |
| Linear speed, maximum | [m/s] | 1,6 | 1,0 | 1,25 |
| Dynamic carriage load (Fz), maximum | [N] | 400 | 1450 | 3000 |
| Remarks | | single ball nut | single ball nut | single ball nut |
| Page | | 40 | 42 | 44 |

### 2HB


2HB20

**Features**
- Can be installed in any orientation
- High load capabilities
- Low profile height
- Preloaded ballscrew and bearing carriages offer high stiffness / rigidity
- Corrosion resistant options available.

| Parameter | | 2HB10 | 2HB20 |
|---|---|---|---|
| Profile size (width × height) | [mm] | 100 × 60 | 200 × 90 |
| Stroke length (Smax), maximum | [mm] | 1375 | 2760 |
| Linear speed, maximum | [m/s] | 0,47 | 0,95 |
| Dynamic carriage load (Fz), maximum | [N] | 8000 | 34000 |
| Remarks | | bellows or shroud options available | bellows or shroud options available |
| Page | | 46 | 48 |

### 2RB


2RB16

**Features**
- Can be installed in any orientation
- High load capabilities
- Low profile height
- Preloaded ballscrew and Super Smart bearing configuration provides stiffness / rigidity
- Corrosion resistant options available.

| Parameter | | 2RB12 | 2RB16 |
|---|---|---|---|
| Profile size (width × height) | [mm] | 130 × 40 | 160 × 48 |
| Stroke length (Smax), maximum | [mm] | 1951 | 2815 |
| Linear speed, maximum | [m/s] | 0,47 | 0,73 |
| Dynamic carriage load (Fz), maximum | [N] | 1760 | 5176 |
| Remarks | | bellows option available | bellows option available |
| Page | | 50 | 52 |

# Linear Motion Systems with Lead or Ball Screw Drive and Ball Guide

## Overview

### MicroStage MS



MS33

**Features**

- Compact, lightweight package
- Stainless steel leadscrew with anti-backlash nut offers precise repeatability
- Segmented linear bearings provide smooth motion
- Corrosion resistant options available

| Parameter | | MS25 | MS33 | MS46L | MS46B |
|---|---|---|---|---|---|
| Profile size (width × height) | [mm] | 50 × 25 | 60 × 33 | 86 × 46 | 86 × 46 |
| Stroke length (Smax), maximum | [mm] | 705,5 | 704 | 821,3 | 821,3 |
| Linear speed, maximum | [m/s] | 0,85 | 1,02 | 0,83 | 0,83 |
| Dynamic carriage load (Fz), maximum | [N] | 100 | 150 | 450 | 450 |
| Remarks | | bellows option available | bellows option available | bellows option available | bellows option available |
| Page | | 54 | 56 | 58 | 60 |

### 2DB



2DB12

**INCH INTERFACE**

**Features**

- Integrated dual-rail, webbed shaft ideal for loading in all orientations
- Low-profile height
- Super Smart bushings with low friction for smooth motion
- Easy mounting
- Corrosion resistant options available

| Parameter | | 2DB08 | 2DB12O | 2DB12J | 2DB16O | 2DB16J |
|---|---|---|---|---|---|---|
| Profile size (width × height) | [in] | 4.5 × 1.625 | 6 × 2.125 | 6 × 2.562 | 7.5 × 2.625 | 7.5 × 3.062 |
| Stroke length (Smax), maximum | [in] | 41 | 63 | 63 | 84.5 | 84.5 |
| Linear speed, maximum | [in/s] | 33.3 | 10.0 | 25.0 | 8.3 | 41.67 |
| Dynamic carriage load (Fz), maximum | [lbs] | 336 | 2115 | 2115 | 3555 | 3555 |
| Remarks | | leadscrew driven | ballscrew driven integrated carriage | ballscrew driven modular carriage | ballscrew driven integrated carriage | ballscrew driven modular carriage |
| Page | | 62 | 64 | 66 | 68 | 70 |

# WM40S

## Ball Screw Drive, Ball Guide, Single Ball Nut

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM40S |
|---|---|
| Profile size (w × h) [mm] | 40 × 40 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

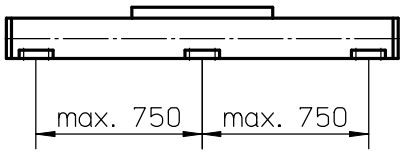
| Parameter | | WM40S |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 2000 |
| Linear speed, maximum | [m/s] | 0,25 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,02 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1000 |
| Dynamic load (Fy), maximum | [N] | 450 |
| Dynamic load (Fz), maximum | [N] | 600 |
| Dynamic load torque (Mx), maximum | [Nm] | 10 |
| Dynamic load torque (My), maximum | [Nm] | 30 |
| Dynamic load torque (Mz), maximum | [Nm] | 30 |
| Drive shaft force (Frd), maximum | [N] | 100 |
| Drive shaft torque (Mta), maximum | [Nm] | 3 |
| Ball screw diameter (d0) | [mm] | 12 |
| Ball screw lead (p) | [mm] | 5 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>1,50<br>0,30<br>0,36 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] |
|---|---|
| | p = 5 |
| 150 | 0,3 |
| 1500 | 0,5 |
| 3000 | 0,8 |

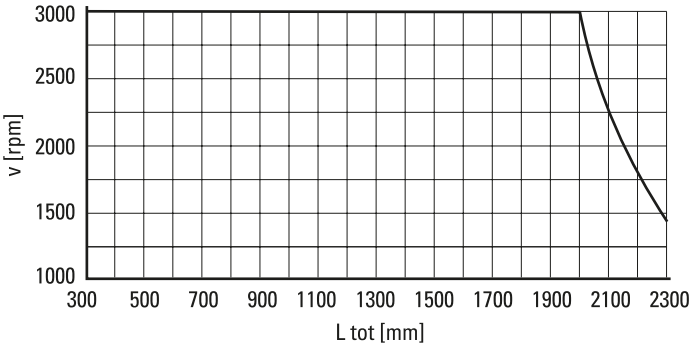
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

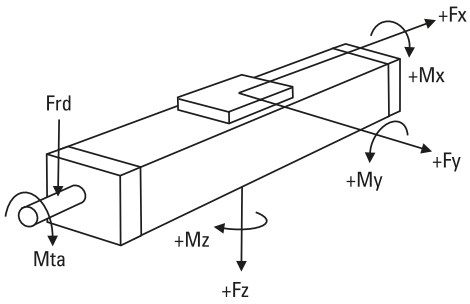



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Critical Speed



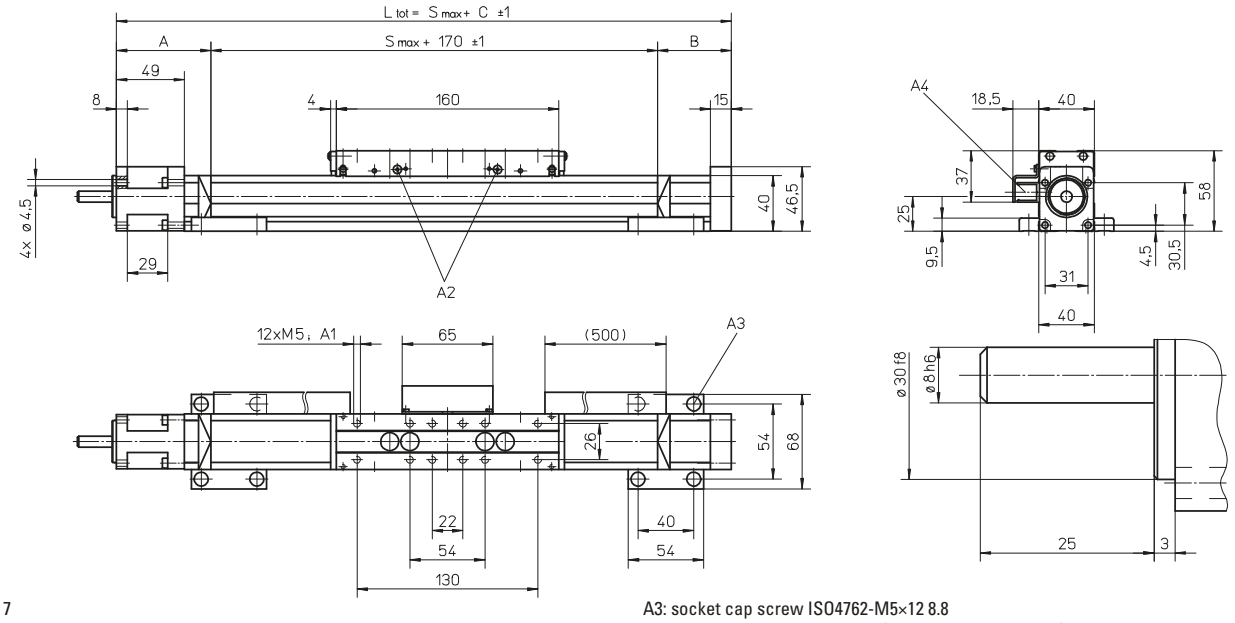

## Definition of Forces



# WM40S

## Ball Screw Drive, Ball Guide, Single Ball Nut

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 7
A2: lubricating nipple on both sides DIN3405 D 1/A
A3: socket cap screw ISO4762-M5×12 8.8
A4: ENF inductive sensor rail kit (optional - see page 172)

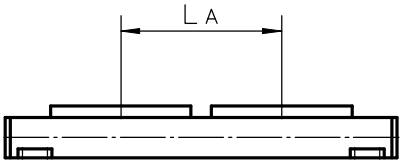
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 – 500 (0 – 450) | 65 | 35 | 270 (320) |
| 501 – 1100 (451 – 1050) | 65 | 45 | 280 (330) |
| 1101 – 2000 (1051 – 1950) | 70 | 60 | 300 (350) |

Values between brackets = for units with long carriage

## Double Carriages

| Parameter | | WM40S |
|---|---|---|
| Minimum distance between carriages (L A) | [mm] | 175 |
| Dynamic load (Fy), maximum | [N] | 900 |
| Dynamic load (Fz), maximum | [N] | 1200 |
| Dynamic load torque (My), maximum | [Nm] | L A[1] × 0,45 |
| Dynamic load torque (Mz), maximum | [Nm] | L A[1] × 0,6 |
| Force required to move second carriage | [N] | 4 |
| Total length (L tot) | [mm] | Smax + C + L A |

[1] Value in mm



# WM40D

## Ball Screw Drive, Ball Guide, Double Ball Nuts, Long Carriage

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM40D |
|---|---|
| Profile size (w × h) [mm] | 40 × 40 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

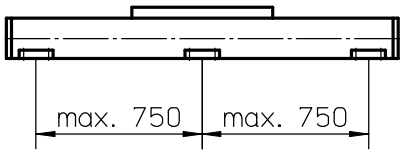
| Parameter | | WM40D |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1950 |
| Linear speed, maximum | [m/s] | 0,25 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1000 |
| Dynamic load (Fy), maximum | [N] | 450 |
| Dynamic load (Fz), maximum | [N] | 600 |
| Dynamic load torque (Mx), maximum | [Nm] | 10 |
| Dynamic load torque (My), maximum | [Nm] | 30 |
| Dynamic load torque (Mz), maximum | [Nm] | 30 |
| Drive shaft force (Frd), maximum | [N] | 100 |
| Drive shaft torque (Mta), maximum | [Nm] | 3 |
| Ball screw diameter ($d_0$) | [mm] | 12 |
| Ball screw lead (p) | [mm] | 5 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>1,90<br>0,30<br>0,60 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] |
|---|---|
| | p = 5 |
| 150 | 0,4 |
| 1500 | 0,6 |
| 3000 | 0,9 |

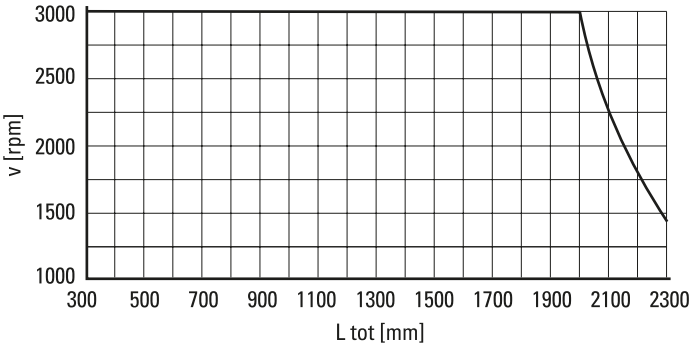
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

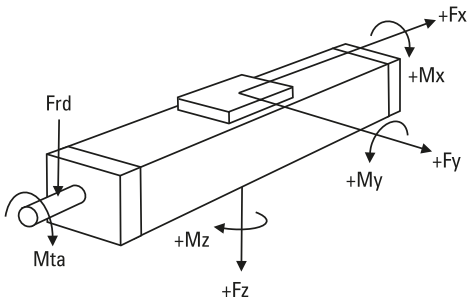



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Critical Speed



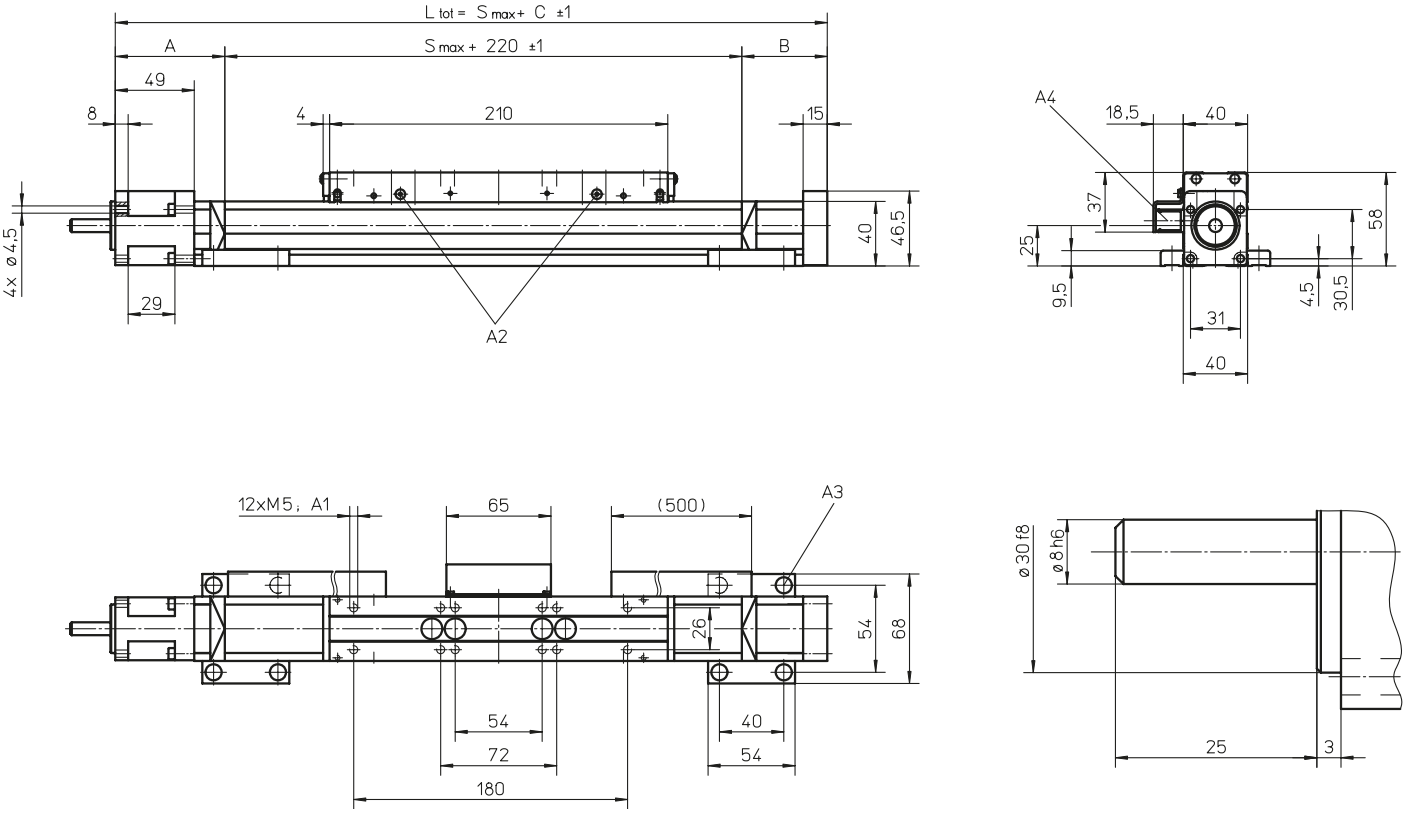

## Definition of Forces



# WM40D

## Ball Screw Drive, Ball Guide, Double Ball Nuts, Long Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |



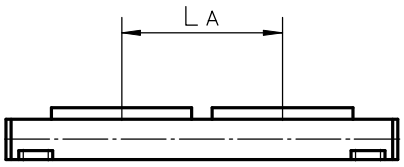

A1: depth 6
A2: lubricating nipple on both sides DIN3405 D 1/A
A3: socket cap screw ISO4762-M5×12 8.8
A4: ENF inductive sensor rail kit (optional - see page 172)

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 – 500 | 65 | 35 | 320 |
| 501 – 1100 | 65 | 45 | 330 |
| 1101 – 2000 | 70 | 60 | 350 |

## Double Long Carriages

| Parameter | | WM40D |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 225 |
| Dynamic load (Fy), maximum | [N] | 900 |
| Dynamic load (Fz), maximum | [N] | 1200 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 0,45 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 0,6 |
| Force required to move second carriage | [N] | 4 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WM60D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM60D |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of screw | ball screw with double nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

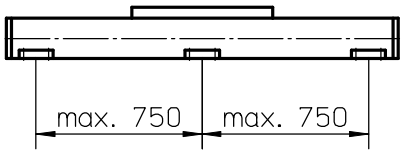
| Parameter | | WM60D |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 20 mm<br>screw lead 50 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 4000 |
| Dynamic load (Fy), maximum | [N] | 2000 |
| Dynamic load (Fz), maximum | [N] | 2000 |
| Dynamic load torque (Mx), maximum | [Nm] | 100 |
| Dynamic load torque (My), maximum | [Nm] | 200 |
| Dynamic load torque (Mz), maximum | [Nm] | 200 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 35 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>6,16<br>0,65<br>1,99 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 20 | p = 50 |
| 150 | 0,8 | 1,3 | 1,6 |
| 1500 | 1,4 | 2,0 | 2,4 |
| 3000 | 1,8 | 2,3 | 2,6 |

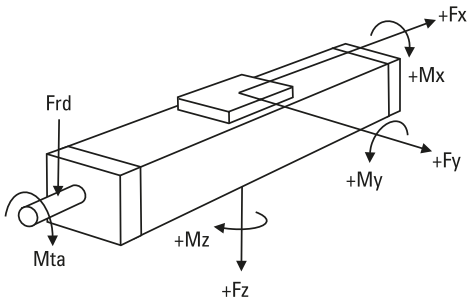
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 6300 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

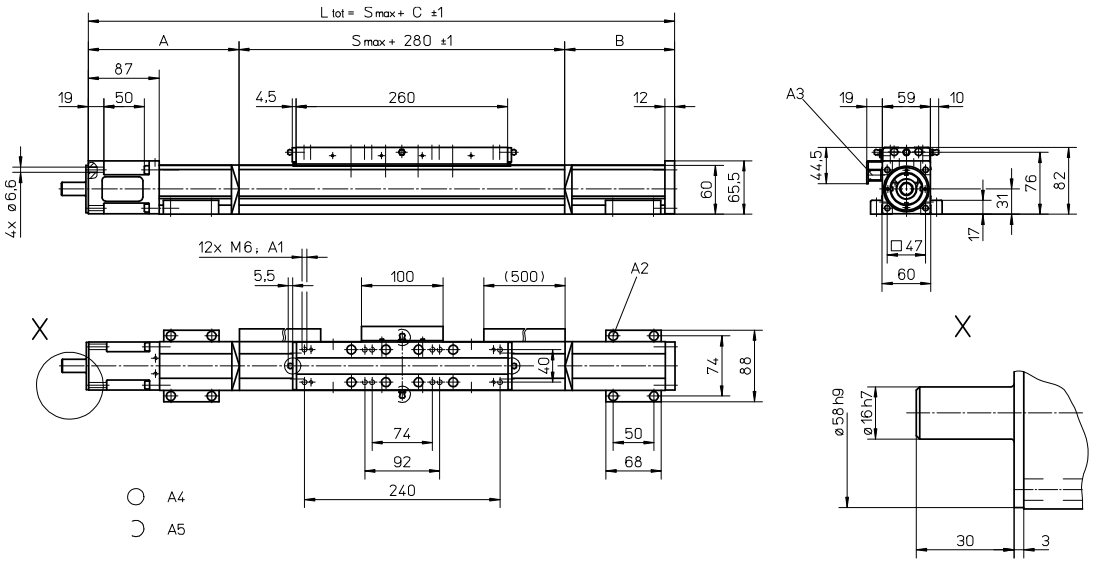
## Definition of Forces



# WM60D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

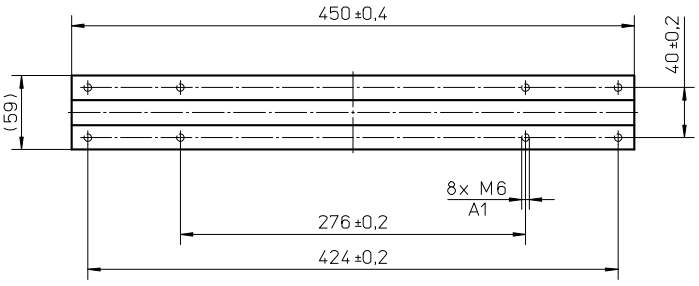
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 695 (0 - 505) | 115 | 65 | 460 (650) |
| 696 - 1335 (506 - 1145) | 165 | 115 | 560 (750) |
| 1336 - 2075 (1146 - 1885) | 185 | 135 | 600 (790) |
| 2076 - 2780 (1886 - 2590) | 210 | 160 | 650 (840) |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2781 - 3545 (2591 - 3355) | 230 | 180 | 690 (880) |
| 3546 - 4285 (3366 - 4095) | 250 | 200 | 730 (920) |
| 4286 - 5015 (4096 - 4825) | 275 | 225 | 780 (970) |
| 5016 - 11000 (4826 - 10810) | contact customer service | | |

Values between brackets = for units with long carriage

## Long Carriage

| Parameter | | WM60D |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 500 |
| Dynamic load torque (Mz), maximum | [Nm] | 500 |
| Weight | [kg] | 3,1 |

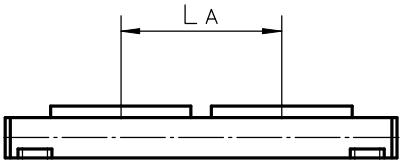



A1: depth 11

## Double Carriages

| Parameter | | WM60D |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 335 |
| Dynamic load (Fy), maximum | [N] | 4000 |
| Dynamic load (Fz), maximum | [N] | 4000 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 2 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 2 |
| Force required to move second carriage | [N] | 20 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WM60S

## Ball Screw Drive, Ball Guide, Single Ball Nut, Short Carriage

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM60S |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

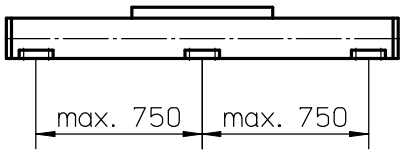
| Parameter | | WM60S |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 10 |
| Repeatability | [± mm] | 0,02 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 2800 |
| Dynamic load (Fy), maximum | [N] | 1400 |
| Dynamic load (Fz), maximum | [N] | 1400 |
| Dynamic load torque (Mx), maximum | [Nm] | 50 |
| Dynamic load torque (My), maximum | [Nm] | 100 |
| Dynamic load torque (Mz), maximum | [Nm] | 100 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 35 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>3,80<br>0,65<br>1,00 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 20 | p = 50 |
| 150 | 0,7 | 1,0 | 1,4 |
| 1500 | 1,1 | 1,6 | 2,0 |
| 3000 | 1,5 | 1,8 | 2,2 |

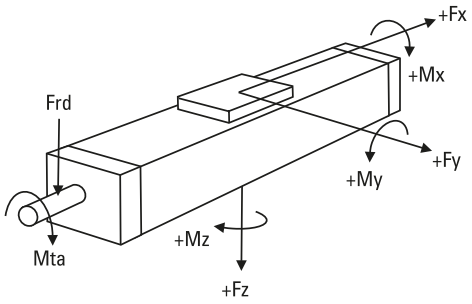
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

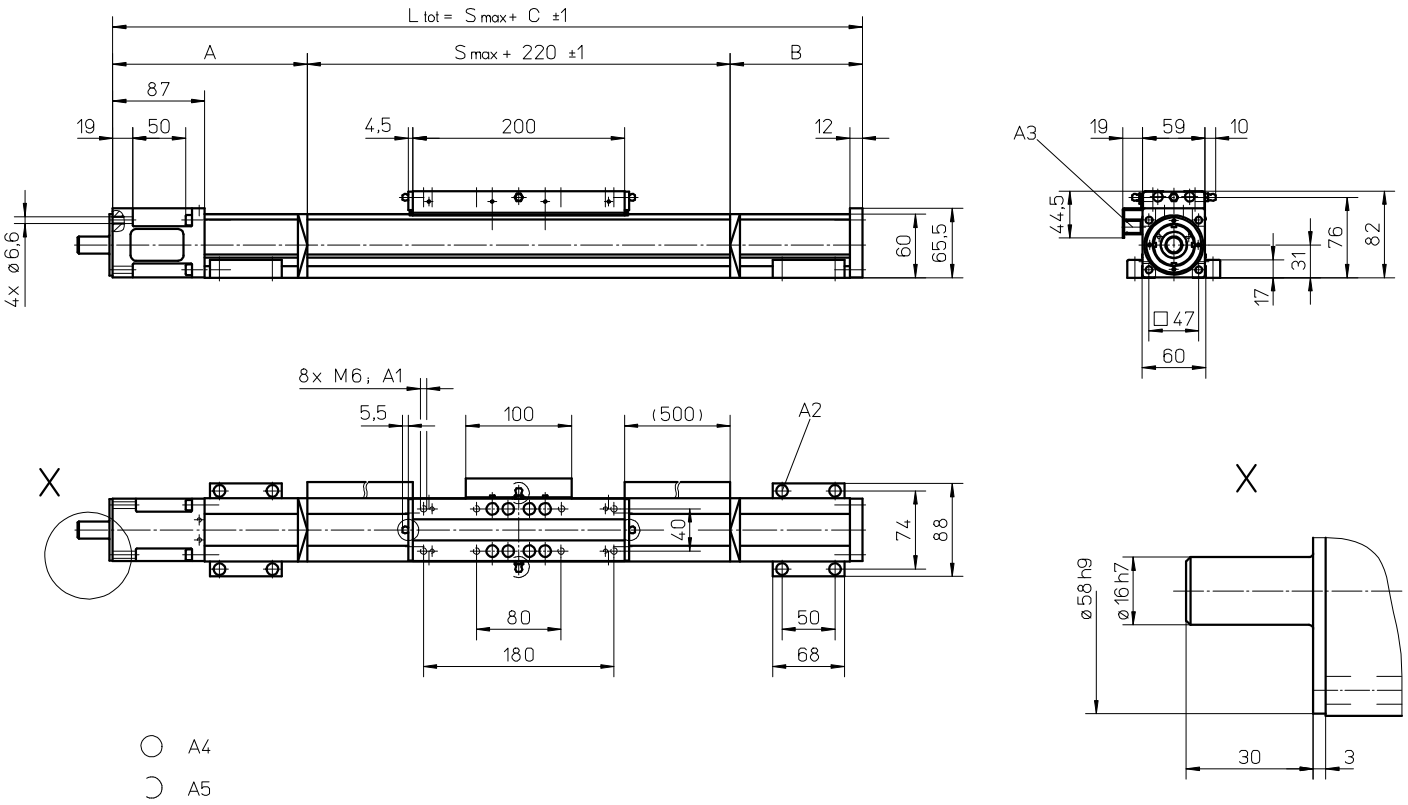
## Definition of Forces



# WM60S

## Ball Screw Drive, Ball Guide, Single Ball Nut, Short Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

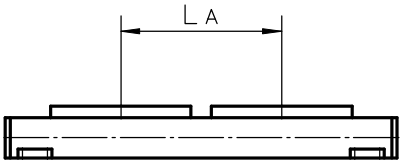
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 580 | 95 | 20 | 335 |
| 581 - 1140 | 110 | 60 | 390 |
| 1141 - 1805 | 130 | 80 | 430 |
| 1806 - 2460 | 155 | 105 | 480 |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2461 - 3125 | 175 | 125 | 520 |
| 3126 - 3780 | 200 | 150 | 570 |
| 3781 - 4445 | 220 | 170 | 610 |
| 4446 - 5000 | 240 | 190 | 650 |

## Double Short Carriages

| Parameter | | WM60S |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 255 |
| Dynamic load (Fy), maximum | [N] | 2800 |
| Dynamic load (Fz), maximum | [N] | 2800 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 1,4 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 1,4 |
| Force required to move second carriage | [N] | 18 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WM60X

## Ball Screw Drive, Ball Guide, Left/Right Moving Carriages

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM60X |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of screw | ball screw with double nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

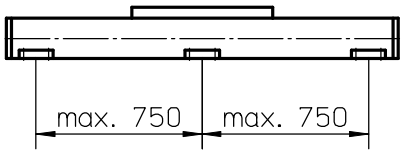
| Parameter | | WM60X |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 10340 |
| Linear speed, maximum | [m/s] | 0,25 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 4000 |
| Dynamic load (Fy), maximum | [N] | 2000 |
| Dynamic load (Fz), maximum | [N] | 2000 |
| Dynamic load torque (Mx), maximum | [Nm] | 100 |
| Dynamic load torque (My), maximum | [Nm] | 200 |
| Dynamic load torque (Mz), maximum | [Nm] | 200 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 35 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5 |
| Weight | [kg] | |
| of unit with zero stroke | | 10,33 |
| of every 100 mm of stroke | | 0,65 |
| of each carriage | | 1,99 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] |
|---|---|
| | p = 5 |
| 150 | 1,6 |
| 1500 | 2,8 |
| 3000 | 3,6 |

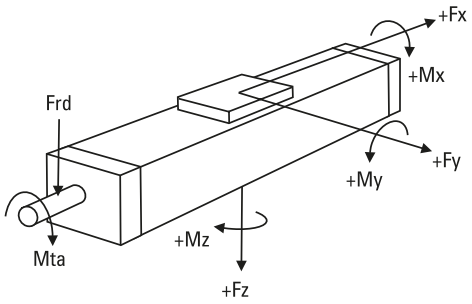
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 5400 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

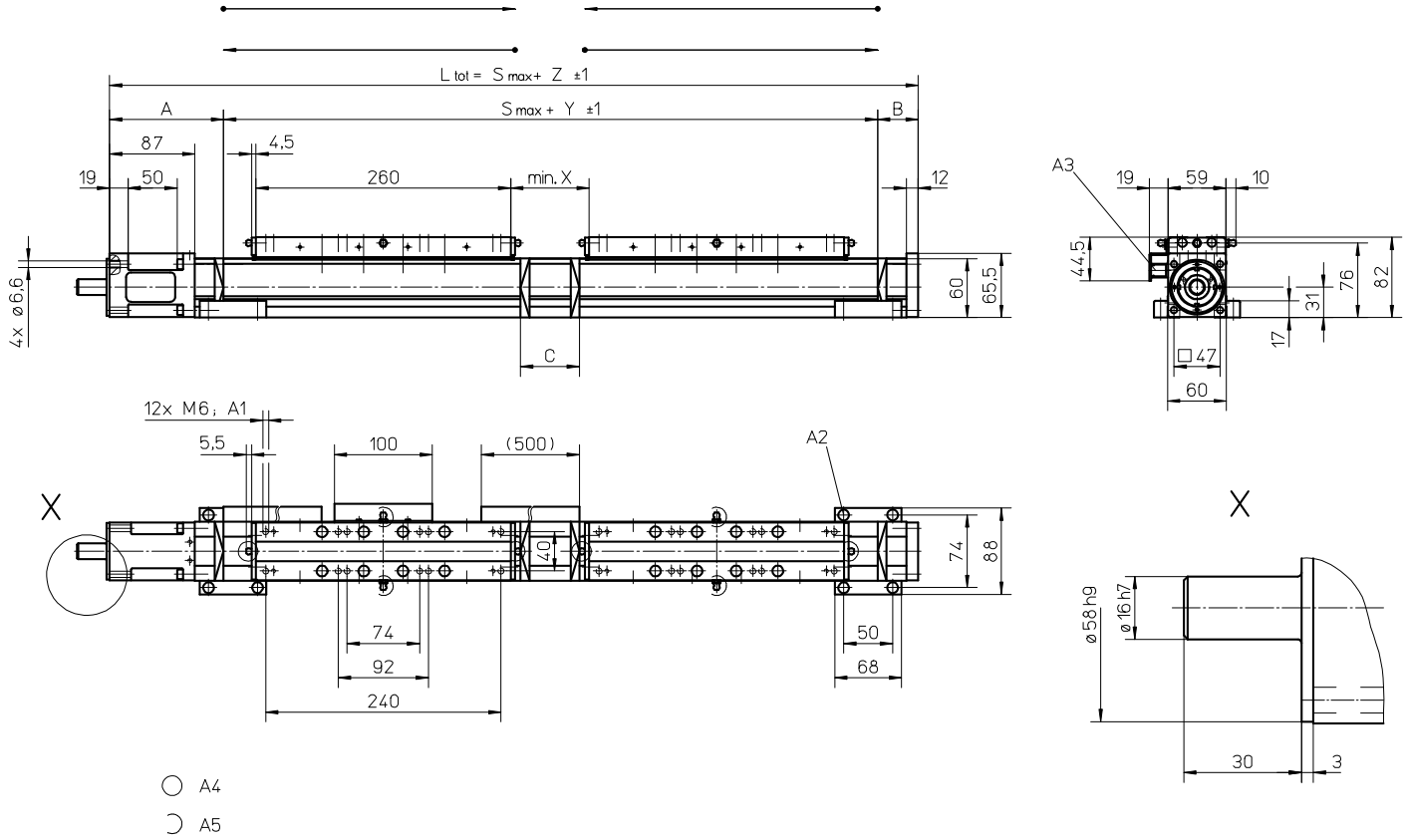
## Definition of Forces



# WM60X

| Dimensions | Projection |
|---|---|
| METRIC | |

## Ball Screw Drive, Ball Guide, Left/Right Moving Carriages




A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

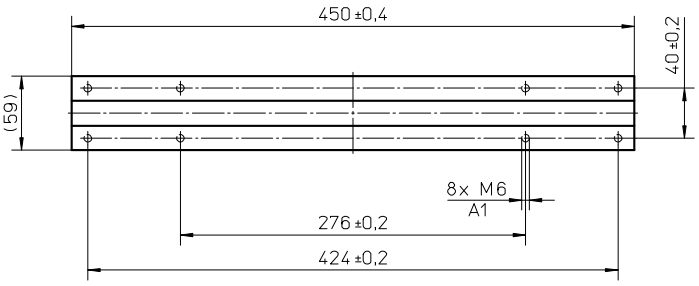
A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] | X [mm] | Y [mm] | Z [mm] |
|---|---|---|---|---|---|---|
| 0 - 1390 (0 - 1200) | 115 | 65 | 60 | 80 | 620 | 800 |
| 1391 - 2670 (1201 - 2480) | 165 | 115 | 210 | 230 | 770 | 1050 |
| 2671 - 4150 (2481 - 3960) | 185 | 135 | 250 | 270 | 810 | 1130 |
| 4151 - 5560 (3961 - 5370) | 210 | 160 | 300 | 320 | 860 | 1230 |
| 5561 - 10340 (5371 - 10150) | contact customer sevice | | | | | |

Values between brackets = for units with long carriage

## Long Carriage

| Parameter | | WM60X |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 500 |
| Dynamic load torque (Mz), maximum | [Nm] | 500 |
| Weight | [kg] | 3,1 |




A1: depth 11

# WM80D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM80D |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

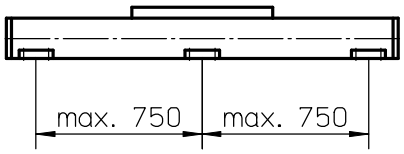
| Parameter | | WM80D |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 50 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 5000 |
| Dynamic load (Fy), maximum | [N] | 3000 |
| Dynamic load (Fz), maximum | [N] | 3000 |
| Dynamic load torque (Mx), maximum | [Nm] | 350 |
| Dynamic load torque (My), maximum | [Nm] | 300 |
| Dynamic load torque (Mz), maximum | [Nm] | 300 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 55 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>11,57<br>1,08<br>4,26 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 50 |
| 150 | 1,1 | 1,5 | 1,8 | 2,3 |
| 1500 | 1,7 | 2.1 | 2,3 | 3,0 |
| 3000 | 2,1 | 2,5 | 2,6 | 3,6 |

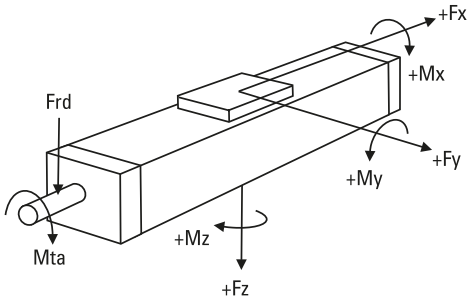
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 6300 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

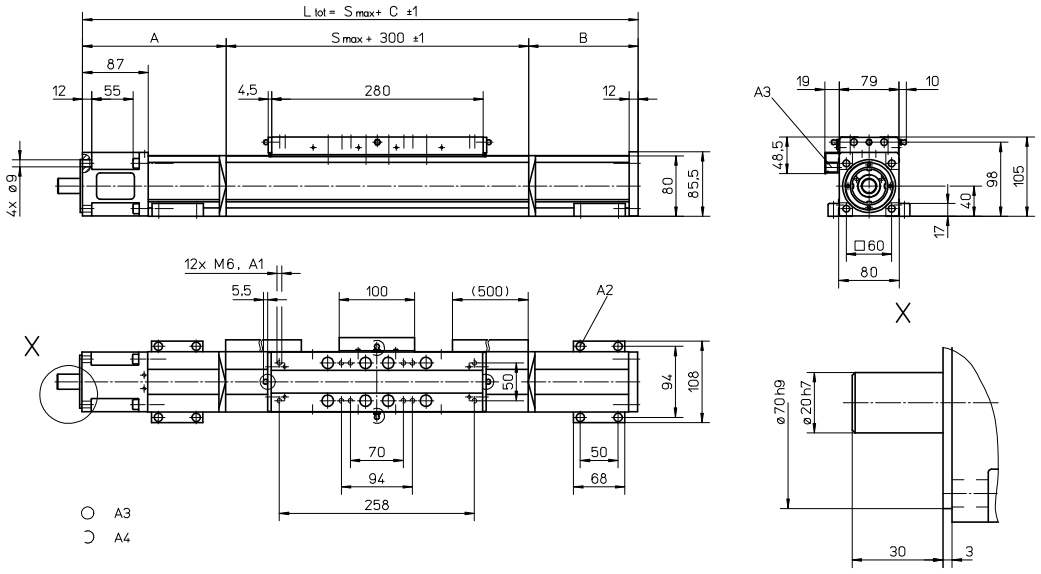
## Definition of Forces



# WM80D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12 mm
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)
A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of three alternative lubrication points by customer

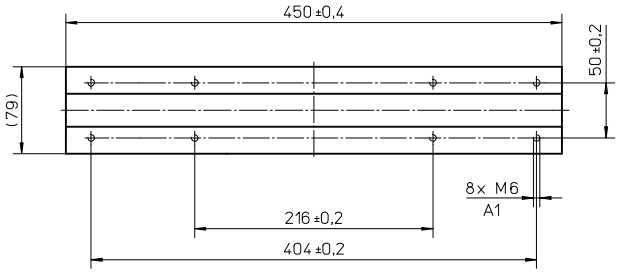
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 780 (0 - 610) | 120 | 80 | 500 (670) |
| 781 - 1535 (611 - 1365) | 170 | 125 | 595 (765) |
| 1536 - 2375 (1366 - 2205) | 190 | 145 | 635 (805) |
| 2376 - 3205 (2206 - 3035) | 215 | 170 | 685 (855) |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 3206 - 4045 (3036 - 3875) | 235 | 190 | 725 (895) |
| 4046 - 4885 (3876 - 4715) | 255 | 210 | 765 (935) |
| 4886 - 5000 (4716 - 4830) | 280 | 235 | 815 (985) |
| 5001 - 11000 (4717 - 10830) | contact customer service | | |

Values between brackets = for units with long carriage

## Long Carriage

| Parameter | | WM80D |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 750 |
| Dynamic load torque (Mz), maximum | [Nm] | 750 |
| Weight | [kg] | 6,4 |

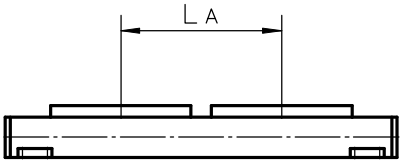



A1: depth 12 mm

## Double Carriages

| Parameter | | WM80D |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 360 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 3 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 3 |
| Force required to move second carriage | [N] | 25 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WM80S

## Ball Screw Drive, Ball Guide, Singel Ball Nut, Short Carriage

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM80S |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

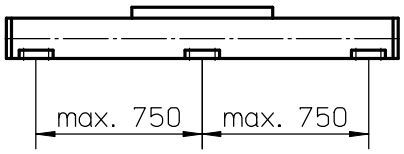
| Parameter | | WM80S |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,02 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 3500 |
| Dynamic load (Fy), maximum | [N] | 2100 |
| Dynamic load (Fz), maximum | [N] | 2100 |
| Dynamic load torque (Mx), maximum | [Nm] | 150 |
| Dynamic load torque (My), maximum | [Nm] | 180 |
| Dynamic load torque (Mz), maximum | [Nm] | 180 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 55 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>7,0<br>1,1<br>1,6 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 50 |
| 150 | 0,9 | 1,1 | 1,3 | 2,0 |
| 1500 | 1,3 | 1,5 | 1,8 | 2,4 |
| 3000 | 1,7 | 1,8 | 2,0 | 2,9 |

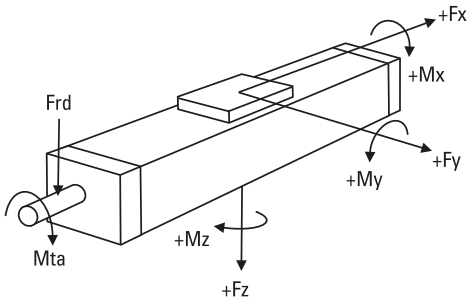
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

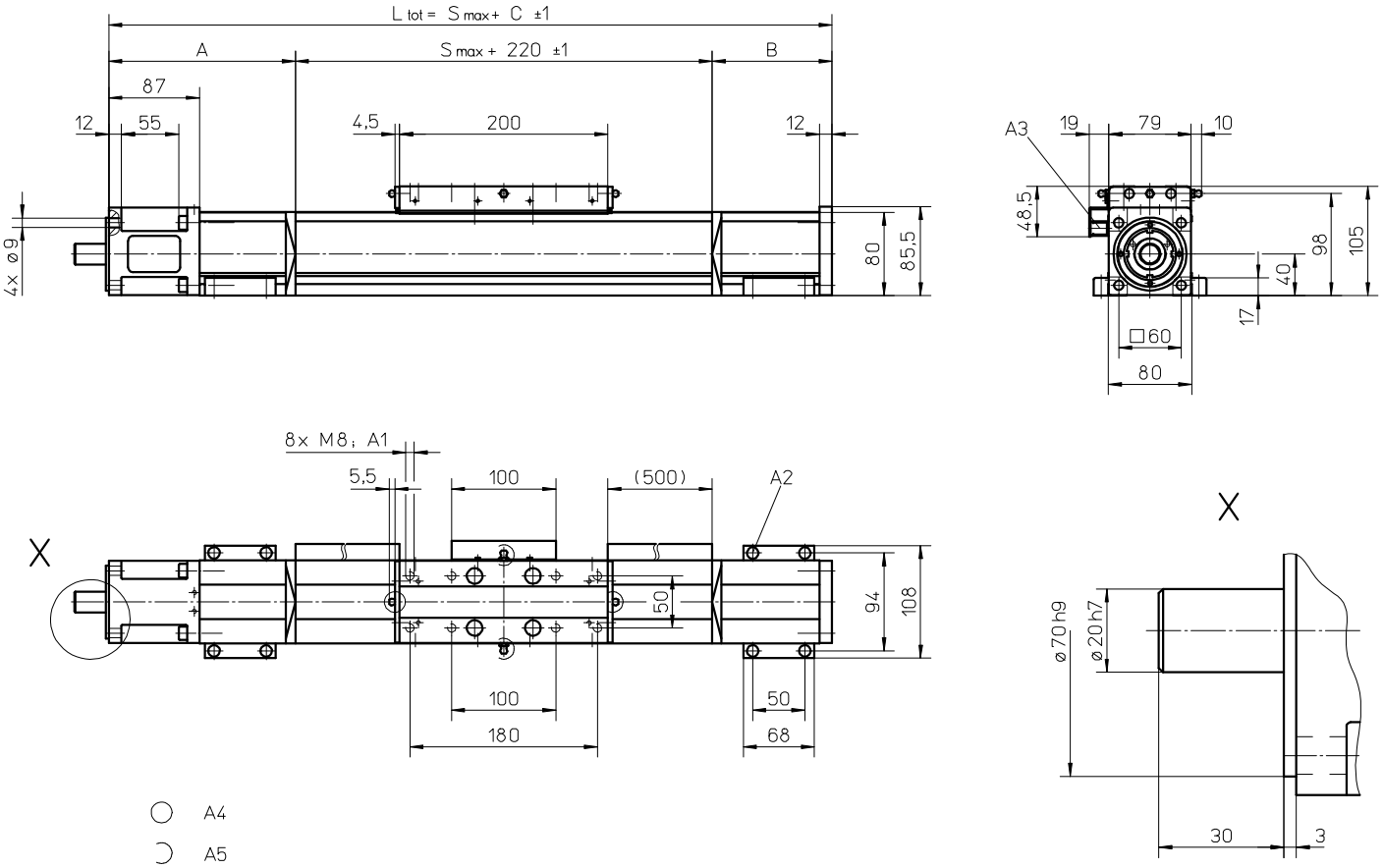
## Definition of Forces



# WM80S

## Ball Screw Drive, Ball Guide, Singel Ball Nut, Short Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12 mm
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of three alternative lubrication points by customer

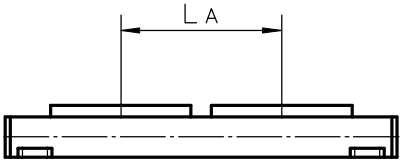
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 680 | 95 | 35 | 350 |
| 681 - 1310 | 125 | 80 | 425 |
| 1311 - 2065 | 150 | 105 | 475 |
| 2066 - 2830 | 170 | 125 | 515 |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2831 - 3590 | 195 | 150 | 565 |
| 3591 - 4355 | 215 | 170 | 605 |
| 4356 - 5000 | 235 | 190 | 645 |

## Double Carriages

| Parameter | | WM80S |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 280 |
| Dynamic load (Fy), maximum | [N] | 4200 |
| Dynamic load (Fz), maximum | [N] | 4200 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 2,1 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 2,1 |
| Force required to move second carriage | [N] | 22,5 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WM120D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

» Ordering key - see page 191
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WM120D |
|---|---|
| Profile size (w × h) [mm] | 120 × 120 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

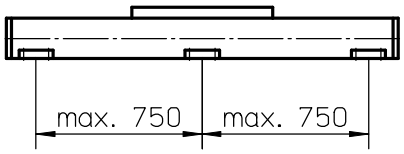
| Parameter | | WM120D |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 40 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 40 mm | [N] | <br>12000<br>8000 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (Mx), maximum | [Nm] | 500 |
| Dynamic load torque (My), maximum | [Nm] | 600 |
| Dynamic load torque (Mz), maximum | [Nm] | 600 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 80 |
| Ball screw diameter (d0) | [mm] | 32 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 40 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>25,91<br>1,93<br>9,25 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 40 |
| 150 | 1,4 | 2,0 | 2,3 | 2,4 |
| 1500 | 2,5 | 3,0 | 3,3 | 3,8 |
| 3000 | 3,0 | 3,7 | 4,0 | 4,3 |

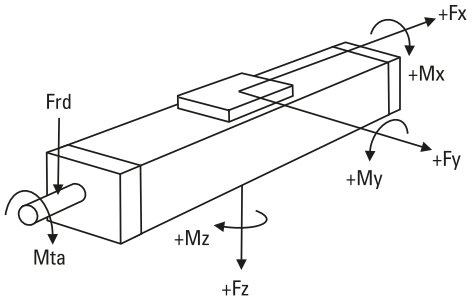
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 5400 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

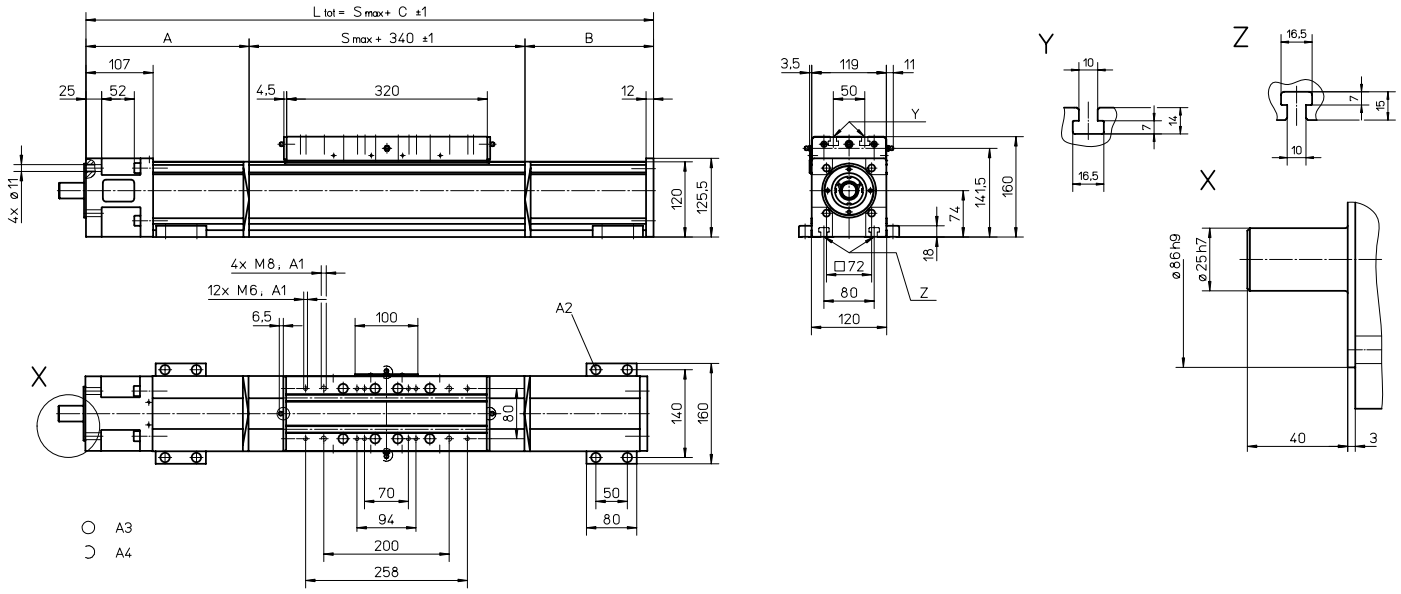
## Definition of Forces



# WM120D

## Ball Screw Drive, Ball Guide, Double Ball Nuts

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 22
A2: socket cap screw ISO4762-M8×20 8.8

A3: tapered lubricating nipple to DIN71412 M8×1 on fixed-bearing side as standard feature
A4: can be changed over to one of the three alternative lubricating points by the customer

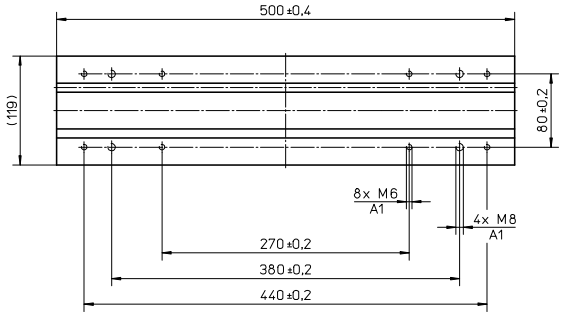
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 890 (0 - 710) | 155 | 100 | 595 (775) |
| 891 - 1695 (711 - 1515) | 225 | 170 | 735 (915) |
| 1696 - 2625 (1516 - 2445) | 260 | 205 | 805 (985) |
| 2626 - 3555 (2446 - 3375) | 295 | 240 | 875 (1055) |

Values between brackets = for units with long carriage

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 3556 - 4485 (3376 - 4305) | 330 | 275 | 945 (1125) |
| 4486 - 5000 (4306 - 4820) | 365 | 310 | 1015 (1195) |
| 5001 - 11000 (4307 - 10820) | contact customer service | | |

## Long Carriage

| Parameter | | WM120D |
|---|---|---|
| Carriage length | [mm] | 500 |
| Dynamic load torque (My), maximum | [Nm] | 1500 |
| Dynamic load torque (Mz), maximum | [Nm] | 1500 |
| Weight | [kg] | 14,2 |

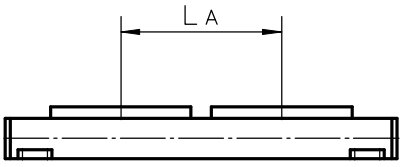



A1: depth 22

## Double Carriages

| Parameter | | WM120D |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 450 |
| Dynamic load (Fy), maximum | [N] | 12000 |
| Dynamic load (Fz), maximum | [N] | 12000 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 6 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 6 |
| Force required to move second carriage | [N] | 30 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# WV60

## Ball Screw Drive, No Guides

» Ordering key - see page 192
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WV60 |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of screw | ball screw with double nut |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

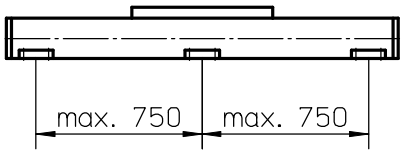
| Parameter | | WV60 |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 20 mm<br>screw lead 50 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 4000 |
| Dynamic load (Fy), maximum | [N] | 0 |
| Dynamic load (Fz), maximum | [N] | 0 |
| Dynamic load torque (Mx), maximum | [Nm] | 0 |
| Dynamic load torque (My), maximum | [Nm] | 0 |
| Dynamic load torque (Mz), maximum | [Nm] | 0 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 35 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>4,72<br>0,55<br>1,42 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 20 | p = 50 |
| 150 | 0,7 | 0,9 | 1,1 |
| 1500 | 1,3 | 1,5 | 1,5 |
| 3000 | 1,7 | 1,9 | 2,1 |

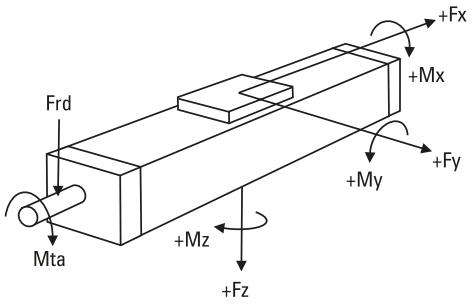
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 6300 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

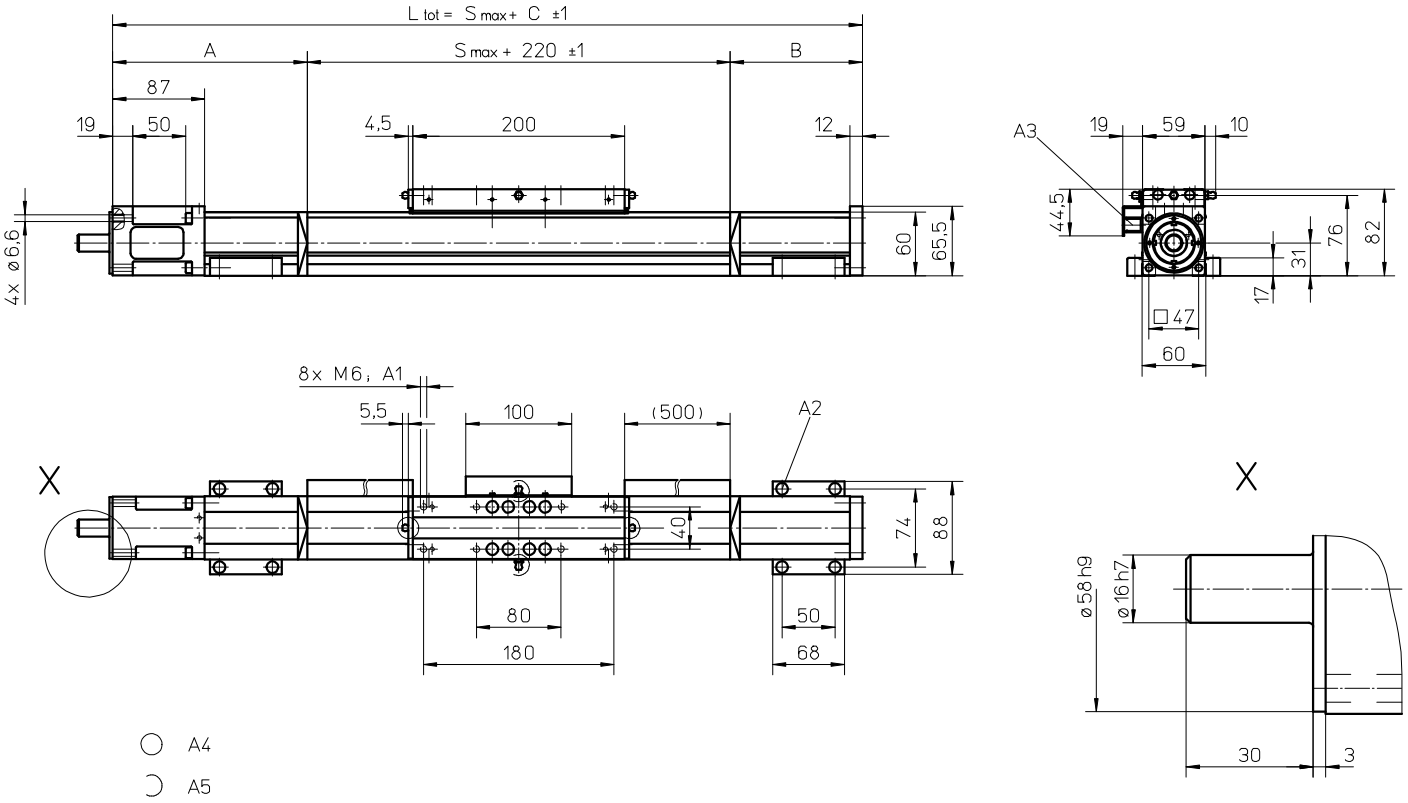
## Definition of Forces



# WV60

## Ball Screw Drive, No Guides

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 690 | 130 | 80 | 430 |
| 691 - 1415 | 155 | 105 | 480 |
| 1416 - 2155 | 175 | 125 | 520 |
| 2156 - 2885 | 200 | 150 | 570 |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2886 - 3625 | 220 | 170 | 610 |
| 3626 - 4355 | 245 | 195 | 660 |
| 4256 - 5095 | 265 | 215 | 700 |
| 5096 - 11000 | contact customer service | | |

# WV80

## Ball Screw Drive, No Guides

» Ordering key - see page 192
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WV80 |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

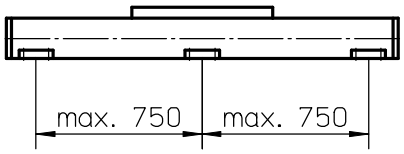
| Parameter | | WV80 |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 50 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 5000 |
| Dynamic load (Fy), maximum | [N] | 0 |
| Dynamic load (Fz), maximum | [N] | 0 |
| Dynamic load torque (Mx), maximum | [Nm] | 0 |
| Dynamic load torque (My), maximum | [Nm] | 0 |
| Dynamic load torque (Mz), maximum | [Nm] | 0 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 55 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>7,95<br>0,99<br>2,25 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 50 |
| 150 | 0,9 | 1,1 | 1,3 | 1,4 |
| 1500 | 1,6 | 1,9 | 2,1 | 2,3 |
| 3000 | 2,0 | 2,4 | 2,6 | 3,0 |

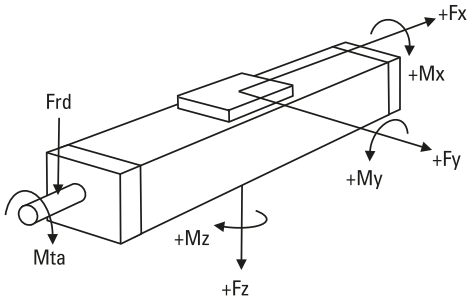
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 6300 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

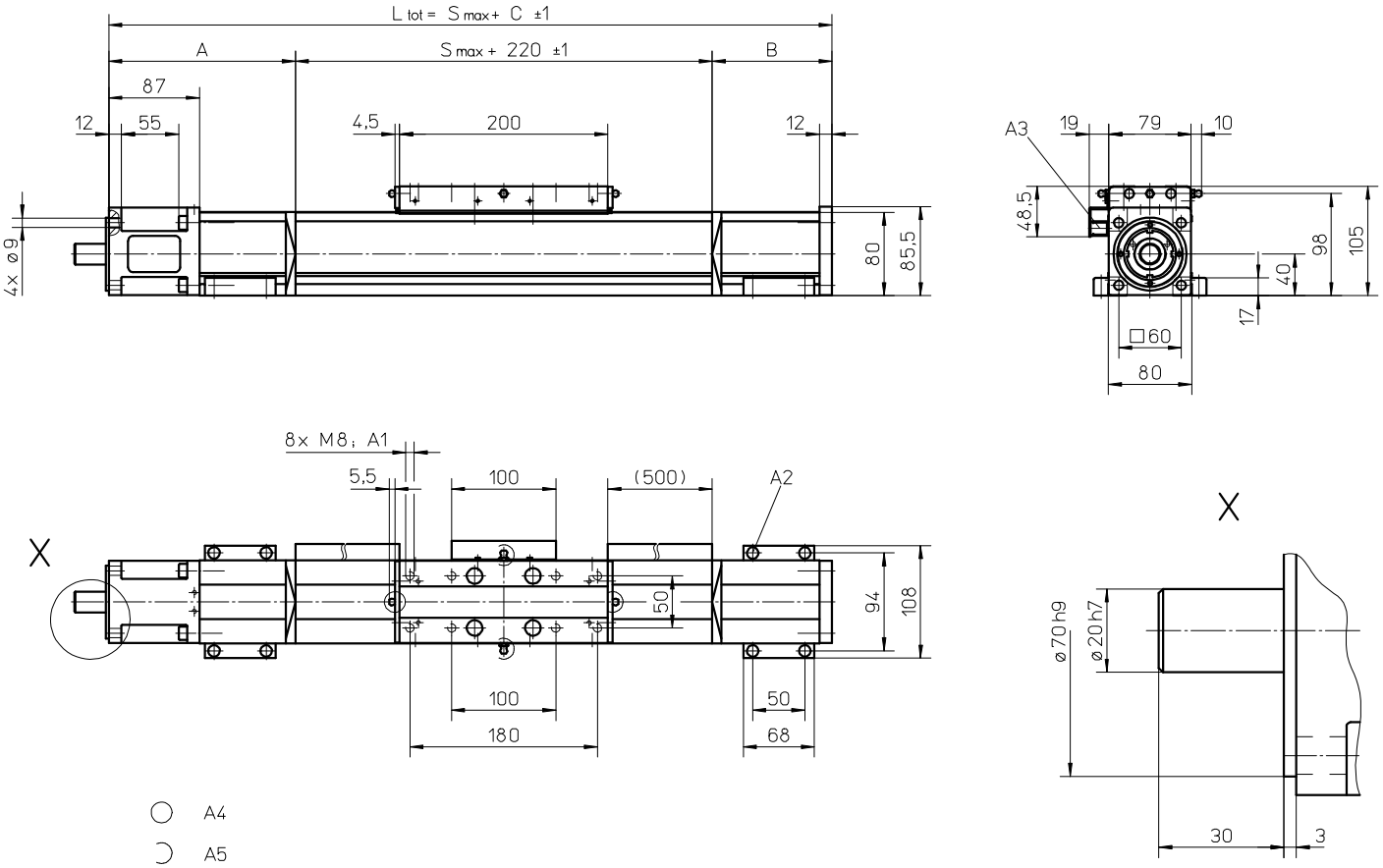
## Definition of Forces



# WV80

## Ball Screw Drive, No Guides

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12 mm
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of three alternative lubrication points by customer

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 775 | 125 | 50 | 395 |
| 776 - 1670 | 145 | 95 | 460 |
| 1671 - 2505 | 170 | 115 | 505 |
| 2506 - 3340 | 190 | 140 | 550 |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 3341 - 4175 | 210 | 160 | 590 |
| 4176 - 5015 | 235 | 180 | 635 |
| 5016 - 11000 | contact customer service | | |

# WV120

## Ball Screw Drive, No Guides

» Ordering key - see page 192
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | WV120 |
|---|---|
| Profile size (w × h) [mm] | 120 × 120 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | self-adjusting plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

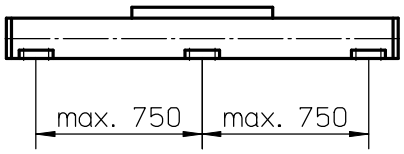
| Parameter | | WV120 |
|---|---|---|
| Stroke length (Smax), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 40 mm | [mm] | <br>11000<br>5000 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 40 mm | [N] | <br>12000<br>8000 |
| Dynamic load (Fy), maximum | [N] | 0 |
| Dynamic load (Fz), maximum | [N] | 0 |
| Dynamic load torque (Mx), maximum | [Nm] | 0 |
| Dynamic load torque (My), maximum | [Nm] | 0 |
| Dynamic load torque (Mz), maximum | [Nm] | 0 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 80 |
| Ball screw diameter (d0) | [mm] | 32 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 40 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>18,10<br>1,94<br>4,75 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 40 |
| 150 | 1,0 | 1,1 | 1,4 | 1,5 |
| 1500 | 2,1 | 2,2 | 2,5 | 2,8 |
| 3000 | 2,4 | 2,6 | 3,0 | 3,5 |

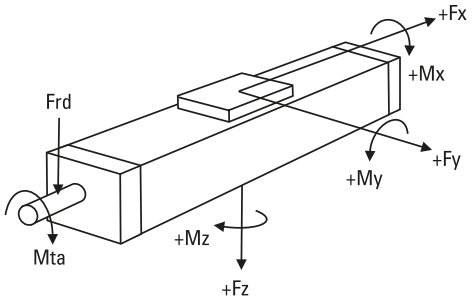
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 5400 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

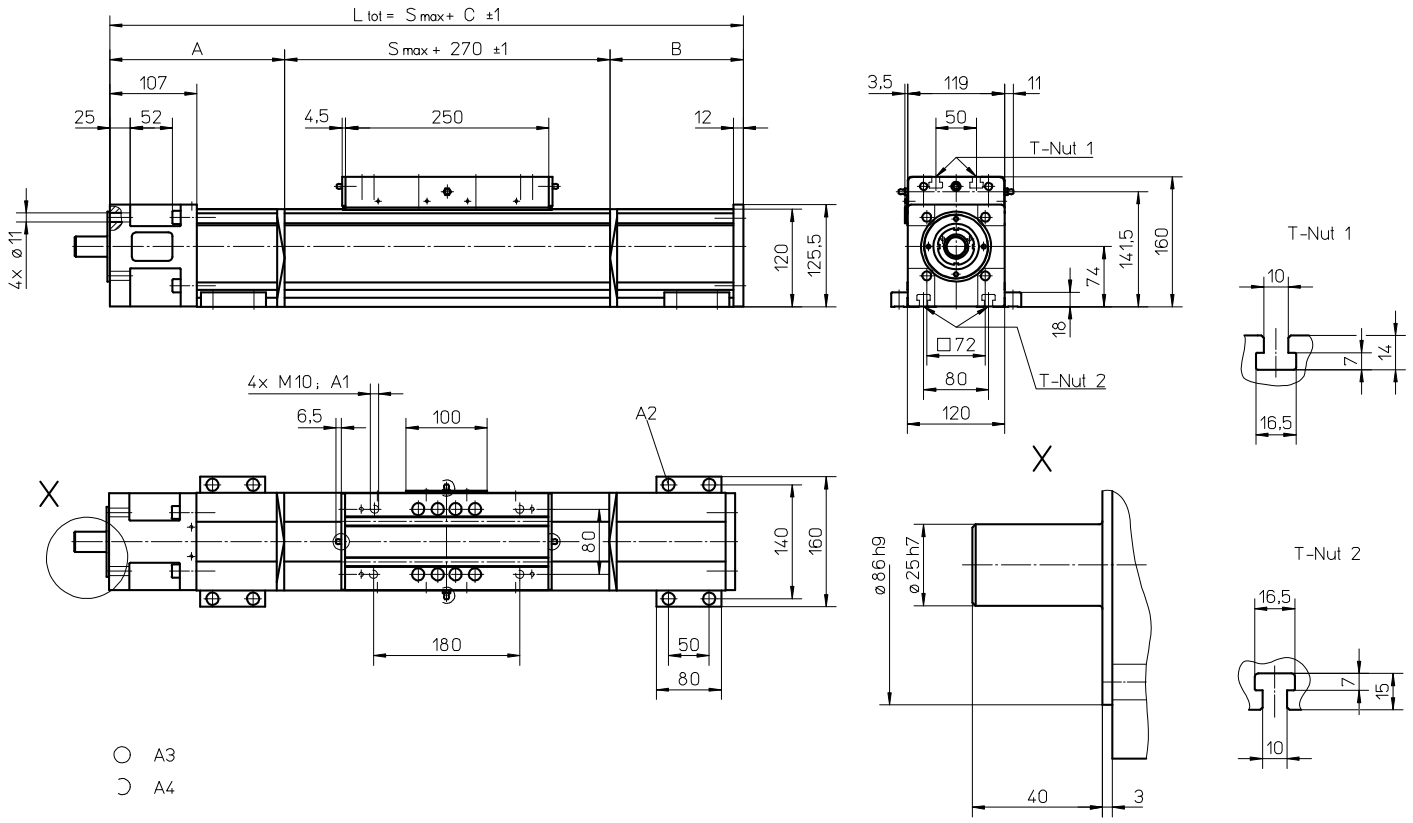
## Definition of Forces



# WV120

## Ball Screw Drive, No Guides

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 22
A2: socket cap screw ISO4762-M8×20 8.8

A3: tapered lubricating nipple to DIN71412 M8×1 on fixed-bearing side as standard feature
A4: can be changed over to one of the three alternative lubricating points by the customer

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 940 | 145 | 50 | 465 |
| 941 - 1860 | 180 | 120 | 570 |
| 1861 - 2790 | 215 | 155 | 640 |
| 2791 - 3720 | 250 | 190 | 710 |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 3721 - 4650 | 285 | 225 | 780 |
| 4651 - 5000 | 320 | 255 | 845 |
| 5001 - 11000 | contact customer service | | |

# MLSM60D

## Ball Screw Drive, Ball Guide

» Ordering key - see page 193
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | MLSM60D |
|---|---|
| Profile size (w × h) [mm] | 160 × 65 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

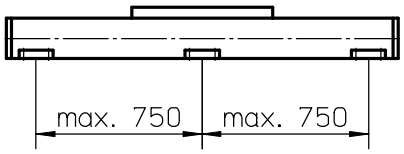
| Parameter | | MLSM60D |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5500 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 5000 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (Mx), maximum | [Nm] | 400 |
| Dynamic load torque (My), maximum | [Nm] | 460 |
| Dynamic load torque (Mz), maximum | [Nm] | 460 |
| Drive shaft force (Frd), maximum | [N] | 350 |
| Drive shaft torque (Mta), maximum | [Nm] | 60 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 50 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>14,40<br>1,65<br>5,70 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 50 |
| 150 | 1,0 | 1,6 | 1,9 | 2,7 |
| 1500 | 1,6 | 2,2 | 2,3 | 3,4 |
| 3000 | 2,0 | 2,6 | 2,6 | 4,0 |

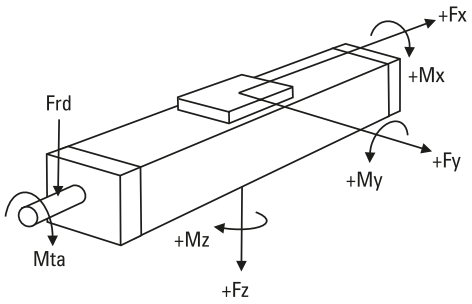
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

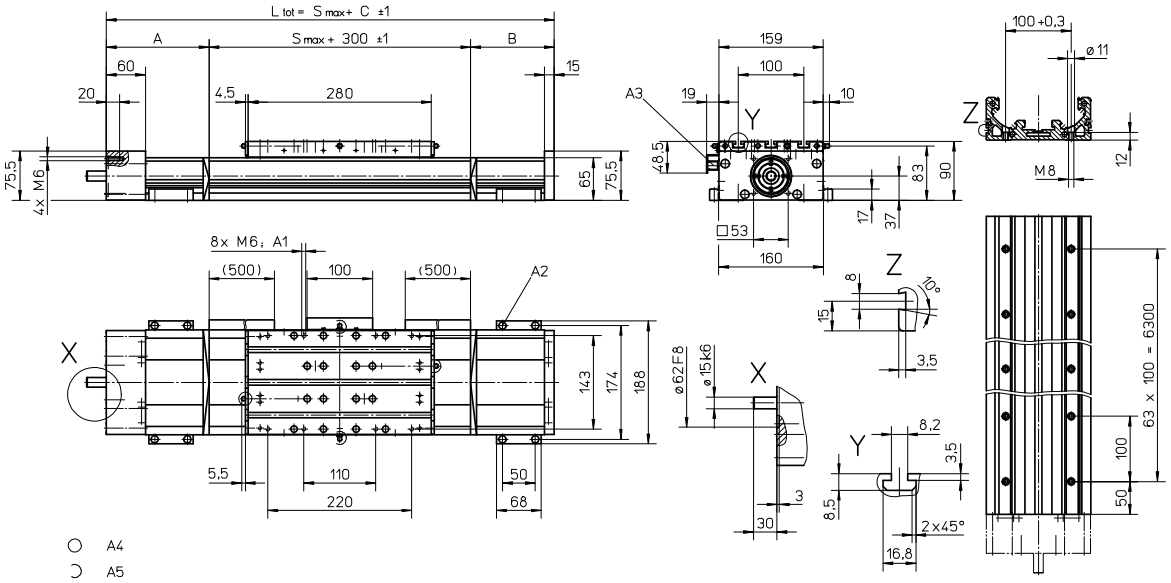
## Definition of Forces



# MLSM60D

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 10
A2: socket cap screw ISO4762-M6×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)

A4: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

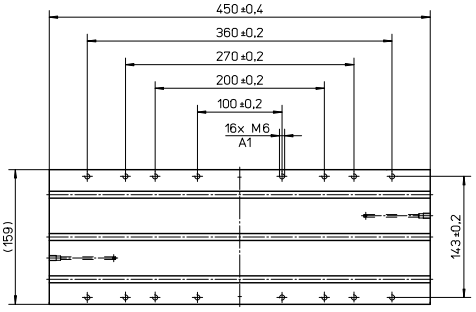
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 750 (0 - 580) | 90 | 45 | 435 (605) |
| 751 - 1220 (581 - 1050) | 105 | 90 | 495 (665) |
| 1221 - 1980 (1051 - 1810) | 125 | 110 | 535 (705) |
| 1981 - 2730 (1811 - 2560) | 150 | 135 | 585 (765) |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2731 - 3490 (2561 - 3320) | 170 | 155 | 625 (795) |
| 3491 - 4240 (3321 - 4070) | 195 | 180 | 675 (845) |
| 4241 - 5000 (4071 - 4830) | 215 | 200 | 715 (885) |
| 5001 - 5500 (4831 - 5330) | 235 | 220 | 755 (925) |

Values between brackets = for units with long carriage

## Long Carriage

| Parameter | | MLSM60D |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 940 |
| Dynamic load torque (Mz), maximum | [Nm] | 940 |
| Weight | [kg] | 6,5 |

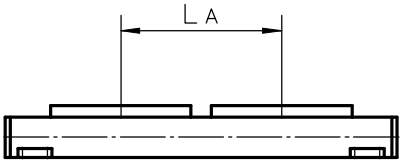



A1: depth 10

## Double Carriages

| Parameter | | MLSM60D |
|---|---|---|
| Minimum distance between carriages (LA) | [mm] | 320 |
| Dynamic load (Fy), maximum | [N] | 12000 |
| Dynamic load (Fz), maximum | [N] | 12000 |
| Dynamic load torque (My), maximum | [Nm] | L A[1] × 6 |
| Dynamic load torque (Mz), maximum | [Nm] | L A[1] × 6 |
| Force required to move second carriage | [N] | 27 |
| Total length (L tot) | [mm] | Smax + C + L A |

[1] Value in mm



# MLSM80D

## Ball Screw Drive, Ball Guide

» Ordering key - see page 193
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | MLSM80D |
|---|---|
| Profile size (w × h) [mm] | 240 × 85 |
| Type of screw | ball screw with double nuts |
| Carriage sealing system | plastic cover band |
| Screw supports | included in all units that require screw supports |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

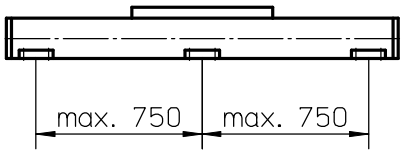
| Parameter | | MLSM80D |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5200 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,01 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum<br>screw lead 5, 10, 20 mm<br>screw lead 40 mm | [N] | <br>12000<br>8000 |
| Dynamic load (Fy), maximum | [N] | 8000 |
| Dynamic load (Fz), maximum | [N] | 8000 |
| Dynamic load torque (Mx), maximum | [Nm] | 780 |
| Dynamic load torque (My), maximum | [Nm] | 900 |
| Dynamic load torque (Mz), maximum | [Nm] | 900 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 85 |
| Ball screw diameter (d0) | [mm] | 32 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 40 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>29,5<br>2,7<br>11,5 |

## Carriage Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 40 |
| 150 | 1,6 | 2,2 | 2,5 | 2,8 |
| 1500 | 2,7 | 3,2 | 3,4 | 4,0 |
| 3000 | 3,2 | 4,0 | 4,2 | 4,5 |

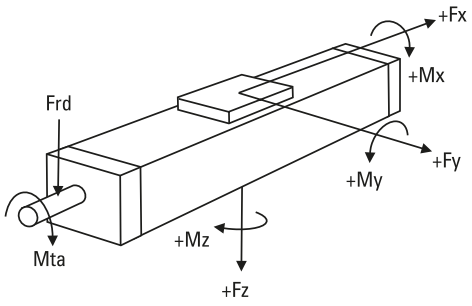
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile




A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

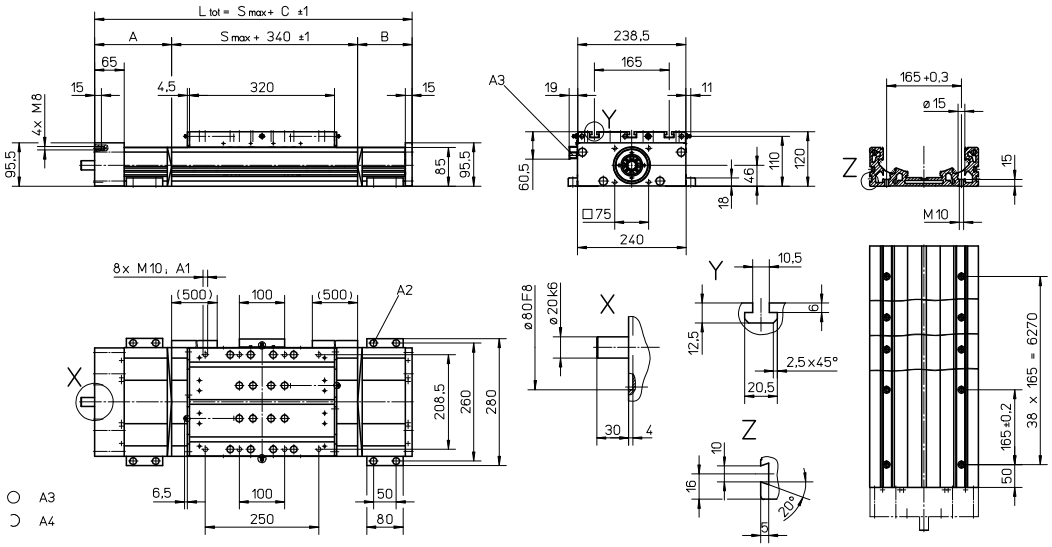
## Definition of Forces



# MLSM80D

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 15
A2: socket cap screw ISO4762-M8×20 8.8
A3: ENF inductive sensor rail kit (optional - see page 172)
A4: tapered lubricating nipple to DIN71412 M8×1 on fixed-bearing side as standard feature
A5: can be changed over to one of the three alternative lubricating points by the customer

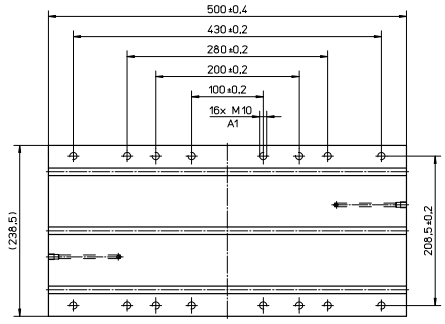
| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 0 - 750 (0 - 570) | 100 | 90 | 530 (710) |
| 751 - 1140 (571 - 960) | 130 | 120 | 590 (770) |
| 1141 - 1880 (961 - 1700) | 160 | 150 | 650 (830) |
| 1881 - 2620 (1701 - 2440) | 190 | 180 | 710 (890) |

| Stroke length (Smax) [mm] | A [mm] | B [mm] | C [mm] |
|---|---|---|---|
| 2621 - 3360 (2441 - 3180) | 220 | 210 | 770 (950) |
| 3361 - 4100 (3181 - 3920) | 250 | 240 | 830 (1010) |
| 4101 - 4840 (3921 - 4660) | 280 | 270 | 890 (1070) |
| 4841 - 5000 (4661 - 4820) | 310 | 300 | 950 (1130) |

Values between brackets = for units with long carriage

## Long Carriage

| Parameter | | MLSM80D |
|---|---|---|
| Carriage length | [mm] | 500 |
| Dynamic load torque (My), maximum | [Nm] | 1750 |
| Dynamic load torque (Mz), maximum | [Nm] | 1750 |
| Weight | [kg] | 16 |

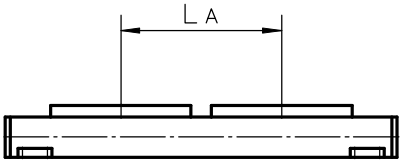



A1: depth 15

## Double Carriages

| Parameter | | MLSM80D |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 400 |
| Dynamic load (Fy), maximum | [N] | 16000 |
| Dynamic load (Fz), maximum | [N] | 16000 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 8 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] ×8 |
| Force required to move second carriage | [N] | 35 |
| Total length (L tot) | [mm] | Smax + C + $L_A$ |

[1] Value in mm



# M55

## Ball Screw Drive, Ball Guide

» Ordering key - see page 194
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | M55 |
|---|---|
| Profile size (w × h) [mm] | 58 × 55 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

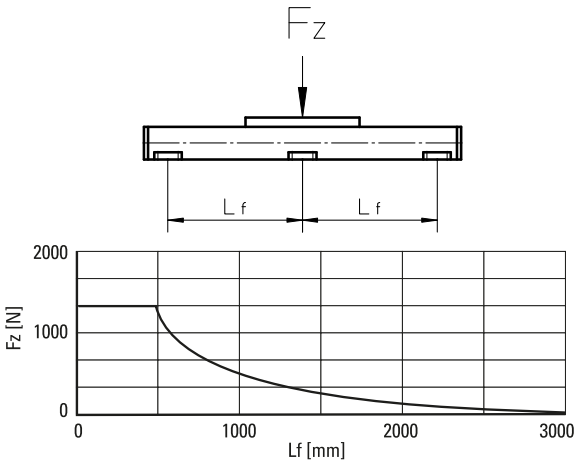
| Parameter | | M55 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 3000 |
| Linear speed, maximum | [m/s] | 1,6 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 1000 |
| Dynamic load (Fy), maximum | [N] | 900 |
| Dynamic load (Fz), maximum | [N] | 900 |
| Dynamic load torque (Mx), maximum | [Nm] | 9 |
| Dynamic load torque (My), maximum | [Nm] | 48 |
| Dynamic load torque (Mz), maximum | [Nm] | 48 |
| Drive shaft force (Frd), maximum | [N] | 200 |
| Drive shaft torque (Mta), maximum | [Nm] | 12 |
| Screw diameter (d0) | [mm] | 16 |
| Screw lead (p) | [mm] | 5, 10, 20 |
| Weight | [kg] | |
| of unit with zero stroke | | 3,90 |
| of every 100 mm of stroke | | 0,56 |
| of carriage | | 1,20 |
| of option single screw support | | 0,83 |
| of option double screw supports | | 1,88 |

## Carriage Idle Torque (M idle) [Nm]

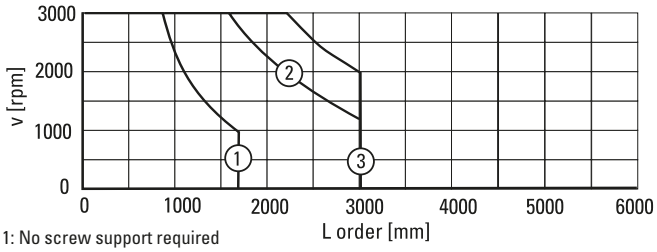
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 10 | p = 20 |
| 500 - no screw supports | 0,02 | 0,03 | 0,04 |
| 500 - with screw supports | 0,03 | 0,05 | 0,07 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

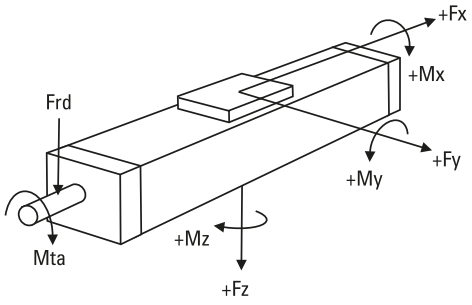



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

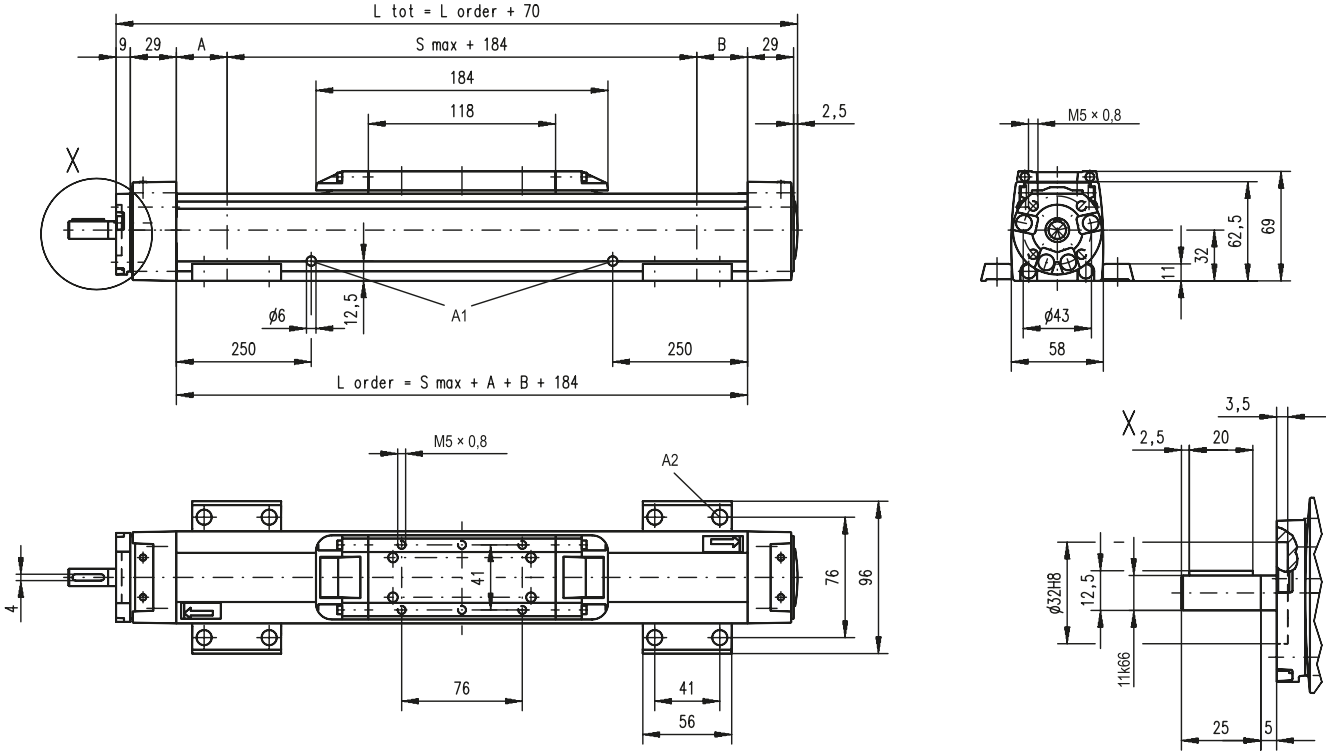
## Definition of Forces



# M55

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

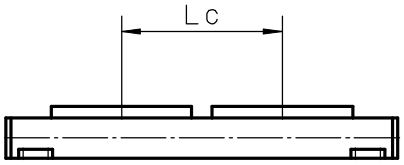



A1: lubrication holes
A2: ø9,5/ø5,5 for socket head cap screw M5

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 6 | 6 | L order = Smax + A + B + 184 | L tot = L order + 70 |
| Single screw support | 40 | 40 | L order = Smax + A + B + 184 | L tot = L order + 70 |
| Double screw supports | 92 | 92 | L order = Smax + A + B + 184 | L tot = L order + 70 |

## Double Carriages

| Parameter | | M55 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 200 |
| Dynamic load (Fy), maximum | [N] | 1350 |
| Dynamic load (Fz), maximum | [N] | 1350 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 0,675 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 0,675 |
| Force required to move second carriage | [N] | 2 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>6,5<br>2,4 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 6 | 6 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |
| Single screw support | 40 | 40 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |
| Double screw supports | 92 | 92 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |

[1] Value in mm

# M75

## Ball Screw Drive, Ball Guide

» Ordering key - see page 194
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | M75 |
|---|---|
| Profile size (w × h) [mm] | 86 × 75 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

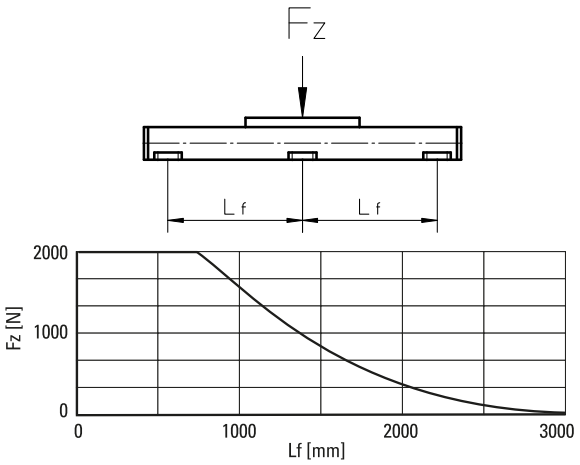
| Parameter | | M75 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 4000 |
| Linear speed, maximum | [m/s] | 1,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 2500 |
| Dynamic load (Fy), maximum | [N] | 2000 |
| Dynamic load (Fz), maximum | [N] | 2000 |
| Dynamic load torque (Mx), maximum | [Nm] | 18 |
| Dynamic load torque (My), maximum | [Nm] | 130 |
| Dynamic load torque (Mz), maximum | [Nm] | 130 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 30 |
| Screw diameter ($d_0$) | [mm] | 20 |
| Screw lead (p) | [mm] | 5, 12,7, 20 |
| Weight | [kg] | |
| of unit with zero stroke | | 6,90 |
| of every 100 mm of stroke | | 1,05 |
| of carriage | | 2,50 |
| of option single screw support | | 1,70 |
| of option double screw supports | | 3,58 |

## Carriage Idle Torque (M idle) [Nm]

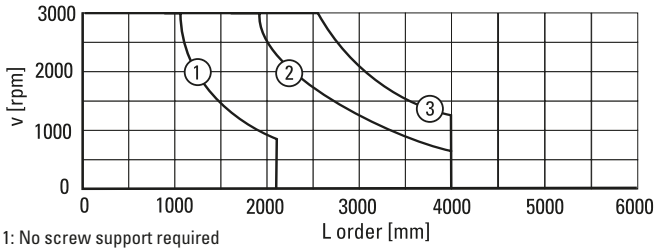
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 12,7 | p = 20 |
| 500 - no screw supports | 0,04 | 0,1 | 0,16 |
| 500 - with screw supports | 0,06 | 0,12 | 0,2 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

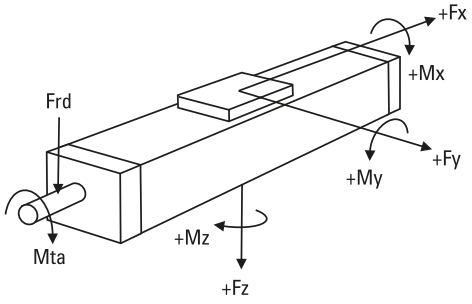



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

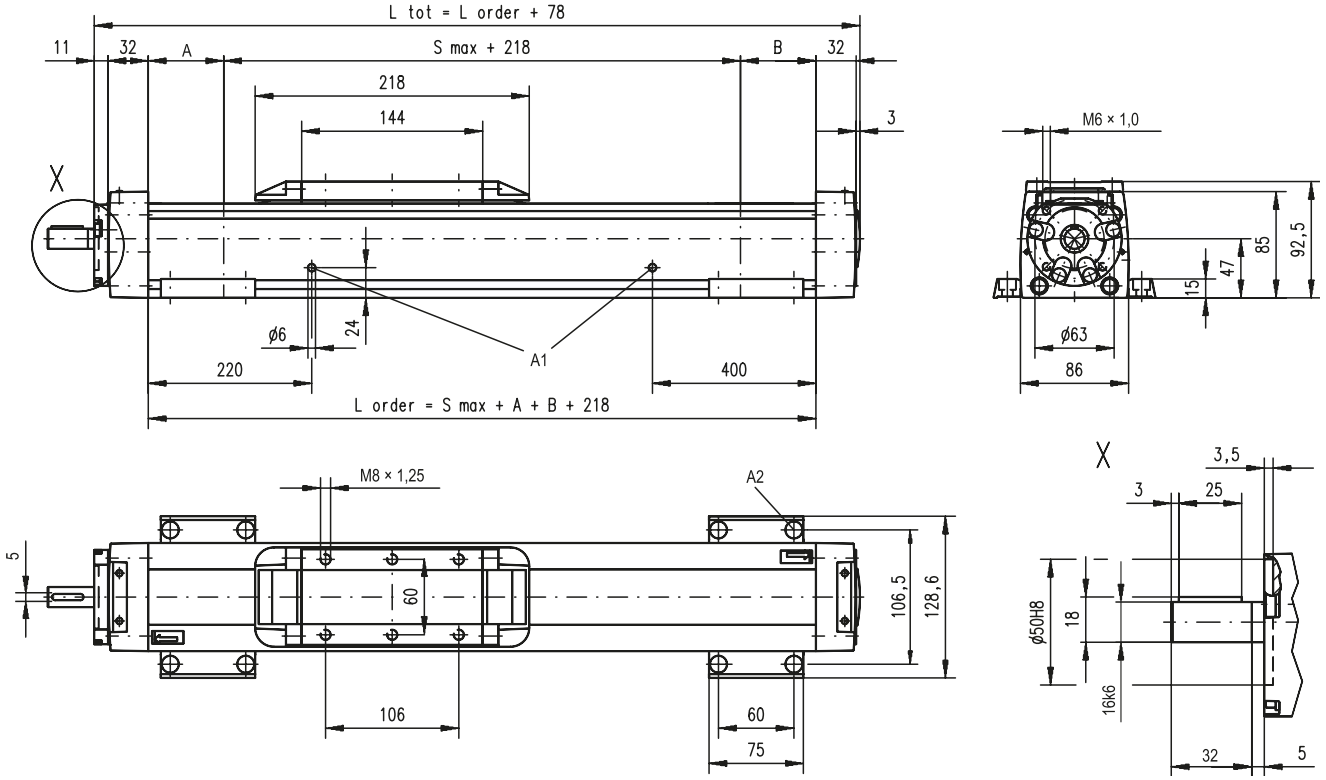
## Definition of Forces



# M75

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

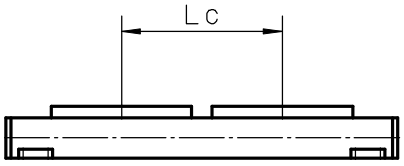



A1: lubrication holes
A2: ø13,5/ø8,5 for socket head cap screw M8

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 5 | 5 | L order = Smax + A + B + 218 | L tot = L order + 78 |
| Single screw support | 60 | 60 | L order = Smax + A + B + 218 | L tot = L order + 78 |
| Double screw supports | 126 | 126 | L order = Smax + A + B + 218 | L tot = L order + 78 |

## Double Carriages

| Parameter | | M75 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 250 |
| Dynamic load (Fy), maximum | [N] | 3000 |
| Dynamic load (Fz), maximum | [N] | 3000 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 1,5 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 1,5 |
| Force required to move second carriage | [N] | 2 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>12,2<br>5,0 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 5 | 5 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |
| Single screw support | 60 | 60 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |
| Double screw supports | 126 | 126 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |

[1] Value in mm

# M100

## Ball Screw Drive, Ball Guide

» Ordering key - see page 194
» Accessories - see page 135
» Additional data - see page 182

## General Specifications

| Parameter | M100 |
|---|---|
| Profile size (w × h) [mm] | 108 × 100 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

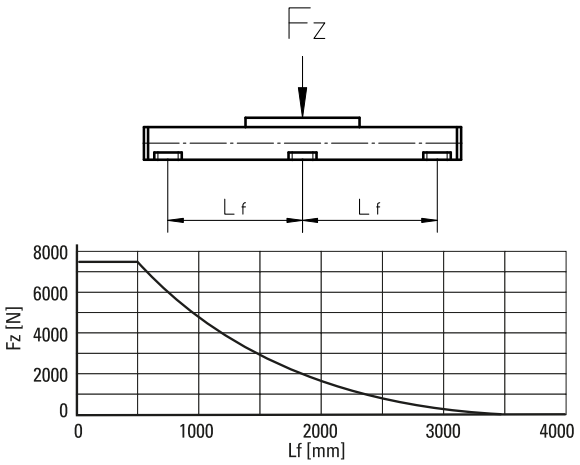
| Parameter | | M100 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 6000 |
| Linear speed, maximum | [m/s] | 1,25 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 5000 |
| Dynamic load (Fy), maximum | [N] | 5000 |
| Dynamic load (Fz), maximum | [N] | 5000 |
| Dynamic load torque (Mx), maximum | [Nm] | 60 |
| Dynamic load torque (My), maximum | [Nm] | 400 |
| Dynamic load torque (Mz), maximum | [Nm] | 400 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 45 |
| Screw diameter (d0) | [mm] | 25 |
| Screw lead (p) | [mm] | 5, 10, 25 |
| Weight | [kg] | |
| of unit with zero stroke | | 14,3 |
| of every 100 mm of stroke | | 1,72 |
| of carriage | | 4,00 |
| of option single screw support | | 1,86 |
| of option double screw supports | | 4,42 |

## Carriage Idle Torque (M idle) [Nm]

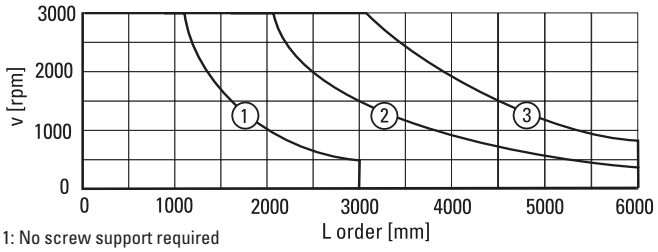
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 10 | p = 25 |
| 500 - no screw supports | 0,08 | 0,14 | 0,32 |
| 500 - with screw supports | 0,1 | 0,16 | 0,37 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

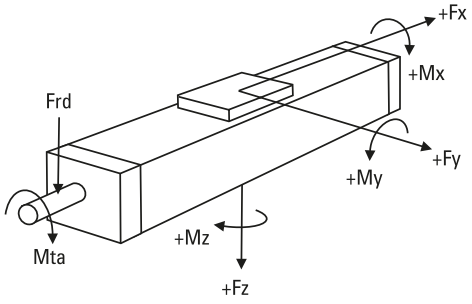



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

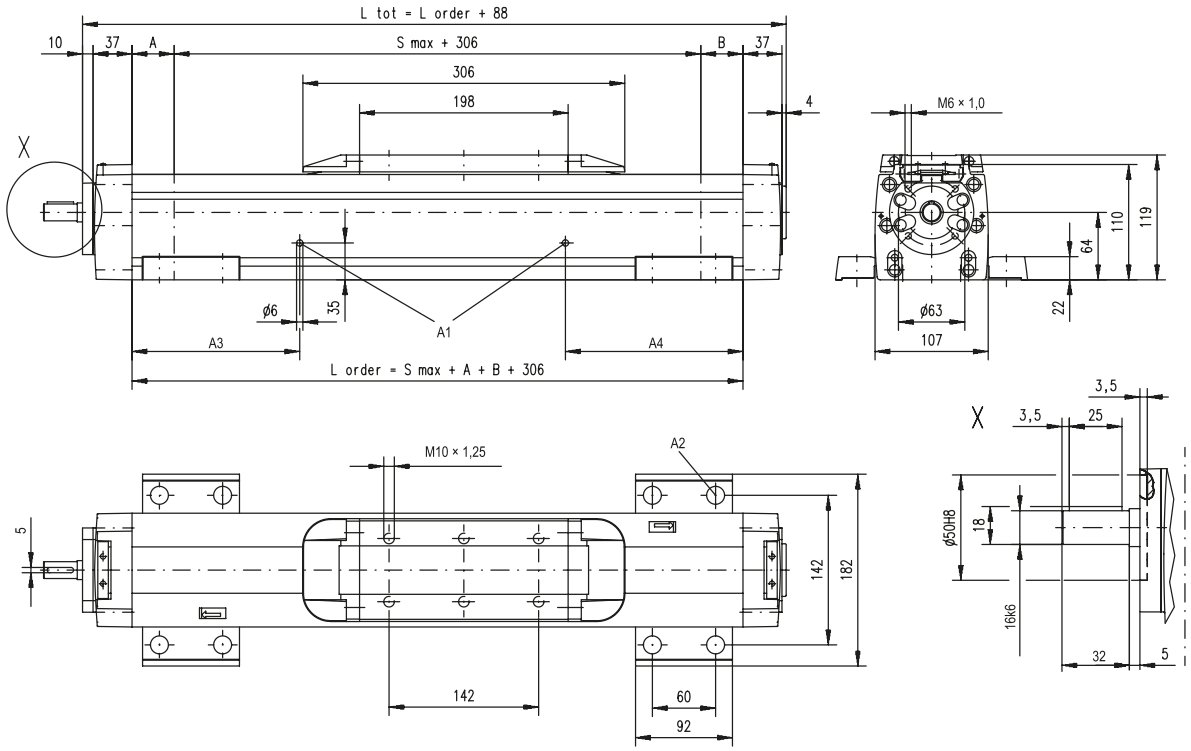
## Definition of Forces



# M100

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |



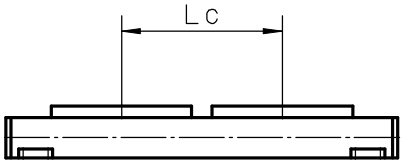

A1: lubrication holes
A2: ø17/ø10,5 for socket head cap screw M10

A3: 100 (L order <= 1 m), 320 (L order > 1 m)
A4: 100 (L order <= 1 m), 430 (L order > 1 m)

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 1 | 1 | L order = Smax + A + B + 306 | L tot = L order + 88 |
| Single screw support | 31 | 31 | L order = Smax + A + B + 306 | L tot = L order + 88 |
| Double screw supports | 86 | 86 | L order = Smax + A + B + 306 | L tot = L order + 88 |

## Double Carriages

| Parameter | | M100 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 350 |
| Dynamic load (Fy), maximum | [N] | 7500 |
| Dynamic load (Fz), maximum | [N] | 7500 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 3,75 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 3,75 |
| Force required to move second carriage | [N] | 2 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>25,3<br>8,0 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 1 | 1 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |
| Single screw support | 31 | 31 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |
| Double screw supports | 86 | 86 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |

[1] Value in mm

# 2HB10

## Ball Screw Drive, Ball Guide

» Ordering key - see page 195
» Accessories - see page 135

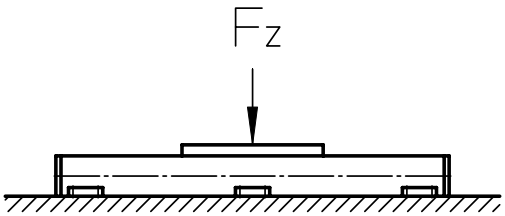
## General Specifications

| Parameter | 2HB10 |
|---|---|
| Profile size (w × h) [mm] | 100 × 60 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional shroud or bellows) |
| Screw supports | none |
| Lubrication | lubrication of screw and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

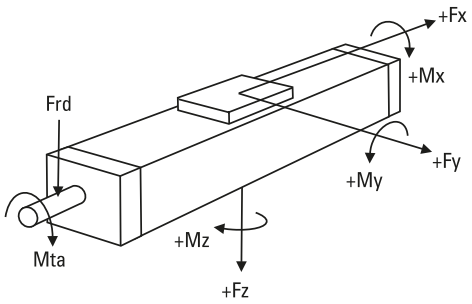
| Parameter | | 2HB10 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1375 |
| Linear speed, maximum | [m/s] | 0,47 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Input speed, maximum | [rpm] | 2800 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 2100 |
| Dynamic load (Fy), maximum | [N] | 8000 |
| Dynamic load (Fz), maximum | [N] | 8000 |
| Dynamic load torque (Mx), maximum | [Nm] | 279 |
| Dynamic load torque (My), maximum | [Nm] | 216 |
| Dynamic load torque (Mz), maximum | [Nm] | 216 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 1,86 |
| Ball screw diameter (d0) | [mm] | 16 |
| Ball screw lead (p) | [mm] | 5, 10 |
| Weight | [kg] | |
| of unit with zero stroke | | 2,59 |
| of every 100 mm of stroke | | 0,69 |
| of each carriage | | 0,82 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

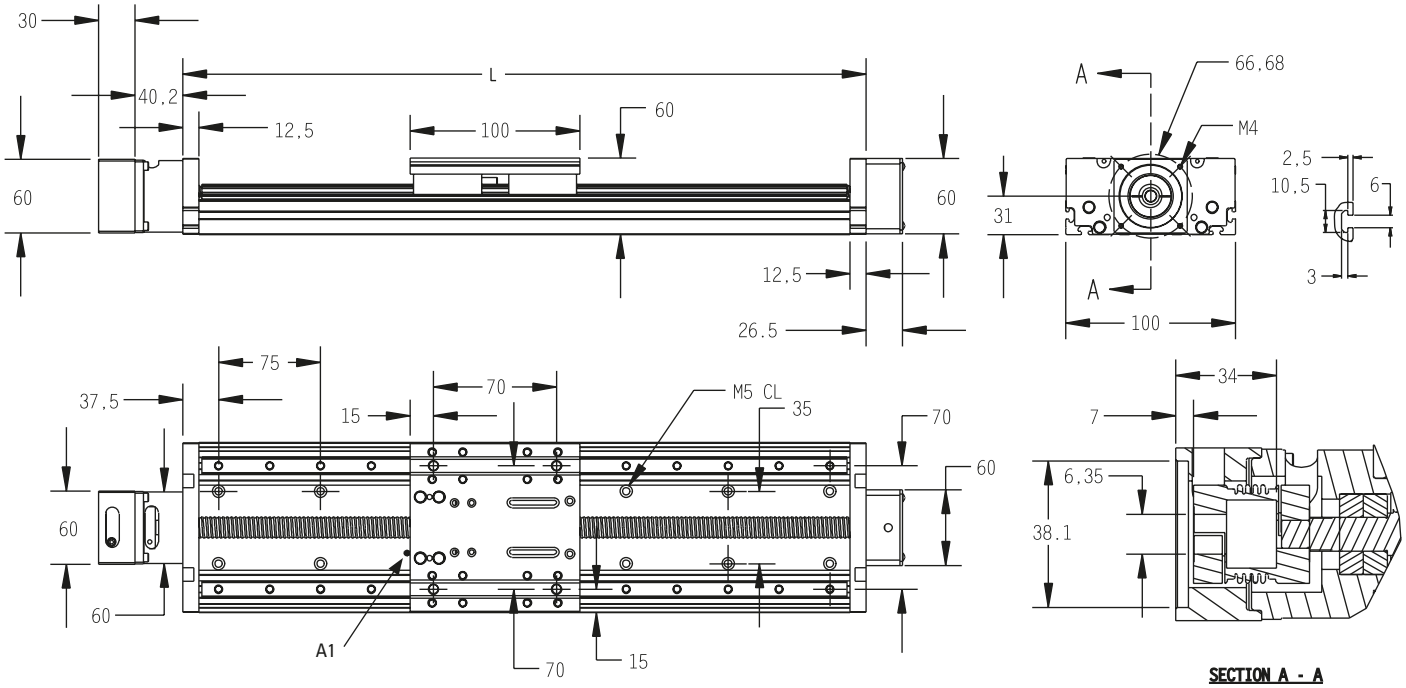
## Definition of Forces



# 2HB10

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: lubrication nipple (using the unit with the nipple mounted makes the stroke 10 mm shorter).

Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 125 |

# 2HB20

## Ball Screw Drive, Ball Guide

» Ordering key - see page 195
» Accessories - see page 135

## General Specifications

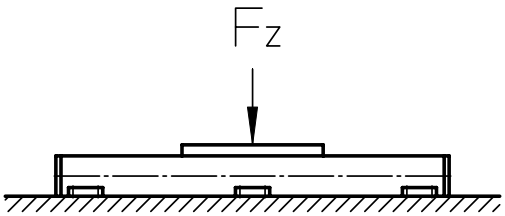
| Parameter | 2HB20 |
|---|---|
| Profile size (w × h) [mm] | 200 × 90 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional shroud or bellows) |
| Screw supports | none |
| Lubrication | lubrication of screw and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2HB20 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 2760 |
| Linear speed, maximum | [m/s] | 0,75 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Input speed, maximum | [rpm] | 1800 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 4697 |
| Dynamic load (Fy), maximum | [N] | 34000 |
| Dynamic load (Fz), maximum | [N] | 34000 |
| Dynamic load torque (Mx), maximum | [Nm] | 2463 |
| Dynamic load torque (My), maximum | [Nm] | 1903 |
| Dynamic load torque (Mz), maximum | [Nm] | 1903 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 15,5 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 25 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>13,32<br>1,70<br>4,47 |

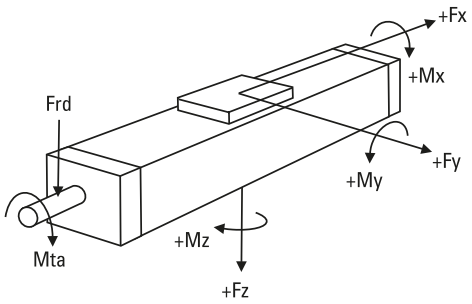
[1] Value for the complete unit
[2] Value for the ball guide only

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

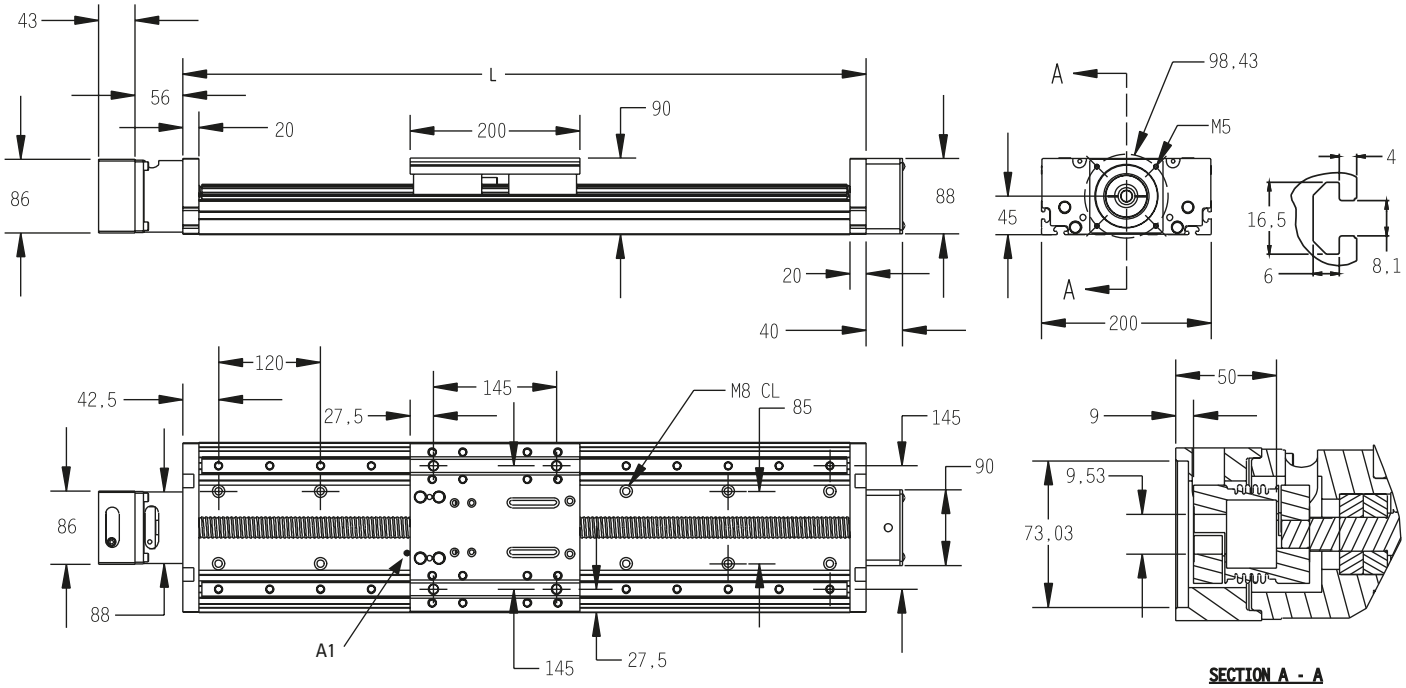
## Definition of Forces



# 2HB20

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: lubrication nipple (using the unit with the nipple mounted makes the stroke 10 mm shorter).

Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 240 |

# 2RB12

## Ball Screw Drive, Ball Guide

» Ordering key - see page 196
» Accessories - see page 135

## General Specifications

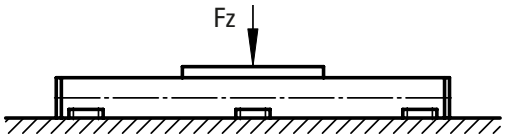
| Parameter | 2RB12 |
|---|---|
| Profile size (w × h) [mm] [1] | 130 × 40 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

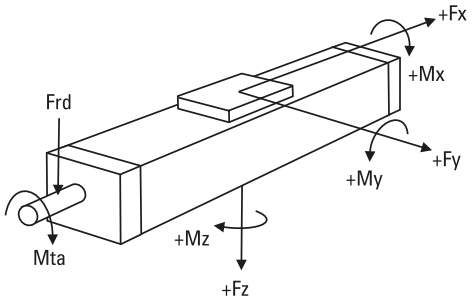
| Parameter | | 2RB12 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1951 |
| Linear speed, maximum | [m/s] | 0,47 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,025 / 300 mm |
| Input speed, maximum | [rpm] | 2800 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 2100 |
| Dynamic load (Fy), maximum | [N] | 880 |
| Dynamic load (Fz), maximum | [N] | 1760 |
| Dynamic load torque (Mx), maximum | [Nm] | 65,5 |
| Dynamic load torque (My), maximum | [Nm] | 76,8 |
| Dynamic load torque (Mz), maximum | [Nm] | 38,4 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 1,86 |
| Ball screw diameter (d0) | [mm] | 16 |
| Ball screw lead (p) | [mm] | 5, 10 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>3,88<br>0,93<br>1,32 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

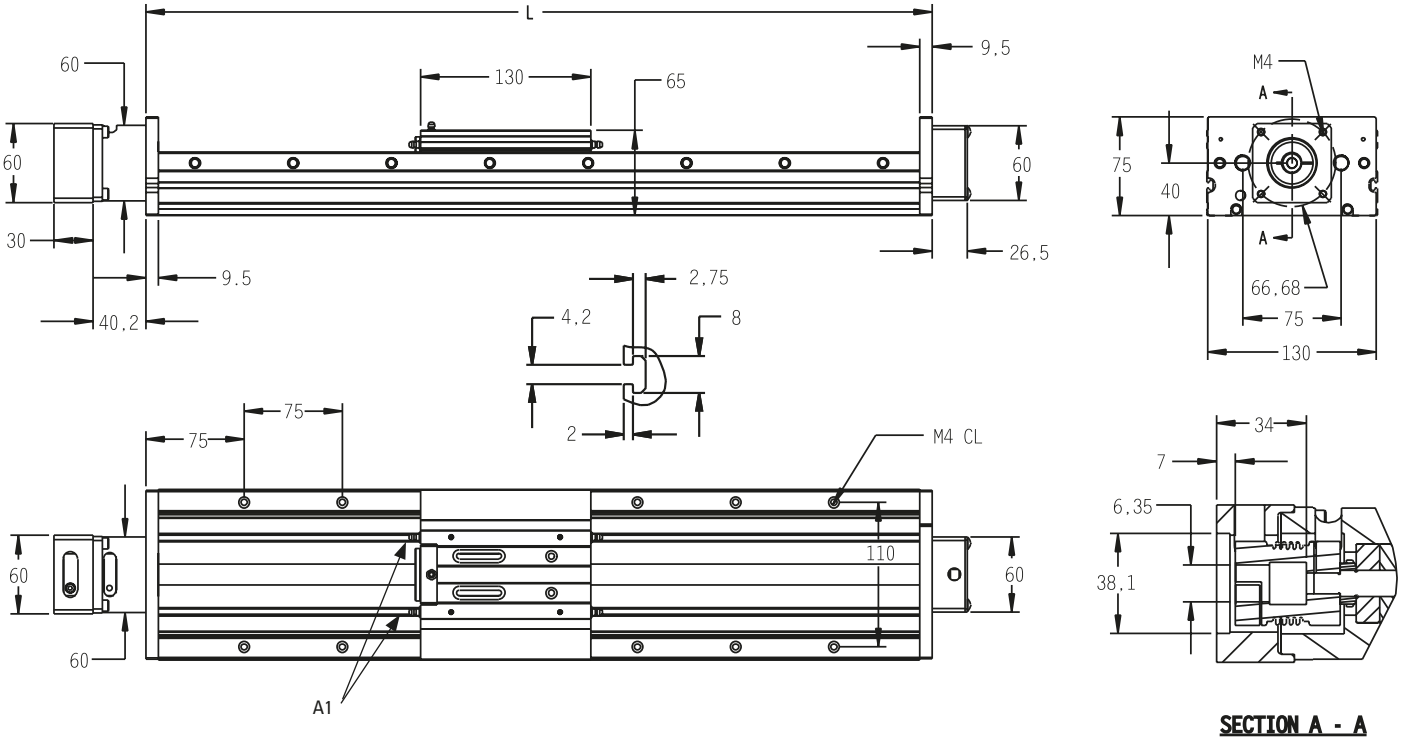
## Definition of Forces



# 2RB12

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: lubrication nipples (using the unit with the nipples mounted makes the stroke 10 mm shorter).

Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 149 |

# 2RB16

## Ball Screw Drive, Ball Guide

» Ordering key - see page 196
» Accessories - see page 135

## General Specifications

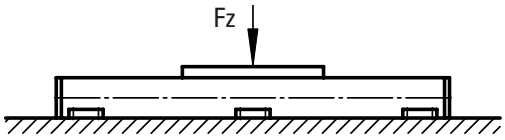
| Parameter | 2RB16 |
|---|---|
| Profile size (w × h) [mm] [1] | 160 × 48 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

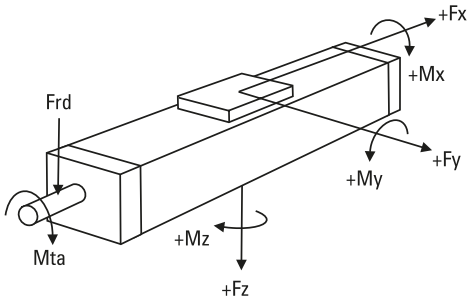
| Parameter | | 2RB16 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 2815 |
| Linear speed, maximum | [m/s] | 0,73 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,025 / 300 mm |
| Input speed, maximum | [rpm] | 2200 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 2998 |
| Dynamic load (Fy), maximum | [N] | 2588 |
| Dynamic load (Fz), maximum | [N] | 5176 |
| Dynamic load torque (Mx), maximum | [Nm] | 243 |
| Dynamic load torque (My), maximum | [Nm] | 299 |
| Dynamic load torque (Mz), maximum | [Nm] | 150 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 2,66 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5, 10, 20 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>6,17<br>1,44<br>2,25 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

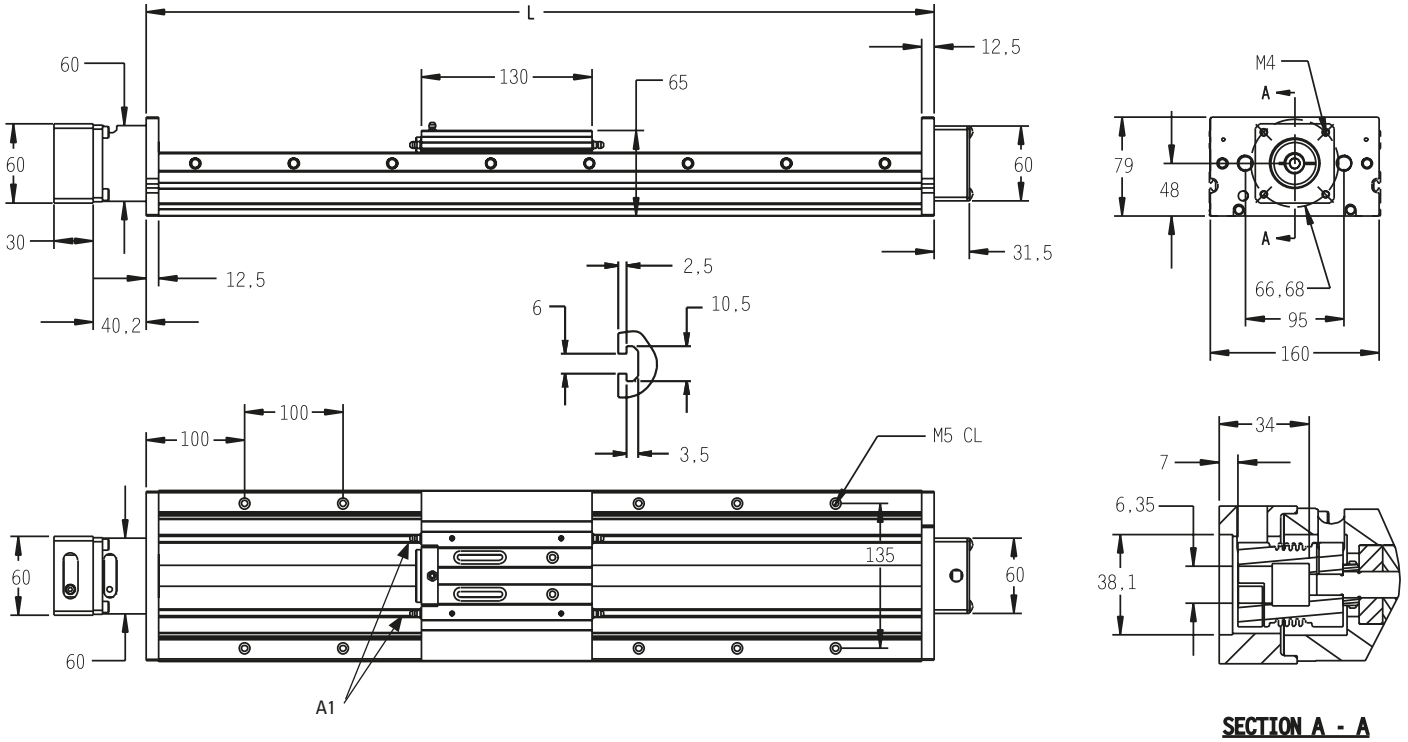
## Definition of Forces



# 2RB16

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: lubrication nipples (using the unit with the nipples mounted makes the stroke 10 mm shorter).

Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 185 |

# MS25

## Lead Screw Drive, Ball Guide

» Ordering key - see page 197
» Accessories - see page 135

## General Specifications

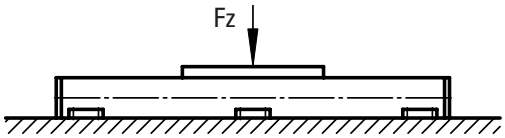
| Parameter | MS25 |
|---|---|
| Profile size (w × h) [mm] [1] | 50 × 25 |
| Type of screw | lead screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

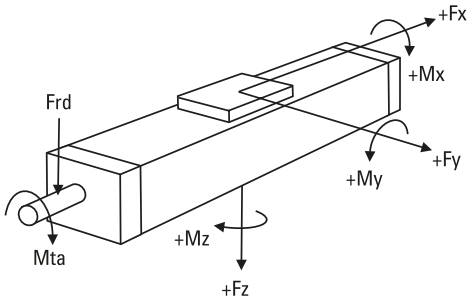
| Parameter | | MS25 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 705,5 |
| Linear speed, maximum | [m/s] | 0,85 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,18 / 300 mm |
| Input speed, maximum | [rpm] | 2000 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 17,8 |
| Dynamic load (Fy), maximum | [N] | 100 |
| Dynamic load (Fz), maximum | [N] | 100 |
| Dynamic load torque (Mx), maximum | [Nm] | 1,4 |
| Dynamic load torque (My), maximum | [Nm] | 1,3 |
| Dynamic load torque (Mz), maximum | [Nm] | 2,7 |
| Drive shaft force (Frd), maximum | [N] | 222 |
| Drive shaft torque (Mta), maximum | [Nm] | 0,08 |
| Lead screw diameter (d0) | [mm] | 6,35 |
| Lead screw lead (p)<br>inch leads<br><br>metric leads | <br>[inch]<br><br>[mm] | <br>0,025, 0,05, 0,062,<br>0,2, 0,25, 0,5, 1,0<br>1,5, 2, 3 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>0,47<br>0,18<br>0,065 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

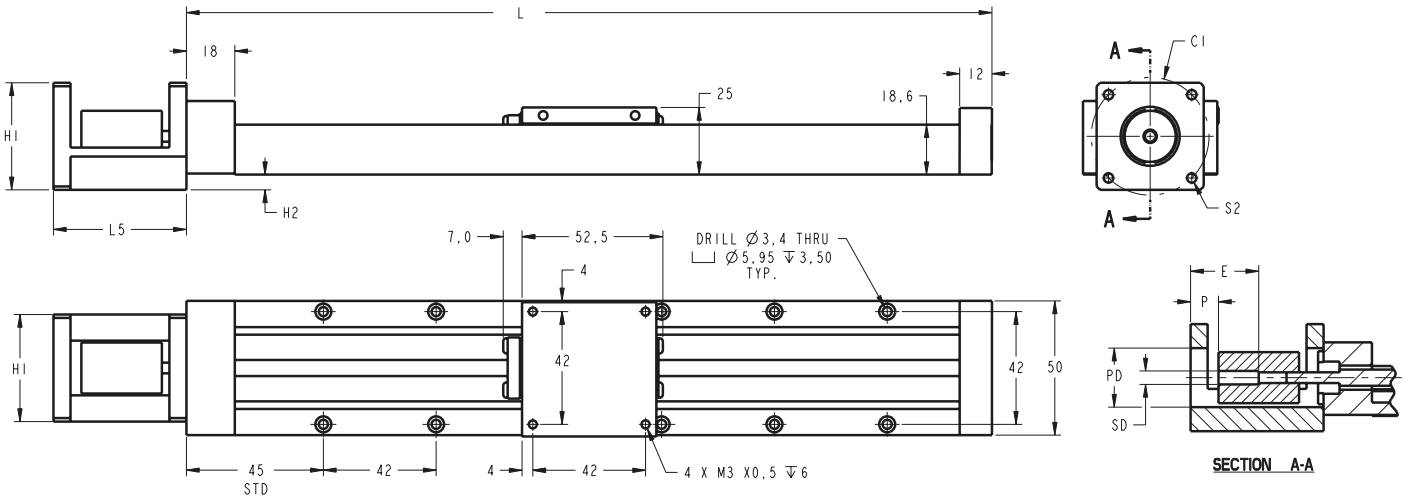
## Definition of Forces



# MS25

## Lead Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 95 |

| Motor block frame size[1] | H1 | H2 | SD | PD | P | E (max.) | S2 | L5 | C1 |
|---|---|---|---|---|---|---|---|---|---|
| NEMA-17 | 39,9 | 5,7 | 5,0 | 22,0 | 10,4 | 28,0 | ø 0,136 | 49,5 | 43,8 |
| NEMA-23 | 57,2 | 14,3 | 6,35 | 38,2 | 14,5 | 33,0 | M4 | 55,9 | 66,7 |

[1] Other sizes are easily configured. See www.linearmotioneering.com for the motor mounting configurator.

# MS33

## Lead Screw Drive, Ball Guide

» Ordering key - see page 197
» Accessories - see page 135

## General Specifications

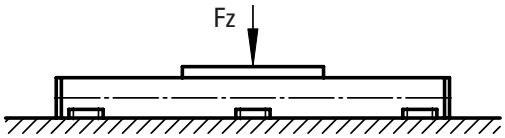
| Parameter | MS33 |
|---|---|
| Profile size (w × h) [mm] [1] | 60 × 33 |
| Type of screw | lead screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

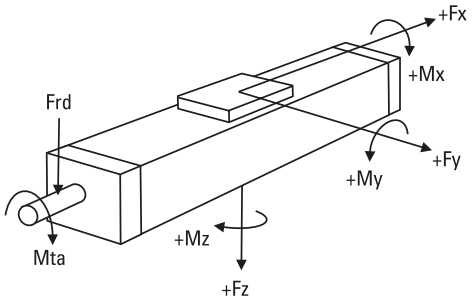
| Parameter | | MS33 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 704 |
| Linear speed, maximum | [m/s] | 1,02 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,18 / 300 mm |
| Input speed, maximum | [rpm] | 2000 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 80,1 |
| Dynamic load (Fy), maximum | [N] | 150 |
| Dynamic load (Fz), maximum | [N] | 150 |
| Dynamic load torque (Mx), maximum | [Nm] | 2,8 |
| Dynamic load torque (My), maximum | [Nm] | 2,5 |
| Dynamic load torque (Mz), maximum | [Nm] | 5,1 |
| Drive shaft force (Frd), maximum | [N] | 222 |
| Drive shaft torque (Mta), maximum | [Nm] | 0,43 |
| Lead screw diameter (d0) | [mm] | 9,525 |
| Lead screw lead (p)<br>inch leads<br><br>metric leads | <br>[inch]<br><br>[mm] | <br>0,0625, 0,1, 0,125, 0,2, 0,375, 0,5, 1,0, 1,2<br>2 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>0,69<br>0,31<br>0,12 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

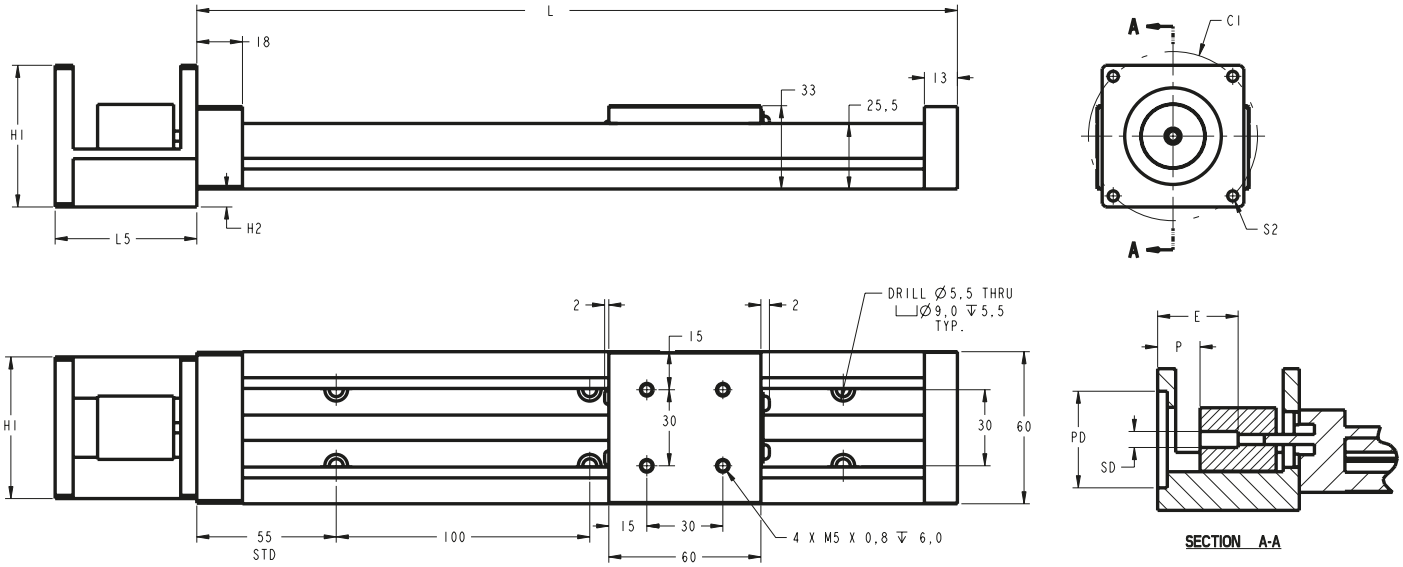
## Definition of Forces



# MS33

## Lead Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 96 |

| Motor block frame size[1] | H1 | H2 | SD | PD | P | E (max.) | S2 | L5 | C1 |
|---|---|---|---|---|---|---|---|---|---|
| NEMA-17 | 39,9 | 1,2 [2] | 5,0 | 22,0 | 7,8 | 28,0 | ø 0,136 | 49,5 | 43,8 |
| NEMA-23 | 57,2 | 7,5 | 6,35 | 38,2 | 14,0 | 33,0 | M4 | 55,9 | 66,7 |

[1] Other sizes are easily configured. See www.linearmotioneering.com for the motor mounting configurator.
[2] Above base.

# MS46L

## Lead Screw Drive, Ball Guide

» Ordering key - see page 198
» Accessories - see page 135

## General Specifications

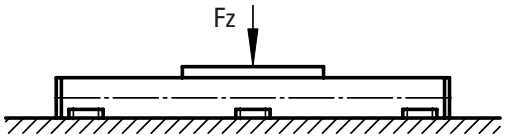
| Parameter | MS46L |
|---|---|
| Profile size (w × h) [mm] [1] | 86 × 46 |
| Type of screw | lead screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

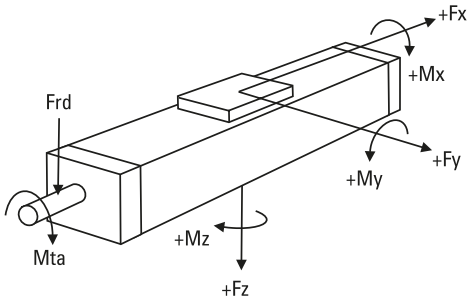
| Parameter | | MS46L |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 821,3 |
| Linear speed, maximum | [m/s] | 0,83 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,25 / 300 mm |
| Input speed, maximum | [rpm] | 2000 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 133,4 |
| Dynamic load (Fy), maximum | [N] | 450 |
| Dynamic load (Fz), maximum | [N] | 450 |
| Dynamic load torque (Mx), maximum | [Nm] | 13,9 |
| Dynamic load torque (My), maximum | [Nm] | 11,6 |
| Dynamic load torque (Mz), maximum | [Nm] | 23,6 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 0,59 |
| Lead screw diameter (d0) | [mm] | 12 |
| Lead screw lead (p) | [mm] | 3, 10, 25 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>2,21<br>0,65<br>0,30 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

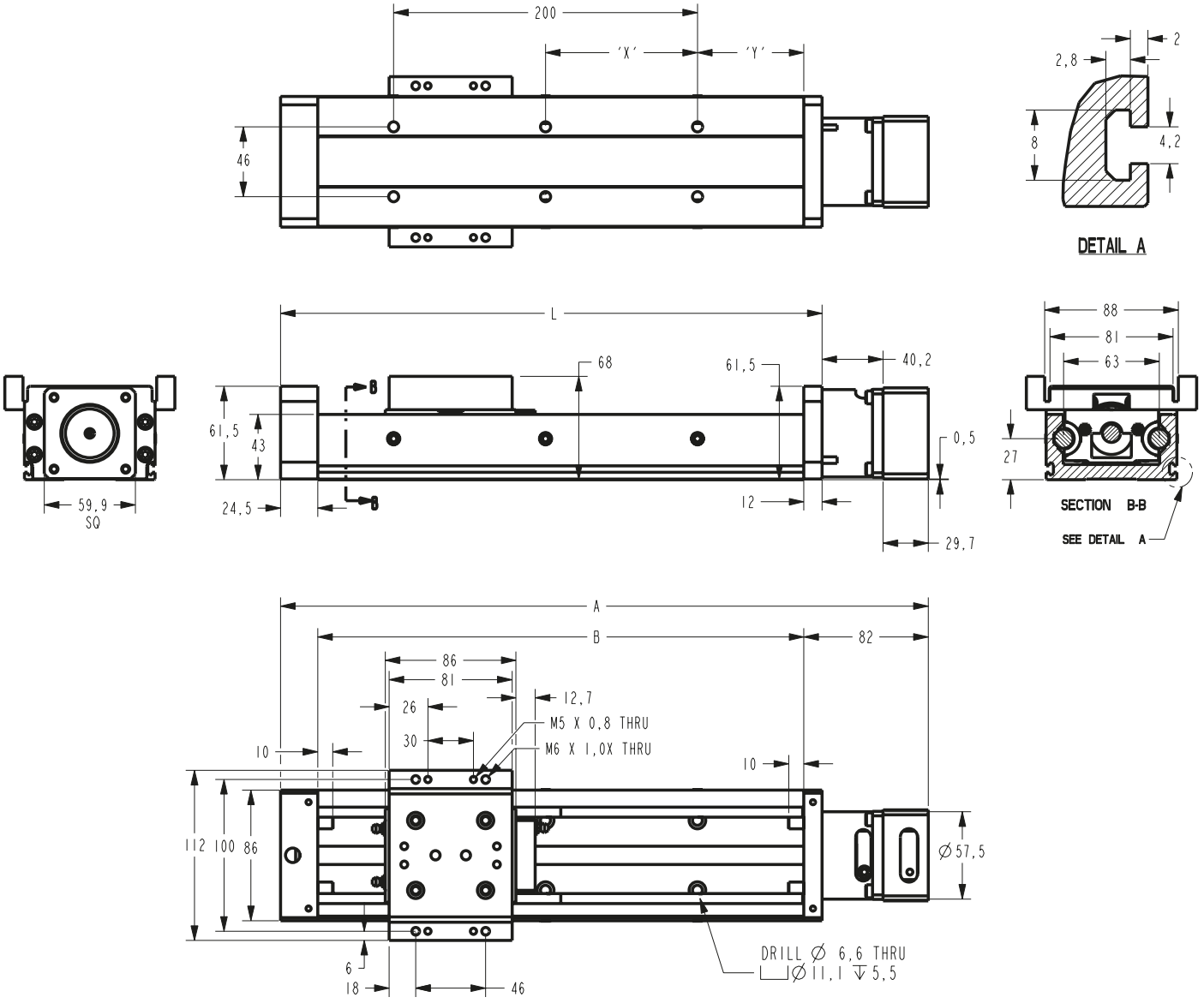
## Definition of Forces



# MS46L

## Lead Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 143 |

| Total Length (A) and Profile Length (B) | |
|---|---|
| A = L + 82,0 | B= L - 36,5 |

# MS46B

## Ball Screw Drive, Ball Guide

» Ordering key - see page 198
» Accessories - see page 135

## General Specifications

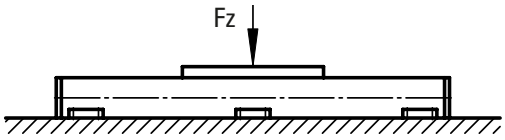
| Parameter | MS46B |
|---|---|
| Profile size (w × h) [mm] [1] | 86 × 46 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

[1] Base width × carriage height.

## Performance Specifications

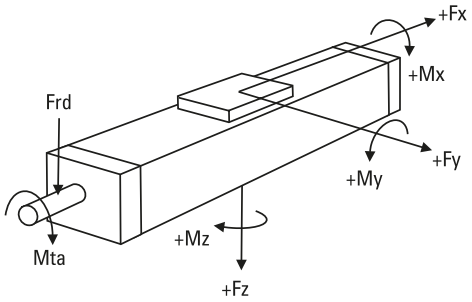
| Parameter | | MS46B |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 821,3 |
| Linear speed, maximum | [m/s] | 0,5 |
| Acceleration, maximum | [m/s²] | 9,8 |
| Repeatability | [± mm] | 0,005 |
| Accuracy | [± mm] | 0,025 / 300 mm |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | -20 – 80 |
| Dynamic load (Fx), maximum | [N] | 1730 |
| Dynamic load (Fy), maximum | [N] | 450 |
| Dynamic load (Fz), maximum | [N] | 450 |
| Dynamic load torque (Mx), maximum | [Nm] | 13,9 |
| Dynamic load torque (My), maximum | [Nm] | 11,6 |
| Dynamic load torque (Mz), maximum | [Nm] | 23,6 |
| Drive shaft force (Frd), maximum | [N] | 533 |
| Drive shaft torque (Mta), maximum | [Nm] | 1,53 |
| Ball screw diameter (d0) | [mm] | 12 |
| Ball screw lead (p) | [mm] | 5, 10 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>2,21<br>0,65<br>0,30 |

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

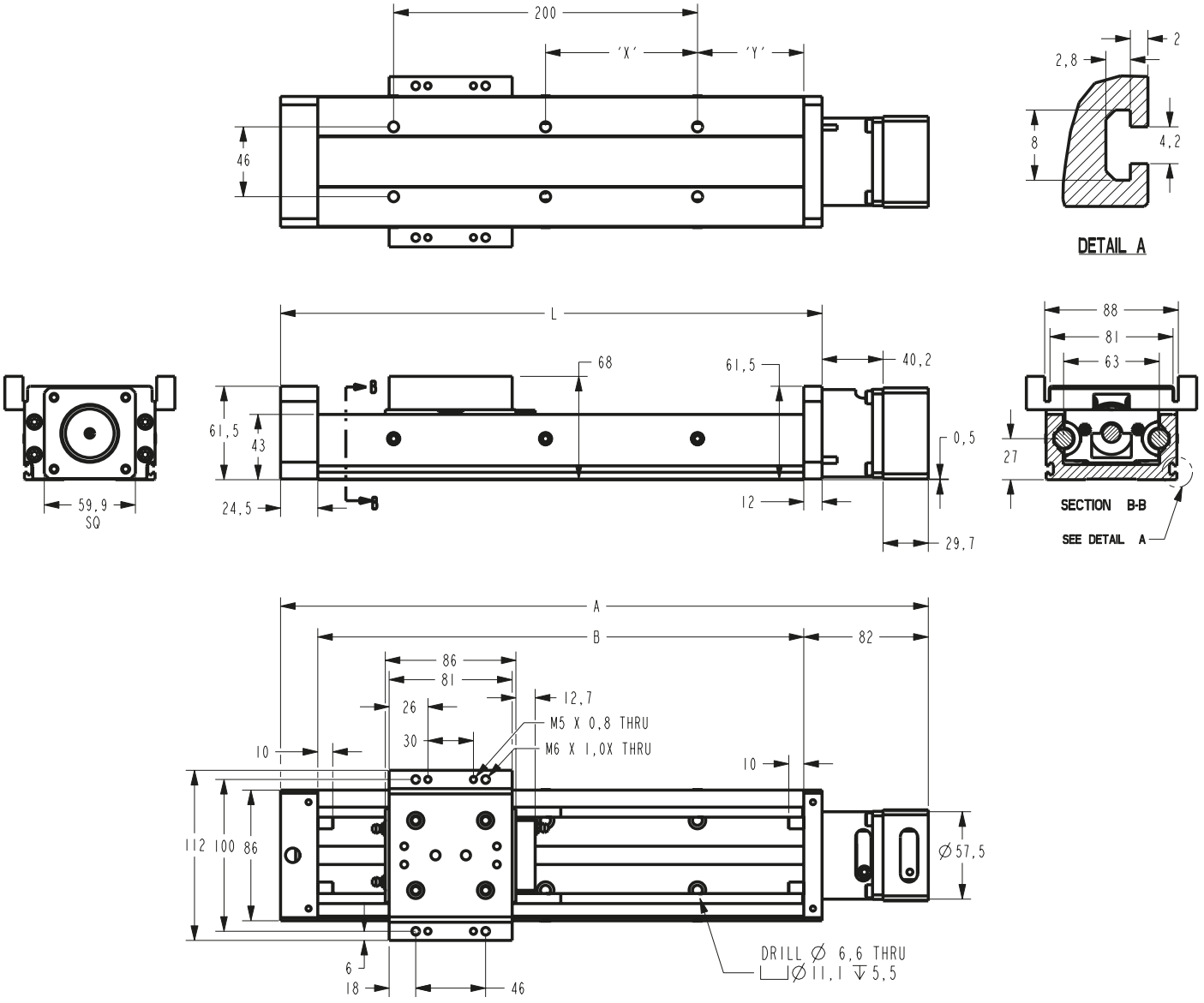
## Definition of Forces



# MS46B

## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 143 |

| Total Length (A) and Profile Length (B) | |
|---|---|
| A = L + 82,0 | B= L - 36,5 |

# 2DB08

## Lead Screw Drive, Ball Guide – Inch Interface

» Ordering key - see page 199
» Accessories - see page 135

## General Specifications

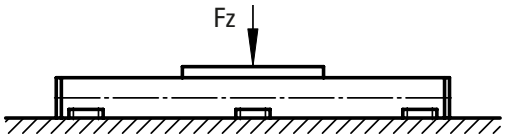
| Parameter | 2DB08 |
|---|---|
| Profile size (w × h) [inch] | 4.50 × 1.625 |
| Type of screw | lead screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2DB08 |
|---|---|---|
| Stroke length (Smax), maximum | [inch] | 41 |
| Linear speed, maximum | [inch/sec] | 33.3 |
| Acceleration, maximum | [inch/s²] | 385 |
| Repeatability | [± inch] | 0.0002 |
| Accuracy | [± inch] | 0.007 / 11.81 in |
| Input speed, maximum | [rpm] | 2000 |
| Operation temperature limits | [°F] | -4 – 176 |
| Dynamic load (Fx), maximum | [lbs] | 20 |
| Dynamic load (Fy), maximum | [lbs] | 168 |
| Dynamic load (Fz), maximum | [lbs] | 336 |
| Dynamic load torque (Mx), maximum | [lbf-in] | 500 |
| Dynamic load torque (My), maximum | [lbf-in] | 500 |
| Dynamic load torque (Mz), maximum | [lbf-in] | 250 |
| Drive shaft force (Frd), maximum [1] | [lbf] | 50 |
| Drive shaft torque (Mta), maximum | [lbf-in] | 3.54 |
| Lead screw diameter (d0) | [inch] | 0.375 |
| Lead screw lead (p) | [inch] | 0.1, 0.25, 0.5, 0.75, 1 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [lb] | <br>5.93<br>1.16<br>1.89 |

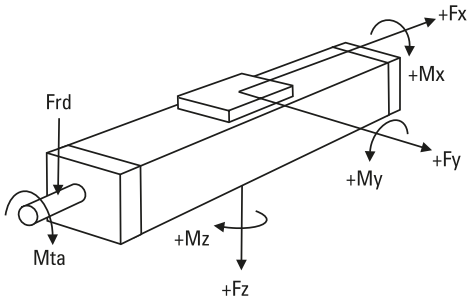
[1] With radial mount option only.

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

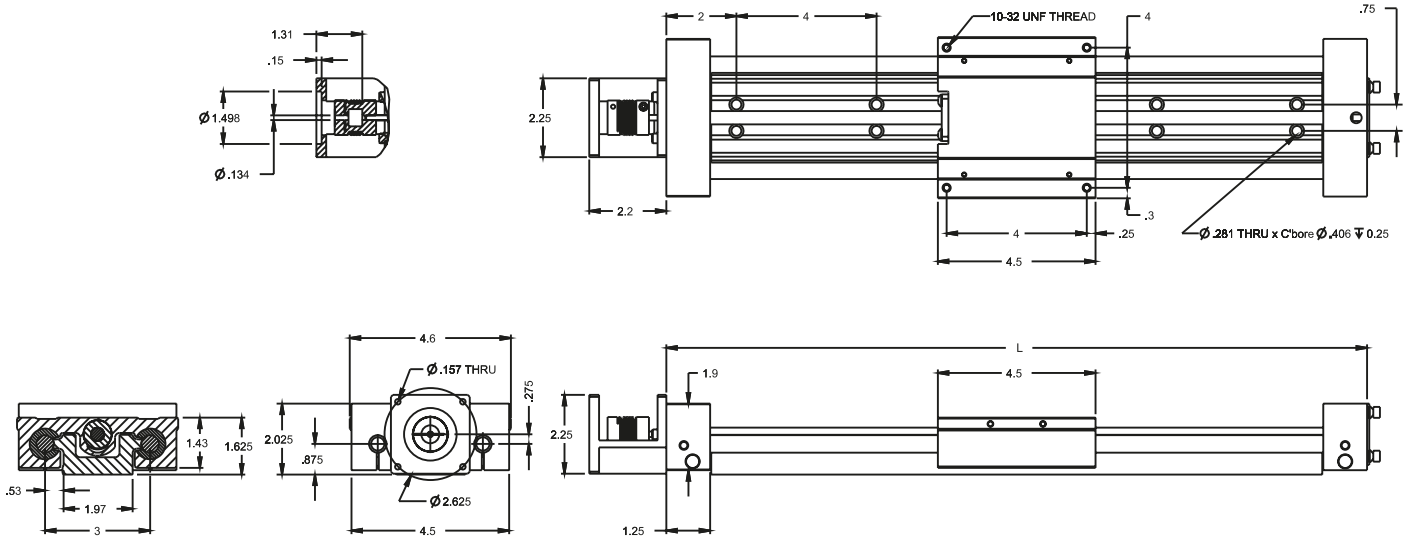
## Definition of Forces



# 2DB08

## Lead Screw Drive, Ball Guide – Inch Interface

| Dimensions | Projection |
|---|---|
| INCH | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 7.0 |

# 2DB120

## Ball Screw Drive, Ball Guide – Inch Interface

» Ordering key - see page 199
» Accessories - see page 135

## General Specifications

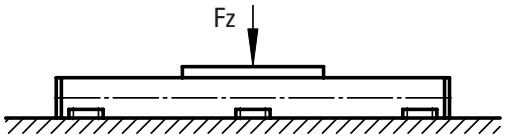
| Parameter | 2DB120 |
|---|---|
| Profile size (w × h) [inch] | 6 × 2.125 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2DB120 |
|---|---|---|
| Stroke length (Smax), maximum | [inch] | 63 |
| Linear speed, maximum | [inch/sec] | 10.0 |
| Acceleration, maximum | [inch/s²] | 385 |
| Repeatability<br>standard nut<br>preloaded nut | [± inch] | <br>0.0020<br>0.0002 |
| Accuracy | [± inch] | 0.002 / 12 in |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°F] | -4 – 176 |
| Dynamic load (Fx), maximum | [lbs] | 190 |
| Dynamic load (Fy), maximum | [lbs] | 1058 |
| Dynamic load (Fz), maximum | [lbs] | 2115 |
| Dynamic load torque (Mx), maximum | [lbf-in] | 4150 |
| Dynamic load torque (My), maximum | [lbf-in] | 4150 |
| Dynamic load torque (Mz), maximum | [lbf-in] | 2071 |
| Drive shaft force (Frd), maximum [1] | [lbf] | 120 |
| Drive shaft torque (Mta), maximum | [lbf-in] | 6.73 |
| Ball screw diameter (d0) | [inch] | 0.5 |
| Ball screw lead (p) | | 0.631 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [lb] | <br>13.17<br>2.30<br>4.29 |

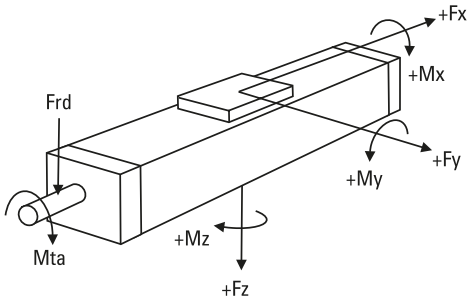
[1] With radial mount option only.

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

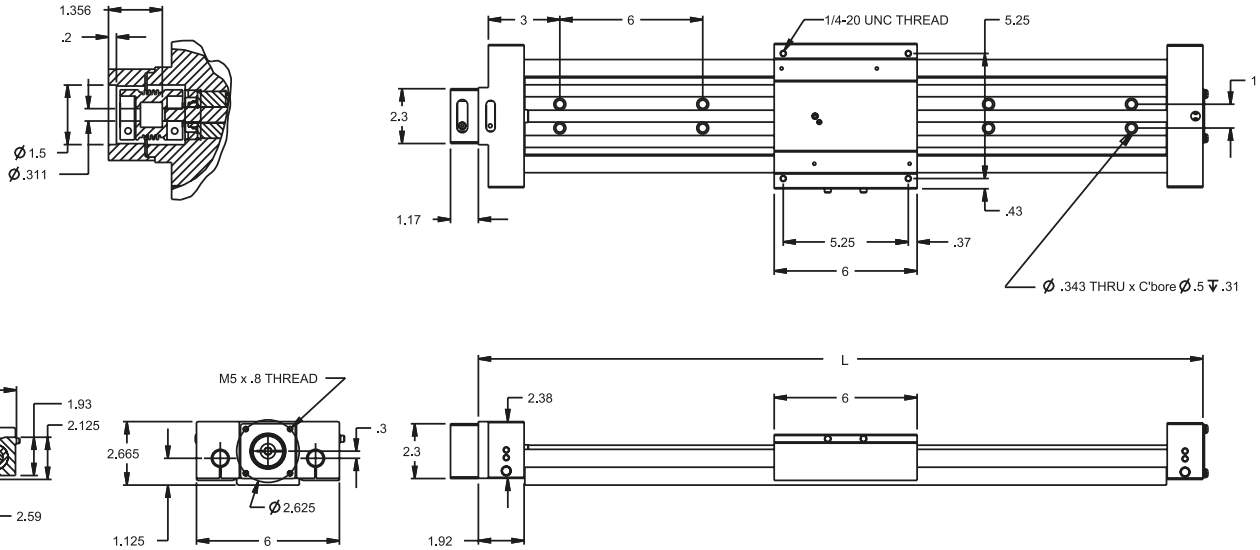
## Definition of Forces



# 2DB120

## Ball Screw Drive, Ball Guide – Inch Interface

| Dimensions | Projection |
|---|---|
| INCH | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 9.0 |

# 2DB12J

## Ball Screw Drive, Ball Guide – Inch Interface

» Ordering key - see page 199
» Accessories - see page 135

## General Specifications

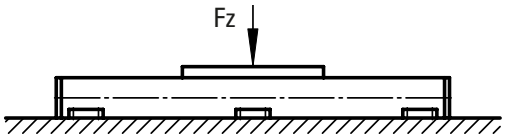
| Parameter | 2DB12J |
|---|---|
| Profile size (w × h) [inch] | 6 × 2.562 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2DB12J |
|---|---|---|
| Stroke length (Smax), maximum | [inch] | 63 |
| Linear speed, maximum | [inch/sec] | 25.0 |
| Acceleration, maximum | [inch/s²] | 385 |
| Repeatability | [± inch] | 0.0002 |
| Accuracy | [± inch] | 0.002 / 12 in |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°F] | -4 – 176 |
| Dynamic load (Fx), maximum | [lbs] | 375 |
| Dynamic load (Fy), maximum | [lbs] | 1058 |
| Dynamic load (Fz), maximum | [lbs] | 2115 |
| Dynamic load torque (Mx), maximum | [lbf-in] | 4150 |
| Dynamic load torque (My), maximum | [lbf-in] | 4150 |
| Dynamic load torque (Mz), maximum | [lbf-in] | 2071 |
| Drive shaft force (Frd), maximum [1] | [lbf] | 120 |
| Drive shaft torque (Mta), maximum | [lbf-in] | 33.19 |
| Ball screw diameter ($d_0$) | [inch] | 0.50 |
| Ball screw lead (p) | [inch] | 0.5 |
| Weight | [lb] | |
| of unit with zero stroke | | 13.58 |
| of every 100 mm of stroke | | 2.296 |
| of each carriage | | 4.850 |

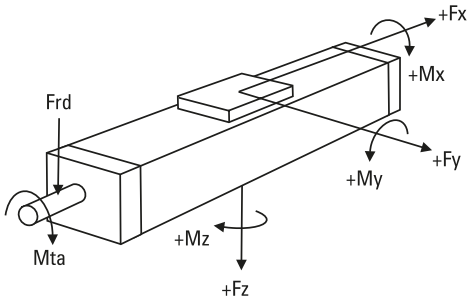
[1] With radial mount option only.

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

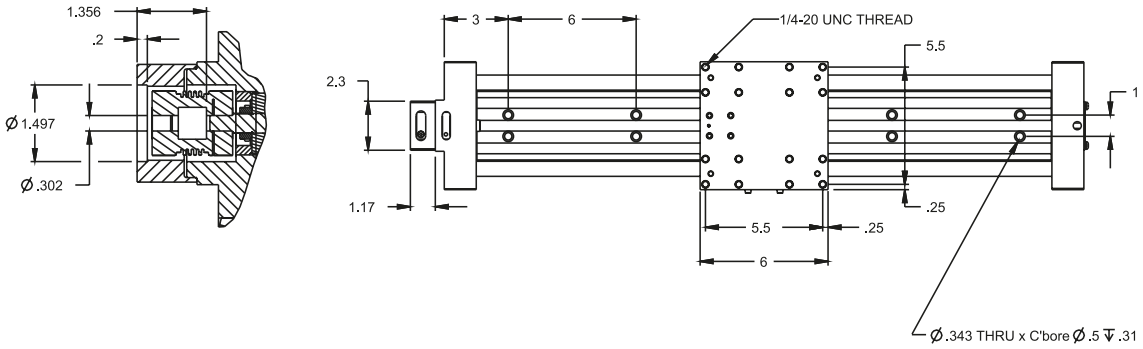
## Definition of Forces

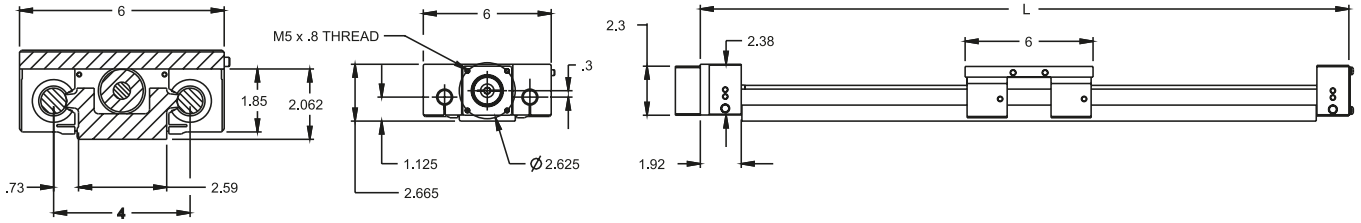


# 2DB12J

## Ball Screw Drive, Ball Guide – Inch Interface

| Dimensions | Projection |
|---|---|
| INCH | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 9.0 |

# 2DB160

## Ball Screw Drive, Ball Guide – Inch Interface

» Ordering key - see page 199
» Accessories - see page 135

## General Specifications

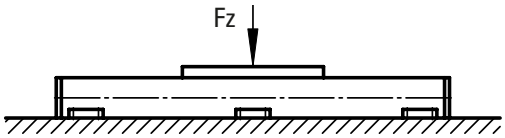
| Parameter | 2DB160 |
|---|---|
| Profile size (w × h) [inch] | 7.5 × 2.625 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2DB160 |
|---|---|---|
| Stroke length (Smax), maximum | [inch] | 84.5 |
| Linear speed, maximum | [inch/sec] | 8.3 |
| Acceleration, maximum | [inch/s²] | 385 |
| Repeatability<br>standard nut<br>preloaded nut | [± inch] | <br>0.0020<br>0.0002 |
| Accuracy | [± inch | 0.002 / 12 in |
| Input speed, maximum | [rpm] | 2500 |
| Operation temperature limits | [°F] | -4 – 176 |
| Dynamic load (Fx), maximum | [lbs] | 350 |
| Dynamic load (Fy), maximum | [lbs] | 1777 |
| Dynamic load (Fz), maximum | [lbs] | 3555 |
| Dynamic load torque (Mx), maximum | [lbf-in] | 8850 |
| Dynamic load torque (My), maximum | [lbf-in] | 8450 |
| Dynamic load torque (Mz), maximum | [lbf-in] | 4195 |
| Drive shaft force (Frd), maximum [1] | [lbf] | 120 |
| Drive shaft torque (Mta), maximum | [lbf-in] | 12.39 |
| Ball screw diameter (d0)<br>inch diameters<br>metric diameters | <br>[inch]<br>[mm] | <br>0.75<br>20 |
| Ball screw lead (p)<br>inch leads<br>metric leads | <br>[inch]<br>[mm] | <br>0.2<br>5,0 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [lb] | <br>26.74<br>3.86<br>8.61 |

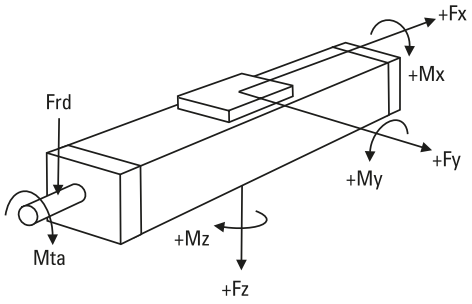
[1] With radial mount option only.

## Deflection of the Profile




The unit must be continiously supported by a machined surface under its entire length.

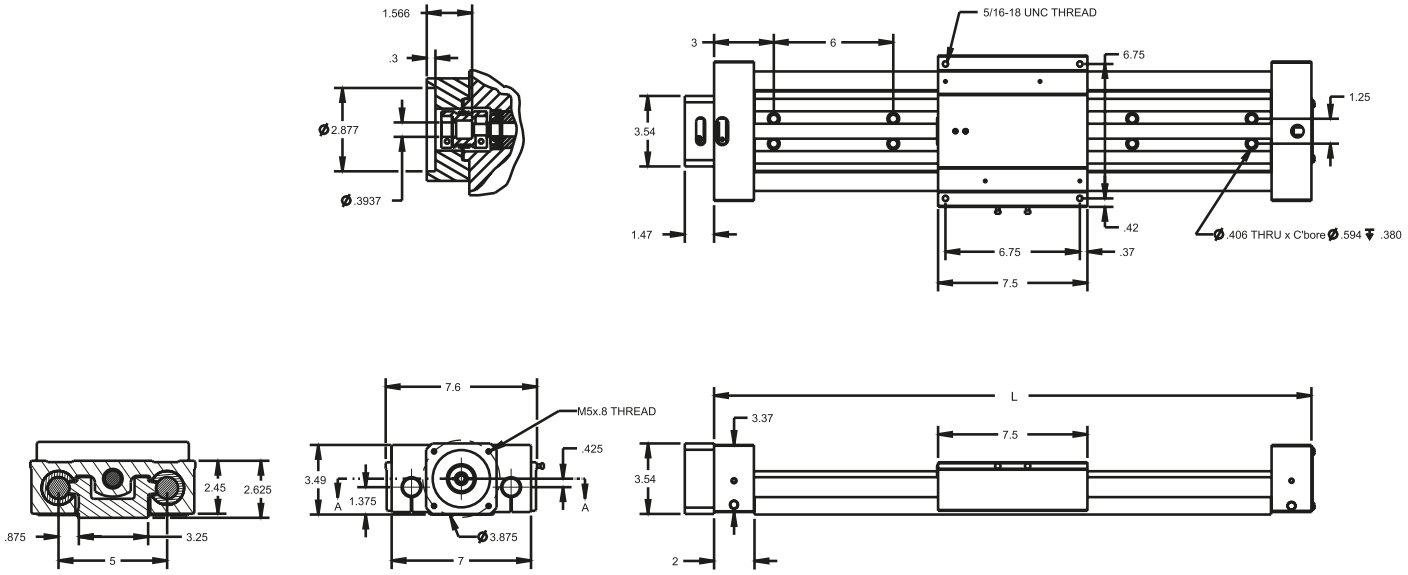
## Definition of Forces



# 2DB160

## Ball Screw Drive, Ball Guide – Inch Interface

| Dimensions | Projection |
|---|---|
| INCH | |




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| Ordering Length (L) and Maximum Stroke (Smax) |
|---|
| L = Smax + 11.5 |

# 2DB16J

## Ball Screw Drive, Ball Guide – Inch Interface

» Ordering key - see page 199
» Accessories - see page 135

## General Specifications

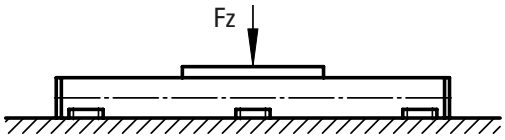
| Parameter | 2DB16J |
|---|---|
| Profile size (w × h) [inch] | 7.5 × 3.062 |
| Type of screw | ball screw |
| Carriage sealing system | none (optional bellows) |
| Screw supports | none |
| Lubrication | lubrication of screws and guides |
| Included accessories | RediMount™ kit |

## Performance Specifications

| Parameter | | 2DB16J |
|---|---|---|
| Stroke length (Smax), maximum | [inch] | 84.5 |
| Linear speed, maximum | [inch/sec] | 41.67 |
| Acceleration, maximum | [inch/s²] | 385 |
| Repeatability | [± inch] | 0.0002 |
| Accuracy | [± inch] | 0.002 / 12 in |
| Input speed, maximum | [rpm] | 2500 |
| Operation temperature limits | [°F] | -4 – 176 |
| Dynamic load (Fx), maximum | [lbs] | 350 |
| Dynamic load (Fy), maximum | [lbs] | 1777 |
| Dynamic load (Fz), maximum | [lbs] | 3555 |
| Dynamic load torque (Mx), maximum | [lbf-in] | 8877 |
| Dynamic load torque (My), maximum | [lbf-in] | 8098 |
| Dynamic load torque (Mz), maximum | [lbf-in] | 4053 |
| Drive shaft force (Frd), maximum [1] | [lbf] | 120 |
| Drive shaft torque (Mta), maximum | [lbf-in] | 30.98 |
| Ball screw diameter ($d_0$) | [inch] | 0.631, 0.750 |
| Ball screw lead (p) | [inch] | 0.5, 1.0 |
| Weight | [lb] | |
| of unit with zero stroke | | 25.73 |
| of every 100 mm of stroke | | 3.86 |
| of each carriage | | 7.70 |

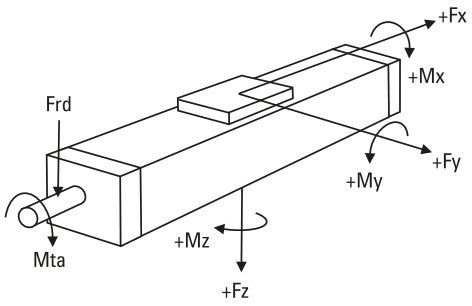
[1] With radial mount option only.

## Deflection of the Profile



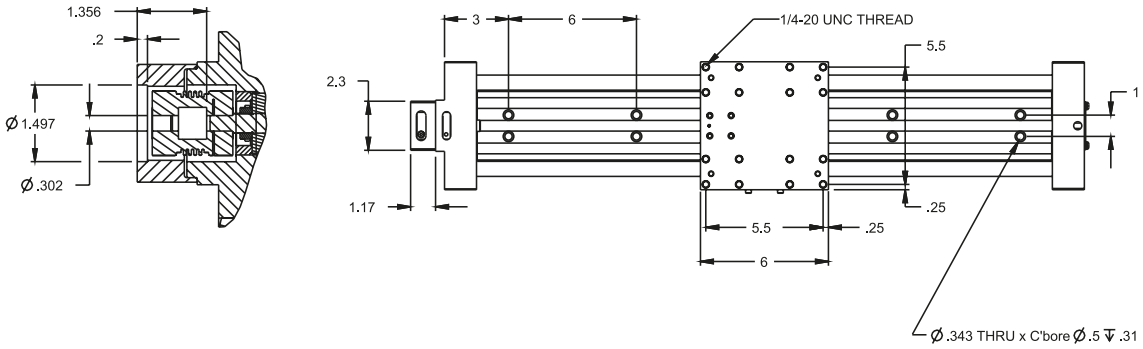

The unit must be continiously supported by a machined surface under its entire length.

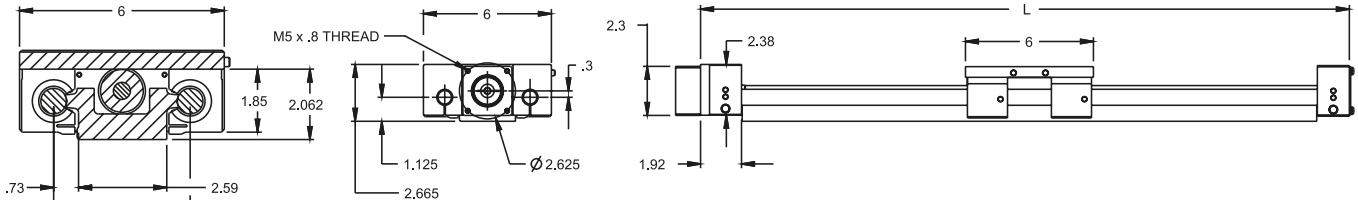
## Definition of Forces



# 2DB16J

## Ball Screw Drive, Ball Guide – Inch Interface




Standard NEMA23 motor dimensions are shown. Other mounting sizes are available and easily configured. Please see www.linearmotioneering.com for details.

| **Ordering Length (L) and Maximum Stroke (Smax)** |
|---|
| L = Smax + 11.5 |

# Linear Motion Systems with Ball Screw Drive and Slide Guide

## Overview

### Movopart M


M75

**Features**

- Can be installed in any orientation
- Self-adjusting stainless steel cover band
- Patented internal self-adjusting prism slide guides
- Wash down protected versions available.

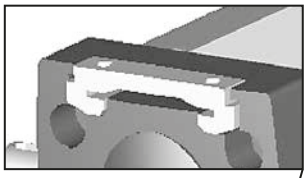
| Parameter | | M55 | M75 | M100 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 58 × 55 | 86 × 75 | 108 × 100 |
| Stroke length (Smax), maximum | [mm] | 3000 | 4000 | 6000 |
| Linear speed, maximum | [m/s] | 1,0 | 1,6 | 1,6 |
| Dynamic carriage load (Fz), maximum | [N] | 400 | 1485 | 3005 |
| Remarks | | single ball nut | single ball nut | single ball nut |
| Page | | 74 | 76 | 78 |

# Linear Motion Systems with Ball Screw Drive and Slide Guide

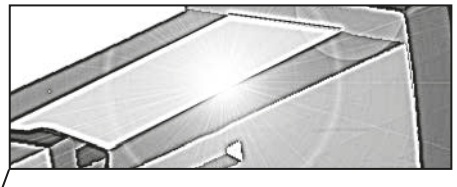
## Overview

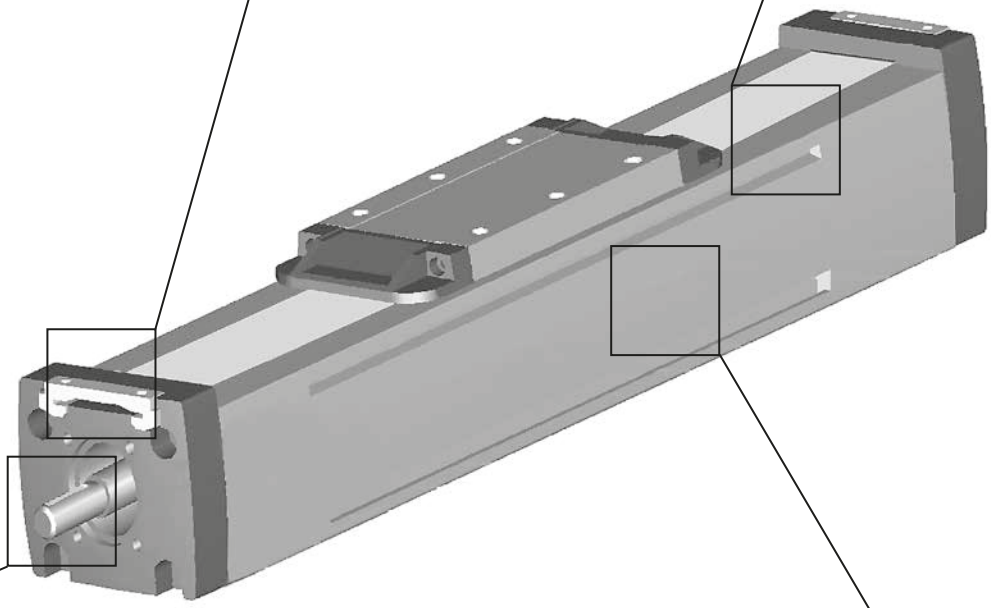
## M-Series Technical Presentation

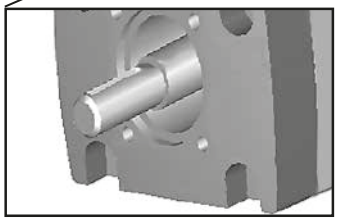
**Cover band**
The self-adjusting magnetically sealed stainless steel cover band protects the unit from the penetration of dirt, dust and liquids.



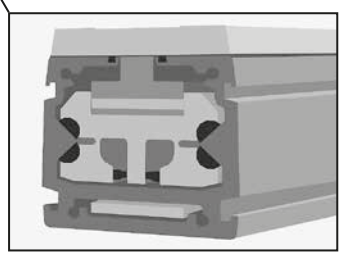
**Environmental protection**
The standard unit can operate in harsh environments but is also available in a wash down version for environments that are dusty, dirty and/or wet.







**Ball screw drive**
The ball screw ensures high accuracy and efficiency and the optional screw supports enable higher speeds.



**Prism slide guides**
The patented self aligning prism slide guides are accurate, durable and are resistant to vibrations and shock loads.

# M55

## Ball Screw Drive, Slide Guide

» Ordering key - see page 200
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M55 |
|---|---|
| Profile size (w × h) [mm] | 58 × 55 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

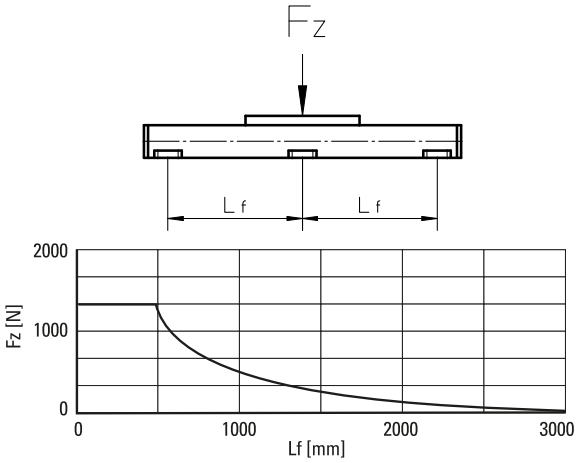
| Parameter | | M55 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 3000 |
| Linear speed, maximum | [m/s] | 1,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 1000 |
| Dynamic load (Fy), maximum | [N] | 400 |
| Dynamic load (Fz), maximum | [N] | 400 |
| Dynamic load torque (Mx), maximum | [Nm] | 9 |
| Dynamic load torque (My), maximum | [Nm] | 23 |
| Dynamic load torque (Mz), maximum | [Nm] | 23 |
| Drive shaft force (Frd), maximum | [N] | 200 |
| Drive shaft torque (Mta), maximum | [Nm] | 12 |
| Screw diameter (d0) | [mm] | 16 |
| Screw lead (p) | [mm] | 5, 10, 20 |
| Weight | [kg] | |
| of unit with zero stroke | | 3,06 |
| of every 100 mm of stroke | | 0,44 |
| of carriage | | 1,20 |
| of option single screw support | | 0,83 |
| of option double screw supports | | 1,88 |

## Carriage Idle Torque (M idle) [Nm]

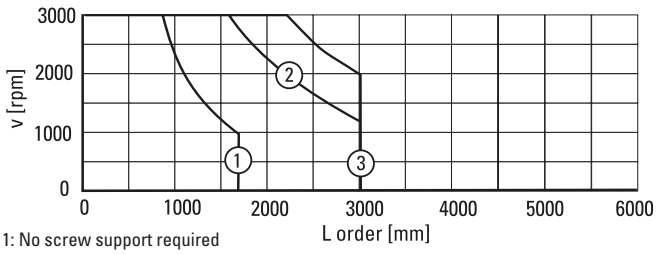
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 10 | p = 20 |
| 500 - no screw supports | 0,10 | 0,15 | 0,30 |
| 500 - with screw supports | 0,13 | 0,27 | 0,45 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

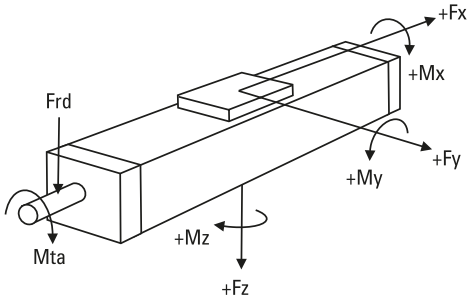



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

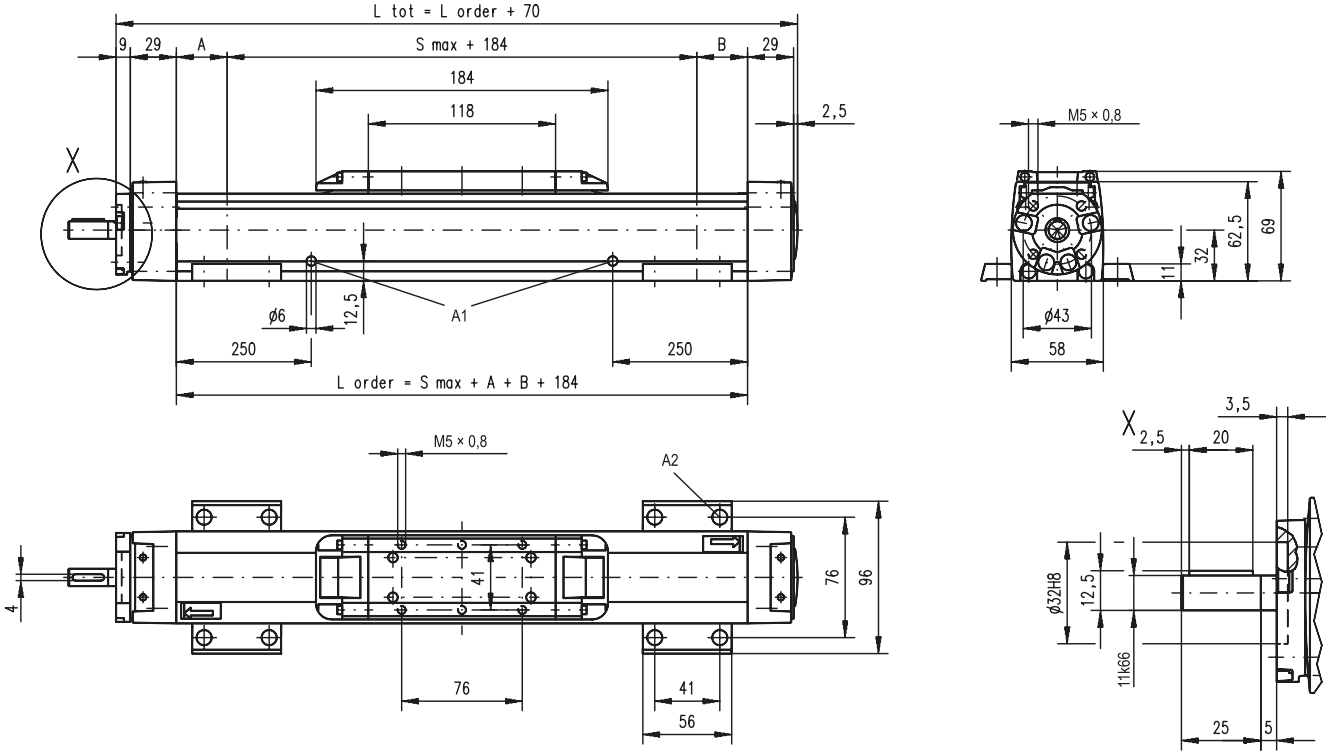
## Definition of Forces



# M55

## Ball Screw Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

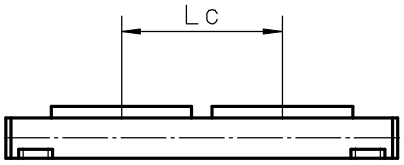



A1: lubrication holes
A2: ø9,5/ø5,5 for socket head cap screw M5

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 6 | 6 | L order = Smax + A + B + 184 | L tot = L order + 70 |
| Single screw support | 32 | 32 | L order = Smax + A + B + 184 | L tot = L order + 70 |
| Double screw supports | 83 | 83 | L order = Smax + A + B + 184 | L tot = L order + 70 |

## Double Carriages

| Parameter | | M55 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 200 |
| Dynamic load (Fy), maximum | [N] | 600 |
| Dynamic load (Fz), maximum | [N] | 600 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 0,3 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 0,3 |
| Force required to move second carriage | [N] | 35 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>5,14<br>2,40 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 6 | 6 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |
| Single screw support | 32 | 32 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |
| Double screw supports | 83 | 83 | L order = Smax + A + B + Lc + 184 | L tot = L order + 70 |

[1] Value in mm

# M75

## Ball Screw Drive, Slide Guide

» Ordering key - see page 200
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M75 |
|---|---|
| Profile size (w × h) [mm] | 86 × 75 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

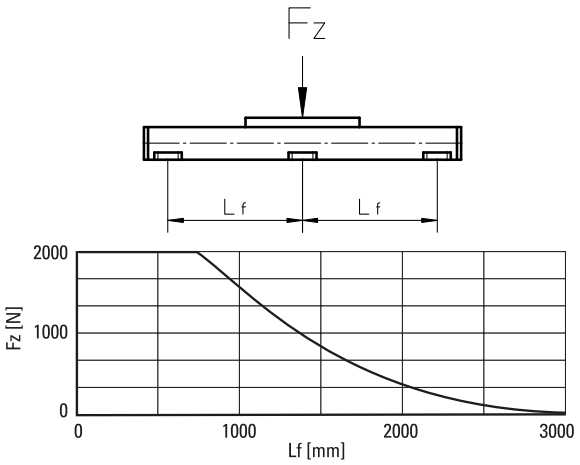
| Parameter | | M75 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 4000 |
| Linear speed, maximum | [m/s] | 1,6 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 5000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 2500 |
| Dynamic load (Fy), maximum | [N] | 1485 |
| Dynamic load (Fz), maximum | [N] | 1485 |
| Dynamic load torque (Mx), maximum | [Nm] | 49 |
| Dynamic load torque (My), maximum | [Nm] | 85 |
| Dynamic load torque (Mz), maximum | [Nm] | 85 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 30 |
| Screw diameter ($d_0$) | [mm] | 20 |
| Screw lead (p) | [mm] | 5, 12,7, 20 |
| Weight | [kg] | |
| of unit with zero stroke | | 6,07 |
| of every 100 mm of stroke | | 0,82 |
| of carriage | | 1,70 |
| of option single screw support | | 1,70 |
| of option double screw supports | | 3,58 |

## Carriage Idle Torque (M idle) [Nm]

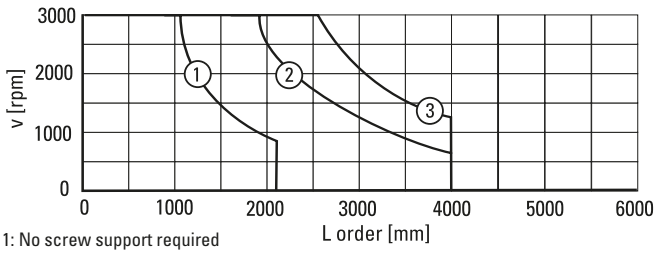
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 12,7 | p = 20 |
| 500 - no screw supports | 0,10 | 0,24 | 0,37 |
| 500 - with screw supports | 0,15 | 0,39 | 0,57 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

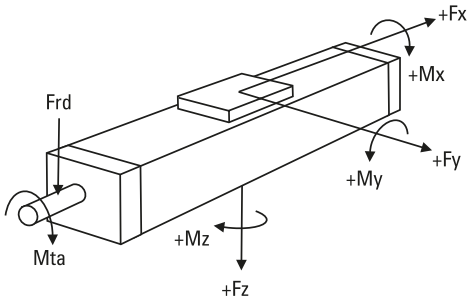



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

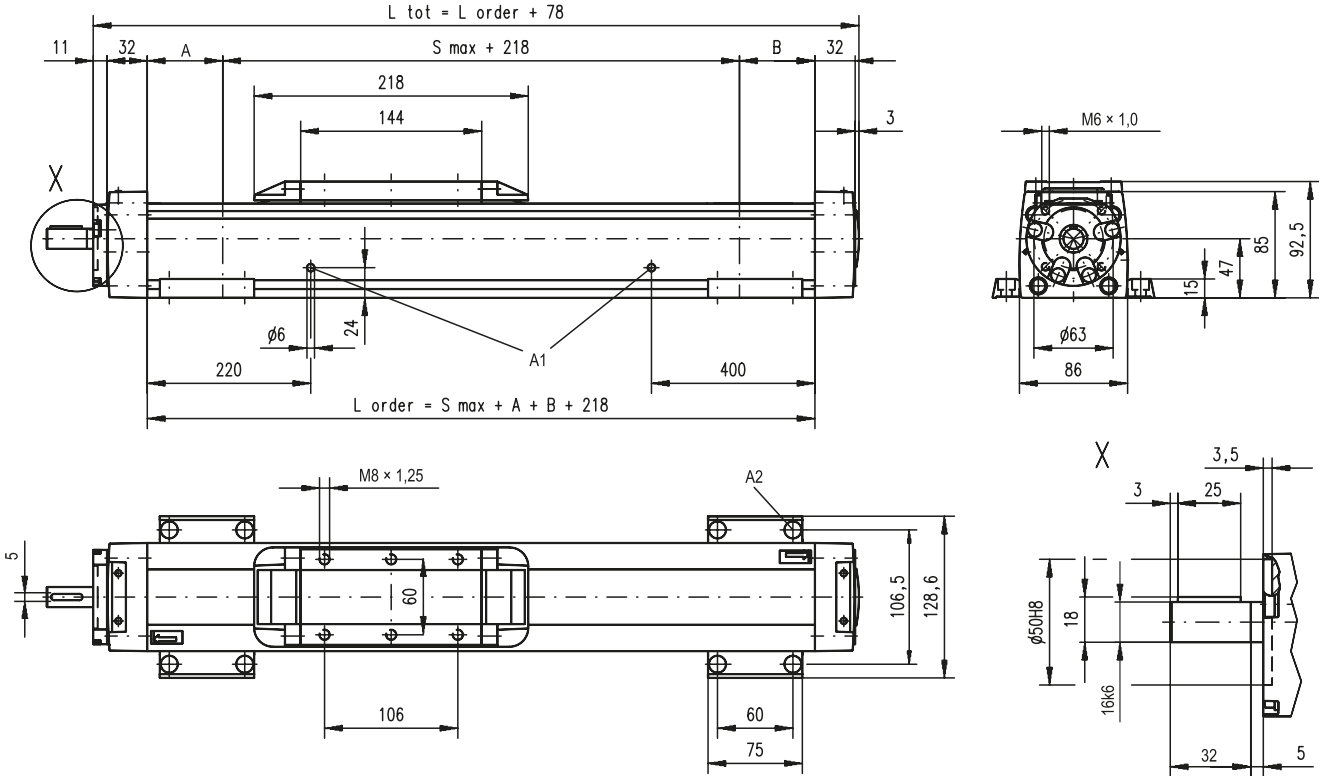
## Definition of Forces



# M75

## Ball Screw Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

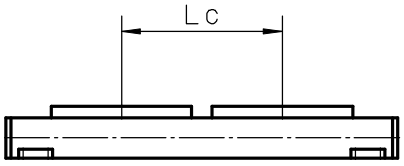



A1: lubrication holes
A2: ø13,5/ø8,5 for socket head cap screw M8

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 5 | 5 | L order = Smax + A + B + 218 | L tot = L order + 78 |
| Single screw support | 60 | 60 | L order = Smax + A + B + 218 | L tot = L order + 78 |
| Double screw supports | 126 | 126 | L order = Smax + A + B + 218 | L tot = L order + 78 |

## Double Carriages

| Parameter | | M75 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 250 |
| Dynamic load (Fy), maximum | [N] | 2227 |
| Dynamic load (Fz), maximum | [N] | 2227 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 1,114 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 1,114 |
| Force required to move second carriage | [N] | 40 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>9,82<br>3,40 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 5 | 5 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |
| Single screw support | 60 | 60 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |
| Double screw supports | 126 | 126 | L order = Smax + A + B + Lc + 218 | L tot = L order + 78 |

[1] Value in mm

# M100

## Ball Screw Drive, Slide Guide

» O» Ordering key - see page 200
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M100 |
|---|---|
| Profile size (w × h) [mm] | 108 × 100 |
| Type of screw | ball screw with single nut |
| Carriage sealing system | self-adjusting steel cover band |
| Screw supports | number of screw supports to be specified by customer at order |
| Lubrication | lubrication of ball screw |
| Included accessories | none |

## Performance Specifications

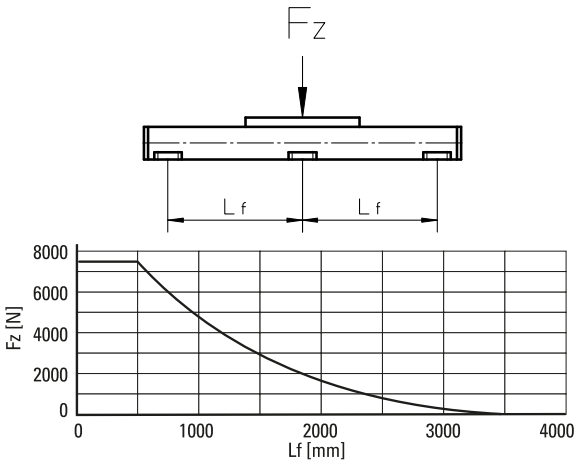
| Parameter | | M100 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 6000 |
| Linear speed, maximum | [m/s] | 1,6 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 4000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 5000 |
| Dynamic load (Fy), maximum | [N] | 3005 |
| Dynamic load (Fz), maximum | [N] | 3005 |
| Dynamic load torque (Mx), maximum | [Nm] | 117 |
| Dynamic load torque (My), maximum | [Nm] | 279 |
| Dynamic load torque (Mz), maximum | [Nm] | 279 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 45 |
| Screw diameter (d0) | [mm] | 25 |
| Screw lead (p) | [mm] | 5, 10, 25 |
| Weight | [kg] | |
| of unit with zero stroke | | 12,87 |
| of every 100 mm of stroke | | 1,42 |
| of carriage | | 3,50 |
| of option single screw support | | 1,86 |
| of option double screw supports | | 4,42 |

## Carriage Idle Torque (M idle) [Nm]

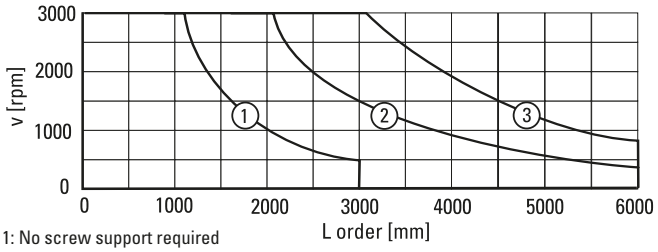
| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 10 | p = 25 |
| 500 - no screw supports | 0,15 | 0,25 | 0,55 |
| 500 - with screw supports | 0,25 | 0,40 | 0,85 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

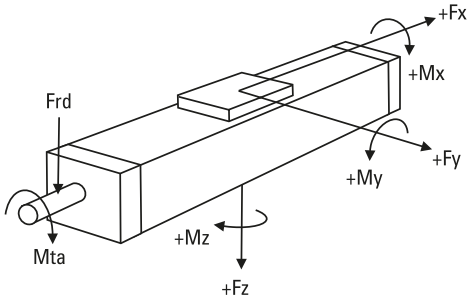



## Critical Speed




1: No screw support required
2: Single screw support required
3: Double screw supports required

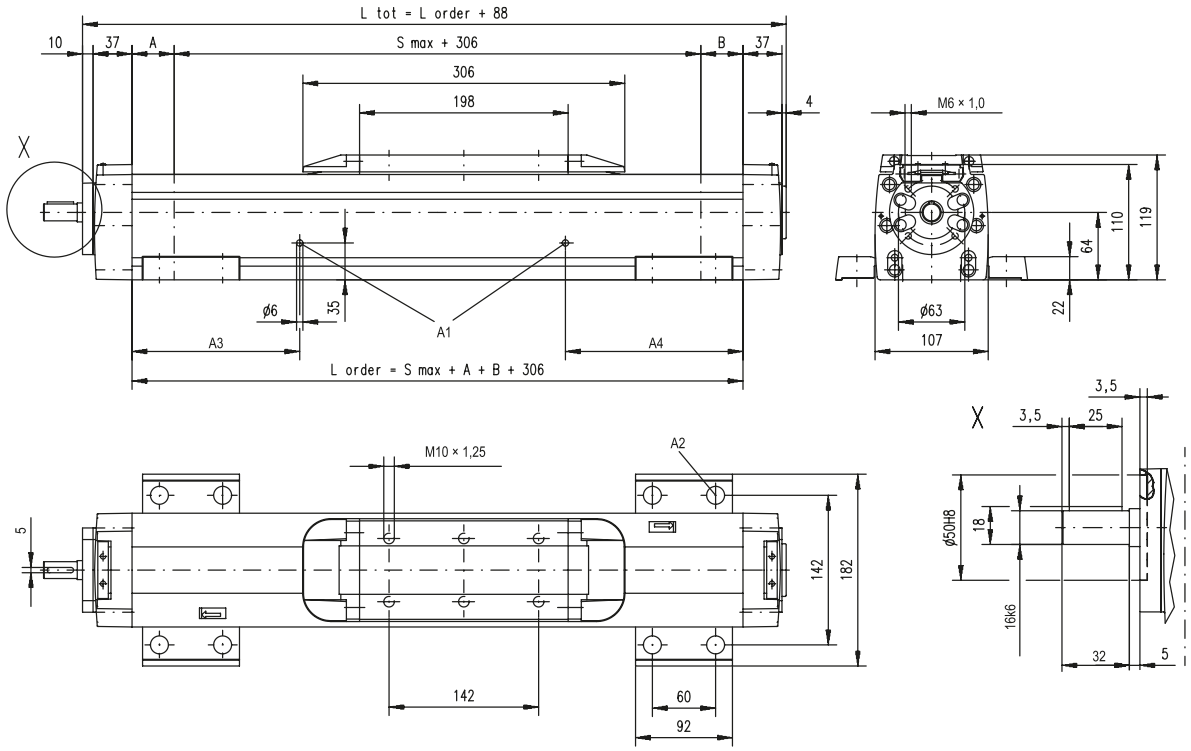
## Definition of Forces



# M100

## Ball Screw Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |



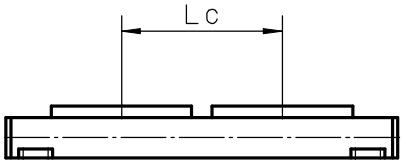

A1: lubrication holes
A2: ø17/ø10,5 for socket head cap screw M10

A3: 100 (L order <= 1 m), 320 (L order > 1 m)
A4: 100 (L order <= 1 m), 430 (L order > 1 m)

| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 1 | 1 | L order = Smax + A + B + 306 | L tot = L order + 88 |
| Single screw support | 31 | 31 | L order = Smax + A + B + 306 | L tot = L order + 88 |
| Double screw supports | 86 | 86 | L order = Smax + A + B + 306 | L tot = L order + 88 |

## Double Carriages

| Parameter | | M100 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 350 |
| Dynamic load (Fy), maximum | [N] | 4508 |
| Dynamic load (Fz), maximum | [N] | 4508 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 2,254 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 2,254 |
| Force required to move second carriage | [N] | 45 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>21,34<br>7,00 |




| Screw support configuration | A [mm] | B [mm] | Ordering length (L order) [mm] | Total length (L tot) [mm] |
|---|---|---|---|---|
| No screw support | 1 | 1 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |
| Single screw support | 31 | 31 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |
| Double screw supports | 86 | 86 | L order = Smax + A + B + Lc + 306 | L tot = L order + 88 |

[1] Value in mm

# Linear Motion Systems with Belt Drive and Ball Guide

## Overview

### SpeedLine WH


WH40

**Features**
- Can be installed in any orientation
- Stroke up to 2 m
- Acceleration up to 40 m/s²
- Compact

| Parameter | | WH40 |
|---|---|---|
| Profile size (width × height) | [mm] | 40 × 40 |
| Stroke length (Smax), maximum | [mm] | 2000 |
| Linear speed, maximum | [m/s] | 3,0 |
| Dynamic carriage load (Fz), maximum | [N] | 600 |
| Remarks | | no cover band |
| Page | | 82 |

### PowerLine WMZ


WM80Z

**Features**
- Can be installed in any orientation
- Stroke up to 5,5 m
- Speed up to 5 m/s
- Patented plastic cover band

| Parameter | | WM60Z | WM80Z |
|---|---|---|---|
| Profile size (width × height) | [mm] | 60 × 60 | 80 × 80 |
| Stroke length (Smax), maximum | [mm] | 4000 | 5500 |
| Linear speed, maximum | [m/s] | 2,5 | 5,0 |
| Dynamic carriage load (Fz), maximum | [N] | 1400 | 2100 |
| Remarks | | - | - |
| Page | | 84 | 86, 88 |

### Movopart M


M75

**Features**
- Can be installed in any orientation
- Self-adjusting stainless steel cover band
- Stroke up to 12 m
- Wash down protected versions available.

| Parameter | | M55 | M75 | M100 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 58 × 55 | 86 × 75 | 108 × 100 |
| Stroke length (Smax), maximum | [mm] | 7000 | 12000 | 12000 |
| Linear speed, maximum | [m/s] | 5,0 | 5,0 | 5,0 |
| Dynamic carriage load (Fz), maximum | [N] | 750 | 1750 | 4000 |
| Remarks | | - | - | - |
| Page | | 90 | 92 | 94 |

# Linear Motion Systems with Belt Drive and Ball Guide

## Overview

### ForceLine **MLSM**



MLSM80Z

**Features**

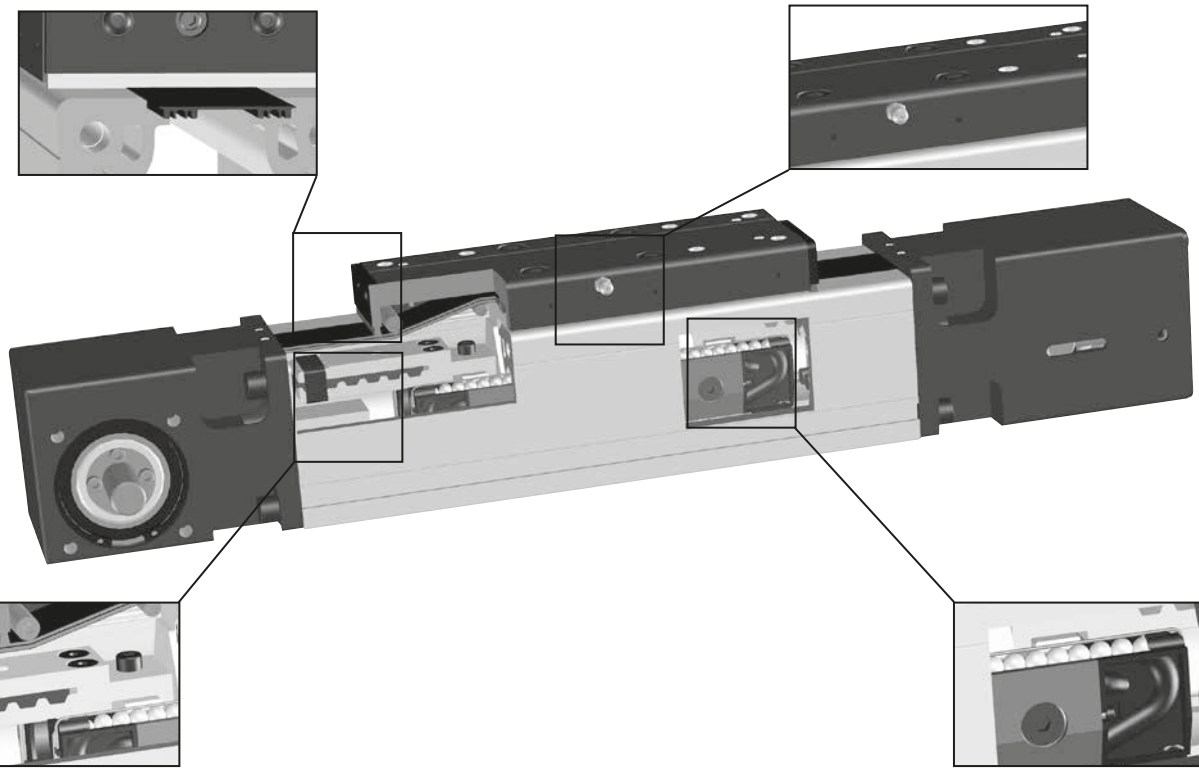
- Can be installed in any orientation
- Patented plastic cover band
- High load capabilities
- Low profile height

| Parameter | | MLSM80Z |
|---|---|---|
| Profile size (width × height) | [mm] | 240 × 85 |
| Stroke length (Smax), maximum | [mm] | 5900 |
| Linear speed, maximum | [m/s] | 5,0 |
| Dynamic carriage load (Fz), maximum | [N] | 6400 |
| Remarks | | - |
| Page | | 96 |

## WMZ-Series Technical Presentation

**Cover band**
The patented self-adjusting cover band protects the interior of the unit from the penetration of dirt, dust and liquids.

**Central lubrication**
One central lubrication point on the carriage services the entire unit resulting in a minimum maintenace requirement.



**Belt drive**
The belt is protected from the outside ensuring long, accurate and safe operation.

**Ball guides**
Integrated patented ball guides with hardened steel tracks for optimum performance.

# WH40

## Belt Drive, Ball Guide

» Ordering key - see page 201
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | WH40 |
|---|---|
| Profile size (w × h) [mm] | 40 × 40 |
| Type of belt | 10 AT 5 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WH40 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 2000 |
| Linear speed, maximum | [m/s] | 3,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 1800 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 315[1] |
| Dynamic load (Fy), maximum | [N] | 450 |
| Dynamic load (Fz), maximum | [N] | 600 |
| Dynamic load torque (Mx), maximum | [Nm] | 10 |
| Dynamic load torque (My), maximum | [Nm] | 30 |
| Dynamic load torque (Mz), maximum | [Nm] | 30 |
| Drive shaft force (Frd), maximum | [N] | 100 |
| Drive shaft torque (Mta), maximum | [Nm] | 6 |
| Pulley diameter | [mm] | 31,83 |
| Stroke per shaft revolution | [mm] | 100 |
| Weight | [kg] | |
| of unit with zero stroke | | 1,19 |
| of every 100 mm of stroke | | 0,15 |
| of each carriage | | 0,28 |

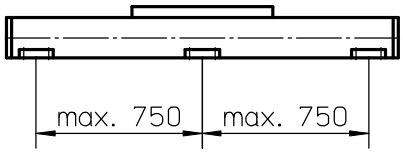
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 0,1 |
| 900 | 0,3 |
| 1800 | 0,6 |

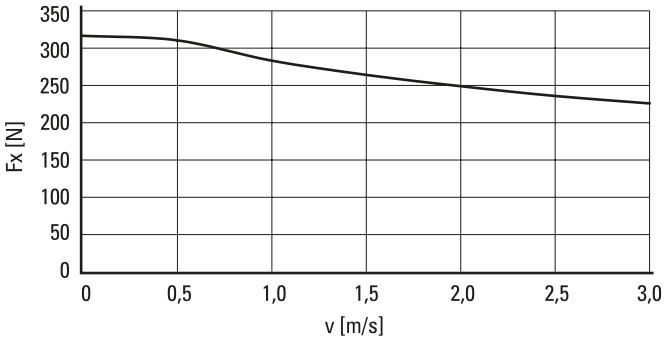
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

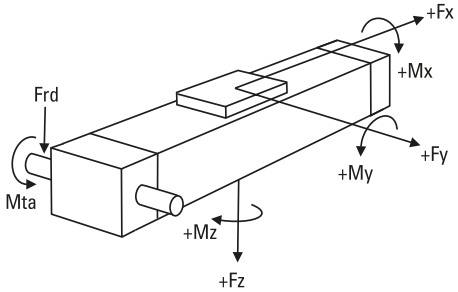



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed

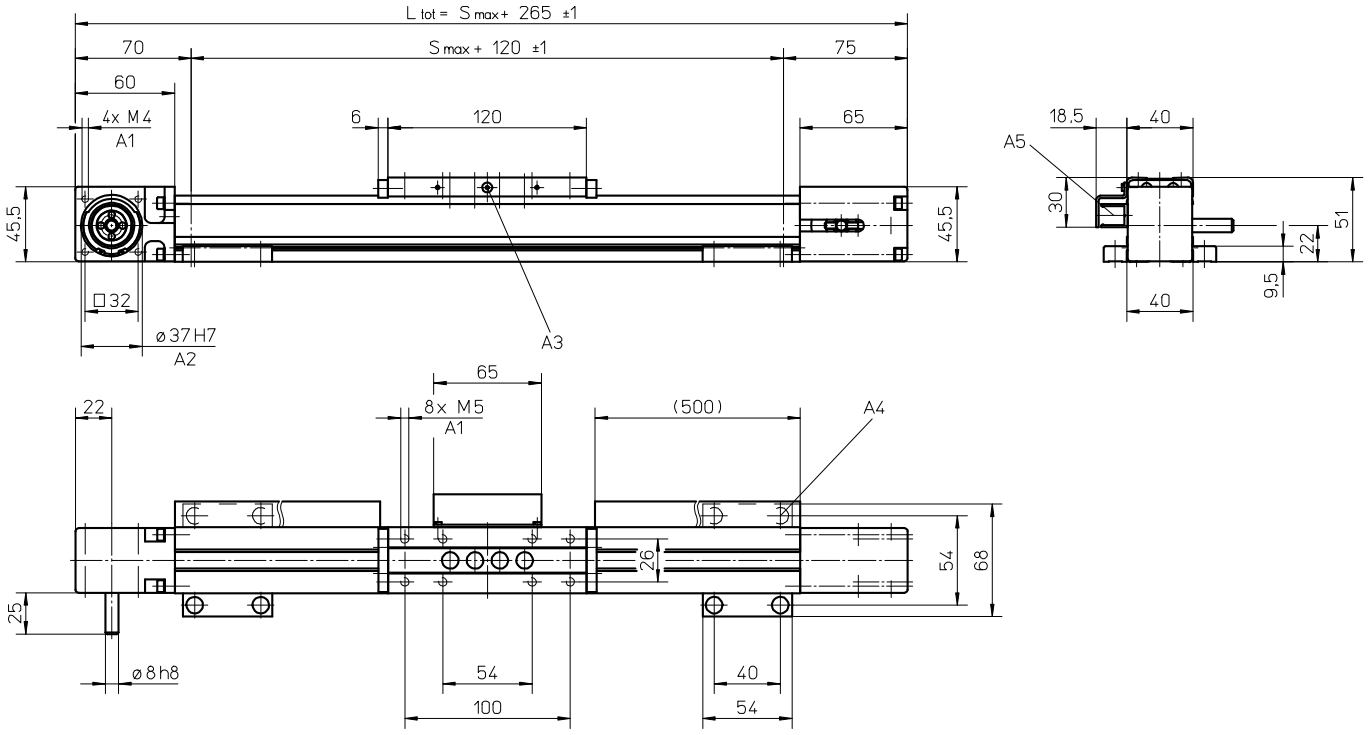



## Definition of Forces



# WH40

## Belt Drive, Ball Guide

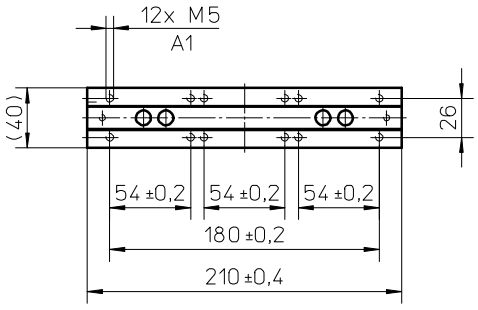



A1: depth 10
A2: depth 3
A3: lubricating nipple on both sides

A4: socket cap screw ISO4762-M5×12 8.8
A5: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

| Parameter | | WH40 |
|---|---|---|
| Carriage length | [mm] | 210 |
| Dynamic load torque (My), maximum | [Nm] | 50 |
| Dynamic load torque (Mz), maximum | [Nm] | 50 |
| Weight | [kg] | 0,43 |

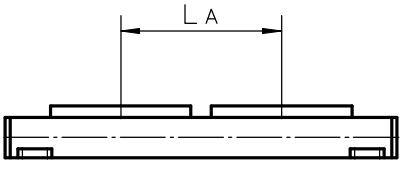



A1: depth 10

## Double Carriages

| Parameter | | WH40 |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 135 |
| Dynamic load (Fy), maximum | [N] | 900 |
| Dynamic load (Fz), maximum | [N] | 1200 |
| Dynamic load torque (My), maximum | [Nm] | $L_{A^1} \times 0,45$ |
| Dynamic load torque (Mz), maximum | [Nm] | $L_{A^1} \times 0,60$ |
| Force required to move second carriage | [N] | 2 |
| Total length (L tot) | [mm] | Smax + 265 + $L_A$ |

[1] Value in mm



# WM60Z

## Belt Drive, Ball Guide, Short Carriage

» Ordering key - see page 202
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | WM60Z |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of belt | 20 ATL 5 |
| Carriage sealing system | self-adjusting plastic cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WM60Z |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 4000 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 1250 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 850 |
| Dynamic load (Fy), maximum | [N] | 1400 [1] |
| Dynamic load (Fz), maximum | [N] | 1400 |
| Dynamic load torque (Mx), maximum | [Nm] | 25 |
| Dynamic load torque (My), maximum | [Nm] | 50 |
| Dynamic load torque (Mz), maximum | [Nm] | 50 |
| Drive shaft force (Frd), maximum | [N] | 150 |
| Drive shaft torque (Mta), maximum | [Nm] | 17 |
| Pulley diameter | [mm] | 38,20 |
| Stroke per shaft revolution | [mm] | 120 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>4,30<br>0,45<br>1,25 |

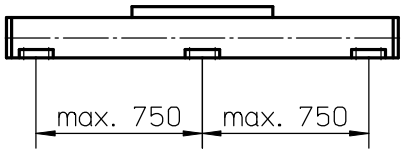
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 1,6 |
| 600 | 2,5 |
| 1250 | 3,0 |

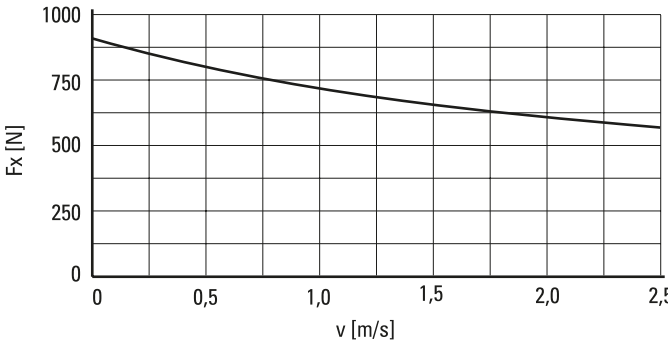
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

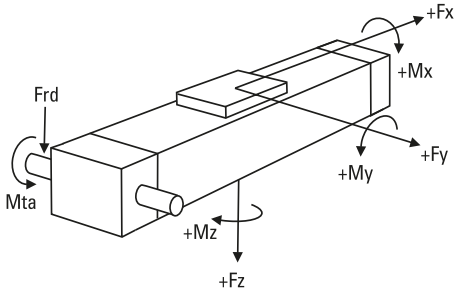



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



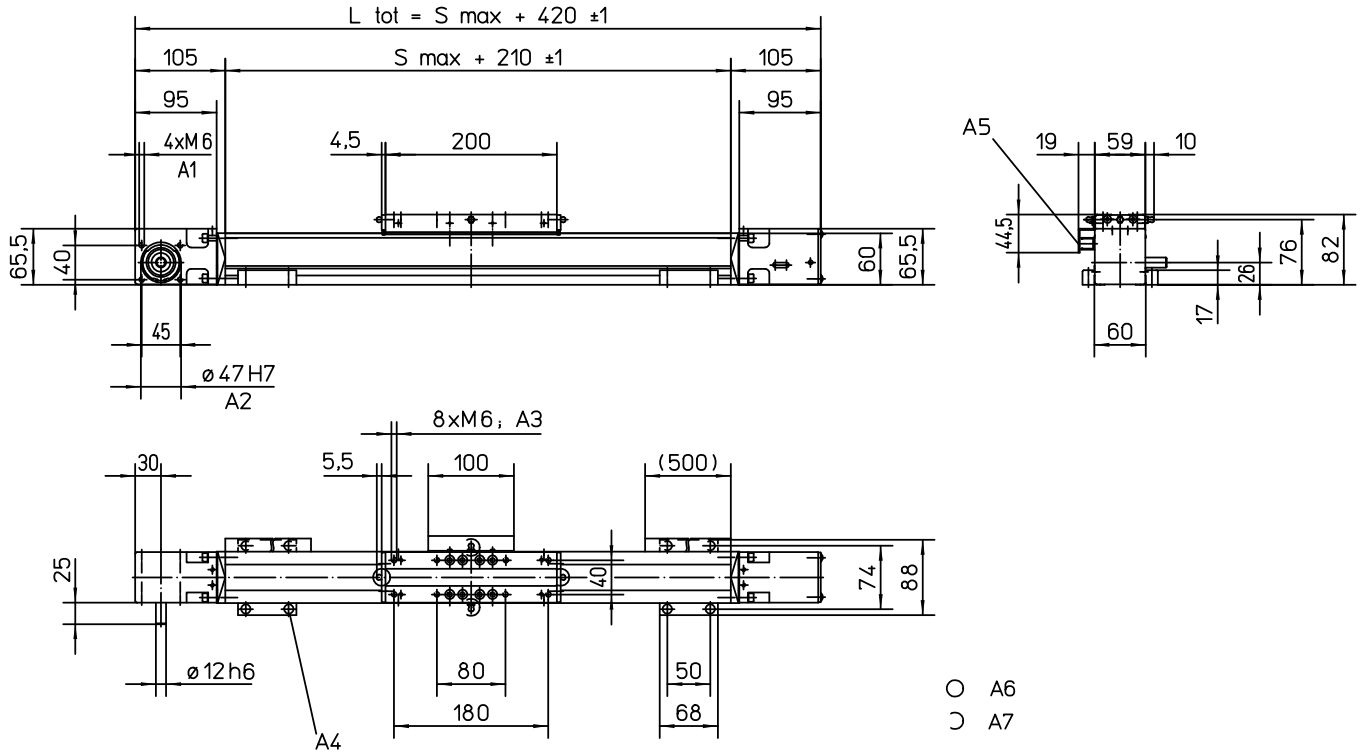

## Definition of Forces



# WM60Z

## Belt Drive, Ball Guide, Short Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |



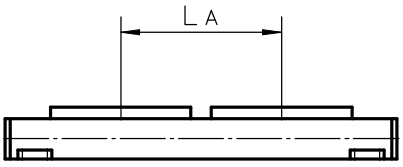

A1: depth 15
A2: depth 4
A3: depth 11
A4: socket cap screw ISO4762-M6×20 8.8

A5: ENF inductive sensor rail kit (optional - see page 172)
A6: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A7: can be changed over to one of three alternative lubrications points by the customer

## Double Short Carriages

| Parameter | | WM60Z |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 255 |
| Dynamic load (Fy), maximum | [N] | 2800 |
| Dynamic load (Fz), maximum | [N] | 2800 |
| Dynamic load torque (My), maximum | [Nm] | $L_{A^1} \times 1,4$ |
| Dynamic load torque (Mz), maximum | [Nm] | $L_{A^1} \times 1,4$ |
| Force required to move second carriage | [N] | 18 |
| Total length (L tot) | [mm] | Smax + 420 + $L_A$ |

[1] Value in mm



# WM80Z

## Belt Drive, Ball Guide, Standard Carriage

» Ordering key - see page 202
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | WM80Z |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of belt | 25 AT 10 |
| Carriage sealing system | self-adjusting plastic cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WM80Z |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5400 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 885 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1470 |
| Dynamic load (Fy), maximum | [N] | 3000 [1] |
| Dynamic load (Fz), maximum | [N] | 3000 |
| Dynamic load torque (Mx), maximum | [Nm] | 150 |
| Dynamic load torque (My), maximum | [Nm] | 300 |
| Dynamic load torque (Mz), maximum | [Nm] | 300 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 40 |
| Pulley diameter | [mm] | 54,11 |
| Stroke per shaft revolution | [mm] | 170 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>11,2<br>0,8<br>3,4 |

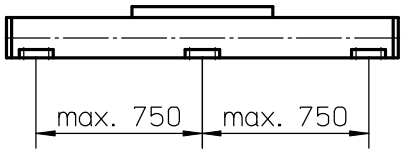
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 6,5 |
| 450 | 7,7 |
| 885 | 9,3 |

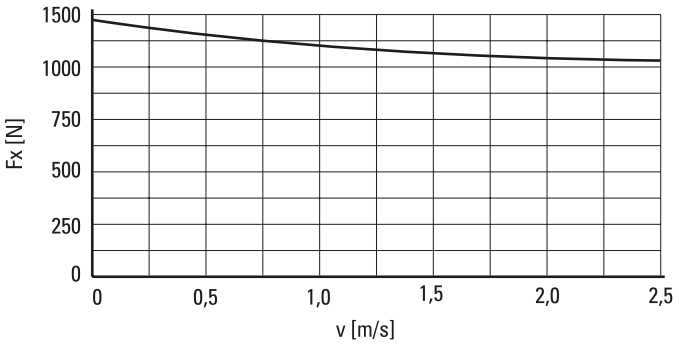
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

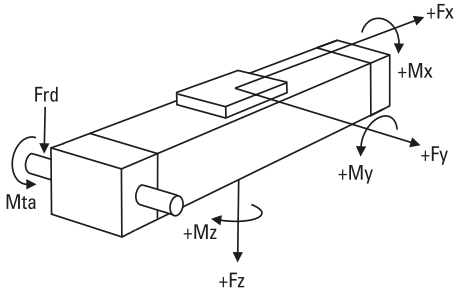



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



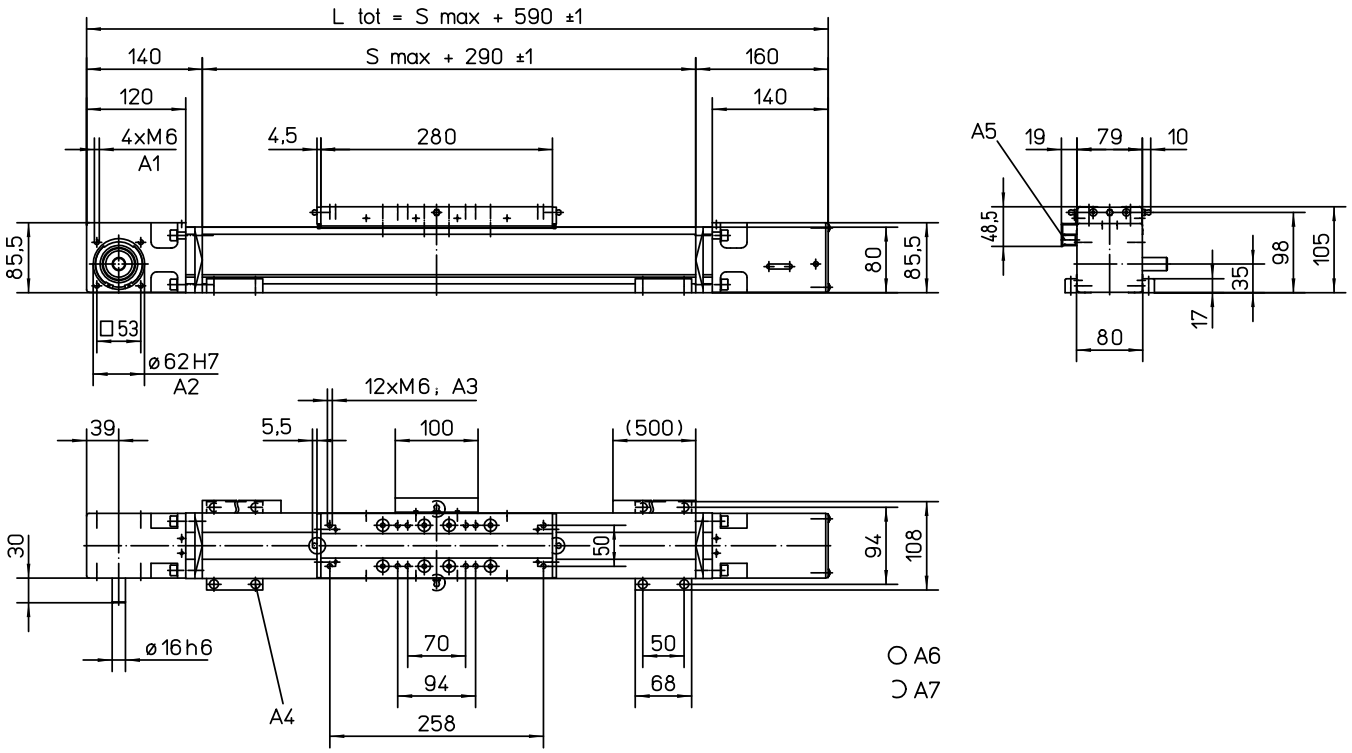

## Definition of Forces



# WM80Z

## Belt Drive, Ball Guide, Standard Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |

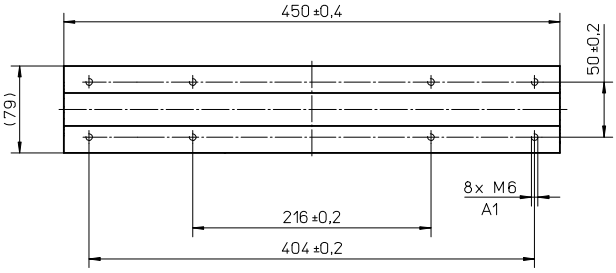



A1: depth 15
A2: depth 2,5
A3: depth 12
A4: socket cap screw ISO4762-M6×20 8.8

A5: ENF inductive sensor rail kit (optional - see page 172)
A6: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A7: can be changed over to one of three alternative lubrications points by the customer

## Long Carriage

| Parameter | | WM80Z |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 750 |
| Dynamic load torque (Mz), maximum | [Nm] | 750 |
| Weight | [kg] | 5,1 |

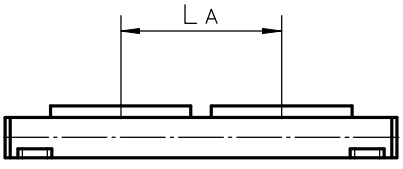



A1: depth 12 mm

## Double Carriages

| Parameter | | WM80Z |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 360 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (My), maximum | [Nm] | $L_{A^1} \times 3$ |
| Dynamic load torque (Mz), maximum | [Nm] | $L_{A^1} \times 3$ |
| Force required to move second carriage | [N] | 25 |
| Total length (L tot) | [mm] | Smax + 590 + $L_A$ |

[1] Value in mm



# WM80Z

## Belt Drive, Ball Guide, Short Carriage

» Ordering key - see page 202
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | WM80Z |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of belt | 25 AT 10 |
| Carriage sealing system | self-adjusting plastic cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WM80Z |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5500 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 885 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1470 |
| Dynamic load (Fy), maximum | [N] | 2100 [1] |
| Dynamic load (Fz), maximum | [N] | 2100 |
| Dynamic load torque (Mx), maximum | [Nm] | 68 |
| Dynamic load torque (My), maximum | [Nm] | 135 |
| Dynamic load torque (Mz), maximum | [Nm] | 135 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 40 |
| Pulley diameter | [mm] | 54,11 |
| Stroke per shaft revolution | [mm] | 170 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of each carriage | [kg] | <br>9,2<br>0,8<br>2,1 |

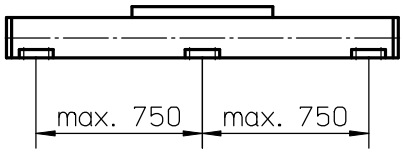
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 4,0 |
| 450 | 5,4 |
| 885 | 6,2 |

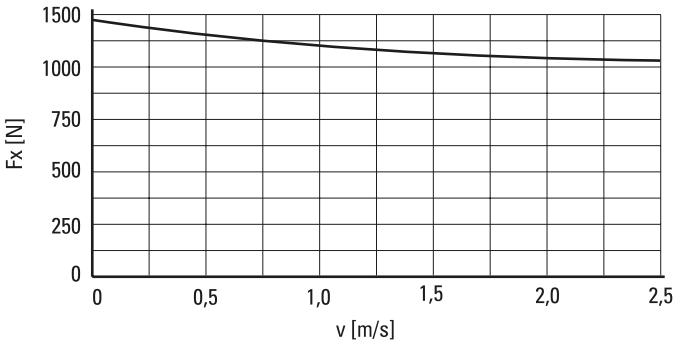
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

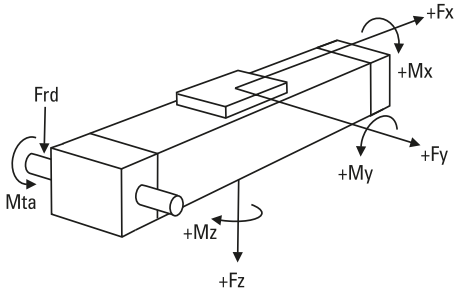



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



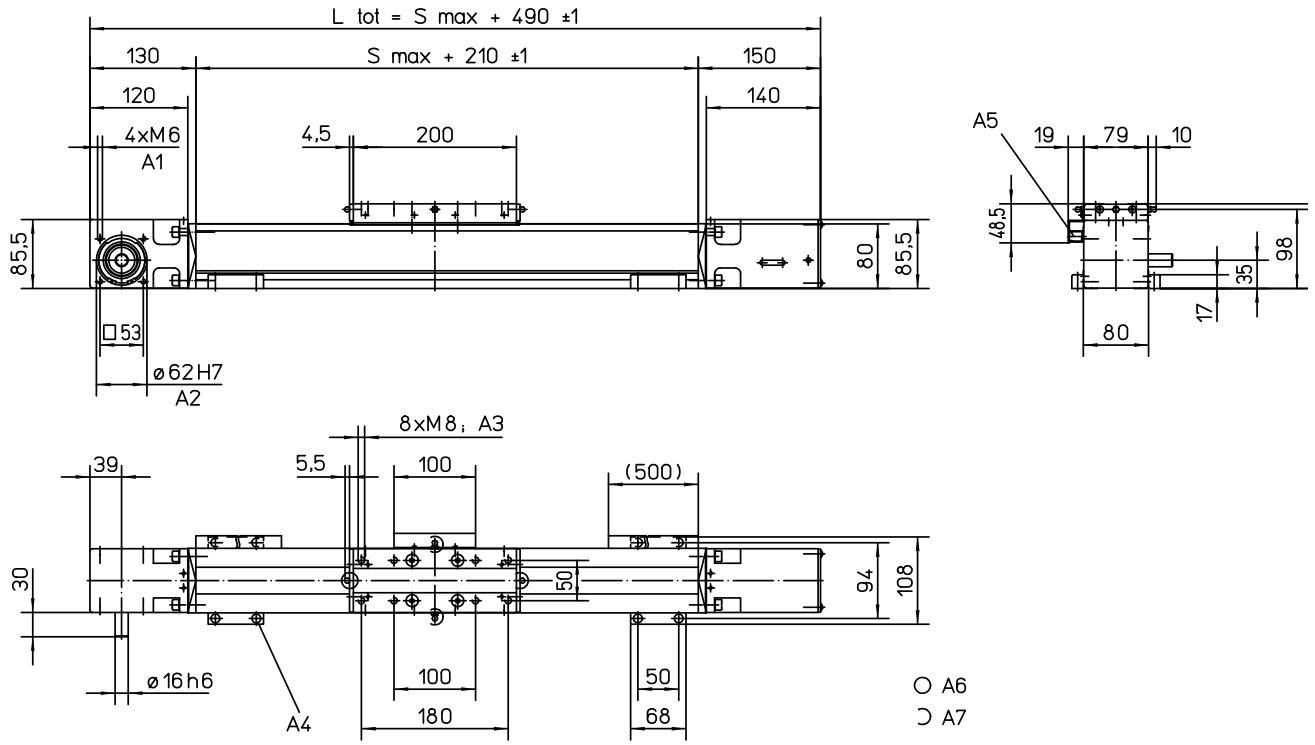

## Definition of Forces



# WM80Z

## Belt Drive, Ball Guide, Short Carriage

| Dimensions | Projection |
|---|---|
| METRIC | |



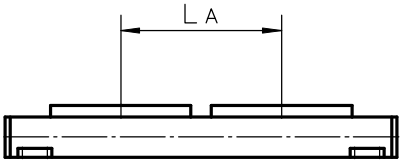

A1: depth 15
A2: depth 2,5
A3: depth 12
A4: socket cap screw ISO4762-M6×20 8.8

A5: ENF inductive sensor rail kit (optional - see page 172)
A6: tapered lubricating nipple to DIN71412 AM6 on fixed-bearing side as standard feature
A7: can be changed over to one of three alternative lubrications points by the customer

## Double Short Carriages

| Parameter | | WM80Z |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 280 |
| Dynamic load (Fy), maximum | [N] | 4200 |
| Dynamic load (Fz), maximum | [N] | 4200 |
| Dynamic load torque (My), maximum | [Nm] | $L_{A^1} \times 2,1$ |
| Dynamic load torque (Mz), maximum | [Nm] | $L_{A^1} \times 2,1$ |
| Force required to move second carriage | [N] | 22,5 |
| Total length (L tot) | [mm] | Smax + 490 + $L_A$ |

[1] Value in mm



# M55

## Belt Drive, Ball Guide

» Ordering key - see page 203
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M55 |
|---|---|
| Profile size (w × h) [mm] | 58 × 55 |
| Type of belt | 22-STD SM5-HP |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication of ball guide carriages |
| Included accessories | none |

## Performance Specifications

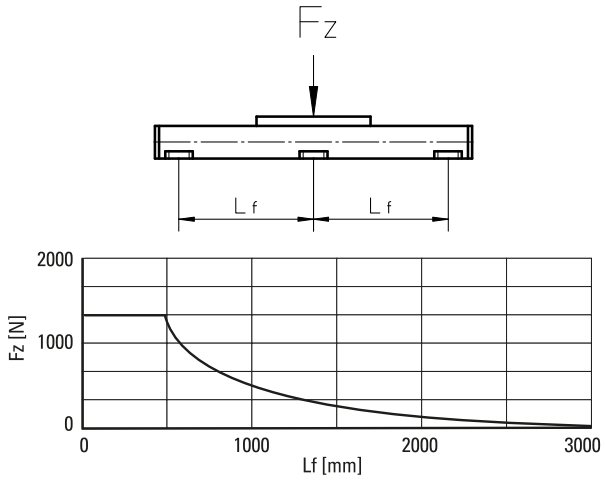
| Parameter | | M55 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 7000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,1 |
| Input speed, maximum | [rpm] | 2850 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>400<br>200 |
| Dynamic load (Fy), maximum | [N] | 750 |
| Dynamic load (Fz), maximum | [N] | 750 |
| Dynamic load torque (Mx), maximum | [Nm] | 5 |
| Dynamic load torque (My), maximum | [Nm] | 29 |
| Dynamic load torque (Mz), maximum | [Nm] | 29 |
| Drive shaft force (Frd), maximum | [N] | 200 |
| Drive shaft torque (Mta), maximum | [Nm] | 12 |
| Pulley diameter | [mm] | 33,42 |
| Stroke per shaft revolution | [mm] | 105 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>4,80<br>0,53<br>1,20 |

## Carriage Idle Torque (M idle) [Nm]

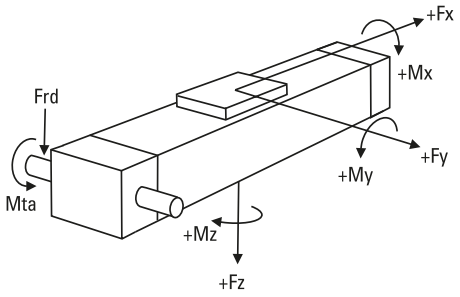
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 1,0 | 1,9 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



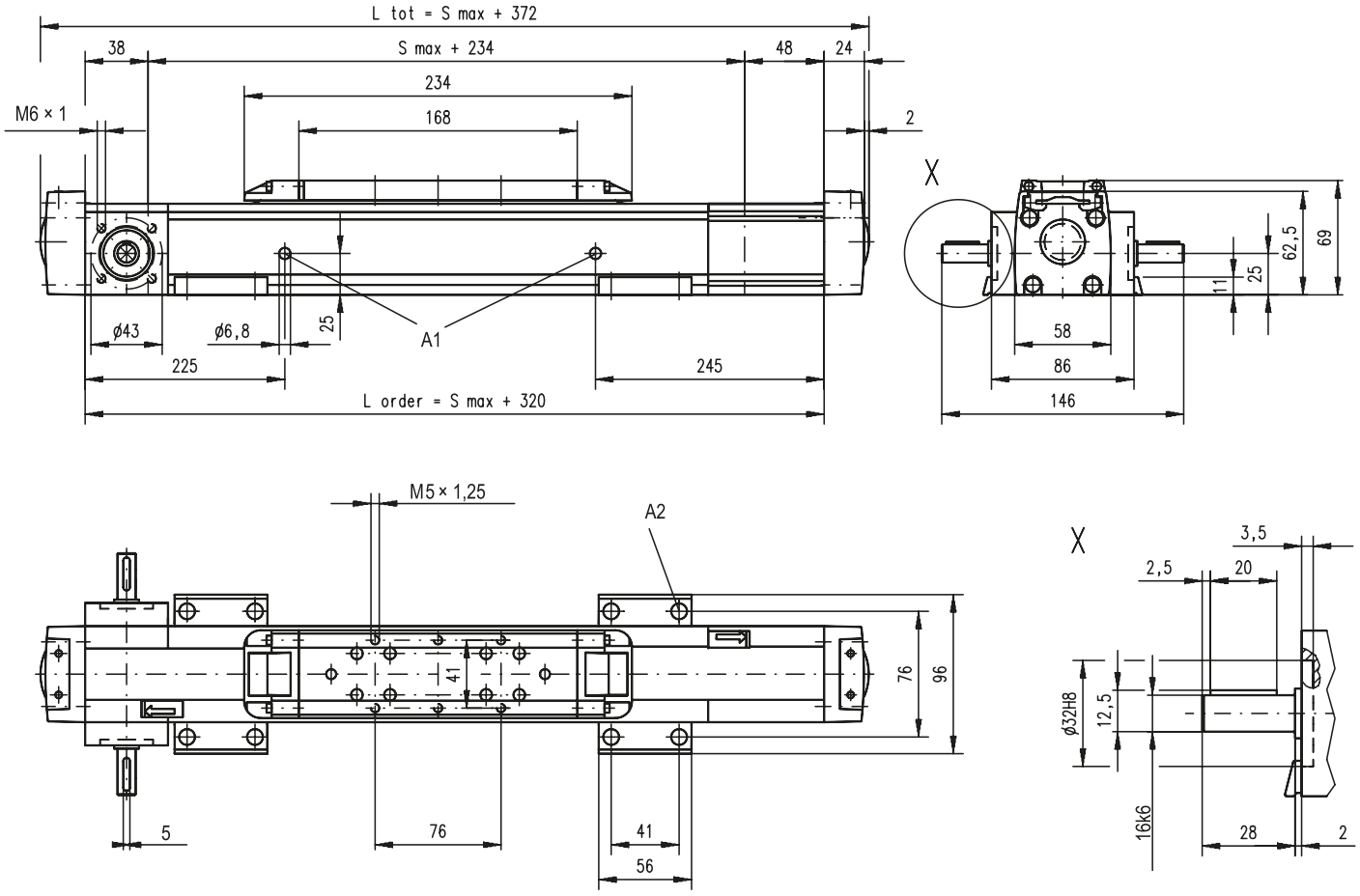

## Definition of Forces



# M55

## Belt Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

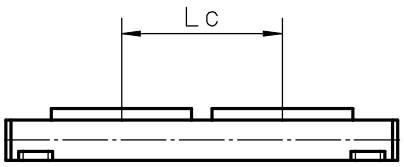



A1: lubrication holes
A2: ø9,5/ø5,5 for socket head cap screw M5

## Double Carriages

| Parameter | | M55 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 250 |
| Dynamic load (Fy), maximum | [N] | 1125 |
| Dynamic load (Fz), maximum | [N] | 1125 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 0,56 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 0,56 |
| Force required to move second carriage | [N] | 2 |
| Ordering length (L order) | [mm] | Smax + Lc + 320 |
| Total length (L tot] | [mm] | L order + 52 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>7,06<br>2,40 |

[1] Value in mm



# M75

## Belt Drive, Ball Guide

» Ordering key - see page 203
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M75 / T75 |
|---|---|
| Profile size (w × h) [mm] | 86 × 75 |
| Type of belt | STD5-40 |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication of ball guide carriages |
| Included accessories | none |

## Performance Specifications

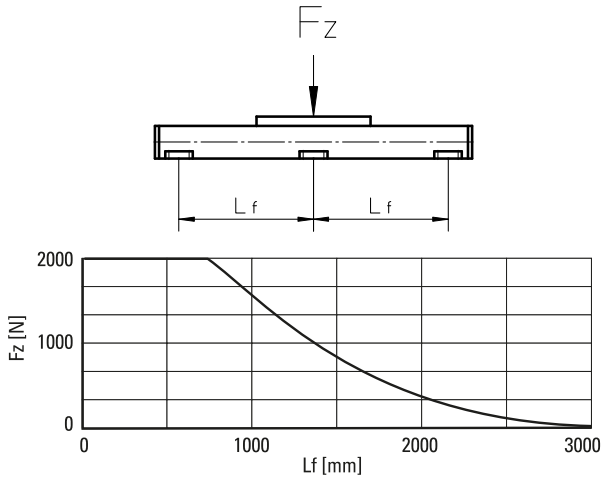
| Parameter | | M75 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 12000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,1 |
| Input speed, maximum | [rpm] | 2300 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>900<br>450 |
| Dynamic load (Fy), maximum | [N] | 1750 |
| Dynamic load (Fz), maximum | [N] | 1750 |
| Dynamic load torque (Mx), maximum | [Nm] | 16 |
| Dynamic load torque (My), maximum | [Nm] | 84 |
| Dynamic load torque (Mz), maximum | [Nm] | 84 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 30 |
| Pulley diameter | [mm] | 41,38 |
| Stroke per shaft revolution | [mm] | 130 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>7,50<br>0,88<br>2,00 |

## Carriage Idle Torque (M idle) [Nm]

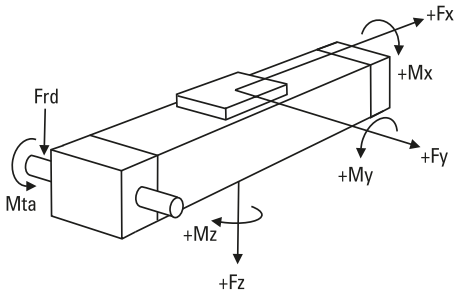
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 1,0 | 1,9 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



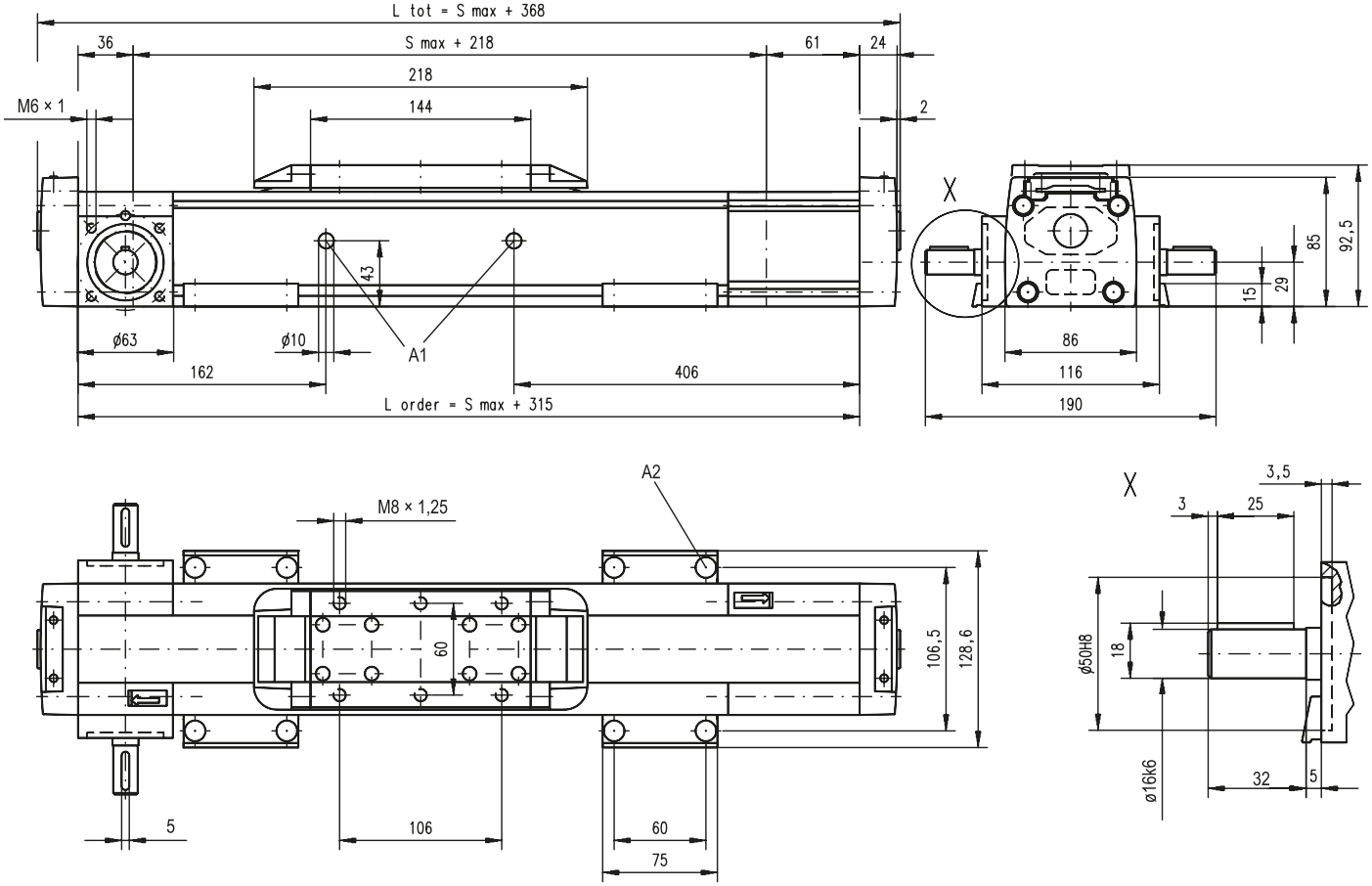

## Definition of Forces



# M75

## Belt Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

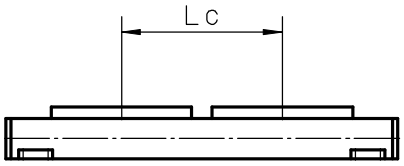



A1: lubrication holes
A2: ø13,5/ø8,5 for socket head cap screw M8

## Double Carriages

| Parameter | | M75 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 250 |
| Dynamic load (Fy), maximum | [N] | 2625 |
| Dynamic load (Fz), maximum | [N] | 2625 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 1,313 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 1,313 |
| Force required to move second carriage | [N] | 2 |
| Ordering length (L order) | [mm] | Smax + Lc + 315 |
| Total length (L tot) | [mm] | L order + 52 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>11,67<br>4,00 |

[1] Value in mm



# M100

## Belt Drive, Ball Guide

» Ordering key - see page 203
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | M100 |
|---|---|
| Profile size (w × h) [mm] | 108 × 100 |
| Type of belt | STD8-50 |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication of ball guide carriages |
| Included accessories | none |

## Performance Specifications

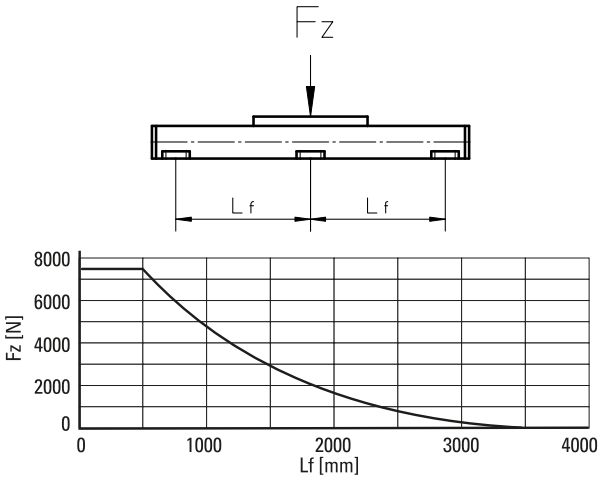
| Parameter | | M100 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 12000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,1 |
| Input speed, maximum | [rpm] | 1700 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>1250<br>625 |
| Dynamic load (Fy), maximum | [N] | 4000 |
| Dynamic load (Fz), maximum | [N] | 4000 |
| Dynamic load torque (Mx), maximum | [Nm] | 43 |
| Dynamic load torque (My), maximum | [Nm] | 280 |
| Dynamic load torque (Mz), maximum | [Nm] | 280 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 45 |
| Pulley diameter | [mm] | 56,02 |
| Stroke per shaft revolution | [mm] | 176 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>11,61<br>1,43<br>2,20 |

## Carriage Idle Torque (M idle) [Nm]

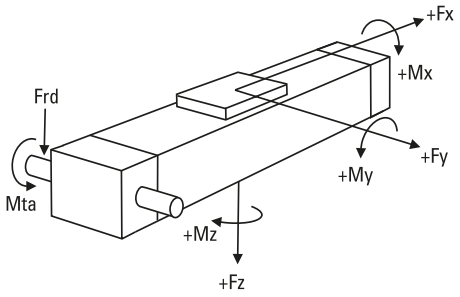
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 1,6 | 3,1 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



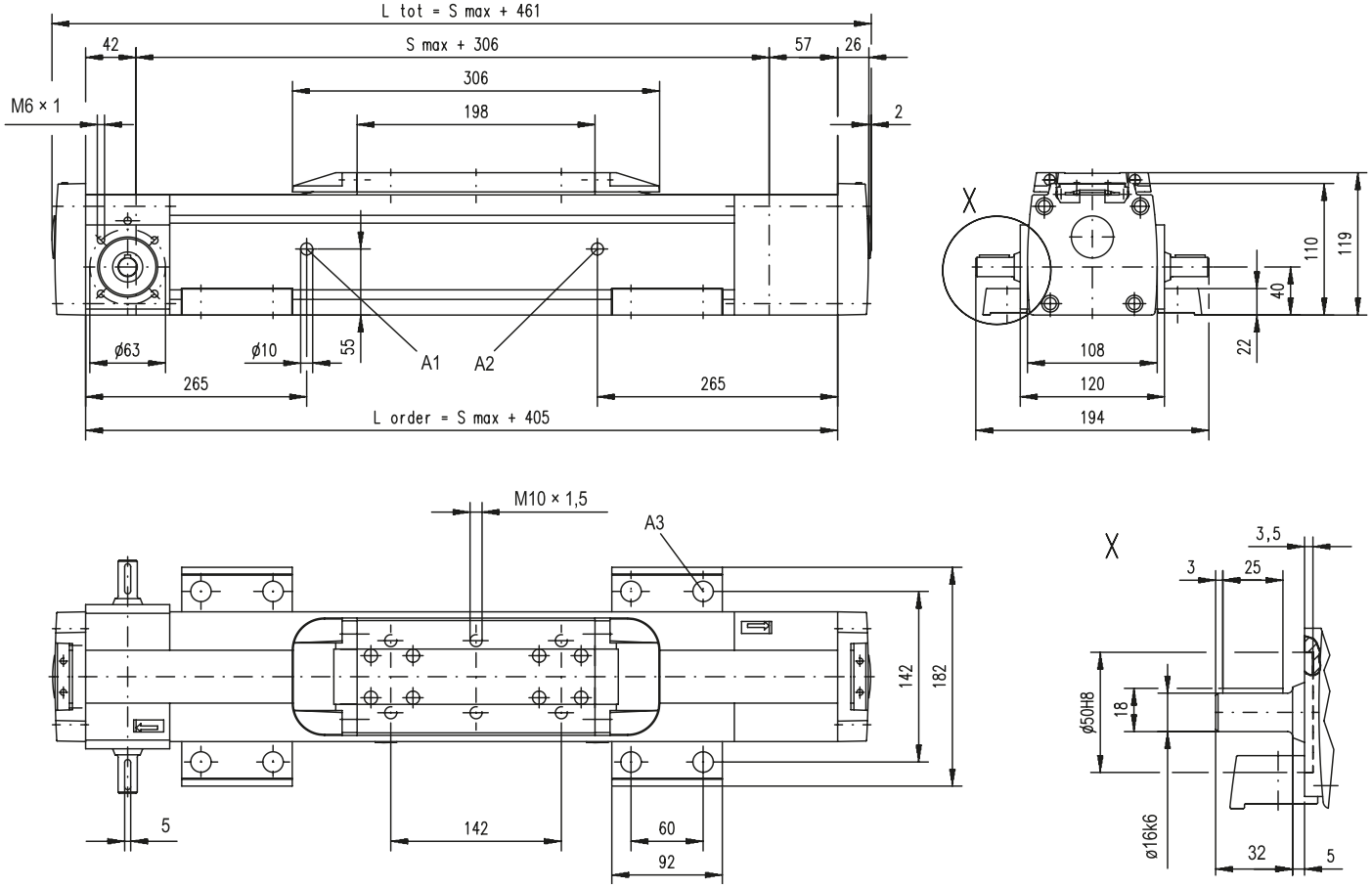

## Definition of Forces



# M100

## Belt Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

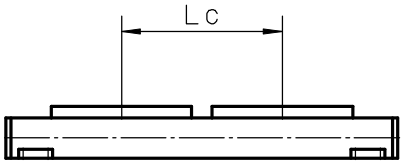



A1: lubrication hole
A2: lubrication hole (no hole if L order is < 856 mm)
A3: ø17/ø10,5 for socket head cap screw M10

## Double Carriages

| Parameter | | M100 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 350 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 3 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 3 |
| Force required to move second carriage | [N] | 2 |
| Ordering length (L order) | [mm] | Smax + Lc + 405 |
| Total length (L tot] | [mm] | L order + 56 |
| Weight<br>of unit with zero stroke<br>of carriagess | [kg] | <br>18,92<br>4,40 |

[1] Value in mm



# MLSM80Z

## Belt Drive, Ball Guide

» Ordering key - see page 204
» Accessories - see page 135
» Additional data - see page 183

## General Specifications

| Parameter | MLSM80Z |
|---|---|
| Profile size (w × h) [mm] | 240 × 85 |
| Type of belt | 75 ATL 10 |
| Carriage sealing system | plastic cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | MLSM80Z |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5900 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 1500 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 5000 [1] |
| Dynamic load (Fy), maximum | [N] | 6400 |
| Dynamic load (Fz), maximum | [N] | 6400 |
| Dynamic load torque (Mx), maximum | [Nm] | 600 |
| Dynamic load torque (My), maximum | [Nm] | 720 |
| Dynamic load torque (Mz), maximum | [Nm] | 720 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 150 |
| Pulley diameter | [mm] | 63,66 |
| Stroke per shaft revolution | [mm] | 200 |
| Weight | [kg] | |
| of unit with zero stroke | | 30,8 |
| of every 100 mm of stroke | | 2,2 |
| of each carriage | | 9,6 |

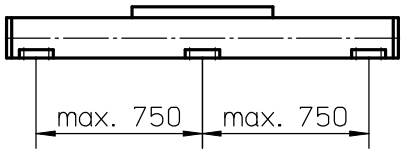
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 8,5 |
| 750 | 12 |
| 1500 | 14,5 |

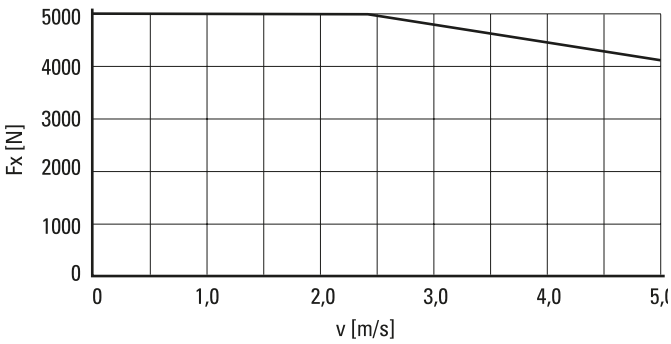
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

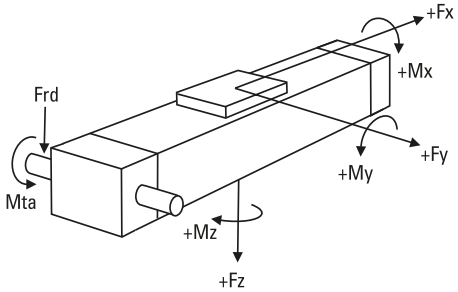



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



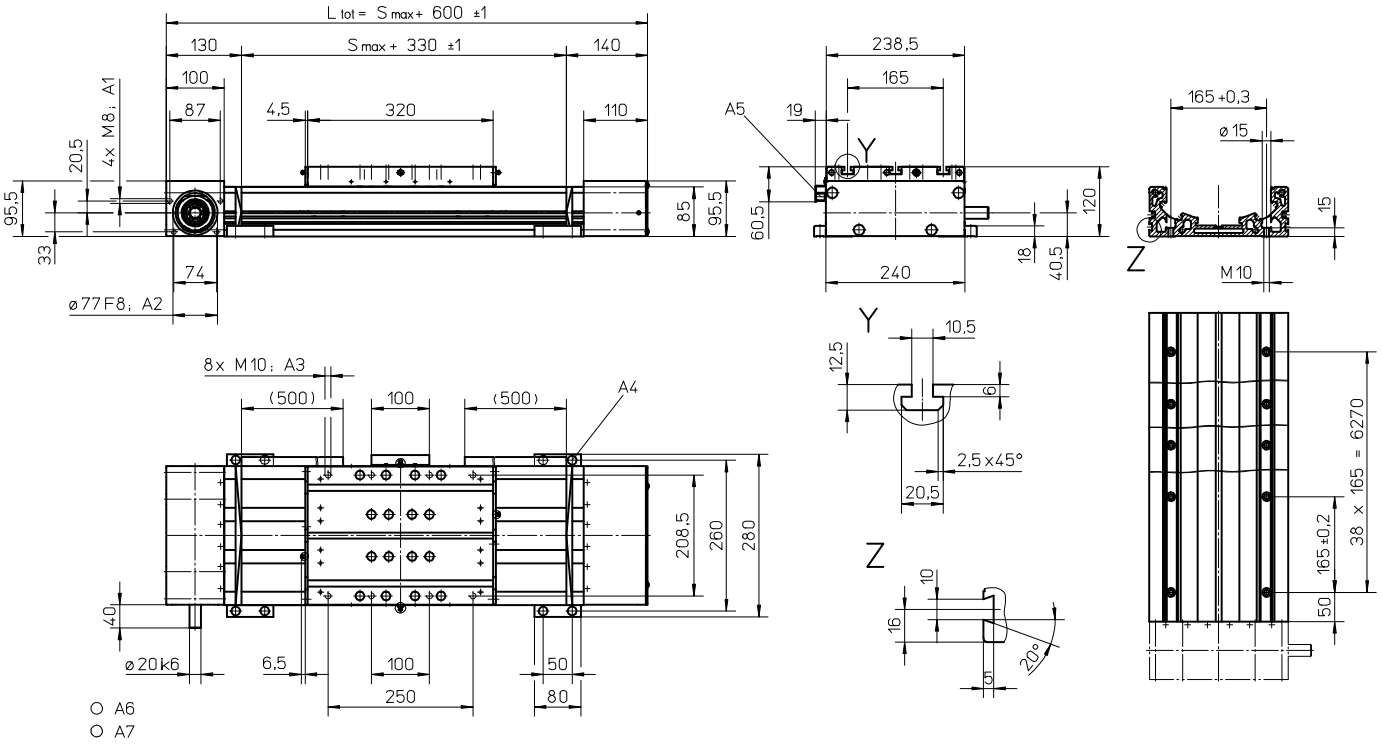

## Definition of Forces



# MLSM80Z

## Belt Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

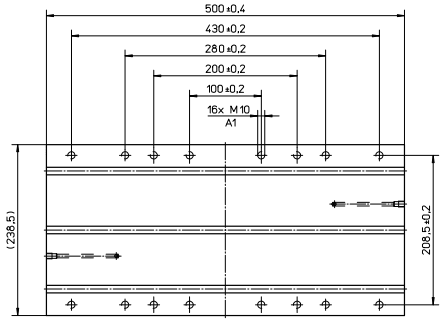



A1: depth 18
A2: depth 4
A3: depth 15
A4: socket cap screw ISO4762-M8×20 8.8

A5: ENF inductive sensor rail kit (optional - see page 172)
A6: tapered lubricating nipple to DIN71412 M8×1 on fixed-bearing side as standard feature
A7: can be changed over to one of the three alternative lubricating points by the customer

## Long Carriage

| Parameter | | MLSM80Z |
|---|---|---|
| Carriage length | [mm] | 500 |
| Dynamic load torque (My), maximum | [Nm] | 1400 |
| Dynamic load torque (Mz), maximum | [Nm] | 1400 |
| Weight | [kg] | 14 |

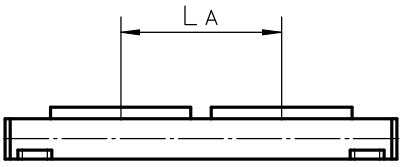



A1: depth 15

## Double Carriages

| Parameter | | MLSM80Z |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 400 |
| Dynamic load (Fy), maximum | [N] | 12800 |
| Dynamic load (Fz), maximum | [N] | 12800 |
| Dynamic load torque (My), maximum | [Nm] | $L_{A^1} \times 6,4$ |
| Dynamic load torque (Mz), maximum | [Nm] | $L_{A^1} \times 6,4$ |
| Force required to move second carriage | [N] | 35 |
| Total length (L tot) | [mm] | Smax + 600 + $L_A$ |

[1] Value in mm



# Linear Motion Systems with Belt Drive and Slide Guide

## Overview

### Movopart M



M50

**Features**

- Can be installed in any orientation
- Patented self-adjusting prism slide guides
- Resistant to shock loads and vibrations
- Low cost

| Parameter | | M50 |
|---|---|---|
| Profile size (width × height) | [mm] | 50 × 50 |
| Stroke length (Smax), maximum | [mm] | 5000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Dynamic carriage load (Fz), maximum | [N] | 400 |
| Remarks | | no cover band |
| Page | | 100 |

### Movopart M



M100

**Features**

- Can be installed in any orientation
- Self-adjusting stainless steel cover band
- Patented self-adjusting prism slide guides
- Wash down and enhanced wash down protected versions available

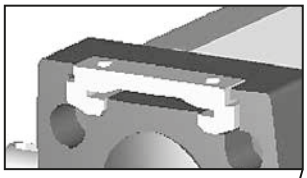
| Parameter | | M55 | M75 | M100 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 58 × 55 | 86 × 75 | 108 × 100 |
| Stroke length (Smax), maximum | [mm] | 7000 | 12000 | 12000 |
| Linear speed, maximum | [m/s] | 5,0 | 5,0 | 5,0 |
| Dynamic carriage load (Fz), maximum | [N] | 400 | 1485 | 3005 |
| Remarks | | - | - | - |
| Page | | 102 | 104 | 106 |

# Linear Motion Systems with Belt Drive and Slide Guide

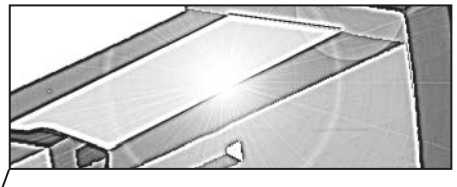
## Overview

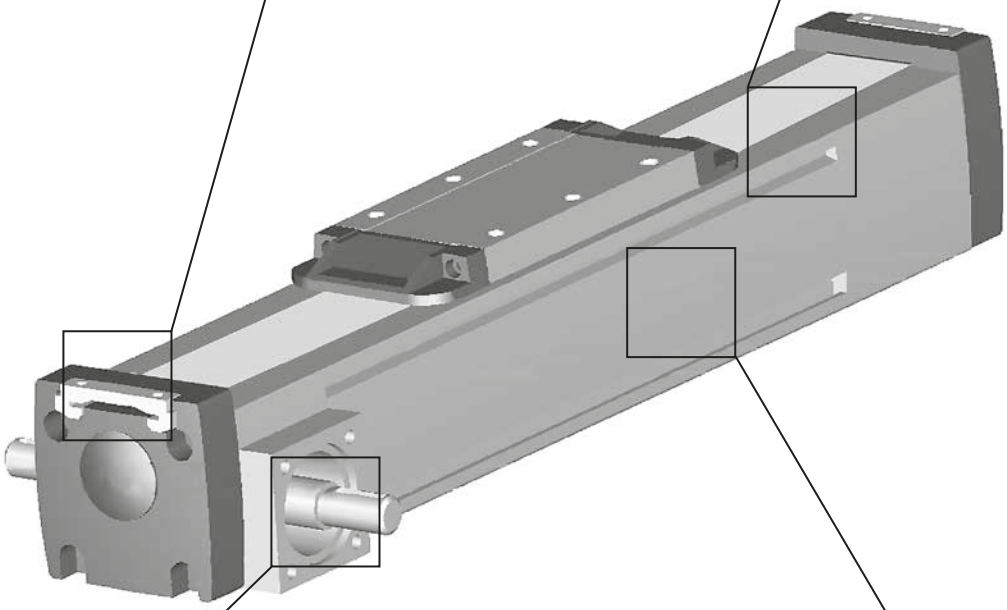
## M-Series Technical Presentation

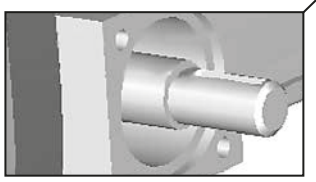
**Cover band**
The self-adjusting magnetically sealed stainless steel cover band protects the unit from the penetration of dirt, dust and liquids.



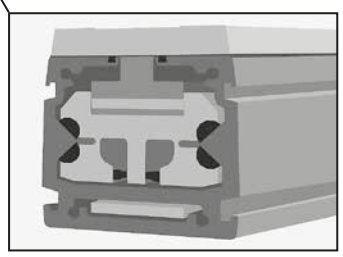
**Environmental protection**
The standard unit can operate in harsh environments but is also available in wash down or enhanced wash down protected versions for the thoughest environments.







**Belt drive**
The belt runs on the inside of the profile and can easily be re-tensioned without removing the load from the carriage.



**Prism slide guides**
The patented self aligning prism slide guides are accurate, durable and are resistant to vibrations and shock loads.

# M50

## Belt Drive, Slide Guide

» Ordering key - see page 205
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | M50 |
|---|---|
| Profile size (w × h) [mm] | 50 × 50 |
| Type of belt | GT 5MR-19 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubricated for life |
| Included accessories | none |

## Performance Specifications

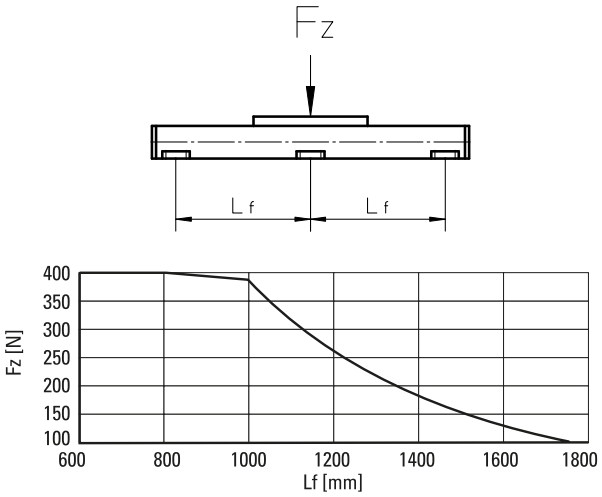
| Parameter | | M50 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,2 |
| Input speed, maximum | [rpm] | 2300 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>400<br>200 |
| Dynamic load (Fy), maximum | [N] | 400 |
| Dynamic load (Fz), maximum | [N] | 400 |
| Dynamic load torque (Mx), maximum | [Nm] | 5 |
| Dynamic load torque (My), maximum | [Nm] | 21 |
| Dynamic load torque (Mz), maximum | [Nm] | 21 |
| Drive shaft force (Frd), maximum | [N] | 350 |
| Drive shaft torque (Mta), maximum | [Nm] | 10 |
| Pulley diameter | [mm] | 41,38 |
| Stroke per shaft revolution | [mm] | 130 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>0,71<br>0,96<br>0,33 |

## Carriage Idle Torque (M idle) [Nm]

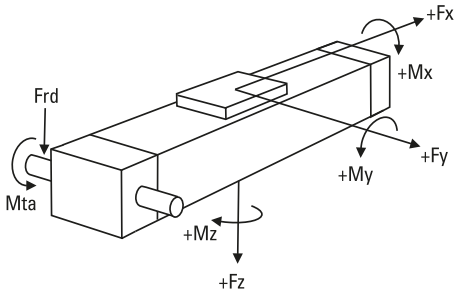
| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 2,1 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



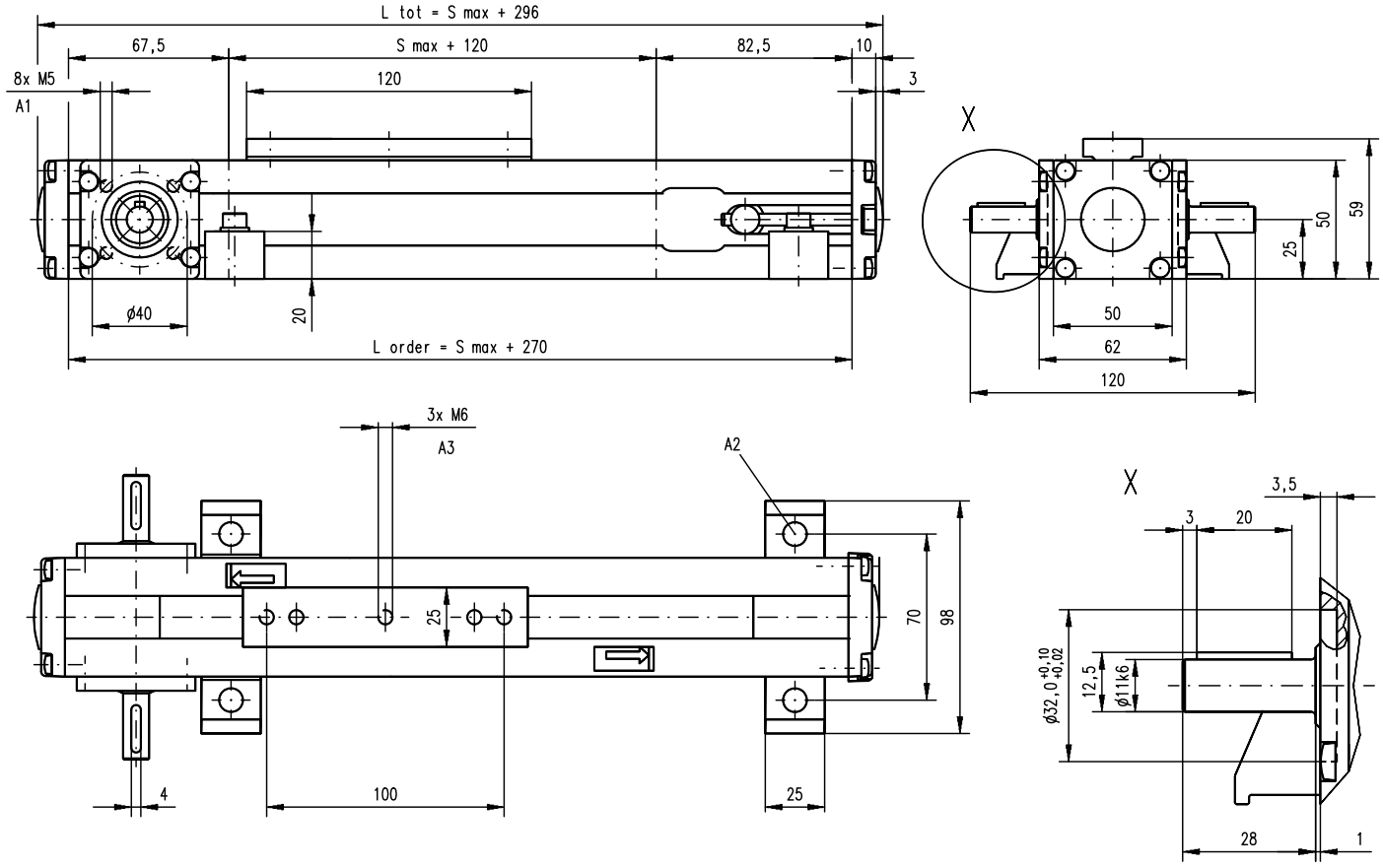

## Definition of Forces



# M50

## Belt Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 8,5
A2: ø6,5 for M6 screw
A3: depth 9, Heli coil

# M55

## Belt Drive, Slide Guide

» Ordering key - see page 205
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | M55 |
|---|---|
| Profile size (w × h) [mm] | 58 × 50 |
| Type of belt | 22-STD SM5-HP |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubricated for life |
| Included accessories | none |

## Performance Specifications

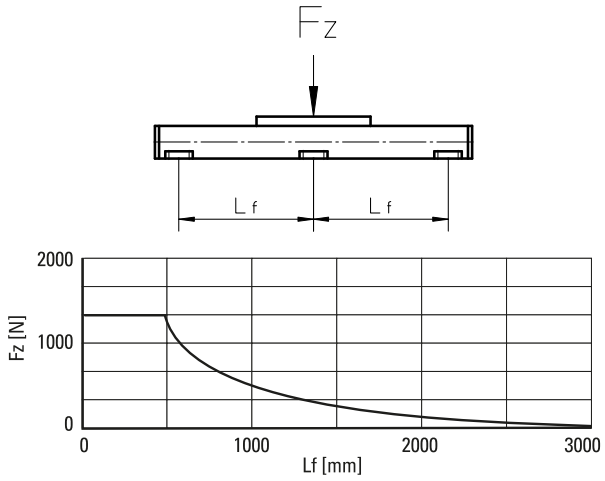
| Parameter | | M55 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 7000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,2 |
| Input speed, maximum | [rpm] | 2850 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>400<br>200 |
| Dynamic load (Fy), maximum | [N] | 400 |
| Dynamic load (Fz), maximum | [N] | 400 |
| Dynamic load torque (Mx), maximum | [Nm] | 9 |
| Dynamic load torque (My), maximum | [Nm] | 21 |
| Dynamic load torque (Mz), maximum | [Nm] | 21 |
| Drive shaft force (Frd), maximum | [N] | 200 |
| Drive shaft torque (Mta), maximum | [Nm] | 7 |
| Pulley diameter | [mm] | 33,42 |
| Stroke per shaft revolution | [mm] | 105 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>4,10<br>0,41<br>1,10 |

## Carriage Idle Torque (M idle) [Nm]

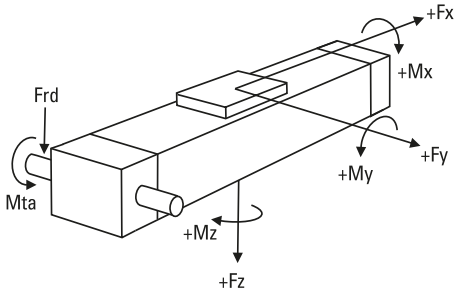
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 2,1 | 3,8 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



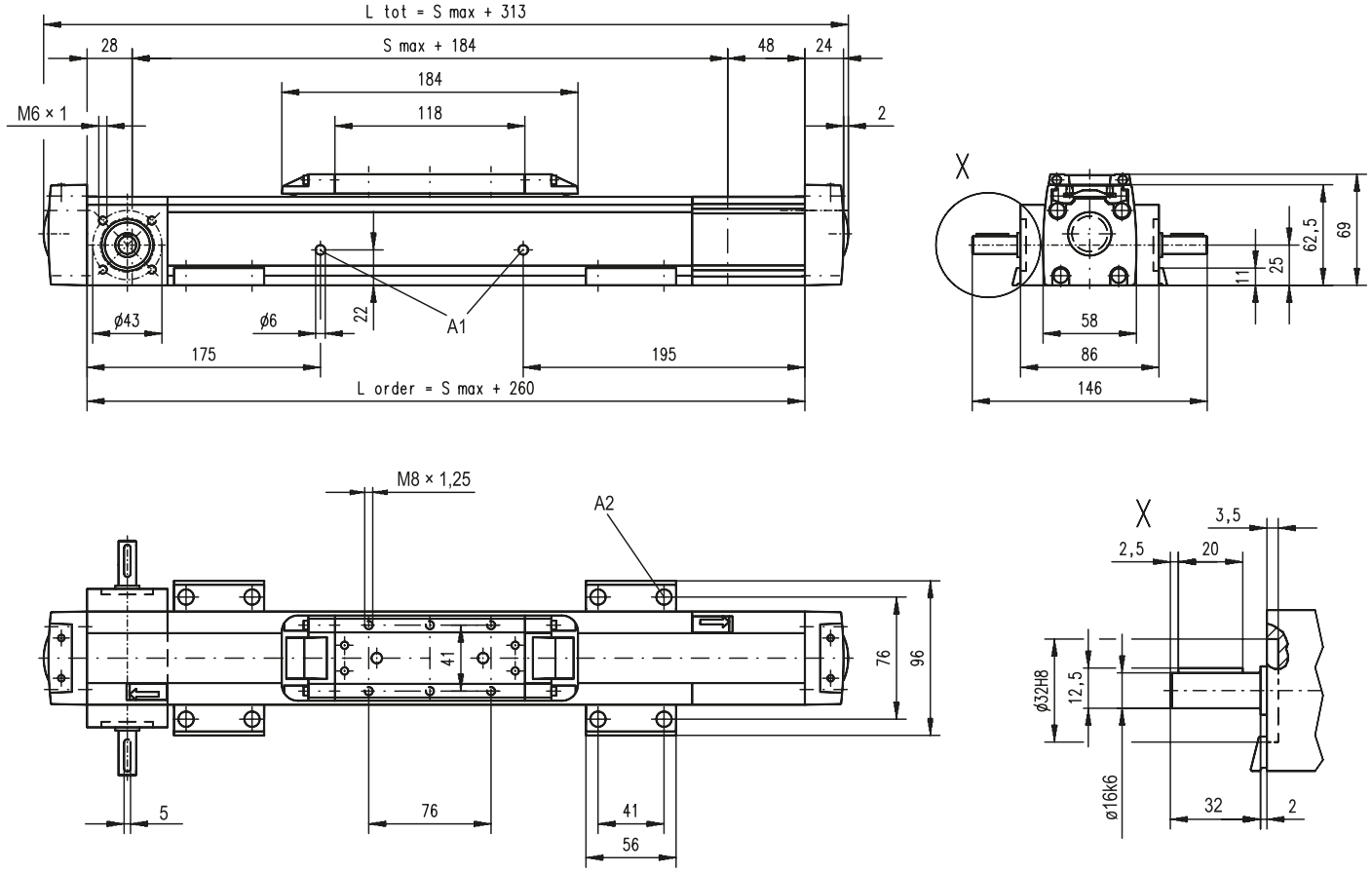

## Definition of Forces



# M55

## Belt Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

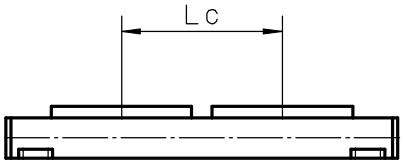



A1: lubrication holes
A2: ø9,5/ø5,5 for socket head cap screw M5

## Double Carriages

| Parameter | | M55 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 200 |
| Dynamic load (Fy), maximum | [N] | 600 |
| Dynamic load (Fz), maximum | [N] | 600 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 0,3 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 0,3 |
| Force required to move second carriage | [N] | 35 |
| Ordering length (L order) | [mm] | Smax + Lc + 260 |
| Total length (L tot) | [mm] | L order + 53 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>6,00<br>2,20 |

[1] Value in mm



# M75

## Belt Drive, Slide Guide

» Ordering key - see page 205
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | M75 |
|---|---|
| Profile size (w × h) [mm] | 86 × 75 |
| Type of belt | STD5-40 |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubricated for life |
| Included accessories | none |

## Performance Specifications

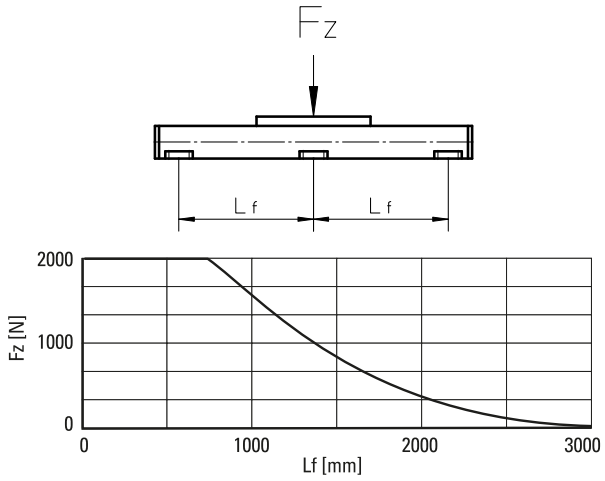
| Parameter | | M75 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 12000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,2 |
| Input speed, maximum | [rpm] | 2300 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>900<br>450 |
| Dynamic load (Fy), maximum | [N] | 1485 |
| Dynamic load (Fz), maximum | [N] | 1485 |
| Dynamic load torque (Mx), maximum | [Nm] | 49 |
| Dynamic load torque (My), maximum | [Nm] | 85 |
| Dynamic load torque (Mz), maximum | [Nm] | 85 |
| Drive shaft force (Frd), maximum | [N] | 600 |
| Drive shaft torque (Mta), maximum | [Nm] | 30 |
| Pulley diameter | [mm] | 41,38 |
| Stroke per shaft revolution | [mm] | 130 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>6,30<br>0,67<br>1,50 |

## Carriage Idle Torque (M idle) [Nm]

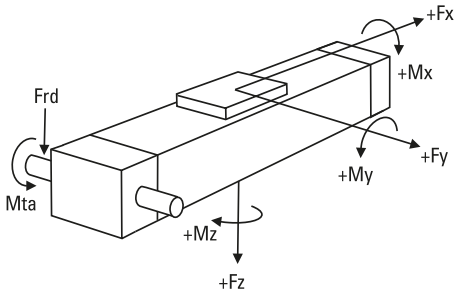
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 2,2 | 4,0 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



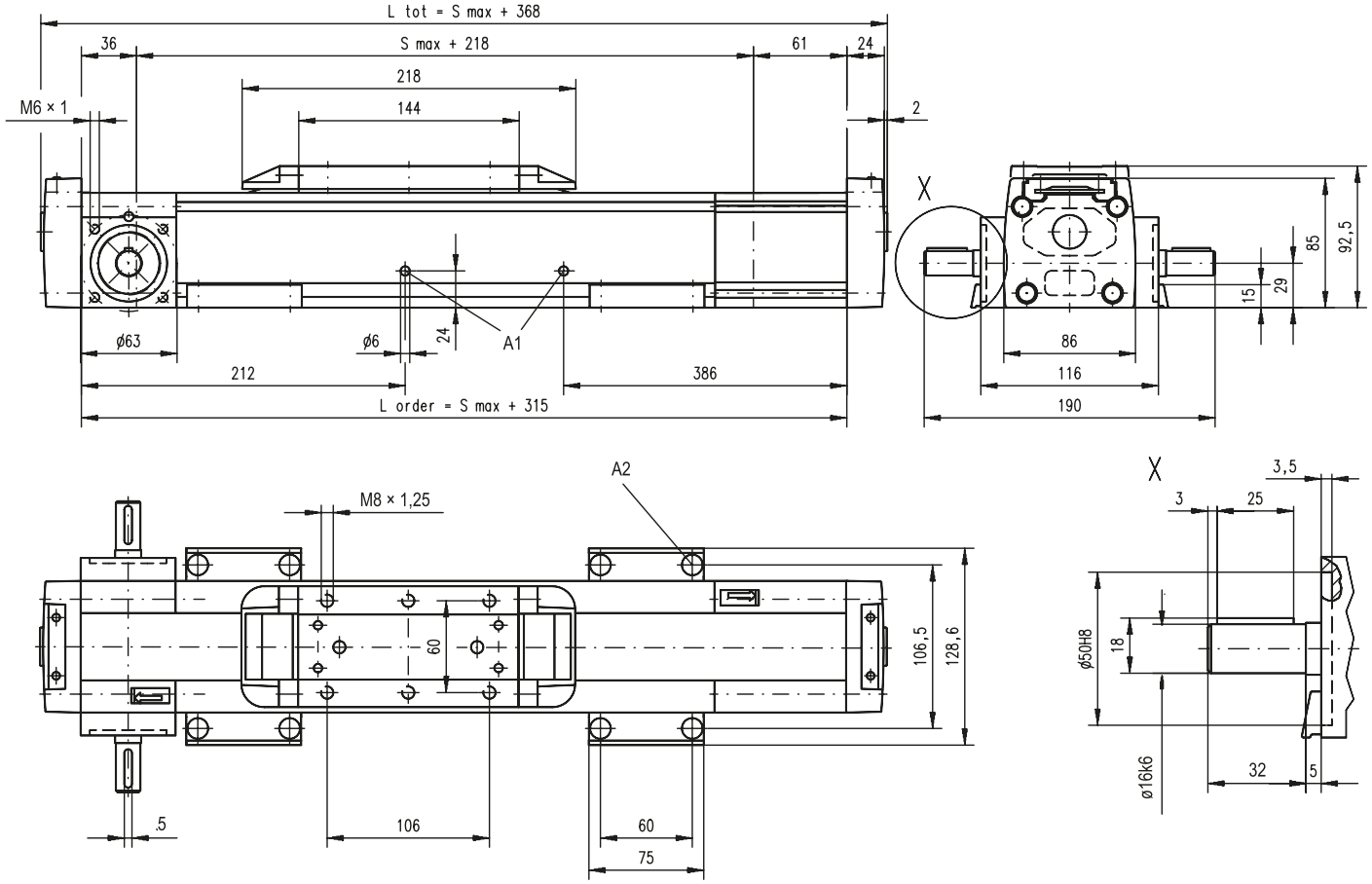

## Definition of Forces



# M75

## Belt Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

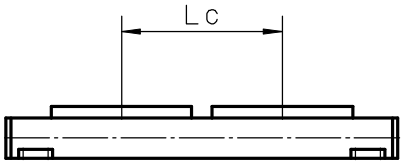



A1: lubrication holes
A2: ø13,5/ø8,5 for socket head cap screw M8

## Double Carriages

| Parameter | | M75 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 250 |
| Dynamic load (Fy), maximum | [N] | 2227 |
| Dynamic load (Fz), maximum | [N] | 2227 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 1,114 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 1,114 |
| Force required to move second carriage | [N] | 40 |
| Ordering length (L order) | [mm] | Smax + Lc + 315 |
| Total length (L tot] | [mm] | L order + 53 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>9,50<br>3,00 |

[1] Value in mm



# M100

## Belt Drive, Slide Guide

» Ordering key - see page 205
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | M100 |
|---|---|
| Profile size (w × h) [mm] | 108 × 100 |
| Type of belt | STD8-50 |
| Carriage sealing system | self-adjusting steel cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubricated for life |
| Included accessories | none |

## Performance Specifications

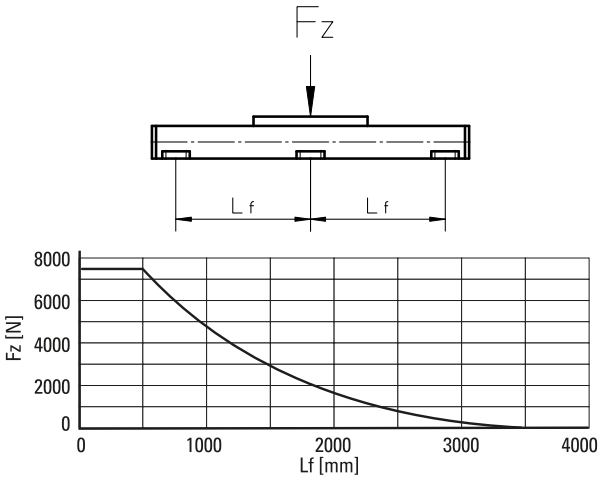
| Parameter | | M100 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 12000 |
| Linear speed, maximum | [m/s] | 5,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,2 |
| Input speed, maximum | [rpm] | 1700 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>< 2,5 m/s<br>> 2,5 m/s | [N] | <br>1250<br>625 |
| Dynamic load (Fy), maximum | [N] | 3005 |
| Dynamic load (Fz), maximum | [N] | 3005 |
| Dynamic load torque (Mx), maximum | [Nm] | 117 |
| Dynamic load torque (My), maximum | [Nm] | 279 |
| Dynamic load torque (Mz), maximum | [Nm] | 279 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 45 |
| Pulley diameter | [mm] | 56,02 |
| Stroke per shaft revolution | [mm] | 176 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of carriage | [kg] | <br>11,10<br>1,16<br>2,40 |

## Carriage Idle Torque (M idle) [Nm]

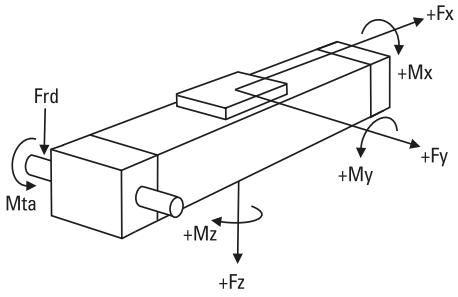
| Input speed [rpm] | Single Carriage | Double Carriages |
|---|---|---|
| 150 | 3,8 | 5,8 |

M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile



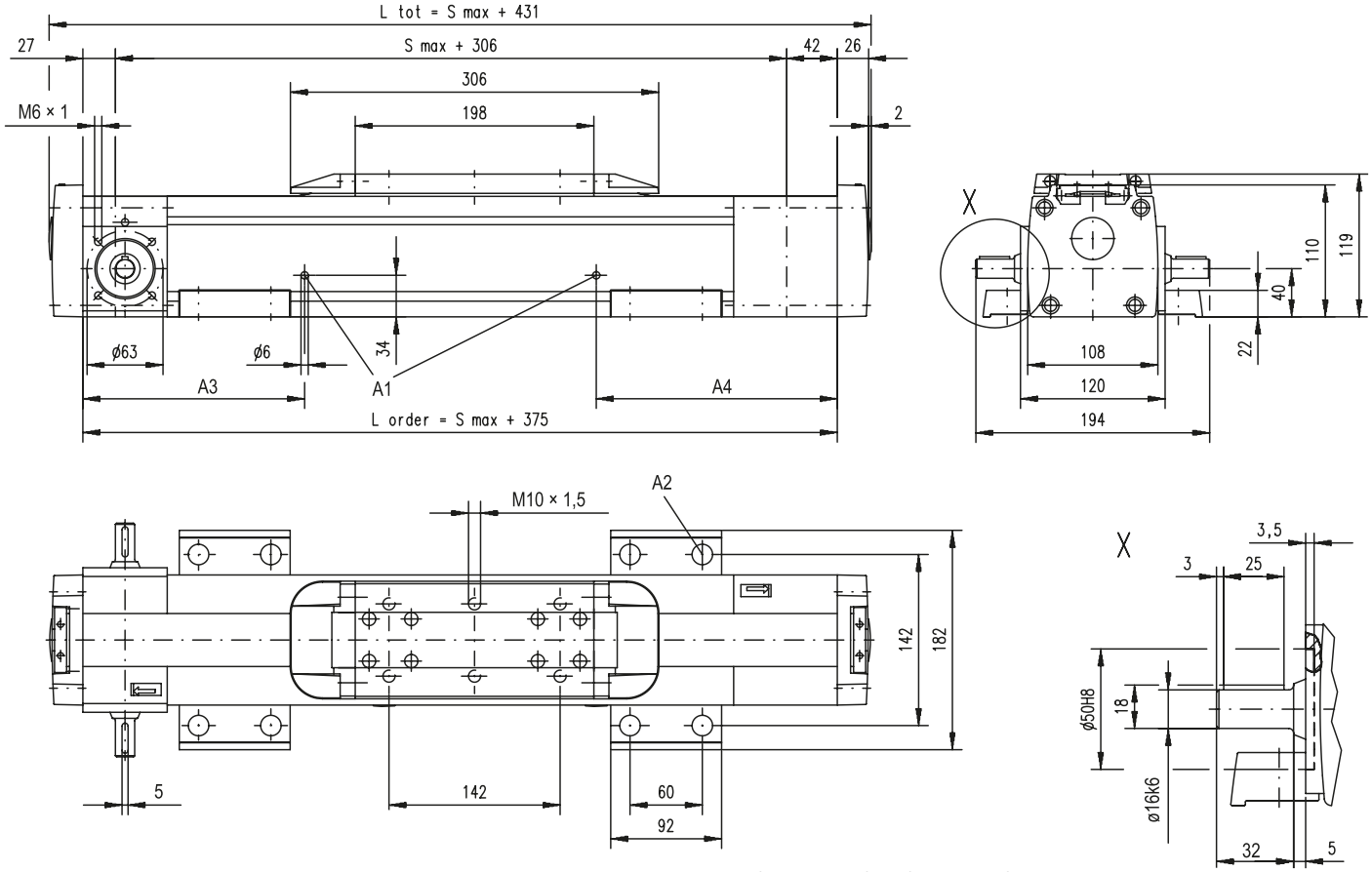

## Definition of Forces



# M100

## Belt Drive, Slide Guide

| Dimensions | Projection |
|---|---|
| METRIC | |



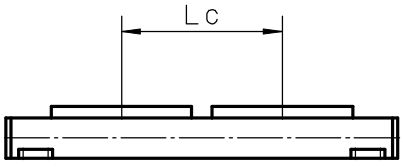

A1: lubrication holes
A2: ø17/ø10,5 for socket head cap screw M10

A3: 170 (L order <= 1 m), 270 (L order > 1 m)
A4: 186 (L order < = 1 m), 436 (L order > 1 m)

## Double Carriages

| Parameter | | M100 |
|---|---|---|
| Minimum distance between carriages (Lc) | [mm] | 350 |
| Dynamic load (Fy), maximum | [N] | 4508 |
| Dynamic load (Fz), maximum | [N] | 4508 |
| Dynamic load torque (My), maximum | [Nm] | Lc[1] × 2,254 |
| Dynamic load torque (Mz), maximum | [Nm] | Lc[1] × 2,254 |
| Force required to move second carriage | [N] | 45 |
| Ordering length (L order) | [mm] | Smax + Lc + 375 |
| Total length (L tot] | [mm] | L order + 56 |
| Weight<br>of unit with zero stroke<br>of carriages | [kg] | <br>17,40<br>4,80 |

[1] Value in mm



# Linear Units with Belt Drive and Wheel Guide

## Overview

### SpeedLine WH


WH80

**Features**

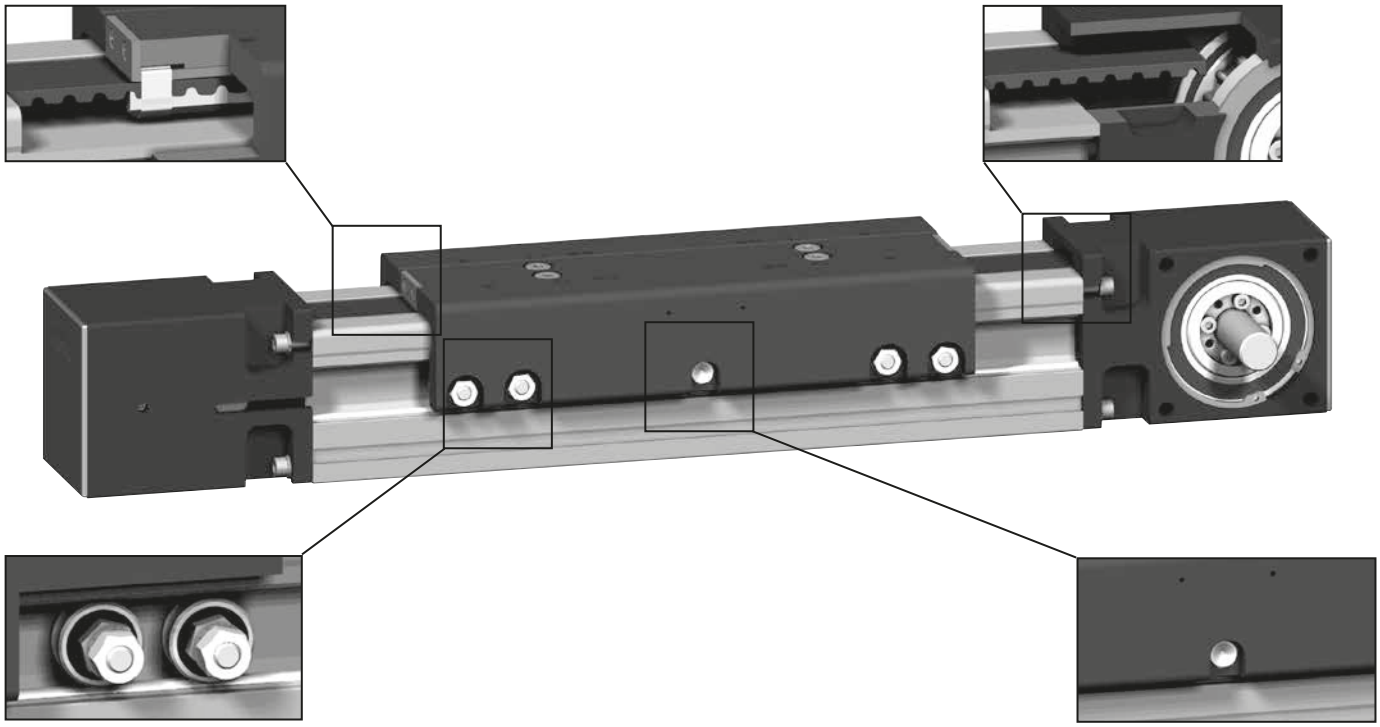
- Can be installed in any orientation
- Speed up to 11 m/s
- Acceleration up to 40 m/s$^2$
- Stroke up to 11 m

| Parameter | | WH50 | WH80 | WH120 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 50 × 50 | 80 × 80 | 120 × 110 |
| Stroke length (Smax), maximum | [mm] | 3000 | 11000 | 11000 |
| Linear speed, maximum | [m/s] | 6,5 | 10,0 | 10,0 |
| Dynamic carriage load (Fz), maximum | [N] | 730 | 2100 | 9300 |
| Remarks | | external wheel guides<br>no cover band | external wheel guides<br>no cover band | external wheel guides<br>no cover band |
| Page | | 110 | 112 | 114 |

## WH-Series Technical Presentation

**Belt tensioning**
The belt can easily be replaced or re-tensioned from the outside of the unit without the load being removed from the carriage.

**Belt drive**
The steel reinforced belt is wear resistant, highly efficient and very accurate even at high speeds and loads.



**Wheel guides**
The H-type arrangement of the guides allows fast moves and high forces and moments.

**Central lubrication**
The guides are lubricated from a central point that is easy and fast to access.

# Linear Units with Belt Drive and Wheel Guide

## Overview

### ForceLine **MLSH**



MLSH60Z

**Features**

- Can be installed in any orientation
- Patented plastic cover band
- Speed up to 10 m/s
- Low profile height

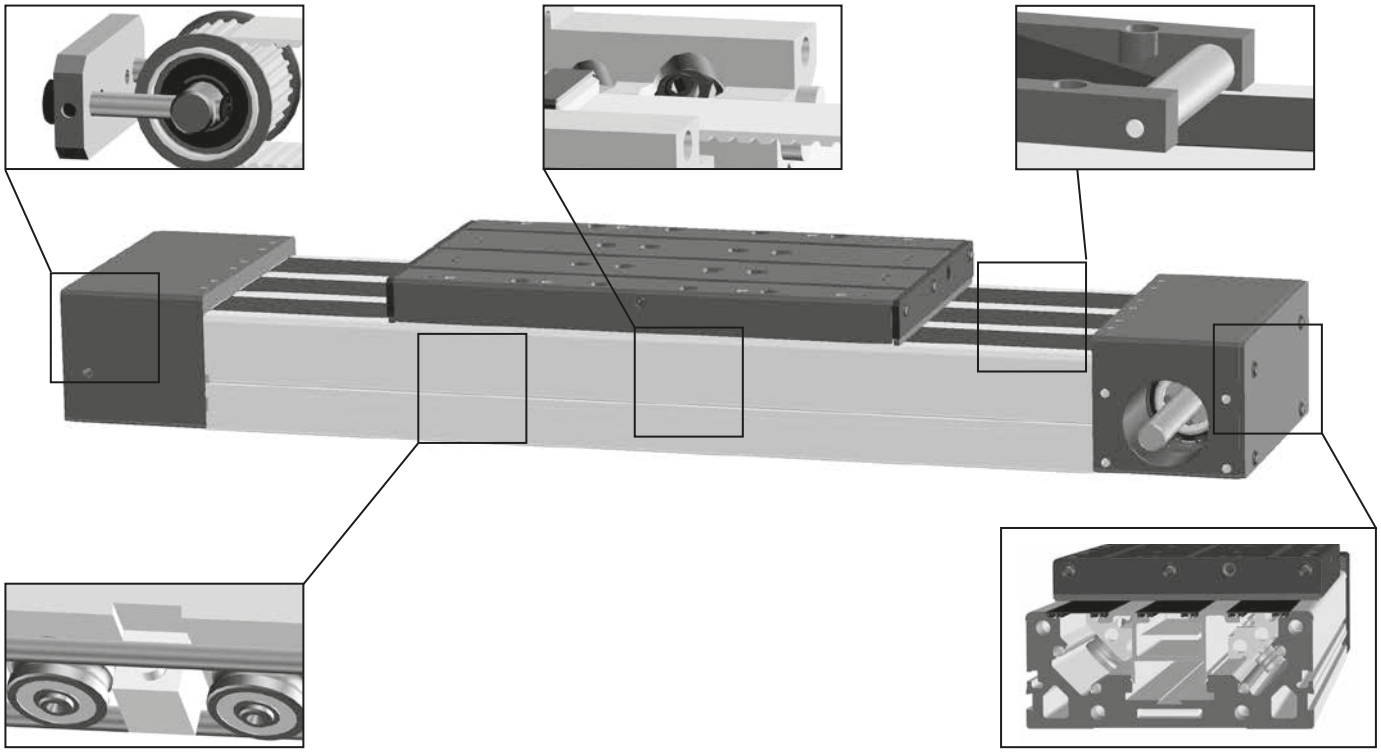
| Parameter | | MLSH60Z |
|---|---|---|
| Profile size (width × height) | [mm] | 160 × 65 |
| Stroke length (Smax), maximum | [mm] | 5500 |
| Linear speed, maximum | [m/s] | 10,0 |
| Dynamic carriage load (Fz), maximum | [N] | 3000 |
| Remarks | | internal wheel guides |
| Page | | 116 |

## MLSH-Series Technical Presentation

**Belt tensioning**
The belt can easily be re-tensioned from the outside of the unit without the load being removed from the carriage.

**Belt drive**
The highly dynamic and accurate belt is protected by the cover band ensuring long and trouble free operation.

**Cover band**
The patented self-adjusting cover band protect the interior of the unit from the penetration of dirt, dust and liquids.



**Wheel guides**
The robust wheel guides runs inside of the profile providing superior motion dynamics.

**Unique profile**
The unique design of the profile guarantees the highest performance and protection of the guides and belt.

# WH50

## Belt Drive, Wheel Guide

» Ordering key - see page 206
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | WH50 |
|---|---|
| Profile size (w × h) [mm] | 50 × 50 |
| Type of belt | 16ATL5 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication og guiding surfaces |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WH50 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 3000 |
| Linear speed, maximum | [m/s] | 6,5 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3250 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 670[1] |
| Dynamic load (Fy), maximum | [N] | 415 |
| Dynamic load (Fz), maximum | [N] | 730 |
| Dynamic load torque (Mx), maximum | [Nm] | 16 |
| Dynamic load torque (My), maximum | [Nm] | 87 |
| Dynamic load torque (Mz), maximum | [Nm] | 50 |
| Drive shaft force (Frd), maximum | [N] | 150 |
| Drive shaft torque (Mta), maximum | [Nm] | 17 |
| Pulley diameter | [mm] | 38,2 |
| Stroke per shaft revolution | [mm] | 120 |
| Weight | [kg] | |
| of unit with zero stroke | | 3,50 |
| of every 100 mm of stroke | | 0,44 |
| of each carriage | | 0,90 |

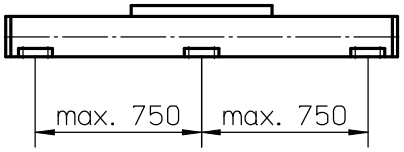
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 1,7 |
| 1500 | 2,4 |
| 3250 | 3,8 |

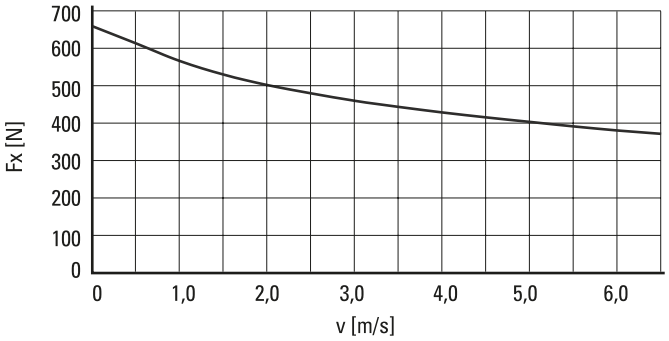
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

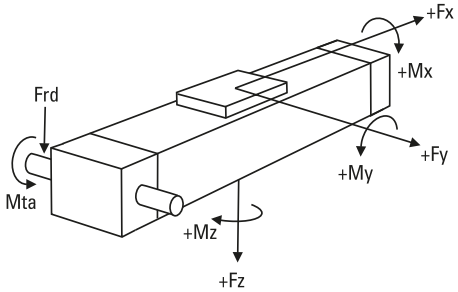



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



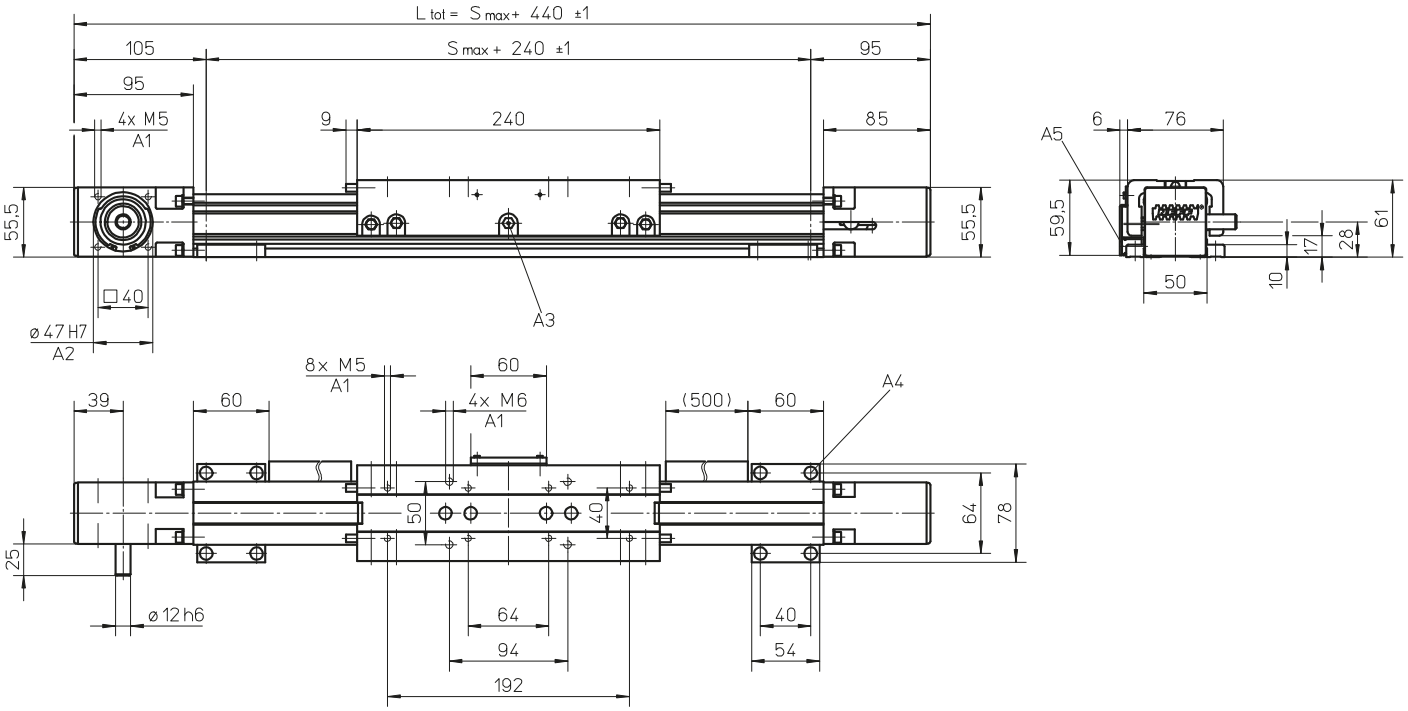

## Definition of Forces



# WH50

## Belt Drive, Wheel Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

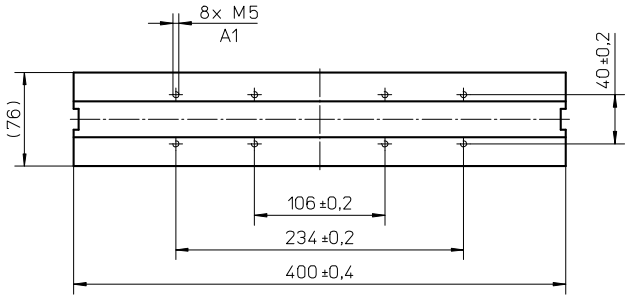



A1: depth 10
A2: depth 3
A3: funnel type lubricating nipple DIN3405-M6×1-D1

A4: socket cap screw ISO4762-M5×12 8.8
A5: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

| Parameter | | WH50 |
|---|---|---|
| Carriage length | [mm] | 400 |
| Dynamic load torque (My), maximum | [Nm] | 130 |
| Dynamic load torque (Mz), maximum | [Nm] | 75 |
| Weight | [kg] | 1,47 |

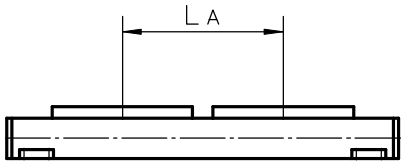



A1: depth 10

## Double Carriages

| Parameter | | WH50 |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 260 |
| Dynamic load (Fy), maximum | [N] | 830 |
| Dynamic load (Fz), maximum | [N] | 1460 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 0,415 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 0,73 |
| Force required to move second carriage | [N] | 16 |
| Total length (L tot) | [mm] | Smax + 440 + $L_A$ |

[1] Value in mm



# WH80

## Belt Drive, Wheel Guide

» Ordering key - see page 206
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | WH80 |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of belt | 32ATL10 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication og guiding surfaces |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WH80 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 11000 |
| Linear speed, maximum | [m/s] | 10,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 2700 [1] |
| Dynamic load (Fy), maximum | [N] | 882 |
| Dynamic load (Fz), maximum | [N] | 2100 |
| Dynamic load torque (Mx), maximum | [Nm] | 75 |
| Dynamic load torque (My), maximum | [Nm] | 230 |
| Dynamic load torque (Mz), maximum | [Nm] | 100 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 100 |
| Pulley diameter | [mm] | 63,66 |
| Stroke per shaft revolution | [mm] | 200 |
| Weight | [kg] | |
| of unit with zero stroke | | 8,63 |
| of every 100 mm of stroke | | 0,93 |
| of each carriage | | 2,75 |

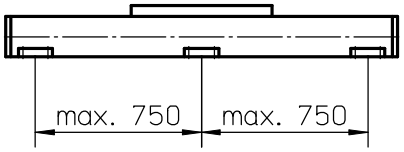
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 2,4 |
| 1500 | 3,5 |
| 3000 | 5,0 |

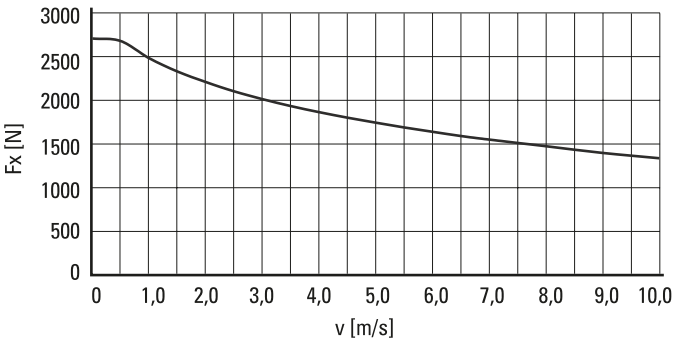
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

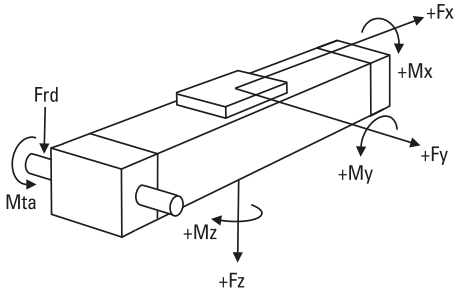



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 6300 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

## Force Fx as a Function of the Speed



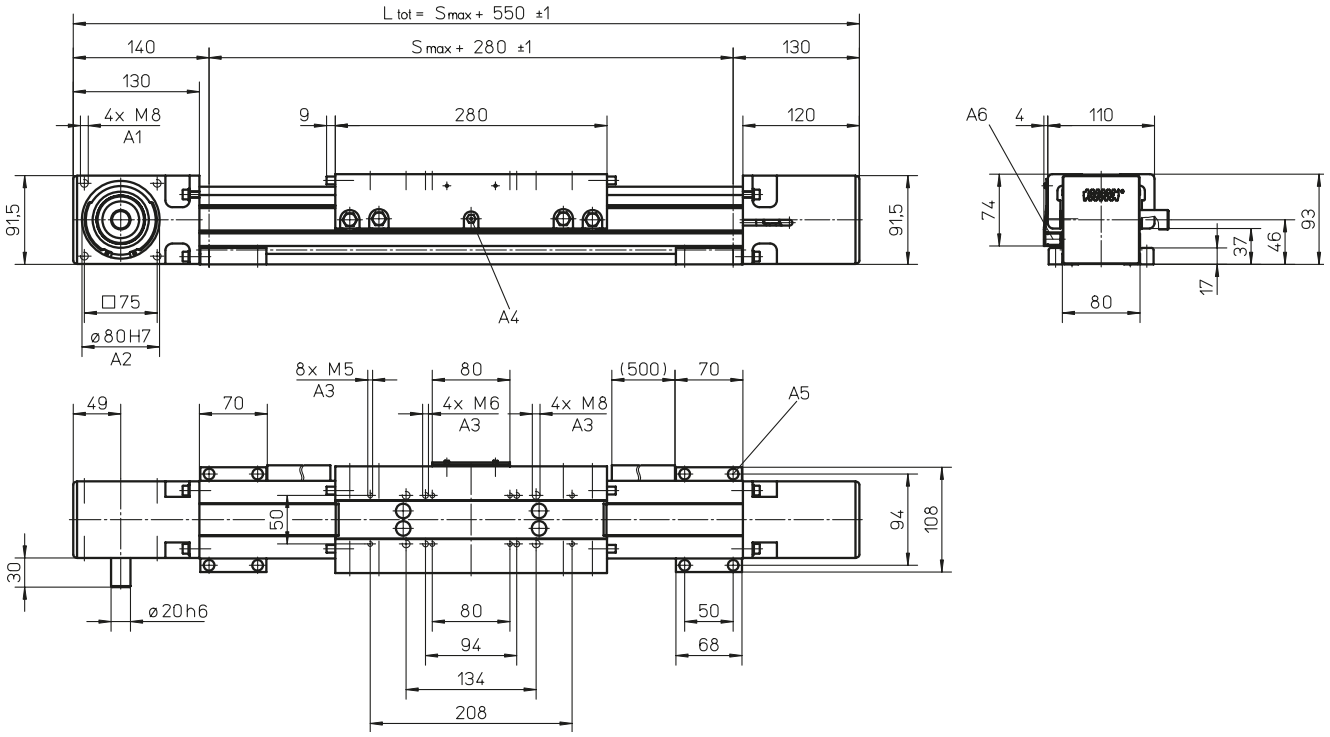

## Definition of Forces



# WH80

## Belt Drive, Wheel Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

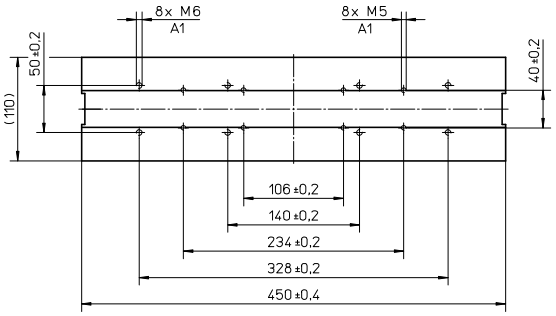



A1: depth 16
A2: depth 2,5
A3: depth 12

A4: funnel type lubricating nipple DIN3405-M6×1-D1
A5: socket cap screw ISO4762-M6×20 8.8
A6: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

| Parameter | | WH80 |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 345 |
| Dynamic load torque (Mz), maximum | [Nm] | 150 |
| Weight | [kg] | 3,43 |

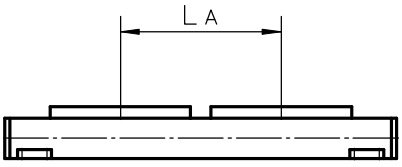



A1: depth 12

## Double Carriages

| Parameter | | WH80 |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 300 |
| Dynamic load (Fy), maximum | [N] | 1764 |
| Dynamic load (Fz), maximum | [N] | 4200 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 0,882 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 2,1 |
| Force required to move second carriage | [N] | 20 |
| Total length (L tot) | [mm] | Smax + 550 + $L_A$ |

[1] Value in mm



# WH120

## Belt Drive, Wheel Guide

» Ordering key - see page 206
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | WH120 |
|---|---|
| Profile size (w × h) [mm] | 120 × 110 |
| Type of belt | 50ATL10 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication og guiding surfaces |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WH120 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 11000 |
| Linear speed, maximum | [m/s] | 10,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 2308 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 5000 [1] |
| Dynamic load (Fy), maximum | [N] | 4980 |
| Dynamic load (Fz), maximum | [N] | 9300 |
| Dynamic load torque (Mx), maximum | [Nm] | 500 |
| Dynamic load torque (My), maximum | [Nm] | 930 |
| Dynamic load torque (Mz), maximum | [Nm] | 500 |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 200 |
| Pulley diameter | [mm] | 82,76 |
| Stroke per shaft revolution | [mm] | 260 |
| Weight | [kg] | |
| of unit with zero stroke | | 17,00 |
| of every 100 mm of stroke | | 1,64 |
| of each carriage | | 5,50 |

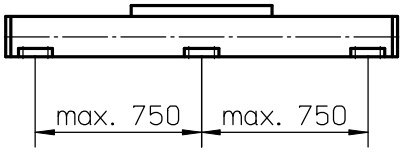
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 4,8 |
| 1500 | 7,0 |
| 2308 | 10,0 |

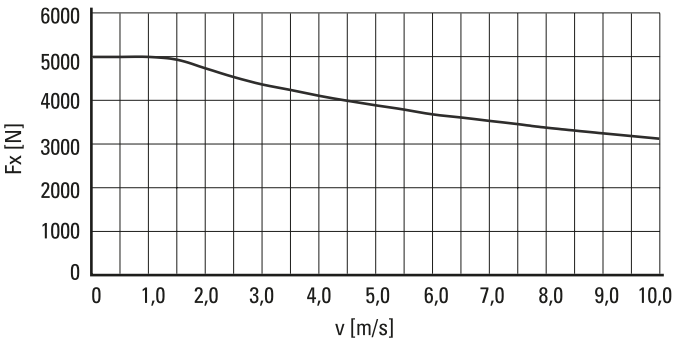
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

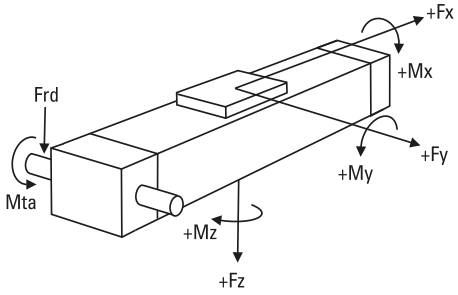



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information. Units with a profile length over 4900 mm consist of two profiles where the joint between the two profiles must be addequately supported on both sides.

## Force Fx as a Function of the Speed



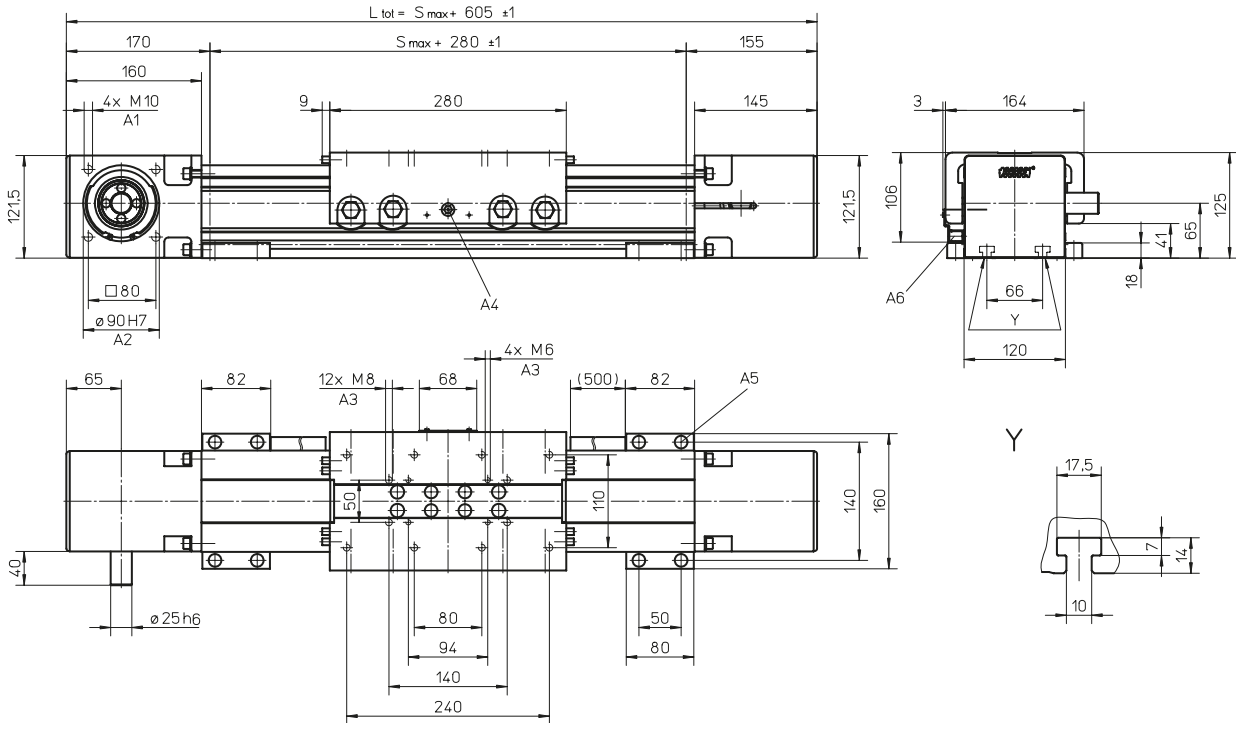

## Definition of Forces



# WH120

## Belt Drive, Wheel Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

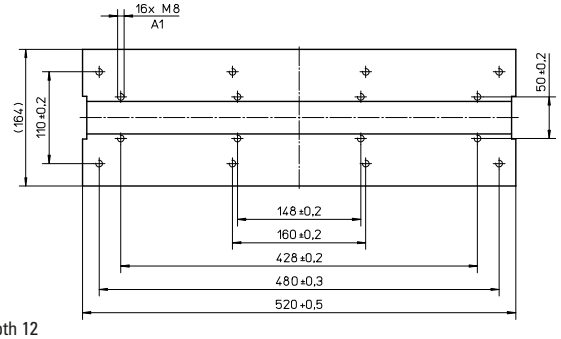



A1: depth 20
A2: depth 7
A3: depth 12

A4: funnel type lubricating nipple DIN3405-M6×1-D1
A5: socket cap screw ISO4762-M8×20 8.8
A6: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

| Parameter | | WH120 |
|---|---|---|
| Carriage length | [mm] | 520 |
| Dynamic load torque (My), maximum | [Nm] | 1395 |
| Dynamic load torque (Mz), maximum | [Nm] | 750 |
| Weight | [kg] | 8,67 |

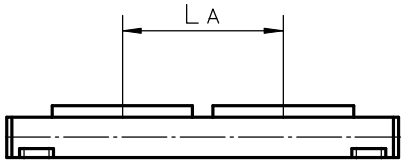



A1: depth 12

## Double Carriages

| Parameter | | WH120 |
|---|---|---|
| Minimum distance between carriages (LA) | [mm] | 300 |
| Dynamic load (Fy), maximum | [N] | 9960 |
| Dynamic load (Fz), maximum | [N] | 18600 |
| Dynamic load torque (My), maximum | [Nm] | L A[1] × 4,98 |
| Dynamic load torque (Mz), maximum | [Nm] | L A[1] × 9,3 |
| Force required to move second carriage | [N] | 30 |
| Total length (L tot) | [mm] | Smax + 605 + L A |

[1] Value in mm



# MLSH60Z

## Belt Drive, Wheel Guide

» Ordering key - see page 207
» Accessories - see page 135
» Additional data - see page 184

## General Specifications

| Parameter | MLSH60Z |
|---|---|
| Profile size (w × h) [mm] | 160 × 65 |
| Type of belt | 32ATL5 |
| Carriage sealing system | plastic cover band |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | no lubrication required |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | MLSH60Z |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 5500 |
| Linear speed, maximum | [m/s] | 6,5 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1480 [1] |
| Dynamic load (Fy), maximum | [N] | 3000 |
| Dynamic load (Fz), maximum | [N] | 3000 |
| Dynamic load torque (Mx), maximum | [Nm] | 165 |
| Dynamic load torque (My), maximum | [Nm] | 310 |
| Dynamic load torque (Mz), maximum | [Nm] | 310 |
| Drive shaft force (Frd), maximum | [N] | 200 |
| Drive shaft torque (Mta), maximum | [Nm] | 45 |
| Pulley diameter | [mm] | 42,97 |
| Stroke per shaft revolution | [mm] | 135 |
| Weight | [kg] | |
| of unit with zero stroke | | 12,60 |
| of every 100 mm of stroke | | 1,33 |
| of each carriage | | 3,90 |

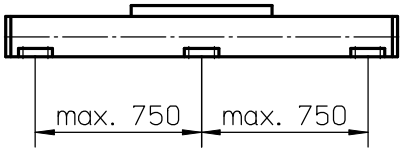
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 4,6 |
| 1500 | 9,0 |
| 3000 | 12,0 |

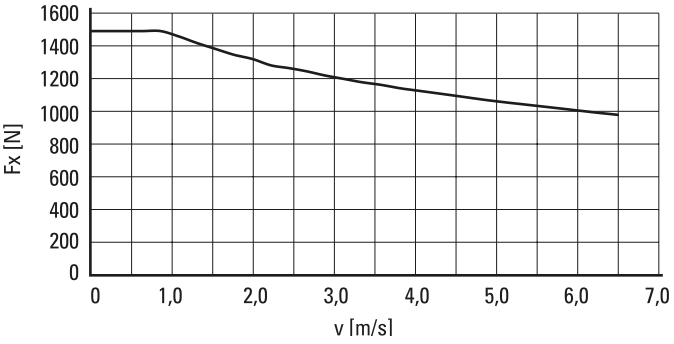
M idle = the input torque needed to move the carriage with no load on it.

## Deflection of the Profile

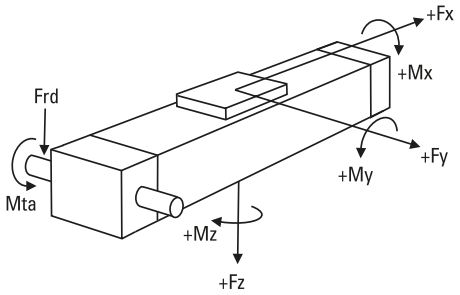



A mounting clamp must be installed at least every 750 mm to be able to operate atmaximum load. Less clamps may be required if less load is being operated, see the additional technical data for more information.

## Force Fx as a Function of the Speed



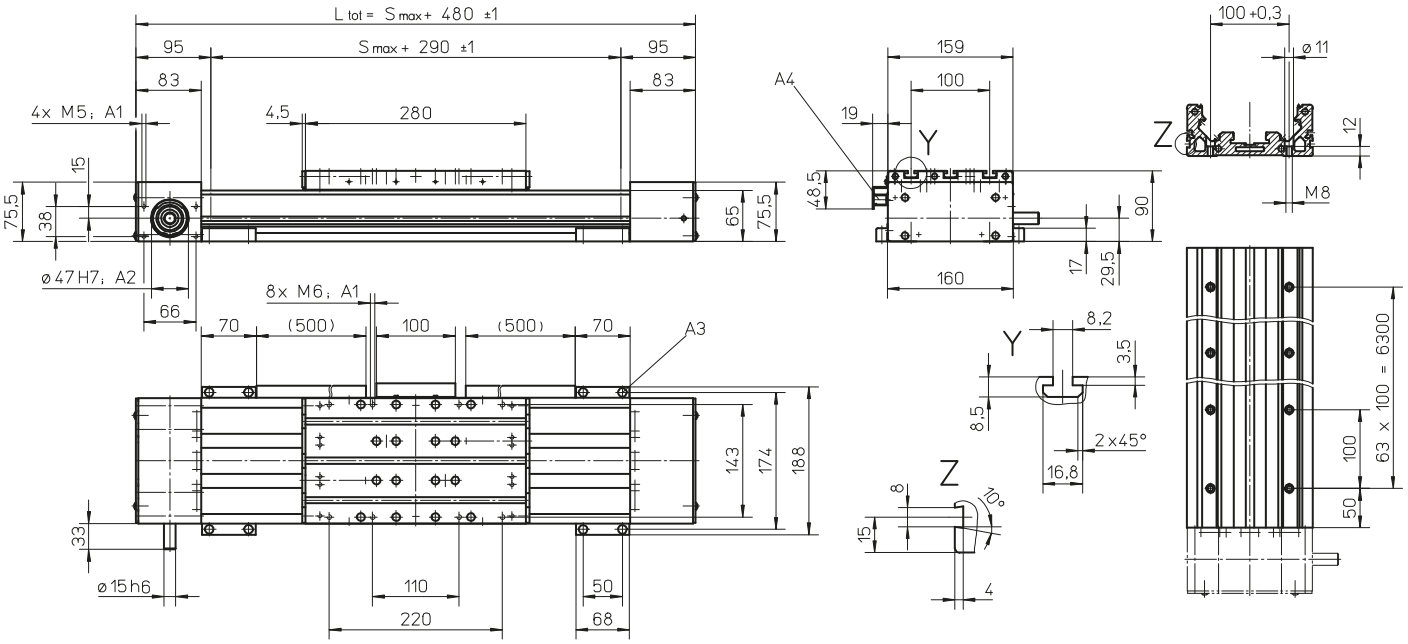

## Definition of Forces



# MLSH60Z

## Belt Drive, Wheel Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

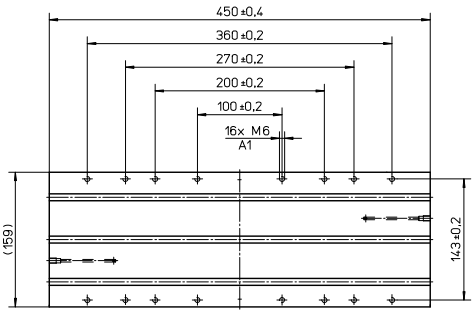



A1: depth 10
A2: depth 4

A3: socket cap screw ISO4762-M6x20 8.8
A4: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

| Parameter | | MLSH60Z |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 585 |
| Dynamic load torque (Mz), maximum | [Nm] | 585 |
| Weight | [kg] | 6 |

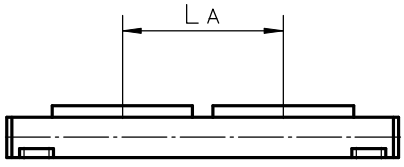



A1: depth 10

## Double Carriages

| Parameter | | MLSH60Z |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 290 |
| Dynamic load (Fy), maximum | [N] | 6000 |
| Dynamic load (Fz), maximum | [N] | 6000 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 3 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 3 |
| Force required to move second carriage | [N] | 10 |
| Total length (L tot) | [mm] | Smax + 480 + $L_A$ |

[1] Value in mm



# Linear Lifting Units

## Overview

### SpeedLine WHZ



WHZ50

**Features**

- Can be installed in any orientation
- Belt drive
- External wheel guides
- Speed up to 10 m/s
- Acceleration up to 40 m/s$^2$

| Parameter | | WHZ50 | WHZ80 |
|---|---|---|---|
| Profile size (width × length) | [mm] | 50 × 50 | 80 × 80 |
| Stroke length (Smax), maximum | [mm] | 1500 | 3000 |
| Linear speed, maximum | [m/s] | 6,5 | 10,0 |
| Dynamic load (Fx), maximum | [N] | 670 | 1480 |
| Remarks | | The load is always attached to the end of the lifting profile | The load is always attached to the end of the lifting profile |
| Page | | 120 | 122 |

# Linear Lifting Units

## Overview

### Movo Z



Z2

**Features**

- Telescopic movement
- Ball screw drive
- Internal slide guides
- Load up to 7500 N
- Load torque up to 2000 Nm
- Two end stop limit switches (Z2 only)

| Parameter | | Z2 | Z3 |
|---|---|---|---|
| Profile size (width × height) | [mm] | 188 × 150 | 188 × 150 |
| Stroke length (Smax), maximum | [mm] | 1500 | 1500 |
| Linear speed, maximum | [m/s] | 1,25 | 1,25 |
| Dynamic load (Fz), maximum | [N] | 7500 | 7500 |
| Remarks | | Can be installed in any direction. The load must be attached at the end of the lifting profile | Can only be installed vertically with motor up. The load must be attached at the end of the lifting profile. |
| Page | | 124 | 126 |

# WHZ50

## Belt Drive, Wheel Guide

» Ordering key - see page 208
» Accessories - see page 135
» Additional data - see page 185

## General Specifications

| Parameter | WHZ50 |
|---|---|
| Profile size (w × h) [mm] | 50 × 50 |
| Type of belt | 16 ATL 5 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication of carriage and guide surfaces |
| Included accessories | - |

## Performance Specifications

| Parameter | | WHZ50 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 6,5 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3250 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 670 [1] |
| Dynamic load (Fy), maximum | [N] | 415 |
| Dynamic load (Fz), maximum | [N] | 730 |
| Dynamic load torque (Mx), maximum | [Nm] | 16 |
| Dynamic load torque (My), maximum | [Nm] | 87 |
| Dynamic load torque (Mz), maximum | [Nm] | 50 |
| Drive shaft force (Frd), maximum | [N] | 150 |
| Drive shaft torque (Mta), maximum | [Nm] | 17 |
| Pulley diameter | [mm] | 38,2 |
| Stroke per shaft revolution | [mm] | 120 |
| Weight | [kg] | |
| of unit with zero stroke | | 4,50 |
| of every 100 mm of stroke | | 0,42 |
| of each drive station box | | 2,90 |

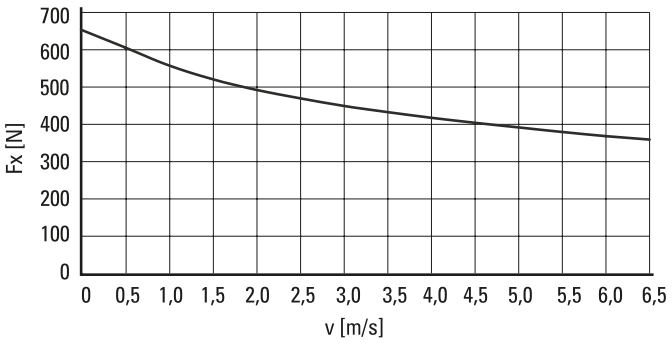
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

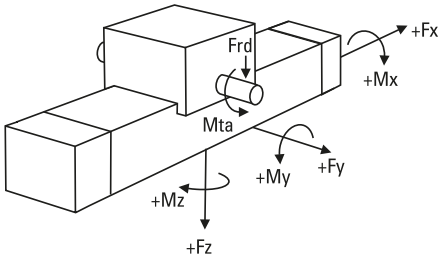
| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 1,7 |
| 1500 | 2,4 |
| 3250 | 3,8 |

M idle = the input torque needed to move the carriage with no load on it.

## Force Fx as a Function of the Speed



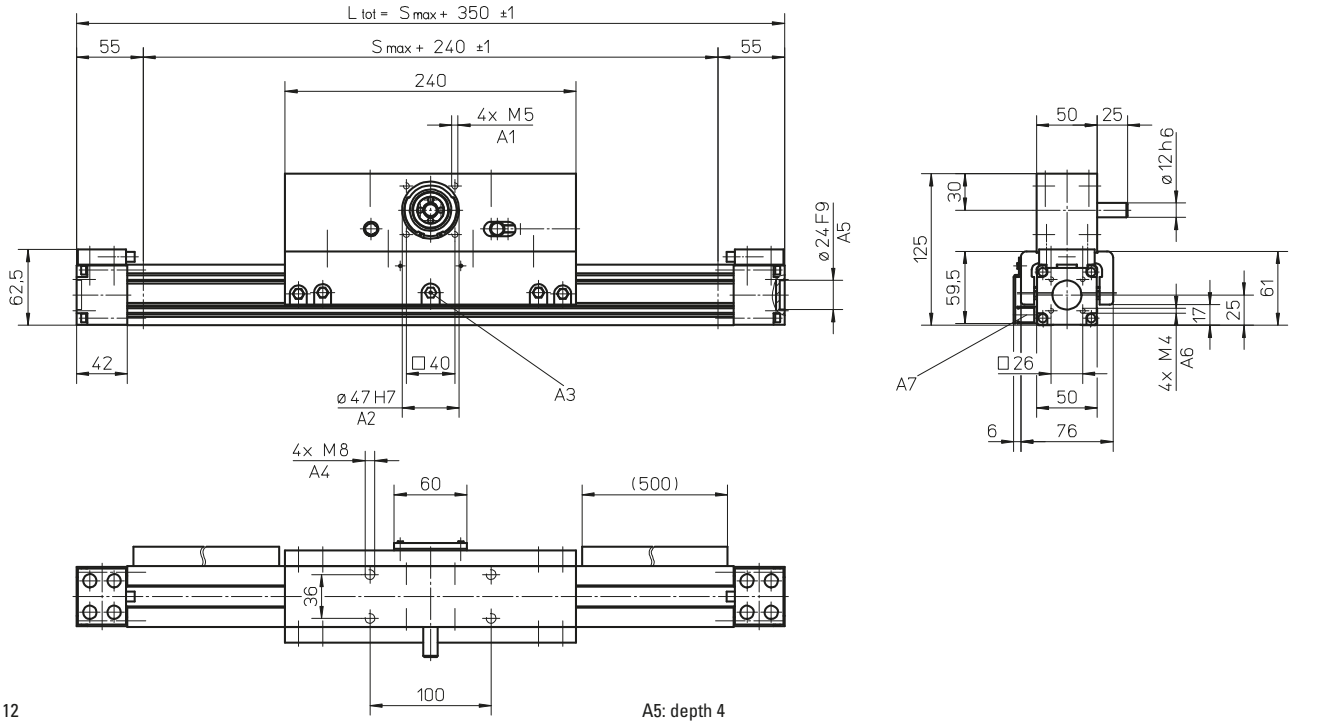

## Definition of Forces



# WHZ50

## Belt Drive, Wheel Guide

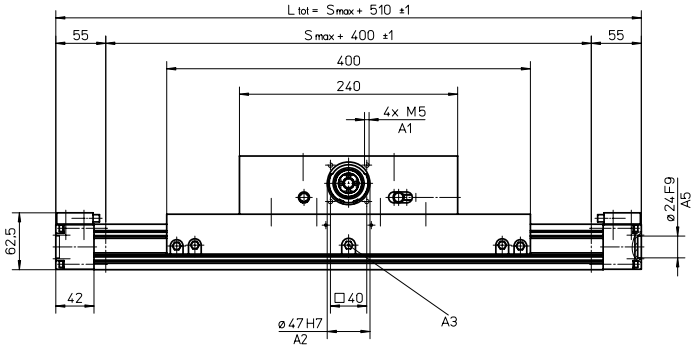
| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12
A2: depth 3,5
A3: funnel type lubricating nipple DIN3405-M6×1-D1
A4: depth 16
A5: depth 4
A6: depth 8
A7: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

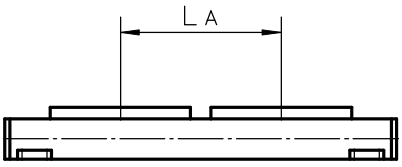
| Parameter | | WHZ50 |
|---|---|---|
| Carriage length | [mm] | 400 |
| Dynamic load torque (My), maximum | [Nm] | 130 |
| Dynamic load torque (Mz), maximum | [Nm] | 75 |
| Weight | [kg] | 3,3 |




A1: depth 12
A2: depth 3,5
A3: funnel type lubricating nipple DIN3405-M6×1-D1
A5: depth 4

## Double Carriages[2]

| Parameter | | WHZ50 |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 260 |
| Dynamic load (Fy), maximum | [N] | 830 |
| Dynamic load (Fz), maximum | [N] | 1460 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 0,415 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 0,73 |
| Force required to move second carriage | [N] | 16 |
| Total length (L tot) | [mm] | Smax + 350 + $L_A$ |




[1] Value in mm
[2] Second carriage is always a long carriage

# WHZ80

## Belt Drive, Wheel Guide

» Ordering key - see page 208
» Accessories - see page 135
» Additional data - see page 185

## General Specifications

| Parameter | WHZ80 |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of belt | 32 ATL 5 |
| Carriage sealing system | none |
| Adjustable belt tensioning | the belt can be retensioned by the customer if necessary |
| Lubrication | lubrication of carriage and guide surfaces |
| Included accessories | - |

## Performance Specifications

| Parameter | | WHZ80 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 3000 |
| Linear speed, maximum | [m/s] | 10,0 |
| Acceleration, maximum | [m/s²] | 40 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 1480 [1] |
| Dynamic load (Fy), maximum | [N] | 882 |
| Dynamic load (Fz), maximum | [N] | 2100 |
| Dynamic load torque (Mx), maximum | [Nm] | 75 |
| Dynamic load torque (My), maximum | [Nm] | 230 |
| Dynamic load torque (Mz), maximum | [Nm] | 100 |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 50 |
| Pulley diameter | [mm] | 63,66 |
| Stroke per shaft revolution | [mm] | 200 |
| Weight | [kg] | |
| of unit with zero stroke | | 11,20 |
| of every 100 mm of stroke | | 0,91 |
| of each drive station box | | 6,65 |

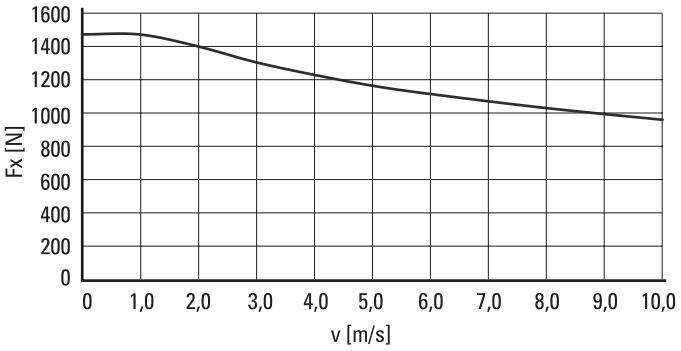
[1] See diagram Force Fx

## Carriage Idle Torque, (M idle) [Nm]

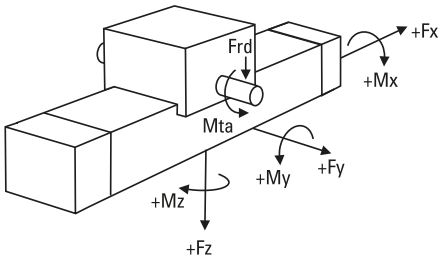
| Input speed [rpm] | Idle torque [Nm] |
|---|---|
| 150 | 2,4 |
| 1500 | 3,5 |
| 3000 | 5,0 |

M idle = the input torque needed to move the carriage with no load on it.

## Force Fx as a Function of the Speed



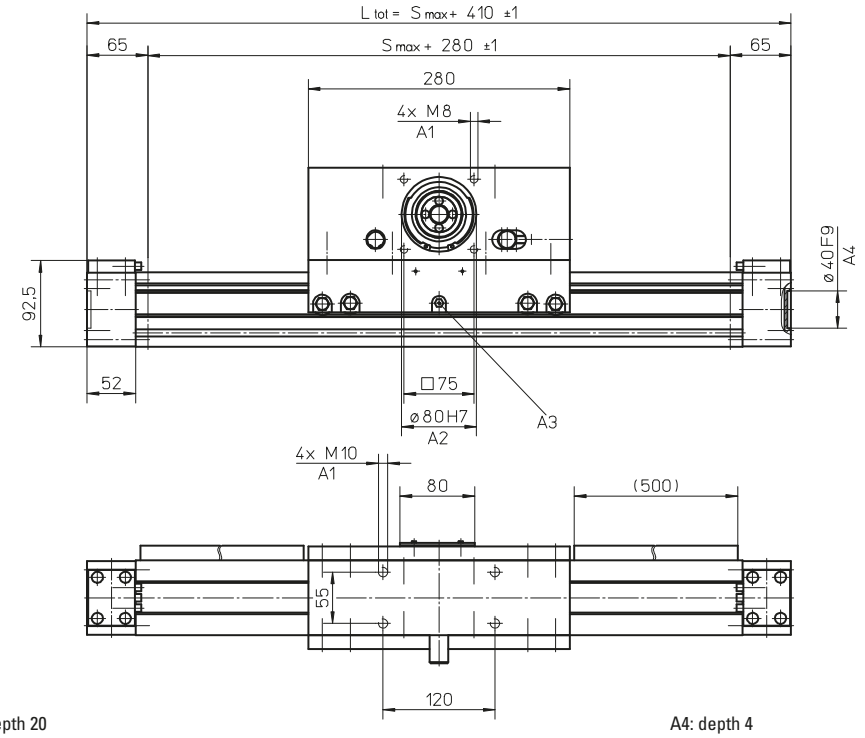

## Definition of Forces

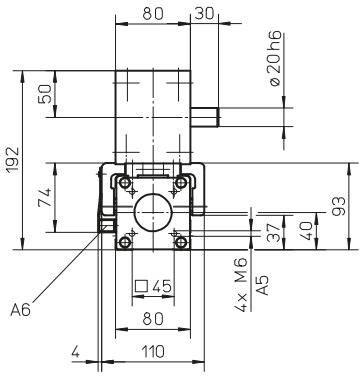


# WHZ80

## Belt Drive, Wheel Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

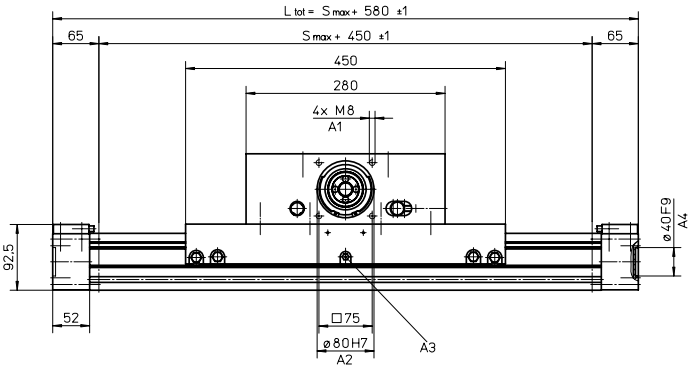



A1: depth 20
A2: depth 3,5
A3: funnel type lubricating nipple DIN3405-M6×1-D1
A4: depth 4
A5: depth 15
A6: ENF inductive sensor rail kit (optional - see page 172)

## Long Carriage

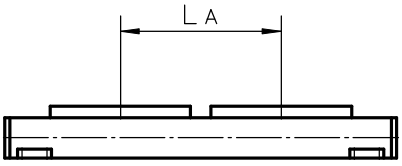
| Parameter | | WHZ80 |
|---|---|---|
| Carriage length | [mm] | 450 |
| Dynamic load torque (My), maximum | [Nm] | 345 |
| Dynamic load torque (Mz), maximum | [Nm] | 150 |
| Weight | [kg] | 7,4 |




A1: depth 20
A2: depth 3,5
A3: funnel type lubricating nipple DIN3405-M6×1-D1
A4: depth 4

## Double Carriages[2]

| Parameter | | WHZ80 |
|---|---|---|
| Minimum distance between carriages ($L_A$) | [mm] | 300 |
| Dynamic load (Fy), maximum | [N] | 1764 |
| Dynamic load (Fz), maximum | [N] | 4200 |
| Dynamic load torque (My), maximum | [Nm] | $L_A$[1] × 0,882 |
| Dynamic load torque (Mz), maximum | [Nm] | $L_A$[1] × 2,1 |
| Force required to move second carriage | [N] | 20 |
| Total length (L tot) | [mm] | Smax + 410 + $L_A$ |




[1] Value in mm
[2] Second carriage is always a long carriage

# Z2

## Ball Screw Drive, Slide Guide

» Ordering key - see page 208
» Accessories - see page 135
» Additional data - see page 185

## General Specifications

| Parameter | Z2 |
|---|---|
| Profile size (w × h) [mm] | 188 × 150 |
| Type of screw | ball screw with single nut |
| Sealing system | none |
| Screw supports | none |
| Lubrication | lubrication of screw and slide surfaces |
| Included accessories | none |

## Performance Specifications

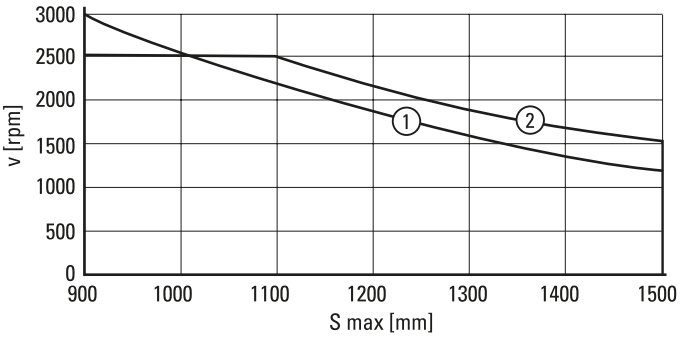
| Parameter | | Z2 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 1,25 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,1 |
| Input speed, maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [rpm] | <br>3000<br>2500 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fz), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [N] | <br>5000<br>7500 |
| Dynamic load torque (Mx), maximum | [Nm] | 700 |
| Dynamic load torque (My), maximum | [Nm] | 700 |
| Dynamic load torque (Mz), maximum | [Nm] | 330 |
| Drive shaft force (Frd), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [N] | <br>1000<br>1200 |
| Drive shaft torque (Mta), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [Nm] | <br>45<br>93 |
| Screw versions, diameter ($d_0$) / lead (p) | [mm] | 25/10, 25/25, 32/20 |
| Weight<br>of unit with zero stroke, ball screw ø 25 mm<br>of unit with zero stroke, ball screw ø 32 mm<br>of every 100 mm of stroke, ball screw ø 25 mm<br>of every 100 mm of stroke, ball screw ø 32 mm | [kg] | <br>19,00<br>23,64<br>2,50<br>2,80 |

## Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw diameter/lead [mm] | | |
|---|---|---|---|
| | $d_0$ = 25 / p = 10 | $d_0$ = 25 / p = 25 | $d_0$ = 32 / p = 20 |
| 500 | 0,7 | 1,9 | 1,5 |

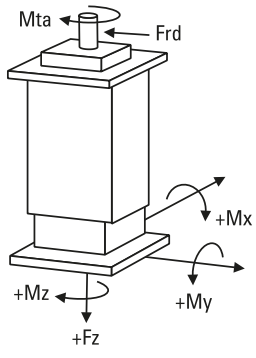
M idle = the input torque needed to move the lifting profiles without any load.

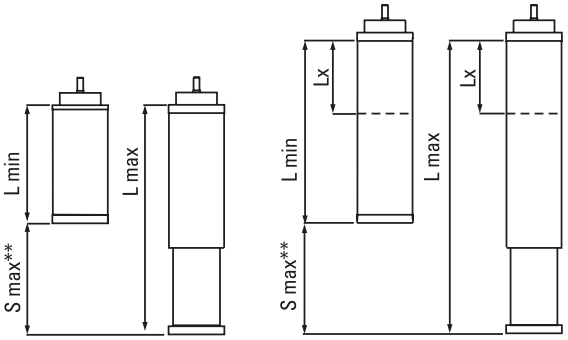
## Critical Speed




1: screw diameter 25 mm
2: screw diameter 32 mm

## Definition of Forces and Stroke



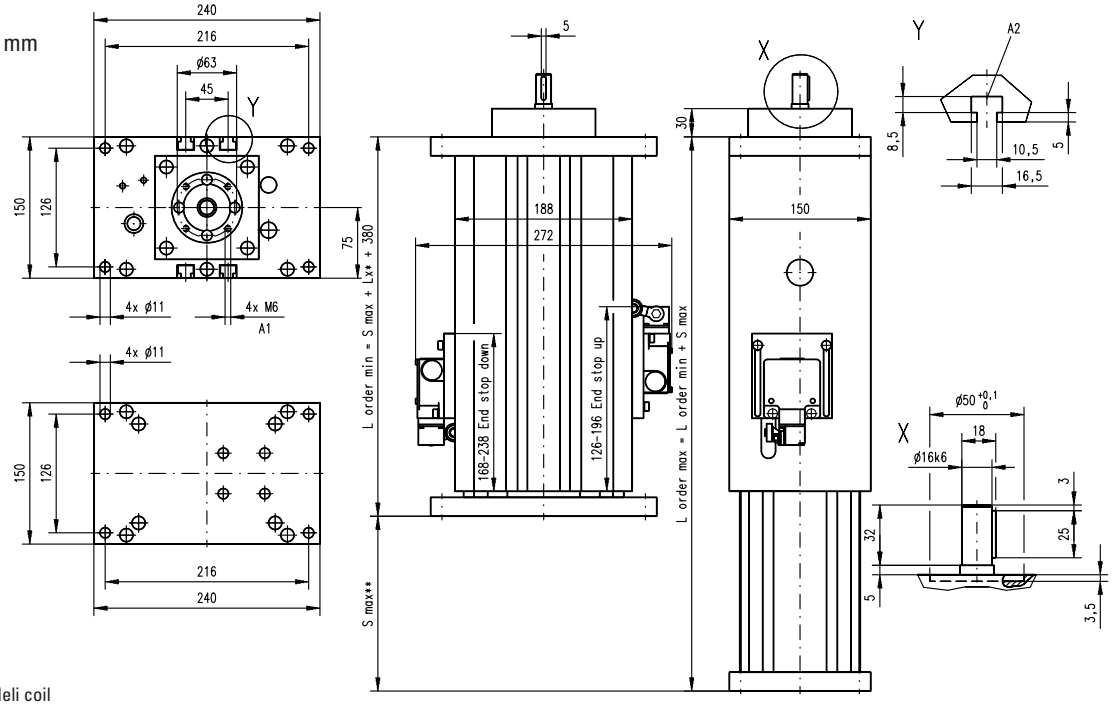

** Smax = maximum stroke between the mechanical ends of the unit. The practical stroke is normally 100 mm shorter to avoid running into the ends of the unit.

# Z2

## Ball Screw Drive, Slide Guide

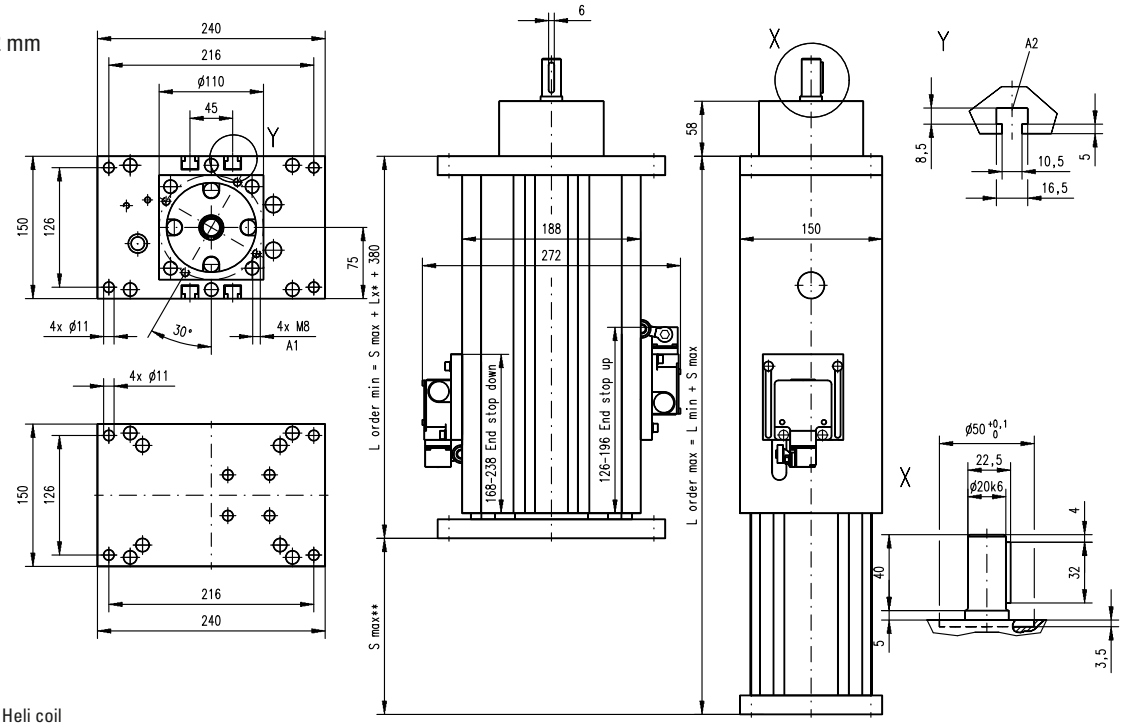
| Dimensions | Projection |
|---|---|
| METRIC | |

MGZ2K25
screw ø25 mm




A1: depth 9, Heli coil
A2: T-slot

MGZ2K32
screw ø32 mm




A1: depth 12, Heli coil
A2: T-slot

| Type of unit | Minimum retracted length (L min) [mm] | Maximum extended length (L max) [mm] |
|---|---|---|
| Standard | L min = Smax + 380 | L max = L min + Smax |
| Elongated* | L min = Smax + 380 + Lx | L max = L min + Smax |

* Elongated versions have an extra length (Lx) added to the total length of the unit which makes the unit longer but does not add any extra length to the stroke (Smax).

# Z3

## Ball Screw Drive, Slide Guide

» Ordering key - see page 208
» Accessories - see page 135
» Additional data - see page 185

## General Specifications

| Parameter | Z3 |
|---|---|
| Profile size (w × h) [mm] | 188 × 150 |
| Type of screw | ball screw with single nut |
| Sealing system | none |
| Screw supports | none |
| Lubrication | lubrication of screw and slide surfaces |
| Included accessories | none |

## Performance Specifications

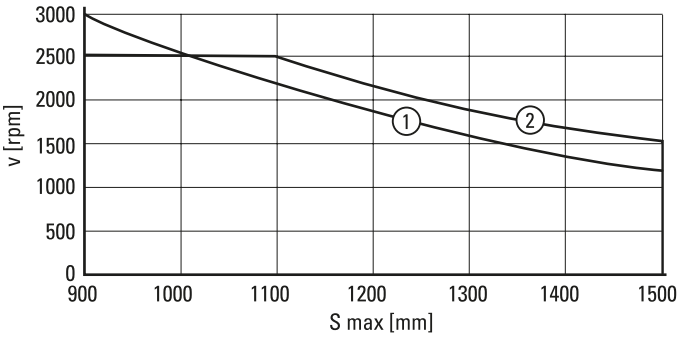
| Parameter | | Z3 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 1,25 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,1 |
| Input speed, maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [rpm] | <br>3000<br>2500 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fz), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [N] | <br>5000<br>7500 |
| Dynamic load torque (Mx), maximum | [Nm] | 2000 |
| Dynamic load torque (My), maximum | [Nm] | 2000 |
| Dynamic load torque (Mz), maximum | [Nm] | 330 |
| Drive shaft force (Frd), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [N] | <br>1000<br>1200 |
| Drive shaft torque (Mta), maximum<br>screw diameter/lead [mm] 25/10, 25/25<br>screw diameter/lead [mm] 32/20 | [Nm] | <br>45<br>93 |
| Screw versions, diameter (d0) / lead (p) | [mm] | 25/10, 25/25, 32/20 |
| Weight<br>of unit with zero stroke, ball screw ø 25 mm<br>of unit with zero stroke, ball screw ø 32 mm<br>of every 100 mm of stroke, ball screw ø 25 mm<br>of every 100 mm of stroke, ball screw ø 32 mm | [kg] | <br>21,14<br>22,65<br>4,20<br>4,50 |

## Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw diameter/lead [mm] | | |
|---|---|---|---|
| | d0 = 25 / p = 10 | d0 = 25 / p = 25 | d0 = 32 / p = 20 |
| 500 | 1,1 | 2,7 | 2,2 |

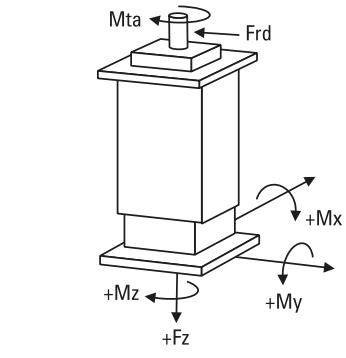
M idle = the input torque needed to move the lifting profiles without any load.

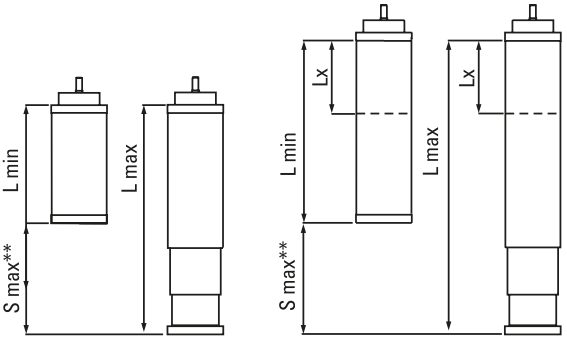
## Critical Speed




1: screw diameter 25 mm
2: screw diameter 32 mm

## Definition of Forces and Stroke



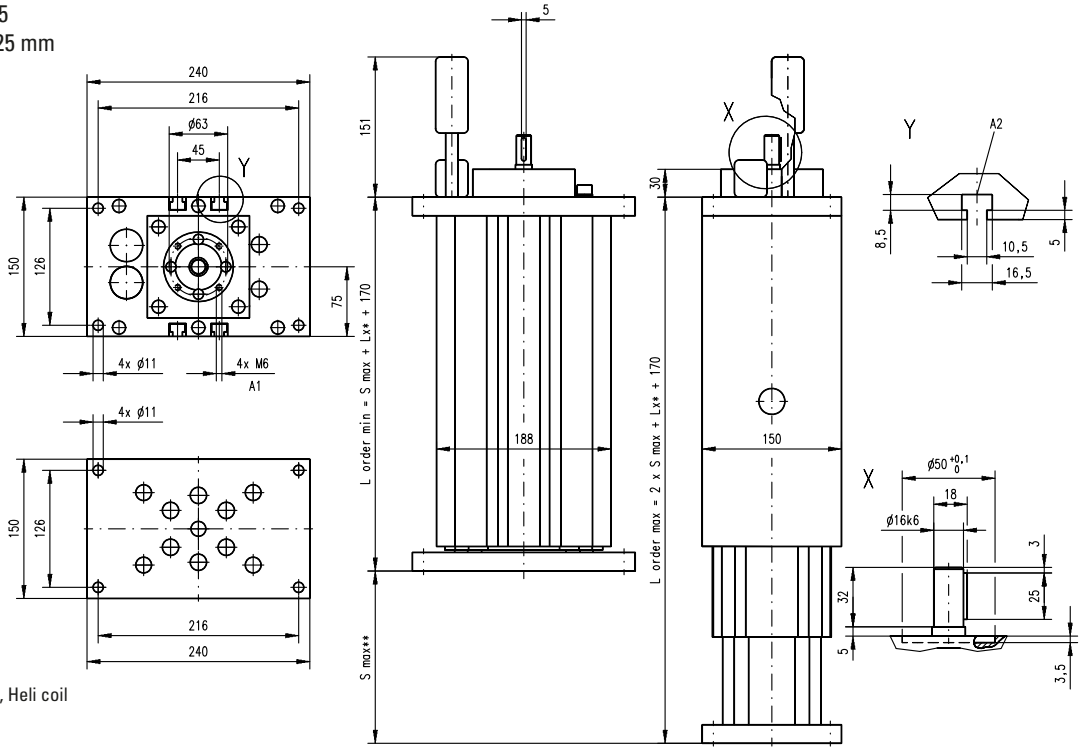

** Smax = maximum stroke between the mechanical ends of the unit. The practical stroke is normally 100 mm shorter to avoid running into the ends of the unit.

# Z3

## Ball Screw Drive, Slide Guide

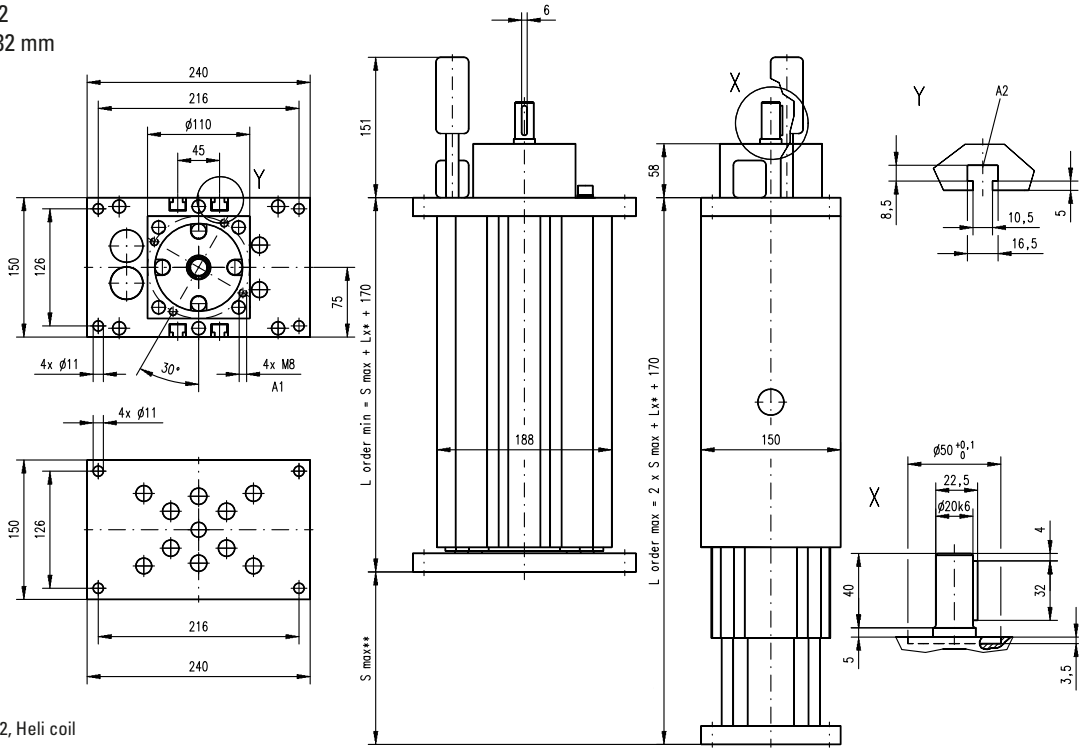
| Dimensions | Projection |
|---|---|
| METRIC | |

MGZ3K25
screw ø25 mm




A1: depth 9, Heli coil
A2: T-slot

MGZ3K32
screw ø32 mm




A1: depth 12, Heli coil
A2: T-slot

| Type of unit | Minimum retracted length (L min) [mm] | Maximum extended length (L max) [mm] |
|---|---|---|
| Standard | L min = Smax + 170 | L max = L min + Smax |
| Elongated* | L min = Smax + 170 + Lx | L max = L min + Smax |

* Elongated versions have an extra length (Lx) added to the total length of the unit which makes the unit longer but does not add any extra length to the stroke (Smax).

# Linear Rod Units

## Overview

### VarioLine WZ


WZ60

**Features**

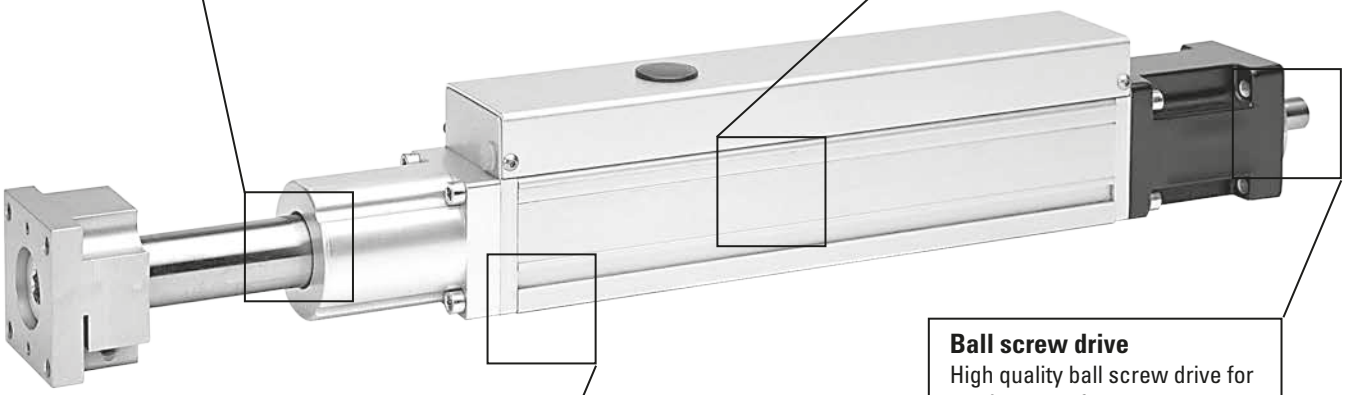
- Can be installed in any orientation
- Ball screw drive
- Ball guides
- Compact

| Parameter | | WZ60 | WZ80 |
|---|---|---|---|
| Profile size (width × height) | [mm] | 60 × 60 | 80 × 80 |
| Stroke length (Smax), maximum | [mm] | 400 | 500 |
| Linear speed, maximum | [m/s] | 1,5 | 1,5 |
| Dynamic carriage load (Fx), maximum | [N] | 2800 | 3500 |
| Remarks | | - | - |
| Page | | 130 | 132 |

# Linear Rod Units

## Overview

## WZ-Series Technical Presentation



**High sideloads**
The design of the extension tube allow the unit to handle high sideloads as well as torsional forces.

**Ball guides**
The ball guides ensure smooth and accurate operation.

**Ball screw drive**
High quality ball screw drive for maximum performance.

**Compact design**
The compact design allow the unit to be used in equipment where a linear motion system with a carriage would not fit.

# WZ60

## Ball Screw Drive, Ball Guide

» Ordering key - see page 209
» Accessories - see page 135
» Additional data - see page 186

## General Specifications

| Parameter | WZ60 |
|---|---|
| Profile size (w × h) [mm] | 60 × 60 |
| Type of screw | single nut ball screw |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WZ60 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 400 |
| Linear speed, maximum | [m/s] | 1,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,02 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 2800 |
| Dynamic load (Fy), maximum | [N] | 2000 [1] |
| Dynamic load (Fz), maximum | [N] | 2000 [1] |
| Dynamic load torque (Mx), maximum | [Nm] | 50 [1] |
| Drive shaft force (Frd), maximum | [N] | 500 |
| Drive shaft torque (Mta), maximum | [Nm] | 30 |
| Ball screw diameter (d0) | [mm] | 20 |
| Ball screw lead (p) | [mm] | 5, 20, 50 |
| Weight | [kg] | |
| of unit with zero stroke | | 4,5 |
| of every 100 mm of stroke | | 0,77 |
| of the rod with zero stroke | | 1,8 |
| of every 100 mm of rod | | 0,26 |

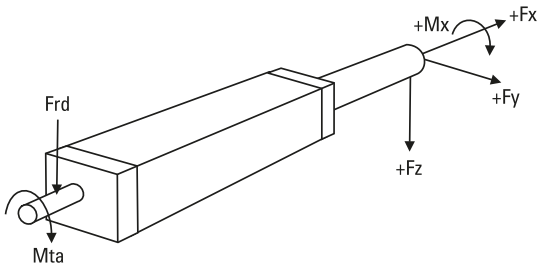
[1] Also see diagrams on next page

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 5 | p = 20 | p = 50 |
| 150 | 0,7 | 1,0 | 1,4 |
| 1500 | 1,1 | 1,6 | 2,0 |
| 3000 | 1,5 | 1,8 | 2,2 |

M idle = the input torque needed to move the rod with no load on it.

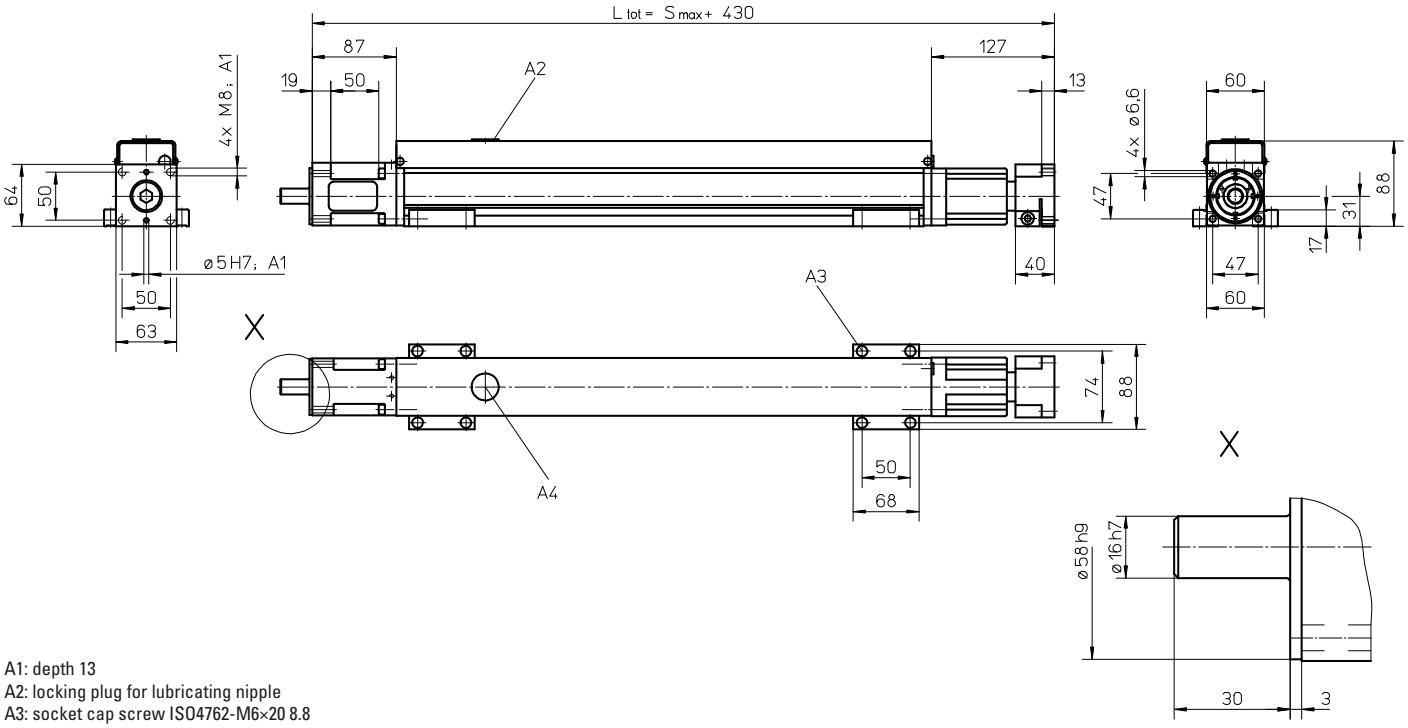
## Definition of Forces



# WZ60

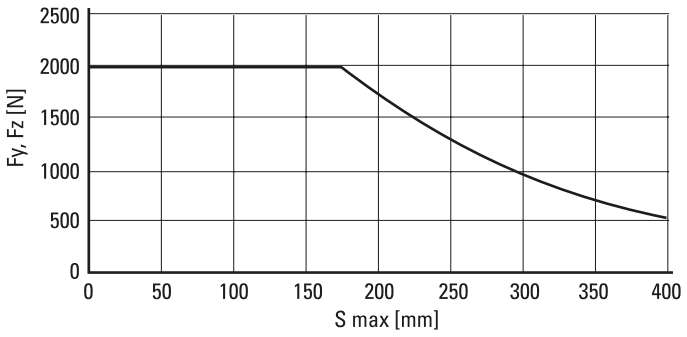
## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

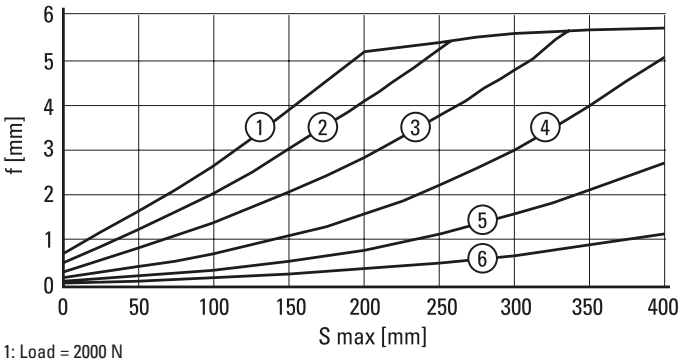



A1: depth 13
A2: locking plug for lubricating nipple
A3: socket cap screw ISO4762-M6×20 8.8
A4: tapered lubricating nipple to DIN71412 AM6 as standard feature

## Maximum Rod Side Forces (Fy, Fz)

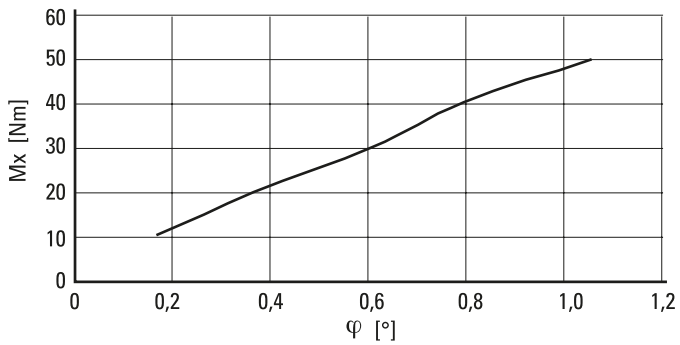



## Deflection (f) of Rod due to Fy and Fz




1: Load = 2000 N
2: Load = 1500 N
3: Load = 1000 N
4: Load = 500 N
5: Load = 250 N
6: Load = 125 N

## Torsion (φ) of Rod due to Mx



# WZ80

## Ball Screw Drive, Ball Guide

» Ordering key - see page 209
» Accessories - see page 135
» Additional data - see page 186

## General Specifications

| Parameter | WZ80 |
|---|---|
| Profile size (w × h) [mm] | 80 × 80 |
| Type of screw | single nut ball screw |
| Lubrication | central lubrication of all parts that require lubrication |
| Included accessories | 4 × mounting clamps |

## Performance Specifications

| Parameter | | WZ80 |
|---|---|---|
| Stroke length (Smax), maximum | [mm] | 500 |
| Linear speed, maximum | [m/s] | 1,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,02 |
| Input speed, maximum | [rpm] | 3000 |
| Operation temperature limits | [°C] | 0 – 80 |
| Dynamic load (Fx), maximum | [N] | 3500 |
| Dynamic load (Fy), maximum | [N] | 3000 [1] |
| Dynamic load (Fz), maximum | [N] | 3000 [1] |
| Dynamic load torque (Mx), maximum | [Nm] | 150 [1] |
| Drive shaft force (Frd), maximum | [N] | 700 |
| Drive shaft torque (Mta), maximum | [Nm] | 55 |
| Ball screw diameter (d0) | [mm] | 25 |
| Ball screw lead (p) | [mm] | 5, 10, 20, 50 |
| Weight | [kg] | |
| of unit with zero stroke | | 7,5 |
| of every 100 mm of stroke | | 1,35 |
| of the rod with zero stroke | | 3,0 |
| of every 100 mm of rod | | 0,5 |

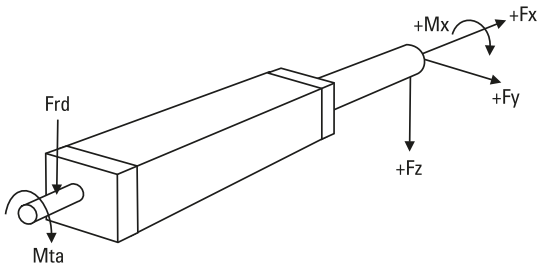
[1] Also see diagrams on next page

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 50 |
| 150 | 0,6 | 1,1 | 1,3 | 1,8 |
| 1500 | 1,1 | 1,5 | 1,6 | 2,2 |
| 3000 | 1,4 | 1,8 | 1,8 | 2,7 |

M idle = the input torque needed to move the rod with no load on it.

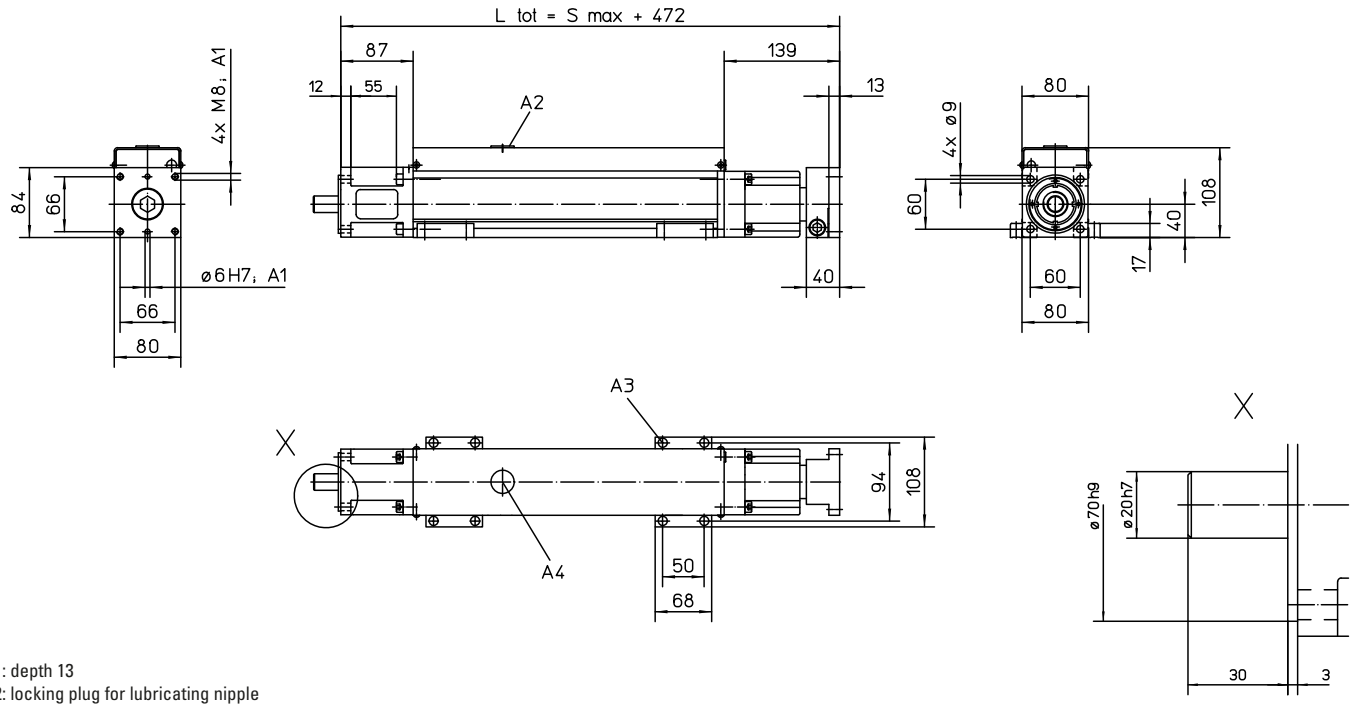
## Definition of Forces



# WZ80

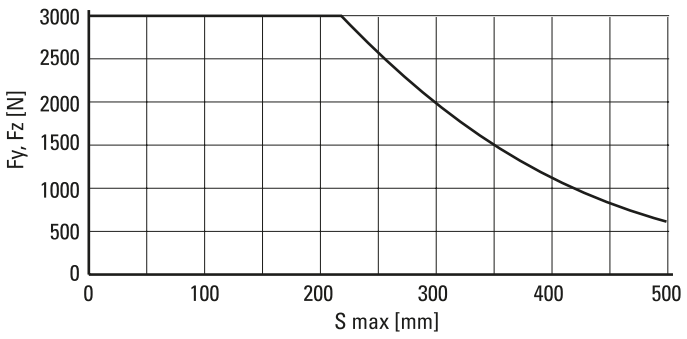
## Ball Screw Drive, Ball Guide

| Dimensions | Projection |
|---|---|
| METRIC | |

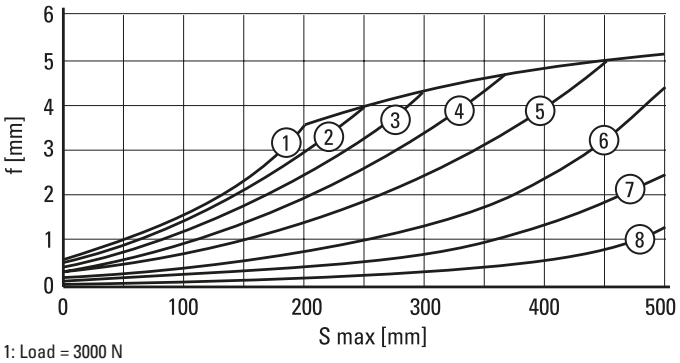



A1: depth 13
A2: locking plug for lubricating nipple
A3: socket cap screw ISO4762-M6×20 8.8
A4: tapered lubricating nipple to DIN71412 AM6 as standard feature

## Maximum Rod Side Forces (Fy, Fz)

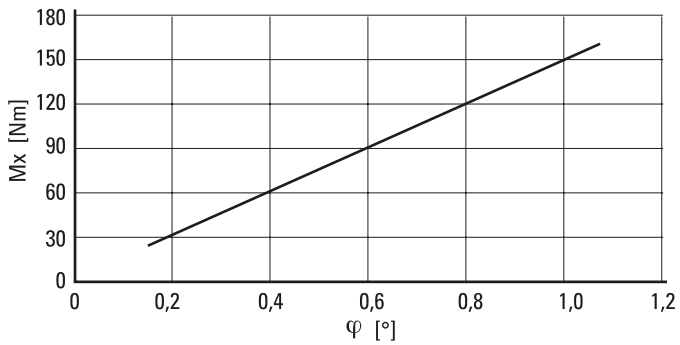


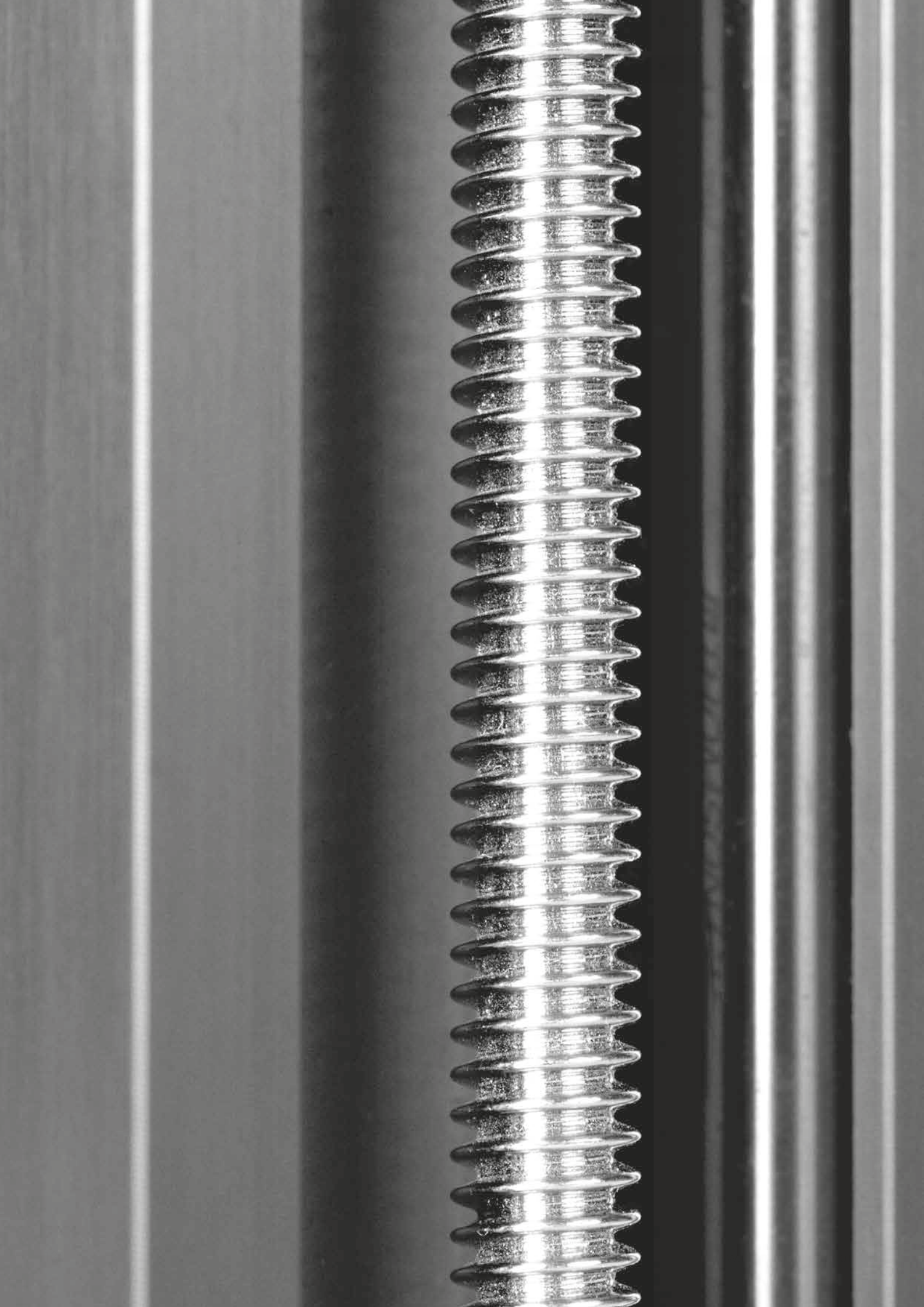

## Deflection (f) of Rod due to Fy and Fz




1: Load = 3000 N
2: Load = 2500 N
3: Load = 2000 N
4: Load = 1500 N
5: Load = 1000 N
6: Load = 500 N
7: Load = 250 N
8: Load = 125 N

## Torsion (φ) of Rod due to Mx





# Accessories

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# Accessories

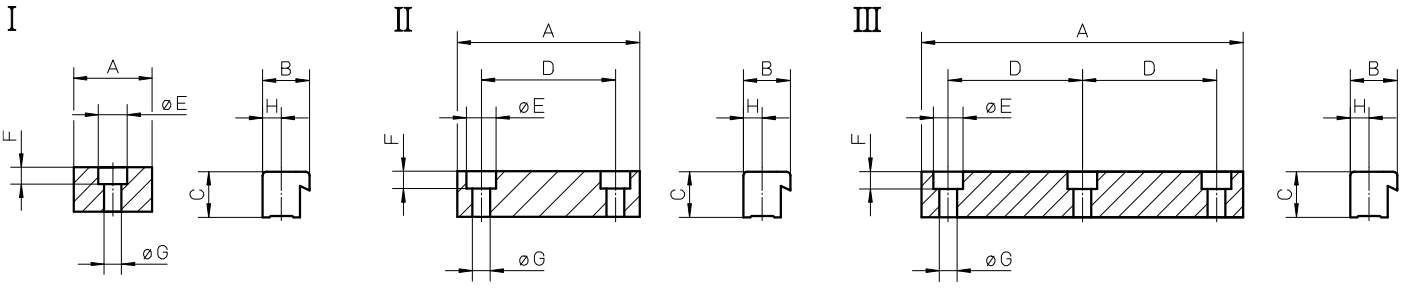
## Mounting Kits

### Mounting Clamps (single clamp)

| Unit type | I | II | III | A | B | C | D | øE | F | øG | H | Screws | Ms [Nm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WH40 | – | 890 885 0001 | – | 54 | 16 | 9,5 | 40 | 10 | 5,7 | 5,5 | 7 | ISO4762-8.8 | 5,4 |
| WH50 | – | 890 885 0001 | – | 54 | 16 | 9,5 | 40 | 10 | 5,7 | 5,5 | 7 | ISO4762-8.8 | 5,4 |
| WH80 / WB60 | – | 890 190 02 | – | 68 | 17,5 | 17 | 50 | 11 | 6,5 | 6,6 | 7 | ISO4762-8.8 | 9 |
| WH120 | – | 890 192 13 | – | 80 | 25 | 18 | 50 | 15 | 8,5 | 9 | 10 | ISO4762-8.8 | 20 |
| WM40 / WB40 | – | 890 885 001 | – | 54 | 16 | 9,5 | 40 | 10 | 5,7 | 5,5 | 7 | ISO4762-8.8 | 5,4 |
| WM60 / WV60 / WZ60 | – | 890 190 02 | – | 68 | 17,5 | 17 | 50 | 11 | 6,5 | 6,6 | 7 | ISO4762-8.8 | 9 |
| WM80 / WV80 / WZ80 | – | 890 190 02 | – | 68 | 17,5 | 17 | 50 | 11 | 6,5 | 6,6 | 7 | ISO4762-8.8 | 9 |
| WM60Z / WM80Z | – | 890 190 02 | – | 68 | 17,5 | 17 | 50 | 11 | 6,5 | 6,6 | 7 | ISO4762-8.8 | 9 |
| WM120 / WV120 | – | 890 192 13 | – | 80 | 25 | 18 | 50 | 15 | 8,5 | 9 | 10 | ISO4762-8.8 | 20 |
| MLS60 | – | 890 190 02 | 890 192 26 | 68/120 | 17,5 | 17 | 50 | 11 | 6,5 | 6,6 | 7 | ISO4762-8.8 | 9 |
| MLS80 | – | 890 192 13 | 890 192 31 | 80/200 | 25 | 18 | 50 | 15 | 8,5 | 9 | 10 | ISO4762-8.8 | 20 |
| M50 [1] | D312 248 | – | – | 25 | 30 | 20 | – | – | – | 6,5 | 14 | ISO4762-8.8 | 9,4 |
| M55 [1] | D313 403 | D313 402 | – | 25/56 | 25,5 | 10,7 | 41 | 9,5 | 5,3 | 5,5 | 10,2 | ISO4762-8.8 | 5,5 |
| M75 [1] | D312 747 | D312 748 | – | 30/75 | 28,5 | 15 | 60 | 14 | 8,5 | 8,5 | 11 | ISO4762-8.8 | 23 |
| M100 [1] | D312 339 | D312 334 | – | 45/92 | 46,5 | 22 | 60 | 17 | 10,5 | 10,5 | 20 | ISO4762-8.8 | 45 |

[1] no screws included in the shipment of these clamps

Ms = tightening torque of screws



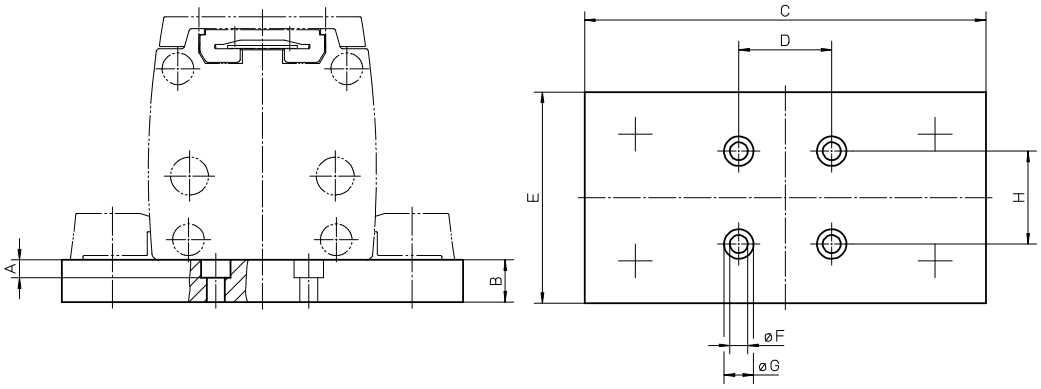
# Accessories

## Mounting Kits

### Mounting Clamps with Plate[1]

| Unit type | p/n | A | B | C | D | E | øF | øG | H |
|---|---|---|---|---|---|---|---|---|---|
| M50 | D312 117 | 7 | 20 | 105 | 35 | 30 | 6,5 | 11 | – |
| M55 | D313 474 | 8,5 | 15 | 100 | 44 | 70 | 8,5 | 14 | 44 |
| M75 | D312 718 | 8,5 | 15 | 134 | 44 | 80 | 8,5 | 14 | 44 |
| M100 | D312 317 | 8,5 | 20 | 190 | 44 | 100 | 8,5 | 14 | 44 |

[1] two mounting clamps of version II (see page 136) and screws to connect these to the plate are included in shipment



# Accessories

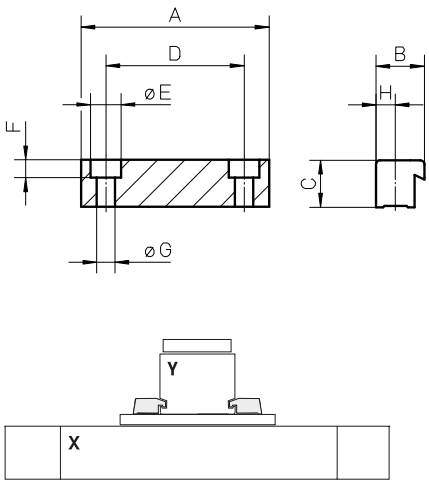
## Mounting Kits

### Mounting Clamps for Multi Axis Systems[1]

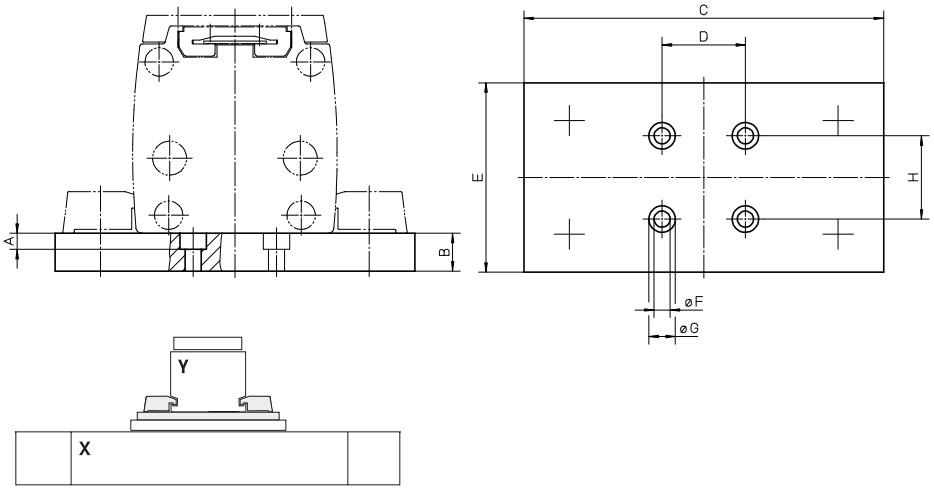
| Unit type X-axis | Unit type Y-axis | I | I I | A | B | C | D | øE | F | øG | H |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WM40 / WH40 | WM40 / WH40 | on request | – | – | – | – | – | – | – | – | – |
| WM60 | WM60 | 890 191 94 | – | 58 | 17,5 | 17 | 40 | 11 | 6,5 | 6,6 | 7 |
| M55 | M55 | D313 424 | – | 56 | 25,5 | 10,7 | 41 | 9,5 | 5,3 | 5,5 | 10,2 |
| M55 | M75 | – | D313 470 | 5,5 | 15 | 134 | 76 | 80 | 5,5 | 9,5 | 41 |
| M75 | M55 | – | D313 060 | - | 15 | 134 | 76 | 80 | M5 × 7,5 | - | 41 |
| M75 | M75 | D312 719 | – | 75 | 28,5 | 15 | 60 | 14 | 8,5 | 8,5 | 11 |
| M75 | M100 | – | D313 062 | 8,5 | 20 | 190 | 106 | 100 | 8,5 | 14 | 60 |
| M100 | M75 | – | D313 292 | - | 20 | 190 | 106,5 | 100 | M8 × 12 | - | 60 |
| M100 | M100 | D312 304 | – | 92 | 46,5 | 22 | 60 | 17 | 10,5 | 10,5 | 20 |

[1] all necessary screws are included in the shipment

I




II

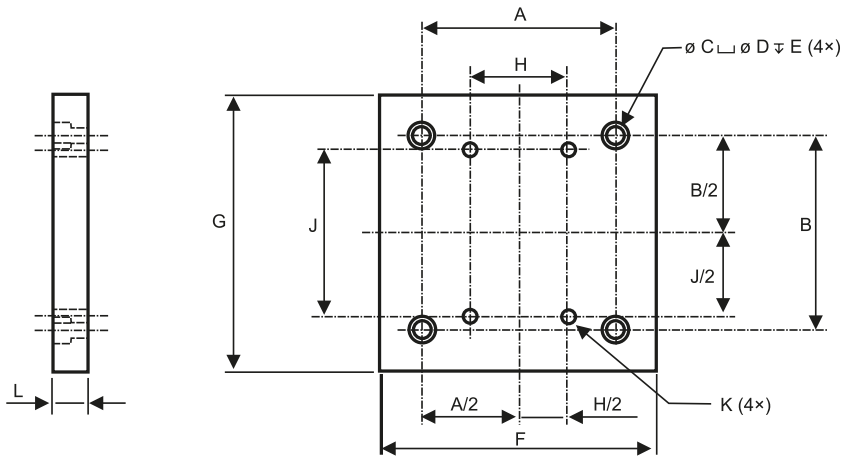


# Accessories

## Mounting Kits

### Mounting Plates for Multi Axis Systems

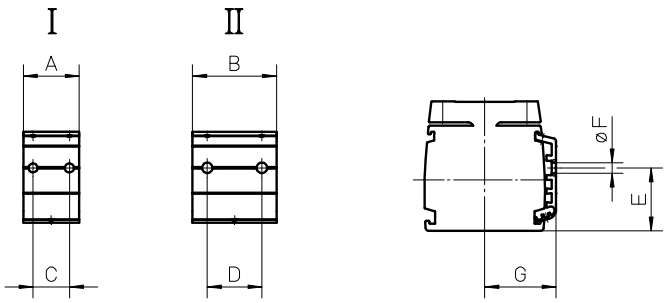
| Unit type X-axis | Unit type Y-axis | p/n | A | B | C | D | E | F | G | H | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MS33 | MS33 | MSXYP33-33 | 30 | 30 | 6 | 9 | 6 | 60 | 120 | 30 | 100 | M5 x 0,8 - 6H | 12,7 |
| MS33 | MS25 | MSXYP33-25 | 30 | 30 | 5,5 | 9 | 6 | 60 | 60 | 42 | 42 | M3 x 0,5 - 6H | 12,7 |
| 2HB10 | MS25 | 2HXYP10-MS25 | 70 | 70 | 5,5 | 9 | 6 | 100 | 100 | 42 | 42 | M3 x 0,5 - 6H | 12,7 |
| 2HB10 | MS33 | 2HXYP10-MS33 | 70 | 70 | 6 | 9 | 6 | 100 | 120 | 30 | 100 | M5 x 0,8 - 6H | 12,7 |
| 2HB10 | 2HB10 | 2HXYP10-10 | 70 | 70 | 5,5 | 9 | 6 | 100 | 100 | 35 | 75 | M5 x 0,8 - 6H | 12,7 |
| 2HB20 | 2HB10 | 2HXYP20-10 | 145 | 145 | 10,5 | 16,5 | 11 | 200 | 200 | 35 | 75 | M5 x 0,8 - 6H | 22 |
| 2HB20 | 2HB20 | 2HXYP20-10 | 145 | 145 | 10,5 | 16,5 | 11 | 200 | 200 | 85 | 120 | M8 x 1,25 - 6H | 22 |




Combinations for other units are available. Plates to connect X and Z axes are also available for the Microstage units size MS25 and MS33. Contact customer support for details.

### Adapter Plates

| Unit type | I | I I | A | B | C | D | E | øF | G |
|---|---|---|---|---|---|---|---|---|---|
| M55 | D313 422 | D313 423 | 40 | 60 | 20 | 38 | 25,5 | 6,5 | 37 |
| M75 | D312 746 | – | 40 | – | 26 | - | 45 | 6,5 | 51 |
| M75 | – | D312 745 | – | 60 | - | 39 | 45 | 7,5 | 51 |
| M100 | D312 338 | – | 40 | – | 26 | - | 69 | 6,5 | 62 |
| M100 | – | D312 337 | – | 60 | - | 39 | 69 | 7,5 | 62 |



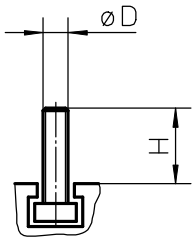

Adapter plates are fitted in the grooves along the profile and can be used to attach sensors, switches, cabl ducts etc. to the unit.

# Accessories

## Mounting Kits

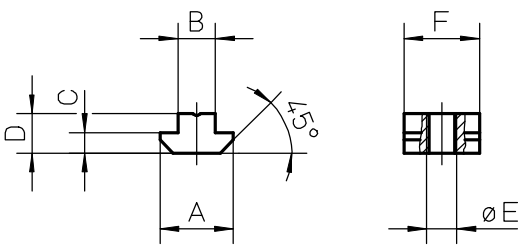
### T-slot Bolts

| Unit type | p/n | øD | H |
|---|---|---|---|
| M50 | D312 221 | M5 | 14 |
| Z2 | D800 089 | M10 | 28 |
| Z3 | D800 089 | M10 | 28 |




### T-slot Nuts

| Unit type | p/n | A | B | C | D | øE | F |
|---|---|---|---|---|---|---|---|
| ZB | D900 151 | 18 | 11 | 1,5 | 6,3 | M6 | 25 |
| ZB | D900 150 | 18 | 11 | 1,5 | 6,3 | M8 | 25 |
| MLS60 | 920 303 0037 | 16 | 8 | 4 | 6 | M6 | 16 |
| MLS80 | 920 303 0039 | 19,5 | 10 | 5,5 | 10,5 | M8 | 20 |
| WH120 | 911 044 19 | 15 | 10 | 6 | 12 | M8 | 15 |
| WM120 | 911 044 19 | 15 | 10 | 6 | 12 | M8 | 15 |
| 2RB12, 2HB10, 2HB20 | TNUT-01-M3 | 7 | 4 | 1,75 | 3 | M3 | 9 |
| 2RB16, 2HB10 | TNUT-02-M4 | 9,5 | 5,5 | 2,25 | 4 | M4 | 12 |
| 2RB12 | TNUT-03-M4 | 12 | 7 | 2,5 | 5 | M4 | 15 |
| 2RB16, 2HB20 | TNUT-04-M4 | 16,5 | 7,9 | 4,8 | 6 | M4 | 16 |
| 2RB16, 2HB20 | TNUT-04-M5 | 16,5 | 7,9 | 4,8 | 6 | M5 | 16 |
| 2RB16, 2HB20 | TNUT-04-M6 | 16,5 | 7,9 | 4,8 | 6 | M6 | 16 |

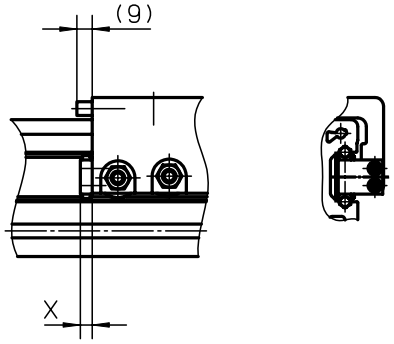


# Accessories

## Cover and Protection Kits

### FA Felt Pad Wiper

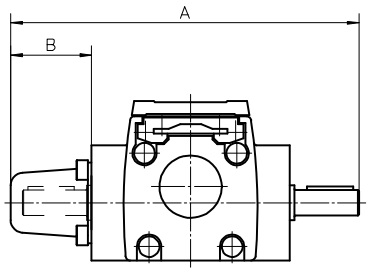
| Unit type | Number of carriages on the unit | p/n | X |
|---|---|---|---|
| WH50 | 1 | 890 885 0064 | 6 |
| WH50 | 2 | 2 × 890 885 0064 | 6 |
| WH80 | 1 | 890 890 0069 | 7 |
| WH80 | 2 | 2 × 890 890 0069 | 7 |
| WH120 | 1 | 890 895 0058 | 8 |
| WH120 | 2 | 2 × 890 895 0058 | 8 |
| WHZ50 | 1 | 890 885 0064 | 6 |
| WHZ50 | 2 | 2 × 890 885 0064 | 6 |
| WHZ80 | 1 | 890 890 0069 | 7 |
| WHZ80 | 2 | 2 × 890 890 0069 | 7 |




The felt pad wipers remove dust and dirt from the guides and are located on the carriage(s). They may increase the driving torque slightly but do not reduce the stroke of the unit. The felt pad wipers come mounted from factory.

### Shaft Protection Cover

| Unit type | p/n | A | B |
|---|---|---|---|
| M50 | D312 201 | 126 | 35 |
| M55 | D312 201 | 151 | 35 |
| M75 | D700 178 | 198 | 45 |
| M100 | D700 178 | 202 | 45 |



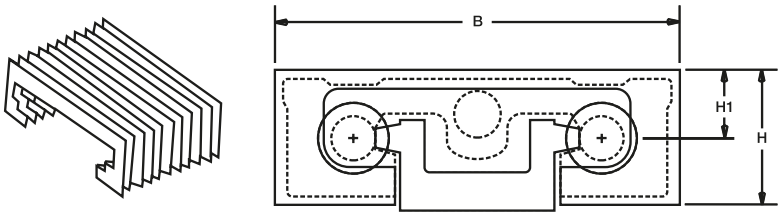

The shaft protection cover is used to cover shafts which are not being used. The covers are fitted by the customer.

# Accessories

## Cover and Protection Kits

### Protective Bellows type 2D

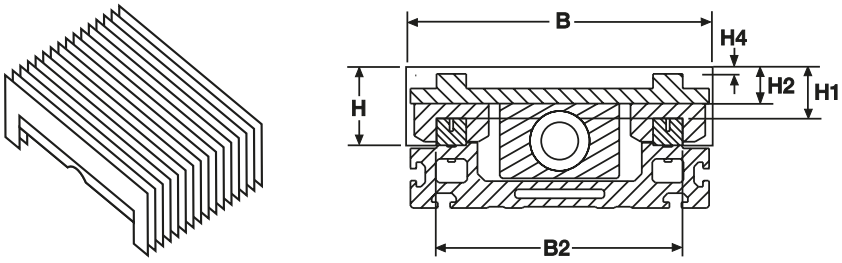
| Unit type | p/n | H | H1 | B |
|---|---|---|---|---|
| 2DB08 | BEL-2DB-08 | 48 | 34 | 130 |
| 2DB12 | BEL-2D-12 | 61 | 36,5 | 152,5 |
| 2DB12 | BEL-2D-16 | 73 | 43 | 190,5 |




Bellows protect the unit from dirt and dust. Note that the bellows option reduces the available stroke of the unit by 28%. Bellows can be ordered and mounted at the factory - see ordering key. Bellows can also be ordered separately and fitted by the customer. In that case, order two pieces of bellows where the length of each bellows piece = stroke length of the unit × 0.86.

### Protective Bellows type 2H

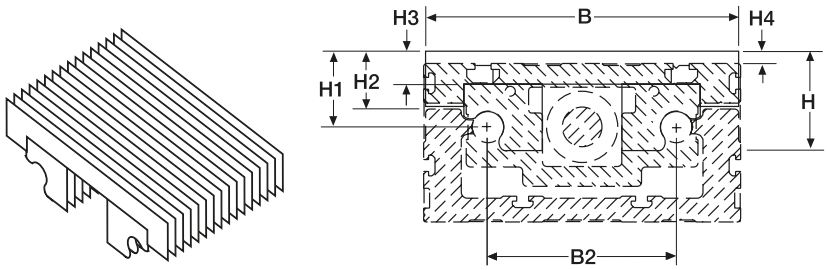
| Unit type | p/n | B | B2 | H | H1 | H2 | H4 |
|---|---|---|---|---|---|---|---|
| 2HB10 | BEL-2H-10 | 103 | 81 | 26 | 11 | 10 | 0 |
| 2HB20 | BEL-2H-20 | 199 | 167 | 48 | 30 | 15 | 5 |




Bellows protect the unit from dirt and dust. Note that the bellows option reduces the available stroke of the unit by 28%. Bellows can be ordered and mounted at the factory - see ordering key. Bellows can also be ordered separately and fitted by the customer. In that case, order two pieces of bellows where the length of each bellows piece = stroke length of the unit × 0.86.

### Protective Bellows type 2R

| Unit type | p/n | B | B2 | H | H1 | H2 | H3 | H4 |
|---|---|---|---|---|---|---|---|---|
| 2RB12 | BEL-2R-12 | 128 | 75 | 48 | 37 | 29 | 15 | 12 |
| 2RB16 | BEL-2R-16 | 158 | 95 | 52 | 43 | 30 | 15 | 10 |



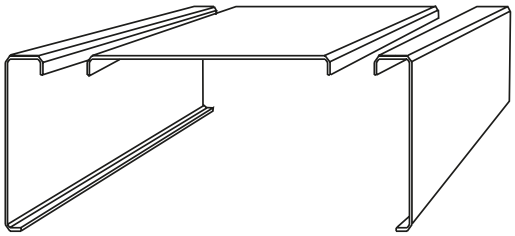

Bellows protect the unit from dirt and dust. Note that the bellows option reduces the available stroke of the unit by 28%. Bellows can be ordered and mounted at the factory - see ordering key. Bellows can also be ordered separately and fitted by the customer. In that case, order two pieces of bellows where the length of each bellows piece = stroke length of the unit × 0.86.

# Accessories

## Cover and Protection Kits

### Protective Shrouds

| Unit type | |
|---|---|
| 2HB10 | see ordering key of the unit for order or www.linearmotioneering.com |
| 2HB20 | see ordering key of the unit for order or www.linearmotioneering.com |



The protective shrouds are made of metal and protect the drive mechanism of the unit from dust and dirt but leave the guides unprotected. Shrouds do not reduce the stroke of the unit but they will add 4 mm to the width of the unit. Shrouds are ordered mounted from factory and are stated in the ordering key of the unit.

# Accessories

## Cover and Protection Kits

### Environment Protection Option Type S1 and S2, compatability table

| Unit type | Drive type | Guide type | S1 | S2 | Ordering |
|---|---|---|---|---|---|
| M55 | ball screw | slide | • | | see ordering key of the unit for order |
| M55 | belt drive | slide | • | • | see ordering key of the unit for order |
| | | ball | • | | see ordering key of the unit for order |
| M75 | ball screw | slide | • | | see ordering key of the unit for order |
| M75 | belt drive | slide | • | • | see ordering key of the unit for order |
| | | ball | • | | see ordering key of the unit for order |
| M100 | ball screw | slide | • | | see ordering key of the unit for order |
| M100 | belt drive | slide | • | • | see ordering key of the unit for order |
| | | ball | • | | see ordering key of the unit for order |
| WM60 / WM80 / WM120 | ball screw | ball | • | | see ordering key of the unit for order |
| WV60 / WV80 / WV120 | ball screw | no guide | • | | see ordering key of the unit for order |
| WH50 / WH80 / WH120 | belt drive | wheel | • | • | see ordering key of the unit for order |
| WHZ50 / WHZ80 | belt drive | wheel | • | | see ordering key of the unit for order |

The S1 and S2 environment protection options can be ordered for some units. All performance data and the life expectancy are the same as for standard units except for WH and WHZ units (contact customer service for more information). S1 can be ordered for both ball screw and belt driven units with ball, slide or wheel guides while S2 only is possible for belt driven units with slide or wheel guides. Never use chemical agents and/or cleaning detergents before contacting your local Thomson customer service for advise.

S1 - Wash down protection
Typical places where S1 is used are in slaughter houses, dairy plants, food plants or in any other light wash down application.

S2 - Enhanced wash down protection
Typical places where S2 is used are in moderately wet areas such as in paper mills, galvanising equipment, food industries or in any other harsh environment application where enhanced wash down capabilities are required.

### Environment Protection Options Type S1 and S2, technical specification

| Item | S1 | S2 |
|---|---|---|
| External screws, bolts and nuts | stainless material class A2 or better | stainless material class A4 or better |
| Internal screws, bolts and nuts | standard material | stainless material class A2 or better |
| Drive shaft, ball screw driven units | standard material | - |
| Drive shaft, belt driven units | stainless material SS2333 or better | stainless material SS2343 or better |
| Tension wheel shaft | standard material | stainless material SS2333 or better |
| Bearings type | standard bearings | 2RS |
| Bearing sealings, belt driven units | radial sealings | radial sealings |
| Surface treatment of machined extruded aluminum parts | none | anodising |
| Surface treatment of machined casted aluminum parts | none | anodising |
| Cam rollers and idler shafting (WH and WHZ units) | standard material | stainless material |
| Belt retainer (WH units) | none | stainless material |

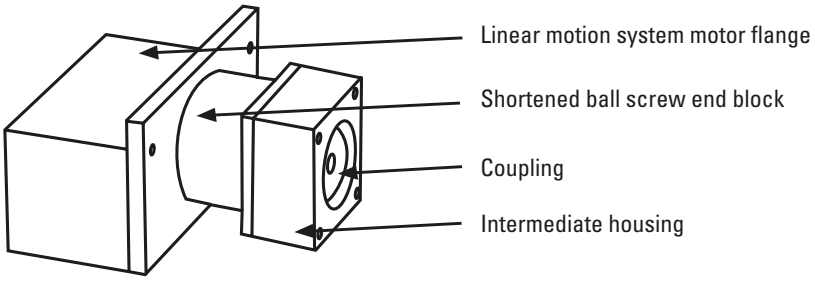
# Accessories

## Motors, Gears and Transmission Kits

### RediMount™ Motor Mount System, NEMA compatability table

| NEMA size | NEMA 17 | NEMA 23 | NEMA 34 | NEMA 42 |
|---|---|---|---|---|
| **Motor code *** | **505** | **001** | **002** | **003** |
| MS25 | x | x | | |
| MS33 | x | x | | |
| MS46 | | x | x | |
| 2HB10 | | x | x | |
| 2HB20 | | | x | x |
| 2RB12 | | x | x | |
| 2RB16 | | x | x | |
| 2DB08 | x (code 523) | x | | |
| 2DB12 | | x | x | |
| 2DB16 | | x | x | |

* See ordering keys for details.



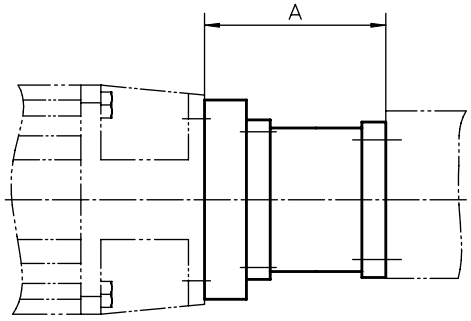

The standard NEMA motor mount sizes are listed above for reference. The Thomson RediMount™ System allows the linear units to be mounted to a wide variety of motor manufacturers and sizes. Many of these combinations can be found at www.linearmotioneering.com. Contact customer support for other motor sizes and their corresponding motor code.

# Accessories

## Motors, Gears and Transmission Kits

### Bell House Flanges for IEC Motors

| Unit type | IEC63 B14 | A | IEC71 B14 | A | IEC80 B14 | A | IEC90 B14 | A | IEC100/112 B14 | A |
|---|---|---|---|---|---|---|---|---|---|---|
| M50 | D390 820 | 64 | D390 821 | 71 | – | – | – | – | – | – |
| M55 | D390 820 | 64 | D390 821 | 71 | – | – | – | – | – | – |
| M75 | – | – | D390 823 | 83 | D390 912 | 101 | D390 916 | 101 | – | – |
| M100 (MG10K) | – | – | D390 823 | 83 | D390 913 | 101 | D390 917 | 101 | – | – |
| M100 (MG10B) | – | – | D390 823 | 83 | D390 912 | 101 | D390 916 | 101 | – | – |



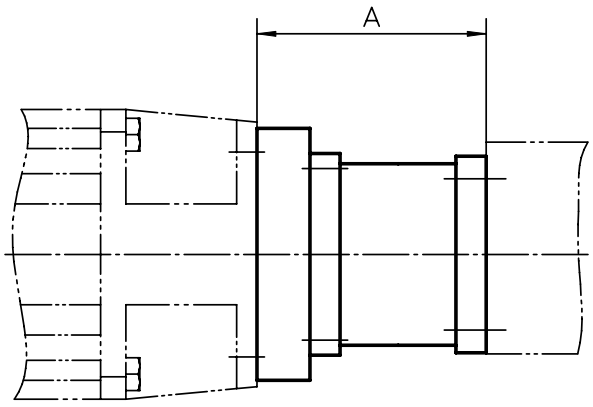

The bell house flange includes a matching coupling. Note! Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

# Accessories

## Motors, Gears and Transmission Kits

### MGK Bell House Flanges for AKM Servo Motors

| Unit type | AKM3 • D-AN | A | AKM4 • D-AN | A | AKM5 • D-AN | A | AKM6 • D-AN | A | AKM7 • D-AN | A |
|---|---|---|---|---|---|---|---|---|---|---|
| WM40 | 891 092 1264 | 71 | – | – | – | – | – | – | – | – |
| WB40 | 891 092 1263 | 63 | – | – | – | – | – | – | – | – |
| WB60 | 891 092 1265 | 75 | – | – | – | – | – | – | – | – |
| WM60 / WV60 / WZ60 | 891 092 1109 | 79 | 891 092 1262 | 89 | 891 092 1261 | 103 | – | – | – | – |
| WM80 / WV80 / WZ80 | D321 759 | 80 | D321 404 | 91 | 891 092 1259 | 101 | 891 092 1258 | 117 | – | – |
| WM120 / WV120 | – | – | – | – | 891 092 0143 | 113 | 891 092 1257 | 121 | D321 281 | 143 |
| MLSM60 | – | – | 891 092 0909 | 88 | 891 092 1260 | 98 | – | – | – | – |
| MLSM80 | – | – | – | – | – | – | 891 092 1256 | 111 | 891 092 1254 | 133 |
| M55 (MG06K) | D390 930 | 73 | D389 939 | 92 | – | – | – | – | – | – |
| M75 (MG07K) | D390 966 | 83 | D390 926 | 93 | D390 909 | 107 | – | – | – | – |
| M75 (MG07B) | D390 966 | 83 | D390 926 | 93 | D390 909 | 107 | – | – | – | – |
| M100 (MG10K) | D390 966 | 83 | D390 927 | 93 | D390 910 | 107 | – | – | – | – |
| M100 (MG10B) | D390 966 | 83 | D390 926 | 93 | D390 909 | 107 | – | – | – | – |




The bell house flange includes a matching coupling. Flanges for other units or motor sizes available on request, contact customer service. Note! Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

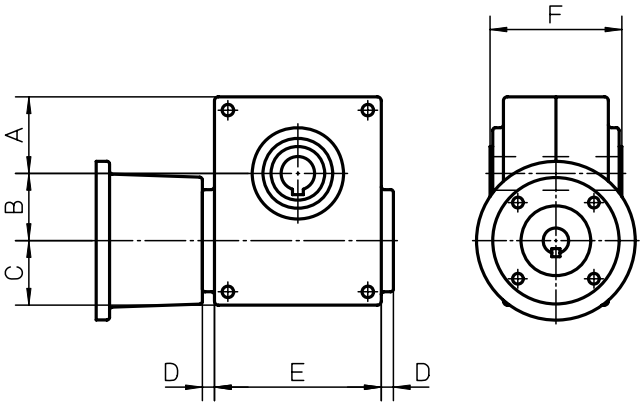
# Accessories

## Motors, Gears and Transmission Kits

### BS40 Worm Gears, dimensions

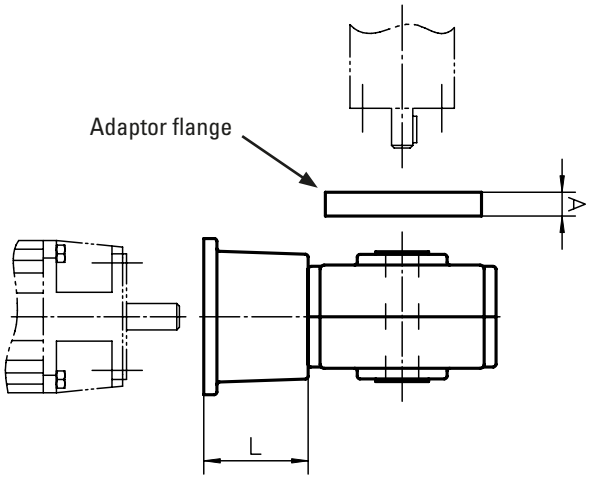
| Gear | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| BS40 | 54 | 40 | 46 | 10 | 100 | 92 |

The worm gear includes the gear, the bell house and a matching coupling.




### BS40 Worm Gears, compatability table

| Unit | BS40 | IEC71B14 | IEC80B14 | IEC90B14 | A | L |
|---|---|---|---|---|---|---|
| Z2 (MGZ2K32) | • | • | | | 17 | 58 |
| Z2 (MGZ2K32) | • | | • | | 17 | 68 |




To be able to install the gear to the unit an adaptor flange must be used between the gear and the unit. The adaptor flange is ordered separately.

# Accessories

## Motors, Gears and Transmission Kits

### BS40 Worm Gears, ordering key

| | 1 | 2 | 3 |
|---|---|---|---|
| Example | BS40 | -10 | -71 |

| 1. Type and size of worm gear | 2. Gear ratio | 6. Motor size |
|---|---|---|
| BS40 = BS40 worm gear | -3 = 3:1<br>-5,5 = 5,5:1<br>-7,5 = 7,5:1<br>-10 = 10:1<br>-15 = 15:1<br>-20 = 20:1<br>-24 = 24:1<br>-30 = 30:1<br>-40 = 40:1<br>-48 = 48:1<br>-60 = 60:1 | no code = without bell house and coupling<br>-71 = IEC71B14<br>-80 = IEC80B14 |

### Adaptor flanges for BS40 Worm Gears, part numbers

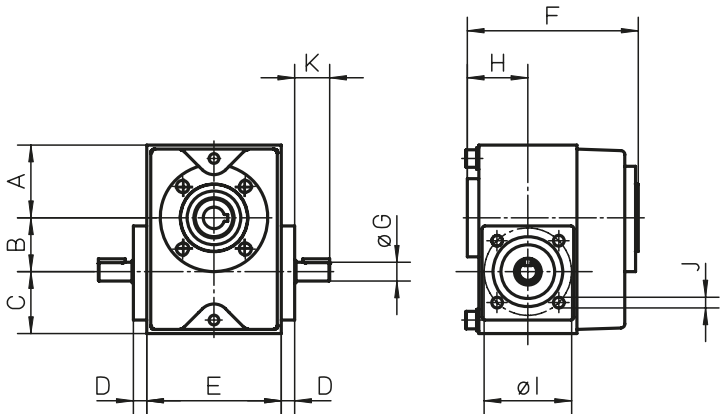
| Unit | p/n |
|---|---|
| Z2 (MGZ2K32) | D606 250 |

# Accessories

## Motors, Gears and Transmission Kits

### TBS40 Worm Gears, dimensions

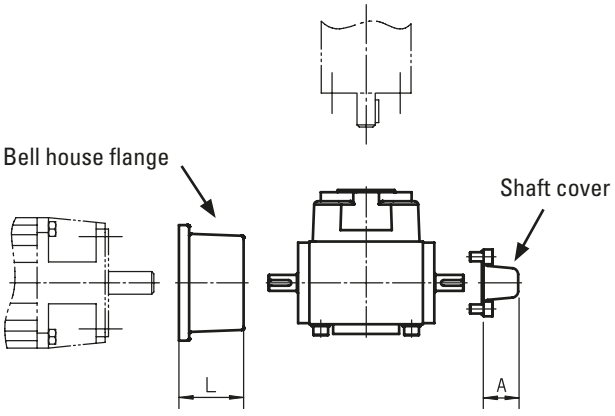
| Gear | A | B | C | D | E | F | øG | H | øI | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TBS40 | 54 | 40 | 46 | 10 | 100 | 125 | 14j6 | 45 | 65 | M8 (4×) | 25 |




The worm gear is installed directly to the unit and requires no intermediate coupling between the two.

### TBS40 Worm Gears, compatability table

| Unit | TBS40 | IEC71B14 | IEC80B14 | A | L |
|---|---|---|---|---|---|
| Z2 (MGZ2K25) | • | • | | 32 | 58 |
| Z2 (MGZ2K25) | • | | • | 32 | 68 |
| Z3 (MGZ3K25) | • | • | | 32 | 58 |
| Z3 (MGZ3K25) | • | | • | 32 | 68 |
| M75 | • | • | | 32 | 58 |
| M75 | • | | • | 32 | 68 |
| M100 | • | • | | 32 | 58 |
| M100 | • | | • | 32 | 68 |




To be able to install the gear to the motor a bell house flange must be used between the gear and the motor. The bell house flange, which includes a matching coupling, is ordered separately. A shaft cover can be ordered to cover the second primary shaft on the gear in case it is not being used.

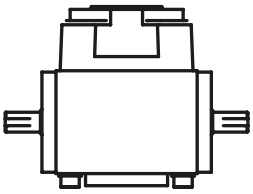
# Accessories

## Motors, Gears and Transmission Kits

### TBS40 Worm Gears, ordering key

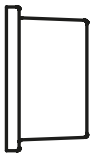
| | 1 | 2 | 3 |
|---|---|---|---|
| Example | TBS40 | -3 | -216 |

| 1. Type and size of worm gear | 2. Gear ratio | 3. Fixed code |
|---|---|---|
| TBS40 = TBS40 worm gear | -3 = 3:1<br>-5,5 = 5,5:1<br>-7,5 = 7,5:1<br>-10 = 10:1<br>-15 = 15:1<br>-20 = 20:1<br>-24 = 24:1<br>-30 = 30:1<br>-40 = 40:1<br>-48 = 48:1<br>-60 = 60:1 | -216 |



### Bell house flanges for TBS40 Worm Gears, part numbers

| Motor size | p/n |
|---|---|
| IEC71B14 | D701 011 |
| IEC80B14 | D701 015 |



### Shaft Cover for TBS40 Worm Gears, part numbers

| Gear type | p/n |
|---|---|
| TBS40 | D701 020 |



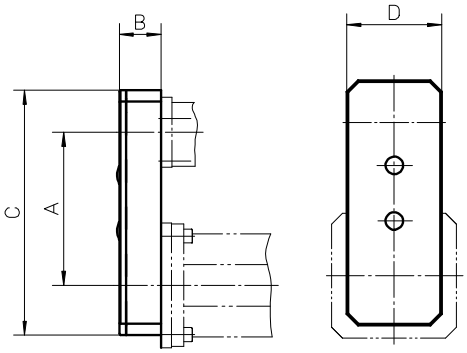
# Accessories

## Motors, Gears and Transmission Kits

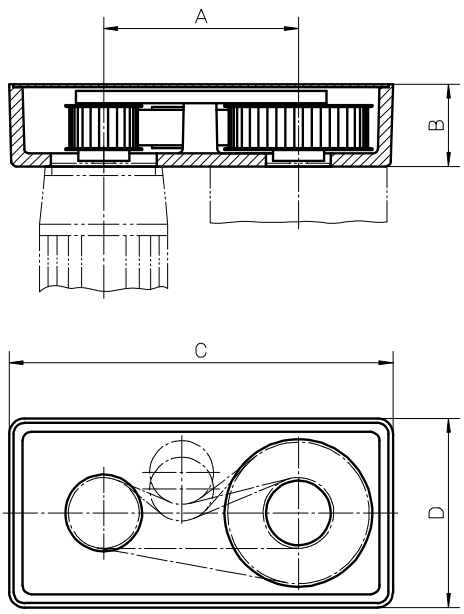
### RT Belt Gears, dimensions

| Gear | A | B | C | D |
|---|---|---|---|---|
| RT40 | 110 | 30 | 176 | 68 |
| RT60 | 175 | 74 | 345 | 170 |
| RT80 | 175 | 74 | 345 | 170 |

RT40




RT60/80




### RT Belt Gears, data

| Gear | i | nmax [rpm] | Mmax [Nm] | M idle [Nm] | η | J [kgm²] | Weight [kg} |
|---|---|---|---|---|---|---|---|
| RT40 | 1:1 | 3000 | 1,75 | 0,3 | 0,80 | 0,000025 | 0,62 |
| RT60 | 1:1 | 3000 | 15 | 0,7 | 0,85 | 0,000438 | 5,6 |
| RT60 | 2:1 | 3000 | 15 | 0,7 | 0,85 | 0,001011 | 7,1 |
| RT80 | 1:1 | 3000 | 30 | 0,7 | 0,85 | 0,000465 | 5,5 |
| RT80 | 2:1 | 3000 | 30 | 0,7 | 0,85 | 0,001038 | 7 |

i = gear ratio
nmax = max. input speed
Mmax = max. input torque
M idle = idle torque
η = efficiency factor
J = inertia

# Accessories

## Motors, Gears and Transmission Kits

### RT Belt Gears, compatability table

| Gear | WH40 / WM40 | WM60 / WV60 / WZ60 / MLSM60D | WH80 / WM80 / WV80 / WM120 / WV120 / MLSM60D / MLSM80D |
|---|---|---|---|
| RT40 | • | | |
| RT60 | | • | |
| RT80 | | | • |

### RT Belt Gears, ordering key

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Example | RT80 | -2 | -••• | -P-N | -05 |

**1. Type and size of belt gear**
RT40 = RT belt gear size 40
RT60 = RT belt gear size 60
RT80 = RT belt gear size 80

**2. Gear ratio**
-1 = 1:1
-2 = 2:1

**3. Motor code**
-••• = alphanumeric motor code (e.g. -AK5). There are several motors that fit each gear and the list of suitable motors is continiously being updated. Please contact customer support for help to see which motors are currently are on the list or if your prefered motor can be added to the list.

**4. Type of mounting**
-P-M = gear supplied mounted to the unit
-P-N = gear supplied unmounted

**5. Compatable unit type**
-01 = WH40
-02 = WH50
-03 = WH80
-04 = WH120
-05 = WM40
-06 = WM60
-07 = WM80
-08 = WM120
-09 = WV60
-10 = WV80
-11 = WV120
-12 = WHZ50
-13 = WHZ80
-14 = WZ60
-15 = WZ80
-16 = MLSH60Z
-18 = MLSM80Z
-19 = MLSM60D
-20 = MLSM80D

# Accessories

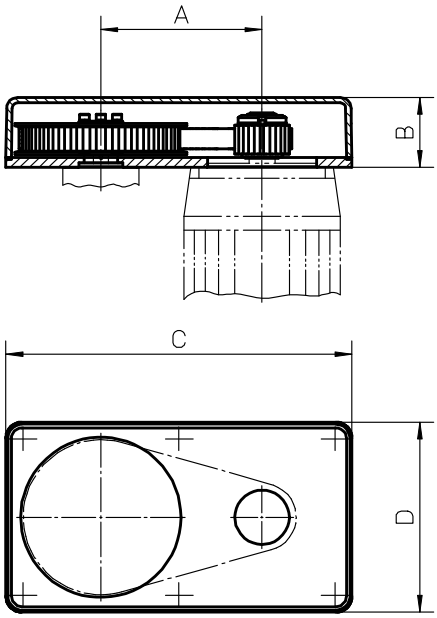
## Motors, Gears and Transmission Kits

### BGM Belt Gears, dimensions

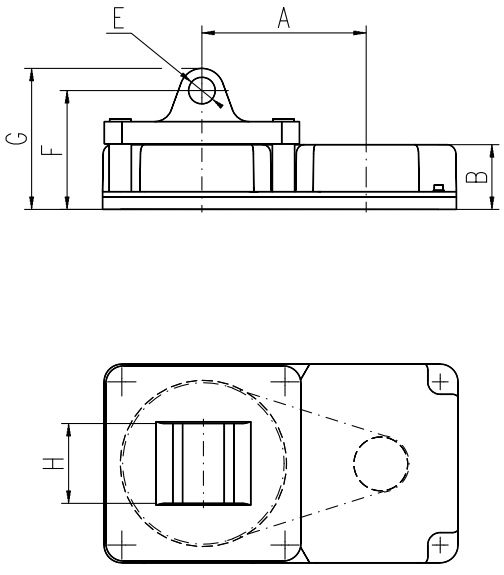
| Gear | A | B | C | D | øE | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| BGM09 | 118,7 | 52 | 255 | 140 | 20 H9 | 95 | 115 | 60 | – | – |
| BGM41 | 155,2 | 70 | 305 | 165 | 25 H9 | 122 | 147 | 70 | – | – |
| BGM81 | 200 | 73 | 399 | 224 | 30 H9 | 134 | 159 | 90 | 90H14 | 170 |

The belt gear comes in parts and is assembled to the unit and motor by the customer.

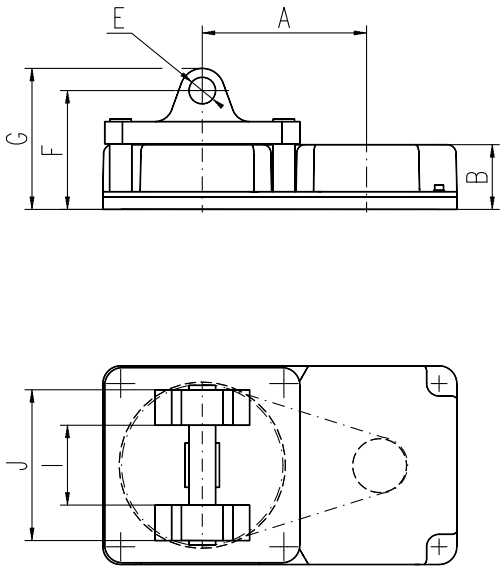
BGM09/41/81 - WITHOUT CLEVIS OPTION




BGM09/41/81 - WITH CLEVIS OPTION TYPE S




BGM81 - WITH CLEVIS OPTION TYPE R



# Accessories

## Motors, Gears and Transmission Kits

### BGM Belt Gears, data

| Gear | i | nmax [rpm] | Mmax [Nm] | η | J [kgm²] | Weight [kg} |
|---|---|---|---|---|---|---|
| BGM09 | 1,04:1 | 4000 | 4,1 | 0,85 | 0,000102 | 2 |
| BGM09 | 1,85:1 | 4000 | 4,1 | 0,85 | 0,000112 | 2,1 |
| BGM09 | 2,85:1 | 4000 | 4,1 | 0,85 | 0,000213 | 2,5 |
| BGM41 | 1:1 | 4000 | 22,0 | 0,85 | 0,000438 | 3,4 |
| BGM41 | 2:1 | 4000 | 15,8 | 0,85 | 0,000342 | 3,7 |
| BGM41 | 3:1 | 4000 | 16,7 | 0,85 | 0,000583 | 4,6 |
| BGM81 | 1:1 | 4000 | 29,0 | 0,85 | 0,000836 | 12,1 |
| BGM81 | 2,25:1 | 4000 | 32,3 | 0,85 | 0,001051 | 12,9 |
| BGM81 | 3,13:1 | 4000 | 30,3 | 0,85 | 0,001439 | 14 |

i = gear ratio
nmax = max. input speed
Mmax = max. input torque
η = efficiency factor
J = inertia

### BGM Belt Gears, compatability table

| Gear | WM/V/Z60 | WM/V80 | WM/V120 | MLSM80D | WB60 | M50 | M55 | M75 | M100 | Z2 |
|---|---|---|---|---|---|---|---|---|---|---|
| BGM09 | • | | | | • | • | • | • | | |
| BGM41 | • | • | | | | | | • | • | • |
| BGM81 | | | • | • | | | | | | |

### BGM Belt Gears, ordering keys

See next page for ordering keys.

# Accessories

## Motors, Gears and Transmission Kits

### BGM 09 Belt Gears, ordering key

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Example | BGM09 | -2 | -CC | 063 | P | 050 | X | +XX |

**1. Type and size of belt gear**
BGM09 = BGM belt gear size 09

**2. Gear ratio**
-1 = 1,04:1
-2 = 1,85:1
-3 = 2,85:1

**3. Type of couplings**
-CC = conical couplings

**4. Motor size[1]**
063 = IEC 63 B14
071 = IEC 71 B14
S80 = servo motor size 80
AK4 = servo motor type AKM 4

**5. Type of mounting**
P = standard

**6. Compatable unit type**
W06 = WM60, WV60, WZ60
WB6 = WB60
050 = M50
060 = M55
070 = M75

**7. Clevis option**
X = no clevis option
S = clevis option type S

**8. Protection**
+XX = standard
+S1 = wash down protection

[1]This is only a selection of all motors that fit this gear. Please contact customer support to see if your prefered motor fits the gear.

### BGM 41 Belt Gears, ordering key

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Example | BGM41 | -1 | -CC | 071 | P | 070 | X | +S1 |

**1. Type and size of belt gear**
BGM41 = BGM belt gear size 41

**2. Gear ratio**
-1 = 1:1
-2 = 2:1
-3 = 3:1

**3. Type of couplings**
-CC = conical couplings

**4. Motor size[1]**
071 = IEC 71 B14
080 = IEC 80 B14
S80 = servo motor size 80
S95 = servo motor size 95
AK5 = servo motor type AKM 5

**5. Type of mounting**
P = standard

**6. Compatable unit type**
W06 = WM60, WV60, WZ60
W08 = WM80, WV80
070 = M75
10B = M100 (MF/G10B)
10K = M100 (MF/G10K/C/D)

**7. Clevis option**
X = no clevis option
S = clevis option type S

**8. Protection**
+XX = standard
+S1 = wash down protection

[1]This is only a selection of all motors that fit this gear. Please contact customer support to see if your prefered motor fits the gear.

# Accessories

## Motors, Gears and Transmission Kits

### BGM 81 Belt Gears, ordering key

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Example | BGM81 | -1 | -CC | 090 | P | M8D | X | +XX |

**1. Type and size of belt gear**
BGM81 = BGM belt gear size 81

**2. Gear ratio**
-1 = 1:1
-2 = 2,25:1
-3 = 3,13:1

**3. Type of couplings**
-CC = conical couplings

**4. Motor size[1]**
090 = IEC 90 B14
100 = IEC 100/121 B14
A20 = servo motor size A200
AK6 = servo motor type AKM 6

**5. Type of mounting**
P = standard

**6. Compatable unit type**
W12 = WM120, WV120
M8D = MLSM80D

**7. Clevis option**
X = no clevis option
S = clevis option type S
R = clevis option type R

**8. Protection**
+XX = standard
+S1 = wash down protection

[1]This is only a selection of all motors that fit this gear. Please contact customer support to see if your prefered motor fits the gear.

# Accessories

## Motors, Gears and Transmission Kits

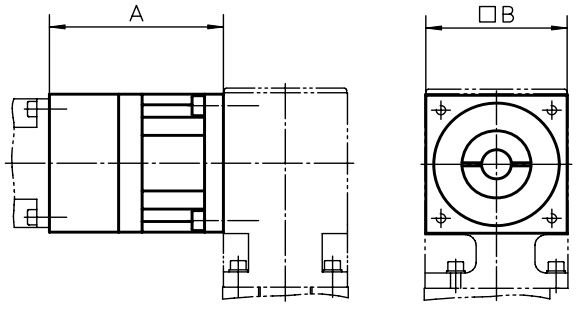
### Micron DT, DTR Planetary Gears, compatability and dimensions

| Unit | Gear | i | □A | B | C | □D | E | Weight [kg] | Backlash [arc min] | Efficiency [%] |
|---|---|---|---|---|---|---|---|---|---|---|
| WH50 | DT60-SS | 3:1 - 10:1 | 89,7 | 60 | – | – | – | 1 | 8 | 90 |
| | DT60-DS | 15:1 - 100:1 | 106,9 | 60 | – | – | – | 1,2 | 9 | 85 |
| | DTR60-SS | 5:1 - 50:1 | – | – | 110,2 | 104,1 | 60 | 2,5 | 9 | 90 |
| | DTR60-DS | 60:1 - 500:1 | – | – | 127,3 | 104,1 | 60 | 2,7 | 9 | 85 |
| WH80 | DT90-SS | 3:1 - 10:1 | 110,9 | 90 | – | – | – | 3 | 9 | 90 |
| | DT90-DS | 15:1 - 100:1 | 133,5 | 90 | – | – | – | 3,7 | 9 | 85 |
| | DTR90-SS | 5:1 - 50:1 | – | – | 145,4 | 138,2 | 90 | 4,8 | 9 | 90 |
| | DTR90-DS | 60:1 - 500:1 | – | – | 168,0 | 138,2 | 90 | 5,5 | 9 | 85 |
| WH120 | DT115-SS | 3:1 - 10:1 | 136,4 | 110 | – | – | – | 12,7 | 8 | 90 |
| | DT115-DS | 15:1 - 100:1 | 167,4 | 110 | – | – | – | 16,2 | 9 | 85 |
| | DTR115-SS | 5:1 - 50:1 | – | – | 185,7 | 173,5 | 115 | 11 | 8 | 90 |
| | DTR115-DS | 60:1 - 500:1 | – | – | 216,7 | 173,5 | 115 | 12 | 9 | 85 |
| WM60Z | DT60-SS | 3:1 - 10:1 | 89,7 | 60 | – | – | – | 1 | 8 | 90 |
| | DT60-DS | 15:1 - 100:1 | 106,9 | 60 | – | – | – | 1,2 | 9 | 85 |
| | DTR60-SS | 5:1 - 50:1 | – | – | 110,2 | 104,1 | 60 | 2,5 | 9 | 90 |
| | DTR60-DS | 60:1 - 500:1 | – | – | 127,3 | 104,1 | 60 | 2,7 | 9 | 85 |
| WM80Z | DT90-SS | 3:1 - 10:1 | 110,9 | 90 | – | – | – | 3 | 9 | 90 |
| | DT90-DS | 15:1 - 100:1 | 133,5 | 90 | – | – | – | 3,7 | 9 | 85 |
| | DTR90-SS | 5:1 - 50:1 | – | – | 145,4 | 138,2 | 90 | 4,8 | 9 | 90 |
| | DTR90-DS | 60:1 - 500:1 | – | – | 168,0 | 138,2 | 90 | 5,5 | 9 | 85 |

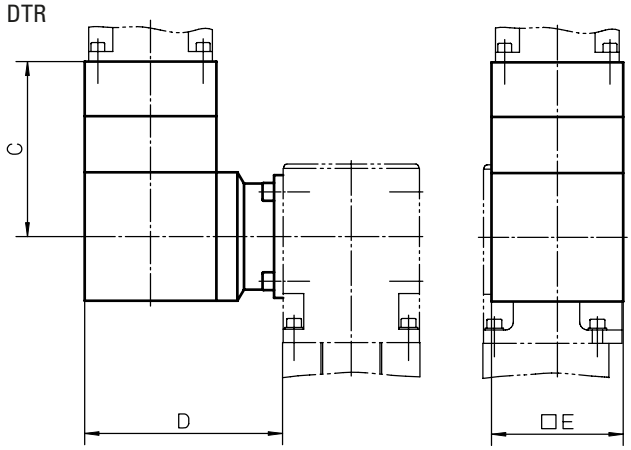
i = gear ratio

Micron DT and DTR planetary gears comes mounted on the unit from factory.

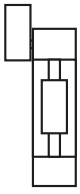
DT



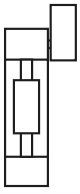

DTR



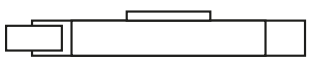

Left side



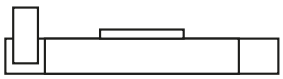
Right side



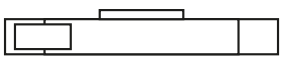
Position 1



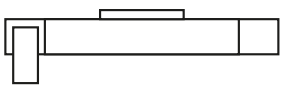
Position 2



Position 3



Position 4



# Accessories

## Motors, Gears and Transmission Kits

## Micron DT, DTR Planetary Gears, how to order

When ordering a DT or DTR planetary gear you need to state the size and type of gear, which side of the unit the gear shall be installed, the gear ratio and which motor that you wish to use. For DTR you also must state the prefered mounting position of the gear. With this information we can check if your choice of motor is possible or not and give you the correct ordering code for the gear.

## Micron DT, ordering data

**1. Size of planetary gear**
DT60
DT90
DT115

**2. Type of gear**
-SS
-DS

**3. Mounting side of the unit**
Left
Right

**4. Gear ratio**
3:1 (only for -SS models)
5:1 (only for -SS models)
10:1 (only for -SS models)
15:1 (only for -DS models)
25:1 (only for -DS models)
30:1 (only for -DS models)
50:1 (only for -DS models)
100:1 (only for -DS models)

**5. Motor**
Specify your choice of motor.

## Micron DTR, ordering data

**1. Type and size of planetary gear**
DTR60
DTR90
DTR115

**2. Type of gear**
-SS
-DS

**3. Mounting position of the gear**
Position 1
Position 2
Position 3
Position 4

**4. Mounting side of the unit**
Left
Right

**5. Gear ratio**
5:1 (only for -SS models)
6:1 (only for -SS models)
9:1 (only for -SS models)
10:1 (only for -SS models)
12:1 (only for -SS models)
15:1 (only for -SS models)
20:1 (only for -SS models)
25:1 (only for -SS models)
30:1 (only for -SS models)
40:1 (only for -SS models)
50:1 (only for -SS models)
60:1 (only for -DS models)
75:1 (only for -DS models)
90:1 (only for -DS models)
100:1 (only for -DS models)
120:1 (only for -DS models)
125:1 (only for -DS models)
150:1 (only for -DS models)
200:1 (only for -DS models)
250:1 (only for -DS models)
300:1 (only for -DS models)
400:1 (only for -DS models)
500:1 (only for -DS models)

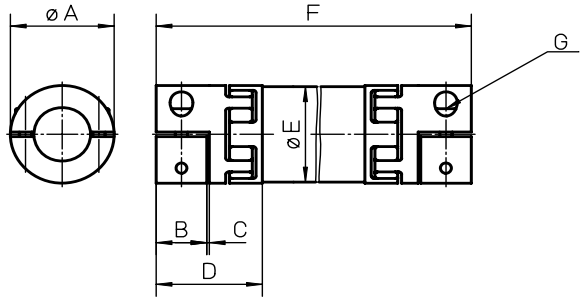
**6. Motor**
Specify your choice of motor.

# Accessories

## Motors, Gears and Transmission Kits

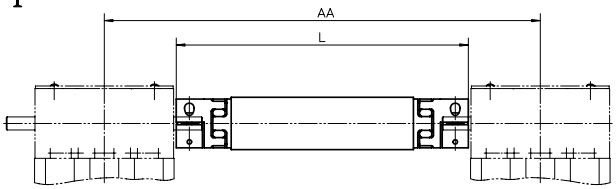
### VWZ Intermediate Shafts, dimensions

| Shaft | øA | B | C | D | øE | F min. | G |
|---|---|---|---|---|---|---|---|
| VWZ-30 | 32 | 15 | 1,5 | 34 | 30 | 99 | M4 |
| VWZ-40 | 42 | 17 | 1,5 | 46 | 40 | 133 | M5 |
| VWZ-60 | 56 | 30 | 2 | 63 | 60 | 177 | M6 |
| VWZ-60V | 67 | 35 | 2 | 73 | 60 | 205 | M8 |
| VWZ-80 | 82 | 40 | 2 | 84 | 80 | 249 | M10 |
| VWZ-100 | 102 | 50 | 2 | 97 | 100 | 283 | M12 |

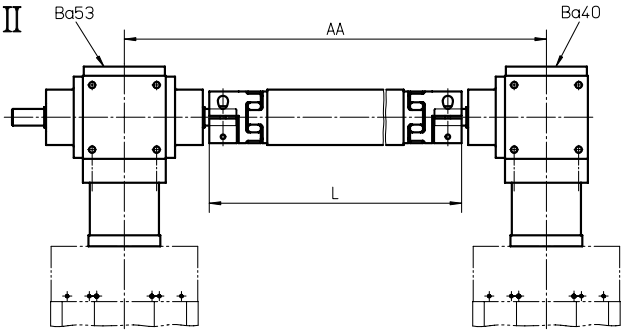



The VWZ intermediate shafts can be installed in two ways. Either directly to belt driven units (I) or to screw driven units using KRG bevel gears (II) of type VL0, VL1 or VL2. The intermediate shaft includes tube and couplings.

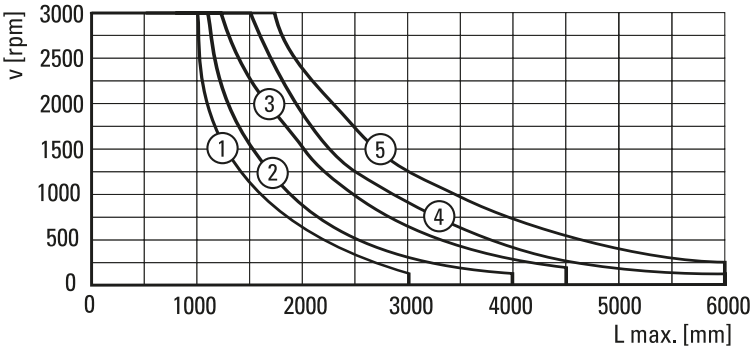
I




II




### Critical Speed of Shaft




1: VWZ-30
2: VWZ-40
3: VWZ-60 and VWZ-60V
4: VWZ-80
5: VWZ-100

### VWZ Intermediate Shafts, data

| Shaft | Mmax [Nm] | Gs [kg/m] | Gc [kg] | Js [kgm²/m] | Jc [kgm²] | Ms [Nm] |
|---|---|---|---|---|---|---|
| VWZ-30 | 4,8 | 0,58 | 0,14 | 0,00011 | 0,00001 | 4 |
| VWZ-40 | 6,4 | 0,76 | 0,36 | 0,00020 | 0,00008 | 8 |
| VWZ-60 | 22,7 | 0,97 | 0,94 | 0,00080 | 0,00024 | 15 |
| VWZ-60V | 60,6 | 0,97 | 1,42 | 0,00080 | 0,00046 | 35 |
| VWZ-80 | 122,7 | 2,00 | 2,98 | 0,00300 | 0,00240 | 70 |
| VWZ-100 | 169,7 | 2,47 | 4,62 | 0,00580 | 0,00600 | 120 |

Mmax = max. shaft torque  Gc = weight of coupling  Jc = inertia of coupling
Gs = weight of shaft  Js = inertia of shaft  Ms = tightening torque

# Accessories

## Motors, Gears and Transmission Kits

### VWZ Intermediate Shafts, compatability table

| Unit | I | I I | VWZ-30 | VWZ-40 | VWZ-60 | VWZ-60V | VWZ-80 | VWZ-100 | AA [mm] |
|---|---|---|---|---|---|---|---|---|---|
| WH40 | • | | | • | | | | | AA = L + 56 |
| WH50 / WHZ50 | • | | | | • | | | | AA = L + 54 |
| WM60Z | • | | | | • | | | | AA = L + 64 |
| WH80 / WHZ80 | • | | | | | • | | | AA = L + 84 |
| WH120 | • | | | | | | | • | AA = L + 124 |
| WM80Z | • | | | | | • | | | AA = L + 84 |
| MLSH60Z | • | | | | | • | | | AA = L + 164 |
| WB40 / WM40 | | VL0 | • | | | | | | AA = L + 170 |
| WB60 | | VL1 | | | • | | | | AA = L + 184 |
| WM60 / WV60 / WZ60 | | VL1 | | | • | | | | AA = L + 184 |
| WM80 / WV80 / MLSM60D | | VL1 | | | | • | | | AA = L + 176 |
| MLSM80Z | • | | | | | | • | | AA = L + 244 |
| WM120 / WV120 / MLSM60D / MLSM80D | | VL2 | | | | | • | | AA = L + 244 |

AA = C/C distance between units
L = total length of shaft and coupling assembly

### VWZ Intermediate Shafts, ordering key

| | 1 | 2 | 3 |
|---|---|---|---|
| Example | VWZ-060 | -02 | -0700 |

**1. Intermediate shaft size**
VWZ-030 = VWZ-30
VWZ-040 = VWZ-40
VWZ-060 = VWZ-60
VWZ-06V = VWZ-60V
VWZ-080 = VWZ-80
VWZ-100 = VWZ-100

**2. Type of unit and type of mounting**
-01 = WH40 for type I mounting
-02 = WH50 / WHZ50 for type I mounting
-03 = WM80Z for type I mounting
-04 = WH80 / WHZ80 for type I mounting
-05 = WH120 for type I mounting
-06 = WM60Z for type I mounting
-07 = MLSH60Z for type I mounting
-08 = WB40 / WM40 for type II mounting on VLO gears
-09 = WB60 for type II mounting on VL1 gears
-10 = WM60 / WV60 / WZ60 for type II mounting on VL1 gears
-11 = WM80 / WV80 / MLSM60D for type II mounting on VL1 gears
-12 = MLSM80Z for type I mounting
-13 = WM120 / WV120 / MLSM60D / MLSM80D for type II mounting on VL2 gears

**3. C/C distance between units (AA)**
- • • • • = distance in mm

# Accessories

## Motors, Gears and Transmission Kits

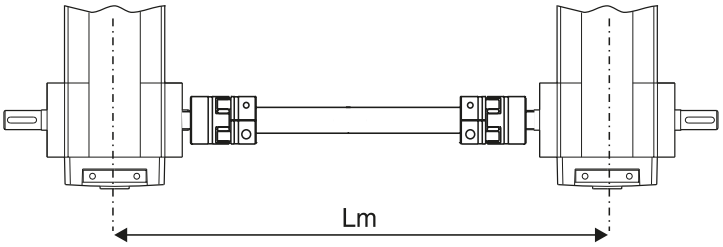
### DSP Intermediate Shafts, data

| Shaft | Weight of shaft [kg] | Max. speed [rpm] | Shaft diameter [mm] |
|---|---|---|---|
| DSP-05B | 0,3 + 1,3 × Lm | 1500 | 20 |
| DSP-06B | 0,3 + 1,3 × Lm | 1500 | 20 |
| DSP-07B | 0,6 + 2,6 × Lm | 1500 | 30 |
| DSP-10B | 0,6 + 2,6 × Lm | 1500 | 30 |
| DSB--ZB | 0,6 + 2,6 × Lm | 1500 | 30 |
| DSP-TBS | 0,6 + 2,6 × Lm | 1500 | 30 |

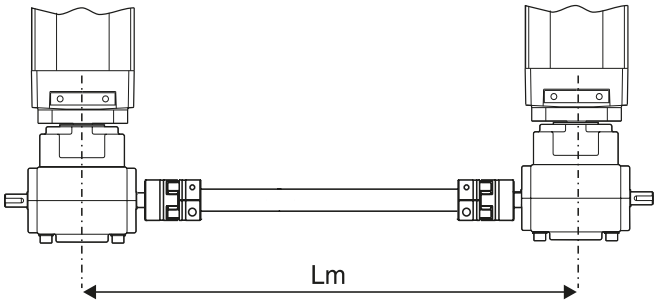
Lm = C/C distance between units in cm

The DSP intermediate shaft can be installed directly between two belt driven units or between two screw driven units using a TBS worm gear. Couplings and tube are included in the shipment. Support bearings may need to be installed if the critical speed of the shaft is exceeded. See diagram. Support bearings can be ordered from your local bearing supplier.

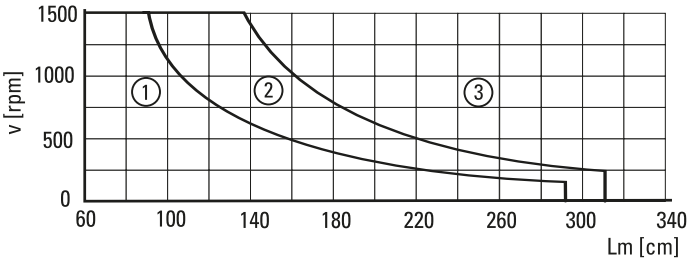
DSP-05B/06B/07B/10B/-ZB




DSP-TBS




### Critical Speed of Shaft




1: No support bearing required
2: Support bearing required for DSP-05B and DSP-06B
3: Support bearing always required

# Accessories

## Motors, Gears and Transmission Kits

### DSP Intermediate Shafts, compatability table

| Unit | Drive type | DSP-05B | DSP-06B | DSP-07B | DSP-10B | DSP--ZB | DSP-TBS |
|---|---|---|---|---|---|---|---|
| M50 | belt | • | | | | | |
| M55 | belt | | • | | | | |
| M75 | belt | | | • | | | |
| M100 | belt | | | | • | | |
| ZB | belt | | | | | • | |
| M55 | screw | | | | | | • |
| M75 | screw | | | | | | • |
| M100 | screw | | | | | | • |

### DSP Intermediate Shafts, ordering key

| | 1 | 2 |
|---|---|---|
| Example | DSP-06B | -305 |

**1. Intermediate shaft size and type**
DSP-05B = for belt driven M50 units
DSP-06B = for belt driven M55 units
DSP-07B = for belt driven M75 units
DSP-10B = for belt driven M100 units
DSP--ZB = for belt driven ZB units
DSP-TBS = for screw driven M55, M75 or M100 units with TBS worm gear

**2. C/C distance between units in cm (Lm)**
-• • • = length in cm

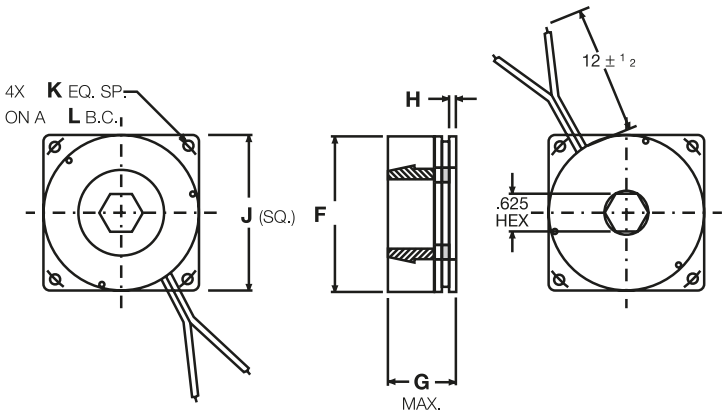
# Accessories

## Motors, Gears and Transmission Kits

### Spring Set Brake

| Unit type | p/n | Nema size | Static torque [lbf-in] | Supply voltage [VDC] | Dimensions [in] | | | | | | | Brake hub p/n[1] | Brake adaptor p/n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | F | G | H | J | K | L | HEX | | |
| 2DB08 | TEB23A | 23 | NEMA 23 | 24 | 2.25 | 1.10 | 0.11 | 2.25 | 0.22 | 2.625 | 5/8 | HEXHUB23A | MB08-23 |
| 2DB12 | TEB23B | 23 | NEMA 23 | 24 | 2.25 | 1.10 | 0.11 | 2.25 | 0.22 | 2.625 | 5/8 | HEXHUB23B | none required |
| 2HB10, 2RB12 | TEB23D | 23 | NEMA 23 | 24 | 2.25 | 1.10 | 0.11 | 2.25 | 0.22 | 2.625 | 5/8 | HEXHUB23D | none required |
| 2RB16 | TEB23E | 23 | NEMA 23 | 24 | 2.25 | 1.10 | 0.11 | 2.25 | 0.22 | 2.625 | 5/8 | HEXHUB23E | none required |
| 2DB16 | TEB34A | 34 | NEMA 34 | 24 | 2.25 | 1.10 | 0.11 | 3.25 | 0.22 | 3.875 | 5/8 | HEXHUB34A | none required |
| 2HB20 | TEB34C | 34 | NEMA 34 | 24 | 2.25 | 1.31 | 0.11 | 3.25 | 0.22 | 3.875 | 7/8 | HEXHUB34A | none required |

[1] Hub included in spring set brake



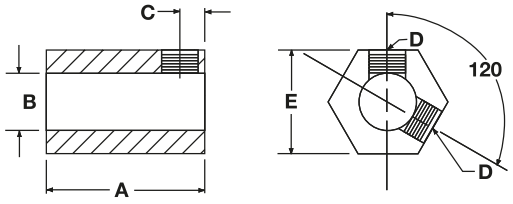

Mounts to support end of 2HB, 2RB, and 2DB units. The brake engages upon loss of power and provides resistance to back drive rotation of ball screws due to gravitational forces when power is interrupted to the brake unit. They are pre-burnished for maximum torque capacity and come with standard NEMA 23, 34 or 42 mounting patterns for easy field retrofit. Compact size minimizes change to the overall system envelope. The 2HB, 2RB, and 2DB ordering keys can be configured with the brake as part of the assembly. See ordering keys or www.linearmotioneering.com for details. The part numbers listed here are for the brake parts as seperate items.

### Spring Set Brake Hubs

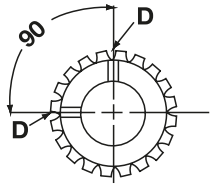
| Brake type | p/n | Unit type | Set screw torque [in-lb][1] | Dimensions [in (mm)] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E |
| TEB23A | HEXHUB23A | 2DB08 | 36 | 1.53 | 3/16 | 0.15 | #10/32 | 5/8 |
| TEB23B | HEXHUB23B | 2DB12 | 36 | 1.31 | 1/4 | 0.26 | #10/32 | 5/8 |
| TEB23D | HEXHUB23D | 2HB10, 2RB12 | 36 | (20) | (8) | (5) | M4 | 5/8 |
| TEB23E | HEXHUB23E | 2RB16 | 36 | (20) | (20) | (5) | M4 | 5/8 |
| TEB34A | HEXHUB34A | 2DB16 | 36 | 1.67 | 3/8 | 0.44 | #10/32 | 5/8 |
| TEB34C | HEXHUB34A | 2HB20 | 36 | (32) | 14 | (6) | M5 | 7/8 |

[1] It is suggested a serviceable thread locking compound be used.

HEXHUB •••




SPLHUB42A



# Accessories

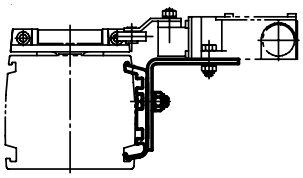
## Electrical Feedback Devices

### Limit Switch Brackets[1]

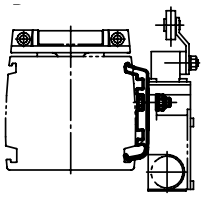
| Unit type | I | For limit switch type | II | For limit switch type |
|---|---|---|---|---|
| M50 | D393 035 | ZCM-D21 | – | – |
| M55 | D313 427 | ZCM-D21 | D313 428 | ZCM-D21 |
| M75 | D312 860 | XCK-M115 | D312 861 | XCK-M115 |
| M100 | D312 330 | XCK-M115 | D312 331 | XCK-M115 |

[1] No limit switches included in the shipment.

I

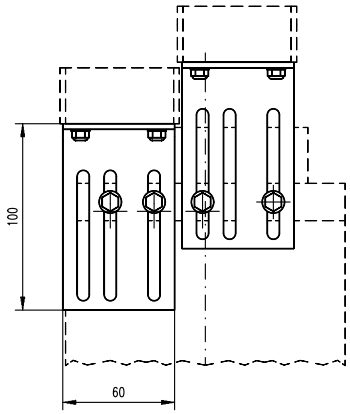


II



### Limit Switch Brackets for Z3

| Unit type | p/n | For limit switch type |
|---|---|---|
| Z3 | D800 042 | XCK-M115 |




The limit switch brackets are adjustable in height. The limit switches on the brackets are operated by the maximum extended and maximum retracted end of stroke bars on top of the Z3 units. Two brackets are required.

### Limit Switches

| Switch type | p/n | Protection degree | Contacts | Cable |
|---|---|---|---|---|
| XCK-M115 | D535 107 | IP67 | NO + NC | – |
| ZCM-D21 | D535 102 | IP67 | NO + NC | 1 meter |

# Accessories

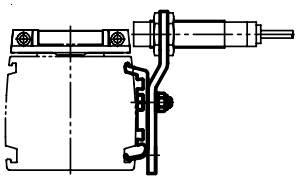
## Electrical Feedback Devices

### Sensor Brackets for Cylindrical Sensors[1]

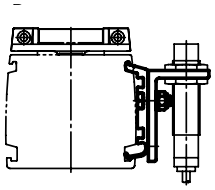
| Unit type | I | For sensor diameter | I I | For sensor diameter |
|---|---|---|---|---|
| M55 | D313 429 | M12 | D313 430 | M12 |
| M75 | D312 862 | M18 | D312 863 | M18 |
| M100 | D312 332 | M18 | D312 333 | M18 |

[1] no sensors included in the shipment

I



II



### Cylindrical Inductive Sensors

| Sensor type | p/n | Diameter | Input voltage | Max. current | Protection degree | Contacts | Cable |
|---|---|---|---|---|---|---|---|
| PNP | D535 085 | M12 | 12 - 48 Vdc | 0,2 A | IP67 | NO | connector |
| PNP | D535 089 | M18 | 12 - 48 Vdc | 0,2 A | IP67 | NO | connector |

### Cylindrical Inductive Sensor Connectors

| For sensor diameter | p/n |
|---|---|
| M12 | D535 092 |
| M18 | D535 091 |

# Accessories

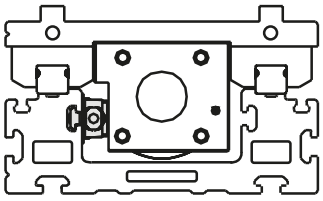
## Electrical Feedback Devices

### Sensor Packages

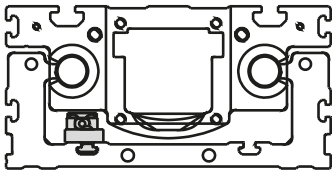
| Unit type | Package type | p/n | Output type | Output operation | Frequency [1] | Supply voltage [VDC] | Cable length [m] | Sdetract [mm] |
|---|---|---|---|---|---|---|---|---|
| 2HB10 | One home sensor | LSP2HBM10-N-1 | NPN | NO | 1 × V | 12 - 24 | 5 | - |
| | | LSP2HBM10-P-1 | PNP | NO | 1 × V | 12 - 24 | 5 | - |
| | Two limit switch sensors | LSP2HBM10-N-2 | NPN | NC | 2 × S | 12 - 24 | 5 | 30 |
| | | LSP2HBM10-P-2 | PNP | NC | 2 × S | 12 - 24 | 5 | 30 |
| | One home and two limit switch sensors | LSP2HBM10-N-3 | NPN | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 30 |
| | | LSP2HBM10-P-3 | PNP | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 30 |
| 2HB20 | One home sensor | LSP2HBM20-N-1 | NPN | NO | 1 × V | 12 - 24 | 5 | - |
| | | LSP2HBM20-P-1 | PNP | NO | 1 × V | 12 - 24 | 5 | - |
| | Two limit switch sensors | LSP2HBM20-N-2 | NPN | NC | 2 × S | 12 - 24 | 5 | 30 |
| | | LSP2HBM20-P-2 | PNP | NC | 2 × S | 12 - 24 | 5 | 30 |
| | One home and two limit switch sensors | LSP2HBM20-N-3 | NPN | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 30 |
| | | LSP2HBM20-P-3 | PNP | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 30 |
| 2RB12 | One home sensor | LSP2RM12-N-1 | NPN | NO | 1 × V | 12 - 24 | 5 | - |
| | | LSP2RM12-P-1 | PNP | NO | 1 × V | 12 - 24 | 5 | - |
| | Two limit switch sensors | LSP2RM12-N-2 | NPN | NC | 2 × S | 12 - 24 | 5 | 35 |
| | | LSP2RM12-P-2 | PNP | NC | 2 × S | 12 - 24 | 5 | 35 |
| | Home and limit switch sensors | LSP2RM12-N-3 | NPN | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 35 |
| | | LSP2RM12-P-3 | PNP | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 35 |
| 2RB16 | One home sensor | LSP2RM16-N-1 | NPN | NO | 1 × V | 12 - 24 | 5 | - |
| | | LSP2RM16-P-1 | PNP | NO | 1 × V | 12 - 24 | 5 | - |
| | Two limit switch sensors | LSP2RM16-N-2 | NPN | NC | 2 × S | 12 - 24 | 5 | 35 |
| | | LSP2RM16-P-2 | PNP | NC | 2 × S | 12 - 24 | 5 | 35 |
| | One home and two limit switch sensors | LSP2RM16-N-3 | NPN | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 35 |
| | | LSP2RM16-P-3 | PNP | 1 × NC, 2 × NO | 1 × V, 2 ×S | 12 - 24 | 5 | 35 |

[1] V = varied frequency. S = standard frequency.

LIMIT SWITCH POSITION 2HBE



LIMIT SWITCH POSITION 2RB



Each 2HB and 2RB can be equipped with sensors inside of the profile where they are protected from mechanical damage. The systems are provided with access holes on each side of each end plate for passage of the sensor package cable. Using limit switch sensors will reduce the effective stroke. The standard position will approximately reduce the stroke by the distance listed in the Sdetract column. The 2HB, 2RB, 2HE and 2RE ordering keys can be configured with the limit switches and/or a home sensor as part of the assembly. See ordering keys or www.linearmotioneering.com for details. The part numbers listed above are for the limit switches and/or home sensors as a seperate items.

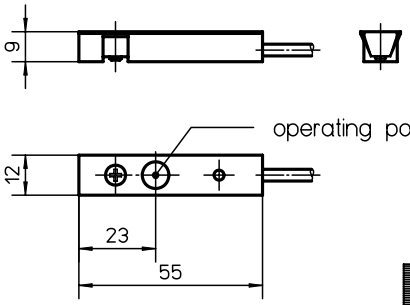
# Accessories

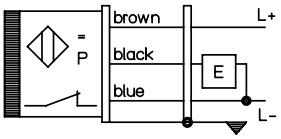
## Electrical Feedback Devices

### EN2 Inductive Sensors, part numbers

| Sensor type | Cable length [m] | p/n |
|---|---|---|
| Normally closed | 2 | 671 545 0305 |
| Normally open | 2 | 671 545 0304 |
| Normally closed | 10 | 671 545 0307 |
| Normally open | 10 | 671 545 0306 |

To be able to mount the EN2 inductive sensors on a unit the ENT14x16 sensor rail is required (see page 178) except for units WM120 and WV120 where they can be fitted directly to the profile of the unit.



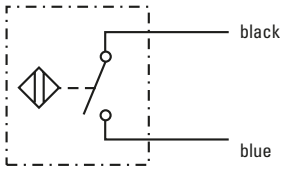



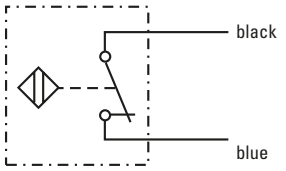

### EN2 Inductive Sensors, data

| Parameter | | EN2 |
|---|---|---|
| Supply voltage | [Vdc] | 10 – 30 |
| Max. load current | [A] | 0,2 |
| Operating distance | [mm] | 2 |
| LED indicator for switch | | yes |
| Protection class | | IP67 |
| Cable type | | screened |
| Weight<br>with cable L = 2 m<br>with cable L= 10 m | [kg] | <br>0,04<br>0,19 |

### Magnetic Sensors, data

| Parameter | | |
|---|---|---|
| Max. power | [W] | 10 |
| Max. voltage | [Vdc] | 100 |
| Max. current | [A] | 0,5 |
| LED indicator for switch | | no |
| Protection class | | IP67 |
| Cable length | [m] | 3 |
| Cable cross section | [mm²] | 2 × 0,15 |
| Operating temperature limits | [°C] | -25 – 65 |
| Weight | [kg] | 0,050 |

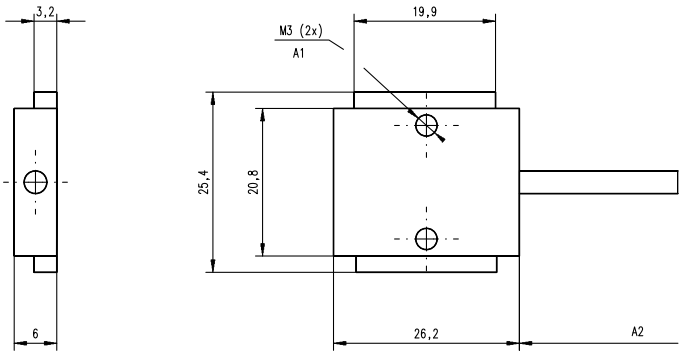



### Magnetic Sensors, part numbers

| Sensor type | suitable units | p/n |
|---|---|---|
| Normally closed | M50, Z2, Z3 | D535 071 |
| Normally open | M50, Z2, Z3 | D535 070 |

On M50 the magnetic sensors are mounted directly in the sensor slot of the profiles of the units and require no mounting bracket while Z2 and Z3 require magnetic sensor mounting brackets. The sensor is fixed in position by two M3 size locking screws (A1). The cable (A2) is molded into the sensor.



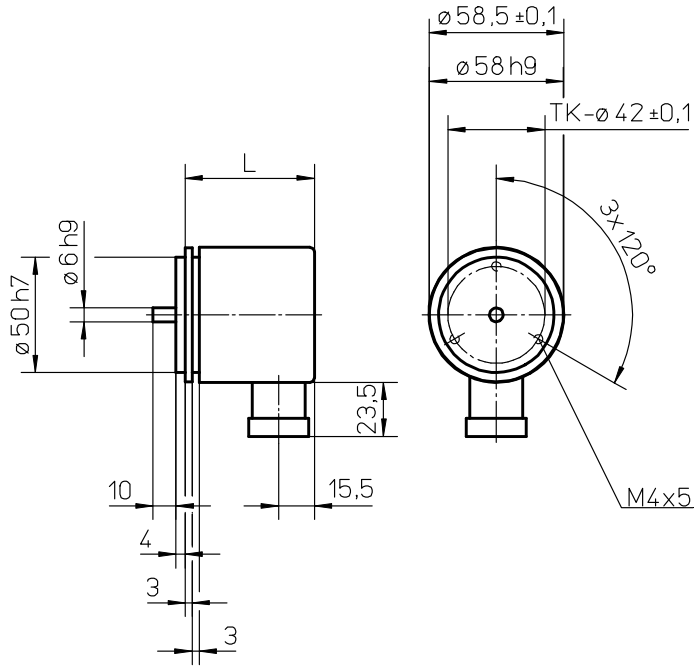
# Accessories

## Electrical Feedback Devices

### IG602 Encoders, data

| Parameter | | IG602 |
|---|---|---|
| Supply voltage<br>Type 1<br>Type 2 | [Vdc] | <br>5 ±10%<br>10 – 30 |
| Output type<br>Type 1<br>Type 2 | | <br>line driver<br>push-pull |
| Pulses per revolution<br>Type 1<br>Type 2 | [ppr] | <br>100 – 2500<br>100 – 600 |
| Length (L)<br>Type 1<br>Type 2 | [mm] | <br>51,5<br>56,0 |
| Weight<br>Type 1<br>Type 2 | [kg] | <br>0,36<br>0,36 |

The IG602 encoders come with mounting screws but no coupling or connector. To be able to mount the encoder to the unit, the unit must have a shaft for encoders. See the ordering keys of the units. The encoders can also be ordered mounted to the unit from factory. See ADG encoder option kit on page 174.




### IG602 Encoders, part numbers

| Encoder type | Supply voltage [Vdc] | Pulses per revolution | p/n |
|---|---|---|---|
| Type 1 | 5 | 100 | 671 521 0194 |
| Type 1 | 5 | 200 | 671 521 0195 |
| Type 1 | 5 | 500 | 671 521 0196 |
| Type 1 | 5 | 600 | 671 521 0197 |
| Type 1 | 5 | 1000 | 671 521 0198 |
| Type 1 | 5 | 1250 | 671 521 0199 |
| Type 1 | 5 | 1500 | 671 521 0200 |
| Type 1 | 5 | 2000 | 671 521 0192 |
| Type 1 | 5 | 2500 | 671 521 0201 |
| Type 2 | 10 – 30 | 100 | 671 521 0193 |
| Type 2 | 10 – 30 | 200 | 671 521 0202 |
| Type 2 | 10 – 30 | 500 | 671 521 0203 |
| Type 2 | 10 – 30 | 600 | 671 521 0204 |

### STE001 Encoder Connector, data

| Parameter | | STE001 |
|---|---|---|
| Number of poles | | 12 |
| Protection class | | IP67 |
| Execution | | jack |
| Cable entrance | | straight |
| Weight | [kg] | 0,04 |
| Part number | | 6715600153 |

### Encoder Cable, data

| Parameter | p/n |
|---|---|
| 5 m cable length | 671 555 0068 |
| 10 m cable length | 671 555 0069 |

The encoder cables come fitted with a STE001 encoder connector in one of the ends.

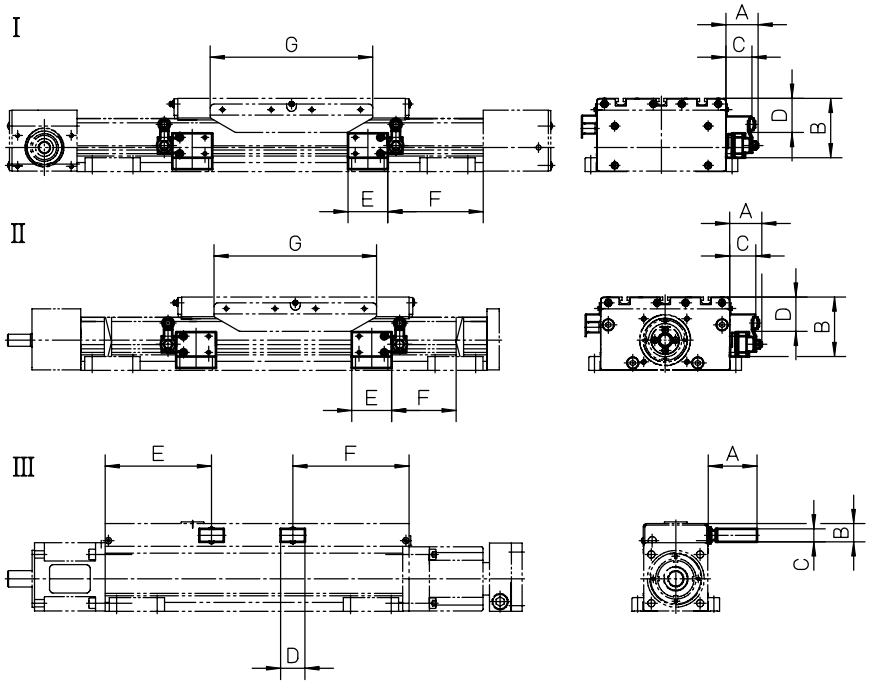
# Accessories

## Electrical Feedback Devices

### ES Limit Switch Option Kit

| Unit type | I | II | III | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|---|
| WH50 [1] | • | | | 34 | 60,5 | 10 | 26 | 49 | 58,5 | 196 |
| WH80 | • | | | 31 | 76 | 10 | 39 | 49 | 78,5 | 196 |
| WH120 | • | | | 34 | 88 | 10 | 51 | 49 | 78,5 | 196 |
| WHZ50 | • | | | 34 | 61 | 10 | 26 | 49 | 58,5 | 196 |
| WHZ80 | • | | | 31 | 76 | 10 | 39 | 49 | 78,5 | 196 |
| WM60 | | • | | 40 | 69 | 32 | 38 | 50 | 63 | 200 |
| WM80 | | • | | 40 | 73 | 32 | 42 | 50 | 79 | 200 |
| WM120 | | • | | 40 | 89 | 32 | 58 | 50 | 94 | 200 |
| WM60Z | • | | | 40 | 69 | 32 | 38 | 50 | 73 | 200 |
| WM80Z [2] | • | | | 40 | 73 | 32 | 42 | 50 | 99 (89) | 200 |
| WV60 | | • | | 40 | 69 | 32 | 38 | 50 | 33 | 200 |
| WV80 | | • | | 40 | 73 | 32 | 42 | 50 | 39 | 200 |
| WV120 | | • | | 40 | 89 | 32 | 58 | 50 | 59 | 200 |
| MLSM60D | | • | | 40 | 73 | 32 | 32 | 50 | 79 | 200 |
| MLSH60Z | • | | | 40 | 73 | 32 | 42 | 50 | 79 | 200 |
| MLSM80D | | • | | 40 | 85 | 32 | 54 | 50 | 101 | 200 |
| MLSM80Z | | • | | 40 | 85 | 32 | 54 | 50 | 101 | 200 |
| WZ60 [1] | | | • | 60 | 22,5 | 16 | 30 | 113 | 53 | – |
| WZ80 [1] | | | • | 60 | 22,5 | 16 | 30 | 112 | 84 | – |

[1] limit switches for these units can not be moved. On all other units the switches can be re-positioned by the customer. [2] Value in brackets = for short carriage.




The ES limit switch assembly is an option that is mounted at the factory. The limit switches are placed 10 mm from the mechanical ends of the unit. Each limit switch has one NO and one NC contact with positive opening action. Protection degree is IP67. Type I and II switches can be repositioned along the profile by the customer. Note! the ES limit switch option and any of the sensor rail options ENT14x16, ENF14x16 or ENK can not be mounted on the same side of the unit.

# Accessories

## Electrical Feedback Devices

### ES Limit Switch Option Kit, ordering key

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Example | ESK07 | -L | -01 | -10 |

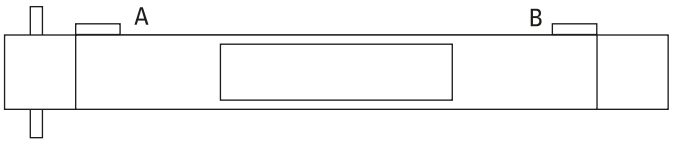
**1. Compatable unit**
ESK02 = WH50
ESK03 = WH80
ESK04 = WH120
ESK05 = WM40
ESK06 = WM60 / WM60Z
ESK07 = WM80 / WM80Z
ESK08 = WM120
ESK09 = WV60
ESK10 = WV80
ESK11 = WV120
ESK12 = WHZ50
ESK13 = WHZ80
ESK14 = WZ60
ESK15 = WZ80
ESK16 = MLSH60Z
ESK18 = MLSM80Z
ESK19 = MLSM60D
ESK20 = MLSM80D

**2. Mounting side of the unit**
-L = left side
-R = right side

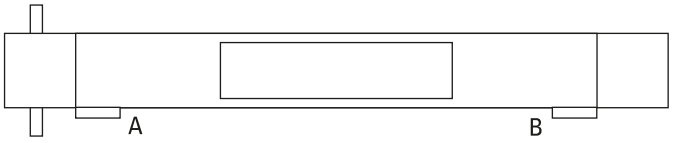
**3. Switch configuration on side A**
-00 = no switch on side A
-01 = switch with 1 m cable
-05 = switch with 5 m cable
-10 = switch with 10 m cable

**4. Switch configuration on side B**
-00 = no switch on side B
-01 = switch with 1 m cable
-05 = switch with 5 m cable
-10 = switch with 10 m cable

ES-••-R-••-••




ES-••-L-••-••

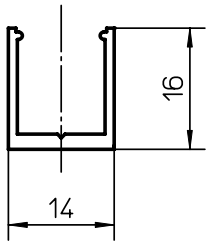


# Accessories

## Electrical Feedback Devices

### ENT14x16 Inductive Sensor Rail

| Unit type | p/n |
|---|---|
| WH40 / WH50 / WH80 / WH120 / WHZ50 / WHZ80 / WM40 / WM60 / WM80 / WM60Z / WM80Z / WV60 / WV80 / MLSM60D / MLSM80D / MLSH60Z / MLSM80Z / WZ60 / WZ80 / WB40 / WB60 | 671 545 0283 |

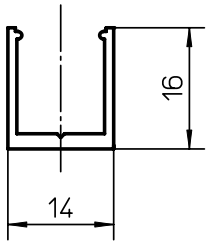


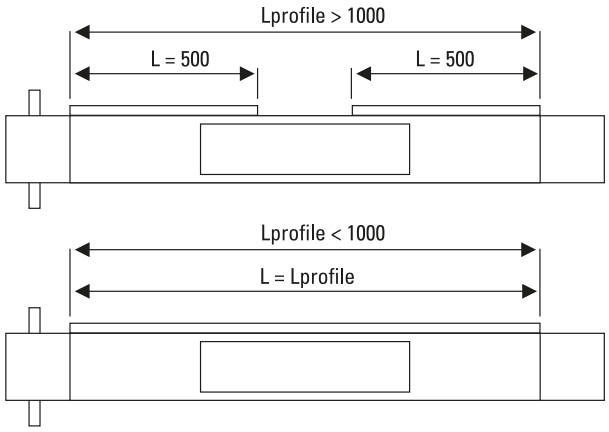

The ENT14x16 inductive sensor rail is mounted to the side of a unit or along any type of beam or profile. Sensors of type EN2 can be mounted in the rail. The rail can also serve as a cable duct for the sensor cables. The rail is sealed with a cover which comes with the rail. The rail comes in lengths of max 3000 mm. Drilling in the profile of the unit is required when mounting the rail. When ordering, specify part number and length of the rail. Note1! WM120 and WV120 units do not require any rail as the EN2 sensors can be fitted directly to the profile of the units. Note2! ES limit switch option and ENT14x16 rail can not be mounted on the same side of the unit.

### ENF and ENK Inductive Sensor Rail Option Kit, compatability table

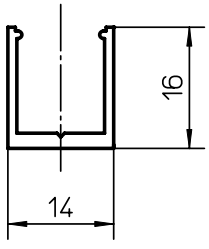
| Unit type | ENF / ENK |
|---|---|
| WH40 / WH50 / WH80 / WH120 / WHZ50 / WHZ80 / WM40 / WM60 / WM80 / WM60Z / WM80Z / WV60 / WV80 / MLSM60D / MLSM80D / MLSH60Z / MLSM80Z / WZ60 / WZ80 / WB40 / WB60 | • |

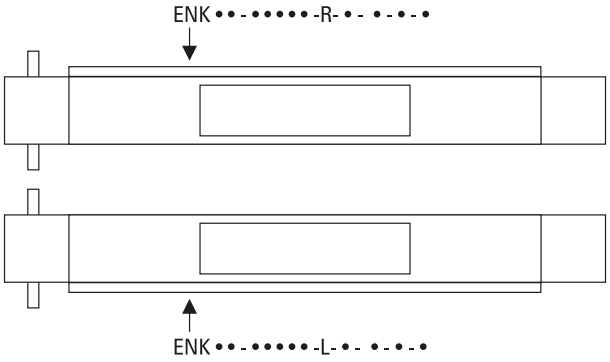
ENF




ENK




The ENF and ENK inductive sensor rail option kits are mounted at the factory. The ENF option consists of two 500 mm long ENT14x16 sensor rails mounted in each end of the unit on the left or right side of the profile. In cases where the unit is too short to allow two 500 mm sensor rails to be mounted, then one rail is mounted along the entire profile of the unit. The ENK option also consists of ENT14 x16 sensor rails but the ENK option has sensor profiles that run along the entire profile of the unit. In the shipment of both ENF and ENK the specified amount and type of EN2 sensors are included. The sensors are fitted to the sensor rail by the customer at the desired positions. Note1! WM120 and WV120 units do not require any ENF or ENK options as the EN2 sensors can be fitted directly to the profile of the units. Note2! The ES limit switch option and ENF rail can not be mounted on the same side of the unit.

# Accessories

## Electrical Feedback Devices

### ENK and ENF Inductive Sensor Rail Option Kit, ordering key

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Example | ENK16 | -S | -04000 | -R | -2 | -0 | -1 | -6 |

**1. Type of rail and compatable unit**

ENK01 = ENK rail for WH40
ENK02 = ENK rail for WH50
ENK03 = ENK rail for WH80
ENK04 = ENK rail for WH120
ENK05 = ENK rail for WM40
ENK06 = ENK rail for WM60 / WV60
ENK07 = ENK rail for WM80 / WV80
ENK08 = ENK rail for WM120 / WV120
ENK09 = ENK rail for WM60Z
ENK10 = ENK rail for WM80Z
ENK11 = ENK rail for WHZ50
ENK12 = ENK rail for WHZ80
ENK13 = ENK rail for WZ60
ENK14 = ENK rail for WZ80
ENK15 = ENK rail for MLSH60Z
ENK17 = ENK rail for MLSM80Z
ENK18 = ENK rail for MLSM60D
ENK19 = ENK rail for MLSM80D
ENK20 = ENK rail for WB40
ENK21 = ENK rail for WB60

ENF01 = ENF rail for WH40
ENF02 = ENF rail for WH50
ENF03 = ENF rail for WH80
ENF04 = ENF rail for WH120
ENF05 = ENF rail for WM40
ENF06 = ENF rail for WM60 / WV60
ENF07 = ENF rail for WM80 / WV80
ENF08 = ENF rail for WM120 / WV120
ENF09 = ENF rail for WM60Z
ENF10 = ENF rail for WM80Z
ENF11 = ENF rail for WHZ50
ENF12= ENF rail for WHZ80
ENF13 = ENF rail for WZ60
ENF14 = ENF rail for WZ80
ENF15 = ENF rail for MLSH60Z
ENF17 = ENF rail for MLSM80Z
ENF18 = ENF rail for MLSM60D
ENF19 = ENF rail for MLSM80D
ENF20 = ENF rail for WB40
ENF21 = ENF rail for WB60

**2. Number of carriages**

-S = single carriage
-D = double carriages

**3. Total length of unit (L tot)**

- ••••• = distance in mm

**4. Mounting side of the unit**

-L = left side
-R = right side

**5. Number of EN2 sensors with NC contact and 2 m cable**

- • = 0 – 9 sensors / normally closed / 2 m cable

**6. Number of EN2 sensors with NO contact and 2 m cable**

- • = 0 – 9 sensors / normally open / 2 m cable

7. **Number of EN2 sensors with NC contact and 10 m cable**

- • = 0 – 9 sensors / normally closed / 10 m cable

8. **Number of EN2 sensors with NO contact and 10 m cable**

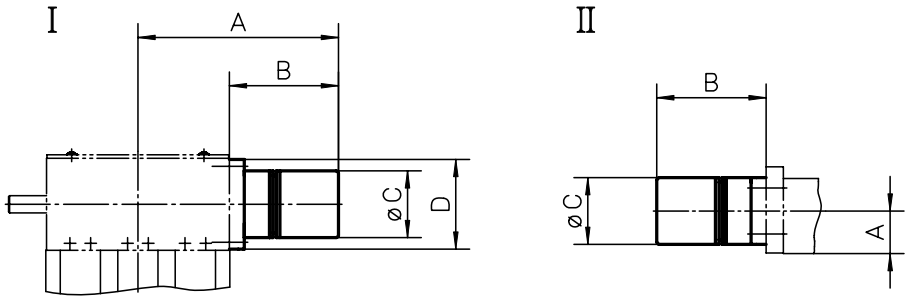
- • = 0 – 9 sensors / normally open / 10 m cable

# Accessories

## Electrical Feedback Devices

### ADG Encoder Option Kit

| Unit type | Mounting type I | Mounting type II | A | B | øC | D |
|---|---|---|---|---|---|---|
| WH40 | • | | 115 | 95 | 58,5 | ø60 |
| WH50 / WHZ50 | • | | 120 | 96 | 58,5 | 50 × 50 |
| WH80 / WHZ80 | • | | 139 | 100 | 58,5 | 90 × 90 |
| WH120 | • | | 153 | 93 | 58,5 | 100 × 100 |
| WM40 | | • | 25 | 95 | 58,5 | – |
| WM60 | | • | 31 | 95 | 58,5 | – |
| WM80 | | • | 40 | 95 | 58,5 | – |
| WM120 | | • | 74 | 95 | 58,5 | – |
| WM60Z | • | | 124 | 94 | 58,5 | 60 × 60 |
| WM80Z | • | | 138 | 98 | 58,5 | 65 × 65 |
| WB40 | | • | 20,8 | 95 | 58,5 | – |
| WB60 | | • | 32,5 | 95 | 58,5 | – |
| MLSM60D | | • | 37 | 95 | 58,5 | – |
| MLSM80D | | • | 46 | 95 | 58,5 | – |
| MLSH60Z | • | | 174,5 | 95 | 58,5 | 78 × 59 |
| MLSM80Z | • | | 214,5 | 95 | 58,5 | 100 × 80 |




The ADG encoder option kit is an option that is mounted to the unit at the factory. It includes an IG602 encoder, a STE001 encoder connector and an encoder mounting flange with coupling. Cable can also be supplied in 5 or 10 meter lengths.

# Accessories

## Electrical Feedback Devices

### ADG Encoder Option Kit, ordering key

| | 1 | 2 | 3 |
|---|---|---|---|
| Example | ADG-08 | -05-0600 | -00 |

**1. Compatable unit**
ADG-01 = WH40
ADG-02 = WH50 / WHZ50
ADG-03 = WH80 / WHZ80
ADG-04 = WH120
ADG-05 = WM40
ADG-06 = WM60 / WV60
ADG-07 = WM80 / WV80
ADG-08 = WM120 / WV120
ADG-09 = WM60Z
ADG-10 = WM80Z
ADG-11 = MLSH60Z
ADG-13 = MLSM80Z
ADG-14 = MLSM60D
ADG-15 = MLSM80D
ADG-16 = WB40
ADG-17 = WB60

**2. Supply voltage and number of pulses**
-05-0100 = 5 volts, 100 pulses per revolution
-05-0200 = 5 volts, 200 pulses per revolution
-05-0500 = 5 volts, 500 pulses per revolution
-05-0600 = 5 volts, 600 pulses per revolution
-05-1000 = 5 volts, 1000 pulses per revolution
-05-1250 = 5 volts, 1250 pulses per revolution
-05-2000 = 5 volts, 2000 pulses per revolution
-05-2500 = 5 volts, 2500 pulses per revolution
-24-0100 = 10 - 30 volts, 100 pulses per revolution
-24-0200 = 10 - 30 volts, 200 pulses per revolution
-24-0500 = 10 - 30 volts, 500 pulses per revolution
-24-0600 = 10 - 30 volts, 600 pulses per revolution

**3. Cable and connector configuation**
-00 = no cable only STE001 encoder connector
-05 = 5 m cable with STE001 encoder connector in one of the ends
-10 = 10 m cable with STE001 encoder connector in one of the ends

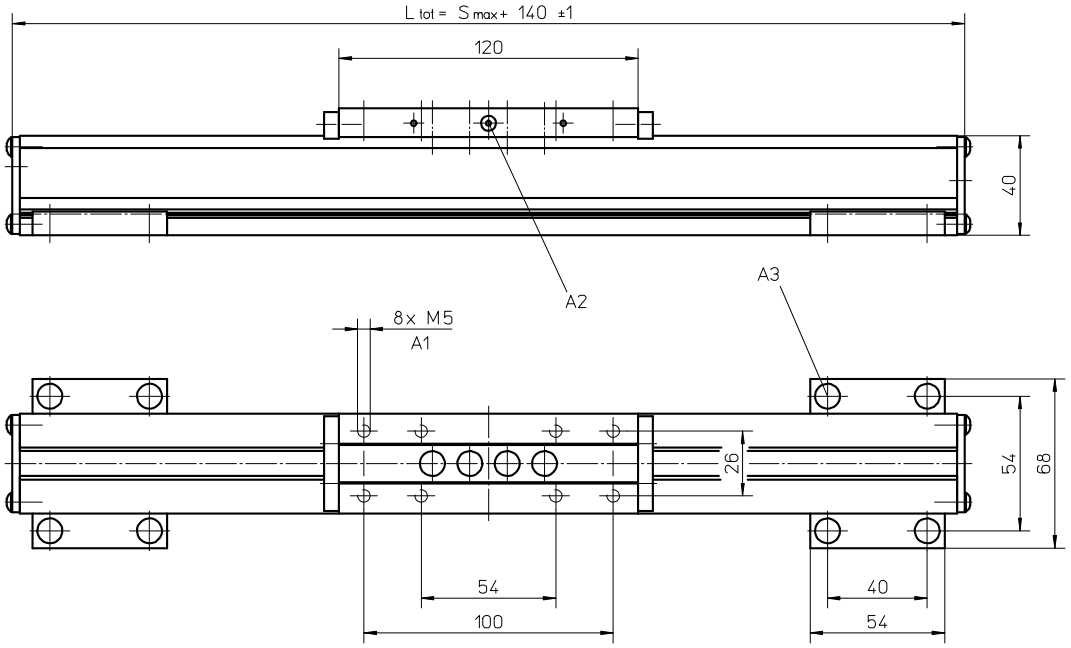
# Accessories

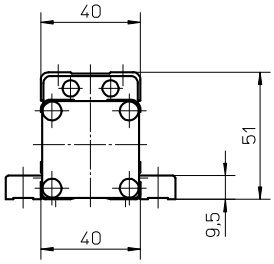
## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## WH40N

» Ordering key - see page 210
» Technical data - see page 82



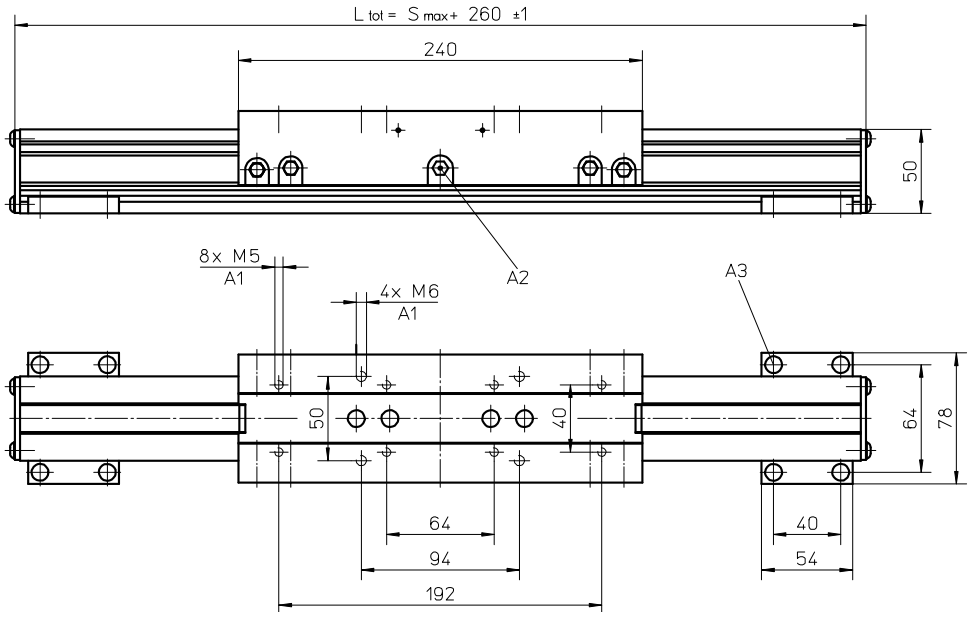

A1: depth 10
A2: lubricating nipple on both sides DIN3405 D 1/A

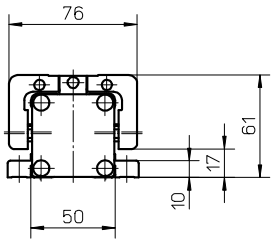
A3: socket cap screw ISO4762-M5×12 8.8

## WH50N

» Ordering key - see page 210
» Technical data - see page 110

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 10
A2: funnel type lubricating nipple DIN3405-M6×1-D1

A3: socket cap screw ISO4762-M5×12 8.8

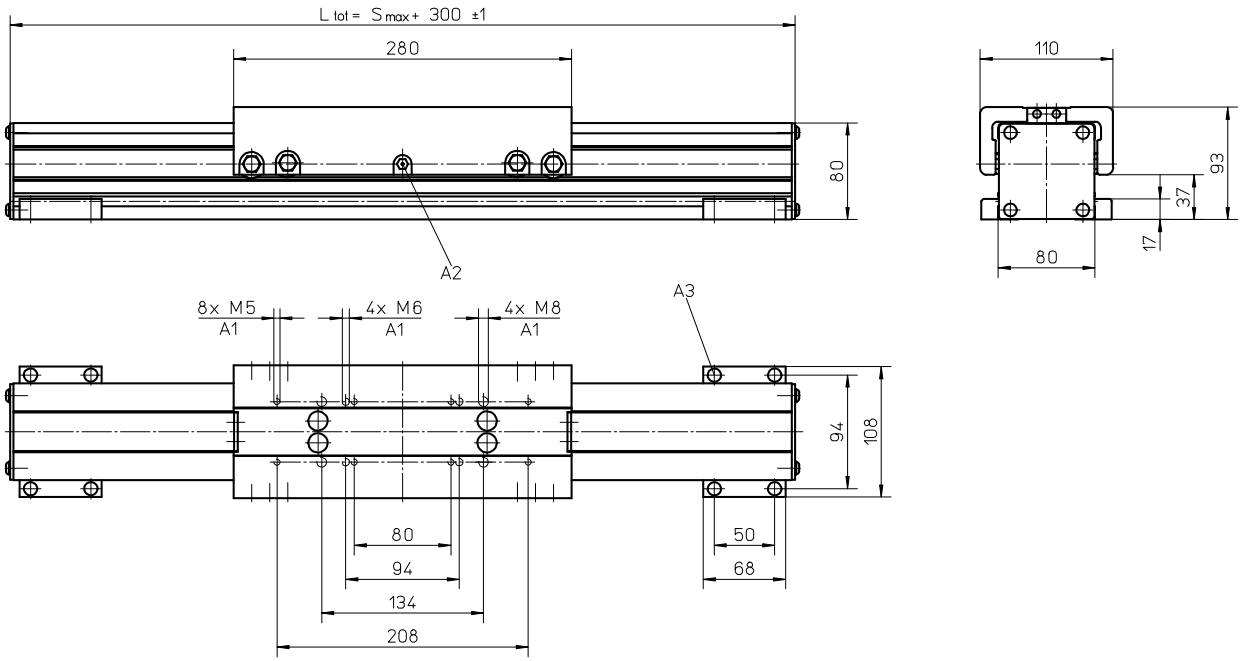
# Accessories

## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## WH80N

» Ordering key - see page 210
» Technical data - see page 112



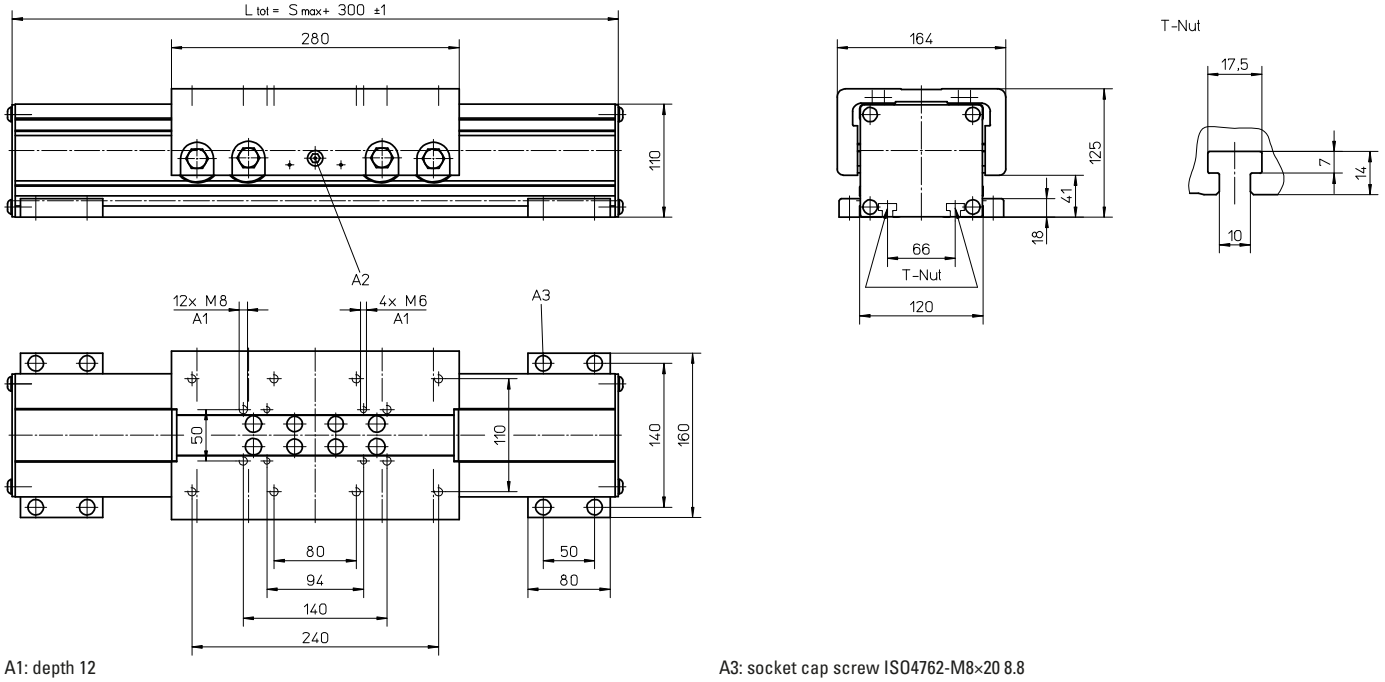

A1: depth 12
A2: funnel type lubricating nipple DIN3405-M6×1-D1

A3: socket cap screw ISO4762-M6×20 8.8

## WH120N

» Ordering key - see page 210
» Technical data - see page 114

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12
A2: funnel type lubricating nipple DIN3405-M6×1-D1

A3: socket cap screw ISO4762-M8×20 8.8

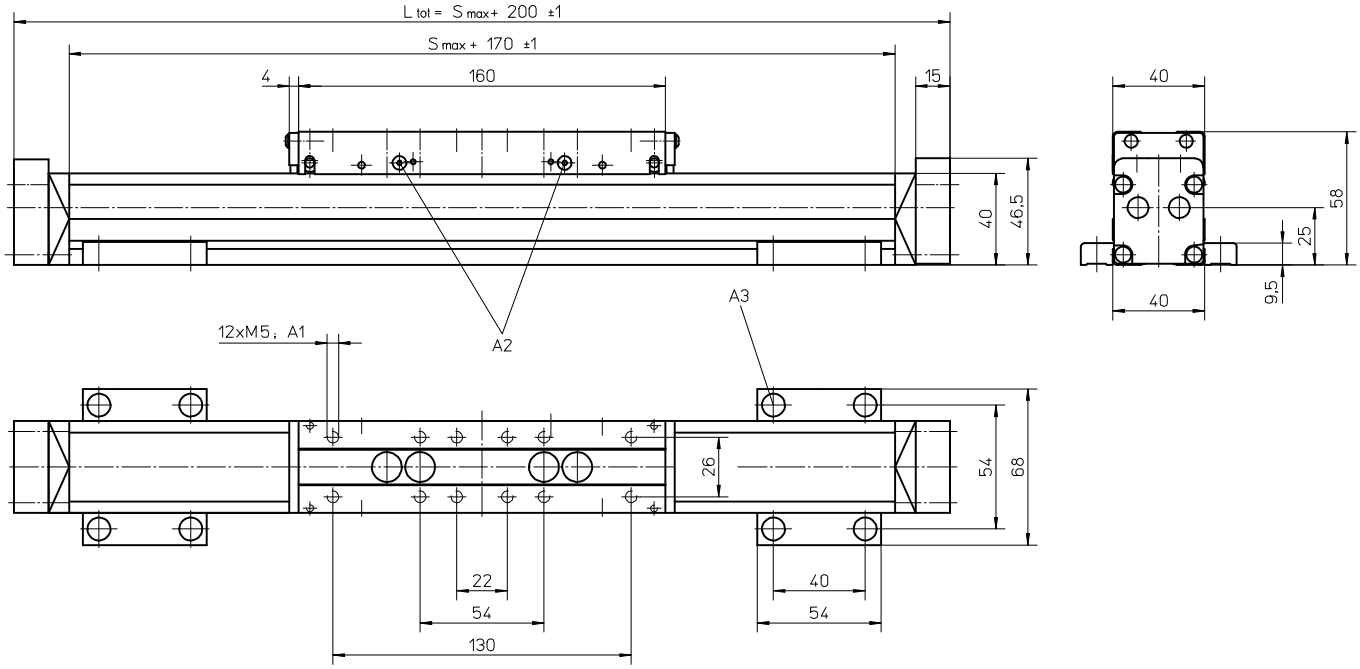
# Accessories

## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## WM40N

» Ordering key - see page 210
» Technical data - see page 14



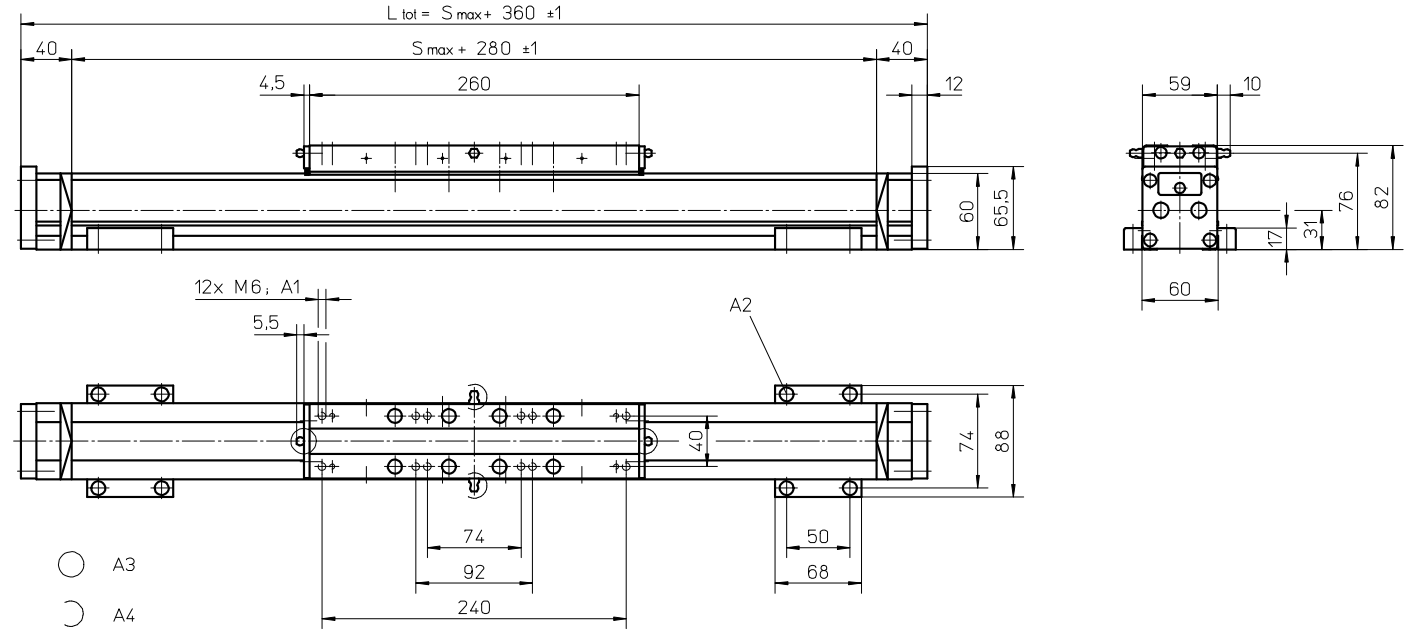

A1: depth 7
A2: lubricating nipple on both sides DIN3405 D 1/A

A3: socket cap screw ISO4762-M5×12 8.8

## WM60N

» Ordering key - see page 210
» Technical data - see page 18

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8

A3: tapered lubricating nipple to DIN71412 AM6
A4: can be changed over to one of the three alternative lubricating points by the customer

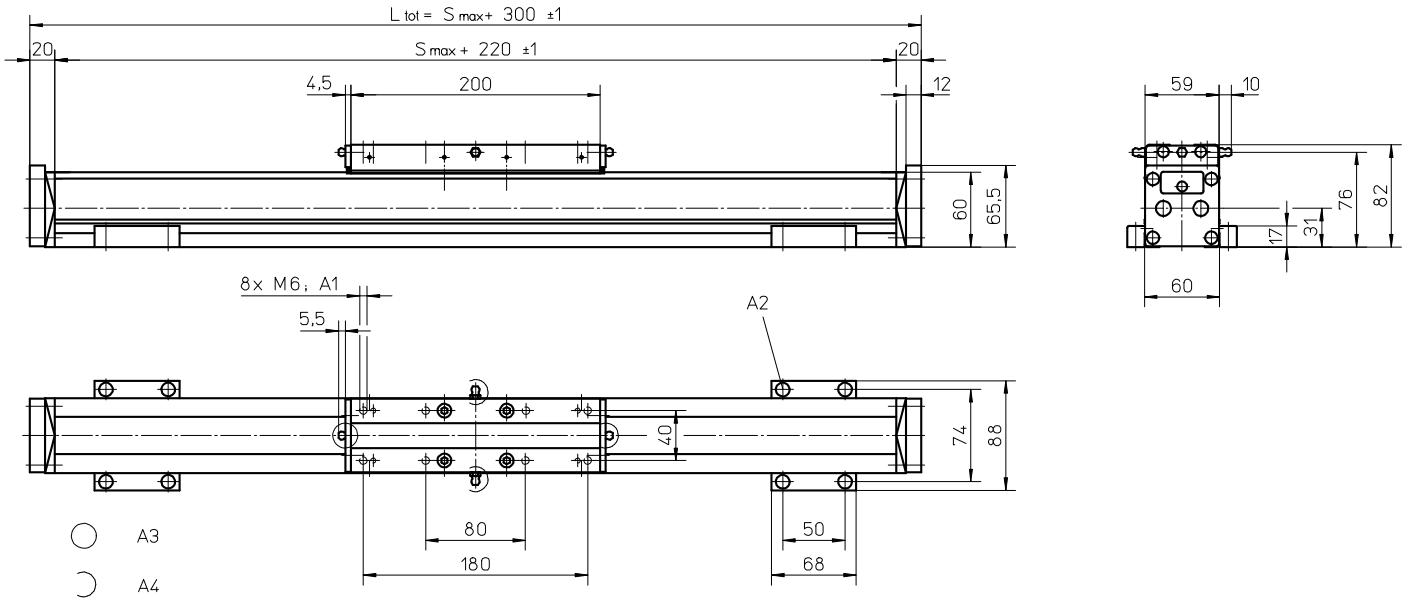
# Accessories

## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## WM60N with Single Short Carriage

» Ordering key - see page 210
» Technical data - see page 20



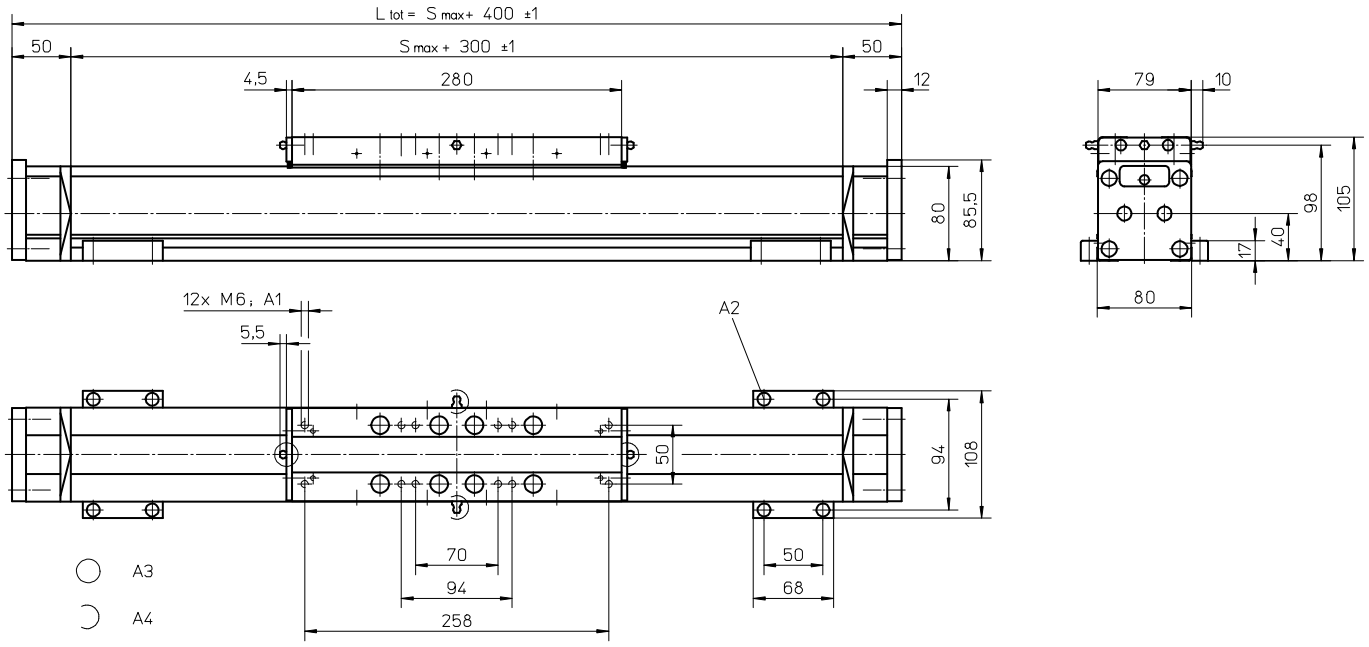

A1: depth 11
A2: socket cap screw ISO4762-M6×20 8.8

A3: tapered lubricating nipple to DIN71412 AM6
A4: can be changed over to one of the three alternative lubricating points by the customer

## WM80N

» Ordering key - see page 210
» Technical data - see page 24

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 12
A2: socket cap screw ISO4762-M6×20 8.8

A3: tapered lubricating nipple to DIN71412 AM6
A4: can be changed over to one of the three alternative lubricating points by the customer

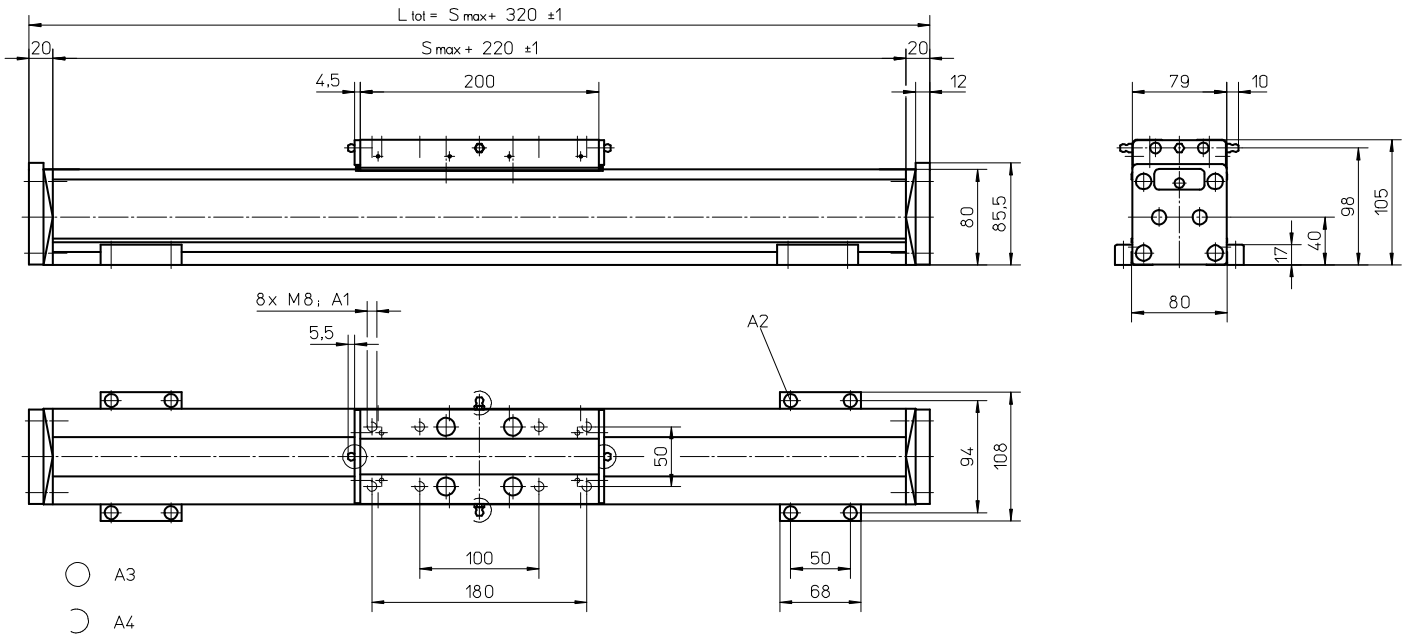
# Accessories

## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## WM80N with Single Short Carriage

» Ordering key - see page 210
» Technical data - see page 26



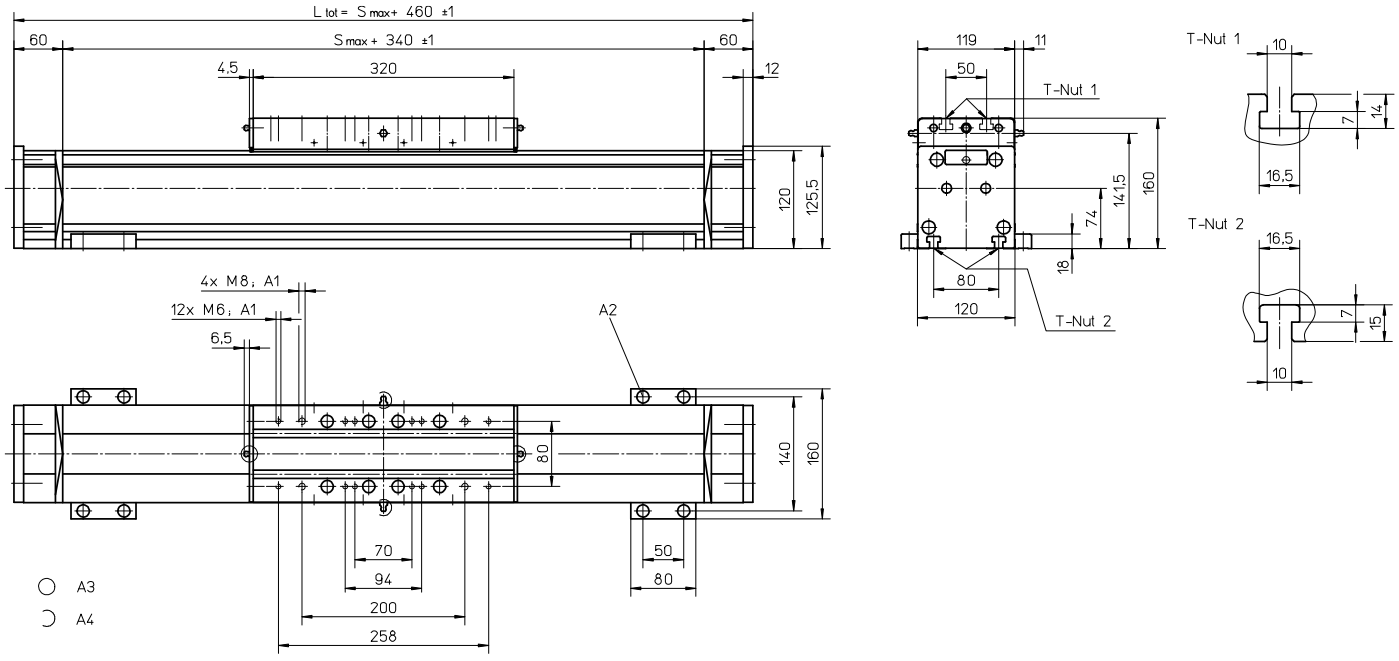

A1: depth 12
A2: socket cap screw ISO4762-M6×20 8.8

A3: tapered lubricating nipple to DIN71412 AM6
A4: can be changed over to one of the three alternative lubricating points by the customer

## WM120N

» Ordering key - see page 210
» Technical data - see page 34

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: depth 22
A2: socket cap screw ISO4762-M8×20 8.8

A3: tapered lubricating nipple to DIN71412 M8×1
A4: can be changed over to one of the three alternative lubricating points by the customer

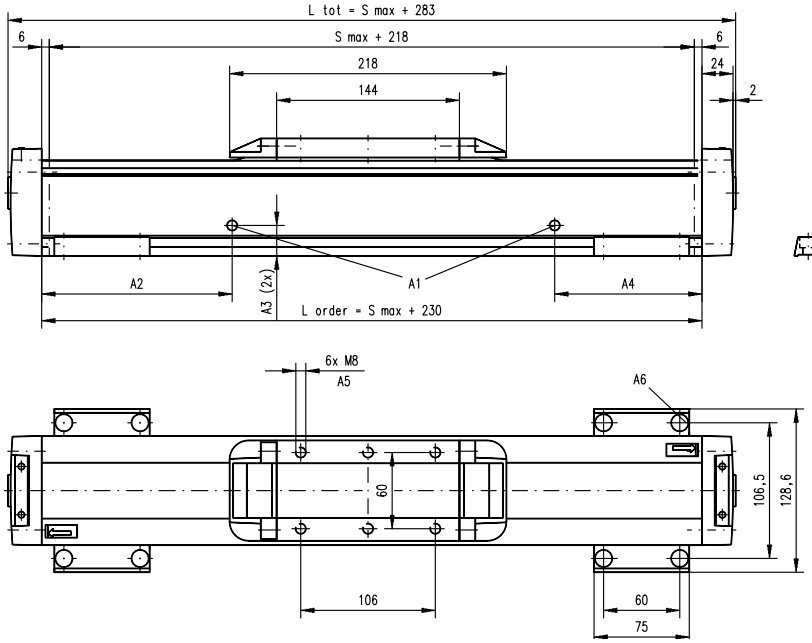
# Accessories

## Non Driven Linear Motion Systems

| Dimensions | Projection |
|---|---|
| METRIC | |

## M75N

» Ordering key - see page 211
» Technical data - see page 42



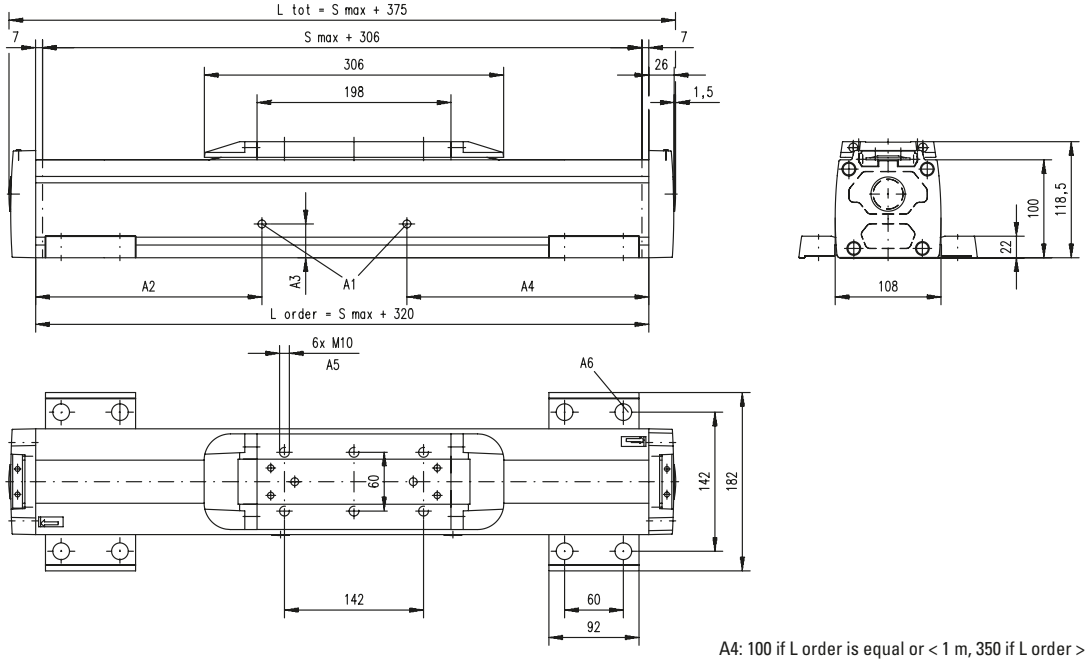

A1: lubrication holes ø6 (MG07N), ø10 (MF07N)
A2: 150 (MG07N), 100 (MF07N)
A3: 24 (MG07N), 43 (MF07N)

A4: 300 (MG07N), 320 (MF07N)
A5: depth 8 Heli coil
A6: ø13,5 / ø 8,5 for socket head cap screw M8

## M100N

» Ordering key - see page 211
» Technical data - see page 44

| Dimensions | Projection |
|---|---|
| METRIC | |




A1: lubrication holes ø6 (MG10N), ø10 (MF10N)
A2: 100 if L order is equal or < 1 m, 200 if L order > 1 m (MG10N), 265 (MF10N)
A3: 34,5 (MG10N), 56,5 (MF10N)

A4: 100 if L order is equal or < 1 m, 350 if L order > 1 m (MG10N)
265 if L order is equal or > 0,7 m, no hole if L order < 0,7 m (MF10N)
A5: depth 10 Heli coil
A6: ø17 / ø 10,5 for socket head cap screw M10

# Additional Technical Data

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### Technical Data

| Parameter | | WM40S | WM40D | WM60D | WM60S | WM60X | WM80D | WM80S | WM120D |
|---|---|---|---|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [mm⁴] | $10{,}8 \times 10^4$ | $10{,}8 \times 10^4$ | $5{,}8 \times 10^5$ | $5{,}8 \times 10^5$ | $5{,}8 \times 10^5$ | $1{,}85 \times 10^6$ | $1{,}85 \times 10^6$ | $7{,}7 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [mm⁴] | $13{,}4 \times 10^4$ | $13{,}4 \times 10^4$ | $5{,}9 \times 10^5$ | $5{,}9 \times 10^5$ | $5{,}9 \times 10^5$ | $1{,}94 \times 10^6$ | $1{,}94 \times 10^6$ | $9{,}4 \times 10^6$ |
| Friction factor of the guide system (μ) | | 0,05 | 0,05 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 |
| Efficiency of the unit | | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Bending factor (b) | | 0,0003 | 0,0003 | 0,0003 | 0,0003 | 0,0003 | 0,0003 | 0,0003 | 0,0003 |
| Inertia of ball screw (jsp) | [kgm²/m] | $1{,}13 \times 10^{-5}$ | $1{,}13 \times 10^{-5}$ | $8{,}46 \times 10^{-5}$ | $8{,}46 \times 10^{-5}$ | $8{,}46 \times 10^{-5}$ | $2{,}25 \times 10^{-4}$ | $2{,}25 \times 10^{-4}$ | $6{,}34 \times 10^{-4}$ |
| Dynamic load rating of ball screw (Cx)<br>05 mm lead<br>10 mm lead<br>20 mm lead<br>40 mm lead<br>50 mm lead | [N] | <br>4400<br>-<br>-<br>-<br>- | <br>4400<br>-<br>-<br>-<br>- | <br>10500<br>-<br>11600<br>-<br>8400 | <br>10500<br>-<br>11600<br>-<br>8400 | <br>10500<br>-<br>-<br>-<br>- | <br>12300<br>13200<br>13000<br>-<br>15400 | <br>12300<br>13200<br>13000<br>-<br>15400 | <br>21500<br>33400<br>29700<br>14900<br>- |
| Dynamic load rating of ball guide (Cy) | [N] | 2 × 2650 | 2 × 2650 | 4 × 11495 | 2 × 12964 | 4 × 11495 | 4 × 14356 | 2 × 18723 | 4 × 18723 |
| Dynamic load rating of ball guide (Cz) | [N] | 2 × 3397 | 2 × 3397 | 4 × 10581 | 2 × 11934 | 4 × 10581 | 4 × 13739 | 2 × 17919 | 4 × 17919 |
| Distance between ball guide carriages (Lx) | [mm] | 87 | 136 | 141,7 | - | 141,7 | 154 | - | 186 |
| Distance between ball guide carriages (Ly) | [mm] | - | - | 35 | 35 | 35 | 49,75 | 49,75 | 80,75 |

| Parameter | | WV60 | WV80 | WV120 | MLSM60D | MLSM80D |
|---|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [mm⁴] | $5{,}8 \times 10^5$ | $1{,}85 \times 10^6$ | $7{,}7 \times 10^6$ | $1{,}19 \times 10^6$ | $3{,}77 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [mm⁴] | $5{,}9 \times 10^5$ | $1{,}94 \times 10^6$ | $9{,}4 \times 10^6$ | $1{,}08 \times 10^7$ | $4{,}71 \times 10^7$ |
| Friction factor of the guide system (μ) | | no guides | no guides | no guides | 0,1 | 0,1 |
| Efficiency of the unit | | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |
| Bending factor (b) | | 0,0003 | 0,0003 | 0,0003 | 0,0003 | 0,0003 |
| Inertia of ball screw (jsp) | [kgm²/m] | $8{,}46 \times 10^{-5}$ | $2{,}25 \times 10^{-4}$ | $6{,}34 \times 10^{-4}$ | $2{,}25 \times 10^{-4}$ | $6{,}34 \times 10^{-4}$ |
| Dynamic load rating of ball screw (Cx)<br>05 mm lead<br>10 mm lead<br>20 mm lead<br>25 mm lead<br>40 mm lead<br>50 mm lead | [N] | <br>10500<br>-<br>11600<br>-<br>8400 | <br>12300<br>13200<br>13000<br>-<br>15400 | <br>21500<br>33400<br>29700<br>14900<br>- | <br>12300<br>13200<br>13000<br>-<br>-<br>15400 | <br>21500<br>33400<br>29700<br>-<br>14900<br>- |
| Dynamic load rating of ball guide (Cy) | [N] | no guides | no guides | no guides | 4 × 13770 | 4 × 17965 |
| Dynamic load rating of ball guide (Cz) | [N] | no guides | no guides | no guides | 4 × 13770 | 4 × 17965 |
| Distance between ball guide carriages (Lx) | [mm] | no guides | no guides | no guides | 163 | 185 |
| Distance between ball guide carriages (Ly) | [mm] | no guides | no guides | no guides | 105 | 164 |

# Additional Technical Data

## Linear Motion Systems with Ball Screw and Slide Guides

### Technical Data

| Parameter | | M55 | M75 | M100 |
|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [mm⁴] | $4{,}27 \times 10^5$ | $1{,}9 \times 10^6$ | $5{,}54 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [mm⁴] | $3{,}4 \times 10^5$ | $1{,}15 \times 10^6$ | $3{,}86 \times 10^6$ |
| Friction factor of the guide system (μ) | | 0,15 | 0,15 | 0,15 |
| Efficiency<br>ball nut unit<br>composite nut unit | | <br>0,8<br>0,5 | <br>0,8<br>0,5 | <br>0,8<br>0,5 |
| Bending factor (b) | | 0,0005 | 0,0005 | 0,0005 |
| Inertia of ball screw (jsp) | [kgm²/m] | $4{,}1 \times 10^{-5}$ | $1{,}6 \times 10^{-4}$ | $2{,}5 \times 10^{-4}$ |
| Dynamic load rating of ball screw (Cx)<br>05 mm lead<br>05,8 mm lead<br>08 mm lead<br>10 mm lead<br>12,7 mm lead<br>20 mm lead<br>25 mm lead<br>32 mm lead | [N] | <br>9300<br>5420<br>-<br>15400<br>-<br>1900<br>-<br>2000 | <br>10400<br>-<br>-<br>-<br>17960<br>10400<br>-<br>- | <br>12500<br>-<br>-<br>20600<br>-<br>-<br>11800<br>- |

## Linear Motion Systems with Belt Drive and Ball Guides

### Technical Data

| Parameter | | WH40 | WM60Z | WM80Z | M55 | M75 | M100 | MLSM80Z |
|---|---|---|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [mm⁴] | $12{,}6 \times 10^4$ | $5{,}62 \times 10^5$ | $1{,}85 \times 10^6$ | $4{,}59 \times 10^5$ | $1{,}9 \times 10^6$ | $5{,}54 \times 10^6$ | $3{,}77 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [mm⁴] | $15{,}3 \times 10^4$ | $5{,}94 \times 10^5$ | $1{,}94 \times 10^6$ | $3{,}56 \times 10^5$ | $1{,}15 \times 10^6$ | $3{,}86 \times 10^6$ | $4{,}71 \times 10^7$ |
| Friction factor of the guide system (μ) | | 0,05 | 0,1 | 0,1 | 0,02 | 0,02 | 0,02 | 0,1 |
| Efficiency of the unit | | 0,85 | 0,85 | 0,85 | 0,95 | 0,95 | 0,95 | 0,85 |
| Bending factor (b) | | 0,0005 | 0,0005 | 0,0005 | 0,0005 | 0,0005 | 0,0005 | 0,0005 |
| Specific mass of belt | [kg/m] | 0,032 | 0,074 | 0,14 | 0,09 | 0,16 | 0,31 | 0,517 |
| Inertia of pulleys (Jsyn) | [kgm²] | $8{,}8 \times 10^{-6}$ | $2{,}13 \times 10^{-5}$ | $1{,}12 \times 10^{-4}$ | $1{,}7 \times 10^{-5}$ | $6{,}8 \times 10^{-5}$ | $8{,}5 \times 10^{-5}$ | $5{,}077 \times 10^{-4}$ |
| Dynamic load rating of ball guide (Cy) | [N] | 2 × 2650 | 2 × 12964 | 4 × 18723<br>(2 × 18723)[1] | 2 × 2717 | 2 × 8206 | 2 × 13189 | 4 × 17965 |
| Dynamic load rating of ball guide (Cz) | [N] | 2 × 3397 | 2 × 11934 | 2 × 17919 | 2 × 3484 | 2 × 15484 | 2 × 24885 | 4 × 17965 |
| Distance between ball guide carriages (Lx) | [mm] | 72 | - | - | 78 | 96 | 140 | 185 |
| Distance between ball guide carriages (Ly) | [mm] | - | 35 | 49,75 | - | - | - | 164 |

[1] Value in brackets = for short carriage.

# Additional Technical Data

## Linear Motion Systems with Belt Drive and Slide Guides

### Technical Data

| Parameter | | M50 | M55 | M75 | M100 |
|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [$mm^4$] | $2{,}61 \times 10^5$ | $4{,}59 \times 10^5$ | $1{,}9 \times 10^6$ | $5{,}54 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [$mm^4$] | $2{,}44 \times 10^5$ | $3{,}56 \times 10^5$ | $1{,}15 \times 10^6$ | $3{,}86 \times 10^6$ |
| Friction factor of the guide system (μ) | | 0,15 | 0,15 | 0,15 | 0,15 |
| Efficiency of the unit | | 0,85 | 0,85 | 0,85 | 0,85 |
| Bending factor (b) | | 0,0005 | 0,0005 | 0,0005 | 0,0005 |
| Specific mass of belt | [kg/m] | 0,086 | 0,09 | 0,16 | 0,31 |
| Inertia of pulleys (Jsyn) | [$kgm^2$] | $3{,}1 \times 10^{-5}$ | $1{,}7 \times 10^{-5}$ | $6{,}8 \times 10^{-5}$ | $8{,}5 \times 10^{-5}$ |

## Linear Motion Systems with Belt Drive and Wheel Guides

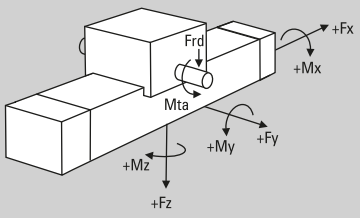
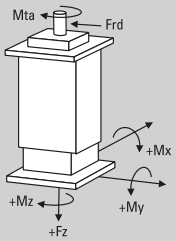
### Technical Data

| Parameter | | WH50 | WH80 | WH120 | MLSH60Z |
|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [$mm^4$] | $3{,}3 \times 10^5$ | $1{,}93 \times 10^6$ | $6{,}69 \times 10^6$ | $1{,}29 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [$mm^4$] | $2{,}65 \times 10^5$ | $1{,}8 \times 10^6$ | $6{,}88 \times 10^6$ | $1{,}2 \times 10^7$ |
| Friction factor of the guide system (μ) | | 0,1 | 0,1 | 0,1 | 0,1 |
| Efficiency of the unit | | 0,85 | 0,85 | 0,85 | 0,85 |
| Bending factor (b) | | 0,0005 | 0,0005 | 0,0005 | 0,0005 |
| Specific mass of belt | [kg/m] | 0,055 | 0,21 | 0,34 | 0,119 |
| Inertia of pulleys (Jsyn) | [$kgm^2$] | $1{,}928 \times 10^{-5}$ | $2.473 \times 10^{-4}$ | $1{,}004 \times 10^{-3}$ | $4{,}604\times 10^{-5}$ |
| Dynamic load rating of wheel guide (Cy) | [N] | - | - | - | $4 \times 1266$ |
| Dynamic load rating of wheel guide (Cz) | [N] | $4 \times 1270$ | $4 \times 3670$ | $4 \times 16200$ | $4 \times 1266$ |
| Distance between carriage wheels (Lx) | [mm] | 198 | 220 | 180 | 109 |
| Distance between carriage wheels (Ly) | [mm] | 39 | 65 | 97 | 102,5 |

# Additional Technical Data

## Linear Lifting Systems

### Technical Data

| Parameter | | WHZ50 | WHZ80 | Z2 | Z3 |
|---|---|---|---|---|---|
| Geometrical moment of inertia of the profile (Ix) | [mm⁴] | - | - | $1{,}87 \times 10^{7}$ | $1{,}87 \times 10^{7}$ |
| Geometrical moment of inertia of the profile (Iy) | [mm⁴] | $3{,}3 \times 10^{5}$ | $1{,}93 \times 10^{6}$ | $2{,}19 \times 10^{7}$ | $2{,}19 \times 10^{7}$ |
| Geometrical moment of inertia of the profile (Iz) | [mm⁴] | $2{,}65 \times 10^{5}$ | $1{,}8 \times 10^{6}$ | - | - |
| Dynamic load rating of ball screw (Fx) | [N] | belt drive | belt drive | - | - |
| Dynamic load rating of ball screw (Fz)<br>ball screw ø 25 lead 10 mm<br>ball screw ø 25 lead 25 mm<br>ball screw ø 32 lead 10 mm | [N | | | <br>21248<br>11182<br>47200 | <br>21248<br>11182<br>47200 |
| Friction factor of the guide system (μ) | | 0,1 | 0,1 | 0,15 | 0,15 |
| Efficiency of the unit | | 0,85 | 0,85 | 0,8 | 0,8 |
| Specific mass of belt | [kg/m] | 0,055 | 0,119 | - | - |
| Inertia of pulleys (Jsyn) | [kgm²] | $6{,}906 \times 10^{-5}$ | $5{,}026 \times 10^{-4}$ | - | - |
| Inertia of ball screw (jsp)<br>ball screw ø 25 lead 10<br>ball screw ø 25 lead 25<br>ball screw ø 32 lead 10 | [kgm²/m] | <br>-<br>-<br>- | <br>-<br>-<br>- | <br>$2{,}1 \times 10^{-4}$<br>$2{,}6 \times 10^{-4}$<br>$6{,}43 \times 10^{-4}$ | <br>$2{,}1 \times 10^{-4}$<br>$2{,}6 \times 10^{-4}$<br>$6{,}43 \times 10^{-4}$ |
| Dynamic load rating of ball guide (Cx) | [N] | - | - | slide guide | slide guide |
| Dynamic load rating of ball guide (Cy) | [N] | 4 × 1270 | 4 × 3670 | slide guide | slide guide |
| Distance between ball guide carriages (Lx) | [mm] | 198 | 220 | - | - |
| Distance between ball guide carriages (Ly) | [mm] | 39 | 65 | slide guide | slide guide |
| Distance between ball guide carriages (Lz) | [mm] | - | - | slide guide | slide guide |
| Definition of forces | |  | |  | |

# Additional Technical Data

## Linear Rod Units

### Technical Data

| Parameter | | WZ60 | WZ80 |
|---|---|---|---|
| Geometrical moment of inertia of the profile (Iy) | [$mm^4$] | $5{,}8 \times 10^5$ | $1{,}85 \times 10^6$ |
| Geometrical moment of inertia of the profile (Iz) | [$mm^4$] | $5{,}9 \times 10^5$ | $1{,}94 \times 10^6$ |
| Friction factor of the guide system (μ) | | 0,1 | 0,1 |
| Efficiency of the unit | | 0,8 | 0,8 |
| Inertia of ball screw (jsp) | [$kgm^2/m$] | | |
| 05 mm lead | | $8{,}46 \times 10^{-5}$ | $2{,}25 \times 10^{-4}$ |
| 10 mm lead | | - | $2{,}25 \times 10^{-4}$ |
| 20 mm lead | | $8{,}46 \times 10^{-5}$ | $2{,}25 \times 10^{-4}$ |
| 25 mm lead | | - | - |
| 32 mm lead | | - | - |
| 40 mm lead | | - | - |
| 50 mm lead | | $8{,}46 \times 10^{-5}$ | $2{,}25 \times 10^{-4}$ |
| Dynamic load rating of ball screw (Cx) | [N] | | |
| 05 mm lead | | 10500 | 12300 |
| 10 mm lead | | - | 13200 |
| 20 mm lead | | 11600 | 13000 |
| 25 mm lead | | - | - |
| 32 mm lead | | - | - |
| 40 mm lead | | - | - |
| 50 mm lead | | 8400 | 15400 |
| Dynamic load rating of ball guide (Cy) | [N] | 2 × 12964 | 2 × 18723 |
| Dynamic load rating of ball guide (Cz) | [N] | 2 × 11943 | 2 × 17919 |
| Distance between ball guide carriages (Lx) | [mm] | - | - |
| Distance between ball guide carriages (Ly) | [mm] | 35 | 50 |
| Dynamic rating of the ball bushing | [N] | 8300 | 13700 |

# Drive Calculations

## Screw Driven Linear Motion Systems

### Feed Force Formula [N]

$$F_x = m \times g \times \mu$$

$F_x$ = feed force [N]
$m$ = total mass to be moved [kg] [1]
$g$ = acceleration due to gravity [m/s²]
$\mu$ = friction factor specific for each unit

### Acceleration Force Formula [N]

$$F_a = m \times a$$

$F_a$ = acceleration force [N]
$m$ = mass to be operated [kg]
$a$ = acceleration [m/s²) [2]

### Power Formula [kW]

$$P = \frac{M_A \times n_{max} \times 2 \times 3{,}14}{60 \times 1000}$$

$P$ = required power [kW]
$M_A$ = required drive moment [Nm]
$n_{max}$ = maximum required rotational speed [rpm]

### Drive Moment Formulas [Nm]

$$M_A = M_{load} + M_{trans} + M_{rot} + M_{idle}$$

$$M_{load} = \frac{F_x \times p}{2 \times 3{,}14 \times 1000}$$

$$M_{trans} = \frac{F_a \times p}{2 \times 3{,}14 \times 1000}$$

$$M_{rot} = j_{sp} \times \frac{2 \times 3{,}14 \times n_{max} \times a \times 2}{V_{max} \times 60 \times 1000}$$

$M_{idle}$ = see table for unit in question

$M_A$ = required drive moment [Nm]
$M_{load}$ = moment as a result of various loads [N]
$M_{trans}$ = translational acceleration moment [Nm]
$M_{rot}$ = rotational acceleration moment [Nm]
$M_{idle}$ = carriage/rod idle torque [Nm] [3]
$F_x$ = feed force [N]
$p$ = screw lead [mm]
$F_a$ = maximum required acceleration force [N]
$j_{sp}$ = inertia of ball screw per meter [kgm²/m] [4]
$n_{max}$ = maximum required rotational speed [rpm]
$a$ =maximum required acceleration [m/s²)
$V_{max}$ = maximum required linear speed [m/s]

[1] The total mass is the mass of all masses to be moved (objects to be moved, carriage(s)/rod, screw).

[2] In vertical applications, the mass acceleration must be added to the acceleration due to gravity g (9,81 m/s²).

[3] This value can be found in the carriage idle torque tables for each linear motion system.

[4] This value can be found in the additional technical data tables.

# Drive Calculations

## Belt Driven Linear Motion Systems

### Feed Force Formula [N]

$$F_x = m \times g \times \mu$$

$F_x$ = feed force [N]
$m$ = total mass to be moved [kg] [1]
$g$ = acceleration due to gravity [m/s²]
$\mu$ = friction factor specific for each unit

### Acceleration Force Formula [N]

$$F_a = m \times a$$

$F_a$ = acceleration force [N]
$m$ = mass to be operated [kg]
$a$ = acceleration [m/s²] [2]

### Power Formula [kW]

$$P = \frac{M_A \times n_{max} \times 2 \times 3{,}14}{60 \times 1000}$$

$P$ = required power [kW]
$M_A$ = required drive moment [Nm]
$n_{max}$ = maximum required rotational speed [rpm]

### Drive Moment Formulas [Nm]

$$M_A = M_{load} + M_{trans} + M_{rot} + M_{idle}$$

$$M_{load} = \frac{F_x \times d_o}{1000 \times 2}$$

$$M_{trans} = \frac{F_a \times d_o}{1000 \times 2}$$

$$M_{rot} = J_{syn} \times \frac{2 \times 3{,}14 \times n_{max}}{60} \times \frac{a}{V_{max}}$$

$M_{idle}$ = see table for unit in question

$M_A$ = required drive moment [Nm]
$M_{load}$ = moment as a result of various loads [N]
$M_{trans}$ = translational acceleration moment [Nm]
$M_{rot}$ = rotational acceleration moment [Nm]
$M_{idle}$ = carriage/rod idle torque [Nm] [3]
$F_x$ = feed force [N]
$d_o$ = pulley diameter [mm] [4]
$F_a$ = maximum required acceleration force [N]
$J_{syn}$ = idle torque of pulleys [kgm²] [5]
$n_{max}$ = maximum required rotational speed [rpm]
$a$ = maximum required acceleration [m/s²]
$V_{max}$ = maximum required linear speed [m/s]

[1] The total mass is the mass of all masses to be moved (objects to be moved, carriage(s)/rod, belt).

[2] In vertical applications, the mass acceleration must be added to the acceleration due to gravity g (9,81 m/s²).

[3] This value can be found in the carriage idle torque tables.

[4] This value can be found in the performance specifications tables for each linear motion system.

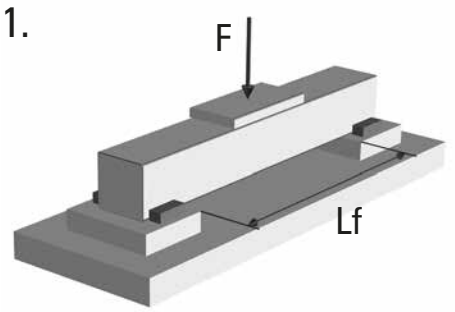
[5] This value can be found in the additional technical data tables.

# Deflection Calculations

How to calculate the deflection of the profile

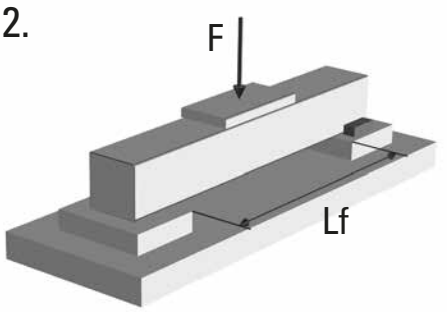
## Load Cases

1.



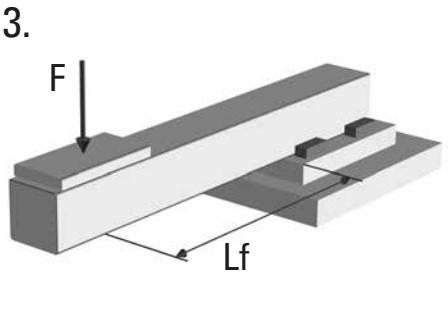

Profile supported in both ends.
Profile fixed at both sides.

2.




Profile supported in both ends.
Profile fixed at one side.

3.




Profile supported in one end.
Profile fixed at one side.

## Permissible Profile Deflection Formula [mm]

$$f_h = L_f \times b$$

| | |
|---|---|
| $f_h$ | = permissible profile deflection [mm] |
| $L_f$ | = length of profile being bent [mm] |
| $b$ | = bending factor [1] |

## Profile Deflection Formulas [mm]

### Load Case 1.

$$f_{max} = \frac{m'_{100} \times g \times L_f^4}{100 \times 384 \times E_{Al} \times I_y} + \frac{(m_{ext} + m_c) \times g \times L_f^3}{192 \times E_{Al} \times I_y}$$

### Load Case 2.

$$f_{max} = \frac{m'_{100} \times g \times L_f^4}{100 \times 185 \times E_{Al} \times I_y} + \frac{(m_{ext} + m_c) \times g \times L_f^3}{48 \times \sqrt{5} \times E_{Al} \times I_y}$$

### Load Case 3.

$$f_{max} = \frac{m'_{100} \times g \times L_f^4}{100 \times 8 \times E_{Al} \times I_y} + \frac{(m_{ext} + m_c) \times g \times L_f^3}{3 \times E_{Al} \times I_y}$$

| | |
|---|---|
| $f_{max}$ | = deflection of the profile [mm] |
| $m'_{100}$ | = weight of every 100 mm of stroke [kg/mm] |
| $m_{ext}$ | = external load on carriage [kg] |
| $m_c$ | = weight of carriage(s) [kg] [2] |
| $g$ | = acceleration due to gravity [m/s²] |
| $E_{Al}$ | = elastic modulus of aluminium (70000 N/mm²) |
| $I_y$ | = geometrical moment of inertia of the profile in Y direction [mm⁴] [1] |

## Conclusion Formulas

$f_h > f_{max}$ = deflection OK

$f_h < f_{max}$ = deflection not OK, $L_f$ must be shorter

[1] This value can be found in the additional technical data tables.

[2] This value can be found in the performance specifications tables for each unit.

# Deflection Calculations

## Examples of calculations of the profile deflection

### Example 1

Type of linear motion system:
WH80

Load case:
Case 1 - profile supported in both ends and fixed at both sides.

Load to be moved by carriage:
$m_{ext}$ = 150 kg

Distance between supports:
$L_f$ = 600 mm

Specific unit data:
$m'_{100}$ = 0,93 kg
$m_c$ = 2,75 kg
$E_{Al}$ = 70000 N/mm$^2$
$I_y$ = 1,93 × 10$^6$ mm$^4$
b = 0,0005

Calculated values:
$f_h$ = 0,3 mm
$f_{max}$ = 0,013 mm

Conclusion:
$f_h > f_{max}$ = deflection OK

### Example 2

Type of linear motion system:
M55 (MF06B)

Load case:
Case 2 - profile supported in both ends and fixed at one side.

Load to be moved by carriage:
$m_{ext}$ = 100 kg

Distance between supports:
$L_f$ = 600 mm

Specific unit data:
$m'_{100}$ = 0,53 kg
$m_c$ = 1,2 kg
$E_{Al}$ = 70000 N/mm$^2$
$I_y$ = 4,59 × 10$^5$ mm$^4$
b = 0,0005

Calculated values:
$f_h$ = 0,3 mm
$f_{max}$ = 0,063 mm

Conclusion:
$f_h > f_{max}$ = deflection OK

### Example 3

Type of linear motion system:
WM80

Load case:
Case 3 - profile supported and fixed at one end.

Load to be moved by carriage:
$m_{ext}$ = 120 kg

Distance between supports:
$L_f$ = 400 mm

Specific unit data:
$m'_{100}$ = 1,08 kg
$m_c$ = 4,26 kg
$E_{Al}$ = 70000 N/mm$^2$
$I_y$ = 1,85 × 10$^6$ mm$^4$
b = 0,0003

Calculated values:
$f_h$ = 0,12 mm
$f_{max}$ = 0,203 mm

Conclusion:
$f_h > f_{max}$ = deflection not OK

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### WM40S, WM40D, WM60S, WM60D, WM60X, WM80S, WM80D, WM120D

| Your Code | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Example | WM06D | 020 | -02545 | -03715 | A | Z | -0520 | S1 |

**1. Type of unit**
WM04S = WM40S unit with single ball nut
WM04D = WM40D unit with double ball nuts
WM06S = WM60S unit with single ball nut
WM06D = WM60D unit with double ball nuts
WM06X = WM60X unit with left/right screw
WM08S = WM80S unit with single ball nut
WM08D = WM80D unit with double ball nuts
WM12D = WM120D unit with double ball nuts

**2. Screw lead**[1]
005 = 5 mm
010 = 10 mm
020 = 20 mm
040 = 40 mm
050 = 50 mm

**3. Maximum stroke (Smax)**
- ••••• = distance in mm

**4. Total length of unit (L tot)**
- ••••• = distance in mm

**5. Drive shaft configuration**[2]
A = single shaft without key way
C = single shaft with key way
G = double shafts, first without key way and second for encoder
I = double shafts, first with key way and second for encoder

**6. Type of carriage**[3]
N = single standard carriage
S = single short carriage
L = single long carriage
Z = double standard carriages
Y = double short carriages
M = double long carriages

**7. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

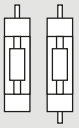
**8. Protection option**[4]
S1 = wash down protection (not available for WM04 units)

[1] See table below for available combinations of units and ball screw leads.

| Type of unit | Available screw leads [mm] | | | | |
|---|---|---|---|---|---|
| | 5 | 10 | 20 | 40 | 50 |
| WM04S | x | | | | |
| WM04D | x | | | | |
| WM06S | x | | x | | x |
| WM06D | x | | x | | x |
| WM06X | x | | | | |
| WM08S | x | x | x | | x |
| WM08D | x | x | x | | x |
| WM12D | x | x | x | x | |

[2] See below for the definition of shafts.

Single Double



[3] See table below for available combinations of units and carriage types.

| Type of unit | Available carriage types | | | | | |
|---|---|---|---|---|---|---|
| | N | S | L | Z | Y | M |
| WM04S | x | | | x | | |
| WM04D | | | x | | | x |
| WM06S | | x | | | x | |
| WM06D | x | | x | x | | |
| WM06X | x | x | x | | | |
| WM08S | | x | | | x | |
| WM08D | x | | x | x | | |
| WM12D | x | | x | x | | |

[4] Leave position blank if no additional protection is required.

Note! for ordering of options type EN, ES, KRG, RT, ADG and MGK, see accessory index on page 135.

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### WV60, WV80, WV120

| Your Code | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Example | WV08D | 020 | -02745 | -03295 | G | N | -0000 | |

**1. Type of unit**
WV06D = WV60 unit
WV08D = WV80 unit
WV12D = WV120 unit

**2. Ball screw lead**[1]
005 = 5 mm
010 = 10 mm
020 = 20 mm
040 = 40 mm
050 = 50 mm

**3. Maximum stroke (Smax)**
- •••••= distance in mm

**4. Total length of unit (L tot)**
- •••••= distance in mm

**5. Drive shaft configuration**[2]
A = single shaft without key way
C = single shaft with key way
G = double shafts, first without key way and second for encoder
I = double shafts, first with key way and second for encoder

**6. Type of carriage**
N = single standard carriage

**7. Distance between double carriages**
- 0000 = always for single carriages

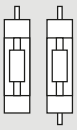
**8. Protection option**[3]
S1 = wash down protection

[1] See table below for available combinations of units and ball screw leads.

| Type of unit | Available screw leads [mm] | | | | |
|---|---|---|---|---|---|
| | 5 | 10 | 20 | 40 | 50 |
| WV60 | x | | x | | x |
| WV80 | x | x | x | | x |
| WV120 | x | x | x | x | |

[2] See below for the definition of shafts.

Single Double



[3] Leave position blank if no additional protection is required.

Note! for ordering of options type EN, ES, KRG, RT, ADG and MGK, see accessory index on page 135.

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### MLSM60D, MLSM80D

| Your Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | MLSM06D | 020 | -03800 | -04645 | C | L | -0000 |

**1. Type of unit**
MLSM06D = MLSM60 unit
MLSM08D = MLSM80 unit

**2. Ball screw lead**
005 = 5 mm
010 = 10 mm
020 = 20 mm
040 = 40 mm
050 = 50 mm

**3. Maximum stroke (Smax)**
- ••••• = distance in mm

**4. Total length of unit (L tot)**
- ••••• = distance in mm

**5. Drive shaft configuration[2]**
A = single shaft without key way
C = single shaft with key way
G = double shafts, first without key way and second for encoder
I = double shafts, first with key way and second for encoder

**6. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

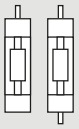
**7. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See table below for available combinations of units and ball screw leads.

| Type of unit | Available screw leads [mm] | | | | |
|---|---|---|---|---|---|
| | 5 | 10 | 20 | 40 | 50 |
| MLSM06D | x | | x | | x |
| MLSM08D | x | x | x | x | |

[2] See below for the definition of shafts.

Single Double



# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### M55, M75, M100

| Your Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | MF07 | K057 | C | 35 | S | 305 | +S1 |

**1. Type of unit**
MF06 = M55 unit
MF07 = M75 unit
MF10 = M100 unit

**2. Ball screw type, lead and tolerance class[2]**
K057 = ball nut, 5 mm, T7
K107 = ball nut, 10 mm, T7
K129 = ball nut, 12,7 mm, T9
K207 = ball nut, 20 mm, T7
K257 = ball nut, 25 mm, T7

**3. Type of carriages**
A = single standard carriage
C = double standard carriages

**4. Distance between carriages (Lc)**
00 = for all single standard carriage units
•• = distance in cm between carriages

**5. Screw supports**
X = no screw supports
S = single screw supports
D = double screw supports

**6. Ordering length (L order)**
••• = distance in cm

**7. Protection option[1]**
+S1 = S1 wash down protection

[1] Leave position blank if no additional protection is required.
[2] See table below for available combinations of units and ball screw type, lead and tolerance.

| Ball screw type | Type of unit | | |
|---|---|---|---|
| | M55 | M75 | M100 |
| K057 | x | x | x |
| K107 | x | | x |
| K129 | | x | |
| K207 | x | x | |
| K257 | | | x |

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### 2HB10, 2HB20

| Your Code | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Example | 2HB10 | HO | N1285 | -038 | N | 001 | A | 0 | A | 0 | 0 |

**1. Type of unit**
2HB10 = 2HB10 unit
2HB20 = 2HB20 unit

**2. Ball screw diameter, lead and nut type**
GO = 16 mm, 5 mm, preloaded (2HB10 only)
HO = 16 mm, 10 mm, preloaded (2HB10 only)

LO = 25 mm, 5 mm, preloaded (2HB20 only)
MO = 25 mm, 10 mm, preloaded( 2HB20 only)
NO = 25 mm, 25 mm, preloaded (2HB20 only)

**3. Ordering length (L)**
N •••• = distance in mm

**4. Y-distance**
- 038 = standard distance in mm between motor end plate to first set of mounting holes on 2HB10
- 043 = standard distance in mm between motor end plate to first set of mounting holes on 2HB20
- ••• = custom distance in mm between motor end plate to first set of mounting holes

**5. Brake option**
N = no brake
B = brake

**6. Motor flange ID**
001 = NEMA 23
002 = NEMA 34
••• = consult www.linearmotioneering.com for complete list of available standard motor flanges

**7. Ball guide rail coating option**
A = standard
D = duralloy

**8. Ball guide carriage coating option**
0 = standard
1 = duralloy

**9. Profile cover option**
A = none
B = bellows (bellows will reduce stroke length app. 28%)
C = shrouds

**10. Hardware option**
0 = alloy plated
1 = stainless steel

**11. Home and end of stroke sensor option**
0 = no sensors
1 = home sensor, NPN type
2 = end of stroke sensors, NPN type
3 = home and end of stroke sensors, NPN type
4 = home sensor, PNP type
5 = end of stroke sensors, PNP type
6 = home and end of stroke sensors, PNP type

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### 2RB12, 2RB16

| Your Code | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Example | 2RB16 | JO | N1000 | -100 | N | 002 | B | 0 | A | 0 | 0 |

**1. Type of unit**
2RB12 = 2RB12 unit
2RB16 = 2RB16 unit

**2. Ball screw diameter, lead and nut type**
GO = 16 mm, 5 mm, preloaded (2RB12 only)
HO = 16 mm, 10 mm, preloaded (2RB12 only)

IO = 20 mm, 5 mm, preloaded (2RB16 only)
JO = 20 mm, 10 mm, preloaded ( 2RB16 only)
KO = 20 mm, 25 mm, preloaded (2RB16 only)

**3. Ordering length (L)**
N •••• = distance in mm

**4. Y-distance**
- 075 = standard distance in mm between motor end plate to first set of mounting holes on 2RB12
- 100 = standard distance in mm between motor end plate to first set of mounting holes on 2RB16
- ••• = custom distance in mm between motor end plate to first set of mounting holes

**5. Brake option**
N = no brake
B = brake

**6. Motor flange ID**
001 = NEMA 23
002 = NEMA 34
••• = consult www.linearmotioneering.com for complete list of available standard motor flanges

**7. Ball guide shaft coating option**
A = standard, 60 Case
B = stainless steel (440C)
C = chrome plated
E = armoloy

**8. Bearing option**
0 = standard
1 = corrosion resistance

**9. Profile cover option**
A = none
B = bellows (bellows will reduce stroke length app. 28%)

**10. Hardware option**
0 = alloy plated
1 = stainless steel

**11. Home and end of stroke sensor option**
0 = no sensors
1 = home sensor, NPN type
2 = end of stroke sensors, NPN type
3 = home and end of stroke sensors, NPN type
4 = home sensor, PNP type
5 = end of stroke sensors, PNP type
6 = home and end of stroke sensors, PNP type

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### MS25, MS33

| Your Code | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Example | MS25 | LC | N0300 | -056 | N | 505 | A | 0 | A | 0 | 0 |

**1. Type of unit**
MS25 = MS25 unit
MS33 = MS33 unit

**2. Lead screw diameter, lead and nut type**
LA = 0,25 inch, 0,025 in, preloaded
LB = 0,25 inch, 0,050 in, preloaded
LC = 0,25 inch, 0,062 in, preloaded
LD = 0,25 inch, 0,200 in, preloaded
LE = 0,25 inch, 0,250 in, preloaded
LF = 0,25 inch, 0,500 in, preloaded
LG = 0,25 inch, 1,000 in, preloaded
LH = 0,25 inch, 1,5 mm, preloaded
LI = 0,25 inch, 2,0 mm, preloaded
LJ = 0,25 inch, 3,0 mm, preloaded

**3. Ordering length (L)**
N •••• = distance in mm

**4. Y-distance**
- 056 = standard distance in mm between motor end plate to first set of mounting holes on MS25
- 075 = standard distance in mm between motor end plate to first set of mounting holes on MS33
- ••• = custom distance in mm between motor end plate to first set of mounting holes

**5. Brake option**
N = no brake
B = brake

**6. Motor flange ID [1]**
505 = NEMA 17
001 = NEMA 23
••• = consult www.linearmotioneering.com for complete list of available standard motor flanges

**7. Linear guides shafting option**
A = 60 case (1566)
B = stainless steel (440C)
C = chrome plated
E = armoloy

**8. Bearing type option**
0 = standard
1 = corrosion resistant

**9. Profile cover option**
A = none
B = bellows (bellows will reduce stroke length app. 28%)

**10. Hardware option**
0 = alloy plated
1 = stainless steel

**11. Home and end of stroke limit switch option**
7 = home position limit switch
8 = end of stroke limit switches

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### MS46L, MS46B

| Your Code | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Example | MS46 | BB | N0720 | -075 | N | 001 | A | 0 | A | 0 | 0 |

**1. Type of unit**
MS46 = MS46 unit

**2. Type of screw, diameter, lead and nut type**
LK = lead screw, 12 mm, 3 mm, preloaded
LL = lead screw, 12 mm, 10 mm, preloaded
LM = lead screw, 12 mm, 25 mm, preloaded
BP = ball screw, 12 mm, 5 mm, preloaded
BB = ball screw, 12 mm, 5 mm, non-preloaded
BQ= ball screw, 12 mm, 10 mm, preloaded
BR = ball screw, 12 mm,10 mm, non-preloaded

**3. Ordering length (L)**
N •••• = distance in mm

**4. Y-distance**
- 075 = standard distance in mm between motor end plate to first set of mounting hole
- ••• = custom distance in mm

**5. Brake option**
N = no brake
B = brake

**6. Motor flange ID**
001 = NEMA 23
002 = NEMA 24
••• = consult www.linearmotioneering.com for complete list of available standard motor flanges

**7. Linear guides shafting option**
A = 60 case (1566)
B = stainless steel (440C)
C = chrome plated
E = armoloy

**8. Bearing type option**
0 = standard
1 = corrosion resistant

**9. Profile cover option**
A = none
B = bellows (bellows will reduce stroke length app. 28%)

**10. Hardware option**
0 = alloy plated
1 = stainless steel

**11. Home and end of stroke limit switch option**
7 = home position limit switch
8 = end of stroke limit switches

# Ordering Keys

## Linear Motion Systems with Lead or Ball Screw Drive and Ball Guides

### 2DB08, 2DB12, 2DB16

| Your Code | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Example | 2DB12 | FO | N0250 | -300 | N | 002 | A | 0 | A | 0 | 0 |

**1. Type of unit**
2DB08 = 2DB08 unit
2DB12 = 2DB12 unit
2DB16 = 2DB16 unit

**2. Screw type, diameter, lead and nut type**
AO = leadscrew, 0.375 in, 0.100 in, non-preloaded (2DB08 only)
BO = leadscrew, 0.375 in, 0.250 in, non-preloaded (2DB08 only)
CO = leadscrew, 0.375 in, 0.500 in, non-preloaded (2DB08 only)
DO = leadscrew, 0.375 in, 1.000 in, non-preloaded (2DB08 only)

FO = ballscrew, 0.631 in, 0.200 in, non-preloaded (2DB12 only)
VO = ballscrew, 0.631 in, 0.200 in, preloaded (2DB12 only)
QJ = ballscrew, 0.500 in, 0.500 in, preloaded (2DB12 only)

GO = ballscrew, 0.750 in, 0.200 in, non-preloaded (2DB16 only)
WO = ballscrew, 0.750 in, 0.200 in, preloaded (2DB16 only)
RJ = ballscrew, 0.750 in, 0.500 in, preloaded (2DB16 only)
LJ = ballscrew, 0.631 in, 1.0 in, preloaded (2DB16 only)
DO = ballscrew, 20 mm, 5 mm, preloaded (2DB16 only)

**3. Ordering length (L)**
N •••• = distance in inch (e.g. 0250 = 25 inch)

**4. Y-distance**
- 200 = standard distance in inch between motor end plate to first set of mounting holes for 2DB08 (e.g. 200 = 2 in)
- 300 = standard distance in inch between motor end plate to first set of mounting holes for 2DB12 and 2DB16 (e.g. 300 = 3 in)
- ••• = custom distance in inch between motor end plate to first set of mounting holes

**5. Brake option**
N = no brake
B = brake

**6. Motor flange ID**
001 = NEMA 23
002 = NEMA 34
••• = consult www.linearmotioneering.com for complete list of available standard motor flanges

**7. Ball guide shaft coating option**
A = standard, 60 Case
B = stainless steel (440C)
C = chrome plated
E = armoloy

**8. Bearing option**
0 = standard
1 = corrosion resistance

**9. Profile cover option**
A = none
B = bellows (bellows will reduce stroke length app. 28%)

**10. Hardware option**
0 = alloy plated
1 = stainless steel

**11. Home and end of stroke sensor option**
0 = no sensors
1 = home sensor, NPN type
2 = end of stroke sensors, NPN type
3 = home and end of stroke sensors, NPN type
4 = home sensor, PNP type
5 = end of stroke sensors, PNP type
6 = home and end of stroke sensors, PNP type

# Ordering Keys

## Linear Motion Systems with Ball Screw Drive and Slide Guides

### M55, M75, M100

| Your Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | MG07 | K057 | C | 35 | S | 305 | +S1 |

**1. Type of unit**
MG06 = M55 unit
MG07 = M75 unit
MG10 = M100 unit

**2. Ball screw type, lead and tolerance class**[2]
K057 = ball nut, 5 mm, T7
K107 = ball nut, 10 mm, T7
K129 = ball nut, 12,7 mm, T9
K207 = ball nut, 20 mm, T7
K257 = ball nut, 25 mm, T7

**3. Type of carriages**
A = single standard carriage
C = double standard carriages

**4. Distance between carriages (Lc)**
00 = for all single standard carriage units
•• = distance in cm between carriages

**5. Screw supports**
X = no screw supports
S = single screw supports
D = double screw supports

**6. Ordering length (L order)**
••• = distance in cm

**7. Protection option**[1]
+S1 = S1 wash down protection

[1] Leave position blank if no additional protection is required.
[2] See table below for available combinations of units and ball screw type, lead and tolerance.

| Ball screw type | Type of unit | | |
|---|---|---|---|
| | M55 | M75 | M100 |
| K057 | x | x | x |
| K107 | x | | x |
| K129 | | x | |
| K207 | x | x | |
| K257 | | | x |

# Ordering Keys

## Linear Motion Systems with Belt Drive and Ball Guides

| WH40 | | | | | | |
|---|---|---|---|---|---|---|
| Your Code | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | WH04Z100 | -01400 | -01755 | H | L | -0400 |

**1. Type of unit**
WH04Z100 = WH40 unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

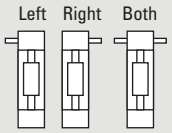
**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
L = shaft on both sides without key way
M = shaft on both sides with key way
W = hollow shaft on both sides with clamping unit

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See below for the definition of shafts.




Note! for ordering of options type EN, ES, KRG, RT, ADG and MGK, see accessory index on page 133.

# Ordering Keys

## Linear Motion Systems with Belt Drive and Ball Guides

### WM60Z, WM80Z

| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | WM08Z170 | -02545 | -03715 | D | L | -0000 |

**1. Type of unit**
WM06Z120 = WM60Z unit
WM08Z170 = WM80Z unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

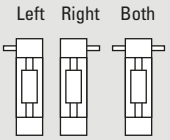
**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
L = shaft on both sides without key way
M = shaft on both sides with key way
V = hollow shaft on both sides for Micron DT/DTR planetary gear option

**5. Carriage configuration[2]**
N = single standard carriage
S = single short carriage
L = single long carriage
Z = double standard carriages
Y = double short carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See below for the definition of shafts.




[2] See table below for available combinations of units and carriage types.

| Type of unit | Available carriage types | | | | |
|---|---|---|---|---|---|
| | N | S | L | Z | Y |
| WM06Z | | x | | | x |
| WM08Z | x | x | x | x | x |

# Ordering Keys

## Linear Motion Systems with Belt Drive and Ball Guides

### M55, M75, M100

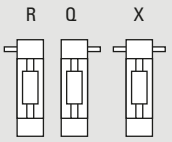
| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | MF06B105 | A | 00 | X | 450 | +S1 |

**1. Type of unit**
MF06B105 = M55 unit
MF07B130 = M75 unit
MF10B176 = M100 unit

**2. Type of carriages**
A = single standard carriage
C = double standard carriages

**3. Distance between carriages (Lc)**
00 = for all single standard carriage units
•• = distance in cm between carriages

**4. Drive shaft configuration**
R = shaft on the side as shown in picture
Q = shaft on the side as shown in picture
X = shaft on both sides




**5. Ordering length (L order)**
••• = distance in cm

**6. Protection option[1]**
+S1 = S1 wash down protection

[1] Leave blank if no protection option required.

# Ordering Keys

## Linear Motion Systems with Belt Drive and Ball Guides

| MLSM80Z | | | | | | |
|---|---|---|---|---|---|---|
| Your Code | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | MLSM08Z200 | -05000 | -05570 | A | N | -0000 |

**1. Type of unit**
MLSM08Z200 = MLSM80 unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

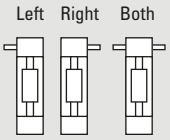
**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
L = shaft on both sides without key way
M = shaft on both sides with key way

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See below for the definition of shafts.



# Ordering Keys

## Linear Motion Systems with Belt Drive and Slide Guides

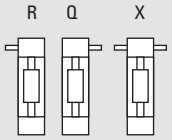
### M50

| Your Code | | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Example | MG05B130 | A00 | R | 560 |

**1. Type of unit**
MG05B130 = M50 unit

**2. Type of carriage**
A00 = single standard carriage

**3. Drive shaft configuration**
R = shaft on the side as shown in picture
Q = shaft on the side as shown in picture
X = shaft on both sides




**4. Ordering length (L order)**
••• = distance in cm

### M55, M75, M100

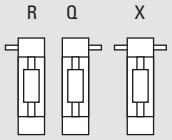
| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | MG06B105 | A | 00 | X | 450 | +S2 |

**1. Type of unit**
MG06B105 = M55 unit
MG07B130 = M75 unit
MG10B176 = M100 unit

**2. Type of carriages**
A = single standard carriage
C = double standard carriages

**3. Distance between carriages (Lc)**
00 = for all single standard carriage units
•• = distance in cm between carriages

**4. Drive shaft configuration**
R = shaft on the side as shown in picture
Q = shaft on the side as shown in picture
X = shaft on both sides




**5. Ordering length (L order)**
••• = distance in cm

**6. Protection option[1]**
+S1 = S1 wash down protection
+S2 = S2 enhanced wash down protection

[1] Leave blank if no protection option required.

# Ordering Keys

## Linear Motion Systems with Belt Drive and Wheel Guides

### WH50, WH80, WH120

| Your Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | WH08Z200 | -02300 | -02710 | J | L | -0000 | S1 |

**1. Type of unit**
WH05Z120 = WH50 unit
WH08Z200 = WH80 unit
WH12Z260 = WH120 unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

**3. Total length of unit (L tot)**
- ••••• = distance in mm

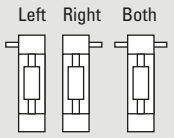
**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
K = hollow shaft on both sides without clamping unit
L = shaft on both sides without key way
M = shaft on both sides with key way
V = hollow shaft on both sides for Micron DT/DTR planetary gear option
W = hollow shaft on both sides with clamping unit

**7. Protection option[2]**
S1 = wash down protection

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See below for the definition of shafts.




[2] Leave position blank if no additional protection is required.

Note! for ordering of options type EN, ES, KRG, RT, ADG and MGK, see accessory index on page 135.

# Ordering Keys

## Linear Motion Systems with Belt Drive and Wheel Guides

| MLSH60Z | | | | | | |
|---|---|---|---|---|---|---|
| Your Code | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | MLSH06Z135 | -04500 | -05580 | D | Z | -0600 |

**1. Type of unit**
MLSH06Z135 = MLSH60 unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

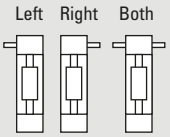
**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
L = shaft on both sides without key way
M = shaft on both sides with key way

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See below for the definition of shafts.



# Ordering Keys

## Linear Lifting Units

### WHZ50, WHZ80

| Your Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | WHZ05Z120 | -01000 | -01410 | A | N | -0000 | |

**1. Type of unit**
WHZ05Z120 = WHZ50 unit
WHZ08Z200 = WHZ80 unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

**3. Total length of unit (L tot)**
- ••••• = distance in mm

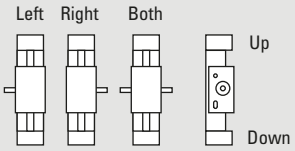
**4. Drive shaft configuration[1]**
A = shaft on left side without key way
B = shaft on right side without key way
C = shaft on left side with key way
D = shaft on right side with key way
E = shaft on left side without key way and shaft on right side with key way
F = shaft on left side with key way and shaft on right side without key way
G = shaft on left side without key way and shaft on right side for encoder
H = shaft on left side for encoder and shaft on right side without key way
I = shaft on left side with key way and shaft on right side for encoder
J = shaft on left side for encoder and shaft on right side with key way
L = shaft on both sides without key way
M = shaft on both sides with key way
V = hollow shaft on both sides for Micron DT/DTR planetary gear option
W = hollow shaft on both sides with clamping unit

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

**7. Protection option[2]**
S1 = wash down protection

[1] See below for the definition of shafts and up and down.




[2] Leave position blank if no additional protection is required.

Note! for ordering of options type EN, ES, KRG, RT, ADG and MGK, see accessory index on page 135.

### Z2, Z3

| Your Code | | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Example | MGZ3K | 25259 | -250 | 450 |

**1. Type of unit**
MGZ2K = Z2 unit
MGZ3K = Z3 unit

**2. Ball screw diameter, lead and tolerance class**
25109 = 25 mm, 10 mm, T9
25259 = 25 mm, 25 mm, T9
32207 = 32 mm, 20 mm, T7

**3. Minimum retracted length (L min)**
- ••• = distance in cm

**4. Maximum extended length (L max)**
••• = distance in cm

# Ordering Keys

## Linear Rod Units

### WZ60, WZ80

| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | WZ06S | 20 | -00350 | -00780 | C | N |

**1. Type of unit**
WZ06 = WZ60 unit
WZ08 = WZ80 unit

**2. Ball screw lead**
05 = 5 mm
10 = 10 mm
20 = 20 mm
50 = 50 mm

**3. Maximum stroke (Smax)**
- ••••• = distance in mm

**4. Total length of unit (L tot)**
- •••• = distance in mm

**5. Drive shaft configuration**
A = shaft without key way
C = shaft with key way

**6. Extension tube configuration**
N = standard

[1] See table below for available combinations of units and screw leads.

| Type of unit | Available screw leads [mm] | | | |
|---|---|---|---|---|
| | 5 | 10 | 20 | 50 |
| WZ06 | x | | x | x |
| WZ08 | x | x | x | x |

Note! for ordering of options type EN, ES, KRG, RT and MGK, see accessory index on page 135.

# Ordering Keys

## Non Driven Linear Motion Systems

### WH40N, WH50N, WH80N, WH120N

| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | WH04N000 | -04500 | -04640 | K | N | -0000 |

**1. Type of unit**
WH04N000 = WH40N unit
WH05N000 = WH50N unit
WH08N000 = WH80N unit
WH12N000 = WH120N unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration**[1]
K = no shaft

**5. Carriage configuration**
N = single standard carriage
L = single long carriage
Z = double standard carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

### WM40N, WM60N, WM80N, WM120N

| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | WM08N000 | -07010 | -07210 | K | N | -0000 |

**1. Type of unit**
WM04N000 = WM40N unit
WM06N000 = WM60N unit
WM08N000 = WM80N unit
WM12N000 = WM120N unit

**2. Maximum stroke (Smax)**
- ••••• = distance in mm

**3. Total length of unit (L tot)**
- ••••• = distance in mm

**4. Drive shaft configuration**
K = no shaft

**5. Type of carriage**[1]
N = single standard carriage
S = single short carriage
L = single long carriage
Z = double standard carriages
Y = double short carriages

**6. Distance between double carriages**
- 0000 = always for single carriages
- •••• = distance in mm

[1] See table below for available combinations of units and carriage types.

| Type of unit | Available carriage types | | | | |
|---|---|---|---|---|---|
| | N | S | L | Z | Y |
| WM04N000 | x | | x | x | |
| WM06N000 | x | x | x | x | x |
| WM08N000 | x | x | x | x | x |
| WM12N000 | x | | x | x | |

# Ordering Keys

## Non Driven Linear Motion Systems

### M75N, M100N

| Your Code | | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Example | MG10N000 | A | 00 | X | 450 | |

**1. Type of unit**
MG07N000 = M75N unit with slide guides
MG10N000 = M100N unit with slide guides
MF07N000 = M75N unit with ball guides
MF10N000 = M100N unit with ball guides

**2. Type of carriages**
A = single standard carriage
C = double standard carriages

**3. Distance between carriages (Lc)**
00 = for all single standard carriage units
•• = distance in cm between carriages

**4. Screw supports**
X = no screw supports

**5. Ordering length (L order)**
••• = distance in cm

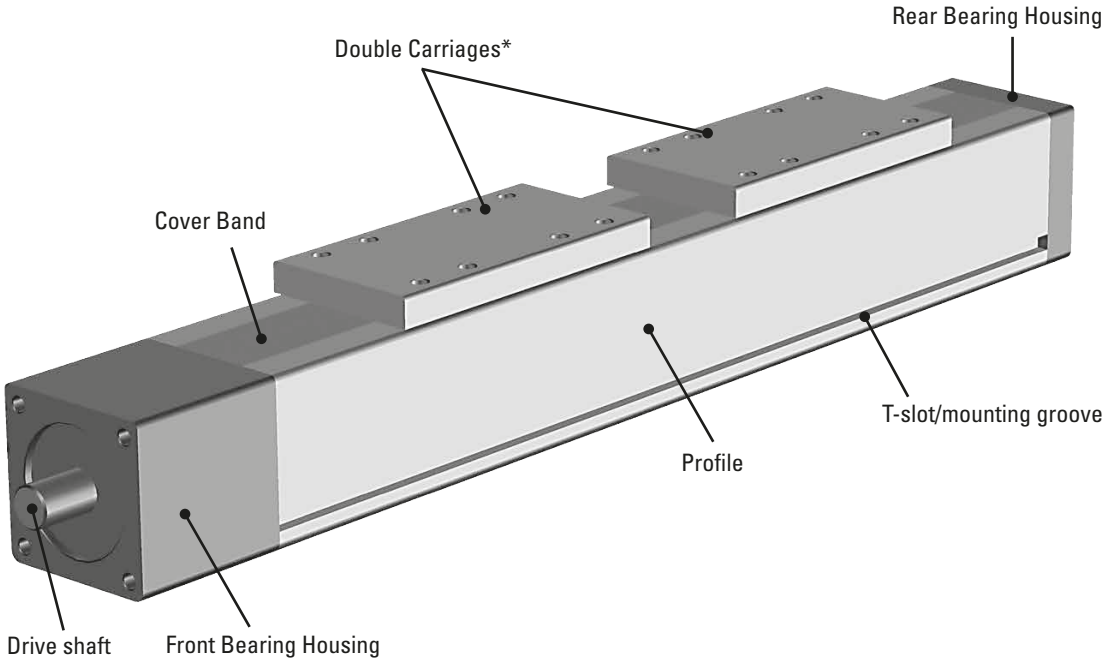
**6. Protection option[1]**
+S1 = wash down protection

[1] Leave blank if no protection option required.

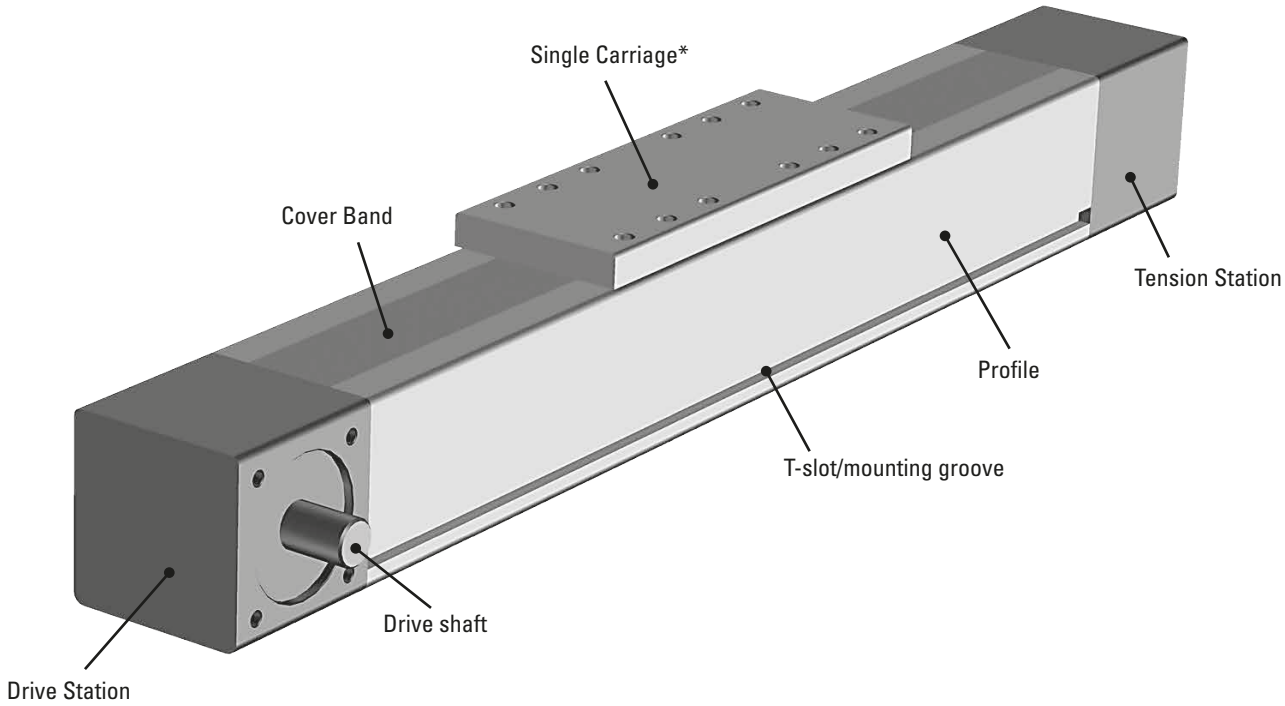
# Terminology

## Basic Linear Motion System Terminology

### Screw Driven Unit




### Belt Driven Unit




* Both screw and belt driven units can have single or double carriages.

# Glossary

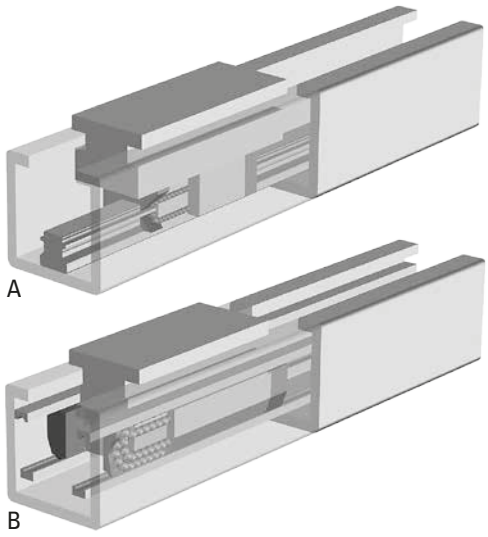
## A - Belt D

### Acceleration
Acceleration is a measure of the rate of speed change going from standstill (or a lower speed) to a higher speed. Please contact customer service if your application is critical to which acceleration rate is acceptable or needed.

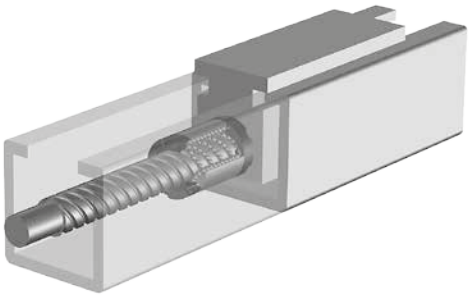
### Accuracy
There are several types of accuracy and many different factors that will affect the overall accuracy of a system. Also see “Repeatability”, “Positioning Accuracy”, “Resolution”, “Lead Accuracy” and “Backlash”.

### Backlash
Backlash is the stack up of tolerances (play) within the leadscrew/belt transmission assembly and gearing which creates a dead band when changing directions. The result is that the motor can rotate some before any motion can be seen on the carriage when reversing the direction of the motor rotation. The backlash varies depending of the liner motion system model.

### Ball Guides
A ball guide consists of a ball rail and a ball bushing. The ball rail is made of hardened steel and runs along the inside of the profile. The ball bushing is attached to the carriage of the unit and contains balls that roll against the rail. The balls in the bushing can be recirculating or have fixed ball positions depending on the type of ball guide. The recirculating type has a longer life and better load capability while the fixed type typically is much smaller. Thomson uses three major types of ball guides in its linear motion systems. Either the compact single rail type with recirculating ball bushing (A), the stronger double rail type also with recirculating ball bushings (B) or the fixed ball position ball bushings type (not shown) which require very little space and are used in the smallest units. Ball guides offer high accuracy, high loads and medium speed.



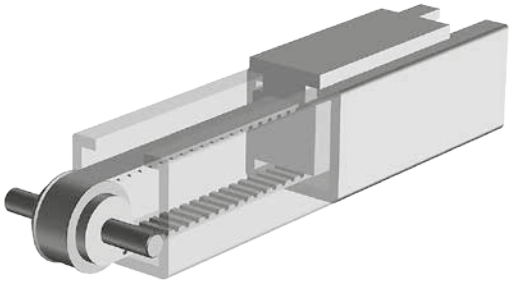

### Ball Screw Drive
A ball screw is made up of a rotating screw and a moving ball nut. The ball nut is attached to the carriage of the unit. It does not have a normal thread, instead balls circulate inside the nut making it work as an efficient ball bearing that travels along the screw. Ball screws come in a large variety of leads, diameters and tolerance classes. The tolerance class (T3, T5, T7 or T9) indicates the lead tolerance of the screw. The lower the number, the higher the tolerance. High load capability and high accuracy are typical features of ball screw driven units.



### Bearing Housing
Screw driven units has two bearing housings, front and rear. The front bearing housing has a drive shaft while the rear has none. Sometimes however the rear housing can have an optional output shaft which is used to connect to an encoder.

### Bell House Flange
A bell house flange is used when a motor should be connected directly to the drive shaft of a linear motion system, i.e when it is direct driven. The bell house has the bolt pattern of the motor flange in one end and the bolt pattern of the drive shaft flange in the other while the two shafts are joined by a coupling. Also see “Direct Drive”.

### Belt Drive
A belt drive consists of a toothed belt which is attached to the carriage of the unit. The belt runs between two pulleys positioned at either end of the profile. One pulley is attached to the motor via the drive shaft in the drive station while the other is mounted in a tension station. The belts are made of plastic reinforced with steel cords. High speeds, long stroke, low noise and low overall weight are typical features of belt driven units



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# Glossary

## Belt G - C

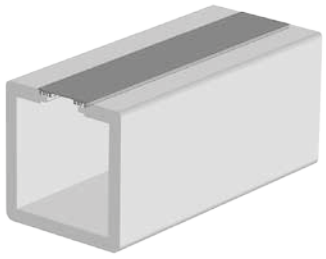
### Belt Gear
A belt gear consists of a timing belt that runs between two pulley wheels of different diameters. The difference between the diameters determines the gear ratio. Belt gears are quiet, have medium accuracy and require no maintenance but are susceptible to belt breakage under overload conditions.

### Brake
None of the units are equipped with a brake or are self-locking which means that a vertical unit will drop the carriage/load if no external brake (such as a brake in the motor, etc.) is applied to the drive shaft.. In the case of belt driven units care must be taken as the carriage/load will drop immediately in the case of a belt breakage. This is particularly important in vertical applications. You also may want to incoorporate a brake in to the system to ensure fast and secure stops at an emergency stop or a power failure. In this case the brake should be of the failsafe type, i.e. a brake that is engaged when power is off and lifted when it is on.

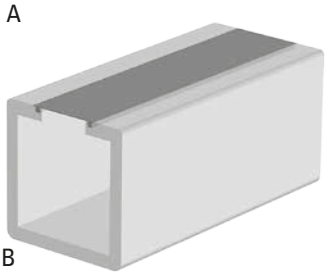
### Carriage
The carriage is the moving member which travel along the profile of the unit to which the load is attached. Some units can have multiple carriages in order to distribute the weight of the load over a greater distance, this will however reduce the available stroke for a given profile length. There are also units having the option of short or long carriage. The short can carry less weight than a standard one but has a slightly longer stroke for a given profile length while the longer works the other way around. It is possible to fix the carriage(s) to the foundation and let the profile act as the moving member if so desired. This is often the case in vertical applications where you let the profile lift and lower the load.

### CE Certificate
Linear motion systems do not need and do therefore not have any CE certification. All Thomson linear motion systems are however designed in accordance with the CE regulations and comes with a manufacturers declaration to prove this. Once the linear motion system is used or made in to a machine it is the responsability of the end customer to make sure the entire machine that the linear motion system is a part of is in accordance with the applicable CE regulations, produce the documents that proves this and apply a CE mark to the machine.

### Cover Band
Cover bands are used on some units to protect them from the ingress of foreign objects through the opening in the profile where the carriage runs and can be made of plastic (A) or stainless steel (B). In the case of plastic the cover band seals the profile by snapping into small grooves running along the carriage opening. In the case of stainless steel the cover band seal the profile magnetically using magnet strips mounted on each side of the carriage opening. Some units also have a self-adjusting cover band tensioning mechanism that eleminates any slack in the cover band that can occur from temperaure changes, thus improving the sealing degree and the expected life of the cover band.

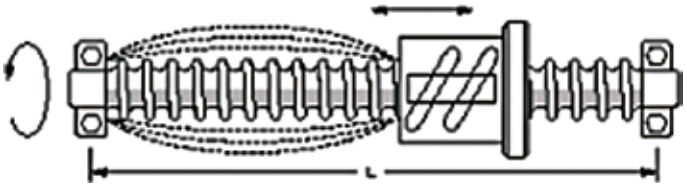


A



B

### Critical Speed
All ball screws have a critical speed where the screw starts to vibrate and eventually bend or warp the screw . The excact limit is a function of how long the screw is and the speed. For some units this means that the allowed maximum speed found in the performance specifications can be higher than the critical speed when the stroke exceeds a certain distance. In this case, either the speed must be reduced to the critical speed, the amount of stroke must be reduced, or you must use the screw support option if the unit in question allows this. Otherwise you must select another unit that can manage the speed at that stroke. The critical speed limits can be found in the “Critical Speed” diagrams on the product pages of the units that this concern.




### Customization
Despite the large range of linear motion systems offered by Thomson you may not find the exact unit to suit your application. But whatever your need is, Thomson is ready to help you to customize a unit according to your requirements. Please contact customer service for more information.

### Cycle
One cycle is when the carriage has travelled back and forth over the complete stroke of the unit one time.

# Glossary

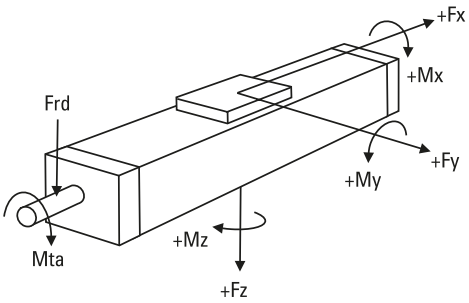
## D - E

### Deceleration

Deceleration is a measure of the rate of speed change going from a higher speed to a lower speed (or standstill). Please contact customer service if your application is critical to which deceleration rate is acceptable or needed.

### Definition of Forces

The designations of the forces that acts on the unit are defined on the product page of each unit in the "Definition of Forcs" drawing (see example below). Please always use the same definitions whenever communicating with Thomson.




### Deflection of the Profile

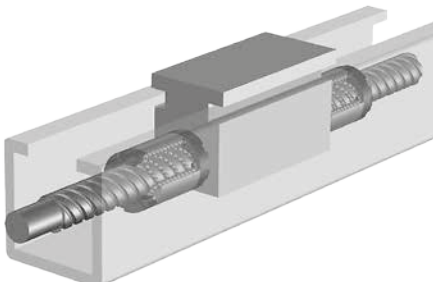
Some units require support along the whole profile whilst some are self supporting over a specified span. Further details can be found on the product data pages. The recommended support intervals should be followed to minimise deflection of the unit. The maximum distance between the support points is shown on the product data pages. The deflection of the unit can also be calculated using the information in the "Additional data and calculations" section.

### Direct Drive

Direct drive means that there is no gearing between the motor and the drive shaft of the linear motion system. Instead the motor is connected to the unit directly via a coupling and an bell house adapter flange. Also see "Bell House Flange".

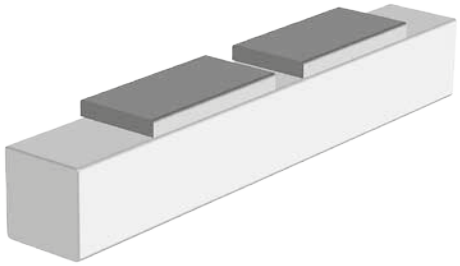
### Double Ball Nuts

Using double ball nuts will increase the repeatability of the unit. The ball nuts are installed so that they are pre-tensioned against each other eleminating the play between the nuts and the screw. A double nut unit will have a slightly shorter stroke for a given overall length.



### Double Carriages

Double carriage units have two carriages which gives them higher load capabilites than single carriage units. When ordering a double carriage unit the distance between the two carriages needs to be defined. This distance is called $L_A$ or Lc depending on the model.



### Drive Shaft

The drive shaft is the is the shaft to which the motor is connected, either directly, via a bell house flange or via a gear box. There are many sizes and types of drive shafts, such as shafts with or without key way or hollow shafts, depending on the type and size of the unit. Belt driven units can often have two drive shafts (same or different type and size), one on each side of the drive station, while screw driven only have on pointing out of the end of the unit. Customized drive shafts are possible, please contact customer service for more information.

### Drive Station

The drive station is the mechanical assembly in one of the ends of a belt driven unit where the drive shaft is situated.

### Duty Cycle

All units are designed for a 100% duty cycle. However, where the unit runs at extreme load, speed, acceleration and temperature or for long operating periods the expected life time may be reduced.

### Encoder Feedback

Encoders provide a digital output signal in the form of a square shaped pulse train that can be used to determine the position of the extension tube. The encoder signal in a servo motor system is connected to the motion control so that it can control the servo drive and hence close the position feedback loop.

### End of Stroke Limit Switches

If a unit runs at speed to the ends of its stroke there is a risk of damage. Damage can be prevented by using end of stroke limit switches to detect and engage a brake and/or cut power to the motor when the unit nears the end of the unit. You must ensure that there is sufficient distance between the end of stroke limit switch and the end of the unit, to allow the carriage to come to a complete stop before colliding with the end. The required stopping distance depends on the speed and the load and will have to be calculated for each application. The stopping distance must be taken into account when defining the necessary stroke.

# Glossary

## G - M

### Guides
Guides are in essence a form of linear bearings on which the carriage(s) travel. Thomson uses three main types of guides that all have different characteristics and which to choose depends on the demands of the application. Alos see “Ball Guides”, “Slide Guides” and “Wheel Guides”.

### Idle Torque
Idle torque is the torque needed to move the carriage with no load in it by rotating the drive shaft. The idle torque will vary with the input speed and the idle torque tables on the product pages gives a value for some speeds. The value given in the table is for a unit having a single carriage of standar length. If you need the exact value for another speed, multiple carriages or short/long carriages , please contact our customer service.

### Inertia
Inertia is the property of an object to resist speed changes and is dependant on the shape and the mass of the object. The inertia is important when sizing and selecting and also when tuning a servo system to optimum performance. Consult customer service for more information.

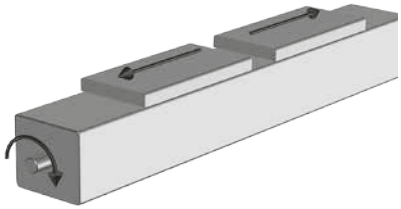
### Input Shaft
The input shaft is the shaft to wich the power source (motor) is connected to on a gear box. Primary shaft is another term for this. Sometimes the drive shaft on a linear unit also is refered to as the input shaft.

### Input Speed
Input speed is the rotational speed that the drive shaft/input shaft of a linear motion system or a gear box is subjected to.

### Installation and Service Manual
Each linear motions system has an installation and service manual to answer typical questions about mounting and servicing the unit.

### Lead Accuracy
Lead accuracy is a measure of how accurate the lead of a ball screw is. For a ball screw with a lead of 25 mm, the screw should in theory move the nut 25 mm per each revolution. In reallity there will be a deviation between the expected traveling distance and what is actually achieved. The deviation is typically for a ball screw 0,05 mm per 300 mm of stroke. Contact customer service for more information.

### Left/right Moving Carriages
Units with left/right moving carriages have two carriages moving in opposite directions when the drive shaft is rotated. This type of unit has a ball screw where half of the screw has a left hand thread and the other half a right hand thread.



### Lifetime Expectancy
When determining the lifetime for a linear motion system it is necessary to evaluate all forces and moments that are acting on the unit. The data and formulas given in this catalogue serve as a basis for this. For a more detailed lifetime calculation please use our sizing and selection software. Please contact us for further guidance.

### Linear Lifting System
A linear lifting system is in essence a linear motion system specially designed for vertical lifting applications. Some units can be used in horizontal applications as well under certain criterias. Please contact us if you plan to mount a lifting unit in any other position than vertically with the load carrying plate pointing down.

### Linear Motion System
A linear motion system is a mechanical assembly that translates the rotating motion of a motor to the linear motion of a carriage that travel along a load supporting beam/profile. Other names for linear motion systems are linear units, linear drive units and rodless actuators among others.

### Load Rating
There are many types of load ratings that all needs to be considered. Normally when you speak about the load you refer to the load that the carriage will move; which is the dynamic load. But there may also be static, side, moment and forces from acceleration, deceleration, gravity and friction that are all equally important. For some units the load and load torque values are given for both the complete unit and the guiding system. The values for the complete unit are the values under which the unit can operate. The values for the guiding system should only be used when comparing different units and do not describe the actual performance of the complete unit.

### Maintenance
Most units require lubrication. General lubrication requirements can be found in the general specifications table on the product data pages. The lubrication intervals, grease qualities and specific lubrication instructions can be found in the installation and service manual of each unit. No other regular maintenance is needed except for normal cleaning and inspection. Units with a cover band may also require irregular cover band replacement due to wear. The belt in belt driven units should not require re-tensioning under normal operating conditions.

### Manufacturers Declaration
All Thomson linear motion systems comes with a manufacturers declaration to prove that it is built according to the CE regulations.

### Mounting
Most units can be mounted in any direction. Any restrictions on mounting positions are shown on the product presentation pages at the beginning of each product category chapter. Even where units may be mounted in any direction there are some considerations. None of the units are self-locking which means that a vertical unit will drop the carriage/load if no

# Glossary

## N - Sc

external brake (such as a brake in the motor, etc.) is applied to the drive shaft of the unit. In the case of belt driven units care must be taken as the carriage/load will drop immediately in the case of a belt breakage. This is particularly important in vertical applications. All ball screw driven units are equipped with a safety nut to prevent the carriage/load being released in case of ball breakage.

### Non Driven Linear Motion Systems

A non driven linear motion system has no drive shaft or any type of transmission. In reality a non driven linear motion system is a guide that has the same look and outer dimensions as the driven version. Normally a non driven unit is used together with a parallel working driven unit that are mechanically linked where the non driven unit help to share to load with the driven one.

### Non Guided Linear Motion Systems

A non guided linear motion system has a drive shaft and a ball screw but no guides. In reality a non guided linear motion system is a enclosed ball screw assembly with a carriage that has the same look and outer dimensions as the driven version. Using a non guided unit requires some kind of external guide to which the carriage can be attached.

### Operation and Storage Temperature

Operational temperature limits can be found in the performance tables on the product data pages. Units can be stored or transported within the same temperature range. Please contact us if the unit will be exposed to higher/lower temperatures than recommended during storage or transportation.

### Output Shaft

The output shaft is the shaft on a gear box that is connected to object being driven by the gear box. Another term for output shaft is secondary shaft.

### Packages and Multi Axis Kits

Thomson can offer complete pre-defined packages (linear motion system, gear and servo motor assembled and shipped with servo drive and cables) as well as mounting kits for the creation of two and three axis systems Please contact us for further information.

### Positioning Accuracy

Positioning accuracy is the error between the the expected and actual position and is the sum of all factors that will reduce the accuracy (i.e. repeatability, backlash, resolution, screw/belt accuracy, and the accuracy of the motor, drive and motion control system). Some of these factors, such as backlash and lead accuracy, can sometimes be compensated for in the software of the motion control system being used. Also see “Accuracy”.

### Position Feedback

The position of the carriage/rod/lifting profile can be obtained in many ways. The most common way is to equip the unit with an encoder or to use a motor which has a built in feed back device (encoder, resolver, etc.). To many units there are encoders or/and encoder mounting kits available. See the accessory chapter.

### Repeatability

Repeatability is the ability for a positioning system to return to a location when approaching from the same distance, at the same speed and deceleration rate. Some of the factors that affect the repatability are the angular repeatability of the motor, drive and motion control system, system friction and changes in load, speed and deceleration.

### Resolution

Resolution is the smallest move increment that the system can perform. Some of the factors that affect the resolution are the angular repeatability of the motor, drive and motion control system, system friction, the drive train reduction, the lead/type of the ball screw/belt and changes in load, speed and deceleration.

### Resolver

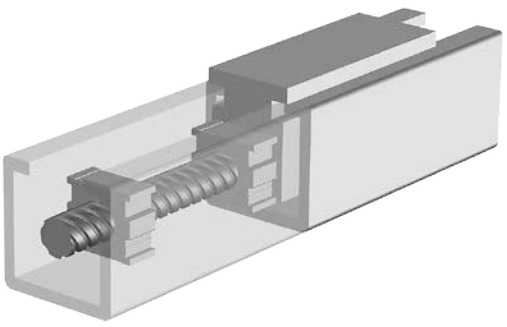
A resolver is basically a type of rotary electrical transformer used for measuring degrees of rotation and are commonly used on AC servo motors as a feedback device to control the commutation of the motor windings. The resolver is mounted to the end of motor shaft and when the motor rotates the resolver will transmit the position and direction of the rotor to the servo drive which then can control the motor. Most servo drives for AC servo motors on the market today can convert the resolver signal in to a pulse train (encoder signal simulation) which can be used by a motion control to determine and control the position of the motor. Also see “Encoder Feedback”.

### RoHS Compliance

The RoHS directive stands for “the restriction of the use of certain hazardous substances in electrical and electronic equipment”. This directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. All linear motion systems and accessories sold in the EU are RoHS compliant.

### Screw Supports

Screw supports allow screw driven units to travel at high speed even when stroke becomes longer. The supports reduce the unsupported length of the screw, that otherwise would be subjected to vibrations. Screw supports come in single (one screw support on each side of the carriage) or double (two supports on each side) versions. Screw support units will have a slightly shorter stroke for a given overall length.

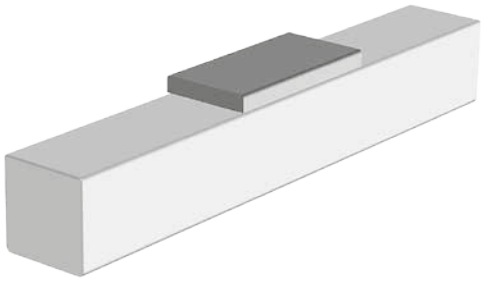


# Glossary

## Si - W

### Single Carriage

Single carriage units have one carriage. Some linear motion system models also have the option of long or short single carriage. The long carriage handle higher loads but will have a longer overall length for a given stroke.

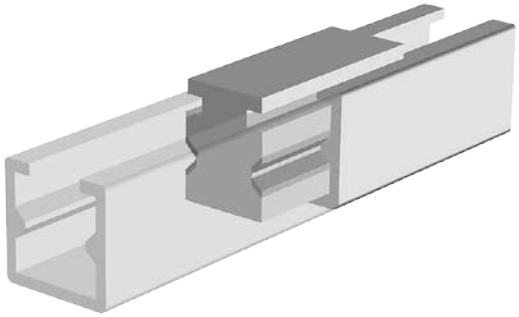


### Sizing and Selection

This catalog can give you an overview of what Thomson can offer you and an indication of which products that may suit your application. But in order to get the best solution it is neccessary to know your specific application and to carry out detailed sizing and selection calculations. Please contact customer service for further help.

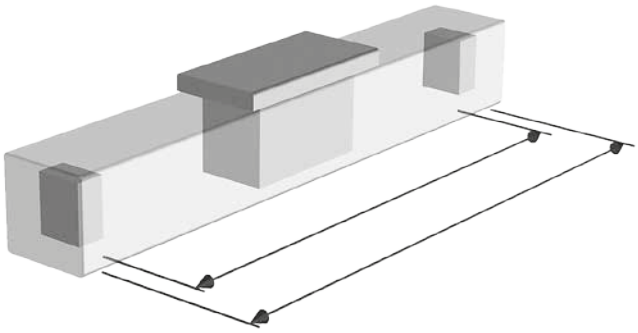
### Slide Guides

A slide guide consist of a guide attached to the inside of the profile and a slide bushing attached to the carriage. The guide can be made of different materials (e.g. polished hardened steel, anodized aluminium) while the bushing is made of a polymer material. There are two types of bushings, fixed and prism. Prism bushings can move in relation to the guide which results in longer life and higher load capabilities. Slide bushings are silent, simple, reliable and robust and can be used in dirty and dusty environments. They are also resistant to shock loads, have a long life expectancy and require little or no maintenance.



### Stroke

The theoretical maximum stroke (Smax) is the length that the carriage can travel from one end of the unit to the other. However, using the maximum stroke means that the carriage will collide with the ends of the profile. The practical stroke is therefore shorter. We recommend that you specify a unit that have at least 100 mm longer stroke than the maximum stroke you need so that the unit can stop before colliding with the ends and also allow for some adjustment of the unit postition at the mounting.

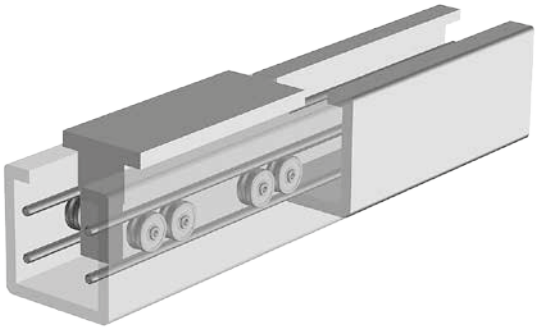


### Tension Station

The tension station is the mechanical assembly situated in the opposite end of the drive station on a belt driven unit. The tension station has a mechanism that allows the belt pulley position to be adjusted thus changing the tension of the belt. Adjustment of the belt tension is normally only necessary when replacing a broken or worn out belt with a new.

### Wheel Guides

A wheel guide consists of ball bearing wheels that run on a hardened steel rail. Wheel guides are a simple and robust guiding method offering high speeds, high loads and medium accuarcy.



### Working Environment

All units are designed for use in normal industrial environments. Units which have an open profile (i.e. have no cover band) are more sensitive to dust, dirt and fluids. These units require some kind of cover if they are used in environments where dust, dirt or fluids are present. Wash down or enhanced wash down protection can be ordered for our closed profile units. Please refer to the accessory pages. In all cases where a unit will be exposed to aggressive chemicals, heavy vibrations or other potentially harmful processes we recommend that you contact us for further advice.

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THOMSON®
Linear Motion. **Optimized.**™



# Linear Actuators

THOMSON™

*Linear Motion.* ***Optimized.***

# Introduction

## Company Introduction

The history of the Thomson Electrak® actuator goes back to the development of ball screw actuators 40 years ago in Marengo, IL, USA. The first generation of general purpose actuators were developed for control of accessory drives on garden tractors and farm equipment. Since that simple beginning, actuators are now used in all types of equipment to automate a process, remove people from dangerous situations, provide remote control or make difficult, tedious manual jobs easier.

The linear actuators in this catalog represent proven design concepts found in the entire Electrak series. From light load 050s to the high performance Electrak Pro series capable of handling loads up to 9000 N, Thomson offers features unavailable anywhere else.

### The world's most versatile actuator selection

Thomson combined the clevis to clevis mount Electrak series and the trunnion mount Electrak PPA units to provide the most versatile selection of linear actuators available. Our actuator team has solved over 10000 tough application challenges with even tougher actuators. We built our reputation in the mobile off highway market in extremely demanding operating conditions. And if you can't find the actuator to meet your application, call us for a cost effective actuator built to your needs. Thomson builds more custom actuators than anyone.

### You can count on Thomson

Thomson linear actuators – rugged, reliable remote linear motion control with the push of a button. You can count on Thomson for worldwide sales, service, application support and local availability. Please visit www.thomsonlinear.com for more information.



| 1967 | 1969 | 1974 | 1982 | 1984 | 1987 | 1988 | 1991 |
|---|---|---|---|---|---|---|---|
| The first generation of actuators for use in garden tractors and farm equipment is released. | First line of ball screw driven actuators with right angle AC and DC motors is released. | First line of actuators with parallel motors and both acme and ball screw drive is released. | The "Tiger" line actuators are released for OEMs. | Electrak 1, 2, 5, 10 and 100 are released for distribution. | Electrak 205 and the first line of MCS controls are released. | Electrak 1SP with feedback potentiometer is released. | The first lifting columns, DMD and DMA, are released. |



# Introduction

## Product Introduction

Thomson actuators are easy to mount and operate, require no maintenance, don't leak hydraulic fluid, are easy to incorporate into an automated process and once installed they will work reliably under the toughest conditions year after year.

Actuators offer advantages over mechanical and hydraulic systems in many applications. They are self-contained, rugged, and durable, making them ideal anywhere you want to lift, lower, push, pull, rotate or position a load.

### Compact design

With their compact size, actuators can be located in confined areas. An actuator with a 100 mm stroke length can produce 9000 N of force from a 290 mm package. Electrak 1 and 050 series actuators fit small areas with package lengths as short as 120 mm.

### Rugged and reliable

All Thomson actuators incorporate strong, high quality components to assure trouble-free service. Rugged spur, worm or helical gearing, aircraft quality lubricants and high performance motors provide the maximum life and value. The actuators are gasketed and sealed throughout for protection in wet, dirty and oily environments and are ideal for use on outdoor equipment. The rod style actuators have stainless steel or aluminum extension tubes to resist corrosion.

### Maintenance-free

All adjustments and lubrication are made at the factory and no maintenance is required or recommended. Consistent, repeatable performance is provided for the entire lifetime of the actuator.

### Bidirectional

Thomson actuators can push and pull loads ranging from one to 900 kg, and can extend up to 900 mm. With the Thomson series of actuator controls, you can create an actuator control system to meet your particular motion control requirements.

### Safe operation

Motors used on Electrak actuators utilize thermal switches in their windings or Electronic Load Monitoring to shut the actuator off in case of overheating. A standard overload clutch or Electronic Load Monitoring will stop the motion if the load is too great or at the end of a stroke. All linear actuators will hold their loads with power removed.

### Versatile

Stroke lengths of 25 to 900 mm are available and speeds are as high as 75 mm per second. Actuators are easy to apply, quick to install and usually only requiring two wires for operation. A wide variety of options and controls makes it easy to find the perfect actuator for your application. And if you have special needs, cost effective custom solutions are our specialty.

| 1992 | 1994 | 1998 | 1999 | 2000 | 2004 | 2006 |
|---|---|---|---|---|---|---|
| A patent for a load lock device is granted. | Electrak 1LL is released. | Electrak 150 with two patents is released. AC control line is released. | Electrak 050 with patented design and the first rotary actuators are released. | The first LM80 rodless actuator is released. | The triple profile lifting column TC16 and the "sweeper" actuator are released. | The Electrak Pro actuator line and the DCG control line are released. |









# Introduction

## The Benefits of Electrification

Electrification is converting manual, hydraulic and pneumatic operations to electromechanical motion. Substantially improved machine performance and cost advantages can be gained through electrification.

### Reduce costs

- Electric actuation components cost less than comparable hydraulic and pneumatic systems.
- One electric linear actuator is faster and easier to install than the multiple hydraulic and pneumatic components required to achieve the same function.
- Electric actuators feature quick and predictable system tuning when compared to the headaches of configuring hydraulic systems and their components which contend with power variation, temperature variation, and non-linear performance profiles.
- Compare zero maintenance electric actuators against the fluid replacement, leak repairs and other routine maintenance needed to support hydraulic systems.
- Eliminate the environmental problems and costs associated with hydraulic fluid leaks and fluid disposal.

### Boost productivity and efficiency

- Improve control over critical machine operations with:
  - Multiple digital and analog feedback options
  - Fixed and programmable limit switches for "teach and repeat" positions
  - Low voltage switching options that can interface directly with programmable PC/PLC controllers
  - Pulse width modulation for variable speed control
- Superior accuracy and repeatability
- Link and automate simultaneous processes
- Reduce down time with:
  - Zero maintenance
  - Longer component life
  - Redundancy through manual override
- Improve safety and reduce costs by removing people from danger with convenient remote control

### Great opportunities for electric conversion

**Making jobs easier**

- Raising and lowering a deck on a mower, paver or floor scrubber.
- Shifting manual transmission.
- Lifting wheelchairs into a vehicle.
- Opening and closing doors on buses or vans.

**Automating a process**

- Moving twine across a round bale of hay for consistent wrap.
- Varying the chute opening on a salt/sand spreader based on speed for consistent application.
- Lift and lower pantographs on electrical trains and trams.

**Providing remote control**

- Throttle control from the rear of garbage trucks.
- Positioning the discharge spout on a large chipper, snowblower or combine.
- Opening a chute on a salt/sand spreader.
- Positioning of solar energy panels and wind power plant turbines.
- Opening/closing the engine hatch on boats.
- Positioning boat, handicap vehicle seats.
- Belt tensioning.

**Removing people from danger**

- Sliding a cover over the stairs in a recreational vehicle.
- Throttle control for a tree stump grinder to keep the operator away from moving parts or flying debris.
- Medical waste/refuse compacting.

**Replacing hydraulics or pneumatics**

- Power steering.
- Dump beds on ATVs.
- Positioning mower decks on golf course equipment.



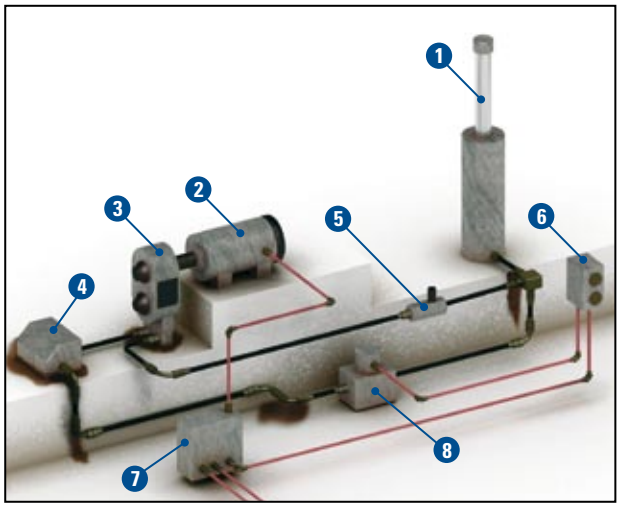




# Introduction

## The Benefits of Electrification

Replacing hydraulic or pneumatic cylinders with electrical linear actuators means a simpler and smaller installation, easier control, lower energy costs, higher accuracy, less maintenance, less noise and a cleaner, healthier environment.

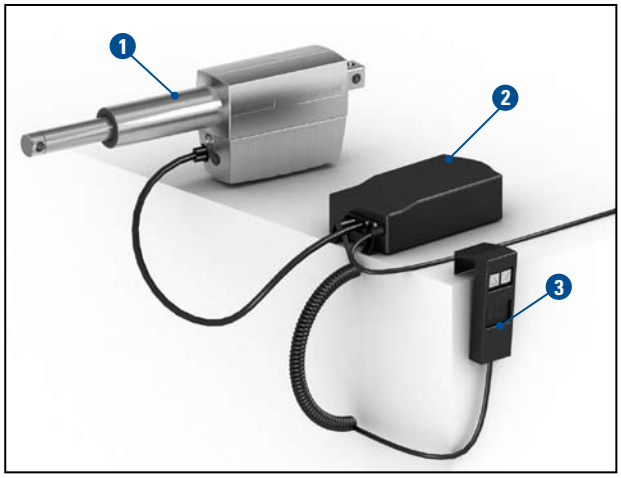



You can design, purchase and install all these components or you can select and install an actuator and control.

**Single acting, uni-directional hydraulic cylinder system**

1. Hydraulic cylinder
2. Electric pump motor
3. Hydraulic pump
4. Hydraulic oil resevoir
5. Check valve
6. Operator push button box
7. Relay cabinet
8. Unloading valve

This single acting, uni-directional hydraulic cylinder system is one of the simplest hydraulic solutions. This system only allows consistent performance in one direction. In order to get consistent performance in both directions a bi-directional system would be required which is even more complex and costly.




Plug and play type of connections, simple installation and no need for any set up or adjustments ensures accurate, clean and trouble free operation within the hour.

**Electric linear actuator system**

1. Linear actuator
2. Actuator control
3. Hand held control pendant

This simple electrical actuator system will ensure consistent operation in both directions. It will also give you added features such as electronic load monitoring, end of stroke limit switches, mid stroke protection and manual override operation in case of power failure. Optional features such as analog or digital position feedback, adjustable end of stroke limit switches, end of stroke indication outputs and signal following capability are also available. Another advantage is that a system like this is easy to integrate with other control systems normally found in industrial systems or vehicles such as PLC's, micro-controllers, computers or simple relay based systems.

# Introduction

## Actuator Applications

Thomson Electrak actuators can be found in the most diverse applications, ranging from agricultural to industrial, ventilation and medical equipment. Anywhere you want to lift, lower, push, pull, rotate or position a load - only your imagination will set the limit.

### Mobile-off-highway

Actuators are widely used in agricultural, construction, mining, forestry, marine, road work and railway equipment for positioning seats, hoods, covers, doors, throttles, sprayer or auger booms, pantographs, chutes, gates, hydraulic valves, shifting transmissions and much more.

### Turf and garden

Actuators can be found on riding lawn mowers, golf carts, garden tractors, cleaning machines, sky lifts and other utility vehicles for throttle control, dump bed, deck lift, transmission shift and positioning brushes and squeegees.

### Energy alternatives

Actuators are used to position solar panels during the day and to return them to a rest position at night. They are also used on wind mills to open and close ventilation ducts and access panels.

### Industrial, ventilation and process control equipment

Actuators are used on conveyor belts, adjustable work tables and in the opening and closing of hatches, doors and locks. They are also common in machines for dispensing, cutting, packaging, labeling, scanning or printing as well as for valve control in ventilation and process equipment.

### Health and fitness

Actuators are commonly used in wheel chairs, patient lifts/beds, hospital devices, handicap adapted vehicles, examination chairs/tables and work out/gym apparatus to position users, patients or equipment.

### Office, domestic and entertainment equipment

Actuators are used in automatic doors, lifts, garage doors, gates, satellite dishes, beds, reclining chairs, adjustable office desks, arcade games, vending machines, theatre/TV/movie props and theme park attractions.













# Introduction

## Actuator Product Groups

Thomson actuators have been divided into good, better, best and custom groups to help you select the appropriate actuator. The following pages will describe the actuators in each group, their features and benefits, typical applications and what sets them apart from the others.

### Good

These actuators are the lowest cost solution, provide capable, reliable performance and have some flexibility of options and configurations. If you just need a basic actuator, this is the best choice.



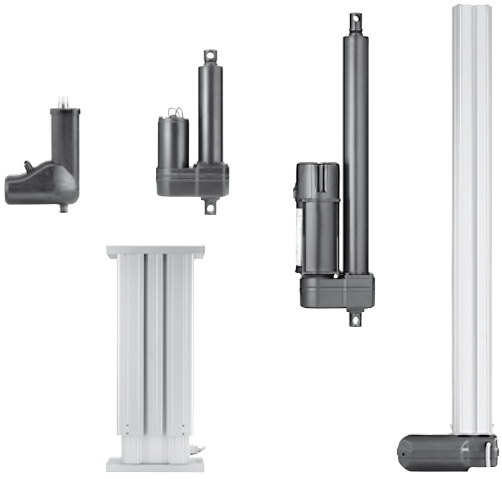
### Best

These robust and strong actuators are the market leaders with state of the art technology and flexibility. They are smaller, lighter and have a shorter retracted length than other actuators on the market. If you need electronic load monitoring, programmable limit switches, digital feedback or signal following, this is the group for you.



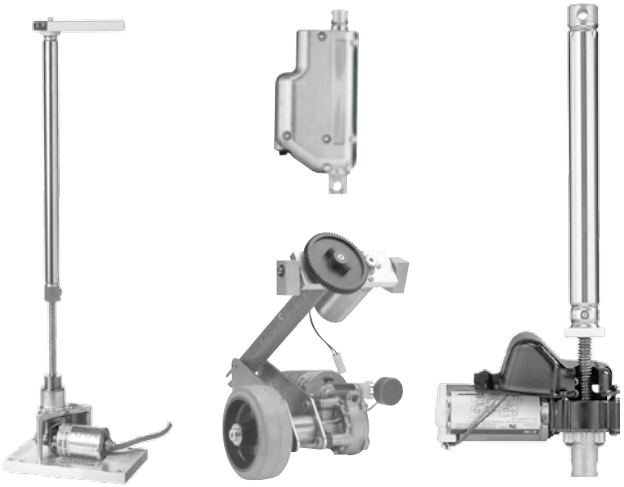
### Better

These actuators have more flexibility in options, configurations and modifications. They have passed the test of time in the toughest agriculture and construction applications. Choose from this group if you need a rugged, heavy duty actuator customized to your application.



### Custom

The actuators found in the good, better and best groups are some of the building blocks we use to create cost effective custom actuators. Don't hesitate to contact us for a custom solution, Thomson is the industry leader in custom actuator design.



# Good Group

## Basic, Reliable, Low Cost Actuators

These actuators are the lowest cost solution, provide capable, reliable performance and have some flexibility of options and configurations. If you just need a basic actuator, this is the best choice.

### Electrak 1

Electrak 1 actuators are compact with stroke lengths up to 150 mm, loads up to 340 N and have either end of stroke limit switches or potentiometer feedback. They are weatherproof, only require two wire control and have clevis to clevis mounting. These are our smallest actuators and are available in either 12, 24 or 36 Vdc models.

- Corrosion free housing with IP65 rating.
- Built in end of stroke limit switches or feedback potentiometer.
- Self locking acme screw drive.
- Motor with auto reset thermal switch.



### Electrak PPA

The Electrak PPA are good basic actuators. They have trunnion mounting in the rear with clevis on the extension tube, loads to 6670 N, strokes to 914 mm, and are available in 12, 24 and 36 Vdc. A built in overload clutch is included as standard and options include end of stroke limit switches, encoder or potentiometer feedback and a manual over ride.

- Overload clutch for mid and end of stroke protection.
- Efficient ball screw drive.
- Versatile actuator with high duty cycle.
- Motor with auto reset thermal switch.



# Better Group

## Flexible, Rugged, Heavy Duty Actuators

These actuators have more flexibility in options, configurations and modifications. They have passed the test of time in the toughest agriculture and construction applications. Choose from this group if you need a rugged, heavy duty actuator customized to your application.

### Electrak 050

For loads up to 500 N, select the very compact Electrak 050 actuator. It has stroke lengths to 200 mm with end of stroke limit switches and an overload clutch as standard. It is maintenance free, corrosion free and available in 12, 24 or 36 Vdc versions.



- Corrosion free plastic housing.
- Very short retracted length.
- Internally restrained extension tube.
- Motor with auto reset thermal switch.

### DMD and DMA lifting columns

The self supporting DMD and DMA lifting columns are available in 12, 24, and 36 Vdc or 115 and 230 Vac, can lift up to 6800 N with strokes to 610 mm. The maximum torque rating is 710 Nm. Potentiometer feedback is optional.

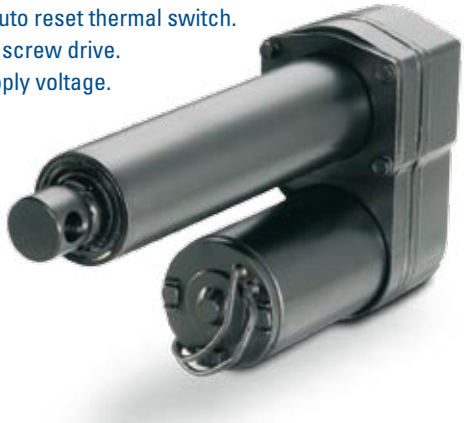
- Designed for industrial use.
- Acme or ball screw drive.
- High load torque capability.
- Overload clutch.
- Motor with auto reset thermal switch.



### Electrak 5 and 10

The Electrak 5 and 10 actuators are rugged, proven actuators available in a variety of voltages, strokes and mounting configurations. Loads to 6800 N, available with options such as limit switches, potentiometer feedback or overload clutch.

- Very robust, strong and reliable actuators.
- Motor with auto reset thermal switch.
- Acme or ball screw drive.
- AC or DC supply voltage.



### LM80 rodless actuators

The LM80 rodless actuators are availble for either horizontal or vertical applications, 12 or 24 Vdc, strokes to 1500 mm and loads to 2000 N. These fast actuators have a carriage that can travel at speeds up to 110 mm/s along the self supporting aluminum profile.

- For use in domestic, office or medical applications.
- Lightweight and quiet operation.
- Easy and fast T-slot mounting.
- Durable and corrosion free.
- Acme or ball screw drive.



# Best Group

## Robust, Strong, State of the Art Actuators

The Electrak Pro series is the next generation of linear actuators from Thomson packed with new and unique features. Electronic Load Monitoring, dynamic braking and IP66 protection are some of the standard features. Add the broad range of options to the mix and the Pro series gives you more versatility than any other actuator.

The Electrak Pro series is not designed for the ordinary tasks. Instead the Pro series stands alone when it comes to the toughest and most demanding applications. When space is scarce, where dust, dirt and water is abdundant and when solid, reliable and maintenance free operation is a must - Electrak Pro is the answer.

### What is special for most is standard for a pro

The Electrak Pro series is packed with standard features developed for applications where performance is essential. Electronic load monitoring (ELM), electronic limit switches (ELS), dynamic braking, manual override and IP66 protection are all standard features.

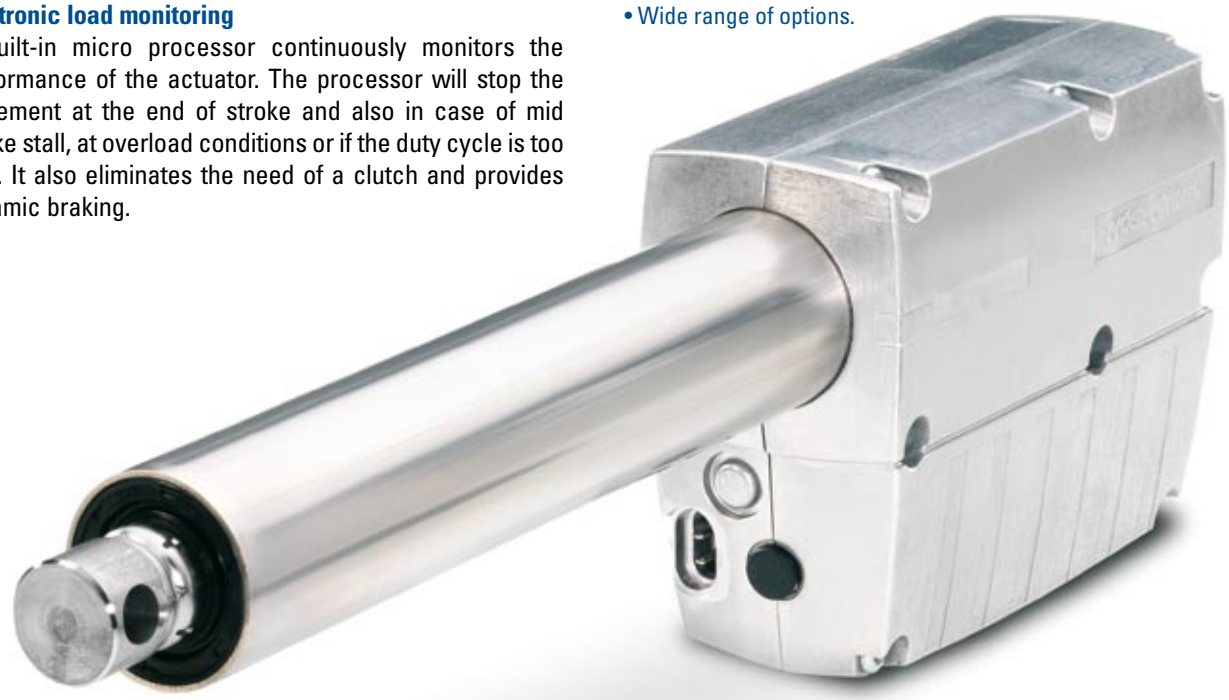
### Electronic load monitoring

A built-in micro processor continuously monitors the performance of the actuator. The processor will stop the movement at the end of stroke and also in case of mid stroke stall, at overload conditions or if the duty cycle is too high. It also eliminates the need of a clutch and provides dynamic braking.

### Broad range of unique options

The Electrak Pro series offers a broad range of options including programmable limit switches, low voltage power switching, signal follower control, analog or digital position feedback and end of stroke indication outputs, with most being available in the standard compact envelope.

- Optimized overall envelope with minimal retracted length.
- Durable and corrosion resistant aluminum housing.
- Cover tube and extension tube in stainless steel.
- Designed for heavy duty operation.
- Acme or ball screw models.
- Wide range of options.



# Best Group

## Robust, Strong, State of the Art Actuators

The TC16 lifting column is another product innovation from Thomson. The TC16 is designed to be used in domestic, medical and office environments, as well as in disability equipment and has all the hallmarks you expect from a Thomson actuator; quality, easy installation and long, trouble free life.

Designed to suit many applications, the TC16 will fit perfectly into all kinds of medical, disability, rehabilitation or health and fitness equipment. With a very low retracted versus stroke length ratio, a TC16 is the ideal product for applications that demand a high load in a space critical environment.

### Innovative design

The innovative and aesthetic design of the extruded aluminum profiles allows the TC16 to be a visible component. This eliminates the need for cover plates or enclosures, reduces material cost, assembly time and makes servicing easy.

### State of the art technologies

The TC16 is built around double-telescoping lead screws and a gearbelt driven by a high quality DC motor. This unique design ensures quiet operation in a highly efficient package, providing high load capacity with minimum current draw. The guiding technology used between the aluminum profiles uses the latest anti-friction material creating a high moment load capability in a very small envelope. Smooth, quiet, rigid and maintenance free operation are other benefits of the guiding technology used in the TC16.

- Designed for domestic, office and medical applications.
- Low weight and quiet operation.
- Smooth operating telescopic screw drive.
- High load torque capability.
- Very short retracted length.
- Very low stroke to retracted length ratio.

### Features that makes the difference

The TC16 is packed with features. It has built-in end of stroke limit switches and utilizes dynamic braking for short and consistent stops. With power off, the integrated load holding brake will keep the unit securely in position. The TC16 are also EMC approved according to medical standards, has a surface treatment according to furniture standards and an IP44 rating. It's also available with encoder feedback, making it easy to synchronize the motion of two or more units.



# Custom Group

## Custom Actuators - Our Speciality

Thomson has been building actuators for 40 years and creating custom actuators from the very beginning - our first actuator was a custom design. Today we build more custom actuators than anyone and we are the industry leader in custom actuator design.

Thomson builds cost effective custom actuators for the most demanding applications - heat, cold, vibration, shock, wet, dirty, oily - using the standard actuators you can see in this catalog as the building blocks. We also build actuators with very different characteristics as you can see from some of the examples below.

### How to get the perfect actuator for your application

First review the performance of our actuators in the catalog and see if there is any actuators that meet the needs of your application. Next, go to our online selection tool on www.danahermotion.com/linear_actuator_advisor to review your actuator selection. This easy to use software lets you fine-tune all the parameters and will give you all the relevant data and the correct ordering information for all of our standard actuators. If you still can't find a suitable actuator, then contact one of our field sales engineers or one of our application engineers. And if they can't find a standard actuator that meets your requirements, we can design an actuator specific to your needs.



# Actuator Controls

## Controls For All Purposes

Thomson has a full line of actuator controls ranging from simple switches to synchronizing controls that can synchronize the motion of two lifting columns or two actuators at once.

The simplest and most basic control is the on-off-on (DPDT) switch for panel mounting and extending or retracting an actuator with a center "off" position.

### The AC series

The AC series of controls provides models for voltage conversion to allow DC actuators to be operated with AC input voltage as well as models that can be supplied with DC voltage from a battery on any other DC voltage source. These controls range from a simple power supply for use with remote switches to controls that can use remote swiches or a hand held pendant and has limit switch inputs or electronic limit switches.

### The new DCG line

The new DCG controls provides power conversion from AC to DC along with hand held pendant controls for convenient operation of the actuator. These small and lightweight controls have built in Electronic Limit Switches (ELS) to stop the actuator at end of stroke or if there is a stall or overload mid stroke. There is also a version that will operate two lifting columns equipped with encoders synchronously.

### The Pro series

The Pro series of actuators can have a variety of control options built right into the actuator - signal following, programmable end of stroke limit switches, low level switching capability, and overload or end of stroke trip indication. Electronic Load Monitoring (ELM) is included as standard on all Pro series.

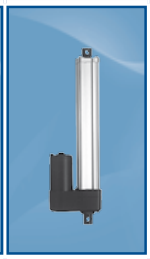
### Special controls

If you need some special control included in the actuator, contact one of our application engineers or salesmen. We build more custom actuators than anyone.

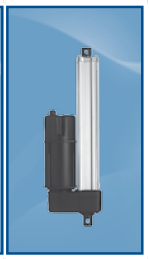


# Performance Overview

## Driven Linear Actuators

| | ELECTRAK | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 1SP | 050 | PPA-DC | 10 | LA14 | |
| |  |  |  |  |  |  | |
| **Product availability** | | | | | | | |
| North America / Europe / Asia [1] | •/•/• | •/•/• | •/•/• | •/•/• | •/•/• | /•/• | |
| **General performance** | | | | | | | |
| Product group rating | good | good | better | good | better | best | |
| Input voltage [Vdc / Vac] | 12, 24, 36 [2] / | 12, 24, 36 [2] / | 12, 24, 36 / | 12, 24, 36, 90 [3] / | 12, 24, 36 / | 12, 24, 36 / | |
| Maximum dynamic load [N] | 340 | 340 | 500 | 6670 | 6800 | 6800 | |
| Maximum speed [mm/s] | 75 | 75 | 48 | 33 | 60 | 60 | |
| Maximum stroke length [mm] | 150 | 150 | 200 | 914 | 610 | 600 | |
| Restraining torque [Nm] | 2,3 | 0 | 0 | 23 | 12 | 0 | |
| Protection class | IP65 | IP65 | IP56 | IP52 | IP65 | IP65 | |
| **Features** | | | | | | | |
| Mounting configuration | clevis | clevis | clevis | trunnion | clevis | clevis/trunnion | |
| Screw type - acme / worm / ball | •/ / | •/ / | /•/ | / /• | •[2] / /• | •[2] / /• | |
| Overload clutch | | | • | • | • | • | |
| Motor overload protection | • | • | • | • | • | • | |
| End of stroke limit switches | • | | • | | | | |
| Potentiometer feedback | | • | | | | | |
| Electronic load monitoring | | | | | | | |
| Dynamic braking | | | •[7] | | | | |
| Manual override | | | | | | | |
| **Optional features** | | | | | | | |
| End of stroke limit switches | | | | • | •[3] | | |
| Potentiometer feedback | | | • | • | • | • | |
| Encoder feedback | | | | • | | | |
| Programmable limit switches | | | | | | | |
| End of stroke indication outputs | | | | | | | |
| Low voltage power switching | | | | | | | |
| Signal follower input | | | | | | | |
| PWM speed control monitoring | | | | | | | |
| Manual override | | | | •[3] | • | • | |

[1] Contact customer support for more information on regional differences. [2] Not available in North America. [3] Not available in Europe.

| | ELECTRAK | | | LIFTING COLUMNS | | | RODLESS | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Pro** | **5** | **LA24** | **TC16** | **DMD** | **DMA** | **LM80-H** | **LM80-V** | **LM80-I** |
| |  |  |  |  |  |  |  |  |  |
| | | | | | | | | | |
| | • / • / • | • / • / • | / • / • | • / • / • | • / • / • | • / • / • | • / • / • | • / • / • | • / • / • |
| | | | | | | | | | |
| | best | better | best | best | better | better | better | better | better |
| | 12, 24 / | / 115 [3], 230, 400 [2] | / 115 [3], 230, 400 [2] | 24 / | 12, 24, 36 / | / 115 [3], 230, 400 [2] | 12, 24 / | 12, 24 / | 12, 24 / |
| | 9000 | 6800 | 6800 | 2000 | 6800 | 6800 | 2000 [4] | 2000 [5] | 2000 [5] |
| | 51 | 60 | 60 | 19 | 60 | 60 | 110 | 110 | 110 |
| | 300 | 610 | 600 | 400 | 610 | 610 | 1500 | 1500 | 1500 |
| | 17 / 0 [6] | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | IP66 (67) | IP45 | IP45 | IP44 | IP65 | IP45 | IP44 | IP44 | IP44 |
| | | | | | | | | | |
| | clevis | clevis | clevis/trunnion | base mount | base mount | base mount | T-slot | T-slot | T-slot |
| | • / / • | • [2] / / • | • / / • | • [8] / / | • / / • | • / / • | • [8] / / • | • [8] / / • | • [8] / / • |
| | | • | • | | • | • | | | |
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| | | • [3] | | | | | | | |
| | • | • | • | | • [2] | • [2] | | | |
| | • | | | • | | | | | |
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| | • | | | | | | | | |
| | | • | • | | | | • | • | • |

[4] For horizontal operation only. [5] For vertical operation only. [6] Without / with anti-rotation option. [7] At end of stroke only. [8] Trapezoidal screw.

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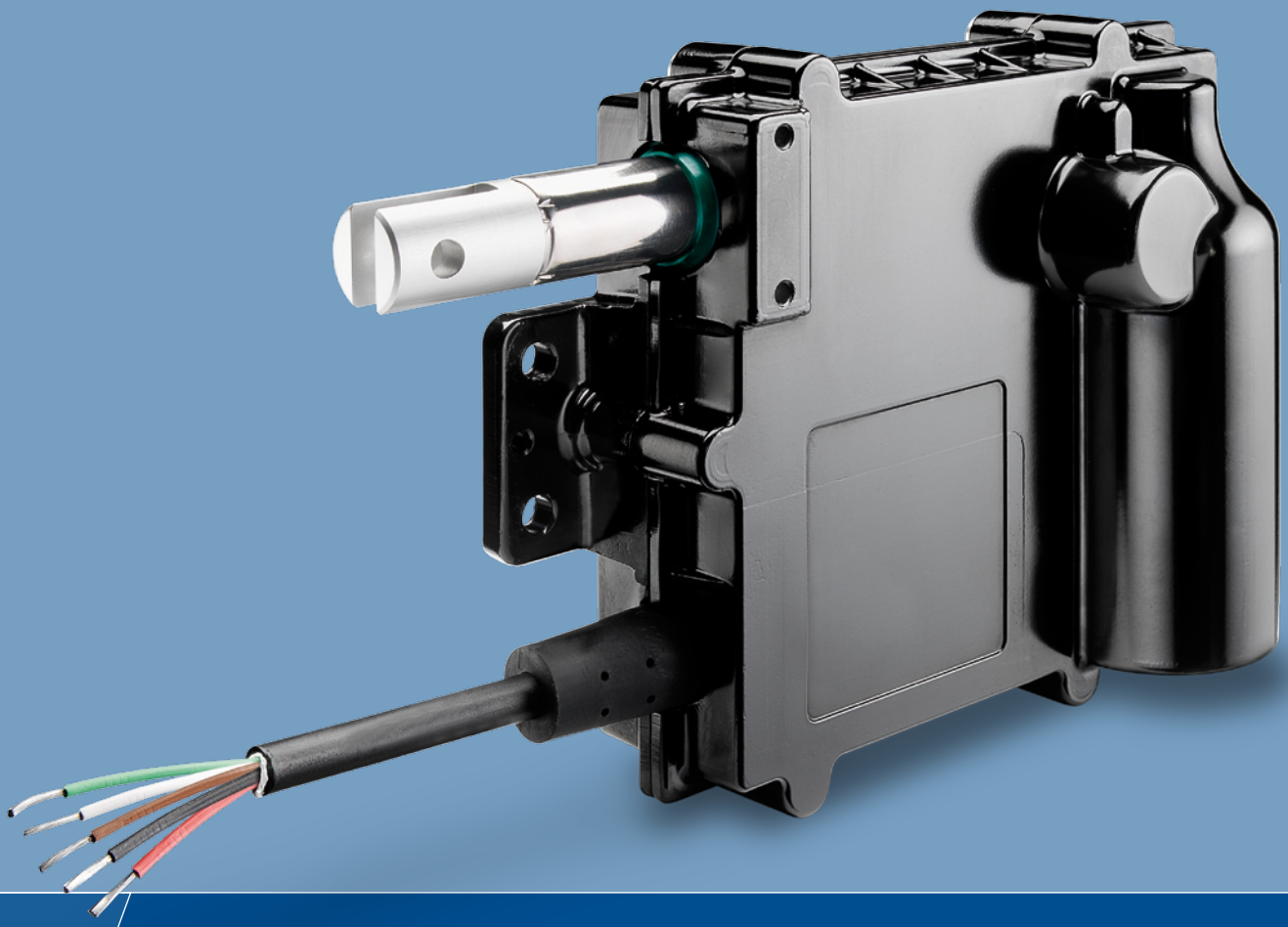
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# Electrak® Throttle Actuator

## The Next Generation of Throttle Control Technology

www.thomsonlinear.com

THOMSON®

*Linear Motion.* ***Optimized.***™

# Introducing the Thomson Electrak® Throttle Actuator

## Transforming throttle control through innovative design

Thomson has taken the rugged, dependable features of the E050 Electrak® actuator and added capabilities making the throttle actuator an ideal solution for industrial vehicles where throttle control is required. It offers:

- Trusted performance
- Simplified installation
- Space-saving design
- Reduced environmental impact
- Minimal maintenance

Simplify installation and increase operator safety and productivity with the space-saving design and electromechanical interface, allowing engine speed controls to be placed in ergonomic positions.

Reduce the environmental impact of a vehicle by utilizing on-board electronic options such as the analog position feedback sensor, electronic limit switches, and CANBUS communication (SAE J1939), to automatically control engine RPM based upon engine demand to increase productivity while reducing fuel consumption, noise and emissions.

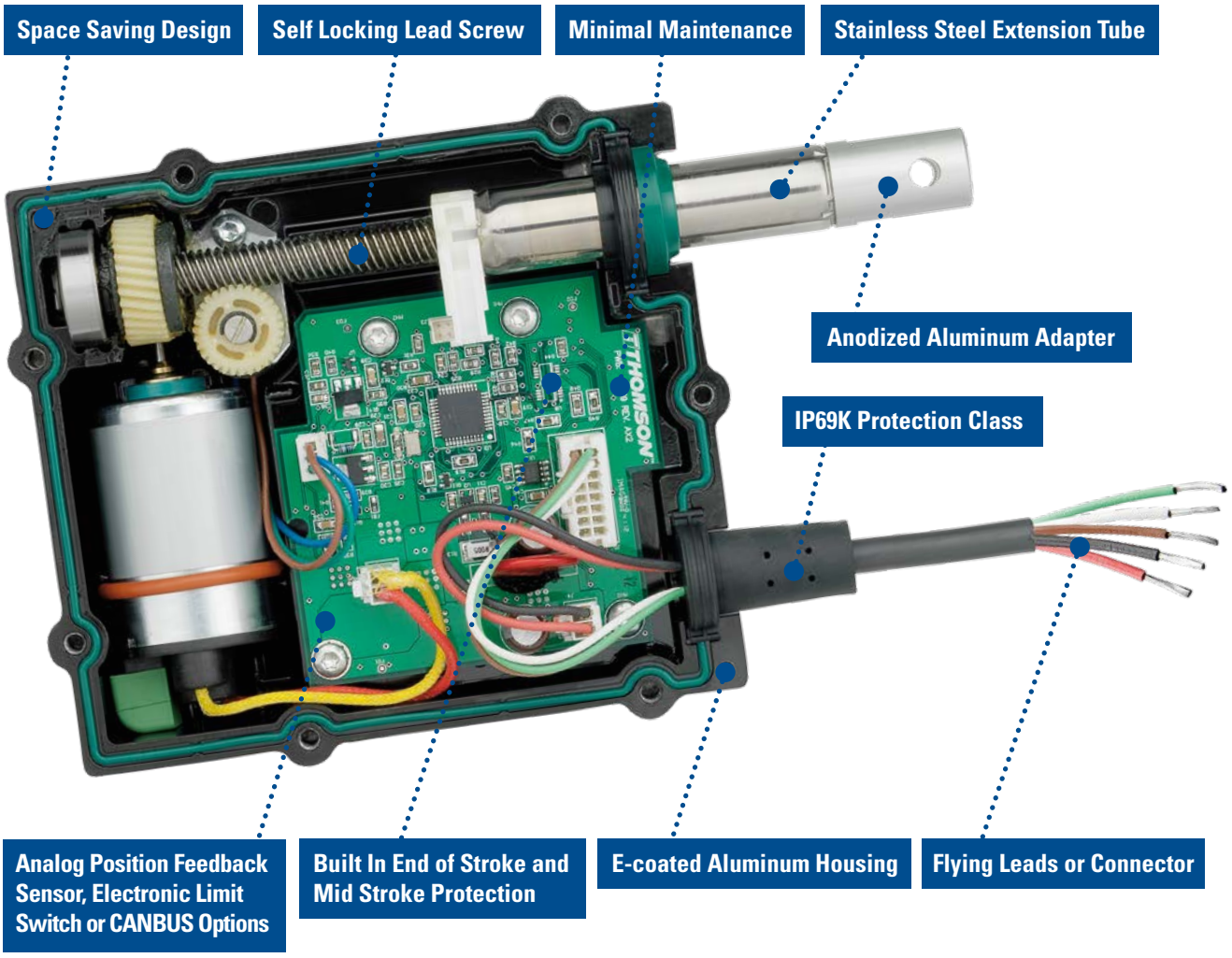
The rugged aluminum housing offers IP69K/IP67 sealing and is e-coated for corrosion resistance to make the throttle actuator virtually maintenance-free.

Need something extra? The Electrak® Throttle actuator can be tailored to your specific application requirements and Thomson engineers are always available to help select an actuator for your application needs.



# The Electrak® Throttle Actuator at a Glance

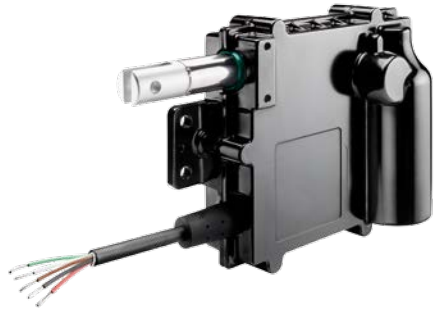
The new Electrak® Throttle Actuator was developed to be the most robust, reliable, and versatile actuator for throttle control applications. Enjoy a simpler and more efficient vehicle design process with the following product innovations:




## Applications

- Agricultural vehicles
- Marine applications
- Street sweepers
- Auxiliary engines
- Mobile generators
- Construction equipment
- Military and rescue vehicles
- Trucks
- Fork lifts
- Pump trucks
- Garden and forestry equipment
- Mass transport vehicles
- Mining equipment
- Industrial automation

# Specifications



## Standard Features and Benefits

- Designed for industrial applications
- Rugged aluminum housing with IP69K/IP67 sealing
- E-coated housing for corrosion resistance
- Minimal maintenance
- Integrated electronic options
- High end features at a low cost
- Integrated mounting holes

## General Specifications

| Parameter | Electrak Throttle |
|---|---|
| Screw type | worm |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking<br>with option CN<br>with option NP, FN, FP | <br>yes<br>no |
| Holding brake | no (self locking) |
| End of stroke protection | yes |
| Mid stroke protection | yes |
| Motor protection<br>with temperature rating S<br>with temperature rating E | <br>auto reset thermal switch<br>no |
| Motor connection | flying leads or Deutsch connector |
| Certificates | CE, RoHS |
| Options | • extended temperature range<br>• adapter orientation<br>• right angle cable exit<br>• analog position feedback sensor<br>• internal end of stroke limit switches<br>• CANBUS SAE J1939 |

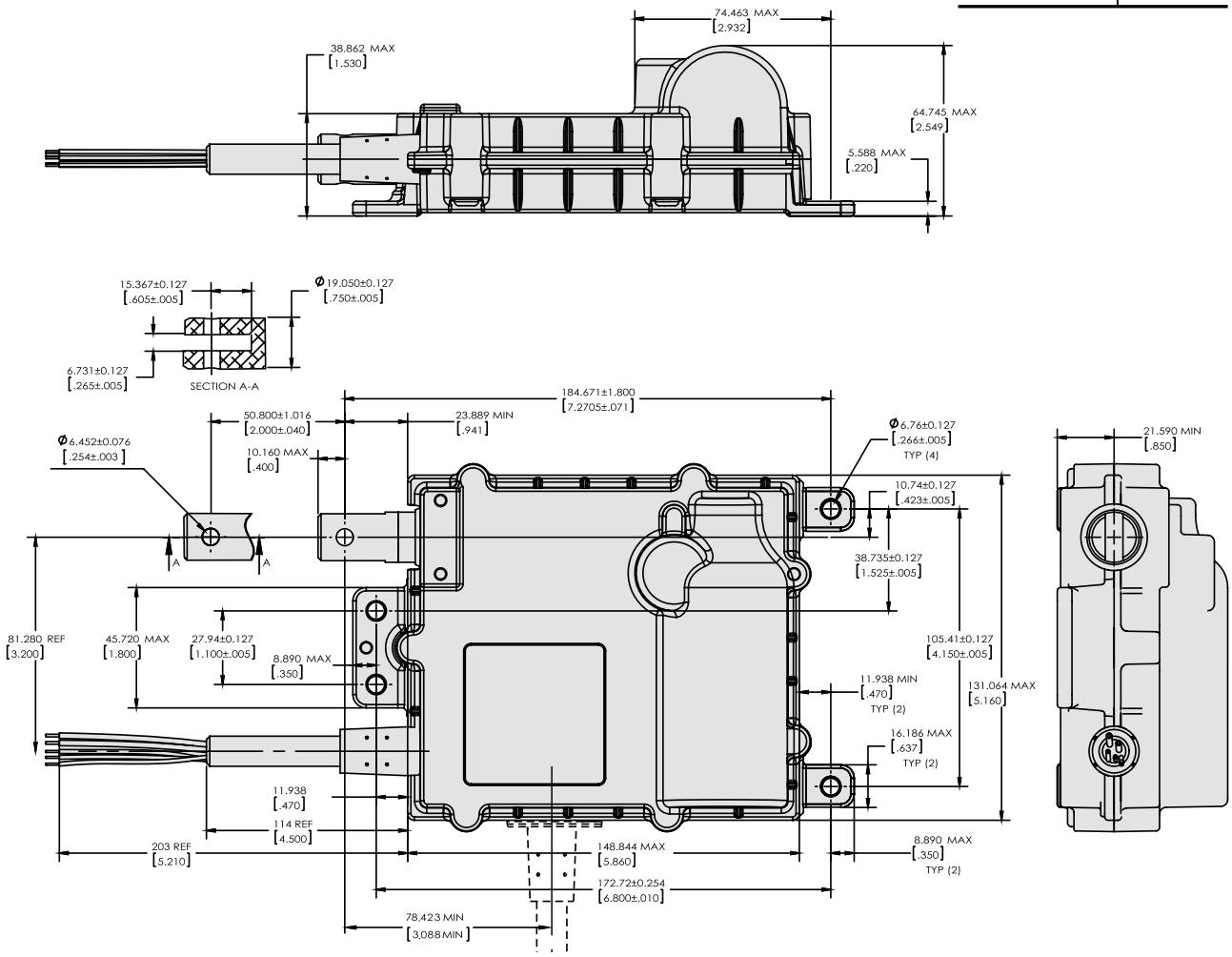
## Performance Specifications

| Parameter | | Electrak Throttle |
|---|---|---|
| Maximum load, dynamic / static<br>ET••-084 [1]<br>ET••-174 | [N (lbf)] | <br>45 (10) / 90 (20)<br>130 (30) / 260 (60) |
| Speed, no load / at max. load<br>ET••-084 [1]<br>ET••-174 | [mm/s (in/s)] | <br>96 (3.7) / 83 (3.3)<br>48 (1.9) / 37 (1.45) |
| Available input voltages | [VDC] | 12, 24 |
| Current draw, max. [2]<br>12 VDC models<br>24 VDC models | [A] | <br>4<br>2 |
| Operating temperature, min | [°C (F)] | - 40 (-40) |
| Operating temperature, max<br>ET••-•••-•S<br>ET••-•••-•E | [°C (F)] | <br>85 (185)<br>125 (257) |
| Full load duty cycle @ 25 °C [3] | [%] | 50 |
| End play, maximum | [mm (in)] | 1.5 (0.06) |
| Restraining torque | [Nm (lbf-in)] | 0 |
| Motor cable lead cross section | [$mm^2$ (AWG)] | 0.8 (18) |
| Motor cable length | [mm (in)] | 165 (6.5) |
| Protection class | | IP69K, IP67 |
| Operational life | [cycles] | 500000 |
| Retracted length | [mm (in)] | 184.7 (7.27) |
| Stroke length | [mm (in)] | 50.8 (2) |
| Weight | [kg (lbs)] | 1.11 (2.5) |
| Analog feedback sensor linearity | [± %] | 1 |

[1] The ET•• -084 (high speed version) can only be ordered in combination with operating temperature rating E.
[2] Max. current draw ratings do not include motor inrush current. Typical inrush current values are 12 A at 12 VDC and 6 A at 24 VDC.
[3] For all models and load ranges.

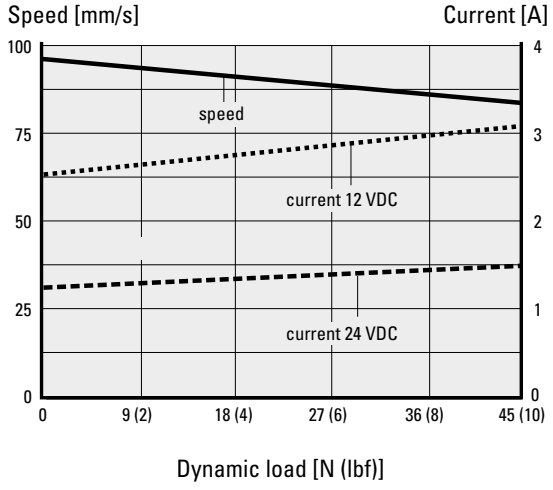
# Dimensions and Performance Diagrams

| Dimensions | Projection |
|---|---|
| METRIC [INCH] | |

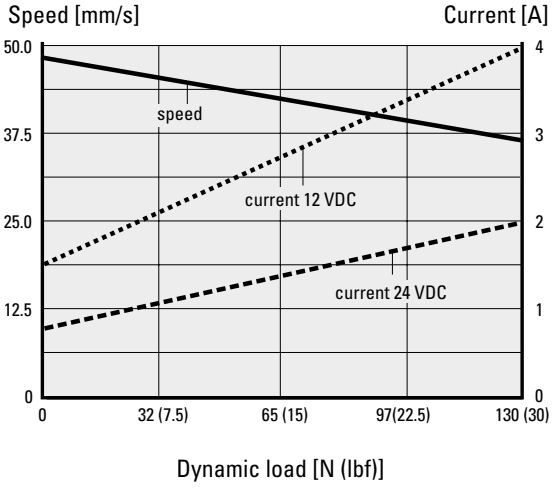



## Performance Diagrams

ET••-084




ET••-174



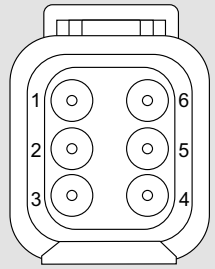
# Electrical Installation

## Cable and Connector Installation

Connect the actuator according to the table below. Actuator will extend if connected as in the table, shift polarity between red (pin 1) and black (pin 3) leads and it will retract. Mating Deutsch connector kit can be ordered from Thomson (P/N 9100-448-021). Note: Connector pin 2 is not used, but contains a sealing plug.

| Option name and order key code | Lead color or Deutsch DTM04-6P connector pin number | | | | |
|---|---|---|---|---|---|
| | **Red (1)** | **Black ( 3)** | **Brown (4)** | **White (5)** | **Green (6)** |
| **Analog position feedback sensor (NP)** | Motor (+) | Motor (-) | VDC in (+) | VDC out | VDC in (-) |
| **End of stroke limit switches (FN)** | Motor (+) | Motor (-) | - | - | - |
| **Analog position feedback sensor and limit switches (FP)** | Motor (+) | Motor (-) | VDC in (+) | VDC out | VDC in (-) |
| **CANBUS SAE J1939 (CN)** | Power (+) | Power (-) | CAN High | CAN Shield* | CAN Low |

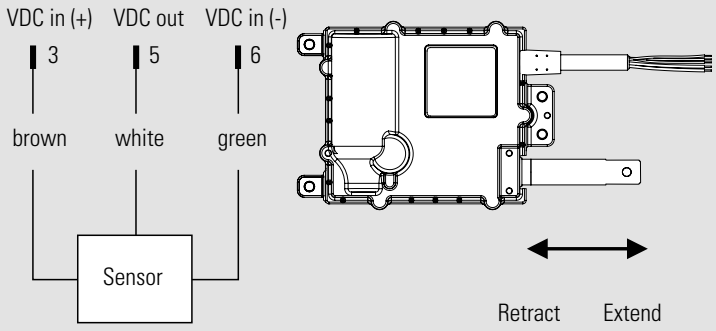
* Not required to connect.




Deutsch connector rear view

## Analog Position Feedback Sensor Installation Data

Brown (pin 3) and green (pin 6) are connected to a voltage source. When extending the actuator the voltage will increase between green (pin 6) and white (pin 5).




| Sensor Specifications | | |
|---|---|---|
| Input voltage, max. (VDC in) | [VDC] | 32 |
| Output voltage (VDC out)<br>at fully retracted<br>at fully extended | [VDC] | <br>< 5 % VDC in<br>> 75% VDC in |
| Max. output current | [mA] | 1 |
| Linearity | [± %] | 1 |

# Ordering Key

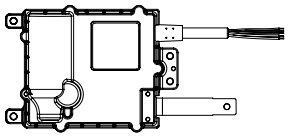
| Ordering Key | | | | | | | |
|---|---|---|---|---|---|---|---|
| Position | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Example | ET12- | 174- | S | S | NP | 1 | S |

1. Actuator type and supply voltage
ET12- = Electrak® Throttle, 12 VDC
ET24- = Electrak® Throttle, 24 VDC

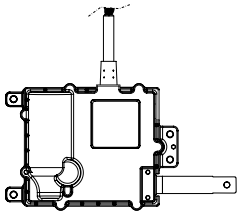
2. Max. dynamic load and speed version
084- = 45 N (10 lbf), high speed *
174- = 130 N (30 lbf), standard speed

3. Harness orientation
S = parallel to adapter
R = rotated 90° in housing

S



R



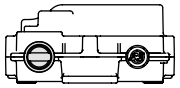
4. Temperature rating
S = standard: -40 (-40) to +85 (+185) °C (F)
E = high temperature: -40 (-40) to +125 (+257) °C (F) *

5. Control option
NP = analog position feedback sensor
FN = end of stroke limit switches
FP = analog position feedback sensor and end of stroke limit switches
CN = CANBUS SAE J1939

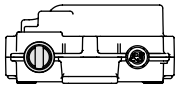
6. Connection options
1 = flying leads
2 = Deutsch DTM04-6P connector

7. Adapter options
S = standard adapter orientation
M = adapter rotated 90°

S



M



* The high speed (084-) version can only be ordered with the high temperature (E) rating and vice versa. Note that there is no thermal switch to protect the motor on the high temperature rated models.

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Electrak_Throttle_Actuator_BRUK-0006-02B | 2013-12-01 TJ
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# Electrak 050

## 12, 24 and 36 Vdc - load up to 510 N

» Ordering Key - see page 65
» Glossary - see page 72
» Electric Wiring Diagram - see page 44



## Standard Features and Benefits

- Designed for office or medical applications
- Small, quiet and lightweight
- Very short retracted length
- Low cost
- Durable and corrosion free plastic housing
- Color molded into the plastic, no painting required
- End of stroke limit switches with dynamic braking
- Maintenance free
- Internally restrained extension tube
- Estimated life is minimum 40000 cycles
- Q-version for noise sensitive applications

## General Specifications

| Parameter | Electrak 050 |
|---|---|
| Screw type | worm |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | yes, at end of stroke |
| Holding brake | no, self-locking |
| End of stroke protection | internal limit switches |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | flying leads |
| Motor connector | no |
| Certificates | CE |
| Options | • potentiometer 10 kOhm*<br>• cross holes rotated 90°<br>• white housing |

* See performance specification table for resistance change per mm of travel.

## Performance Specifications

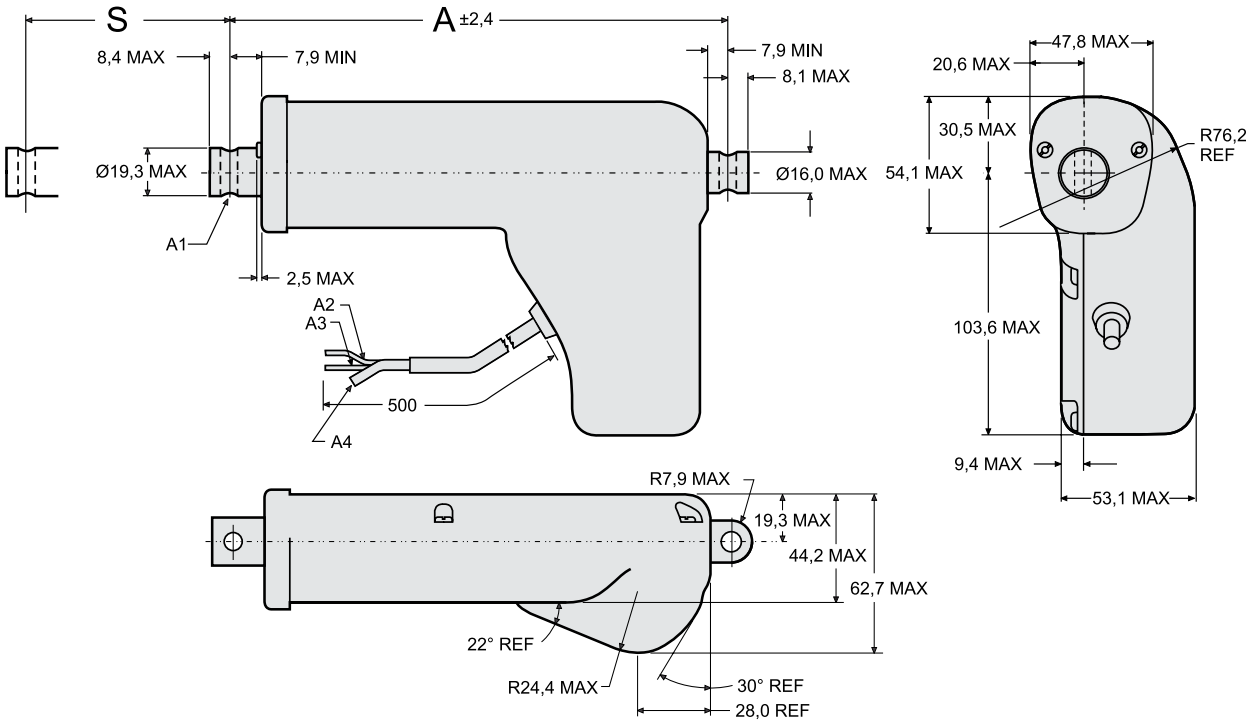
| Parameter | | Electrak 050 |
|---|---|---|
| Maximum load, dynamic / static<br>DE • • • 17W41<br>DE • • • 17W42<br>DE • • • 17W44 | [N] | <br>510 / 1020<br>275 / 550<br>140 / 280 |
| Speed, at no load / at maximum load<br>DE • • - 17W41<br>DE • • - 17W42<br>DE • • - 17W44<br>DE • • Q17W41<br>DE • • Q17W42<br>DE • • Q17W44 | [mm/s] | <br>12 / 9<br>24 / 18<br>48 / 37<br>9 / 7,5<br>18 / 14<br>38 / 30 |
| Available input voltages | [Vdc] | 12, 24, 36 |
| Standard stroke lengths | [mm] | 25, 50, 75, 100, 125, 150, 175, 200 |
| Operating temperature limits | [°C] | -30 – +80 |
| Full load duty cycle @ 20 °C | [%] | 25 |
| End play, maximum | [mm] | 1,5 |
| Restraining torque | [Nm] | 0 |
| Lead cross section | [$mm^2$] | 1 |
| Lead length | [mm] | 500 |
| Protection class<br>standar version<br>Q-version | | <br>IP56<br>IP51 |
| Potentiometer resistance change<br>DE • • • 17W41<br>DE • • • 17W42<br>DE • • • 17W44 | [ohm/mm] | <br>22,0<br>21,9<br>21,2 |

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| DCG-150 | 52 |
| AC-247 ELS | 54 |

# Electrak 050

## 12, 24 and 36 Vdc - load up to 510 N




S: stroke (tolerances: 17W41 = ± 3,23 mm, 17W42 = ± 4,25 mm, 17W44 = ± 5,26 mm)
A: retracted length
A1: Ø 6 mm +0,15/ -0 mounting cross holes (2 ×) in standard position

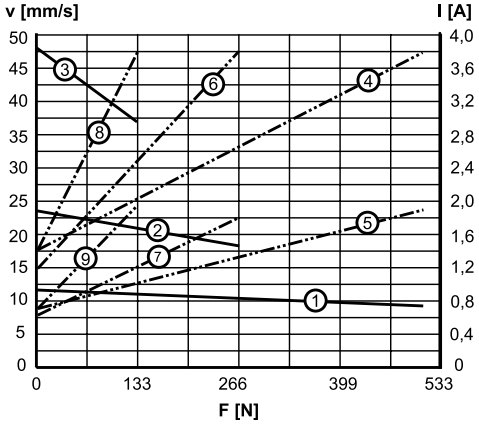
A2: red lead
A3: yellow lead
A4: vent tube Ø 3 mm

| Stroke (S) | [mm] | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|
| Retracted length (A) | [mm] | 114,2 | 139,2 | 164,2 | 189,2 | 214,2 | 239,2 | 264,2 | 289,2 |
| Retracted length, with potentiometer (A) | [mm] | 145,7 | 170,7 | 195,7 | 220,7 | 245,7 | 270,7 | 295,7 | - * |
| Weight | [kg] | 0,59 | 0,64 | 0,69 | 0,73 | 0,78 | 0,82 | 0,87 | 0,91 |
| Weight with potentiometer | [kg] | 0,69 | 0,74 | 0,79 | 0,83 | 0,88 | 0,92 | 0,97 | - * |

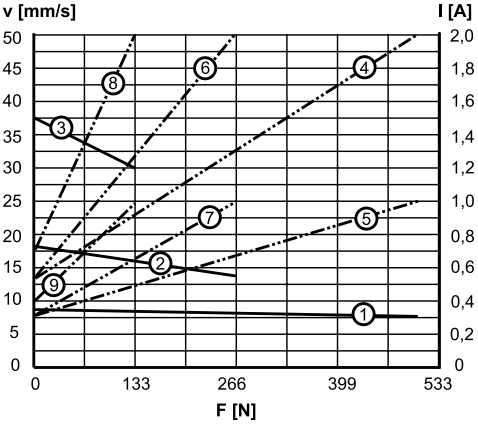
* 200 mm stroke not possible with potentiometer (PO, MP, PF options)

## Performance Diagrams

050, standard version
Speed and Current vs. Load




050, Q-version
Speed and Current vs. Load




V: speed I: current F: load
1: speed DE • • • 17W41
2: speed DE • • • 17W42
3: speed DE • • • 17W44
4: current 12 Vdc, DE12 • 17W41
5: current 24 Vdc, DE24 • 17W41
6: current 12 Vdc, DE12 • 17W42
7: current 24 Vdc, DE24 • 17W42
8: current 12 Vdc, DE12 • 17W44
9: current 24 Vdc, DE24 • 17W44

# Ordering Keys

## Electrak DC-actuators

### Electrak 050

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| DE24 - | 17W44M | 15 | FS |

**1. Model and input voltage**
DE12 - = Electrak 050, 12 Vdc
DE24 - = Electrak 050, 24 Vdc
DE36 - = Electrak 050, 36 Vdc
DE12Q = Electrak 050, 12 Vdc, Q-version[1]
DE24Q = Electrak 050, 24 Vdc, Q-version[1]
DE36Q = Electrak 050, 36 Vdc, Q-version[1]

**2. Dynamic load capacity and color**
17W41M = 510 N, black housing
17W42M = 275 N, black housing
17W44M = 140 N, black housing
17W41W = 510 N, white housing[1]
17W42W = 275 N, white housing[1]
17W44W = 140 N, white housing[1]

**3. Stroke**
02 = 25 mm
05 = 50 mm
07 = 75 mm
10 = 100 mm
12 = 125 mm
15 = 150 mm
17 = 175 mm
20 = 200 mm

**4. End of stroke limit switches and potentiometer**
FS = limit switches and no potentiometer
PO = potentiometer[2]
PF = limit switches and potentiometer[2]
MF = crossholes rotated 90° and limit switches
MP = crossholes rotated 90° and potentiometer[2]

[1] White housing is standard for the Q-version.
[2] Not possible in combination with 200 mm stroke.

### Electrak PPA-DC

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| PPA24 - | 58B65 - | 18 | N - | LS | X |

**1. Model and input voltage**
PPA12 - = Electrak PPA-DC, 12 Vdc
PPA24 - = Electrak PPA-DC, 24 Vdc
PPA36 - = Electrak PPA-DC, 36 Vdc

**2. Dynamic load capacity**
18B65 - = 3330 N
58B65 - = 6670 N

**3. Stroke**
04 = 4 inch (101,6 mm)
08 = 8 inch (203,2 mm)
12 = 12 inch (304,8 mm)
18 = 18 inch (457,2 mm)
24 = 24 inch (609,6 mm)
36 = 36 inch (914,4 mm)

**4. Brake option**
N - = no brake option

**5. Feedback option**
XX = no feedback option
LS = end of stroke limit switches
PO = potentiometer
HS = encoder
HL = encoder + end of stroke limit switches

**6. Bellows option**
X = no bellows
C = bellows

# Electrak PPA-AC

## 115 and 230 Vac - load up to 6670 N

» Ordering Key - see page 68
» Glossary - see page 72
» Electric Wiring Diagram - see page 46



## Standard Features and Benefits

- Strong and versatile heavy duty actuator
- High duty cycle
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Stroke lengths up to 36 inch (914,4 mm)
- Motor with thermal switch
- Integrated motor capacitor
- Maintenance free
- Large range of options

## General Specifications

| Parameter | Electrak PPA-AC |
|---|---|
| Screw type | ball |
| Internally restrained | no |
| Manual override | no, optional |
| Dynamic braking | no |
| Holding brake | yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | flying leads |
| Motor connector | no |
| Certificates | CE |
| Options | • end of stroke limit switches<br>• potentiometer<br>• encoder<br>• protective bellows<br>• anti-coast brake<br>• electrical brake * |

* Only possible on 115 Vac models

## Performance Specifications

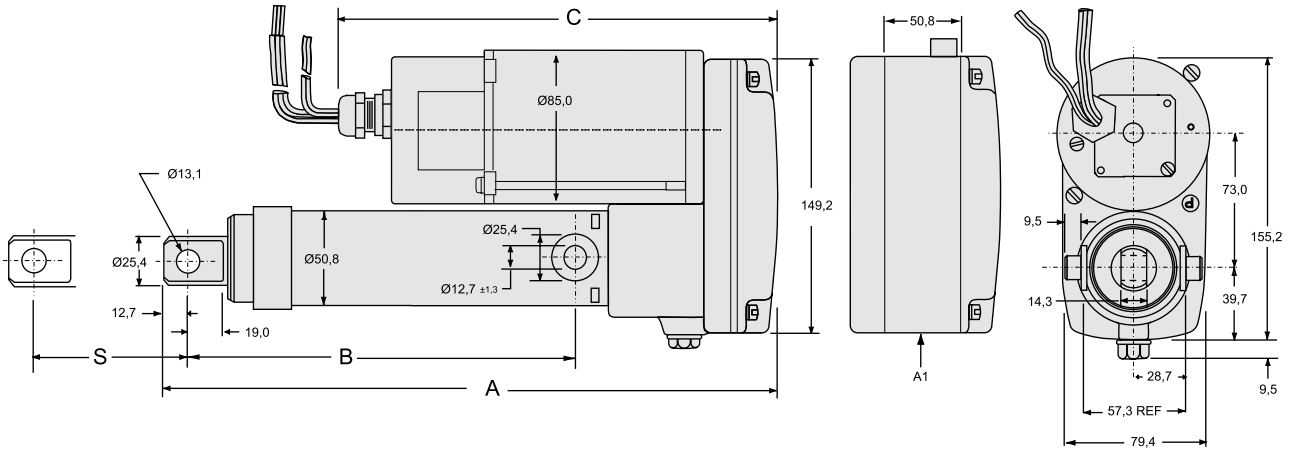
| Parameter | | PPA-AC |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| PPA • • -18B65 | | 2220 / 13350 |
| PPA • • -58B65 | | 6670 / 13350 |
| Speed, at no load / at maximum load | [mm/s] | |
| PPA11-18B65 | | 16 / 15 |
| PPA22-18B65 | | 14 / 13 |
| PPA11-58B65 | | 4,3 / 4,3 |
| PPA22-58B65 | | 4,3 / 4,3 |
| Available input voltages | [Vac] | |
| Single phase | | 115, 230 |
| Input frequency | [Hz] | |
| 1 × 115 Vac model | | 50/60 |
| 1 × 230 Vac model | | 50/60 |
| Standard stroke lengths | [inch] | 4, 8, 12, 18, 24, 36 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °F | [%] | 30 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | |
| PPA • • -18B65 | | 11,3 |
| PPA • • -58B65 | | 22,6 |
| Lead cross section | [$mm^2$] | 0,75 |
| Lead length | [mm] | 500 |
| Protection class | | IP45 |

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |

# Electrak PPA-AC

## 115 and 230 Vac - load up to 6670 N



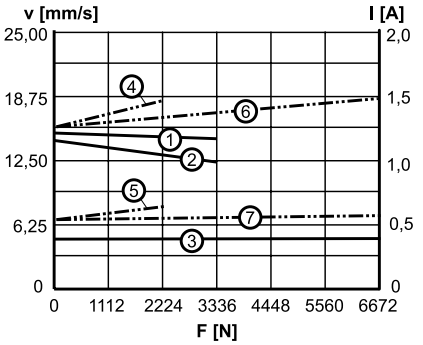

S: stroke
A: retracted length
B: retracted length to trunnions

C: motor length
A1: housing dimensions for limit switch, encoder or potentiometer options

| Stroke (S) | [inch (mm)] | 4 (101,6) | 8 (203,2) | 12 (304,8) | 18 (457,2) | 24 (609,6) | 36 (914,4) |
|---|---|---|---|---|---|---|---|
| Retracted length (A) without options | [mm] | 348,0 | 449,6 | 551,2 | 754,4 | 906,8 | 1211,6 |
| Retracted length (A) with limit switch, encoder or potentiometer | [mm] | 398,8 | 500,4 | 602,0 | 805,2 | 957,6 | 1262,4 |
| Retracted length (B) | [mm] | 223,5 | 352,1 | 426,7 | 629,9 | 782,3 | 1087,1 |
| Motor length (C) without electrical brake | [mm] | 213,6 | 213,6 | 213,6 | 213,6 | 213,6 | 213,6 |
| Motor length (C) with electrical brake | [mm] | 277,4 | 277,4 | 277,4 | 277,4 | 277,4 | 277,4 |
| Weight | [kg] | 6,0 | 6,7 | 7,5 | 8,7 | 9,8 | 12,2 |
| Weight with electrical brake | [kg] | 6,6 | 7,3 | 8,1 | 9.3 | 10,4 | 12,9 |
| Add on weight for limit switch, encoder or potentiometer | [kg] | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 | 0,8 |

## Performance Diagrams

### Speed and Current vs. Load




V: speed I: current F: load

1: speed 115 Vac, PPA11-18B65
2: speed 230 Vac, PPA22-18B65
3: speed 115 Vac, PPA11-58B65 and 230 Vac, PPA22-58B65
4: current 115 Vac, PPA11-18B65
5: current 230 Vac, PPA22-18B65
6: current 115 Vac, PPA11-58B65
7: current 230 Vac, PPA22-58B65

# Rolled ball screw shafts

| Nominal diameter | Lead | Number of threads | Ball diameter | best available tolerance class for right-hand thread shafts | best available tolerance class for left-hand thread shafts | External diameter | Thread minor diameter | Maximum length | Specific mass per meter shaft length | Cross-sectional area | Minimum axial moment of inertia | Polar moment of inertia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | | | $d_1$ | $d_2$ | $l_{max}$ | M | a | i | $I_p$ |
| [mm] | [mm] | | [mm] | | | [mm] | [mm] | [mm] | [kg/m] | [$mm^2$] | [$mm^4$] | [$mm^4$] |
| 12 | 4 | 1 | 2.000 | P3 | | 11.60 h11 | 10.07 | 3000 | 0.76 | 9.63E+01 | 7.00E+02 | 1.48E+03 |
| 12 | 5 | 1 | 2.000 | P3 | | 11.50 h11 | 9.97 | 3000 | 0.76 | 9.64E+01 | 6.89E+02 | 1.48E+03 |
| 12 | 10 | 2 | 2.000 | P3 | | 11.50 h11 | 10.05 | 3000 | 0.75 | 9.61E+01 | 6.59E+02 | 1.48E+03 |
| 16 | 5 | 1 | 3.500 | P3 | T7 | 15.55 h11 | 12.88 | 6000 | 1.38 | 1.75E+02 | 2.22E+03 | 4.93E+03 |
| 16 | 5.08 | 1 | 3.500 | P3 | | 15.68 h12 | 12.86 | 6000 | 1.26 | 1.60E+02 | 2.03E+03 | 4.08E+03 |
| 16 | 10 | 2 | 3.000 | P3 | | 15.35 h11 | 12.89 | 6000 | 1.26 | 1.60E+02 | 1.69E+03 | 4.17E+03 |
| 20 | 5 | 1 | 3.500 | P3 | P3 | 19.50 h11 | 16.87 | 6000 | 2.21 | 2.82E+02 | 5.85E+03 | 1.27E+04 |
| 20 | 20 | 4 | 3.500 | P3 | | 19.50 h11 | 16.87 | 6000 | 2.03 | 2.59E+02 | 5.41E+03 | 1.08E+04 |
| 20 | 50 | 5 | 3.500 | P3 | | 19.10 h11 | 16.40 | 6000 | 2.05 | 2.62E+02 | 5.53E+03 | 1.11E+04 |
| 25 | 5 | 1 | 3.500 | P3 | T7 | 24.60 h11 | 21.90 | 6000 | 3.32 | 4.23E+02 | 1.42E+04 | 2.85E+04 |
| 25 | 10 | 2 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.34 | 4.25E+02 | 1.27E+04 | 2.90E+04 |
| 25 | 20 | 4 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.32 | 4.23E+02 | 1.44E+04 | 2.88E+04 |
| 25 | 25 | 4 | 3.500 | P3 | | 24.71 h12 | 21.92 | 6000 | 3.40 | 4.34E+02 | 1.51E+04 | 3.02E+04 |
| 25 | 25 | 5 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.32 | 4.23E+02 | 1.44E+04 | 2.88E+04 |
| 25 | 50 | 5 | 3.500 | P3 | | 24.15 h11 | 21.47 | 6000 | 3.37 | 4.29E+02 | 1.48E+04 | 2.95E+04 |
| 32 | 5 | 1 | 3.500 | P3 | T7 | 31.50 h11 | 28.87 | 6000 | 5.90 | 7.52E+02 | 4.29E+04 | 9.01E+04 |
| 32 | 10 | 1 | 5.556 | P3 | | 31.67 h11 | 27.36 | 6000 | 5.54 | 7.05E+02 | 3.80E+04 | 7.92E+04 |
| 32 | 10 | 1 | 7.144 | P3 | | 32.74 h11 | 27.33 | 6000 | 5.57 | 7.10E+02 | 3.98E+04 | 8.03E+04 |
| 32 | 20 | 2 | 5.000 | P3 | | 31.70 h11 | 27.81 | 6000 | 5.67 | 7.22E+02 | 3.63E+04 | 8.38E+04 |
| 32 | 20 | 2 | 5.556 | P3 | | 31.67 h11 | 27.36 | 6000 | 5.53 | 7.04E+02 | 3.38E+04 | 7.99E+04 |
| 32 | 32 | 4 | 3.969 | P3 | | 31.30 h11 | 28.33 | 6000 | 5.74 | 7.31E+02 | 4.28E+04 | 8.56E+04 |
| 32 | 40 | 4 | 3.500 | P3 | | 30.90 h11 | 28.26 | 6000 | 5.63 | 7.17E+02 | 4.10E+04 | 8.21E+04 |
| 40 | 5 | 1 | 3.500 | P3 | T7 | 39.53 h11 | 36.90 | 6000 | 9.03 | 1.15E+03 | 1.05E+05 | 2.11E+05 |
| 40 | 10 | 1 | 7.144 | P3 | T7 | 39.62 h11 | 34.28 | 6000 | 8.43 | 1.07E+03 | 9.11E+04 | 1.83E+05 |
| 40 | 20 | 2 | 5.000 | P3 | | 39.70 h11 | 35.81 | 6000 | 9.05 | 1.15E+03 | 9.52E+04 | 2.13E+05 |
| 40 | 20 | 2 | 5.556 | P3 | | 40.00 h12 | 35.72 | 6000 | 8.87 | 1.13E+03 | 9.00E+04 | 2.05E+05 |
| 40 | 40 | 4 | 3.500 | P3 | | 38.95 h11 | 36.24 | 6000 | 9.02 | 1.15E+03 | 1.05E+05 | 2.11E+05 |
| 40 | 40 | 4 | 7.144 | P3 | | 39.81 h12 | 34.32 | 6000 | 8.37 | 1.07E+03 | 9.16E+04 | 1.83E+05 |
| 50 | 10 | 1 | 7.144 | P3 | T7 | 49.60 h11 | 44.11 | 6000 | 13.53 | 1.72E+03 | 2.35E+05 | 4.73E+05 |
| 50 | 20 | 2 | 6.350 | P3 | | 49.60 h11 | 44.87 | 6000 | 13.86 | 1.77E+03 | 2.22E+05 | 4.99E+05 |
| 50 | 20 | 2 | 7.144 | P3 | | 49.50 h11 | 43.99 | 6000 | 13.46 | 1.71E+03 | 2.05E+05 | 4.72E+05 |
| 63 | 10 | 1 | 7.144 | P3 | | 62.60 h11 | 57.15 | 6000 | 22.07 | 2.81E+03 | 6.25E+05 | 1.26E+06 |
| 63 | 20 | 2 | 7.144 | P3 | | 62.70 h11 | 57.16 | 6000 | 22.06 | 2.81E+03 | 5.70E+05 | 1.26E+06 |
| 80 | 10 | 1 | 7.144 | T7 | | 79.65 h12 | 74.20 | 6000 | 36.43 | 4.64E+03 | 1.71E+06 | 3.43E+06 |

Nut styles available from stock
(R = with right-hand thread
L = with left-hand thread)

| KGF-D (FK) | KGF-D (FH) | KGF-L (FL) | KGM-G (ZG) | KGF-D | KGF-N | KGM-D | KGM-N | FM-D | FM-N | MM-D | MM-N | FF-D | FF-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | | | | R | | | | | | |
| | | | | | | | R | | | | | | |
| | | | | R | | R | | | | | | | |
| R | | R | R | R | R | R | | R | R | R | | R | R |
| | | | | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| R | | R | R | R+L | R | R+L | R | R+L | R | R+L | R | R+L | R |
| | R | | | | R | | R | | R | | R | | R |
| | | | | | R | | R | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | R | R | | R | | R | | R | | R | |
| | | | | R | | R | | R | | R | | R | |
| | R | | | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| | | | | R | | R | | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| R | | R | R | | | | | | | | | | |
| | | | | R | R | | R | R | R | | R | R | R |
| | | | | R | | | R | R | | | R | R | |
| | R | | | | | | | | | | | | |
| | R | | | R | | | | | | | | R | |
| | | | | | R | | R | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| R | | R | R | R | R | R | | R | R | R | | R | R |
| | R | | R | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| | R | | | | | | | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | | | | | | | | | | | |
| | | | | R | | | R | R | | | R | R | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | | R | | R | | R | | R | | R | |
| R | | | R | | R | | R | | R | | R | | R |
| R | | | | | | | | | R | | R | | R |
























# Lifting Column TC16

## 24 Vdc - load up to 2000 N

» Ordering Key - see page 69
» Glossary - see page 72
» Electric Wiring Diagram - see page 45



## Standard Features and Benefits

- Designed for domestic, office and medical applications
- Self supporting column in extruded anodized aluminum
- Low weight and quiet operation
- Smooth operating telescopic screw drive
- High load torque capability
- Very short retracted length
- Very low stroke to retracted length ratio
- Maintenance free
- Dynamic braking and load holding brake
- Integrated end of stroke limit switches
- EMC recognized for medical applications

## General Specifications

| Parameter | TC16 |
|---|---|
| Screw type | trapezoidal |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | yes |
| Holding brake | yes |
| End of stroke protection | end of stroke limit switches |
| Mid stroke protection | no |
| Motor protection | no |
| Motor connection | cable |
| Motor connector | DIN 41524 8 pin plug |
| Certificates | CE<br>EMC for medical applications* |
| Options | encoder |

* Emission: EN 61000-6-3:2001, EN 60601-1-2:1993, EN 55011 Class B,
Immunity: EN 61000-6-2:2001, EN 61000-4-2, EN 61000-4-3

## Performance Specifications

| Parameter | | TC16 |
|---|---|---|
| Maximum load | [N] | 2000 |
| Maximum load torque, dynamic / static | [Nm] | 150 / 500 |
| Speed, at no load / at maximum load | [mm/s] | 19 / 15 |
| Available input voltages | [Vdc] | 24 |
| Maximum standard stroke* | [mm] | 400 |
| Minimum standard stroke | [mm] | 200 |
| Operating temperature limits | [°C] | 0 – +40 |
| Full load duty cycle @ 20 °C | [%] | 15 |
| Maximum on time | [s] | 60 |
| Restraining torque | [Nm] | 0 |
| Lead cross section | [$mm^2$] | 1,5 |
| Cable length | [mm] | 2000 |
| Protection class | | IP44 |

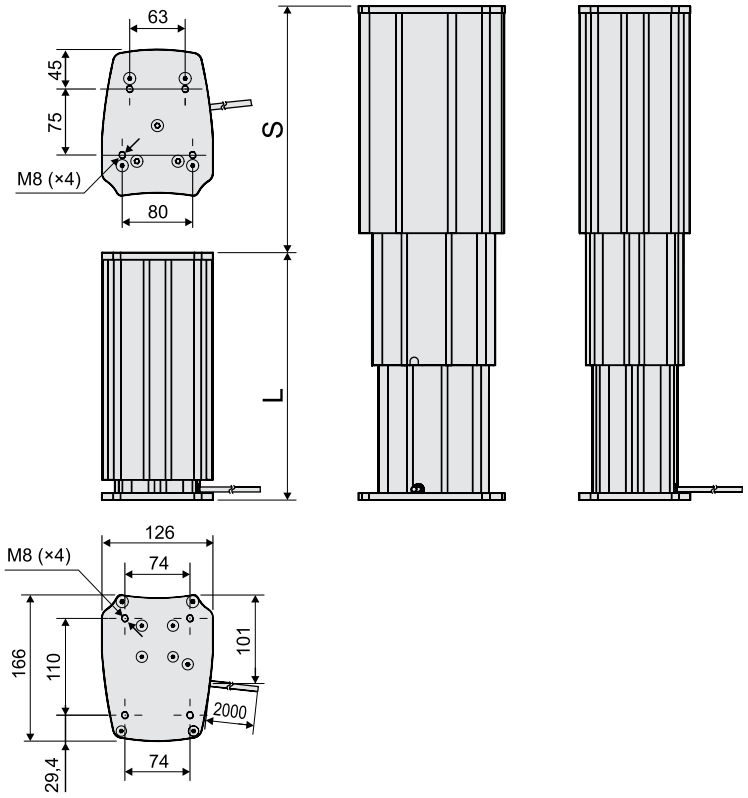
* For longer stroke length, contact customer support.

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| DCG-180 | 54 |
| DCG-280 | 54 |
| AC-247 ELS | 52 |

# Lifting Column TC16

## 24 Vdc - load up to 2000 N

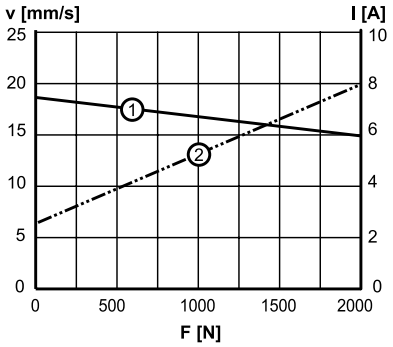



S: stroke
L: retracted length

| | |
|---|---|
| **Stroke (S), minimum and maximum** | Min. possible stroke (Smin) = 200 mm, Max. possible stroke (Smax) = 400 mm |
| **Retracted length (L), minimum and maximum** | Min. retracted length (Lmin) = 250 mm, Max. retracted length (Lmax) = 400 mm |
| **Stroke / retracted length relationship** | Longest possible stroke (S) for a given retracted length (L) [mm] = L [mm] × 2 - 282 |
| **Retracted length / stroke relationship** | Shortest possible retracted length (L) for a given given stroke (S) [mm] = (S [mm] + 282) / 2 |
| **Weight** | Weight of unit [kg] = 3,4 + L × 0,0203 + S × 0,000755 |

## Performance Diagrams

### Speed and Current vs. Load




V: speed I: current F: load

1: speed
2: current

# Lifting.Column.DMA

## 230 and 400 Vac - load up to 6800 N

» Ordering Key - see page 75
» Glossary - see page 80
» Electric Wiring Diagram - see page 50



## Standard Features and Benefits

- Designed for industrial use
- Rugged, robust and strong
- Self supporting column in extruded anodized aluminum
- Acme or ball screw drive
- High load torque capability
- Overload clutch for mid and end of stroke protection
- T-slot grooves along the entire profile
- Maintenance free

## General Specifications

| Parameter | DMA |
|---|---|
| Screw type | acme or ball |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | no |
| Holding brake<br>acme screw models<br>ball screw models | <br>no, self-locking<br>yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | cable |
| Motor connector | no |
| Certificates | CE |
| Options | potentiometer |

## Performance Specifications

| Parameter | | DMA |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| DMA22-05A5 (acme screw)* | | 1100 / 11350 |
| DMA • • -10A5 (acme screw) | | 2250 / 11350 |
| DMA • • -20A5 (acme screw) | | 2250 / 11350 |
| DMA • • -05B5 (ball screw) | | 2250 / 18000 |
| DMA • • -10B5 (ball screw) | | 4500 / 18000 |
| DMA • • -20B5 (ball screw) | | 4500 / 18000 |
| DMA • • -21B5 (ball screw) | | 6800 / 18000 |
| Maximum load torque, dynamic / static | [Nm] | |
| acme screw models | | 565 / 565 |
| ball screw models | | 710 / 710 |
| Speed, at no load / at maximum load | [mm/s] | |
| DMA22-05A5 (acme screw)* | | 48 / 38 |
| DMA • • -10A5 (acme screw) | | 30 / 18 |
| DMA • • -20A5 (acme screw) | | 15 / 12 |
| DMA • • -05B5 (ball screw) | | 61 / 37 |
| DMA • • -10B5 (ball screw) | | 30 / 19 |
| DMA • • -20B5 (ball screw) | | 15 / 12 |
| DMA • • -21B5 (ball screw) | | 15 / 11 |
| Available input voltages | [Vac] | |
| Single phase** | | 230 |
| Three phase | | 400 |
| Input frequency | [Hz] | |
| 1 × 230 Vac model | | 50/60 |
| 3 × 400 Vac model | | 50 |
| Standard stroke lengths | [in] | 4, 6, 8, 10, 12, 14, 16, 18, 20, 24 |
| Operating temperature limits | [°C] | -25 – +65 |
| Maximum on time | [s] | 45 |
| Full load duty cycle @ 25 °C | [%] | 25 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 0 |
| Lead cross section | [mm²] | 2,5 |
| Cable length | [mm] | 2000 |
| Protection class | | IP45 |

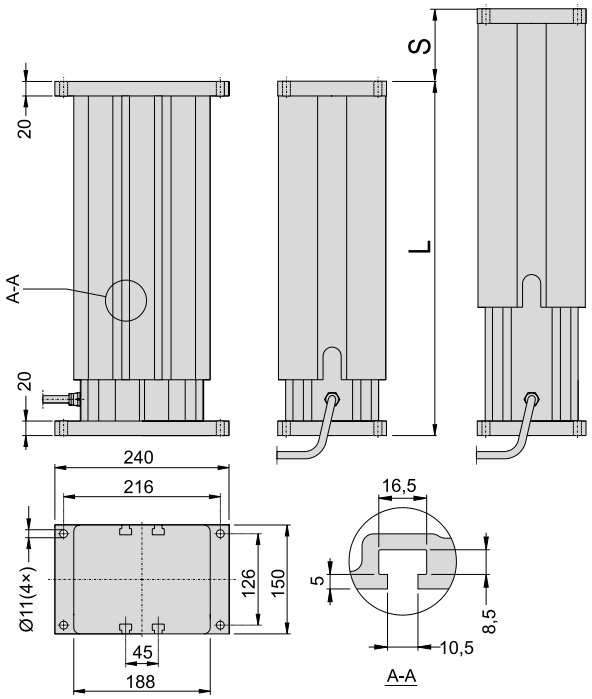
* Not possible with 400 Vac input voltage
** 10 µF capacitor required to run the actuator, p/n 9200-448-003

## Compatible Controls

| Control.model | See.page |
|---|---|
| DPDT switch | 53 |

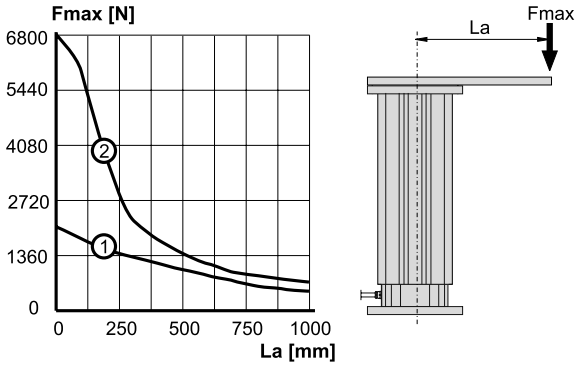
# Lifting.Column.DMA

## 230 and 400 Vac - load up to 6800 N




S: stroke L: retracted length

## Off Center Load Capacity




Fmax: maximum load operated La: length of lever arm

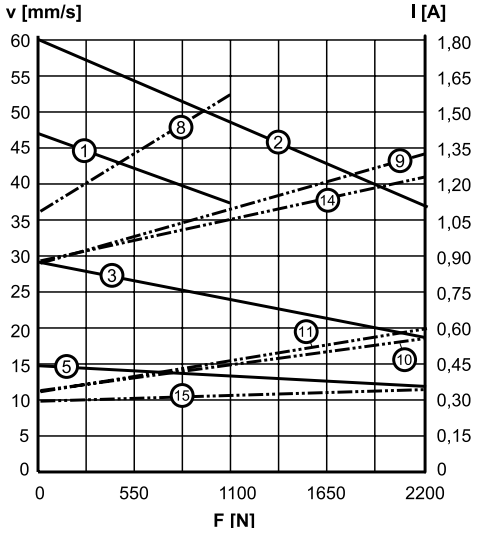
1: acme screw models
2: ball screw models

| Stroke.(S) | [inch.(mm)] | 4 (101,6) | 6 (152,4) | 8 (203,2) | 10 (254,0) | 12 (304,8) | 14 (355,6) | 16 (406,4) | 18 (457,2) | 20 (508,0) | 24 (609,6) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Retracted.length.(L),.acme.screw.models | [mm] | 329,6 | 380,4 | 431,2 | 482,0 | 532,8 | 633,6 | 684,4 | 735,2 | 786,0 | 887,6 |
| Retracted.length.(L),.ball.screw.models | [mm] | 369,6 | 420,4 | 471,2 | 522,0 | 572,8 | 673,6 | 724,4 | 775,2 | 826,0 | 927,6 |
| Add.on.length.for.potentiometer* | [mm] | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 |
| Weight,.acme.screw.models | [kg] | 20,9 | 22,4 | 23,8 | 25,3 | 26,8 | 29,5 | 30,9 | 32,4 | 33,9 | 36,8 |
| Weight,.ball.screw.models | [kg] | 22,6 | 24,1 | 25,6 | 27,0 | 28,5 | 31,2 | 32,6 | 34,1 | 35,6 | 38,6 |
| Add.on.weight.for.potentiometer* | [kg] | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 |

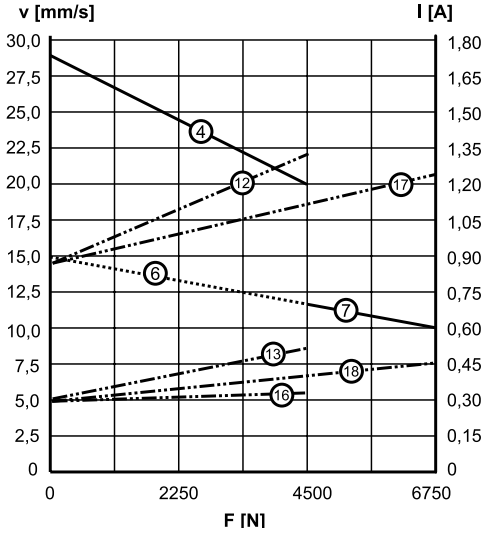
* Potentiometer is optional

## Performance Diagrams

### Speed and Current vs. Load - Chart 1




### Speed and Current vs. Load - Chart 2




V: speed I: current F: load

1: speed DMA22-05A5 - chart 1
2: speed DMA••-05B5 - chart 1
3: speed DMA••-10A5 - chart 1
4: speed DMA••-10B5 - chart 2
5: speed DMA••-20A5 - chart 1
6: speed DMA••-20B5 - chart 2
7: speed DMA••-21B5 - chart 2
8: current DMA22-05A5 - chart 1
9: current DMA22-05B5 and DMA22-10A5 - chart 1
10: current DMA42-05B5 - chart 1
11: current DMA42-10A5 - chart 1
12: current DMA22-10B5 and DMA22-20B5 - chart 2
13: current DMA42-10B5 - chart 2
14: current DMA22-20A5 - chart 1
15: current DMA42-20A5 - chart 1
16: current DMA42-20B5 - chart 2
17: current DMA22-21B5 - chart 2
18: current DMA42-21B5 - chart 2

# Lifting.Column.DMD

## 12, 24 and 36 Vdc - load up to 6800 N

» Ordering Key - see page 75
» Glossary - see page 80
» Electric Wiring Diagram - see page 49



## Standard Features and Benefits

- Designed for industrial use
- Rugged, robust and strong
- Self supporting column in extruded anodized aluminum
- Acme or ball screw drive
- High load torque capability
- Overload clutch for mid and end of stroke protection
- T-slot grooves along the entire profile
- Maintenance free

## General Specifications

| Parameter | DMD |
|---|---|
| Screw type | acme or ball |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | no |
| Holding brake<br>acme screw models<br>ball screw models | <br>no, self-locking<br>yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | cable |
| Motor connector | no |
| Certificates | CE |
| Options | potentiometer* |

* For encoder feedback, contact customer support.

## Performance Specifications

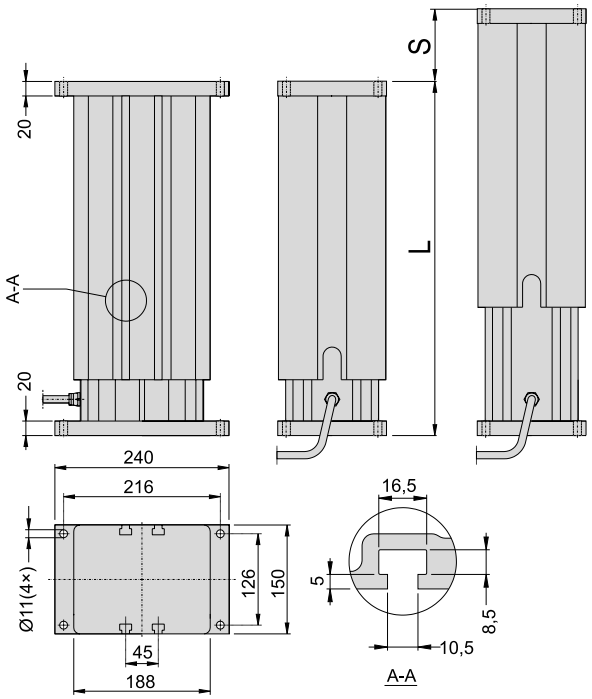
| Parameter | | DMD |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| DMD • • -05A5 (acme screw) | | 1100 / 11350 |
| DMD • • -10A5 (acme screw) | | 2250 / 11350 |
| DMD • • -20A5 (acme screw) | | 2250 / 11350 |
| DMD • • -05B5 (ball screw) | | 2250 / 18000 |
| DMD • • -10B5 (ball screw) | | 4500 / 18000 |
| DMD • • -20B5 (ball screw) | | 4500 / 18000 |
| DMD • • -21B5 (ball screw) | | 6800 / 18000 |
| Maximum load torque, dynamic / static | [Nm] | |
| acme screw models | | 565 / 565 |
| ball screw models | | 710 / 710 |
| Speed, at no load / at maximum load | [mm/s] | |
| DMD • • -05A5 (acme screw) | | 54 / 32 |
| DMD • • -10A5 (acme screw) | | 30 / 18 |
| DMD • • -20A5 (acme screw) | | 15 / 12 |
| DMD • • -05B5 (ball screw) | | 61 / 37 |
| DMD • • -10B5 (ball screw) | | 30 / 19 |
| DMD • • -20B5 (ball screw) | | 15 / 12 |
| DMD • • -21B5 (ball screw) | | 15 / 11 |
| Available input voltages | [Vdc] | 12, 24, 36 |
| Standard stroke lengths | [in] | 4, 6, 8, 10, 12, 14, 16, 18, 20, 24 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °C | [%] | 25 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 0 |
| Lead cross section | [$mm^2$] | 2,5 |
| Cable length | [mm] | 2000 |
| Protection class | | IP65 |

## Compatible Controls

| Control.model | See.page |
|---|---|
| DPDT switch | 53 |
| DCG-190 | 58 |
| AC-063 | 54 |

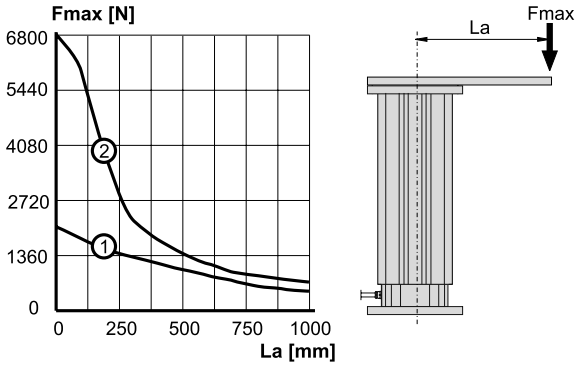
# Lifting.Column.DMD

## 12, 24 and 36 Vdc - load up to 6800 N




S: stroke L: retracted length

## Off Center Load Capacity




Fmax: maximum load operated La: length of lever arm

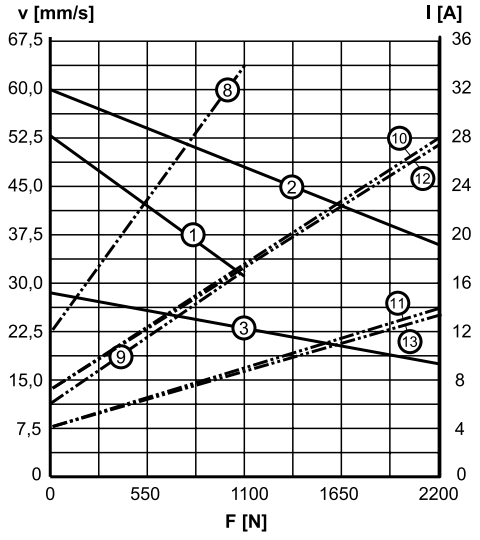
1: acme screw models
2: ball screw models

| Stroke.(S) | [inch.(mm)] | 4 (101,6) | 6 (152,4) | 8 (203,2) | 10 (254,0) | 12 (304,8) | 14 (355,6) | 16 (406,4) | 18 (457,2) | 20 (508,0) | 24 (609,6) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Retracted.length.(L),.acme.screw.models | [mm] | 329,6 | 380,4 | 431,2 | 482,0 | 532,8 | 633,6 | 684,4 | 735,2 | 786,0 | 887,6 |
| Retracted.length.(L),.ball.screw.models | [mm] | 369,6 | 420,4 | 471,2 | 522,0 | 572,8 | 673,6 | 724,4 | 775,2 | 826,0 | 927,6 |
| Add.on.length.for.potentiometer* | [mm] | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 |
| Weight,.acme.screw.models | [kg] | 18,7 | 20,2 | 21,6 | 23,1 | 24,6 | 27,3 | 28,7 | 30,2 | 31,7 | 34,6 |
| Weight,.ball.screw.models | [kg] | 20,4 | 21,9 | 23,4 | 24,8 | 26,3 | 29,0 | 30,4 | 31,9 | 33,4 | 36,3 |
| Add.on.weight.for.potentiometer* | [kg] | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 |

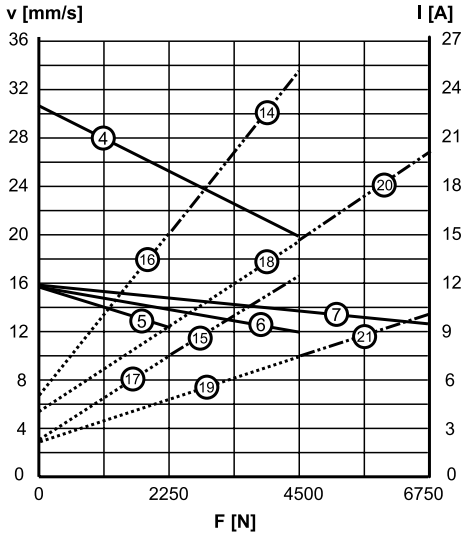
* Potentiometer is optional

## Performance Diagrams

### Speed and Current vs. Load - Chart 1




### Speed and Current vs. Load - Chart 2




V: speed I: current F: load

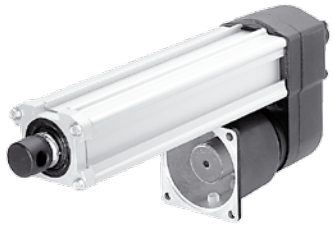
1: speed DMD • • -05A5 - chart 1
2: speed DMD • • -05B5 - chart 1
3: speed DMD • • -10A5 - chart 1
4: speed DMD • • -10B5 - chart 2
5: speed DMD • • -20A5 - chart 2
6: speed DMD • • -20B5 - chart 2
7: speed DMD • • -21B5 - chart 2
8: current DMD12-05A5 - chart 1
9: current DMD24-05A5 - chart 1
10: current DMD12-05B5 - chart 1
11: current DMD24-05B5 - chart 1
12: current DMD12-10A5 - chart 1
13: current DMD24-10A5 - chart 1
14: current DMD12-10B5 - chart 2
15: current DMD24-10B5 - chart 2
16: current DMD12-20A5 - chart 2
17: current DMD24-20A5 - chart 2
18: current DMD12-20B5 - chart 2
19: current DMD24-20B5 - chart 2
20: current DMD12-21B5 - chart 2
21: current DMD24-21B5 - chart 2

Contact customer service for data on 36 Vdc models.

# Electrak Non-driven Actuator FA14

» Ordering Key - see page 71
» Glossary - see page 72

## Load up to 6800 N



## Standard Features and Benefits

- Actuator with a flange where a customer supplied motor can be mounted
- Rugged and robust
- Withstands very harsh environments
- Stainless steel extension tube
- Corrosion free aluminium cover tube
- Acme or ball screw drive
- Trunnion mounting possible
- Overload clutch for mid and end of stroke protection
- T-slot grooves in the cover tube for magnetic sensors
- Maintenance free

## General Specifications

| Parameter | FA14 |
|---|---|
| Screw type | acme or ball |
| Internally restrained | yes |
| Manual override | no |
| Holding brake<br>acme screw versions<br>ball screw versions | <br>no, self-locking<br>yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Certificates | CE |
| Options | • manual override<br>• alternative adaptor positions<br>• custom color* |

* Contact customer support

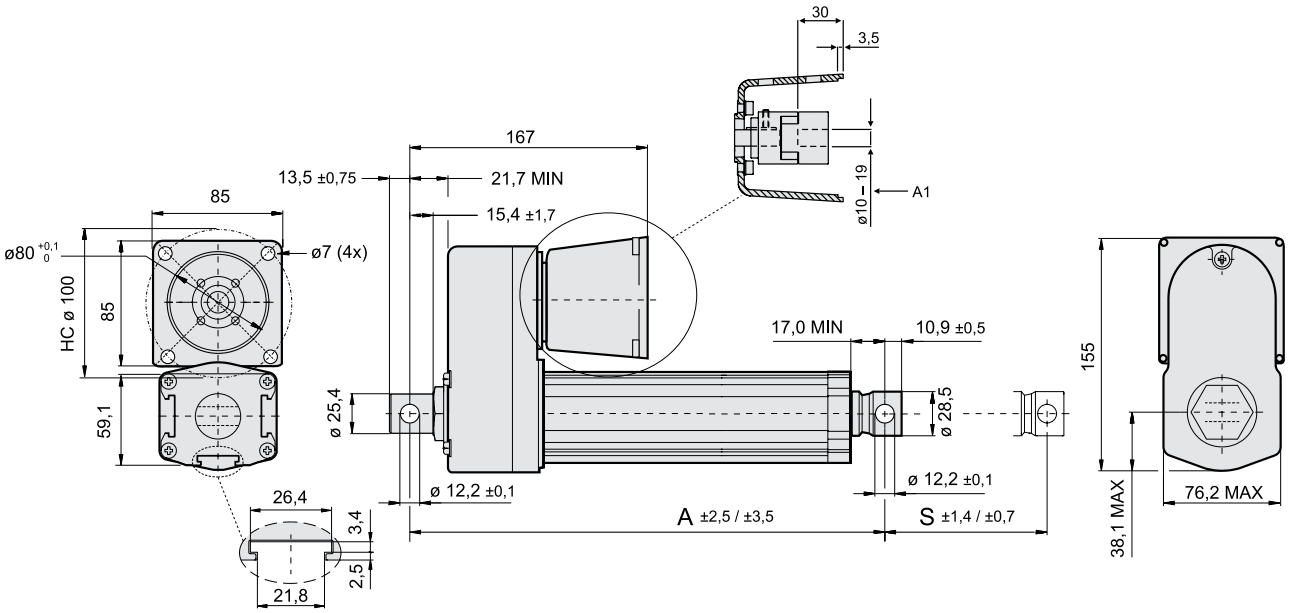
## Performance Specifications

| Parameter | | FA14 |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| FA14-05A65 (acme screw) | | 1100 / 11350 |
| FA14-10A65 (acme screw) | | 2250 / 11350 |
| FA14-20A65 (acme screw) | | 2250 / 11350 |
| FA14-05B65 (ball screw) | | 2250 / 18000 |
| FA14-10B65 (ball screw) | | 4500 / 18000 |
| FA14-20B65 (ball screw) | | 4500 / 18000 |
| FA14-21B65 (ball screw) | | 6800 / 18000 |
| Maximum speed at max. load* | [mm/s] | |
| FA14-05A65 (acme screw) | | 32 |
| FA14-10A65 (acme screw) | | 18 |
| FA14-20A65 (acme screw) | | 12 |
| FA14-05B65 (ball screw) | | 37 |
| FA14-10B65 (ball screw) | | 19 |
| FA14-20B65 (ball screw) | | 12 |
| FA14-21B65 (ball screw) | | 11 |
| Maximum input torque | [Nm] | 1,8 |
| Maximum input speed | [rpm] | 3000 |
| Standard stroke lengths | [mm] | 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550 ,600 |
| Operating temperature limits | [°C] | -25 – +65 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 0 |

* Recommended maximum speed

# Electrak Non-driven Actuator FA14

## Load up to 6800 N




S: stroke, tolerance acme / ball screw
A: retracted length, tolerance acme / ball screw
A1: minimum/maximum input shaft bore in the coupling

| Stroke (S) | [mm] | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Retracted length (A), acme screw models | [mm] | 216,7 | 266,7 | 316,7 | 366,7 | 416,7 | 466,7 | 566,7 | 616,7 | 666,7 | 716,7 | 766,7 | 816,7 |
| Retracted length (A), ball screw models | [mm] | 269,6 | 319,6 | 369,6 | 419,6 | 469,6 | 519,6 | 619,6 | 669,6 | 719,6 | 769,6 | 819,6 | 869,6 |
| Weight, acme screw models | [kg] | 3,5 | 3,7 | 4,0 | 4,2 | 4,5 | 4,7 | 5,0 | 5,2 | 5,5 | 5,7 | 6,0 | 6,3 |
| Weight, ball screw models | [kg] | 4,2 | 4,5 | 4,7 | 5,0 | 5,2 | 5,5 | 5,7 | 6,0 | 6,2 | 6,5 | 6,7 | 7,0 |

# Ordering Keys

## Non-driven Actuators

### Electrak PPA-M

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| PPA00 - | 01B65 - | 24 | N-XXX |

**1. Model**
PPA00 - = Electrak PPA-M

**2. Dynamic load capacity**
01B65 - = 6670 N

**3. Stroke**
04 = 4 inch (101,6 mm)
06 = 6 inch (152,4 mm)
08 = 8 inch (203,2 mm)
12 = 12 inch (304,8 mm)
18 = 18 inch (457,2 mm)
24 = 24 inch (609,6 mm)
36 = 36 inch (914,4 mm)

**4. Bellows option**
N-XXX = no bellows
N-XXC = bellows

### FA14

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| FA14 - | 10A65M | 35 | M2 | |

**1. Model**
FA14 - = Electrak FA14

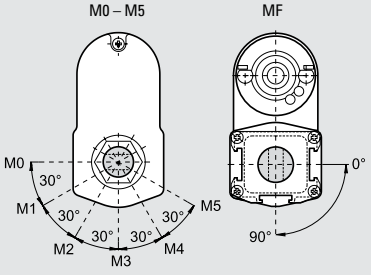
**2. Dynamic / static load capacity and screw type**
05A65M = 1100 / 11350 N, acme
10A65M = 2250 / 11350 N, acme
20A65M = 2250 / 11350 N, acme
05B65M = 2250 / 18000 N, ball
10B65M = 4500 / 18000 N, ball
20B65M = 4500 / 18000 N, ball
21B65M = 6800 / 18000 N, ball

**3. Stroke**
05 = 50 mm
10 = 100 mm
15 = 150 mm
20 = 200 mm
25 = 250 mm
30 = 300 mm
35 = 350 mm
40 = 400 mm
45 = 450 mm
50 = 500 mm
55 = 550 mm
60 = 600 mm

**4. Adapter hole positions**[1]
M0 = rear adaptor 0° (standard)
M1 = rear adaptor 30°
M2 = rear adaptor 60°
M3 = rear adaptor 90°
M4 = rear adaptor 120°
M5 = rear adaptor 150°
MF = rear and front adaptor 90°

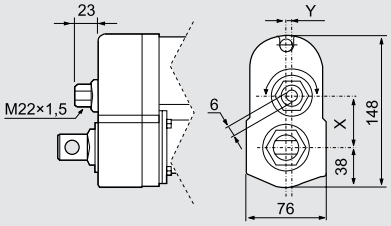
**5. Options**[2]
NHW = manual override[3]

[1] Definition of adapter hole positons.




[2] Leave position blank for no option.

[3] Dimensions for manual override option.




| Model | X | Y |
|---|---|---|
| 05A(B)65M | 49,6 | 0,0 |
| 10A(B)65M | 43,3 | 5,2 |
| 20(21)A(B)65M | 38,9 | 0,0 |

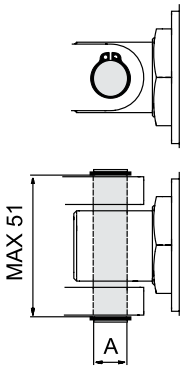
# Accessories and Spare Parts

## Mounting Components

### Mounting Pin Kits

| Designation | Compatible Actuators | A [mm] | Part Number |
|---|---|---|---|
| Mounting pins (pair) | Electrak 10, Electrak 5 | 12,7 | D603 028 |
| Mounting pins (pair) | Electrak FA14 | 12 | D603 029 |

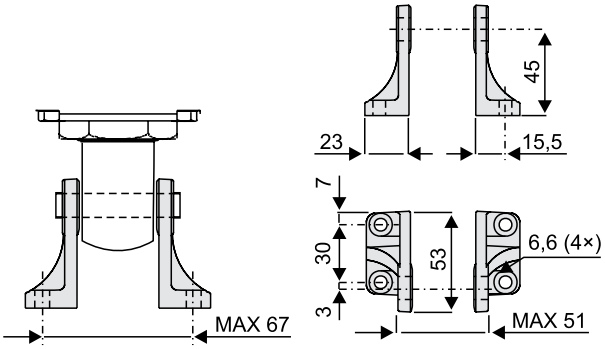
The mounting pins are used in the rear and front adapter holes of the actuator. The pins have a groove in each end so that it can be secured with snap rings.




### Mounting Pin Bracket Kits

| Designation | Compatible Actuators | Part Number |
|---|---|---|
| Mounting pin brackets (pair) | Electrak FA14 | D603 028 |

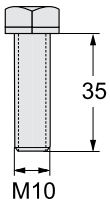
The mounting pin brackets are used to attach the front and rear adapter via a pair of mounting pins to the objects to which it is mounted.




### T-slot Bolt

| Designation | Compatible Actuators | Part Number |
|---|---|---|
| M10 T-slot bolt | DMD, DMA | D800041 |

The T-slot bolt fits in to the T-slot running along the outer profile of DMD and DMA lifting columns. The T-slot bolts can be used to mount the unit instead of using the upper mounting plate, or/and for attaching other components to the profile.



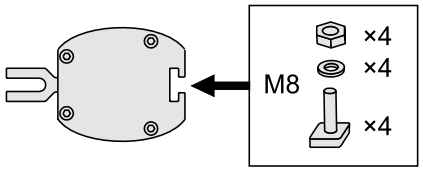
# Accessories and Spare Parts

## Mounting Components

### T-slot Mounting Kit

| Designation | Compatible Actuators | Part Number |
|---|---|---|
| M8 T-slot mounting kit | LM80-H, LM80-V | D680507 |

The T-slot mounting kit consists of four T-slot bolts, washers and nuts that fit in to the T-slot running along the profile of LM80 rodless actuators. The T-slot mounting kit can be used to mount the unit or/and for attaching other components to the profile.

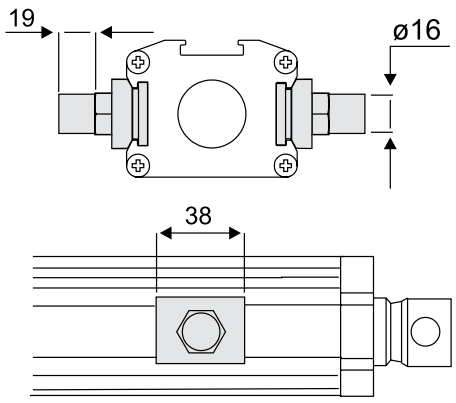



### FA14 Trunnion Mounting Kits

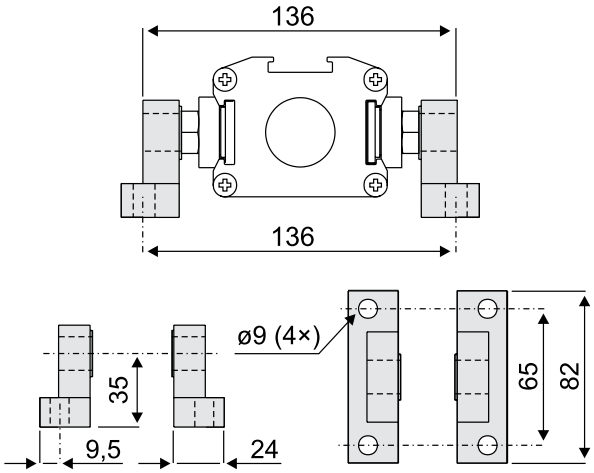
| Designation | Compatible Actuators | Part Number |
|---|---|---|
| Electrak FA14 trunnions (pair) | Electrak FA14 | D603 022 |
| Electrak FA14 trunnion brackets (pair) | Electrak FA14 | D603 030 |

The trunnions can be mounted to the T-slot running along the right and left side of the cover tube on an Electrak FA14.

**Electrak FA14 Trunnions**




**Electrak FA14 Trunnion Brackets**



# Accessories and Spare Parts

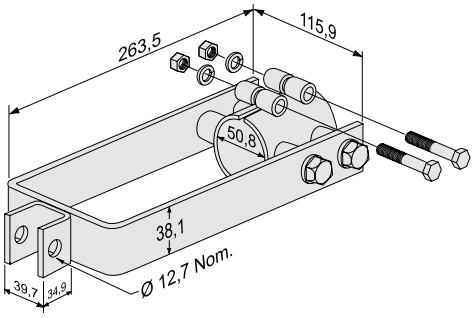
## Mounting Components

### PPA Rear Clevis Mounting Kits

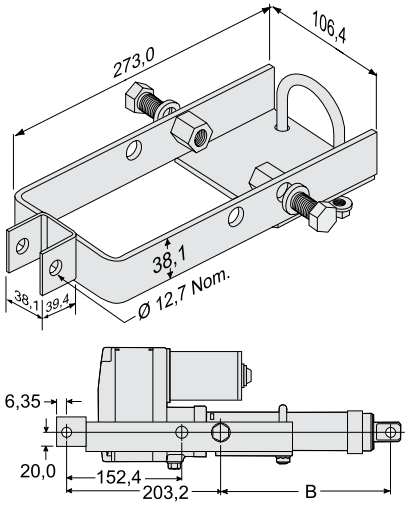
| Designation | Compatible Actuators | Part Number |
|---|---|---|
| PPA rear clevis mounting kit for DC actuators | Electrak PPA-DC | 7827320 |
| PPA rear clevis mounting kit | Electrak PPA-DC, Electrak PPA-AC | 7824295 |

The rear clevis mounting kits are attached to the tube of an Electrak PPA actuator allowing the actuator to be mounted clevis to clevis style. Note that one of the kits fits both PPA-DC and PPA-AC actuators while the other only fits PPA-DC actuators.

**PPA Rear Clevis Mounting Kit**




**PPA Rear Clevis Mounting Kit for DC Actuators**



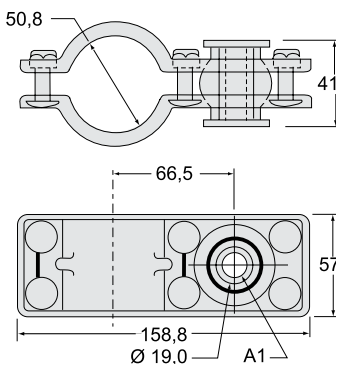

B: retracted length to trunnion, also see product pages.

### PPA Tube Mounting Kits

| Designation | Compatible Actuators | Part Number |
|---|---|---|
| Electrak PPA tube mount - light duty 3330 N | Electrak PPA-DC, Electrak PPA-AC | 7822520 |
| Electrak PPA tube mount - heavy duty 6670 N | Electrak PPA-DC, Electrak PPA-AC | 7821783 |

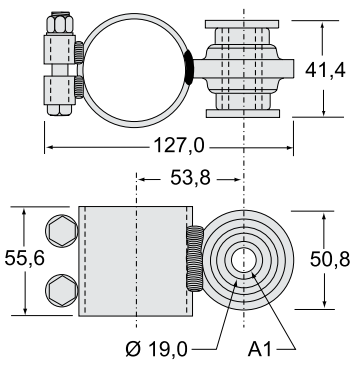
The tube mounting kits work as a clamp that is mounted at any desired position along the actuator tube. Trunnion pins for the tube mount clamp are supplied and mounted by the customer.

**Electrak PPA Tube Mount - Light Duty 3330 N**




A1: hole diameter 12,7 with bushing.

**Electrak PPA Tube Mount - Heavy Duty 6670 N**




A1: hole diameter 12,7 with bushing.

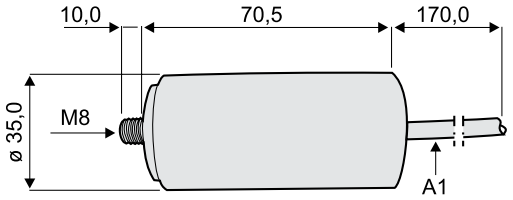
# Accessories and Spare Parts

## Electrical Components

### Capacitor Kits

| Designation | Compatible Actuators | Actuator Supply Voltage | Part Number |
|---|---|---|---|
| Capacitor kit 35 µF | Electrak 5, DMA | 115 Vac | 9200-448-002 |
| Capacitor kit 10 µF | Electrak 5, DMA | 230 Vac | 9200-448-003 |

All AC actuators, except Electrak PPA-AC and E5 with 400 Vac motor, require a capacitor to be wired between the motor windings to run. Also see the Electrical Wiring Diagrams section.




A1: cable 2 × 0,75 mm²

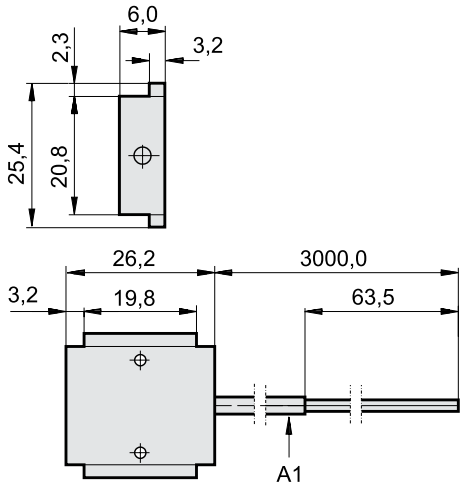
### Magnetic Sensor

| Designation | Compatible Actuators | Contact Type | Part Number |
|---|---|---|---|
| Magnetic sensor | Electrak FA14 | normally open | D535 070 |
| Magnetic sensor | Electrak FA14 | normally closed | D535 071 |

### Specifications

| Parameter | | |
|---|---|---|
| Maximum power | [W] | 10 |
| Maximum voltage | [Vdc] | 43 |
| Maximum current | [A] | 0,5 |
| Maximum contact resistance | [ohm] | 0,2 |
| Lead cross section | [mm²] | 2 × 0,12 |
| Cable length | [mm] | 3000 |
| Protection class | | IP67 |

The magnetic sensor fits in to the T-slot running along three sides of the cover tube on an Electrak FA14. The sensors can be used with AC-063 controls that have limit switch inputs. The cable is molded into the switch.




A1: cable 2 × 0,12 mm²

# Accessories and Spare Parts

## Electrical Components

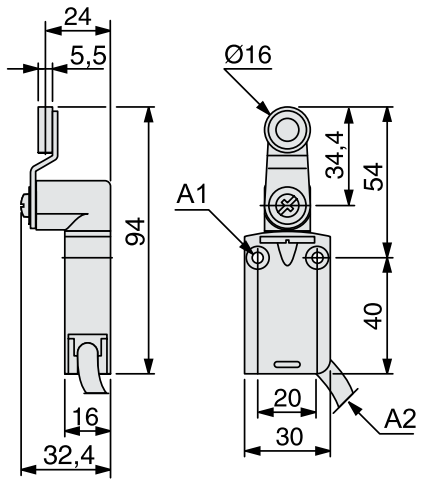
### Limit Switches

| Designation | Cable Length | Part Number |
|---|---|---|
| Limit switch | 1 m | 671 545 0281 |
| Limit switch | 5 m | 671 545 0290 |
| Limit switch | 10 m | 671 545 0299 |

### Specifications

| Parameter | | |
|---|---|---|
| Maximum voltage | [V] | 240 |
| Maximum current | [A] | 1,5 |
| Lead cross section | [mm²] | 5 × 0,75 |
| Contact type | | 1 NO + 1 NC |
| Protection class | | IP67 |

The limit switches can be used with AC-063 controls that have limit switch inputs. The cable is molded into the switch.

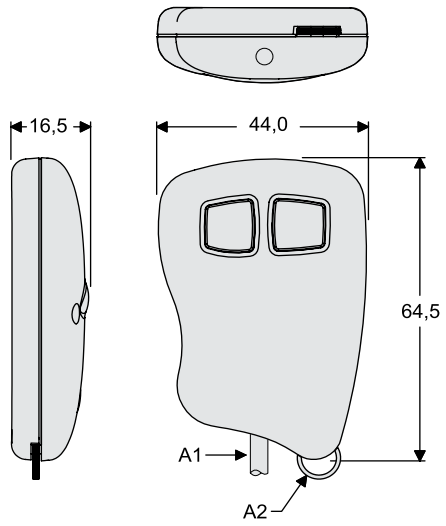



A1: 2 × mounting holes ø 4,2, counterbored ø 8 mm by 4 mm deep
A2: cable ø 7,5 mm

### Electrak Pro Programming Unit

| Designation | Part Number |
|---|---|
| Programming Unit | 9200-101-045 |

If an Electrak Pro actuator is equipped with the programmable limit switch option the programming unit is necessary to be able to program the limit switch positions.




A1: cable
A2: key ring

# Accessories and Spare Parts

## Spare Parts

### Electrak Pro Spare Parts

| Designation | Part Number |
|---|---|
| Electrak Pro mating connector | 9200-101-042 |
| Electrak Pro mating connector with 1 m pigtail | 9200-101-043 |
| Electrak Pro manual override seal | 9200-680-001 |

# Ball Screws — Inch Series





## Table of Contents


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|---|---|
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| Precision Rolled Ball Screws — Inch Series | 42 |
| Visual Product Reference — Precision Rolled Ball Screws — Inch Series | 87 |
| Precision Plus Ground Ball Screws — Inch Series | 97 |


Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

# Ball Screws Product Overview

## Thomson Advantages

Ball screws are not all alike. Differences in design, quality, materials, manufacturing, and application support are all factors that affect the performance and extend the life of your ball screw. That's why it's important to select your ball screw — and ball screw supplier — very carefully.

**Design: Optimal solution for your application needs**
The Thomson engineering team has painstakingly evaluated the breadth of ball screw products from BSA, Warner Linear, and Thomson Industries and integrated them into a single, comprehensive, product offering. Our new line of ball screws come in a full range of diameters, leads, and ball nut configurations, in either preloaded or non-preloaded types, all in industry-standard envelopes. They provide dependable accuracy and repeatability at an economical price.

**Quality: Reliability and consistent performance**
At Thomson, we pride ourselves in consistently providing high quality ball screws. Our background in flight critical aerospace and defense applications uniquely positions us to provide the highest levels of quality across all our ball screw products. Our fully equipped engineering laboratory performs qualification testing for mechanical performance, environmental effects, and structural integrity. Your ball screw is inspected every step of the way to ensure top quality and performance. The result, Thomson ball screws perform the way you expect them to perform — no surprises, no problems.

**Materials: Just the right custom and standard offerings**
The materials used to manufacture ball screws are critical to their performance. Our in-house metallurgists control and verify that the materials used are of the highest quality. They can also select and recommend materials best suited to your particular application. We have years of experience working with a wide range of standard and non-standard materials. Put our experience and expertise to work for you!

**Manufacturing: Ensures consistent quality and delivery**
Thomson maintains the most modern and complete ball screw manufacturing facilities in the industry. In-house manufacturing capabilities include our proprietary heat treating and plating processes. Expert manufacturing using the most modern equipment available provides ball screws that set the standards for performance, precision, and travel life.

**Application Support: Over 70 years of experience at your disposal**
Working with Thomson is like having your own staff of ball screw design engineers able to address application concerns and recommend solutions. Thomson field sales and applications engineering personnel have more ball screw expertise than any other group in the industry. They are skilled at evaluating your requirements and designing assemblies that fit your needs.



**Catalog Standard Ball Screws feature a high luster polished and oil finish.**

# Inch Ball Screws Product Overview

## Rolled Screws — Product Availability[1], Accuracy and Axial Play

| Screw Diameter | Accuracy | Max. Axial Backlash (Non-preloaded)[2] |
|---|---|---|
| 0.187" to 4.000" | ± .004 in/ft | 0.002 to 0.015" |

| | Inch | Lead (in.) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.050 | 0.062 | 0.125 | 0.200 | 0.250 | 0.413 | 0.473 | 0.500 | 0.660 | 1.000 | 1.500 | 1.875 | 2.000 |
| Dia. (in.) | 0.187 | ● | ● | | | | | | | | | | | |
| | 0.375 | | | ● | | | | | | | | | | |
| | 0.500 | | | | ● | | | | ● | | | | | |
| | 0.631 | | | | ● | | | | | | ● | | | |
| | 0.750 | | | | ● | | | | ● | | | | | |
| | 0.875 | | | | ● | | | | | | | | | |
| | 1.000 | | | | | ● | | | ● | | ● | | | |
| | 1.150 | | | | ● | | | | | | | | | |
| | 1.171 | | | | | | ● | | | | | | | |
| | 1.500 | | | | | ● | | ● | ● | | ● | | ● | ● |
| | 2.000 | | | | | | | | ● | | ● | | | |
| | 2.250 | | | | | | | | ● | | ● | | | |
| | 2.500 | | | | | ● | | | ● | | ● | | | |
| | 3.000 | | | | | | | | | ● | | ● | | |
| | 4.000 | | | | | | | | | | ● | | | |

## Ground Screws — Product Availability[1], Accuracy and Axial Play

| Screw Diameter | Accuracy | Max. Axial Backlash |
|---|---|---|
| 0.500" to 2.500" | ± .0005 in/ft | 0" |

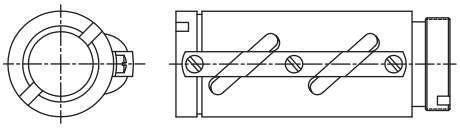
| | Inch | Lead (in.) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.050 | 0.062 | 0.125 | 0.200 | 0.250 | 0.413 | 0.473 | 0.500 | 0.660 | 1.000 | 1.500 | 1.875 | 2.000 |
| Dia. (in.) | 0.631 | | | | ● | | | | | | | | | |
| | 0.750 | | | | ● | | | | | | | | | |
| | 0.875 | | | | ● | | | | | | | | | |
| | 1.000 | | | | ● | ● | | | | | | | | |
| | 1.150 | | | | ● | | | | | | | | | |
| | 1.250 | | | | ● | | | | ● | | | | | |
| | 1.500 | | | | ● | ● | | | ● | | | | | |
| | 1.750 | | | | ● | | | | | | | | | |
| | 2.000 | | | | ● | | | | | | | | | |
| | 2.250 | | | | | | | | ● | | | | | |
| | 2.500 | | | | | ● | | | | | | | | |

(1) Additional sizes are available. See our comprehensive product reference section on page 87, or contact customer service for more details.

(2) Standard lash dependent on ball diameter. See page 237 as reference. Consult factory for special requirements.

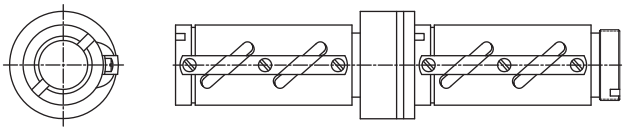
# Precision Rolled Ball Screws Product Overview — Inch Series

## Standard Non-Preloaded Ball Nuts



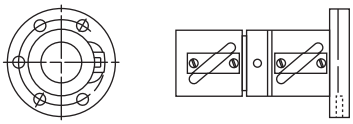
Standard Non-Preloaded Ball Nuts are a flexible, economical solution for use in industrial, transport grade applications. Both round and square models are available, with flange and wiper kits as accessories. Non-Preloaded Ball Nuts come standard with black-oxide coating (thin dense chrome is available upon request).

## Preloaded Ball Nuts



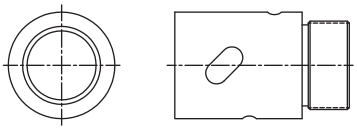
Preloaded Ball Nuts should be considered to eliminate backlash and increase system stiffness in applications where multi-directional positional accuracy and repeatability are required. Preloaded Ball Nuts consist of two non-preloaded ball nuts (round or square) joined by an adjustable preload package with springs. This design allows ease of setup and adjust of preload based on application requirements.

## Preloaded Ball Nuts with Integral Flange



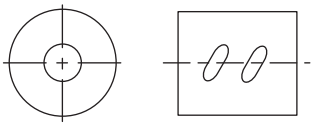
Preloaded Ball Nuts with Integral Flange provide higher-level positional accuracy and repeatability from a rolled screw assembly. These adjustable preload ball nuts feature precision ground internal threads, which enable smoother running, more consistent performance. The integral flange is held to high perpendicularity tolerances to ensure the load bearings are aligned to load to prevent unnecessary wear.

## Internal Return Ball Nuts



Internal Return Ball Nuts feature an internal ball recirculation sytem, which allows higher speeds, and lower noise in a compact envelope. Each nut includes an integrated wiper as standard. These ball nuts come standard “as machined” with corrosion protective film applied prior to shipment. machined” with corrosion protective film applied prior to shipment. Please note, a full line of internal return ball nuts are featured as part of our metric series ball screws.

## Cylindrical Ball Nuts



Cylindrical Ball Nuts are compact in size and ideal for constrained envelopes. These ball nuts come standard “as machined” with corrosion protective film applied prior to shipment. Please note, a full line of cylindrical ball nuts are featured as part of our metric series ball screws.

## High Capacity Ball Nuts

High Capacity Ball Nuts provide higher static and dynamic load capacities than our standard nuts. These ball nuts are typically longer than standard nuts, allowing for more balls in contact with the screw. High capacity nuts may also include larger balls than those found in standard ball nuts.

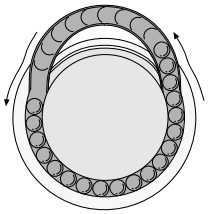
## High Speed Ball Nuts

High Speed Ball Nuts are designed to permit higher linear speeds in applications where critical speed of the ball nut (DN value) limits performance in an application. These ball nuts feature solid deflectors and reinforced ball return guides to allow smooth, reliable transition of balls entering and exiting the return system at high speeds.

# Precision Rolled Ball Screws Product Overview — Inch Series



### Tangential Ball Return



A unique Thomson feature which minimizes recirculated bearing ball deflection, for smoother and quieter operation. The tangential circuit consists of a pick-up deflector finger and modified return tube which allows the bearing balls to enter and exit the load carrying portion of the ball screw circuit in a straight path. Standard on ball bearing screws with up to 10,000 pound dynamic load capabilities.

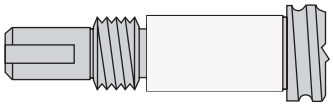
### Load Locking Spring

The load locking spring is a coil turned into the inactive portion of the nut and conforms to the ball tract. In normal operation, the spring is inactive and not in contact with the screw. In the event the ball bearings are lost from the nut, the load locking spring will not allow the load carrying nut to free-fall down the screw.

### End Journals and Bearing Supports

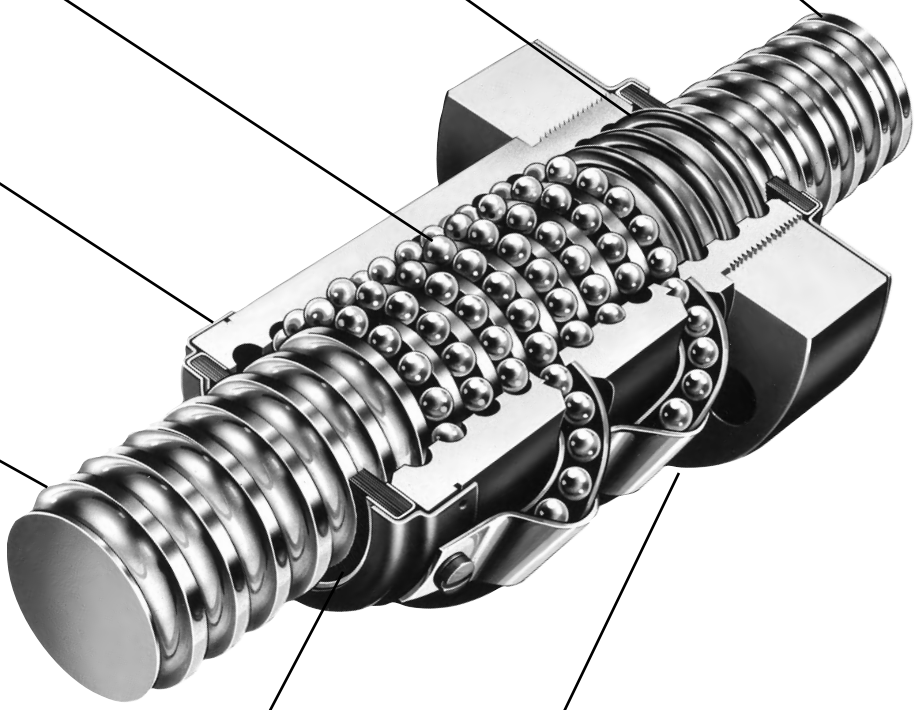
To assist the designer, standard end journals and bearing supports are included in this catalog. Ball screw assemblies, complete with end journals and bearing supports, may be ordered through a local Thomson distributor or directly from the factory.

Thomson welcomes the opportunity to custom machine end journals to unique customer designs.



### Lube Holes

A standard 1/8-27 NPT tapped hole on ball nuts with a dynamic load capacity of 10,000 pounds or more provides easy access for continuing lubrication.

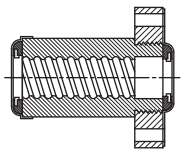


### Coating

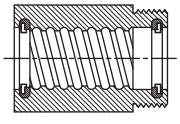
Our catalog standard ball screws feature a high luster polished and oiled finish, which provides superior surface finish, smoother operation, and a high quality look and feel which is consistent across our entire product line. Additional ball screw coatings (thin dense chrome, black oxide, manganese phosphate) are available upon request.

### Wiper Kit

Wipers can increase the life and long-term performance of ball bearing screws by preventing most dirt and other foreign matter from entering the ball nut. Wipers are attached via two methods: Type A attaches directly to the ball nut body and flange; and Type B installs into the ends of the ball nut with easy-to-install snap rings kits. See our installation section on page 227 for more details.



Type A



Type B

### Flanges

Standard flanges are offered for all ball nuts. Flanges provide an easy, low cost method to mount the load square and concentric to the ball screw.

# 0.187 x 0.050 Precision Rolled Ball Screws — Inch Series

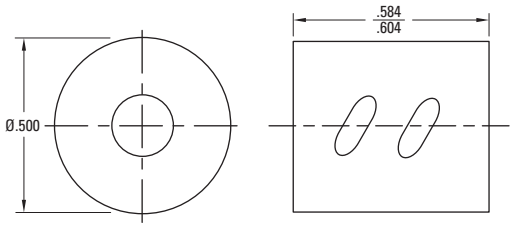
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.187 x 0.050 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.1 |
| **Screw Root Diameter (in.)** | 0.14 |
| **Nominal Ball Diameter (in.)** | 0.039 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | | | 12" |
| **Maximum Length** | | | 12" |
| **Part Number** | | | **7821634** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Cylindrical Ball Nut, Internal Return — Stainless Steel




| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | | | 20 |
| **Max. Static Load (lbs)** | | | 75 |
| **Torque to raise 1 lb (oz-in.)** | | | 0.14 |
| **Nut weight (lbs)** | | | 0.005 |
| **Ball Nut Part Number** | | | **7821609** |
| **Flange Part Number** | | | **N/A** |
| **Wiper Kit Part Number** | | | **N/A** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.187 x 0.062 Precision Rolled Ball Screws — Inch Series

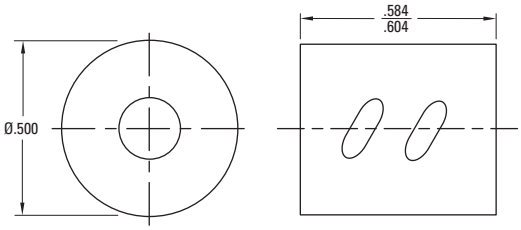
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.187 x 0.062 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.1 |
| **Screw Root Diameter (in.)** | 0.14 |
| **Nominal Ball Diameter (in.)** | 0.039 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | | | 12" |
| **Maximum Length** | | | 12" |
| **Part Number** | | | **7821633** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Cylindrical Ball Nut, Internal Return — Stainless Steel




| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | | | 20 |
| **Max. Static Load (lbs)** | | | 75 |
| **Torque to raise 1 lb (oz-in.)** | | | 0.18 |
| **Nut weight (lbs)** | | | 0.005 |
| **Ball Nut Part Number** | | | **7821579** |
| **Flange Part Number** | | | **N/A** |
| **Wiper Kit Part Number** | | | **N/A** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.375 x 0.125 Precision Rolled Ball Screws — Inch Series

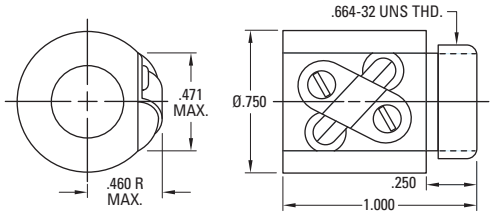
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.375 x 0.125 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.3 |
| **Screw Root Diameter (in.)** | 0.30 |
| **Nominal Ball Diameter (in.)** | 0.063 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 48" | 48" | 48" |
| **Maximum Length** | 48" | 48" | 48" |
| **Part Number** | **5707538** | **5708532** | **5706540** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Single Circuit, Round Ball Nut

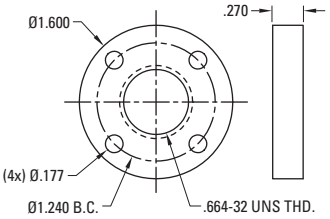



| **Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | 136 | 136 | 24 |
| **Max. Static Load (lbs)** | 1415 | 1415 | 255 |
| **Torque to raise 1 lb (oz-in.)** | 0.35 | 0.35 | 0.35 |
| **Nut weight (lbs)** | 0.13 | 0.13 | 0.13 |
| **Ball Nut Part Number** | **5709574** | **5709576** | **5709578** |
| **Flange Part Number** | **5706751** | **5706751** | **N/A** |
| **Wiper Kit Part Number** | **N/A** | **N/A** | **N/A** |

## Flange Kit

| | | |
|---|---|---|
| **Wiper Part Number** | **N/A** | |
| **Flange Part Number** | **5706751** | |

### Flange




Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.375 x 0.125 Precision Rolled High Capacity Ball Screws — Inch Series

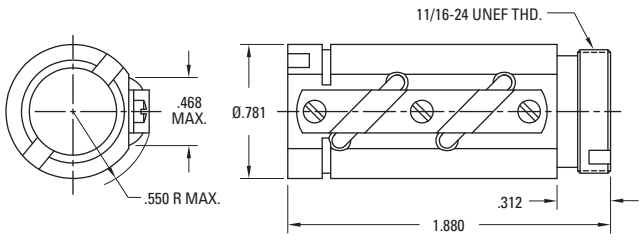
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.375 x 0.125 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.3 |
| **Screw Root Diameter (in.)** | 0.31 |
| **Nominal Ball Diameter (in.)** | 0.078 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 72" | | |
| **Part Number** | **190-9441** | | |

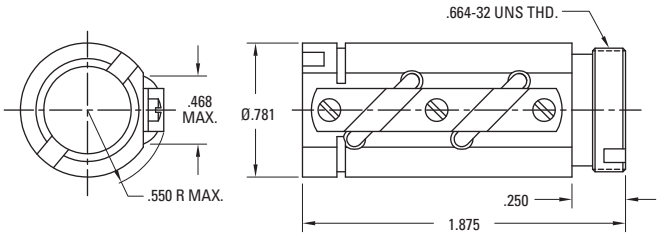
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock (11/16 - 24 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 500 | |
| **Max. Static Load (lbs)** | 4,250 | |
| **Torque to raise 1 lb (oz-in.)** | 0.35 | |
| **Nut weight (lbs)** | 0.16 | |
| **Ball Nut Part Number** | **8103-448-003** | |
| **Flange Part Number** | **8103-448-002** | |
| **Wiper Kit Part Number** | **8103-101-002** | |

## Double Circuit, Round Ball Nut with Load Lock (.664 - 32 V-Thread)

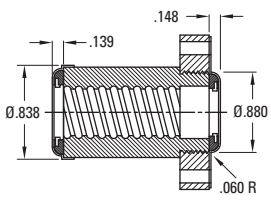



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 500 | |
| **Max. Static Load (lbs)** | 4,250 | |
| **Torque to raise 1 lb (oz-in.)** | 0.35 | |
| **Nut weight (lbs)** | 0.16 | |
| **Ball Nut Part Number** | **8103-448-013** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **8103-101-002** | |

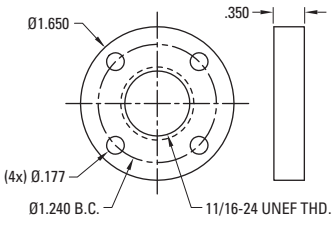
## Wiper and Flange Kits

| **Wiper Part Number** | **8103-101-002** | |
|---|---|---|
| **Flange Part Number** | **8103-448-002** | |

**Wiper**




**Flange**




Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.500 x 0.200 Precision Rolled Ball Screws — Inch Series

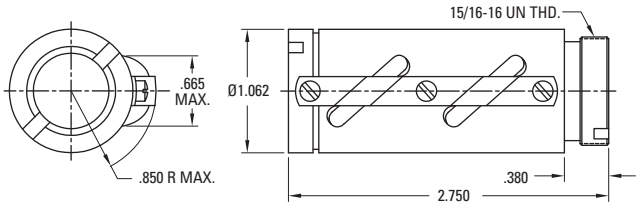
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.500 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.7 |
| **Screw Root Diameter (in.)** | 0.41 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 72" | | |
| **Part Number** | **190-9097** | | |

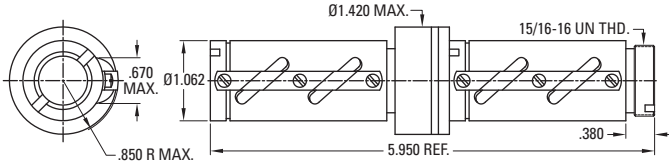
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,200 | |
| **Max. Static Load (lbs)** | 9,430 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.55 | |
| **Ball Nut Part Number** | **8105-448-013** | |
| **Flange Part Number** | **8105-448-002** | |
| **Wiper Kit Part Number** | **8105-101-002** | |

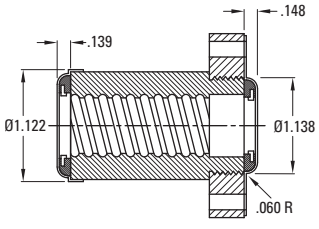
## Preloaded, Double Circuit, Round Ball Nut with Load Lock



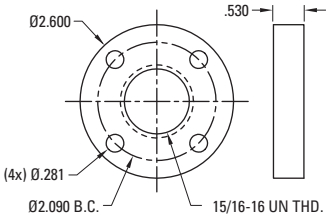

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,200 | |
| **Max. Static Load (lbs)** | 9,430 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 1.30 | |
| **Ball Nut Part Number** | **8105-448-008** | |
| **Flange Part Number** | **8105-448-002** | |
| **Wiper Kit Part Number** | **8105-101-002** | |

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8105-101-002** | |
|---|---|---|
| **Flange Part Number** | **8105-448-002** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.500 x 0.500 Precision Rolled Ball Screws — Inch Series

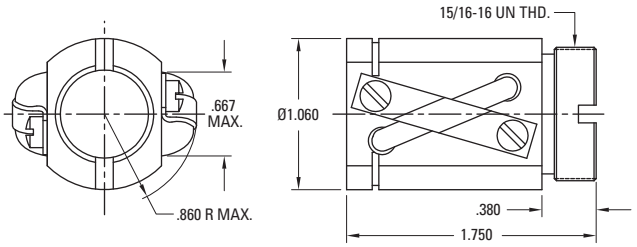
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.500 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.7 |
| **Screw Root Diameter (in.)** | 0.41 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | 72" |
| **Maximum Length** | 72" | | 72" |
| **Part Number** | **190-9096** | | **190-9010** |

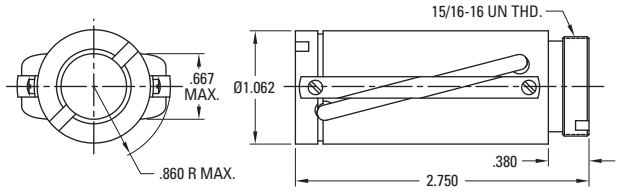
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 929 | |
| **Max. Static Load (lbs)** | 4,150 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 0.27 | |
| **Ball Nut Part Number** | **8105-448-014** | |
| **Flange Part Number** | **8105-448-002** | |
| **Wiper Kit Part Number** | **8105-101-002** | |

## Double Circuit, Round Ball Nut with Load Lock — High Capacity

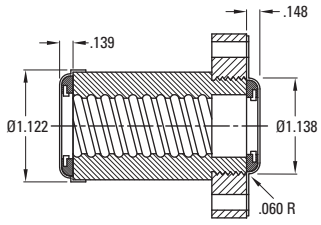



| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | 2,200 | | 380 |
| **Max. Static Load (lbs)** | 13,350 | | 1,950 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | | 1.42 |
| **Nut weight (lbs)** | 0.40 | | 0.40 |
| **Ball Nut Part Number** | **8105-448-011** | | **8105-448-016**(1) |
| **Flange Part Number** | **8105-448-002** | | **8105-448-004** |
| **Wiper Kit Part Number** | **8105-101-002** | | **8105-101-002** |

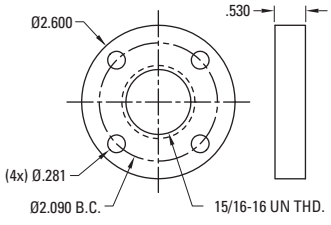
(1) Load Lock not available

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8105-101-002** | | **8105-101-002** |
|---|---|---|---|
| **Flange Part Number** | **8105-448-002** | | **8105-448-004** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.631 x 0.200 Precision Rolled Ball Screws — Inch Series

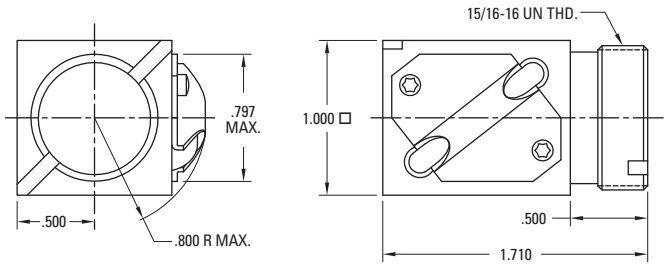
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.631 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.9 |
| **Screw Root Diameter (in.)** | 0.50 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | 72" | 72" |
| **Maximum Length** | 144" | 144" | 72" |
| **Part Number** | **190-9098** | **190-9099** | **5705378** |

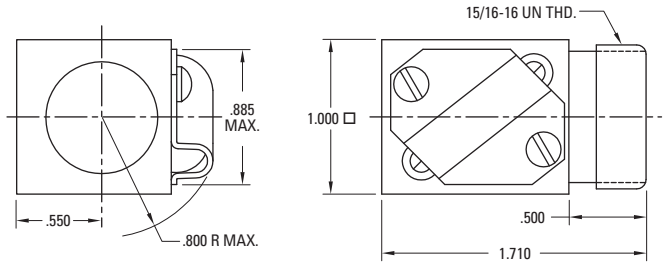
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Single Circuit, Square Ball Nut with Load Lock



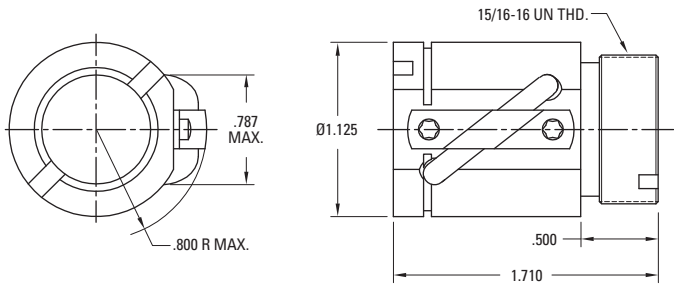

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 800 | 800 |
| **Max. Static Load (lbs)** | 6,384 | 6,384 |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | 0.57 |
| **Nut weight (lbs)** | 0.27 | 0.27 |
| **Ball Nut Part Number** | **8106-448-022** | **8106-448-026** |
| **Flange Part Number** | **8105-448-002** | **8105-448-002** |
| **Wiper Kit Part Number** | **N/A** | **N/A** |

## Single Circuit, Square Ball Nut – Stainless Steel




| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | | | 140 |
| **Max. Static Load (lbs)** | | | 1,149 |
| **Torque to raise 1 lb (oz-in.)** | | | 0.57 |
| **Nut weight (lbs)** | | | 0.27 |
| **Ball Nut Part Number** | | | **5707645** |
| **Flange Part Number** | | | **N/A** |
| **Wiper Kit Part Number** | | | **5702647** |

## Single Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 800 | 800 |
| **Max. Static Load (lbs)** | 6,384 | 6,384 |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | 0.57 |
| **Nut weight (lbs)** | 0.27 | 0.27 |
| **Ball Nut Part Number** | **8106-448-009** | **8106-448-008** (1) |
| **Flange Part Number** | **8105-448-002** | **8105-448-002** |
| **Wiper Kit Part Number** | **8106-101-002** | **8106-101-002** |

1) Load Lock not available

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.631 x 0.200 Precision Rolled Ball Screws — Inch Series

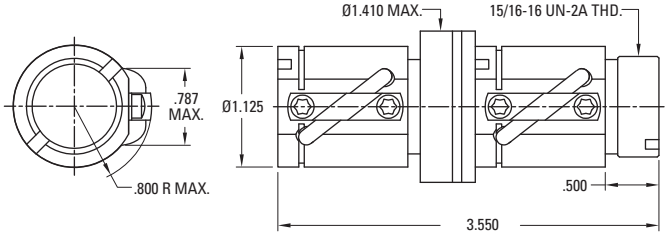
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.631 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.9 |
| **Screw Root Diameter (in.)** | 0.50 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | 72" | 72" |
| **Maximum Length** | 144" | 144" | 72" |
| **Part Number** | **190-9098** | **190-9099** | **5705378** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

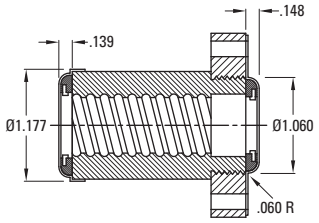
## Preloaded, Single Circuit, Round Ball Nut



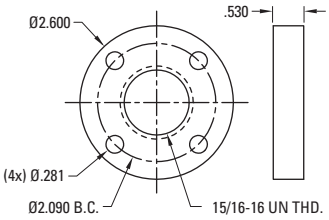

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 800 | 800 |
| **Max. Static Load (lbs)** | 6,384 | 6,384 |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | 0.57 |
| **Nut weight (lbs)** | 0.79 | 0.79 |
| **Ball Nut Part Number** | **8106-448-015** | **8106-448-019** |
| **Flange Part Number** | **8105-448-002** | **8105-448-002** |
| **Wiper Kit Part Number** | **8106-101-002** | **8106-101-002** |

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8106-101-002** | | **5702647** |
|---|---|---|---|
| **Flange Part Number** | **8105-448-002** | | **N/A** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.631 x 0.200 Precision Rolled High Capacity Ball Screws — Inch Series

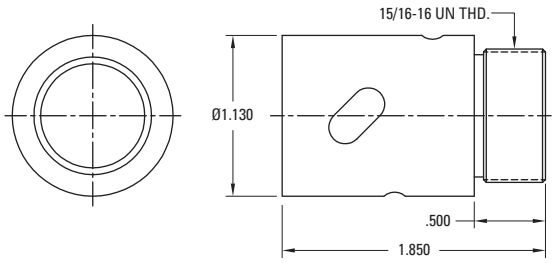
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.631 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.9 |
| **Screw Root Diameter (in.)** | 0.50 |
| **Nominal Ball Diameter (in.)** | 0.138 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 118" | | |
| **Maximum Length** | 118" | | |
| **Part Number** | **7832873-T7** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

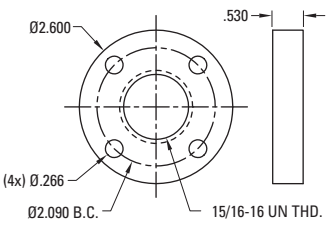
## Triple Circuit, Internal Return, Round Ball Nut — High Capacity




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 650 | |
| **Max. Static Load (lbs)** | 4,950 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.27 | |
| **Ball Nut Part Number** | **7832872** | |
| **Flange Part Number** | **5707570** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| | | |
|---|---|---|
| **Wiper Part Number** | **N/A** | |
| **Flange Part Number** | **5707570** | |

* Wiper Kit is included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.631 x 1.000 Precision Rolled Ball Screws — Inch Series

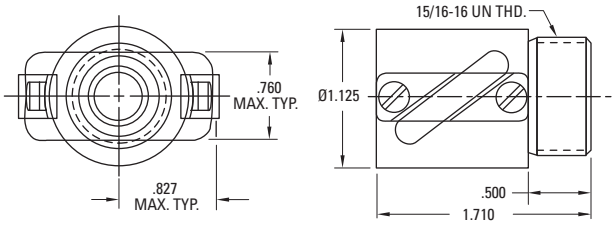
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.631 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 0.8 |
| **Screw Root Diameter (in.)** | 0.48 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 4 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 96" | | |
| **Part Number** | **7826712** | | |

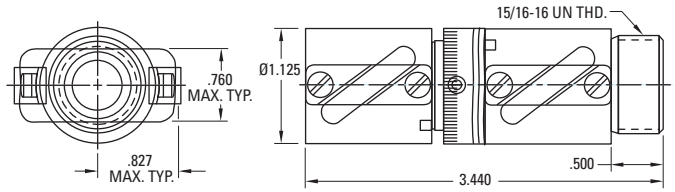
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 578 | |
| **Max. Static Load (lbs)** | 2,425 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 0.28 | |
| **Ball Nut Part Number** | **7826713** | |
| **Flange Part Number** | **5707570** | |
| **Wiper Kit Part Number** | **7827527** | |

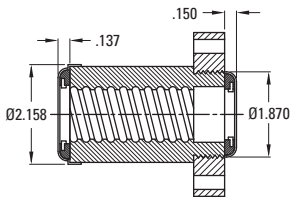
## Preloaded, Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 578 | |
| **Max. Static Load (lbs)** | 2,425 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 0.67 | |
| **Ball Nut Part Number** | **7827531** | |
| **Flange Part Number** | **5707570** | |
| **Wiper Kit Part Number** | **7827527** | |

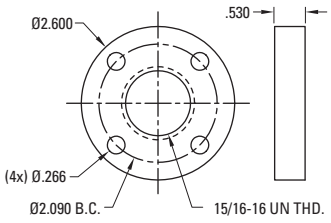
## Wiper and Flange Kits

**Wiper**




Note: Wiper kit does not include flange end cap.

**Flange**




| **Wiper Part Number** | **7827527** | |
|---|---|---|
| **Flange Part Number** | **5707570** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

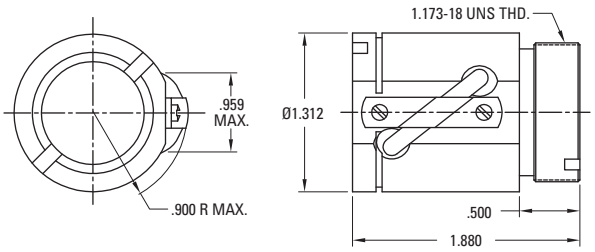
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.750 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.4 |
| **Screw Root Diameter (in.)** | 0.66 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 144" | | |
| **Part Number** | **190-9101** | | |

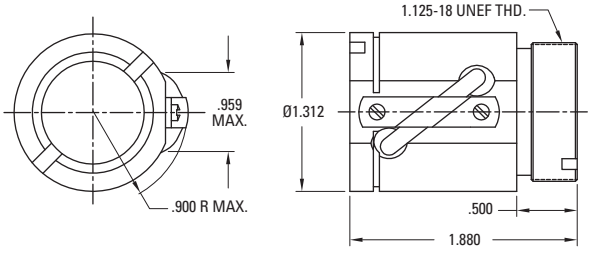
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Single Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



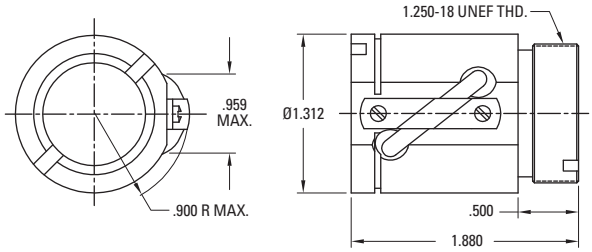

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 950 | |
| **Max. Static Load (lbs)** | 7,750 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.50 | |
| **Ball Nut Part Number** | **8107-448-018** | |
| **Flange Part Number** | **8107-448-007** | |
| **Wiper Kit Part Number** | **8107-101-002** | |

## Single Circuit, Round Ball Nut (1.125 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 950 | |
| **Max. Static Load (lbs)** | 7,750 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.50 | |
| **Ball Nut Part Number** | **8107-448-026** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

## Single Circuit, Round Ball Nut (1.250 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Carbon Steel | |
| **Dynamic Load (lbs)** | 950 | |
| **Max. Static Load (lbs)** | 7,750 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.50 | |
| **Ball Nut Part Number** | **8107-448-047** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

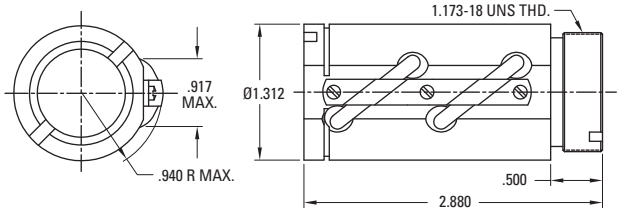
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.750 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.4 |
| **Screw Root Diameter (in.)** | 0.66 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 144" | | |
| **Part Number** | **190-9101** | | |

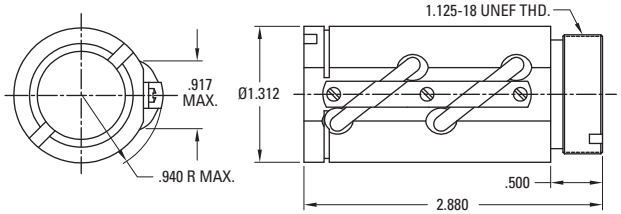
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)



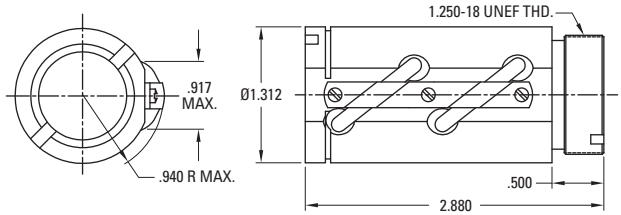

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,900 | |
| **Max. Static Load (lbs)** | 18,800 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.75 | |
| **Ball Nut Part Number** | **8107-448-016** | |
| **Flange Part Number** | **8107-448-007** | |
| **Wiper Kit Part Number** | **8107-101-002** | |

## Double Circuit, Round Ball Nut with Load Lock (1.125 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,900 | |
| **Max. Static Load (lbs)** | 18,800 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.75 | |
| **Ball Nut Part Number** | **8107-448-027** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

## Double Circuit, Round Ball Nut with Load Lock (1.250 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,900 | |
| **Max. Static Load (lbs)** | 18,800 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.75 | |
| **Ball Nut Part Number** | **8107-448-046** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.750 x 0.200 Precision Rolled Ball Screws — Inch Series

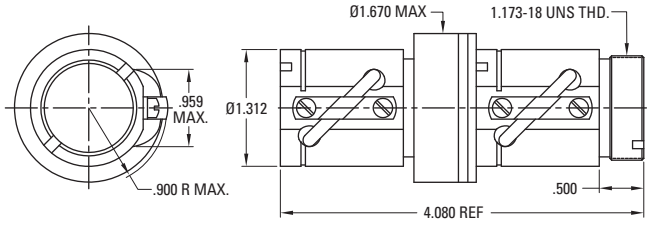
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.750 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.4 |
| **Screw Root Diameter (in.)** | 0.66 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | |
| **Maximum Length** | 144" | | |
| **Part Number** | **190-9101** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Preloaded, Single Circuit, Round Ball Nut (1.173 - 18 V-Thread)

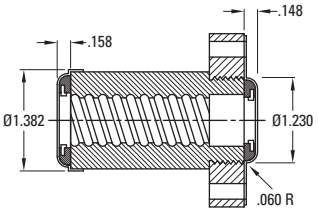



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load** (lbs) | 950 | |
| **Max. Static Load** (lbs) | 7,750 | |
| **Torque to raise 1 lb** (oz-in.) | 0.57 | |
| **Nut weight** (lbs) | 1.20 | |
| **Ball Nut Part Number** | **8107-448-025** | |
| **Flange Part Number** | **8107-448-007** | |
| **Wiper Kit Part Number** | **8107-101-002** | |

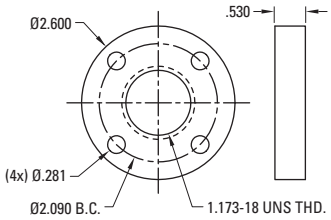
## Wiper and Flange Kits

| **Wiper Part Number** | **8107-101-002** | |
|---|---|---|
| **Flange Part Number** | **8107-448-007** | |

**Wiper**




**Flange**




Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

## NOTES:

# 0.750 x 0.500 Precision Rolled Ball Screws — Inch Series

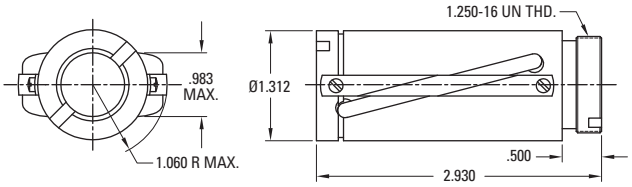
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.750 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.4 |
| **Screw Root Diameter (in.)** | 0.63 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | 72" |
| **Maximum Length** | 144" | | 144" |
| **Part Number** | **190-9100** | | **190-9006** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

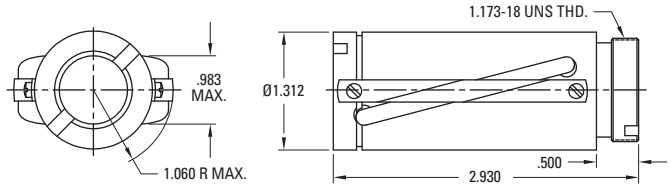
## Double Circuit, Round Ball Nut with Load Lock (1.250 - 16 V-Thread)




| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | 3,450 | | 600 |
| **Max. Static Load (lbs)** | 24,200 | | 3,460 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | | 1.42 |
| **Nut weight (lbs)** | 0.80 | | 0.80 |
| **Ball Nut Part Number** | **8107-448-014** | | **8107-448-020** (1) |
| **Flange Part Number** | **8107-448-002** | | **8107-448-004** |
| **Wiper Kit Part Number** | **8107-101-002** | | **8107-101-002** |

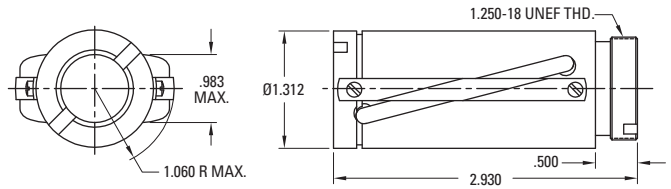
(1) Load Lock not available

## Double Circuit, Round Ball Nut with Load Lock (1.173 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,450 | |
| **Max. Static Load (lbs)** | 24,200 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 0.80 | |
| **Ball Nut Part Number** | **8107-448-049** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

## Double Circuit, Round Ball Nut with Load Lock (1.250 - 18 V-Thread)




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,450 | |
| **Max. Static Load (lbs)** | 24,200 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 0.80 | |
| **Ball Nut Part Number** | **8107-448-048** | |
| **Flange Part Number** | **N/A** | |
| **Wiper Kit Part Number** | **N/A** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.750 x 0.500 Precision Rolled Ball Screws — Inch Series

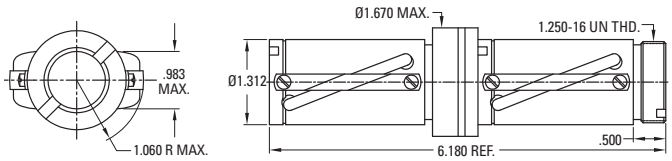
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.750 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.4 |
| **Screw Root Diameter (in.)** | 0.63 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 72" | | 72" |
| **Maximum Length** | 144" | | 144" |
| **Part Number** | **190-9100** | | **190-9006** |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

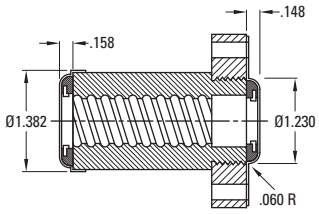
## Preloaded, Double Circuit, Round Ball Nut with Load Lock (1.250 - 16 V-Thread)



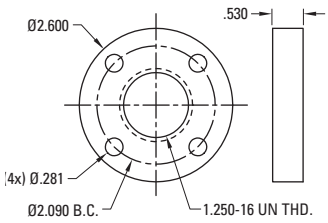

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,450 | |
| **Max. Static Load (lbs)** | 24,200 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 1.85 | |
| **Ball Nut Part Number** | **8107-448-011** | |
| **Flange Part Number** | **8107-448-002** | |
| **Wiper Kit Part Number** | **8107-101-002** | |

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8107-101-002** | | |
|---|---|---|---|
| **Flange Part Number** | **8107-448-002** | | **8107-448-004** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 0.875 x 0.200 Precision Rolled Ball Screws — Inch Series

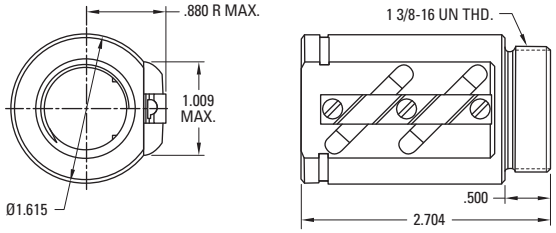
| | |
|---|---|
| **Diameter x Lead (in.)** | 0.875 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 1.8 |
| **Screw Root Diameter (in.)** | 0.74 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 144" | | |
| **Part Number** | **5708859** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

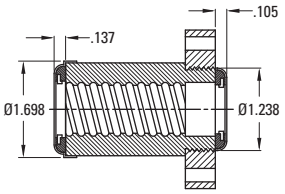
## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,942 | |
| **Max. Static Load (lbs)** | 18,063 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.69 | |
| **Ball Nut Part Number** | **5708277** | |
| **Flange Part Number** | **5708281** | |
| **Wiper Kit Part Number** | **7831512** | |

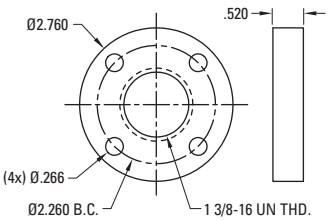
## Wiper and Flange Kits

### Wiper




Note: Wiper kit does not include flange end cap.

### Flange




| **Wiper Part Number** | **7831512** | |
|---|---|---|
| **Flange Part Number** | **5708281** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

## NOTES:

# 1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

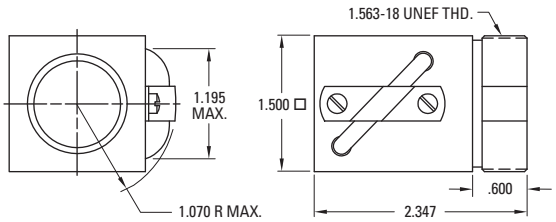
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.000 x 0.250 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.3 |
| **Screw Root Diameter (in.)** | 0.84 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 144" | |
| **Maximum Length** | 288" | 144" | |
| **Part Number** | **190-9104** | **190-9105** | |

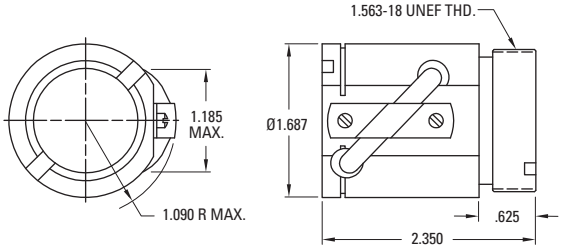
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Single Circuit, Square Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,612 | |
| **Max. Static Load (lbs)** | 15,300 | |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | |
| **Nut weight (lbs)** | 0.81 | |
| **Ball Nut Part Number** | **8110-448-055** | |
| **Flange Part Number** | **8110-448-002** | |
| **Wiper Kit Part Number** | **N/A** | |

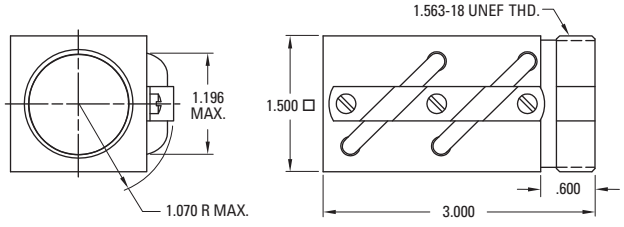
## Single Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 1,612 | 1,612 |
| **Max. Static Load (lbs)** | 13,913 | 13,913 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 0.81 | 0.81 |
| **Ball Nut Part Number** | **8110-448-032** | **8110-448-030**(1) |
| **Flange Part Number** | **8110-448-002** | **8110-448-002** |
| **Wiper Kit Part Number** | **8110-101-002** | **8110-101-002** |

(1) Load Lock not available

## Double Circuit, Square Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,350 | |
| **Max. Static Load (lbs)** | 30,750 | |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | |
| **Nut weight (lbs)** | 1.25 | |
| **Ball Nut Part Number** | **8110-448-056** | |
| **Flange Part Number** | **8110-448-002** | |
| **Wiper Kit Part Number** | **N/A** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

| | |
|---|---|
| **Diameter x Lead (in.)** | 1.000 x 0.250 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.3 |
| **Screw Root Diameter (in.)** | 0.84 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 1 |

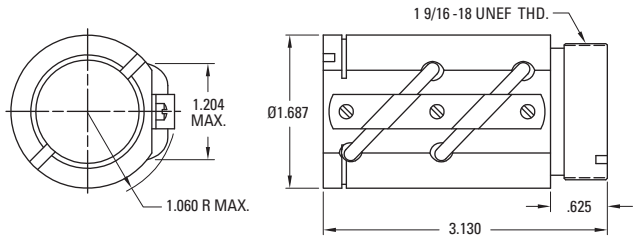
## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 144" | |
| **Maximum Length** | 288" | 144" | |
| **Part Number** | **190-9104** | **190-9105** | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

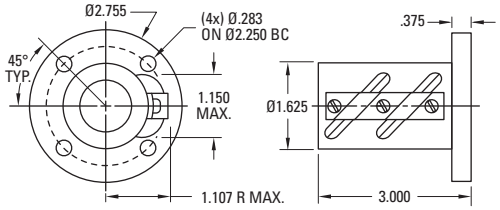


## Double Circuit, Round Ball Nut with Load Lock



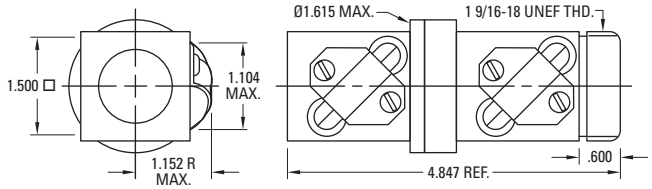

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 3,350 | 3,350 |
| **Max. Static Load (lbs)** | 30,750 | 30,750 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 1.25 | 1.25 |
| **Ball Nut Part Number** | **8110-448-026** | **8110-448-024** |
| **Flange Part Number** | **8110-448-002** | **8110-448-002** |
| **Wiper Kit Part Number** | **8110-101-002** | **8110-101-002** |

## Double Circuit, Round Ball Nut with Integral Flange




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 3,350 | 3,350 |
| **Max. Static Load (lbs)** | 30,750 | 30,750 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 1.50 | 1.50 |
| **Ball Nut Part Number** | **8110-448-087** | **8110-448-088** |
| **Flange Part Number** | **Integral** | **Integral** |
| **Wiper Kit Part Number** | **N/A** | **N/A** |

## Preloaded, Single Circuit, Square Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 1,612 | 1,612 |
| **Max. Static Load (lbs)** | 13,913 | 13,913 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 1.90 | 1.90 |
| **Ball Nut Part Number** | **8110-448-092** | **8110-448-089** |
| **Flange Part Number** | **8110-448-002** | **8110-448-002** |
| **Wiper Kit Part Number** | **N/A** | **N/A** |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.000 x 0.250 Precision Rolled Ball Screws — Inch Series

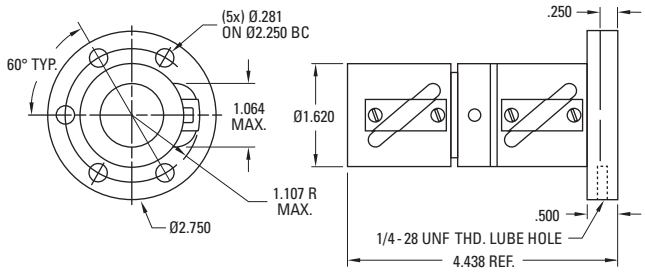
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.000 x 0.250 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.3 |
| **Screw Root Diameter (in.)** | 0.84 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 144" | |
| **Maximum Length** | 288" | 144" | |
| **Part Number** | **190-9104** | **190-9105** | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Preloaded, Single Circuit, Round Ball Nut with Integral Flange

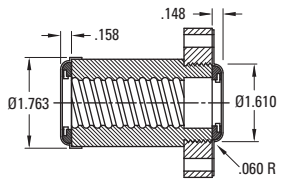



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,612 | |
| **Max. Static Load (lbs)** | 13,913 | |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | |
| **Nut weight (lbs)** | 2.00 | |
| **Ball Nut Part Number** | **8110-448-097** | |
| **Flange Part Number** | **Integral** | |
| **Wiper Kit Part Number** | **Internal** | |

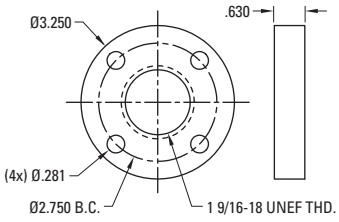
## Wiper and Flange Kits

| **Wiper Part Number** | **8110-101-002** | |
|---|---|---|
| **Flange Part Number** | **8110-448-002** | |

**Wiper**




**Flange**




Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.000 x 0.500 Precision Rolled Ball Screws — Inch Series

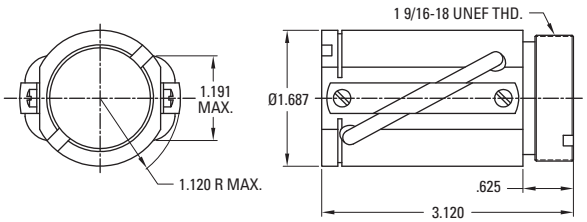
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.000 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.6 |
| **Screw Root Diameter (in.)** | 0.88 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9103** | | |

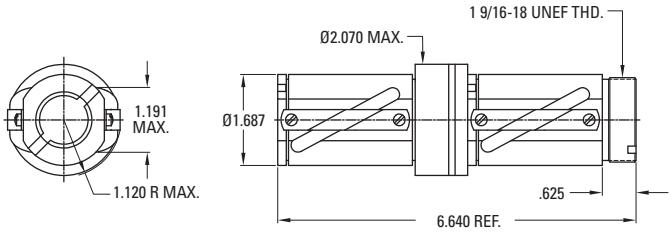
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,950 | |
| **Max. Static Load (lbs)** | 32,300 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 1.25 | |
| **Ball Nut Part Number** | **8110-448-022** | |
| **Flange Part Number** | **8110-448-002** | |
| **Wiper Kit Part Number** | **8110-101-002** | |

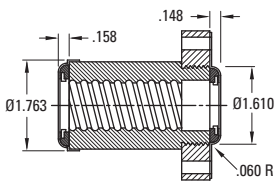
## Preloaded, Double Circuit, Round Ball Nut with Load Lock



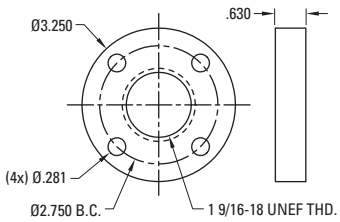

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 3,950 | |
| **Max. Static Load (lbs)** | 32,300 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 2.90 | |
| **Ball Nut Part Number** | **8110-448-016** | |
| **Flange Part Number** | **8110-448-002** | |
| **Wiper Kit Part Number** | **8110-101-002** | |

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8110-101-002** | |
|---|---|---|
| **Flange Part Number** | **8110-448-002** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.000 x 1.000 Precision Rolled Ball Screws — Inch Series

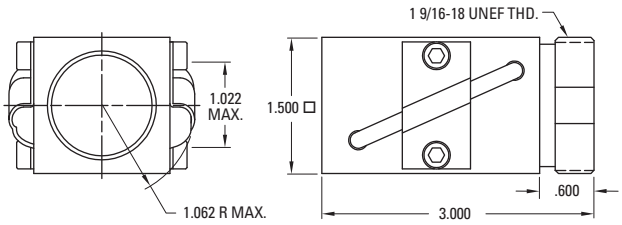
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.000 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.3 |
| **Screw Root Diameter (in.)** | 0.84 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 4 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | 144" |
| **Maximum Length** | 288" | | 144" |
| **Part Number** | **190-9102** | | **190-9150** |

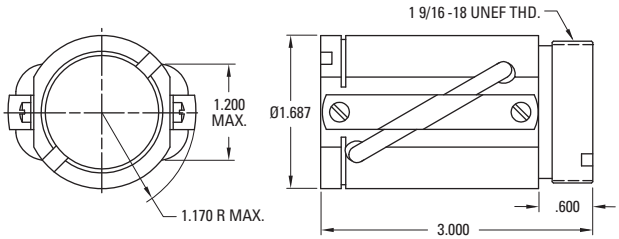
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Square Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 2,400 | |
| **Max. Static Load (lbs)** | 13,600 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 1.25 | |
| **Ball Nut Part Number** | **8110-448-086** | |
| **Flange Part Number** | **8110-448-002** | |
| **Wiper Kit Part Number** | **N/A** | |

## Double Circuit, Round Ball Nut with Load Lock

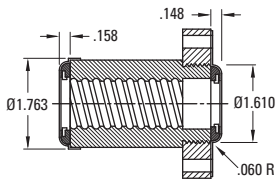



| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Dynamic Load (lbs)** | 2,250 | | 430 |
| **Max. Static Load (lbs)** | 13,750 | | 2000 |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | | 2.83 |
| **Nut weight (lbs)** | 1.25 | | 1.25 |
| **Ball Nut Part Number** | **8110-448-020** | | **8110-448-034** (1) |
| **Flange Part Number** | **8110-448-002** | | **8110-448-037** |
| **Wiper Kit Part Number** | **8110-101-002** | | **8110-101-002** |

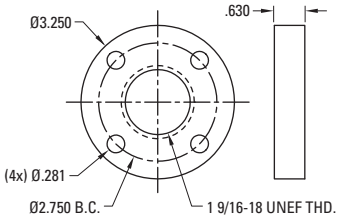
(1) Load Lock not available

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8110-101-002** | |
|---|---|---|
| **Flange Part Number** | **8110-448-002** | |
| **Flange Part Number** | **8110-448-037** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

## NOTES:

# 1.150 x 0.200 Precision Rolled Ball Screws — Inch Series

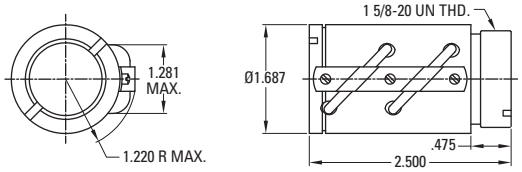
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.150 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 3.2 |
| **Screw Root Diameter (in.)** | 1.02 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9106** | | |

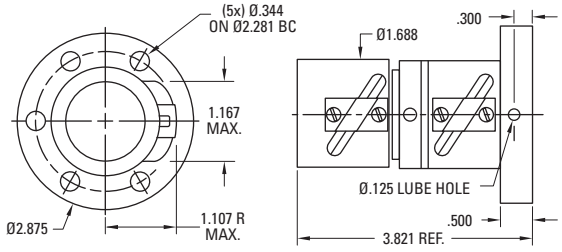
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 2,400 | |
| **Max. Static Load (lbs)** | 27,550 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 0.88 | |
| **Ball Nut Part Number** | **8111-448-006** | |
| **Flange Part Number** | **8111-448-002** | |
| **Wiper Kit Part Number** | **8111-101-002** | |

## Preloaded, Single Circuit, Round Ball Nut with Integral Flange




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 1,185 | |
| **Max. Static Load (lbs)** | 13,090 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 1.75 | |
| **Ball Nut Part Number** | **8111-448-014** | |
| **Flange Part Number** | **Integral** | |
| **Wiper Kit Part Number** | **Internal** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.150 x 0.200 Precision Rolled Ball Screws — Inch Series

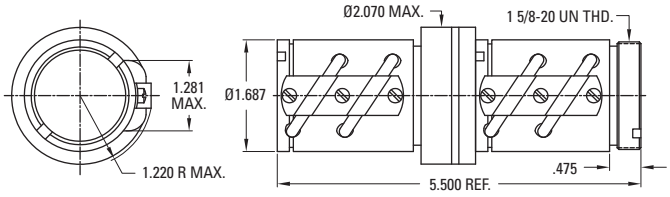
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.150 x 0.200 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 3.2 |
| **Screw Root Diameter (in.)** | 1.02 |
| **Nominal Ball Diameter (in.)** | 0.125 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9106** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

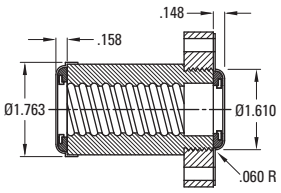
## Preloaded, Double Circuit, Round Ball Nut with Load Lock



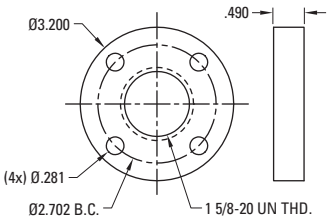

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 2,400 | |
| **Max. Static Load (lbs)** | 27,550 | |
| **Torque to raise 1 lb (oz-in.)** | 0.57 | |
| **Nut weight (lbs)** | 2.25 | |
| **Ball Nut Part Number** | **8111-448-004** | |
| **Flange Part Number** | **8111-448-002** | |
| **Wiper Kit Part Number** | **8111-101-002** | |

## Wiper and Flange Kits

**Wiper**




**Flange**




| **Wiper Part Number** | **8111-101-002** | |
|---|---|---|
| **Flange Part Number** | **8111-448-002** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.171 x 0.413 Precision Rolled Ball Screws — Inch Series

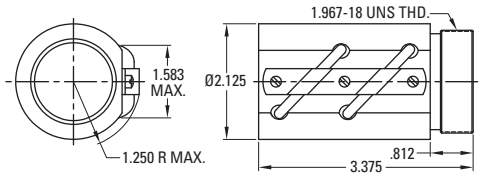
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.171 x 0.413 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 2.8 |
| **Screw Root Diameter (in.)** | 0.87 |
| **Nominal Ball Diameter (in.)** | 0.281 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 192" | | |
| **Maximum Length** | 192" | | |
| **Part Number** | **7820432** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

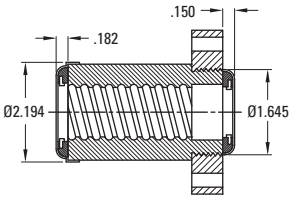
## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load** (lbs) | 3,894 | |
| **Max. Static Load** (lbs) | 22,917 | |
| **Torque to raise 1 lb** (oz-in.) | 1.17 | |
| **Nut weight** (lbs) | 1.94 | |
| **Ball Nut Part Number** | **5707511** | |
| **Flange Part Number** | **5707572** | |
| **Wiper Kit Part Number** | **5702653** | |

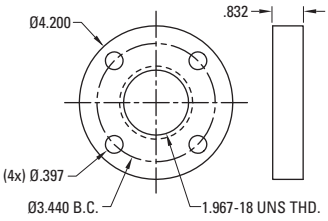
## Wiper and Flange Kits

**Wiper**




Note: Wiper kit does not include flange end cap.

**Flange**




| **Wiper Part Number** | **5702653** | |
|---|---|---|
| **Flange Part Number** | **5707572** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 0.250 Precision Rolled Ball Screws — Inch Series

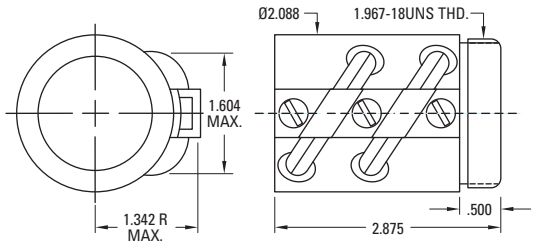
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 0.250 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.2 |
| **Screw Root Diameter (in.)** | 1.32 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | 240" | |
| **Maximum Length** | 240" | 240" | |
| **Part Number** | **7820595** | **7820596** | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

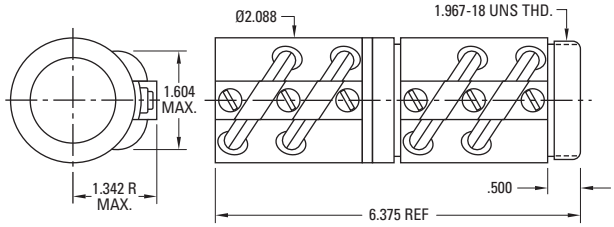
## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand (1) |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 4,198 | 4,198 |
| **Max. Static Load (lbs)** | 44,030 | 44,030 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 1.65 | 1.65 |
| **Ball Nut Part Number** | **7833233** | **5701990** (1) |
| **Flange Part Number** | **5706754** | **5706754** |
| **Wiper Kit Part Number** | **5702654** | **5702654** |

(1) Load Lock not available

## Preloaded, Double Circuit, Round Ball Nut with Load Lock

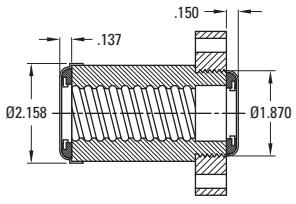



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 4,198 | 4,198 |
| **Max. Static Load (lbs)** | 44,030 | 44,030 |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | 0.71 |
| **Nut weight (lbs)** | 3.80 | 3.80 |
| **Ball Nut Part Number** | **7833234** | **5704573** (1) |
| **Flange Part Number** | **5706754** | **5706754** |
| **Wiper Kit Part Number** | **5702654** | **5702654** |

(1) Load Lock not available

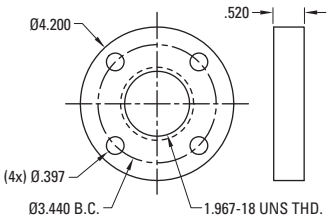
## Wiper and Flange Kits

**Wiper**




Note: Wiper kit does not include flange end cap.

**Flange**




| **Wiper Part Number** | **5702654** | |
|---|---|---|
| **Flange Part Number** | **5706754** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 0.473 Precision Rolled Ball Screws — Inch Series

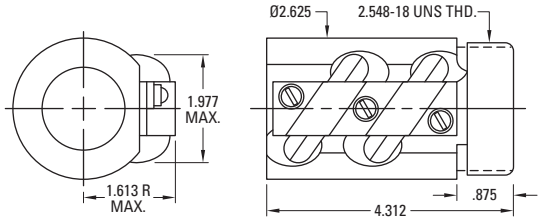
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 0.473 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 4.5 |
| **Screw Root Diameter (in.)** | 1.14 |
| **Nominal Ball Diameter (in.)** | 0.344 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **7820597** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

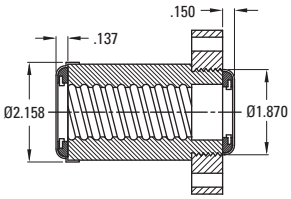
## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 10,050 | |
| **Max. Static Load (lbs)** | 57,770 | |
| **Torque to raise 1 lb (oz-in.)** | 1.34 | |
| **Nut weight (lbs)** | 3.94 | |
| **Ball Nut Part Number** | **5707513** | |
| **Flange Part Number** | **5707573** | |
| **Wiper Kit Part Number** | **5702655** | |

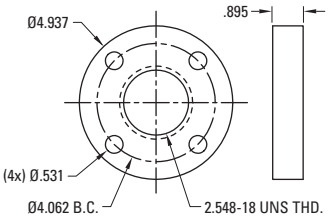
## Wiper and Flange Kits

### Wiper




Note: Wiper kit does not include flange end cap.

### Flange




| **Wiper Part Number** | **5702655** | |
|---|---|---|
| **Flange Part Number** | **5707573** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 0.500 Precision Rolled Ball Screws — Inch Series

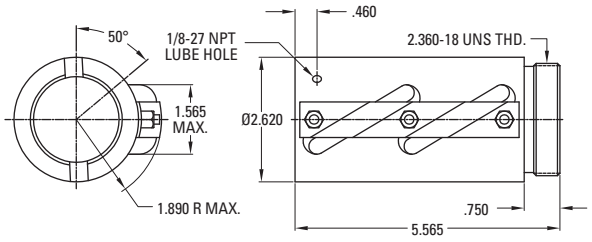
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.6 |
| **Screw Root Diameter (in.)** | 1.27 |
| **Nominal Ball Diameter (in.)** | 0.312 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 144" | |
| **Maximum Length** | 288" | 144" | |
| **Part Number** | **190-9108** | **190-9109** | |

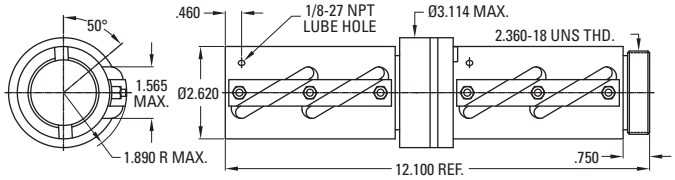
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 14,513 | 14,513 |
| **Max. Static Load (lbs)** | 102,300 | 102,300 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | 1.42 |
| **Nut weight (lbs)** | 5.70 | 5.70 |
| **Ball Nut Part Number** | **8115-448-016** | **8115-448-018** |
| **Flange Part Number** | **8115-448-004** | **8115-448-004** |
| **Wiper Kit Part Number*** | **Internal** | **Internal** |

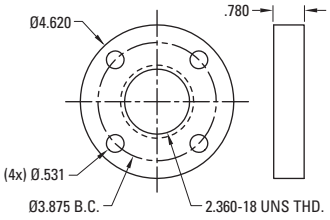
## Preloaded, Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 14,513 | |
| **Max. Static Load (lbs)** | 102,300 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 12.20 | |
| **Ball Nut Part Number** | **8115-448-006** | |
| **Flange Part Number** | **8115-448-004** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

**Flange**




| **Wiper Part Number** | **8115-101-004** | |
|---|---|---|
| **Flange Part Number** | **8115-448-004** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

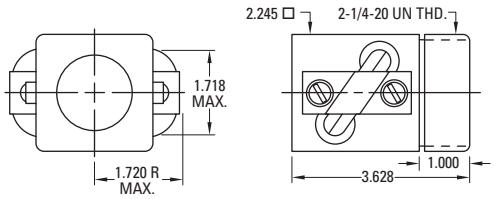
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.6 |
| **Screw Root Diameter (in.)** | 1.14 |
| **Nominal Ball Diameter (in.)** | 0.344 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 240" | |
| **Maximum Length** | 288" | 240" | |
| **Part Number** | **190-9107** | **190-9666** | |

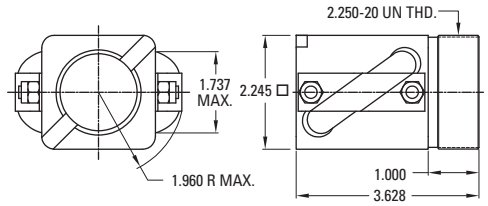
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Square Ball Nut



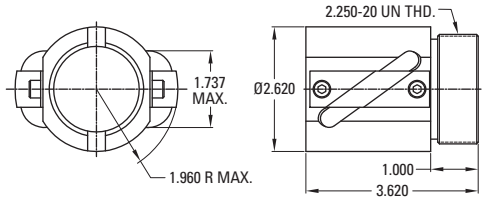

| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 8,250 | 8,250 |
| **Max. Static Load (lbs)** | 34,662 | 34,662 |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | 2.83 |
| **Nut weight (lbs)** | 3.88 | 3.88 |
| **Ball Nut Part Number** | **8115-448-074** | **8115-448-080** |
| **Flange Part Number** | **8115-448-002** | **8115-448-002** |
| **Wiper Kit Part Number** | **N/A** | **N/A** |

## Double Circuit, Square Ball Nut — High Speed




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 8,250 | |
| **Max. Static Load (lbs)** | 34,662 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 3.88 | |
| **Ball Nut Part Number** | **8115-448-076** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number** | **N/A** | |

## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 8,250 | |
| **Max. Static Load (lbs)** | 47,800 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 3.90 | |
| **Ball Nut Part Number** | **8115-448-014** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

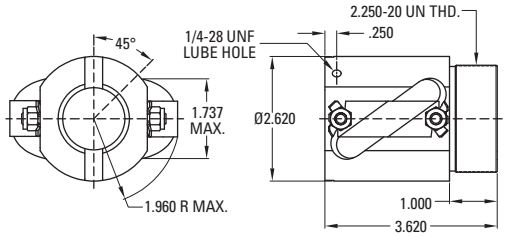
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.6 |
| **Screw Root Diameter (in.)** | 1.14 |
| **Nominal Ball Diameter (in.)** | 0.344 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 240" | |
| **Maximum Length** | 288" | 240" | |
| **Part Number** | **190-9107** | **190-9666** | |

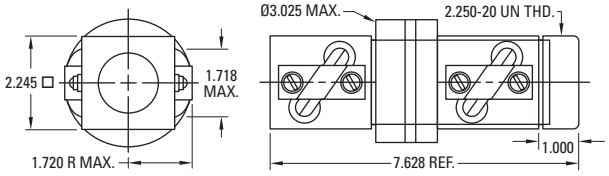
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut – High Speed




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 8,250 | |
| **Max. Static Load (lbs)** | 47,800 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 3.90 | |
| **Ball Nut Part Number** | **8115-448-049** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number*** | **Integral** | |

## Preloaded, Double Circuit, Square Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 8,250 | |
| **Max. Static Load (lbs)** | 34,662 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 8.55 | |
| **Ball Nut Part Number** | **8115-448-075** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number** | **N/A** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 1.000 Precision Rolled Ball Screws — Inch Series

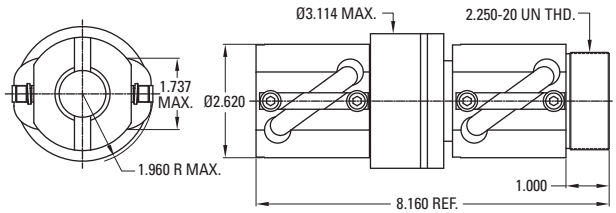
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.6 |
| **Screw Root Diameter (in.)** | 1.14 |
| **Nominal Ball Diameter (in.)** | 0.344 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 240" | |
| **Maximum Length** | 288" | 240" | |
| **Part Number** | **190-9107** | **190-9666** | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

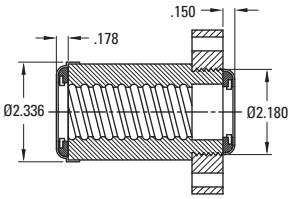
## Preloaded, Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 8,250 | |
| **Max. Static Load (lbs)** | 47,800 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 8.60 | |
| **Ball Nut Part Number** | **8115-448-011** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

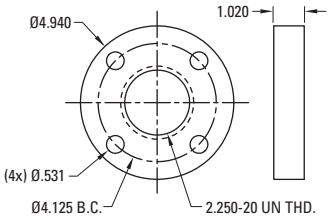
## Wiper and Flange Kits

**Wiper — 8115-101-012**




Note: Wiper kit does not include flange end cap.

**Flange**




| **Wiper Part Number (RND)** | **8115-101-004** | |
|---|---|---|
| **Wiper Part Number (SQ)** | **8115-101-012** | |
| **Flange Part Number** | **8115-448-002** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 1.875 Precision Rolled Ball Screws — Inch Series

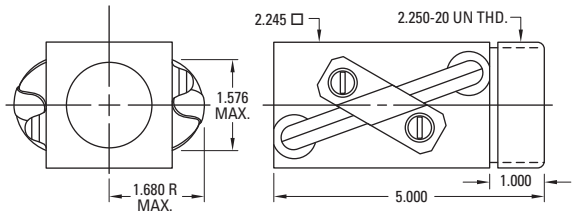
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 1.875 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.3 |
| **Screw Root Diameter (in.)** | 1.19 |
| **Nominal Ball Diameter (in.)** | 0.281 |
| **Number of Starts** | 4 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **7820599** | | |

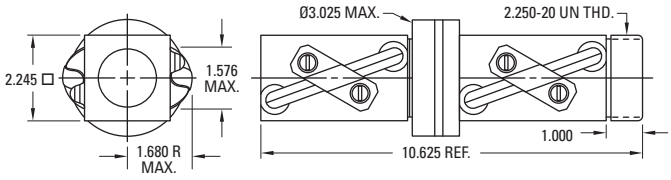
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Square Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 7,242 | |
| **Max. Static Load (lbs)** | 29,895 | |
| **Torque to raise 1 lb (oz-in.)** | 5.31 | |
| **Nut weight (lbs)** | 4.22 | |
| **Ball Nut Part Number** | **5707654** | |
| **Flange Part Number** | **5707777** | |
| **Wiper Kit Part Number** | **5702658** | |

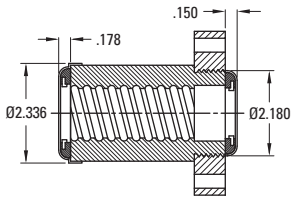
## Preloaded, Double Circuit, Square Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 7,242 | |
| **Max. Static Load (lbs)** | 29,895 | |
| **Torque to raise 1 lb (oz-in.)** | 5.31 | |
| **Nut weight (lbs)** | 9.93 | |
| **Ball Nut Part Number** | **5704272** | |
| **Flange Part Number** | **5707777** | |
| **Wiper Kit Part Number** | **5702658** | |

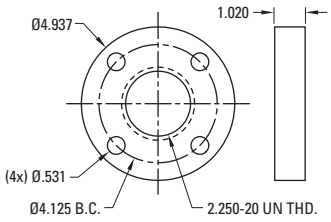
## Wiper and Flange Kits

**Wiper**




Note: Wiper kit does not include flange end cap.

**Flange**




| **Wiper Part Number** | **5702658** | |
|---|---|---|
| **Flange Part Number** | **5707777** | |

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 1.500 x 2.000 Precision Rolled Ball Screws — Inch Series

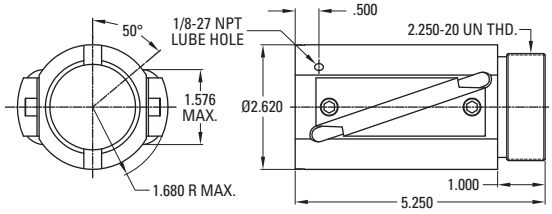
| | |
|---|---|
| **Diameter x Lead (in.)** | 1.500 x 2.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 5.6 |
| **Screw Root Diameter (in.)** | 1.21 |
| **Nominal Ball Diameter (in.)** | 0.281 |
| **Number of Starts** | 4 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9345** | | |

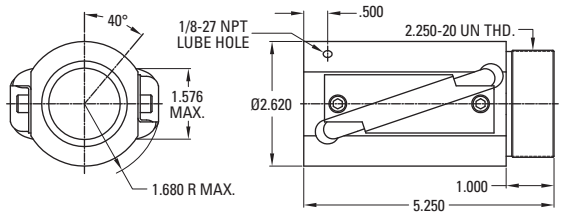
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 7,600 | |
| **Max. Static Load (lbs)** | 29,000 | |
| **Torque to raise 1 lb (oz-in.)** | 5.66 | |
| **Nut weight (lbs)** | 5.00 | |
| **Ball Nut Part Number** | **8115-448-056** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Double Circuit, Round Ball Nut with Load Lock — High Speed

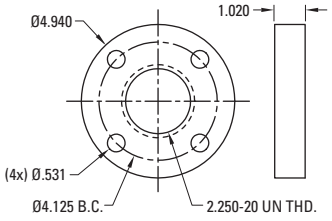



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 7,600 | |
| **Max. Static Load (lbs)** | 29,000 | |
| **Torque to raise 1 lb (oz-in.)** | 5.66 | |
| **Nut weight (lbs)** | 5.00 | |
| **Ball Nut Part Number** | **8115-448-057** | |
| **Flange Part Number** | **8115-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

| **Wiper Part Number** | **8115-101-004** | |
|---|---|---|
| **Flange Part Number** | **8115-448-002** | |

**Flange**




* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.000 x 0.500 Precision Rolled Ball Screws — Inch Series

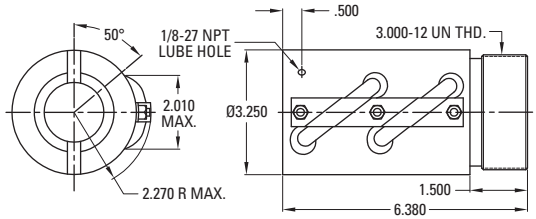
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.000 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 9.8 |
| **Screw Root Diameter (in.)** | 1.72 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | 144" | |
| **Maximum Length** | 288" | 288" | |
| **Part Number** | **190-9112** | **190-9113** | |

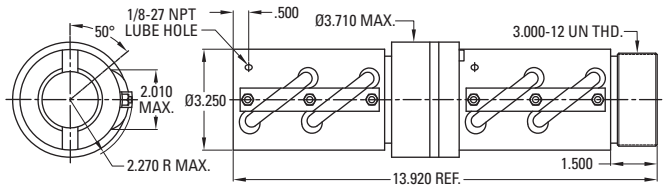
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 18,500 | 18,500 |
| **Max. Static Load (lbs)** | 143,400 | 143,400 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | 1.42 |
| **Nut weight (lbs)** | 8.00 | 8.00 |
| **Ball Nut Part Number** | **8120-448-011** | **8120-448-013** |
| **Flange Part Number** | **8120-448-002** | **8120-448-002** |
| **Wiper Kit Part Number*** | **Internal** | **Internal** |

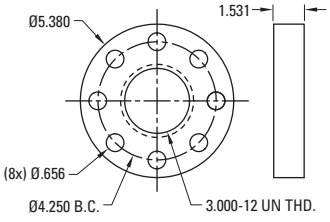
## Preloaded, Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 18,500 | 18,500 |
| **Max. Static Load (lbs)** | 154,635 | 154,635 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | 1.42 |
| **Nut weight (lbs)** | 19.25 | 19.25 |
| **Ball Nut Part Number** | **8120-448-006** | **8120-448-007** |
| **Flange Part Number** | **8120-448-002** | **8120-448-002** |
| **Wiper Kit Part Number*** | **Internal** | **Internal** |

## Flange Kit

**Flange**




| | | |
|---|---|---|
| **Wiper Part Number** | **8120-101-002** | |
| **Flange Part Number** | **8120-448-002** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.000 x 1.000 Precision Rolled Ball Screws — Inch Series

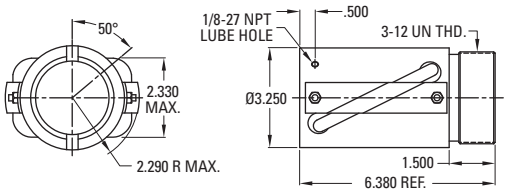
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.000 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 9.8 |
| **Screw Root Diameter (in.)** | 1.72 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9111** | | |

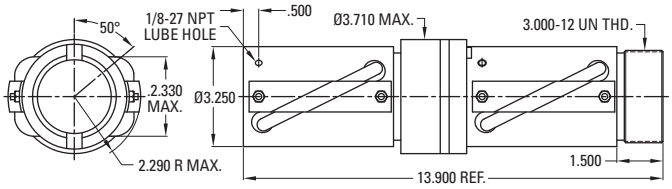
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 21,200 | |
| **Max. Static Load (lbs)** | 134,500 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 8.00 | |
| **Ball Nut Part Number** | **8120-448-021** | |
| **Flange Part Number** | **8120-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Preloaded, Double Circuit, Round Ball Nut with Load Lock

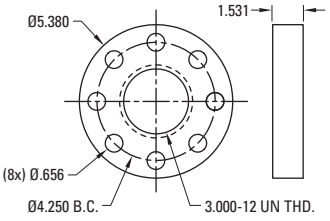



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 21,200 | |
| **Max. Static Load (lbs)** | 152,605 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 19.25 | |
| **Ball Nut Part Number** | **8120-448-019** | |
| **Flange Part Number** | **8120-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

| **Wiper Part Number** | **8120-101-002** | |
|---|---|---|
| **Flange Part Number** | **8120-448-002** | |

**Flange**




* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.250 x 0.500 Precision Rolled Ball Screws — Inch Series

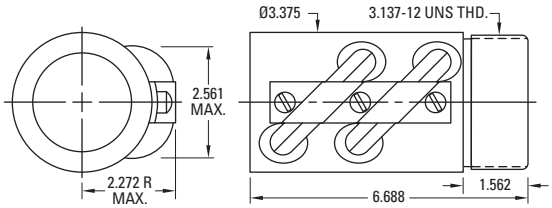
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.250 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 10.9 |
| **Screw Root Diameter (in.)** | 1.85 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | 240" | |
| **Maximum Length** | 240" | 240" | |
| **Part Number** | **7820600** | **7820602** | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Double Circuit, Round Ball Nut with Load Lock

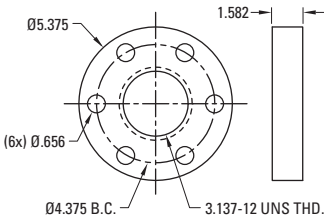



| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | Alloy Steel |
| **Dynamic Load (lbs)** | 21,306 | 21,306 |
| **Max. Static Load (lbs)** | 161,150 | 161,150 |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | 1.42 |
| **Nut weight (lbs)** | 8.25 | 8.25 |
| **Ball Nut Part Number** | **7833235** | **5704000** (1) |
| **Flange Part Number** | **5707574** | **5707574** |
| **Wiper Kit Part Number*** | **Internal** | **Internal** |

(1) Load Lock not available

## Flange Kit

### Flange




| **Wiper Part Number** | **5702659** | |
|---|---|---|
| **Flange Part Number** | **5707574** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.250 x 1.000 Precision Rolled Ball Screws — Inch Series

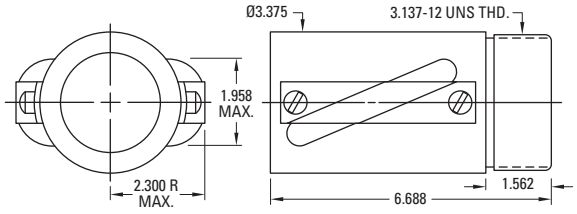
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.250 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 10.9 |
| **Screw Root Diameter (in.)** | 1.85 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **7820604** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

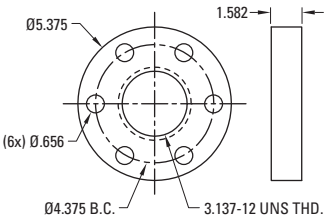
## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 26,538 | |
| **Max. Static Load (lbs)** | 161,150 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 8.25 | |
| **Ball Nut Part Number** | **5704555** | |
| **Flange Part Number** | **5707574** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| | | |
|---|---|---|
| **Wiper Part Number** | **5702659** | |
| **Flange Part Number** | **5707574** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.500 x 0.250 Precision Rolled Ball Screws — Inch Series

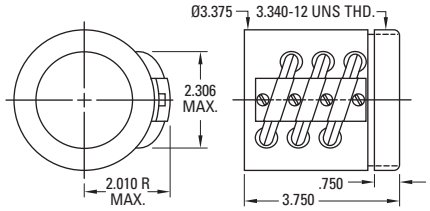
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.500 x 0.250 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 15.5 |
| **Screw Root Diameter (in.)** | 2.32 |
| **Nominal Ball Diameter (in.)** | 0.156 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **7820606** | | |

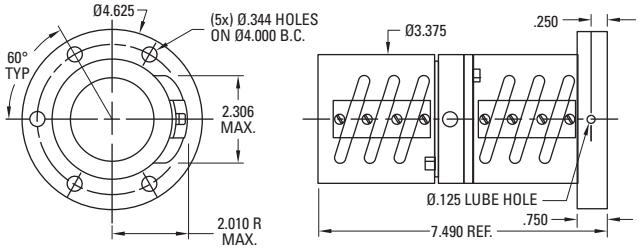
Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

## Triple Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 6,315 | |
| **Max. Static Load (lbs)** | 81,938 | |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | |
| **Nut weight (lbs)** | 4.72 | |
| **Ball Nut Part Number** | **5703243** | |
| **Flange Part Number** | **5703263** | |
| **Wiper Kit Part Number*** | **Internal** | |

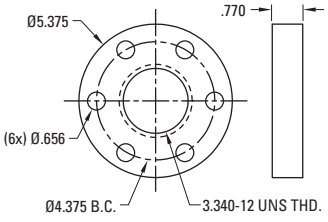
## Preloaded, Triple Circuit, Round Ball Nut with Integral Flange




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 6,315 | |
| **Max. Static Load (lbs)** | 81,938 | |
| **Torque to raise 1 lb (oz-in.)** | 0.71 | |
| **Nut weight (lbs)** | 9.94 | |
| **Ball Nut Part Number** | **7823590** | |
| **Flange Part Number** | **Integral** | |
| **Wiper Kit Part Number** | **Internal** | |

## Flange Kit

**Flange**




| **Wiper Part Number** | **5703324** | |
|---|---|---|
| **Flange Part Number** | **5703263** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.500 x 0.500 Precision Rolled Ball Screws — Inch Series

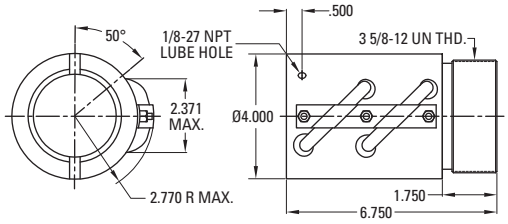
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.500 x 0.500 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 15.0 |
| **Screw Root Diameter (in.)** | 2.22 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9116** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

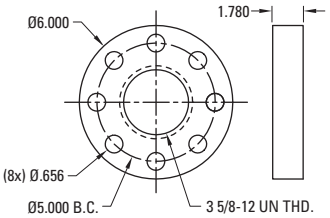
## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 22,981 | |
| **Max. Static Load (lbs)** | 186,000 | |
| **Torque to raise 1 lb (oz-in.)** | 1.42 | |
| **Nut weight (lbs)** | 13.00 | |
| **Ball Nut Part Number** | **8125-448-010** | |
| **Flange Part Number** | **8125-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| **Wiper Part Number** | **8125-101-002** | |
|---|---|---|
| **Flange Part Number** | **8125-448-002** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 2.500 x 1.000 Precision Rolled Ball Screws — Inch Series

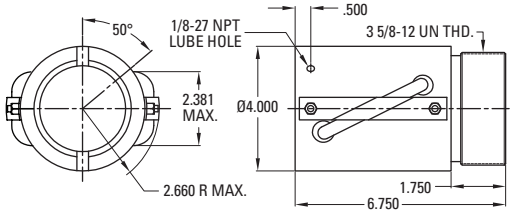
| | |
|---|---|
| **Diameter x Lead (in.)** | 2.500 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 15.0 |
| **Screw Root Diameter (in.)** | 2.22 |
| **Nominal Ball Diameter (in.)** | 0.375 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9115** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

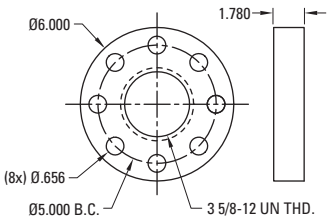
## Double Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 27,000 | |
| **Max. Static Load (lbs)** | 174,000 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 13.00 | |
| **Ball Nut Part Number** | **8125-448-008** | |
| **Flange Part Number** | **8125-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| **Wiper Part Number** | **8125-101-002** | |
|---|---|---|
| **Flange Part Number** | **8125-448-002** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 3.000 x 0.660 Precision Rolled Ball Screws — Inch Series

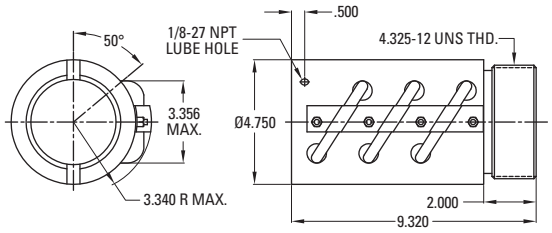
| | |
|---|---|
| **Diameter x Lead (in.)** | 3.000 x 0.660 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 18.3 |
| **Screw Root Diameter (in.)** | 2.48 |
| **Nominal Ball Diameter (in.)** | 0.500 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 144" | | |
| **Maximum Length** | 288" | | |
| **Part Number** | **190-9117** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

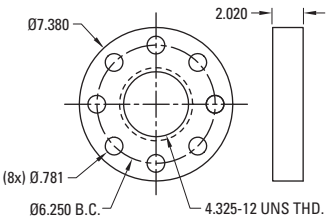
## Triple Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 44,316 | |
| **Max. Static Load (lbs)** | 323,950 | |
| **Torque to raise 1 lb (oz-in.)** | 1.87 | |
| **Nut weight (lbs)** | 26.00 | |
| **Ball Nut Part Number** | **8130-448-007** | |
| **Flange Part Number** | **8130-448-002** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| **Wiper Part Number** | **8130-101-002** | |
|---|---|---|
| **Flange Part Number** | **8130-448-002** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 3.000 x 1.500 Precision Rolled Ball Screws — Inch Series

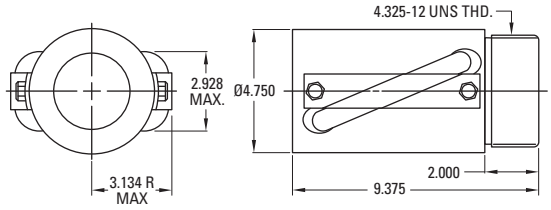
| | |
|---|---|
| **Diameter x Lead** (in.) | 3.000 x 1.500 |
| **Lead Accuracy** (in/ft) | ± 0.004 |
| **Screw Weight** (lbs/ft) | 19.3 |
| **Screw Root Diameter** (in.) | 2.48 |
| **Nominal Ball Diameter** (in.) | 0.500 |
| **Number of Starts** | 2 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **7820609** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

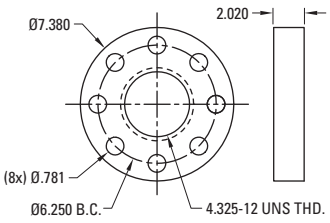
## Double Circuit, Round Ball Nut




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load** (lbs) | 53,646 | |
| **Max. Static Load** (lbs) | 253,617 | |
| **Torque to raise 1 lb** (oz-in.) | 4.25 | |
| **Nut weight** (lbs) | 27.2 | |
| **Ball Nut Part Number** | **5704986** | |
| **Flange Part Number** | **5707575** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange




| **Wiper Part Number** | **5702661** | |
|---|---|---|
| **Flange Part Number** | **5707575** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# 4.000 x 1.000 Precision Rolled Ball Screws — Inch Series

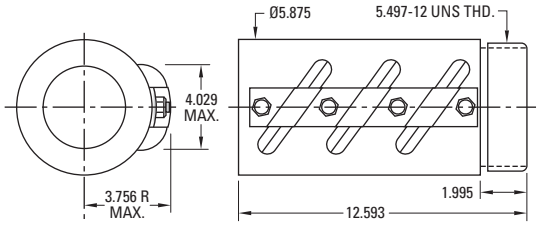
| | |
|---|---|
| **Diameter x Lead (in.)** | 4.000 x 1.000 |
| **Lead Accuracy (in/ft)** | ± 0.004 |
| **Screw Weight (lbs/ft)** | 34.4 |
| **Screw Root Diameter (in.)** | 3.34 |
| **Nominal Ball Diameter (in.)** | 0.625 |
| **Number of Starts** | 1 |

## Ball Screw Part Numbers

| **Thread Direction** | Right Hand | Left Hand | Right Hand |
|---|---|---|---|
| **Screw Material** | Alloy Steel | Alloy Steel | Stainless Steel |
| **Standard Length** | 240" | | |
| **Maximum Length** | 240" | | |
| **Part Number** | **5703262** | | |

Ball screws can be cut to the length you require. Specify ball screw part number and overall length at time of order.

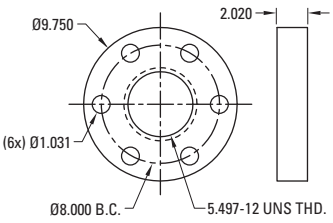
## Triple Circuit, Round Ball Nut with Load Lock




| **Thread Direction** | Right Hand | Left Hand |
|---|---|---|
| **Nut Material** | Alloy Steel | |
| **Dynamic Load (lbs)** | 85,758 | |
| **Max. Static Load (lbs)** | 476,970 | |
| **Torque to raise 1 lb (oz-in.)** | 2.83 | |
| **Nut weight (lbs)** | 53.5 | |
| **Ball Nut Part Number** | **5703258** | |
| **Flange Part Number** | **5703307** | |
| **Wiper Kit Part Number*** | **Internal** | |

## Flange Kit

### Flange

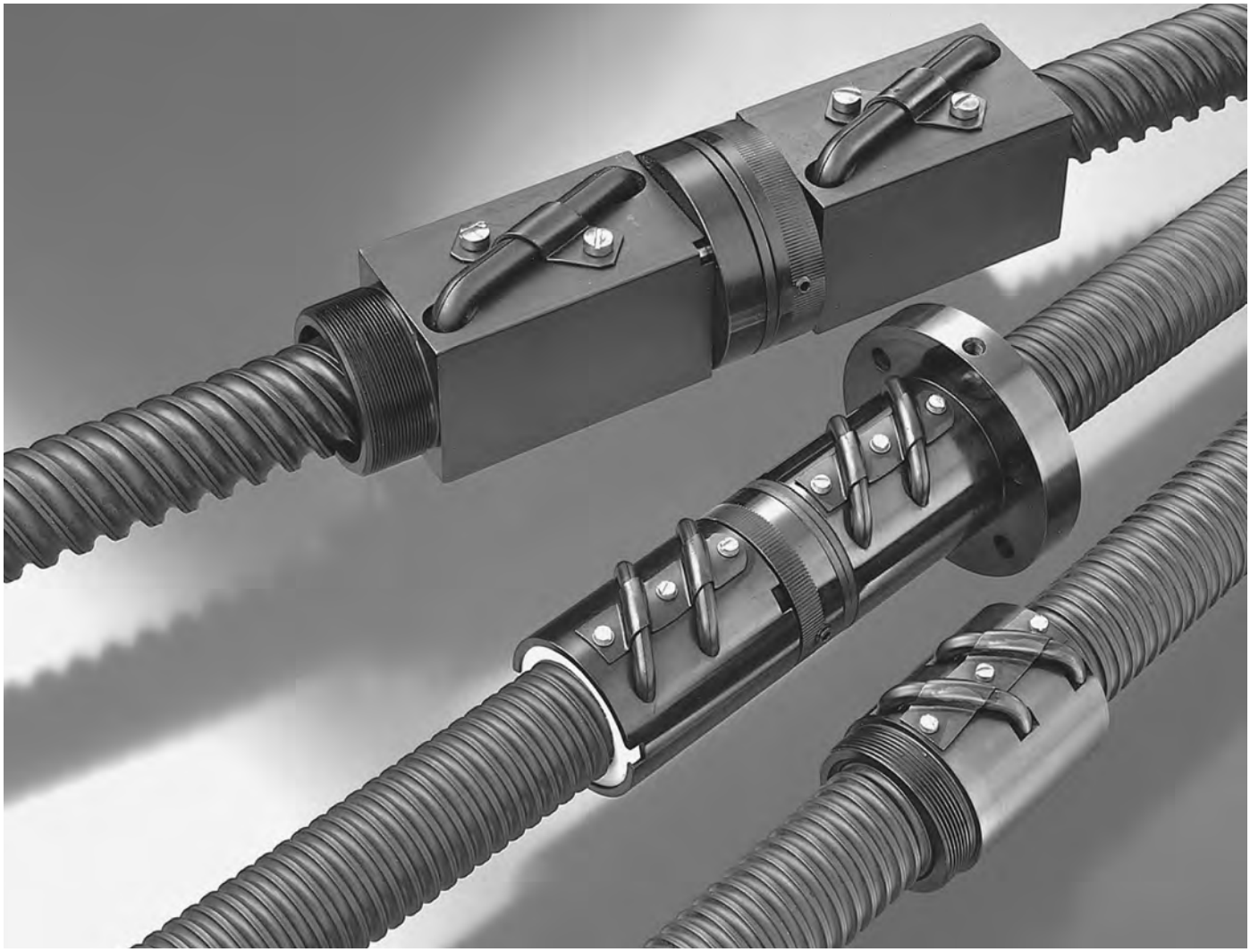



| **Wiper Part Number** | **5703306** | |
|---|---|---|
| **Flange Part Number** | **5703307** | |

* Wiper kit included with this ball nut.

Note: Dimensional information for all End Journals and Bearing Supports is available on page 144. Information on required lubrication is on page 243.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series



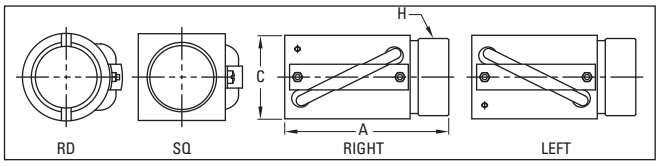
## Current and Historical Standard & Custom Ball Screw Components, Inch Series

The Visual Product Reference section is intended to document the many standard and custom ball screw components that have been produced by Thomson and Warner Linear. This section is intended to help identify existing customer product that may or may not be still shown as featured product in this catalog. Most of these products remain readily available for sale and can be ordered using the part numbers shown. The following tables are organized by ball nut shape and then sorted by ball circle diameter (BCD) and lead. Please contact the factory for assistance if the correct ball nut or screw cannot be identified or for any additional questions.

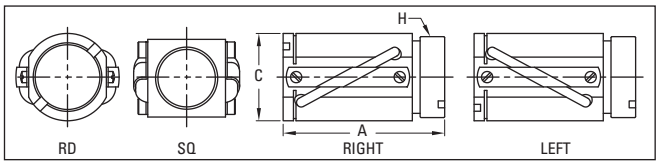
Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

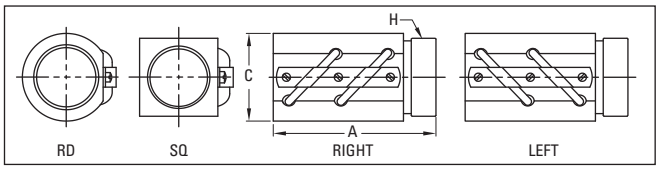
# Visual Product Reference — Precision Rolled Ball Screws — Inch Series



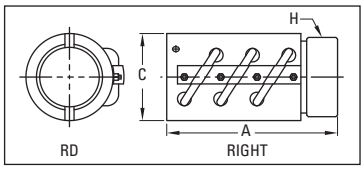

**Type A**



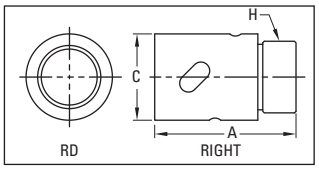

**Type B**



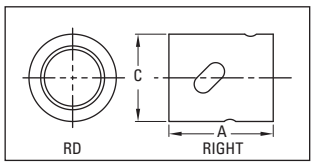

**Type C**



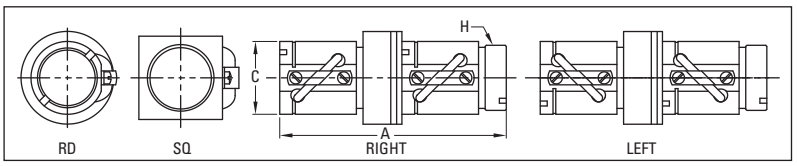

**Type D**



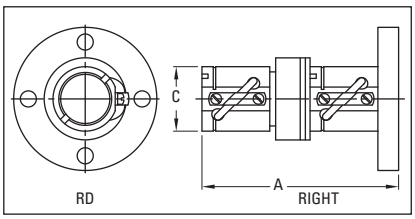

**Type E**



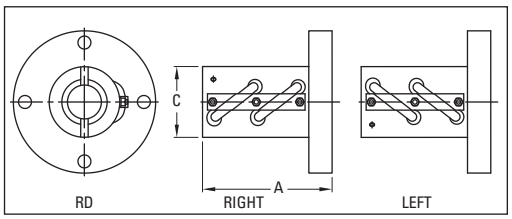

**Type F**




**Type G**



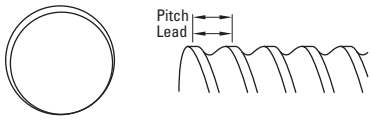

**Type H**



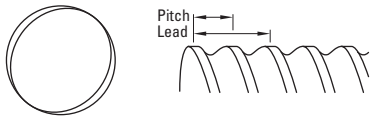

**Type J**



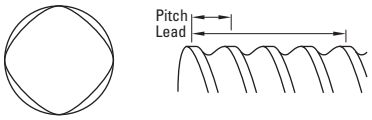

**Type Other**



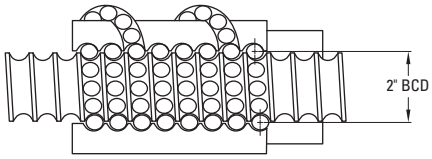

**Single Start**



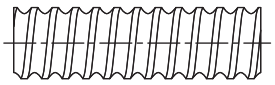

**Double Start**



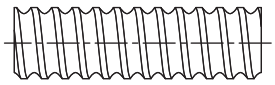

**Four Start**




**Ball Circle Diameter (BCD)**



**Left Hand Screw**



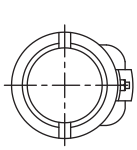
**Right Hand Screw**

### Visual Product Reference Instructions

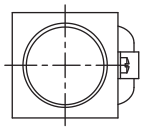
1. Visually determine the ball nut "Type" based on the above figures.
2. Narrow the choice by selecting the appropriate ball circle diameter (BCD) and lead as defined in the figure above.
3. If the ball nut has an identifying model number, this will uniquely identify the nut as shown in the 4th column of the tables. Unmarked nuts are listed as Thomson and will require dimensions to identify.
4. Count the number of ball return circuits and match to column 5.
5. Measure length, width/diameter, and V-thread (if applicable) of the ball nut and match to columns 6 – 8.
6. Determine if the thread direction is left of right by matching nut or screw (screw direction is shown in figure above) to provided figures and locating in column 9.
7. If the ball nut is not available, determine the number of starts of the screw (integral number of independent threads — see figures above), measure the screw major diameter, and measure the screw lead (distance between two adjacent turns of the screw — see figure above). Screw information is provided in columns 11 – 13.
8. Determine if the screw and/or nut material is either carbon steel (STEEL) or stainless steel (SS) and locate in column 14. Carbon steel nuts are coated with black oxide or other finish to prevent corrosion.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

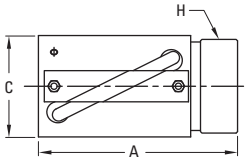
## Type A



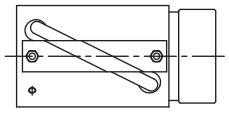
RD



SQ




RIGHT



LEFT

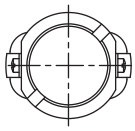
**Return:** Single Circuit
**Shape:** Round or Square
**Mounting:** V-Thread
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.375 | 0.125 | RD | Thomson | 1 | 1.000 | 0.750 | 0.664-32 | RH | 1 | 0.365 | STEEL | **5709574** | **5707538** | **5706751** | **N/A** | 44 |
| 0.375 | 0.125 | RD | Thomson | 1 | 1.000 | 0.750 | 0.664-32 | LH | 1 | 0.365 | STEEL | **5709576** | **5708532** | **5706751** | **N/A** | 44 |
| 0.375 | 0.125 | RD | Thomson | 1 | 1.000 | 0.750 | 0.664-32 | RH | 1 | 0.365 | SS | **5709578** | **5706540** | **N/A** | **N/A** | 44 |
| 0.375 | 0.125 | RD | Thomson | 1 | 1.170 | 0.750 | 11/16-28 | RH | 1 | 0.370 | STEEL | **7831870** | **7824974** | **N/A** | **N/A** | |
| 0.631 | 0.200 | RD | Thomson | 1 | 1.710 | 1.125 | 1-16 | RH | 1 | 0.620 | STEEL | **7832206** | **5707540** | **7832920** | **N/A** | |
| 0.631 | 0.200 | RD | RC0605 | 1 | 1.710 | 1.125 | 15/16-16 | RH | 1 | 0.610 | STEEL | **8106-448-009** | **190-9098** | **8105-448-002** | **8106-101-002** | 48 |
| 0.631 | 0.200 | RD | RE0605 | 1 | 1.710 | 1.125 | 15/16-16 | LH | 1 | 0.610 | STEEL | **8106-448-007** | **190-9099** | **8105-448-002** | **8106-101-002** | |
| 0.631 | 0.200 | RD | RK0605 | 1 | 1.710 | 1.125 | 15/16-16 | LH | 1 | 0.610 | STEEL | **8106-448-008** | **190-9099** | **8105-448-002** | **8106-101-002** | 48 |
| 0.631 | 0.200 | SQ | Thomson | 1 | 1.710 | 1.000 | 15/16-16 | RH | 1 | 0.620 | SS | **5707645** | **5705378** | **N/A** | **5702647** | 48 |
| 0.631 | 0.200 | SQ | Thomson | 1 | 1.710 | 1.000 | 15/16-16 | RH | 1 | 0.620 | STEEL | **7820827** | **5707540** | **5707570** | **5702647** | |
| 0.631 | 0.200 | SQ | Thomson | 1 | 1.710 | 1.000 | 15/16-16 | LH | 1 | 0.620 | STEEL | **7820828** | **5707541** | **5707570** | **5702647** | |
| 0.631 | 0.200 | SQ | RQ0605 | 1 | 1.710 | 1.000 | 15/16-16 | RH | 1 | 0.610 | STEEL | **8106-448-010** | **190-9098** | **8105-448-002** | **N/A** | |
| 0.631 | 0.200 | SQ | RQ0605 | 1 | 1.710 | 1.000 | 15/16-16 | RH | 1 | 0.610 | STEEL | **8106-448-022** | **190-9098** | **8105-448-002** | **N/A** | 48 |
| 0.631 | 0.200 | SQ | RR0605 | 1 | 1.710 | 1.000 | 15/16-16 | LH | 1 | 0.610 | STEEL | **8106-448-026** | **190-9099** | **8105-448-002** | **N/A** | 48 |
| 0.631 | 0.200 | SQ | RR0605 | 1 | 1.710 | 1.000 | 15/16-16 | LH | 1 | 0.610 | STEEL | **8106-448-011** | **190-9099** | **8105-448-002** | **N/A** | |
| 0.750 | 0.200 | RD | RC0705 | 1 | 1.880 | 1.312 | 1.173-18 | RH | 1 | 0.765 | STEEL | **8107-448-017** | **190-9101** | **8107-448-007** | **8107-101-002** | |
| 0.750 | 0.200 | RD | RC0705 | 1 | 1.880 | 1.312 | 1.173-18 | RH | 1 | 0.765 | STEEL | **8107-448-018** | **190-9101** | **8107-448-007** | **8107-101-002** | 52 |
| 0.750 | 0.200 | RD | RC0705 | 1 | 1.880 | 1.312 | 1.25-18 | RH | 1 | 0.765 | STEEL | **8107-448-047** | **190-9101** | **N/A** | **N/A** | 52 |
| 0.750 | 0.200 | RD | RC0705STH | 1 | 1.880 | 1.312 | 1.125-18 | RH | 1 | 0.765 | STEEL | **8107-448-026** | **190-9101** | **N/A** | **N/A** | 52 |
| 1.000 | 0.250 | RD | RC1004 | 1 | 2.350 | 1.687 | 1-9/16-18 | RH | 1 | 0.985 | STEEL | **8110-448-029** | **190-9104** | **8110-448-002** | **8110-101-002** | |
| 1.000 | 0.250 | RD | RC1004 | 1 | 2.350 | 1.687 | 1-9/16-18 | RH | 1 | 0.985 | STEEL | **8110-448-032** | **190-9104** | **8110-448-002** | **8110-101-002** | 60 |
| 1.000 | 0.250 | RD | RK1004 | 1 | 2.350 | 1.687 | 1-9/16-18 | LH | 1 | 0.985 | STEEL | **8110-448-030** | **190-9105** | **8110-448-002** | **8110-101-002** | 60 |
| 1.000 | 0.250 | SQ | Thomson | 1 | 2.347 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **5707508** | **7820426** | **5707571** | **5702649** | |
| 1.000 | 0.250 | SQ | Thomson | 1 | 2.347 | 1.500 | 1.563-18 | LH | 1 | 0.985 | STEEL | **5707535** | **7820428** | **5707571** | **5702649** | |
| 1.000 | 0.250 | SQ | RQ1004 | 1 | 2.347 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **8110-448-055** | **190-9104** | **8110-448-002** | **N/A** | 60 |

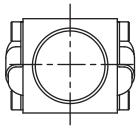
Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

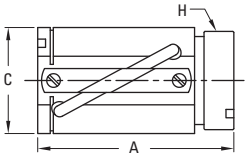
## Type B



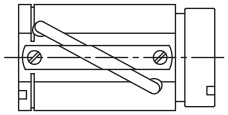
RD



SQ




RIGHT



LEFT

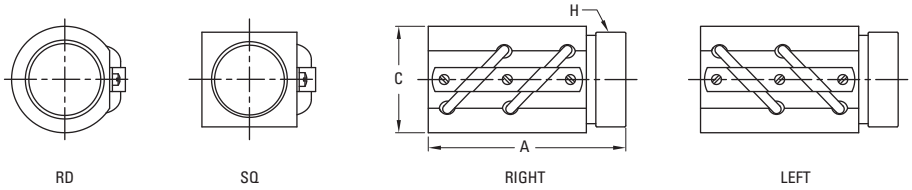
**Return:** Double Circuit
**Shape:** Round or Square
**Mounting:** V-Thread
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.500 | 0.500 | RD | R-0502 | 2 | 2.750 | 1.062 | 15/16-16 | RH | 2 | 0.510 | STEEL | **8105-448-011** | **190-9096** | **8105-448-002** | **8105-101-002** | 47 |
| 0.500 | 0.500 | RD | R-0502 | 2 | 2.750 | 1.060 | 15/16-16 | RH | 2 | 0.510 | STEEL | **8105-448-014** | **190-9096** | **8105-448-002** | **8105-101-002** | 47 |
| 0.500 | 0.500 | RD | R-0502 | 2 | 2.750 | 1.062 | 15/16-16 | RH | 2 | 0.510 | SS | **8105-448-016** | **190-9010** | **8105-448-002** | **8105-101-002** | 47 |
| 0.500 | 0.500 | RD | RS0502 | 2 | 2.750 | 1.062 | 15/16-16 | RH | 2 | 0.510 | SS | **8105-448-016** | **190-9010** | **8105-448-002** | **8105-101-002** | |
| 0.500 | 0.500 | SQ | Thomson | 2 | 1.875 | 1.000 | 15/16-16 | RH | 2 | 0.490 | STEEL | **5709582** | **5706740** | **5707570** | **N/A** | |
| 0.500 | 0.500 | SQ | Thomson | 2 | 1.875 | 1.000 | 15/16-16 | RH | 2 | 0.490 | SS | **5709584** | **5706846** | **N/A** | **N/A** | |
| 0.631 | 0.200 | RD | RC0605 | 2 | 1.710 | 1.125 | 15/16-16 | RH | 1 | 0.610 | STEEL | **8106-448-006** | **190-9098** | **8105-448-002** | **8106-101-002** | |
| 0.631 | 1.000 | RD | Thomson | 2 | 1.710 | 1.125 | 15/16-16 | RH | 2 | 0.620 | STEEL | **7826713** | **7826712** | **5707570** | **7827527** | 51 |
| 0.750 | 0.500 | RD | Thomson | 2 | 2.995 | 1.300 | 1.25-18 | RH | 2 | 0.729 | STEEL | **7824358** | **7824361** | **7823336** | **7824337** | |
| 0.750 | 0.500 | RD | R-0702 | 2 | 2.930 | 1.312 | 1-1/4-16 | RH | 2 | 0.765 | STEEL | **8107-448-014** | **190-9100** | **8107-448-002** | **8107-101-002** | 47 |
| 0.750 | 0.500 | RD | R-0702 | 2 | 2.930 | 1.312 | 1.25-18 | RH | 2 | 0.765 | STEEL | **8107-448-048** | **190-9100** | **N/A** | **N/A** | 56 |
| 0.750 | 0.500 | RD | R-0702 | 2 | 2.930 | 1.312 | 1.173-18 | RH | 2 | 0.765 | STEEL | **8107-448-049** | **190-9100** | **8107-448-007** | **8107-448-002** | 56 |
| 0.750 | 0.500 | RD | RS0702 | 2 | 2.930 | 1.312 | 1-1/4-16 | RH | 2 | 0.765 | SS | **8107-448-020** | **190-9006** | **8107-448-020** | **8107-101-002** | 56 |
| 1.000 | 0.500 | RD | Thomson | 2 | 3.120 | 1.625 | 1-9/16-18 | RH | 2 | 0.974 | STEEL | **7824286** | **7824290** | **5707571** | **7824292** | |
| 1.000 | 0.500 | RD | R-1002 | 2 | 3.120 | 1.687 | 1-9/16-18 | RH | 2 | 1.015 | STEEL | **8110-448-022** | **190-9103** | **8110-448-002** | **8110-101-002** | 63 |
| 1.000 | 1.000 | RD | R-1001 | 2 | 3.000 | 1.687 | 1-9/16-18 | RH | 4 | 0.985 | STEEL | **8110-448-020** | **190-9102** | **8110-448-002** | **8110-101-002** | 64 |
| 1.000 | 1.000 | RD | RS1001 | 2 | 3.000 | 1.687 | 1-9/16-18 | RH | 4 | 0.985 | SS | **8110-448-034** | **190-9150** | **8110-448-002** | **8110-101-002** | 64 |
| 1.000 | 1.000 | SQ | Thomson | 2 | 3.000 | 1.500 | 1.563-18 | RH | 4 | 0.985 | STEEL | **5707509** | **7820429** | **5707571** | **5702650** | |
| 1.000 | 1.000 | SQ | Thomson | 2 | 6.000 | 1.500 | 1.563-18 | RH | 4 | 0.985 | STEEL | **7829720** | **7820429** | **5707571** | **5702650** | |
| 1.000 | 1.000 | SQ | RF1001 | 2 | 3.000 | 1.500 | 1.563-18 | RH | 4 | 0.985 | STEEL | **8110-448-086** | **190-9102** | **8110-448-002** | **N/A** | 64 |
| 1.500 | 1.000 | RD | R-1501 | 2 | 3.620 | 2.620 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-014** | **190-9107** | **8115-448-002** | **8115-101-002** | 72 |
| 1.500 | 1.000 | RD | RH1501 | 2 | 3.620 | 2.620 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-049** | **190-9107** | **8115-448-002** | **8115-101-004** | 73 |
| 1.500 | 1.000 | SQ | Thomson | 2 | 3.628 | 2.250 | 2-1/4-20 | LH | 2 | 1.480 | STEEL | **5701995** | **7825925** | **5707777** | **5702657** | |
| 1.500 | 1.000 | SQ | Thomson | 2 | 3.628 | 2.250 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **5708280** | **7820598** | **5707777** | **5702657** | |
| 1.500 | 1.000 | SQ | Thomson | 2 | 3.628 | 2.250 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **20019711-10** | **7820598** | **5707777** | **5702657** | |
| 1.500 | 1.000 | SQ | RF1501 | 2 | 3.628 | 2.245 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-074** | **190-9107** | **8115-448-002** | **N/A** | 72 |
| 1.500 | 1.000 | SQ | RF1501 HS | 2 | 3.628 | 2.245 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-076** | **190-9107** | **8115-448-002** | **N/A** | 72 |
| 1.500 | 1.000 | SQ | RR1501 | 2 | 3.628 | 2.245 | 2-1/4-20 | LH | 2 | 1.480 | STEEL | **8115-448-080** | **190-9666** | **8115-448-002** | **N/A** | 72 |
| 1.500 | 1.875 | SQ | Thomson | 2 | 5.000 | 2.250 | 2-1/4-20 | RH | 4 | 1.480 | STEEL | **5707654** | **7820599** | **5707777** | **5702658** | 75 |
| 1.500 | 2.000 | RD | R-1520 | 2 | 5.260 | 2.620 | 2-1/4-20 | RH | 4 | 1.435 | STEEL | **8115-448-056** | **190-9345** | **8115-448-002** | **8115-101-004** | 76 |
| 1.500 | 2.000 | RD | RH1520 HS | 2 | 5.260 | 2.620 | 2-1/4-20 | RH | 4 | 1.435 | STEEL | **8115-448-057** | **190-9345** | **8115-448-002** | **8115-101-004** | 76 |
| 2.000 | 1.000 | RD | R-2001 | 2 | 6.380 | 3.250 | 3-12 | RH | 2 | 2.045 | STEEL | **8120-448-021** | **190-9111** | **8120-448-002** | **8120-101-002** | 78 |
| 2.250 | 1.000 | RD | Thomson | 2 | 6.688 | 3.375 | 3.137-12 | RH | 2 | 2.230 | STEEL | **5704555** | **7820604** | **5707574** | **5702659** | 80 |
| 2.500 | 1.000 | RD | R-2501 | 2 | 6.750 | 4.000 | 3-5/8-12 | RH | 2 | 2.545 | STEEL | **8125-448-008** | **190-9115** | **8125-448-002** | **8125-448-002** | 83 |
| 3.000 | 1.500 | RD | Thomson | 2 | 9.313 | 4.750 | 4.325-12 | RH | 2 | 2.910 | STEEL | **5704986** | **7820609** | **5707575** | **5702661** | 85 |
| 4.000 | 1.000 | RD | R-2501 | 2 | 6.750 | 4.000 | 3-5/8-12 | RH | 2 | 2.545 | STEEL | **8125-448-008** | **190-9115** | **8125-448-002** | **8125-101-002** | 83 |

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

## Type C



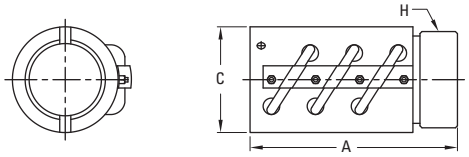

**Return:** Double Circuit
**Shape:** Round or Square
**Mounting:** V-Thread
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.375 | 0.125 | RD | Thomson | 2 | 1.875 | 0.750 | 0.664-32 | RH | 1 | 0.365 | STEEL | **5707502** | **5707538** | **5706751** | **N/A** | |
| 0.375 | 0.125 | RD | Thomson | 2 | 1.875 | 0.750 | 0.664-32 | RH | 1 | 0.365 | SS | **5707643** | **5706540** | **N/A** | **N/A** | |
| 0.375 | 0.125 | RD | Thomson | 2 | 1.875 | 0.750 | 0.664-32 | LH | 1 | 0.365 | STEEL | **5708282** | **5708532** | **5706751** | **N/A** | |
| 0.375 | 0.125 | RD | R-0308 | 2 | 1.880 | 0.781 | 11/16-24 | RH | 1 | 0.380 | STEEL | **8103-448-003** | **190-9217** | **8103-448-002** | **8103-101-002** | 45 |
| 0.375 | 0.125 | RD | R-0308LN | 2 | 1.875 | 0.781 | 0.664-32 | RH | 1 | 0.380 | STEEL | **8103-448-013** | **190-9217** | **N/A** | **8103-101-002** | 45 |
| 0.500 | 0.200 | RD | Thomson | 2 | 2.600 | 1.030 | 15/16-16 | RH | 1 | 0.482 | STEEL | **7826720** | **7826721** | **5707570** | **7826759** | |
| 0.500 | 0.200 | RD | R-0505 | 2 | 2.750 | 1.062 | 15/16-16 | RH | 1 | 0.510 | STEEL | **8105-448-013** | **190-9097** | **8105-448-002** | **8105-101-002** | 46 |
| 0.750 | 0.200 | RD | Thomson | 2 | 2.635 | 1.300 | 1.25-18 | RH | 1 | 0.727 | STEEL | **7824297** | **7824298** | **7823336** | **7824337** | |
| 0.750 | 0.200 | RD | R-0705 | 2 | 2.880 | 1.312 | 1.173-18 | RH | 1 | 0.765 | STEEL | **8107-448-016** | **190-9101** | **8107-448-007** | **8107-101-002** | 53 |
| 0.750 | 0.200 | RD | R-0705 | 2 | 2.880 | 1.312 | 1.25-18 | RH | 1 | 0.765 | STEEL | **8107-448-046** | **190-9101** | **N/A** | **N/A** | 53 |
| 0.750 | 0.200 | RD | R-0705STH | 2 | 2.880 | 1.312 | 1.125-18 | RH | 1 | 0.765 | STEEL | **8107-448-027** | **190-9101** | **N/A** | **N/A** | 53 |
| 0.875 | 0.200 | RD | Thomson | 2 | 2.704 | 1.615 | 1-3/8-16 | RH | 1 | 0.852 | STEEL | **5708277** | **5708859** | **5708281** | **7831512** | 61 |
| 1.000 | 0.250 | RD | R-1004 | 2 | 3.130 | 1.687 | 1-9/16-18 | RH | 1 | 0.985 | STEEL | **8110-448-026** | **190-9104** | **8110-448-002** | **8110-101-002** | 61 |
| 1.000 | 0.250 | RD | RL1004 | 2 | 3.130 | 1.687 | 1-9/16-18 | LH | 1 | 0.985 | STEEL | **8110-448-024** | **190-9105** | **8100-448-002** | **8110-101-002** | 61 |
| 1.000 | 0.250 | SQ | Thomson | 2 | 3.000 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **5700348** | **7820426** | **5707571** | **5702649** | |
| 1.000 | 0.250 | SQ | RF1004 | 2 | 3.000 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **8110-448-056** | **190-9104** | **8110-448-002** | **N/A** | 60 |
| 1.150 | 0.200 | RD | Thomson | 2 | 2.500 | 1.687 | 1-5/8-20 | RH | 1 | 1.130 | STEEL | **5701566** | **7820430** | **5708283** | **5702652** | |
| 1.150 | 0.200 | RD | Thomson | 2 | 2.500 | 1.687 | 1-5/8-20 | LH | 1 | 1.130 | STEEL | **7820207** | **7820431** | **5708283** | **5702652** | |
| 1.150 | 0.200 | RD | R-1105 | 2 | 2.500 | 1.687 | 1-5/8-20 | RH | 1 | 1.130 | STEEL | **8111-448-006** | **190-9106** | **8111-448-002** | **8111-101-002** | 66 |
| 1.171 | 0.413 | RD | Thomson | 2 | 3.375 | 2.125 | 1.967-18 | RH | 1 | 1.160 | STEEL | **5707511** | **7820432** | **5707572** | **5702653** | 68 |
| 1.500 | 0.250 | RD | Thomson | 2 | 2.875 | 2.088 | 1.967-18 | LH | 1 | 1.485 | STEEL | **5701990** | **7820596** | **5706754** | **5702654** | 69 |
| 1.500 | 0.250 | RD | Thomson | 2 | 2.875 | 2.088 | 1.967-18 | RH | 1 | 1.485 | STEEL | **5709587** | **7820595** | **5706754** | **5702654** | |
| 1.500 | 0.250 | RD | Thomson | 2 | 2.875 | 2.088 | 1.967-18 | RH | 1 | 1.485 | STEEL | **7833233** | **7820595** | **5706754** | **5702654** | 69 |
| 1.500 | 0.250 | RD | R-1504 | 2 | 3.250 | 2.093 | 1.967-18 | RH | 1 | 1.515 | STEEL | **8115-448-020** | **190-9110** | **8115-448-009** | **8115-101-006** | |
| 1.500 | 0.473 | RD | Thomson | 2 | 4.312 | 2.625 | 2.548-18 | RH | 1 | 1.470 | STEEL | **5707513** | **7820597** | **5707573** | **5702655** | 70 |
| 1.500 | 0.473 | RD | Thomson | 2 | 3.625 | 2.625 | N/A | RH | 1 | 1.470 | STEEL | **5708345** | **7820597** | **N/A** | **5702656** | |
| 1.500 | 0.473 | RD | R-1547 | 2 | 4.307 | 2.620 | 2.548-18 | RH | 1 | 1.415 | STEEL | **8115-448-055** | **190-9328** | **8115-448-064** | **8115-101-004** | |
| 1.500 | 0.500 | RD | Thomson | 2 | 5.590 | 2.623 | 2.375-16 | RH | 1 | 1.470 | STEEL | **7824246** | **7824253** | **7824250** | **7824251** | |
| 1.500 | 0.500 | RD | R-1502 | 2 | 5.565 | 2.620 | 2.360-18 | RH | 1 | 1.535 | STEEL | **8115-448-016** | **190-9108** | **8115-448-018** | **8115-101-004** | 53 |
| 1.500 | 0.500 | RD | RL1502 | 2 | 5.565 | 2.620 | 2.360-18 | LH | 1 | 1.535 | STEEL | **8115-448-018** | **190-9109** | **8115-448-004** | **8115-101-004** | 71 |
| 2.000 | 0.500 | RD | R-2002 | 2 | 6.380 | 3.250 | 3-12 | RH | 1 | 2.045 | STEEL | **8120-448-011** | **190-9112** | **8120-448-002** | **8120-101-002** | 77 |
| 2.000 | 0.500 | RD | RL2002 | 2 | 6.380 | 3.250 | 3-12 | LH | 1 | 2.045 | STEEL | **8120-448-013** | **190-9113** | **8120-448-002** | **8120-101-002** | 45 |
| 2.250 | 0.500 | RD | Thomson | 2 | 6.688 | 3.375 | 3.137-12 | LH | 1 | 2.230 | STEEL | **5704000** | **7820602** | **5707574** | **5702659** | 79 |
| 2.250 | 0.500 | RD | Thomson | 2 | 6.688 | 3.375 | 3.137-12 | RH | 1 | 2.230 | STEEL | **5707516** | **7820600** | **5707574** | **5702659** | |
| 2.250 | 0.500 | RD | Thomson | 2 | 6.688 | 3.375 | 3.137-12 | RH | 1 | 2.230 | STEEL | **7833235** | **7820600** | **5707574** | **5702659** | 79 |
| 2.250 | 0.500 | RD | Thomson | 2 | 5.250 | 3.376 | N/A | RH | 1 | 2.230 | STEEL | **5708346** | **7820600** | **N/A** | **5702659** | |
| 2.250 | 0.500 | RD | Thomson | 2 | 5.250 | 3.376 | N/A | LH | 1 | 2.230 | STEEL | **7830722** | **7820602** | **N/A** | **5702659** | |
| 2.250 | 0.500 | RD | R-2202 | 2 | 6.680 | 3.370 | 3.137-12 | RH | 1 | 2.180 | STEEL | **8122-448-005** | **190-9114** | **N/A** | **8122-101-002** | |
| 2.500 | 0.500 | RD | Thomson | 2 | 6.750 | 3.625 | 3.5-12 | RH | 1 | 2.480 | STEEL | **7824136** | **7824262** | **7824141** | **7824140** | |
| 2.500 | 0.500 | RD | R-2502 | 2 | 6.750 | 4.000 | 3-5/8-12 | RH | 1 | 2.545 | STEEL | **8125-448-010** | **190-9116** | **8125-448-002** | **8125-101-002** | 82 |

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

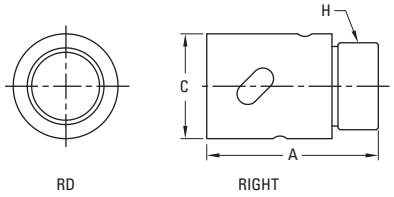
## Type D




**Return:** Triple Circuit
**Shape:** Round
**Mounting:** V-Thread
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.500 | 0.250 | RD | Thomson | 3 | 3.750 | 3.375 | 3.34-12 | RH | 1 | 2.485 | **STEEL** | **5703243** | **7820606** | **5703263** | **5703324** | 81 |
| 3.000 | 0.660 | RD | Thomson | 3 | 9.313 | 4.750 | 4.325-12 | RH | 1 | 2.965 | **STEEL** | **5707519** | **7820607** | **5707575** | **5702661** | |
| 3.000 | 0.660 | RD | Thomson | 3 | 7.000 | 4.750 | N/A | RH | 1 | 2.965 | **STEEL** | **5708347** | **7820607** | **N/A** | **5702662** | |
| 3.000 | 0.660 | RD | R-3066 | 3 | 9.320 | 4.750 | 4.325-12 | RH | 1 | 2.950 | **STEEL** | **8130-448-007** | **190-9117** | **8130-448-002** | **8130-101-002** | 84 |
| 4.000 | 1.000 | RD | Thomson | 3 | 12.593 | 5.875 | 5.497-12 | RH | 1 | 3.795 | **STEEL** | **5703258** | **5703262** | **5703307** | **5703306** | 86 |
| 6.000 | 1.000 | RD | Thomson | 3 | 14.438 | 9.000 | 8.5-8 | RH | 1 | 5.795 | **STEEL** | **5704738** | **5704762** | **5704764** | **5704746** | |

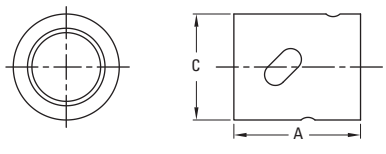
## Type E




**Return:** Single-Liner
**Shape:** Round
**Mounting:** V-Thread
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.375 | 0.125 | RD | RC0308 | 1 | 0.988 | 0.825 | 11/16-24 | RH | 1 | 0.380 | STEEL | **8103-448-008** | **190-9217** | **N/A** | **8103-101-002** | |
| 0.631 | 0.200 | RD | Thomson | 3 | 1.850 | 1.130 | 15/16-16 | RH | 1 | 0.620 | STEEL | **7832872** | **7832873** | **5707570** | **INTEGRAL** | 50 |

## Type F



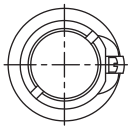

**Return:** Single-Liner
**Shape:** Round
**Mounting:** Cylindrical
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.187 | 0.050 | RD | Thomson | 2 | 0.594 | 0.500 | N/A | RH | 1 | 0.178 | SS | **7821609** | **7821634** | **N/A** | **N/A** | 42 |
| 0.187 | 0.050 | RD | Thomson | 2 | 0.594 | 0.500 | N/A | RH | 1 | 0.178 | EPOXY | **7821632** | **7821634** | **N/A** | **N/A** | |
| 0.187 | 0.063 | RD | Thomson | 2 | 0.594 | 0.500 | N/A | RH | 1 | 0.178 | SS | **7821579** | **7821633** | **N/A** | **N/A** | 43 |
| 0.187 | 0.063 | RD | Thomson | 2 | 0.594 | 0.500 | N/A | RH | 1 | 0.178 | EPOXY | **7821631** | **7821633** | **N/A** | **N/A** | |

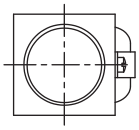
Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

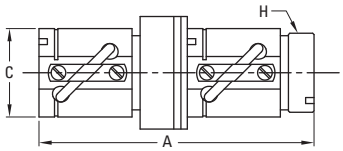
## Type G



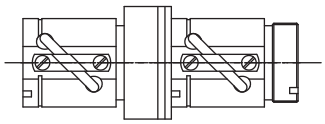
RD



SQ




RIGHT



LEFT

**Return:** See Table
**Shape:** Round or Square
**Mounting:** V-Thread
**Backlash:** Preloaded

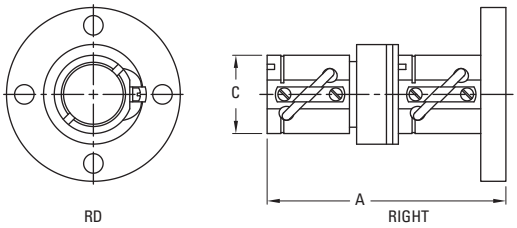


| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.375 | 0.125 | RD | RP0308 | 2 X 2 | 4.130 | 0.781 | 11/16-24 | RH | 1 | 0.380 | STEEL | **8103-448-004** | **190-9217** | **N/A** | **8103-101-002** | |
| 0.500 | 0.200 | RD | RP0505 | 2 X 2 | 5.950 | 1.062 | 15/16-16 | RH | 1 | 0.510 | STEEL | **8105-448-008** | **190-9097** | **8105-448-002** | **8105-101-002** | 46 |
| 0.500 | 0.500 | RD | RP0502 | 2 X 2 | 6.000 | 1.060 | 15/16-16 | RH | 2 | 0.510 | SS | **8105-448-009** | **190-9096** | **8105-448-002** | **8105-101-002** | |
| 0.500 | 0.500 | SQ | Thomson | 2 X 2 | 3.875 | 1.000 | 15/16-16 | RH | 2 | 0.490 | STEEL | **7826767** | **5706740** | **5707570** | **N/A** | |
| 0.631 | 0.200 | RD | RD0605 | 2 X 1 | 3.550 | 1.125 | 15/16-16 | RH | 1 | 0.610 | STEEL | **8106-448-015** | **190-9098** | **8105-448-002** | **8106-101-002** | 49 |
| 0.631 | 0.200 | RD | RE0605 | 2 X 1 | 3.550 | 1.125 | 15/16-16 | LH | 1 | 0.610 | STEEL | **8106-448-019** | **190-9099** | **8105-448-002** | **8106-101-002** | 49 |
| 0.631 | 0.200 | SQ | Thomson | 2 X 1 | 3.510 | 1.000 | 15/16-16 | RH | 1 | 0.620 | STEEL | **7820955** | **5707540** | **5707570** | **5702647** | |
| 0.631 | 0.200 | SQ | Thomson | 2 X 1 | 3.510 | 1.000 | 15/16-16 | LH | 1 | 0.620 | STEEL | **7820956** | **5707541** | **5707570** | **5702647** | |
| 0.631 | 1.000 | RD | Thomson | 2 X 2 | 3.440 | 1.125 | 15/16-16 | RH | 4 | 0.620 | STEEL | **7827531** | **7826712** | **5707570** | **7827527** | 51 |
| 0.750 | 0.200 | RD | RD0705 | 2 X 1 | 4.080 | 1.312 | 1.173-18 | RH | 1 | 0.765 | STEEL | **8107-448-025** | **190-9101** | **8107-448-007** | **8107-101-002** | 54 |
| 0.750 | 0.500 | RD | Thomson | 2 X 2 | 5.750 | 1.300 | 1.25-18 | RH | 2 | 0.729 | STEEL | **7826991** | **7824361** | **7823336** | **7824337** | |
| 0.750 | 0.500 | RD | RP0705 | 2 X 2 | 6.180 | 1.312 | 1.250-16 | RH | 1 | 0.765 | STEEL | **8107-448-011** | **190-9100** | **8107-448-002** | **8107-101-002** | 57 |
| 1.000 | 0.250 | RD | RU1004 | 2 X 1 | 4.847 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **8110-448-092** | **190-9104** | **8110-448-002** | **8110-101-002** | 61 |
| 1.000 | 0.250 | SQ | Thomson | 2 X 1 | 4.847 | 1.500 | 1.563-18 | RH | 1 | 0.985 | STEEL | **5704167** | **7820426** | **5707571** | **5702649** | |
| 1.000 | 0.250 | SQ | Thomson | 2 X 1 | 4.847 | 1.500 | 1.563-18 | LH | 1 | 0.985 | STEEL | **5704168** | **7820428** | **5707571** | **5702649** | |
| 1.000 | 0.250 | SQ | RV1004 | 2 X 1 | 4.847 | 1.500 | 1.563-18 | LH | 1 | 0.985 | STEEL | **8110-448-089** | **190-9105** | **8110-448-002** | **N/A** | 61 |
| 1.000 | 0.500 | RD | RP1002 | 2 X 2 | 6.640 | 1.687 | 1.5625-18 | RH | 2 | 1.015 | STEEL | **8110-448-016** | **190-9103** | **8110-448-002** | **8110-101-002** | 63 |
| 1.150 | 0.200 | RD | Thomson | 2 X 1 | 3.704 | 1.687 | 1-5/8-20 | RH | 1 | 1.130 | STEEL | **5704270** | **7820430** | **5708283** | **5702652** | |
| 1.150 | 0.200 | RD | Thomson | 2 X 1 | 3.704 | 1.687 | 1-5/8-20 | LH | 1 | 1.130 | STEEL | **7820206** | **7820431** | **5708283** | **5702652** | |
| 1.150 | 0.200 | RD | RP1105 | 2 X 2 | 5.500 | 1.687 | 1.625-20 | RH | 1 | 1.130 | STEEL | **8111-448-004** | **190-9106** | **8111-448-002** | **8111-101-002** | 67 |
| 1.500 | 0.250 | RD | Thomson | 2 X 2 | 6.375 | 2.088 | 1.967-18 | RH | 1 | 1.485 | STEEL | **5704271** | **7820595** | **5706754** | **5702654** | |
| 1.500 | 0.250 | RD | Thomson | 2 X 2 | 6.375 | 2.088 | 1.967-18 | RH | 1 | 1.485 | STEEL | **7833234** | **7820595** | **5706754** | **5702654** | 69 |
| 1.500 | 0.250 | RD | Thomson | 2 X 2 | 6.375 | 2.088 | 1.967-18 | LH | 1 | 1.485 | STEEL | **5704573** | **7820596** | **5706754** | **5702654** | 69 |
| 1.500 | 0.500 | RD | RP1502 | 2 X 2 | 12.100 | 2.620 | 2.360-18 | RH | 1 | 1.535 | STEEL | **8115-448-006** | **190-9108** | **8115-448-004** | **8115-101-004** | 71 |
| 1.500 | 1.000 | RD | RP1501 | 2 X 2 | 8.160 | 2.620 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-011** | **190-9107** | **8115-448-002** | **8115-101-004** | 73 |
| 1.500 | 1.000 | SQ | Thomson | 2 X 2 | 7.628 | 2.250 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **5700698** | **7820598** | **5707777** | **5702657** | |
| 1.500 | 1.000 | SQ | RU1501 | 2 X 2 | 7.628 | 2.245 | 2-1/4-20 | RH | 2 | 1.480 | STEEL | **8115-448-075** | **190-9107** | **8115-448-002** | **N/A** | 73 |
| 1.500 | 1.875 | SQ | Thomson | 2 X 2 | 10.625 | 2.245 | 2-1/4-20 | RH | 4 | 1.480 | STEEL | **5704272** | **7820599** | **5707777** | **5702658** | 75 |
| 2.000 | 0.500 | RD | RP2002 | 2 X 2 | 13.920 | 3.250 | 3-12 | RH | 1 | 2.045 | STEEL | **8120-448-006** | **190-9112** | **8120-448-002** | **8120-101-002** | 77 |
| 2.000 | 0.500 | RD | RT2002 | 2 X 2 | 13.920 | 3.250 | 3-12 | LH | 1 | 2.045 | STEEL | **8120-448-007** | **190-9113** | **8120-448-002** | **8120-101-002** | 77 |
| 2.000 | 1.000 | RD | RP2001 | 2 X 2 | 13.900 | 3.250 | 3-12 | RH | 2 | 2.045 | STEEL | **8120-448-019** | **190-9111** | **8120-448-002** | **8120-101-002** | 78 |

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

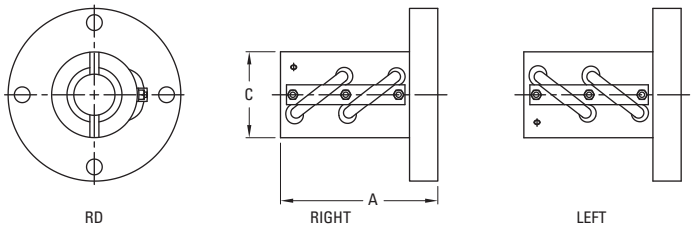
## Type H




**Return:** See Table
**Shape:** Round
**Mounting:** Flange
**Backlash:** Preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.631 | 0.200 | RD | Thomson | 2 X 1 | 3.775 | 1.130 | N/A | RH | 1 | 0.620 | STEEL | **7823584** | **5707540** | **INTEGRAL** | **INTEGRAL** | |
| 0.875 | 0.200 | RD | Thomson | 2 X 1 | 3.835 | 1.250 | N/A | RH | 1 | 0.852 | STEEL | **7823585** | **5708859** | **INTEGRAL** | **INTEGRAL** | |
| 1.000 | 0.250 | RD | Thomson | 2 X 1 | 4.438 | 1.618 | N/A | RH | 1 | 0.985 | STEEL | **7823586** | **7820426** | **INTEGRAL** | **INTEGRAL** | |
| 1.000 | 0.250 | RD | RD1004F | 2 X 1 | 4.438 | 1.620 | N/A | RH | 1 | 0.985 | STEEL | **8110-448-097** | **190-9104** | **INTEGRAL** | **INTEGRAL** | 62 |
| 1.150 | 0.200 | RD | Thomson | 2 X 1 | 3.821 | 1.688 | N/A | RH | 1 | 1.130 | STEEL | **7823587** | **7820430** | **INTEGRAL** | **INTEGRAL** | |
| 1.150 | 0.200 | RD | RD1105F | 2 X 1 | 3.821 | 1.688 | N/A | RH | 4 | 1.130 | STEEL | **8111-448-014** | **190-9106** | **INTEGRAL** | **INTEGRAL** | 66 |
| 1.500 | 0.250 | RD | Thomson | 2 X 2 | 6.845 | 2.088 | N/A | RH | 1 | 1.485 | STEEL | **7823588** | **7820595** | **INTEGRAL** | **INTEGRAL** | |
| 2.250 | 0.500 | RD | Thomson | 2 X 2 | 13.787 | 3.375 | N/A | RH | 1 | 2.230 | STEEL | **7823589** | **7820600** | **INTEGRAL** | **INTEGRAL** | |
| 2.500 | 0.250 | RD | Thomson | 2 X 3 | 7.490 | 3.375 | N/A | RH | 1 | 2.485 | STEEL | **7823590** | **7820606** | **INTEGRAL** | **INTEGRAL** | 81 |
| 3.000 | 0.660 | RD | Thomson | 2 X 3 | 18.549 | 4.750 | N/A | RH | 1 | 2.965 | STEEL | **5703045** | **7820607** | **INTEGRAL** | **INTEGRAL** | |

## Type J




**Return:** Double Circuit
**Shape:** Round
**Mounting:** Flange
**Backlash:** Non-preloaded

| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 0.250 | RD | Thomson | 2 | 3.000 | 1.625 | N/A | RH | 1 | 0.985 | STEEL | **5708278** | **7820426** | **INTEGRAL** | **5702651** | |
| 1.000 | 0.250 | RD | Thomson | 2 | 3.000 | 1.625 | N/A | LH | 1 | 0.985 | STEEL | **5708284** | **7820428** | **INTEGRAL** | **5702651** | |
| 1.000 | 0.250 | RD | R-1004F | 2 | 3.000 | 1.625 | N/A | RH | 1 | 0.985 | STEEL | **8110-448-087** | **190-9104** | **INTEGRAL** | **5702651** | 61 |
| 1.000 | 0.250 | RD | RL1004F | 2 | 3.000 | 1.625 | N/A | LH | 1 | 0.985 | STEEL | **8110-448-088** | **190-9105** | **INTEGRAL** | **5702651** | 61 |

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

# Visual Product Reference — Precision Rolled Ball Screws — Inch Series

## Type Other



**Return:** See Table
**Shape:** Miscellaneous
**Mounting:** Miscellaneous
**Backlash:** Miscellaneous



| BCD (in.) | Lead (in.) | Shape | Nut Model | No. of Circuits | Length (in.) "A" | Width/ Dia. (in.) "C" | V-Thd. "H" | Thd. Dir. | No. of Starts | Major Screw Dia. | Mat'l | Nut P/N | Screw P/N | Flange P/N | Wiper P/N | Cat. Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.312 | 0.100 | RD | Thomson | 4 | 1.180 | 0.625 | 0.586-32 | RH | 1 | 0.292 | STEEL | **7832875** | **7832897** | **N/A** | **N/A** | |
| 0.375 | 0.063 | RD | Thomson | 8 | 1.180 | 0.750 | 11/16-32 | RH | 1 | 0.3685 | STEEL | **7832874** | **7832894** | **N/A** | **N/A** | |
| 0.375 | 0.125 | RD | Thomson | 1 | 0.677 | 0.749 | N/A | RH | 1 | 0.482 | STEEL | **7824973** | **7824974** | **N/A** | **N/A** | |
| 0.500 | 0.200 | RD | Thomson | 3 | 1.660 | 0.943 | N/A | RH | 1 | 0.482 | STEEL | **7826763** | **7826721** | **N/A** | **INTEGRAL** | |
| 0.500 | 0.500 | RD | Thomson | 2 | 1.500 | 1.320 | N/A | RH | 2 | 0.490 | STEEL | **5707506** | **5706740** | **N/A** | **N/A** | |
| 0.500 | 0.500 | RD | Thomson | 2 | 1.500 | 1.320 | N/A | RH | 2 | 0.490 | SS | **5707644** | **5706846** | **N/A** | **N/A** | |
| 0.750 | 0.200 | RD | Thomson | 4 | 1.800 | 1.297 | N/A | RH | 1 | 0.734 | STEEL | **7826768** | **7826770** | **N/A** | **INTEGRAL** | |

Note: Manganese Phosphate coating provided as standard finish on Thomson ball screws not featured in catalog pages.

Note: These ball nuts available for high quantity purchase only (100 piece minimum order required).

## NOTES:

# Precision Plus Ground Ball Screws — Inch Series



## High accuracy and stiffness with zero backlash, for stringent applications where ball screw performance is critical.

Thomson Precision Plus Ground Ball Screw Assemblies provide the positioning accuracy and repeatability required for the most stringent positioning applications. Thomson assemblies are designed and manufactured to provide 8 times the lead accuracy of conventional ball screws (± .0005 in/ft), and provide consistent, zero-backlash, preload for high repeatability. All ball nuts feature an integral flange for optimal precision and mounting ease, and specially designed seals/wipers that provide superior lubricant retention while keeping out harmful contaminants. Precision Plus Ground Assemblies are ideal for machine tools, robots, semi-conductor/electronic assembly systems, and many more applications where high-level ball screw performance is required.

Need a quote or have a question about an application? Contact us in North America at:

Phone: 540-633-3549
Fax: 540-639-4162
Email: thomson@danahermotion.com

# Precision Plus Ground Ball Screws — Inch Series

Lead Accuracy: ± .0005 in/ft



**Preloaded, Round Ball Nut with Integral Flange and Wiper**

- Precision ground for highly accurate and smooth running performance
- Long-lasting preload for minimal backlash and consistent stiffness
- Standard sizes stocked for quick delivery. Additional sizes are available as custom product.

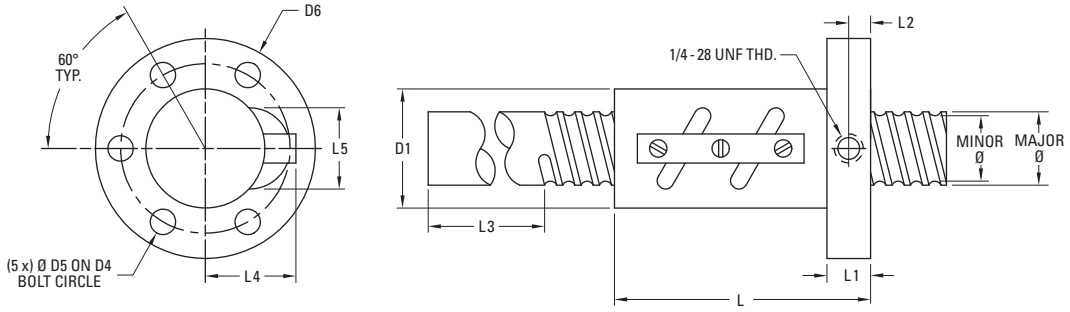
| Nominal Diameter (size) | Lead | Ball Screw and Nut Assembly P/N[1][2][3] | Ball Nut Details | | Performance Data | | | Screw Specifications | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direction | No. of Return Tubes | Dynamic Load Capacity ($C_{am}$) | Static Load Capacity ($C_o$) | Max. Axial Backlash | Major Diameter (max.) | Minor Diameter | Standard Length | Screw Weight |
| (in.) | (in.) | | | | (lbf) | (lbf) | (in.) | (in.) | (in.) | (in.) | (lb/ft) |
| 0.631 | 0.200 | **7820396** | Right Hand | 2 | 440 | 2,110 | 0.00 | 0.611 | 0.496 | 42 | 0.90 |
| 0.750 | 0.200 | **5700974** | Right Hand | 2 | 1,473 | 9,916 | 0.00 | 0.750 | 0.599 | 42 | 1.45 |
| 0.875 | 0.200 | **7820397** | Right Hand | 2 | 1,375 | 10,780 | 0.00 | 0.875 | 0.740 | 60 | 1.78 |
| 1.000 | 0.200 | **5700975** | Right Hand | 2 | 1,565 | 13,073 | 0.00 | 1.000 | 0.865 | 72 | 2.20 |
| 1.000 | 0.250 | **7820477** | Right Hand | 2 | 2,285 | 15,815 | 0.00 | 1.000 | 0.833 | 72 | 2.20 |
| 1.150 | 0.200 | **5700976** | Right Hand | 2 | 1,680 | 14,886 | 0.00 | 1.130 | 1.015 | 72 | 3.18 |
| 1.250 | 0.200 | **5700977** | Right Hand | 2 | 1,800 | 16,625 | 0.00 | 1.250 | 1.115 | 72 | 3.75 |
| 1.250 | 0.200 | **7820830** | Left Hand | 2 | 1,800 | 16,625 | 0.00 | 1.235 | 1.115 | 72 | 3.75 |
| 1.250 | 0.500 | **7820399** | Right Hand | 2 | 1,765 | 11,080 | 0.00 | 1.250 | 1.050 | 96 | 3.77 |
| 1.500 | 0.200 | **7820375** | Right Hand | 4 | 4,745 | 45,073 | 0.00 | 1.500 | 1.349 | 120 | 5.18 |
| 1.500 | 0.250 | **7820965** | Right Hand | 4 | 4,250 | 27,250 | 0.00 | 1.500 | 1.333 | 120 | 5.18 |
| 1.500 | 0.500 | **7820401** | Right Hand | 2 | 5,075 | 35,770 | 0.00 | 1.500 | 1.236 | 120 | 4.79 |
| 1.750 | 0.200 | **5700979** | Right Hand | 4 | 4,464 | 47,446 | 0.00 | 1.750 | 1.615 | 96 | 7.56 |
| 2.000 | 0.200 | **7820402** | Right Hand | 6 | 6,181 | 65,903 | 0.00 | 2.000 | 1.849 | 120 | 9.81 |
| 2.250 | 0.500 | **7820484** | Right Hand | 2 | 20,160 | 108,325 | 0.00 | 2.250 | 1.858 | 120 | 10.87 |
| 2.500 | 0.250 | **7820483** | Right Hand | 6 | 8,945 | 93,165 | 0.00 | 2.500 | 2.333 | 120 | 15.46 |

(1) All Precision Plus Ground product is sold in matched sets as ball screw and nut assemblies.

(2) Dimensional information on bearing supports and standard end machining is available on page 144.

(3) Information on required lubrication is on page 243.

# Precision Plus Ground Ball Screws — Inch Series




| Nominal Diameter (size) | Lead | Nut Specifications | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D1 | D4 | D5 | D6 | L | L1 | L2 | L3 | L4 (max.) | L5 (max.) | Nut Weight | Ball Diameter |
| (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (lb) | (in.) |
| 0.631 | 0.200 | 1.130 | 1.562 | 0.281 | 2.000 | 2.200 | 0.375 | 0.200 | 2.750 | 0.849 | 0.710 | 0.66 | 0.125 |
| 0.750 | 0.200 | 1.370 | 1.875 | 0.281 | 2.320 | 3.000 | 0.500 | 0.312 | 2.750 | 0.996 | 0.855 | 1.26 | 0.141 |
| 0.875 | 0.200 | 1.250 | 1.750 | 0.281 | 2.250 | 3.000 | 0.500 | 0.312 | 2.750 | 0.891 | 1.024 | 0.92 | 0.125 |
| 1.000 | 0.200 | 1.620 | 2.250 | 0.281 | 2.750 | 3.000 | 0.500 | 0.312 | 3.750 | 1.042 | 1.134 | 1.63 | 0.125 |
| 1.000 | 0.250 | 1.685 | 2.250 | 0.344 | 2.875 | 3.370 | 0.500 | 0.312 | 3.750 | 1.100 | 1.203 | 1.98 | 0.156 |
| 1.150 | 0.200 | 1.685 | 2.280 | 0.344 | 2.875 | 3.000 | 0.500 | 0.312 | 3.750 | 1.067 | 1.287 | 1.61 | 0.125 |
| 1.250 | 0.200 | 1.645 | 2.312 | 0.344 | 2.770 | 3.000 | 0.500 | 0.312 | 3.750 | 1.109 | 1.248 | 1.31 | 0.125 |
| 1.250 | 0.200 | 1.650 | 2.312 | 0.344 | 2.770 | 3.000 | 0.500 | 0.312 | 3.750 | 1.109 | 1.248 | 1.31 | 0.125 |
| 1.250 | 0.500 | 1.990 | 3.124 | 0.406 | 3.865 | 3.580 | 0.625 | 0.410 | 3.750 | 1.356 | 1.531 | 3.43 | 0.188 |
| 1.500 | 0.200 | 2.020 | 2.750 | 0.344 | 3.500 | 5.000 | 0.625 | 0.375 | 3.750 | 1.273 | 1.758 | 3.17 | 0.141 |
| 1.500 | 0.250 | 2.020 | 2.750 | 0.344 | 3.500 | 5.000 | 0.625 | 0.375 | 3.750 | 1.290 | 1.520 | 3.17 | 0.156 |
| 1.500 | 0.500 | 2.250 | 3.125 | 0.406 | 3.875 | 4.625 | 0.625 | 0.410 | 3.750 | 1.575 | 1.900 | 4.27 | 0.250 |
| 1.750 | 0.200 | 2.265 | 3.250 | 0.406 | 4.000 | 5.000 | 0.625 | 0.375 | 4.750 | 1.352 | 1.878 | 3.81 | 0.125 |
| 2.000 | 0.200 | 2.500 | 3.250 | 0.406 | 4.000 | 5.750 | 0.700 | 0.438 | 4.750 | 1.550 | 1.900 | 4.39 | 0.141 |
| 2.250 | 0.500 | 3.375 | 4.375 | 0.656 | 5.375 | 8.125 | 1.250 | 0.812 | 4.750 | 2.259 | 2.535 | 16.29 | 0.375 |
| 2.500 | 0.250 | 3.375 | 4.000 | 0.344 | 4.625 | 6.250 | 0.750 | 0.500 | 4.750 | 2.010 | 2.609 | 8.81 | 0.156 |

# Electrak Pro

## 12 and 24 Vdc - load up to 9000 N

» Ordering Key - see page 67
» Glossary - see page 72
» Electric Wiring Diagram - see page 44



## Standard Features and Benefits

- Designed for heavy duty operation, IP66 protection
- Optimized overall envelope with minimal retracted length
- Durable and corrosion resistant aluminum housing
- Cover tube and extension tube in stainless steel[2/5]
- Acme or ball screw models
- Maintenance free
- Electronic load monitoring (ELM)
- Manual override
- Wide range of options

## General Specifications

| Parameter | Electrak Pro |
|---|---|
| Screw type | acme or ball |
| Internally restrained | no / yes[1] |
| Manual override | yes |
| Dynamic braking | yes |
| Holding brake<br>acme screw models<br>ball screw models | <br>no, self-locking<br>yes |
| End of stroke protection | electronic load monitoring |
| Mid stroke protection | electronic load monitoring |
| Motor protection | electronic load monitoring |
| Motor connection | connector integrated in housing |
| Motor connector | Delphi Metri-Pack 280 |
| Certificates | CE |
| Options | • linear potentiometer[2]<br>• encoder<br>• programmable limit switches[2]<br>• low voltage power switching[3]<br>• end of stroke indication outputs[2]<br>• ELM trip indication output<br>• signal follower input[2/3]<br>• PWM speed control monitoring[4]<br>• IP67[5]<br>• black paint[6] |

## Performance Specifications

| Parameter | | Electrak Pro |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| PR • • 02-2A65 (acme screw) | | 1125 / 2250 |
| PR • • 05-4A65 (acme screw) | | 2250 / 4500 |
| PR • • 07-8A65 (acme screw) | | 3375 / 6750 |
| PR • • 05-2B65 (ball screw) | | 2250 / 3375 |
| PR • • 10-4B65 (ball screw) | | 4500 / 9000 |
| PR • • 15-8B65 (ball screw) | | 6800 / 13600 |
| PR • • 20-8B65 (ball screw) | | 9000 / 18000 |
| Speed, at no load / at maximum load | [mm/s] | |
| PR • • 02-2A65 (acme screw) | | 50 / 43 |
| PR • • 05-4A65 (acme screw) | | 28 / 23 |
| PR • • 07-8A65 (acme screw) | | 14 / 12 |
| PR • • 05-2B65 (ball screw) | | 50 / 38 |
| PR • • 10-4B65 (ball screw) | | 25 / 20 |
| PR • • 15-8B65 (ball screw) | | 14 / 11 |
| PR • • 20-8B65 (ball screw) | | 14 / 10 |
| Available input voltages | [Vdc] | 12, 24 |
| Standard stroke lengths[7] | [mm] | 100, 150, 200, 300 |
| Operating temperature limits | [°C] | -40 – + 85 |
| Full load duty cycle @ 25 °C | [%] | 25 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque, maximum | [Nm] | 17 / 0[1] |
| Protection class | | IP66 |

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| DCG-190 | 54 |
| AC-063 | 50 |

[1] Without / with anti-rotation option. When the anti-rotation option is being used, the front adapter cross hole can't be freely rotated. Instead the front cross hole must be ordered in standard postion (shown in the drawing) or rotated 90°.

[2] Actuators with linear potentiometer, programmable limit switches or signal follower input option must have the anti-rotation option and an aluminum cover tube. Note that a programming unit is neccessary for the programmable limit swich option, see page 62.

[3] Only possible on models with 12 Vdc input voltage.

[4] PWM speed control monitoring requires the ELM to be set from factory to match the customer's PWM source. Contact customer support for more information.

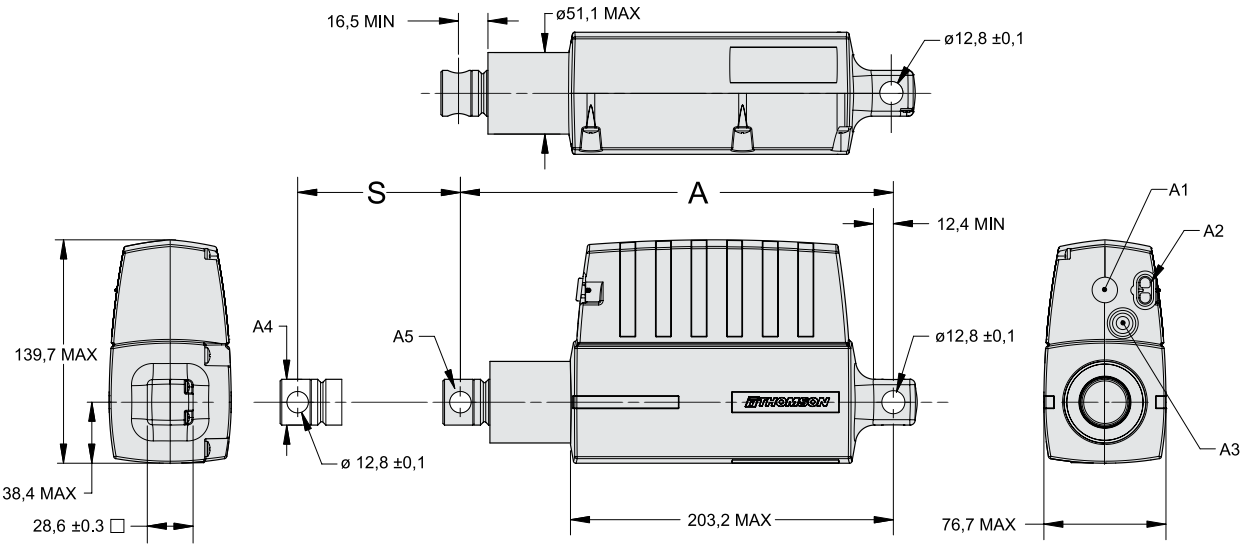
[5] IP67 requires the mating connector be installed and the factory sealing, including the manual override cover, must not be compromised.

[6] Black paint requires a carbon steel or an aluminum cover tube.

[7] For longer stroke length, contact customer support.

# Electrak Pro

## 12 and 24 Vdc - load up to 9000 N



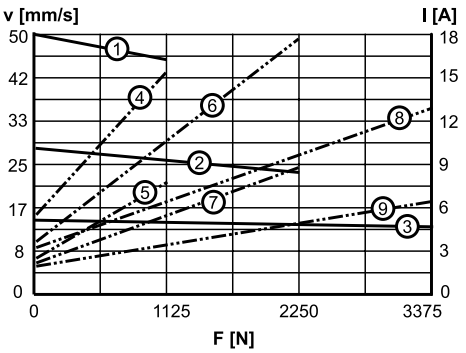

S: stroke
A: retracted length
A1: manual override cover (manual override requires 5 mm or 3/16 hexagon key to operate)
A2: motor connector
A3: knock out plug for signal wire exit
A4: adapter / extension tube diam. for 1125 - 6800 N models = 28,58 ±0,13 mm, for 9000 N model diam. = 30,16 ±0,13 mm.
A5: front adapter cross hole shown in standard position

| Stroke (S) | [mm] | 100 | 150 | 200 | 300 |
|---|---|---|---|---|---|
| Retracted length, acme screw models (A) | [mm] | 257,5 | 307,5 | 357,5 | 457,5 |
| Retracted length, ball screw models (A) | [mm] | 289,5 | 339,5 | 389,5 | 489,5 |
| Weight, acme screw models | [kg] | 3,0 | 3,2 | 3,4 | 3,9 |
| Weight, ball screw models | [kg] | 3,4 | 3,6 | 3,8 | 4,1 |
| Potentiometer resistance change* | [ohm/mm] | 36,2 | 26,5 | 41,7 | 29,3 |

* Potentiometer is optional

## Performance Diagrams

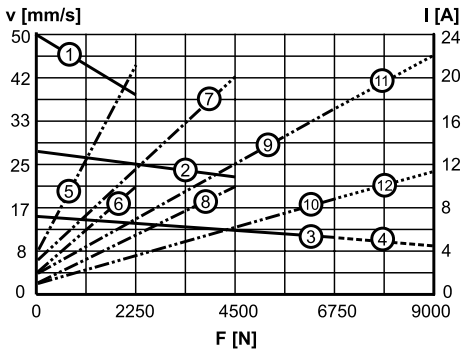
### Acme Screw Models
### Speed and Current vs. Load




V: speed
I: current
F: load

1: speed PR • • 02-2A65
2: speed PR • • 05-4A65
3: speed PR • • 07-8A65
4. current 12 Vdc, PR1202-2A65
5: current 24 Vdc, PR2402-2A65
6: current 12 Vdc, PR1205-4A65
7: current 24 Vdc, PR2405-4A65
8: current 12 Vdc, PR1207-8A65
9: current 24 Vdc, PR2407-8A65

### Ball Screw Models
### Speed and Current vs. Load




V: speed
I: current
F: load

1: speed PR • • 05-2B65
2: speed PR • • 10-4B65
3: speed PR • • 15-8B65
4: speed PR • • 20-8B65
5. current 12 Vdc, PR1205-2B65
6: current 24 Vdc, PR2405-2B65
7: current 12 Vdc, PR1210-4B65
8: current 24 Vdc, PR2410-4B65
9: current 12 Vdc, PR1215-8B65
10: current 24 Vdc, PR2415-8B65
11: current 12 Vdc, PR1220-8B65
12: current 24 Vdc, PR2420-8B65

# Ordering Keys

## Electrak DC-actuators

### Electrak Pro

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| PR24 | 20-8B65 | D | 10 | R | C | S |

**1. Model and input voltage**
PR12 = Electrak Pro, 12 Vdc
PR24 = Electrak Pro, 24 Vdc

**2. Dynamic load capacity and screw type**
02-2A65 = 1100 N, acme
05-4A65 = 2250 N, acme
07-8A65 = 3375 N, acme
05-2B65 = 2250 N, ball
10-4B65 = 4500 N, ball
15-8B65 = 6750 N, ball
20-8B65 = 9000 N, ball

**3. Protection class**
D = IP66 (standard)
G = IP67

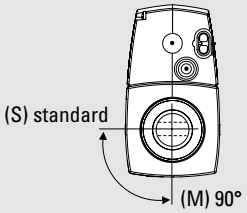
**4. Stroke**
10 = 100 mm
15 = 150 mm
20 = 200 mm
30 = 300 mm

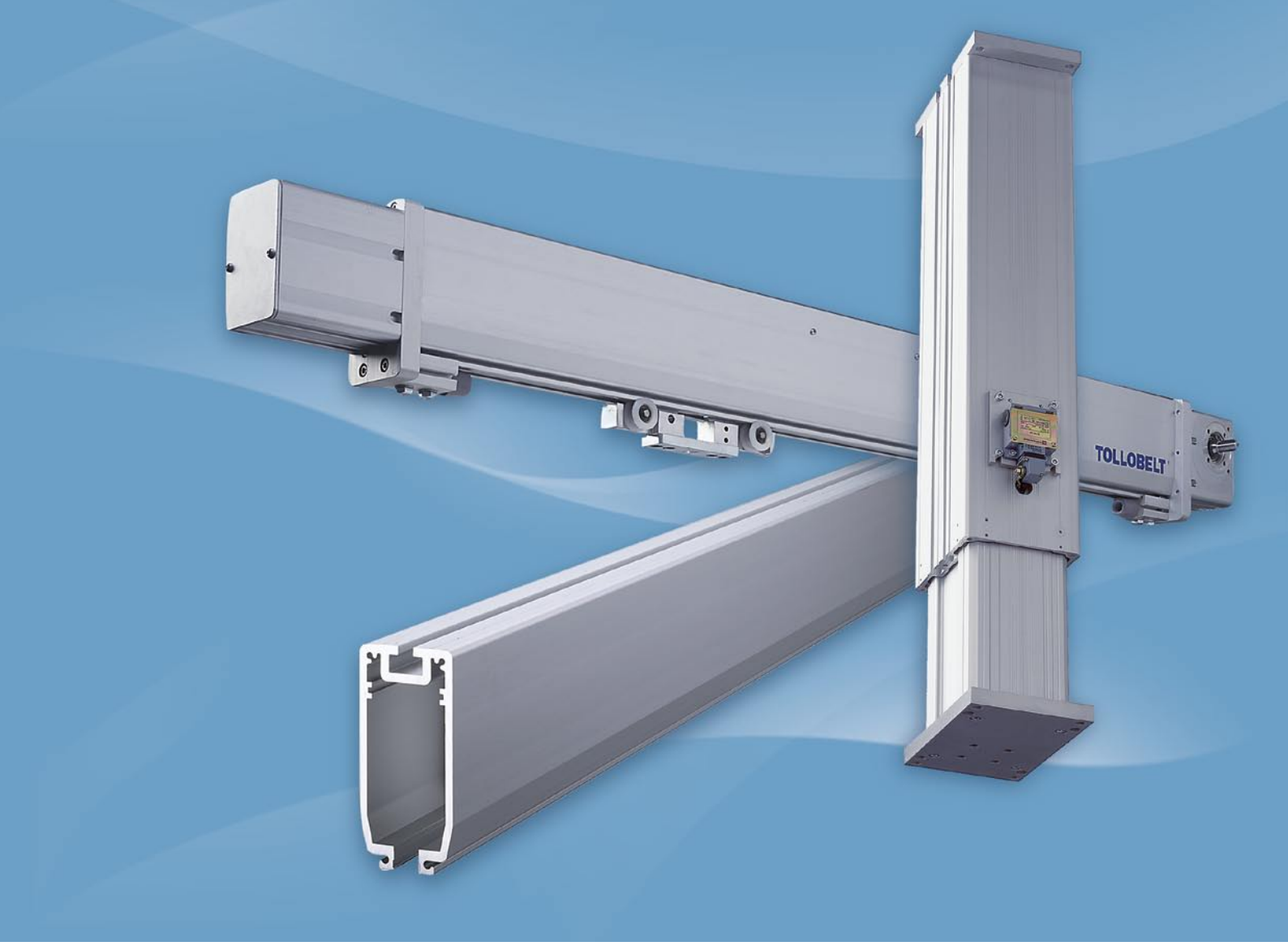
**5. Control PCB options**
S = electronic load monitoring, ELM (standard)
D = ELM + encoder
L = ELM + linear potentiometer[1]
P = ELM + programmable limit switches [1]
T = ELM + low level power switching[2]
R = ELM + end of stroke indication outputs[1]
U = ELM + ELM trip indication output
W = ELM + PWM speed control monitoring[3]
K = ELM + signal follower input[1/2]

**6. Front adapter hole and anti-rotation options**
C = freely rotatable cross hole, no anti-rotation
S = adapter hole in standard position, anti-rotation[4]
M = adapter hole rotated 90°, anti-rotation[4]

**7. Finish**
S = no paint (standard)
B = actuator painted black

[1] Requires anti-rotation mechanism (specify option S or M in position 6).
[2] Only possible on 12 Vdc input voltage models.
[3] PWM speed control monitoring requires the ELM to be set from factory to match the customer's PWM source. Contact customer support for more information.
[4] Definition of adapter hole positions.






THOMSON TOLLO™

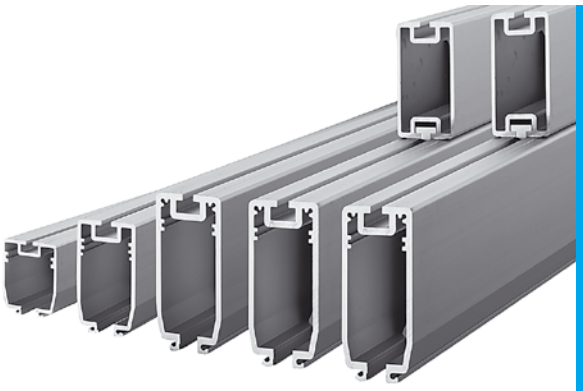
# Handling Components

DANAHER MOTION

*Helping you build a better machine,* ***faster.***

## Light weight overhead rail system - Movorail

- Low weight means easy to handle and install
- Five basic sizes
- Can handle loads up to 600 kg
- Anodised aluminium profiles
- Quick installation
- Modular design
- Easy to install suspensions
- No welding required at installation
- Large number of trollies for different requirements available
- Broad range of options available



PAGE 6

## High speed overhead rodless actuators - Tollobelt

- Light weight belt driven unit in four sizes
- Extruded aluminium profile
- Easy to install
- Speed up to 5 m/s
- Stroke up to 20 m
- Load up to 600 kg
- Up to four trollies per unit possible
- Suitable gear boxes available
- Units can be synchronized using intermediate shafts




PAGE 11

## Industrial lifting actuators - MovoZ

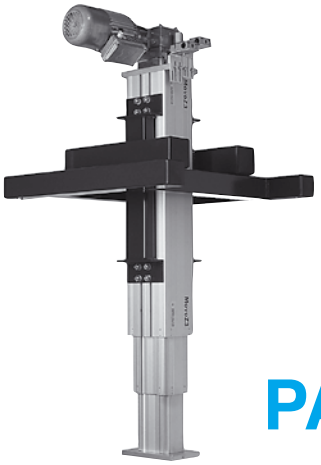
- Telescopic space saving lifting units
- Ball screw drive with safety nut
- Slide guides
- Stroke up to 1,5 m
- Speed up to 1 m/s
- Load up to 7500 N
- Repeatability down to ± 0,1 mm
- Mounting frames available
- Suitable worm gears and belt gears available



PAGE 17

## Lifting units - Movolift

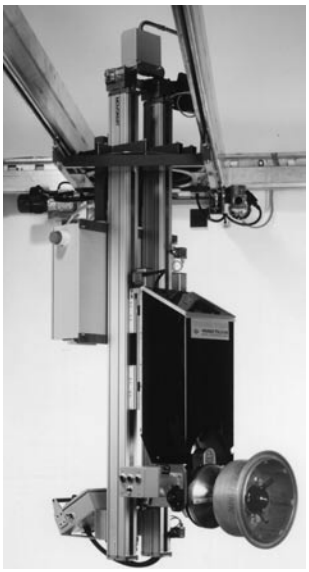
- Lifting units based on MovoZ Z3
- Ready for suspension in Movorail or Tollobelt systems
- Easy to install
- Ball screw drive with safety nut
- Comes with motor, gear box, limit switches and mounting frame
- Frame with manual or motorized rotation available
- Stroke up to 1,5 m
- Lifting speed up to 0,4 m/s
- Load up to 7500 N



PAGE 23

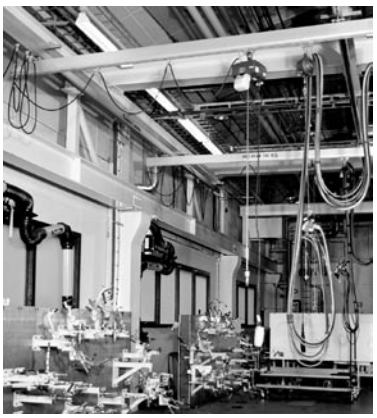


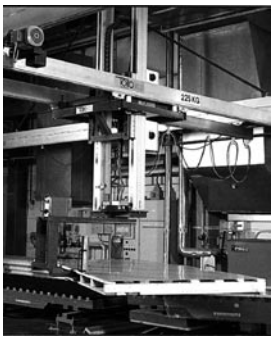


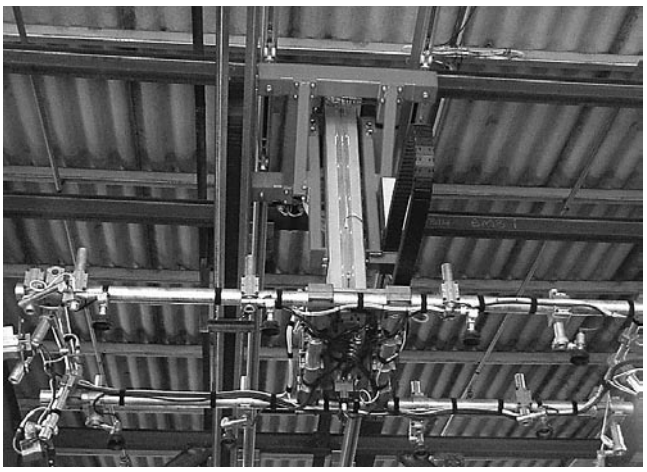






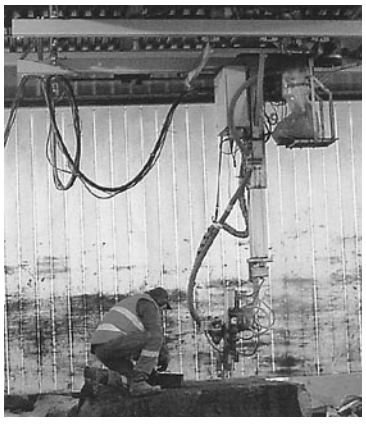


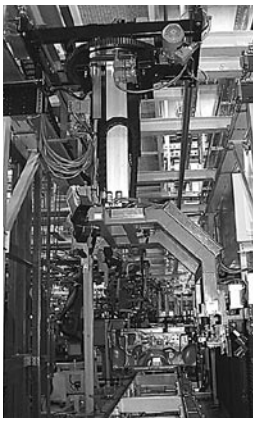


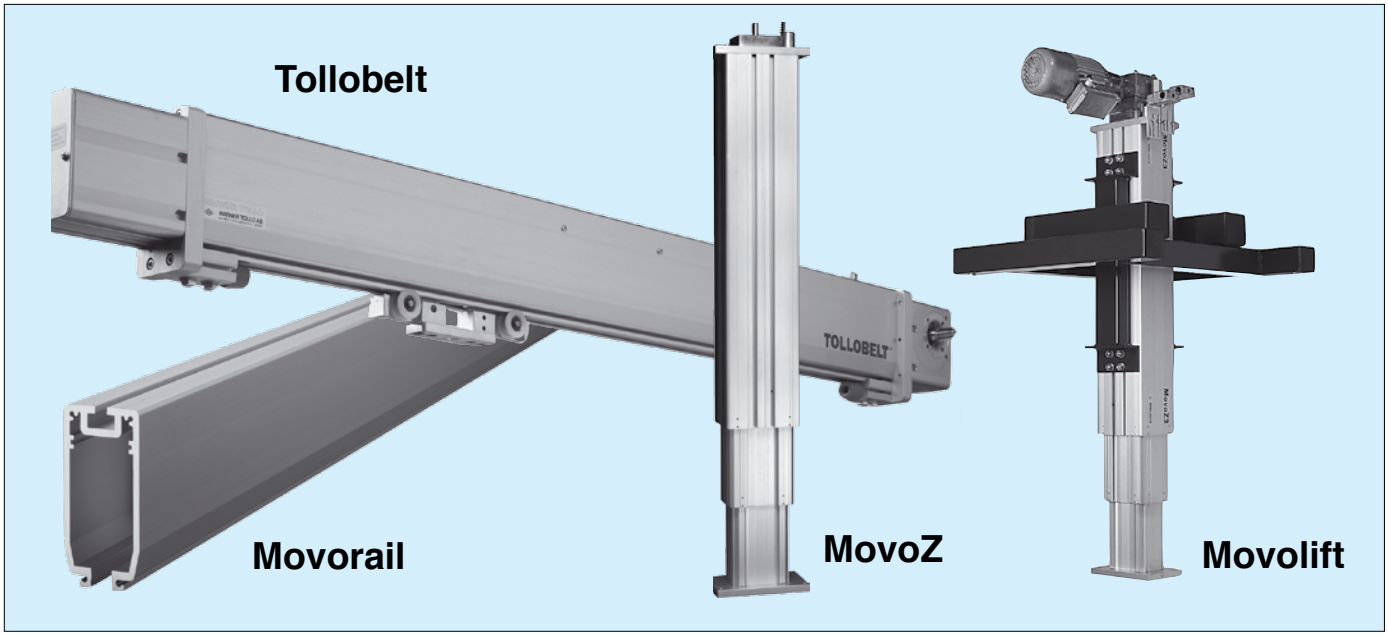













## A complete range

The Thomson Tollo range of material handling units are designed for manual, motorised and automated equipment, in one or multiple axes, for all kinds of industrial handling applications. The range consists of:

- Movorail, an “easy to move” overhead rail system available in a number of sizes.
- Tollobelt, a belt driven high speed linear drive unit for overhead installation with strokes up to 20 meters.
- MovoZ, a series of telescopic space saving linear drive units for lifting applications.
- Movolift, a lifting unit based on MovoZ Z3 fitted with mounting frame, gearbox and motor which can be directly suspended to a Movorail or Tollobelt system.

## Flexibility and versatility

The whole range of units are based on extruded anodised aluminium profiles making them light, easy to install and resistant against corrosion and many chemicals. All units are modular in concept and come with a broad range of accessories so that they can easily be combined into an almost infinite number of combinations. This makes it easy to design a solution for most tasks in the field of material handling as well as to re-configure an existing system so that it can be re-used in a new configuration.

## Applications

Below is a small selection of all the areas where Thomson Tollo handling equipment can be useful:

- In workshop crane systems for lifting and moving objects up to 600 kg.
- In the automotive industry for the handling and the mounting of doors, hoods, wind shields, roofs, seats, dashboards, motors, wheels, etc.
- In the wood industry for the handling and mounting of boards, plates, doors, windows, etc.
- In the moving and handling of sheet metal, bricks, bags, pallets, boxes, barrels etc.
- At workstations for the suspension of electrical and pneumatic tools.

## Movorail

Movorail has been proven during more than 20 years of use at companies around the world and has become one of the leading light weight rail systems on the market.

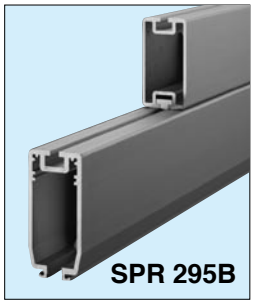
The main reasons for the success of Movorail are light weight, a high degree of modularity, simple and quick installation and a broad range of accessories. This makes it as easy to install a Movorail as it is to move, enlarge, rebuild or rearrange. In other terms, a Movorail system is an investment that can grow and change as demands change.









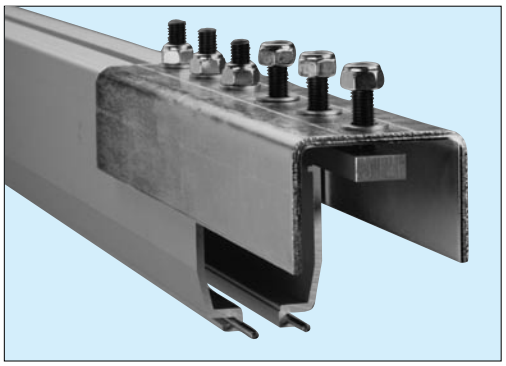







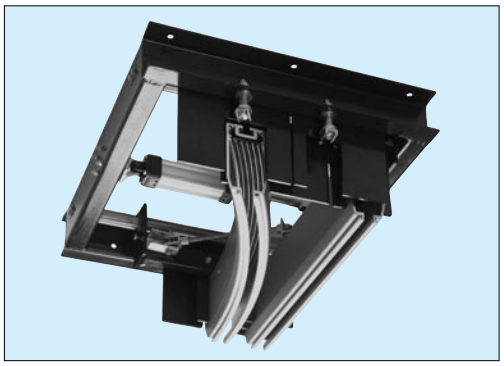
**Profiles**

- Five sizes for a large load range coverage
- Same basic design for all sizes
- Low weigth = easy to handle and install
- T-slot for easy and quick suspension
- Built in grooves for installation of current track
- Anodised aluminium profiles = non corrosive
- Over 95% of materials recyclable
- No welding or painting required at installation.



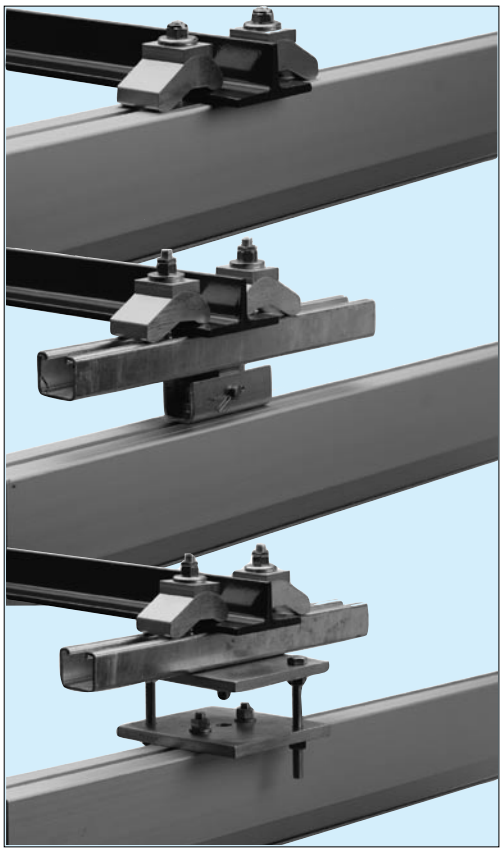
**Rail connections**

- Quick to install
- Self aligning
- No drilling required at installation.



**Switches and turntables**

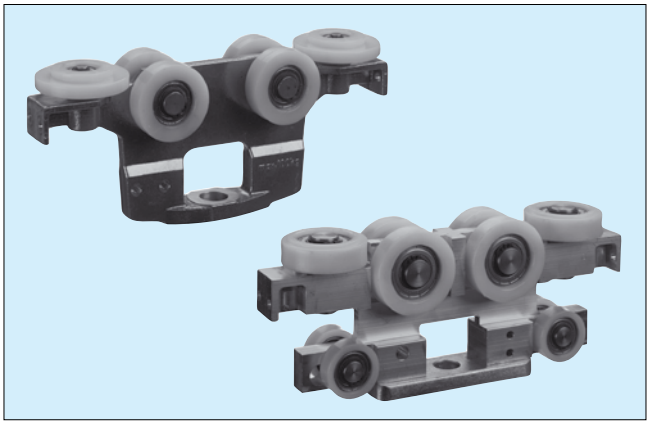
- Makes it possible to design conveyor like systems where trolleys can take different routes.

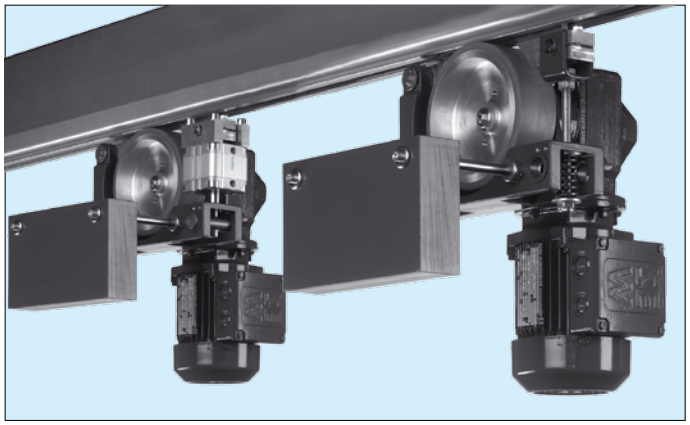


**Suspensions**

- For I-beam installation, no drilling required
- Versions for installation to the T-slot or on connections
- Safety cables for enhanced safety available
- Quick and simple installation.

## Movorail



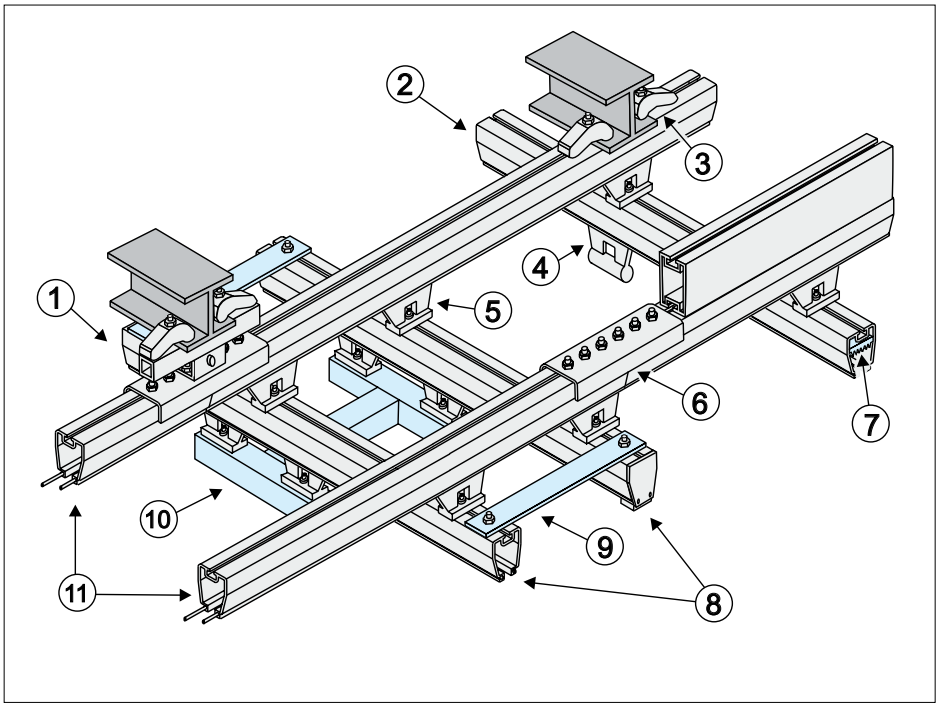


**Trolleys**

- Large range of trolleys for different requirements
- Light weight trolleys with ball bearing wheels means easy rolling.
- Quick installation to crane rail
- Safety cables included for each trolley
- Motor trolleys for heavy loads
- Cable trolleys for cables and pneumatic hoses.

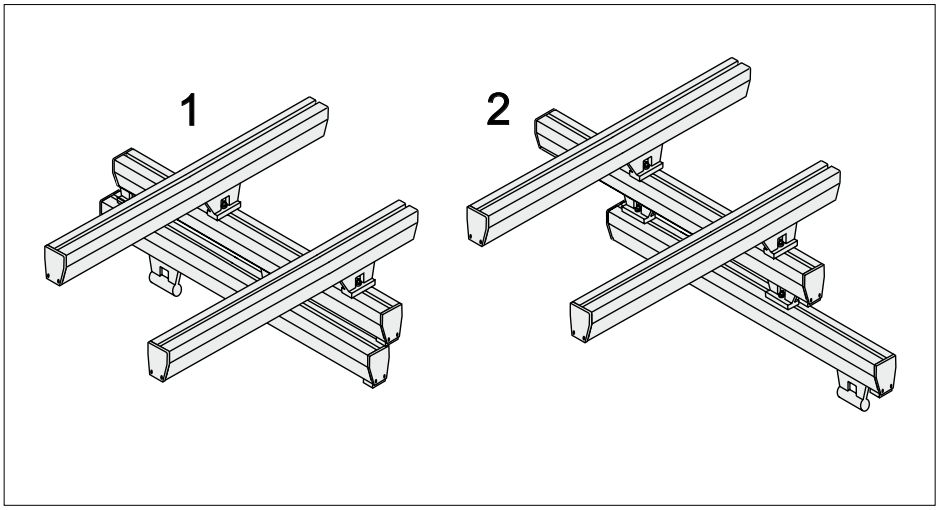
Example of a rail system with a double girder crane and a single girder crane.

1. I-beam suspension for installation on a connection
2. Single girder crane rail
3. I-beam clamps for installation on the rail
4. Crab trolley
5. Bogie trolley
6. Connection
7. Current track inserted in rail
8. Double girder crane rails
9. Distance girder
10. Yoke
11. Main girder rails.




Example of a rail system with telescopic girder crane rails.

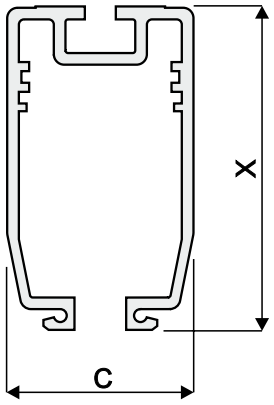
When not in use (1) the system is stowed leaving space for conveyor systems and other equipment. When in use (2) the lower crane rail is extended over the work place.



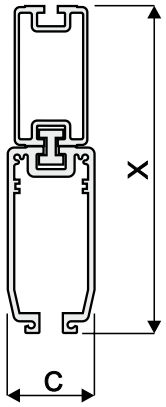
## Technical data

| Parameters | SPR 85 | SPR 125 | SPR 160A | SPR 295B | SPR 295W |
|---|---|---|---|---|---|
| X (mm) | 85 | 125 | 160 | 295 | 295 |
| C (mm) | 68,8 | 71,5 | 73,5 | 73,5 | 73,5 |
| Profile lengths (m) | 4, 5, 6, 8 | 4, 5, 6, 8 | 4, 5, 6, 8 | 4, 5, 6, 8 | 4, 5, 6, 8 |
| Inertia ($cm^4$) | 97 | 333 | 812 | 1368 | 3700 |
| Weight / meter (kg/m) | 3 | 5 | 7,8 | 14 | 14,1 |

**SPR 85, SPR 125, SPR 160A**

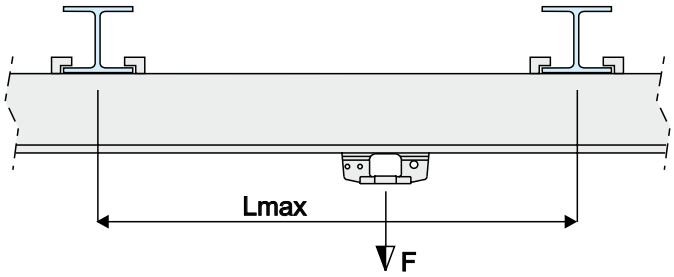


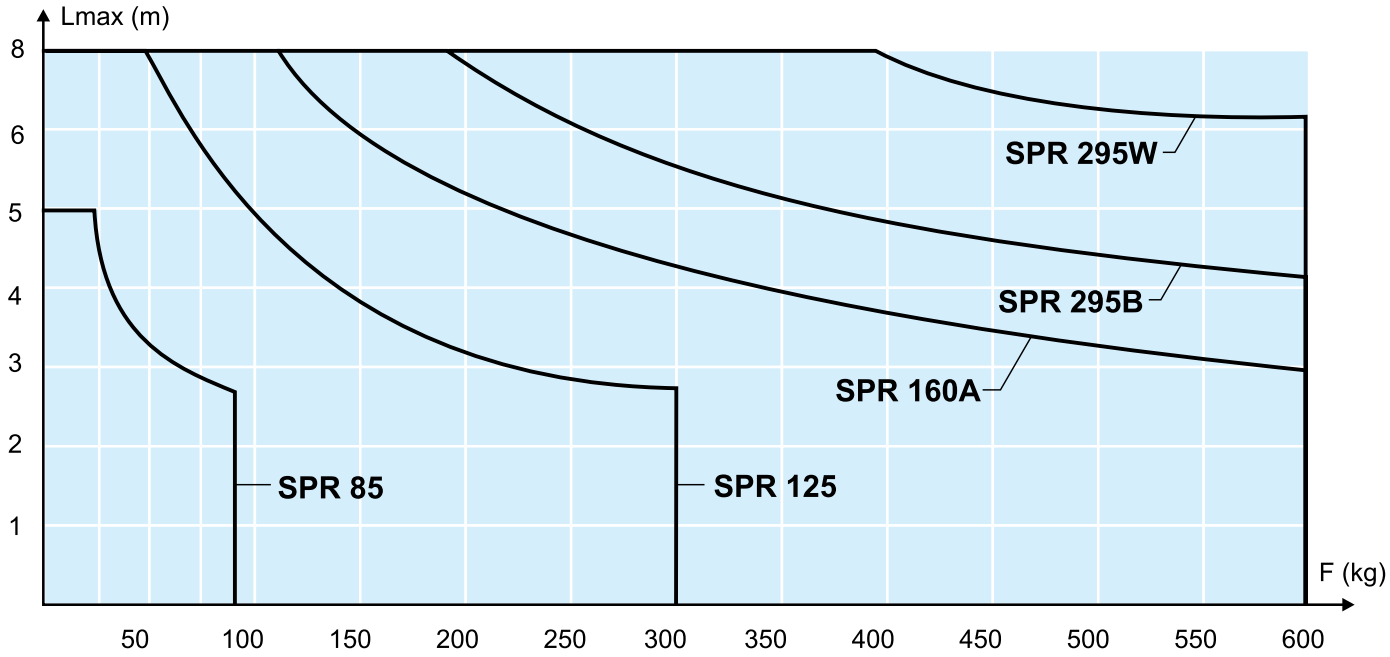

**SPR 295B, SPR 295W**




## Deflection of the rails

The diagram is based on a maximum deflection of 1/500 of the distance between the suspensions (Lmax).



## Installation dimensions for standard systems

| X-profile | Y-profile | X | Y | A | B | H |
|---|---|---|---|---|---|---|
| SPR 85 | SPR 85 | 85 | 85 | 57,5 | 52 | 279,5 |
| SPR 85 | SPR 125 | 85 | 125 | 58,5 | 49,5 | 318 |
| SPR 85 | SPR 160A | 85 | 160 | 58,5 | 45 | 348,5 |
| SPR 125 | SPR 85 | 125 | 85 | 55 | 52 | 317 |
| SPR 125 | SPR 125 | 125 | 125 | 56 | 49,5 | 355,5 |
| SPR 125 | SPR 160A | 125 | 160 | 56 | 45 | 386 |
| SPR 160A | SPR 85 | 160 | 85 | 50,5 | 52 | 347,5 |
| SPR 160A | SPR 125 | 160 | 125 | 51,5 | 49,5 | 386 |
| SPR 160A | SPR 160A | 160 | 160 | 51,5 | 45 | 416,5 |
| SPR 295• | SPR 85 | 295 | 85 | 50,5 | 52 | 482,5 |
| SPR 295• | SPR 125 | 295 | 125 | 51,5 | 49,5 | 521 |
| SPR 295• | SPR 160A | 295 | 160 | 51,5 | 45 | 551,5 |

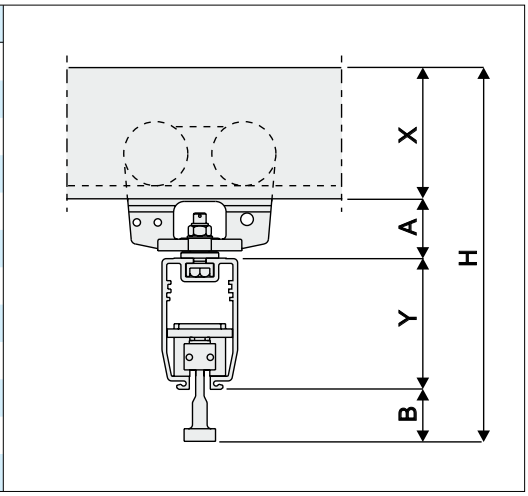
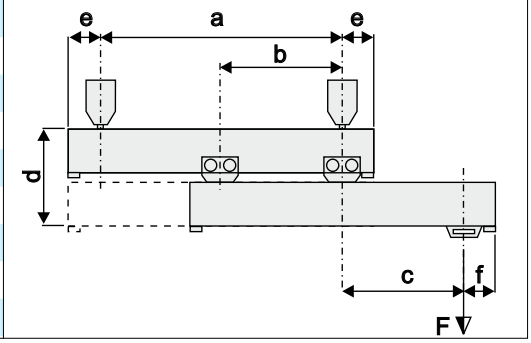



Table valid for BGV trolleys only.

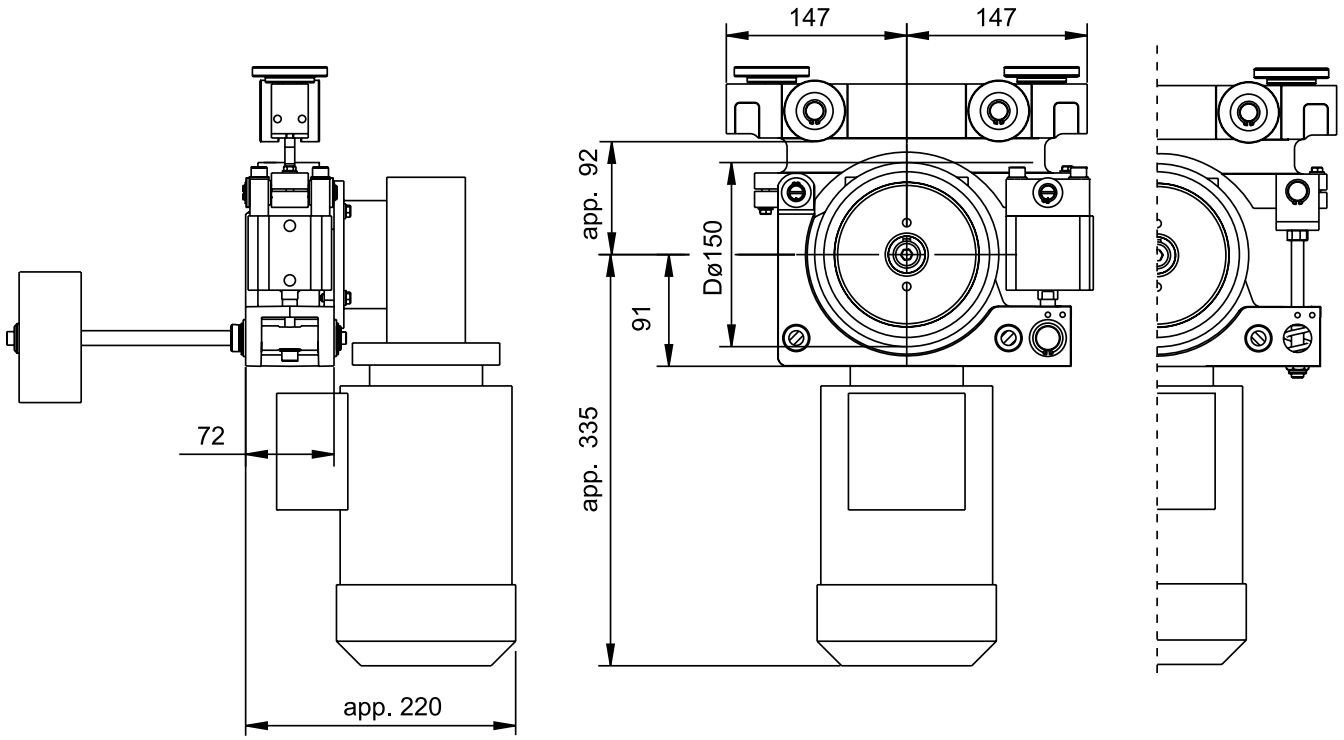
## Installation dimensions and load capacity for systems with telescopic crane rail

| X-profile | Y-profile | a | b | c | d | e | f | Max. load F (N) |
|---|---|---|---|---|---|---|---|---|
| SPR 85 | SPR 85 | 2000 | 1000 | 1000 | 229 | 250 | 200 | 400 |
| SPR 85 | SPR 85 | 3000 | 1500 | 1000 | 229 | 250 | 200 | 300 |
| SPR 85 | SPR 85 | 4000 | 2000 | 1000 | 229 | 250 | 200 | 250 |
| SPR 125 | SPR 125 | 2000 | 1000 | 1000 | 307 | 250 | 200 | 1400 |
| SPR 125 | SPR 125 | 3000 | 1500 | 1000 | 307 | 250 | 200 | 1000 |
| SPR 125 | SPR 125 | 4000 | 2000 | 1000 | 307 | 250 | 200 | 900 |
| SPR 160A | SPR 160A | 2000 | 1000 | 1000 | 372 | 250 | 200 | 3000 |
| SPR 160A | SPR 160A | 3000 | 1500 | 1000 | 372 | 250 | 200 | 2500 |
| SPR 160A | SPR 160A | 4000 | 2000 | 1000 | 372 | 250 | 200 | 2000 |




The table above shows a few examples of possible combinations of loads and dimensions.

## Tollo motor trolley dimensions

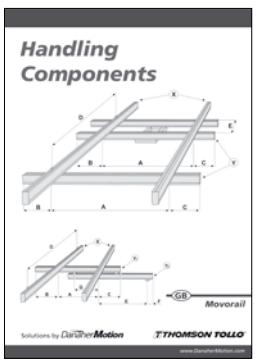


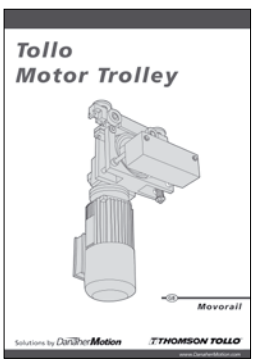
Ordering key for Tollo motor trolleys with motor

| Designation example | TMT | 125 | S | B | 20 | A | 7 | -2 | N |
|---|---|---|---|---|---|---|---|---|---|
| **Unit type** | | | | | | | | | |
| Tollo Motor Trolley | **TMT** | | | | | | | | |
| **Profile size** | | | | | | | | | |
| SPR 125 | | **125** | | | | | | | |
| SPR 160A | | **160** | | | | | | | |
| **Type of TMT trolley** | | | | | | | | | |
| Spring loaded drive wheel (standard) | | | **S** | | | | | | |
| Pneumatically released drive wheel | | | **P** | | | | | | |
| Spring loaded drive wheel and power pick up | | | **T** | | | | | | |
| Pneumatically released drive wheel and power pick up | | | **Q** | | | | | | |
| **Colour** | | | | | | | | | |
| Blue (standard) | | | | **B** | | | | | |
| Yellow | | | | **Y** | | | | | |
| **Speed of trolley at nominal motor speed** | | | | | | | | | |
| 20 m/min | | | | | **20** | | | | |
| 25 m/min | | | | | **25** | | | | |
| 30 m/min | | | | | **30** | | | | |
| 35 m/min | | | | | **35** | | | | |
| 40 m/min | | | | | **40** | | | | |
| 50 m/min | | | | | **50** | | | | |
| 60 m/min | | | | | **60** | | | | |
| **Motor, gear and drive wheel configuration** | | | | | | | | | |
| 3 × 400 Vac SEW motor, SEW gear and drive wheel (standard) | | | | | | **A** | | | |
| **Motor size** | | | | | | | | | |
| IEC 71 | | | | | | | **7** | | |
| IEC 80 | | | | | | | **8** | | |
| **Motor poles** | | | | | | | | | |
| 2 pole | | | | | | | | **-2** | |
| 4 pole | | | | | | | | **-4** | |
| 8/2 pole (two speed motor) | | | | | | | | **82** | |
| **Type of motor brake** | | | | | | | | | |
| No brake | | | | | | | | | **N** |
| Electromagnetic fail safe brake | | | | | | | | | **B** |
| Electromagnetic fail safe brake with hand release | | | | | | | | | **H** |

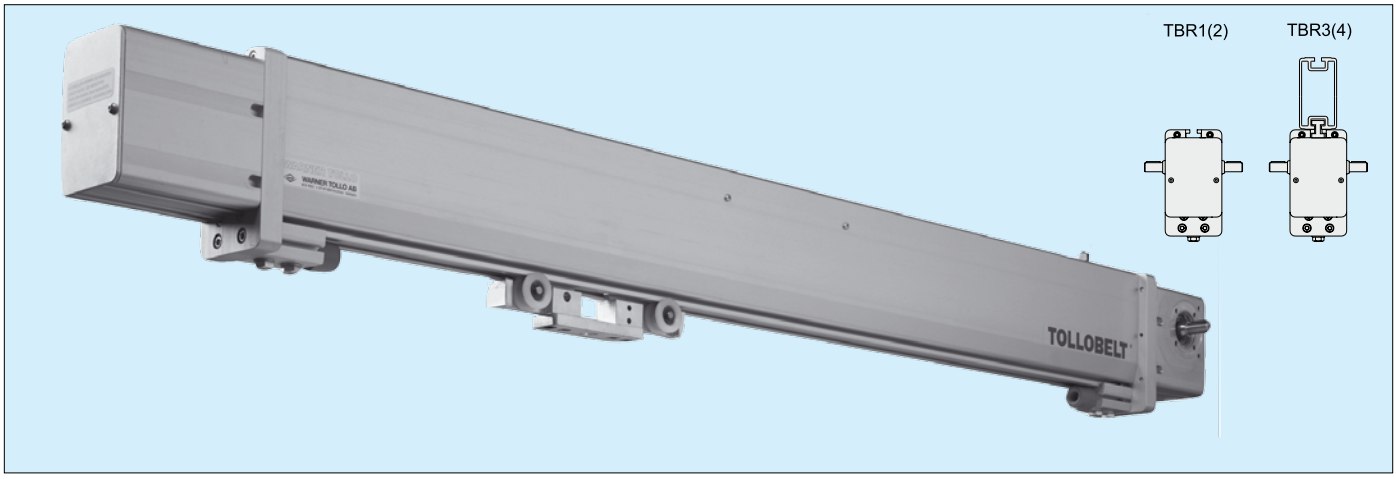
How to order and select Movorail components

The complete range of Movorail components and part numbers can be found in the Movorail Project Specification. Information about the motor trolleys can also be found in the Tollo Motor Trolley folder.
The Thomson Tollo Movorail Sizing & Selection software will assist you when calculating the requirements of your system and guide you trough the process of choosing the correct components.
The Project Specification, the Motor Trolley folder and the Sizing and Selection software can be obtained free of charge.



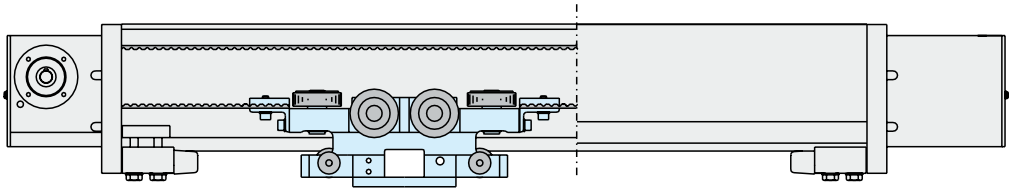



## Tollobelt TBR1, TBR2, TBR3 and TBR4




**Belt drive, roller guide**

- Four sizes
- Belt drive
- Ball bearing trolleys
- Speed up to 5 m/s
- Stroke up to 20 m
- Load up to 600 kg
- One to four trolleys possible.

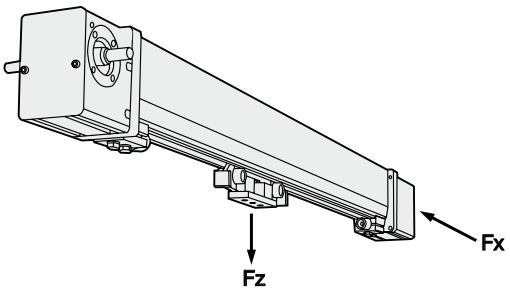


## General

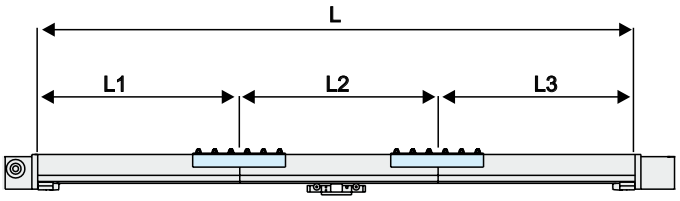
| Parameters | TBR1 | TBR2 | TBR3 | TBR4 |
|---|---|---|---|---|
| Weight per trolley (kg) | 3,5 | 3,5 | 3,5 | 3,5 |
| Max. input speed (rpm) | 1250 | 1250 | 1250 | 1250 |
| Move (mm/revolution) | 240 | 240 | 240 | 240 |
| Ambient temperature (°C) | -20 to 70 | -20 to 70 | -20 to 70 | - 20 to 70 |
| Weight with single trolley (kg/m) | 11,5 + L × 6,3 | 13,5 + L × 9,1 | 13,5 + L × 16,3 | 13,5 + L × 16,3 |

## Load capacity

| Parameters | TBR1 | TBR2 | TBR3 | TBR4 |
|---|---|---|---|---|
| Max. stroke (m) | 15 | 20 | 20 | 20 |
| Fx max. (N) | 800 | 1250 | 1250 | 1250 |
| Fz max. (N) | 3000 | 6000 | 6000 | 6000 |
| Max. speed (m/s) | 5 | 5 | 5 | 5 |
| Repeatability (±mm) | 0,5 | 0,5 | 0,5 | 0,5 |
| Resolution (mm) | 1 | 1 | 1 | 1 |



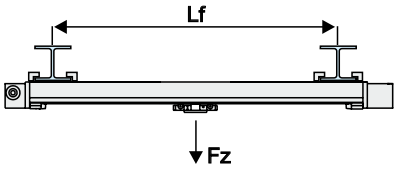

## Length of profile sections and number of connections

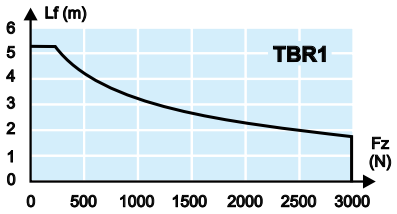


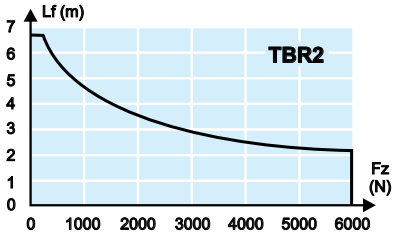

| L (ordering length in cm) | | | | | | |
|---|---|---|---|---|---|---|
| | 0 – 800 | 801 – 1200 | 1201 – 1400 | 1401 – 1600 | 1601 – 1800 | 1801 – 2000 |
| L1(cm) | 0 – 800 | 600 | 600 | 800 | 600 | 600 |
| L2 (cm) | | 201 – 600 | 601 – 800 | 601 – 800 | 600 | 600 |
| L3 (cm) | | | | | 401 – 600 | 601 – 800 |

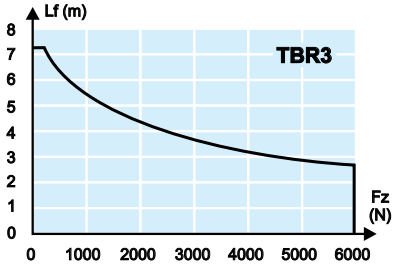
Note! sectioning can be done in other ways if agreed before order.

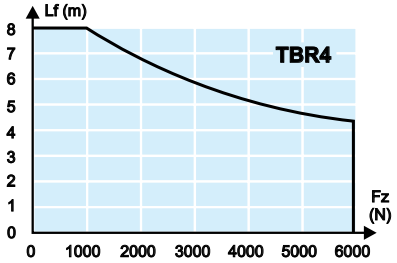
## Deflection of the beam



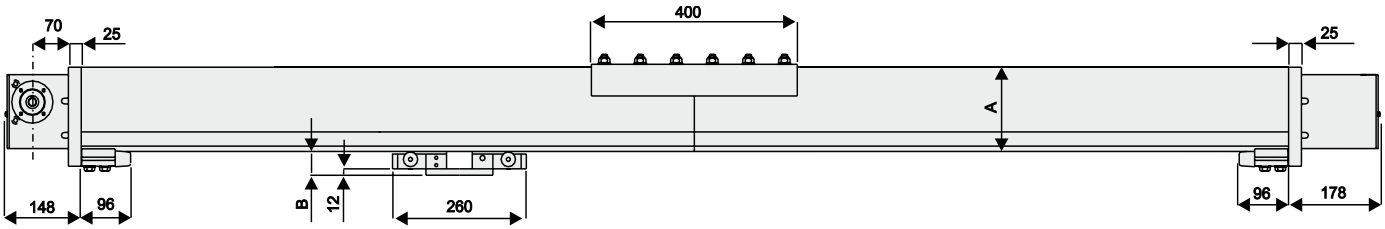



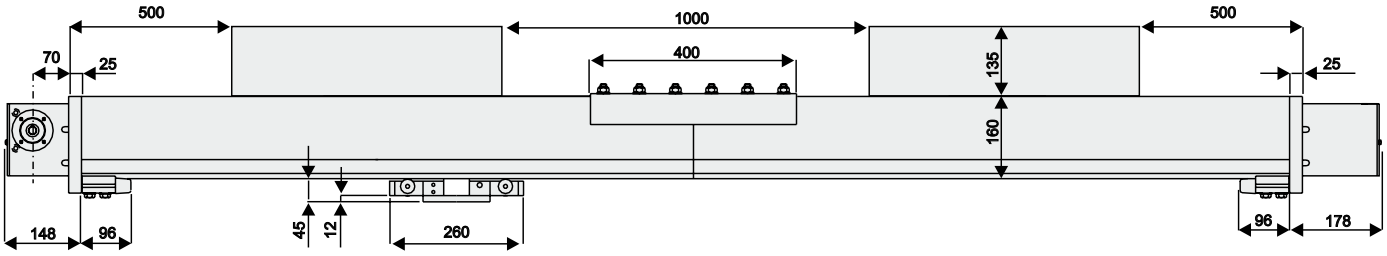



Dimensions

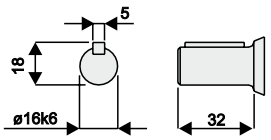
Designation: TBR1(2)B240 • • • • • • •

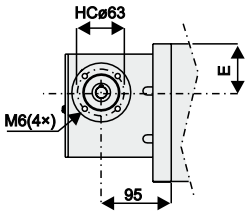


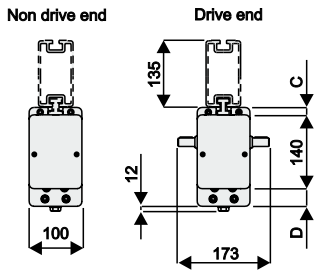

Designation: TBR3(4)B240 • • • • • • •




| | TBR1 | TBR2(3/4) |
|---|---|---|
| A | 125 | 160 |
| B | 50 | 45 |
| C | 11 | 15 |
| D | 0 | 34 |
| E | 62,5 | 66,5 |

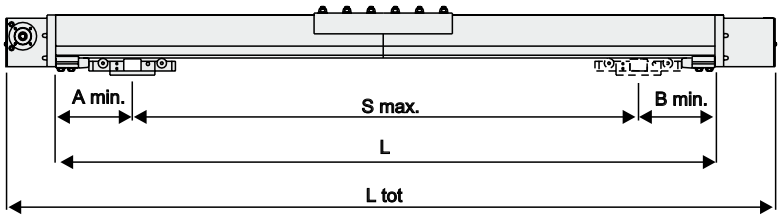


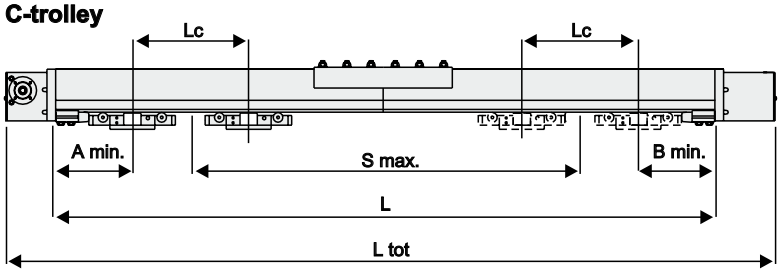




Ordering length

**A-trolley**



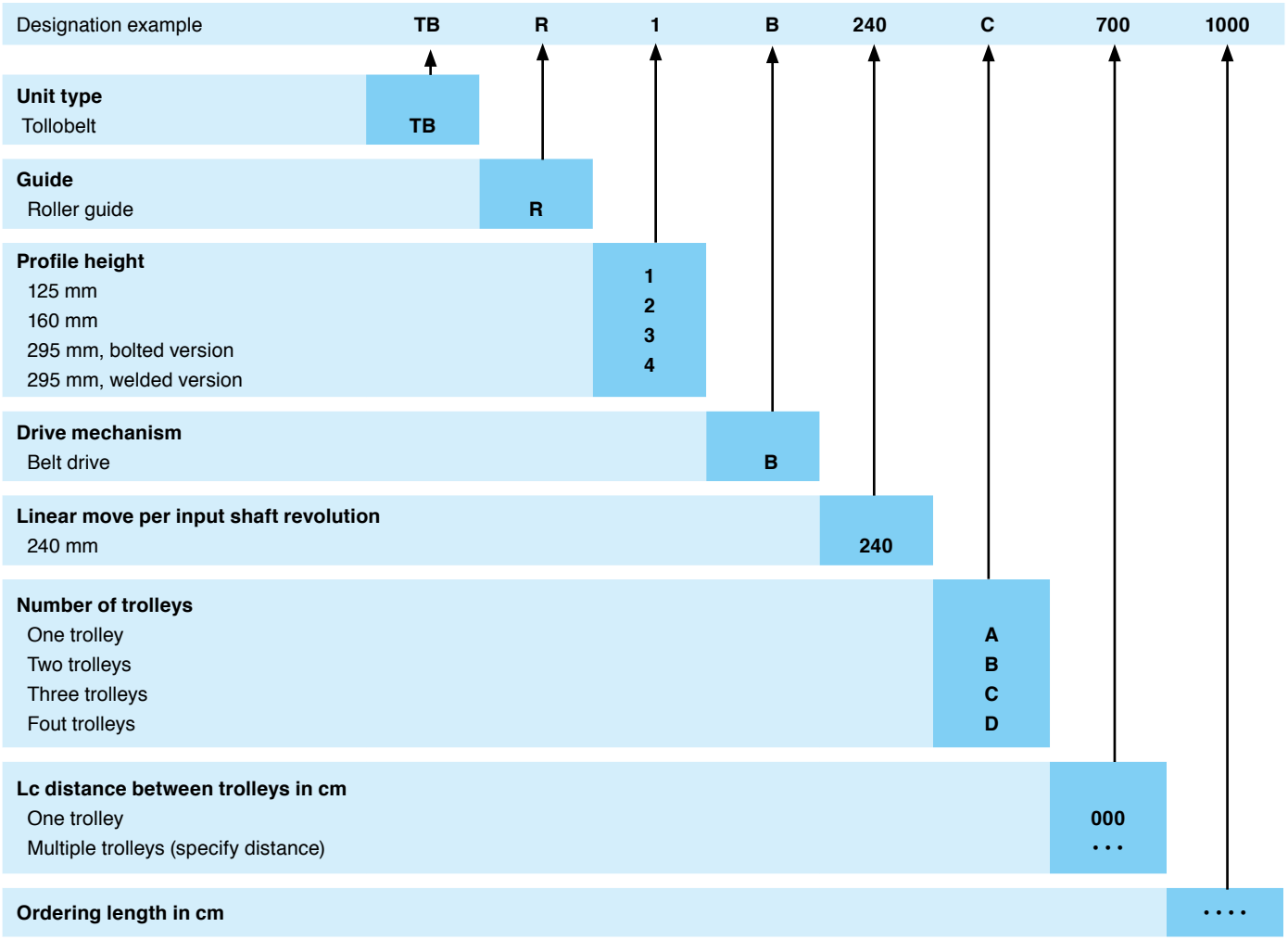

**C-trolley**




| | | | Trolley c/c distance* | Ordering lenght | Total lenght |
|---|---|---|---|---|---|
| | A min. | B min. | Lc | L | L tot |
| TBR • | 226 | 226 | Lc min = 410 | L = S max.+ Lc + A min + B min | L tot = L + 326 |

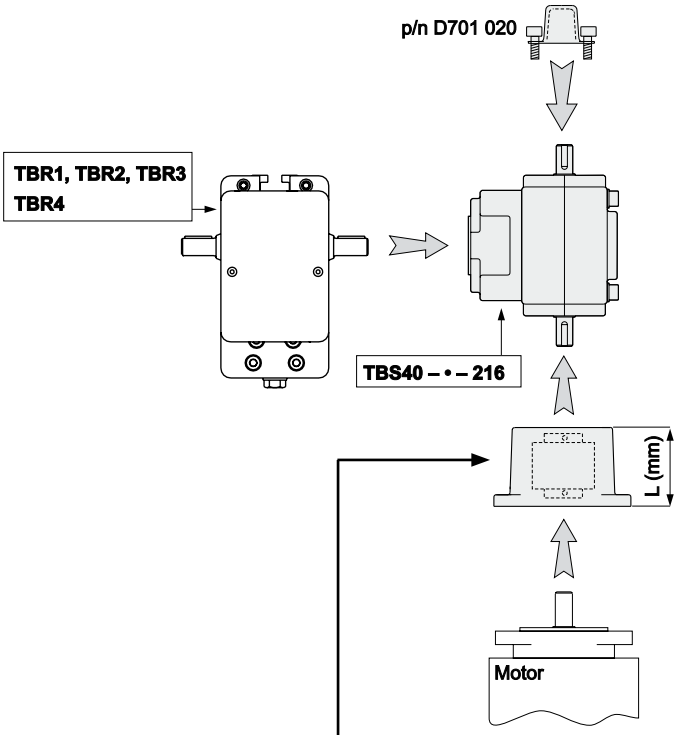
* For A-trolleys, Lc = 0 mm

## Tollobelt

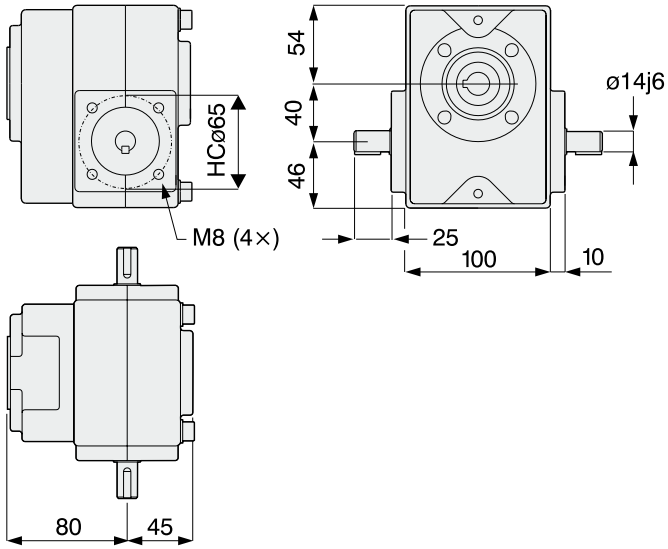

Designation example
TB
R
1
B
240
C
700
1000
Unit type
Tollobelt
TB
Guide
Roller guide
R
Profile height
125 mm
160 mm
295 mm, bolted version
295 mm, welded version
1
2
3
4
Drive mechanism
Belt drive
B
Linear move per input shaft revolution
240 mm
240
Number of trolleys
One trolley
Two trolleys
Three trolleys
Fout trolleys
A
B
C
D
Lc distance between trolleys in cm
One trolley
Multiple trolleys (specify distance)
000
• • •
Ordering length in cm
• • • •

## Worm gear type TBS40

The worm gear is installed directly to the unit while the motor has to be installed to an intermediate bell house flange which includes a matching coupling. The gear and the bell house are ordered seperately.




**TBS40**




### Part number table for bell house

| Bell house | | |
|---|---|---|
| **IEC 71 B14** | **IEC 80 B14** | **Servo 95** |
| L = 58 | L = 68 | L = 78 |
| D701 011 | D701 015 | D389 825 |

### Ordering key for worm gear TBS40

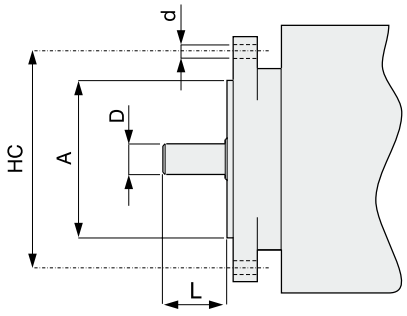
| Example: | **TBS40–** | **5,5** | **–216** |
|---|---|---|---|

| **Gear ratio** | |
|---|---|
| 3 | **3** |
| 5,5 | **5,5** |
| 7,5 | **7,5** |
| 10 | **10** |
| 15 | **15** |
| 20 | **20** |
| 24 | **24** |
| 30 | **30** |
| 40 | **40** |
| 48 | **48** |
| 60 | **60** |

## Motor size table

Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

| Motor size | A | D | L | HC | d |
|---|---|---|---|---|---|
| **IEC 63 B14** | 60 | 11 | 23 | 75 | M5 |
| **IEC 71 B14** | 70 | 14 | 30 | 85 | M6 |
| **IEC 80 B14** | 80 | 19 | 40 | 100 | M6 |
| **IEC 90 B14** | 95 | 24 | 50 | 115 | M8 |
| **IEC 100/112 B14** | 110 | 28 | 60 | 130 | M8 |
| **Servo 80*** | 80 | 14 | 30 | 100 | ø7 |
| **Servo 95*** | 95 | 19 | 40 | 115 | ø9 |
| **Servo A200** | 130 | 24 | 50 | 165 | ø11 |



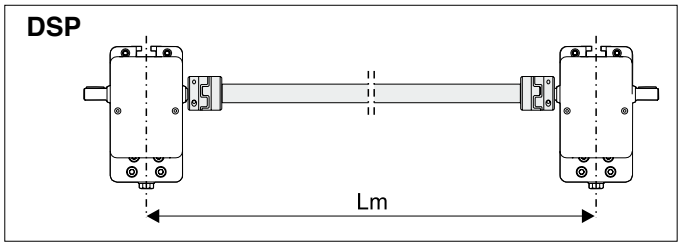

* Measures according to DIN 42950.

## Intermediate shafts

The intermediate shafts provides synchronous drive of multiple Tollobelt units with a single motor.

The intermediate shaft type DSP consists of couplings matching the drive shaft of the Tollobelt units and a high precision tube with customer defined length.

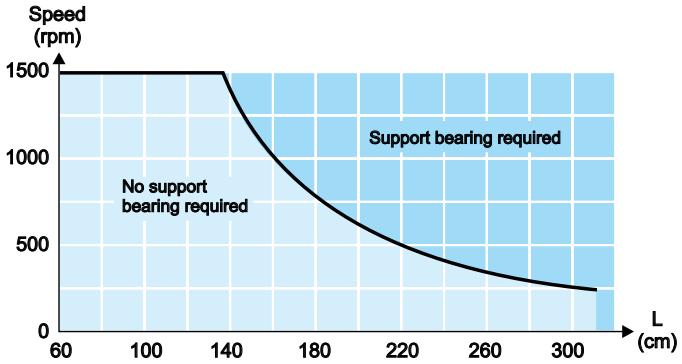
The intermediate shaft has a critical speed which may not be exceeded. The critical speed is a function of the length of the tube, as diagrammed below. Higher speed or longer transmissions require additional support bearings which can be ordered from your local bearing supplier.




### Technical data

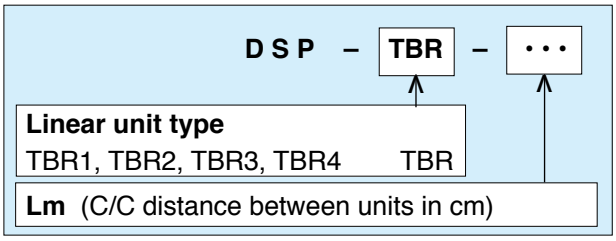
| | DSP |
|---|---|
| Weight (kg) | 1,3 + 0,026 × (Lm - 20) |
| Max. speed (rpm) | 1500 |
| Diameter (mm) | 30 |

### Critical speed



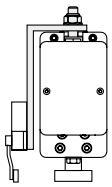

### Ordering information

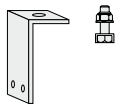
### Designation for DSP



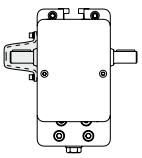

# Accessories

### Brackets for mechanical limit switch



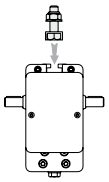
| | TBR1 | TBR2 | TBR3(4) |
|---|---|---|---|
|  | D390 017 | D390 016 | D390 015 |

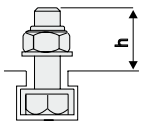
### Shaft cover



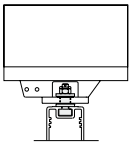
| | TBR1(2/3/4) |
|---|---|
|  | D700 178 |

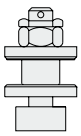
### T-slot bolts



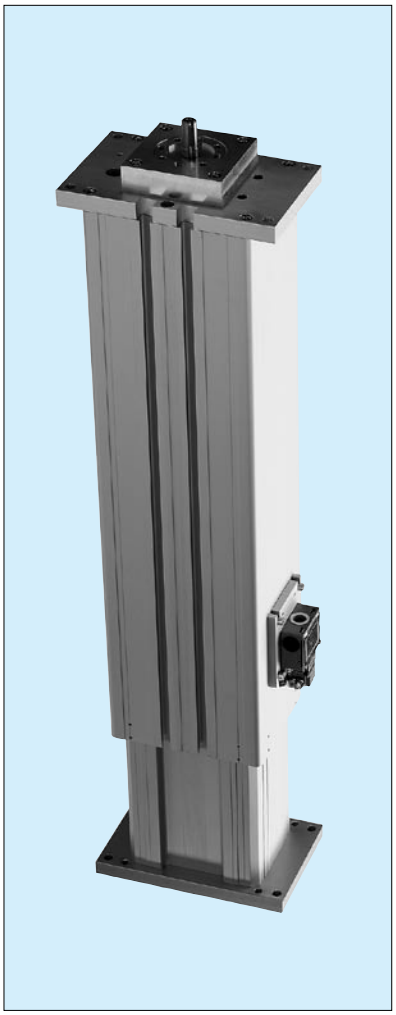
| | TBR1(2/3/4) | | |
|---|---|---|---|
|  | M12<br>h = 26<br>D102 510 | M12<br>h = 42<br>D102 530 | M12<br>h = 89<br>D102 520 |

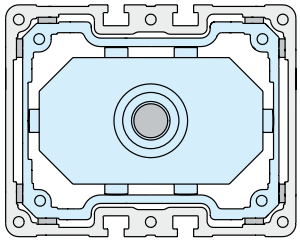
### Flexible trolley bolt connection



| | TBR1(2/3/4) |
|---|---|
|  | D105 710 |

## MovoZ Z2

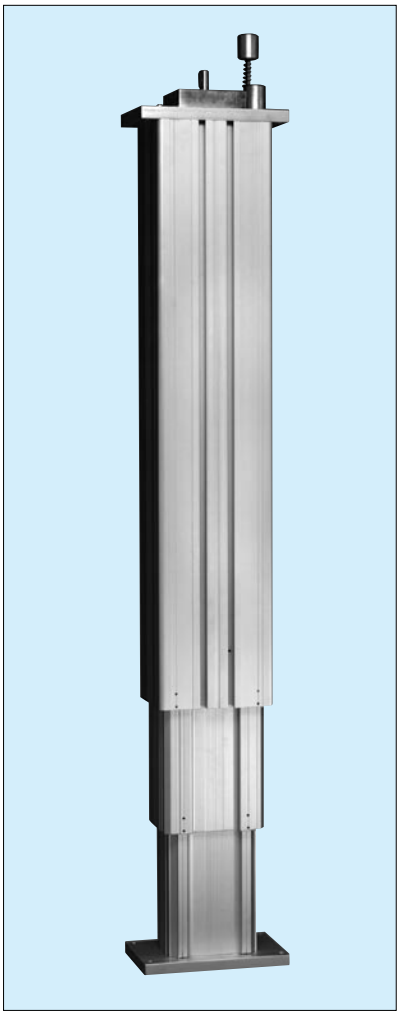


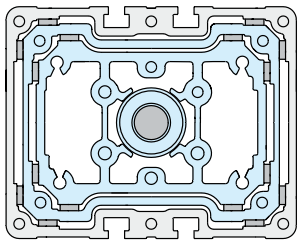


**Screw drive, sliding guide**

- Telescopic movement (double profiles)
- Can be installed in any desired direction
- Built in end of stroke limit switches
- Short retracted length
- High load
- High side load capacity
- Space-saving
- High torsion strength

## MovoZ Z3





**Screw drive, sliding guide**

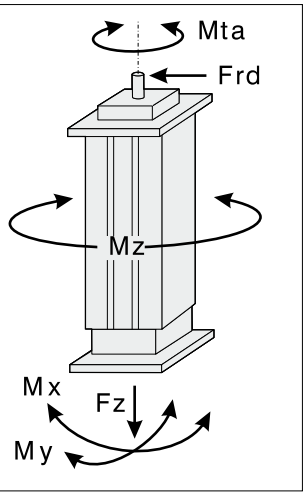
- Telescopic movement (triple profiles)
- Only for lifting applications
- Very short retracted length
- High load
- High side load capacity
- Space-saving
- High torsion strength

## General

| Parameters | MGZ2K2510 | MGZ2K2525 | MGZ2K3220 |
|---|---|---|---|
| Max. input speed (rpm) | 3000 | 2400 | 3000 |
| Ambient temperature (°C) | -20 to 70 | -20 to 70 | -20 to 70 |
| Weight (kg) | 9,5 + 0,25 × L min. | 9,5 + 0,25 × L min. | 13 + 0,28 × L min. |

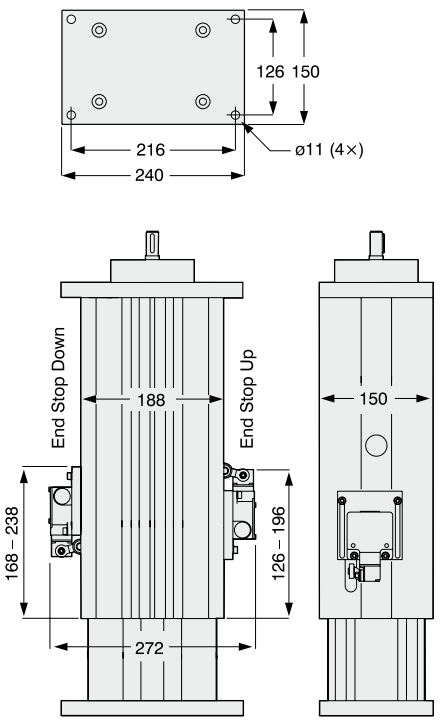
## Load capacity

| Parameters | MGZ2K2510 | MGZ2K2525 | MGZ2K3220 |
|---|---|---|---|
| Max. stroke (m) | 1,5 | 1,5 | 1,5 |
| Fz max. (N) | 5000 | 5000 | 7500 |
| L max. (mm) | 4000 | 4000 | 4000 |
| Mx max. (Nm) | 700 | 700 | 700 |
| My max. (Nm) | 700 | 700 | 700 |
| Mz max. (Nm) | 330 | 330 | 330 |
| Mta max. (Nm) | 45 | 45 | 93 |
| Frd max. (N) | 1000 | 1000 | 1200 |
| Max. speed (m/s) | 0,5 | 1,0 | 1,0 |
| Repeatability (±mm) | 0,1 | 0,1 | 0,1 |
| Screw lead (mm/rev.) | 10 | 25 | 20 |
| Screw diameter (mm) | 25 | 25 | 32 |

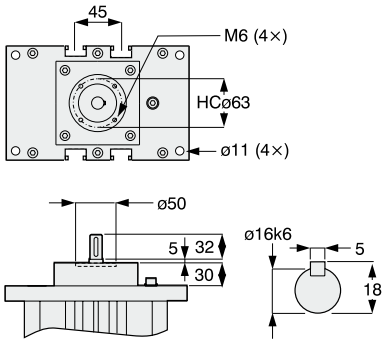



## Dimensions

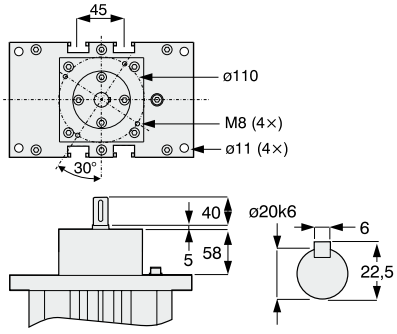
Designation: MGZ2K • • • • • • • • • • •



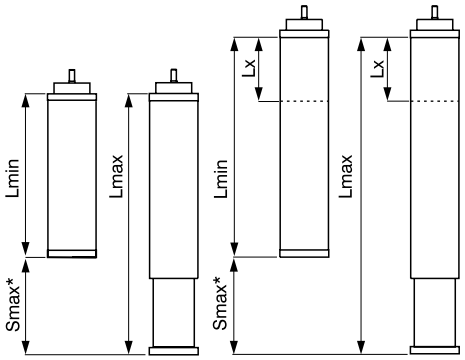

**MGZ2K2510(25)**




**MGZ2K3220**




Standard version Elongated version




* Smax = maximum stroke between the mechanical stops of the unit (theoretical stroke). Safe stroke is normally about 100 mm shorter (practical stroke).

## Ordering length (all dimensions in cm)

| Min. retracted length | Max. extended length |
|---|---|
| Lmin = Smax + Lx** + 38 | Lmax = Lmin + Smax |

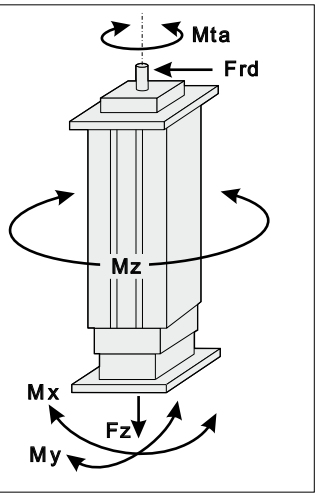
** Lx = optional extra length which makes the unit longer but does not add to the stroke.

## General

| Parameters | MGZ3K2510 | MGZ3K2525 | MGZ3K3220 |
|---|---|---|---|
| Max. input speed (rpm) | 3000 | 2400 | 2500 |
| Ambient temperature (°C) | -20 to 70 | -20 to 70 | -20 to 70 |
| Weight (kg) | 14 + 0,42 × L min. | 14 + 0,42 × L min. | 15 + 0,45 × L min. |

## Load capacity

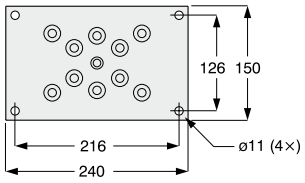
| Parameters | MGZ3K2510 | MGZ3K2525 | MGZ3K3220 |
|---|---|---|---|
| Max. stroke (m) | 1,5 | 1,5 | 1,5 |
| Fz max. (N) | 5000 | 5000 | 7500 |
| L max. (mm) | 4000 | 4000 | 4000 |
| Mx max. (Nm) | 2000 | 2000 | 2000 |
| My max. (Nm) | 2000 | 2000 | 2000 |
| Mz max. (Nm) | 330 | 330 | 330 |
| Mta max. (Nm) | 45 | 45 | 93 |
| Frd max. (N) 1000 | 1000 | 1000 | 1200 |
| Max. speed (m/s) | 0,5 | 1,0 | 0,8 |
| Repeatability (±mm) | 0,1 | 0,1 | 0,1 |
| Screw lead (mm/rev.) | 10 | 25 | 20 |
| Screw diameter (mm) | 25 | 25 | 32 |

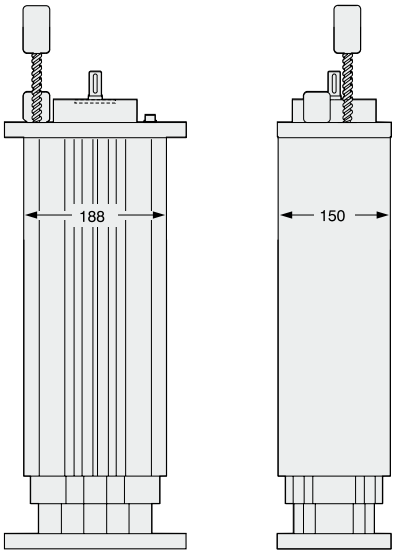



## Dimensions

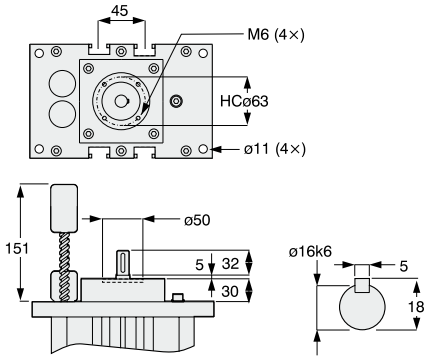
Designation: MGZ3K • • • • • • • • • • •

Standard version Elongated version

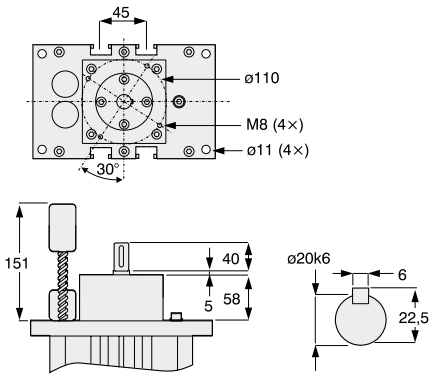


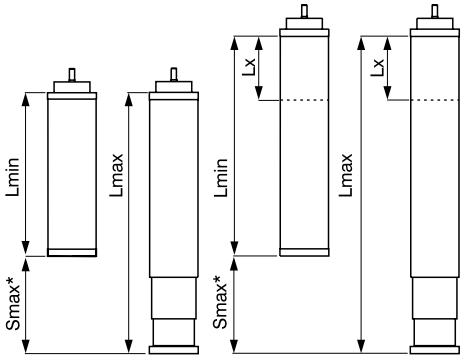




**MGZ3K2510(25)**




**MGZ3K3220**




* Smax = maximum stroke between the mechanical stops of the unit (theoretical stroke). Safe stroke is normally about 100 mm shorter (practical stroke).

## Ordering length (all dimensions in cm)

| Min. retracted length | Max. extended length |
|---|---|
| Lmin = Smax + Lx** + 17 | Lmax = 2 × Smax + Lx** + 17 |

** Lx = optional extra length which makes the unit longer but does not add to the stroke.

MovoZ Z2 and Z3

| Designation example | M | G | Z3 | K | 25109 | 250 | 450 |
|---|---|---|---|---|---|---|---|
| **Unit type**<br>Linear unit | **M** | | | | | | |
| **Guide type**<br>Sliding guide | | **G** | | | | | |
| **Size**<br>Z2<br>Z3 | | | **Z2**<br>**Z3** | | | | |
| **Drive type**<br>Ball screw and ball nut | | | | **K** | | | |
| **Screw diameter / screw lead / tolerance class**<br>25 mm / 10 mm / T9<br>25 mm / 25 mm / T9<br>32 mm / 20 mm / T7 | | | | | **25109**<br>**25259**<br>**32207** | | |
| **Minimum retracted length in cm (L min.)** | | | | | | ... | |
| **Maximum extended length in cm (L max.)** | | | | | | | ... |



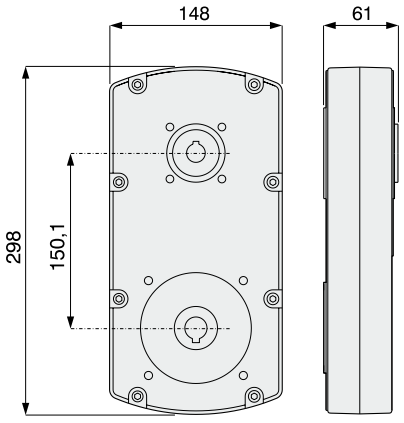
## Belt gear type BGM40

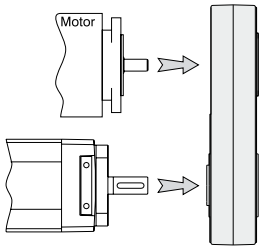
The belt gear is installed directly on to the shafts of the motor and the actuator. No couplings are required. The belt gears are maintenance free.

### Ordering key

| Example: | BGM40- | 2 | –KK | 080 | P | 07 |
|---|---|---|---|---|---|---|
| **Gear ratio**<br>1,00<br>2,14<br>3,00 | | **1**<br>**2**<br>**3** | | | | |
| **Motor size**<br>IEC 71 B14<br>IEC 80 B14<br>Servo 80<br>Servo 95 | | | | **071**<br>**080**<br>**S80**<br>**S95** | | |
| **Linear drive unit**<br>Z2 (only models with 25 mm screw diameter) | | | | | | **07** |

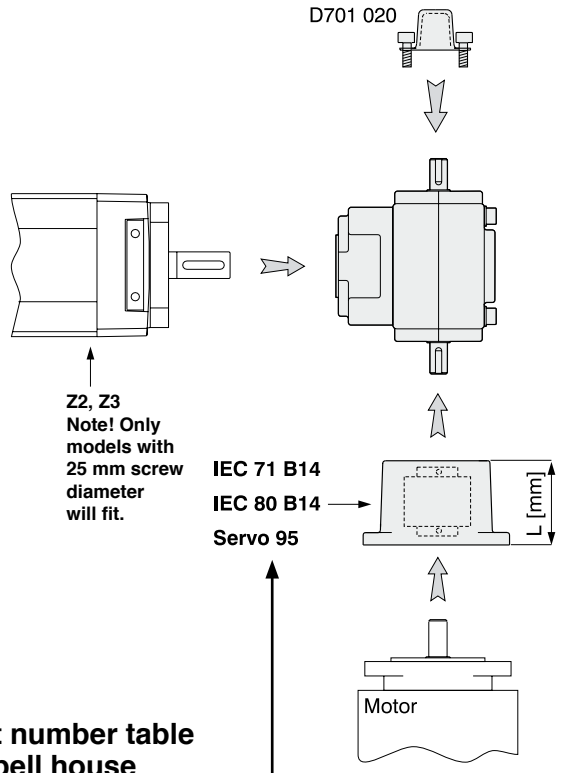
**BGM40**



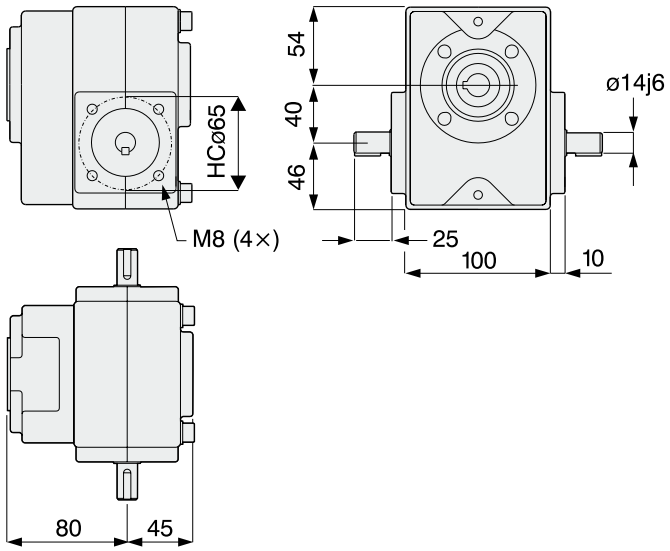



## Worm gear type TBS40

The worm gear is installed directly to the unit while the motor has to be installed to an intermediate bell house flange which includes a matching coupling. The gear and the bell house are ordered seperately. Note! The worm gear only fits models with 25 mm screw diameter.




**TBS40**




### Part number table for bell house

| Bell house | | |
|---|---|---|
| **IEC 71 B14** | **IEC 80 B14** | **Servo 95** |
| L = 58 | L = 68 | L = 78 |
| D701 011 | D701 015 | D389 825 |

### Ordering key for worm gear TBS40

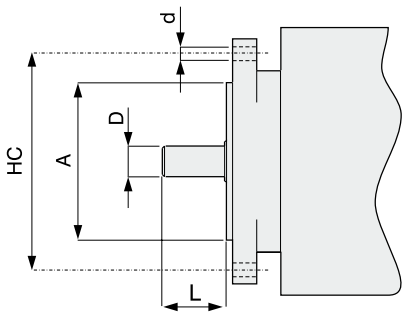
| Example: | **TBS40–** | **5,5** | **–216** |
|---|---|---|---|

| **Gear ratio** | |
|---|---|
| 3 | **3** |
| 5,5 | **5,5** |
| 7,5 | **7,5** |
| 10 | **10** |
| 15 | **15** |
| 20 | **20** |
| 24 | **24** |
| 30 | **30** |
| 40 | **40** |
| 48 | **48** |
| 60 | **60** |

## Motor size table

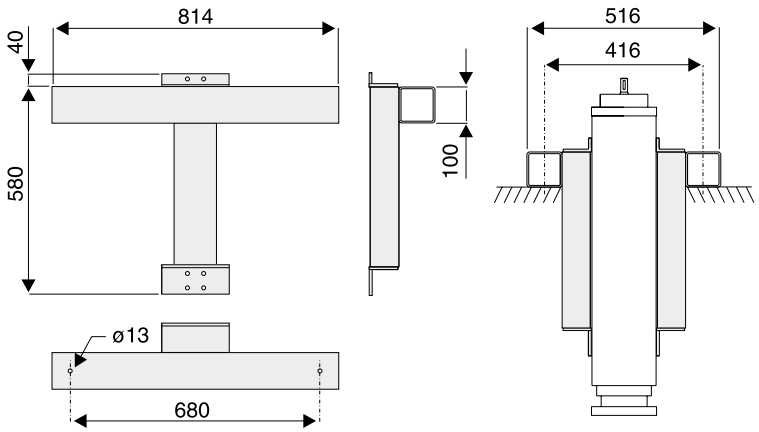
Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

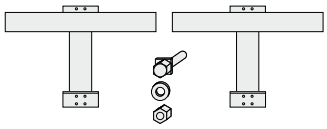
| Motor size | A | D | L | HC | d |
|---|---|---|---|---|---|
| **IEC 63 B14** | 60 | 11 | 23 | 75 | M5 |
| **IEC 71 B14** | 70 | 14 | 30 | 85 | M6 |
| **IEC 80 B14** | 80 | 19 | 40 | 100 | M6 |
| **IEC 90 B14** | 95 | 24 | 50 | 115 | M8 |
| **IEC 100/112 B14** | 110 | 28 | 60 | 130 | M8 |
| **Servo 80*** | 80 | 14 | 30 | 100 | ø7 |
| **Servo 95*** | 95 | 19 | 40 | 115 | ø9 |
| **Servo A200** | 130 | 24 | 50 | 165 | ø11 |



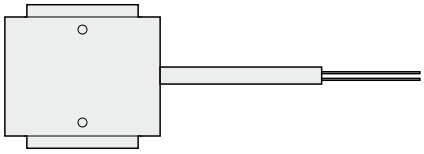

* Measures according to DIN 42950.

## Z2 and Z3 mounting frame

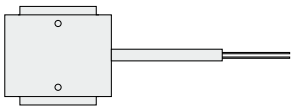



| | Z2/Z3 |
|---|---|
|  | D800 250 |

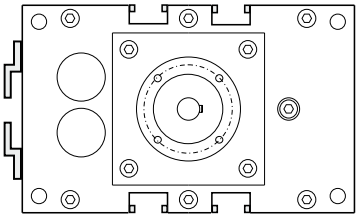
## Magnetic sensor

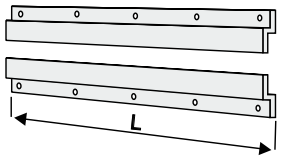


Max. power: 10 W
Max. voltage: 100 Vdc
Max. current: 0,5 A
Lead data: 2 × 0,12 mm²

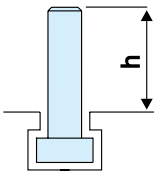
| | Z2/Z3 | |
|---|---|---|
|  | Normally open D535 070 | Normally closed D535 071 |

## Mounting rail for magnetic sensor



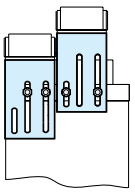
| | Z2/Z3 |
|---|---|
|   | L = 1000 D800 223 |

## T-slot bolts




| Z2/Z3 |
|---|
| M10 h = 28 D800 089 |

## Limit switch bracket*



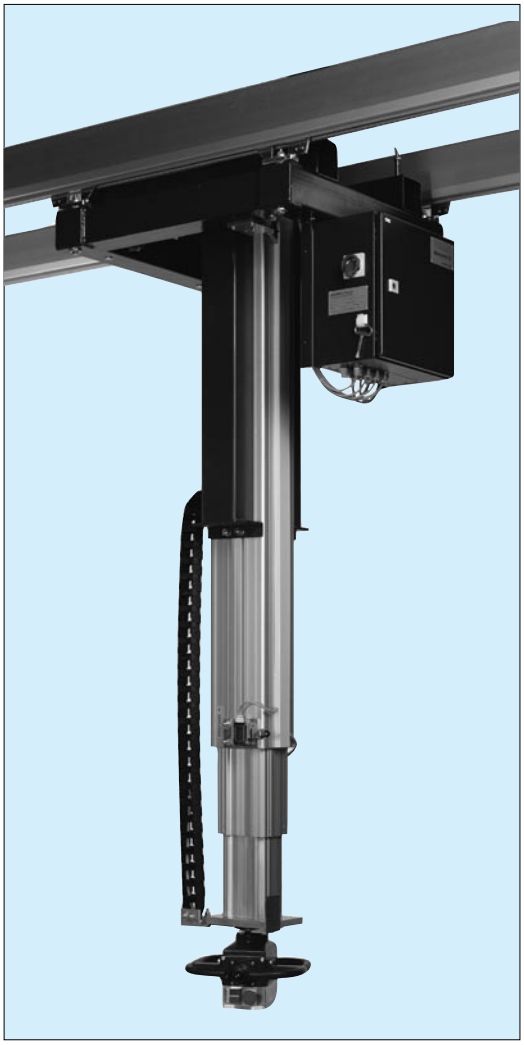
| Z3 |
|---|
| D800 042 |

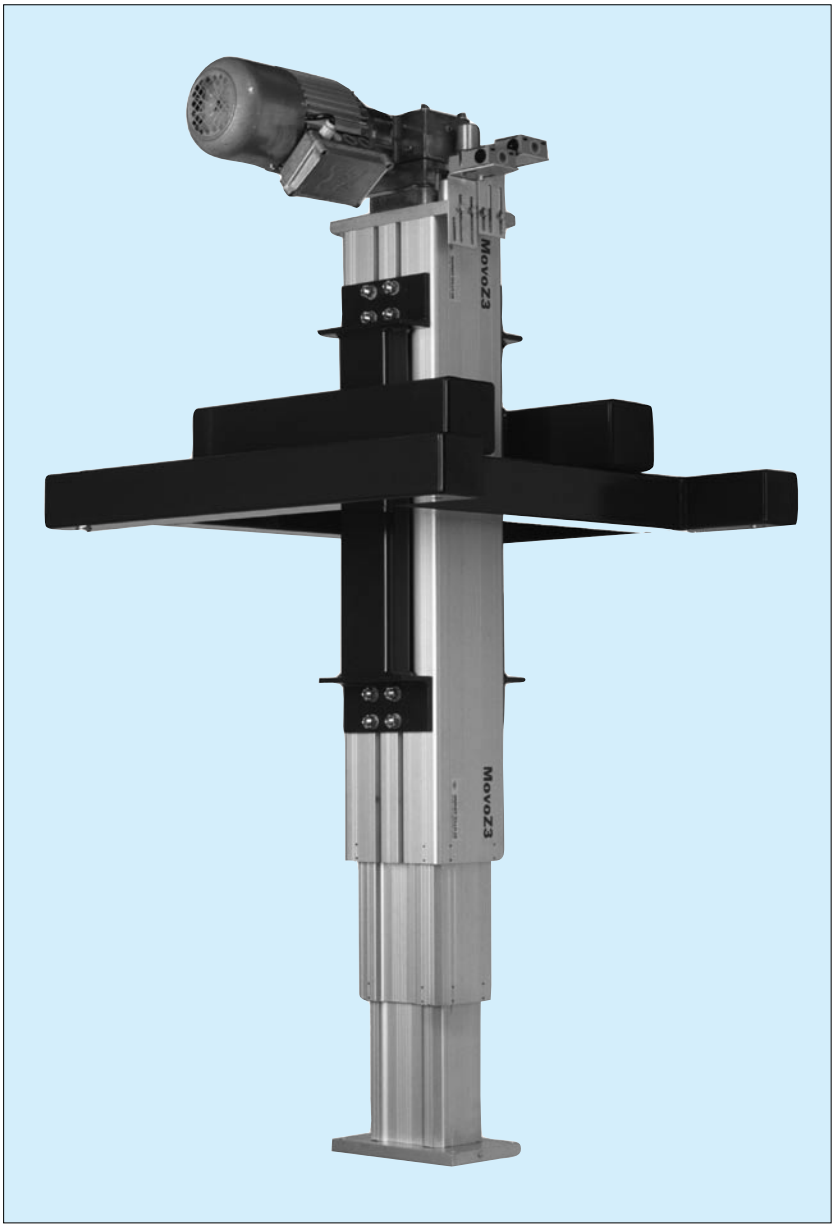
* Suitable limit switch: Telemecanique XCK-M115

## Movolift

Consists of a MovoZ Z3 unit fitted with mounting frame, gearbox, three phase asynchronius brake motor and limit switches, prepared for suspension in a Movorail or Tollobelt system.

- Stroke up to 1,5 m
- Safety nut
- Lifting speed up to 0,4 m/s
- Load up to 7500 N
- Three types of frames available:
  frame without rotation, frame with ± 360° manual rotation and frame with ± 360° motorized rotation.





## General

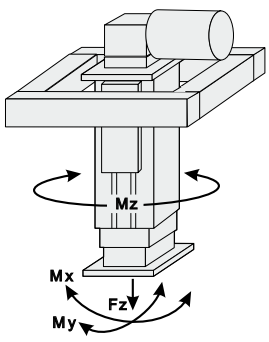
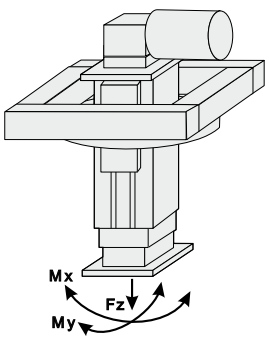
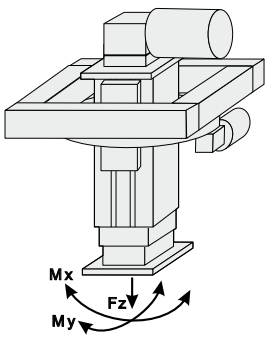
| Parameters | MLZ31 | MLZ33 | MLZ35 | MLZ37 | MLZ39 |
|---|---|---|---|---|---|
| Lifting motor | 3 × 230/400 Vac<br>50 Hz<br>1,1 kW<br>230 Vac brake | 3 × 230/400 Vac<br>50 Hz<br>1,1 kW<br>230 Vac brake | 3 × 230/400 Vac<br>50 Hz<br>1,1 kW<br>230 Vac brake | 3 × 230/400 Vac<br>50 Hz<br>2,2 kW<br>230 Vac brake | 3 × 230/400 Vac<br>50 Hz<br>2,2 kW<br>230 Vac brake |
| Ambient temperature (°C) | -20 to 70 | -20 to 70 | -20 to 70 | -20 to 70 | -20 to 70 |
| Weight without rotation, type A (kg) | 140 + Max. retracted × 0,42 | | | 150 + Max. retracted × 0,44 | |
| Weight with manual rotation, type B (kg) | 235 + Max. retracted × 0,42 | | | 245 + Max. retracted × 0,44 | |
| Weight with motorized rotation, type C (kg) | 280 + Max. retracted × 0,42 | | | 290 + Max. retracted × 0,44 | |

## Load capacity

| Parameters | MLZ31 | MLZ33 | MLZ35 | MLZ37 | MLZ39 |
|---|---|---|---|---|---|
| Max. lifting stroke (m) | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Fz max. lifting load. (N) | 5000* | 2400* | 1100* | 7500* | 3500* |
| Mx max. (Nm) | 2000 | 2000 | 2000 | 2000 | 2000 |
| My max. (Nm) | 2000 | 2000 | 2000 | 2000 | 2000 |
| Mz max. (Nm) | 330 | 330 | 330 | 330 | 330 |
| Max. lifting speed (m/s) | 0,09 | 0,2 | 0,4 | 0,13 | 0,3 |

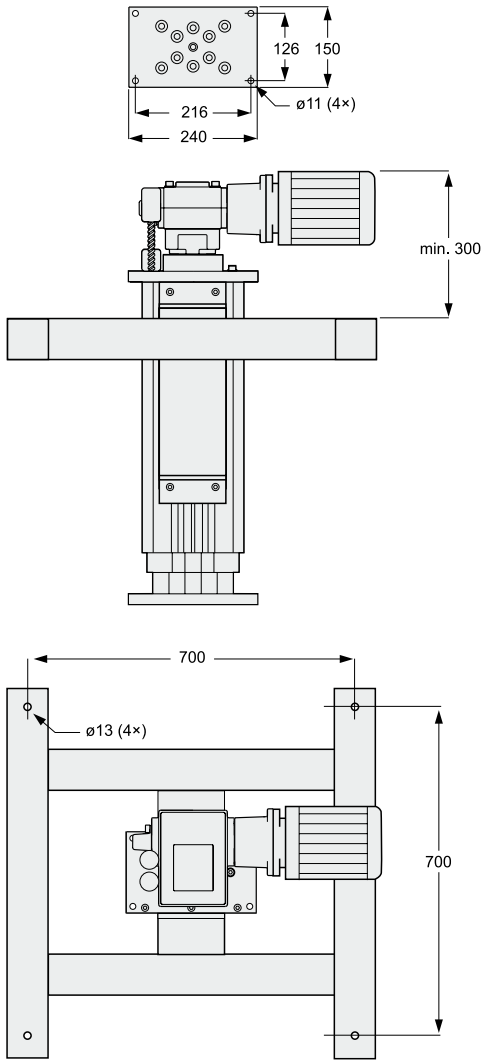
* The max. lifting capacity for any application ultimately depends on the values for Mx, My and Mz

## Rotation data

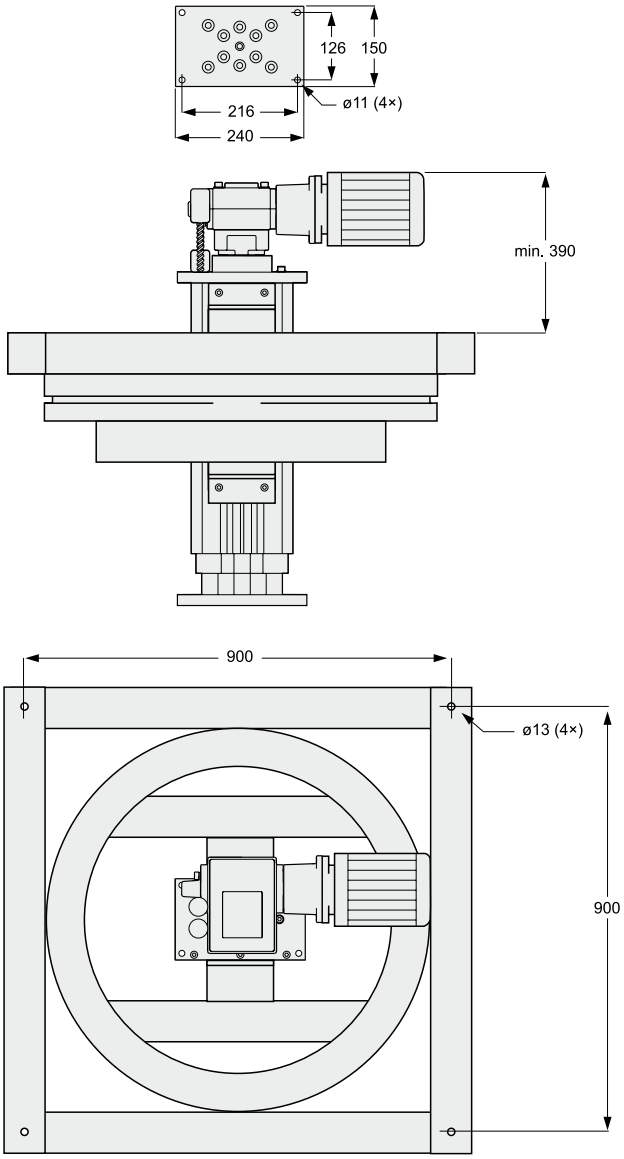
| Parameters | MLZ3 · A | MLZ3 · B | MLZ3 · C |
|---|---|---|---|
| Type of rotation | none | manual ± 360° | motorized ± 360° |
| Rotation motor | – | – | 3 × 230/400Vac 50 Hz<br>0,37 kW |
| Max. rotation speed (rpm) | – | – | 10 rpm |
| Anti back driving mechanism | – | no | yes, self-locking |
| |  |  |  |

## Dimensions

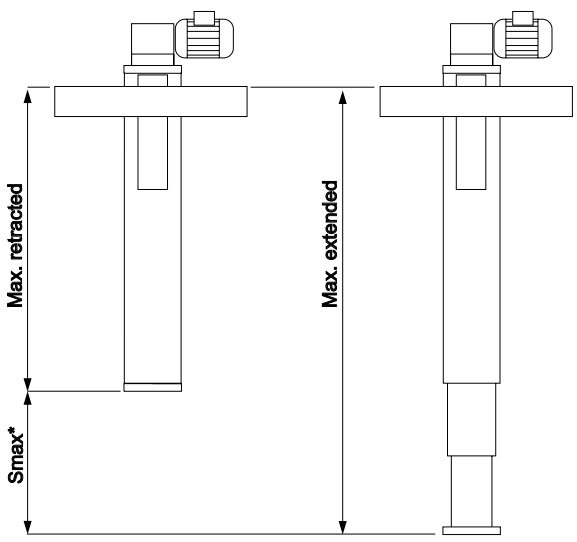
Designation: MLZ31(3/5/7/9)A • • • • • •




Designation: MLZ31(3/5/7/9)B(C) • • • • • •

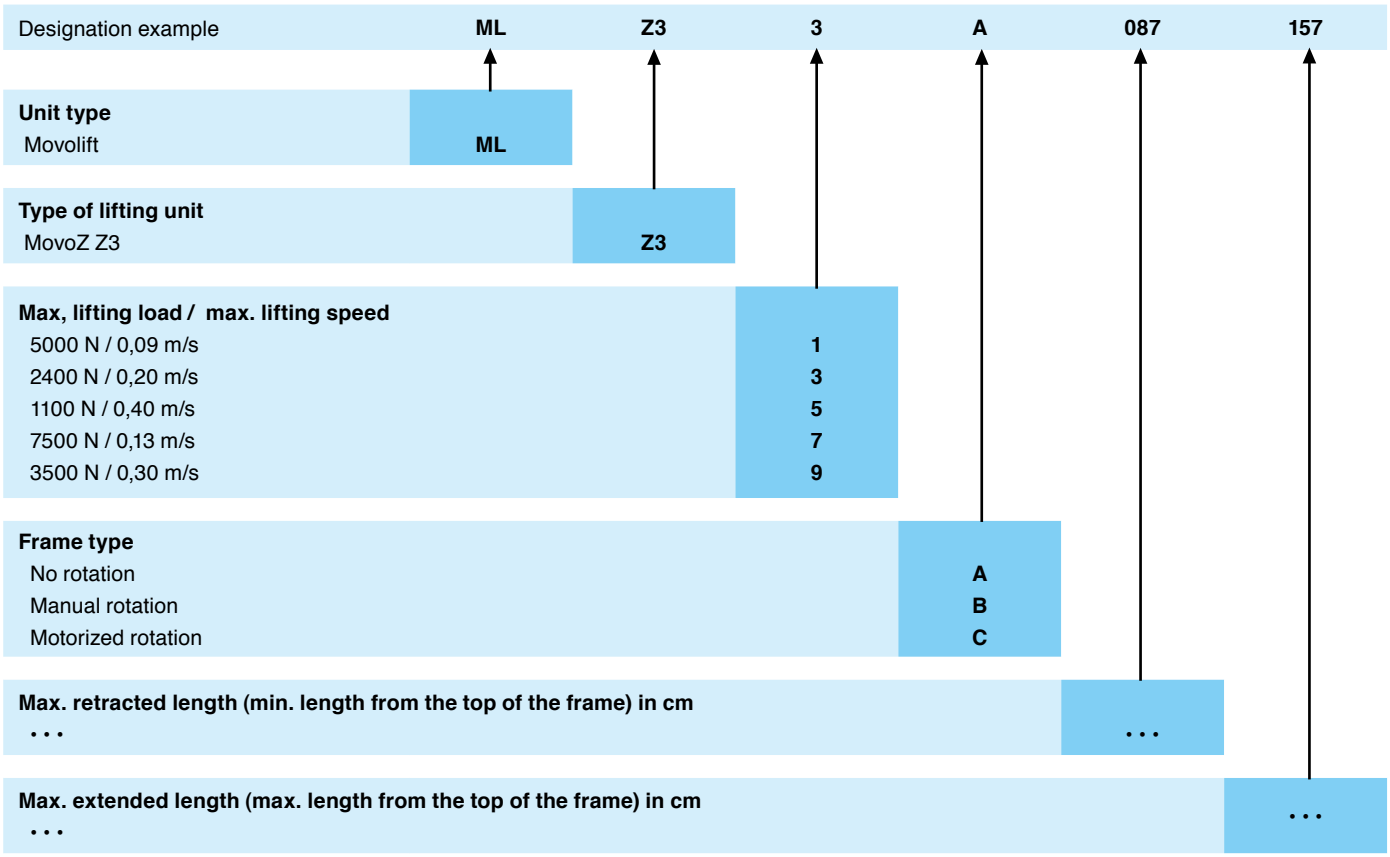



## Ordering length




* Smax = maximum stroke between the mechanical stops of the unit (theoretical stroke). Safe stroke is normally about 100 mm shorter (practical stroke).

## Movolift


Designation example
ML
Z3
3
A
087
157
Unit type
Movolift
ML
Type of lifting unit
MovoZ Z3
Z3
Max, lifting load / max. lifting speed
5000 N / 0,09 m/s
2400 N / 0,20 m/s
1100 N / 0,40 m/s
7500 N / 0,13 m/s
3500 N / 0,30 m/s
1
3
5
7
9
Frame type
No rotation
Manual rotation
Motorized rotation
A
B
C
Max. retracted length (min. length from the top of the frame) in cm
• • •
• • •
Max. extended length (max. length from the top of the frame) in cm
• • •
• • •

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*Helping you build a better machine, **faster.***

# Electrak 5

## 230 and 400 Vac - load up to 6800 N

» Ordering Key - see page 68
» Glossary - see page 72
» Electric Wiring Diagram - see page 46



## Standard Features and Benefits

- Robust, strong and reliable
- Stainless steel extension tube
- Acme or ball screw models
- Overload clutch for mid and end of stroke protection
- Heavy duty motor with thermal switch
- Anti-coast brake for repeatable positioning on all ball screw models. Optional on acme screw models.
- Maintenance free

## General Specifications

| Parameter | Electrak 5 |
|---|---|
| Screw type | acme or ball |
| Internally restrained | no |
| Manual override | no, optional |
| Dynamic braking | no |
| Holding brake<br>acme screw models<br>ball screw models | <br>no, self-locking<br>yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | cable |
| Motor connector | no |
| Certificates | UL, CSA, CE |
| Options | • potentiometer<br>• manual override |

## Performance Specifications

| Parameter | | Electrak 5 |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| A • • -05A5 (acme screw)* | | 1100 / 11350 |
| A • • -10A5 (acme screw) | | 2250 / 11350 |
| A • • -20A5 (acme screw) | | 2250 / 11350 |
| A • • -05B5 (ball screw) | | 2250 / 18000 |
| A • • -10B5 (ball screw) | | 4500 / 18000 |
| A • • -20B5 (ball screw) | | 4500 / 18000 |
| A • • -21B5 (ball screw) | | 6800 / 18000 |
| Speed, at no load / at maximum load | [mm/s] | |
| A • • -05A5 (acme screw)* | | 48 / 38 |
| A • • -10A5 (acme screw) | | 30 / 18 |
| A • • -20A5 (acme screw) | | 15 / 12 |
| A • • -05B5 (ball screw) | | 61 / 37 |
| A • • -10B5 (ball screw) | | 30 / 19 |
| A • • -20B5 (ball screw) | | 15 / 12 |
| A • • -21B5 (ball screw) | | 15 / 11 |
| Available input voltages | [Vac] | |
| Single phase | | 230** |
| Three phase | | 400 |
| Input frequency | [Hz] | |
| 1 × 230 Vac model | | 50/60 |
| 3 × 400 Vac model | | 50 |
| Standard stroke lengths | [inch] | 4, 6, 8, 10, 12, 14, 16, 18, 20, 24 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °C | [%] | 25 |
| Maximum on time | [s] | 45 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 11,3 |
| Lead cross section | [mm²] | 1,5 |
| Cable length | [mm] | 600 |
| Protection class | | IP45 |

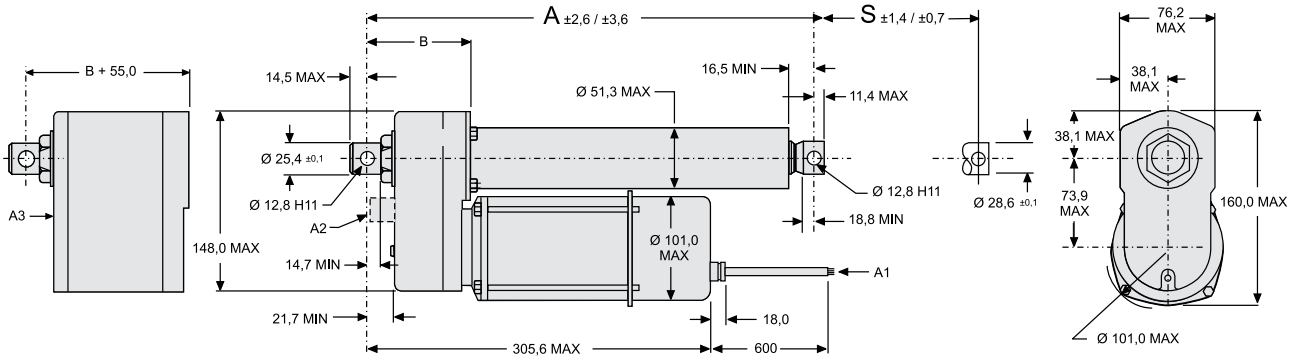
* Not possible with 400 Vac input voltage.
** 10 µF capacitor required to run the actuator, p/n 9200-448-003

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |

# Electrak 5

## 230 and 400 Vac - load up to 6800 N




S: stroke, tolerance acme / ball screw
A: retracted length, tolerance acme / ball screw

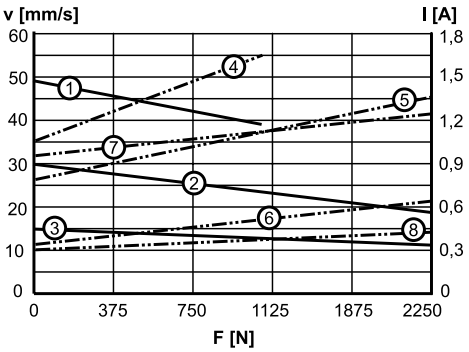
A1: cable
A2: manual override input (optional)
A3: housing dimensions for potentiometer option

| Stroke (S) | [inch (mm)] | 4 (101,6) | 6 (152,4) | 8 (203,2) | 10 (254,0) | 12 (304,8) | 14 (355,6) | 16 (406,4) | 18 (457,2) | 20 (508,0) | 24 (609,6) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Retracted length, acme screw models (A) | [mm] | 262,3 | 313,1 | 363,9 | 414,7 | 465,5 | 567,1 | 617,9 | 668,7 | 719,5 | 821,1 |
| Retracted length, ball screw models (A) | [mm] | 302,3 | 353,1 | 403,9 | 454,7 | 505,5 | 607,1 | 657,9 | 708,7 | 759,5 | 861,1 |
| Add on length for potentiometer* | [mm] | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 |
| Weight, acme screw models | [kg] | 5,9 | 6,1 | 6,3 | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,8 |
| Weight, ball screw models | [kg] | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,7 | 7,9 | 8,1 | 8,4 |
| Add on weight for potentiometer* | [kg] | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 |
| Potentiometer resistance change* | [ohm/mm] | 39 | 39 | 39 | 39 | 20 | 20 | 20 | 20 | 20 | 10 |

* Potentiometer is optional (NPO, BPO option)

## Performance Diagrams

### Acme Screw Models
### Speed and Current vs. Load

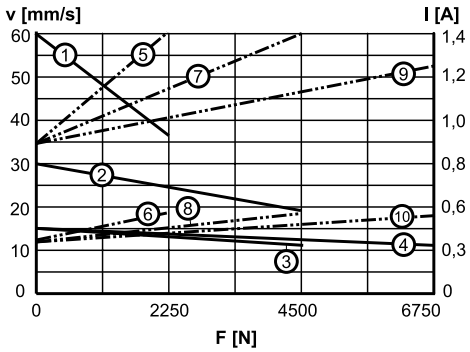



V: speed
I: current
F: load

1: speed A22 -05A5
2: speed A• • -10A5
3: speed A• • -20A5

4. current 230 Vac, A22-05A5
5: current 230 Vac, A22-10A5
6: current 400 Vac, A42-10A5
7: current 230 Vac, A22-20A5
8: current 400 Vac, A42-20A5

### Ball Screw Models
### Speed and Current vs. Load




V: speed
I: current
F: load

1: speed A22-05B5, A42-05B5
2: speed A22-10B5, A42-10B5
3: speed A22-20B5, A42-20B5
4: speed A22-21B5, A42-21B5

5. current 230 Vac, A22-05B5
6: current 400 Vac, A42-05B5
7: current 230 Vac, A22-10B5, A22-20B5
8: current 400 Vac, A42-10B5, A42-20B5
9: current 230 Vac, A22-21B5
10: current 400 Vac, A42-21B5

# Ordering Keys

## Electrak AC-actuators

### Electrak PPA-AC

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| PPA22 - | 18B65 - | 06 | SB | XX | C |

**1. Model and input voltage**
PPA11 - = Electrak PPA-AC, 1 × 115 Vac
PPA22 - = Electrak PPA-AC, 1 × 230 Vac

**2. Dynamic load capacity**
18B65 - = 2220 N
58B65 - = 6670 N

**3. Stroke**
04 = 4 inch (101,6 mm)
08 = 8 inch (203,2 mm)
12 = 12 inch (304,8 mm)
18 = 18 inch (457,2 mm)
24 = 24 inch (609,6 mm)
36 = 36 inch (914,4 mm)

**4. Brake option[1]**
N - = no brake option
SB = anti coast brake
EB = electrical brake[2]

**5. Feedback option**
XX = no feedback option
LS = end of stroke limit switches
PO = potentiometer
HS = encoder
HL = encoder + end of stroke limit switches

**6. Bellows option**
X = no bellows
C = bellows

[1]See "Brake" in the Glossary section for more information.
[2]Only possible for 1 × 115 Vac models.

### Electrak 5

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| A22 - | 20B5 - | 04 | M0 | BPO |

**1. Input voltage**
A22 - = 1 × 230 Vac
A42 - = 3 × 400 Vac

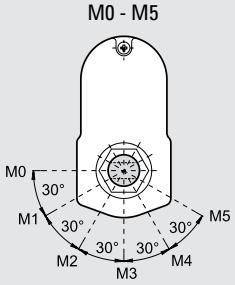
**2. Dynamic load capacity, screw type and maximum speed**
05A5 = 1100 N, acme, 54 mm/s[1]
10A5 = 2250 N, acme, 30 mm/s
20A5 = 2250 N, acme, 15 mm/s
05B5 = 2250 N, ball, 61 mm/s
10B5 = 4500 N, ball, 30 mm/s
20B5 = 4500 N, ball, 15 mm/s
21B5 = 6800 N, ball, 15 mm/s

**3. Stroke**
04 = 4 inch (101,6 mm)
06 = 6 inch (152,4 mm)
08 = 8 inch (203,2 mm)
10 = 10 inch (254,0 mm)
12 = 12 inch (304,8 mm)
14 = 14 inch (355,6 mm)
16 = 16 inch (406,4 mm)
18 = 18 inch (457,2 mm)
20 = 20 inch (508,0 mm)
24 = 24 inch (609,6 mm)

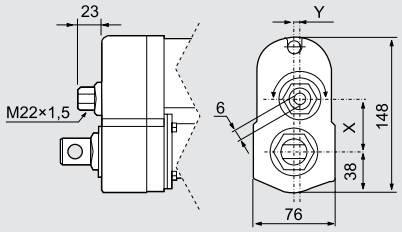
**4. Rear adapter hole position[2]**
M0 = adaptor at 0° (standard position)
M1 = adaptor at 30°
M2 = adaptor at 60°
M3 = adaptor at 90°
M4 = adaptor at 120°
M5 = adaptor at 150°

**5. Options[3]**
N = no option
B = anti coast brake[3]
NPO = potentiometer
NHW = manual override[4]
BPO = anti coast brake and potentiometer[3]
BHW = anti coast brake and manual override[3/4]

[1] 05A5 not possible with 400 Vac input voltage.
[2] Definition of rear adapter hole positions.




[3] Ball screw versions must always be ordered with an anti coast brake while acme versions can be ordered with or without an anti coast brake.
[4] Dimensions for manual override option.




| Model | X | Y |
|---|---|---|
| 05A(B)5 | 49,6 | 0,0 |
| 10A(B)5 | 43,3 | 5,2 |
| 20(21)A(B)5 | 38,9 | 0,0 |

# Electrak 10

## 12, 24 and 36 Vdc - load up to 6800 N

» Ordering Key - see page 66
» Glossary - see page 72
» Electric Wiring Diagram - see page 44



## Standard Features and Benefits

- Robust, strong and reliable
- Withstands very harsh environments
- Stainless steel extension tube
- Acme or ball screw models
- Overload clutch for mid and end of stroke protection
- Motor with thermal switch
- Maintenance free

## General Specifications

| Parameter | Electrak 10 |
|---|---|
| Screw type | acme or ball |
| Internally restrained | no |
| Manual override | no, optional |
| Dynamic braking | no |
| Holding brake<br>acme screw models<br>ball screw models | <br>no, self-locking<br>yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | flying leads and connector |
| Motor connector | AMP connector<br>with housing p/n 180908-5<br>with male terminals p/n 42098-2 |
| Certificates | CE |
| Options | • potentiometer<br>• manual override |

## Performance Specifications

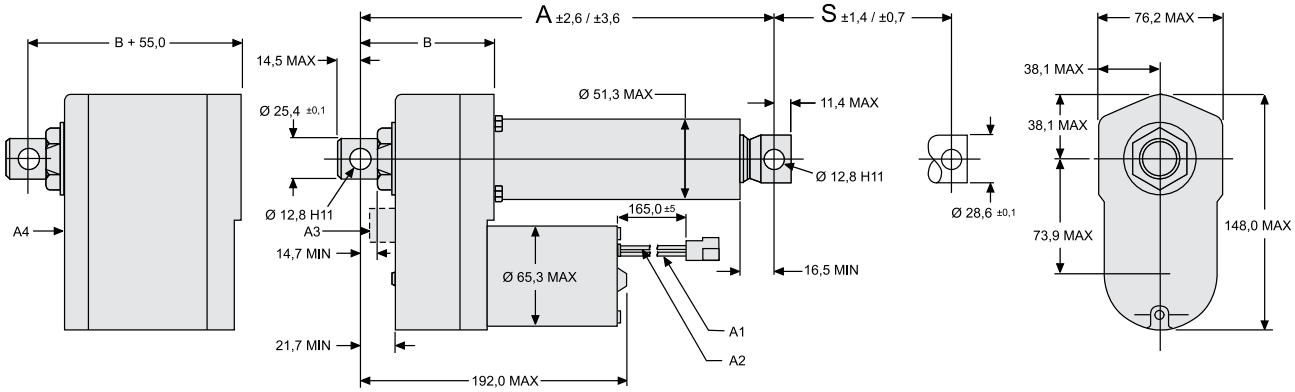
| Parameter | | Electrak 10 |
|---|---|---|
| Maximum load, dynamic / static | [N] | |
| D • • -05A5 (acme screw) | | 1100 / 11350 |
| D • • -10A5 (acme screw) | | 2250 / 11350 |
| D • • -20A5 (acme screw) | | 2250 / 11350 |
| D • • -05B5 (ball screw) | | 2250 / 18000 |
| D • • -10B5 (ball screw) | | 4500 / 18000 |
| D • • -20B5 (ball screw) | | 4500 / 18000 |
| D • • -21B5 (ball screw) | | 6800 / 18000 |
| Speed, at no load / at maximum load | [mm/s] | |
| D • • -05A5 (acme screw) | | 54 / 32 |
| D • • -10A5 (acme screw) | | 30 / 18 |
| D • • -20A5 (acme screw) | | 15 / 12 |
| D • • -05B5 (ball screw) | | 61 / 37 |
| D • • -10B5 (ball screw) | | 30 / 19 |
| D • • -20B5 (ball screw) | | 15 / 12 |
| D • • -21B5 (ball screw) | | 15 / 11 |
| Available input voltages | [Vdc] | 12, 24, 36 |
| Standard stroke lengths | [inch] | 4, 6, 8, 10, 12, 14, 16, 18, 20, 24 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °C | [%] | 25 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 11,3 |
| Lead cross section | [$mm^2$] | 2 |
| Lead length | [mm] | 165 |
| Protection class | | IP65 |

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| AC-063 | 50 |
| DCG-190 | 54 |

# Electrak 10

## 12, 24 and 36 Vdc - load up to 6800 N



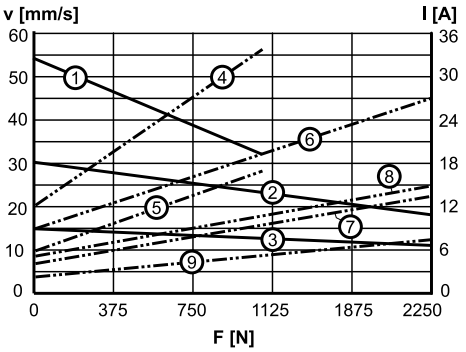

S: stroke, tolerance acme / ball screw
A: retracted length, tolerance acme / ball screw
A1: black lead
A2: red lead
A3: manual override input (optional)
A4: housing dimensions for potentiometer option

| Stroke (S) | [inch (mm)] | 4 (101,6) | 6 (152,4) | 8 (203,2) | 10 (254,0) | 12 (304,8) | 14 (355,6) | 16 (406,4) | 18 (457,2) | 20 (508,0) | 24 (609,6) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Retracted length, acme screw models (A) | [mm] | 262,3 | 313,1 | 363,9 | 414,7 | 465,5 | 567,1 | 617,9 | 668,7 | 719,5 | 821,1 |
| Retracted length, ball screw models (A) | [mm] | 302,3 | 353,1 | 403,9 | 454,7 | 505,5 | 607,1 | 657,9 | 708,7 | 759,5 | 861,1 |
| Add on length for potentiometer* | [mm] | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 | 55,0 |
| Weight, acme screw models | [kg] | 4,5 | 4,7 | 4,9 | 5,0 | 5,2 | 5,4 | 5,5 | 5,7 | 5,8 | 6,2 |
| Weight, ball screw models | [kg] | 5,1 | 5,3 | 5,5 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 6,4 | 6,8 |
| Add on weight for potentiometer* | [kg] | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 | 1,3 |
| Potentiometer resistance change* | [ohm/mm] | 39 | 39 | 39 | 39 | 20 | 20 | 20 | 20 | 20 | 10 |

* Potentiometer is optional

## Performance Diagrams

### Acme Screw Models
### Speed and Current vs. Load

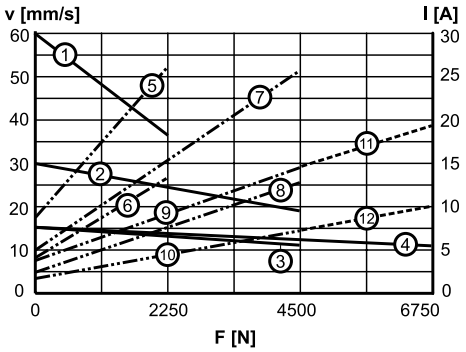



V: speed
I: current
F: load

1: speed D • • -05A5
2: speed D • • -10A5
3: speed D • • -20A5

4. current 12 Vdc, D12-05A5
5: current 24 Vdc, D24-05A5
6: current 12 Vdc, D12-10A5
7: current 24 Vdc, D24-10A5
8: current 12 Vdc, D12-20A5
9: current 24 Vdc, D24-20A5

### Ball Screw Models
### Speed and Current vs. Load




V: speed
I: current
F: load

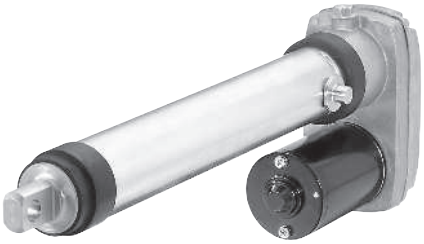
1: speed D • • -05B5
2: speed D • • -10B5
3: speed D • • -20B5
4: speed D • • -21B5

5. current 12 Vdc, D12-05B5
6: current 24 Vdc, D24-05B5
7: current 12 Vdc, D12-10B5
8: current 24 Vdc, D24-10B5
9: current 12 Vdc, D12-20B5
10: current 24 Vdc, D24-20B5
11: current 12 Vdc, D12-21B5
12: current 24 Vdc, D24-21B5

# Electrak.PPA-DC

## 12, 24 and 36 Vdc - load up to 6670 N

» Ordering Key - see page 69
» Glossary - see page 80
» Electric Wiring Diagram - see page 49



## Standard Features and Benefits

- Strong and versatile heavy duty actuator
- High duty cycle
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Stroke lengths up to 36 inch (914 mm)
- Three different input voltages to choose from
- Motor with thermal switch
- Maintenance free
- Large range of options

## General Specifications

| Parameter | Electrak.PPA-DC |
|---|---|
| Screw type | ball |
| Internally restrained | no |
| Manual override | no, optional |
| Dynamic braking | no |
| Holding brake | yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | flying leads |
| Motor connector | no |
| Certificates | CE |
| Options | • end of stroke limit switches<br>• potentiometer<br>• encoder<br>• protective bellows |

## Performance Specifications

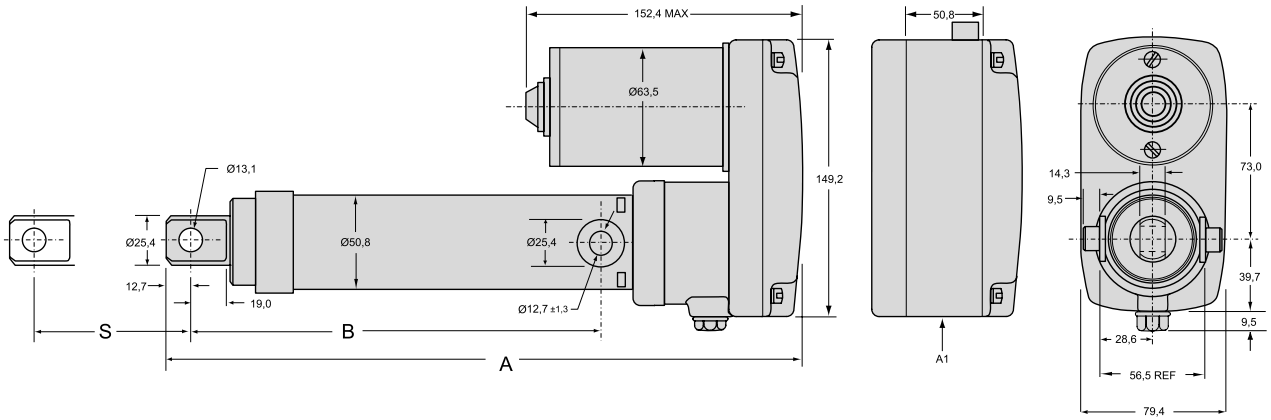
| Parameter | | PPA-DC |
|---|---|---|
| Maximum load, dynamic / static<br>PPA • • -18B65<br>PPA • • -58B65 | [N] | <br>3330 / 13350<br>6670 / 13350 |
| Speed, at no load / at maximum load<br>PPA12(24/36)-18B65<br>PPA12(24/36)-58B65 | [mm/s] | <br>32 / 28<br>12 / 9 |
| Available input voltages | [Vdc] | 12, 24, 36 |
| Standard stroke lengths | [inch] | 4, 8, 12, 18, 24, 36 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °C | [%] | 30 |
| End play, maximum | [mm] | 1 |
| Restraining torque<br>PPA • • -18B65<br>PPA • • -58B65 | [Nm] | <br>11<br>22 |
| Lead cross section | [mm²] | 2 |
| Lead length | [mm] | 420 |
| Protection class | | IP52 |

## Compatible Controls

| Control.model | See.page |
|---|---|
| DPDT switch | 53 |
| AC-063 | 54 |
| DCG-190 | 58 |

# Electrak.PPA-DC

## 12, 24 and 36 Vdc - load up to 6670 N



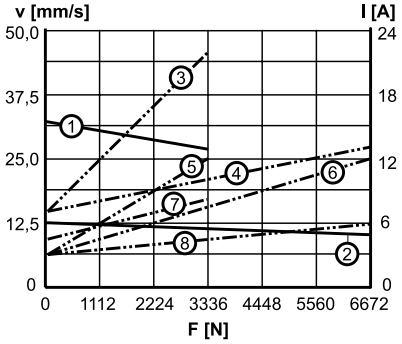

S: stroke
A: retracted length

B: retracted length to trunnions
A1: housing dimensions for limit switch, encoder or potentiometer options

| Stroke.(S). | [inch.(mm)] | 4 (101,6) | 8 (203,2) | 12 (304,8) | 18 (457,2) | 24 (609,6) | 36 (914,4) |
|---|---|---|---|---|---|---|---|
| Retracted.length.(A).without.options | [mm] | 348,0 | 449,6 | 551,2 | 754,4 | 906,8 | 1211,6 |
| Retracted.length.(A).with.limit.switch,.. encoder.or.potentiometer | [mm] | 398,8 | 500,4 | 602,0 | 805,2 | 957,6 | 1262,4 |
| Retracted.length.to.trunnions.(B) | [mm] | 223,5 | 352,1 | 426,7 | 629,9 | 782,3 | 1087,1 |
| Weight | [kg] | 4,5 | 5,3 | 6,0 | 7,2 | 8,4 | 10,8 |
| Add.on.weight.for.limit.switch,.. encoder.or.potentiometer | [kg] | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 |

## Performance Diagrams

### Speed and Current vs. Load




V: speed I: current F: load

1: speed PPA • • -18B65
2: speed PPA • • -58B65
3: current 12 Vdc, PPA12-18B65
4: current 12 Vdc, PPA12-58B65
5: current 24 Vdc, PPA24-18B65
6: current 24 Vdc, PPA24-58B65
7: current 36 Vdc, PPA36-18B65
8: current 36 Vdc, PPA36-58B65

# Electrak PPA-DC

## 12, 24 and 36 Vdc - load up to 6670 N

» Ordering Key - see page 65
» Glossary - see page 72
» Electric Wiring Diagram - see page 45



## Standard Features and Benefits

- Strong and versatile heavy duty actuator
- High duty cycle
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Stroke lengths up to 36 inch (914 mm)
- Three different input voltages to choose from
- Motor with thermal switch
- Maintenance free
- Large range of options

## General Specifications

| Parameter | Electrak PPA-DC |
|---|---|
| Screw type | ball |
| Internally restrained | no |
| Manual override | no, optional |
| Dynamic braking | no |
| Holding brake | yes |
| End of stroke protection | overload clutch |
| Mid stroke protection | overload clutch |
| Motor protection | auto reset thermal switch |
| Motor connection | flying leads |
| Motor connector | no |
| Certificates | CE |
| Options | • end of stroke limit switches<br>• potentiometer<br>• encoder<br>• protective bellows |

## Performance Specifications

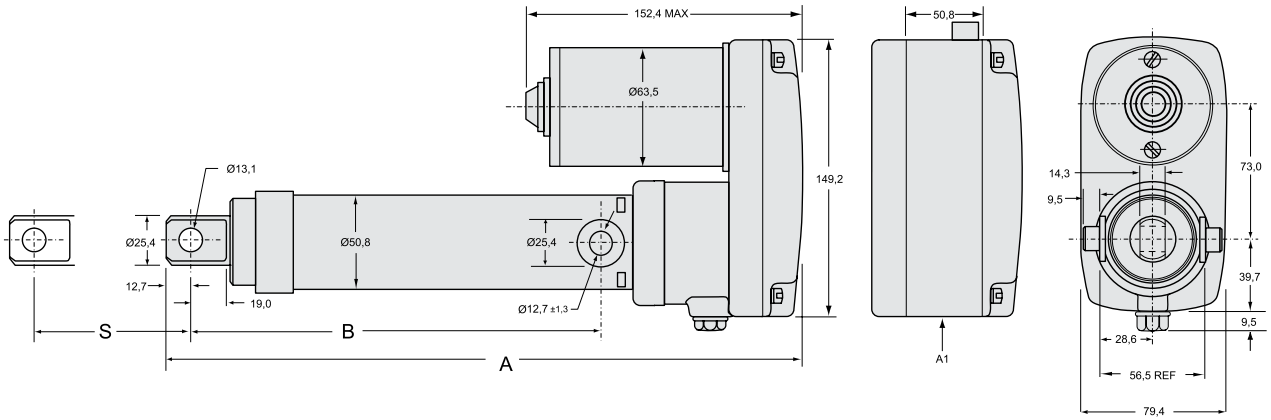
| Parameter | | PPA-DC |
|---|---|---|
| Maximum load, dynamic / static<br>PPA • • -18B65<br>PPA • • -58B65 | [N] | <br>3330 / 13350<br>6670 / 13350 |
| Speed, at no load / at maximum load<br>PPA12(24/36)-18B65<br>PPA12(24/36)-58B65 | [mm/s] | <br>32 / 28<br>12 / 9 |
| Available input voltages | [Vdc] | 12, 24, 36 |
| Standard stroke lengths | [inch] | 4, 8, 12, 18, 24, 36 |
| Operating temperature limits | [°C] | -25 – +65 |
| Full load duty cycle @ 25 °C | [%] | 30 |
| End play, maximum | [mm] | 1 |
| Restraining torque<br>PPA • • -18B65<br>PPA • • -58B65 | [Nm] | <br>11<br>22 |
| Lead cross section | [$mm^2$] | 2 |
| Lead length | [mm] | 420 |
| Protection class | | IP52 |

## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| AC-063 | 50 |
| DCG-190 | 54 |

# Electrak PPA-DC

## 12, 24 and 36 Vdc - load up to 6670 N



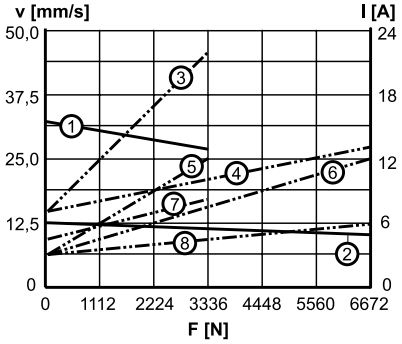

S: stroke
A: retracted length

B: retracted length to trunnions
A1: housing dimensions for limit switch, encoder or potentiometer options

| Stroke (S) | [inch (mm)] | 4 (101,6) | 8 (203,2) | 12 (304,8) | 18 (457,2) | 24 (609,6) | 36 (914,4) |
|---|---|---|---|---|---|---|---|
| Retracted length (A) without options | [mm] | 348,0 | 449,6 | 551,2 | 754,4 | 906,8 | 1211,6 |
| Retracted length (A) with limit switch, encoder or potentiometer | [mm] | 398,8 | 500,4 | 602,0 | 805,2 | 957,6 | 1262,4 |
| Retracted length to trunnions (B) | [mm] | 223,5 | 352,1 | 426,7 | 629,9 | 782,3 | 1087,1 |
| Weight | [kg] | 4,5 | 5,3 | 6,0 | 7,2 | 8,4 | 10,8 |
| Add on weight for limit switch, encoder or potentiometer | [kg] | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 |

## Performance Diagrams

### Speed and Current vs. Load




V: speed I: current F: load

1: speed PPA • • -18B65
2: speed PPA • • -58B65
3: current 12 Vdc, PPA12-18B65
4: current 12 Vdc, PPA12-58B65
5: current 24 Vdc, PPA24-18B65
6: current 24 Vdc, PPA24-58B65
7: current 36 Vdc, PPA36-18B65
8: current 36 Vdc, PPA36-58B65

# Electrak Non-driven Actuator PPA-M

» Ordering Key - see page 71
» Glossary - see page 72

Load up to 6670 N



## Standard Features and Benefits

- Actuator with double input shafts to which a customer supplied motor or/and an intermediate shaft can be mounted
- Can be operated manually
- Robust and versatile
- Withstands very harsh environments
- Highly efficient ball screw drive system
- Holding brake prevents back driving
- Trunnion to clevis mounting
- Maintenance free

## General Specifications

| Parameter | Electrak PPA-M |
|---|---|
| Screw type | ball |
| Internally restrained | no |
| Manual override | no* |
| Holding brake | yes |
| End of stroke protection | no |
| Mid stroke protection | no |
| Certificates | – |
| Options | protective bellows |

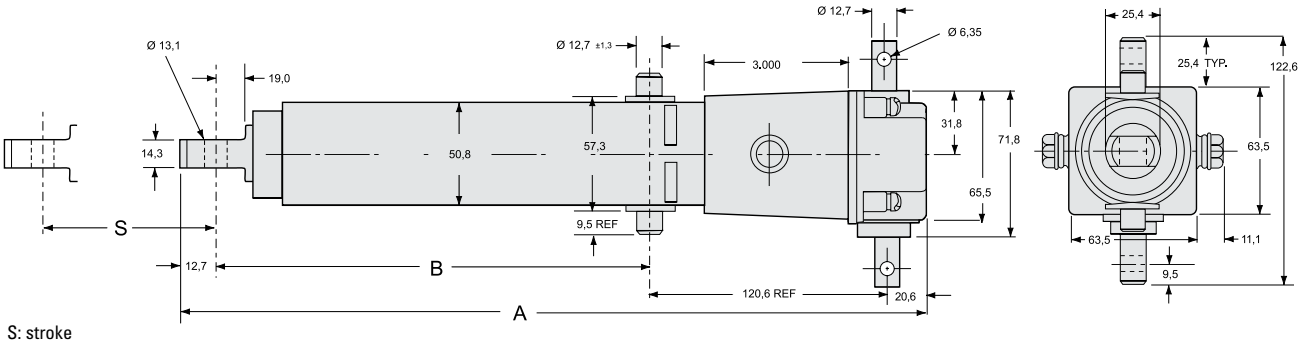
* Either of the two input shafts can be used for manual operation if both shafts are not connected to a motor or an intermediate shaft.

## Performance Specifications

| Parameter | | PPA-M |
|---|---|---|
| Maximum load, dynamic / static | [N] | 6670 / 13350 |
| Maximum speed at max. load | [mm/s] | 8 |
| Maximum input torque | [Nm] | 9 |
| Maximum input speed | [rpm] | 100 |
| Standard stroke lengths | [in] | 4, 8, 12, 18, 24, 36 |
| Operating temperature limits | [°C] | -25 – +65 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 23 |

# Electrak Non-driven Actuator PPA-M

## Load up to 6670 N

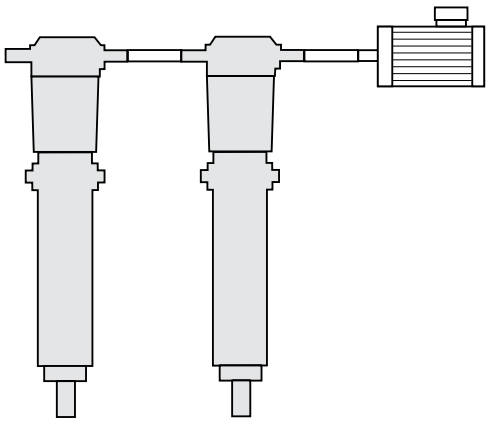



S: stroke
A: retracted length
B: retracted length to trunnions

| Stroke (S) | [inch (mm)] | 4 (101,6) | 8 (203,2) | 12 (304,8) | 18 (457,2) | 24 (609,6) | 36 (914,4) |
|---|---|---|---|---|---|---|---|
| Retracted length (A) | [mm] | 375,9 | 477,5 | 579,1 | 782,3 | 934,7 | 1239,5 |
| Retracted length to trunnions (B) | [mm] | 223,5 | 325,1 | 426,7 | 629,9 | 782,3 | 1087,1 |
| Weight | [kg] | 3,4 | 4,2 | 4,8 | 6,1 | 7,3 | 9,7 |

## Synchronous Operation

Two or more PPA-M actuators can easily be mechanically linked for synchronous operation by using intermediate shafts. The intermediate shafts and necessary couplings are provided by the customer.





# Precision Screws

Ball screws, trapezoidal and lead screws.

THOMSON®

Linear Motion. **Optimized.**™

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THOMSON®

*Linear Motion. **Optimized.**™*

# Thomson – the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

## The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that makes us the supplier of choice for motion control technology.

- Thomson own the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

## A Name You Can Trust

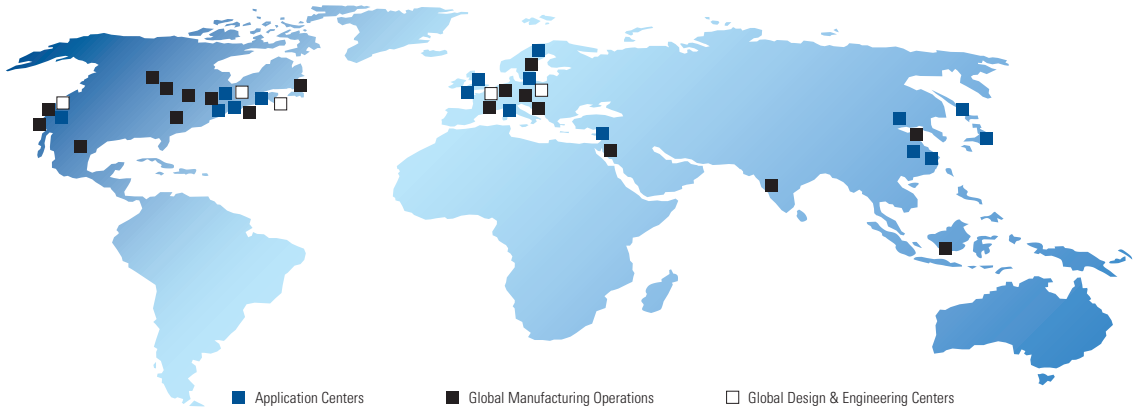
A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com. For assistance in Europe, contact us at +44 1271 334 500 or e-mail us at sales.uk@thomsonlinear.com.

Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

## The Danaher Business System

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

## Local Support Around the Globe



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## What do you want from today's thread drives?

The principle behind the thread drive is incredibly easy to grasp. And yet, all kinds of demands are made of these drives in practice and there is a wide range of designs in use. Apart from technical requirements, the issue of cost is becoming increasingly important. This presents the user with the following challenges:

**How can the costs associated with procurement, manufacture and installation be reduced?**
Increasing pressure in terms of costs and the need for greater flexibility call for short delivery times and attractive prices when it comes to procuring the components to be used. This involves taking individual customer requirements into account right from the start.

**How can I make my system more reliable?**
Components are expected to deliver high levels of accuracy and quality as well as low maintenance costs.

**How can I make my system more cost-effective?**
When combined with the right thread drive, high speeds and more power make it possible to use a system more cost-effectively.





## Thomson Neff ball screws: We can offer the right solution for your motion task

Thomson Neff is the world's leading manufacturer of ball screws. Our products are used in some of the most demanding sectors of industry. Example applications include machine tools, handling machinery, technical devices used within the field of medicine and aviation technology.

Our varied product range is bound to contain the right drive for almost any motion task: from very small custom thread drives for highly sensitive medical devices right through to ball screws for high-performance machine tools with very high demands in terms of speed and stiffness.

We have made it our business to provide our customers with the perfect solution for their applications, whatever their requirements in terms of loads, speed, stiffness, accuracy, service life and reliability. Thanks to our 40 years' experience and impeccable quality management, we can guarantee you the very highest levels of performance, quality and reliability.

# Recirculating ball screws

Our ball screws are ideal for use in all technological and mechanical engineering applications. These mainly include:

- Machine tools
- Aircraft construction
- Wood working
- Handling equipment, industrial robots
- Printing and paper machines
- Traffic engineering
- Medical equipment
- Measuring technology
- …

A ball screw is a driving element for converting rotary motion into axial motion and vice versa. A ball screw consists of a ball screw shaft, a ball screw nut featuring a ball return and the balls themselves.

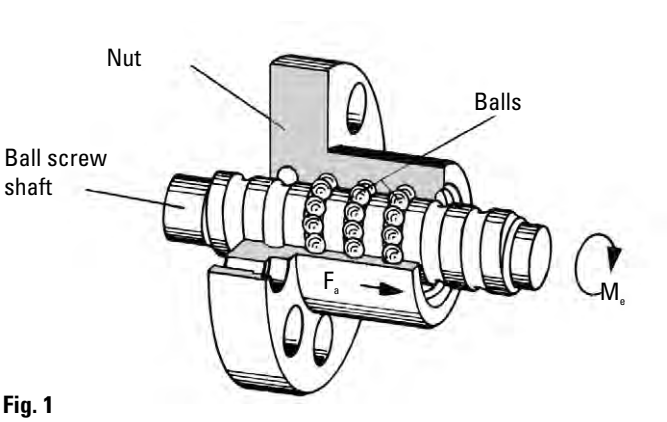



**Fig. 1**

Action: Torque $M_e$ → Reaction: Force $F_a$

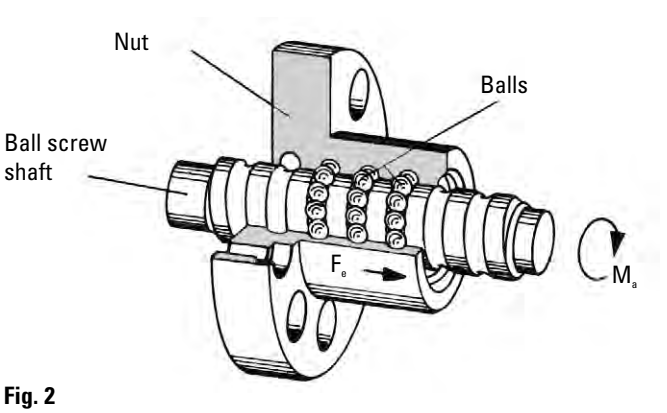
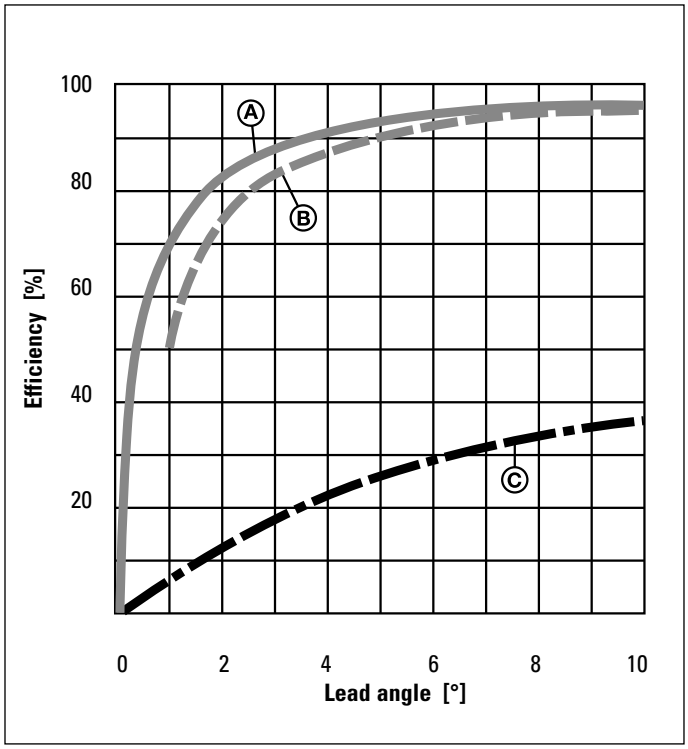



**Fig. 2**

Action: Force $F_e$ → Reaction: Torque $M_a$

The balls, which roll between the screw shaft and the nut, offer optimum levels of efficiency (up to 98%).

As a result, ball screws, unlike trapezoidal screws, are not capable of self locking.




Ⓐ Efficiency for ball screws according to Fig. 1
Ⓑ Efficiency for ball screws according to Fig. 2
Ⓒ Efficiency for trapezoidal screw

Advantages of ball screws compared to trapezoidal screws:

- More accurate positioning throughout service life
- Less wear, longer service life
- Less drive power required
- Less heat generated
- Higher travel speeds
- No stick/slip effect

# General technical data for recirculating ball screws

## Manufacturing process

THOMSON NEFF recirculating ball screws are manufactured in rolled, ground and whirled versions. Both shaft and nut have a gothic arc profile. The load angle is 45°.

## Speeds

The permissible speed limit is currently 3000 rpm, up to 4500 rpm for spot measurements. This speed limit identifies the maximum speed that may only be used under optimum operating conditions.

## Mounting position

The mounting position of a lead screw may be selected freely. The only factor to be taken into consideration is that all radial forces generated must be absorbed by external guides.

## Precision

Rolled Thomson Neff ball screw shafts are available in tolerance classes P3, P5, T5 and T7.
Ground/whirled Thomson Neff recirculating ball screws are available in tolerance classes up to P0.

## Self-locking

Thanks to their low rolling friction, recirculating ball screws are not self-locking. It is therefore necessary to fit suitable motors with a holding brake, especially if the ball screw is mounted vertically.

## Temperatures

All ball screws are designed for ambient temperatures between -30°C and 80°C. Temperatures of no more than 110°C are also permitted for intermittent operations. Ball screws are only conditionally suited for temperatures below freezing.

## Repetition accuracy

The repetition accuracy refers to the capability of a lead screw to return again to a set position it has previously traveled to under the same conditions. It corresponds to the mean position scatter range as defined in VDI/DGQ 3441. Repetition accuracy is influenced by factors including:

- Load
- Speed
- Deceleration
- Direction of movement
- Temperature

## Standard manufacturing program

| Nominal lead $P_{h0}$ [mm] | Sizes used: Nominal diameter $d_0$ [mm] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12 | 16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
| 4 | ● | | | | | | | | | | | |
| 5 | ● | ●○ | ●○ | ●○ | ●○ | ●○ | ○ | | | | | |
| 10 | ● | ● | ○ | ●○ | ●○ | ●○ | ●○ | ●○ | ●○ | ○ | ○ | |
| 15 | | | | | ○ | ○ | | ○ | | | | |
| 20 | | | ● | ● | ● | ●○ | ●○△ | ●○△ | ○△ | ○△ | ○△ | ○△ |
| 25 | | | | ● | | | △ | ○△ | ○△ | ○△ | ○△ | ○△ |
| 30 | | | | | | | | | ○ | ○ | ○△ | ○△ |
| 32 | | | | | ● | | | | | | | |
| 40 | | | | | ● | ● | | | | ○ | ○ | |
| 50 | | | ● | ● | | | | | | | | |

● = rolled (stock item) ○ = ground/whirled △ = heavy duty ground/whirled

## Precision drives us on

Our range complies with DIN 69051 and ISO 3408. All nuts, both flanged and cylindrical nuts, are available with connections complying with DIN specifications.

Every shaft can be supplied with customized end journals. On request, customers can also order screws with an annealed end for machining their own end journal.

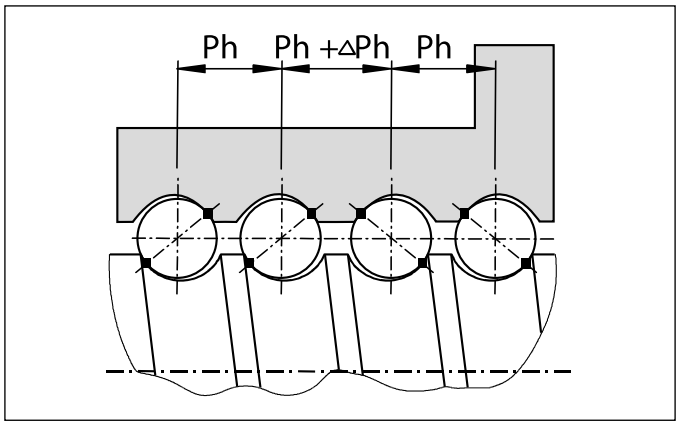
# Preloading methods

## If the ball nut unit is preloaded on the ball screw, the following results can be achieved:

- Increased positioning accuracy
- Increased stiffness in the nut area
- Reduced width of backlash

### Preloading with 2-point ball contact:

Standard preloading force: 10% of dynamic rated load

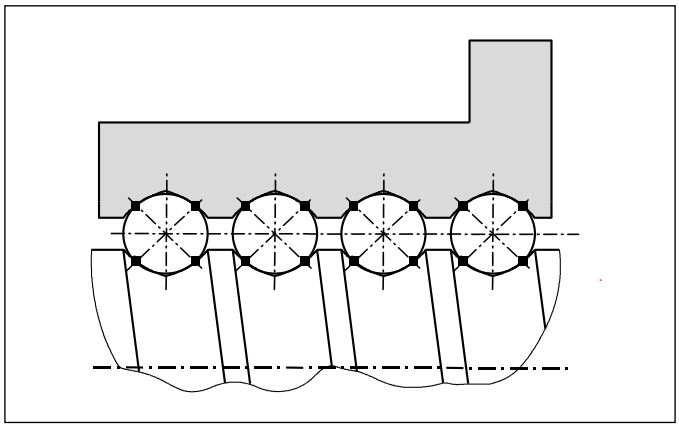



#### Designs:

- VDM preloaded double nut
- VEM-2 and FL preloaded single nut with internal thread shift
- VEM-2 preloaded single nut with internal thread shift between individual threads (only where there is more than one thread)

### Preloading with 4-point ball contact:

Standard preloading force: 4% of dynamic rated load



#### Design:

Preloaded single nut with oversized ball bearings VEM-4

#### Note:

- Allows shorter nut lengths to be used
- Not suitable for all applications due to increased levels of sliding friction, but provides a cost-effective solution in certain cases

**Note:**

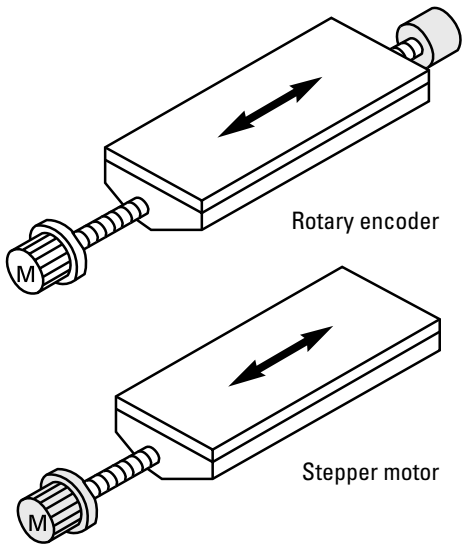
In the case of lead precisions poorer than P5 and shaft leads < diameter $d_0$, the unit can only be set to low backlash. The overall length of the nuts can be increased by up to 10 mm as a consequence of the preloading system used.

Single nuts may also be supplied assembled backlash-free on request.
Please contact our technical advice service.

## Tolerance classes

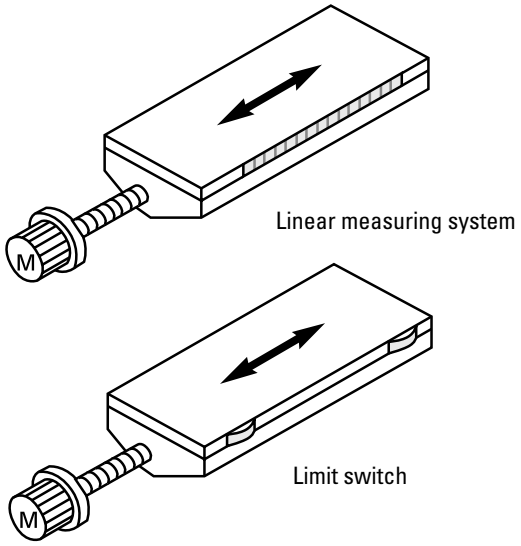
| P | Positioning ball screws |
|---|---|

Indirect measuring system




| T | Transport ball screws |
|---|---|

Direct measuring system




| Type and tolerance class | Permissible travel variance within 300 mm travel in µm | Type and tolerance class |
|---|---|---|
| ***P1*** | 6µm | |
| ***P3*** | 12µm | |
| ***P5*** | 23µm | ***T5*** |
| | 52µm | ***T7*** |

Standard

# Ball screw nuts

THOMSON NEFF ball screw nuts are manufactured as flanged nuts and as cylindrical nuts. They can be combined with all shafts and the relevant end journals. Single nuts with backlash may also be supplied on an assembly sleeve.

Ball screw flanged nuts are manufactured with fixing holes, ball screw cylindrical nuts have a keyway or an external thread.

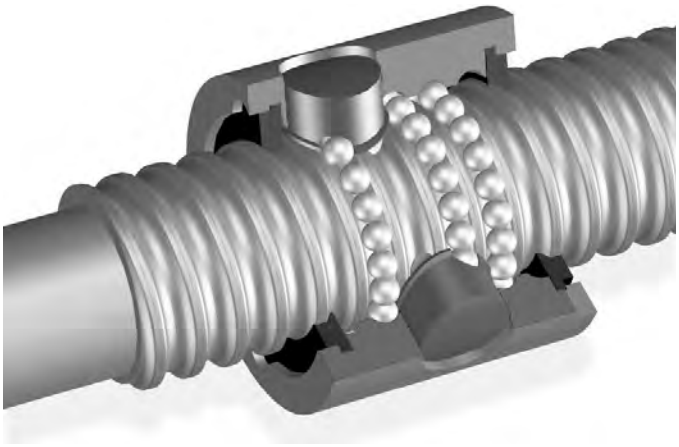
THOMSON NEFF manufactures ball screw nuts with three different ball recirculation systems depending on the diameter and lead of the shafts used. Profiled wiper rings reduce the escape of lubricant and prevent the ingress of dirt.

## THOMSON NEFF ball recirculation systems

### Single return (EUS, MUS)

**For single-start ball screws**

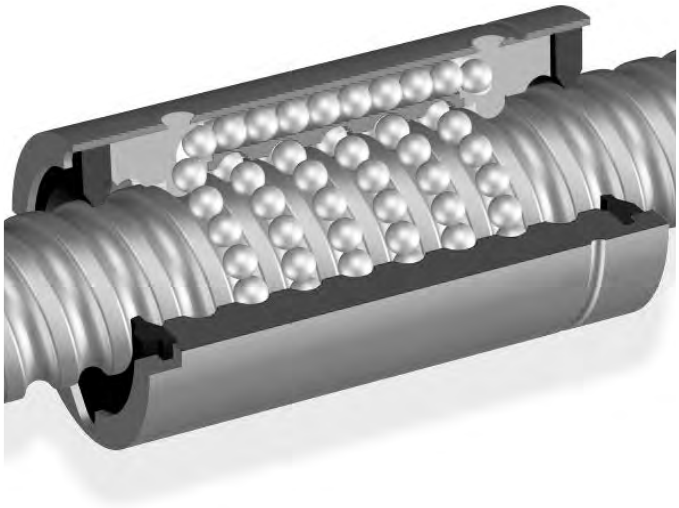
After each turn, the balls are lifted from the shaft raceway and set back by a single turn. THOMSON NEFF return systems made from glass-fiber reinforced plastic or steel guarantee a faultless and gentle recirculation of the balls.
May be supplied for short leads.



### Internal return (channel, insert)

**For single-start and multiple-start ball screws.**

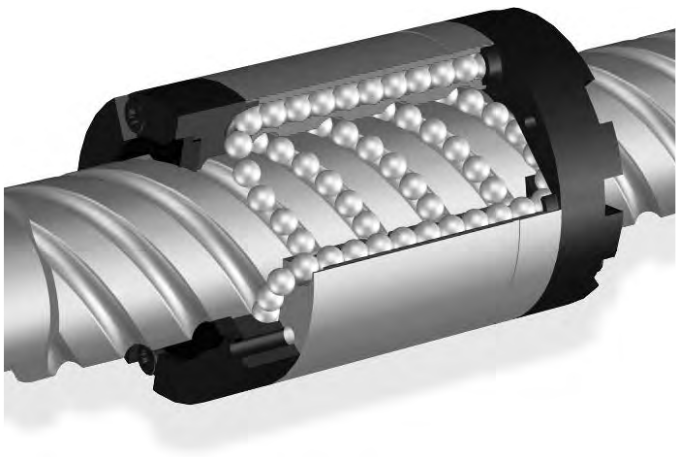
After several turns, the balls are returned either by a patented plastic recirculation system integrated into the nut or through recirculation channels also integrated into the nut using steel recirculation inserts.



### External return (end cap)

**For multiple-start ball screws**

The balls are recirculated via two special end caps and return channels integrated into the nut.



# Ball nuts

## Ball nut units – pre-loaded

As a rule all nuts can be combined to form backlash-free, pre-loaded nut units except when the lead is equal to or greater than the diameter of the screw. THOMSON NEFF supplies ready-to-install units with "O" pre-loading.

**O pre-loading:**
With this type of pre-loading the lines of forces run in a rhomboidal pattern (O-shaped), i.e. the nuts are pressed apart by the pre-loading force. This configuration offers particularly high rigidity against tilting. The standard preloading is equal to 10 % of the dynamic load rating C.

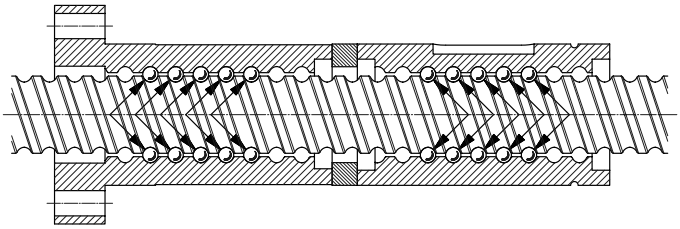
**Note:**
Backlash-free preloading is only possible with a lead accuracy ² 50 µm/300 mm and leads P < diameter d0.
Lead accuracies of > 50 µm/300 mm and leads ³ diameter d0 only allow a low backlash preloading. The total length of the nut can accelerate up to 10 mm due to the installed preloading disc.

Single nuts mounted backlash-free on request. Please contact our technical support.

## Pre-loading variants

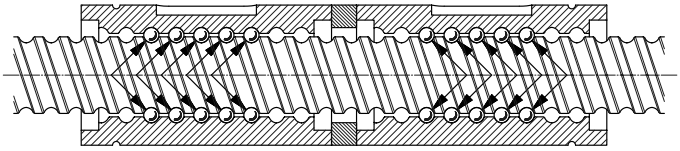
### KGT-FM

Ball screw drive with one KGF flanged nut and one KGM cylindrical nut with O-pre-loading.



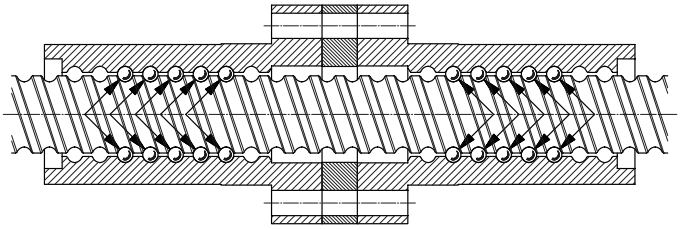
### KGT-MM

Ball screw drive with two KGM cylindrical nuts and O-pre-loading. Only one of the two feather keys transmits the drive torque.



### KGT-FF

Ball screw drive with two KGF flanged nuts with O-pre-loading.



# General information regarding rolled ball screws

## Method of manufacture

**Thread rolling**

Rolled ball screw shafts are manufactured by cold forming without chip removal. In this procedure, the bar stock is given a ball track in a continuous process. This means that it is, in principle, possible to create leads of any amount and to form any number of threads on the ball screw shaft. The shafts are then heat treated and polished. The forming process ensures high strength and a very good surface finish for the ball screw shafts.

Rolled ball screw shafts and the associated standard nuts can be supplied ex stock at favorable prices.

Special nuts to meet particular customer requirements are also possible.

Thomson Neff offers machined ends to the ball screw shafts, such as bearing seats, for instance, both to meet customer requirements and in accordance with common standard forms.

## Tolerance classes

Rolled ball screw shafts are available in classes P3, P5, T5 and T7

## Lengths

Various maximum shaft lengths are possible as a function of the nominal diameter:

- Nominal diameter ≤ 12 mm: Maximum shaft length 3000mm
- Nominal diameter > 12 mm: Maximum shaft length 6000mm

## Thomson Neff's rolled shafts have been setting the standard for many years:

- Very low surface roughness thanks to the non-cutting rolling process and finishing polishing
- Longest service lives thanks to optimized profiles and the maximum number of threads while simultaneously using large balls
- Greatest quality and stable running thanks to patented ball circulation systems
- Decades of experience in the manufacture of rolled and ground ball screws

## Nuts

A wide range of stock nut styles are available for you to use with our rolled shafts.

- FK, FH, KGF-D style flanged nuts with dimensions complying with DIN 69051
- KGF-N style flanged nuts with a round flange and dimensions complying with the Thomson Neff standard
- Internally preloaded FL style flanged nuts with dimensions as specified in DIN 69051
- ZG style cylindrical nuts with external thread with dimensions complying with DIN 69051
- KGM-D style cylindrical nuts with keyway with dimensions complying with DIN 69051
- KGM-N style cylindrical nuts with keyway with dimensions complying with Thomson Neff standards

KGF-D style nuts can be combined with KGF-D or KGM-D style nuts to create preloaded nut units. The same is true for KGF-N style nuts which can be combined with KGF-N and KGM-N style nuts. Please contact our technical advisory service for further options with regards to preloaded nuts. On request, you may also have our nuts mounted backlash-free or with low backlash.

# Rolled ball screw shafts

| Nominal diameter | Lead | Number of threads | Ball diameter | best available tolerance class for right-hand thread shafts | best available tolerance class for left-hand thread shafts | External diameter | Thread minor diameter | Maximum length | Specific mass per meter shaft length | Cross-sectional area | Minimum axial moment of inertia | Polar moment of inertia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | | | $d_1$ | $d_2$ | $l_{max}$ | M | a | i | $I_p$ |
| [mm] | [mm] | | [mm] | | | [mm] | [mm] | [mm] | [kg/m] | [$mm^2$] | [$mm^4$] | [$mm^4$] |
| 12 | 4 | 1 | 2.000 | P3 | | 11.60 h11 | 10.07 | 3000 | 0.76 | 9.63E+01 | 7.00E+02 | 1.48E+03 |
| 12 | 5 | 1 | 2.000 | P3 | | 11.50 h11 | 9.97 | 3000 | 0.76 | 9.64E+01 | 6.89E+02 | 1.48E+03 |
| 12 | 10 | 2 | 2.000 | P3 | | 11.50 h11 | 10.05 | 3000 | 0.75 | 9.61E+01 | 6.59E+02 | 1.48E+03 |
| 16 | 5 | 1 | 3.500 | P3 | T7 | 15.55 h11 | 12.88 | 6000 | 1.38 | 1.75E+02 | 2.22E+03 | 4.93E+03 |
| 16 | 5.08 | 1 | 3.500 | P3 | | 15.68 h12 | 12.86 | 6000 | 1.26 | 1.60E+02 | 2.03E+03 | 4.08E+03 |
| 16 | 10 | 2 | 3.000 | P3 | | 15.35 h11 | 12.89 | 6000 | 1.26 | 1.60E+02 | 1.69E+03 | 4.17E+03 |
| 20 | 5 | 1 | 3.500 | P3 | P3 | 19.50 h11 | 16.87 | 6000 | 2.21 | 2.82E+02 | 5.85E+03 | 1.27E+04 |
| 20 | 20 | 4 | 3.500 | P3 | | 19.50 h11 | 16.87 | 6000 | 2.03 | 2.59E+02 | 5.41E+03 | 1.08E+04 |
| 20 | 50 | 5 | 3.500 | P3 | | 19.10 h11 | 16.40 | 6000 | 2.05 | 2.62E+02 | 5.53E+03 | 1.11E+04 |
| 25 | 5 | 1 | 3.500 | P3 | T7 | 24.60 h11 | 21.90 | 6000 | 3.32 | 4.23E+02 | 1.42E+04 | 2.85E+04 |
| 25 | 10 | 2 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.34 | 4.25E+02 | 1.27E+04 | 2.90E+04 |
| 25 | 20 | 4 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.32 | 4.23E+02 | 1.44E+04 | 2.88E+04 |
| 25 | 25 | 4 | 3.500 | P3 | | 24.71 h12 | 21.92 | 6000 | 3.40 | 4.34E+02 | 1.51E+04 | 3.02E+04 |
| 25 | 25 | 5 | 3.500 | P3 | | 24.60 h11 | 21.92 | 6000 | 3.32 | 4.23E+02 | 1.44E+04 | 2.88E+04 |
| 25 | 50 | 5 | 3.500 | P3 | | 24.15 h11 | 21.47 | 6000 | 3.37 | 4.29E+02 | 1.48E+04 | 2.95E+04 |
| 32 | 5 | 1 | 3.500 | P3 | T7 | 31.50 h11 | 28.87 | 6000 | 5.90 | 7.52E+02 | 4.29E+04 | 9.01E+04 |
| 32 | 10 | 1 | 5.556 | P3 | | 31.67 h11 | 27.36 | 6000 | 5.54 | 7.05E+02 | 3.80E+04 | 7.92E+04 |
| 32 | 10 | 1 | 7.144 | P3 | | 32.74 h11 | 27.33 | 6000 | 5.57 | 7.10E+02 | 3.98E+04 | 8.03E+04 |
| 32 | 20 | 2 | 5.000 | P3 | | 31.70 h11 | 27.81 | 6000 | 5.67 | 7.22E+02 | 3.63E+04 | 8.38E+04 |
| 32 | 20 | 2 | 5.556 | P3 | | 31.67 h11 | 27.36 | 6000 | 5.53 | 7.04E+02 | 3.38E+04 | 7.99E+04 |
| 32 | 32 | 4 | 3.969 | P3 | | 31.30 h11 | 28.33 | 6000 | 5.74 | 7.31E+02 | 4.28E+04 | 8.56E+04 |
| 32 | 40 | 4 | 3.500 | P3 | | 30.90 h11 | 28.26 | 6000 | 5.63 | 7.17E+02 | 4.10E+04 | 8.21E+04 |
| 40 | 5 | 1 | 3.500 | P3 | T7 | 39.53 h11 | 36.90 | 6000 | 9.03 | 1.15E+03 | 1.05E+05 | 2.11E+05 |
| 40 | 10 | 1 | 7.144 | P3 | T7 | 39.62 h11 | 34.28 | 6000 | 8.43 | 1.07E+03 | 9.11E+04 | 1.83E+05 |
| 40 | 20 | 2 | 5.000 | P3 | | 39.70 h11 | 35.81 | 6000 | 9.05 | 1.15E+03 | 9.52E+04 | 2.13E+05 |
| 40 | 20 | 2 | 5.556 | P3 | | 40.00 h12 | 35.72 | 6000 | 8.87 | 1.13E+03 | 9.00E+04 | 2.05E+05 |
| 40 | 40 | 4 | 3.500 | P3 | | 38.95 h11 | 36.24 | 6000 | 9.02 | 1.15E+03 | 1.05E+05 | 2.11E+05 |
| 40 | 40 | 4 | 7.144 | P3 | | 39.81 h12 | 34.32 | 6000 | 8.37 | 1.07E+03 | 9.16E+04 | 1.83E+05 |
| 50 | 10 | 1 | 7.144 | P3 | T7 | 49.60 h11 | 44.11 | 6000 | 13.53 | 1.72E+03 | 2.35E+05 | 4.73E+05 |
| 50 | 20 | 2 | 6.350 | P3 | | 49.60 h11 | 44.87 | 6000 | 13.86 | 1.77E+03 | 2.22E+05 | 4.99E+05 |
| 50 | 20 | 2 | 7.144 | P3 | | 49.50 h11 | 43.99 | 6000 | 13.46 | 1.71E+03 | 2.05E+05 | 4.72E+05 |
| 63 | 10 | 1 | 7.144 | P3 | | 62.60 h11 | 57.15 | 6000 | 22.07 | 2.81E+03 | 6.25E+05 | 1.26E+06 |
| 63 | 20 | 2 | 7.144 | P3 | | 62.70 h11 | 57.16 | 6000 | 22.06 | 2.81E+03 | 5.70E+05 | 1.26E+06 |
| 80 | 10 | 1 | 7.144 | T7 | | 79.65 h12 | 74.20 | 6000 | 36.43 | 4.64E+03 | 1.71E+06 | 3.43E+06 |

Nut styles available from stock
(R = with right-hand thread
L = with left-hand thread)

| KGF-D (FK) | KGF-D (FH) | KGF-L (FL) | KGM-G (ZG) | KGF-D | KGF-N | KGM-D | KGM-N | FM-D | FM-N | MM-D | MM-N | FF-D | FF-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R | | | | R | | | | | | |
| | | | | | | | R | | | | | | |
| | | | | R | | R | | | | | | | |
| R | | R | R | R | R | R | | R | R | R | | R | R |
| | | | | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| R | | R | R | R+L | R | R+L | R | R+L | R | R+L | R | R+L | R |
| | R | | | | R | | R | | R | | R | | R |
| | | | | | R | | R | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | R | R | | R | | R | | R | | R | |
| | | | | R | | R | | R | | R | | R | |
| | R | | | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| | | | | R | | R | | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| R | | R | R | | | | | | | | | | |
| | | | | R | R | | R | R | R | | R | R | R |
| | | | | R | | | R | R | | | R | R | |
| | R | | | | | | | | | | | | |
| | R | | | R | | | | | | | | R | |
| | | | | | R | | R | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| R | | R | R | R | R | R | | R | R | R | | R | R |
| | R | | R | | | | | | | | | | |
| | | | | R | | R | | R | | R | | R | |
| | R | | | | | | | | | | | | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | | | | | | | | | | | |
| | | | | R | | | R | R | | | R | R | |
| R | | R | R | R | R | R | R | R | R | R | R | R | R |
| | R | | | R | | R | | R | | R | | R | |
| R | | | R | | R | | R | | R | | R | | R |
| R | | | | | | | | | R | | R | | R |
























# Nuts for rolled ball screw shafts

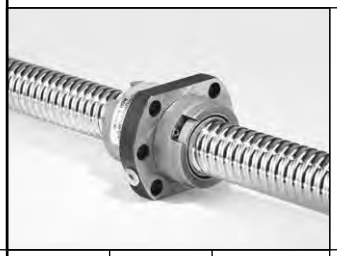
See fold-out cover page for dimensions, form and drilling pattern

## KGF-D (FK) style single nut



| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | L | $L_m$ | $L_1$ | $L_3$ | $L_7$ |
| | | | | g6 | | | h13 | | | | | h13 |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 16 | 5 | 1 | 3.500 | 28 | 38 | 5.5 | 48 | 48.5 | 33 | 10 | 5.5 | 10 |
| 20 | 5 | 1 | 3.500 | 36 | 47 | 6.6 | 58 | 48.5 | 33 | 10 | 5.5 | 10 |
| 25 | 5 | 1 | 3.500 | 40 | 51 | 6.6 | 62 | 49 | 33 | 10 | 6 | 10 |
| 32 | 5 | 1 | 3.500 | 50 | 65 | 9 | 80 | 57 | 39 | 10 | 6 | 12 |
| 32 | 10 | 1 | 5.556 | 50 | 65 | 9 | 80 | 73 | 55 | 16 | 6 | 12 |
| 40 | 5 | 1 | 3.500 | 63 | 78 | 9 | 93 | 66 | 45 | 10 | 7 | 14 |
| 40 | 10 | 1 | 7.144 | 63 | 78 | 9 | 93 | 88.5 | 67.5 | 16 | 7 | 14 |
| 50 | 10 | 1 | 7.144 | 75 | 93 | 11 | 110 | 92 | 69 | 13 | 7 | 16 |
| 63 | 10 | 1 | 7.144 | 90 | 108 | 11 | 125 | 103.5 | 78.5 | 16 | 7 | 18 |
| 80 | 10 | 1 | 7.144 | 105 | 125 | 13.5 | 145 | 121 | 92 | 16 | 9 | 20 |

## KGF-D (FH) style single nut



| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | L | $L_m$ | $L_1$ | $L_3$ | $L_7$ |
| | | | | g6 | | | h13 | | | | | h13 |
| [mm] | [mm] | | [mm] | [mm] | [MM] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 20 | 20 | 4 | 3.500 | 36 | 47 | 6.6 | 58 | 36 | 15 | 4 | 11 | 10 |
| 25 | 10 | 2 | 3.500 | 40 | 51 | 6.6 | 62 | 51 | 30.85 | 20.7 | 10.15 | 10 |
| 25 | 25 | 4 | 3.500 | 40 | 51 | 6.6 | 62 | 39 | 19 | 9 | 10 | 10 |
| 32 | 20 | 2 | 5.556 | 56 | 71 | 9 | 86 | 83 | 56 | 25 | 15 | 12 |
| 32 | 32 | 4 | 3.969 | 56 | 71 | 9 | 86 | 42 | 21 | 12 | 9 | 12 |
| 40 | 20 | 2 | 5.556 | 63 | 78 | 9 | 93 | 83 | 49.5 | 25 | 19.5 | 14 |
| 40 | 40 | 4 | 7.144 | 70 | 85 | 9 | 100 | 104 | 72,5 | 25 | 17,5 | 14 |
| 50 | 20 | 2 | 6.350 | 75 | 93 | 11 | 110 | 85 | 47 | 16 | 22 | 16 |
| 63 | 20 | 2 | 7.144 | 95 | 115 | 13.5 | 135 | 86 | 42 | 18 | 24 | 20 |

[1] Dimension does not comply with DIN 69051; [2] Lubrication bore located anywhere on the circumference; [3] No wiper; [4] Round flange

| | | | | | Nut form | Drilling pattern | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $L_8$ | $D_B$ | $L_B$ | $L_{10}$ | | | | | | $C_{am}$ | $C_{0am}$ |
| | h13 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | | | | [mm] | | [kN] | [kN] |
| | 40 | M6x1 | 5 | 8 | S | 1 | EUS | 0.041 | 3 | 9.5 | 10.9 |
| | 44 | M6x1 | 5 | 8 | S | 1 | EUS | 0.041 | 3 | 11.5 | 15.5 |
| | 48 | M6x1 | 5 | 8 | S | 1 | EUS | 0.041 | 3 | 13.1 | 20.2 |
| | 62 | M6x1 | 6 | 8 | S | 1 | EUS | 0.041 | 4 | 19.3 | 36.3 |
| | 62 | M6x1 | 6 | 8 | S | 1 | EUS | 0.065 | 3 | 26.4 | 39 |
| | 70 | M8x1 | 7 | 10 | S | 2 | EUS | 0.041 | 5 | 26.3 | 59.2 |
| | 70 | M8x1 | 7 | 10 | S | 2 | EUS | 0.084 | 4 | 64.9 | 109 |
| | 85 | M8x1 | 8 | 9 | S | 2 | EUS | 0.084 | 4 | 66.4 | 134.3 |
| | 95 | M8x1 | 9 | 10 | S | 2 | EUS | 0.084 | 5 | 93.8 | 229.7 |
| | 110 | M8x1 | 10 | 10 | S | 2 | EUS | 0.084 | 6 | 121.9 | 374.9 |

| | | | | | Nut form | Drilling pattern | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $L_8$ | $D_B$ | $L_B$ | $L_{10}$ | | | | | | $C_{am}$ | $C_{0am}$ |
| | h13 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | | | | [mm] | | [kN] | [kN] |
| | 44 | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 2.8 | 10.8 | 17.5 |
| | 48 | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 6.1 | 24.7 | 53.4 |
| | 48 | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 3.6 | 13.1 | 26.0 |
| | 65 | M6x1 | 6 | 9 | S | 1 | End cap | 0.065 | 5.6 | 47.2 | 83.2 |
| | 68 | M6x1 | 6 | 8 | S | 1 | End cap | 0.047 | 4 | 19.7 | 39 |
| | 70 | M8x1 | 7 | 10 | S | 2 | End cap | 0.065 | 5.6 | 52.2 | 103.6 |
| | 75 | M8x1 | 7 | 10 | S | 2 | End cap | 0.084 | 6.4 | 80.0 | 178.6 |
| | 85 | M8x1 | 8 | 10 | S | 2 | End cap | 0.084 | 5.6 | 78.8 | 188.7 |
| | 100 | M8x1 | 10 | 10 | S | 2 | End cap | 0.084 | 5.6 | 103.1 | 270.8 |

# Nuts for rolled ball screw shafts

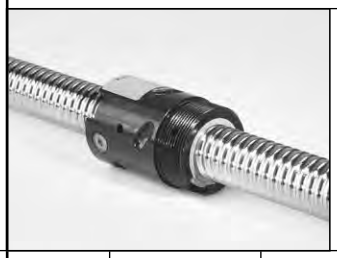
See fold-out cover page for dimensions, form and drilling pattern

## KGF-L(FL) style preloaded single nut



| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | L | $L_m$ | $L_1$ | $L_3$ | $L_7$ | |
| | | | | g6 | | | h13 | | | | | h13 | |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 16 | 5 | 1 | 3.500 | 28 | 38 | 5.5 | 48 | 55 | 39.5 | 10 | 5.5 | 10 | |
| 20 | 5 | 1 | 3.500 | 36 | 47 | 6.6 | 58 | 68.5 | 53 | 10 | 5.5 | 10 | |
| 25 | 5 | 1 | 3.500 | 40 | 51 | 6.6 | 62 | 69.5 | 53.5 | 10 | 6 | 10 | |
| 32 | 5 | 1 | 3.500 | 50 | 65 | 9 | 80 | 83 | 65 | 10 | 6 | 12 | |
| 32 | 10 | 1 | 5.556 | 50 | 65 | 9 | 80 | 105.5 | 87.5 | 16 | 6 | 12 | |
| 40 | 5 | 1 | 3.500 | 63 | 78 | 9 | 93 | 97 | 76 | 10 | 7 | 14 | |
| 40 | 10 | 1 | 7.144 | 63 | 78 | 9 | 93 | 142 | 121 | 16 | 7 | 14 | |
| 50 | 10 | 1 | 7.144 | 75 | 93 | 11 | 110 | 144 | 121 | 16 | 7 | 16 | |
| 63 | 10 | 1 | 7.144 | 90 | 108 | 11 | 125 | 166 | 141 | 16 | 7 | 18 | |

## KGF-G(ZG) style single nut



| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_{11}$ | L | $L_{11}$ | $D_B$ | $L_B$ | $L_{10}$ | $D_{13}$ | $L_{13}$ | |
| | | | | h12 | | | | | | | | | |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 12 | 4 | 1 | 2.000 | 25 | M20x1 | 34 | 10 | M6x1 | 5 | through | - | - | |
| 16 | 5 | 1 | 3.500 | 32 | M30x1.5 | 57.5 | 16.5 | M6x1 | 10.5 | through | 4 | 22 | |
| 20 | 5 | 1 | 3.500 | 38 | M35x1.5 | 57.5 | 16.5 | M6x1 | 10.5 | through | 4 | 22 | |
| 25 | 5 | 1 | 3.500 | 42 | M40x1.5 | 63.5 | 17 | M6x1 | 10.5 | through | 4 | 23 | |
| 25 | 10 | 2 | 3.500 | 42 | M40x1.5 | 61 | 17 | M6x1 | 10 | through | 4 | 21 | |
| 32 | 5 | 1 | 3.500 | 52 | M48x1.5 | 65.5 | 19 | M6x1 | 10.5 | through | 5 | 23 | |
| 32 | 10 | 1 | 5.556 | 52 | M48x1.5 | 85 | 19 | M6x1 | 12 | through | 5 | 43 | |
| 40 | 5 | 1 | 3.500 | 58 | M56x1.5 | 67.5 | 19 | M8x1 | 12 | through | 5 | 22.5 | |
| 40 | 10 | 1 | 7.144 | 65 | M60x2 | 105.5 | 27 | M8x1 | 13 | through | 6 | 43 | |
| 40 | 20 | 2 | 5.556 | 65 | M60x2 | 83 | 27 | M6x1 | 10 | through | 6 | 33 | |
| 50 | 10 | 1 | 7.144 | 78 | M72x2 | 118 | 29 | M8x1 | 13 | through | 6 | 53 | |
| 63 | 10 | 1 | 7.144 | 92 | M85x2 | 118 | 29 | M8x1 | 13 | through | 6 | 53 | |
| 80 | 10 | 1 | 7.144 | 120 | M110x2 | 126 | 34 | M8x1 | 15.5 | through | 8 | 53 | |

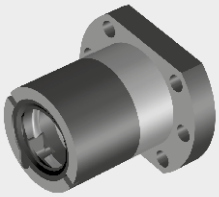
| | | | | | Nut form | Drilling pattern | Return system | Preload force+ | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $L_8$ | $D_B$ | $L_B$ | $L_{10}$ | | | | | | $C_{am}$ | $C_{0am}$ |
| | h13 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | | | | [kN] | | [kN] | [kN] |
| | 40 | M6x1 | 5 | 8 | S | 1 | EUS | 0.67 | 2+2 | 6.7 | 7.2 |
| | 44 | M6x1 | 5 | 8 | S | 1 | EUS | 1.15 | 3+3 | 11.5 | 15.5 |
| | 48 | M6x1 | 5 | 8 | S | 1 | EUS | 1.26 | 3+3 | 12.6 | 19.1 |
| | 62 | M6x1 | 6 | 9 | S | 1 | EUS | 1.93 | 4+4 | 19.3 | 36.4 |
| | 62 | M6x1 | 6 | 8 | S | 1 | EUS | 2.64 | 3+3 | 26.4 | 39 |
| | 70 | M8X1 | 7 | 10 | S | 2 | EUS | 2.63 | 5+5 | 26.3 | 59.2 |
| | 70 | M8X1 | 7 | 10 | S | 2 | EUS | 6.49 | 4+4 | 64.9 | 109 |
| | 85 | M8X1 | 8 | 10 | S | 2 | EUS | 6.64 | 4+4 | 66.4 | 134.3 |
| | 95 | M8X1 | 9 | 10 | S | 2 | EUS | 9.38 | 5+5 | 93.8 | 229.7 |

| | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|
| | | | | $C_{am}$ | $C_{0am}$ |
| | | | | | |
| | | [mm] | | [kN] | [kN] |
| | EUS | 0.024 | 3 | 3.8 | 4.3 |
| | EUS | 0.041 | 4 | 12.1 | 14.5 |
| | EUS | 0.041 | 4 | 14.8 | 20.7 |
| | EUS | 0.041 | 5 | 20.4 | 33.7 |
| | MUS | 0.041 | 6 | 19.9 | 31.8 |
| | EUS | 0.041 | 5 | 23.3 | 45.5 |
| | EUS | 0.065 | 4 | 33.8 | 52 |
| | EUS | 0.041 | 5 | 26.3 | 59.2 |
| | EUS | 0.084 | 5 | 78.6 | 136.2 |
| | MUS | 0.065 | 4 | 34.2 | 57.2 |
| | EUS | 0.084 | 6 | 97.8 | 213.2 |
| | EUS | 0.084 | 6 | 109.7 | 275.6 |
| | EUS | 0.084 | 6 | 121.9 | 375 |

[1] Dimension does not comply with DIN 69051
[2] Lubrication bore located anywhere on the circumference
[3] No wiper
[4] Round flange

# Nuts for rolled ball screw shafts

See fold-out cover page for dimensions, form and drilling pattern

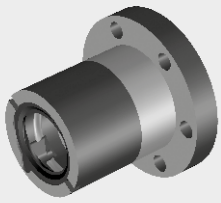
| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | KGF-D style single nut | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | |  | | | | | | | | |
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | L | $L_m$ | $L_1$ | $L_3$ | $L_7$ |
| | | | | g6 | | | h13 | | | | | h13 |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 12 | 10 | 2 | 2.000 | 24 | 32 | 4.5 | 40 | 27.5 | 14.5 | 9.5 | 5 | 8 |
| 16 | 5 | 1 | 3.500 | 28 | 38 | 5.5 | 48 | 42 | 32 | 10 | 0 | 10 |
| 16 | 10 | 2 | 3.000 | 28 | 38 | 5.5 | 48 | 55 | 45 | 10 | 0 | 10 |
| 20 | 5 | 1 | 3.500 | 36 | 47 | 6.6 | 58 | 42 | 32 | 10 | 0 | 10 |
| 25 | 5 | 1 | 3.500 | 40 | 51 | 6.6 | 62 | 42 | 32 | 10 | 0 | 10 |
| 25 | 10 | 2 | 3.500 | 40 | 51 | 6.6 | 62 | 55 | 45 | 16 | 0 | 10 |
| 25 | 20 | 4 | 3.500 | 40 | 51 | 6.6 | 62 | 35 | 14.5 | 4 | 10.5 | 10 |
| 25 | 25 | 5 | 3.500 | 40 | 51 | 6.6 | 62 | 35 | 17 | 9 | 8 | 10 |
| 25 | 50 | 5 | 3.500 | 40 | 51 | 6.6 | 62 | 58 | 38 | 10 | 10 | 10 |
| 32 | 5 | 1 | 3.500 | 50 | 65 | 9 | 80 | 55 | 43 | 10 | 0 | 12 |
| 32 | 10 | 1 | 7.144 | 53 [1] | 65 | 9 | 80 | 69 | 57 | 16 | 0 | 12 |
| 32 | 20 | 2 | 5.000 | 53 [1] | 65 | 9 | 80 | 80 | 68 | 16 | 0 | 12 |
| 32 | 32 | 4 | 3.969 | 50 | 65 | 9 | 80 | 42 | 21 | 12 | 9 | 12 |
| 40 | 5 | 1 | 3.500 | 63 | 78 | 9 | 93 | 57 | 43 | 10 | 0 | 14 |
| 40 | 10 | 1 | 7.144 | 63 | 78 | 9 | 93 | 71 | 57 | 16 | 0 | 14 |
| 40 | 20 | 2 | 5.000 | 63 | 78 | 9 | 93 | 80 | 66 | 16 | 0 | 14 |
| 40 | 40 | 4 | 3.500 | 63 | 78 | 9 | 93 | 85 | 63.5 | 16 | 7.5 | 14 |
| 50 | 10 | 1 | 7.144 | 75 | 93 | 11 | 110 | 95 | 79 | 16 | 0 | 16 |
| 50 | 20 | 2 | 7.144 | 85 [1] | 103 [1] | 11 | 125 | 95 | 77 | 22 | 0 | 18 |
| 63 | 10 | 1 | 7.144 | 90 | 108 | 11 | 125 | 97 | 79 | 16 | 0 | 18 |
| 63 | 20 | 2 | 7.144 | 95 | 115 | 13.5 | 135 | 99 | 79 | 25 | 0 | 20 |

[1] Dimension does not comply with DIN 69051; [2] Lubrication bore located anywhere on the circumference; [3] No wiper; [4] Round flange

| | | | | | Nut form | Drilling pattern | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $L_8$ | $D_B$ | $L_B$ | $L_{10}$ | | | | | | $C_{am}$ | $C_{0am}$ |
| | h13 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | | | | [mm] | | [kN] | [kN] |
| | 26 | M5x0.8 | 4 | 6 | S | 3 | End cap | 0.024 | 4 | 4.9 | 8 |
| | 40 | M6x1 | 5 | 10 | E | 1 | EUS | 0.041 | 3 | 9.3 | 13.1 |
| | 40 | M6x1 | 5 | 10 | E | 1 | Channel | 0.041 | 6 | 15.4 | 26.5 |
| | 44 | M6x1 | 5 | 10 | E | 1 | Channel | 0.035 | 3 | 10.5 | 16.6 |
| | 48 | M6x1 | 5 | 10 | E | 1 | EUS | 0.041 | 3 | 12.3 | 22.5 |
| | 48 | M6x1 | 5 | 10 | E | 1 | Channel | 0.041 | 3 | 13.2 | 25.3 |
| | 48 | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 4 | 13 | 23.3 |
| | - [4] | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 5 | 16.7 | 32.2 |
| | 48 | M6x1 | 5 | 8 | S | 1 | End cap | 0.041 | 5 | 15.4 | 31.7 |
| | 62 | M6x1 | 6 | 10 | E | 1 | EUS | 0.041 | 5 | 21.5 | 49.3 |
| | 62 | M8x1 | 6 | 10 | E | 1 | EUS | 0.084 | 3 | 33.4 | 54.5 |
| | 62 | M6x1 | 6 | 10 | E | 1 | Channel | 0.059 | 4 | 29.7 | 59.8 |
| | 62 | M6x1 | 6 | 8 | S | 1 | End cap | 0.047 | 4 | 19.7 | 37.4 |
| | 70 | M6x1 | 7 | 10 | E | 2 | EUS | 0.041 | 5 | 23.8 | 63.1 |
| | 70 | M8x1 | 7 | 10 | E | 2 | EUS | 0.084 | 3 | 38 | 69.1 |
| | 70 | M8x1 | 7 | 10 | E | 2 | Channel | 0.059 | 4 | 33.3 | 76.1 |
| | - [4] | M8x1 | 7 | 10 | S | 2 | End cap | 0.041 | 8 | 35 | 101.9 |
| | 85 | M8x1 | 8 | 10 | E | 2 | EUS | 0.084 | 5 | 68.7 | 155.8 |
| | 95 | M8x1 | 9 | 10 | E | 2 | Channel | 0.084 | 4 | 60 | 136.3 |
| | 95 | M8x1 | 9 | 10 | E | 2 | EUS | 0.084 | 5 | 76 | 197 |
| | 100 | M8x1 | 10 | 10 | E | 2 | Channel | 0.084 | 4 | 78.4 | 171.3 |

# Nuts for rolled ball screw shafts

See fold-out cover page for dimensions, form and drilling pattern

| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | KGF-N style single nut | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | |  | | | | | | | | |
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | L | $L_m$ | $L_1$ | $L_3$ | $L_7$ |
| | | | | g6 | | | h13 | | | | | h13 |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 16 | 5 | 1 | 3.500 | 28 | 38 | 5.5 | 48 | 44 | 32 | 8 | 0 | 12 |
| 20 | 5 | 1 | 3.500 | 32 | 45 | 7 | 55 | 44 | 32 | 8 | 0 | 12 |
| 20 | 20 | 4 | 3.500 | 35 | 50 | 7 | 62 | 30 | 12 | 4 | 8 | 10 |
| 20 | 50 | 5 | 3.500 | 35 | 50 | 7 | 62 | 56 | 37 | 10 | 9 | 10 |
| 25 | 5 | 1 | 3.500 | 38 | 50 | 7 | 62 | 46 | 32 | 8 | 0 | 14 |
| 32 | 5 | 1 | 3.500 | 45 | 58 | 7 | 70 | 49 | 43 | 10 | 0 | 16 |
| 32 | 10 | 1 | 7.144 | 53 | 68 | 7 | 80 | 73 | 57 | 10 | 0 | 16 |
| 32 | 40 | 4 | 3.500 | 53 | 68 | 7 | 80 | 45 | 21.5 | 14 | 7.5 | 16 |
| 40 | 5 | 1 | 3.500 | 53 | 68 | 7 | 80 | 59 | 43 | 10 | 0 | 16 |
| 40 | 10 | 1 | 7.144 | 63 | 78 | 9 | 95 | 73 | 57 | 10 | 0 | 16 |
| 50 | 10 | 1 | 7.144 | 72 | 90 | 11 | 110 | 97 | 79 | 10 | 0 | 18 |
| 63 | 10 | 1 | 7.144 | 85 | 105 | 11 | 125 | 99 | 79 | 10 | 0 | 20 |
| 80 | 10 | 1 | 7.144 | 105 | 125 | 14 | 145 | 101 | 79 | 10 | 0 | 22 |

[1] Dimension does not comply with DIN 69051; [2] Lubrication bore located anywhere on the circumference; [3] No wiper; [4] Round flange

| | | | | | Nut form | Drilling pattern | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $L_8$ | $D_B$ | $L_B$ | $L_{10}$ | | | | | | $C_{am}$ | $C_{0am}$ |
| | h13 | | | | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | | | | [mm] | | [kN] | [kN] |
| | - [4] | M6x1 | 6 | 8 | E | 4 | EUS | 0.041 | 3 | 9.3 | 13.1 |
| | - [4] | M6x1 | 6 | 8 | E | 4 | EUS | 0.041 | 3 | 10.5 | 16.6 |
| | - [4] | M6x1 | 5 | 8 | S | 4 | End cap | 0.041 | 4 | 11.6 | 18.4 |
| | - [4] | M6x1 | 5 | 8 | S | 4 | End cap | 0.041 | 5 | 13 | 24.6 |
| | - [4] | M6x1 | 7 | 8 | E | 4 | EUS | 0.041 | 3 | 12.3 | 22.5 |
| | - [4] | M6x1 | 8 | 8 | E | 4 | EUS | 0.041 | 5 | 21.5 | 49.3 |
| | - [4] | M8x1 | 8 | 8 | E | 4 | EUS | 0.084 | 3 | 33.4 | 54.5 |
| | - [4] | M6x1 | 8 | 10 | S | 4 | End cap | 0.041 | 4 | 14.9 | 32.4 |
| | - [4] | M6x1 | 8 | 8 | E | 4 | EUS | 0.041 | 5 | 23.8 | 63.1 |
| | - [4] | M8x1 | 8 | 8 | E | 4 | EUS | 0.084 | 3 | 38 | 69.1 |
| | - [4] | M8x1 | 9 | 8 | E | 4 | EUS | 0.084 | 5 | 68.7 | 155.8 |
| | - [4] | M8x1 | 10 | 8 | E | 4 | EUS | 0.084 | 5 | 76 | 197 |
| | - [4] | M8x1 | 11 | 8 | E | 4 | EUS | 0.084 | 5 | 86.25 | 262.41 |

# Nuts for rolled ball screw shafts

See fold-out cover page for dimensions, form and drilling pattern

| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | KGM-D style single nut | | | | | | | | | Nut form | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | L | $L_3$ | $D_B$ | $L_B$ | $L_9$ | $L_{12}$ | B | T | | | | | $C_{am}$ | $C_{0am}$ |
| | | | | g6 | | | | | | | P9 | | | | | | | |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | | | [mm] | | [kN] | [kN] |
| 12 | 10 | 2 | 2.000 | 24 | 27.5 | 5 | 2 | 7 | 8.75 | 10 | 3 | 1.8 | S | End cap | 0.024 | 4 | 4.9 | 8 |
| 16 | 5 | 1 | 3.500 | 28 | 34 | - | 3 | 7 | 7 | 20 | 5 | 2 | E | EUS | 0.041 | 3 | 9.3 | 13.1 |
| 16 | 10 | 2 | 3.000 | 28 | 50 | - | 3 | 7 | 15 | 20 | 5 | 2 | E | Channel | 0.035 | 6 | 15.4 | 26.5 |
| 20 | 5 | 1 | 3.500 | 36 | 34 | - | 3 | 7 | 7 | 20 | 5 | 2 | E [2] | Channel | 0.041 | 3 | 10.5 | 16.6 |
| 25 | 5 | 1 | 3.500 | 40 | 34 | - | 3 | 7 | 7 | 20 | 5 | 2 | E | EUS | 0.041 | 3 | 12.3 | 22.5 |
| 25 | 10 | 2 | 3.500 | 40 | 45 | - | 3 | 7.5 | 12.5 | 20 | 5 | 2 | E | Channel | 0.041 | 3 | 13.2 | 25.3 |
| 25 | 20 | 4 | 3.500 | 40 | 35 | 10.5 | 1.5 | 14 | 11.5 | 12 | 5 | 3 | S | End cap | 0.041 | 4 | 13 | 23.3 |
| 25 | 25 | 5 | 3.500 | 40 | 35 | 8 | 1.5 | 11.5 | 11 | 13 | 5 | 3 | S | End cap | 0.041 | 5 | 16.7 | 32.2 |
| 25 | 50 | 5 | 3.500 | 40 | 58 | 10 | 1.5 | 17 | 19 | 20 | 5 | 3 | S | End cap | 0.041 | 5 | 15.4 | 31.7 |
| 32 | 5 | 1 | 3.500 | 50 | 45 | - | 3 | 7.5 | 8 | 30 | 6 | 2.5 | E | EUS | 0.041 | 5 | 21.5 | 49.3 |
| 40 | 5 | 1 | 3.500 | 63 | 45 | - | 3 | 7.5 | 8 | 30 | 6 | 2.5 | E | EUS | 0.041 | 5 | 23.8 | 63.1 |
| 40 | 10 | 1 | 7.144 | 63 | 60 | - | 4 | 10 | 15 | 30 | 6 | 2.5 | E | EUS | 0.084 | 3 | 38 | 69.1 |
| 40 | 20 | 2 | 5.000 | 63 | 70 | - | 3 | 7.5 | 20 | 30 | 6 | 2.5 | E | Channel | 0.059 | 4 | 33.3 | 76.1 |
| 40 | 40 | 4 | 3.500 | 63 | 85 | 7.5 | 1.5 | 15 | 27.5 | 30 | 6 | 3.5 | S | End cap | 0.041 | 8 | 35 | 101.9 |
| 50 | 10 | 1 | 7.144 | 75 | 82 | - | 4 | 11 | 23 | 36 | 6 | 2.5 | E | EUS | 0.084 | 5 | 68.7 | 155.8 |
| 63 | 10 | 1 | 7.144 | 90 | 82 | - | 4 | 11 | 23 | 36 | 6 | 2.5 | E | EUS | 0.084 | 5 | 76 | 197 |
| 63 | 20 | 2 | 7.144 | 95 | 82 | - | 4 | 10 | 23 | 36 | 6 | 2.5 | E | Channel | 0.084 | 4 | 78.4 | 171.3 |

[1] Dimension does not comply with DIN 69051; [2] Lubrication bore located anywhere on the circumference; [3] No wiper; [4] Round flange

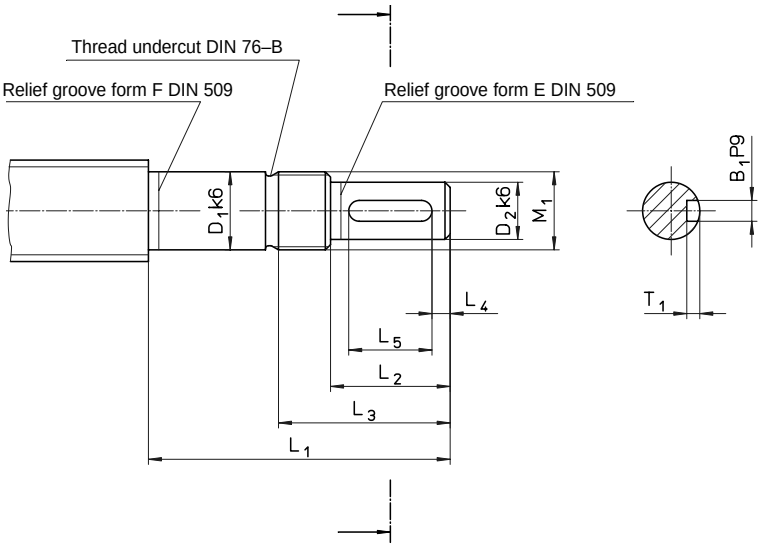
| Nominal diameter | Lead | Number of threads on the shaft | Ball diameter | KGM-N style single nut | | | | | | | | | Nut form | Return system | Nominal axial backlash | Number of loaded turns | Modified dynamic rated load | Modified static rated load |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_h$ | | $D_w$ | $D_1$ | L | $L_3$ | $D_B$ | $L_B$ | $L_9$ | $L_{12}$ | B | T | | | | | $C_{am}$ | $C_{0am}$ |
| | | | | g6 | | | | | | | P9 | | | | | | | |
| [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | | | [mm] | | [kN] | [kN] |
| 12 | 4 | 1 | 2.000 | 20 | 24 | - | 0 | 0 | 5 | 14 | 3 | 1.8 | E [3] | Channel | 0.024 | 3 | 4.9 | 6.6 |
| 12 | 5 | 1 | 2.000 | 20 | 24 | - | 0 | 0 | 5 | 14 | 3 | 1.8 | E [3] | Channel | 0.024 | 3 | 4.4 | 6.8 |
| 20 | 5 | 1 | 3.500 | 32 | 34 | - | 3 | 7 | 7 | 20 | 5 | 2 | E | EUS | 0.041 | 3 | 10.5 | 16.6 |
| 20 | 20 | 4 | 3.500 | 35 | 30 | 8 | 1.5 | 11.5 | 9 | 12 | 5 | 3 | S | End cap | 0.041 | 4 | 11.6 | 18.4 |
| 20 | 50 | 5 | 3.500 | 35 | 56 | 9 | 1.5 | 16 | 18 | 20 | 5 | 3 | S | End cap | 0.041 | 5 | 13 | 24.6 |
| 25 | 5 | 1 | 3.500 | 38 | 34 | - | 3 | 7 | 7 | 20 | 5 | 2 | E | EUS | 0.041 | 3 | 12.3 | 22.5 |
| 32 | 5 | 1 | 3.500 | 45 | 45 | - | 3 | 7.5 | 8 | 30 | 6 | 2.5 | E | EUS | 0.041 | 5 | 21.5 | 49.3 |
| 32 | 10 | 1 | 7.144 | 53 | 60 | - | 4 | 10 | 15 | 30 | 6 | 2.5 | E | EUS | 0.084 | 3 | 33.4 | 54.5 |
| 32 | 20 | 2 | 5.000 | 53 | 70 | - | 3 | 7.5 | 20 | 30 | 6 | 2.5 | E | Channel | 0.059 | 4 | 29.7 | 59.8 |
| 32 | 40 | 4 | 3.500 | 53 | 45 | 7.5 | 1.5 | 13 | 10 | 25 | 6 | 4 | S | End cap | 0.041 | 4 | 14.9 | 32.4 |
| 40 | 5 | 1 | 3.500 | 53 | 45 | - | 3 | 7.5 | 8 | 30 | 6 | 2.5 | E | EUS | 0.041 | 5 | 23.8 | 63.1 |
| 50 | 10 | 1 | 7.144 | 72 | 82 | - | 4 | 11 | 23 | 36 | 6 | 2.5 | E | EUS | 0.084 | 5 | 68.7 | 155.8 |
| 50 | 20 | 2 | 7.144 | 85 | 82 | - | 4 | 10 | 23 | 36 | 6 | 2.5 | E | Channel | 0.084 | 4 | 60 | 136.3 |
| 63 | 10 | 1 | 7.144 | 85 | 82 | - | 4 | 11 | 23 | 36 | 6 | 2.5 | E | EUS | 0.084 | 5 | 76 | 197 |
| 80 | 10 | 1 | 7.144 | 105 | 82 | - | 4 | 11 | 23 | 36 | 8 | 3 | E | EUS | 0.084 | 5 | 86.3 | 262.4 |

[1] Dimension does not comply with DIN 69051; [2] Lubrication bore located anywhere on the circumference; [3] No wiper; [4] Round flange

# End journals for loose bearings/fixed bearings
# Form D, F

The type of bearing selected influences the stiffness of the lead screw system as a whole and also the rotational vibration and buckling behavior of the lead screw shaft. The required end journals are made for the trapezoidal lead screw according to the various types of bearing.

**Note: Bearings are not supplied.**




| **Form D** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| KGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $B_1xT_1$ | ZKLF…2RS |
| 1605, 1610 | 12 | 9 | 55 | 20 | 32 | 2.5 | 16 | M 12x1 | 3x1.8 | 1255 |
| 2005, 2020, 2050 | 15 | 11 | 58 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1560 |
| 2505, 2510, 2520, 2525, 2550 | 20 | 14 | 70 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 2068 |
| 3205, 3210, 3220, 3232, 3240 | 25 | 19 | 82 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 2575 |
| 4005, 4010, 4020, 4040 | 30 | 24 | 92 | 50 | 67 | 7 | 36 | M 30x1.5 | 8x4 | 3080 |

| **Form F** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| KGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $B_1xT_1$ | ZARN...LTN |
| 2505, 2510, 2520, 2525, 2550 | 15 | 11 | 73 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1545 |
| 3205, 3232, 3240 | 20 | 14 | 88 | 30 | 45 | 4 | 22 | M 20x1 | 5x3 | 2052 |
| 3210, 3220 | 20 | 14 | 107 | 30 | 50 | 4 | 22 | M 20x1 | 5x3 | 2062 |
| 4005 | 25 | 19 | 105 | 40 | 58 | 6 | 28 | M 25x1.5 | 6x3.5 | 2557 |
| 4010, 4020, 4040 | 25 | 19 | 120 | 40 | 63 | 6 | 28 | M 25x1.5 | 6x3.5 | 2572 |
| 5010, 5020 | 35 | 28 | 145 | 60 | 82 | 10 | 40 | M 35x1.5 | 8x4 | 3585 |
| 6310, 6320 | 40 | 36 | 175 | 80 | 103 | 8.5 | 63 | M 40x1.5 | 10x5 | 4090 |

# End journals for loose bearings/fixed bearings
# Form H, J, L, Z

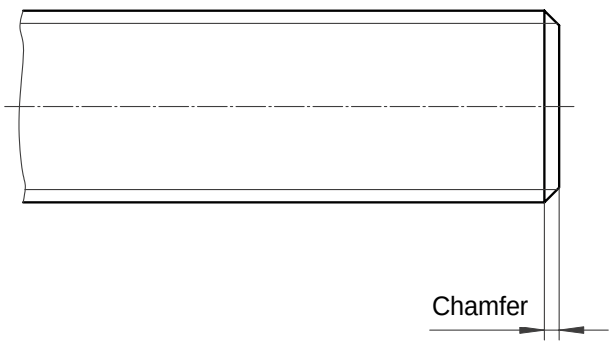
| **Form H** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| KGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $B_1xT_1$ | ZARF...LTN |
| 2505, 2510, 2520, 2525, 2550 | 15 | 11 | 85 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1560 |
| 3205, 3232, 3240 | 20 | 14 | 102 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 2068 |
| 3210, 3220 | 20 | 14 | 122 | 30 | 49 | 4 | 22 | M 20x1 | 5x3 | 2080 |
| 4005 | 25 | 19 | 120 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 2575 |
| 4010,4020,4040 | 25 | 19 | 135 | 40 | 63 | 6 | 28 | M 25x1.5 | 6x3.5 | 2590 |
| 5010, 5020 | 35 | 28 | 160 | 60 | 81 | 10 | 40 | M 35x1.5 | 8x4 | 35110 |
| 6310, 6320 | 40 | 36 | 195 | 80 | 105 | 8.5 | 63 | M 40x1.5 | 10x5 | 40115 |

| **Form J** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| KGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $B_1xT_1$ | FDX |
| 1605, 1610 | 12 | 9 | 88 | 20 | 32 | 2.5 | 16 | M 12x1 | 3x1.8 | 12 |
| 2005, 2020, 2050 | 15 | 11 | 92 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 15 |
| 2505, 2510, 2520, 2525, 2550 | 20 | 14 | 107 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 20 |
| 3205, 3210, 3220, 3232, 3240 | 25 | 19 | 122 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 25 |
| 4005, 4010, 4020, 4040 | 30 | 24 | 136 | 50 | 72 | 7 | 36 | M 30x1.5 | 8x4 | 30 |
| 5010, 5020 | 40 | 36 | 182 | 80 | 102 | 8.5 | 63 | M 40x1.5 | 10x5 | 40 |

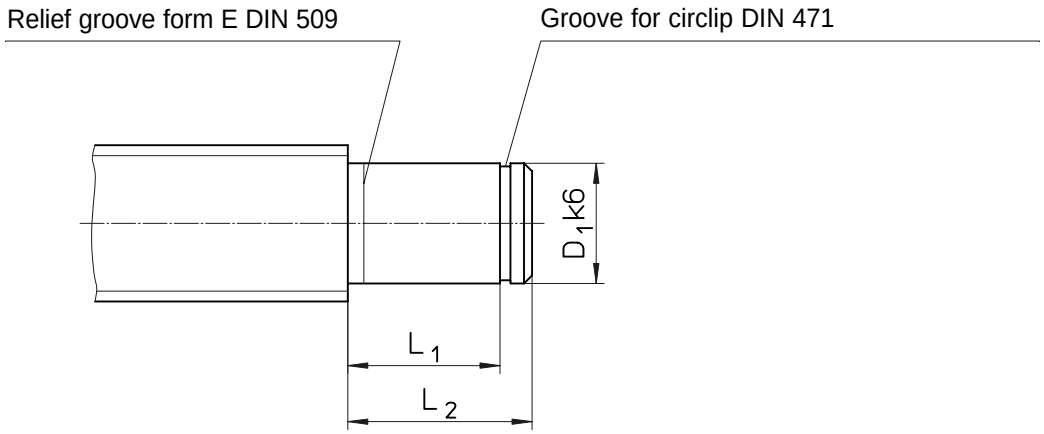
| **Form L** | Dimensions [mm] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| KGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $B_1xT_1$ | Bearing |
| 1605, 1610, 2005, 2020, 2050 | 12 | 9 | 58 | 20 | 30 | 2.5 | 16 | M 12x1 | 3x1,8 | 7201 BE RS |
| 2505, 2510, 2520, 2525, 2550 | 15 | 11 | 73 | 23 | 33 | 3.5 | 16 | M 15x1 | 4x2.5 | 7202 BE RS |
| 3205, 3210, 3220, 3232, 3240 | 20 | 14 | 88 | 30 | 43 | 4 | 22 | M 20x1 | 5x3 | 7204 BE RS |
| 4005, 4010, 4020, 4040 | 25 | 19 | 120 | 40 | 55 | 6 | 28 | M 25x1.5 | 6x3.5 | 7205 BE RS |
| 5010, 5020 | 35 | 28 | 145 | 60 | 77 | 10 | 40 | M 35x1.5 | 8x4 | 7207 BE RS |
| 6310, 6320 | 40 | 36 | 175 | 80 | 103 | 8,5 | 63 | M 40x1.5 | 10x5 | 7208 BE RS |

**Form Z**

Chamfer 2 x 45°: KGS von ø 12 – 25 mm
Chamfer 3 x 45°: KGS von ø 26 – 40 mm
Chamfer 4 x 45°: KGS von ø 44 – 50 mm



# End journals for loose bearings/fixed bearings
# Form S, T, W, G, K




| **Form S** | Dimensions [mm] | | | | |
|---|---|---|---|---|---|
| KGT | $D_1$ | $L_1$ | $L_2$ | Spacer bushing | Bearing |
| 1605, 1610 | 12 | 40 | 45 | 18x12.1x24 | 6001 RS |
| 2005, 2020, 2050 | 15 | 46 | 51 | 21x15.1x28 | 6002 RS |
| 2505, 2510, 2520, 2525, 2550 | 20 | 53 | 58 | 27x20.1x29 | 6004 RS |
| 3205, 3210, 3220 3232, 3240 | 25 | 53 | 58 | 32x25.1x23 | 6205 RS |
| 4005, 4010, 4020, 4040 | 30 | 60 | 68 | 40x30.1x28 | 6206 RS |
| 5010, 5020 | 40 | 80 | 88 | 50x40.1x44 | 6208 RS |
| 6310, 6320 | 55 | 102 | 110 | 65x55.1x60 | 6211 RS |

| **Form T** | Dimensions [mm] | | | | |
|---|---|---|---|---|---|
| KGT | $D_1$ | $L_1$ | $L_2$ | Inner ring | Needle bearing |
| 1605, 1610 | 12 | 40 | 45 | 2 IR 12x16x20 | HK 1614 RS |
| 2005, 2020, 2050 | 15 | 46 | 51 | 2 IR 15x20x23 | HK 2018 RS |
| 2505, 2510, 2520, 2525, 2550 | 20 | 53 | 58 | 2 LR 20x25x26.5 | HK 2518 RS |
| 3205, 3210, 3220, 3232, 3240 | 25 | 53 | 58 | 2 LR 25x30x26.5 | HK 3018 RS |
| 4005, 4010, 4020, 4040 | 30 | 60 | 68 | 2 LR 30x35x30 | HK 3518 RS |
| 5010, 5020 | 40 | 80 | 88 | 4 LR 40x45x20 | HK 4518 RS |

**Form G:** End journal annealed to costumer's specification.

**Form K:** Special production per customer's drawing.

| **Form W** | Dimensions [mm] | | | |
|---|---|---|---|---|
| KGT | $D_1$ | $L_1$ | $L_2$ | Bearing |
| 1605, 1610 | 12 | 8 | 12 | 6001 RS |
| 2005, 2020, 2050 | 15 | 9 | 13 | 6002 RS |
| 2505, 2510, 2520, 2525, 2550 | 20 | 12 | 16 | 6004 RS |
| 3205, 3210, 3220, 3240 | 25 | 15 | 20 | 6205 RS |
| 4005, 4010, 4020, 4040 | 30 | 16 | 21 | 6206 RS |
| 5010, 5020 | 40 | 18 | 25 | 6208 RS |
| 6310 | 55 | 21 | 29 | 6211 RS |

## Notes

# General information regarding whirled/ground ball screws

## Method of manufacture

- **Whirled (standard)**

  Whirled ball screw shafts are produced using cutting plates in special materials. In this process, the raceway is cut into the previously hardened raw material in a single pass, or multiple passes for large balls.

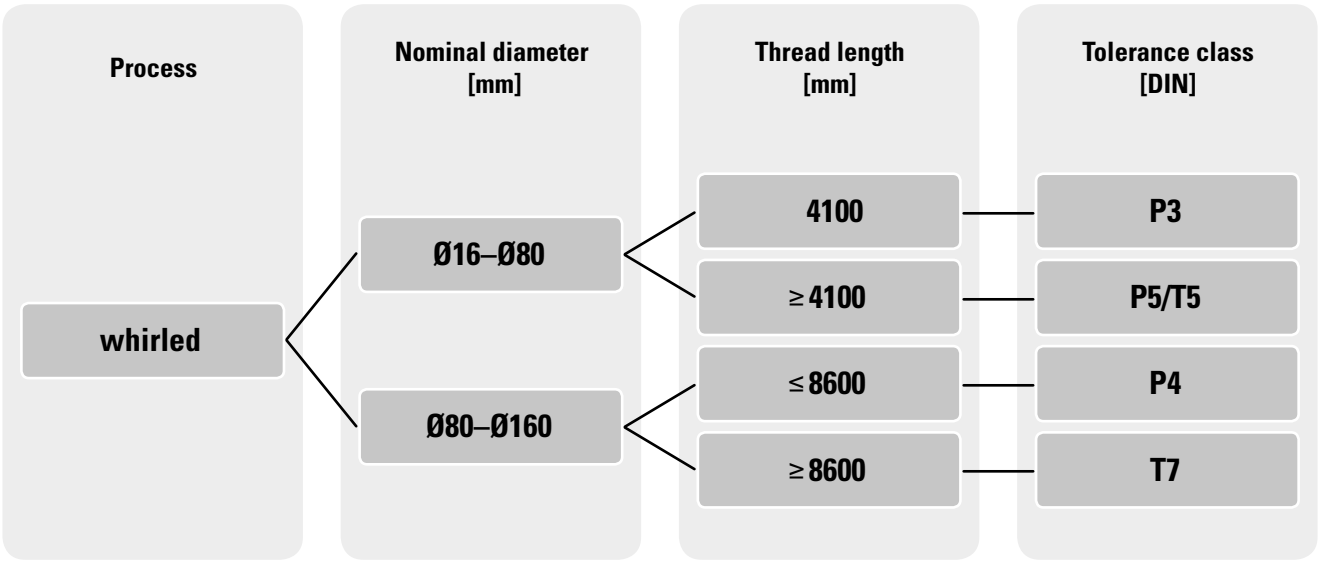
- **Ground**

  Depending on the ball size, the raceway of ground ball screw shafts is either ground directly into the solid blank, or the blank is first whirled and then ground.

## Tolerance classes

- **Whirled (standard)**

  Whirled ball screw shafts are currently available in classes P3, P4 and P5 and also T5 and T7




- **Ground**

  Ground shafts are available on request.

## Thomson Neff whirled shafts are setting new standards:

- Higher or at least identical surface quality of the raceway compared with ground ball screws
- Better running in behavior, i.e. the ball screw nut's preloading is maintained for longer
- Greater profile accuracy thanks to geometrically defined cutting of the cutting plates
- Greater service life thanks to the points listed above

## Technical data

| | |
|---|---|
| **Thread:** | Gothic thread profile |
| **Diameter:** | 16–160mm (other sizes on request) |
| **Number of starts:** | 1–2 |
| **Lead:** | As customer requirement |
| **Thread direction:** | Clockwise, counter-clockwise, right-hand/left-hand shaft |
| **End journal:** | As customer requirement |

# Standard range of whirled recirculating ball screws with single return Ø16-Ø63

| Nominal diameter | Nominal lead | Ball diameter | Fit diameter | Nut length [mm] * **L** SEM or VEM-4 SEM single nut with backlash VEM-4 anti-backlash or preloaded single nut | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_{h0}$ | $D_w$ | $D_1$ | Number of loaded turns | | | | | | | | |
| [mm] | [mm] | [mm] | [mm] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 16 | 5 | 3.500 | 28 | 42.50 | 48.50 | 55.00 | 59.00 | 64.50 | - | - | - | - |
| 20 | 5 | 3.500 | 36 | 42.50 | 48.50 | 54.00 | 59.00 | 68.50 | 70.00 | 76.00 | - | - |
| 20 | 10 | 3.969 | 36 | 58.00 | 69.50 | - | - | - | - | - | - | - |
| 25 | 5 | 3.500 | 40 | 43.50 | 49.50 | 55.00 | 60.00 | 69.50 | 71.00 | 77.00 | 83.00 | 88.50 |
| 25 | 10 | 3.969 | 40 | 59.00 | 70.50 | 83.50 | 92.00 | 102.00 | - | - | - | - |
| 32 | 5 | 3.500 | 50 | 45.50 | 51.50 | 57.00 | 62.00 | 67.50 | 73.00 | 83.00 | 85.00 | 90.50 |
| 32 | 10 | 5.556 | 50 | 61.00 | 72.50 | 85.50 | 94.00 | 105.50 | 116.00 | 127.50 | - | - |
| 32 | 15 | 5.556 | 56 | 76.00 | 93.50 | 110.00 | 128.50 | 147.50 | - | - | - | - |
| 40 | 5 | 3.500 | 63 | 49.50 | 55.50 | 61.00 | 66.00 | 71.50 | 77.00 | 83.00 | 89.00 | 97.00 |
| 40 | 10 | 6.350 | 63 | 67.00 | 79.00 | 89.50 | 100.00 | 110.50 | 122.00 | 142.00 | 145.50 | 157.00 |
| 40 | 10 | 7.144 | 63 | 67.00 | 79.00 | 89.50 | 100.00 | 110.50 | 122.00 | 142.00 | 145.50 | 157.00 |
| 40 | 15 | 6.350 | 63 | 78.50 | 96.00 | 112.50 | 128.00 | 143.50 | 161.00 | 178.50 | - | - |
| 40 | 20 | 6.350 | 63 | 93.00 | 116.00 | 136.00 | 159.00 | 179.50 | - | - | - | - |
| 50 | 5 | 3.500 | 75 | 51.50 | 57.50 | 63.00 | 68.00 | 73.50 | 79.00 | 85.00 | 91.00 | 96.50 |
| 50 | 10 | 7.144 | 75 | 69.00 | 81.00 | 91.50 | 102.00 | 112.50 | 124.00 | 144.00 | 147.50 | 159.00 |
| 50 | 20 | 7.938 | 75 | 96.50 | 120.00 | 141.50 | 162.50 | 186.50 | 206.50 | 230.00 | - | - |
| 63 | 5 | 3.500 | 90 | 53.50 | 59.50 | 65.00 | 70.00 | 75.50 | 81.00 | 87.00 | 91.00 | 97.00 |
| 63 | 10 | 7.144 | 90 | 71.00 | 83.00 | 93.50 | 104.00 | 114.50 | 126.00 | 138.00 | 146.00 | 166.00 |
| 63 | 15 | 7.938 | 95 | 92.00 | 109.50 | 126.00 | 141.50 | 157.00 | 174.50 | 192.00 | - | - |
| 63 | 20 | 9.525 | 95 | 106.50 | 130.00 | 151.50 | 172.50 | 209.50 | 216.50 | 240.00 | - | - |
| 63 | 25 | 9.525 | 95 | 118.50 | 148.00 | 175.00 | 201.00 | - | - | - | - | - |

**Standard**

* Nut lengths may vary

| Nut length [mm] * **L** VEM-2 VEM-2 preloaded single nut | | | | | | | Nut length [mm] * **L** VDM VDM Preloaded double nut | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of loaded turns | | | | | | | Number of loaded turns | | | | | | |
| 2+2 | 3+3 | 4+4 | 5+5 | 6+6 | 7+7 | 8+8 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 55.00 | 68.50 | - | - | - | - | - | - | - | - | - | - | - | - |
| 53.50 | 68.50 | 80.00 | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 58.50 | 69.50 | 81.00 | 91.00 | - | - | - | - | - | - | - | - | - | - |
| 83.50 | 110.50 | - | - | - | - | - | - | - | - | - | - | - | - |
| 60.50 | 71.50 | 83.00 | 93.00 | 103.00 | 115.00 | - | 75.00 | 87.00 | 97.50 | 108.00 | 118.50 | 130.00 | 142.00 |
| 85.50 | 105.50 | 129.00 | - | - | - | - | 105.50 | 129.00 | 150.50 | 171.50 | 192.00 | 215.50 | 239.00 |
| 121.00 | 153.50 | - | - | - | - | - | 133.50 | 168.50 | 201.00 | 232.50 | 263.50 | - | - |
| 64.50 | 75.50 | 87.00 | 97.00 | 111.00 | 119.00 | 130.50 | 79.00 | 91.00 | 101.50 | 112.00 | 122.50 | 134.00 | 146.00 |
| 97.00 | 119.00 | 142.00 | 162.00 | - | - | - | 114.00 | 137.50 | 159.00 | 180.00 | 201.00 | 224.00 | 247.50 |
| 97.00 | 119.00 | 142.00 | 162.00 | - | - | - | 114.00 | 137.50 | 159.00 | 180.00 | 201.00 | 224.00 | 247.50 |
| 123.50 | 156.00 | 191.00 | - | - | - | - | 136.50 | 171.50 | 204.00 | 235.50 | 266.50 | 301.50 | 336.50 |
| 136.00 | 196.00 | - | - | - | - | - | 165.00 | 212.00 | 255.00 | 297.00 | 338.50 | - | - |
| 66.50 | 77.50 | 89.00 | 99.00 | 109.00 | 121.00 | 132.50 | 81.00 | 93.00 | 103.50 | 114.00 | 124.50 | 136.00 | 148.00 |
| 99.00 | 120.50 | 144.00 | 164.00 | 184.00 | - | - | 116.00 | 139.50 | 161.00 | 182.00 | 203.00 | 226.00 | 249.50 |
| 156.50 | 186.50 | 233.50 | - | - | - | - | 170.50 | 217.00 | 260.50 | 302.50 | 343.50 | 390.50 | 437.00 |
| 68.50 | 79.50 | 91.00 | 101.00 | 111.00 | 123.00 | - | 89.00 | 101.00 | 111.50 | 122.00 | 132.50 | 144.00 | 156.00 |
| 101.00 | 123.00 | 146.00 | 166.00 | 186.00 | - | - | 124.00 | 147.50 | 169.00 | 190.00 | 211.00 | 234.00 | 257.50 |
| 137.00 | 169.50 | 199.50 | - | - | - | - | 159.50 | 194.50 | 227.00 | 258.50 | 289.50 | 324.50 | 359.50 |
| 166.00 | 209.50 | 259.50 | - | - | - | - | 188.50 | 235.00 | 278.50 | 320.50 | 361.50 | 408.50 | 455.00 |
| 193.50 | - | - | - | - | - | - | 212.50 | 271.00 | 325.00 | 377.50 | - | - | - |

**Standard** * Nut lengths may vary

# Standard range of whirled recirculating ball screws with single return Ø16-Ø63

| Nominal diameter | Nominal lead | Ball diameter | Fit diameter | Modified dynamic rated load [kN] $C_{am}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_{h0}$ | $D_w$ | $D_1$ | Number of loaded turns | | | | | | | | |
| [mm] | [mm] | [mm] | [mm] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 16 | 5 | 3.500 | 28 | 6.70 | 9.40 | 12.10 | 14.70 | 17.20 | - | - | - | - |
| 20 | 5 | 3.500 | 36 | 8.10 | 11.50 | 14.80 | 17.90 | 20.90 | 23.90 | 26.80 | - | - |
| 20 | 10 | 3.969 | 36 | 8.70 | 12.40 | - | - | - | - | - | - | - |
| 25 | 5 | 3.500 | 40 | 9.60 | 13.60 | 17.40 | 21.10 | 24.70 | 28.20 | 31.60 | 35.00 | 38.30 |
| 25 | 10 | 3.969 | 40 | 10.40 | 14.80 | 19.00 | 23.00 | 26.90 | - | - | - | - |
| 32 | 5 | 3.500 | 50 | 10.90 | 15.50 | 19.80 | 24.00 | 28.10 | 32.10 | 36.00 | 39.80 | 43.60 |
| 32 | 10 | 5.556 | 50 | 18.60 | 26.40 | 33.80 | 40.90 | 47.90 | 54.70 | 61.30 | - | - |
| 32 | 15 | 5.556 | 56 | 17.60 | 24.90 | 31.90 | 38.70 | 45.20 | - | - | - | - |
| 40 | 5 | 3.500 | 63 | 12.20 | 17.30 | 22.10 | 26.80 | 31.40 | 35.80 | 40.20 | 44.50 | 48.70 |
| 40 | 10 | 6.350 | 63 | 29.70 | 42.10 | 53.90 | 65.30 | 76.40 | 87.20 | 97.80 | 108.20 | 118.50 |
| 40 | 10 | 7.144 | 63 | 35.70 | 50.60 | 64.90 | 78.60 | 91.90 | 104.90 | 117.70 | 130.30 | 142.60 |
| 40 | 15 | 6.350 | 63 | 29.50 | 41.90 | 53.60 | 65.00 | 76.00 | 86.80 | 97.30 | - | - |
| 40 | 20 | 6.350 | 63 | 28.00 | 39.70 | 50.90 | 61.60 | 72.10 | - | - | - | - |
| 50 | 5 | 3.500 | 75 | 12.70 | 18.00 | 23.00 | 27.90 | 32.60 | 37.20 | 41.80 | 46.20 | 50.60 |
| 50 | 10 | 7.144 | 75 | 38.00 | 53.90 | 69.00 | 83.60 | 97.80 | 111.70 | 125.30 | 138.60 | 151.80 |
| 50 | 20 | 7.938 | 75 | 41.20 | 58.40 | 74.80 | 90.60 | 106.00 | 121.00 | 135.80 | - | - |
| 63 | 5 | 3.500 | 90 | 14.10 | 20.00 | 25.60 | 31.00 | 36.30 | 41.50 | 46.50 | 51.50 | 56.40 |
| 63 | 10 | 7.144 | 90 | 43.90 | 62.20 | 79.60 | 96.50 | 112.90 | 128.90 | 144.50 | 159.90 | 175.10 |
| 63 | 15 | 7.938 | 95 | 49.60 | 70.30 | 90.00 | 109.00 | 127.50 | 145.60 | 163.30 | - | - |
| 63 | 20 | 9.525 | 95 | 61.90 | 87.70 | 112.30 | 136.00 | 159.10 | 181.70 | 203.80 | - | - |
| 63 | 25 | 9.525 | 95 | 59.20 | 83.90 | 107.40 | 130.20 | - | - | - | - | - |

**Standard**

| Modified static rated load [kN] $C_{0am}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Number of loaded turns | | | | | | | | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 7.20 | 10.90 | 14.50 | 18.10 | 21.70 | - | - | - | - |
| 10.30 | 15.50 | 20.70 | 25.80 | 31.00 | 36.20 | 41.30 | - | - |
| 10.30 | 15.40 | - | - | - | - | - | - | - |
| 14.20 | 21.30 | 28.40 | 35.50 | 42.70 | 49.80 | 56.90 | 64.00 | 71.10 |
| 14.30 | 21.40 | 28.50 | 35.60 | 42.80 | - | - | - | - |
| 18.90 | 28.40 | 37.90 | 47.30 | 56.80 | 66.30 | 75.70 | 85.20 | 94.70 |
| 26.00 | 39.00 | 52.00 | 65.00 | 78.00 | 91.00 | 104.00 | - | - |
| 24.00 | 36.00 | 48.00 | 60.00 | 72.00 | - | - | - | - |
| 24.40 | 36.70 | 48.90 | 61.10 | 73.30 | 85.60 | 97.80 | 110.00 | 122.20 |
| 46.50 | 69.70 | 93.00 | 116.20 | 139.40 | 162.70 | 185.90 | 209.20 | 232.40 |
| 54.50 | 81.80 | 109.00 | 136.30 | 163.50 | 190.80 | 218.00 | 245.30 | 272.50 |
| 46.30 | 69.50 | 92.60 | 115.80 | 138.90 | 162.10 | 185.20 | - | - |
| 43.00 | 64.50 | 86.00 | 107.50 | 129.00 | - | - | - | - |
| 31.50 | 47.30 | 63.10 | 78.80 | 94.60 | 110.30 | 126.10 | 141.90 | 157.60 |
| 71.10 | 106.60 | 142.20 | 177.70 | 213.20 | 248.80 | 284.30 | 319.80 | 355.40 |
| 72.30 | 108.40 | 144.60 | 180.70 | 216.90 | 253.00 | 289.20 | - | - |
| 41.00 | 61.50 | 82.00 | 102.40 | 122.90 | 143.40 | 163.90 | 184.40 | 204.90 |
| 95.90 | 143.80 | 191.70 | 239.70 | 287.60 | 335.50 | 383.50 | 431.40 | 479.30 |
| 102.90 | 154.40 | 205.90 | 257.30 | 308.80 | 360.30 | 411.70 | - | - |
| 118.60 | 177.90 | 237.30 | 296.60 | 355.90 | 415.20 | 474.50 | - | - |
| 111.40 | 167.00 | 222.70 | 278.40 | - | - | - | - | - |

**Standard**

# Standard range of whirled recirculating ball screws with single return Ø80-Ø160

| Nominal diameter | Nominal lead | Ball diameter | Fit diameter | Nut length [mm] * **L** SEM or VEM-4 SEM single nut with backlash VEM-4 anti-backlash or preloaded single nut | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_{h0}$ | $D_w$ | $D_1$ | Number of loaded turns | | | | | | | | |
| [mm] | [mm] | [mm] | [mm] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 80 | 10 | 7.144 | 105 | 77.00 | 89.00 | 99.50 | 110.00 | 120.50 | 132.00 | 144.00 | 155.50 | 167.00 |
| 80 | 20 | 12.700 | 125 | 115.50 | 139.00 | 160.50 | 181.50 | 202.50 | 225.50 | 265.50 | 272.50 | 295.50 |
| 80 | 25 | 12.700 | 125 | 127.50 | 157.00 | 184.00 | 210.00 | 236.00 | 265.00 | - | - | - |
| 80 | 30 | 12.700 | 125 | 138.50 | 173.50 | 206.00 | 237.50 | 268.50 | - | - | - | - |
| 100 | 10 | 7.144 | 125 | 81.00 | 93.00 | 103.50 | 114.00 | 124.50 | 136.00 | 148.00 | 159.50 | 171.00 |
| 100 | 20 | 14.288 | 150 | 124.50 | 148.00 | 169.50 | 190.50 | 211.50 | 234.50 | 258.00 | - | - |
| 100 | 25 | 14.288 | 150 | 137.50 | 166.50 | 194.00 | 220.00 | 246.00 | 275.00 | 304.00 | - | - |
| 100 | 30 | 12.700 | 150 | 145.50 | 180.50 | 213.00 | 244.50 | 275.50 | 310.50 | 345.50 | - | - |
| 100 | 40 | 12.700 | 150 | 172.50 | 219.50 | 262.50 | 304.50 | 346.00 | - | - | - | - |
| 125 | 10 | 7.144 | 150 | 84.00 | 96.00 | 106.50 | 117.00 | 127.50 | 139.00 | 151.00 | 159.00 | 170.50 |
| 125 | 20 | 14.288 | 170 | 124.50 | 148.00 | 169.50 | 190.50 | 211.50 | 234.50 | 258.00 | 274.50 | 297.00 |
| 125 | 25 | 19.050 | 200 | 143.00 | 172.50 | 199.50 | 225.50 | 251.50 | 280.50 | 310.00 | 339.00 | - |
| 125 | 30 | 19.050 | 200 | 155.50 | 190.50 | 223.00 | 254.50 | 285.50 | 320.50 | - | - | - |
| 125 | 40 | 19.050 | 200 | 178.50 | 225.50 | 268.50 | 310.50 | 352.00 | - | - | - | - |
| 160 | 20 | 14.288 | 210 | 134.50 | 158.00 | 179.50 | 200.50 | 221.50 | 244.50 | 268.00 | 291.50 | 314.50 |
| 160 | 25 | 19.050 | 260 | 153.00 | 182.50 | 209.50 | 235.50 | 261.50 | 290.50 | 320.00 | 349.00 | - |
| 160 | 30 | 19.050 | 260 | 165.50 | 200.50 | 233.00 | 264.50 | 295.50 | 330.50 | 365.50 | - | - |

**Standard**

* Nut lengths may vary

| Nut length [mm] * **L** VEM-2 VEM-2 preloaded single nut | | | | | | | Nut length [mm] * **L** VDM VDM Preloaded double nut | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of loaded turns | | | | | | | Number of loaded turns | | | | | | |
| 2+2 | 3+3 | 4+4 | 5+5 | 6+6 | 7+7 | 8+8 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 107.00 | 129.00 | 152.00 | 172.00 | 192.00 | 215.50 | 239.00 | 131.00 | 154.50 | 176.00 | 197.00 | 218.00 | 241.00 | 264.50 |
| 175.50 | 219.00 | 265.50 | 299.00 | - | - | - | 201.50 | 248.50 | 291.50 | 333.50 | 375.00 | 421.50 | 468.50 |
| 202.50 | 257.00 | - | - | - | - | - | 225.50 | 284.00 | 338.00 | 390.50 | 442.00 | 500.50 | - |
| 228.50 | 293.50 | - | - | - | - | - | 247.50 | 317.50 | 382.50 | 445.50 | 507.50 | - | - |
| 111.00 | 133.00 | 156.00 | 184.00 | 196.00 | 219.50 | 243.00 | 150.00 | 173.50 | 195.00 | 216.00 | 237.00 | 260.00 | 283.50 |
| - | - | - | - | - | - | - | 217.50 | 264.50 | 307.50 | 349.50 | 391.00 | 437.50 | 484.50 |
| - | - | - | - | - | - | - | 243.00 | 301.50 | 355.50 | 408.00 | 459.50 | 518.00 | 576.50 |
| 230.50 | 300.50 | 370.50 | - | - | - | - | 259.50 | 329.50 | 394.50 | 457.50 | 519.50 | 589.50 | 659.50 |
| 286.00 | 379.50 | - | - | - | - | - | 313.50 | 407.00 | 493.50 | 577.50 | 660.50 | - | - |
| 112.50 | 136.00 | 159.00 | 179.00 | 199.00 | 222.50 | - | 153.00 | 176.50 | 198.00 | 219.00 | 240.00 | 263.00 | 286.50 |
| - | - | - | - | - | - | - | 217.50 | 264.50 | 307.50 | 349.50 | 391.00 | 437.50 | 484.50 |
| - | - | - | - | - | - | - | 254.50 | 313.00 | 367.00 | 419.50 | 471.50 | 529.50 | 588.00 |
| - | - | - | - | - | - | - | 279.50 | 349.50 | 414.50 | 477.50 | 539.50 | 609.50 | - |
| - | - | - | - | - | - | - | 325.50 | 419.00 | 505.50 | 589.50 | 672.50 | - | - |
| - | - | - | - | - | - | - | 227.50 | 274.50 | 317.50 | 359.50 | 401.00 | 447.50 | 494.50 |
| - | - | - | - | - | - | - | 264.50 | 323.00 | 377.00 | 429.50 | 481.50 | 539.50 | 598.00 |
| - | - | - | - | - | - | - | 289.50 | 359.50 | 424.50 | 487.50 | 549.50 | 619.50 | 689.50 |

**Standard** * Nut lengths may vary

# Standard range of whirled recirculating ball screws with single return Ø80-Ø160

| Nominal diameter | Nominal lead | Ball diameter | Fit diameter | Modified dynamic rated load [kN] $C_{am}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | $P_{h0}$ | $D_w$ | $D_1$ | Number of loaded turns | | | | | | | | |
| [mm] | [mm] | [mm] | [mm] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 80 | 10 | 7.144 | 105 | 48.40 | 68.60 | 87.90 | 106.40 | 124.50 | 142.20 | 159.50 | 176.50 | 193.20 |
| 80 | 20 | 12.700 | 125 | 97.20 | 137.70 | 176.40 | 213.70 | 250.00 | 285.40 | 320.20 | 354.30 | 387.90 |
| 80 | 25 | 12.700 | 125 | 97.00 | 137.40 | 176.00 | 213.30 | 249.50 | 284.80 | - | - | - |
| 80 | 30 | 12.700 | 125 | 96.70 | 137.10 | 175.60 | 212.70 | 248.80 | - | - | - | - |
| 100 | 10 | 7.144 | 125 | 51.10 | 72.40 | 92.70 | 112.30 | 131.30 | 149.90 | 168.20 | 186.10 | 203.80 |
| 100 | 20 | 14.288 | 150 | 127.40 | 180.60 | 231.30 | 280.20 | 327.80 | 374.20 | 419.80 | - | - |
| 100 | 25 | 14.288 | 150 | 122.70 | 174.00 | 222.80 | 269.90 | 315.70 | 360.50 | 404.40 | - | - |
| 100 | 30 | 12.700 | 150 | 103.80 | 147.10 | 188.40 | 228.20 | 267.00 | 304.80 | 341.90 | - | - |
| 100 | 40 | 12.700 | 150 | 103.40 | 146.50 | 187.60 | 227.30 | 265.90 | - | - | - | - |
| 125 | 10 | 7.144 | 150 | 56.50 | 80.00 | 102.50 | 124.20 | 145.30 | 165.90 | 186.10 | 205.90 | 225.40 |
| 125 | 20 | 14.288 | 170 | 142.10 | 201.40 | 257.90 | 312.50 | 365.50 | 417.30 | 468.10 | 518.00 | 567.10 |
| 125 | 25 | 19.050 | 200 | 201.00 | 284.80 | 364.80 | 442.00 | 517.00 | 590.30 | 662.10 | 732.70 | - |
| 125 | 30 | 19.050 | 200 | 200.80 | 284.50 | 364.40 | 441.50 | 516.40 | 589.60 | - | - | - |
| 125 | 40 | 19.050 | 200 | 200.20 | 283.80 | 363.40 | 440.30 | 515.00 | - | - | - | - |
| 160 | 20 | 14.288 | 210 | 162.20 | 229.90 | 294.50 | 356.80 | 417.30 | 476.50 | 534.50 | 591.40 | 647.50 |
| 160 | 25 | 19.050 | 260 | 233.90 | 331.50 | 424.60 | 514.40 | 601.70 | 687.00 | 770.60 | 852.70 | - |
| 160 | 30 | 19.050 | 260 | 233.80 | 331.30 | 424.30 | 514.00 | 601.30 | 686.50 | 770.10 | - | - |

**Standard**

| Modified static rated load [kN] $C_{0am}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Number of loaded turns | | | | | | | | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 129.00 | 193.50 | 258.00 | 322.50 | 387.00 | 451.50 | 516.00 | 580.50 | 645.00 |
| 198.40 | 297.50 | 396.70 | 495.90 | 595.10 | 694.30 | 793.40 | 892.60 | 991.80 |
| 198.00 | 297.10 | 396.10 | 495.10 | 594.10 | 693.10 | - | - | - |
| 197.60 | 296.50 | 395.30 | 494.10 | 592.90 | - | - | - | - |
| 162.30 | 243.50 | 324.70 | 405.80 | 487.00 | 568.20 | 649.30 | 730.50 | 811.70 |
| 300.20 | 450.30 | 600.40 | 750.50 | 900.60 | 1050.70 | 1200.80 | - | - |
| 284.10 | 426.10 | 568.20 | 710.20 | 852.30 | 994.30 | 1136.40 | - | - |
| 250.50 | 375.70 | 501.00 | 626.20 | 751.50 | 876.70 | 1002.00 | - | - |
| 249.70 | 374.50 | 499.40 | 624.20 | 749.00 | - | - | - | - |
| 208.10 | 312.10 | 416.20 | 520.20 | 624.20 | 728.30 | 832.30 | 936.40 | 1040.40 |
| 383.40 | 575.10 | 766.80 | 958.50 | 1150.20 | 1341.90 | 1533.60 | 1725.30 | 1917.00 |
| 322.70 | 484.10 | 645.40 | 806.80 | 968.10 | 1129.50 | 1290.80 | 1452.20 | - |
| 322.40 | 483.70 | 644.90 | 806.10 | 967.30 | 1128.60 | - | - | - |
| 321.80 | 482.70 | 643.50 | 804.40 | 965.30 | - | - | - | - |
| 516.10 | 774.10 | 1032.10 | 1290.20 | 1548.20 | 1806.20 | 2064.20 | 2322.30 | 2580.30 |
| 442.20 | 663.30 | 884.40 | 1105.60 | 1326.70 | 1547.80 | 1768.90 | 1990.00 | - |
| 442.00 | 663.00 | 884.00 | 1105.00 | 1326.00 | 1547.00 | 1768.00 | - | - |

**Standard**

# Nut dimensions with DIN flange for whirled recirculating ball screws

| Nominal diameter | | Lead | | | | | Lubrication nipple | | | | | | Drilling pattern | Fastening screws | Maximum operating force for screws $F_{bmax}$ | | Tightening torque for screws $T_a$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $d_0$ | | $P_h$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | $D_B$ | $L_1$ | $L_3$ | $L_7$ | $L_8$ | $L_{10}$ | | | Dyn. | Stat. | |
| [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [-] | [mm] | [mm] | [mm] | [mm] | [mm] | [-] | [-] | [kN] | [kN] | [Nm] |
| 16 | ≤ | 5 | 28 | 38 | 5.5 | 48 | M6x1 | 10 | 5.5 | 10 | 40 | 8 | 1 | M5 | 12 | 40 | 6 |
| 16 | > | 5 | 32 | 42 | 5.5 | 52 | M6x1 | 10 | 5.5 | 10 | 40 | 8 | 1 | M5 | 12 | 40 | 6 |
| 20 | > | 1 | 36 | 47 | 6.6 | 58 | M6x1 | 10 | 5.5 | 10 | 44 | 8 | 1 | M6 | 16 | 63 | 10 |
| 25 | ≤ | 5 | 40 | 51 | 6.6 | 62 | M6x1 | 10 | 6 | 10 | 48 | 8 | 1 | M6 | 16 | 63 | 10 |
| 25 | > | 5 | 40 | 51 | 6.6 | 62 | M6x1 | 10 | 6 | 10 | 48 | 8 | 1 | M6 | 16 | 63 | 10 |
| 32 | ≤ | 10 | 50 | 65 | 9 | 80 | M6x1 | 10 | 6 | 12 | 62 | 8 | 1 | M8 | 32 | 100 | 25 |
| 32 | > | 10 | 56 | 71 | 9 | 86 | M6x1 | 20 | 6 | 14 | 65 | 8 | 1 | M8 | 32 | 100 | 25 |
| 40 | < | 10 | 63 | 78 | 9 | 93 | M8x1 | 10 | 7 | 14 | 70 | 10 | 2 | M8 | 40 | 150 | 25 |
| 40 | ≥ | 10 | 63 | 78 | 9 | 93 | M8x1 | 20 | 7 | 14 | 70 | 10 | 2 | M8 | 40 | 150 | 25 |
| 40• | > | 10 | 70 | 85 | 9 | 100 | M8x1 | 25 | 7 | 14 | 75 | 10 | 2 | M8 | 40 | 150 | 25 |
| 50 | ≤ | 10 | 75 | 93 | 11 | 110 | M8x1 | 10 | 7 | 16 | 85 | 10 | 2 | M10 | 80 | 225 | 49 |
| 50 | > | 10 | 75 | 93 | 11 | 110 | M8x1 | 20 | 7 | 16 | 85 | 10 | 2 | M10 | 80 | 225 | 49 |
| 50• | > | 10 | 82 | 100 | 11 | 118 | M8x1 | 25 | 7 | 16 | 92 | 10 | 2 | M10 | 80 | 225 | 49 |
| 63 | ≤ | 10 | 90 | 108 | 11 | 125 | M8x1 | 10 | 7 | 18 | 95 | 10 | 2 | M10 | 80 | 225 | 49 |
| 63 | > | 10 | 95 | 115 | 13.5 | 135 | M8x1 | 25 | 9 | 20 | 100 | 10 | 2 | M12 | 125 | 320 | 86 |
| 63• | > | 10 | 105 | 125 | 13.5 | 145 | M8x1 | 25 | 9 | 20 | 110 | 10 | 2 | M12 | 125 | 320 | 86 |
| 80 | ≤ | 10 | 105 | 125 | 13.5 | 145 | M8x1 | 12 | 9 | 20 | 110 | 10 | 2 | M12 | 125 | 320 | 86 |
| 80 | > | 10 | 125 | 145 | 13.5 | 165 | M8x1 | 25 | 9 | 25 | 130 | 10 | 2 | M12 | 125 | 320 | 86 |
| 80• | > | 10 | 135 | 155 | 13.5 | 175 | M8x1 | 25 | 9 | 25 | 140 | 10 | 2 | M12 | 125 | 320 | 86 |
| 100 | ≤ | 10 | 125 | 145 | 13.5 | 165 | M8x1 | 10 | 10 | 22 | 130 | 10 | 2 | M12 | 125 | 320 | 86 |
| 100 | > | 10 | 150 | 176 | 17.5 | 202 | M8x1 | 25 | 10 | 30 | 155 | 10 | 2 | M16 | 250 | 630 | 210 |
| 100• | > | 10 | 160 | 186 | 17.5 | 212 | M8x1 | 40 | 10 | 30 | 165 | 10 | 2 | M16 | 250 | 630 | 210 |
| 125 | ≤ | 10 | 150 | 176 | 17.5 | 202 | M8x1 | 10 | 10 | 25 | 155 | 10 | 2 | M16 | 250 | 630 | 210 |
| 125 | > | 10 | 170 | 196 | 17.5 | 222 | M8x1 | 25 | 10 | 30 | 175 | 10 | 2 | M16 | 250 | 630 | 210 |
| 125• | > | 10 | 200 | 233 | 22 | 265 | M8x1 | 40 | 10 | 30 | 205 | 10 | 2 | M20 | 400 | 1000 | 410 |
| 160 | ≤ | 10 | 185 | 212 | 17.5 | 240 | M8x1 | 10 | 10 | 30 | 190 | 10 | 2 | M16 | 250 | 630 | 210 |
| 160 | > | 10 | 210 | 243 | 22 | 275 | M8x1 | 25 | 10 | 40 | 215 | 10 | 2 | M20 | 400 | 1000 | 410 |
| 160• | > | 10 | 260 | 300 | 22 | 340 | M8x1 | 40 | 10 | 40 | 265 | 10 | 2 | M20 | 400 | 1000 | 410 |

• Secondary size

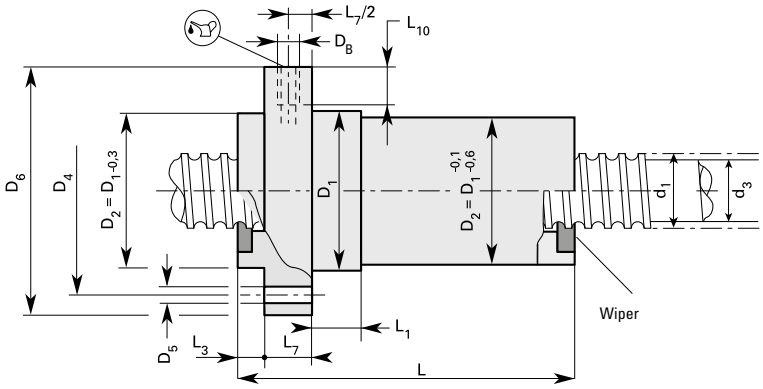
[1] Basis for screw calculation:
Cheese head screws complying with EN ISO 4762, property class 8.8, maximum operating forces $Fb_{max}$ at 90% exploitation of the yield point, safety factor v=0.8 additionally taken into consideration, friction factor $\mu_{ges}$= 0.14 for untreated, oiled screws.
Tighten using torque wrench to torque $T_a$. Operating forces in excess of this shall be absorbed by the use of screws complying with EN ISO 4762 in higher property classes

## Standard range for whirled heavy duty recirculating ball screws

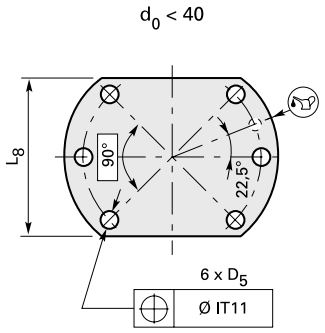
Only available with single nuts with backlash (SEM)

| $d_0$ | $P_h$ | $D_w$ | $D_1$ | i | L | $C_{am}$ | $C_{0am}$ | $D_4$ | $D_5$ | $D_6$ | $D_B$ | $L_1$ | $L_3$ | $L_7$ | $L_8$ | $L_{10}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [mm] | [mm] | [mm] | [mm] | [each] | [mm] | [kN] | [kN] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| 40 | 12 | 7.938 | 75 | 8 | 165.0 | 220 | 434 | 93 | 11 | 110 | M8x1 | 25 | 7 | 16 | 85 | 10 |
| 50 | 20 | 9.525 | 90 | 5.8 | 152.0 | 259.4 | 603.4 | 108 | 11 | 125 | M8x1 | 25 | 7 | 20 | 95 | 10 |
| 50 | 25 | 9.525 | 90 | 5.8 | 177.5 | 258 | 600.9 | 108 | 11 | 125 | M8x1 | 25 | 7 | 20 | 95 | 10 |
| 63 | 20 | 12.700 | 105 | 8 | 249.0 | 478.6 | 1108.7 | 125 | 13.5 | 145 | M8x1 | 25 | 9 | 25 | 110 | 10 |
| 63 | 25 | 12.700 | 120 | 5.8 | 185.5 | 419.8 | 1002.2 | 145 | 13.5 | 165 | M8x1 | 30 | 9 | 25 | 130 | 10 |
| 80 | 20 | 14.288 | 135 | 9 | 280.5 | 690.2 | 1860.8 | 155 | 13.5 | 175 | M8x1 | 30 | 9 | 30 | 140 | 10 |
| 80 | 25 | 14.288 | 135 | 7 | 273.0 | 554.8 | 1445 | 155 | 13.5 | 175 | M8x1 | 30 | 9 | 30 | 140 | 10 |
| 100 | 20 | 14.288 | 160 | 8 | 252.0 | 709.3 | 2276.5 | 186 | 17.5 | 212 | M8x1 | 40 | 10 | 30 | 165 | 10 |
| 100 | 25 | 19.050 | 160 | 8 | 310.0 | 968.4 | 1843.8 | 189 | 17.5 | 212 | M8x1 | 40 | 10 | 30 | 165 | 10 |
| 125 | 20 | 14.288 | 200 | 11 | 338.0 | 1040.1 | 3997.8 | 233 | 22 | 265 | M8x1 | 40 | 10 | 40 | 205 | 10 |
| 125 | 25 | 19.050 | 200 | 9 | 349.0 | 1238 | 2753.2 | 233 | 22 | 265 | M8x1 | 40 | 10 | 40 | 205 | 10 |
| 125 | 30 | 19.050 | 200 | 7 | 330.5 | 996.3 | 2139.6 | 233 | 22 | 265 | M8x1 | 40 | 10 | 40 | 205 | 10 |
| 160 | 20 | 14.288 | 260 | 12 | 357.0 | 1279.9 | 5870.3 | 300 | 22 | 340 | M8x1 | 40 | 10 | 45 | 265 | 10 |
| 160 | 25 | 19.050 | 260 | 9 | 354.0 | 1440.8 | 3772.8 | 300 | 22 | 340 | M8x1 | 40 | 10 | 45 | 265 | 10 |
| 160 | 30 | 19.050 | 260 | 8 | 370.5 | 1301.2 | 3351.9 | 300 | 22 | 340 | M8x1 | 40 | 10 | 45 | 265 | 10 |

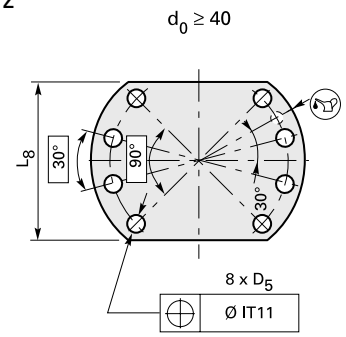
Dimensions do not comply with DIN



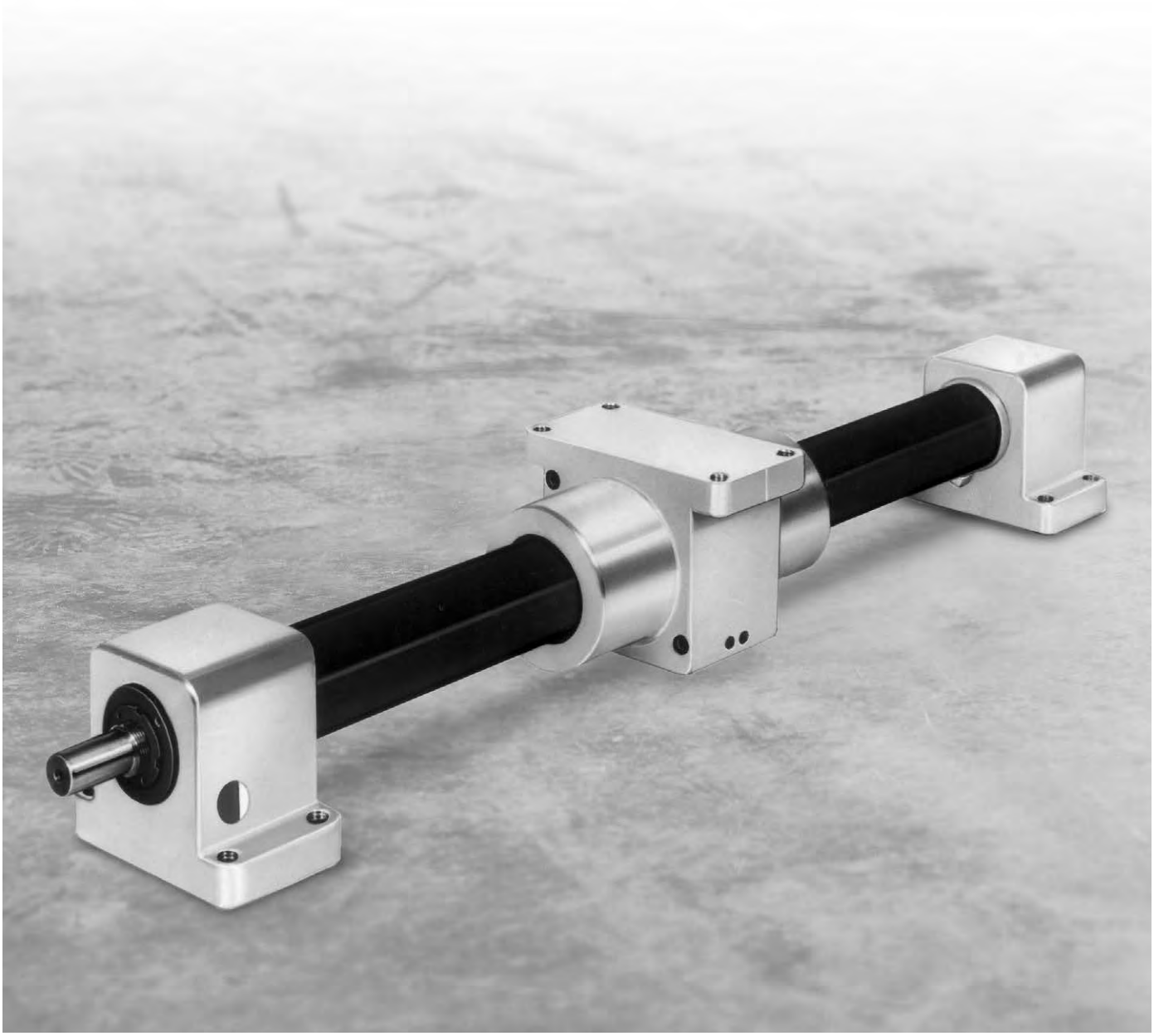

Drilling pattern




Drilling pattern 2




**Have you not found the correct size?**
**Should you have any further questions, please contact our engineers**



# KOKON recirculating ball screw with full protection for harsh operating conditions

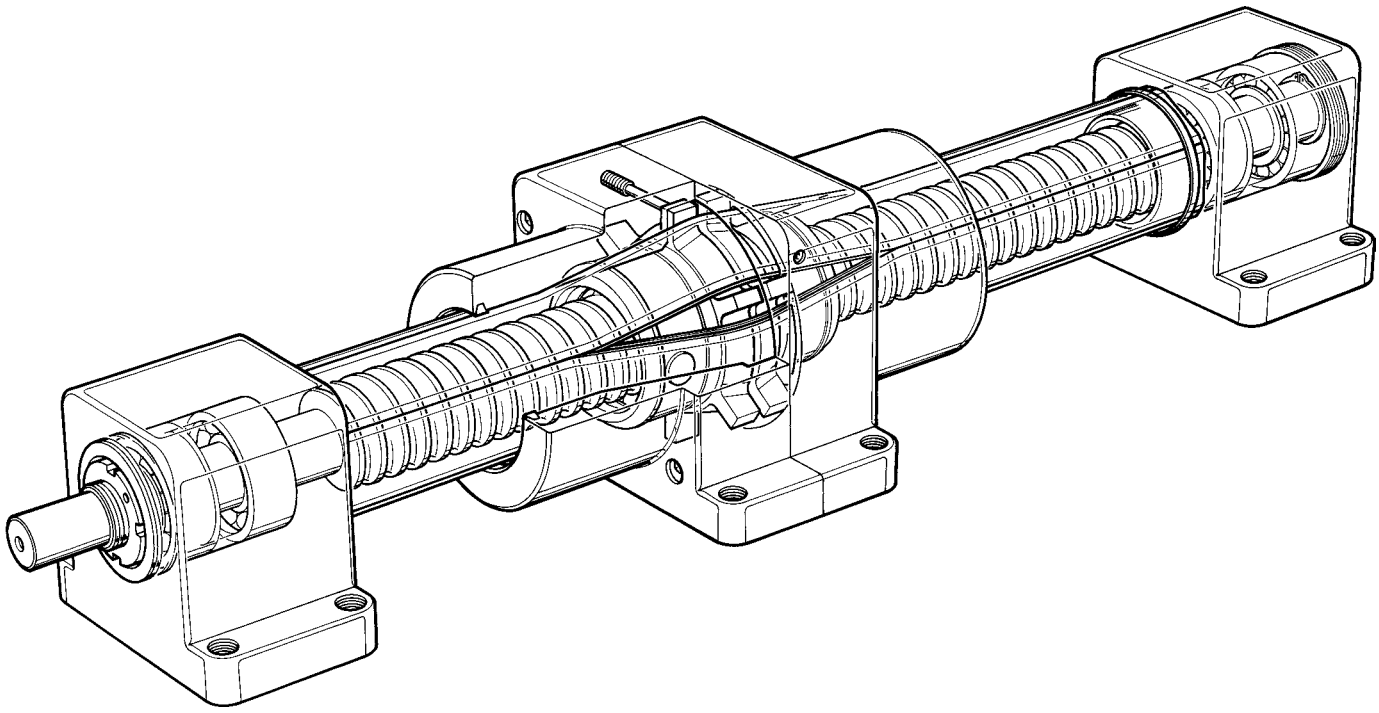
The KOKON® recirculating ball screw is perfectly suited for harsh, very dirty applications and applications with long travels.

Complete with shaft, cover and bearings as a ready-to-fit motion system. The central housing with preloaded nut unit and cover band return may be mounted in various orientations.

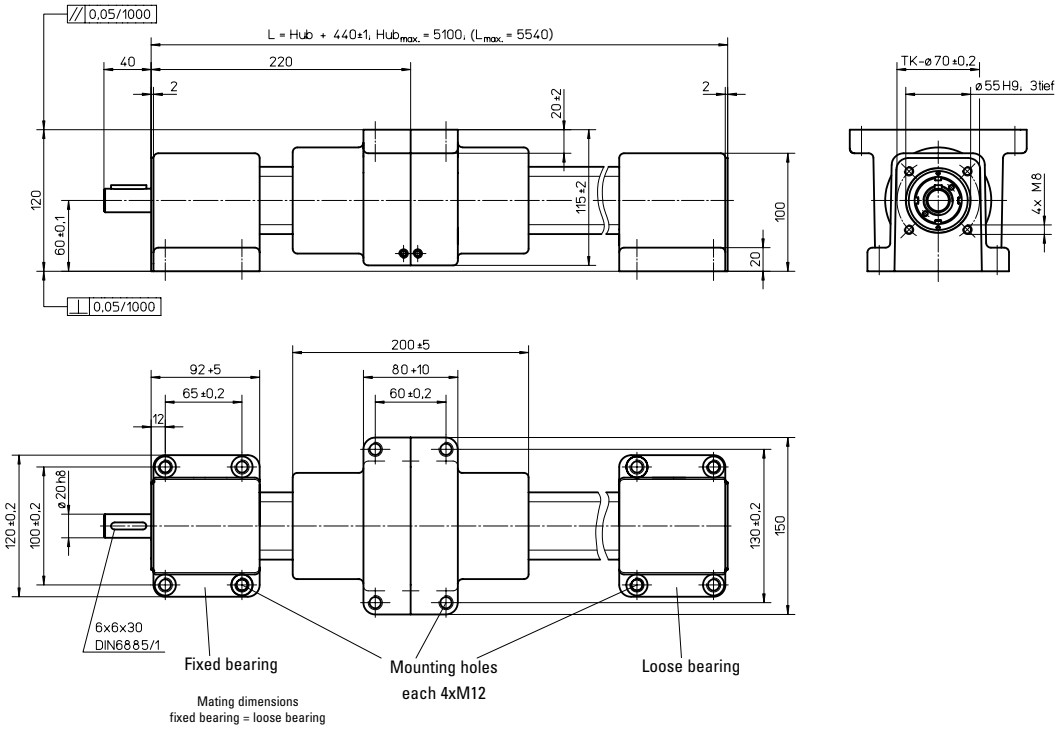
KGT cover in impact resistant elastomeric polymer PA 12.

Simple maintenance thanks to easy accessibility for relubrication.

All dimensions for the cover are dependent on the length of the elements.

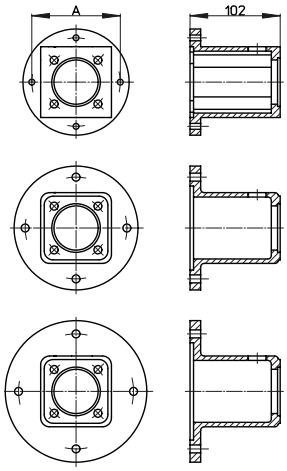


# KOKON® Fully protected recirculating ball screw




**Motor housing accessories**

| | A |
|---|---|
| C120 | 100 |
| C140 | 115 |
| C160 | 130 |




## Technical data

| | KOKON 4005 | KOKON 4010 |
|---|---|---|
| ▪ Travel speed: | max. 250 mm/s | max. 500 mm/s |
| ▪ Repetition accuracy: | ± 0.05 mm | ± 0.05 mm |
| ▪ Acceleration: | max. 20 m/s$^2$ | max. 20 m/s$^2$ |
| ▪ Speed [rpm]: | max. 3000 | max. 3000 |
| ▪ Diameter: | 40 mm | 40 mm |
| ▪ Motion system element: | Preloaded recirculating ball screw | |
| ▪ Lead: | 5 mm | 10 mm |
| ▪ Drag torque $M_0$: | 0.6 ± 0.2 Nm | 1.6 ± 0.4 Nm |
| ▪ Axial load capacity $C_0$: | 46000 N | 46000 N |
| Axial load capacity C[1]: | 23000 N | 42000 N |
| Axial load capacity C[2]: | 23000 N | 38000 N |
| ▪ Efficiency η: | 0.75 | 0.75 |
| ▪ Weights | | |
| Base without lift: | 4.40 kg | 4.40 kg |
| 100 mm lift: | 0.95 kg | 0.95 kg |
| Nut unit with housing: | 3.60 kg | 3.60 kg |

**Material characteristics**

**Cover band**

| | | |
|---|---|---|
| ▪ Cover band | PA12 | PA12 |
| ▪ Modulus of elasticity | 300 N/mm$^2$ | 300 N/mm$^2$ |
| ▪ Tear resistance | 40 N/mm$^2$ | 40 N/mm$^2$ |
| ▪ Shore hardness | 54 | 54 |
| ▪ Water absorption | max. 1.4 % | max. 1.4 % |
| ▪ Oil and coolant resistant | yes | yes |

[1] DIN 69051 Draft April 1978
[2] DIN 69051 Draft May 1989

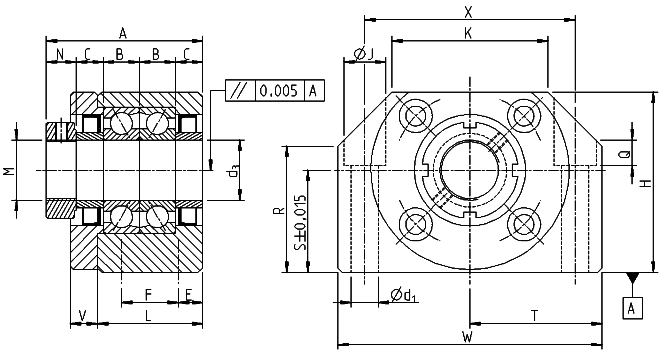
See p. 54 et seq. for calculation principles

## Notes

# Bearing units for ball screws - fixed bearing

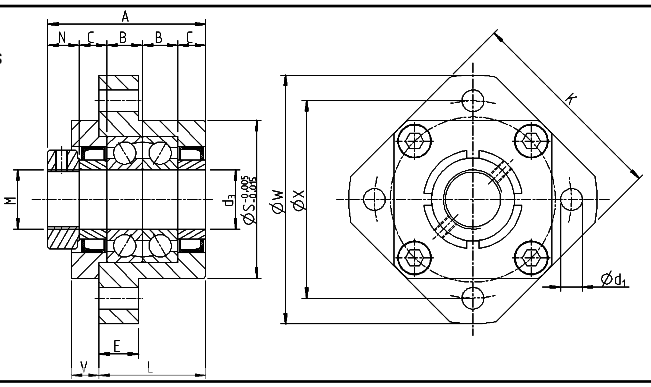
Type BK block

Ød1 hole
ØJ counter bore
Q depth



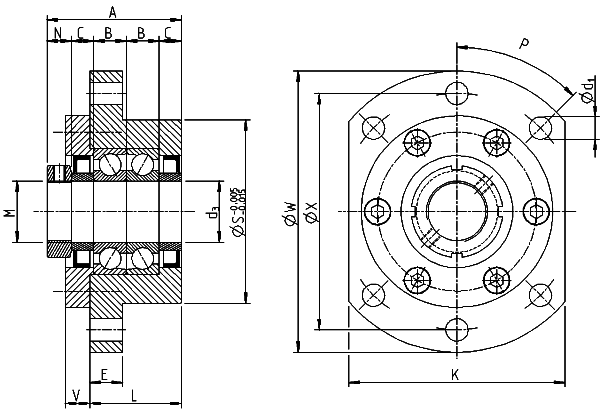

| Part number | W (mm) | H (mm) | S (mm) |
|---|---|---|---|
| BK 8 | 52 | 32 | 17 |
| BK 10 | 60 | 39 | 22 |
| BK 12 | 60 | 43 | 25 |
| BK 15 | 70 | 48 | 28 |
| BK 17 | 86 | 64 | 39 |
| BK 20 | 88 | 60 | 34 |
| BK 25 | 106 | 80 | 48 |
| BK 30 | 128 | 89 | 51 |
| BK 40 | 160 | 110 | 60 |

AFK type flange –
drilling pattern with 4 holes



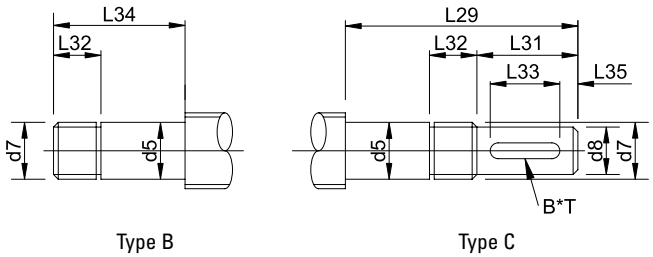

| Part number | W (mm) | X (mm) | S (mm) |
|---|---|---|---|
| AFK 8 | 43 | 35 | 28 |
| AFK 10 | 52 | 42 | 34 |
| AFK 12 | 54 | 44 | 36 |
| AFK 15 | 63 | 50 | 40 |
| AFK 20 | 85 | 70 | 57 |

AFK type flange –
drilling pattern with 6 holes




| Part number | W (mm) | X (mm) | S (mm) |
|---|---|---|---|
| AFK 25 | 122 | 100 | 80 |
| AFK 30 | 138 | 116 | 90 |
| AFK 40 | 176 | 150 | 120 |

Standard end journal




Type B Type C

| $d_0$ (mm) | $d_5$ $h_6$ (mm) | $d_7$ (mm) |
|---|---|---|
| 12 | 8 | M8x1.0 |
| 16 | 10 | M10x1.0 |
| 16 | 12 | M12x1.0 |
| 20 | 15 | M15x1.0 |
| 25 | 17 | M17x1.0 |
| 25 | 20 | M20x1.0 |
| 32 | 25 | M25x1.5 |
| 40 | 30 | M30x1.5 |
| 50 | 40 | M40x1.5 |

| Dimensions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R (mm) | T (mm) | X (mm) | K (mm) | $d_1$ (mm) | J (mm) | Q (mm) | M (mm) | L (mm) | A (mm) | E (mm) | F (mm) | V (mm) |
| 18.5 | 26 | 38 | 25 | 6.6 | 11 | 6.5 | M8x1.0 | 23 | 33 | 11.5 | | 5 |
| 26 | 30 | 46 | 34 | 6.6 | 11 | 6.5 | M10x1.0 | 25 | 38 | 6 | 13 | 6 |
| 30 | 30 | 46 | 34 | 6.6 | 11 | 6.5 | M12x1.0 | 25 | 38 | 6 | 13 | 6 |
| 33 | 35 | 54 | 40 | 6.6 | 11 | 6.5 | M15x1.0 | 27 | 40 | 6 | 15 | 7 |
| 46 | 43 | 68 | 50 | 9 | 14 | 8.5 | M17x1.0 | 35 | 52 | 8 | 19 | 9 |
| 42 | 44 | 70 | 52 | 9 | 14 | 8.5 | M20x1.0 | 35 | 52 | 8 | 19 | 9 |
| 59 | 53 | 85 | 64 | 11 | 17.5 | 11 | M25x1.5 | 42 | 65 | 10 | 22 | 11 |
| 63 | 64 | 102 | 76 | 14 | 20 | 13 | M30x1.5 | 45 | 74 | 11 | 23 | 12 |
| 80 | 80 | 130 | 100 | 18 | 26 | 17.5 | M40x1.5 | 61 | 93 | 14 | 33 | 14 |

| Technical data | | |
|---|---|---|
| Bearing type | Rated axial load (kN) | Maximum permissible load (kN) |
| EN8 | 1.64 | 1.48 |
| 7000A | 6.70 | 2.78 |
| 7001A | 7.25 | 3.10 |
| 7002A | 7.75 | 4.07 |
| 7203A | 14.00 | 5.95 |
| 7004A | 12.95 | 9.70 |
| 7205A | 20.60 | 11.70 |
| 7206B | 28.60 | 16.60 |
| 7208B | 45.00 | 27.70 |

| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| K (mm) | L (mm) | A. (mm) | E (mm) | V (mm) | $d_1$ (mm) | P (°) | M (mm) |
| 35 | 21 | 30 | 7 | 5 | 3.4 | 90 | M8x1.0 |
| 42 | 25 | 38 | 7 | 6 | 4.5 | 90 | M10x1.0 |
| 44 | 25 | 38 | 8 | 6 | 4.5 | 90 | M12x1.0 |
| 52 | 27 | 40 | 10 | 7 | 5.5 | 90 | M15x1.0 |
| 68 | 37 | 52 | 15 | 7 | 6.6 | 90 | M20x1.0 |

| Technical data | | |
|---|---|---|
| Bearing type | Rated axial load (kN) | Maximum permissible load (kN) |
| 608 | 1.64 | 3.35 |
| 7000A | 6.70 | 2.78 |
| 7001A | 7.25 | 3.10 |
| 7002A | 7.75 | 4.07 |
| 7204B | 18.30 | 9.70 |

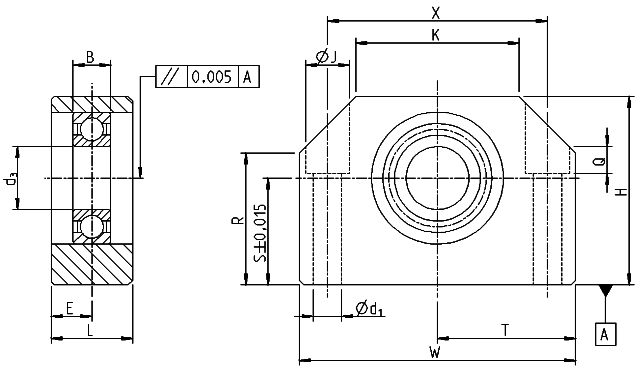
| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| K (mm) | L (mm) | A (mm) | E (mm) | V (mm) | $d_1$ (mm) | P (°) | M (mm) |
| 92 | 42 | 65 | 15 | 11 | 11 | 45 | M25x1.5 |
| 106 | 45 | 74 | 16 | 12 | 11 | 45 | M30x1.5 |
| 128 | 61 | 93 | 19 | 15 | 14 | 45 | M40x1.5 |

| Technical data | | |
|---|---|---|
| Bearing type | Rated axial load (kN) | Maximum permissible load (kN) |
| 7205B | 20.60 | 11.70 |
| 7206B | 28.60 | 16.60 |
| 7208B | 45.00 | 27.70 |

| Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $d_8$ $h_7$ (mm) | $L_{29}$ (mm) | $L_{31}$ (mm) | $L_{32}$ (mm) | $L_{34}$ (mm) | B $P_9$ (mm) | T (mm) | $L_{33}$ (mm) | $L_{35}$ (mm) | Note |
| 6 | 47/45 | 15 | 8 | 32/30 | 2 | 2.2 | 10 | 2.5 | BK/AFK |
| 8 | 58 | 20 | 10 | 38 | 3 | 1.8 | 15 | 2.5 | |
| 10 | 63 | 25 | 10 | 38 | 3 | 1.8 | 18 | 3.5 | |
| 14 | 77 | 35 | 12 | 42 | 4 | 2.5 | 27 | 4 | |
| 15 | 94 | 40 | 14 | 54 | 5 | 3 | 32 | 4.5 | BK only |
| 16 | 99 | 45 | 14 | 54 | 5 | 3 | 36 | 4.5 | |
| 20 | 120 | 55 | 17 | 65 | 6 | 3.5 | 45 | 5 | |
| 25 | 133 | 64 | 17 | 69 | 8 | 4 | 50 | 7 | |
| 36 | 165 | 78 | 21 | 87 | 10 | 5 | 63 | 7.5 | |

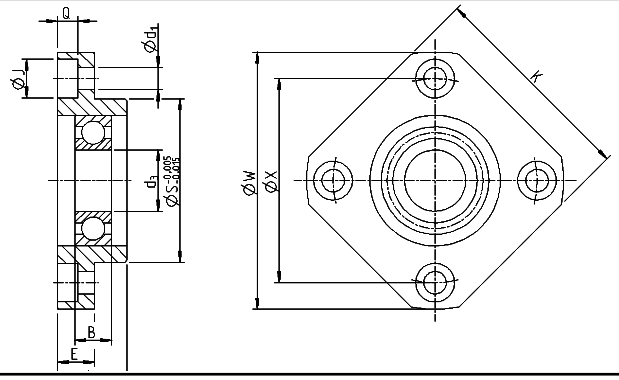
# Bearing units for ball screws – loose bearing

Type BF block



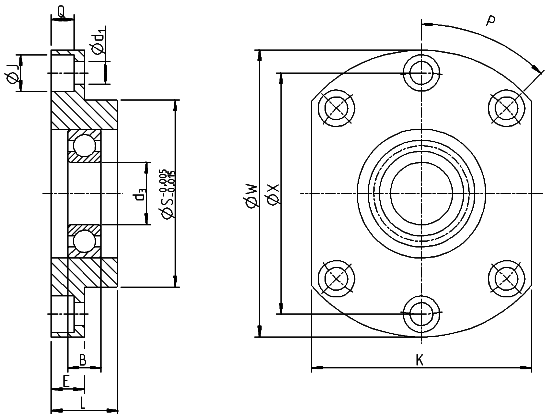

| Part number | W (mm) | H (mm) | S (mm) |
|---|---|---|---|
| BF 8 | 52 | 32 | 17 |
| BF 10 | 60 | 39 | 22 |
| BF 12 | 60 | 43 | 25 |
| BF 15 | 70 | 48 | 28 |
| BF 17 | 86 | 64 | 39 |
| BF 20 | 88 | 60 | 34 |
| BF 25 | 106 | 80 | 48 |
| BF 30 | 128 | 89 | 51 |
| BF 40 | 160 | 110 | 60 |

AFF type flange –
drilling pattern with 4 holes



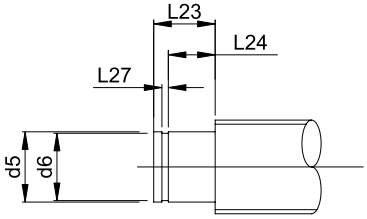

| Part number | W (mm) | X (mm) | S (mm) |
|---|---|---|---|
| AFF 8 | 43 | 35 | 28 |
| AFF 10 | 52 | 42 | 34 |
| AFF 12 | 54 | 44 | 36 |
| AFF 15 | 63 | 50 | 40 |
| AFF 20 | 85 | 70 | 57 |

AFF type flange –
drilling pattern with 6 holes




| Part number | W (mm) | X (mm) | S (mm) |
|---|---|---|---|
| AFF 25 | 122 | 100 | 80 |
| AFF 30 | 138 | 116 | 90 |
| AFF 40 | 176 | 150 | 120 |

Standard end journal




Type D (AFF, BF)

| $d_0$ (mm) | $d_5$ h6 (mm) | $d_6$ h12 (mm) |
|---|---|---|
| 12 | 8 | 7.6 |
| 16 | 10 | 11.5 |
| 16 | 12 | 11.5 |
| 20 | 15 | 14.0 |
| 25 | 17 | 19.0 |
| 25 | 20 | 19.0 |
| 32 | 25 | 23.9 |
| 40 | 30 | 28.6 |
| 50 | 40 | 37.5 |

| Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| R (mm) | T (mm) | X (mm) | K (mm) | $d_1$ (mm) | J (mm) | Q (mm) | L (mm) | E (mm) |
| 18.5 | 26 | 38 | 25 | 6.6 | 11 | 6.5 | 20 | 10 |
| 26 | 30 | 46 | 34 | 6.6 | 11 | 6.5 | 20 | 10 |
| 35 | 30 | 46 | 35 | 6.6 | 11 | 6.5 | 20 | 10 |
| 38 | 35 | 54 | 40 | 6.6 | 11 | 6.5 | 20 | 10 |
| 46 | 43 | 68 | 50 | 9 | 14 | 8.5 | 23 | 11.5 |
| 50 | 44 | 70 | 52 | 9 | 14 | 8.5 | 26 | 13 |
| 70 | 53 | 85 | 64 | 11 | 17.5 | 11 | 30 | 15 |
| 78 | 64 | 102 | 76 | 14 | 20 | 13 | 32 | 16 |
| 90 | 80 | 130 | 100 | 18 | 26 | 17.5 | 37 | 18.5 |

| Technical data | |
|---|---|
| Bearing type | Rated radial load (kN) |
| 606 | 2.31 |
| 608 | 3.35 |
| 6001 | 4.65 |
| 6002 | 5.70 |
| 6203 | 9.75 |
| 6004 | 9.55 |
| 6205 | 14.30 |
| 6206 | 19.80 |
| 6208 | 29.70 |

| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| K (mm) | L (mm) | E (mm) | N (mm) | $d_1$ (mm) | J (mm) | Q (mm) | P (°) |
| 35 | 11 | 6 | 4 | 3.4 | 6.5 | 4 | 90 |
| 42 | 12 | 7 | 4 | 4.5 | 8 | 5 | 90 |
| 44 | 15 | 8 | 4 | 4.5 | 8 | 5 | 90 |
| 52 | 17 | 9 | 4 | 5.5 | 9.5 | 6 | 90 |
| 68 | 20 | 14 | 4 | 6.6 | 11 | 10 | 90 |

| Technical data | |
|---|---|
| Bearing type | Rated radial load (kN) |
| 606 | 2.31 |
| 608 | 3.35 |
| 6001 | 4.65 |
| 6002 | 5.70 |
| 6204 | 13.00 |

| Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| K (mm) | L (mm) | E (mm) | N (mm) | $d_1$ (mm) | J (mm) | Q (mm) | P (°) |
| 92 | 30 | 15 | 6 | 11 | 17.5 | 11 | 45 |
| 106 | 32 | 15 | 6 | 11 | 17.5 | 11 | 45 |
| 128 | 36 | 18 | 6 | 14 | 20 | 13 | 45 |

| Technical data | |
|---|---|
| Bearing type | Rated radial load (kN) |
| 6205 | 14.30 |
| 6206 | 19.80 |
| 6208 | 29.70 |

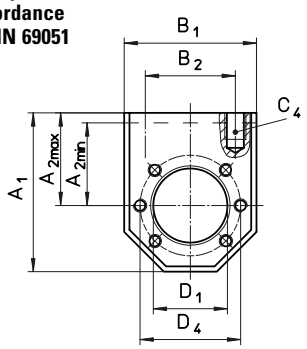
| Dimensions | | |
|---|---|---|
| $L_{23}$ (mm) | $L_{24}$ (mm) | $L_{27}$ H13 (mm) |
| 7.5 | 6 | 0.9 |
| 9 | 7 | 1.1 |
| 10.5 | 8 | 1.1 |
| 13 | 9 | 1.1 |
| 16 | 12 | 1.3 |
| 16 | 12 | 1.3 |
| 19 | 15 | 1.3 |
| 21 | 16 | 1.6 |
| 25 | 18 | 1.85 |

# KON adapter support

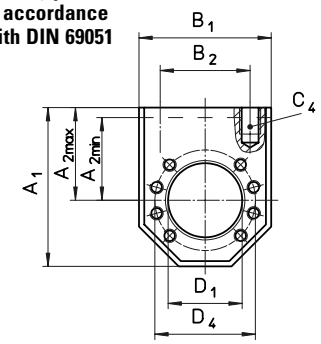
Adapter support for radial fixing of KGF ball screw flanged nut.

**Material:** 1.0065 (St37) or 1.0507 (St52).

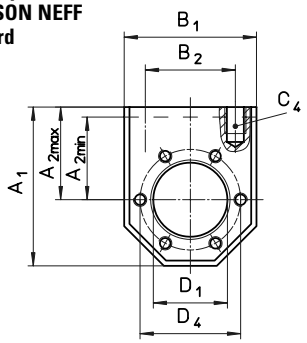
**Drilling pattern 1 in accordance with DIN 69051**

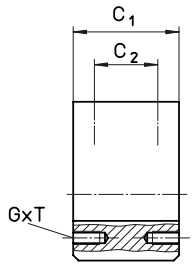



**Drilling pattern 2 in accordance with DIN 69051**




**Drilling pattern 4 THOMSON NEFF standard**




| For KGF | Drilling pattern | Dimensions [mm] $A_1$ | $A_{2\ max}$ [1)] | $A_{2\ min}$ | $B_1$ | $B_2$ | $C_1$ | $C_2$ | $C_4$ [1)] | $D_1$ | $D_4$ | Th x D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KON 1605 | 4 | 60 | 35 | 25 | 50 | 34 | 40 | 24 | M 8x15 | 28 | 38 | M 5x10 |
| KON 1605/1610 | 1 | 60 | 35 | 25 | 50 | 34 | 40 | 24 | M 8x15 | 28 | 38 | M 5x10 |
| KON 2005 | 4 | 68 | 37.5 | 29 | 58 | 39 | 40 | 24 | M 8x15 | 32 | 45 | M 6x12 |
| KON 2005 | 1 | 68 | 37.5 | 30 | 58 | 39 | 40 | 24 | M 8x15 | 36 | 47 | M 6x12 |
| KON 2020/2050 | 4 | 75 | 42.5 | 32.5 | 65 | 49 | 40 | 24 | M 10x15 | 35 | 50 | M 6x12 |
| KON 2505 | 4 | 75 | 42.5 | 32.5 | 65 | 49 | 40 | 24 | M 10x15 | 38 | 50 | M 6x12 |
| KON 2505/2510/2520/ 2525/2550 | 1 | 75 | 42.5 | 32.5 | 65 | 49 | 40 | 24 | M 10x12 | 40 | 51 | M 6x12 |
| KON 3205 | 4 | 82 | 45 | 37 | 75 | 54 | 50 | 30 | M 10x12 | 45 | 58 | M 6x12 |
| KON 3205/3232 | 1 | 92 | 50 | 40 | 85 | 60 | 50 | 30 | M 12x15 | 50 | 65 | M 8x12 |
| KON 3210/3240/4005 | 4 | 92 | 50 | 42 | 85 | 60 | 50 | 30 | M 12x15 | 53 | 68 | M 6x12 |
| KON 3210/3220 | 1 | 92 | 50 | 40 | 85 | 60 | 50 | 30 | M 12x15 | 53 | 65 | M 8x12 |
| KON 4010 | 4 | 120 | 70 | 50 | 100 | 76 | 65 | 41 | M 14x25 | 63 | 78 | M 8x14 |
| KON 4005/4010/4020/4040 | 2 | 120 | 70 | 50 | 100 | 76 | 65 | 41 | M 14x25 | 63 | 78 | M 8x14 |
| KON 5010 | 4 | 135 | 77.5 | 57.5 | 115 | 91 | 88 | 64 | M 16x25 | 72 | 90 | M 10x16 |
| KON 5010 | 2 | 135 | 77.5 | 57.5 | 115 | 91 | 88 | 64 | M 16x25 | 75 | 93 | M 10x16 |
| KON 5020 | 2 | 152 | 87.5 | 65 | 130 | 101 | 88 | 64 | M 16x30 | 85 | 103 | M 10x16 |
| KON 6310 | 4 | 152 | 87.5 | 65 | 130 | 101 | 88 | 64 | M 16x30 | 85 | 105 | M 10x16 |
| KON 6320 | 2 | 172 | 97.5 | 75 | 150 | 121 | 88 | 64 | M 16x30 | 95 | 115 | M 12x18 |
| KON 8010 | 4 | 172 | 97.5 | 75 | 150 | 121 | 88 | 64 | M 16x30 | 105 | 125 | M 12x18 |

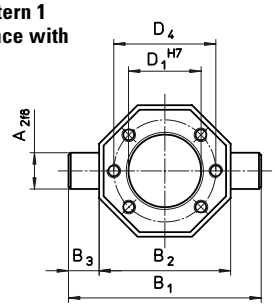
[1)] Standard = $A_{2\ max}$ (as delivered)

# KAR universal joint adapter

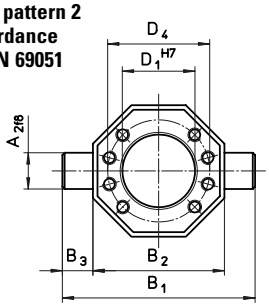
Universal joint adapter for universally mounting on KGF ball screw flanged nut.

**Material:** 1.0065 (St37) or 1.0507 (St52).

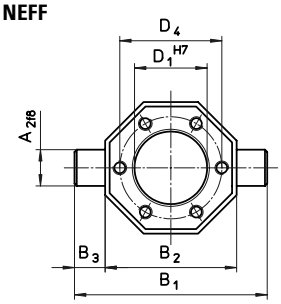
**Drilling pattern 1 in accordance with DIN 69051**

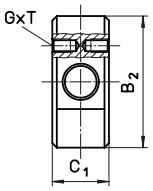



**Drilling pattern 2 in accordance with DIN 69051**




**Drilling pattern 4 THOMSON NEFF standard**




| For KGF | Drilling pattern | Dimensions [mm] $A_2$ | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $D_1$ | $D_4$ | Th x D |
|---|---|---|---|---|---|---|---|---|---|
| KAR 1605 | 4 | 12 | 70 | 50 | 10 | 20 | 28 | 38 | M 5x10 |
| KAR 1605/1610 | 1 | 12 | 70 | 50 | 10 | 20 | 28 | 38 | M 5x10 |
| KAR 2005 | 4 | 16 | 85 | 58 | 13.5 | 25 | 32 | 45 | M 6x12 |
| KAR 2005 | 1 | 16 | 85 | 58 | 13.5 | 25 | 36 | 47 | M 6x12 |
| KAR 2020/2050 | 4 | 18 | 95 | 65 | 15 | 25 | 35 | 50 | M 6x12 |
| KAR 2505 | 4 | 18 | 95 | 65 | 15 | 25 | 38 | 50 | M 6x12 |
| KAR 2505/2510/2520/2525/2550 | 1 | 18 | 95 | 65 | 15 | 25 | 40 | 51 | M 6x12 |
| KAR 3205 | 4 | 20 | 110 | 75 | 17.5 | 30 | 45 | 58 | M 6x12 |
| KAR 3205/3232 | 1 | 25 | 125 | 85 | 20 | 30 | 50 | 65 | M 8x12 |
| KAR 3210/3240/4005 | 4 | 25 | 125 | 85 | 20 | 30 | 53 | 68 | M 6x12 |
| KAR 3210/3220 | 1 | 25 | 125 | 85 | 20 | 30 | 53 | 65 | M 8x12 |
| KAR 4010 | 4 | 30 | 140 | 100 | 20 | 40 | 63 | 78 | M 8x14 |
| KAR 4005/4010/4020/4040 | 2 | 30 | 140 | 100 | 20 | 40 | 63 | 78 | M 8x14 |
| KAR 5010 | 4 | 40 | 165 | 115 | 25 | 50 | 72 | 90 | M 10x16 |
| KAR 5010 | 2 | 40 | 165 | 115 | 25 | 50 | 75 | 93 | M 10x16 |
| KAR 5020 | 2 | 40 | 180 | 130 | 25 | 50 | 85 | 103 | M 10x16 |
| KAR 6310 | 4 | 40 | 180 | 130 | 25 | 50 | 85 | 105 | M 10x16 |
| KAR 6320 | 2 | 50 | 200 | 150 | 25 | 60 | 95 | 115 | M 12x18 |
| KAR 8010 | 4 | 50 | 200 | 150 | 25 | 60 | 105 | 125 | M 10x16 |

# SF helical spring cover

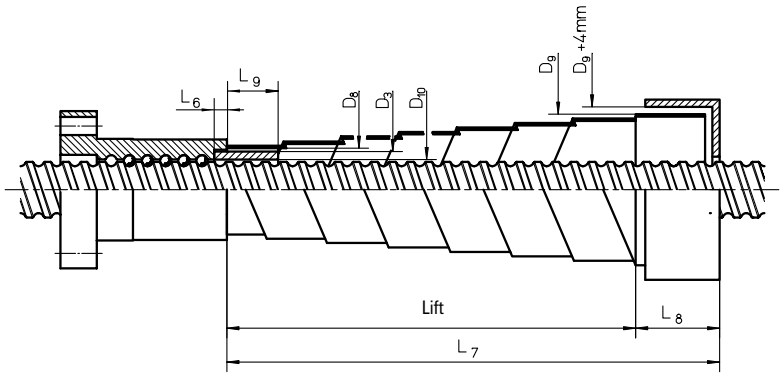
Helical spring cover for protection against ambient influences. Suitable for horizontal and vertical installation.

**Material:** Hardened spring steel.

A centering sleeve is required on the mounting face of the nut where a helical spring cover is used.

Only available for KGF-D, KGF-N, KGM-D and KGM-N style nuts.

Table headings are nominal diameter x lead (e.g. 16x05).




**For 16x05**
**16x10**

| $D_3$ = 22 mm<br>$D_{10}$ = 17 mm<br>$L_6$ = 6 mm<br>$L_9$ = 21 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 25/100/20 | 60 | 35 |
| SF 25/150/20 | 110 | 38 |
| SF 25/200/20 | 160 | 40 |
| SF 25/250/20 | 210 | 44 |
| SF 25/300/30 | 240 | 43 |
| SF 25/350/30 | 290 | 46 |
| SF 25/400/30 | 340 | 49 |
| SF 25/450/40 | 370 | 48 |
| SF 25/500/40 | 420 | 51 |

**For 25x05 25x25**
**25x10 25x50**
**25x10**

| $D_3$ = 28 mm<br>$D_{10}$ = 26 mm<br>$L_6$ = 6 mm<br>$L_9$ = 21 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 30/150/30 | 90 | 39 |
| SF 30/250/30 | 190 | 44 |
| SF 30/350/30 | 290 | 49 |
| SF 30/450/40 | 370 | 53 |
| SF 30/550/40 | 470 | 58 |
| SF 30/650/50 | 550 | 55 |
| SF 30/750/50 | 650 | 59 |

**For 20x05**
**20x20**
**20x50**

| $D_3$ = 26 mm<br>$D_{10}$ = 21 mm<br>$L_6$ = 6 mm<br>$L_9$ = 21 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 30/150/30 | 90 | 39 |
| SF 30/250/30 | 190 | 44 |
| SF 30/350/30 | 290 | 49 |
| SF 30/450/40 | 370 | 53 |
| SF 30/550/40 | 470 | 58 |
| SF 30/650/50 | 550 | 55 |
| SF 30/750/50 | 650 | 59 |

**For 32x05**
**32x40**

| $D_3$ = 38 mm<br>$D_{10}$ = 33 mm<br>$L_6$ = 6 mm<br>$L_9$ = 26 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 40/150/30 | 90 | 51 |
| SF 40/250/30 | 190 | 56 |
| SF 40/350/30 | 290 | 60 |
| SF 40/450/40 | 370 | 64 |
| SF 40/550/40 | 470 | 68 |
| SF 40/350/50 | 250 | 55 |
| SF 40/450/50 | 350 | 59 |

**For 32x05**
**32x40**
**(continued)**

| $D_3$ = 38 mm<br>$D_{10}$ = 33 mm<br>$L_6$ = 6 mm<br>$L_9$ = 26 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 40/550/50 | 450 | 61 |
| SF 40/650/50 | 550 | 65 |
| SF 40/750/50 | 650 | 69 |
| SF 40/450/60 | 330 | 55 |
| SF 40/550/60 | 430 | 58 |
| SF 40/650/60 | 530 | 62 |
| SF 40/750/60 | 630 | 66 |
| SF 40/900/60 | 780 | 70 |
| SF 40/650/75 | 500 | 62 |
| SF 40/750/75 | 600 | 66 |
| SF 40/900/75 | 750 | 72 |
| SF 40/1100/78 | 950 | 78 |
| SF 40/1300/75 | 1150 | 84 |
| SF 40/1500/75 | – | 90 |
| SF 40/1000/100 | 800 | 66 |
| SF 40/1200/100 | 1000 | 70 |
| SF 40/1500/100 | 1300 | 78 |
| SF 40/1800/100 | 1600 | 82 |
| SF 40/1800/120 | 1560 | 82 |
| SF 40/2000/120 | 1760 | 86 |
| SF 40/2200/120 | – | 91 |

**For 32x10**
**(32x20)**

| $D_3$ = 44 (48) mm<br>$D_{10}$ = 35 (39) mm<br>$L_6$ = 8 mm<br>$L_9$ = 27 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 50/150/30 | 90 | 63 |
| SF 50/250/30 | 190 | 68 |
| SF 50/250/50 | 150 | 62 |
| SF 50/350/50 | 250 | 66 |
| SF 50/450/50 | 350 | 70 |
| SF 50/550/50 | 450 | 73 |
| SF 50/550/60 | 430 | 68 |
| SF 50/650/60 | 530 | 73 |
| SF 50/750/60 | 630 | 76 |
| SF 50/750/75 | 600 | 78 |
| SF 50/900/75 | 750 | 84 |
| SF 50/1100/75 | 950 | 90 |
| SF 50/1100/100 | 900 | 77 |
| SF 50/1300/100 | 1100 | 80 |
| SF 50/1500/100 | 1300 | 87 |
| SF 50/1800/100 | – | 94 |
| SF 50/1700/120 | 1460 | 91 |
| SF 50/1900/120 | 1660 | 97 |
| SF 50/2100/120 | 1860 | 102 |
| SF 50/2300/120 | – | 105 |
| SF 50/2500/120 | – | 111 |
| SF 50/2800/120 | – | 118 |
| SF 50/2800/150 | 2500 | 119 |
| SF 50/3000/150 | – | 124 |
| SF 50/3000/180 | 2640 | 123 |
| SF 50/3250/180 | – | 130 |
| SF 50/3250/200 | 2650 | 128 |
| SF 50/3500/200 | – | 134 |

[1] $L_{7v} = L_7$ vertical installation
[2] $L_{7h} = L_7$ horizontal installation

# SF helical spring cover

**For 40x05**
**40x40**

| $D_3$ = 48 mm<br>$D_{10}$ = 42 mm<br>$L_6$ = 6 mm<br>$L_9$ = 26 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 50/150/30 | 90 | 63 |
| SF 50/250/30 | 190 | 68 |
| SF 50/250/50 | 150 | 62 |
| SF 50/350/50 | 250 | 66 |
| SF 50/450/50 | 350 | 70 |
| SF 50/550/50 | 450 | 73 |
| SF 50/550/60 | 430 | 68 |
| SF 50/650/60 | 530 | 73 |
| SF 50/750/60 | 630 | 76 |
| SF 50/750/75 | 600 | 78 |
| SF 50/900/75 | 750 | 84 |
| SF 50/1100/75 | 950 | 90 |
| SF 50/1100/100 | 900 | 77 |
| SF 50/1300/100 | 1100 | 80 |
| SF 50/1500/100 | 1300 | 87 |
| SF 50/1800/100 | – | 94 |
| SF 50/1700/120 | 1460 | 91 |
| SF 50/1900/120 | 1660 | 97 |
| SF 50/2100/120 | 1860 | 102 |
| SF 50/2300/120 | – | 105 |
| SF 50/2500/120 | – | 111 |
| SF 50/2800/120 | – | 118 |
| SF 50/2800/150 | 2500 | 119 |
| SF 50/3000/150 | – | 124 |
| SF 50/3000/180 | 2640 | 123 |
| SF 50/3250/180 | – | 130 |
| SF 50/3250/200 | 2650 | 128 |
| SF 50/3500/200 | – | 134 |

**For 40x10**
**40x20**

| $D_3$ = 53 mm<br>$D_{10}$ = 46 mm<br>$L_6$ = 10 mm<br>$L_9$ = 35 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 55/150/30 | 90 | 68 |
| SF 55/250/30 | 190 | 73 |
| SF 55/250/50 | 150 | 66 |
| SF 55/350/50 | 250 | 71 |
| SF 55/450/50 | 350 | 74 |
| SF 55/550/50 | 450 | 77 |
| SF 55/550/60 | 430 | 75 |
| SF 55/650/60 | 530 | 79 |
| SF 55/750/60 | 630 | 83 |
| SF 55/750/75 | 600 | 83 |
| SF 55/900/75 | 750 | 89 |
| SF 55/1100/75 | 950 | 94 |
| SF 55/1100/100 | 900 | 88 |
| SF 55/1300/100 | 1100 | 89 |
| SF 55/1500/100 | 1300 | 94 |
| SF 55/1800/100 | – | 102 |
| SF 55/1700/120 | 1460 | 96 |
| SF 55/1900/120 | 1660 | 103 |
| SF 55/2100/120 | 1860 | 106 |
| SF 55/2300/120 | 2060 | 110 |
| SF 55/2500/120 | – | 117 |
| SF 55/2800/120 | – | 119 |
| SF 55/2800/150 | 2500 | 122 |
| SF 55/3000/150 | – | 126 |
| SF 55/3000/180 | 2640 | 127 |
| SF 55/3250/180 | – | 130 |

**For 50x10**
**(50x20)**

| $D_3$ = 62 mm<br>$D_{10}$ = 56 mm<br>$L_6$ = 11 mm<br>$L_9$ = 39 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 65/250/30 | 190 | 85 |
| SF 65/250/50 | 150 | 76 |
| SF 65/350/50 | 250 | 83 |
| SF 65/450/50 | 350 | 88 |
| SF 65/550/60 | 430 | 88 |
| SF 65/650/60 | 530 | 92 |
| SF 65/750/60 | 630 | 96 |
| SF 65/750/75 | 600 | 93 |
| SF 65/900/75 | 750 | 99 |
| SF 65/1100/75 | 950 | 107 |
| SF 65/1100/100 | 900 | 95 |
| SF 65/1300/100 | 1100 | 100 |
| SF 65/1500/100 | 1300 | 109 |
| SF 65/1800/100 | – | 120 |
| SF 65/1700/120 | 1460 | 106 |
| SF 65/1900/120 | 1660 | 109 |
| SF 65/2100/120 | 1860 | 113 |
| SF 65/2300/120 | 2060 | 118 |
| SF 65/2500/120 | – | 128 |
| SF 65/2800/120 | – | 132 |
| SF 65/2800/150 | 2500 | 133 |
| SF 65/3000/150 | – | 139 |
| SF 65/3000/180 | 2640 | 136 |
| SF 65/3250/180 | – | 146 |
| SF 65/3250/200 | 2850 | 140 |

**For 63x10**
**63x20**

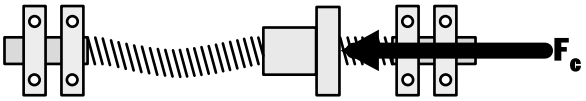
| $D_3$ = 74 mm<br>$D_{10}$ = 66 mm<br>$L_6$ = 11 mm<br>$L_9$ = 49 mm | | |
|---|---|---|
| Designation<br>$D_8/L_{7v}$ [1]/$L_8$ | $L_{7h}$ [2] | $D_9$ |
| SF 75/250/50 | 150 | 89 |
| SF 75/350/50 | 250 | 94 |
| SF 75/450/50 | 350 | 101 |
| SF 75/550/60 | 430 | 100 |
| SF 75/650/60 | 530 | 103 |
| SF 75/750/60 | 630 | 109 |
| SF 75/650/75 | 500 | 99 |
| SF 75/750/75 | 600 | 104 |
| SF 75/900/75 | 750 | 111 |
| SF 75/1100/100 | 900 | 108 |
| SF 75/1300/100 | 1100 | 114 |
| SF 75/1500/100 | 1300 | 120 |
| SF 75/1700/100 | 1500 | 126 |
| SF 75/1500/120 | 1260 | 115 |
| SF 75/1800/120 | 1560 | 125 |
| SF 75/2000/120 | 1760 | 128 |
| SF 75/2200/120 | – | 132 |
| SF 75/2000/150 | 1700 | 135 |
| SF 75/2400/150 | 2100 | 141 |
| SF 75/2800/150 | – | 145 |
| SF 75/2800/180 | 2440 | 142 |
| SF 75/3000/180 | – | 148 |
| SF 75/3250/180 | – | 156 |
| SF 75/3250/200 | 2850 | 148 |
| SF 75/3500/200 | – | 158 |

[1] $L_{7v} = L_7$ vertical installation
[2] $L_{7h} = L_7$ horizontal installation

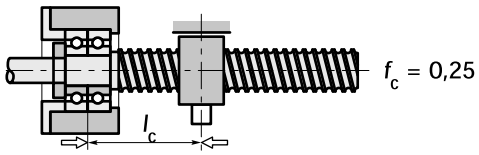
# Calculation

## Buckling load

Buckling load $F_c$ [N]

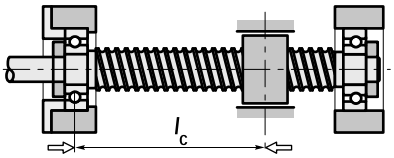



1A, 1B



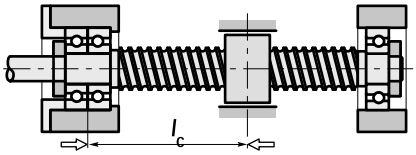

$f_c = 0{,}25$

2



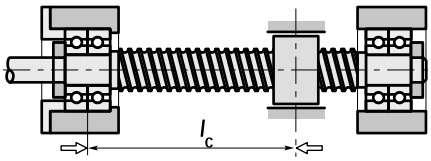

$f_c = 1$

3




$f_c = 2$

4




$f_c = 4$

$F_{cp} = 0.8 \cdot F_c \cdot f_c \geq F_{max.}$ [N]

$F_c = \dfrac{1.017 \cdot 10^5 \cdot d^4}{l_c^2}$ [N]

$d \approx \dfrac{d_0 + d_3}{2}$ [mm]

$l_c$ [mm]

$D_w$ = ball diameter

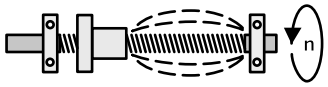
$d_3 \approx d_0 - D_w$

Index p → permissible

## Speeds

| Limit speed $n_l$ [min$^{-1}$] | Return system | Single | Overall |
|---|---|---|---|
| | $n'$ [min$^{-1}$] | $\dfrac{140.000}{d_0\,[mm]}$ | $\dfrac{100.000}{d_0\,[mm]}$ |

Critical speed $n_{cr}$ [min$^{-1}$]




$n_{crp} = 0.8 \cdot n_{cr} \cdot f_{cr} > n_{max}$ [min$^{-1}$]

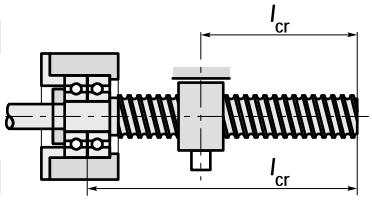
$n_{cr} = 1.2 \cdot 10^8 \cdot \dfrac{d}{l_{cr}^2}$ [min$^{-1}$]

$d \approx \dfrac{d_0 + d_3}{2}$ [mm]

$d_3 \approx d_0 - D_w$ [mm] $D_w$ = ball diameter

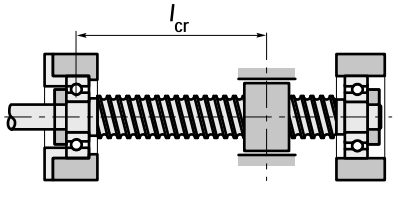
index p → permissible

1A, 1B



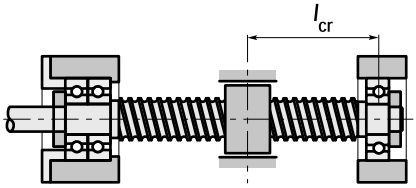

$f_{cr} = 0{,}356$

2



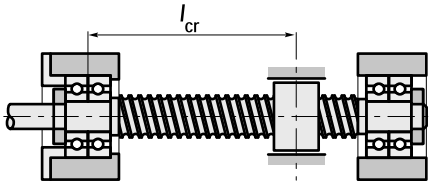

$f_{cr} = 1$

3




$f_{cr} = 1{,}56$

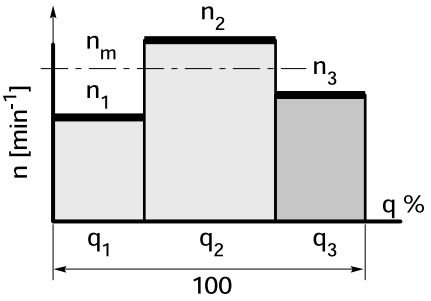
4



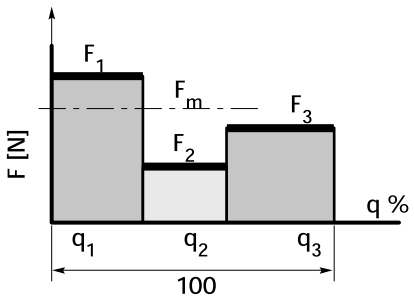

$f_{cr} = 2{,}27$

# Calculation

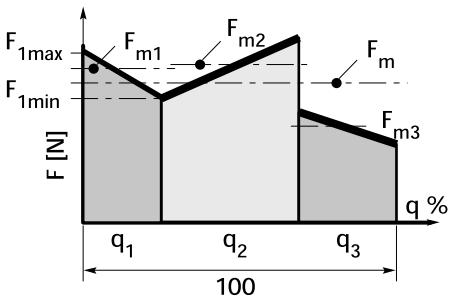
## Service life




$$n_m = \sum_{i=1}^{n} n_i \cdot \frac{q_i}{100} \; [\text{min}^{-1}]$$




$$F_m = \left( \sum_{i=1}^{n} F_i^3 \cdot \frac{n_i}{n_m} \cdot \frac{q_i}{100} \right)^{1/3} [\text{N}]$$




$$F_m = \left( \sum_{i=1}^{n} F_{mi}^3 \cdot \frac{n_i}{n_m} \cdot \frac{q_i}{100} \right)^{1/3} [\text{N}]$$

Modified service life in revolutions

$$L_{10} = \left[ \frac{C_{am}}{F_m} \right]^3 \cdot 10^6$$

Modified service life in hours

$$L_{h10} = \frac{L_{10}}{n_m \cdot 60}$$

$n_m$ = Equivalent speed

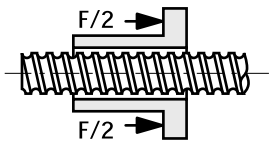
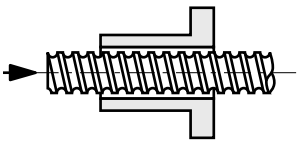
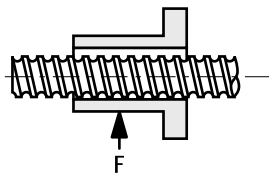
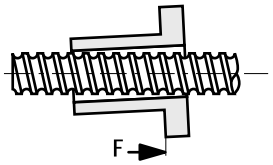
$F_m$ = Equivalent load

$C_{am}$ = Modified dyn. rated load [N]

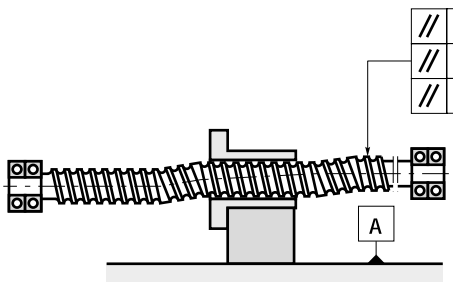
Rated load/service life calculation based on DIN 69 051/4

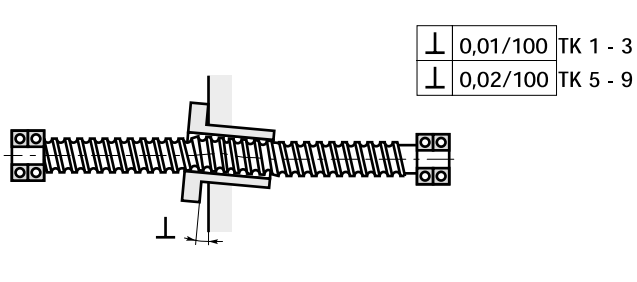
# Installation

## Application of force

| Optimum | | Please contact us regarding radial forces | |
|---|---|---|---|
|   |  |   |   |

## Installation tolerances

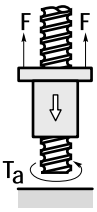


# Calculation

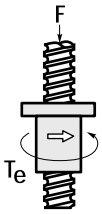
**Efficiency and torques**

Efficiency is affected by many operating influences as well as geometric data.
This means that practical values may fluctuate in relation to the calculated values by ± 5%.




Theoretical efficiency ($\eta$) when converting torque into axial force is calculated as follows:

$$\eta = \frac{\tan \varphi}{\tan (\varphi - \rho'')} \quad \text{where } \tan \varphi = \frac{P_{h0}}{d_0 \cdot \pi}$$




The theoretical efficiency ($\eta'$) when converting an axial force into a torque is calculated as follows:

$$\eta' = \frac{\tan (\varphi - \rho'')}{\tan \varphi} \quad \text{where } \tan \varphi = \frac{P_{h0}}{d_0 \cdot \pi}$$

The theoretical level of efficiency is reduced by around 5% to make allowances for operating influences such as speed, temperature and lubrication. If the ratio of load F to dynamic rated load Cam is less than 0.5, a further reduction is made based on the load factor $f_l$ (see table below).

The resulting efficiency only applies to the ball screw. The figure assumes the ball screw is lubricated but has no wiper or shaft bearing.

If you are interested in special measures for improving efficiency, please contact us.

Friction angle $\rho''$ (rhò)

$\rho'' = 0.23°$ At tolerance class P and T1 – T3

$\rho'' = 0.34°$ At tolerance class T5

$P_{h0}$
+
$d_0$ See tables of dimensions

| $\frac{F}{C_{am}}$ | $f_l$ |
|---|---|
| 0.4 | 0.99 |
| 0.3 | 0.98 |
| 0.2 | 0.97 |
| 0.1 | 0.96 |

**Example**

$$\frac{F}{C_{am}} = \frac{10.000}{53.900} = 0{,}19 \rightarrow f_l \approx 0.97$$

$$\tan \varphi = \frac{10}{40 \cdot \pi} = 0.08$$

$$\varphi = 4.55°$$

Practical efficiency after running in

$F = 10{,}000$ N

$C_{am} = 53{,}900$ N

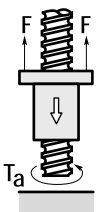
$\eta = 0.08$
$\tan(4.55° + 0.23°)$

$\eta = 0.957$

$\eta_p = \eta \cdot 0.95 \cdot f_l$

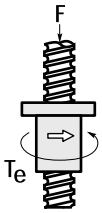
$\eta_p = 0.957 \cdot 0.95 \cdot 0.97$

$\eta_p = 0.88 \pm 5\%$




Converting torque into an axial force requires an input torque of:

$$T_a = \frac{F \cdot P_{h0}}{2000 \cdot \pi \cdot \eta_p} \text{ [Nm]}$$




Converting an axial force into a torque produces an output torque of:

$$T_e = \frac{F \cdot P_{h0} \cdot \eta'_p}{2000 \cdot \pi} \text{ [Nm]}$$

F = Axial load

$C_{am}$ = Dynamic rated load

$f_l$ = Load factor

$\varphi$ (phi) = Lead angle

$\eta$ (êta) = Theoretical efficiency

$\eta_p$ / $\eta'_p$ = Practical efficiency

$T_a$ = Input torque [Nm]

$T_e$ = Output torque [Nm]

# Calculation

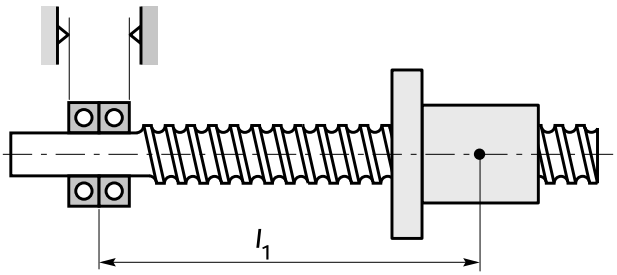
**Stiffness R**

The total stiffness Rtot of a ball screw is composed of the stiffness of the shaft $R_s$ and the stiffness of the nut unit $R_{nu,\,ar}$.

$$\frac{1}{R_{tot}} = \frac{1}{R_s} + \frac{1}{R_{nu,\,ar}} \quad [N/\mu m]$$

Shaft stiffness depends on the type of bearing.

Fixed bearing at one end

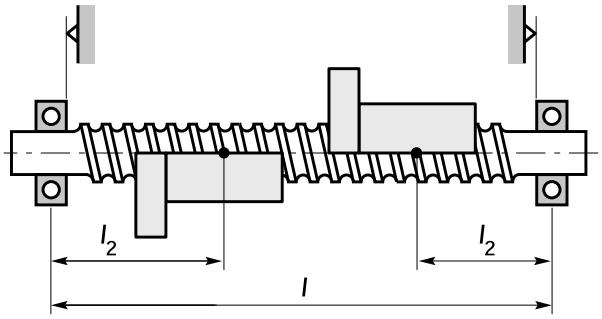



$$R_{s1} = \frac{A \cdot E}{l_1 \cdot 10^3} \quad [N/\mu m]$$

$E = 21 \cdot 10^4\ N/mm^2$

$l, l_1, l_2$ [mm]

Fixed bearing at both ends




$$R_{s2} = \frac{A \cdot E}{l_2 \cdot 10^3} \cdot \frac{l}{l - l_2} \quad [N/\mu m] \quad \rightarrow \quad l_2 \leq l/2$$

$R_{s2\,min}$ at $l_2 = l/2$

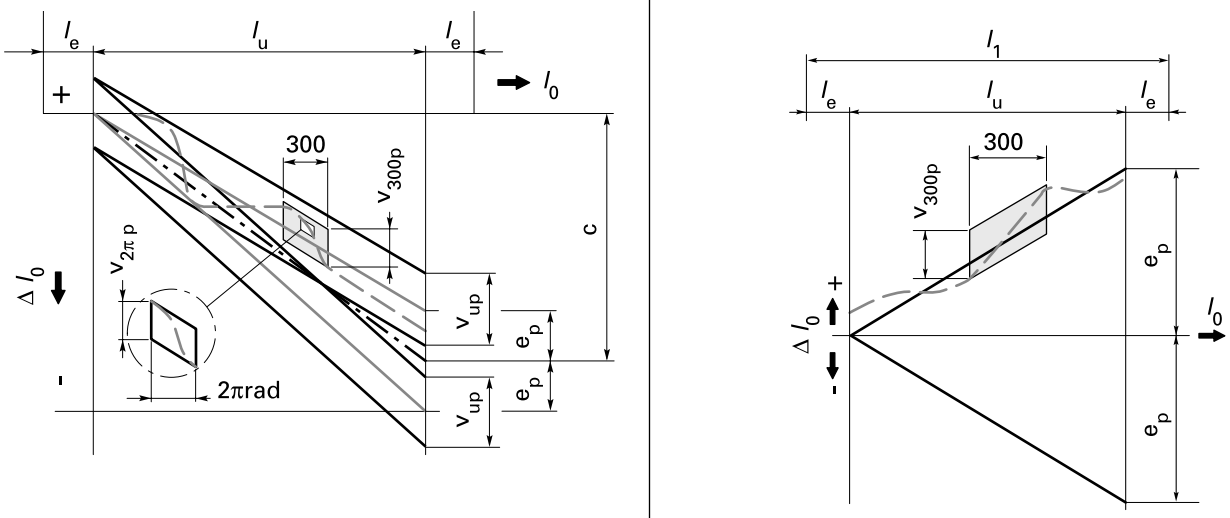
**Reference values for shaft cross-sections**

| d0 | 16 | 20 | 25 | 32 | | 40 | | 50 | 63 | 80 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{h0}$ | 5 | 5 | 5–25 | 5 | 10 | 5 | 10–40 | 10, 20 | 10, 20 | 10 | 20 |
| A [mm²] | 162 | 263 | 428 | 723 | 685 | 1155 | 1075 | 1705 | 2823 | 4650 | 4412 |

# Acceptance conditions

**Permissible travel variances**

| Type | P | Positioning ball screws | Type | T | Transport ball screws |
|---|---|---|---|---|---|




$l_1$ = Axial thread length $l_u$ = Useful travel $l_e$ = Overrun = Tab. 2 $l_0$ = Nominal distance $\Delta l_0$ = Travel deviation

| | | P1 – 3 | P5 | t |
|---|---|---|---|---|
| $v_{300p}$ | Permissible travel variance over 300 mm | Tab. 1 | Tab. 1 | Tab. 1 |
| $v_{2\pi p}$ | Permissible travel variance over 2 πtravel | Tab. 1 | Tab. 1 | – |
| c | Travel compensation | -0.01/1000 | 0 | 0 |
| $e_p$ | Limit deviations for useful distance $l_u$ | Tab. 3 | Tab. 3 | $\pm \frac{l_u}{300} \cdot v_{300p}$ |
| $v_{up}$ | Permissible travel variance over useful travel $l_u$ | Tab. 3 | Tab. 3 | – |

**Tab. 1**

| | Tolerance class | | | | |
|---|---|---|---|---|---|
| | 1 | 3 | 4 | 5 | 7 |
| v300p [µm] | 6 | 12 | 18 | 23 | 52 |
| v2πp [µm] | 4 | 6 | 7 | 8 | 12 |

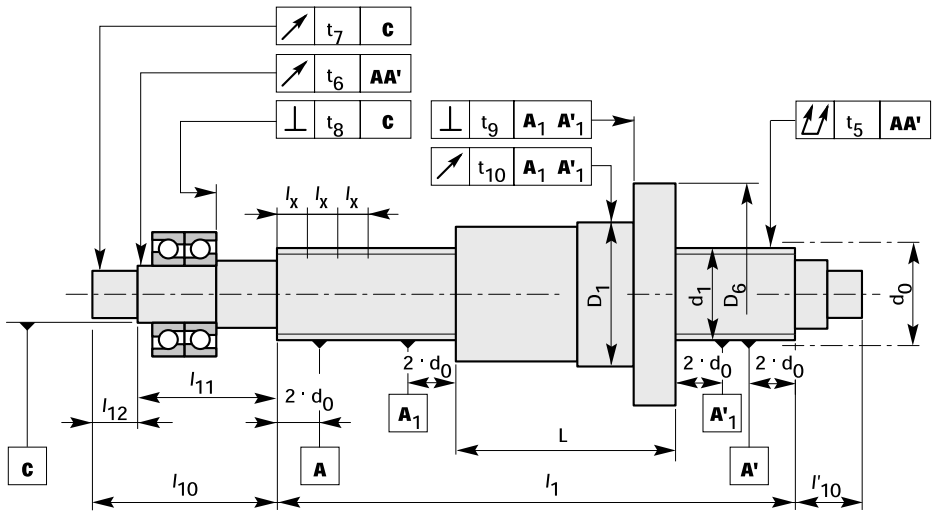
**Tab. 2**

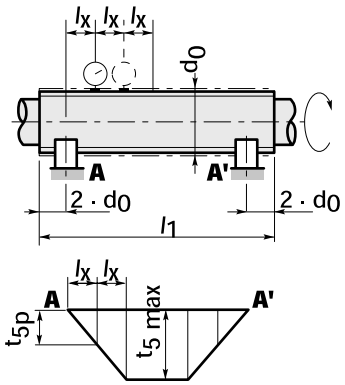
| | | | | | | |
|---|---|---|---|---|---|---|
| Nominal lead | Ph [mm] | ≤ 2.5 | ≤ 5 | ≤ 10 | ≤ 20 | > 20 |
| Lead error | le [mm] | 10 | 20 | 40 | 60 | 100 |

**Tab. 3**

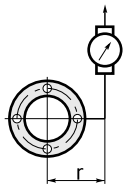
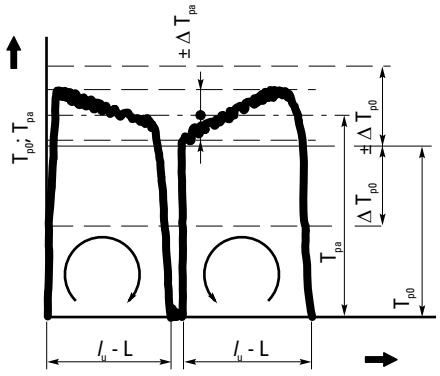
| | | $l_u$ [mm] | > | 0 | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 | 12500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ≤ | 315 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | 10000 | 12500 | 16000 |
| Tolerance class | 1 | $e_p$ | [µm] | 6 | 7 | 8 | 9 | 10 | 11 | 13 | 15 | 18 | 22 | 26 | 32 | 39 | 48 | 60 | 76 | 94 | 115 |
| | | $v_{up}$ | | 6 | 6 | 7 | 7 | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 21 | 27 | 33 | 40 | 50 | 61 | 76 |
| | 3 | $e_p$ | | 12 | 13 | 15 | 16 | 18 | 21 | 24 | 29 | 35 | 41 | 50 | 62 | 76 | 92 | 115 | 140 | 175 | 220 |
| | | $v_{up}$ | | 12 | 12 | 13 | 14 | 16 | 17 | 19 | 22 | 25 | 29 | 34 | 41 | 49 | 61 | 75 | 92 | 113 | 140 |
| | 4 | $e_p$ | | 18 | 18 | 20 | 22 | 25 | 28 | 33 | 39 | 46 | 55 | 68 | 84 | 102 | 125 | 159 | 199 | 240 | 290 |
| | | $v_{up}$ | | 18 | 19 | 20 | 21 | 23 | 26 | 29 | 33 | 38 | 44 | 52 | 56 | 68 | 83 | 101 | 124 | 152 | 189 |
| | 5 | $e_p$ | | 23 | 25 | 27 | 32 | 36 | 40 | 47 | 55 | 65 | 78 | 96 | 115 | 140 | 170 | 210 | 270 | 330 | 410 |
| | | $v_{up}$ | | 23 | 25 | 26 | 29 | 31 | 34 | 39 | 44 | 51 | 59 | 69 | 82 | 99 | 119 | 142 | 174 | 213 | 265 |

## Acceptance conditions




| Acceptance | Description | $d_0$ [mm] | | $l_x$ [mm] | | Tolerance class 1 | 3 | 5 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | > | ≤ | > | ≤ | Permissible deviation $t_p$ [µm] | | | |
| $t_5$ | Radial runout for determining degree of straightness   | 6 | 12 | – | 80 | 20 | 25 | 32 | 40 |
| | | 12 | 25 | – | 160 | | | | |
| | | 25 | 50 | – | 315 | | | | |
| | | 50 | 100 | – | 630 | | | | |
| | | 100 | 200 | – | 1250 | | | | |
| | | $t_{5\,max.}$ for $l_1/d_0 \leq 40$ | | | | 40 | 50 | 64 | 80 |
| | | $t_{5\,max.}$ for $40 < l_1/d_0 \leq 60$ | | | | 60 | 75 | 96 | 120 |
| | | $t_{5\,max.}$ for $60 < l_1/d_0 \leq 80$ | | | | 100 | 125 | 160 | 200 |
| | | $t_{5\,max.}$ for $80 < l_1/d_0 \leq 100$ | | | | 160 | 200 | 256 | 320 |
| t6 | Concentricity $t_6$ according to $d_0$ and $l_{11}$. The greater of the two values applies. | $d_0$ | | $l_{11}$ | | | | | |
| | | > | ≤ | > | ≤ | | | | |
| | | – | 32 | – | 80 | 10 | 12 | 20 | 32 |
| | | | 63 | 80 | 160 | 12 | 16 | 20 | 40 |
| | | 63 | 125 | 160 | 250 | 16 | 20 | 25 | 50 |
| | | 125 | – | 250 | 400 | 20 | 25 | 32 | 63 |
| | | – | – | 400 | 630 | 25 | 32 | 40 | 80 |
| | | – | – | 630 | – | 32 | 40 | 50 | 100 |

# Acceptance conditions

| Acceptance | Description | TK | | | | 1 | 3 | 5 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| | | $d_0$ [mm] | | $l_{12}$ [mm] | | Permissible deviation $t_p$ [µm] | | | |
| | | > | ≤ | > | ≤ | | | | |
| $t_7$ | Concentricity $t_7$ selected according to $d_0$ and $l_{12}$. The greater of the two values applies. | – | 32 | – | 80 | 5 | 6 | 8 | 10 |
| | | 32 | 63 | 80 | 160 | 6 | 8 | 10 | 12 |
| | | 63 | 125 | 160 | 250 | 8 | 10 | 12 | 16 |
| | | 125 | – | 250 | 400 | 10 | 12 | 16 | 20 |
| | | – | – | 400 | – | – | 16 | 20 | 25 |
| $t_8$ | Axial runout | 6 | 63 | – | – | 3 | 4 | 5 | 6 |
| | | 63 | 125 | – | – | 4 | 5 | 6 | 8 |
| | | 125 | 200 | – | – | – | 6 | 8 | 10 |
| $t_9$; $t_{10}$ | Axial and radial runout only for preloaded nut units or backlash-free nut units | $D_6$; D | | | | | | | |
| | | > | ≤ | | | | | | |
| | | 16 | 32 | | | 10 | 12 | 16 | 20 |
| | | 32 | 63 | | | 12 | 16 | 20 | 25 |
| | | 63 | 125 | | | 16 | 20 | 25 | 32 |
| | | 125 | 250 | | | 20 | 25 | 32 | 40 |
| | | 250 | 500 | | | – | 32 | 40 | 50 |
| $t_{12}$ | Drag torque ($T_p$) as a consequence of preloading ($F_p$) of the nut unit<br>$n_{const}$ = 100 rpm<br><br><br>ISO VG 100 lubricating oil<br>Limit frequency for acceptance equipment = 1 Hz<br><br><br>L Nut length<br>a Actual<br>p Permissible<br>0 Nominal<br>t Total | Nominal drag torque | | | | Permissible deviation $\Delta T_{p0}$ (%) | | | |
| | | $T_{p0}$ [Nm] | | | | For $\frac{l_u}{d_0} \leq 40$ and $l_u \leq 4000$ mm | | | |
| | | > | ≤ | | | | | | |
| | | – | 0.3 | | | 30 | 35 | 40 | 50 |
| | | 0.3 | 0.6 | | | 25 | 30 | 35 | 40 |
| | | 0.6 | 1.0 | | | 20 | 25 | 30 | 35 |
| | | 1.0 | 2.5 | | | 15 | 20 | 25 | 30 |
| | | 2.5 | 6.3 | | | 10 | 15 | 20 | 25 |
| | | 6.3 | – | | | – | 10 | 15 | 25 |
| | | | | | | For $\frac{l_u}{d_0} \leq 60$ and $l_u \leq 4000$ mm | | | |
| | | – | 0.3 | | | 35 | 40 | 50 | 60 |
| | | 0.3 | 0.6 | | | 30 | 35 | 40 | 50 |
| | | 0.6 | 1.0 | | | 25 | 30 | 35 | 40 |
| | | 1.0 | 2.5 | | | 20 | 25 | 30 | 35 |
| | | 2.5 | 6.3 | | | 15 | 20 | 25 | 30 |
| | | 6.3 | – | | | – | 15 | 20 | 30 |
| | | | | | | For $\frac{l_u}{d_0} > 60$ or $l_u > 4000$ mm | | | |
| | | – | 0.3 | | | – | – | – | – |
| | | 0.3 | 0.6 | | | – | – | – | – |
| | | 0.6 | 1.0 | | | – | 35 | 40 | 45 |
| | | 1.0 | 2.5 | | | – | 30 | 35 | 40 |
| | | 2.5 | 6.3 | | | – | 25 | 30 | 35 |
| | | 6.3 | – | | | – | 20 | 25 | 35 |

## Materials

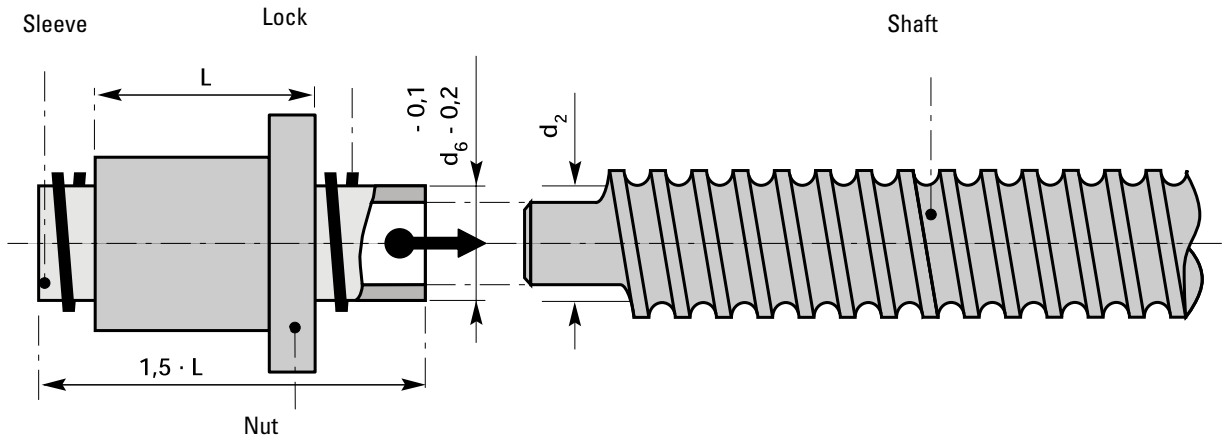
| Part | Material (comparable) | Strength | | Heat treatment |
|---|---|---|---|---|
| | | $R_m$ [N/mm²] | $R_e$ [N/mm²] | |
| Shaft | Cf53 42CrMo4 | ≥ 610 | ≥ 380 | 60 ± 2 HRC Inductive hardening |
| Nut | 16MnCr5 100Cr6 | > 800 | > 600 | 60 ± 2 HRC hardened |
| Wiper | PPN 7190 TV 40 NBR 33 | | | |
| Ball | 100Cr6 | | | 64 ± 2 HRC |

Special materials and heat or surface treatment on request.

Permitted temperature in continuous operation -30 °C to +100 °C. Please inquire for other applications.

Nuts with plastic ball returns only to +80° C (briefly 110° C)

### Fitting the nut



# Lubrication

Correct lubrication for ball screws is not only essential in terms of achieving the expected service life, but also has an impact on smooth running properties, heat generation during operation and idling torque.
In principle, the types of oil and grease used for rolling bearings are suitable for this purpose. Unless the customer has specified otherwise, the function acceptance process is performed at Thomson Neff using an oil in accordance with ISO VG100.

**Oil lubrication**

Generally speaking, CL oils are used in this context for increasing corrosion protection and durability. Alloyed CLP oils with EP additives can also be used. The appropriate level of viscosity depends on the circumferential speed (in other words, diameter and speed) and the ambient or expected operating temperature. The amount of oil required per ball revolution lies somewhere between 0.3 and 0.5 $cm^3/h$, depending on the speed. Only 1/10 of this amount is needed if liquid grease is used. For oil bath lubrication, it is enough for the oil level to reach half way up the lowest lying ball if the mounting position is horizontal. Use the diagram below to determine the viscosity level.

Example: KGT63 x 10
Average speed nm = 200 rpm
Operating temperature t = 25°C

For a nominal diameter of 63 mm and $n_m$= 200 rpm the left part of the diagram shows a viscosity $v_1$ of 110 $mm^2/s$. When this value is transferred to the diagram on the right, the point of intersection at a temperature of 25°C lies between ISO VG46 and ISO VG68. In order to ensure there is an adequate lubricating film during all operating states, the higher value should be selected in each case. This would be ISO VG68 in the current case, although even higher levels may be required for longer running times where fatigue may be an issue. The appropriate oils with this viscosity class can be selected from the table of lubricants shown below.

**Grease lubrication**

Grease can also be used to lubricate ball screws. This approach allows longer intervals between each lubrication.

Given that a small amount of grease escapes from the nut and remains on the shaft with each stroke of the ball screw, even when the wipers are working as well as they can, the amount of grease available reduces during operation. This limits the length of time the ball screw can be used without being regreased. The expected service life L10 can only be achieved if the grease lost is replaced by means of a centralized lubrication system or a lubrication schedule tailored to the application in question.

Manual regreasing can achieve an average of around 700 extra service hours. This figure can vary considerably, however, depending on the machine design and the conditions under which it is used.

Lubricating greases are divided into NLGI classes based on their penetration level in accordance with DIN 51818. Under normal conditions (operating temperatures between -20°C and +120°C), waterproof greases from class K2K-20 in accordance with DIN 51825 should be used for ball screws. Greases from class K1K-20 (very high speeds) or KP2K-20 (very high loads or low speeds) can be used for special applications.

Greases which do not share the same saponification basis should not be mixed. The manufacturer must be consulted if operating temperatures are going to be higher or lower than the values specified. When deciding how much grease to use, look to fill about half of the space available. In order to avoid the ball screws heating up unnecessarily as a result of excess grease, machine designs should ensure that waste or superfluous grease is able to escape.

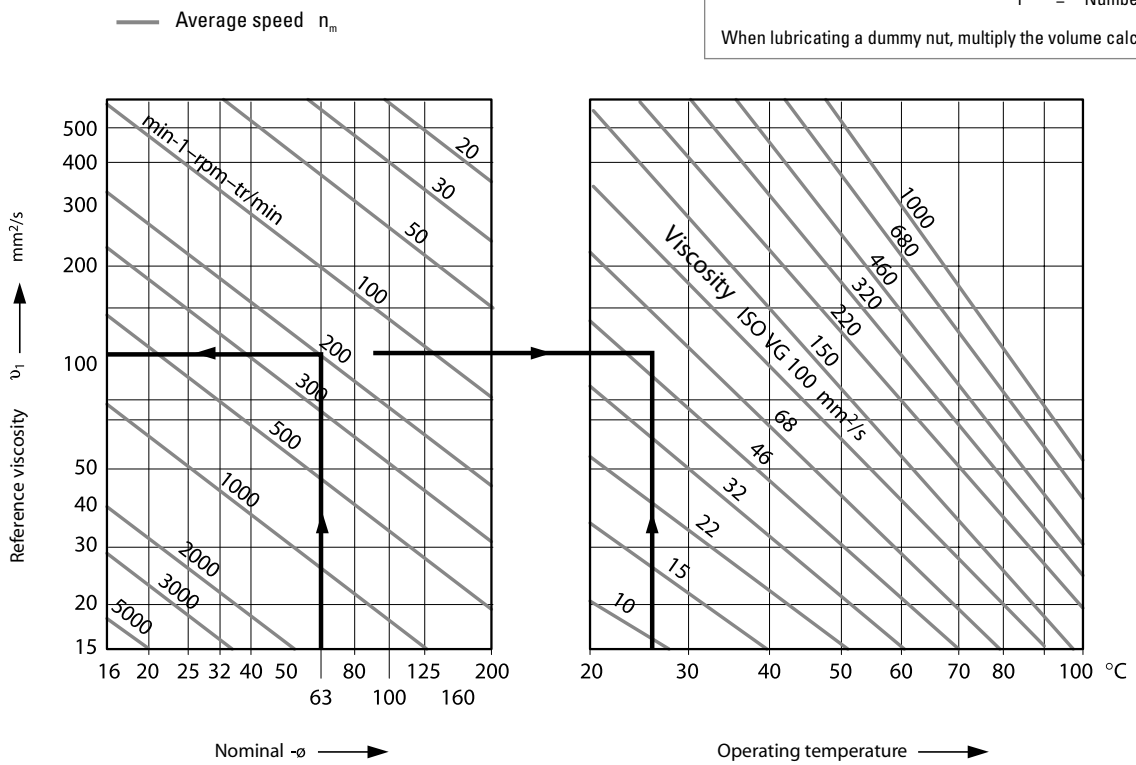
If you have any additional questions concerning lubrication, please consult our engineering consultants.

**Calculation for determining volume when regreasing (using grease)**

$$V_{RL} = \frac{d_0 \times P_h \times D_w \times i^{0.7}}{1250}$$

$V_{RL}$ = Regreasing volume [g]
$d_0$ = Nominal diameter of shaft [mm]
$P_h$ = Lead [mm]
$D_w$ = Diameter of ball [mm]
i = Number of revolutions in nut

When lubricating a dummy nut, multiply the volume calculated by 2.5.



## Recommended lubricants

| Viscosity class | | | | |
|---|---|---|---|---|
| **ISO** | **BP** | **CASTROL** | **ESSO** | **TOTAL FINA** |
| VG 68 | Energol RC 68<br>Energol HLP-D 68<br>Energol GR-XP 68<br>Maccurat 68D* | Hyspin AWS 68<br>Hyspin SP 68<br>Vario HDX Alpha SP 68<br>Alpha MW 68<br>Magnaglide D 68* | Teresso 68<br>Spartan EP 68<br>Febis K 68* | Hydran G 68 |
| VG 100 | Energol RC 100<br>Energol GR-XP 100 | Hyspin AWS 100<br>Hyspin SP 100<br>Alpha SP 100<br>Alpha MW 100 | Circulating oil 100<br>Spartan EP 100 | Hydran G 100 |
| VG 150 | Energol RC 150<br>Energol GR-XP 150 | Alpha SP 150<br>Alpha MW 150 | Nuto 150<br>Spartan EP 150 | Hydran G 150 |
| VG200 | Energol CS-HB 220<br>Energol CR-XP 220<br>Maccurat 220D* | Alpha SP 220<br>Alpha MW 220<br>Magnaglide D 220* | Nuto 220<br>Spartan EP 220<br>Febis K 220* | Hydran G 220 |
| **Not ISO** | | | | |
| K 1 K 20 | Energrease LS 1 | Available on request | Beakon EP 1 | Marson L 1 |
| K 2 K 20 | Energrease LS 2<br>Multi-purpose grease L 2 | Castrol Spheerol AP 2<br>Castrol product 783/46 | Beakon 2<br>Unirex N 2 EXXON multi-purpose grease | Marson L 2 |
| KP 2 K 20 | Energrease LS-EP 2<br>BP long-life grease | Castrol ALV<br>Castrol product 783/46 | Beakon EP 2<br>Ronex MP-D | Marson EPL 2 |

| Viscosity class | | |
|---|---|---|
| **ISO** | **KLÜBER** | **MOBIL** |
| VG 68 | Crucolan 68<br>Klüberoil GEM1-68 | Vactra Oil Heavy Medium<br>Mobilgear 626/Vactra Oil No. 2* |
| VG 100 | Crucolan 100<br>Klüberoil GEM1-100 | Vactra Oil Heavy<br>Mobilgear 627 |
| VG 150 | Crucolan 150<br>Klüberoil GEM1-150 | Vactra Oil Extra Heavy<br>Mobilgear 627 |
| VG200 | Crucolan 220<br>Klüberoil GEM1-220 | Mobil DTE Oil BB<br>Mobilgear 630 / Vactra Oil No. 4* |
| **Not ISO** | Centoplex 1 DL | Mobilith AW1: (not available in Germany) |
| K 1 K 20 | Centoplex 2 | Mobilux EP1: (not available in Germany) |
| K 2 K 20 | Centoplex GLP 402 | Mobilux 2 |
| KP 2 K 20 | Isoflex NBU 15<br>Staburags NBU 8 EP | Mobilux EP2<br>Mobilgrease HP 222 |

# Ball screw drives/ball screws/KOKON®

## Order Code Structure:

Ball screw drive/ball screw

| 1. | 2. | 3. \| 4. | 5. | 6. | 7.\| 8. | 9. | 10.\| 11. | 12. | 13. | 14. | 15. | 16. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**1. Product**
KGT = Ball screw drive complete

**2. Nut version**
D = Version according to DIN 69051
N = Thomson Neff version
G = Cylindrical with thread
L = Shifted (FL)
S = Special, according to drawing

**3. Nominal thread diameter [mm]**

**4. Thread lead [mm]**

**5. Lead accuracy**
P3, P5, T5, T7

**6. Thread direction**
RH = Right hand thread
LH = Left hand thread

**7. Screw end 1**
Standard end form C, D, F, H, J, L, S, T, W, B, Z, see page 26 et seq.
G = Annealed end
K = According to customer's drawing
X = Cut only

**8. Reference to end length 1**
for G/K end length [mm]

**9. Overall length [mm]**

**10. Screw end 2**
Standard end form C, D, F, H, J, L, S, T, W, B, Z, see page 26 et seq.
G = Annealed end
K = According to customer's drawing
X = Cut only

**11. Reference to end length 2**
for G/K end length [mm]

**12. Nut form and configuration**
Flanged side KGF nut and contact surface KGM nut always at screw end 1
F = 1 Flanged nut
M = 1 Cylindrical nut
FM = 1 Preloaded double nut unit (1 KGF, 1 KGM)
FF = 1 Preloaded double nut unit (2 KGF)
MM = 1 Preloaded double nut unit (2 KGM)

**13. Return system**
E = Single liner
M = Multi liner (MUS)
D = End cap
K = Channel
U = Insert

**14. Wiper**
EE = Elastomer
KK = Plastic
00 = Without wiper
ZZ = Center bushing

**15. Manufacturing process**
R = Rolled

**16. Special version or with accessories**
0 = No
1 = Yes (please describe)

## Example:

1 Ball screw drive complete with machined screw ends

| KGT | D | 2005 | T7 | RH | K105 | 1003 | K025 | F | E | EE | R | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 2. | 3. \| 4. | 5. | 6. | 7.\| 8. | 9. | 10.\| 11. | 12. | 13. | 14. | 15. | 16. |

## Order Code Structure:

Ball nut

| 1. | 2. | 3. \| 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|

**1. Product**
KGF = Flanged nut
KGM = Cylindrical nut

**2. Nut version**
D = Version according to DIN 69051
N = Thomson Neff version
G = Cylindrical with thread
L = Shifted (FL)
S = Special, according to drawing

**3. Nominal thread diameter [mm]**

**4. Thread lead [mm]**

**6. Thread direction**
RH = Right hand thread
LH = Left hand thread

**13. Return system**
E = Single liner
M = Multi liner (MUS)
D = End cap
K = Channel
U = Insert

**14. Wiper**
EE = Elastomer
KK = Plastic
00 = Without wiper
ZZ = Center bushing

## Order Code Structure:

KOKON®

| KOKON | 40 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 2. | 3. | 5. | 6. | 7. | 7. | 8. | 9. | 10. |

**1. Product**
KOKON

**2. Nominal thread diameter [mm]**
40

**3. Thread lead [5/10 mm]**

**5. Lead accuracy [µm/300mm]**

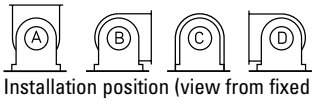
**5. Stroke [mm]**

**6. Overall length [mm]**

**7. Preloading**
0 = No backlash
1 = Preloaded

**8. Drive shaft**
0 = Without feather key groove
1 = With feather key groove

**9. Installation position**
K = According to customer's requirement
A-D = Thomson Neff standard versions



Installation position (view from fixed bearing)

**10. Special version or with accessories**
0 = No
1 = Yes

# Robust and value-for-money

Trapezoidal thread screws are an inexpensive solution for design tasks relating to clamping, positioning and advance motions.

The range complies with DIN 103 and offers a wide selection of nuts made from various materials.

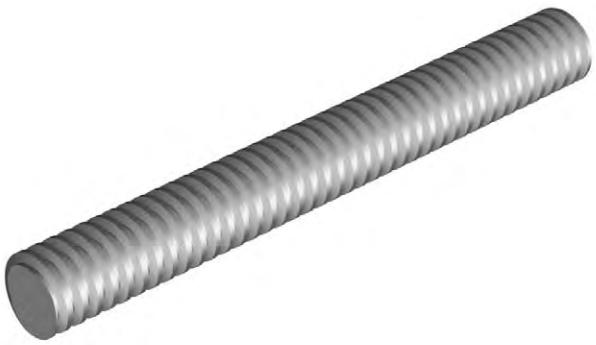
Every shaft can be supplied with customized end journals.



# General technical data for trapezoidal thread screws

THOMSON NEFF trapezoidal-thread screws are manufactured in a rolled design. See separate THOMSON NEFF catalog for other dimensions and coarse thread (V2A version).

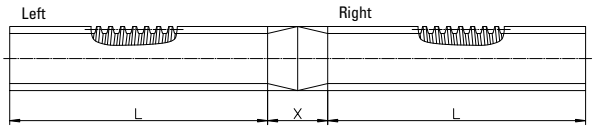
## RPTS precision trapezoidal thread screw



## Technical data

- Thread: Metric ISO trapezoidal thread complying with DIN 103
- Diameter: 10 – 80 mm
- Lead: 2 – 24 mm
- Number of starts: up to 6 threads
- Direction of rotation: right-hand thread, single-start also available as left-hand thread, see table on page 67
- Length: up to 3000 mm to Tr 18 x 4; up to 6000 mm from Tr 20 x 4
- Material: 1.0401 (case-hardened steel C15) low-stress annealed, weldable
- Precision: 50 – 300 µm/300 mm
- Straightness: 0.1 – 0.5 mm/300 mm
- Right-hand/left-hand shaft: for leads of 2 – 10 mm
- End journal: as customer requirement

## Trapezoidal-thread screw in right-hand and left-hand thread

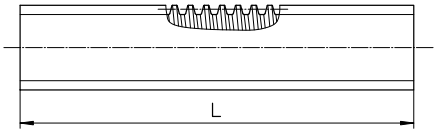


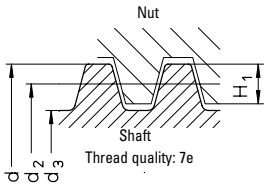

## Technical data

- Diameter: 10 – 80 mm
- Lead: 2 – 10 mm
- Number of starts: single-start
- Direction of rotation: right-hand thread and left-hand thread
- Length: maximum 3000 mm, from Tr 20x4 up to 6000 mm on request
- Material: 1.0401 (C15)
- Precision: 50 – 300 µm/300 mm
- Straightness: 0.1 – 0.5 mm/300 mm
- Dimension X: 100 mm
  Diameter in area of dimension X is smaller than the nominal diameter

# RPTS trapezoidal-thread screws

## RPTS rolled precision trapezoidal thread screw




Manufacturing length 3000 mm, available up to 6000 mm length in diameters of 20 mm and greater. Dimension L as customer requirement.

**Material:** 1.0401 (C15).

| Style<br>External diameter [mm]<br>Lead [mm]<br>right-hand/left-hand | d | Dimension [mm] $d_{2\,min}$ | $d_{2\,max}$ | $d_3$ [1] | $H_1$ | Precision [µm/ 300 mm] | Straightness [mm/ 300 mm] | $\alpha$ [2] | $\eta$ [3] | Distributed load [kg/m] | Geometrical moment of inertia [$cm^4$] | Section modulus [4] [$cm^3$] | Mass moment of inertia [kg $m^2$/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RPTS Tr 10x2 | 10 | 8.739 | 8.929 | 6.89 | 1 | 300 | 0.5 | 4° 2′ | 0.40 | 0.500 | 0.011 | 0.032 | $0.51 \cdot 10^{-5}$ |
| RPTS Tr 10x3 | | 8.191 | 8.415 | 5.84 | 1.5 | 300 | 0.5 | 6° 24′ | 0.51 | 0.446 | 0.0057 | 0.020 | $0.40 \cdot 10^{-5}$ |
| RPTS Tr 12x3 | 12 | 10.191 | 10.415 | 7.84 | 1.5 | 300 | 0.5 | 5° 11′ | 0.46 | 0.68 | 0.019 | 0.047 | $0.94 \cdot 10^{-5}$ |
| RPTS Tr 12x6 P3 [5] | 12 | 10.165 | 10.415 | 7.84 | 1.5 | 300 | 0.5 | 10° 18′ | 0.62 | 0.68 | 0.019 | 0.047 | $0.94 \cdot 10^{-5}$ |
| RPTS Tr 14x3 | 14 | 12.191 | 12.415 | 9.84 | 1.5 | 300 | 0.5 | 4° 22′ | 0.42 | 0.96 | 0.046 | 0.094 | $1.88 \cdot 15^{-5}$ |
| RPTS Tr 14x4 | | 11.640 | 11.905 | 8.80 | 2 | 300 | 0.5 | 6° 3′ | 0.50 | 0.888 | 0.029 | 0.067 | $1.60 \cdot 10^{-5}$ |
| RPTS Tr 16x2 | 16 | 14.729 | 14.929 | 12.89 | 1 | 50 | 0.1 | 2° 36′ | 0.28 | 1.39 | 0.136 | 0.210 | $3.90 \cdot 10^{-5}$ |
| RPTS Tr 16x4 | 16 | 13.640 | 13.905 | 10.80 | 2 | 50 | 0.1 | 5° 11′ | 0.46 | 1.21 | 0.067 | 0.124 | $2.96 \cdot 10^{-5}$ |
| RPTS Tr 16x8 P4 [5] | 16 | 13.608 | 13.905 | 10.80 | 2 | 300 | 0.3 | 10° 18′ | 0.62 | 1.21 | 0.067 | 0.124 | $2.96 \cdot 10^{-5}$ |
| RPTS Tr 18x4 | 18 | 15.640 | 15.905 | 12.80 | 2 | 50 | 0.1 | 4° 32′ | 0.43 | 1.58 | 0.132 | 0.206 | $5.05 \cdot 10^{-5}$ |
| RPTS Tr 20x4 | 20 | 17.640 | 17.905 | 14.80 | 2 | 50 | 0.1 | 4° 2′ | 0.40 | 2.00 | 0.236 | 0.318 | $8.10 \cdot 10^{-5}$ |
| RPTS Tr 20x8 P4 [5] | | 17.608 | 17.905 | 14.80 | 2 | 200 | 0.2 | 8° 3′ | 0.57 | 2.00 | 0.236 | 0.318 | $8.10 \cdot 10^{-5}$ |
| RPTS Tr 20x16 P4 [5] | | 17.608 | 17.905 | 14.80 | 2 | 200 | 0.2 | 15° 47′ | 0.71 | 2.00 | 0.236 | 0.318 | $8.10 \cdot 10^{-5}$ |
| RPTS Tr 22x5 | 22 | 19.114 | 19.394 | 15.50 | 2.5 | 50 | 0.1 | 4° 39′ | 0.43 | 2.34 | 0.283 | 0.366 | $1.11 \cdot 10^{-4}$ |
| RPTS Tr 22x24 P4 S [5][6] | | 19.140 | 19.505 | 16.50 | 2 | 200 | 0.2 | 21° 34′ | 0.75 | 2.34 | 0.364 | 0.441 | $1.11 \cdot 10^{-4}$ |
| RPTS Tr 24x5 | 24 | 21.094 | 21.394 | 17.50 | 2.5 | 50 | 0.1 | 4° 14′ | 0.41 | 2.85 | 0.460 | 0.526 | $1.65 \cdot 10^{-4}$ |
| RPTS Tr 24x10 P5 [5] | | 21.058 | 21.394 | 17.50 | 2.5 | 200 | 0.2 | 8° 25′ | 0.58 | 2.85 | 0.460 | 0.526 | $1.65 \cdot 10^{-4}$ |
| RPTS Tr 26x5 | 26 | 23.094 | 23.394 | 19.50 | 2.5 | 50 | 0.1 | 3° 52′ | 0.39 | 3.40 | 0.710 | 0.728 | $2.35 \cdot 10^{-4}$ |
| RPTS Tr 28x5 | 28 | 25.094 | 25.394 | 21.50 | 2.5 | 50 | 0.1 | 3° 34′ | 0.37 | 4.01 | 1.050 | 0.976 | $3.26 \cdot 10^{-4}$ |
| RPTS Tr 30x6 | 30 | 26.547 | 26.882 | 21.90 | 3 | 50 | 0.1 | 4° 2′ | 0.40 | 4.50 | 1.130 | 1.030 | $4.10 \cdot 10^{-4}$ |
| RPTS Tr 30x12 P6 [5] | | 26.507 | 26.882 | 21.90 | 3 | 200 | 0.2 | 8° 3′ | 0.57 | 4.50 | 1.130 | 1.030 | $4.10 \cdot 10^{-4}$ |
| RPTS Tr 32x6 | 32 | 28.547 | 28.882 | 23.90 | 3 | 50 | 0.1 | 3° 46′ | 0.38 | 5.19 | 1.600 | 1.340 | $5.45 \cdot 10^{-4}$ |
| RPTS Tr 36x6 | 36 | 32.547 | 32.882 | 27.90 | 3 | 50 | 0.1 | 3° 18′ | 0.35 | 6.71 | 2.970 | 2.130 | $9.10 \cdot 10^{-4}$ |
| RPTS Tr 40x7 | 40 | 36.020 | 36.375 | 30.50 | 3.5 | 50 | 0.1 | 3° 29′ | 0.37 | 8.21 | 4.250 | 2.790 | $1.37 \cdot 10^{-3}$ |
| RPTS Tr 40x14 P7 [5] | | 35.978 | 36.375 | 30.50 | 3.5 | 200 | 0.2 | 6° 57′ | 0.53 | 8.21 | 4.250 | 2.790 | $1.37 \cdot 10^{-3}$ |
| RPTS Tr 44x7 | 44 | 40.020 | 40.275 | 34.50 | 3.5 | 50 | 0.1 | 3° 8′ | 0.34 | 10.10 | 6.950 | 4.030 | $2.10 \cdot 10^{-3}$ |
| RPTS Tr 48x8 | 48 | 43.468 | 43.868 | 37.80 | 4 | 100 | 0.1 | 3° 18′ | 0.35 | 12.00 | 10.000 | 5.300 | $2.90 \cdot 10^{-3}$ |
| RPTS Tr 50x8 | 50 | 45.468 | 45.868 | 39.30 | 4 | 100 | 0.1 | 3° 10′ | 0.34 | 13.10 | 11.700 | 5.960 | $3.40 \cdot 10^{-3}$ |
| RPTS Tr 60x9 | 60 | 54.935 | 55.360 | 48.15 | 4.5 | 200 | 0.3 | 2° 57′ | 0.33 | 19.00 | 26.400 | 11.000 | $7.30 \cdot 10^{-3}$ |
| RPTS Tr 70x10 | 70 | 64.425 | 64.850 | 57.00 | 5 | 200 | 0.3 | 2° 48′ | 0.32 | 26.00 | 51.800 | 18.200 | $1.40 \cdot 10^{-2}$ |
| RPTS Tr 80x10 | 80 | 74.425 | 74.850 | 67.00 | 5 | 200 | 0.3 | 2° 25′ | 0.29 | 34.70 | 98.900 | 29.500 | $2.40 \cdot 10^{-2}$ |

[1] In a deviation from DIN 103 the minor diameter is slightly smaller for greater root rounding.

[2] Pitch angle at the pitch diameter; ⟶ formula (XVI) p. 84.

[3] Theoretical efficiency for the transformation of a rotary motion into an axial motion at coefficient of friction µ = 0.1.
Efficiency for other coefficients of friction ; ⟶ formula (XVI) p. 84.

[4] The polar resistance moment is twice as great as the resistance moment.

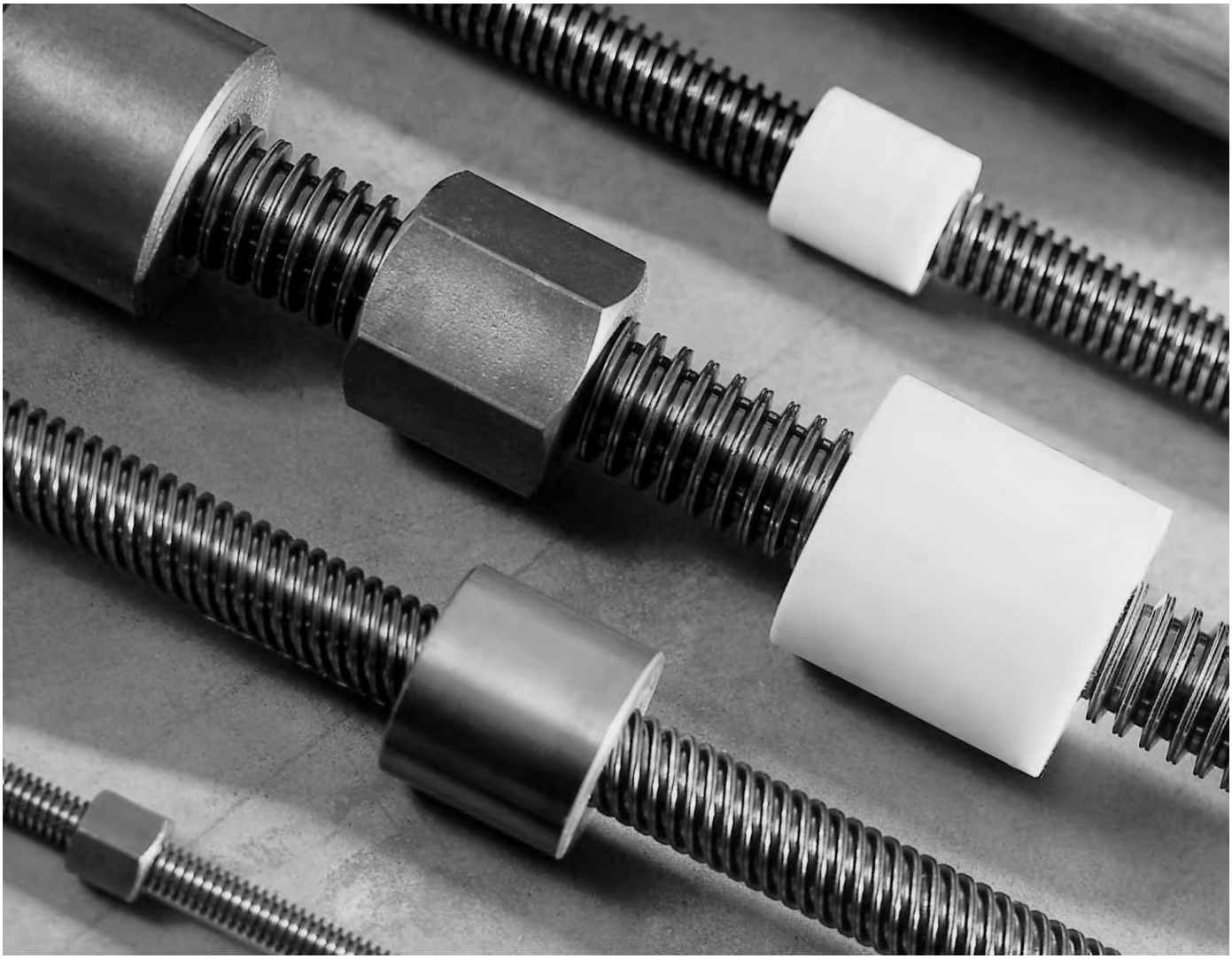
[5] Right-hand thread only.

[6] Special profile.

# Trapezoidal thread nuts

Trapezoidal thread nuts complying with DIN 103, tolerance class 7H.

In principle, chased versions of nuts with Ø 18 mm and above are available for all screws.



# Trapezoidal thread nuts

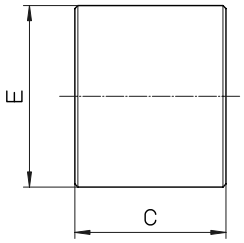
## KSM short cylindrical steel nut blank

Suitable for clamping, adjustment movements in manual operation and as a fixing nut. Not suited for motion systems as the steel-steel sliding pairing has a tendency to scuffing.

Further processing: The thread may be used as a reference for precise instructions on use and installation.

**Material:** Free-cutting steel 1.0718 (9 SMn 28K).






| Style | E [mm] | C [mm] | Mass [kg] |
|---|---|---|---|
| KSM Tr 10x2 | 22 | 15 | 0.037 |
| KSM Tr 10x3 | 22 | 15 | 0.036 |
| KSM Tr 12x3 | 26 | 18 | 0.064 |
| KSM Tr 14x3 | 30 | 21 | 0.96 |
| KSM Tr 14x4 | 30 | 21 | 0.96 |
| KSM Tr 16x4 | 36 | 24 | 0.16 |
| KSM Tr 18x4 | 40 | 27 | 0.22 |
| KSM Tr 20x4 | 45 | 30 | 0.31 |
| KSM Tr 22x5 | 45 | 33 | 0.33 |
| KSM Tr 24x5 | 50 | 36 | 0.45 |
| KSM Tr 26x5 | 50 | 39 | 0.47 |
| KSM Tr 28x5 | 60 | 42 | 0.76 |
| KSM Tr 30x6 | 60 | 45 | 0.79 |
| KSM Tr 32x6 | 60 | 48 | 0.81 |
| KSM Tr 36x6 | 75 | 54 | 1.5 |
| KSM Tr 40x7 | 80 | 60 | 1.9 |
| KSM Tr 44x7 | 80 | 66 | 2.7 |
| KSM Tr 48x8 | 90 | 72 | 2.9 |
| KSM Tr 50x8 | 90 | 75 | 2.7 |
| KSM Tr 60x9 | 100 | 90 | 3.7 |
| KSM Tr 70x10 | 110 | 105 | 4.9 |
| KSM Tr 80x10 | 120 | 120 | 6.4 |

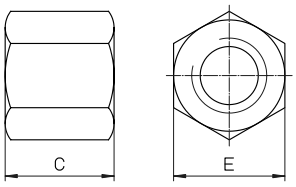
## SKM hexagonal steel nut

For clamping, adjustment movements in manual operation and as a fixing nut. Not suited for motion systems as the steel-steel sliding pairing has a tendency to scuffing.

Further processing: The thread may be used as a reference for precise instructions on use and installation.

**Material:** Free-cutting steel 1.0718 (9 SMn 28K).






| Style | E [mm] | C [mm] | Mass [kg] |
|---|---|---|---|
| SKM Tr 10x2 | 17 | 15 | 0.022 |
| SKM Tr 10x3 | 17 | 15 | 0.022 |
| SKM Tr 12x3 | 19 | 18 | 0.028 |
| SKM Tr 14x3 | 22 | 21 | 0.044 |
| SKM Tr 14x4 | 22 | 21 | 0.044 |
| SKM Tr 16x4 | 27 | 24 | 0.084 |
| SKM Tr 18x4 | 27 | 27 | 0.086 |
| SKM Tr 20x4 | 30 | 30 | 0.17 |
| SKM Tr 22x5 | 30 | 33 | 0.17 |
| SKM Tr 24x5 | 36 | 36 | 0.20 |
| SKM Tr 26x5 | 36 | 39 | 0.20 |
| SKM Tr 28x5 | 41 | 42 | 0.30 |
| SKM Tr 30x6 | 46 | 45 | 0.43 |
| SKM Tr 32x6 | 46 | 48 | 0.42 |
| SKM Tr 36x6 | 55 | 54 | 0.73 |
| SKM Tr 40x7 | 65 | 60 | 1.3 |
| SKM Tr 44x7 | 65 | 66 | 1.2 |
| SKM Tr 48x8 | 75 | 72 | 1.8 |
| SKM Tr 50x8 | 75 | 75 | 1.8 |
| SKM Tr 60x9 | 90 | 90 | 2.8 |
| SKM Tr 70x10 | 90 | 105 | 3.1 |

# Trapezoidal thread nuts

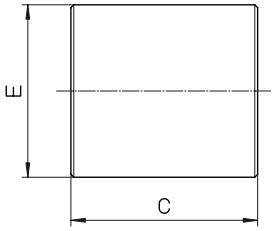
## LRM long cylindrical gunmetal nut

For motion systems in continuous operation with particularly favorable wear characteristics. Suitable as safety nut.

Further processing: The thread may be used as a reference for precise instructions on use and installation.

**Material:** 2.1090 (G-CuSn 7Zn Pb (Rg7)), characteristics → page 72.






| Style | E [mm] | C [mm] | Mass [kg] | Bearing length ratio [mm²] |
|---|---|---|---|---|
| LRM Tr 10x2 | 22 | 20 | 0.056 | 200 |
| LRM Tr 10x3 | 22 | 20 | 0.056 | 190 |
| LRM Tr 12x3 | 26 | 24 | 0.092 | 280 |
| LRM Tr 12x6 P3[1)] | 26 | 24 | 0.092 | 280 |
| LRM Tr 14x3 | 30 | 28 | 0.14 | 380 |
| LRM Tr 14x4 | 30 | 28 | 0.14 | 370 |
| LRM Tr 16x2 | 36 | 32 | 0.25 | 490 |
| LRM Tr 16x4 | 36 | 32 | 0.25 | 490 |
| LRM Tr 16x8 P4[1)] | 36 | 32 | 0.25 | 490 |
| LRM Tr 18x4 | 40 | 36 | 0.34 | 630 |
| LRM Tr 20x4 | 45 | 40 | 0.48 | 790 |
| LRM Tr 20x8 P4[1)] | 45 | 40 | 0.45 | 790 |
| LRM Tr 22x5 | 45 | 40 | 0.46 | 850 |
| LRM Tr 22x24 P4S[1) 2)] | 45 | 40 | 0.46 | 880 |
| LRM Tr 24x5 | 50 | 48 | 0.69 | 1130 |
| LRM Tr 24x10 P5[1)] | 50 | 48 | 0.65 | 1130 |
| LRM Tr 26x5 | 50 | 48 | 0.58 | 1240 |
| LRM Tr 28x5 | 60 | 60 | 1.2 | 1680 |
| LRM Tr 30x6 | 60 | 60 | 1.2 | 1780 |
| LRM Tr 30x12 P6[1)] | 60 | 60 | 1.2 | 1780 |
| LRM Tr 32x6 | 60 | 60 | 1.2 | 1910 |
| LRM Tr 36x6 | 75 | 72 | 2.2 | 2610 |
| LRM Tr 40x7 | 80 | 80 | 2.8 | 3210 |
| LRM Tr 40x14 P7[1)] | 80 | 80 | 2.8 | 3210 |
| LRM Tr 44x7 | 80 | 80 | 2.6 | 3560 |
| LRM Tr 48x8 | 90 | 100 | 4.3 | 4840 |
| LRM Tr 50x8 | 90 | 100 | 4.2 | 5060 |
| LRM Tr 60x9 | 100 | 120 | 5.7 | 7320 |
| LRM Tr 70x10 | 110 | 140 | 7.6 | 10000 |
| LRM Tr 80x10 | 120 | 160 | 9.7 | 13200 |

[1)] Right-hand thread only.
[2)] Special profile; nominal diameter 21.5.

# Trapezoidal thread nuts

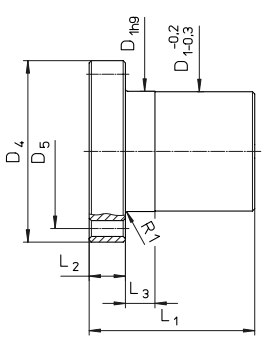
## EFM complete bronze nut

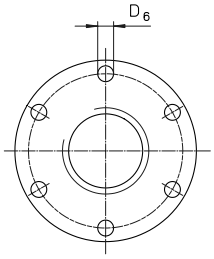
For motion systems in continuous operation with particularly favorable wear characteristics. Suitable as safety nut.

EFM can be fitted with the KON and KAR adapters (→ pages 73–74).

**Material:** 2.1090 (G-CuSn 7Zn Pb (Rg7)), characteristics → page 72.






| Style | Dimensions [mm] | | | | | | | Mass [kg] | Bearing length ratio [mm²] |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ | $D_4$ | $D_5$ | $6xD_6$ | $L_1$ | $L_2$ | $L_3$ | | |
| EFM Tr 16x4 | 28 | 48 | 38 | 6 | 44 | 12 | 8 | 0.25 | 670 |
| EFM Tr 18x4 | 28 | 48 | 38 | 6 | 44 | 12 | 8 | 0.25 | 770 |
| EFM Tr 20x4 | 32 | 55 | 45 | 7 | 44 | 12 | 8 | 0.30 | 870 |
| EFM Tr 24x5 | 32 | 55 | 45 | 7 | 44 | 12 | 8 | 0.30 | 1040 |
| EFM Tr 30x6 | 38 | 62 | 50 | 7 | 46 | 14 | 8 | 0.40 | 1370 |
| EFM Tr 36x6 | 45 | 70 | 58 | 7 | 59 | 16 | 10 | 0.60 | 2140 |
| EFM Tr 40x7 | 63 | 95 | 78 | 9 | 73 | 16 | 10 | 1.70 | 2930 |
| EFM Tr 50x8 | 72 | 110 | 90 | 11 | 97 | 18 | 10 | 2.60 | 4900 |
| EFM Tr 60x9 | 85 | 125 | 105 | 11 | 99 | 20 | 10 | 3.70 | 6040 |
| EFM Tr 70x10 | 95 | 180 | 140 | 17 | 100 | 30 | 16 | 7.80 | 8250 |
| EFM Tr 80x10 | 105 | 190 | 150 | 17 | 110 | 30 | 16 | 8.90 | 10890 |

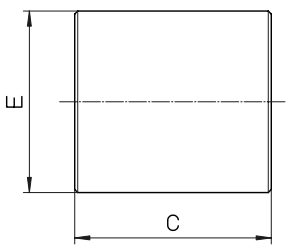
## LKM long cylindrical plastic nut

For low-noise motion systems with higher speeds and longer duty times. Especially recommended in combination with rolled trapezoidal lead screws. Good emergency running characteristics

**Material:** PETP, characteristics → page 72.

Lubrication: FUCHS LUBRITEC,
URETHYN EM 1 synthetic oil-based semi-fluid transmission grease






| Style | E [mm] | C [mm] | Mass [kg] | Bearing length ratio [mm2] |
|---|---|---|---|---|
| LKM Tr 12x3 | 26 | 24 | 0.012 | 280 |
| LKM Tr 12x6 P3 | 26 | 24 | 0.012 | 280 |
| LKM Tr 16x4 | 36 | 32 | 0.032 | 490 |
| LKM Tr 16x8 P4 | 36 | 32 | 0.032 | 490 |
| LKM Tr 20x4 | 45 | 40 | 0.06 | 790 |
| LKM Tr 20x8 P4 | 45 | 40 | 0.06 | 790 |
| LKM Tr 24x5 | 50 | 48 | 0.088 | 1130 |
| LKM Tr 30x6 | 60 | 60 | 0.15 | 1780 |
| LKM Tr 30x12 P6 | 60 | 60 | 0.15 | 1780 |
| LKM Tr 36x6 | 75 | 72 | 0.30 | 2610 |
| LKM Tr 40x7 | 80 | 80 | 0.37 | 3210 |
| LKM Tr 50x8 | 90 | 100 | 0.55 | 5060 |

Right-hand thread only, left-hand thread on request.

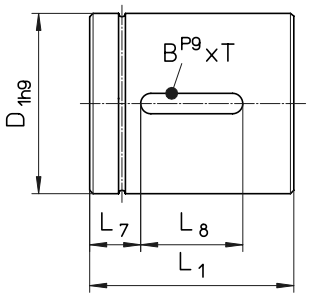
# Trapezoidal thread nuts

## EKM complete plastic nuts

For low-noise motion systems with higher speeds and longer duty times under moderate load. Good emergency running characteristics. Especially recommended in combination with rolled trapezoidal lead screws.

**Material:** PETP, see below for characteristics.






| Style | Dimensions [mm] | | | | | Mass [kg/each | Bearing length ratio [mm2] |
|---|---|---|---|---|---|---|---|
| | ø $D_1$ | $L_1$ | $L_7$ | $L_8$ | WxD | | |
| EKM Tr 16x4 | 28 | 34 | 7 | 20 | 5x2.9 | 0.02 | 520 |
| EKM Tr 20x4 | 32 | 34 | 7 | 20 | 5x2.9 | 0.03 | 670 |
| EKM Tr 20x8P4 | 32 | 34 | 7 | 20 | 5x2.9 | 0.03 | 670 |
| EKM Tr 20x16 P4 | 32 | 34 | 7 | 20 | 5x2.9 | 0.03 | 670 |

EKM with left-hand thread on request.

## Material properties

**Material 2.1090**

- 0.2 % yield point $R\rho_{0.2}$: 120 N/mm²
- Tensile strength $R_m$ (δB): 240 N/mm²
- Elongation at fracture A5 min.: 15 %
- Brinell hardness HB 10/1000: 65
- Density: 8.8 kg/dm³
- Modulus of elasticity: 90000 N/mm³
- pv factor: 300 N/mm² · m/min

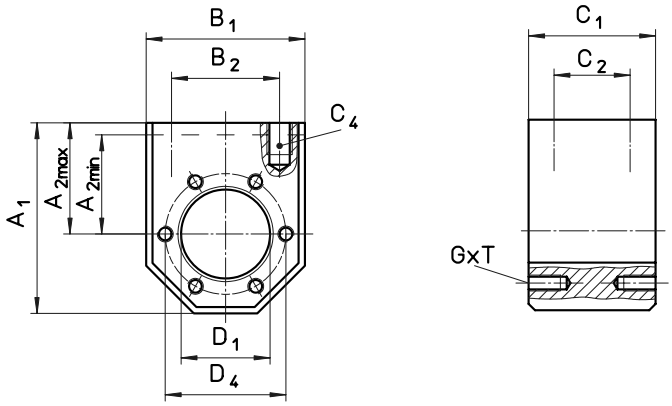
**Material PETP**

- Tensile strength: 80 N/mm²
- Modulus of elasticity: 2800 – 3000 N/mm²
- Impact strength: 40 kJm²
- Notched bar impact strength: 4 kJm²
- Thermal expansion: 8,5 · 10-5/°C
- Water absorption: 0.25 %
- Water saturation: 0.6 %
- Density: 1.38 kg/dm³
- Friction against steel: 0.05 – 0.08
- Ball indentation hardness H 358/30: 150 N/mm²
- Elongation at yield stress of 80 N/mm²: 4 – 5 %
- pv factor: 100 N/mm² · m/min
- Maximum pressure per unit area: 10 N/mm²
- Maximum sliding speed: 120 m/min

# KON adapter support

Adapter support for radial fastening of EFM trapezoidal thread flanged nut.

**Material:** 1.0065 (St37) or 1.0507 (St52).



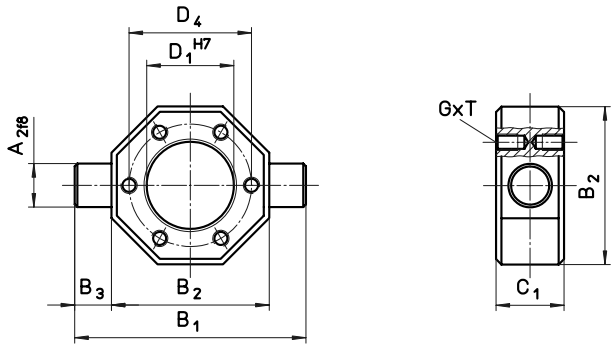

| Style for EFM | Dimensions [mm] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $A_1$ | $A_{2\,max}$ [1)] | $A_{2\,min}$ | $B_1$ | $B_2$ | $C_1$ | $C_2$ | $C_4$ | $D_1$ | $D_4$ | Th x D |
| KON Tr 16x4/Tr 18x4 | 60 | 35 | 25 | 50 | 34 | 40 | 24 | M 8x15 | 28 | 38 | M 5x10 |
| KON Tr 20x4/Tr 24x5 | 68 | 37.5 | 29 | 58 | 39 | 40 | 24 | M 8x15 | 32 | 45 | M 6x12 |
| KON Tr 30x6 | 75 | 42.5 | 32.5 | 65 | 49 | 40 | 24 | M 10x15 | 38 | 50 | M 6x12 |
| KON Tr 36x6 | 82 | 45 | 37 | 75 | 54 | 50 | 30 | M 10x12 | 45 | 58 | M 6x12 |
| KON Tr 40x7 | 120 | 70 | 50 | 100 | 76 | 65 | 41 | M 14x25 | 63 | 78 | M 8x14 |
| KON Tr 50x8 | 135 | 77.5 | 57.5 | 115 | 91 | 88 | 64 | M 16x25 | 72 | 90 | M 10x16 |
| KON Tr 60x9 | 152 | 87.5 | 65 | 130 | 101 | 88 | 64 | M 16x30 | 85 | 105 | M 10x16 |

[1)] Standard = $A_{2\,max}$ (as delivered)

# KAR universal joint adapter

Universal joint adapter for universally mounting on EFM trapezoidal thread flanged nut.

**Material:** 1.0065 (St37) or 1.0507 (St52).

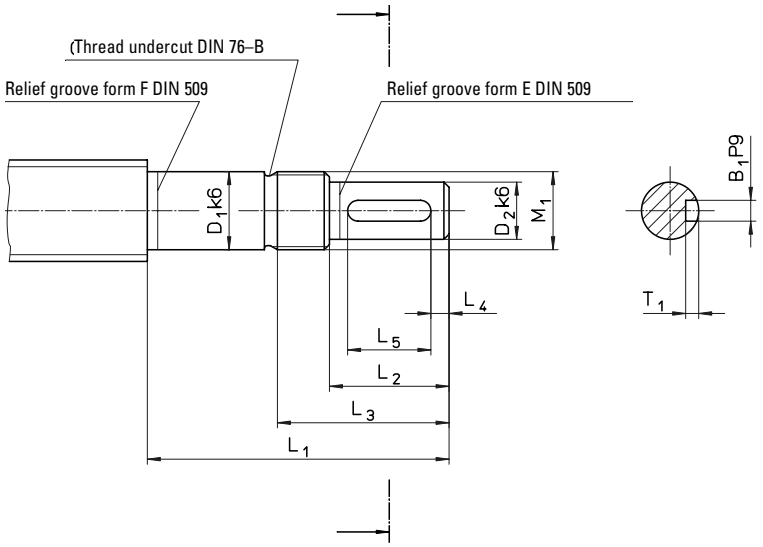



| Style for EFM | Dimensions [mm] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $A_2$ | $B_1$ | $B_2$ | $B_3$ | $C_1$ | $D_1$ | $D_4$ | Th x D |
| KAR Tr 16x4/Tr 18x4 | 12 | 70 | 50 | 10 | 20 | 28 | 38 | M 5x10 |
| KAR Tr 20x4/Tr 24x5 | 16 | 85 | 58 | 13.5 | 25 | 32 | 45 | M 6x12 |
| KAR Tr 30x6 | 18 | 95 | 65 | 15 | 25 | 38 | 50 | M 6x12 |
| KAR Tr 36x6 | 20 | 110 | 75 | 17.5 | 30 | 45 | 58 | M 6x12 |
| KAR Tr 40x7 | 30 | 140 | 100 | 20 | 40 | 63 | 78 | M 8x14 |
| KAR Tr 50x8 | 40 | 165 | 115 | 25 | 50 | 72 | 90 | M 10x16 |
| KAR Tr 60x9 | 40 | 180 | 130 | 25 | 50 | 85 | 105 | M 10x16 |

# End journals for loose bearings/fixed bearings
# Form D, F

The type of bearing selected influences the stiffness of the lead screw system as a whole and also the rotational vibration and buckling behavior of the lead screw shaft. The required end journals are made for the trapezoidal lead screw according to the various types of bearing.

**Note: Bearings are not supplied.**




| **Form D** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| TGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $W_1xD_1$ | ZKLF…2RS |
| Tr 18/20/22x… | 12 | 9 | 55 | 20 | 32 | 2.5 | 16 | M 12x1 | 3x1.8 | 1255 |
| Tr 24/26x… | 15 | 11 | 58 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1560 |
| Tr 28/30/32x… | 20 | 14 | 70 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 2068 |
| Tr 36x… | 25 | 19 | 82 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 2575 |
| Tr 40/44/48/50x… | 30 | 24 | 92 | 50 | 67 | 7 | 36 | M 30x1.5 | 8x4 | 3080 |

| **Form F** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| TGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $W_1xD_1$ | ZARN...LTN |
| Tr 22/24/26x… | 15 | 11 | 73 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1545 |
| Tr 28/30/32x… | 20 | 14 | 88 | 30 | 45 | 4 | 22 | M 20x1 | 5x3 | 2052 |
| Tr 28/30/32x… | 20 | 14 | 107 | 30 | 50 | 4 | 22 | M 20x1 | 5x3 | 2062 |
| Tr 36/40/44x… | 25 | 19 | 105 | 40 | 58 | 6 | 28 | M 25x1.5 | 6x3.5 | 2557 |
| Tr 36/40/44x… | 25 | 19 | 120 | 40 | 63 | 6 | 28 | M 25x1.5 | 6x3.5 | 2572 |
| Tr 48/50x… | 35 | 28 | 145 | 60 | 82 | 10 | 40 | M 35x1.5 | 8x4 | 3585 |
| Tr 60/70x… | 40 | 36 | 175 | 80 | 103 | 8.5 | 63 | M 40x1.5 | 10x5 | 4090 |
| Tr 80x… | 55 | 48 | 215 | 110 | 136 | 10 | 90 | M 55x2 | 14x5.5 | 55115 |

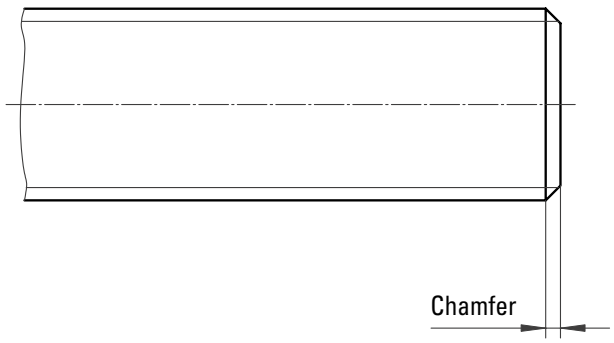
# End journals for loose bearings/fixed bearings
# Form H, J, L, Z

| **Form H** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| TGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $W_1xD_1$ | ZARF...LTN |
| Tr 22/24/26x… | 15 | 11 | 85 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 1560 |
| Tr 28/30/32x… | 20 | 14 | 102 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 2068 |
| Tr 28/30/32x… | 20 | 14 | 122 | 30 | 49 | 4 | 22 | M 20x1 | 5x3 | 2080 |
| Tr 36/40/44x… | 25 | 19 | 120 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 2575 |
| Tr 36/40/44x… | 25 | 19 | 135 | 40 | 63 | 6 | 28 | M 25x1.5 | 6x3.5 | 2590 |
| Tr 48/50x… | 35 | 28 | 160 | 60 | 81 | 10 | 40 | M 35x1.5 | 8x4 | 35110 |
| Tr 60/70x… | 40 | 36 | 195 | 80 | 105 | 8.5 | 63 | M 40x1.5 | 10x5 | 40115 |
| Tr 80x… | 55 | 48 | 235 | 110 | 135 | 10 | 90 | M 55x2 | 14x5.5 | 55145 |

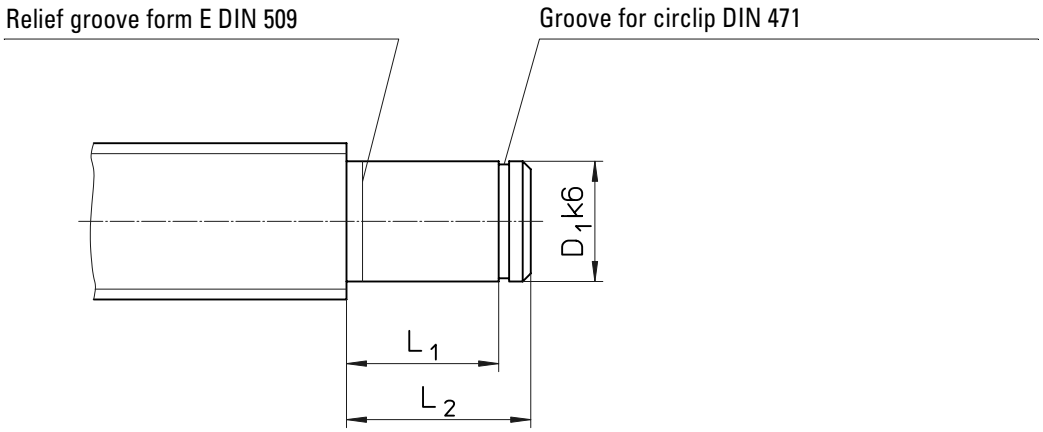
| **Form J** | Dimensions [mm] | | | | | | | | | Bearing |
|---|---|---|---|---|---|---|---|---|---|---|
| TGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $W_1xD_1$ | FDX |
| Tr 20/22x… | 12 | 9 | 88 | 20 | 32 | 2.5 | 16 | M 12x1 | 3x1.8 | 12 |
| Tr 24/26x… | 15 | 11 | 92 | 23 | 35 | 3.5 | 16 | M 15x1 | 4x2.5 | 15 |
| Tr 28/30/32x… | 20 | 14 | 107 | 30 | 44 | 4 | 22 | M 20x1 | 5x3 | 20 |
| Tr 36/40/44x… | 25 | 19 | 122 | 40 | 57 | 6 | 28 | M 25x1.5 | 6x3.5 | 25 |
| Tr 48/50x… | 30 | 24 | 136 | 50 | 72 | 7 | 36 | M 30x1.5 | 8x4 | 30 |
| Tr 60x… | 40 | 36 | 182 | 80 | 102 | 8.5 | 63 | M 40x1.5 | 10x5 | 40 |

| **Form L** | Dimensions [mm] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TGT | $D_1$ | $D_2$ | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $M_1$ | $W_1xD_1$ | Bearing |
| Tr 16/18x… | 10 | 8 | 55 | 20 | 30 | – | – | M 10x0.75 | – | 7200 BE RS |
| Tr 20/22x… | 12 | 9 | 58 | 20 | 30 | 2.5 | 16 | M 12x1 | 3x1.8 | 7201 BE RS |
| Tr 24/26x… | 15 | 11 | 73 | 23 | 33 | 3.5 | 16 | M 15x1 | 4x2.5 | 7202 BE RS |
| Tr 28/30/32x… | 20 | 14 | 88 | 30 | 43 | 4 | 22 | M 20x1 | 5x3 | 7204 BE RS |
| Tr 36/40/44x… | 25 | 19 | 120 | 40 | 55 | 6 | 28 | M 25x1.5 | 6x3.5 | 7205 BE RS |
| Tr 48/50x… | 35 | 28 | 145 | 60 | 77 | 10 | 40 | M 35x1.5 | 8x4 | 7207 BE RS |
| Tr 60x… | 40 | 36 | 175 | 80 | 103 | 8.5 | 63 | M 40x1.5 | 10x5 | 7208 BE RS |
| Tr 70/80x… | 55 | 48 | 215 | 110 | 133 | 10 | 90 | M 55x2 | 14x5.5 | 7211 BE RS |

**Form Z**
Chamfer 2 x 45°: TGS of ø 12 – 25 mm
Chamfer 3 x 45°: TGS of ø 26 – 40 mm
Chamfer 4 x 45°: TGS of ø 44 – 50 mm



# End journals for loose bearings/fixed bearings
# Form S, T, W, K




| **Form S** | Dimensions [mm] | | | | |
|---|---|---|---|---|---|
| TGT | $D_1$ | $L_1$ | $L_2$ | Spacer bushing | Bearing |
| Tr 18/20x… | 12 | 40 | 45 | 18x12.1x24 | 6001 RS |
| Tr 22/24/26x… | 15 | 46 | 51 | 21x15.1x28 | 6002 RS |
| Tr 28/30/32x… | 20 | 53 | 58 | 27x20.1x29 | 6004 RS |
| Tr 36x… | 25 | 53 | 58 | 32x25.1x23 | 6205 RS |
| Tr 40/44/48/50x… | 30 | 60 | 68 | 40x30.1x28 | 6206 RS |
| Tr 60x… | 40 | 80 | 88 | 50x40.1x44 | 6208 RS |
| Tr 70/80x… | 55 | 102 | 110 | 65x55.1x60 | 6211 RS |

| **Form T** | Dimensions [mm] | | | | |
|---|---|---|---|---|---|
| TGT | $D_1$ | $L_1$ | $L_2$ | Inner ring | Needle bearings |
| Tr 18/20x… | 12 | 40 | 45 | 2 IR 12x16x20 | HK 1614 RS |
| Tr 22/24/26x… | 15 | 46 | 51 | 2 IR 15x20x23 | HK 2018 RS |
| Tr 28/30/32x… | 20 | 53 | 58 | 2 LR 20x25x26.5 | HK 2518 RS |
| Tr 36x… | 25 | 53 | 58 | 2 LR 25x30x26.5 | HK 3018 RS |
| Tr 40/44/48/50x… | 30 | 60 | 68 | 2 LR 30x35x30 | HK 3518 RS |
| Tr 60x… | 40 | 80 | 88 | 4 LR 40x45x20 | HK 4518 RS |

**Form K:** Special manufacture, in accordance with customer drawing.

| **Form W** | Dimensions [mm] | | | |
|---|---|---|---|---|
| TGT | $D_1$ | $L_1$ | $L_2$ | Bearing |
| Tr 14/16x… | 10 | 8 | 12 | 6000 RS |
| Tr 18/20x… | 12 | 8 | 12 | 6001 RS |
| Tr 22/24/26x… | 15 | 9 | 13 | 6002 RS |
| Tr 28/30/32x… | 20 | 12 | 16 | 6004 RS |
| Tr 36x… | 25 | 15 | 20 | 6205 RS |
| Tr 40/44/48/50x… | 30 | 16 | 21 | 6206 RS |
| Tr 60x… | 40 | 18 | 25 | 6208 RS |
| Tr 70/80x… | 55 | 21 | 29 | 6211 RS |

# Calculation

**Load capacity of trapezoidal thread screws**
The load capacity of sliding pairs is generally dependent on their material and surface properties, running in status, pressure per unit area, lubrication ratio, the sliding speed and the temperature and thus from the duty time and the options for heat dissipation.

The permissible pressure per unit area is primarily dependent on the sliding speed of the lead screw.

The pressure per unit area for motion systems should not exceed the value of 5 N/mm$^2$.

The permissible speed can be calculated from the bearing length ratio of the nut (see tables on pages 70–72) and the pv factor of the nut material concerned (see page 72).

| **pv factors** Material | pv factors [N/mm$^2$ · m/min] |
|---|---|
| G-CuSn 7 ZnPb (Rg 7) | 300 |
| G-CuSn 12 (G Bz 12) | 400 |
| Plastic (PETP) | 100 |
| Cast iron GG 22/GG 25 | 200 |

**Required bearing length ratio**

**(VIII)** $$A_{erf} = \frac{F_{ax}}{P_p}$$

$A_{erf}$ Required bearing length ratio [mm$^2$]
$F_{ax}$ Axial load acting [N]
$P_p$ Maximum permissible pressure per unit area = 5 N/mm$^2$

**Maximum permissible sliding speed**

**(IX)** $$v_{Gp} = \frac{pv - Wert}{P_p}$$

pv factor See table
$v_{Gp}$ Maximum permissible sliding speed [m/min]

**Maximum permissible speed**

**(X)** $$n_p = \frac{v_{Gp} \cdot 1000}{D \cdot \pi}$$

D Pitch diameter [mm]
$n_p$ Maximum permissible speed [rpm]

**Permissible advance speed**

**(XI)** $$s_p = \frac{n_p \cdot P}{1000}$$

P Thread pitch [mm]
$s_p$ Permissible advance speed [m/min]

# Calculation

**Example calculation for load capacity**

**Given:** Lead screw, trapezoidal-thread screw with bronze nut $P_p$ = 5 N/mm², axial load $F_{ax}$ = 10000 N

**Sought:** What travel speed is still permissible at this loading?

**Required bearing length ratio $A_{erf}$**

**from (VIII)** $$A_{erf} = \frac{F_{ax}}{P_p} = \frac{10000\,N}{5\,N/mm^2} = 2000\,mm^2$$

**Selection of the bronze nut from the technical data**
**→ page 43**

36 x 6 with bearing length ratio A = 2140 mm²

Thread pitch P = 6 mm
Pitch circle diameter D = d - $\frac{P}{2}$
= 36 - $\frac{6}{2}$ [mm]
= 33 mm

**Maximum permissible sliding speed $V_{Gp}$**

**from (IX)** $$v_{Gp} = \frac{pv - Wert}{P_p} = \frac{300\,N/mm^2 \cdot m/min}{5\,N/mm^2} = 60\ m/min$$

With pv factor for Rg 7 = 300 m/min (see table)

**Maximum permissible speed**

**from (X)** $$n_p = \frac{v_{Gp} \cdot 1000}{D \cdot \pi} = \frac{60\,m/min \cdot 1000\,mm/m}{33\,mm \cdot \pi} = 579\ 1/min$$

**Permissible advance speed**

**from (XI)** $$s_p = \frac{n_p \cdot P}{1000} = \frac{579\ 1/min \cdot 6\,mm}{1000\,mm/m} = 3{,}474\ m/min$$

**Result:**

Under a loading of 10000 N, the selected trapezoidal thread lead screw can be operated with an advance speed of 3.474 m/min.

# Calculation

**Critical speed of trapezoidal thread screws**

There is a risk of resonance bending vibration in slender rotating components such as shafts. The method described below permits the estimation of the resonant frequency on the assumption of an adequately rigid installation. Speeds close to the critical speed furthermore considerably increase the risk of lateral buckling. The critical speed must, therefore, also be viewed in conjunction with the critical buckling force.

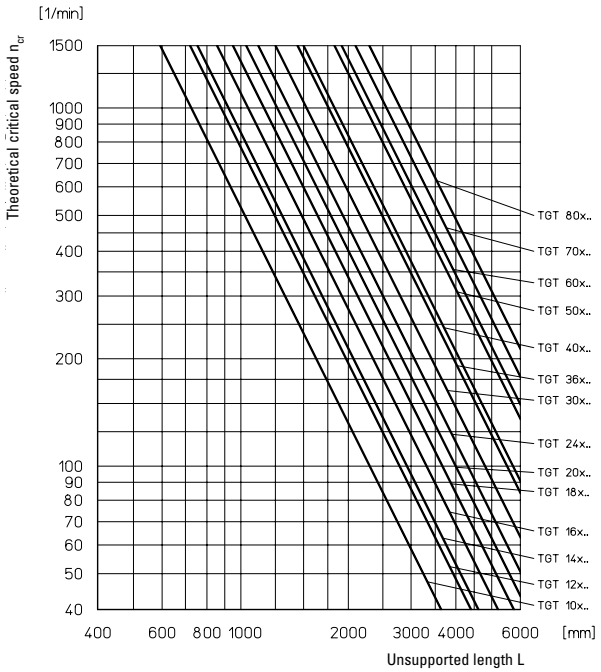
**Maximum permissible shaft speed**

**(XII)** $$n_p = 0{,}8 \cdot n_{cr} \cdot f_{cr}$$

$n_p$ Maximum permissible shaft speed [rpm]
$n_{cr}$ Theoretical critical shaft speed [rpm], leading to resonance vibrations → see graph
$f_{cr}$ Correction factor taking into consideration the type of shaft bearing → see table

! The operating speed may not be more than 80 % of the maximum speed

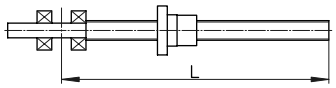
**Theoretical critical speed $n_{cr}$**



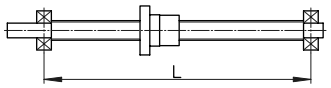

**Bearing types**

Typical values for the correction factor $f_{cr}$ corresponding to the classical installation situations for standard shaft bearings.

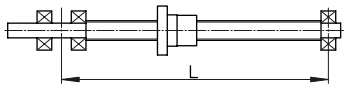
**Case 1**
$f_{cr}$ = 0.36



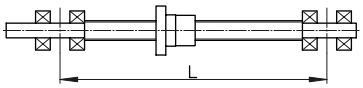

**Case 2**
$f_{cr}$ = 1




**Case 3**
$f_{cr}$ = 1.47




**Case 4**
$f_{cr}$ = 2.23



# Calculation

**Critical buckling force of trapezoidal thread screws**
There is a risk of slender components such as shafts buckling to one side under axial compressive loading.

The permissible axial force according to Euler can be determined with the procedure described below. The safety factors appropriate to the system shall be taken into consideration prior to the specification of the permissible compressive force.

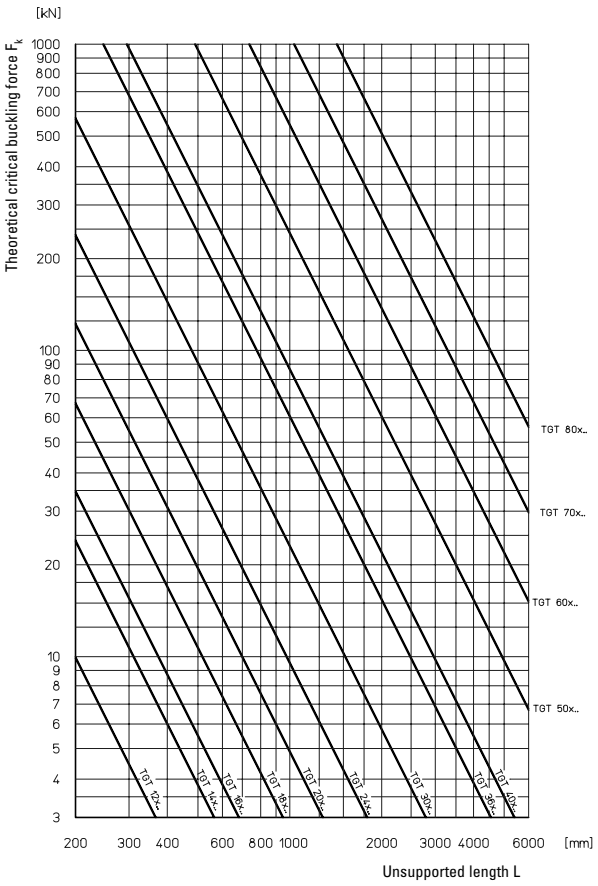
**Maximum permissible axial force**

**(XIII)** $F_p = 0{,}8 \cdot F_c \cdot f_c$

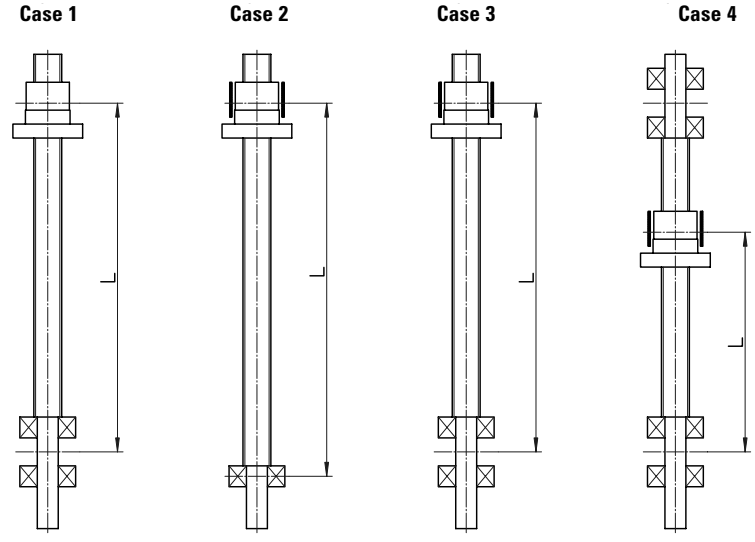
$F_p$ Maximum permissible axial force [kN]
$F_c$ Theoretical critical buckling force [kN], → see graph
$f_c$ Correction factor taking into consideration the type of shaft bearing → see table

! The operating force may not be more than 80 % of the maximum permissible axial force

**Theoretical critical buckling force $F_c$**




**Bearing types**
Typical values for the correction factor $f_c$ corresponding to the classical installation situations for standard shaft bearings.



# Calculation

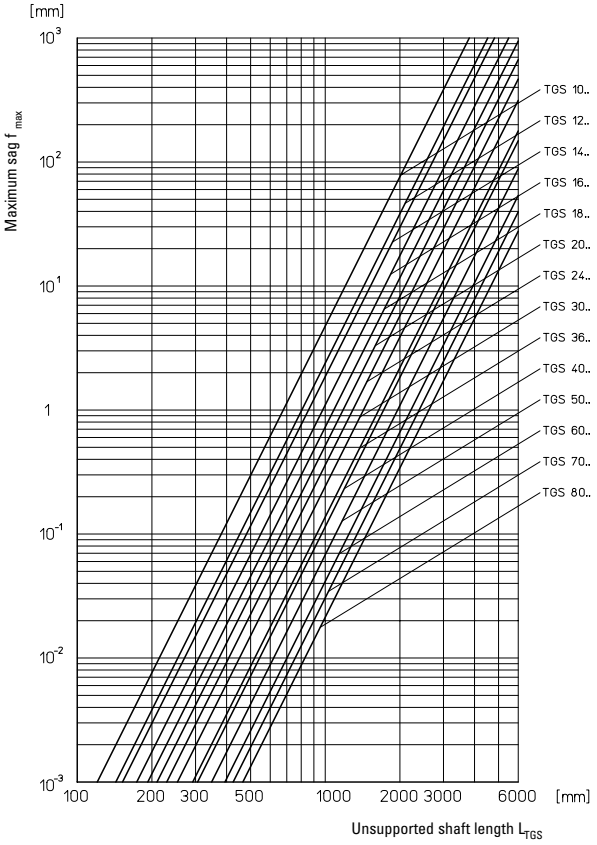
**Shaft sag as a consequence of its own weight**
The dead weight of the unsupported shaft leads to sag, even in the case of properly installed lead screws, in which the forces acting are absorbed by external guides. The formula given below allows determination of the shaft's maximum sag.

**Maximum shaft sag**

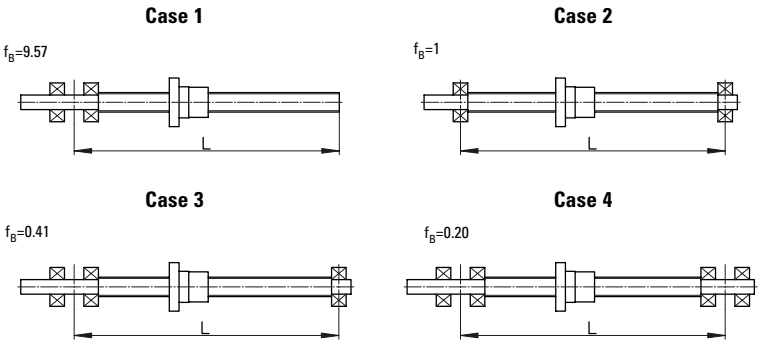
**(XIV)** $$f_{max} = f_B \cdot 0{,}061 \cdot \frac{w_{TGS} \cdot L_{TGS}}{I_Y}$$

| | |
|---|---|
| $f_B$ | Correction factor taking into consideration the type of shaft bearing → see table |
| $I_Y$ | Geometrical moment of inertia [mm⁴] → see table on page 68 |
| $L_{TGS}$ | Free, unsupported shaft length [mm] |
| $w_{TGS}$ | Distributed load [kg/m] |

**Theoretical maximum sag**




**Bearing types**
Typical values for the correction factor $f_B$ corresponding to the classical installation situations for standard shaft bearings.



# Calculation

**Example calculation of trapezoidal screw**

**Given:** Trapezoidal thread lead screw
RPTS Tr 24x5 shaft
Length L = 1500 mm
Bearing journal case 2
Operating speed: $n_{max}$ = 500 [rpm]

**Sought:** Is the operating speed non-critical?
How great is the permissible axial force?
How great is the maximum sag?

**Maximum permissible shaft speed $n_{zul}$**

**from (XII)** $n_p = 0{,}8 \cdot n_{cr} \cdot f_{cr} = 0{,}8 \cdot 830\ 1/\text{min} \cdot 1 = 664\ 1/\text{min}$

Theoretical critical speed $n_{cr}$ = 830 rpm
→ Theoretical critical speed graph

**from (XIII)** $F_p = 0{,}8 \cdot F_c \cdot f_c = 0{,}8 \cdot 4{,}2\ \text{kN} \cdot 1 = 3{,}36\ \text{kN}$

Theoretical critical buckling force $F_c$ = 4.2 kN
→ from Theoretical critical buckling force graph

**from (XIV)** $f_{max} = f_B \cdot 0{,}061 \cdot \frac{w_{TGS} \cdot L_{TGS}}{I_Y} = 1 \cdot 0{,}061 \cdot \frac{2{,}85\ \text{kg/m} \cdot 1{,}5\ \text{m}}{0{,}460\ \text{cm}^4}$

$f_{max} = 0{,}57\ \text{mm}$

Distributed load $W_{TGS}$ = 2.85 kg/m
Geometrical moment of inertia $I_y$ = 0.460 $cm^4$
→ from table on page 67

**Result:**

The lead screw selected is non-critical at $n_{max}$ = 500 rpm.
It can be loaded with a maximum axial load of 3.36 kN and, mounted horizontally, will suffer a maximum sag of 0.57 mm.
**(Note pressure per unit area and pv factor)**

# Calculation

**Input torque and input power required**

The input torque required for a lead screw is a result of the acting axial load, the thread pitch and the efficiency of the lead screw and its bearings. The acceleration torque must be checked if acceleration times are short and speeds are high.
As a matter of principle, it must be noted that a breakaway torque must be overcome when a trapezoidal thread lead screw starts to move.

**Input torque required**

**(XV)**

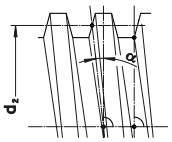
$$M_d = \frac{F_{ax} \cdot P}{2000 \cdot \pi \cdot \eta_A} + M_{rot}$$

$F_{ax}$ Total axial load acting [N]
$P$ Thread pitch [mm]
$\eta_A$ Efficiency of total motion system
$= \eta_{TGT} \cdot \eta_{Fixed\ bearing} \cdot \eta_{Loose\ bearing}$
$\eta_{TGT\ (\mu = 0.1)}$ → Table page 67
$\eta_{Fixed\ bearing} = 0.9 \ldots 0.95$
$\eta_{Loose\ bearing} = 0.95$
$M_d$ Input torque required [Nm]
$M_{rot}$ Rotary moment of acceleration [Nm]
$= J_{rot} \cdot \alpha_0$
$= 7.7 \cdot d^4 \cdot L \cdot 10^{-13}$
$J_{rot}$ Rotary moment of inertia [kgm²]
$d$ Shaft nominal diameter [mm]
$L$ Shaft length [mm]
$\alpha_0$ Angular acceleration [1/s²]

**Efficiency $\eta$ for friction factors other than μ = 0.1**

**(XVI)**

$$\eta = \frac{\tan\alpha}{\tan(\alpha + \rho')}$$




$\eta$ Efficiency of the conversion of a rotary motion into a axial motion
$\alpha$ Pitch angle of the thread [°] → Table page 67 or generally:

$$\tan\alpha = \frac{P}{d_2 \cdot \pi}$$

where $P$ Thread pitch [mm]
$d_2$ Pitch diameter [mm]
$\rho'$ Thread angle of friction [°]
$\tan\rho' = \mu \cdot 1.07$ for ISO trapezoidal thread
$\mu$ Coefficient of friction

| | μ starting up (= $\mu_0$) | | μ in motion | |
|---|---|---|---|---|
| | dry | lubricated | dry | lubricated |
| Metal nuts | ≈ 0.3 | ≈ 0.1 | ≈ 0.1 | ≈ 0.04 |
| Plastic nuts | ≈ 0.1 | ≈ 0.04 | ≈ 0.1 | ≈ 0.03 |

**Input power**

**(XVII)**

$$P_a = \frac{M_d \cdot n}{9550}$$

$M_d$ Input torque required [Nm] → from (XV)
$n$ Shaft speed [rpm]
$P_a$ Input power required [kW]

# Calculation

**Torque as a consequence of an axial load**

Trapezoidal lead screws, the pitch angle $\alpha$ of which is greater than the friction angle $\rho'$ are considered non-self locking. This means that an axial force applied generates a resulting torque on the shaft. The efficiency $\eta'$ for the conversion of an axial motion into a rotary motion is less than that for the conversion of a rotary motion into an axial motion.

**Holding torque required**

**(XVIII)** $$M_d' = \frac{F_{ax} \cdot P \cdot \eta'}{2000 \cdot \pi} + M_{rot}$$

$F_{ax}$ Total axial load acting [N]
$P$ Thread pitch [mm]
$\eta'$ Efficiency of the conversion of an axial motion into a rotary motion

$$= \frac{\tan(\alpha - \rho')}{\tan \alpha}$$
$$= 0{,}7 \cdot \eta$$

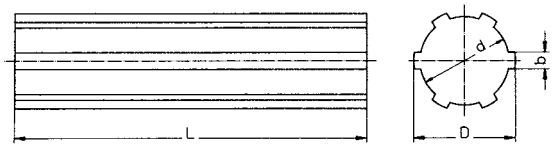
The influence of the efficiency of the bearings can be ignored.

$M_d'$ Holding torque required [Nm]
$M_{rot}$ Rotary moment of acceleration [Nm]
$= J_{rot} \cdot \alpha_0$
$= 7.7 \cdot d^4 \cdot L \cdot 10^{-13}$

- $J_{rot}$ Rotary moment of inertia [kgm$^2$]
- $d$ Shaft nominal diameter [mm]
- $L$ Shaft length [mm]
- $\alpha_0$ Angular acceleration [1/s$^2$]

## KW splined shafts

**Material:** CK 45.
Based on DIN 5463.

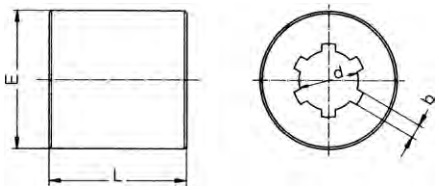



| Designation | Dimensions [mm] | | | Weight [kg/m] |
|---|---|---|---|---|
| | ø D -0.07 -0.27 | ø d +0.0 -0.08 | b +0.0 -0.08 | |
| KW 16 | 20 | 16 | 4 | 1.90 |
| KW 21 | 25 | 21 | 5 | 2.10 |
| KW 26 | 32 | 26 | 6 | 5.00 |
| KW 42 | 48 | 42 | 8 | 12.30 |
| KW 46 | 54 | 46 | 9 | 15.30 |

Straightness: 0.5 – 0.6 mm/300 mm
Straightness: 0.1 mm/300 mm on request

## SR sliding sleeve blank

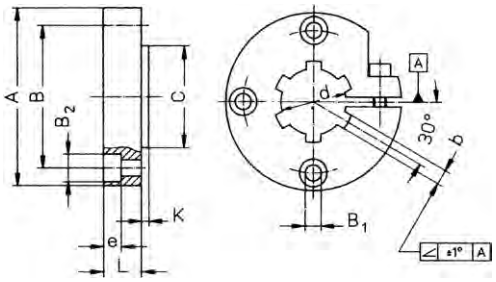
**Material:** 9 Smn 28 K.
Based on DIN 5463.




| Designation | Dimensions [mm] | | | | Weight [kg/each] |
|---|---|---|---|---|---|
| | ø d $G_6$ | b $F_9$ | ø E | L | |
| SR 16 | 16 | 4 | 40 | 35 | 0.25 |
| SR 21 | 21 | 5 | 45 | 43 | 0.40 |
| SR 26 | 26 | 6 | 60 | 59 | 1.00 |
| SR 42 | 42 | 8 | 90 | 71 | 2.60 |
| SR 46 | 46 | 9 | 90 | 95 | 3.25 |

## EK complete clamping ring

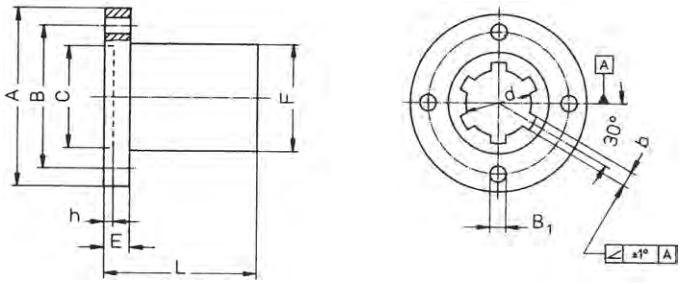
**Material:** C 45, surface burnished. Drillings match ES.
Based on DIN 5463.




| Designation | Number of grooves | Dimensions [mm] | | | | | | | | | | Weight [kg/each] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ø d $G_6$ | b $F_9$ | ø A | ø B | ø $B_1$ | ø $B_2$ | e | ø C $f_7$ | K | L | |
| EK 16 | 6 | 16 | 4 | 52 | 38 | 5.3 | 10 | 6 | 26 | 2 | 14 | 0.20 |
| EK 21 | 6 | 21 | 5 | 62 | 48 | 6.4 | 11 | 7 | 35 | 3 | 14 | 0.25 |
| EK 26 | 6 | 26 | 6 | 70 | 56 | 6.4 | 11 | 7 | 40 | 3 | 15 | 0.25 |
| EK 42 | 8 | 42 | 8 | 95 | 75 | 10.5 | 18 | 11 | 60 | 3 | 22 | 0.85 |
| EK 46 | 8 | 46 | 9 | 99 | 80 | 10.5 | 18 | 11 | 65 | 3 | 24 | 0.95 |

## ES complete sliding sleeve

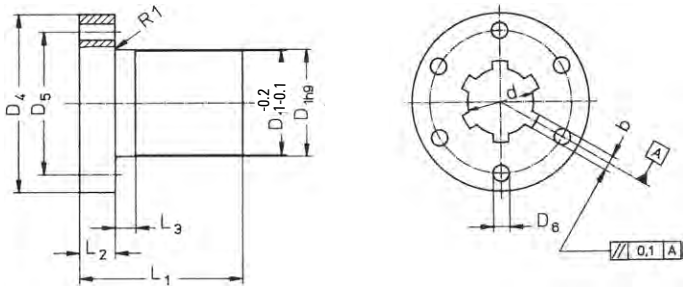
**Material:** C 45, Grooves do not match bores.
Based on DIN 5463.




| Designation | Number of grooves | Dimensions [mm] | | | | | | | | | | Weight [kg/each] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ø d $G_6$ | b $F_9$ | ø A | ø B | ø $B_1$ | ø C $H_7$ | h | ø F $h_7$ | L | E | |
| ES 16 | 6 | 16 | 4 | 52 | 38 | 5.3 | 26 | 3 | 28 | 35 | 9 | 0.20 |
| ES 21 | 6 | 21 | 5 | 62 | 48 | 6.4 | 35 | 3.5 | 34 | 50 | 10 | 0.30 |
| ES 26 | 6 | 26 | 6 | 70 | 56 | 6.4 | 40 | 3.5 | 42 | 60 | 10 | 0.50 |
| ES 42 | 8 | 42 | 8 | 95 | 75 | 10.5 | 60 | 4 | 60 | 90 | 16 | 1.30 |
| ES 46 | 8 | 46 | 9 | 99 | 80 | 10.5 | 65 | 4 | 65 | 100 | 16 | 1.50 |

## ESS complete sliding sleeve made from special bronze

**Material:** High-quality bronze GBZ 12, Grooves do not match bores.
Based on DIN 5463.




| Designation | Number of grooves | Dimensions [mm] | | | | | | | | | Weight [kg/each] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ø d $G_6$ | b $F_9$ | $D_1$ | $D_4$ | $D_5$ | $D_6$ | $L_1$ | $L_2$ | $L_3$ | |
| ESS 16 | 6 | 16 | 4 | 28 | 48 | 38 | 6 | 44 | 12 | 8 | 0.25 |
| ESS 21 | 6 | 21 | 5 | 32 | 55 | 45 | 7 | 44 | 12 | 8 | 0.30 |
| ESS 26 | 6 | 26 | 6 | 38 | 62 | 50 | 7 | 46 | 14 | 8 | 0.40 |
| ESS 42 | 8 | 42 | 8 | 63 | 95 | 78 | 9 | 73 | 16 | 10 | 1.45 |
| ESS 46 | 8 | 46 | 9 | 72 | 110 | 90 | 11 | 97 | 18 | 10 | 2.25 |

# Installation and maintenance

## TGT trapezoidal thread screws

**Installation**
Trapezoidal thread screws must be carefully aligned on installation – if the appropriate measuring equipment is not available, the lead screw shall be moved once by hand over the entire length before the input unit is fitted. Uneven force requirements and/or running traces on the external diameter of the shaft here indicate errors in the alignment between shaft axis and guide. In this case, first slacken off the relevant mounting screws and then operate the lead screw once again by hand. If the force requirement is now uniform, the corresponding elements must be aligned, otherwise the alignment error must be determined by slackening further mounting screws.

**Caps**
Trapezoidal thread screws are inherently less sensitive to contamination than recirculating ball screws, especially at low speeds (e.g. manual operation).

Motion drives, in particular those using plastic nuts, however, also require protective measures similar to those for recirculating ball screws.

**Lubrication**

**Oil lubrication**
Is only used on trapezoidal thread screws in special cases.

**Grease lubrication**
This is the usual lubrication for trapezoidal thread screws. The lubrication intervals depend on the operating conditions; it is recommended that the shaft is cleaned before being greased, especially if high performance lubricating systems are being used.
Grease grades: roller bearing greases without a solid lubricant constituent.

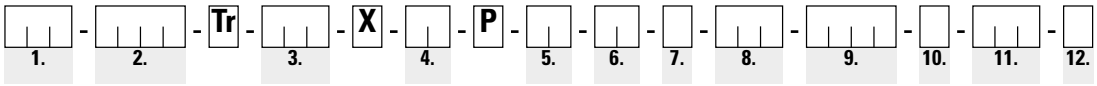
**Operating temperature**
Depends on the nature of the nut used, the lubricating conditions and the requirements made. Please consult us for operation at temperatures in excess of 100 °C (in excess of 70 °C for plastic nuts).

**Wear**
May be tested by hand; the nut must be replaced if the axial play of a single thread lead screw is greater than $^1/_4$ of the lead.

# Trapezoidal thread screw/helical spring cover/splined shafts

## The structure of the order code

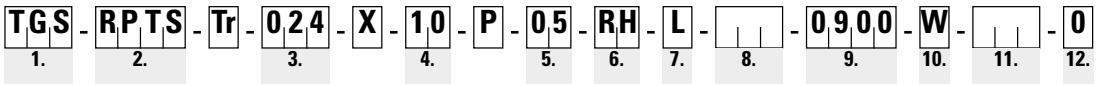
Trapezoidal thread screws




1. **Product**
   TGS = trapezoidal-thread screw shaft
   TGM= Trapezoidal thread nut
2. **Type**
   Shaft RPTS
   Nut: LKM, EKM, KSM, SKM, LRM, EFM
3. **Thread nominal diameter [mm]**
4. **Thread lead [mm]**
5. **Thread pitch [mm]**
   Only in the case of multiple-start threads: The distance between two consecutive threads in the axial direction = pitch/number of starts
6. **Thread direction**
   RH = right hand thread
   LH = left hand thread
7. **Shaft end 1**
   Standard end form D, F, H, J, L, S, T, W, Z, see pages 75 et seq.
   K = in accordance with attached customer drawing
   X = separating only
8. **Reference to end length 1**
   End length for version K [mm]
9. **Overall length of TGS [mm]**
10. **Shaft end 2**
    Standard end form D, F, H, J, L, S, T, W, Z, see pages 75 et seq.
    K = in accordance with attached customer drawing
    X = separating only
11. **Reference to end length 2**
    End length for version K [mm]
12. **Special designs or with accessories**
    0 = no
    1 = yes

## Ordering example:

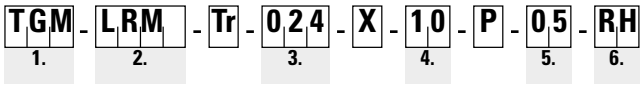
1 Trapezoidal-thread lead screw with shaft ends




1. **Product**
   TGS= trapezoidal-thread screw shaft
2. **Type**
   Shaft RPTS
3. **Thread nominal diameter [mm]**
   24
4. **Thread lead [mm]**
   10
5. **Thread pitch [mm]**
   5
6. **Thread direction**
   RH = right hand thread
7. **Shaft end 1**
   Standard end form L
9. **Overall length of TGS [mm]**
   900
10. **Shaft end 2**
    Standard end form W
12. **Special designs or with accessories**
    0 = no

## Ordering example:

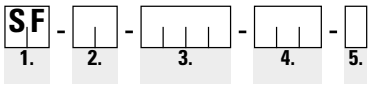
1 Trapezoidal thread nut




1. **Product**
   TGM= Trapezoidal thread nut
2. **Type**
   Nut: LRM
3. **Thread nominal diameter [mm]**
   24
4. **Thread lead [mm]**
   10
5. **Thread pitch [mm]**
   5
6. **Thread direction**
   RH = right hand thread

## The structure of the order code

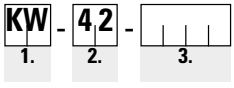
Helical spring cover




1. **Product**
   SF = Helical spring cover
2. **Minimum diameter D8 [mm]**
3. **Overall length [mm]**
4. **Minimum length L8 [mm]**
5. **Mounting position**
   V = vertical
   H = horizontal

## The structure of the order code

splined shaft




1. **Product**
   KW= splined shaft
2. **Size**
3. **Length [mm]**

## With their easy running, precise and cost-effective positioning function, lead screws offer the optimum solution for your application.

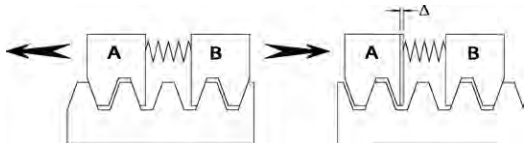
The Thomson Neff precision lead screws manufactured by Thomson Neff are an outstanding and economical solution to your linear motion requirements. Thomson Neff has been active for more than 25 years developing and producing the highest quality lead screws in this industrial sector. Our precision rolling process guarantees precision positioning to 0.075 mm/300 mm, and our coating method using PTFE creates systems with a lower drag torque and a higher service life.

Thomson Neff has a wide range of standard plastic nuts systems available, in the form of anti-backlash or standard Supernuts®. A composite material of acetal and PTFE is used in all these standard plastic nut systems, offering an outstanding lubricant capability with or without supplementary lubrication, at the same time achieving a low rate of wear. As a result of the introduction of our new, unique patented backlash-free method design, Thomson Neff is able to offer systems with high axial stiffness, zero backlash and a very low drag torque, reducing the demands on the motor. This creates more cost-effective products with a higher performance and longer service life. The two designs automatically adapt to the wear conditions, so that zero backlash is guaranteed for the life of the nut.

**Thomson Neff also offers a design service for your application requirements. This means that lead screws can be manufactured to meet your specifications. Get in touch with Thomson Neff today and discuss your application with our experienced product specialists.**

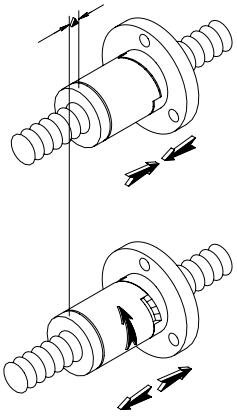
## Supply options

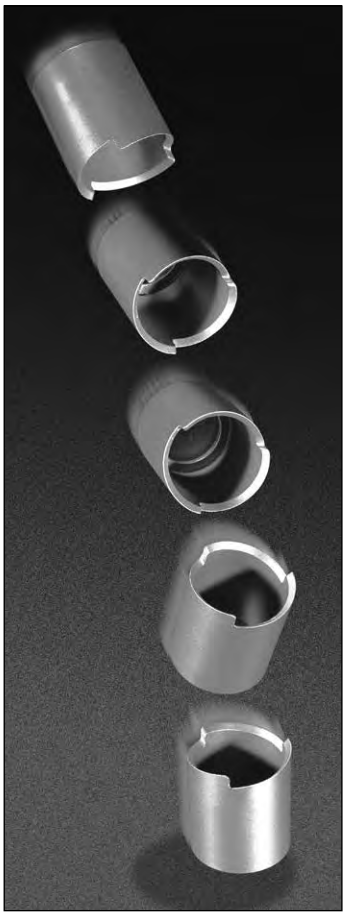
Reducing backlash is of decisive importance in ensuring precise positioning. Several types of preload variants, which all use a resilient preload are available on the market. As these mechanisms are only limited in their stiffness, a high preload is necessary to retain the position.
This leads to a high drag torque, shorter service life and reduced performance. The costs for
the system increase and a larger motor is required.




## The solution – THOMSON NEFF

With the introduction of the patented XC series of nuts with **ActiveCAM**, optimum axial stiffness with minimum drag torque at the same time is achieved. The use of a an extremely stiff stainless steel sleeve for the preload leads to an incomparable axial stiffness. The axial backlash is rectified without high preloading and so the lowest possible drag torque is achieved.





## Readjusting the preloading following wear

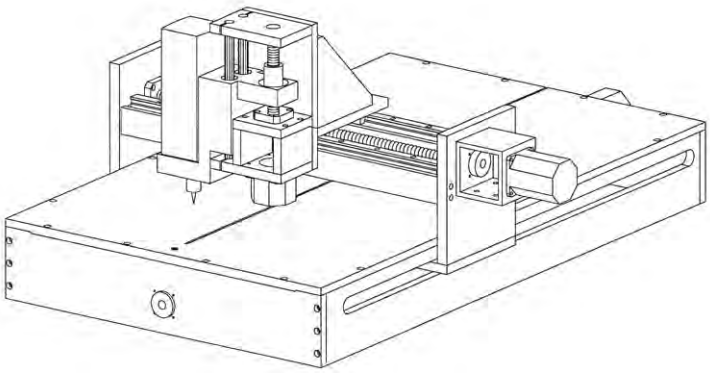
The wear occurring over time is automatically compensated for by the unique **ActiveCAM**mechanism, without sacrificing stiffness and positioning accuracy, or influencing the drag torque.
US Patent #5839321 and one or more foreign equivalents.

## Quality lead screws

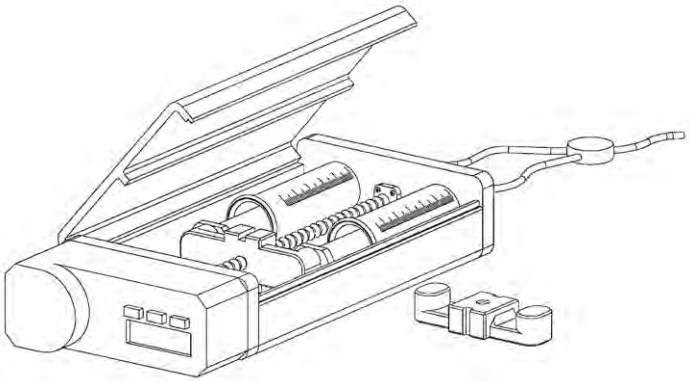
**- ActiveCAM technology**
**- High-quality plastic nuts**
**- High precision**

### Fields of application for lead screws

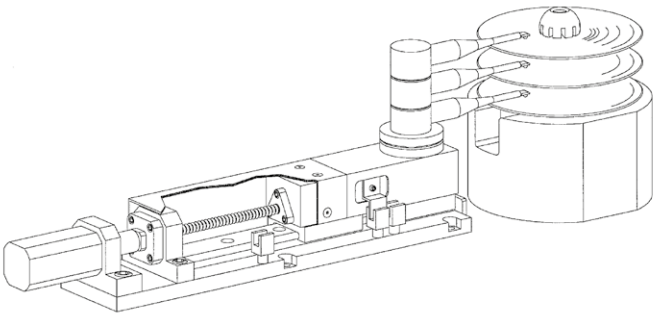
Engraving machines



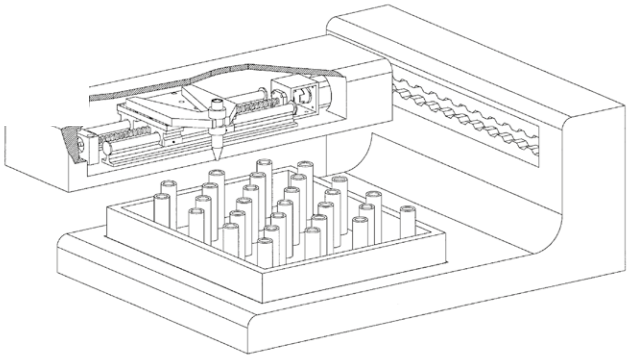
Medical equipment



Semiconductor production



Laboratory equipment



# Precision lead screws and Supernuts®

## Features/benefits

**Low costs**
Considerable savings over ball screws.

**Variety**
Huge selection of leads and diameters.

**Lubrication**
Internally lubricated plastic nuts may be used without supplementary lubrication. We nevertheless recommend the use of TriGEL grease or a dry lubricant to extend the service life. See page 100.

**Vibration and noise generation**
No vibration from ball recirculation and frequently
less audible noise generation by comparison with recirculating ball screws.

## Aspects of the design

**Load**
Supernuts are a cost-effective solution for medium to light loading. In vertical applications, the Anti-Backlash Supernuts should be mounted with the thread/flange on the underside.

**Unilateral load**
Unilateral loads that may exert a torque on the nut will lead to premature failure.

**Critical speed**
See critical speed graph on page 93.

**Buckling load**
See buckling load graph on page 94.

**Self-locking**
Lead screws can be self-locking at small leads. For the best possible operating conditions, the shaft pitch should always be greater than 1/3 of the nominal diameter.

**Customized solution**
Ability to adapt the components to your application.

**Corrosion resistant***
Stainless steel shafts, Acetal nuts.

**Environment**
Less susceptible to contamination by particles than recirculating ball screws.

**Low weight**
There is less mass to move.

**Temperature**
The heat generated by the environment and friction is the principal cause for premature failure of the plastic nuts. Note the limit values for temperature listed below and discuss your application with regard to continuous operation, high loading and high-speed applications with our product specialists. Thomson Neff recommends bronze nuts for very high temperature environments. We will also be pleased to advise you on the selection of a high temperature plastic for a custom application.

**Efficiency**
The following is true except for very large leads: the greater the lead, the better the efficiency. Even though acetal in combination with PTFE has excellent lubricating properties, recirculating ball screws have significantly greater efficiency than lead screws.
See page 99 for the actual efficiency.

**Length limit values**

| **Shaft diameter** | **maximum length** |
|---|---|
| 10 mm | 1200 mm |
| 12 – 16 mm | 1800 mm |
| >16 mm | 3600 mm |

**Pitch precision**

| | |
|---|---|
| Standard quality (SRA) | 250 µm/300 mm |
| Precision quality (SPR) | 75 µm/300 mm |

| **Mounting** | | **Shafts** | **Nuts**** | | | |
|---|---|---|---|---|---|---|
| **Maximum temperature** | **Coefficient of friction** | **Material** | **Material** | **Tensile strength** | **Water absorption (24 hour %)** | **Coefficient of thermal expansion** |
| 82 °C | 0.08 - 0.14 | Stainless steel* | Acetal with PTFE | 55 N/mm² | 0.15 | 9.7 x $10^{-5}$ 1/°C |

* 1.4301 (AISI 304) and 1.4305 (AISI 303)
** Other materials available on a custom basis.

## Useful formulas for lead screws

### TORQUE, ROTARY LINEAR

Drive on the shaft to move the nut, or drive on the nut to move the shaft.

$$\text{Torque (Nmm)} = \frac{\text{load (N)} \times \text{lead (mm)}}{2\pi \times \text{efficiency}}$$

### TORQUE, LINEAR ROTARY

Load on the nut to rotate the shaft.

$$\text{Torque} = \frac{\text{load} \times \text{lead} \times \text{efficiency}}{2\pi}$$

### EFFICIENCY

$$\%\ \text{efficiency} = \frac{\tan(\text{pitch angle})}{\tan(\text{pitch angle} + \text{“arctan” f})} \times 100$$

f = coefficient of friction

As a rule, the following is true: Systems with an efficiency of 50 % and greater are not self-locking. For efficiency see page 99. The efficiencies listed in the catalog are calculated for a coefficient of friction of 0.1.

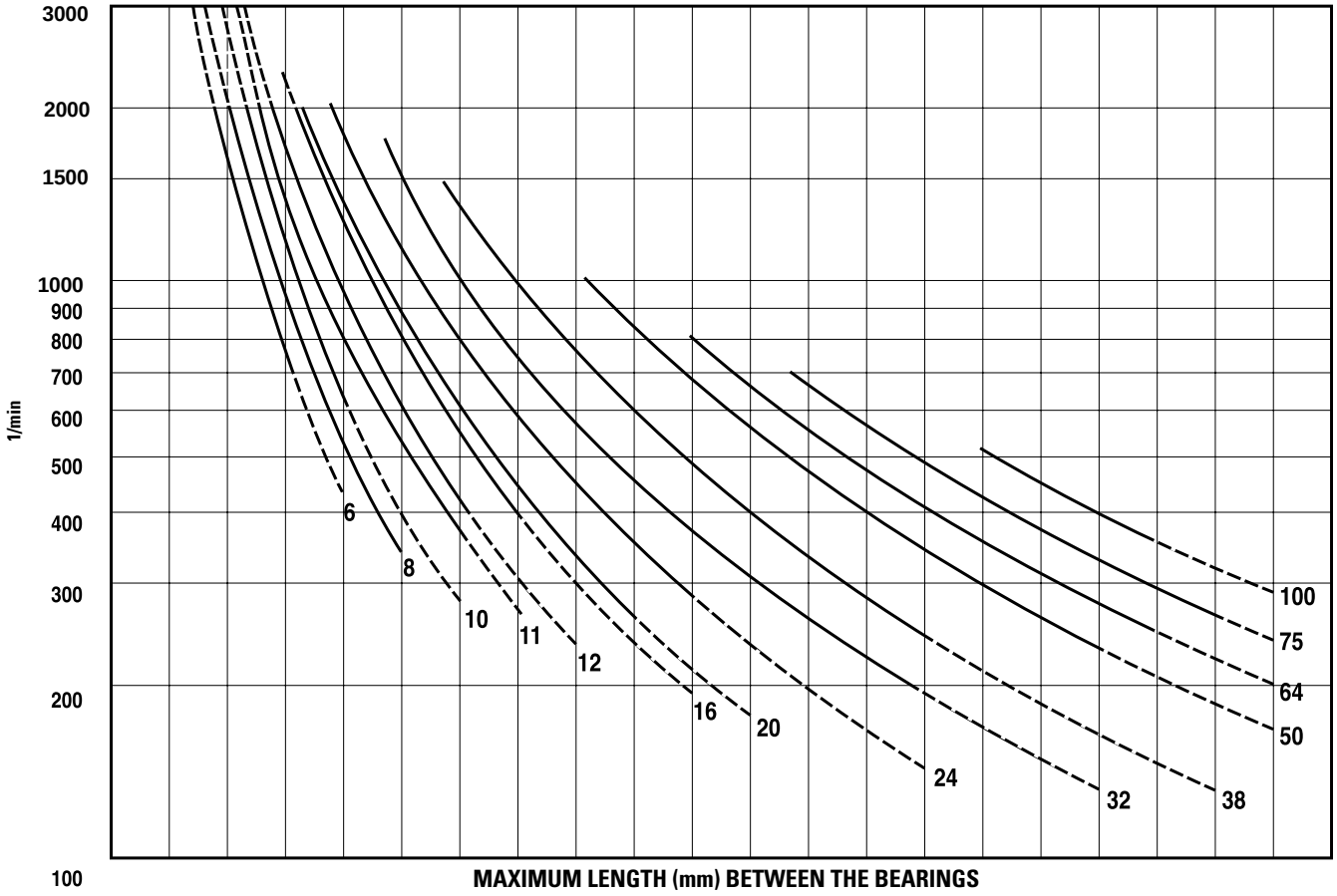
# Graph of critical rotational speed limit values

Every lead screw has a rotational speed limit. This is the point at which the rotational speed sets up heavy vibration. This critical point changed depending on the end bearing supports used and the bearing combination.

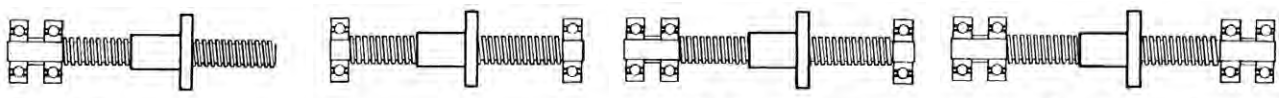
To use this chart, you must determine the speed of rotation required and the maximum length between the bearing supports. Then select one of the four bearing combinations shown below. The critical speed limit can be found by locating the point at which the speed of rotation (horizontal lines) intersects with the unsupported shaft length (vertical lines) as modified by the bearing combination listed below. It is recommended that the lead screws be operated at no more than 80% of the critical speed limit value.

**Warning: The graphs for the shaft diameters illustrated are based on the smallest minor diameter of a standard shaft within the nominal size range and are cut off at the maximum speed of rotation for the nut. This value for the rotational speed MAY NOT BE EXCEEDED, whatever the shaft length.**






| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bearing scenario 1 | 150 | 300 | 460 | 610 | 760 | 910 | 1070 | 1220 | 1370 | 1520 | 1680 | 1830 | 1980 | 2130 | 2290 | 2440 | 2590 | 2740 | 3050 | 3200 |
| Bearing scenario 2 | 250 | 510 | 760 | 1020 | 1270 | 1520 | 1780 | 2030 | 2290 | 2540 | 2790 | 3050 | 3300 | 3560 | 3810 | 4060 | 4320 | 4570 | 4830 | 5080 |
| Bearing scenario 3 | 300 | 610 | 910 | 1220 | 1550 | 1850 | 2160 | 2460 | 2770 | 3070 | 3380 | 3910 | 4010 | 4320 | 4620 | 4930 | 5230 | 5540 | 5840 | 6150 |
| Bearing scenario 4 | 380 | 760 | 1140 | 1520 | 1910 | 2290 | 2670 | 3020 | 3400 | 3780 | 4170 | 4550 | 4930 | 5310 | 5690 | 6070 | 6450 | 6830 | 7210 | 7570 |

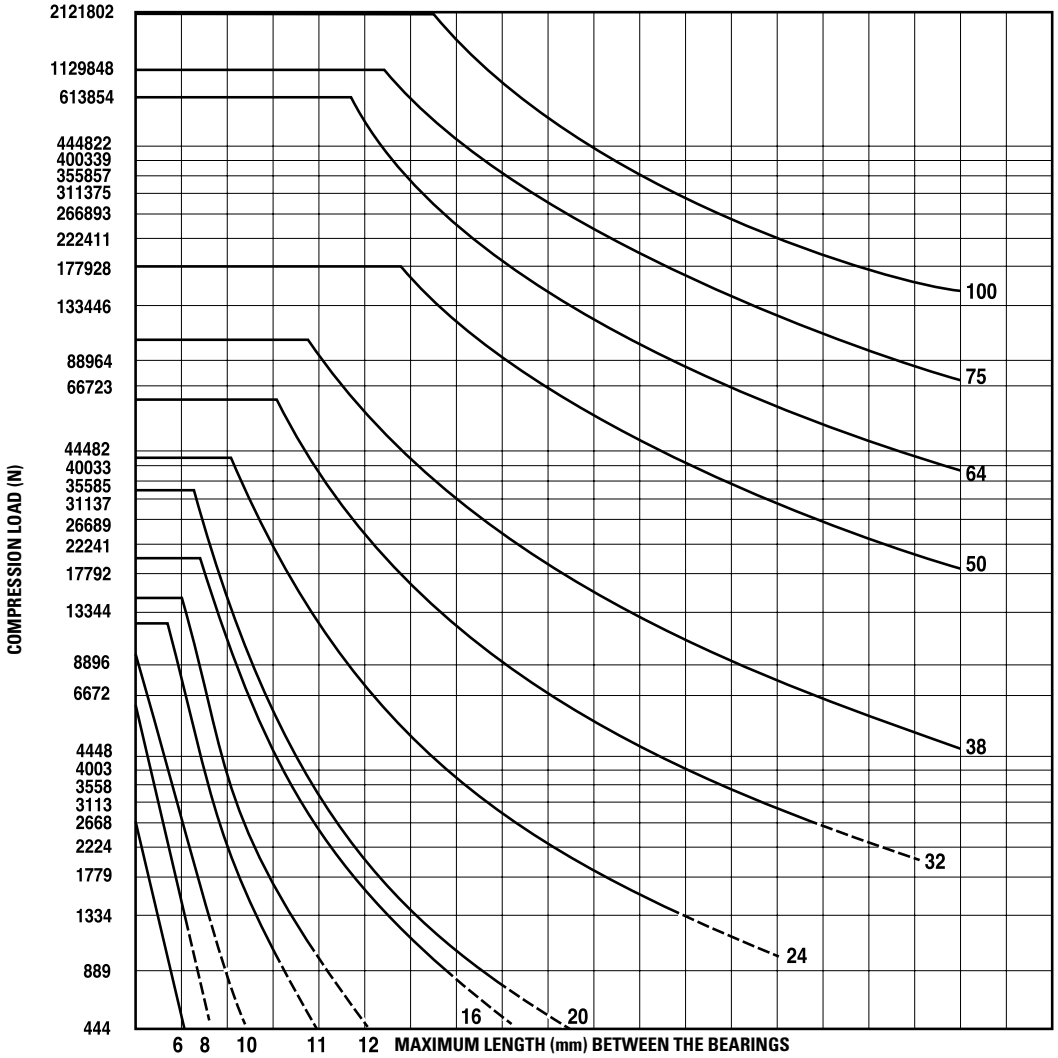


**Bearing scenario 1** **Bearing scenario 2** **Bearing scenario 3** **Bearing scenario 4**

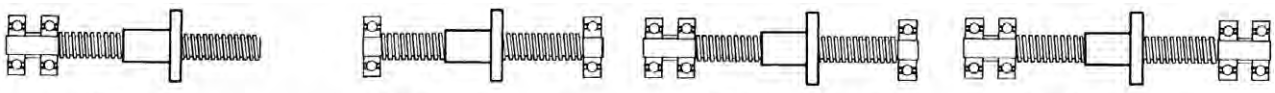
# Graph of critical buckling force

This graph is used to determine the maximum compression loading on the shafts. Normally, shafts operated under tensile stress are capable of withstanding a loading up to the design load capacity of the nut. The bearing combinations influence the load capacity of the shaft. The four standard variants are listed below with the corresponding bearing scenarios. To determine the safe minimum diameter of the shaft, you must determine the point at which the graphs for the compressive load (horizontal) and the shaft length (vertical) intersect. Consult the manufacturer if the loading values lie in the area of the dotted lines.

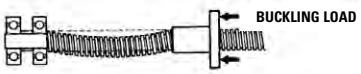
**Warning: The load capacity of the nuts MAY NOT BE EXCEEDED. The curves for the shaft diameter are based on the smallest minor diameter of a standard shaft within the nominal size range.**




| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bearing scenario 1 | 130 | 250 | 380 | 510 | 640 | 760 | 890 | 1020 | 1140 | 1270 | 1400 | 1520 | 1650 | 1780 | 1910 | 2030 | 2160 | 2290 | 2410 |
| Bearing scenario 2 | 250 | 510 | 760 | 1020 | 1270 | 1520 | 1780 | 2030 | 2290 | 2540 | 2790 | 3050 | 3300 | 3560 | 3810 | 4060 | 4320 | 4570 | 4830 |
| Bearing scenario 3 | 360 | 710 | 1070 | 1450 | 1800 | 2160 | 2510 | 2870 | 3230 | 3580 | 3960 | 4320 | 4670 | 5030 | 5380 | 5740 | 6100 | 6480 | 6860 |
| Bearing scenario 4 | 510 | 1020 | 1520 | 2030 | 2540 | 3050 | 3560 | 4060 | 4570 | 5080 | 5590 | 6100 | 6600 | 7110 | 7620 | 8130 | 8640 | 9140 | 9650 |



**Bearing scenario 1** **Bearing scenario 2** **Bearing scenario 3** **Bearing scenario 4**




**Compression load (buckling load)**




**Tensile load**

## Lead screw product features

| Series | Thomson Neff precision lead screw |
|---|---|
| Lead precision | Standard - 250 µm/300 mm<br>Precision - 75 µm/300 mm |
| Diameter | 10 to 24 mm |
| Lead | 2 to 45 mm |
| Backlash | 0.02 to 0.25 mm (standard nut)<br>backlash-free version available |
| Dynamic load | up to 1550 N |
| Maximum static load | up to 6675 N |
| **Catalog page** | 70 to 72 |

## Lead screw product availability

### Metric

**Lead (mm)**

| Diameter (mm) | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 16 | 20 | 25 | 35 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | ● ○ | ● | | ● | ● | | ● | | | | ● | | ● | |
| 12 | | ● | ● | ● | ● | | ● | | ● | | | ● | | ● |
| 16 | | | ● ○ | ● | | ● | | | | ● | | ● | ● | |
| 20 | | | ● ○ | | | ● | | ● | | ● | ● | | | ● |
| 24 | | | | ● ○ | | | | | | | | | | |

● = size with right hand thread in stock ○ = size with left hand thread in stock

### Inch

Lead screws in inch dimensions are also available.
Further information may be found on the Internet at **www.thomsonlinear.com**

**Lead (inches)**

| Diameter (inches) | 0.050 | 0.063 | 0.083 | 0.100 | 0.125 | 0.167 | 0.200 | 0.250 | 0.375 | 0.500 | 0.800 | 1.000 | 1.200 | 2.000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/8 | | ● ○ | ● ○ | ● ○ | ● ○ | ● | ● | ● ○ | ● ○ | ● ○ | | ● | ● | |
| 7/16 | | | | | ● | | | ● | | ● | | | | |
| 1/2 | | ● | | ● ○ | | | ● | ● | | ● | ● | ● | | |
| 5/8 | | | | ● ○ | ● ○ | | ● | ● | | ● | | | | |
| 3/4 | | | | ● ○ | ● ○ | ● ○ | ● ○ | | | ● | | ● | | ● ○ |
| 1 | | | | ● ○ | ● ○ | | ● ○ | ● ○ | | ● | | ● | | |

**Note:** Miniature sizes are also available. Information may be found on the Internet at **www.thomsonlinear.com**
Customized diameters and leads on request.

# Ordering information

Thomson Neff designs the lead screws for optimum performance. To ensure correct operation, it is recommended that our nuts and shafts are used only with the appropriate Thomson Neff products, as manufactured by Thomson Neff. This is of particular importance in the case of our own thread dimensions. Select a shaft size complying with DIN from page 99 if interchangeability is a requirements criterion.

The use of a lubricant is recommended for the operation of a lead screw with a plastic nut. This increases the service life of the unit and the permissible operating load.
**Note:** The load indications in the catalog are based on the use of a lubricant.
See pages 100 and 101 for lubrication options.

**Nut part number**
**(see pages 97 and 98)**

| | | | |
|---|---|---|---|
| | | | |
| **Prefix for nut style number** (letters only - 2 or 3 characters) | | | **Shaft size from table on page 99.** (No statement of precision prefix) |
| **Example** | | | |
| X | C | B | 10x2M |

**Note:** Make sure that nut you selected is offered for use with the shaft diameter selected. See "Shaft series" on pages 97 and 98 to verify.

**Shaft part numbers (see page 99)**

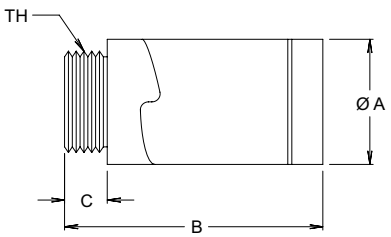
| | | | | |
|---|---|---|---|---|
| | | | | - |
| **Precision prefix** (3 letters for precision or standard accuracy) | | | **Shaft size** (indication of diameter and lead) | **Shaft length** (please state units - preferably mm) |
| **Example** | | | | |
| S | P | T | 10x2M | 150 mm |

The shaft and nut are designed to work together properly where these two components have the same suffix for the shaft size (see examples listed above).



## XC series – The leading performer

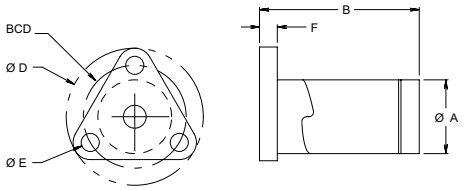




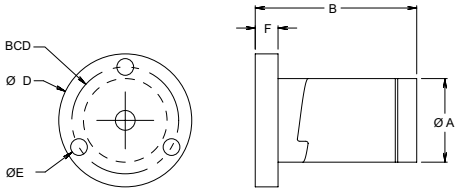

**Threaded nut style**

| Model no. | Shaft diameter (mm) | May also be used with inch thread | Dimensions | | | | Permissible dynamic load (N) | Drag torque | |
|---|---|---|---|---|---|---|---|---|---|
| | | | A (mm) | B (mm) max | C (mm) | TH (mm) | | min. (Nmm) | max. (Nmm) |
| XCB3700 | 10 | 5/16, 3/8 | 20.8 | 47.6 | 6.4 | M16 x 1.5 | 100 | 7 | 21 |
| XCB5000 | 12 | 7/16, 1/2 | 28.4 | 57.2 | 9.5 | M25 x 1.5 | 550 | 7 | 21 |
| XCB6200 | 16 | 5/8 | 35.6 | 66.0 | 12.7 | M30 x 1.5 | 775 | 14 | 42 |
| XCB7500 | 20 | 3/4 | 41.4 | 73.7 | 12.7 | M35 x 1.5 | 1100 | 21 | 71 |
| XCB10000 | 24 | 1 | 47.8 | 76.2 | 15.2 | M40 x 1.5 | 1550 | 35 | 71 |






Only XCF3700



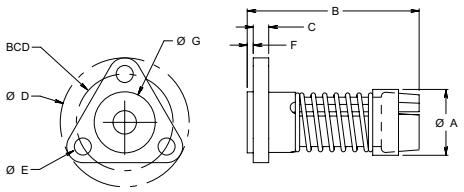

XCF5000, XCF6200

**Flanged nut style**

| Model no. | Shaft diameter (mm) | May also be used with inch thread | Dimensions | | | | | | Permissible dynamic load (N) | Drag torque | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A (mm) | B (mm) max | D (mm) | E (mm) | F (mm) | BCD (mm) | | min. (Nmm) | max. (Nmm) |
| XCF3700 | 10 | 5/16, 3/8 | 20.8 | 47.6 | 38.1 | 5.1 | 5.1 | 28.6 | 100 | 7 | 21 |
| XCF5000 | 12 | 7/16, 1/2 | 28.4 | 57.2 | 44.5 | 5.6 | 7.6 | 35.5 | 550 | 7 | 21 |
| XCF6200 | 16 | 5/8 | 35.6 | 66.0 | 54.1 | 5.6 | 12.7 | 42.9 | 775 | 14 | 42 |

## AFT3700 - The OEM solution





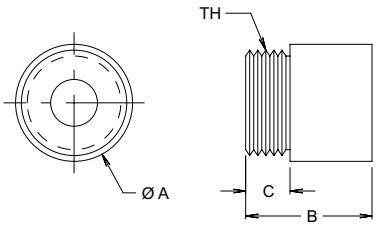

**Flanged nut style**

| Model no. | Shaft diameter (mm) | May also be used with inch thread | Dimensions | | | | | | | | Permissible dynamic load (N) | Drag torque | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A (mm) | B (mm) | C (mm) | D (mm) | E (mm) | F (mm) | G (mm) | BCD (mm) | | min. (Nmm) | max. (Nmm) |
| AFT3700 | 10 | 3/8, 7/16 | 19.6 | 50.8 | 5.1 | 38.1 | 5.1 | 1.5 | 18.0 | 28.6 | 45 | 14 | 35 |

See page 96 for notes on ordering

## SB series – Compact screw nuts



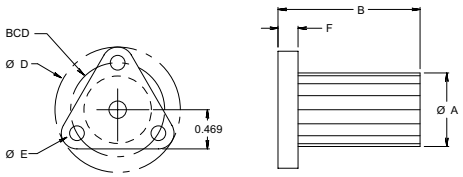



**Threaded nut style**

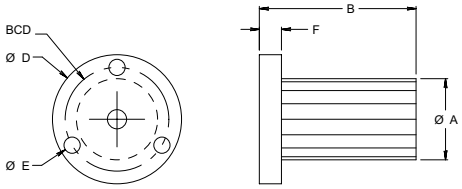
| Model no. | Shaft diameter (mm) | May also be used with inch thread | Dimensions | | | | Permissible dynamic load (N) | Maximum static load (N) | Drag torque |
|---|---|---|---|---|---|---|---|---|---|
| | | | A (mm) | B (mm) | C (mm) | TH (mm) | | | |
| SB3700 | 10 | 5/16, 3/8 | 19.1 | 19.1 | 6.4 | M16 x 1.5 | 310 | 1550 | No preloading |
| SB5000 | 12, 16 | 7/16, 1/2 | 25.4 | 25.4 | 9.5 | M22 x 1.5 | 445 | 2225 | |
| SB1000 | 20, 24 | 3/4, 1 | 38.1 | 38.1 | 12.7 | M35 x 1.5 | 1335 | 6675 | |

## MTS series - Simple to fit flanged nut






MTS3700 solo




MTS5000, MTS6200, MTS7500

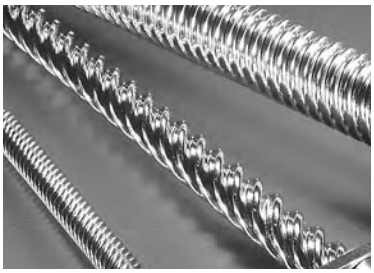
**Flanged nut style**

| Model no. | Shaft diameter (mm) | May also be used with inch thread | Dimensions | | | | | | Permissible dynamic load (N) | Drag torque |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | A (mm) | B (mm) | D (mm) | E (mm) | F (mm) | BCD (mm) | | |
| MTS3700 | 10 | 3/8, 7/16 | 18.0 | 38.1 | 38.1 | 5.1 | 5.1 | 28.6 | 325 | No preloading |
| MTS5000 | 12 | 1/2 | 19.1 | 38.1 | 38.1 | 5.1 | 6.4 | 28.6 | 550 | |
| MTS6200 | 16 | 5/8 | 22.4 | 41.4 | 38.1 | 5.1 | 7.6 | 30.2 | 775 | |
| MTS7500 | 20 | 3/4 | 28.6 | 44.5 | 50.8 | 5.1 | 7.6 | 36.5 | 1200 | |

See page 96 for notes on ordering

**Note:** The permissible loading describes the maximum operating load with lubrication at room temperature, 50 % duty time and 500 rpm. Increasing the speed of rotation will lead to a reduction in the maximum operating load.
At 1000 rpm, the operating load is approximately 50 % of the permissible load.

## Metric stainless steel precision trapezoidal thread lead screw shafts



Rolled precision trapezoidal thread lead screws have a polished finish and thus offer optimum efficiency and low wear. All shafts are made from stainless steel to ensure resistance to corrosion and a smooth finish. SPT and SRT shafts comply with the requirements of DIN 103, while SPR and SRA shafts have improved thread forms for high performance.

| Shaft diameter (mm) | Lead (mm) | Part number | | | Minor diameter (mm) | Efficiency with coefficient of friction of 0.1 (%) |
|---|---|---|---|---|---|---|
| | | Prefix for precision accuracy | Prefix for standard accuracy | Size | | |
| 10 | 2* | SPT | SRT | 10 x 2M | 7.4 | 42 |
| | 3^ | SPT | SRT | 10 x 3M | 6.4 | 53 |
| | 5 | SPR | SRA | 2-10 x 2.5M | 7.1 | 64 |
| | 6 | SPR | SRA | 4-10 x 1.5M | 8.2 | 66 |
| | 10 | SPR | SRA | 5-10 x 2M | 7.5 | 76 |
| | 20 | - | SRA | 6-10 x 3.3M | 8.4 | 81 |
| | 35 | - | SRA | 10-10 x 3.5M | 7.4 | 81 |
| 12 | 3* | SPT | SRT | 12 x 3M | 8.0 | 48 |
| | 4 | SPR | SRA | 2-12 x 2M | 9.2 | 54 |
| | 5^ | SPT | SRT | 2-12 x 2.5M | 8.9 | 59 |
| | 6 | SPR | SRA | 3-12 x 2M | 9.1 | 63 |
| | 10^ | SPT | SRT | 4-12 x 2.5M | 8.9 | 73 |
| | 15 | SPR | SRA | 6-12 x 2.5M | 8.7 | 78 |
| | 25 | - | SRA | 10-12 x 2.5M | 9.2 | 82 |
| | 45 | - | SRA | 15-12 x 3M | 9.6 | 81 |
| 16 | 4* | SPT | SRT | 16 x 4M | 11.3 | 48 |
| | 5 | SPR | SRA | 2-16 x 2.5M | 12.2 | 52 |
| | 8 | SPR | SRA | 4-16 x 2M | 13.0 | 63 |
| | 16 | SPR | SRA | 7-16 x 2.3M | 12.6 | 75 |
| | 25 | - | SRA | 5-16 x 5M | 11.5 | 80 |
| | 35 | - | SRA | 7-16 x 5M | 12.2 | 82 |
| 20 | 4* | SPT | SRT | 20 x 4M | 15.3 | 42 |
| | 8 | SPR | SRA | 2-20 x 4M | 14.8 | 59 |
| | 12 | SPR | SRA | 3-20 x 4M | 15.0 | 67 |
| | 16 | SPR | SRA | 4-20 x 4M | 15.0 | 72 |
| | 20 | - | SRA | 5-20 x 4M | 15.0 | 76 |
| | 45 | - | SRA | 9-20 x 5M | 15.8 | 82 |
| 24 | 5* | SPT | SRT | 24 x 5M | 18.5 | 42 |

*complies with the requirements specified in DIN 103 Parts 1 and 2. Tolerance class 7e.
^*complies with the requirements specified in DIN 103 Part 1, not defined in Parts 2 and 3.
See page 92 for maximum available shaft lengths
See page 96 for notes on ordering

# Lubrication




**Overview**
We offer a complete range of lubricants including our greases for clean room and vacuum uses. The TriGel product range has been especially developed to provide a lubrication solution for a wide range of applications in linear motion systems. Select the lubricant suited to your requirements.
This will ensure that you get the best performance from your Thomson Neff products.

## Lubrication selection table for trapezoidal thread lead screws

| **Thomson Neff** | **TriGel-300S** | **TriGel-450R** | **TriGel-600SM** | **TriGel-1200SC** | **TriGel-1800RC** |
|---|---|---|---|---|---|
| Application | Lead screws, Supernuts, plastic nuts | Ball screw linear bearings | Bronze nuts | Lead screws, plastic nuts clean room, high vacuum | Ball screw linear bearings, bronze nuts, clean room, vacuum |
| Maximum temperature | 200 °C (392 °F) | 125 °C (257 °F) | 125 °C (257 °F) | 250 °C (482 °F) | 125 °C (257 °F) |
| Loaded material | plastic on plastic or metal | Metal on metal | Metal on metal bronze on steel | plastic or metal, combination | Metal on metal |
| Mechanical load | slight | medium | medium to heavy | slight to medium | medium |
| Very low torque change in relation to the temperature | yes | — | — | yes | — |
| Very low starting torque | yes | yes | — | yes | yes |
| Compatibility with reactive chemicals | not recommended without OEM testing | not recommended without OEM testing | not recommended without OEM testing | possible | not recommended without OEM testing |
| Compatibility with plastics and | can lead to swelling of the silicon rubber seal | can lead to swelling of the EPDM seal | can lead to swelling of the EPDM seal | possible | can lead to swelling of the EPDM seal |
| elastomers Clean room use | not recommended | not recommended | not recommended | possible | possible |
| Use in high vacuum | not recommended | not recommended | not recommended | possible | possible |
| Vapor pressure (25 °C) | changes with volume | changes with volume | changes with volume | 1 x $10^{-6}$ Pa | 0.5 x $10^{-6}$ Pa |
| Packaging 10 cc syringe 0.45 kg tube | **TriGel-300S** **TriGel-300S-1** | 7832867/**TriGel-450R** 7832868/**TriGel-450R-1** | 0.1 kg tube/**TriGel-600SM** | **TriGel-1200SC** n.a. | 7832869/**TriGel-1800RC** |

* Maximum temperature for continuous exposure. Higher temperatures may be permissible but should be validated in the actual end use by the OEM.
Low temperature limits are -15°C or lower. Further information may be obtained from Thomson Neff.

## PTFE dry lubricant

Developed for trapezoidal lead screw applications with plastic on metal



A PTFE coating comprises a dry coating, forming a lubricating and barrier layer between the metal substrate and the polymer nut or ball nut. This means that the application of an additional lubricant that must be renewed is unnecessary in many cases.
The coating is very well suited to our XC (SuperNut) series, comprising plastic nuts and stainless steel lead screws. Service intervals for lubrication are no longer necessary, and the coating does not attract particles of dirt as a lubricant does. Although lower coefficients of friction are possible with a lubricant than with a dry lubricant, lubrication must be maintained to avoid a drop in performance. Coating with PTFE is an attractive and cleaner* alternative to greases and oils.



**Typical features**

| | |
|---|---|
| Type: | Connection with solid lubricant |
| Aim: | Increased lubrication, reduced friction/wear |
| Appearance: | Black coating |
| Thickness: | Approximately 13 – 25 µm |
| Active lubricant: | Polytetrafluorethylene |
| Coefficient of friction: | 0.06 to 0.12 |
| Operating temperature range for the coating: | -250 °C to 290 °C |
| Acid resistance: | Outstanding |
| Resistance to alkali: | Very good |
| Resistance to solvents: | Outstanding |

*Some particles are generated by the wear between the nut and the shaft. Over time, the shaft can show signs of a polished finish. This is not necessarily an indication of a malfunction.

# Inquiry form

**Contact address**

Company:
Address:

Contact:
Phone:
Fax:
e-mail:

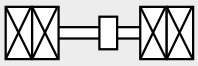
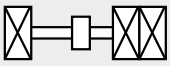
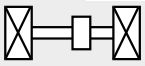
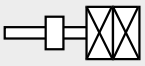
Contact:
Phone:
Fax:
e-mail:

**Recirculating ball screw parameters**

Diameter: mm Lead: mm Thread direction: Clockwise Counter-clockwise
Precision: /300 mm Nut design: Backlash-free: Preloaded: Backlash:
Stroke length: mm Track length: mm Total length: mm
Application:
Environment:
Lubrication: Oil Grease
Quantity: Annual requirement: Quantity: Delivery lot

**Mounting the ball screw**

Motion system element: Shaft Nut Mounting position: Horizontal Vertical Diagonal
Maximum speed: Rpm Maximum load: kN
Bearing scenario:

fixed-fixed 
loose-fixed 
loose-loose 
free-fixed 

**Load/service life specifications**

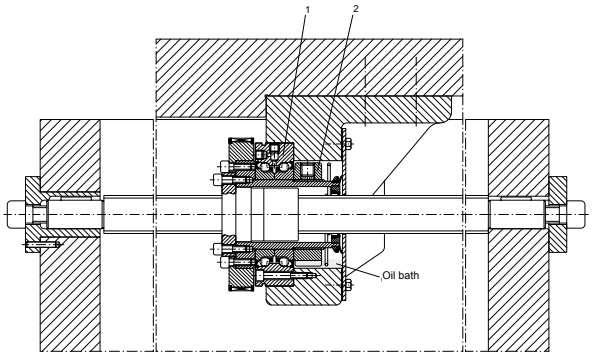
| Usage: | | | Load (N) | Speed (m/s) | Time period (s) |
|---|---|---|---|---|---|
| Required service life: | x$10^6$ rev. | $F_1$ | | | |
| Required service life: | hrs | $F_2$ | | | |
| Minimum dynamic load: | kN | $F_3$ | | | |

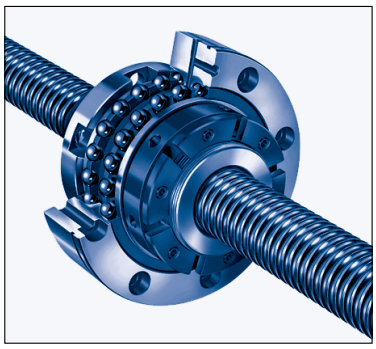
**Module construction options**

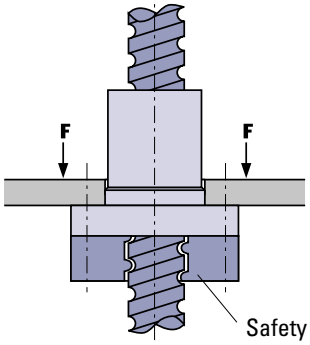
- Shafts, cut to length, with ready-mounted nuts
- Shafts, cut to length, with separately supplied nuts
- Shafts, annealed ends, with ready-mounted nuts
- Shafts, annealed ends, with separately supplied nuts
- Shafts, fully machined, with ready-mounted nuts
- Shafts, fully machined, with ready-mounted nuts and bearing units

## Applications

Installing a rotating ball nut






Installing a safety nut

We recommend using a safety nut if the ball screw is being installed in a vertical direction. This will take the load if the ball nut is destroyed as a result of powerful forces.

## Packaging, transport, storage, installation, lubrication, assembly, End journal

1. **Storage/packaging**
   Precondition for storage for up to 6 months in dry conditions:
   preservation with Zeller+Gmelin Multicor LF80.
   Ball screws to be wrapped in plastic film with kieselguhr packet.

2. **Installation**
   2.1 Misalignment shortens service life
   2.2 Ball screws should be cleaned using an environmentally friendly substance before installation
   2.3 Treat with the designated lubricant immediately after cleaning

3. **Lubrication by the customer** (see pages 58 and 59)

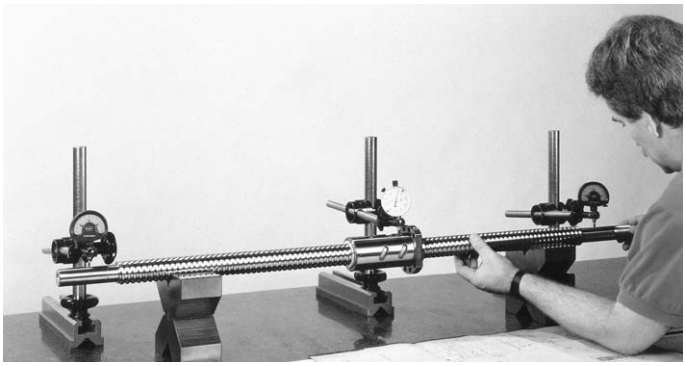
4. **Removal of ball nuts by the customer**
   These should only be removed when absolutely necessary. To prevent balls being lost, the nut should be screwed onto a sleeve.

5. **Installation by the customer**
   The installation process is performed in reverse. Do not use unnecessary force when screwing the nut onto the ball screw.

6. **Adjustment of ball nuts by the customer**
   We recommend that any alterations to the preload are either made at the factory or on site by our customer service personnel.

7. **End journal**
   7.1 Cover the ball nut on the ball screw
   7.2 Remove any hard areas by grinding or annealing them at around 900°C and then machining
   7.3 Straighten any ball screws which may have become skewed

## Service offer



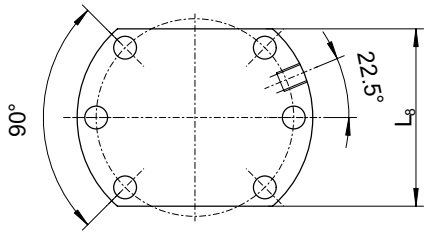
We are able to perform expert repair work on ball screws at short notice, both at our own and our customers' premises. This service is also available for products manufactured by other companies. Our standard range enables replacement items to be provided at short notice.

**If necessary, please contact:**

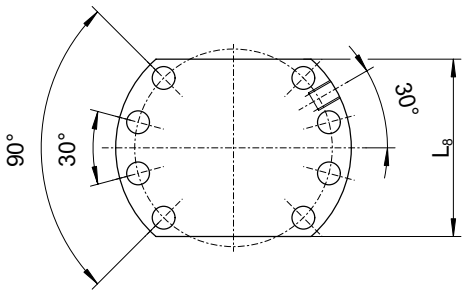
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# Dimensions, drilling patterns and forms of ball screw nuts

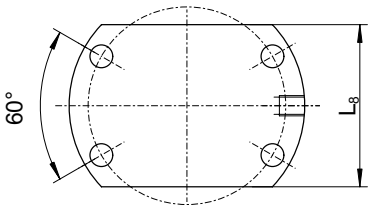
KGF-D, KGF-L nut styles: Drilling pattern 1



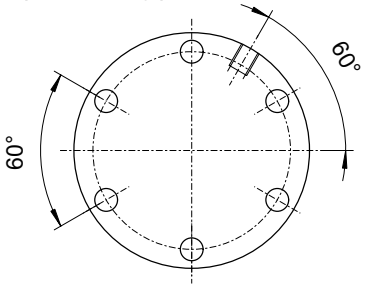

KGF-D, KGF-L nut styles: Drilling pattern 2



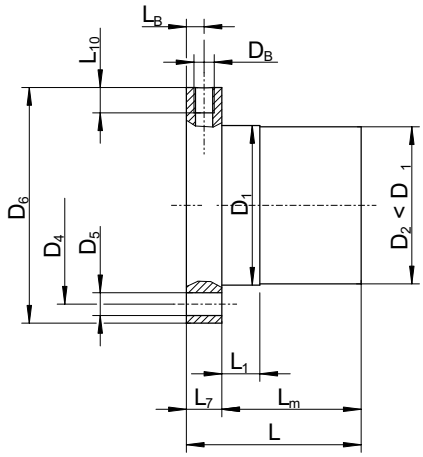

KGF-D nut styles: Drilling pattern 3



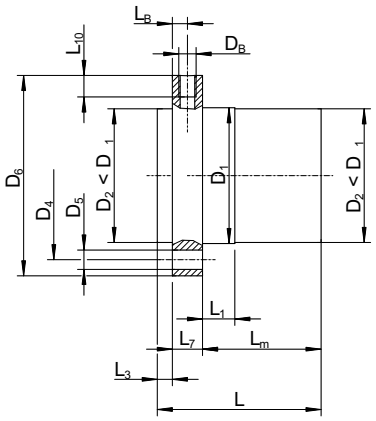

KGF-N nut styles: Drilling pattern 4



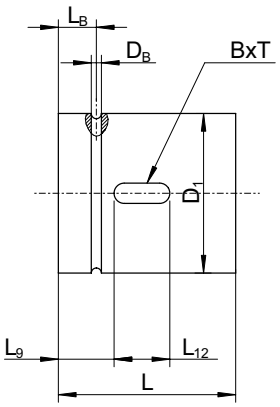

KGF-D, KGF-N nut styles: Form E



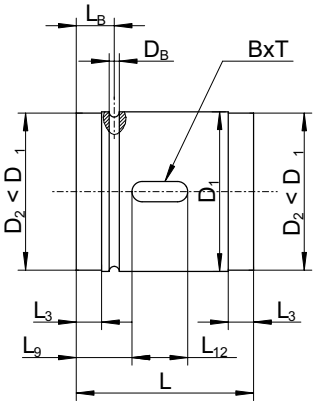

KGF-D, KGF-L, KGF-N nut styles: Form S



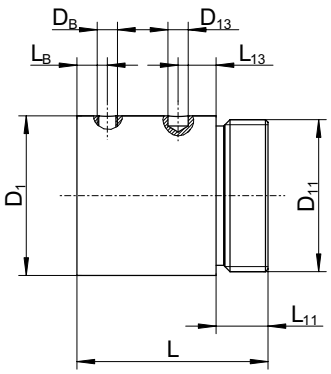

KGM-D, KGM-N nut styles: Form E




KGM-D, KGM-N nut styles: Form S




KGM-G (ZG) nut style



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E-mail: sales.korea@thomsonlinear.com





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Linear Motion. **Optimized.**™

THOMSON®



# Precision Linear Actuators

www.thomsonlinear.com

THOMSON®

*Linear Motion.* ***Optimized.***™

# Thomson – the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

## The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that makes us the supplier of choice for motion control technology.

- Thomson own the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

## A Name You Can Trust

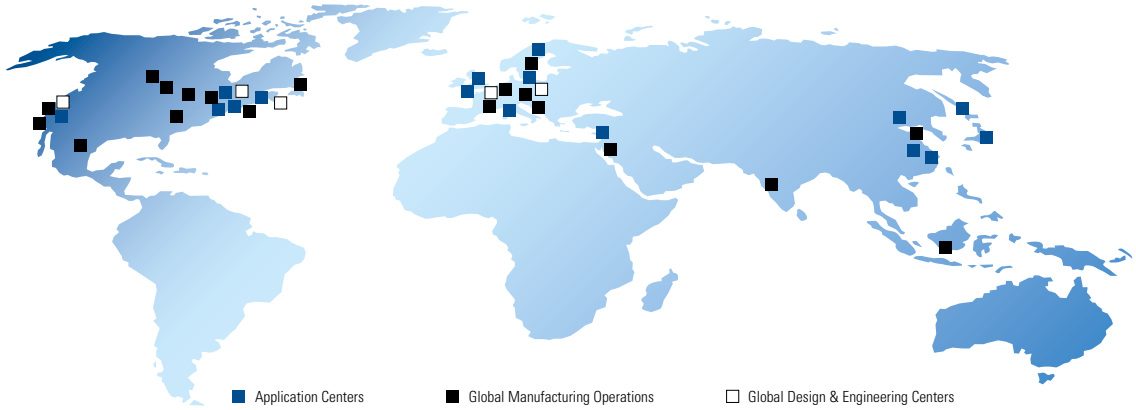
A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com. For assistance in Europe, contact us at +44 1271 334 500 or e-mail us at sales.uk@thomsonlinear.com.

Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

## The Danaher Business System

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

## Local Support Around the Globe



# Introduction

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# Introduction

## Company Introduction

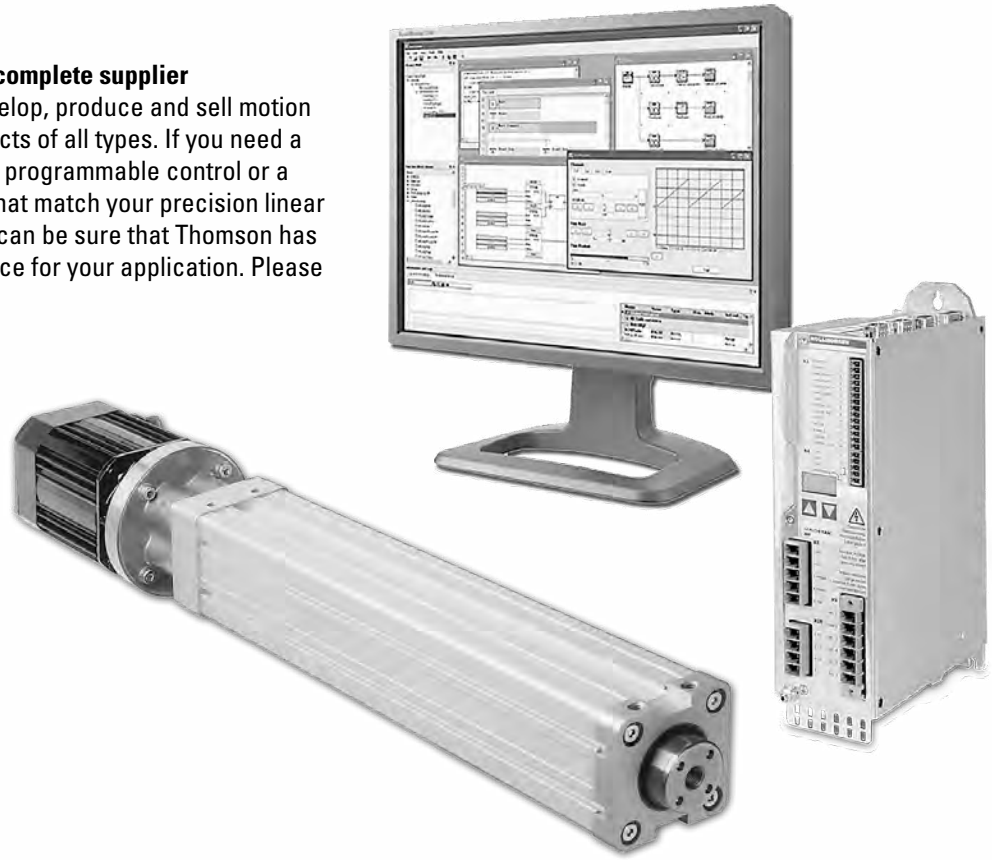
Thomson is one of the leading suppliers of motion control products in the world offering a complete product portfolio. Actuators, servo motors, lead screws, servo drives and controls are just some of the products manufactured by Thomson. The precision linear actuator range is a result of over 40 years of actuator development and represents the state of the art in linear actuator design.

The precision linear actuators in this catalog represent the experience gained during decades of actuator development. The result are design concepts that will work in the hardest applications imaginable and unique product features unavailable anywhere else.

**World wide representation**
Thomson has plants, support centers and sales offices all around the globe. In addition we have a large network of distributors and system houses that all are ready to support you throughout the entire life cycle of the product.

**Thomson - a complete supplier**
Thomson develop, produce and sell motion control products of all types. If you need a servo drive, a programmable control or a linear guide that match your precision linear actuator you can be sure that Thomson has the ideal choice for your application. Please visit www.thomsonlinear.com for more information on us and our products.

**Online product selector tool**
Selection is made easy when using our precision linear actuator product selector at www.thomsonlinear.com/selectors. This online tool helps you select the right system for your application needs based off pre-selected performance and electromechanical criteria.



# Introduction

## Product Introduction

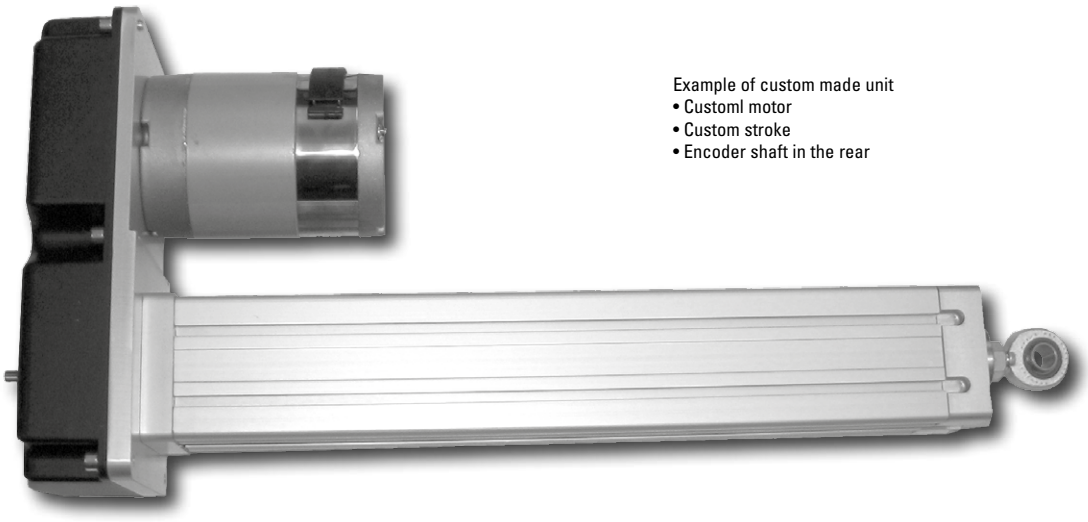
Precision linear actuators are used in handling, machining and manufacturing applications. Another suitable area is in the replacement of hydraulic or pneumatic cylinders where they bring many benefits compared to these traditional technologies. The broad range of options and accessories and our long experience in building customized units makes it easy to find the perfect actuator for almost any application.

The hallmark for Thomson precision linear actuators is the ability to work hard, fast and accurately, day in and day out, under the toughest conditions. All precision linear actuators are designed to require a minimum of maintenance. There are no parts that need to be replaced due to wear and regular lubrication is needed only in applications where the actuator works hard and frequently.

**Hydraulics and pneumatics replacement**
Precision linear actuators are direct descendants of hydraulic and pneumatic cylinders. Possessing many of the same unique design characteristics that made hydraulic and pneumatic cylinders popular, actuators benefit from cleaner, simpler and more energy-efficient power transmission. They are also much easier to integrate with modern programmable controls, have greater accuracy and are less noisy.

**Harsh environments**
Chemical plants, paper mills, welding operations and outdoor applications are all suitable for precision linear actuators. IP65 protection as standard or as option, a robust design and the use of high-quality components makes them suitable for almost every location.

**Customized units**
Customization is one of our strengths and we have built hundreds of customized units. If you need a special stroke, a unique mounting bracket, or some other adaptation of the standard product, our engineers will help you find the perfect solution for your application. Please contact customer service for more information.

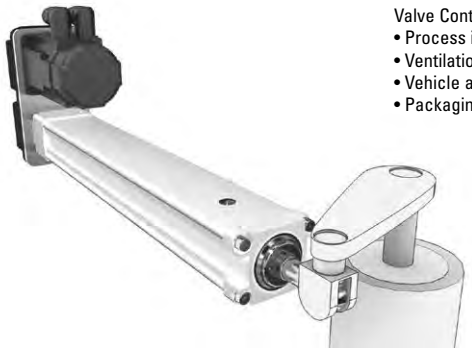


Example of custom made unit
- Customl motor
- Custom stroke
- Encoder shaft in the rear

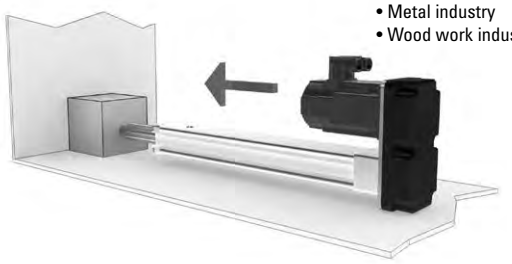
# Introduction

## Applications

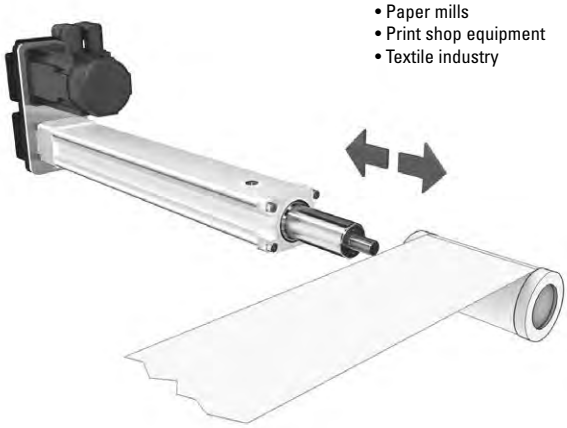
Precision linear actuators can fit a wide variety of applications within many motion industries. In combination with high performance drives and controls from Thomson, design into linear motion equipment is made easy and simple. Some common applications are described below.



Valve Control
- Process industry
- Ventilation equipment
- Vehicle applications
- Packaging industry



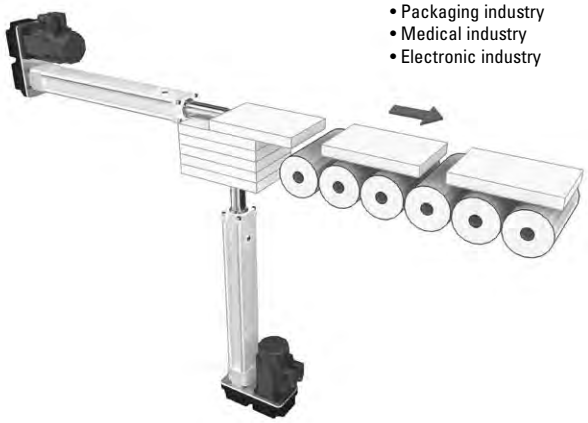
Pressing and clamping
- Machine tools
- Electronic industry
- Plastic industry
- Metal industry
- Wood work industry



Edge Guide Control
- Paper mills
- Print shop equipment
- Textile industry



Backstop Adjust
- Wood work industry
- Machine tools
- Metal industry



Loading or Unloading
- Handling equipment
- Packaging industry
- Medical industry
- Electronic industry



Drilling, Welding, Gluing or Thermo-forming
- Machine tools
- Plastic industry
- Metal industry
- Wood work industry
- Electronic industry
- Packaging industry

# Introduction

## The Benefits of Electrification

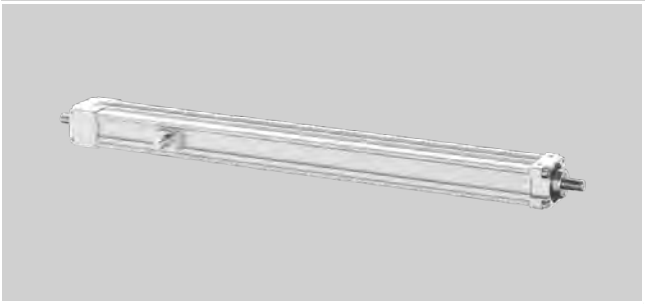
Precision linear actuators are often a better choice than hydraulic or pneumatic alternatives with advantages of simpler and smaller installation, easier control, lower energy costs, higher accuracy, less maintenance, less noise, and a cleaner, healthier environment.

### Electrical Actuators vs. Hydraulic and Pneumatic Cylinders

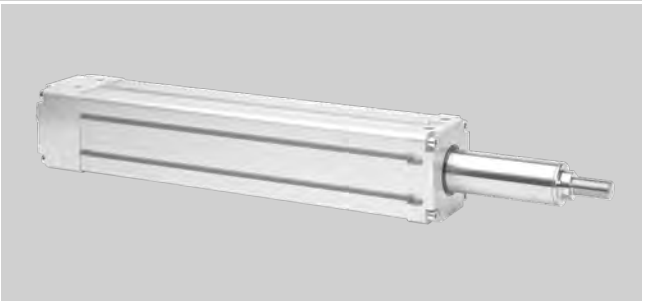
| | Electrical Linear Actuators | Hydraulic Cylinders | Pneumatic Cylinders |
|---|---|---|---|
| **Installation** | All electric operation requires simple wiring. | Requires expensive plumbing, filtering, pumps, etc. | Requires expensive plumbing, filtering, pumps, etc. |
| **Accuracy** | Very repeatable (to ± 0,013 mm) and rigid, multi-stop capabilities. | Requires expensive position sensing and precise electro-hydraulic valving to implement, has tendency to creep. | Difficult to achieve.Requires expensive position sensing and precise valving to implement, has tendency to creep. |
| **Control** | Directly compatible with standard programmable controls allowing easy automatic operation of complex motion sequences. | Requires electronic/fluid interfaces and exotic valve designs. Hysteresis, dead zone, supply pressure and temperature changes complicate control. | Inherently non-linear, compressible power source severely complicates servo control. |
| **Speed** | Smooth, variable speed with from 0 to 2 m/s with controlled accleration. | Difficult to control accurately. Varies with temperature and wear. Stick slip can be a problem. | More susceptible to stick slip and varying load. Well-suited for light high speed applications. |
| **Reliability** | Repeatable, reproducible performance during the entire product life. Very little maintenance required. | Very contamination sensitive. Require regular maintenance. Seals are prone to leak. Reliable with diligent maintenance. | Very contamination sensitive. Air sources require proper filtration. Good reliability, but usually many system components are involved. |
| **Power** | Up to 40 000 N | Virtually unlimited force. Most powerful. | Up to 25 000 N. Typically used below 6000 N. |
| **Life expectancy** | Up to millions of cycles at rated load. Easy to predict. | Dependent on design and seal wear, usually good. | Dependent on design and seal wear, usually good. |
| **Environment** | Standard models rated for -30 to +70 °C. Inherently clean and energy efficient. | Temperature extremes can be a major problem. Seals are prone to leak. Waste disposal is increasingly problematic. | Temperature extremes can be a major problem. Seals prone to leak. Air-borne oil can be a problem. |
| **Load holding** | Acme screw units are selflocking if power fails. Fail-safe brakes available for ball screw models. | Complex back-up safety devices must be used. | Complex back-up safety devices must be used. |
| **Cost** | Moderate initial cost, very low operating cost. | Components often cost less, but installation and maintenance are increased. Hydraulic power unit cost is high if not pre-existing. | Components often cost less, but installation and maintenance are increased. |

# Performance Overview

## Precision Linear Actuators - T Series

| | | T60 |
|---|---|---|
| | |  |
| **Load** | | |
| Maximum load, Fx | [N] | 10 000 |
| Maximum load, Fy | [N] | 100 |
| Maximum load, Fz | [N] | 100 |
| Maximum load torque, Mx | [Nm] | - |
| Maximum load torque, My | [Nm] | 50 |
| Maximum load torque, Mz | [Nm] | 50 |
| **Stroke** | | |
| Maximum standard stroke | [mm] | 1500 |
| **Speed** | | |
| Maximum speed | [m/s] | 2,5 |
| **Accuracy** | | |
| Repeatability | [± mm] | 0,05 |
| Backlash | [mm] | 0,11 |
| **General data** | | |
| Profile size (width × height) | [mm] | 75 × 60 |
| Operating temperature limits | [°C] | -20 – +70 |
| Maximum duty cycle | [%] | 100 |
| Screw diameter | [mm] | 25 |
| Screw type | | ball screw |
| Protection class - standard / optional | | IP65 |
| **Features** | | |
| Single point lubrication | | • |
| **Mounting options** | | |
| Magnetic position sensors | | • |
| Mounting feet kit | | on request |
| Trunnion mounting kit | | • |
| Clevis mounting kit | | • |
| Tube end - inside thread / outside thread / spherical joint | | • / • / • |

[1] Depending on the screw diameter used in the actuator.

| | T90 | T130 |
|---|---|---|
| |  |  |
| | | |
| | 20 000 | 60 000 |
| | 500 | 800 |
| | 500 | 800 |
| | - | - |
| | 150 | 300 |
| | 150 | 300 |
| | | |
| | 1500 | 2000 |
| | | |
| | 2,0 | 2,0 |
| | | |
| | 0,05 | 0,05 |
| | 0,11 (0,18) [1] | 0,21 |
| | | |
| | 90 × 92 | 130 × 130 |
| | -20 – +70 | -20 – +70 |
| | 100 | 100 |
| | 25, 32 | 40, 50 |
| | ball screw | ball screw |
| | IP65 | IP65 |
| | | |
| | • | • |
| | | |
| | • | • |
| | • | • |
| | • | • |
| | • | • |
| | •/•/• | •/•/• |

# Performance Overview

## Packaged Precision Linear Actuators - ECT Series

| | | ECT90 |
|---|---|---|
| | |  |
| **Load** | | |
| Maximum load, Fx | [N] | 20 000 |
| Maximum load, Fy | [N] | 500 |
| Maximum load, Fz | [N] | 500 |
| Maximum load torque, Mx | [Nm] | - |
| Maximum load torque, My | [Nm] | 150 |
| Maximum load torque, Mz | [Nm] | 150 |
| **Stroke** | | |
| Maximum standard stroke | [mm] | 1500 |
| **Speed** | | |
| Maximum speed | [m/s] | 1,6 |
| **Accuracy** | | |
| Repeatability | [± mm] | 0,05 |
| Backlash | [mm] | 0,11 (0,18) [1] |
| **General data** | | |
| Profile size (width × height) | [mm] | 90 × 92 |
| Operating temperature limits | [°C] | -20 – +70 |
| Maximum duty cycle | [%] | 100 |
| Screw diameter | [mm] | 25, 32 |
| Screw type | | ball screw |
| Protection class - standard / optional | | IP65 |
| **Features** | | |
| Brushless AC servo motor / Three phase AC motor | | • / • |
| Single point lubrication | | • |
| **Mounting options** | | |
| Magnetic position sensors | | • |
| Mounting feet kit | | • |
| Trunnion mounting kit | | • |
| Clevis mounting kit | | • |
| Tube end - inside thread / outside thread / spherical joint | | • / • / • |

[1] Depending on the screw diameter used in the actuator.

| | ECT130 |
|---|---|
| |  |
| | |
| | 38 000 |
| | 800 |
| | 800 |
| | - |
| | 300 |
| | 300 |
| | |
| | 2000 |
| | |
| | 2,0 |
| | |
| | 0,05 |
| | 0,21 |
| | |
| | 130 × 130 |
| | -20 – +70 |
| | 100 |
| | 40 |
| | ball screw |
| | IP65 |
| | |
| | • / • |
| | • |
| | |
| | • |
| | • |
| | • |
| | • |
| | • / • / • |

# T Series

## Introduction

The proven design of the T series precision linear actuators has found its way into thousands of applications throughout the world. Precision-rolled ball screws provide smooth motion, accurate positioning and quiet operation while the slide guide bushings and the rugged exterior design allows it to be used in the thoughest applications. The T series combines durability, performance and ease-of-use with a large selection of factory-engineered options and accessories. Regardless of the environment or requirement, we can customize our standard models to fit just about any application.



# T Series

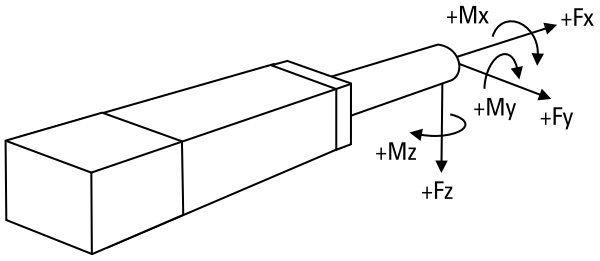
## Overview

**Features**

- Extruded anodized aluminum cover tube
- Anodized aluminum housing
- Hard chromed steel extension tube
- Can be installed in all directions
- Ball screw drive
- Slide guides
- Load up to 60000 N
- IP65 protection class
- Wash down protected versions
- Mounting accessories according to hydraulic cylinder standards available

| Parameter | | T60 | T90 | T130 |
|---|---|---|---|---|
| Profile size (width × height) | [mm] | 75 × 60 | 90 × 92 | 130 × 130 |
| Stroke length (S), maximum | [mm] | 1500 | 1500 | 2000 |
| Speed, maximum | [m/s] | 2,5 | 2,0 | 2,0 |
| Dynamic Load (Fx), maximum | [N] | 10 000 | 20 000 | 60 000 |
| Page | | 14 | 16 | 18 |

## Definition of Forces



# T60

## Ball Screw Drive, Slide Guide

» Ordering Key - see page 69
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Compact, robust and reliable
- High accuracy ball screw drive
- Stroke up to 1500 mm
- Load up to 10000 N
- Speed up to 2,5 m/s
- Hard chromed steel extension tube
- IP65 as standard
- Mounting accessories according to hydraulic cylinder standards available.

## General Specifications

| Parameter | T60 |
|---|---|
| Profile size (w × h) [mm] | 75 × 60 |
| Type of screw | ball screw with single nut |
| Protection class | IP65 |
| Lubrication | One point lubrication of ballscrew |
| Included accessories | – |

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead (p) [mm] | | | |
|---|---|---|---|---|
| | p = 5 | p = 10 | p = 25 | p = 50 |
| 500 | 1,5 | 1,5 | 2 | 3,5 |

M idle = the input torque needed to move the rod with no load on it.

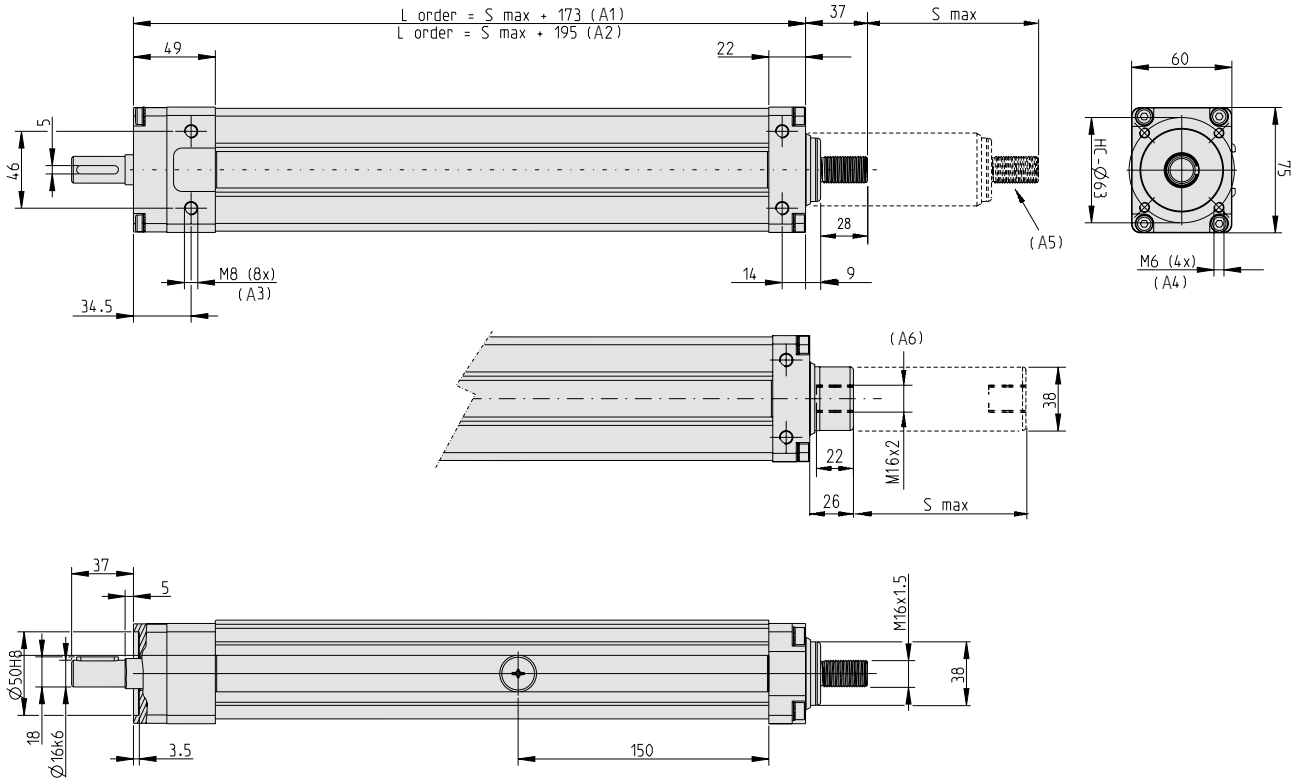
## Performance Specifications

| Parameter | | T60 |
|---|---|---|
| Stroke length (S max), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 2,5 |
| Acceleration, maximum | [m/s²] | 20 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum<br>screw diameter/lead 25/10, 25/25<br>screw diameter/lead 25/05, 25/50 | [rpm] | <br>4000<br>3000 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum | [N] | 10000 |
| Dynamic load (Fy), maximum | [N] | 100 |
| Dynamic load (Fz), maximum | [N] | 100 |
| Dynamic load torque (Mz, My), max. | [Nm] | 50 |
| Drive shaft force (Frd), maximum | [N] | 1000 |
| Drive shaft torque (Mta), maximum | [Nm] | 48 |
| Screw versions, diameter ($d_0$) / lead (p) | [mm] | 25/05, 25/10, 25/25, 25/50 |
| Weight of units<br>of unit with zero stroke<br>of every 100 mm of stroke | [kg] | <br>5,20<br>0,95 |

[1] Value for the complete unit

# T60

## Ball Screw Drive, Slide Guide




A1: screw 25/05 and 25/25
A2: screw 25/10 and 25/50
A3: depth 10
A4: depth 20
A5: outside thread
A6: inside thread

# T90

## Ball Screw Drive, Slide Guide

» Ordering Key - see page 69
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Compact, robust and reliable
- High accuracy ball screw drive
- Stroke up to 1500 mm
- Load up to 20000 N
- Speed up to 2 m/s
- Hard chromed steel extension tube
- IP65 as standard
- Mounting accessories according to hydraulic cylinder standards available.

## General Specifications

| Parameter | T90 |
|---|---|
| Profile size (w × h) [mm] | 90 × 92 |
| Type of screw | ball screw with single nut |
| Protection class | IP65 |
| Lubrication | One point lubrication of ballscrew |
| Included accessories | – |

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead (p) [mm] | | | | |
|---|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 25 | p = 32 |
| 500 | 1,5 | 1,5 | 3,0 | 2,0 | 3,5 |

M idle = the input torque needed to move the rod with no load on it.

## Performance Specifications

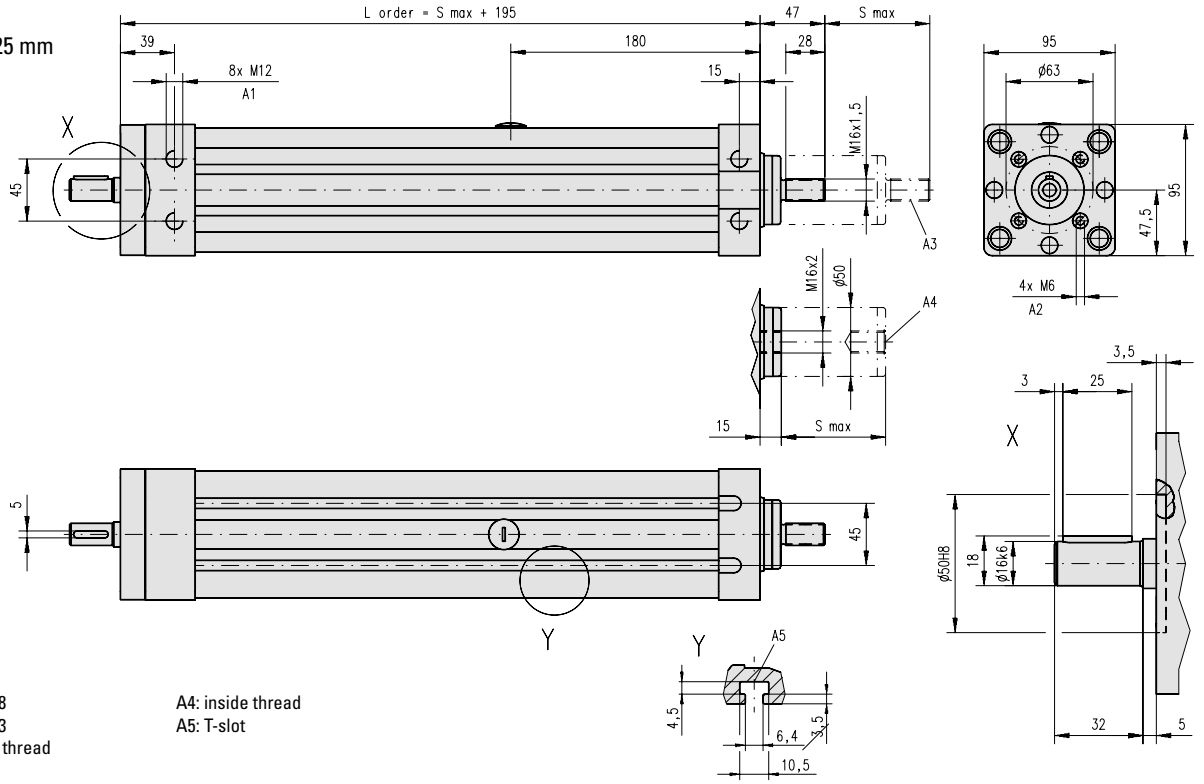
| Parameter | | T90 |
|---|---|---|
| Stroke length (S max), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum<br>screw diam./lead 25/05 mm<br>screw diam./lead 25/10, 25/25 mm<br>screw diam./lead 32/10, 32/20, 32/32 mm | [rpm] | <br>3000<br>4000<br>3750 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>10000<br>20000 |
| Dynamic load (Fy), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>300[1]<br>500[1] |
| Dynamic load (Fz), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>300[1]<br>500[1] |
| Dynamic load torque (Mz, My), max. | [Nm] | 150[1] |
| Drive shaft force (Frd), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>1000<br>1300 |
| Drive shaft torque (Mta), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [Nm] | <br>48<br>93 |
| Screw versions, diameter (d0) / lead (p) | [mm] | 25/05, 25/10, 25/25, 32/10, 32/20, 32/32 |
| Weight of units<br>with screw diameter 25 mm<br>of unit with zero stroke<br>of every 100 mm of stroke | [kg] | <br><br>8,16<br>1,62 |
| Weight of units<br>with screw diameter 32 mm<br>of unit with zero stroke<br>of every 100 mm of stroke | [kg] | <br><br>10,64<br>1,80 |

[1] Value for the complete unit

# T90

## Ball Screw Drive, Slide Guide

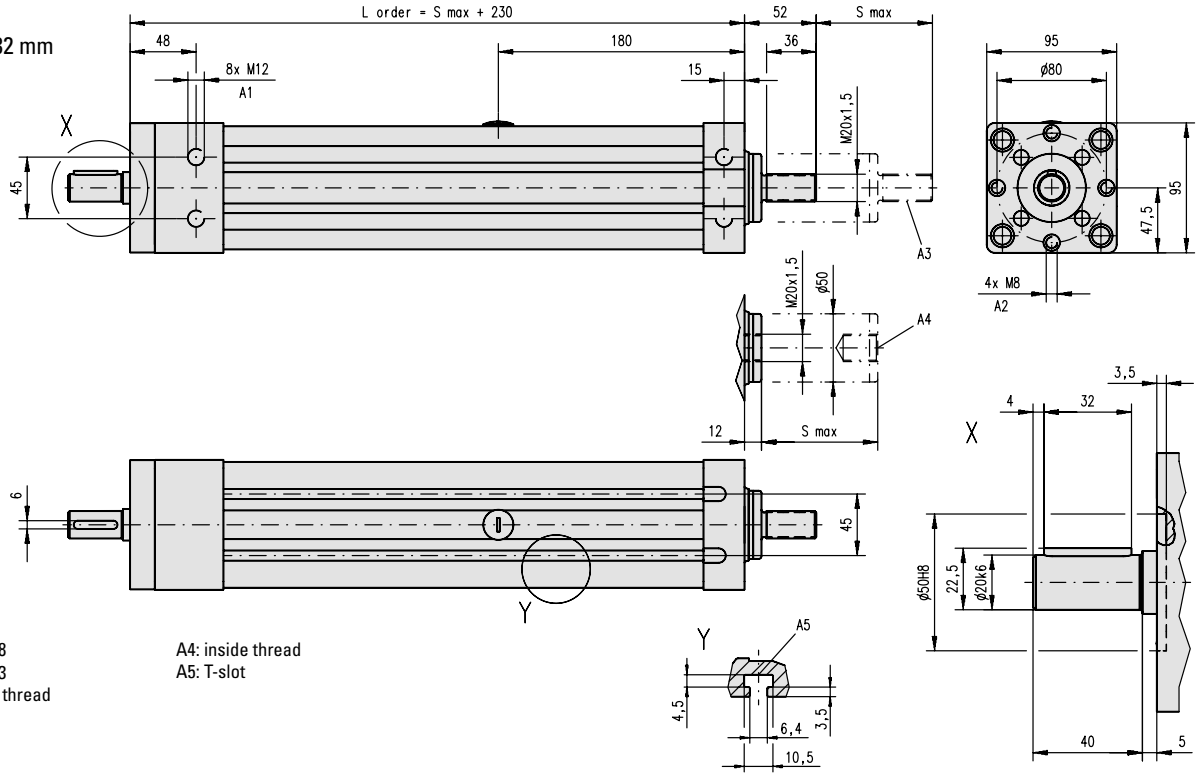
T09-B25
screw ø25 mm




A1: depth 18
A2: depth 33
A3: outside thread

A4: inside thread
A5: T-slot

T09-B32
screw ø32 mm




A1: depth 18
A2: depth 43
A3: outside thread

A4: inside thread
A5: T-slot

# T130

## Ball Screw Drive, Slide Guide

» Ordering Key - see page 69
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Compact, robust and reliable
- High accuracy ball screw drive
- Stroke up to 2000 mm
- Load up to 60000 N
- Speed up to 2 m/s
- Hard chromed steel extension tube
- IP65 as standard
- Mounting accessories according to hydraulic cylinder standards available.

## General Specifications

| Parameter | T90 |
|---|---|
| Profile size (w × h) [mm] | 130 × 130 |
| Type of screw | ball screw with single nut |
| Protection class | IP65 |
| Lubrication | One point lubrication of ballscrew |
| Included accessories | – |

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw diameter (do) [mm] / lead (p) [mm] | | | |
|---|---|---|---|---|
| | do = 40 | | | do = 50 |
| | p = 10 | p = 20 | p = 40 | p = 10 |
| 500 | 4,5 | 4,5 | 5,5 | 5,5 |

M idle = the input torque needed to move the rod with no load on it.

## Performance Specifications

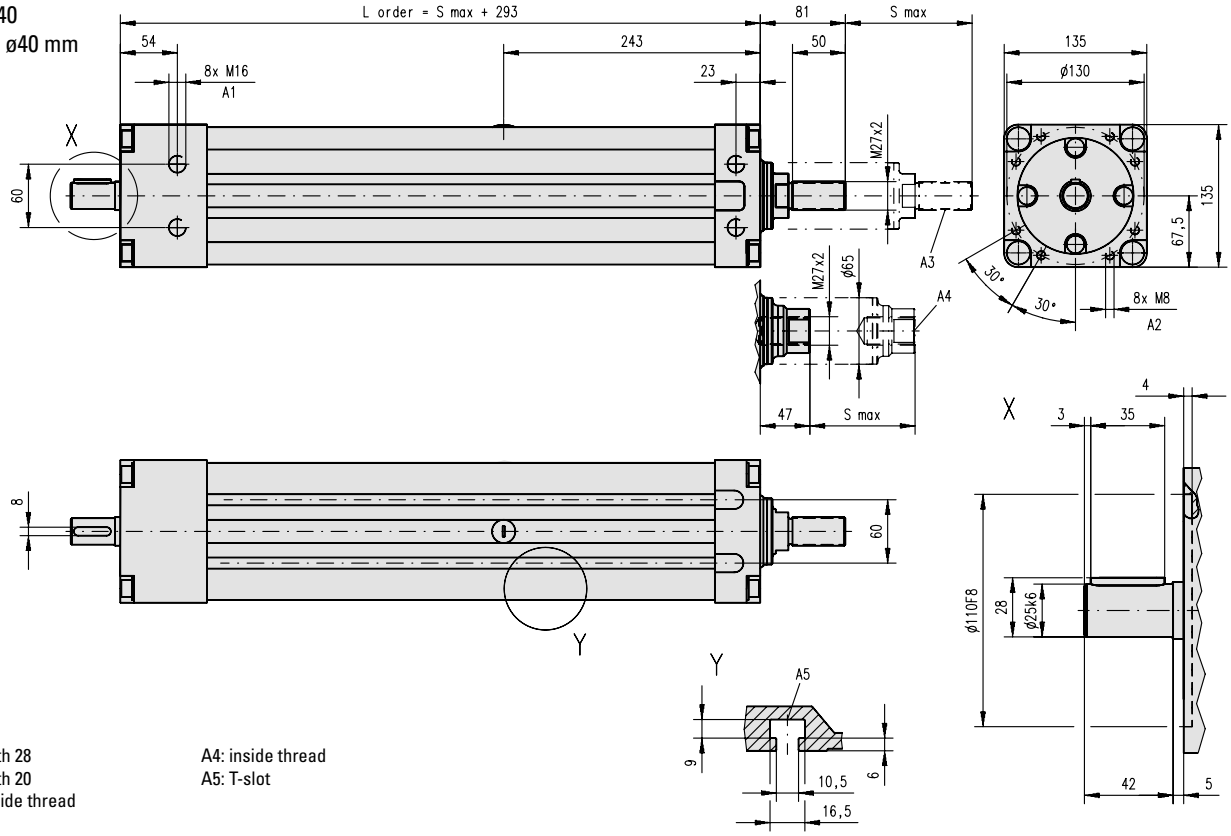
| Parameter | | T130 |
|---|---|---|
| Stroke length (S max), maximum | [mm] | 2000 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum<br>screw diameter/lead 40/10 mm<br>screw diameter/lead 40/20, 40/40 mm<br>screw diameter/lead 50/10 mm | [rpm] | <br>2500<br>3000<br>2000 |
| Operation temperature limits | [°C] | - 20 – 70 |
| Dynamic load (Fx), maximum<br>screw diameter/lead 50/10 mm<br>screw diameter/lead 40/10 mm<br>screw diameter/lead 40/20 mm<br>screw diameter/lead 40/40 mm | [N] | <br>60000<br>40000<br>35000<br>15000 |
| Dynamic load (Fy), maximum | [N] | 800[1] |
| Dynamic load (Fz), maximum | [N] | 800[1] |
| Dynamic load torque (My, Mz), max. | [Nm] | 300[1] |
| Drive shaft force (Frd), maximum | [N] | 3000 |
| Drive shaft torque (Mta), maximum<br>screw diameter 40 mm<br>screw diameter 50 mm | [Nm] | <br>140<br>200 |
| Screw versions, diameter (do) / lead (p) | [mm] | 40/10, 40/20, 40/40, 50/10 |
| Weight of units<br>with screw diameter 40 mm<br>of unit with zero stroke<br>of every 100 mm of stroke | [kg] | <br><br>18,50<br>3,00 |
| Weight of units<br>with screw diameter 50 mm<br>of unit with zero stroke<br>of every 100 mm of stroke | [kg] | <br><br>25,40<br>3,60 |

[1] Value for the complete unit

# T130

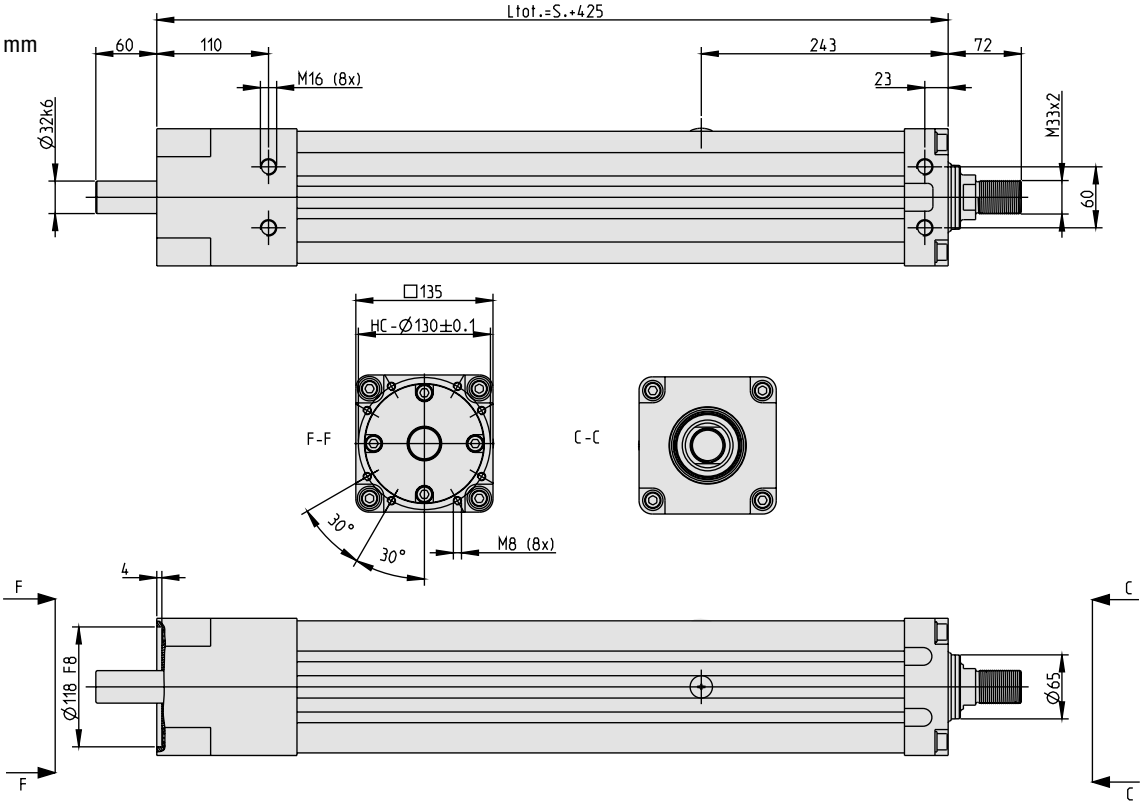
## Ball Screw Drive, Slide Guide

T13-B40
screw ø40 mm




A1: depth 28
A2: depth 20
A3: outside thread
A4: inside thread
A5: T-slot

T13-B50
screw ø50 mm



# ECT Series

## Introduction

The ECT series is our line of packaged precision linear actuators. They are based on the proven T series and equipped with a high quality selection of motors and gears that make them ready to take on the most demanding applications. The ECT series is ideal when short design times, maximum performance and the longest life cycle are required. And if you can't find a standard unit that fits our engineers can build you a customized unit to suit just your needs.



# ECT Series

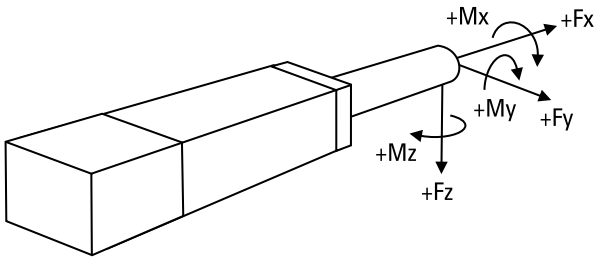
## Overview

**Features**

- Extruded anodized aluminum cover tube
- Anodized aluminum housing
- Hard chromed steel extension tube
- Can be installed in all directions
- Ball screw drive
- Slide guides
- Load up to 38000 N
- Asynchronous three phase AC motor or brushless AC servo motor
- Parallel or Inline motor
- Belt gear, planetary gear or direct drive
- IP65 as standard
- Large range of options and accessories
- Wash down protected versions
- Mounting accessories according to hydraulic cylinder standards available

| Parameter | | ECT90 | ECT130 |
|---|---|---|---|
| Profile size (width × height) | [mm] | 90 × 92 | 130 × 130 |
| Stroke length (S), maximum | [mm] | 1500 | 2000 |
| Speed, maximum | [mm/s] | 1600 | 2000 |
| Dynamic load (Fx), maximum | [N] | 20 000 | 38 000 |
| Page | | 22 - 35 | 36 - 49 |

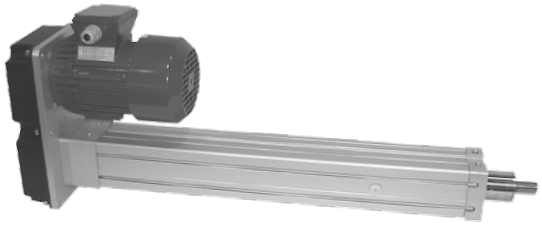
## Definition of Forces



# ECT90

## Parallel IEC90 AC Motor

» Ordering Key - see page 70
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Three phase asynchronous AC motor with brake
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 9750 N
- Speed up to 1520 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | asynchronous AC motor |
| Motor voltage | 3 × 400 Vac |
| Motor power | 2,2 kW |
| Motor current, nominal | 4,7 A |
| Motor feedback | no |
| Motor connection | terminal box |
| Motor brake | yes (230 Vac) |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • mounting options<br>• adapter options |

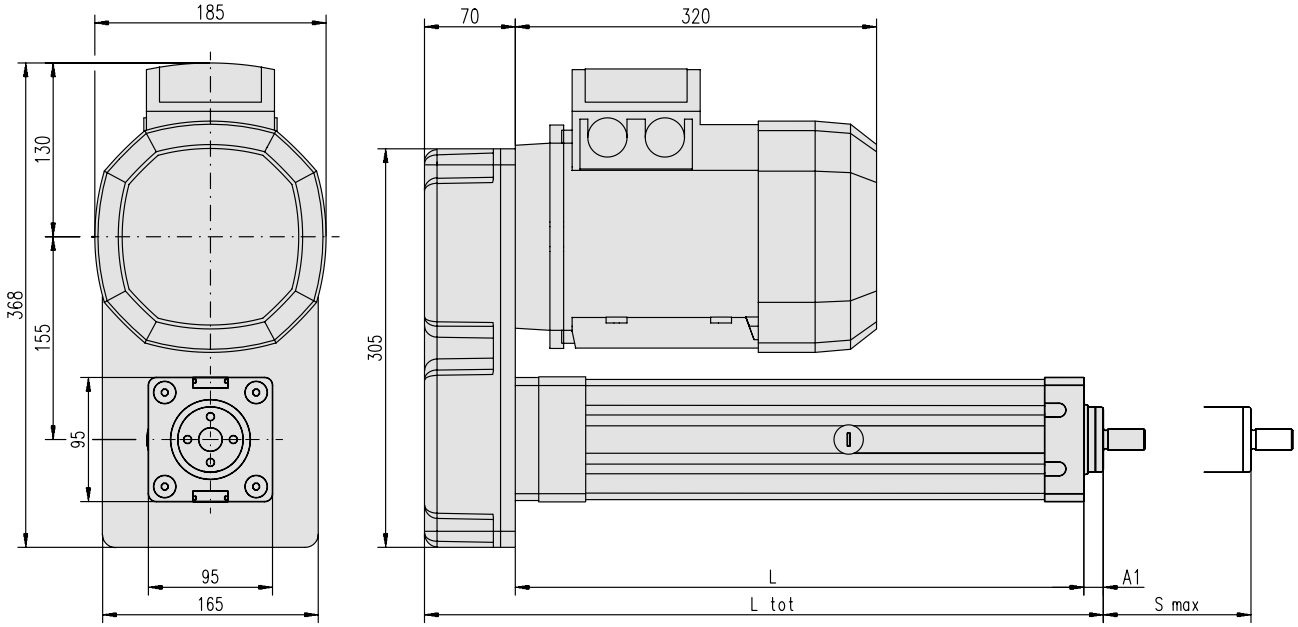
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT09-I09B03PB-2510 | | 9750 |
| ECT09-I09B02PB-2510 | | 6500 |
| ECT09-I09B03PB-3220 | | 4800 |
| ECT09-I09B02PB-3220 | | 3100 |
| ECT09-I09B01PB-3220 | | 1600 |
| ECT09-I09B01PB-3232 | | 900 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed[3] | [mm/s] | |
| ECT09-I09B03PB-2510 | | 160 |
| ECT09-I09B02PB-2510 | | 240 |
| ECT09-I09B03PB-3220 | | 320 |
| ECT09-I09B02PB-3220 | | 480 |
| ECT09-I09B01PB-3220 | | 960 |
| ECT09-I09B01PB-3232 | | 1520 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 25, 32 |
| Screw leads[4] | [mm] | 10, 20, 32 |
| Backlash | [mm] | |
| Screw diameter = 25 mm | | 0,11 |
| Screw diameter = 32 mm | | 0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] The maximum speed is based on a max. input frequency to the motor of 50 Hz. Frequency inverters can provide higher frequencies thus higher speeds but that may damage the actuator.
[4] 10 mm lead = diameter 25 mm. 20 and 32 mm leads = diameter 32 mm.

# ECT90

## Parallel IEC90 AC Motor



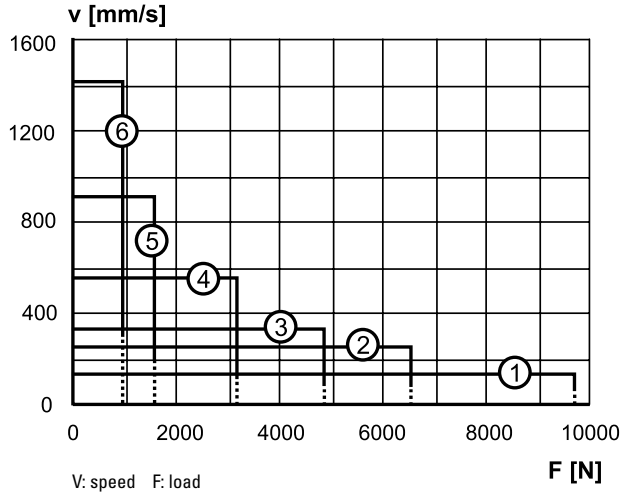

S max: maximum stroke (ordering stroke in mm)
L: cover tube length

L tot: retracted length
A1: ECT09-I09B • • PB-25 = 15 mm, ECT09-I09B • • PB-32 = 12 mm

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | ECT09-I09B •• PB-25: L = S max + 195<br>ECT09-I09B •• PB-32: L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | ECT09-I09B •• PB-25: L tot = S max + 280<br>ECT09-I09B •• PB-32: L tot = S max + 312 |
| **Weight of unit** | **[kg]** | ECT09-I09B •• PB-25: kg = 30,8 + 0,016 × S max<br>ECT09-I09B •• PB-32: kg = 33,2 + 0,018 kg × S max |

## Performance Diagrams

### Speed vs. Load

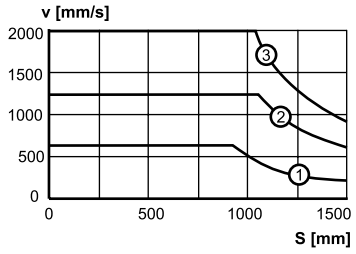



V: speed F: load

1: ECT09-I09B03PB-2510
2: ECT09-I09B02PB-2510
3: ECT09-I09B03PB-3220
4: ECT09-I09B02PB-3220
5: ECT09-I09B01PB-3220
6: ECT09-I09B01PB-3232

----- = Overheating of the motor may occur if running at this speed continiously!

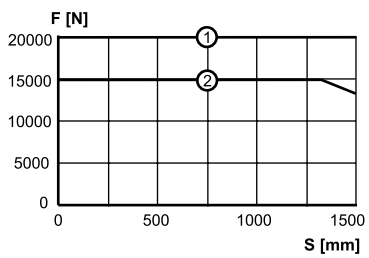
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT09-I09B0 • PB-2510
2: ECT09-I09B0 • PB-3220
3: ECT09-I09B0 • PB-3232

### Column Load Limit vs. Stroke



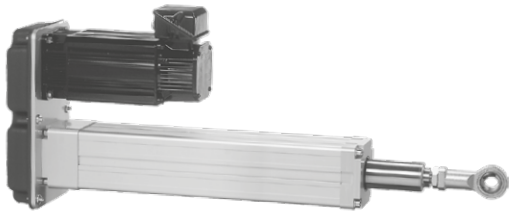

F: load S: stroke length

1: ECT09-I09B0 • PB-2510
2: ECT09-I09B0 • PB-32 ••

# ECT90

## Parallel B43 AC Servo Motor

» Ordering Key - see page 70
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 5800 N
- Speed up to 420 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM43E-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

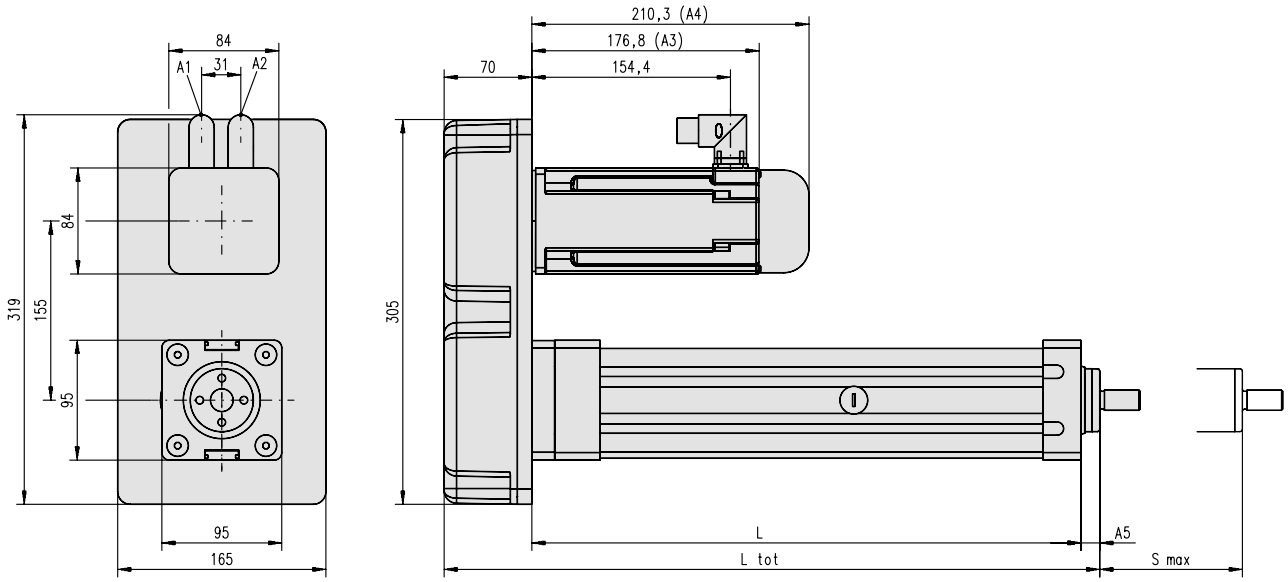
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT09-B43R03PB-2510 | | 5800 |
| ECT09-B43R02PB-2510 | | 3800 |
| ECT09-B43R03PB-3220 | | 2800 |
| ECT09-B43R02PB-3220 | | 1800 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT09-B43R03PB-2510 | | 140 |
| ECT09-B43R02PB-2510 | | 210 |
| ECT09-B43R03PB-3220 | | 270 |
| ECT09-B43R02PB-3220 | | 420 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 25, 32 |
| Screw leads[3] | [mm] | 10, 20 |
| Backlash | [mm] | |
| Screw diameter = 25 mm | | 0,11 |
| Screw diameter = 32 mm | | 0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] 10 mm lead = diameter 25 mm. 20 mm lead = diameter 32 mm.

# ECT90

## Parallel B43 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

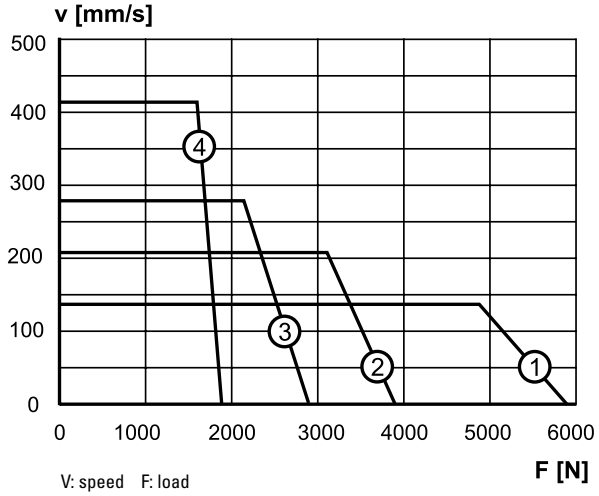
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake
A5: ECT09-B43 • • • PB-25 = 15 mm, ECT09-B43 • • • PB-32 = 12 mm

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | ECT09-B43 • • • PB-25: L = S max + 195<br>ECT09-B43 • • • PB-32: L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | ECT09-B43 • • • PB-25: L tot = S max + 280<br>ECT09-B43 • • • PB-32: L tot = S max + 312 |
| **Weight of unit** | **[kg]** | ECT09-B43 • • PB-25: kg = 17,2 + 0,016 × S max<br>ECT09-B43 • • PB-32: kg = 19,6 + 0,018 × S max |

## Performance Diagrams

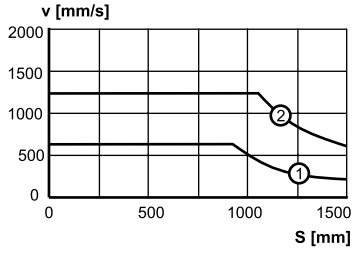
### Speed vs. Load




V: speed F: load

1: ECT09-B43R03PB-2510
2: ECT09-B43R02PB-2510
3: ECT09-B43R03PB-3220
4: ECT09-B43R02PB-3220

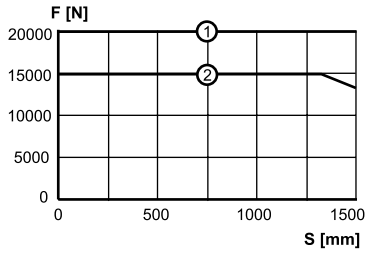
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT09-B43R0 • PB-2510
2: ECT09-B43R0 • PB-3220

### Column Load Limit vs. Stroke



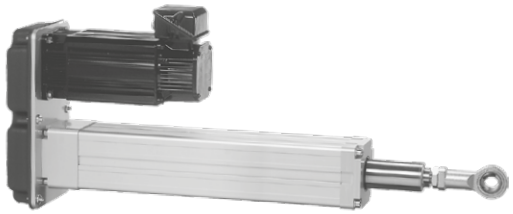

F: load S: stroke length

1: ECT09-B43R0 • PB-2510
2: ECT09-B43R0 • PB-3220

# ECT90

## Parallel B53 AC Servo Motor

» Ordering Key - see page 71
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 9800 N
- Speed up to 670 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-CNCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

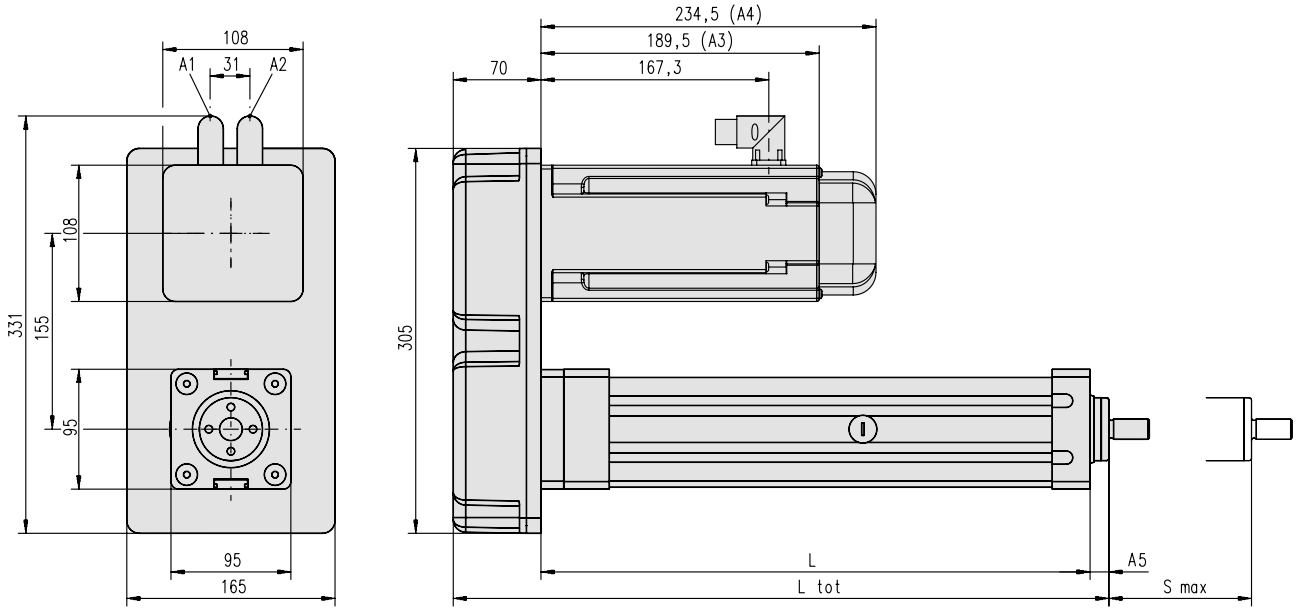
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT09-B53R03PB-2510 | | 9800 |
| ECT09-B53R02PB-2510 | | 8000 |
| ECT09-B53R03PB-3220 | | 5900 |
| ECT09-B53R02PB-3220 | | 3900 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT09-B53R03PB-2510 | | 220 |
| ECT09-B53R02PB-2510 | | 330 |
| ECT09-B53R03PB-3220 | | 440 |
| ECT09-B53R02PB-3220 | | 670 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 25, 32 |
| Screw leads[3] | [mm] | 10, 20 |
| Backlash | [mm] | |
| Screw diameter = 25 mm | | 0,11 |
| Screw diameter = 32 mm | | 0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] 10 mm lead = diameter 25 mm. 20 mm lead = diameter 32 mm.

# ECT90

## Parallel B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

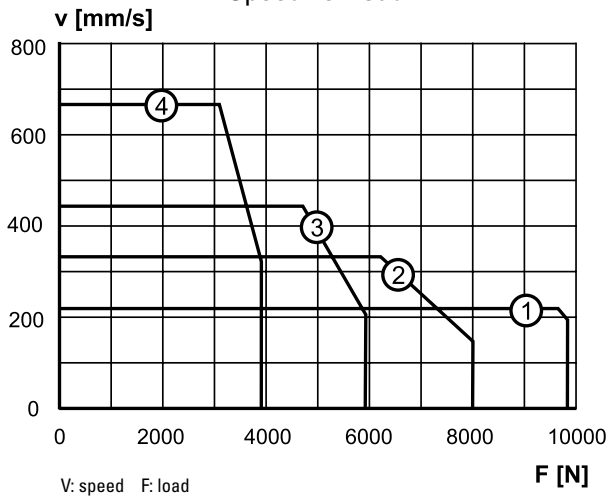
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake
A5: ECT09-B53 • • • PB-25 = 15 mm, ECT09-B53 • • • PB-32 = 12 mm

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | ECT09-B53 • • • PB-25: L = S max + 195<br>ECT09-B53 • • • PB-32: L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | ECT09-B53 • • • PB-25: L tot = S max + 280<br>ECT09-B53 • • • PB-32: L tot = S max + 312 |
| **Weight of unit** | **[kg]** | ECT09-B53 • • PB-25: kg = 20,2 + 0,016 × S max<br>ECT09-B53 • • PB-32: kg = 22,6 + 0,018 × S max |

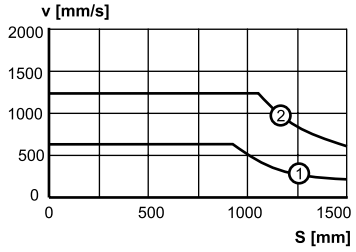
## Performance Diagrams

### Speed vs. Load



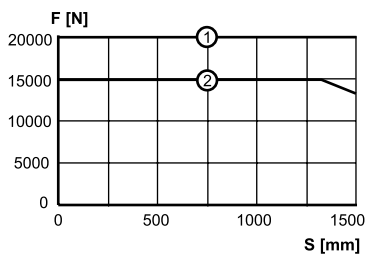

V: speed F: load
1: ECT09-B53R03PB-2510
2: ECT09-B53R02PB-2510
3: ECT09-B53R03PB-3220
4: ECT09-B53R02PB-3220

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT09-B53R0 • PB-2510
2: ECT09-B53R0 • PB-3220

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT09-B53R0 • PB-2510
2: ECT09-B53R0 • PB-3220

# ECT90

## Direct Drive, Inline B43 AC Servo Motor

» Ordering Key - see page 71
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Direct drive
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 5300 N
- Speed up to 1600 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | no, direct drive |
| Motor type | brushless AC servo motor |
| Motor designation | AKM43E-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

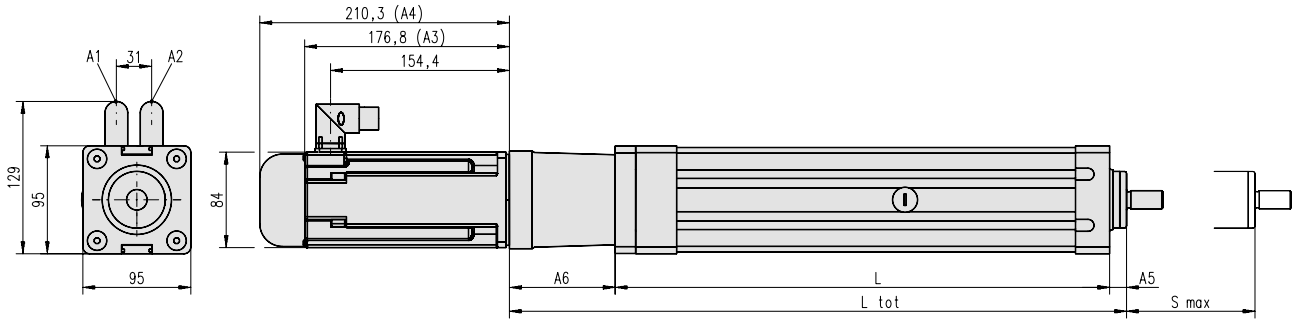
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1]<br>ECT09-B43R01LD-2510<br>ECT09-B43R01LD-3220 | [N] | <br>2000<br>900 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed<br>ECT09-B43R01LD-2510<br>ECT09-B43R01LD-3220 | [mm/s] | <br>410<br>820 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 25, 32 |
| Screw leads[3] | [mm] | 10, 20 |
| Backlash<br>Screw diameter = 25 mm<br>Screw diameter = 32 mm | [mm] | <br>0,11<br>0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] 10 mm lead = diameter 25 mm. 20 mm lead = diameter 32 mm.

# ECT90

## Direct Drive, Inline B43 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

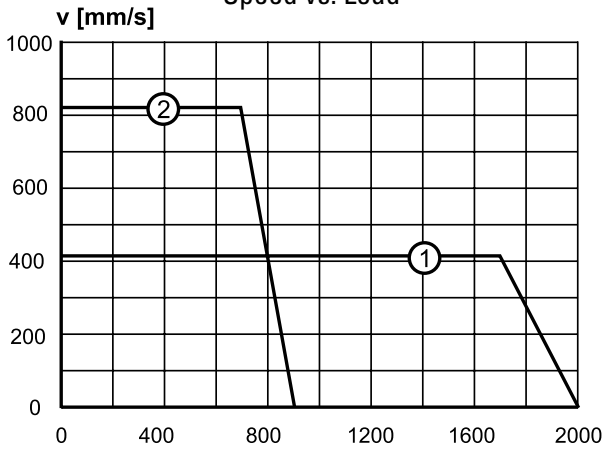
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake
A5: ECT09-B43 • 01LD-25 = 15 mm, ECT09-B43 • 01LD-32 = 12 mm
A6: ECT09-B43 • 01LD-25 = 93 mm, ECT09-B43 • 01LD-32 = 103 mm

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | ECT09-B43 • 01LD-25: L = S max + 195<br>ECT09-B43 • 01LD-32: L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | ECT09-B43 • 01LD-25: L tot = S max + 303<br>ECT09-B43 • 01LD-32: L tot = S max + 345 |
| **Weight of unit** | **[kg]** | ECT09-B43 • • 01LD-25: kg = 13,7 + 0,016 × S max<br>ECT09-B43 • • 01LD-32: kg = 16,2 + 0,018 × S max |

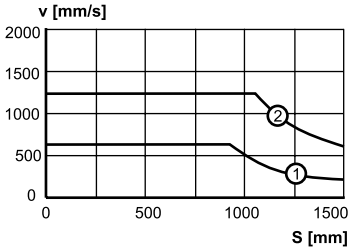
## Performance Diagrams

### Speed vs. Load



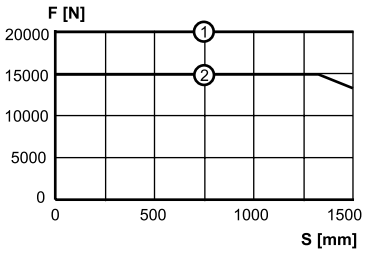

V: speed F: load
1: ECT09-B43R01LD-2510
2: ECT09-B43R01LD-3220

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT09-B43R01LD-2510
2: ECT09-B43R01LD-3220

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT09-B43R01LD-2510
2: ECT09-B43R01LD-3220

# ECT90

## Direct Drive, Inline B53 AC Servo Motor

» Ordering Key - see page 71
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Direct drive
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 5300 N
- Speed up to 1600 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | no, direct drive |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

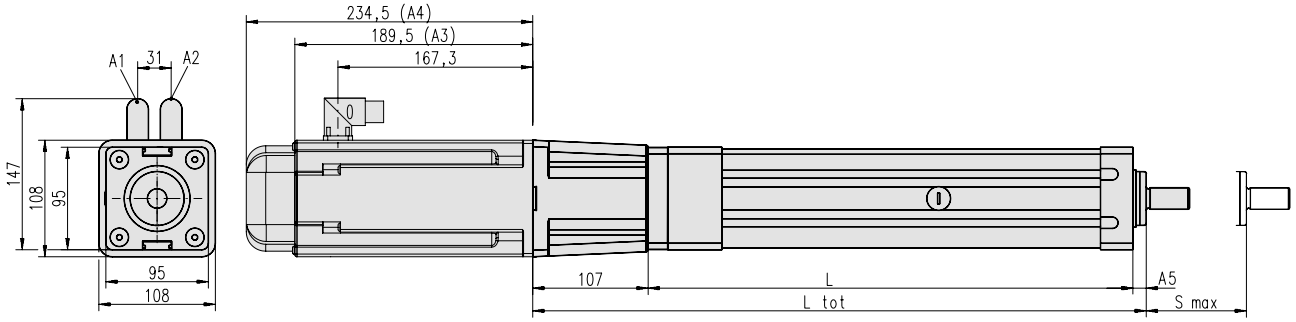
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT09-B53R01LD-2510 | | 5300 |
| ECT09-B53R01LD-3220 | | 2600 |
| ECT09-B53R01LD-3232 | | 1500 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT09-B53R01LD-2510 | | 450 |
| ECT09-B53R01LD-3220 | | 1000 |
| ECT09-B53R01LD-3232 | | 1600 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 25, 32 |
| Screw leads[3] | [mm] | 10, 20, 32 |
| Backlash | [mm] | |
| Screw diameter = 25 mm | | 0,11 |
| Screw diameter = 32 mm | | 0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] 10 mm lead = diameter 25 mm. 20 and 32 mm leads = diameter 32 mm.

# ECT90

## Direct Drive, Inline B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

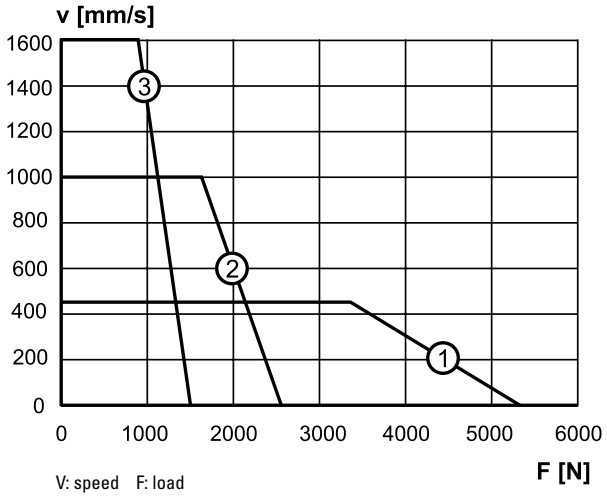
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake
A5: ECT09-B53 • 01LD-25 = 15 mm, ECT09-B53 • 01LD-32 = 12 mm

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | ECT09-B53 • 01LD-25: L = S max + 195<br>ECT09-B53 • 01LD-32: L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | ECT09-B53 • 01LD-25: L tot = S max + 303<br>ECT09-B53 • 01LD-32: L tot = S max + 344 |
| **Weight of unit** | **[kg]** | ECT09-B53 • • 01LD-25: kg = 17,2 + 0,016 × S max<br>ECT09-B53 • • 01LD-32: kg = 19,6 + 0,018 × S max |

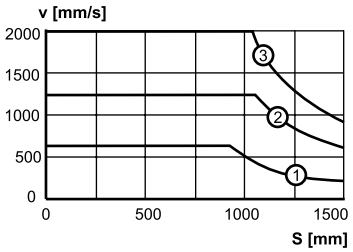
## Performance Diagrams

### Speed vs. Load



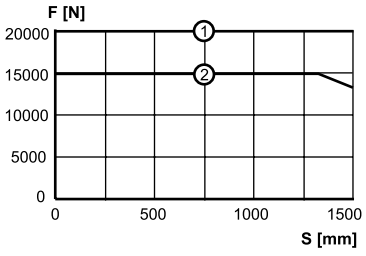

V: speed F: load
1: ECT09-B53R01LD-2510
2: ECT09-B53R01LD-3220
3: ECT09-B53R01LD-3232

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT09-B53R01LD-2510
2: ECT09-B53R01LD-3220
3: ECT09-B53R01LD-3232

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT09-B53R01LD-2510
2: ECT09-B53R01LD-32 • •

# ECT90

## Planetary Gear, Inline B43 AC Servo Motor

» Ordering Key - see page 71
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Planetary gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 10000 N
- Speed up to 160 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | planetary gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM43E-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

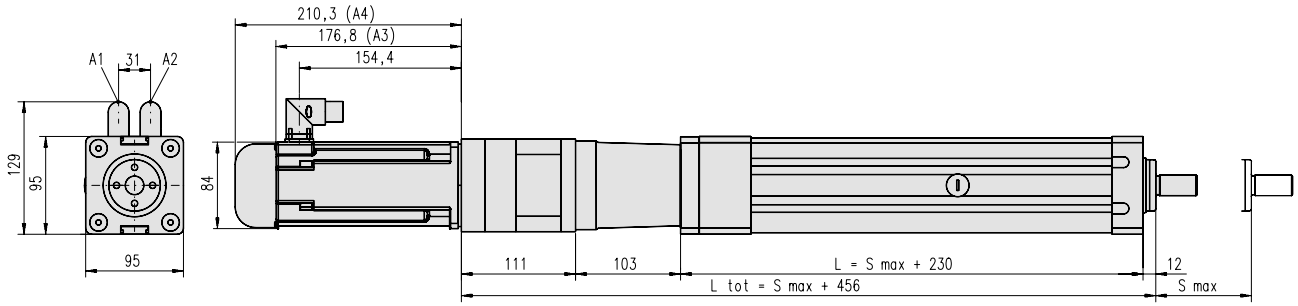
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1]<br>ECT09-B43R10LP-3220<br>ECT09-B43R05LP-3220 | [N] | <br>10000<br>5000 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed<br>ECT09-B43R10LP-3220<br>ECT09-B43R05LP-3220 | [mm/s] | <br>80<br>160 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 32 |
| Screw leads | [mm] | 20 |
| Backlash<br>Screw diameter = 25 mm<br>Screw diameter = 32 mm | [mm] | <br>0,11<br>0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT90

## Planetary Gear, Inline B43 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

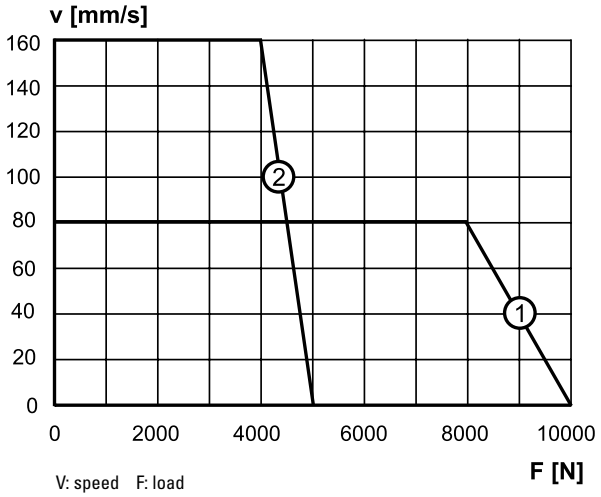
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 456 |
| **Weight of unit** | **[kg]** | kg = 19,2 + 0,018 × S max |

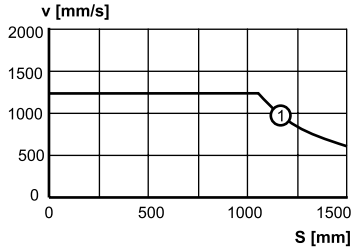
## Performance Diagrams

### Speed vs. Load



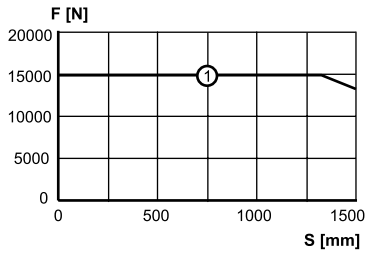

V: speed F: load
1: ECT09-B43R10LP-3220
2: ECT09-B43R05LP-3220

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT09-B43R • • LP-3220

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT09-B43R • • LP-3220

# ECT90

## Planetary Gear, Inline B53 AC Servo Motor

» Ordering Key - see page 71
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Planetary gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 1500 mm
- Load up to 20000 N
- Speed up to 270 mm/s

## General Specifications

| Parameter | ECT90 |
|---|---|
| Profile size (w × h) | 90 × 92 mm |
| Screw type | ball screw |
| Gear box | planetary gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

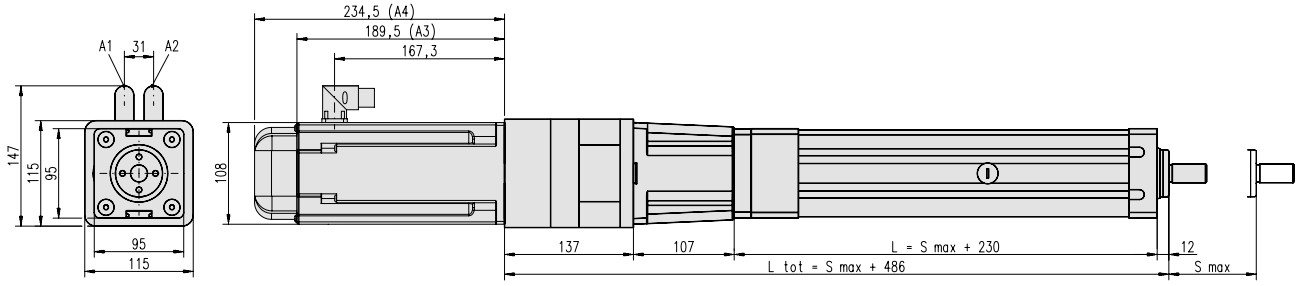
## Performance Specifications

| Parameter | | ECT90 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 1500 |
| Maximum dynamic load (Fx)[1]<br>ECT09-B53R10LP-3220<br>ECT09-B53R05LP-3220 | [N] | <br>20000<br>13000 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed<br>ECT09-B53R10LP-3220<br>ECT09-B53R05LP-3220 | [mm/s] | <br>130<br>270 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 32 |
| Screw leads | [mm] | 20 |
| Backlash<br>Screw diameter = 25 mm<br>Screw diameter = 32 mm | [mm] | <br>0,11<br>0,18 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT90

## Planetary Gear, Inline B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

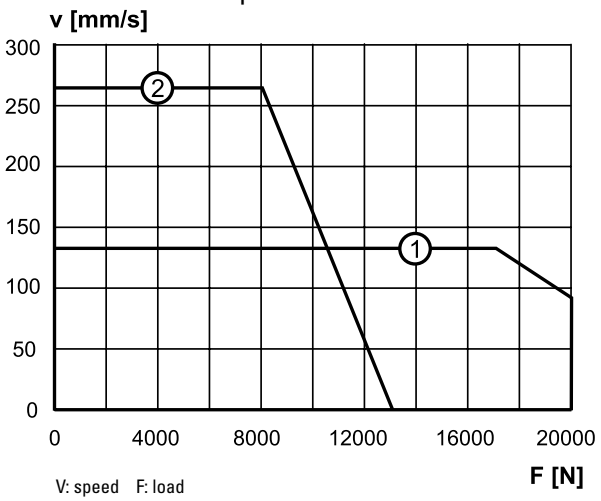
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 230 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 486 |
| **Weight of unit** | **[kg]** | kg = 24,8 + 0,018 × S max |

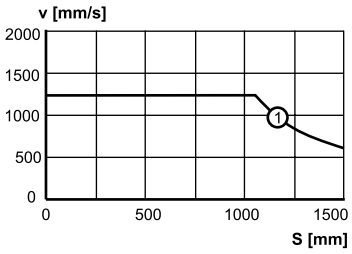
## Performance Diagrams

### Speed vs. Load



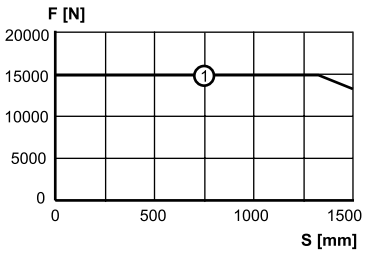

V: speed F: load
1: ECT09-B53R10LP-3220
2: ECT09-B53R05LP-3220

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT09-B53R••LP-3220

### Column Load Limit vs. Stroke

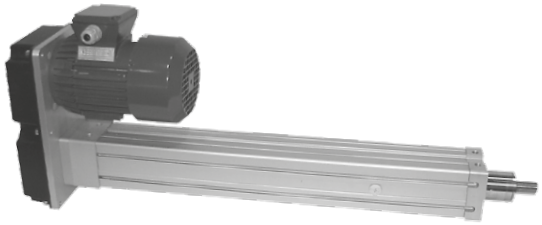



F: load S: stroke length
1: ECT09-B53R••LP-3220

# ECT130

## Parallel IEC100 AC Motor

» Ordering Key - see page 72
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Three phase asynchronous AC motor with brake
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 13300 N
- Speed up to 1900 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | asynchronous AC motor |
| Motor voltage | 3 × 400 Vac |
| Motor power | 3,0 kW |
| Motor current, nominal | 6,1 A |
| Motor feedback | no |
| Motor connection | terminal box |
| Motor brake | yes (230 Vac) |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • mounting options<br>• adapter options |

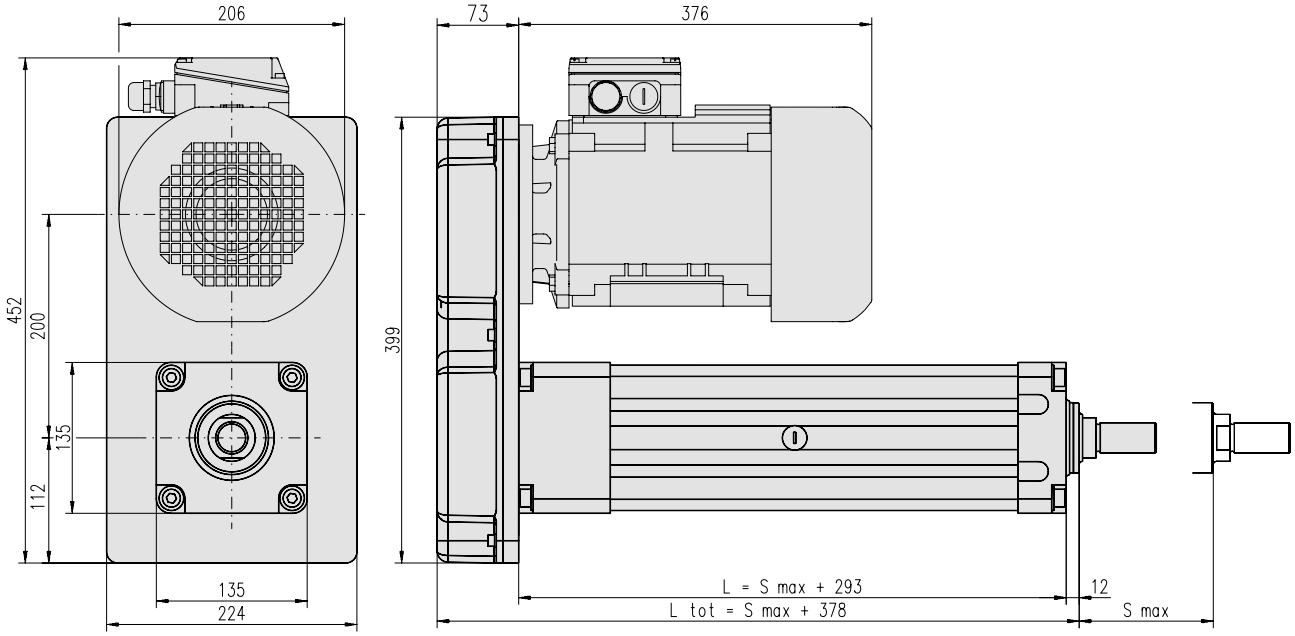
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT13-I10B03PB-4010 | | 13300 |
| ECT13-I10B02PB-4010 | | 9400 |
| ECT13-I10B03PB-4020 | | 6200 |
| ECT13-I10B02PB-4020 | | 4200 |
| ECT13-I10B01PB-4020 | | 1800 |
| ECT13-I10B01PB-4040 | | 600 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed[3] | [mm/s] | |
| ECT13-I10B03PB-4010 | | 175 |
| ECT13-I10B02PB-4010 | | 210 |
| ECT13-I10B03PB-4020 | | 300 |
| ECT13-I10B02PB-4020 | | 420 |
| ECT13-I10B01PB-4020 | | 950 |
| ECT13-I10B01PB-4040 | | 1900 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20, 40 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.
[3] The maximum speed is based on a max. input frequency to the motor of 50 Hz. Frequency inverters can provide higher frequencies thus higher speeds but that may damage the actuator.

# ECT130

## Parallel IEC100 AC Motor

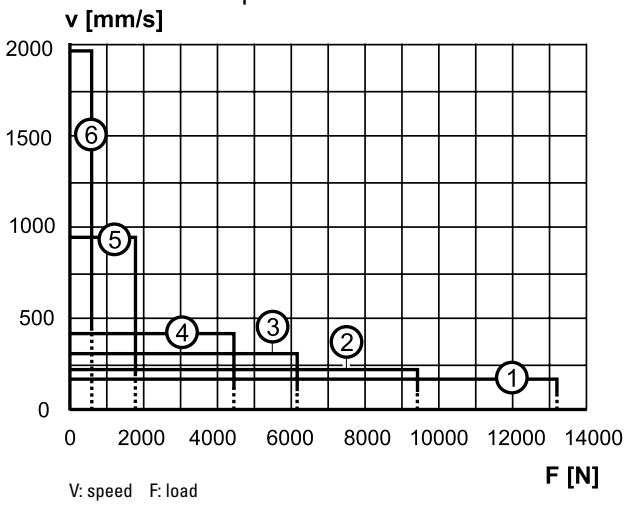



S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 378 |
| **Weight of unit** | **[kg]** | kg = 63,5 + 0,03 × S max |

## Performance Diagrams

### Speed vs. Load

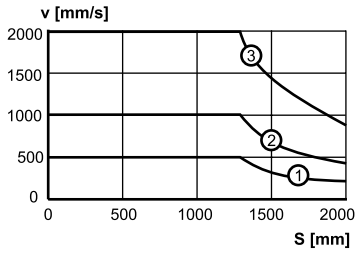



V: speed F: load

1: ECT13-I10B03PB-4010
2: ECT13-I10B02PB-4010
3: ECT13-I10B03PB-4020
4: ECT13-I10B02PB-4020
5: ECT13-I10B01PB-4020
6: ECT13-I10B01PB-4040

▪▪▪▪▪ = Overheating of the motor may occur if running at this speed continiously!

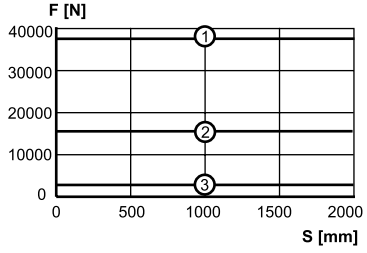
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT13-I10B0 • PB-4010
2: ECT13-I10B0 • PB-4020
3: ECT13-I10B0 • PB-4040

### Column Load Limit vs. Stroke



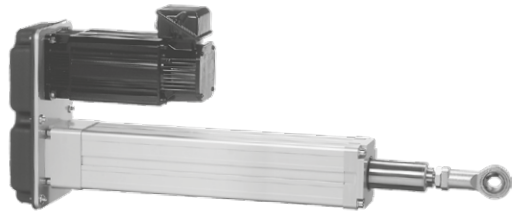

F: load S: stroke length

1: ECT13-I10B0 • PB-4010
2: ECT13-I10B0 • PB-4020
3: ECT13-I10B0 • PB-4040

# ECT130

## Parallel B53 AC Servo Motor

» Ordering Key - see page 72
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 15000 N
- Speed up to 440 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-CNCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

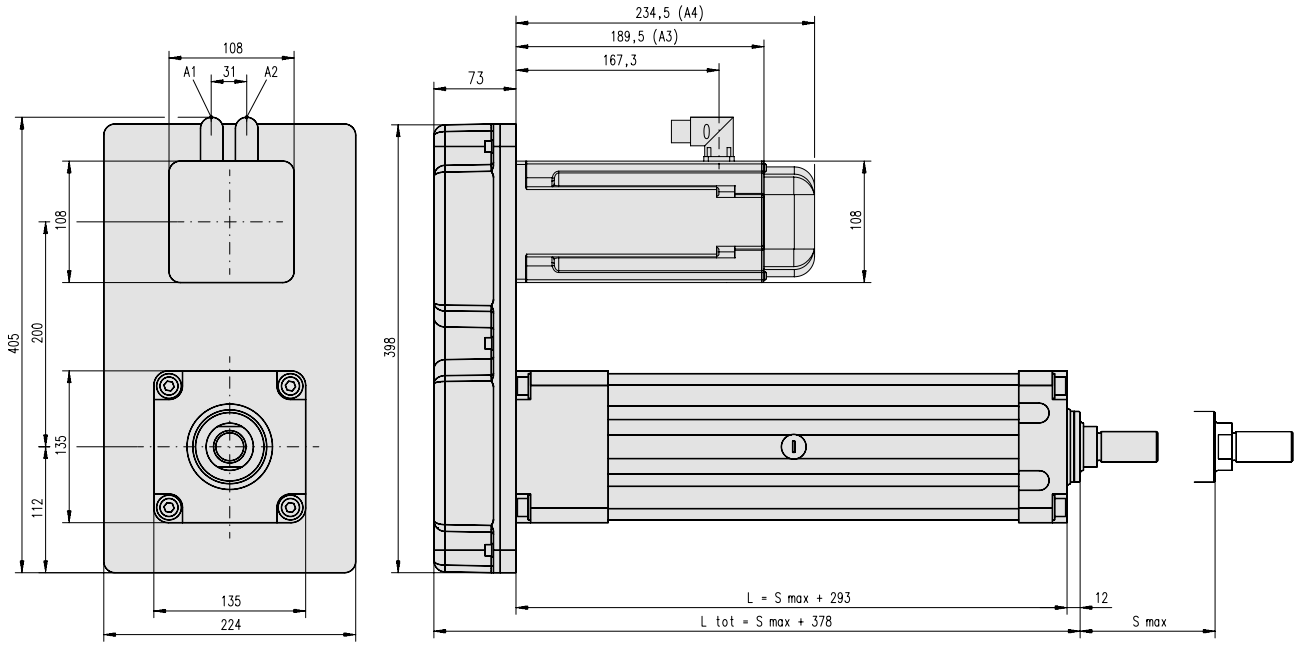
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT13-B53R03PB-4010 | | 15000 |
| ECT13-B53R02PB-4010 | | 10500 |
| ECT13-B53R03PB-4020 | | 7000 |
| ECT13-B53R02PB-4020 | | 5000 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT13-B53R03PB-4010 | | 160 |
| ECT13-B53R02PB-4010 | | 220 |
| ECT13-B53R03PB-4020 | | 320 |
| ECT13-B53R02PB-4020 | | 440 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Parallel B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

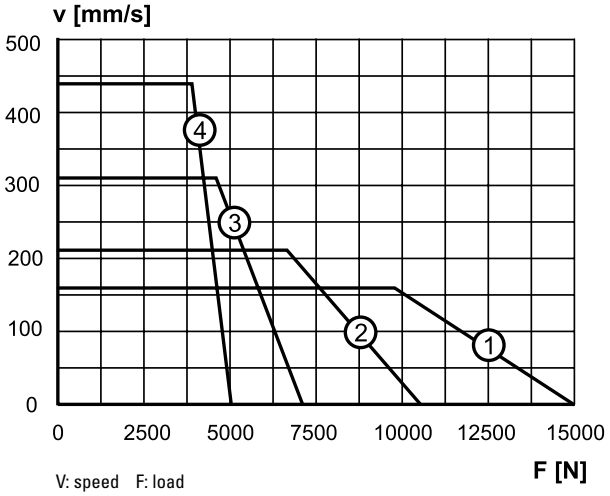
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 378 |
| **Weight of unit** | **[kg]** | kg = 39,9 + 0,03 × S max |

## Performance Diagrams

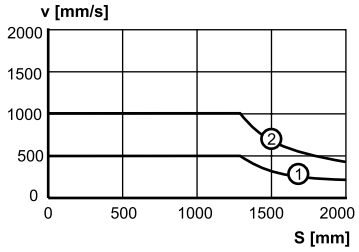
### Speed vs. Load




V: speed F: load

1: ECT13-B53R03PB-4010
2: ECT13-B53R02PB-4010
3: ECT13-B53R03PB-4020
4: ECT13-B53R02PB-4020

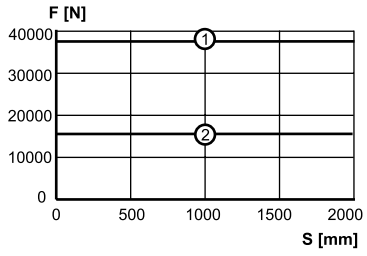
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT13-B53R • 3PB-4010
2: ECT13-B53R • 3PB-4020

### Column Load Limit vs. Stroke



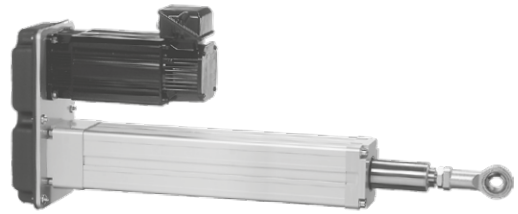

F: load S: stroke length

1: ECT13-B53R • 3PB-4010
2: ECT13-B53R • 3PB-4020

# ECT130

## Parallel B63 AC Servo Motor

» Ordering Key - see page 72
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Belt gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 21500 N
- Speed up to 440 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | belt gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM63K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

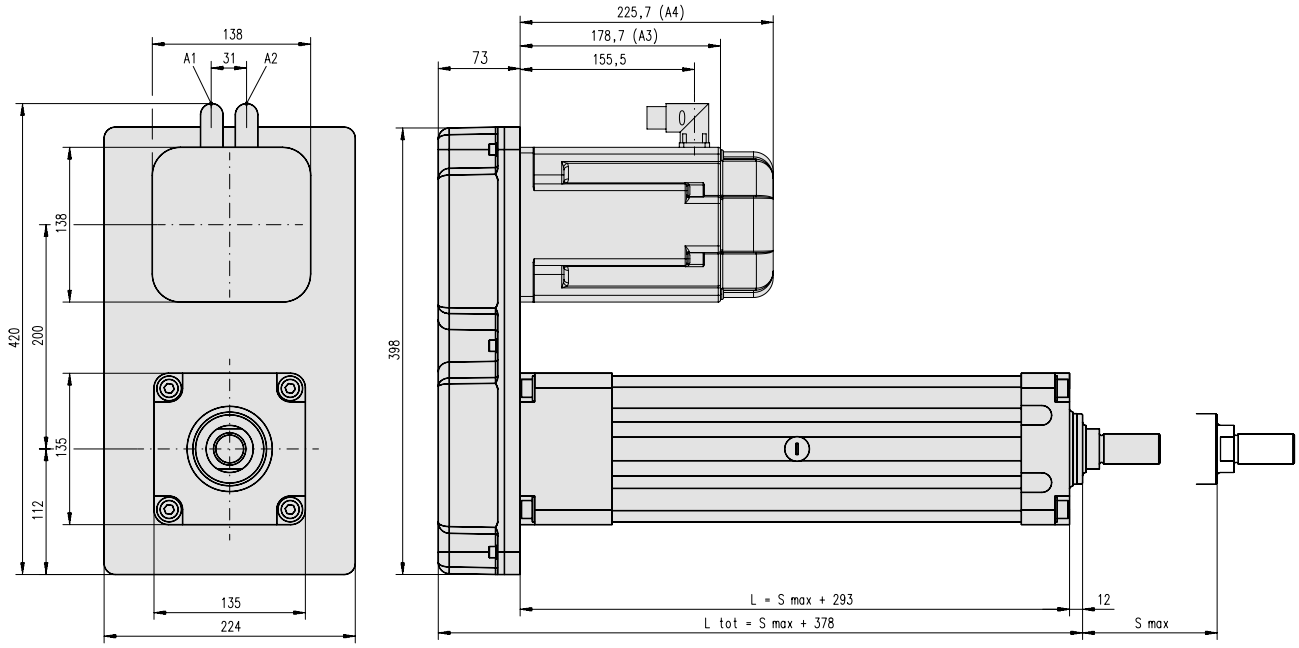
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT13-B63R03PB-4010 | | 21500 |
| ECT13-B63R02PB-4010 | | 15500 |
| ECT13-B63R03PB-4020 | | 10500 |
| ECT13-B63R02PB-4020 | | 7500 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT13-B63R03PB-4010 | | 160 |
| ECT13-B63R02PB-4010 | | 220 |
| ECT13-B63R03PB-4020 | | 320 |
| ECT13-B63R02PB-4020 | | 440 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Parallel B63 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

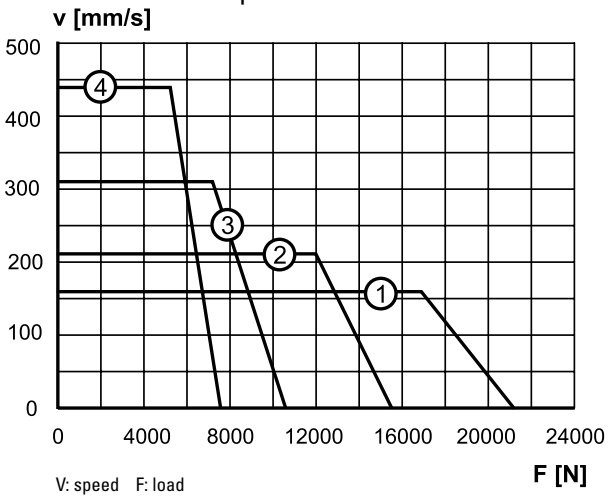
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 378 |
| **Weight of unit** | **[kg]** | kg = 43,6 + 0,03 × S max |

## Performance Diagrams

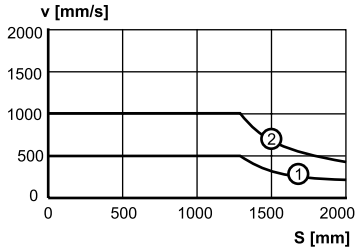
### Speed vs. Load




V: speed F: load

1: ECT13-B63R03PB-4010
2: ECT13-B63R02PB-4010
3: ECT13-B63R03PB-4020
4: ECT13-B63R02PB-4020

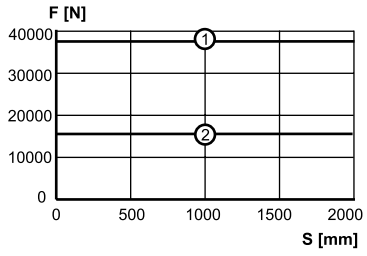
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT13-B63R • 3PB-4010
2: ECT13-B63R • 3PB-4020

### Column Load Limit vs. Stroke




F: load S: stroke length

1: ECT13-B63R • 3PB-4010
2: ECT13-B63R • 3PB-4020

# ECT130

## Direct Drive, Inline B53 AC Servo Motor

» Ordering Key - see page 73
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Direct drive
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 4900 N
- Speed up to 2000 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | no, direct drive |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

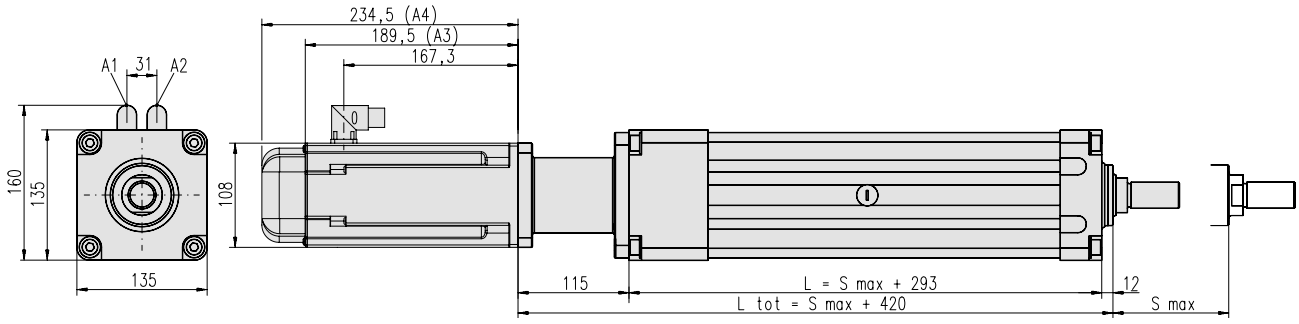
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT13-B53R01LD-4010 | | 4900 |
| ECT13-B53R01LD-4020 | | 2250 |
| ECT13-B53R01LD-4040 | | 700 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT13-B53R01LD-4010 | | 400 |
| ECT13-B53R01LD-4020 | | 1000 |
| ECT13-B53R01LD-4040 | | 2000 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20, 40 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Direct Drive, Inline B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

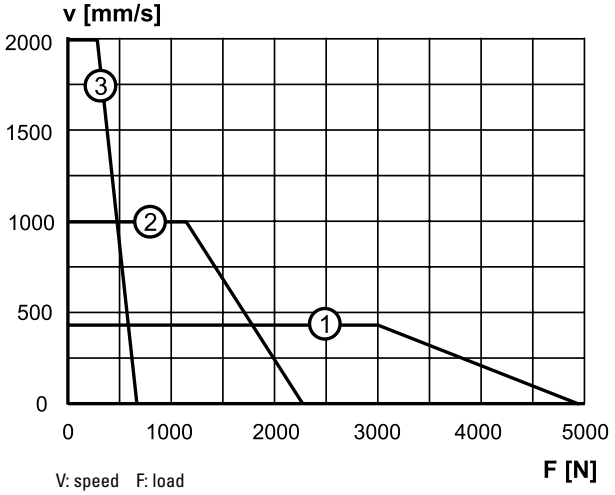
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 420 |
| **Weight of unit** | **[kg]** | kg = 28,7 + 0,03 × S max |

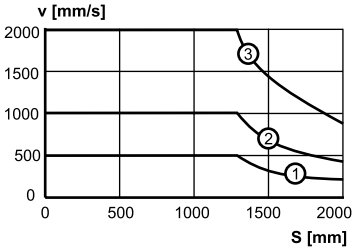
## Performance Diagrams

### Speed vs. Load



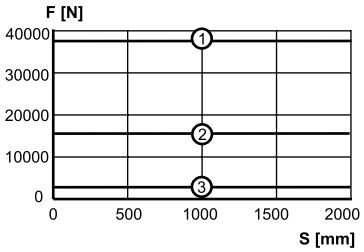

V: speed F: load
1: ECT13-B53R01LD-4010
2: ECT13-B53R01LD-4020
3: ECT13-B53R01LD-4040

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT13-B53R01LD-4010
2: ECT13-B53R01LD-4020
3: ECT13-B53R01LD-4040

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT13-B53R01LD-4010
2: ECT13-B53R01LD-4020
3: ECT13-B53R01LD-4040

# ECT130

## Direct Drive, Inline B63 AC Servo Motor

» Ordering Key - see page 73
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Direct drive
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 7400 N
- Speed up to 2000 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | no, direct drive |
| Motor type | brushless AC servo motor |
| Motor designation | AKM63K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

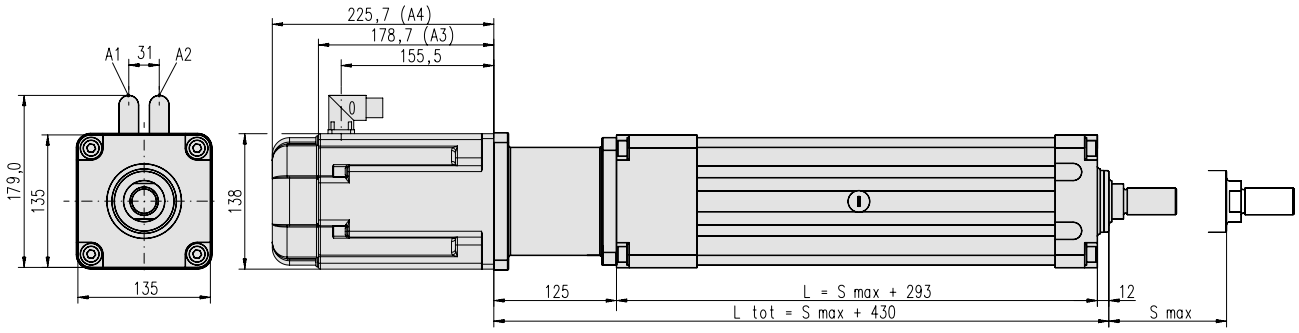
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1] | [N] | |
| ECT13-B63R01LD-4010 | | 7400 |
| ECT13-B63R01LD-4020 | | 3400 |
| ECT13-B63R01LD-4040 | | 1400 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed | [mm/s] | |
| ECT13-B63R01LD-4010 | | 400 |
| ECT13-B63R01LD-4020 | | 1000 |
| ECT13-B63R01LD-4040 | | 2000 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20, 40 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Direct Drive, Inline B63 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

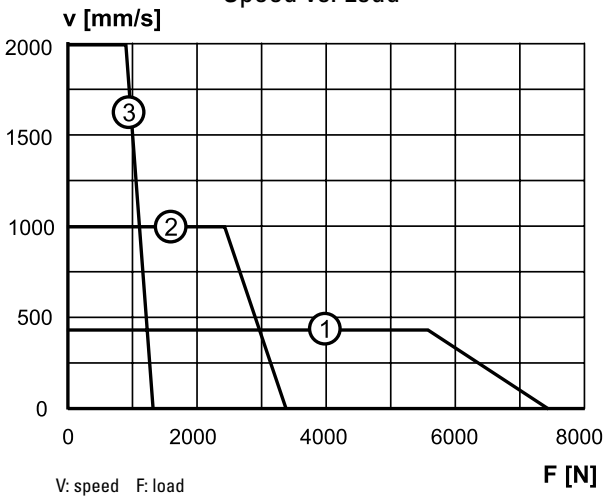
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 430 |
| **Weight of unit** | **[kg]** | kg = 32,8 + 0,03 × S max |

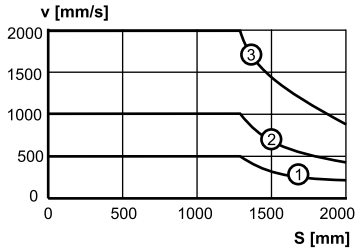
## Performance Diagrams

### Speed vs. Load



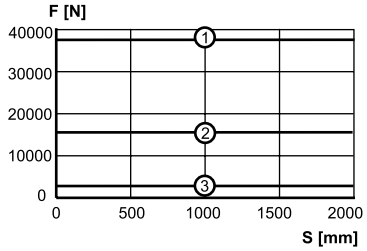

V: speed F: load
1: ECT13-B63R01LD-4010
2: ECT13-B63R01LD-4020
3: ECT13-B63R01LD-4040

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT13-B63S(R901LD-4010
2: ECT13-B63R01LD-4020
3: ECT13-B63R01LD-4040

### Column Load Limit vs. Stroke




F: load S: stroke length
1: ECT13-B63R01LD-4010
2: ECT13-B63R01LD-4020
3: ECT13-B63R01LD-4040

# ECT130

## Planetary Gear, Inline B53 AC Servo Motor

» Ordering Key - see page 73
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Planetary gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 38000 N
- Speed up to 200 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | planetary gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM53K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

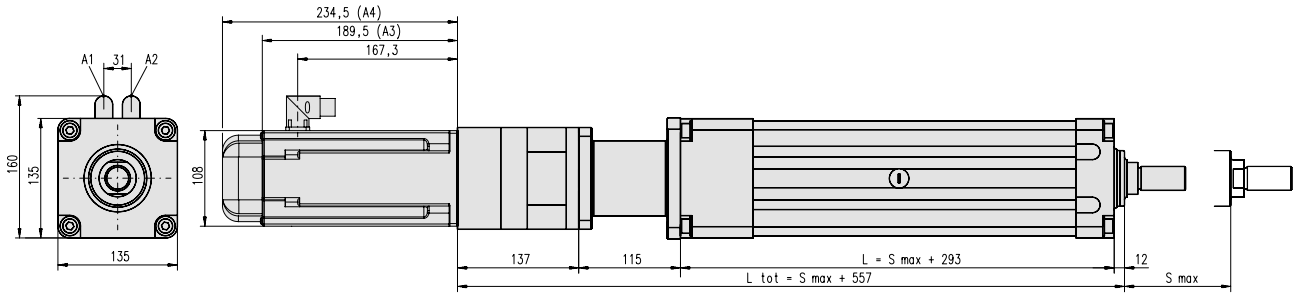
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1]<br>ECT13-B53R10LP-4010<br>ECT13-B53R05LP-4010<br>ECT13-B53R05LP-4020 | [N] | <br>38000<br>22500<br>11000 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed<br>ECT13-B53R10LP-4010<br>ECT13-B53R05LP-4010<br>ECT13-B53R05LP-4020 | [mm/s] | <br>50<br>100<br>200 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Planetary Gear, Inline B53 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

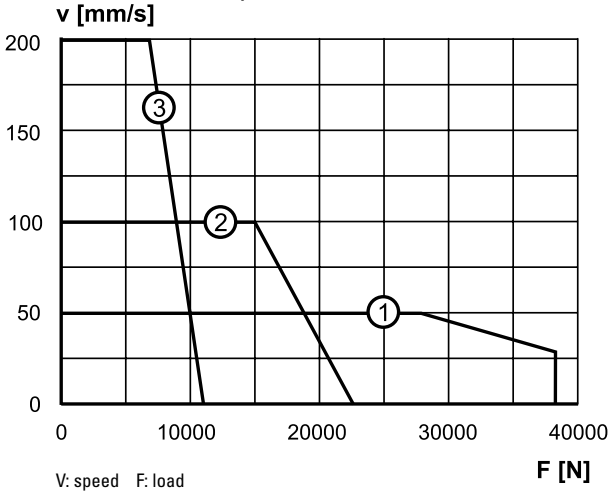
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 557 |
| **Weight of unit** | **[kg]** | kg = 33,9 + 0,03 × S max |

## Performance Diagrams

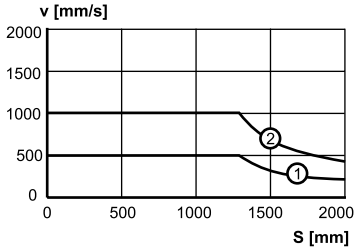
### Speed vs. Load




V: speed F: load

1: ECT13-B53R10LP-4010
2: ECT13-B53R05LP-4010
3: ECT13-B53R05LP-4020

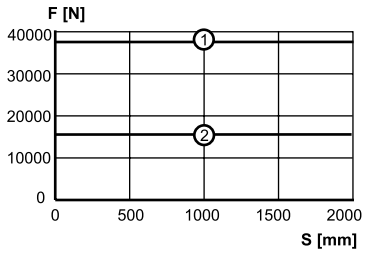
### Critical Speed vs. Stroke




v: speed S: stroke length

1: ECT13-B53R • • LP-4010
2: ECT13-B53R • • LP-4020

### Column Load Limit vs. Stroke




F: load S: stroke length

1: ECT13-B53R • • LP-4010
2: ECT13-B53R • • LP-4020

# ECT130

## Planetary Gear, Inline B63 AC Servo Motor

» Ordering Key - see page 73
» Mounting Options - see page 50
» Adapter Options - see page 54
» Glossary - see page 74



## Standard Features and Benefits

- Robust and reliable
- Brushless AC servo motor
- Planetary gear
- Ball screw
- Hard chromed steel extension tube
- IP65 as standard
- Stroke up to 2000 mm
- Load up to 33000 N
- Speed up to 200 mm/s

## General Specifications

| Parameter | ECT130 |
|---|---|
| Profile size (w × h) | 130 × 130 mm |
| Screw type | ball screw |
| Gear box | planetary gear |
| Motor type | brushless AC servo motor |
| Motor designation | AKM63K-ANCNR-00 |
| Motor feedback | resolver |
| Motor connection | connector |
| Motor brake | no, optional |
| Lubrication | single point lubrication |
| Certificates | CE |
| Options | • motor brake (24 Vdc)<br>• mounting options<br>• adapter options |

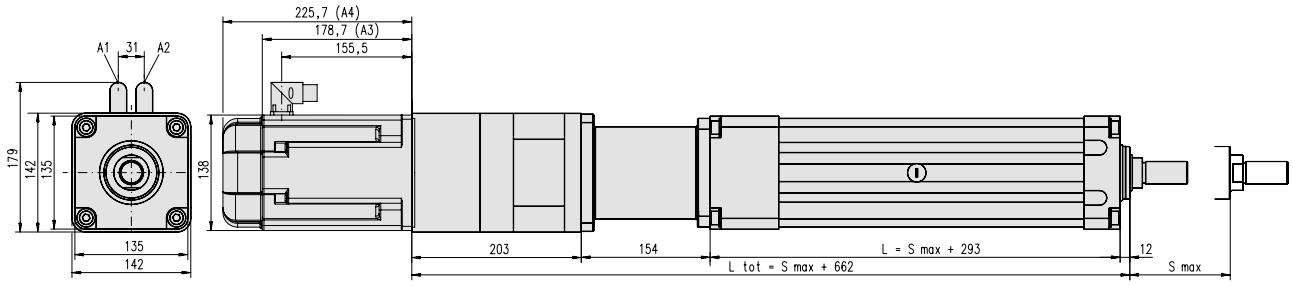
## Performance Specifications

| Parameter | | ECT130 |
|---|---|---|
| Stroke length (S), maximum | [mm] | 2000 |
| Maximum dynamic load (Fx)[1]<br>ECT13-B63R05LP-4010<br>ECT13-B63R05LP-4020 | [N] | <br>33000<br>16000 |
| Maxium load (Fy, Fz)[2] | [N] | 500 |
| Maximum load torque (My, Mz) | [Nm] | 150 |
| Maximum speed<br>ECT13-B63R05LP-4010<br>ECT13-B63R05LP-4020 | [mm/s] | <br>100<br>200 |
| Operating temperature limits | [°C] | -20 – 70 |
| Screw diameters | [mm] | 40 |
| Screw leads | [mm] | 10, 20 |
| Backlash | [mm] | 0,21 |
| Repeatability | [± mm] | 0,05 |
| Protection class, standard | | IP65 |

[1] At a 100% duty cycle.
[2] Value at full retraction - decreases as the actuator extends.

# ECT130

## Planetary Gear, Inline B63 AC Servo Motor




S max: maximum stroke (ordering stroke in mm)
L: cover tube length
L tot: retracted length

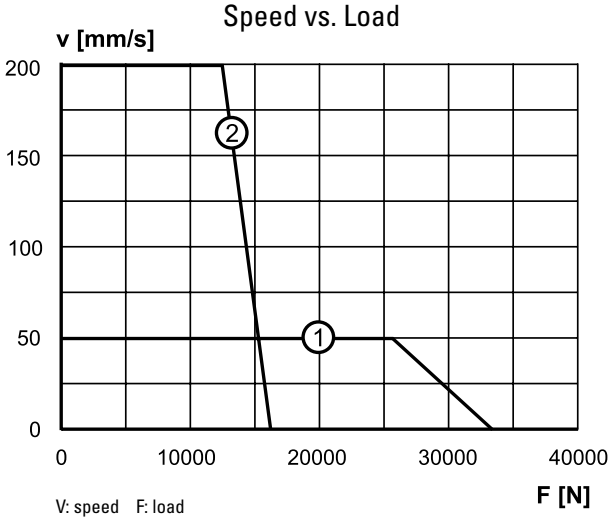
A1: power connector
A2: resolver connector
A3: without brake

A4: with brake

| | | |
|---|---|---|
| **Cover tube length (L)** | **[mm]** | L = S max + 293 |
| **Retracted length (L tot)** | **[mm]** | L tot = S max + 662 |
| **Weight of unit** | **[kg]** | kg = 46,8 + 0,03 × S max |

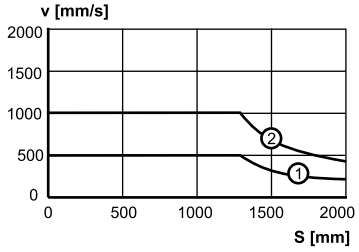
## Performance Diagrams

### Speed vs. Load



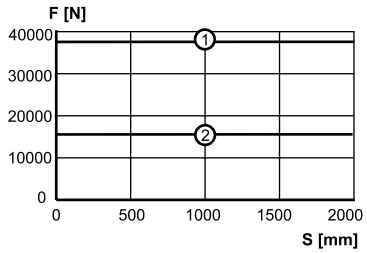

V: speed F: load
1: ECT13-B63R05LP-4010
2: ECT13-B63R05LP-4020

### Critical Speed vs. Stroke




v: speed S: stroke length
1: ECT13-B63R • • LP-4010
2: ECT13-B63R • • LP-4020

### Column Load Limit vs. Stroke

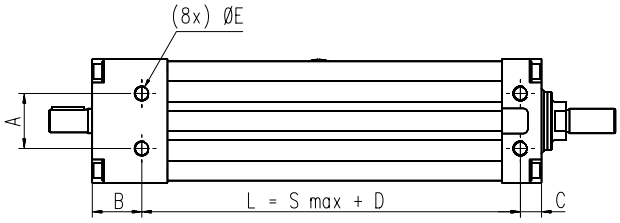



F: load S: stroke length
1: ECT13-B63R • • LP-4010
2: ECT13-B63R • • LP-4020

# Options and Accessories

## Mounting

### Mounting Holes - Standard Feature

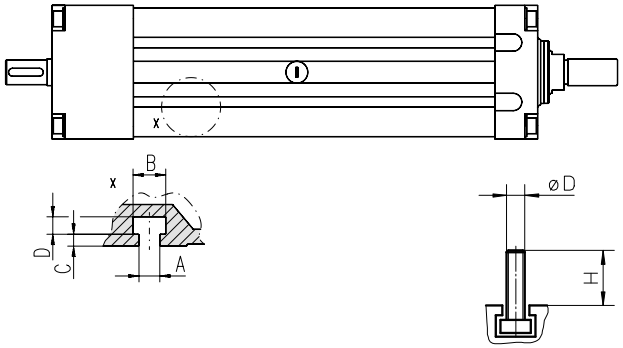



All T and ECT models have mounting holes as standard. If however mounting feet type F are used these holes will be occupied by the attachment screws for the feet. Note! The distances “B” and “D” can be different depending on the diameter or lead of the screw of the unit.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| T60 | 46 | 34,5 | 14 | 124,5 [1] / 146,5 [2] | M8 × 10 |
| T90 / ECT90 | 45 | 39[1] / 48[2] | 15 | 141 [3] / 167 [4] | M12 × 18 |
| T130 / ECT130 | 60 | 54 | 23 | 216 | M16 × 28 |

[1] T06-B2505, T06-B2525 [2] T06-B2510, T06-B2550 [3] T09-B25, ECT09-B •••••••25 [4] T09-B32, ECT09-B •••••••32

### T-slots and T-slot Bolts - Standard Feature




The T60, T90, T130, ECT90 and ECT130 models all have T-slots running along the entire profile. T60 has two T-slot (one on each side) while the other models have four (two on each side). Suitable T-slot bolts can be ordered using the part numbers in the table below.

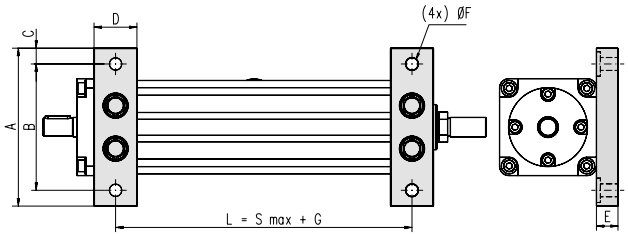
| | A | B | C | D |
|---|---|---|---|---|
| T60 | 21,8 | 26,4 | 2,55 | 3,4 |
| T90 / ECT90 | 6,4 | 10,5 | 3,5 | 4,5 |
| T130 / ECT130 | 10,5 | 16,5 | 6,0 | 9,0 |

| | ø D | H | p/n |
|---|---|---|---|
| T60 | M5 | 14 | D312 221 |
| T90 / ECT90 | M6 | 18 | D310 314 |
| T90 / ECT90 | M6 | 26 | D310 311 |
| T130 / ECT130 | M10 | 28 | D800 089 |

# Options and Accessories

## Mounting

### Mounting Feet type F

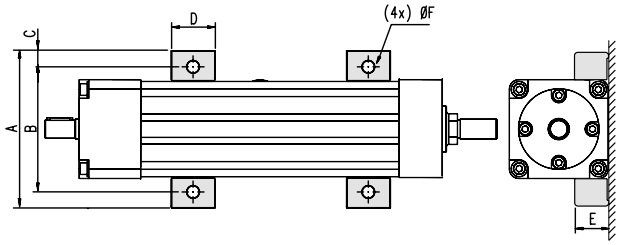



The mounting feet option can be mounted on the unit from the factory if this is stated in the ordering key at order (ECT series only) or be ordered seperately using the part number (T and ECT series). When ordered seperately all neccessary screws to attach the feet are included. Note! The distance "G" can be different depending of the screw diameter of the unit.

| | A | B | C | D | E | F | G | p/n |
|---|---|---|---|---|---|---|---|---|
| T90 / ECT90 | 155 | 125 | 15 | 40 | 20 | 13 | 141[1] / 162[2] | D606 225 |
| T130 / ECT130 | 220 | 176 | 22 | 60 | 30 | 17 | 216 / | D606 157 |

[1] T09-B25, ECT09-B•••••••25 [2] T09-B32, ECT09-B •••••••32

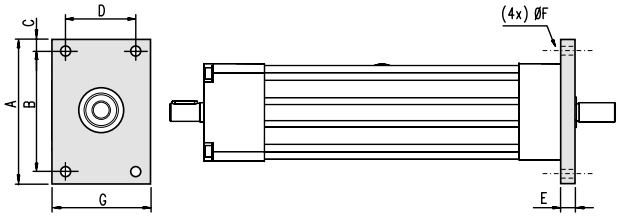
### T-slot Mounting Clamps




The T-slot mounting clamp accessory are only available for the T60 models. They are ordered seperately using the part number (one clamp). Normally you would need four clamps per unit. The clamps fit in to the T-slot running along each side of the unit.

| | A | B | C | D | E | F | p/n |
|---|---|---|---|---|---|---|---|
| T60 | 109 | 87 | 9,7 | 25 | 20,8 | 6,5 | D313 618 |

### Front Mounting Plates



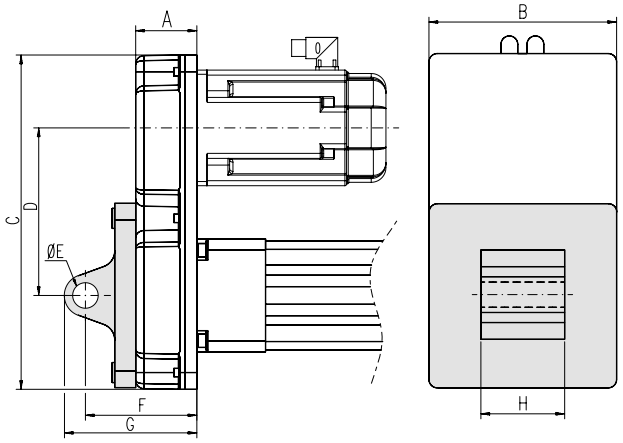

The front mounting plates must be mounted from the factory as a part of the assembly of the unit and can not be mounted afterwards by the customer.

| | A | B | C | D | E | F | G | p/n |
|---|---|---|---|---|---|---|---|---|
| T60 | 120 | 100 | 10 | 56 | 14 | 7 | 75 | D606 359 |
| T90 / ECT90 | 150 | 126 | 12 | 72 | 16 | 9 | 95 | D606 360 |
| T130 / ECT130 | 205 | 180 | 12,5 | 110 | 20 | 11 | 140 | D606 361 |

# Options and Accessories

## Mounting

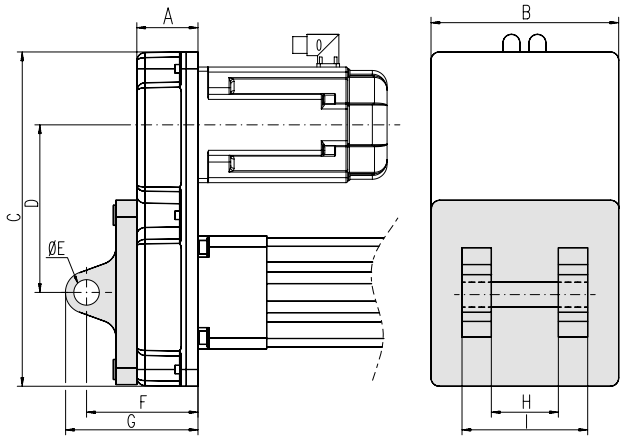
### Clevis type S




The clevis option is only available for ECT units with BGM belt gear and is orderder by stating this in the ordering key at order. The clevis comes mounted on the unit from the factory.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| ECT90 | 70 | 165 | 305 | 155 | 25 H9 | 122 | 147 | 70 |
| ECT130 | 73 | 224 | 399 | 200 | 30 H9 | 134 | 159 | 90 |

### Clevis type R




The clevis option can either be mounted on the belt gear from the factory if this is stated in the ordering key at order (ECT series only) or be ordered seperately using the part number (T and ECT series). The clevis mounting option can only be mounted on T130 or ECT130 units equipped with a BGM belt gear.

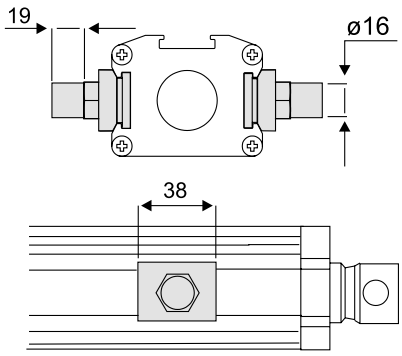
| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| ECT130 | 73 | 224 | 399 | 200 | 30 H9 | 134 | 159 | 90H4 | 170 |

# Options and Accessories

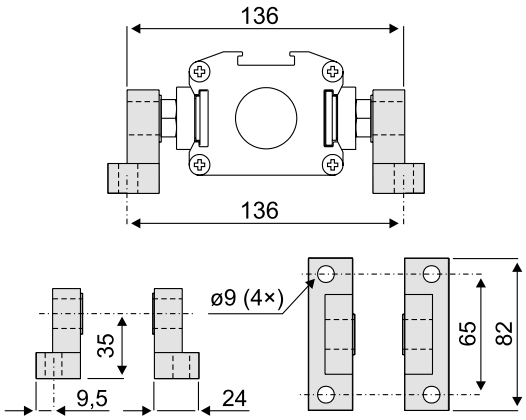
## Mounting

### Trunnion type T

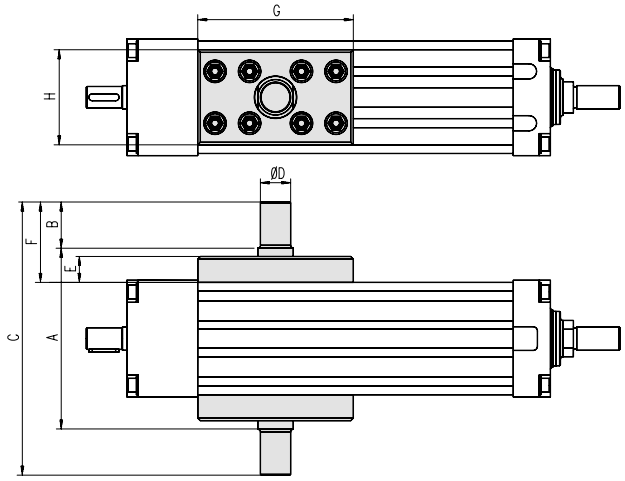
Trunnion kit for T60




Trunnion bracket kit for T60




Trunnion kit for T90, T130, ECT90, ECT130




The trunnion option can be mounted on the unit from the factory if this is stated in the ordering key at order (ECT series only) or be ordered seperately using the part number (T and ECT series). When ordered seperately all neccessary screws to attach the trunnions to the unit are included. The position along the profile can be adjusted freely by the customer. A trunnion bracket kit is available for T60 which is ordered seperately.

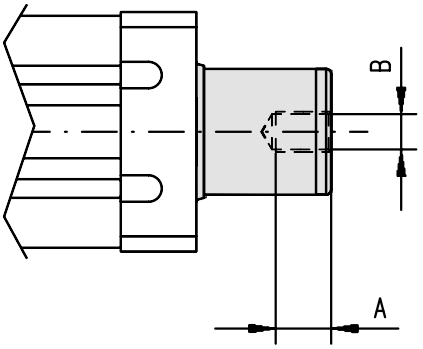
| | p/n |
|---|---|
| T60 trunnion kit | D603 022 |
| T60 trunnion bracket kit | D603 030 |
| T90 / ECT90 trunnion kit | D606 030 |
| T130 / ECT130 trunnion kit | D606 155 |

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| T90 / ECT90 | 150 | 45 | 240 | 20f8 | 25 | 75 | 130 | 80 |
| T130 / ECT130 | 210 | 53 | 316 | 35f8 | 30 | 93 | 180 | 110 |

# Options and Accessories

## Adapters

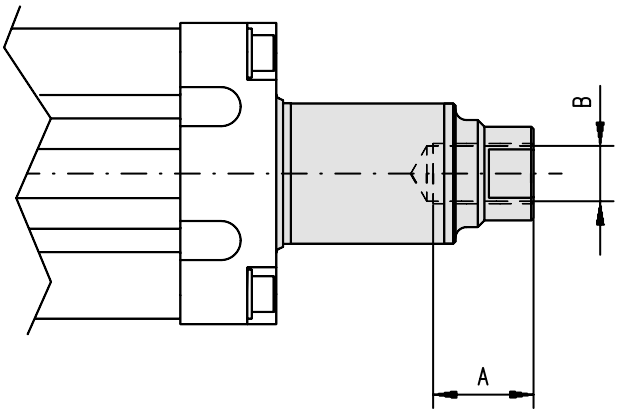
### Inside Thread type P and R




The inside thread option comes mounted from factory if this is stated in the ordering key at order. Which types that are possible for the different unit sizes depends on on the ball screw diameter of the unit, see “Ball screw diameter” in the table.

| | Ball screw diameter | Type | A | B |
|---|---|---|---|---|
| T60 | 25 mm | P | 22 | M16 × 2 |
| T90 / ECT90 | 25 mm | P | 22 | M16 × 2 |
| T90 / ECT90 | 25, 32 mm | R | 24 | M20 × 1,5 |

### Inside Thread type T, V and X



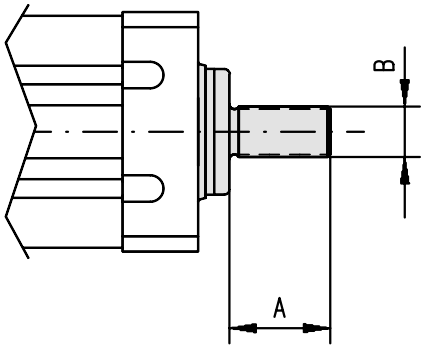

The inside thread option comes mounted from factory if this is stated in the ordering key at order. Which types that are possible for the different unit sizes depends on on the ball screw diameter of the unit, see “Ball screw diameter” in the table.

| | Ball screw diameter | Type | A | B |
|---|---|---|---|---|
| T130 / ECT130 | 40 mm | T | 45 | M27 × 2 |
| T130 / ECT130 | 40, 50 mm | V | 45 | M33 × 2 |
| T130 / ECT130 | 40 mm | X | 45 | M30 × 2 |

# Options and Accessories

## Adapters

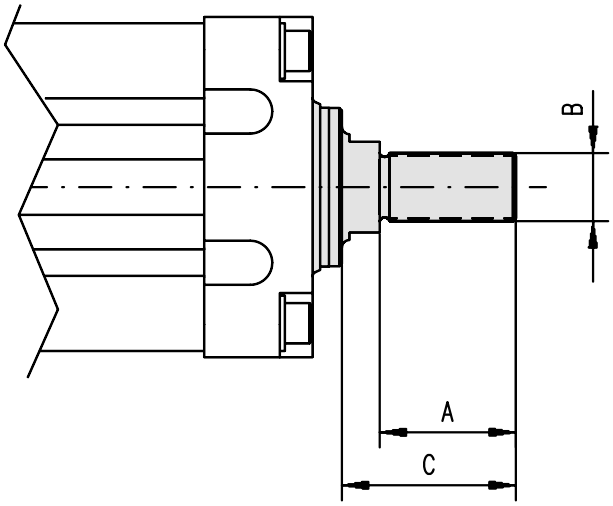
### Outside Thread type N and Q




The outside thread option comes mounted from factory if this is stated in the ordering key at order. Which types that are possible for the different unit sizes depends on on the ball screw diameter of the unit, see “Ball screw diameter” in the table.

| | Ball screw diameter | Type | A | B |
|---|---|---|---|---|
| T60 / T90 / ECT90 | 25 mm | N | 32 | M16 × 1,5 |
| T90 / ECT90 | 25, 32 mm | Q | 40 | M20 × 1,5 |

### Outside Thread type S and U



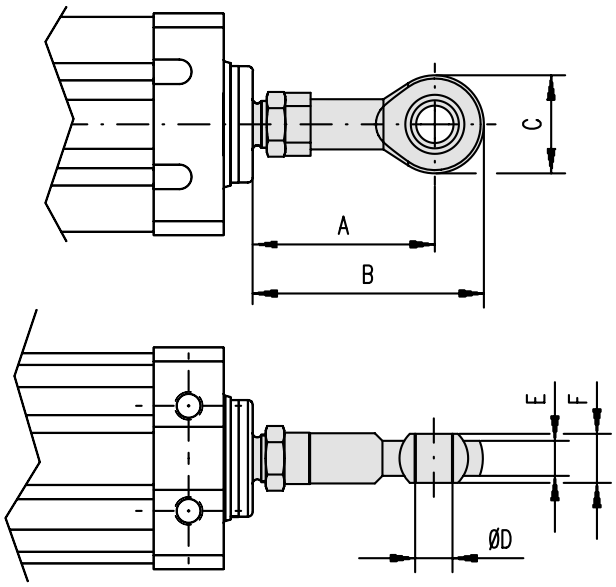

The outside thread option comes mounted from factory if this is stated in the ordering key at order. Which types that are possible for the different unit sizes depends on on the ball screw diameter of the unit, see “Ball screw diameter” in the table.

| | Ball screw diameter | Type | A | B | C |
|---|---|---|---|---|---|
| T130 / ECT130 | 40 mm | S | 54 | M27 × 2 | 66 |
| T130 / ECT130 | 40, 50 mm | U | 45 | M33 × 2 | 57 |

# Options and Accessories

## Adapters

### Spherical Joint type J and K




The spherical joint option can be mounted on the unit from the factory if this is stated in the ordering key at order (ECT series only) or be ordered seperately using the part numbers (T and ECT series). When ordered seperately all neccessary componnets to attach the spherical joints to the unit are included. Note! when ordering a spherical joint seperately, make sure that the extension tube end has an outside thread adapter to be able to mount it.

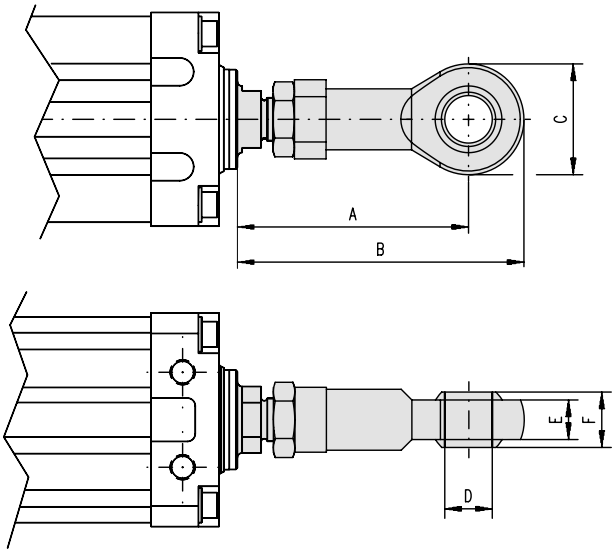
| | Type | A | B | C | D | E | F | p/n |
|---|---|---|---|---|---|---|---|---|
| T60 / T90 / ECT90 | J | 76 | 97 | 42 | 16 | 15 | 21 | D606 193 + D290 286 |
| T90 / ECT90 | K | 90 | 115 | 50 | 20 | 18 | 25 | D606 192 + D290 281 |

# Options and Accessories

## Adapters

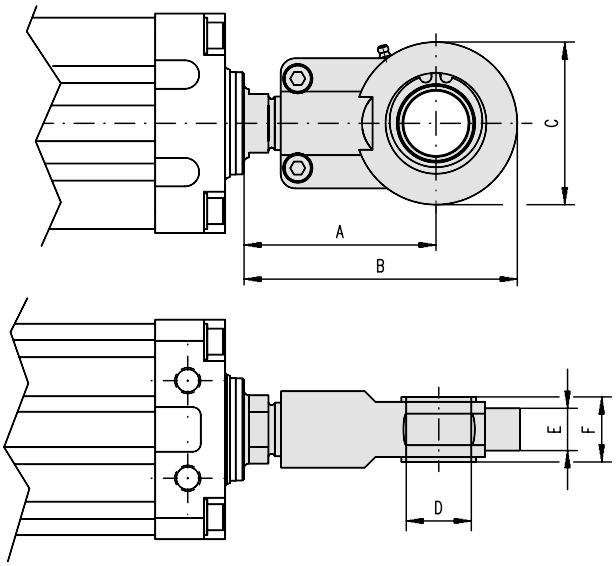
### Spherical Joint type L and M

Type L




The spherical joint option can be mounted on the unit from the factory if this is stated in the ordering key at order (ECT series only) or be ordered seperately using the part number(s) (T and ECT series). When ordered seperately all neccessary componnets to attach the spherical joints to the unit are included.Type M joints includes a grease nipple. Note! when ordering a spherical joint seperately, make sure that the extension tube end has an outside thread adapter to be able to mount it.

Type M



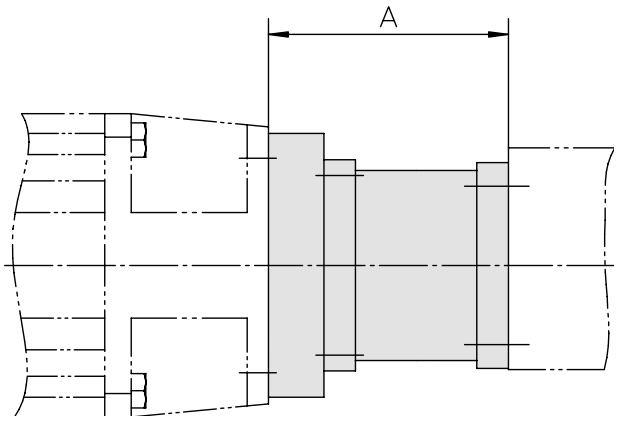

| | Type | A | B | C | D | E | F | p/n |
|---|---|---|---|---|---|---|---|---|
| T130 / ECT130 | L [1] | 137 | 172 | 70 | 30 | 25 | 37 | D606 191 + D290 287 |
| T130 / ECT130 | M | 115 | 164 | 97 | 40 | 32 | 40 | D606 159 |

[1] Not possible for T13- B50

# Options and Accessories

## Flanges and Gears

### Bell House Flanges for IEC Motors



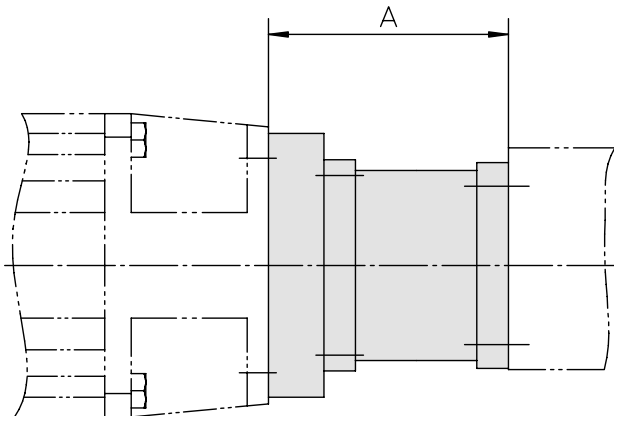

The bell house flange includes a matching coupling. Note! Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

| | IEC63 B14 | A | IEC71 B14 | A | IEC80 B14 | A | IEC90 B14 | A | IEC100/112 B14 | A |
|---|---|---|---|---|---|---|---|---|---|---|
| T60 | D391 126 | 91 | contact customer support for availability | | | | | | | |
| T90 (T09-B25) | | | D390 823 | 83 | D390 914 | 101 | D390 918 | 101 | – | – |
| T90 (T09-B32) | | | – | – | D390 922 | 101 | D390 924 | 108 | – | – |
| T130 | | | – | – | – | – | D606 180 | 115 | D606 181 | 125 |

# Options and Accessories

## Flanges and Gears

### MGK Bell House Flanges for AKM Servo Motors



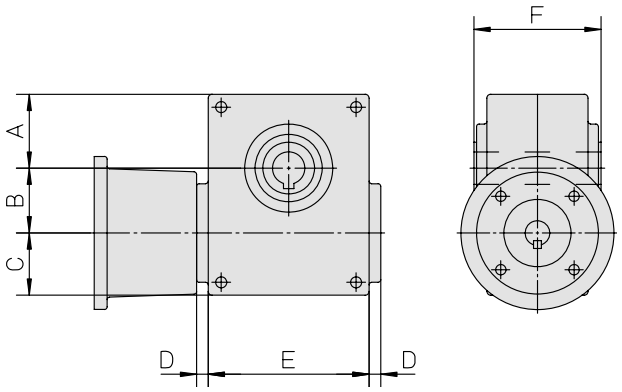

The bell house flange includes a matching coupling. Note! Keep in mind that heavy motors will need extra support in order not to break the flange or gear due to the load torque created.

| | AKM3 • • -Ax | A | AKM4 • • -Ax | A | AKM5 • • -Ax | A | AKM6 • • -Ax | A |
|---|---|---|---|---|---|---|---|---|
| T60 | D391 094 | 82 | D391 075 | 93 | D391 077 | 103 | contact customer support | |
| T90 (T09-B25) | – | – | D390 928 | 93 | D390 940 | 107 | – | – |
| T90 (T09-B32) | – | – | D390 946 | 103 | D390 906 | 107 | – | – |
| T130 (T13-B40) | – | – | – | – | D390 972 | 115 | D309 907 | 125 |

# Options and Accessories

## Flanges and Gears

### BS40 / BS50 Worm Gears




The worm gear includes a gear, a bell house and a matching coupling but no adaptor flange. The worm gear is ordered using the ordering keys on the right page. The adaptor flange is ordered seperately using the part numbers below as there are different adaptor flanges depending on the type of unit being used.

### Dimensions

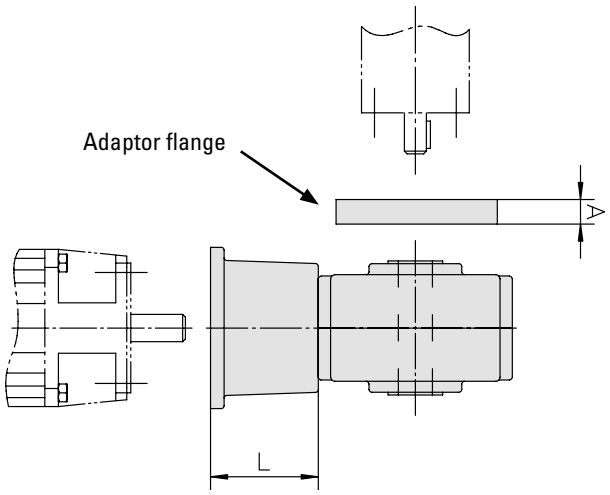
| Gear | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| BS40 | 54 | 40 | 46 | 10 | 100 | 92 |
| BS50 | 57 | 50 | 48 | 10 | 124 | 98 |

### Compatability

| Unit | BS40 | BS50 | IEC71B14 | IEC80B14 | IEC90B14 | A | L |
|---|---|---|---|---|---|---|---|
| T90 (T09-B32) | • | | • | | | 17 | 58 |
| T90 (T09-B32) | • | | | • | | 17 | 68 |
| T130 | | • | • | | | 17 | 78 |
| T130 | | • | | • | | 17 | 88 |
| T130 | | • | | | • | 17 | 98 |

### Adaptor Flanges

| Unit | p/n |
|---|---|
| T90 (T09-B32) | D606 227 |
| T130 | D606 187 |



# Options and Accessories

## Flanges and Gears

### BS40 / BS50 Worm Gears

#### BS40 Ordering Key

| 1 | 2 | 3 |
|---|---|---|
| **BS40** | **-10** | **-71** |
| **1. Type and size of worm gear**<br>BS40 = BS40 worm gear | **2. Gear ratio**<br>-3 = 3:1<br>-5,5 = 5,5:1<br>-7,5 = 7,5:1<br>-10 = 10:1<br>-15 = 15:1<br>-20 = 20:1<br>-24 = 24:1<br>-30 = 30:1<br>-40 = 40:1<br>-48 = 48:1<br>-60 = 60:1 | **6. Motor size**<br>-71 = IEC71B14<br>-80 = IEC80B14 |

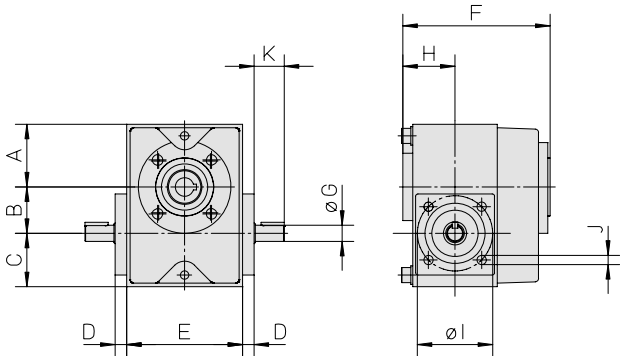
#### BS50 Ordering Key

| 1 | 2 | 3 |
|---|---|---|
| **BS50** | **-37** | **-90** |
| **1. Type and size of worm gear**<br>BS50 = BS50 worm gear | **2. Gear ratio**<br>-8 = 8:1<br>-10,5 = 10,5:1<br>-14 = 14:1<br>-21 = 21:1<br>-24 = 24:1<br>-32 = 32:1<br>-37 = 37:1<br>-42 = 42:1<br>-54 = 54:1<br>-64 = 64:1<br>-81 = 81:1 | **6. Motor size**<br>-71 = IEC71B14<br>-80 = IEC80B14<br>-90 = IEC90B14 |

# Options and Accessories

## Flanges and Gears

### TBS40 Worm Gear




The worm gear is installed directly to the unit and require no intermediate coupling between the two. To be able to install the gear to the motor a bell house flange must be used between the gear and the motor. The bell house flange, which includes a matching coupling, is ordered separately. A shaft cover can be ordered to cover the second primary shaft on the gear in case it is not being used.

#### Dimensions

| Gear | A | B | C | D | E | F | øG | H | øI | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TBS40 | 54 | 40 | 46 | 10 | 100 | 125 | 14j6 | 45 | 65 | M8 (4×) | 25 |

#### Compatability

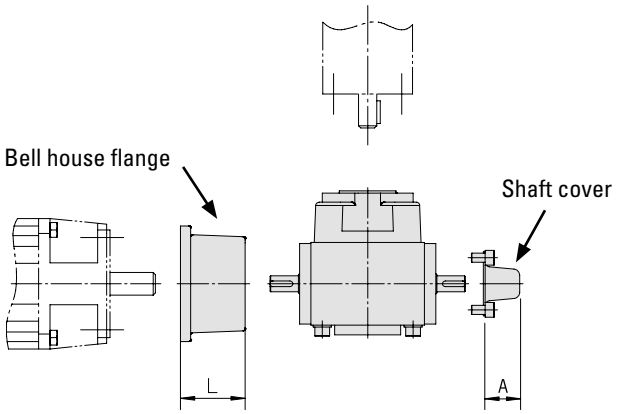
| Unit | TBS40 | IEC71B14 | IEC80B14 | A | L |
|---|---|---|---|---|---|
| T60 / T90 (T09-B25) | • | • | | 32 | 58 |
| T60 / T90 (T09-B25) | • | | • | 32 | 68 |

#### Bell House Flange

| Motor size | p/n |
|---|---|
| IEC71B14 | D701 011 |
| IEC80B14 | D701 015 |

#### Shaft Cover

| Gear type | p/n |
|---|---|
| TBS40 | D701 020 |



# Options and Accessories

## Flanges and Gears

### TBS40 Worm Gear

#### Ordering Key

| 1 | 2 | 3 |
|---|---|---|
| TBS40 | -3 | -216 |

| 1. Type and size of worm gear | 2. Gear ratio | 3. Fixed code |
|---|---|---|
| TBS40 = TBS40 worm gear | -3 = 3:1<br>-5,5 = 5,5:1<br>-7,5 = 7,5:1<br>-10 = 10:1<br>-15 = 15:1<br>-20 = 20:1<br>-24 = 24:1<br>-30 = 30:1<br>-40 = 40:1<br>-48 = 48:1<br>-60 = 60:1 | -216 |

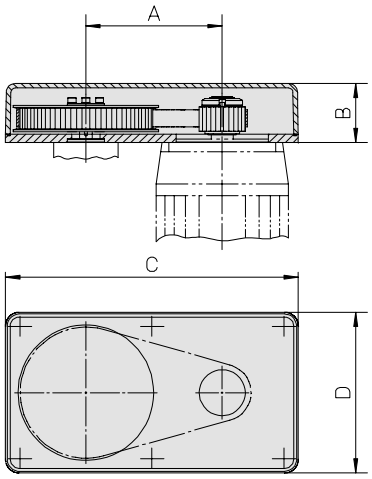
# Options and Accessories

## Flanges and Gears

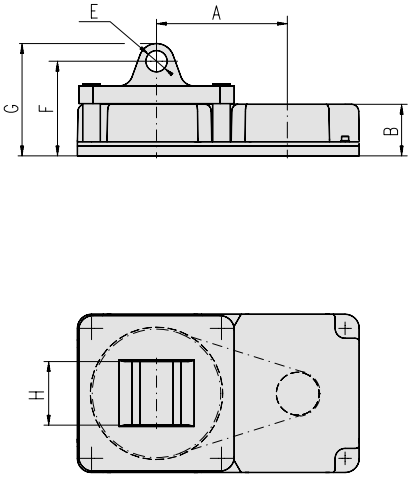
## BGM Belt Gear

The belt gear comes in parts and is assembled and mounted to the unit and motor by the customer.

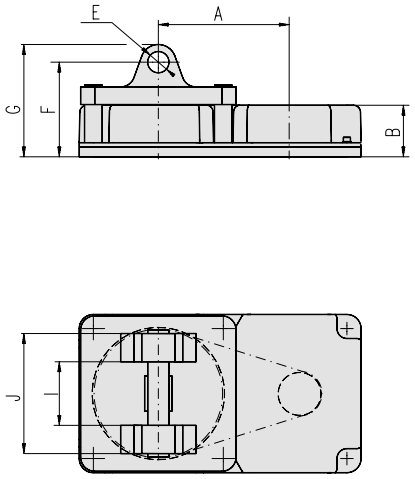
BGM06/09/41/81 - NO CLEVIS OPTION




BGM09/41/81 - CLEVIS OPTION TYPE S




BGM06/81 - CLEVIS OPTION TYPE R




### Dimensions

| Gear | A | B | C | D | øE | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| BGM06 | 72,5 | 50 | 152 | 95 | 16 H9 | 82 | 98 | – | 40 | 70 |
| BGM09 | 118,7 | 52 | 255 | 140 | 20 H9 | 95 | 115 | 60 | – | – |
| BGM41 | 155,2 | 70 | 305 | 165 | 25 H9 | 122 | 147 | 70 | – | – |
| BGM81 | 200 | 73 | 399 | 224 | 30 H9 | 134 | 159 | 90 | 90H14 | 170 |

### Technical Data

| Gear | i | nmax [rpm] | Mmax [Nm] | η | J [kgm²] | Weight [kg] |
|---|---|---|---|---|---|---|
| BGM06 | 1:1 | 4000 | 2,1 | 0,85 | 0,000076 | 1,6 |
| BGM06 | 2:1 | 4000 | 3,4 | 0,85 | 0,000100 | 1,7 |
| BGM09 | 1,04:1 | 4000 | 3,3 | 0,85 | 0,000102 | 2 |
| BGM09 | 1,85:1 | 4000 | 3,3 | 0,85 | 0,000112 | 2,1 |
| BGM09 | 2,85:1 | 4000 | 3,3 | 0,85 | 0,000213 | 2,5 |
| BGM41 | 1:1 | 4000 | 16,6 | 0,85 | 0,000438 | 3,4 |
| BGM41 | 2:1 | 4000 | 9,7 | 0,85 | 0,000342 | 3,7 |
| BGM41 | 3:1 | 4000 | 9,7 | 0,85 | 0,000583 | 4,6 |
| BGM81 | 1:1 | 4000 | 32 | 0,85 | 0,000836 | 12,1 |
| BGM81 | 2,25:1 | 4000 | 30 | 0,85 | 0,001051 | 12,9 |
| BGM81 | 3,13:1 | 4000 | 28 | 0,85 | 0,001439 | 14 |

i = gear ratio, nmax = max. input speed, Mmax = max. input torque, η = efficiency factor, J = inertia

# Options and Accessories

## Flanges and Gears

## BGM Belt Gear

### BGM Compatability

| Gear | T60 | T90 (T09-B25) | T90 (T09-B32) | T130 |
|---|---|---|---|---|
| BGM06 | • | | | |
| BGM09 | • | • | | |
| BGM41 | | • | • | • |
| BGM81 | | | | • |

### BGM Ordering Key

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| BGM09 | -2 | -CC | 063 | P | 09A | X | +XX |

**1. Type and size of belt gear**
BGM06 = BGM belt gear size 06
BGM09 = BGM belt gear size 09
BGM41 = BGM belt gear size 41
BGM81 = BGM belt gear size 81

**2. Gear ratio**
-1 = see table below
-2 = see table below
-3 = see table below

| Gear ratio code | Belt gear type | | | |
|---|---|---|---|---|
| | BGM06 | BGM09 | BGM41 | BGM81 |
| -1 | 1:1 | 1,04:1 | 1:1 | 1:1 |
| -2 | 2:1 | 1,85:1 | 2:1 | 2,25:1 |
| -3 | – | 2,85:1 | 3:1 | 3,13:1 |

**3. Type of couplings**
-CC = conical couplings

**4. Motor size compatability [1]**
063 = IEC 63 B14
071 = IEC 71 B14
080 = IEC 80 B14
090 = IEC 90 B14
100 = IEC 100/121 B14
S80 = servo motor size 80
S95 = servo motor size 95
A20 = servo motor size A200
AK3 = servo motor type AKM 3
AK4 = servo motor type AKM 4
AK5 = servo motor type AKM 5
AK6 = servo motor type AKM 6

| Motor code | Belt gear type | | | |
|---|---|---|---|---|
| | BGM06 | BGM09 | BGM41 | BGM81 |
| 063 | | • | | |
| 071 | | • | • | |
| 080 | | | • | |
| 090 | | | | • |
| 100 | | | | • |
| S80 | | • | • | |
| S95 | | | | |
| A20 | | | • | • |
| AK3 | • | | | |
| AK4 | • | • | | |
| AK5 | | | • | |
| AK6 | | | | • |

**5. Type of mounting**
P = standard

**6. Compatable unit**
T06 = T60
09A = T90 (T09-B25)
09B = T90 (T09-B32)
130 = T130

| Unit code | Belt gear type | | | |
|---|---|---|---|---|
| | BGM06 | BGM09 | BGM41 | BGM81 |
| T06 | • | • | | |
| 09A | | • | • | |
| 09B | | | • | |
| 130 | | | • | • |

**7. Clevis option compatability**
X = no clevis option
S = clevis option type S
R = clevis option type R

| Clevis code | Belt gear typ | | | |
|---|---|---|---|---|
| | BGM06 | BGM09 | BGM41 | BGM81 |
| X | • | • | • | • |
| S | | • | • | • |
| R | • | | | • |

**8. Protection**
+XX = standard
+S1 = wash down protection

(1) This is only a selection of all motors that fits the gears. Please contact customer support to see if your prefered motor fits the gear.

# Options and Accessories

## Sensors

## Magnetic Sensors Option

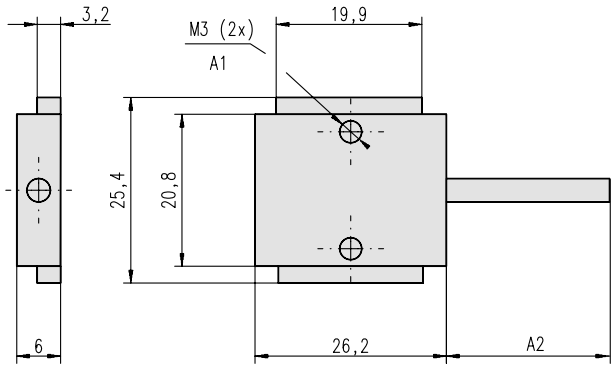
### Technical Specification

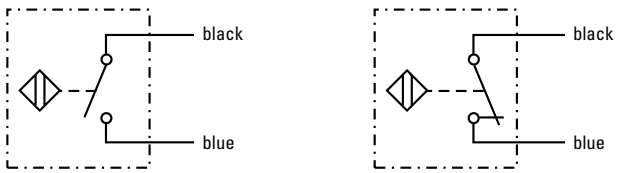
| Parameter | | |
|---|---|---|
| Max. power | [W] | 10 |
| Max. voltage | [Vdc] | 100 |
| Max. current | [A] | 0,5 |
| LED indicator for switch | | no |
| Protection class | | IP67 |
| Cable length | [m] | 3 |
| Cable cross section | [mm²] | 2 × 0,15 |
| Operating temperature limits | [°C] | -25 – 65 |
| Weight | [kg] | 0,050 |

### Part Numbers

| Sensor type | suitable units | p/n |
|---|---|---|
| Normally closed | T60, T90, T130, ECT90, ECT130 | D535 071 |
| Normally open | T60, T90, T130, ECT90, ECT130 | D535 070 |

The magnetic sensors are mounted directly in the sensor slots on both sides of the profile of the units. They require no additional mounting bracket. The sensor is fixed in position by two M3 size locking screws (A1). The cable (A2) is molded into the sensor. Up to nine normally open and nine normally closed sensors can be ordered to the unit using the ordering key. These sensors will be shipped with the unit but not mounted to the unit. Extra sensors can be ordered using the part numbers.



# Options and Accessories

## Environmental Protection

### Environment Protection Option S1

### Technical Specification

| Item | S1 |
|---|---|
| External screws, bolts, nuts and washers | stainless class A2 |
| Extension tube rod end | standard class A2 |

The S1 environment protection option will enhance the units ability to withstand harsh environments where water, acids and basic agents are present. All performance data and the life expectancy is the same as for standard units.

S1 - Wash down protection
Typical places where S1 is used are in slaughter houses, dairy plants, food plants or in any other light wash down application.

# Ordering Keys

How to Order

When ordering a Thomson precision linear actuator it is necessary to first make sure that the proper sizing and selection has been done. The demand on your system will impact on your choice of stroke length, profile size, belt or screw drive, environmental protection demands etc.

The load and speed demand will tell you the configuration of gearboxes drive shafts and motor attachment accessories that are necessary. You will also need to evaluate what accessories and options that are necessary.

We will assist you in the sizing and selection work and determining of part numbers but it is important that you are aware of the demand and need of your specific application in order to enable us to supply you with the correct unit.

On the following pages you will find the ordering keys for the different T and ECT precision linear actuators shown in earlier chapters. These keys are self-explanatory and by following the examples you can quickly and easily learn about the different options and versions available. Please also visit www.thomsonlinear.com where you can find a information and CAD drawings that makes the selection, ordering and design process much easier or contact us for further support.

# Ordering Keys

## T60, T90 and T130

### T60, T90 and T130

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| T09-B | 2525 | M | P | 045 | S1 |

**1. Model**
T06-B = T60 unit
T09-B = T90 unit
T13-B = T130 unit

**2. Ball screw diameter, lead and tolerance class**
2505 = 25 mm, 05 mm, T7 (only possible for T06-B and T09-B)
2510 = 25 mm, 10 mm, T7 (only possible for T06-B and T09-B)
2525 = 25 mm, 25 mm, T7 (only possible for T06-B and T09-B)
2550 = 25 mm, 50 mm, T7 ((only possible for T06-B)
3220 = 32 mm, 20 mm, T7 (only possible for T09-B)
3232 = 32 mm, 32 mm, T7 (only possible for T09-B)
4010 = 40 mm, 10 mm, T7 (only possible for T13-B)
4020 = 40 mm, 20 mm, T7 (only possible for T13-B)
4040 = 40 mm, 40 mm, T7 (only possible for T13-B)
5010 = 50 mm, 10 mm, T7 (only possible for T13-B)

**3. Engineering unit**
M = metric

**4. Type of adapter**
N = M16 × 1,5 outside thread (only possible for T06-B25 • • and T09-B25 • •)
P = M16 × 2 inside thread (only possible for T06-B25 • • and T09-B25 • •)
Q = M20 × 1,5 outside thread (only possible for T09-B32 • •)
R = M20 × 1,5 inside thread (only possible for T09-B32 • •)
S = M27 × 2 outside thread (only possible for T13-B40 • •)
T = M27 × 2 inside thread (only possible for T13-B40 • •)
U = M33 × 2 outside thread (only possible for T13-B40 • • and T13-B5010)
V = M33 × 2 inside thread (only possible for T13-B40 • • and T13-B5010)
X = M30 × 2 inside thread (only possible for T13-B40 • •)

**5. Ordering length (L order)**
• • • = distance in cm

**6. Protection option[1]**
S1 = wash down protection

[1] Leave blank if no protection option required.

# Ordering Keys

## ECT90

### ECT90 - Parallel IEC90 AC Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT09-I | 09B02PB2510 | -1500 | X | J | 0 | 2 | XX |

**1. Model and motor type**
ECT09-I = ECT90 with IEC90 three phase AC motor

**2. Max. load, speed, gear type, brake and motor style**
09B03PB2510 = 9750 N, 160 mm/s, belt gear, brake, parallel [1]
09B02PB2510 = 6500 N, 240 mm/s, belt gear, brake, parallel [1]
09B03PB3220 = 4800 N, 320 mm/s, belt gear, brake, parallel [2]
09B02PB3220 = 3100 N, 480 mm/s, belt gear, brake, parallel [2]
09B01PB3220 = 1600 N, 960 mm/s, belt gear, brake, parallel [2]
09B01PB3232 = 900 N, 1520 mm/s, belt gear, brake, parallel [2]

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
S = clevis
F = mounting feet
T = trunnion

**5. Adapter options**
J = spherical joint ø16 mm
K = spherical joint ø20 mm
N = outside thread M16 × 1,5
P = inside thread M16 × 2
Q = outside thread M20 × 1,5
R = inside thread M20 × 1,5

**6. Magnetic sensors N.C** [3]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [3]
• = number of normally open sensors (0 - 9)

**8. Protection options** [4]
XX = standard
S1 = wash down protection

[1] These models are only compatable with adapter options J, N and P.

[2] These models are only compatable with adapter options K, Q and R.

[3] The sensors are shipped unmounted with the unit.

[4] See page 67 for more information.

### ECT90 - Parallel B43 or B53 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT09-B | 53R03PB3220 | -1340 | S | Q | 3 | 0 | S1 |

**1. Model and motor type**
ECT09-B = ECT90 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
53R03PB2510 = 9800 N, 220 mm/s, belt gear, no brake, parallel [1]
53R02PB2510 = 8000 N, 330 mm/s, belt gear, no brake, parallel [1]
53R03PB3220 = 5900 N, 440 mm/s, belt gear, no brake, parallel [2]
43R03PB2510 = 5800 N, 140 mm/s, belt gear, no brake, parallel [1]
53R02PB3220 = 3900 N, 670 mm/s, belt gear, no brake, parallel [2]
43R02PB2510 = 3800 N, 210 mm/s, belt gear, no brake, parallel [1]
43R03PB3220 = 2800 N, 270 mm/s, belt gear, no brake, parallel [2]
43R02PB3220 = 1800 N, 420 mm/s, belt gear, no brake, parallel [2]
53S03PB2510 = 9800 N, 220 mm/s, belt gear, brake, parallel [1]
53S02PB2510 = 8000 N, 330 mm/s, belt gear, brake, parallel [1]
53S03PB3220 = 5900 N, 440 mm/s, belt gear, brake, parallel [2]
43S03PB2510 = 5800 N, 140 mm/s, belt gear, brake, parallel [1]
53S02PB3220 = 3900 N, 670 mm/s, belt gear, brake, parallel [2]
43S02PB2510 = 3800 N, 210 mm/s, belt gear, brake, parallel [1]
43S03PB3220 = 2800 N, 270 mm/s, belt gear, brake, parallel [2]
43S02PB3220 = 1800 N, 420 mm/s, belt gear, brake, parallel [2]

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
S = clevis
F = mounting feet
T = trunnion

**5. Adapter options**
J = spherical joint ø16 mm
K = spherical joint ø20 mm
N = outside thread M16 × 1,5
P = inside thread M16 × 2
Q = outside thread M20 × 1,5
R = inside thread M20 × 1,5

**6. Magnetic sensors N.C** [3]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [3]
• = number of normally open sensors (0 - 9)

**8. Protection options** [4]
XX = standard
S1 = wash down protection

[1] These models are only compatable with adapter options J, N and P.

[2] These models are only compatable with adapter options K, Q and R.

[3] The sensors are shipped unmounted with the unit.

[4] See page 67 for more information.

# Ordering Keys

## ECT90

### ECT90 - Direct Drive, Inline B43 or B53 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT09-B | 53R01LD2510 | -0800 | T | P | 0 | 0 | S1 |

**1. Model and motor type**
ECT09-B = ECT90 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
53R01LD2510 = 5300 N, 450 mm/s, direct drive, no brake, inline [1]
53R01LD3220 = 2600 N, 1000 mm/s, direct drive, no brake, inline [2]
43R01LD2510 = 2000 N, 410 mm/s, direct drive, no brake, inline [1]
53R03LD3232 = 1500 N, 1600 mm/s, direct drive, no brake, inline [2]
43R01LD3220 = 900 N, 820 mm/s, direct drive, no brake, inline [2]
53S01LD2510 = 5300 N, 450 mm/s, direct drive, brake, inline [1]
53S01LD3220 = 2600 N, 1000 mm/s, direct drive, brake, inline [2]
43S01LD2510 = 2000 N, 410 mm/s, direct drive, brake, inline [1]
53S03LD3232 = 1500 N, 1600 mm/s, direct drive, brake, inline [2]
43S01LD3220 = 900 N, 820 mm/s, direct drive, brake, inline [2]

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
F = mounting feet
T = trunnion

**5. Adapter options**
J = spherical joint ø16 mm
K = spherical joint ø20 mm
N = outside thread M16 × 1,5
P = inside thread M16 × 2
Q = outside thread M20 × 1,5
R = inside thread M20 × 1,5

**6. Magnetic sensors N.C** [3]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [3]
• = number of normally open sensors (0 - 9)

**8. Protection options** [4]
XX = standard
S1 = wash down protection

[1] These models are only compatable with adapter options J, N and P.

[2] These models are only compatable with adapter options K, Q and R.

[3] The sensors are shipped unmounted with the unit.

[4] See page 67 for more information.

### ECT90 - Planetary Gear, Inline B43 or B53 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT09-B | 43R10LP3220 | -1205 | X | R | 9 | 2 | XX |

**1. Model and motor type**
ECT09-B = ECT90 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
53R10LP3220 = 20000 N, 130 mm/s, planetary gear, no brake, inline
53R05LP3220 = 13000 N, 270 mm/s, planetary gear, no brake, inline
43R10LP3220 = 10000 N, 80 mm/s, planetary gear, no brake, inline
43R05LP3220 = 5000 N, 160 mm/s, planetary gear, no brake, inline
53S10LP3220 = 20000 N, 130 mm/s, planetary gear, brake, inline
53S05LP3220 = 13000 N, 270 mm/s, planetary gear, brake, inline
43S10LP3220 = 10000 N, 80 mm/s, planetary gear, brake, inline
43S05LP3220 = 5000 N, 160 mm/s, planetary gear, brake, inline

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
F = mounting feet
T = trunnion

**5. Adapter options**
K = spherical joint ø20 mm
Q = outside thread M20 × 1,5
R = inside thread M20 × 1,5

**6. Magnetic sensors N.C** [1]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [1]
• = number of normally open sensors (0 - 9)

**8. Protection options** [2]
XX = standard
S1 = wash down protection

[1] The sensors are shipped unmounted with the unit.

[2] See page 67 for more information.

# Ordering Keys

## ECT130

### ECT130 - Parallel IEC100 AC Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT13-I | 10B03PB4010 | -1850 | R | V | 1 | 0 | S1 |

**1. Model and motor type**
ECT13-I = ECT130 with IEC100 three phase AC motor

**2. Max. load, speed, gear type, brake and motor style**
10B03PB4010 = 13300 N, 175 mm/s, belt gear, brake, parallel
10B02PB4010 = 9400 N, 210 mm/s, belt gear, brake, parallel
10B03PB4020 = 6200 N, 300 mm/s, belt gear, brake, parallel
10B02PB4020 = 4200 N, 420 mm/s, belt gear, brake, parallel
10B01PB4020 = 1800 N, 950 mm/s, belt gear, brake, parallel
10B01PB4040 = 600 N, 1900 mm/s, belt gear, brake, parallel

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
R = clevis
F = mounting feet
T = trunnion

**5. Adapter options**
L = spherical joint ø30 mm
M = spherical joint ø40 mm
S = outside thread M27 × 2
T = inside thread M27 × 2
U = outside thread M33 × 2
V = inside thread M33 × 2
X = inside thread M30 × 2

**6. Magnetic sensors N.C** [1]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [1]
• = number of normally open sensors (0 - 9)

**8. Protection options** [2]
XX = standard
S1 = wash down protection

[1] The sensors are shipped unmounted with the unit.

[2] See page 67 for more information.

### ECT130 - Parallel B53 or B63 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT13-B | 53R02PB4020 | -2000 | X | U | 0 | 0 | XX |

**1. Model and motor type**
ECT13-B = ECT130 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
63R03PB4010 = 21500 N, 160 mm/s, belt gear, no brake, parallel
63R02PB4010 = 15500 N, 220 mm/s, belt gear, no brake, parallel
53R03PB4010 = 15000 N, 160 mm/s, belt gear, no brake, parallel
63R03PB4020 = 10500 N, 320 mm/s, belt gear, no brake, parallel
53R02PB4010 = 10500 N, 220 mm/s, belt gear, no brake, parallel
63R02PB4020 = 7500 N, 440 mm/s, belt gear, no brake, parallel
53R03PB4020 = 7000 N, 320 mm/s, belt gear, no brake, parallel
53R02PB4020 = 5000 N, 440 mm/s, belt gear, no brake, parallel
63S03PB4010 = 21500 N, 160 mm/s, belt gear, brake, parallel
63S02PB4010 = 15500 N, 220 mm/s, belt gear, brake, parallel
53S03PB4010 = 15000 N, 160 mm/s, belt gear, brake, parallel
63S03PB4020 = 10500 N, 320 mm/s, belt gear, brake, parallel
53S02PB4010 = 10500 N, 220 mm/s, belt gear, brake, parallel
63S02PB4020 = 7500 N, 440 mm/s, belt gear, brake, parallel
53S03PB4020 = 7000 N, 320 mm/s, belt gear, brake, parallel
53S02PB4020 = 5000 N, 440 mm/s, belt gear, brake, parallel

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
R = clevis
F = mounting feet
T = trunnion

**5. Adapter options**
L = spherical joint ø30 mm
M = spherical joint ø40 mm
S = outside thread M27 × 2
T = inside thread M27 × 2
U = outside thread M33 × 2
V = inside thread M33 × 2
X = inside thread M30 × 2

**6. Magnetic sensors N.C** [1]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [1]
• = number of normally open sensors (0 - 9)

**8. Protection options** [2]
XX = standard
S1 = wash down protection

[1] The sensors are shipped unmounted with the unit.

[2] See page 67 for more information.

# Ordering Keys

## ECT130

### ECT130 - Direct Drive, Inline B53 or B63 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT13-B | 53R01LD4040 | -1850 | X | S | 1 | 1 | S1 |

**1. Model and motor type**
ECT13-B = ECT130 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
63R01LD4010 = 7400 N, 400 mm/s, direct drive, no brake, inline
53R01LD4010 = 4900 N, 400 mm/s, direct drive, no brake, inline
63R01LD4020 = 3400 N, 1000 mm/s, direct drive, no brake, inline
53R01LD4020 = 2250 N, 1000 mm/s, direct drive, no brake, inline
63R01LD4040 = 1400 N, 2000 mm/s, direct drive, no brake, inline
53R01LD4040 = 700 N, 2000 mm/s, direct drive, no brake, inline
63S01LD4010 = 7400 N, 400 mm/s, direct drive, brake, inline
53S01LD4010 = 4900 N, 400 mm/s, direct drive, brake, inline
63S01LD4020 = 3400 N, 1000 mm/s, direct drive, brake, inline
53S01LD4020 = 2250 N, 1000 mm/s, direct drive, brake, inline
63S01LD4040 = 1400 N, 2000 mm/s, direct drive, brake, inline
53S01LD4040 = 700 N, 2000 mm/s, direct drive, brake, inline

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
F = mounting feet
T = trunnion

**5. Adapter options**
L = spherical joint ø30 mm
M = spherical joint ø40 mm
S = outside thread M27 × 2
T = inside thread M27 × 2
U = outside thread M33 × 2
V = inside thread M33 × 2
X = inside thread M30 × 2

**6. Magnetic sensors N.C** [1]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [1]
• = number of normally open sensors (0 - 9)

**8. Protection options** [2]
XX = standard
S1 = wash down protection

[1] The sensors are shipped unmounted with the unit.

[2] See page 67 for more information.

### ECT130 - Planetary Gear, Inline B53 or B63 AC Servo Motor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ECT13-B | 63R05LP4010 | -0600 | F | L | 0 | 5 | XX |

**1. Model and motor type**
ECT13-B = ECT130 with AC servo motor

**2. Max. load, speed, gear type, brake and motor style**
53R10LP4010 = 38000 N, 50 mm/s, planetary gear, no brake, inline
63R05LP4010 = 33000 N, 100 mm/s, planetary gear, no brake, inline
53R05LP4010 = 22500 N, 100 mm/s, planetary gear, no brake, inline
63R05LP4020 = 16000 N, 200 mm/s, planetary gear, no brake, inline
53R05LP4020 = 11000 N, 200 mm/s, planetary gear, no brake, inline
53S10LP4010 = 38000 N, 50 mm/s, planetary gear, brake, inline
63S05LP4010 = 33000 N, 100 mm/s, planetary gear, brake, inline
53S05LP4010 = 22500 N, 100 mm/s, planetary gear, brake, inline
63S05LP4020 = 16000 N, 200 mm/s, planetary gear, brake, inline
53S05LP4020 = 11000 N, 200 mm/s, planetary gear, brake, inline

**3. Stroke (S max)**
- •••• = distance in mm

**4. Mounting options**
X = no mounting option
F = mounting feet
T = trunnion

**5. Adapter options**
L = spherical joint ø30 mm
M = spherical joint ø40 mm
S = outside thread M27 × 2
T = inside thread M27 × 2
U = outside thread M33 × 2
V = inside thread M33 × 2
X = inside thread M30 × 2

**6. Magnetic sensors N.C** [1]
• = number of normally closed sensors (0 - 9)

**7. Magnetic sensors N.O** [1]
• = number of normally open sensors (0 - 9)

**8. Protection options** [2]
XX = standard
S1 = wash down protection

[1] The sensors are shipped unmounted with the unit.

[2] See page 67 for more information.

# Glossary

## A – Ce

### Acceleration
Acceleration is a measure of the rate of speed change going from standstill (or a lower speed) to a higher speed. The calculations, which are used to develop the Load versus Speed diagrams for each actuator, are based on an acceleration rate that is limited by the maximum speed of the unit. Therefore, this value will be different for all actuators. Please contact customer service if your application is critical to which acceleration rate is acceptable or needed. Also see "Deceleration".

### Accuracy
There are several types of accuracy and many different factors that will affect the overall accuracy of a system. Also see "Repeatability", "Positioning Accuracy", "Resolution", "Lead Accuracy" and "Backlash".

### AC Motor
There are several types of AC motors; all of which run on an applied alternating current. Also see "Three Phase AC Motor".

### AC Servo Motor
AC servo motor is an abbreviation for a brushless, synchronous AC motor design. This type of design requires little mechanical maintenance since no physical contact (no brushes and bars) is used to commutate the motor. This extends the life of the motor and reduces down time. Also see "Brushless AC Servo Motor".

### Adapter
The adapter on T and ECT actuators is the connection point for the load and is situated at the end of the extension tube. There are several types of adapters: 1) tapped hole, 2) threaded rod and 3) spherical joint. Also see "Mounting".

### Anti Rotation Mechanism
An actuator with anti-rotation mechanism has a built-in feature that prevent the extension tube from rotating if the tube is not attached to any load. All T and ECT actuators have this feature.

### Backlash
Backlash is the stack up of tolerances (play) within the leadscrew assembly and gearing which creates a dead band when changing directions. The result is that the motor can rotate some before any motion can be seen on the extension tube when reversing the direction of the motor rotation. The backlash varies depending of the actuator model and the amount of backlash for each can be found in the performance specifications. The backlash for ball screw models will remain the same during its life time while it will increase slightly for acme screws. Direct driven models normally have less backlash because the do not incorporate any gearing.

### Ball Screw
Ball screws (fig. a) are used on all T and ECT actuators. They are highly efficient and can run up at 100% duty cycle. Also see "Duty Cycle".

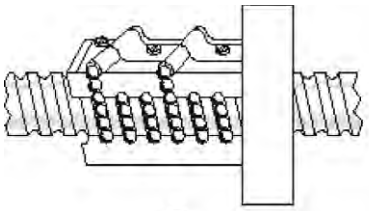


Fig. a

### Belt Gear
A belt gear consist of a timing belt that runs between two pulley wheels of different diameter. The difference between the diameters determines the gear ratio. Belt gears are quiet, have medium accuracy, and require no maintenance. But the belt is susceptible to breakage under overload conditions

### Brake
Acme screws are inherently self-locking while ball screws are not. To prevent ball screw actuators from backdriving, the actuator may need some type of motor brake depending on the application. A brake can also be used to stop the actuator quickly and safely in emergency situations. Precision linear actuators with DC motors do not have optional brakes so an alternative solution must be sought. All asynchronous three-phase AC motors come equipped with an electrically released, fail-safe brake (optional for brushless AC servo motors).

### Brushless AC Servo Motor
A brushless AC servo motor has many advantages over DC and asynchronous three-phase AC motors. For a given power rating, they are smaller and can typically travel at higher speeds and acceleration rates (due to a lower rotor inertia). Unlike DC motors, AC servo motors have no brushes for commutation; therefore, they are almost maintenance free. Instead, they incorporate a resolver feedback device that feeds a shaft-position signal to the drive control for commutation. The drive control also converts the resolver signal into a simulated encoder pulse train that can be used to feed a positioning controller. Also see " Three Phase AC motor","Servo Motor" and "Servo Drive".

### Certificates
All T and ECT actuators sold in the EU are CE certified. Please contact customer service if you need any other type of certificate.

# Glossary

## Co – Du

### Column Load Limit

The column load limit is the maximum compression force that the lead screw can handle before it becomes damaged (Fig. b). The limit is a function of the the screw diameter and the unsupported length of the screw which means that the limit will drop as the extension tube extends. For some actuators this means that the allowed maximum dynamic load found in the performance specifications can be higher than the column load limit when the extension tube travel is beyond a certain distance. In this case, either the load must be reduced to the column load limit, the amount of used stroke must be reduced, or you must select another actuator model that can manage the column load at that stroke. The column load force limits can be found in the "Column Load vs. Stroke" diagram on the product pages for each actuator. Also see "Dynamic Load Rating".

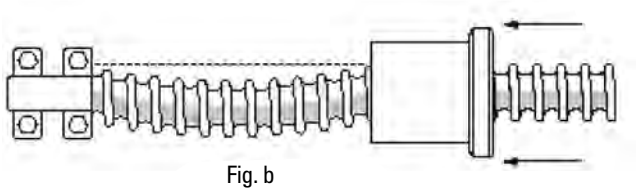


Fig. b

### Controls

There are many types of programmable controls that can be used to control the motion of the actuator. PLC's, motion controls, robot controls, CNC controls and industrial computers are just some of them. Many types of servo drives have built-in (or as an expansion card option) programmable motion control features. Thomson offers a variety of combinations to serve your motion control needs.

### Cover Tube

The cover tube provides protection for the ball or acme screw and provides protection and support for the extension tube. The cover tube on T and ECT actuators are designed so that magnetic sensors easily can be mounted to the outside of the tube. Also see "Extension Tube" and "Magnetic Sensors".

### Critical Speed

All ball screws have a critical speed where the screw starts to vibrate and eventually bend or warp the screw (Fig. c). The excact limit is a function of how far out the extension tube is run and speed. For some actuators this means that the allowed maximum speed found in the performance specifications can be higher than the critical speed when the extension tube travel is beyond a certain distance. In this case, either the speed must be reduced to the critical speed, the amount of stroke must be reduced, or you must select another actuator model that can manage the speed at that stroke. The critical speed limits can be found in the "Critical Speed vs. Stroke" diagram on the product pages for each actuator. Also see "Speed Rating".

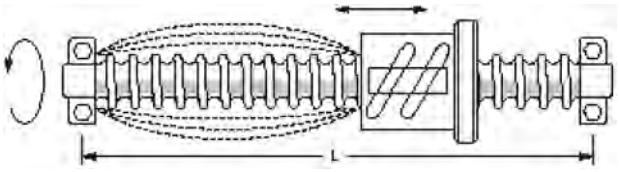



Fig. c

### Customization

Even the most versatile standard actuator may not always suit all applications. But whatever your need is, our engineers are ready to help you to customize the actuators according to your requirements. We build more exclusive actuators than anyone in the bussines and have decades of experience in customizing actuators to meet special needs.

### Cycle

One cycle is one complete extension and retraction of the extension tube.

### Deceleration

Deceleration is a measure of the rate of speed change going from a higher speed to a lower speed (or standstill). The calculations, which are used to develop the Load versus Speed diagrams for each actuator, are based on a deceleration rate that is limited by the maximum speed of the unit. Therefore, this value will be different for all actuators. Please contact customer service if your application is critical to which deceleration rate is acceptable or needed. Also see "Acceleration".

### Direct Drive

Direct drive means that there is no gearing between the motor and the lead screw. Instead the motor is connected to the lead screw directly via a coupling.

### Duty Cycle

$$\text{Duty cycle} = \frac{\text{on time}}{(\text{on time} + \text{off time})}$$

Example: 2,5 minutes on, 7,5 minutes off

$$\frac{2{,}5 \text{ min}}{(2{,}5 \text{ min} + 7{,}5 \text{ min})} = 25\% \text{ duty cycle}$$

The duty cycle is a function of the load and the ambient temperature. A higher ambient temperature and/or load will affect the duty cycle negatively while a lower temperature and/or lower load will affect it positively. The duty cycles stated in this catalog are all valid for a 10 minute period.

# Glossary

## Dy – Lif

### Dynamic Load Rating
The dynamic load rating (Fx) is the maximum load the actuator can move at a given speed. The relation between the the dynamic load and the speed can be studied in the speed versus load diagrams. For some actuators however, the column load limit will be exceeded if the extension tube extends beyond a certain point. Also see “Load Rating” “Forces” and “Column Load Limit”.

### Encoder
Encoders provide a digital output signal in the form of a square shaped pulse train that can be used to determine the position of the extension tube. The encoder signal in a servo motor system is connected to the motion control so that it can control the servo drive and hence close the position feedback loop. The servo motors used on the precision linear actuators do not have an encoder. Instead, they incorporate a resolver feedback device that feeds a shaft-position signal to the drive control. The drive control also converts the resolver signal into a simulated encoder pulse train that can be used to feed a positioning controller. Also see “Resolver”, Servo Motor” and Servo Drive”.

### End of Stroke Switches
We strongly recommend the use of switches at the ends of the actuator stroke to prevent the unit from running in to the mechanical end stops. Keep in mind that the extension tube will travel some distance (dependant of speed, load and actuator type) before it comes to a complete stop. This means the end of stroke switches must be placed before the mechanical end of stroke and will reduce the available stroke length.

### Extension Tube
The extension tube slides in and out of the actuator’s cover tube and is connected via the front adaptor to the load being moved or positioned. Also see “Cover Tube”.

### Extension Tube Side Load
The extension tube side loads (Fy and Fz) are the forces applied to the sides of the extension tube. The maximum allowed side loads can be found in the performance specifications for each actuator. The stated side loads are only valid for a completely retracted extension tube and will decrease as the extension tube extends. Also see “Forces”.

### Forces
The below figure (Fig. d) show the definitions for the forces and moments used in this catalog. Always use these definitions in any communication with Thomson.

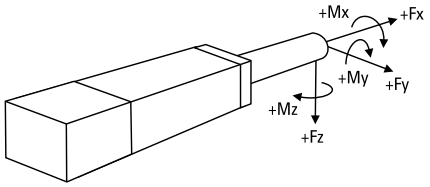



Fig. d

### Frequency Inverter
A frequency inverter (also called frequeny converter) is a type of motor drive that are used to control the speed, acceleration and decelration of three phase AC motors. A frequency inverter does that by changing the input frequency to the motor windings as the rotational speed of a three phase AC motor is dependant of the frequency. Also see “Three Phase AC Motor”.

### Inertia
Inertia is the property of an object to resist speed changes and is dependant on the shape and the mass of the object. The inertia is important when sizing and selecting and also when tuning a servo system to optimum performance. Consult customer service for more information.

### Inline Motor
An inline motor is mounted in line with the cover tube.

### Installation Instructions
Each actuator has an installation manual to answer typical questions about mounting and wiring the actuators.

### Lead Accuracy
Lead accuracy is a measure of how accurate the lead of a lead screw is. For a lead screw with a lead of 25 mm, the screw should in theory move the nut 25 mm per each revolution. In reallity there will be a deviation between the expected traveling distance and what is actually achieved. The deviation is typically for a ball screw 0,05 mm per 300 mm of stroke. Contact customer service for more information. Also se “Accuracy”.

### Lifetime Expectancy
The life time expectancy is a function of many important factors, including load, speed, duty cycle, ambient temperature and screw type. To be able to accurately estimate the life time expectancy, applications must be evaluated on a case by case basis. However, for most actuators a travel life of at least 25 km under the maximum dynamic load can be used as a general approximation. Contact customer service for more information.

# Glossary

## Lin – Po

### Linear Actuators
Actuators providing a linear thrust via an extension tube to lift, lower, push, pull or position a load.

### Load Rating
There are many types of load ratings that all needs to be considered. Normally when you speak about the load you refer to the load that the extension tube will pull or push; which is the dynamic load. But there may also be static, side, moment and column loads and forces from acceleration, deceleration, gravity and friction that are all equally important. Also see “Dynamic Load Rating”, “Static Load Rating”, “Side Loads”,“Column Load Limit”, “Tension and Compression Load”, “Acceleration” and “Deceleration”.

### Magnetic Sensors
The magnetic sensors used to the precision linear actuators consist of a reed switch that are molded into a plastic housing. In the actuator a magnet is mounted that travels back and forth with the extension tube. The magnet triggers the magnetic sensors which are mounted on the outside of the cover tube. The sensors come in both normally open and normally closed versions.

### Motion Control
A motion control is a control that is dedicated to control the motion of a servo motor. To be able to do this the control must have inputs that can recieve the feedback signal which typically is an encoder signal (even if other devices such as potentiometers and resolvers, can be used) and an output which gives the motion commands to the servo drive. Motion controls can be stand alone units or be integrated in other control systems. Also see “Control”, “Servo Motors and “Servo Drive”.

### Motor Type
There are two types of electrical motors in different sizes used on the precision linear actuators; three phase AC motors and brushless AC servo motors. Also see Brushless AC Servo Motor” and “Three Phase AC motor”.

### Mounting
The precision linear actuators can quickly and easily be mounted using any of the available mounting and adapter options. There are however some things to consider when mounting the actuator. When using the clevis type of mounting, solid mounting pins should be used (avoid using roll or spring type mounting pins). The mounting pins (or trunnions) should be parallel to each other as shown below (Fig. e). It is also recommended to attach the load so that the force act along the axis of the actuator (Fig. f). Any actuator using side angel brackets, tapped holes or mounting feet should be mounted so that the covertube or the extension tube not becomes bend or is subjected to bending forces during standstill or operation.

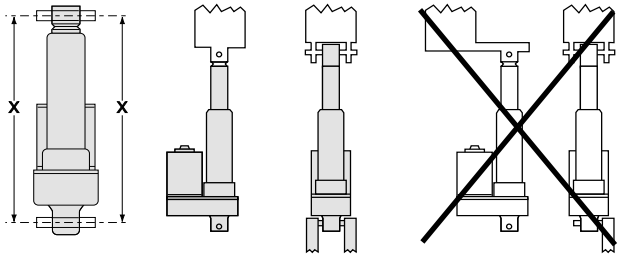


Fig. e

Fig. f

### Mounting Options
To be able to mount a precision linear actuator you must select the appropiate mounting and adapter options for your application. There are several different options to choose from and you can define your choice by using the ordering keys or part numbers. T and ECT actuators, however comes with mounting holes and T-slots that can be used for mounting.

### Operating and Storage Temperature
The operating temperature is the range in which the actuator may be safely operated. All actuators can be stored or transported at the same temperature as the operating temperature. Contact customer support if the operating temperature will be exceeded during storage or transportation.

### Parallel Motor
A parallel motor is mounted parallel to the cover tube.

### Planetary Gear
A planetary gear is a gear system that consists of one or more outer gears (planet gears) rotating about a central (sun) gear. Typically, the planet gears are mounted on a movable arm or carrier which itself may rotate relative to the sun gear. As a result, planetary gears have the input and output shaft in line with each other with rotation in the same direction. Planetary gears are robust, accurate and comparably small but are more expensive than belt or helical gears.

### Positioning accuracy
Positioning accuracy is the error between the the expected and actual position and is the sum of all factors that will reduce the accuracy (i.e. repeatability, backlash, resolution, lead accuracy, and the accuracy of the motor, drive and motion control system). Some of these factors, such as backlash and lead accuracy, can sometimes be compensated for in the software of the motion control system being used. Also see “Accuracy”.

# Glossary

## Pr – Sta

### Protection Class
The protection class refers to the environmental rating of the enclosure. The first digit applies to airborne contaminants and the second digit to water/moisture.

IP65: dust tight and protected against low pressure water jets from any direction.

### Repeatability
Repeatability is the ability for a positioning system to return to a location when approaching from the same distance, at the same speed and deceleration rate. Some of the factors that affect the repatability are the angular repeatability of the motor, drive and motion control system, system friction and changes in load, speed and deceleration.

### Resolution
Resolution is the smallest move increment that the system can perform. Some of the factors that affect the resolution are the angular repeatability of the motor, drive and motion control system, system friction, the drive train reduction, the type and lead of the lead screw and changes in load, speed and deceleration.

### Resolver
A resolver is basically a type of rotary electrical transformer used for measuring degrees of rotation and are commonly used on AC servo motors as a feedback device to control the commutation of the motor windings. The resolver is mounted to the end of motor shaft and when the motor rotates the resolver will transmit the position and direction of the rotor to the servo drive which then can control the motor. Most servo drives for AC servo motors on the market today can convert the resolver signal in to a pulse train (encoder signal simulation) which can be used by a motion control to determine and control the position of the motor. Also see “Encoder”, “Servo Drive”, “Servo Motor” and “Motion Control”.

### RoHS Compliance
The RoHS directive stands for “the restriction of the use of certain hazardous substances in electrical and electronic equipment”. This directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. All precicion linear actuators, controls and accessories sold in the EU are RoHS compliant.

### Service and Maintenance
Precision liner actuators only need to be lubricated. The intervall between the lubrications depends on the how frequent and hard the actuator works. The lubrication of the entire actuator is done at one single point. No other service or maintenance is required

### Servo Drive
A servo drive is an electrical device which controls the commutation of a servo motor. Different types of servo motors require different types of drives. To be able to run the system as a servo system there must also be a motion control which give the commands to the servo drive and some kind of feedback (encoder, potentiometer, etc) to the control so that it can determine and adjust the speed and the position of the motor (closed loop feedback). Some servo drives has built in motion controls. Also see “Servo Motor”, Brushless AC Servo Motor” and “Controls”.

### Servo Motor
A servo motor is a motor that works with a feedback device in a closed loop configuration controlled by a motion control. Any type of motor can in principal work as a servo motor but normally when speaking about servo motors you refer to motors that are specially designed to work in servo systems. Also see “Servo Drive”, Brushless AC Servo Motor” and “Controls”.

### Side Loads
See “Extension Tube Side Loads”.

### Sizing and Selection
This catalog can give you an overview of what Thomson can offer you and an indication of which products that may suit your application. But in order to get the best solution it is neccessary to know your specific application and to carry out detailed sizing and selection calculations. Please contact customer service for further help.

### Speed Rating
The speed versus load diagrams on each product page show the maximum allowed speed at any given dynamic load ranging from no load to maximum allowed dynamic load. For some actuators however, the critical speed limit can be a limiting factor for the maximum allowed speed if the extension tube extends beyond a certain point. Also see “Load Rating” “Forces” and “Critical Speed Limit”.

### Static Load Rating
The static load rating is how much load the actuator will hold at standstill. This value can be higher than the dynamic load rating and depends on factors such as stroke length, column load rating, gear type, and maximum holding force of the motor brake. Consult customer service for more information. Also see “Load Rating”.

# Glossary

## Str – Th

### Stroke Length

The maximum stroke length for each actuator type can be found in the performance specifications. The stroke length is the available distance the extension tube can move from one mechanical end to the other. Keep in mind that extra stroke length above the application requirements will be needed to avoid hitting the mechanical end stops. We also recommend the use of end of stroke limit switches (both extension and retraction) to avoiding running in to the mechanical ends by accident. Using end of stroke limit switches require some deceleration distance to be added to the stroke so that the extension tube has time to stop before running in to the ends. Exactly how much extra stroke you need depends on many factors and needs to be determined for each application on a case to case basis. Also see “End of Stroke Limit Switches”.

### Tension and Compression Load

A tension load tries to stretch the actuator and a compression load tries to compress the actuator (Fig. g). All precision linear actuators can manage the same tension and compression load. Also see “Dynamic Load Rating”.

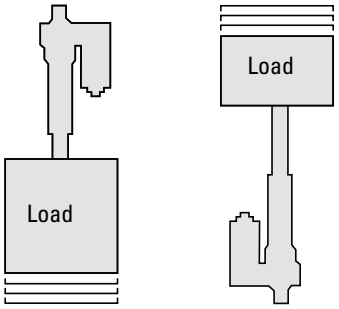



Fig. g

### Three Phase AC Motor

The three phase AC motor is known under many names; squirrel cage motor, induction motor, asynchronous motor or asynchronous induction motor are a few. The three phase AC motor can be run directly from a three phase source in which case its speed will be determined by the frequency and the number of poles. The typical nominal speed of a 2 pole motor is around 2850 rpm, a 4 pole has half that speed and a 8 pole half of the 4 pole, etc. However, when running the motor directly from a three phase source there is no control of the speed, acceleration or deceleration. Instead, the motor accelerates as fast as it can, depending of the load, to its nominal speed. This puts stress on the mechanical components, if they can manage it at all. A precision linear unit with a three phase AC motor is not designed to run directly from a three phase source. Instead, a frequency inverter must be used that can control speed, acceleration and deceleration to keep these within the acceptable limits. A three phase motor is relatively cheap, very robust and needs no maintenance. The downside is that even though it can be controlled from a frequency inverter, it will never be as accurate as a servo motor system. Especially at low speeds (below approximately 10 Hz), the motor will start to loose torque and may also become overheated with time, as the internal fan mounted on the rotor will rotate too slow to be able to cool the motor sufficient for operation. Using an external fan mounted to the back of the motor may solve this problem but is an added cost and will also make the installation larger. The speed at which overheating caution should be taken is marked in the “Speed vs. Load” diagrams with a dashed line instead of a continous line (Fig. h). Also see “Frequency Inverter” and “Motor Type”.

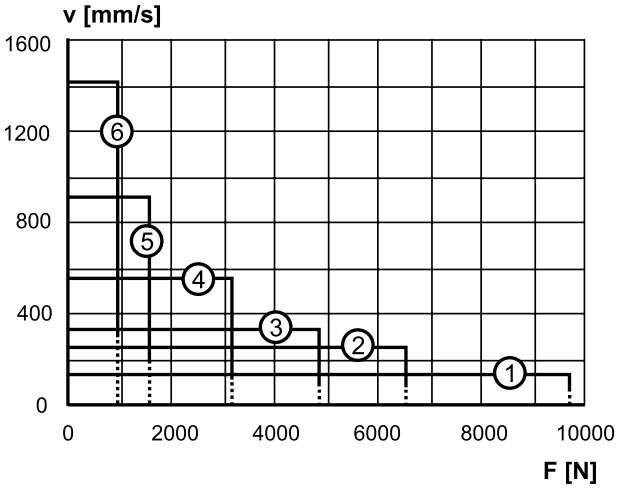



Fig. h

# Application Data Form

## Worksheet

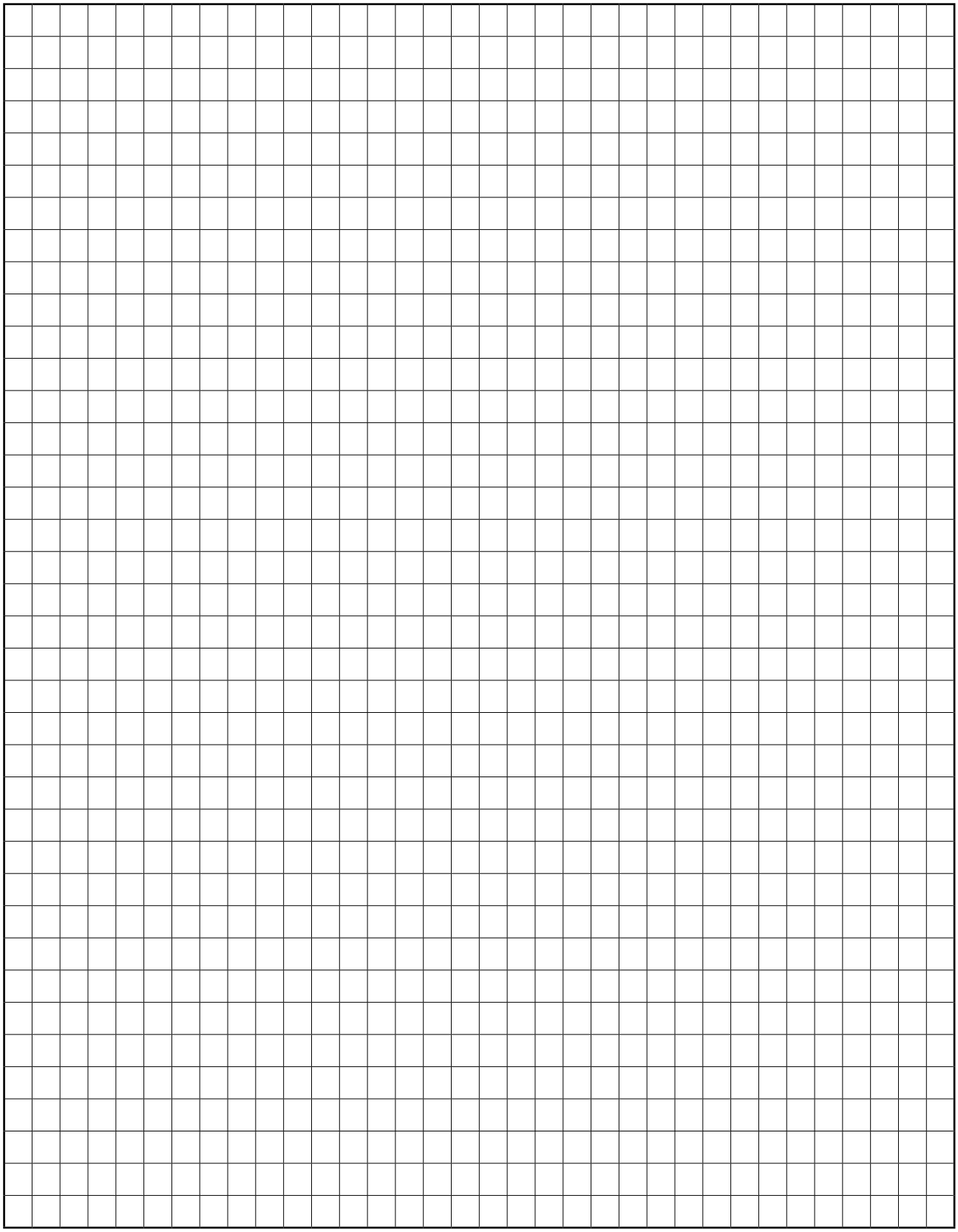
### Application Data Form*

| Submitted by: | Phone: | Date: |
|---|---|---|
| 1. Company name | 20. Do you need any special retracted length (cross hole c/c in mm)? | |
| 2. Street address | 21. What kind of motor would you prefer? | |
| 3. City-state, zip | 22. Is a holding brake required? | |
| 4. Contact name | 23. Do you need any of the optional features of the actuator? | |
| 5. Phone | 24. Do you need a matching drive to the actuator? | |
| 6. Fax | 25. What is the accuracy requirements of the application? | |
| 7. E-mail | 26. What are the environmental conditions (dusty, outdoors, wash down)? | |
| 8. What is the estimated annual volume? | 27. What is the operation temperature range in Celcius? | |
| 9. What is the target price? | 28. What is the duty cycle (on-time / on-time + off-time) in seconds? | |
| 10. What is the current or alternative solution? | 29. Do you need any certificate (UL, CE, etc.)? | |
| 11. How much load is moved in Newton? | 30. Do you require any print (dwg, dxf, faxed)? | |
| 12. How much load do you need to hold in Newton? | 31. Describe any additional requirements (packaging, labeling, etc.) | |
| 13. How will the actuator be mounted (horizontal/vertical)? | | |
| 14. Is the load trying to stretch or/and compress the actuator? | | |
| 15. What speed do you want the actuator to move in mm/s? | | |
| 16. What is the life of the unit in cycles (one cycle = extend and retract)? | | |
| 17. What is the stroke length? | | |
| 18. How will the actuator be mounted to the extension tube? | | |
| 19. How will the actuator be mounted to the foundation? | | |

* Please enter all fields in the form and send it and any drawing to customer service by mail or fax. See the back of the catalog for the nearest location.

# Application Data Form

## Drawing/Notes



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# Profile Rail Linear Guides

## 500 Series Ball Profile Rail, 500 Series Roller Profile Rail, 400 Series Profile Rail, AccuMini, MicroGuide, T-Series

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- As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

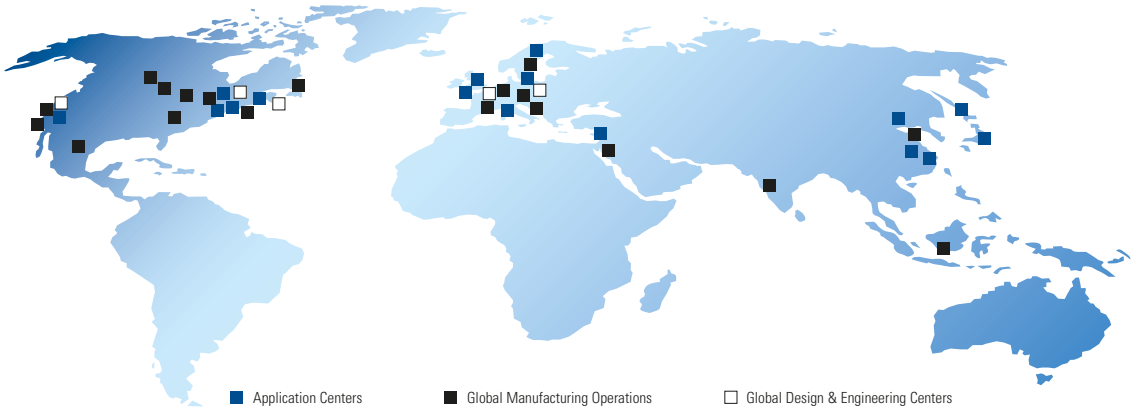
## A Name You Can Trust

A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com. For assistance, contact your local sales office (contact information listed on the back of catalog). Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

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The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

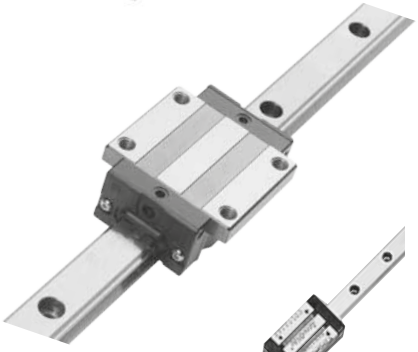
## Local Support Around the Globe

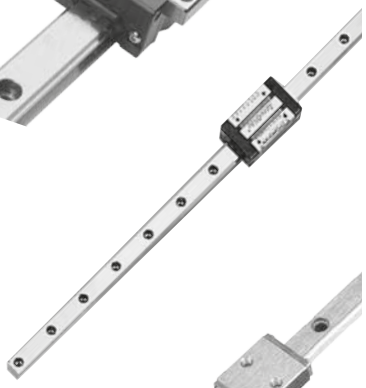


## An Overview of Thomson Profile Rail













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Since the invention of the linear anti-friction Ball Bushing bearing by Thomson over 50 years ago, the Thomson precision linear products have meant high quality, innovative products. Today, Thomson continues producing and developing these high quality, innovative products. The Thomson Profile Rail assortment consists of the Next Generation Profile Rail "500 Series" Ball and Roller Linear Guides, compact miniature "MicroGuide™," lightweight "T-Series," and AccuMini.

The Thomson Profile Rail – Linear Guide Assortment is a complete assortment of rails and carriages in a broad range of styles, sizes and unique features produced to industry standard dimensions for easy retrofitting into existing applications or designing into new applications.



### 500 Series Roller Profile Rail Linear Guide

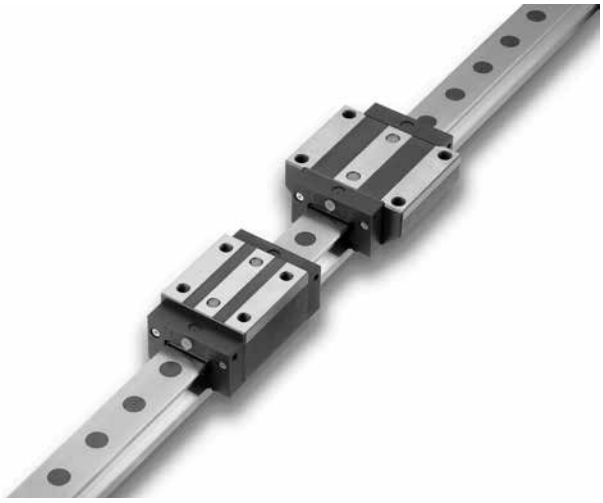
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Superior Design. Superior Quality.
- Industry leading load capacities
- High rigidity from back to back four roller track arrangement
- Straight rails through advanced grinding technologies
- Simple installation and greater accuracy with joint-free rails up to 6 meters
- Smooth, quiet movement through patented insert molded recirculation paths and optimized geometries
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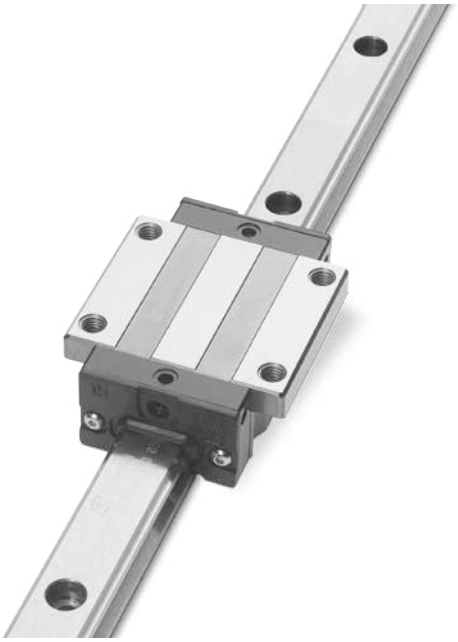
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- Industrial Automation
- Industrial Robots
- Machine Tool Equipment
- Precision Measuring Equipment

### 500 Series Ball Profile Rail Linear Guide

**Features & Benefits**
Superior Design. Superior Quality.
- Straight rails through advanced grinding technologies
- Simple installation and greater accuracy with joint-free rails up to 6 meters
- Smooth, quiet movement through patented insert molded recirculation paths and optimized geometries
- Extended lubrication life as a result of grease pockets built into the recirculation path
- Multiple carriage styles and sizes available
- On site field modifiable modular seals
- Rail and carriage options from stock or short delivery
- Customization with expanded accessory offering
- Replaces Thomson AccuGlide

**Typical Applications**
- Industrial Automation
- Machine Tool Equipment
- Precision Measuring Equipment
- Industrial Robots





**400 Series Ball Profile Rail Linear Guide**

**Features & Benefits**
- Polymer ball-return tube reduces noise and vibration while retaining lubrication
- Standard double lip end and longitudinal seals retain lubrication while protecting the bearing from contamination
- Lubrication channels that direct lubricant to individual ball tracks, maximizing lubricating effectiveness
- Double-faced ball tracks utilize a 45° face-to-face bearing arrangement, resulting in equal load-carrying capacity in all directions
- 413 ball cage option provides increased travel smoothness, lower noise at high speeds, and individual lubricant reservoirs
- See Thomson 400 Series Profile Rail Linear Guide catalog for more details

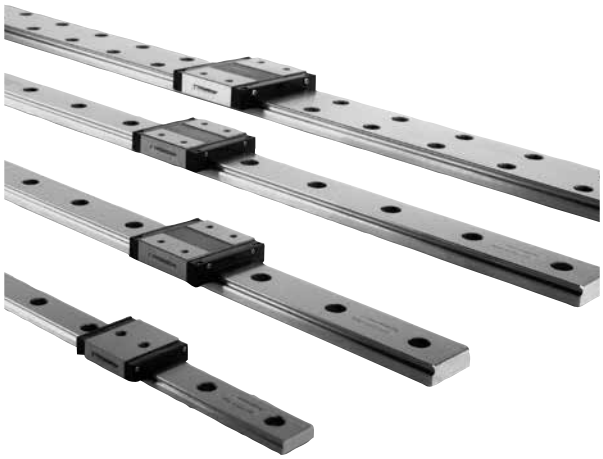
**Typical Applications**
- Industrial Automation
- Packaging Equipment
- Food Processing Equipment

**AccuMini**

**Features & Benefits**
- Ball control design for smooth, quiet, low friction at high speeds
- Full length integral wiper which protects important bearing from contaminants… effective system life is maximized
- Gothic design, which provides high roll moment capacity...a requirement for stand-alone applications
- Wear-resistant, engineered polymer retainer which reduces system inertia and noise

**Typical Applications**
- Wafer Handling Equipment
- Assembly Equipment
- Inspection and Measurement Equipment

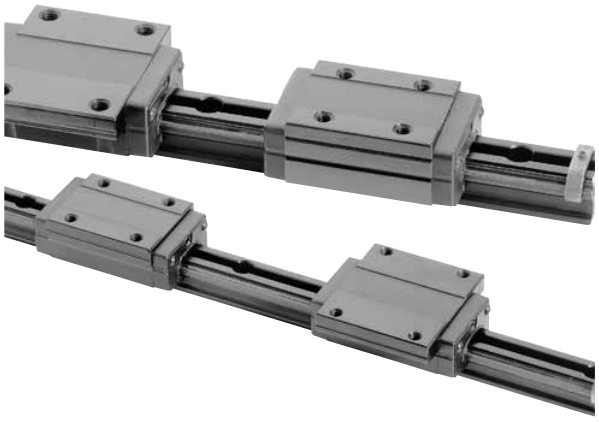




## MicroGuide

### Features & Benefits
- Industry standard drop-in replacement
- 440 stainless steel construction (corrosion resistance, little or no lubrication)
- High precision accuracy (up to ±0.010mm)
- Extremely smooth, quiet operation
- Low Profile
- High Moment Load Capacity for single rail / carriage applications
- Whisper quiet movement
- Gothic arch ball groove geometry provides enables single rail application
- One-piece length up to 1 meter (in sizes 7mm - 15mm)
- Contact Thomson for custom lengths and configurations

### Typical Applications
- Front end semiconductor processing equipment
- Backend semiconductor packaging and handling equipment
- Medical diagnostic and imaging equipment
- Laboratory automation equipment
- Testing and inspection equipment



## T-Series

### Features & Benefits
- Lightweight, flexible and forgiving alternative to all-steel profile rail.
- High quality product made from aircraft aluminum alloy with hardened steel load bearing plates and ball paths.
- Ideal choice for applications requiring reduced weight or inertia.
- High flexibility translates into N class radial run out only.
- Proprietary "U" channel construction allows the rail to "flex" to accommodate poor machine bases or misalignment errors.
- Lower cost installation and reduced installation time by eliminating the need for a costly machined base and special tools.
- Drop-in replacement for conventional all-steel profile linear guides.

### Typical Applications
- Airplanes
- Automobiles
- Ships
- Packaging

## Assortment

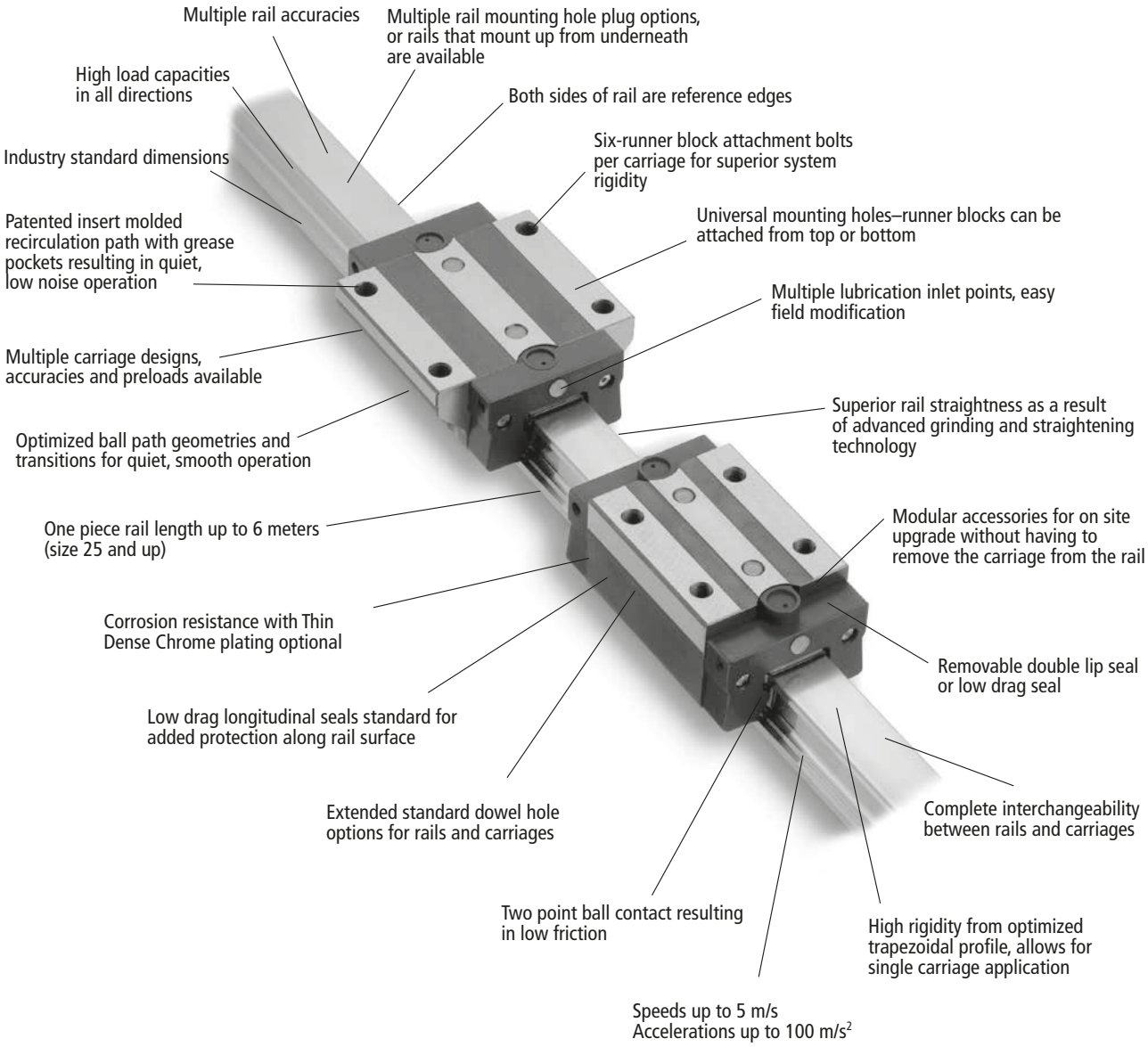
| Size [mm] | 500 Series Ball | | | | | | | 500 Series Roller | | | | 400 Series | | | | | | | | AccuMini | MicroGuide | | T-Series | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Standard | | Narrow | | | | | Standard | | Narrow | | Standard | | Narrow | | | | | | Standard | Standard | Wide | Standard | | | |
| — | | Long | | Long | | Long | Short | | Long | | Long | | Long | | | Long | | Long | Short | | | | | | | |
| | — | — | — | — | High | High | | — | — | — | — | — | — | — | | — | High | High | | | — | — | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | • | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | • | • | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | • | • | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | • | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | • | • | | | | |
| 15 | • | | • | | • | | • | | | | | • | • | • | | • | • | | • | • | • | • | | | | |
| 20 | • | • | • | • | | | • | | | | | • | • | • | • | | | • | • | • | | | • | • | • | • |
| 25 | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | | | | • | • | • | • |
| 30 | • | • | • | • | • | • | | | | | | • | • | • | | • | • | • | • | | | | | | | |
| 35 | • | • | • | • | • | • | | • | • | • | • | • | • | • | | • | • | • | • | | | | • | • | • | • |
| 45 | • | • | • | | | • | | • | • | • | • | • | • | • | | • | • | • | | | | | | | | |
| 55 | | | | | | | | • | • | • | • | | | | | | | | | | | | | | | |
| 65 | | | | | | | | • | • | • | • | | | | | | | | | | | | | | | |
| Style | A | B | C | D | E | F | G | A | B | C | D | A | B | C | K | D | E | F | G | A | N/A | N/A | A | G | E | F |
| Page | 21 | 21 | 23 | 23 | 25 | 25 | 27 | 55 | 55 | 57 | 57 | 74 | 74 | 75 | 75 | 75 | 76 | 76 | 75 | 85 | 88 | 90 | 98 | 98 | 99 | 99 |

## Application Criteria

| Feature | 500 Series Ball | 500 Series Roller | 400 Series | AccuMini | MicroGuide | T-Series |
|---|---|---|---|---|---|---|
| Load Capacity | ••• | •••• | ••• | •• | • | •• |
| Equivalent Loads all directions | ••• | •••• | ••• | •• | •• | • |
| Ultra Compactness | • | • | •• | ••• | •••• | • |
| High Travel Accuracy | •••• | •••• | ••• | •••• | •••• | ••• |
| Rigidity | ••• | •••• | •• | •• | •• | • |
| Smoothness | ••• | •• | ••• | •••• | •••• | ••• |
| Friction Characteristic | •••• | •• | ••• | •••• | •••• | •• |
| Admissable Speed | •••• | ••• | •••• | •••• | •••• | ••• |
| Ease of Installation | ••• | •• | ••• | •• | ••• | •••• |
| Lightweight | • | • | • | •• | ••• | •••• |
| Industry Standard Dimensions | •••• | •••• | •••• | | •••• | •••• |
| Page | 8 | 44 | 72 | 83 | 87 | 94 |

• = satisfactory •••• = excellent

# 500 Series Ball Profile Rail Linear Guide



## 500 Series Ball Profile Rail Linear Guide



**Features**
The Thomson 500 Series Ball Linear Guide provides long life, exceptional rigidity, high dynamic and static load capacities, accommodation for high moment loads, high running accuracy, multiple sealing options and multiple lubrication inlet options. This allows for on-site field modifications, and interchangeability with competitor offering.

These properties result in improved machine accuracies and rigidity resulting in reduced vibration extending machine and tool life. This has a direct effect on operational efficiency resulting in cost savings for the user.

Available in 7 carriage designs, and sizes 15 to 45mm.

**Materials Linear Guides**
The 500 Series Ball Linear Guides are produced from high quality bearing steel. All carriages and rolling elements are through hardened and all rails are case hardened (except size 15 rail which is through hardened). The end cap is constructed of a high strength, glass filled nylon with nitrile rubber seal. Stringent quality controls are in place to ensure consistency of materials from the source, allowing us to ensure that we delivery the highest quality product.

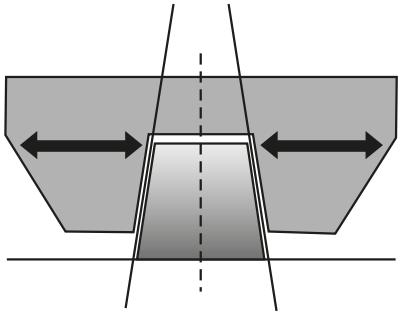
**Interchangeability**
The 500 Series Ball Linear Guides are completely interchangeable. Any carriage can be run on any rail of the same accuracy without compromising system accuracy. This is the result of our stringent manufacturing process controls.

**Accuracy and Preload**
The 500 Series Ball Linear Guides are available in three different accuracy classes, three different preload ranges and with clearance to allow for customization to your application needs.

**Straightness**
The 500 Series Ball rail is subjected to multiple straightening processes during and after grinding of the roller paths.

These added processes and inspections result in some of the straightest rails in the market today, improving machine accuracies wherever the 500 Series Ball is used.

**Rigidity**
The 500 Series Ball Linear Guide rail utilizes a special trapezoidal profile that maximizes the carriage cross section, resulting in the highest possible rigidity.



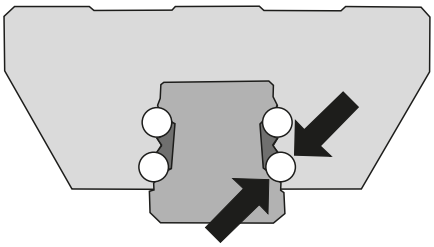
## 500 Series Ball Profile Rail Linear Guide

**Running Smoothness / Low Noise**
The running smoothness and low noise are the result of a patented, custom insert molded recirculation path that has an optimized geometric shape and minimal transitions, to ensure smooth and quiet operation in both low and high-speed operation.

In addition, the balls make contact at only two points between rail and carriage. As a result, friction is reduced to a minimum, resulting in quiet, smooth operation.

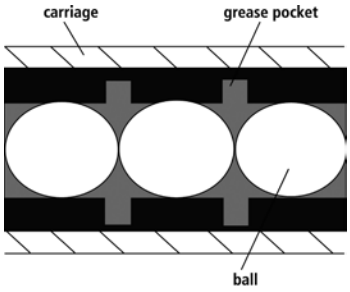


**Back-to-Back**
The 500 Series Linear Guide utilizes a back-to-back bearing arrangement, resulting in added rigidity. As a result, the 500 Series Ball can be used in single rail applications.



**Internal Grease Pockets**
The patented insert molded recirculation path has built in grease pockets. These provide an extra level of security by ensuring adequate lubrication is available to the ball bearings to help extend life.

The pocket and area between the balls provide greater grease quantities in the ball path than a conventional designed linear guide bearing.




**Multiple Lubrication Options**
The standard end cap is designed for flexibility. The end cap comes standard with four lubrication inlet options. These inlet options are easily changed on-site in the field or can be supplied from the factory.

Unsure of the best lubrication inlet location? These carriages allow the user to make these changes easily in the field to optimize the system performance. In addition, they allow for ease in maintenance – all without removing the carriage from the rail.



## 500 Series Ball Profile Rail Linear Guide




**Modular Accessory Options**
The standard carriage is supplied with low friction double lip seals and longitudinal seals that completely encase the bearing carriage to protect the balls and track surfaces and minimize lubrication loss.

Optional metal scrapers or wipers, lube blocks and oil reservoir components can be easily added on-site in the field or can be supplied assembled from the factory.

The trapezoidal rail profile allows for easy servicing and replacing or adding of the end cap, additional wiper and oil reservoir without removing the carriage from the rail.

These innovative design features allow users to easily, efficiently, and economically upgrade carriage sealing.



**Longitudinal Seals**
The carriage has built-in under carriage low drag longitudinal seals that protect the balls and ball path from contamination. These longitudinal seals are an added protection to increase the life and overall performance.

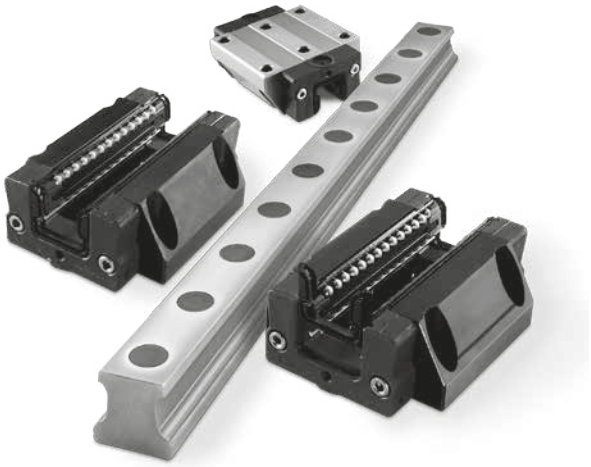
**Extended Standards**
Extended Standards are an assortment of Thomson dowel hole options for both carriage and rail products. Take the guesswork out of design by using our standard assortment of dowel hole options for ease of design and availability, another solution from Thomson. Refer to page 29, 30 and 33 for more information and detailed datasheets.



**Rail Accessories**
The rails have multiple options to protect the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plastic plugs, mylar tape and stainless steel rail cover strip are available.

**Retained Balls**
The rolling elements of the carriages are retained within the bearing so the carriage can be removed from the rail without worrying about the balls falling out. It is recommended to place any removed carriage onto an assembly rail or shipping arbor to provide added protection to the rolling elements.

# 500 Series Profile Rail Enhanced Carriage



## New, 66% Smoother Running Design, with 50% Lower Drag Force*
## New Ball Spacer and Stainless Steel Options

**Features and Benefits**

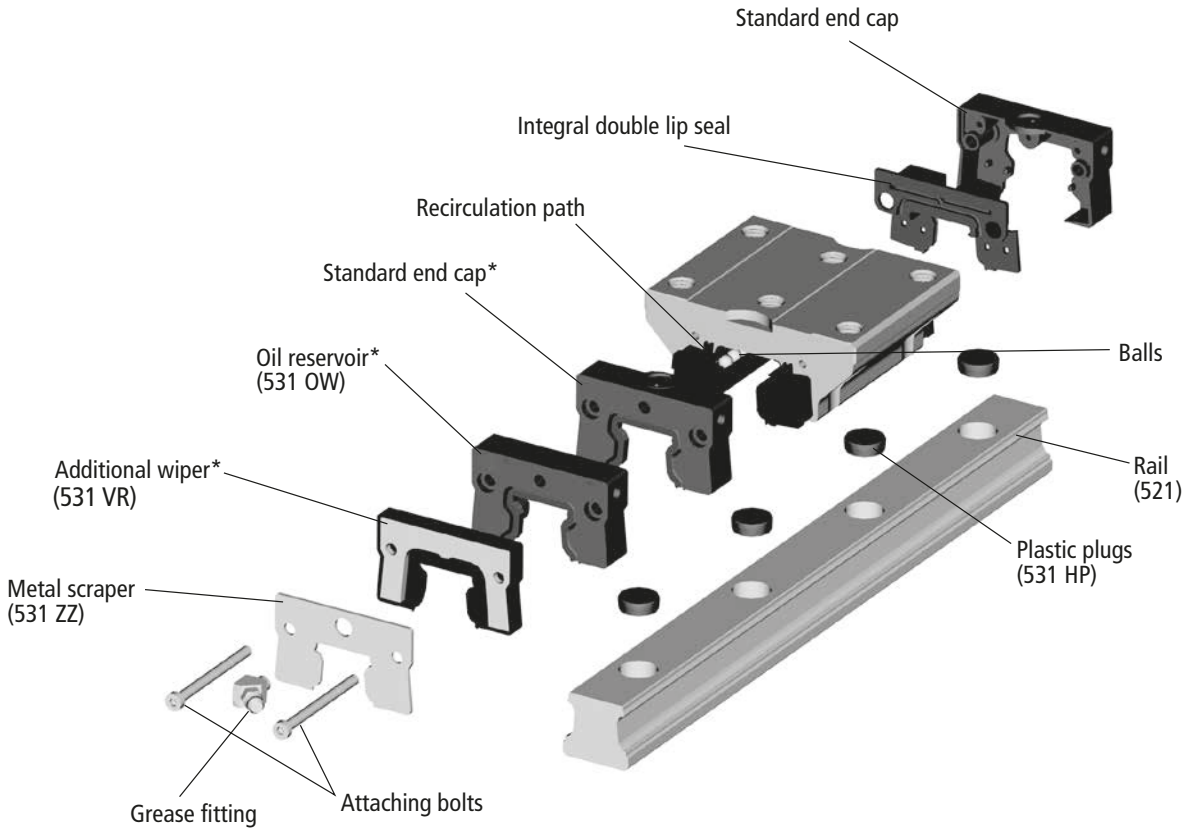
Now available in all sizes: the new Thomson 500 Series Profile Rail enhanced carriage design can improve the smoothness and precision of your linear motion application. New optional 440B stainless carriages and rails provide corrosion resistance well-suited for medical, food, electronic assembly and semiconductor applications.

- New ball spacer carriage option provides smooth, quiet motion.
- New, smoother running design optimizes the surface interfaces between steel and plastic transition areas along the ball bearing circulation path.
- New standard end seals provide twice the contaminant protection compared to competitive products. Optional low drag end seals are ideal for low push force requirements.
- Four longitudinal seals per carriage provide much better contaminant protection than competitive designs with only two longitudinal seals.
- Additional lubrication reservoir enables longer running time and easy change end caps & seals are quick to replace.
- 100% interchangeable with previous Thomson 500 Series carriage and rail.

** 66% smoothness increase measured as variability of drag force while the carriage is in motion. 50% lower drag force measured with new low drag seals option; 41% lower drag force measured with standard wiper option.*

## 500 Series Ball Profile Rail Linear Guide

### Modular Accessory Exploded View



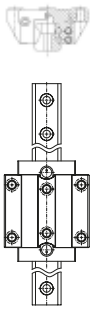
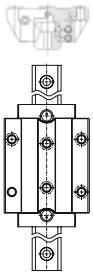
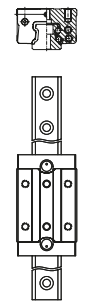
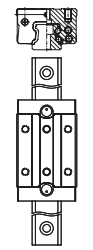

Also available (not shown):
- Lube Block (531 LL)
- Mylar Rail Tape (531 RT)
- Bolt up from bottom rail (521 Type U)
- Stainless Steel Rail, Cover Strip and Rail (521 Type C and 531RCS)

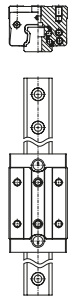
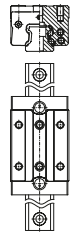
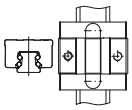
* Can be installed without removing carriage from the rail

The modular building block design of the 500 Series Ball Profile Rail Linear Guide assembly allows for easy on-site field upgrades for quick seal or lubrication changes, all without the need to remove the carriage from the rail.

## 500 Series Ball Standard Carriages

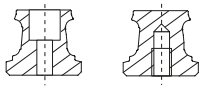
Thomson offers six carriage styles with six mounting holes allowing for additional mounting configurations in the field or for retrofitting. All provide superior rigidity and design flexibility.

| Style | | | Size | Accuracy | Basic Part Number | | | | Appropriate Rail Standard Style | Max. Single Piece Rail Length (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Clearance | Preload 0.03C | Preload 0.08C | Preload 0.13C | | |
| Standard Carriage | A |  | 15 | H | 511H15A0 | 511H15A1 | 511H15A2 | – | 521H15A | 1500 |
| | | | | P | – | 511P15A1 | 511P15A2 | 511P15A3 | 521P15A | |
| | | | | U | – | 511U15A1 | 511U15A2 | 511U15A3 | 521U15A | |
| | | | 20 | H | 511H20A0 | 511H20A1 | 511H20A2 | – | 521H20A | 3000 |
| | | | | P | – | 511P20A1 | 511P20A2 | 511P20A3 | 521P20A | |
| | | | | U | – | 511U20A1 | 511U20A2 | 511U20A3 | 521U20A | |
| | | | 25 | H | 511H25A0 | 511H25A1 | 511H25A2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25A1 | 511P25A2 | 511P25A3 | 521P25A | |
| | | | | U | – | 511U25A1 | 511U25A2 | 511U25A3 | 521U25A | |
| | | | 30 | H | 511H30A0 | 511H30A1 | 511H30A2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30A1 | 511P30A2 | 511P30A3 | 521P30A | |
| | | | | U | – | 511U30A1 | 511U30A2 | 511U30A3 | 521U30A | |
| | | | 35 | H | 511H35A0 | 511H35A1 | 511H35A2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35A1 | 511P35A2 | 511P35A3 | 521P35A | |
| | | | | U | – | 511U35A1 | 511U35A2 | 511U35A3 | 521U35A | |
| | | | 45 | H | 511H45A0 | 511H45A1 | 511H45A2 | – | 521H45A | 6000 |
| | | | | P | – | 511P45A1 | 511P45A2 | 511P45A3 | 521P45A | |
| | | | | U | – | 511U45A1 | 511U45A2 | 511U45A3 | 521U45A | |
| Standard Long Carriage | B |  | 20 | H | 511H20B0 | 511H20B1 | 511H20B2 | – | 521H20A | 3000 |
| | | | | P | – | 511P20B1 | 511P20B2 | 511P20B3 | 521P20A | |
| | | | | U | – | 511U20B1 | 511U20B2 | 511U20B3 | 521U20A | |
| | | | 25 | H | 511H25B0 | 511H25B1 | 511H25B2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25B1 | 511P25B2 | 511P25B3 | 521P25A | |
| | | | | U | – | 511U25B1 | 511U25B2 | 511U25B3 | 521U25A | |
| | | | 30 | H | 511H30B0 | 511H30B1 | 511H30B2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30B1 | 511P30B2 | 511P30B3 | 521P30A | |
| | | | | U | – | 511U30B1 | 511U30B2 | 511U30B3 | 521U30A | |
| | | | 35 | H | 511H35B0 | 511H35B1 | 511H35B2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35B1 | 511P35B2 | 511P35B3 | 521P35A | |
| | | | | U | – | 511U35B1 | 511U35B2 | 511U35B3 | 521U35A | |
| | | | 45 | H | 511H45B0 | 511H45B1 | 511H45B2 | – | 521H45A | 6000 |
| | | | | P | – | 511P45B1 | 511P45B2 | 511P45B3 | 521P45A | |
| | | | | U | – | 511U45B1 | 511U45B2 | 511U45B3 | 521U45A | |
| Narrow Carriage | C |  | 15 | H | 511H15C0 | 511H15C1 | 511H15C2 | – | 521H15A | 1500 |
| | | | | P | – | 511P15C1 | 511P15C2 | 511P15C3 | 521P15A | |
| | | | | U | – | 511U15C1 | 511U15C2 | 511U15C3 | 521U15A | |
| | | | 20 | H | 511H20C0 | 511H20C1 | 511H20C2 | – | 521H20A | 3000 |
| | | | | P | – | 511P20C1 | 511P20C2 | 511P20C3 | 521P20A | |
| | | | | U | – | 511U20C1 | 511U20C2 | 511U20C3 | 521U20A | |
| | | | 25 | H | 511H25C0 | 511H25C1 | 511H25C2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25C1 | 511P25C2 | 511P25C3 | 521P25A | |
| | | | | U | – | 511U25C1 | 511U25C2 | 511U25C3 | 521U25A | |
| | | | 30 | H | 511H30C0 | 511H30C1 | 511H30C2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30C1 | 511P30C2 | 511P30C3 | 521P30A | |
| | | | | U | – | 511U30C1 | 511U30C2 | 511U30C3 | 521U30A | |
| | | | 35 | H | 511H35C0 | 511H35C1 | 511H35C2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35C1 | 511P35C2 | 511P35C3 | 521P35A | |
| | | | | U | – | 511U35C1 | 511U35C2 | 511U35C3 | 521U35A | |
| Narrow Long Carriage | D |  | 20 | H | 511H20D0 | 511H20D1 | 511H20C2 | – | 521H20A | 3000 |
| | | | | P | – | 511P20D1 | 511P20D2 | 511P20D3 | 521P20A | |
| | | | | U | – | 511U20D1 | 511U20D2 | 511U20D3 | 521U20A | |
| | | | 25 | H | 511H25D0 | 511H25D1 | 511H25D2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25D1 | 511P25D2 | 511P25D3 | 521P25A | |
| | | | | U | – | 511U25D1 | 511U25D2 | 511U25D3 | 521U25A | |
| | | | 30 | H | 511H30D0 | 511H30D1 | 511H30D2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30D1 | 511P30D2 | 511P30D3 | 521P30A | |
| | | | | U | – | 511U30D1 | 511U30D2 | 511U30D3 | 521U30A | |
| | | | 35 | H | 511H35D0 | 511H35D1 | 511H35D2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35D1 | 511P35D2 | 511P35D3 | 521P35A | |
| | | | | U | – | 511U35D1 | 511U35D2 | 511U35D3 | 521U35A | |

| Style | | | Size | Accuracy | Basic Part Number | | | | Appropriate Rail Standard Style | Max. Single Piece Rail Length (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Clearance | Preload 0.03C | Preload 0.08C | Preload 0.13C | | |
| Narrow High Carriage | E |  | 15 | H | 511H15E0 | 511H15E1 | 511H15E2 | – | 521H15A | 1500 |
| | | | | P | – | 511P15E1 | 511P15E2 | 511P15E3 | 521P15A | |
| | | | | U | – | 511U15E1 | 511U15E2 | 511U15E3 | 521U15A | |
| | | | 25 | H | 511H25E0 | 511H25E1 | 511H25E2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25E1 | 511P25E2 | 511P25E3 | 521P25A | |
| | | | | U | – | 511U25E1 | 511U25E2 | 511U25E3 | 521U25A | |
| | | | 30 | H | 511H30E0 | 511H30E1 | 511H30E2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30E1 | 511P30E2 | 511P30E3 | 521P30A | |
| | | | | U | – | 511U30E1 | 511U30E2 | 511U30E3 | 521U30A | |
| | | | 35 | H | 511H35E0 | 511H35E1 | 511H35E2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35E1 | 511P35E2 | 511P35E3 | 521P35A | |
| | | | | U | – | 511U35E1 | 511U35E2 | 511U35E3 | 521U35A | |
| | | | 45 | H | 511H45E0 | 511H45E1 | 511H45E2 | – | 521H45A | 6000 |
| | | | | P | – | 511P45E1 | 511P45E2 | 511P45E3 | 521P45A | |
| | | | | U | – | 511U45E1 | 511U45E2 | 511U45E3 | 521U45A | |
| Narrow High Long Carriage | F |  | 25 | H | 511H25F0 | 511H25F1 | 511H25F2 | – | 521H25A | 6000 |
| | | | | P | – | 511P25F1 | 511P25F2 | 511P20F3 | 521P25A | |
| | | | | U | – | 511U25F1 | 511U25F2 | 511U20F3 | 521U25A | |
| | | | 30 | H | 511H30F0 | 511H23F1 | 511H30F2 | – | 521H30A | 6000 |
| | | | | P | – | 511P30F1 | 511P30F2 | 511P30F3 | 521P30A | |
| | | | | U | – | 511U30F1 | 511U30F2 | 511U30F3 | 521U30A | |
| | | | 35 | H | 511H35F0 | 511H35F1 | 511H35F2 | – | 521H35A | 6000 |
| | | | | P | – | 511P35F1 | 511P35F2 | 511P35F3 | 521P35A | |
| | | | | U | – | 511U35F1 | 511U35F2 | 511U35F3 | 521U35A | |
| | | | 45 | H | 511H45F0 | 511H45F1 | 511H45F2 | – | 521H45A | 6000 |
| | | | | P | – | 511P45F1 | 511P45F2 | 511P45F3 | 521P45A | |
| | | | | U | – | 511U45F1 | 511U45F2 | 511U45F3 | 521U45A | |
| Narrow Short Carriage | G |  | 15 | H | 511H15G0 | 511H15G1 | 511H15G2 | – | 521H15A | 1500 |
| | | | | P | – | 511P15G1 | 511P15G2 | 511P15G3 | 521P15A | |
| | | | | U | – | 511U15G1 | 511U15G2 | 511U15G3 | 521U15A | |
| | | | 20 | H | 511H20G0 | 511H20G1 | 511H20G2 | – | 521H20A | 3000 |
| | | | | P | – | 511P20G1 | 511P20G2 | 511P20G3 | 521P20A | |
| | | | | U | – | 511U20G1 | 511U20G2 | 511U20G3 | 521U20A | |

**Extended Standard Carriage Options**

The carriages are also available with the Thomson standard dowel holes or lubrication inlets as shown on pages 29 to 33 or special lubricants either from stock or with a short lead-time.



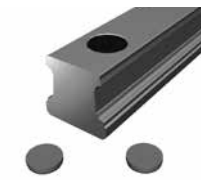
**Type A** **Type U**

**Rail Types and Accessories**

The rails are available in two configurations:

- Bolt down from the top – 521 Type A
- Bolt up from the bottom – 521 Type U

The standard 521 rail mounting holes can be plugged or sealed after installation with the options below.



**Plastic Plugs**

531HP plastic plugs are an inexpensive and simple method to seal the rail attachment bolt area. The plastic plugs are easily driven in place to any rail with a soft non-metallic drift. They can easily be removed.

**Mylar Tape**

A simple and low cost alternative is specialty Mylar tape that can be placed quickly on the top surface of the rail. Part number 531RT is available in 3 meter lengths.



**Stainless Steel Cover Strip**

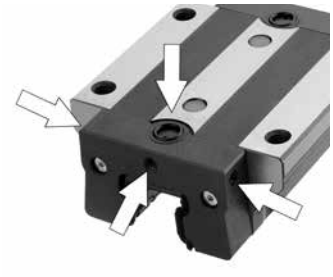
Option 531RCS utilizes a special rail (521 Type C) and stainless steel cover strip that is easily installed with the proper mounting tool.

## Additional Seal Types and Lubrication Accessories

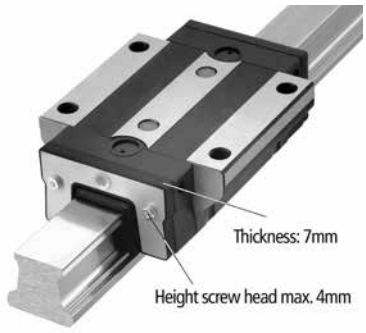


The carriage is designed with modular sealing and lubrication options for simple on-site field modification or can be supplied factory direct.

The standard carriage end cap has an integral low friction double lip seal and longitudinal seal that completely encase the bearing carriage. The double lip design keeps contaminants out and lubrication in. It also allows for grease to purge out of the carriage to prevent excessive lubrication, which can result in higher operating temperatures. This double lip design can be used with oil lubrication.



The standard carriage end cap is equipped with a lubrication inlet centered with a specially designed lubricant channel to direct the lubrication to individual ball tracks. The lubrication inlet can be easily changed in the field or supplied from the factory with a side inlet or top inlet.




**Additional Seal**

The **531 VR** seal provide an additional level of protection from contaminants to the assembly. This additional component can easily be added on-site without removing the carriage from the rail. It is supplied with the required screws to make the installation simple.

- 531 VR is constructed from durable Viton®

This seal can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. It can be easily installed on-site in the field or can be supplied from the factory.



**Metal Scraper**

The Type **531 ZZ Metal Scraper** made of stainless steel, serves as an added protection to the seal lips against large dirt particles, metal shavings or chips. Large contaminants are easily pushed away providing an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction with the other optional modular accessories providing you with an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.

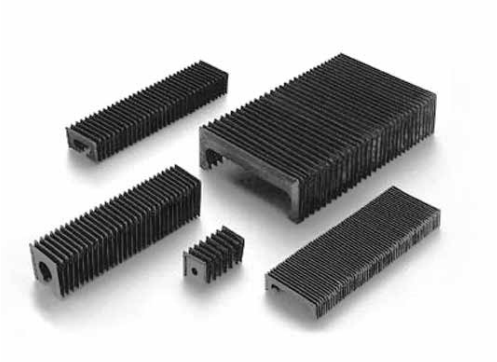


### Oil Reservoir

The Type **531 OW oil reservoir** is a cost effective, automatic lubrication system. It is constructed with an integrated oil reservoir that provides a uniform, consistent lubricating oil to the ball paths for extended periods of time. The Type 531 OW oil reservoir lubrication plate eliminates the need for a routine maintenance schedule, assures lubrication gets to the required points, can be refilled if required, and can operate up to 5000 km of travel. The Type 531 OW oil reservoir can be easily installed in conjunction with other optional modular accessories providing an easy upgrade to the standard seals. These can be easily installed on-site in the field or can be supplied from the factory.

### Lube Block

The **531 LL Lube Block** is a solid lubricant that is a mixture of polymers, oils and selected additives that reduce the penetration of dirt, grit, and liquids into the ball path, preventing premature failures. The oil diffuses, lubricating the ball path surfaces by capillary action. Additional oil is supplied to the ball path surfaces from the polymer. For additional protection the assembly is packed with EP2 grease. There is no need for maintenance or additional lubrication during the life of the Lube Block filled bearing. The 531 LL Lube Block can be easily installed in conjunction with the other optional modular accessories providing an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.



### Bellows

**Standard bellows** are available for all assemblies. The bellows cover the entire length of the rail. The bellows are used to provide additional protection against dirt, dust and splashed liquids. Installation is simple and requires little time. Retrofitting is possible when the rail ends are drilled for the attachment of the end plate 531. Bellows are available in three styles:

- Type B “Low Profile” with outside dimensions that do not exceed the carriage
- Type C “High Compression”
- Type W “Walk On” capable of handling the harshest environments with a 90kg load bearing capacity

The bellow can be easily installed in conjunction with other optional modular seals providing you with a simple upgrade to the standard seal. These can be installed on-site in the field or can be supplied from the factory.

Note: Additional modular accessories add additional drag to the carriage assembly resulting in increased start up friction and power consumption.

**Relative Drag Comparison for Design Consideration**

| Type | Relative Drag |
|---|---|
| Standard carriage | • |
| Viton® Wiper (531 VR) | • • • |
| Metal Scraper (531 ZZ) | • |
| Oil Reservoir (531 OW) | • • |
| Lube Block (531 LL) | • • • • |

• Low

**For ordering information or for additional Seal Types and Lubrication Accessories, see pages 37 to 38.**

## 500 Series Ball Spacer

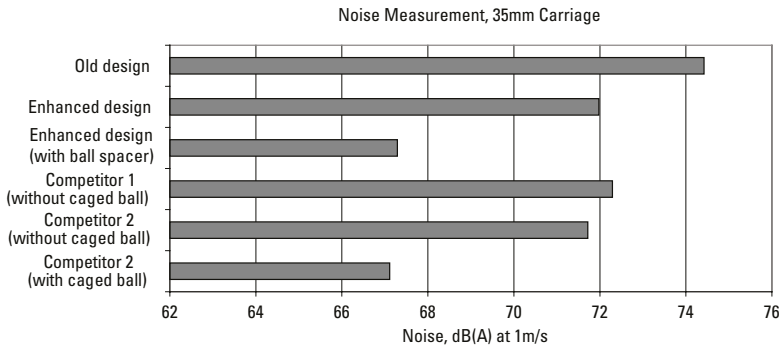


500 Series Ball Profile Rail carriages are now available with ball spacer elements that significantly reduce the running noise of the carriage. The ball spacer carriage is available in sizes 20, 25, 30, 35 and 45. It is a drop-in replacement for the current ball carriage; all external carriage dimensions are exactly the same.

The noise reduction is achieved by inserting plastic discs between each ball bearing. This reduces noise by preventing the balls from contacting each other as well as bumping into the ball track. The addition of the plastic discs requires a reduced number of load carrying balls, which leads to a slight reduction of the static and dynamic load capacity of the ball spacer carriage.

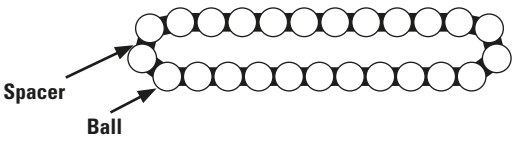
**Features and Benefits:**

- Significant noise reduction (-6 dB)
- Minimum reduction of dynamic and static load capacity – Contact Thomson Application Engineering for load rating details
- Drop-in replacement for 511 ball carriage
- Same accessory options as 511 ball carriage
- Better or identical performance in comparison to competitor push force and noise
- Carriage type designation: 513

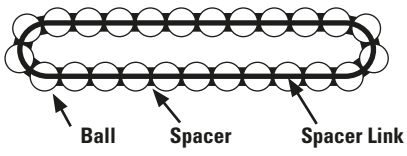



## Ball Spacer Technology Comparison

**Thomson Ball Spacer**



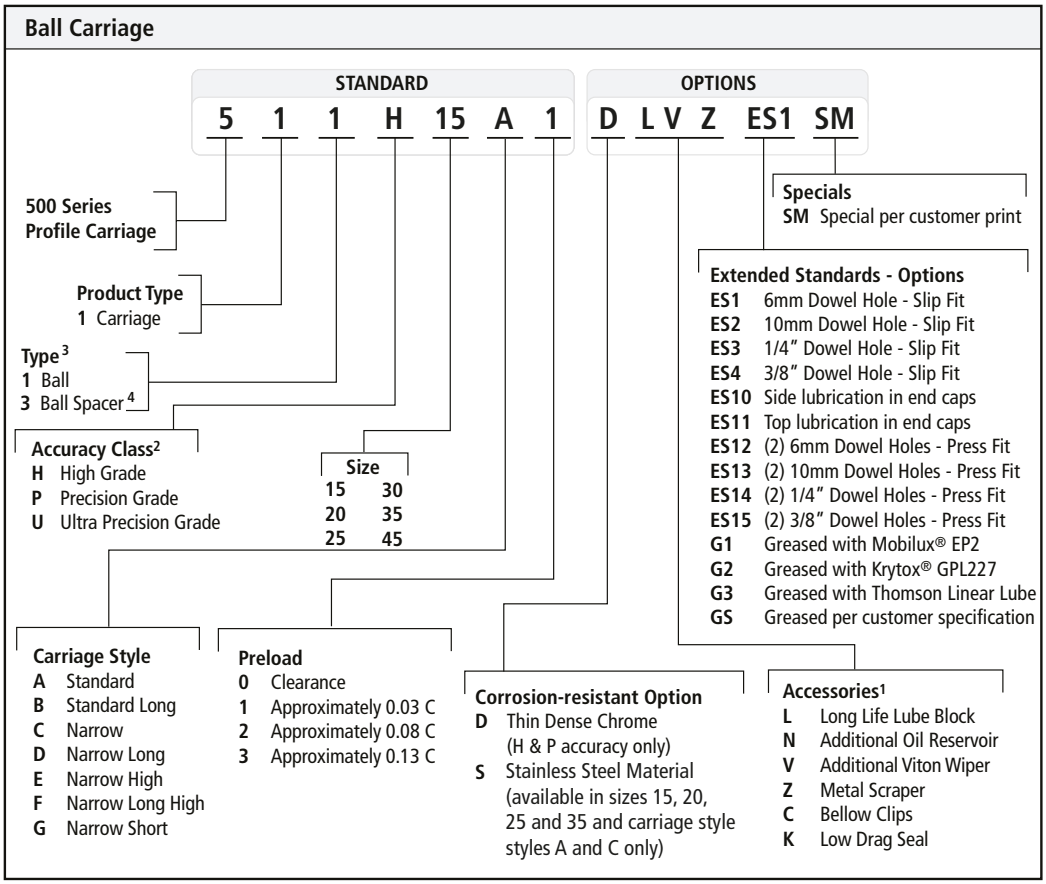

**Competitor Ball Chain**




| | Thomson 513 Ball Spacer | Competitor Ball Chain |
|---|---|---|
| **Internal Forces** | No tensile load | Tensile load on spacer links |
| **Quality** | Automatic inspection of each spacer element | Optical inspection not possible without bending link |
| **Balltrack clearances** | Any clearance between balls and spacers is minimized during assembly | Spacer link tolerances leads to undefined clearances |
| **Push Force** | Slight increase in push force | Significant increase in push force |
| **Reliability** | Fewer elements = fewer failure modes | Broken link elements can block re-circulation path |

## 500 Series Ball

### Part Numbering Description




1. Accessory combination part numbers are listed from carriage end cap outward. Not all combinations are available. For specific combination availability see pages 35-36.

2. The 500 Series Ball lowest accuracy grade is High as a result of tight manufacturing controls and grinding capabilities. We do not offer Normal grade accuracy, our High grade is our Normal grade.

3. New enhanced carriage does not retain ball bearings when end cap is removed. Removal of end caps can result in loss of ball bearings.

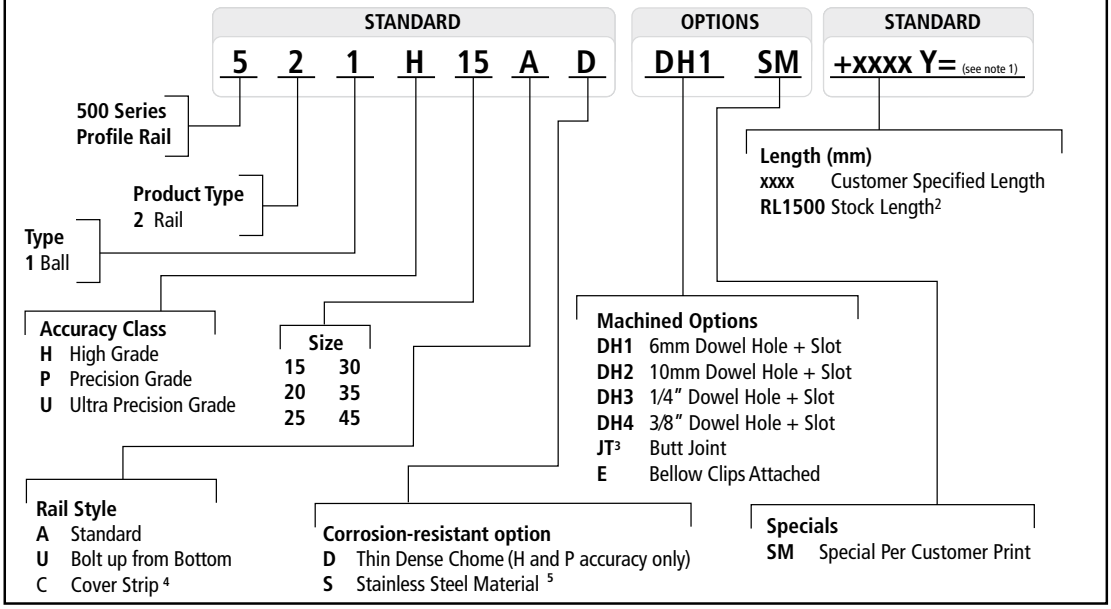
4. Ball Spacer carriage not available in size 15.

**Assemblies are available, please see page 124 for assembly part number details.**

# 500 Series Ball

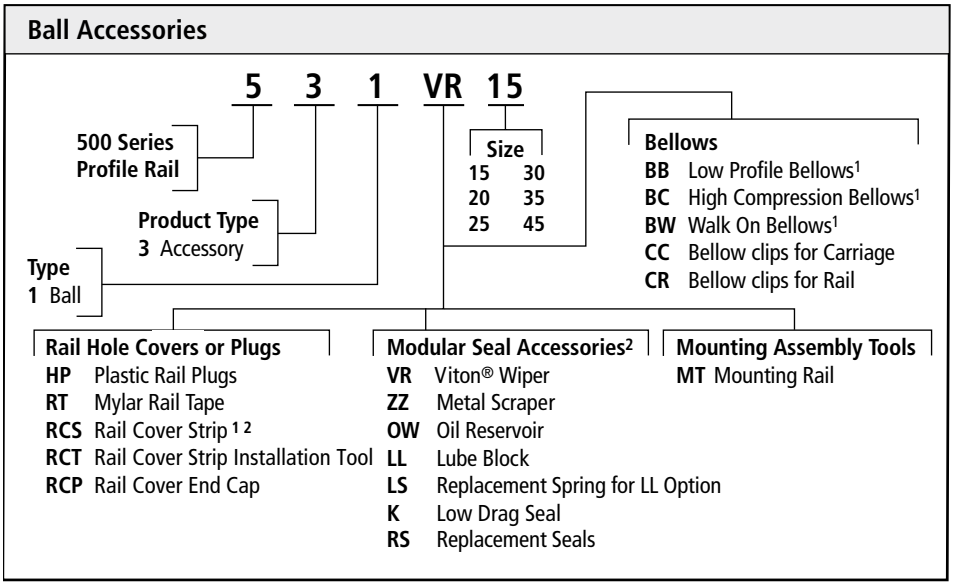
## Part Numbering Description

### Ball Rail




1. Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified
2. Stock length rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used by customer who will cut to length.
3. Customer drawing required at time of quote and order. See page 122 for more information and templates.
4. Cover strip rail available in size 25 and up only.
5. Available in sizes 15, 20, 25 and 35 only. Max. rail length at 1,000 mm.

### Ball Accessories

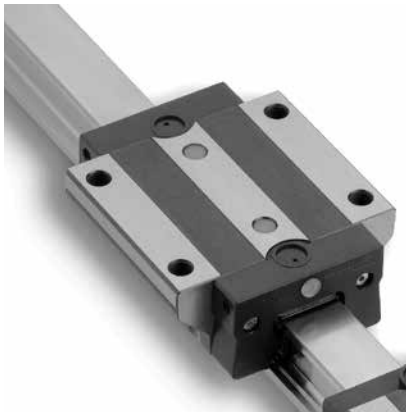


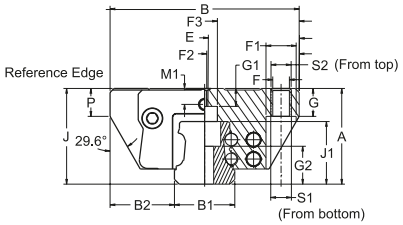

1. Bellows and rail cover strip must include length at time of order. Example: 531BB15 + 1000mm. See page 118 on how to calculate bellows length.
2. Cover strip rail available in size 25 and up only.
3. Two standard screws included with each item. Screws for attaching this accessory to carriage and not combinations of accessories.

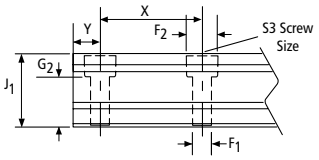
**Assemblies are available, please see page 124 for assembly part number details.**

# 500 Series Ball

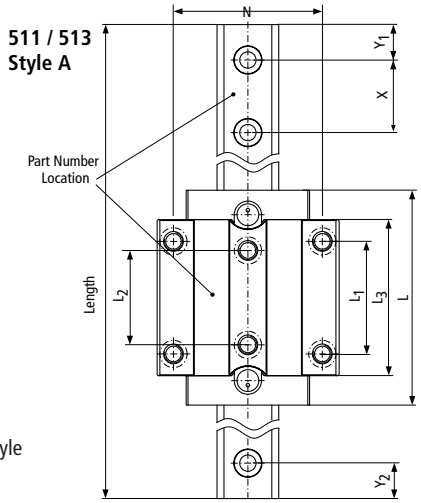
## 511 / 513 Style A and B



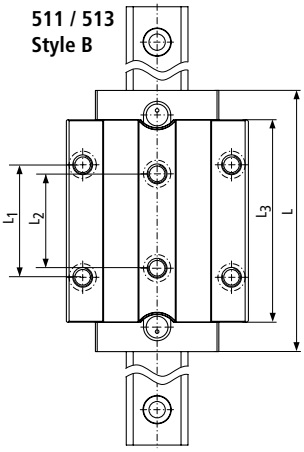



**511 / 513 Style A**




**511 / 513 Style B**




Stainless Steel Material (available in sizes 15, 20, 25 and 35 and carriage style styles A and C only)

## 511 / 513† Style A – Standard Ball

| Size | Dimensions (mm) A | B +0.0 −0.4 | $B_1$* ±0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_2$ | $L_3$ | X | N | $S_1$ | $S_2$ | $S_3$ | F | $F_1$ | $F_2$ | $F_3$ | Ball Ø | G | $G_1$ | $G_2$ | $M_1$ | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 24 | 47 | 15 | 16 | 20.2 | 15.7 | 56.6 | 30 | 26 | 39.6 | 60 | 38 | M 4 | M 5 | M 4 | 4.4 | 4.5 | 8 | 7.5 | 3.2 | 7 | 4.5 | 9.5 | 4 | 7 | 7 |
| 20 | 30 | 63 | 20 | 21.5 | 25.5 | 19 | 71.5 | 40 | 35 | 49.5 | 60 | 53 | M 5 | M 6 | M 5 | 5.4 | 5.8 | 10 | 9.5 | 40 | 8 | 6.5 | 11.5 | 5.2 | 8 | 8 |
| 25 | 36 | 70 | 23 | 23.5 | 30.5 | 22.7 | 84.5 | 45 | 40 | 59.5 | 60 | 57 | M 6 | M 8 | M 6 | 6.8 | 7 | 11 | 11 | 4.8 | 9 | 8.7 | 14 | 5.5 | 7 | 11 |
| 30 | 42 | 90 | 28 | 31 | 35.9 | 26 | 97.4 | 52 | 44 | 69.4 | 80 | 72 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 5.6 | 12 | 10 | 14.5 | 7 | 8 | 12 |
| 35 | 48 | 100 | 34 | 33 | 41 | 29.5 | 111.6 | 62 | 52 | 79.6 | 80 | 82 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 6.4 | 12 | 12 | 18 | 7 | 8 | 14 |
| 45 | 60 | 120 | 45 | 37.5 | 50.8 | 37 | 137.1 | 80 | 60 | 99.1 | 105 | 100 | M 10 | M 12 | M 12 | 10.5 | 14 | 20 | 18 | 7.9 | 15 | 15 | 22 | 8 | 10 | 17.5 |

## 511 / 513† Style B – Standard Long Ball

| Size | Dimensions (mm) A | B +0.0 −0.4 | $B_1$* ±0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_2$ | $L_3$ | X | N | $S_1$ | $S_2$ | $S_3$ | F | $F_1$ | $F_2$ | $F_3$ | Ball Ø | G | $G_1$ | $G_2$ | $M_1$ | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 30 | 63 | 20 | 21.5 | 25.5 | 19 | 87.5 | 40 | 35 | 65.5 | 60 | 53 | M 5 | M 6 | M 5 | 5.4 | 5.8 | 10 | 9.5 | 4.0 | 8 | 6.5 | 11.5 | 5.2 | 8 | 8 |
| 25 | 36 | 70 | 23 | 23.5 | 30.5 | 22.7 | 103.5 | 45 | 40 | 78.5 | 60 | 57 | M 6 | M 8 | M 6 | 6.8 | 7 | 11 | 11 | 4.8 | 9 | 8 | 14 | 5.5 | 7 | 11 |
| 30 | 42 | 90 | 28 | 31 | 35.9 | 26 | 119.4 | 52 | 44 | 91.4 | 80 | 72 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 5.6 | 12 | 10 | 14.5 | 7 | 8 | 12 |
| 35 | 48 | 100 | 34 | 33 | 41 | 29.5 | 137.1 | 62 | 52 | 105.1 | 80 | 82 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 6.4 | 12 | 12 | 18 | 7 | 8 | 14 |
| 45 | 60 | 120 | 45 | 37.5 | 50.8 | 37 | 168.6 | 80 | 60 | 130.6 | 105 | 100 | M 10 | M 12 | M 12 | 10.5 | 14 | 20 | 18 | 7.9 | 15 | 15 | 22 | 8 | 10 | 17.5 |

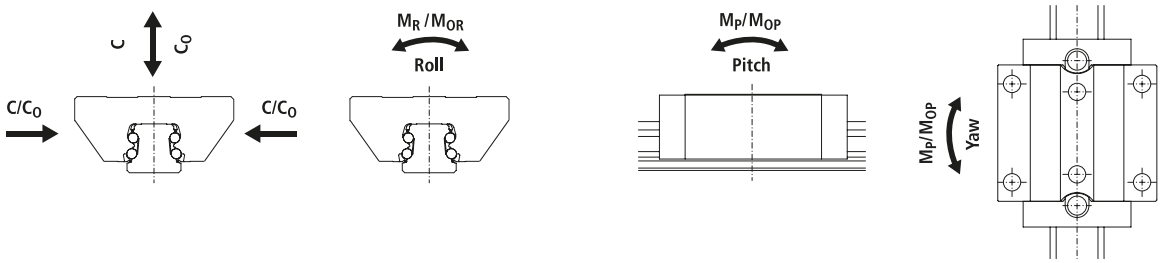
* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
† 513 Spacer ball not available in size 15.
†† All thread pitches will be ISO coarse.

# 500 Series Ball

## 511 Style A and B

**Dynamic Load and Moment Ratings**
C = Dynamic load rating
$M_P$ = Dynamic pitch and yaw moment rating
$M_R$ = Dynamic roll moment rating

**Static Load and Moment Ratings**
$C_O$ = Static load rating
$M_{OP}$ = Static pitch and yaw moment rating
$M_{OR}$ = Static roll moment rating




| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Static | | | Dynamic | | | | | | Carriage | Rail |
| | | | | | 100 Km | | | 50 Km | | | | |
| | | $C_O$ (N) | $M_{OR}$ (Nm) | $M_{OP, OY}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P,Y}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P, Y}$ (Nm) | (kg) | (kg/m) |
| A | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 15-S | 19 600 | 181 | 146 | 7 600 | 70 | 57 | 9 576 | 88 | 72 | 0.2 | 1.4 |
| | 20 | 31 400 | 373 | 292 | 14 400 | 171 | 134 | 18 143 | 215 | 169 | 0.5 | 2.2 |
| | 20-S | 31 400 | 373 | 292 | 12 000 | 143 | 112 | 15 120 | 180 | 141 | 0.5 | 2.2 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.7 | 3.0 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 1.2 | 4.3 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.8 | 5.4 |
| | 45 | 134 800 | 3 193 | 2 498 | 61 900 | 1 466 | 1 147 | 77 989 | 1 847 | 1 445 | 3.3 | 8.8 |
| B | 20 | 41 100 | 490 | 495 | 17 400 | 206 | 208 | 21 923 | 260 | 262 | 0.6 | 2.2 |
| | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.9 | 3.0 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 1.5 | 4.3 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 2.3 | 5.4 |
| | 45 | 176 300 | 4 175 | 4 199 | 74 700 | 1 769 | 1 779 | 94 116 | 2 229 | 2 241 | 4.2 | 8.8 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
3. For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

## Bearing Travel Life Comparison

**$L = (C/F)^3 \times 100km$**
**where:**
**L = travel life, km**
**C = 100 km dynamic load rating**
**F = applied dynamic load, N**

**$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$**
**where:**
**Cmin = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

**Operating Parameters:**

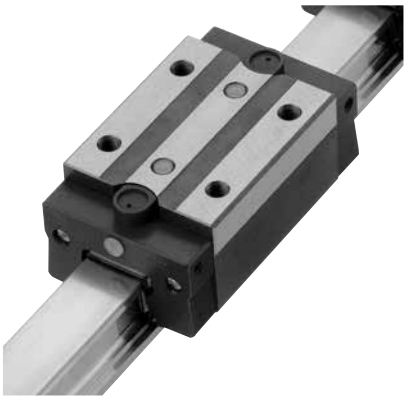
| | |
|---|---|
| **Maximum Velocity:** | **5 m/s** |
| **Maximum Acceleration:** | **100 m/s²** |
| **Temperature:** | |
| **Min:** | **– 40° C** |
| **Max:** | **80° C** |
| **Max peak:** | **120° C short time*** |

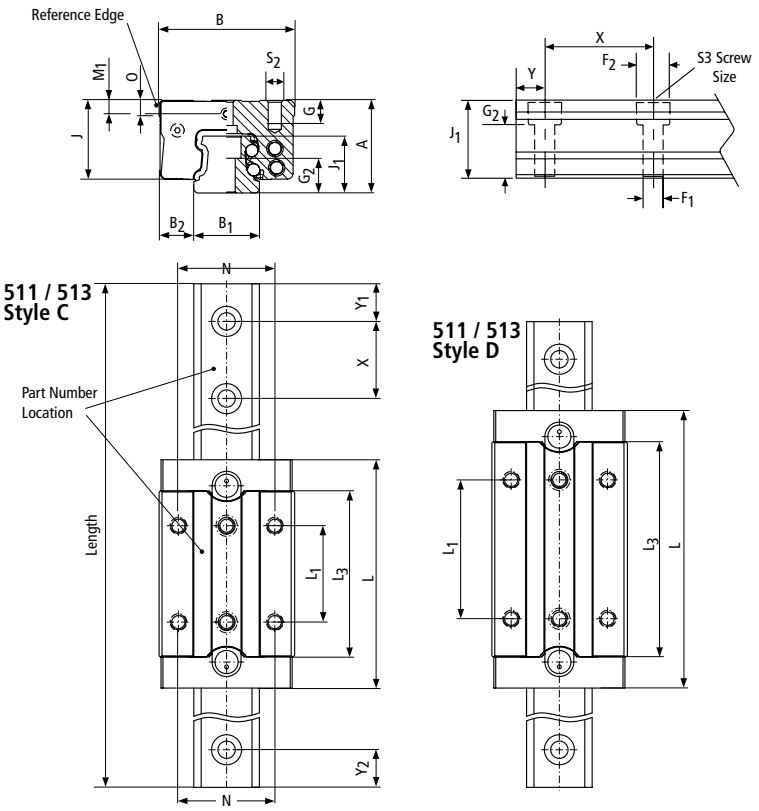
*without bellows

**Conversion Factors:** See Page 128

# 500 Series Ball Profile Rail Linear Guide

## 511 / 513 Style C and D






## 511 / 513† Style C Narrow

| Size | Dimensions (mm) A | B +0.0 −0.4 | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_3$ | X | N | $S_2/S_3$ | $F_1$ | $F_2$ | Ball Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 24 | 34 | 15 | 9.5 | 20.2 | 15.7 | 56.6 | 26 | 39.6 | 60 | 26 | M 4 | 4.5 | 8 | 3.2 | 5 | 9.5 | 4 | 5.5 |
| 20 | 30 | 44 | 20 | 12 | 25.5 | 19 | 71.5 | 36 | 49.5 | 60 | 32 | M 5 | 5.8 | 10 | 4.0 | 7 | 11.5 | 5.2 | 6 |
| 25 | 36 | 48 | 23 | 12.5 | 30.5 | 22.7 | 84.5 | 35 | 59.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 5.5 | 7.5 |
| 30 | 42 | 60 | 28 | 16 | 35.9 | 26 | 97.4 | 40 | 69.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 7 | 8 |
| 35 | 48 | 70 | 34 | 18 | 41 | 29.5 | 111.6 | 50 | 79.6 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 7 | 8 |

## 511 / 513† Style D Narrow Long

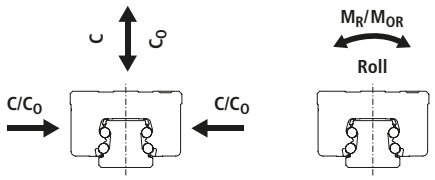
| Size | Dimensions (mm) A | B +0.0 −0.4 | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_3$ | X | N | $S_2/S_3$ | $F_1$ | $F_2$ | Ball Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 30 | 44 | 20 | 12 | 25.5 | 19 | 87.5 | 50 | 65.5 | 60 | 32 | M 5 | 5.8 | 10 | 4.0 | 7 | 11.5 | 5.2 | 6 |
| 25 | 36 | 48 | 23 | 12.5 | 30.5 | 22.7 | 103.5 | 50 | 78.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 5.5 | 7.5 |
| 30 | 42 | 60 | 28 | 16 | 35.9 | 26 | 119.4 | 60 | 91.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 7 | 8 |
| 35 | 48 | 70 | 34 | 18 | 41 | 29.5 | 137.1 | 72 | 105.1 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 7 | 8 |

* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
† 513 Spacer ball not available in size 15.

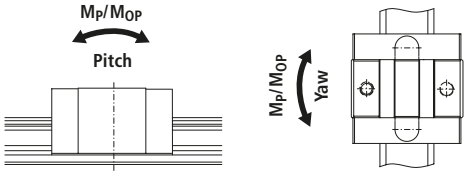
# 500 Series Ball

## 511 Style C and D

**Dynamic Load and Moment Ratings**
C = Dynamic load rating
$M_P$ = Dynamic pitch and yaw moment rating
$M_R$ = Dynamic roll moment rating




**Static Load and Moment Ratings**
$C_O$ = Static load rating
$M_{OP}$ = Static pitch and yaw moment rating
$M_{OR}$ = Static roll moment rating




| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Static | | | Dynamic | | | | | | Carriage | Rail |
| | | | | | 100 Km | | | 50 Km | | | | |
| | | $C_O$ (N) | $M_{OR}$ (Nm) | $M_{OP, OY}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P,Y}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P, Y}$ (Nm) | (kg) | (kg/m) |
| C | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 15-S | 19 600 | 181 | 146 | 7 600 | 70 | 57 | 9 576 | 88 | 106 | 0.2 | 1.4 |
| | 20 | 31 400 | 373 | 292 | 14 400 | 171 | 134 | 18 143 | 215 | 169 | 0.5 | 2.2 |
| | 20-S | 31 400 | 373 | 292 | 12 000 | 143 | 112 | 15 120 | 180 | 141 | 0.5 | 2.2 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.7 | 3.0 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 1.2 | 4.3 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.8 | 5.4 |
| D | 20 | 41 100 | 490 | 495 | 17 400 | 206 | 208 | 21 923 | 260 | 262 | 0.6 | 2.2 |
| | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.9 | 3.0 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 1.5 | 4.3 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 2.3 | 5.4 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
3. For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

## Bearing Travel Life Comparison

**$L = (C/F)^3 \times 100$ km**
**where:**
**L = travel life, km**
**C = 100 km dynamic load rating**
**F = applied dynamic load, N**

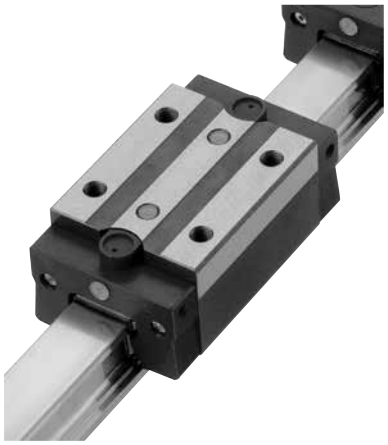
**$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$**
**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

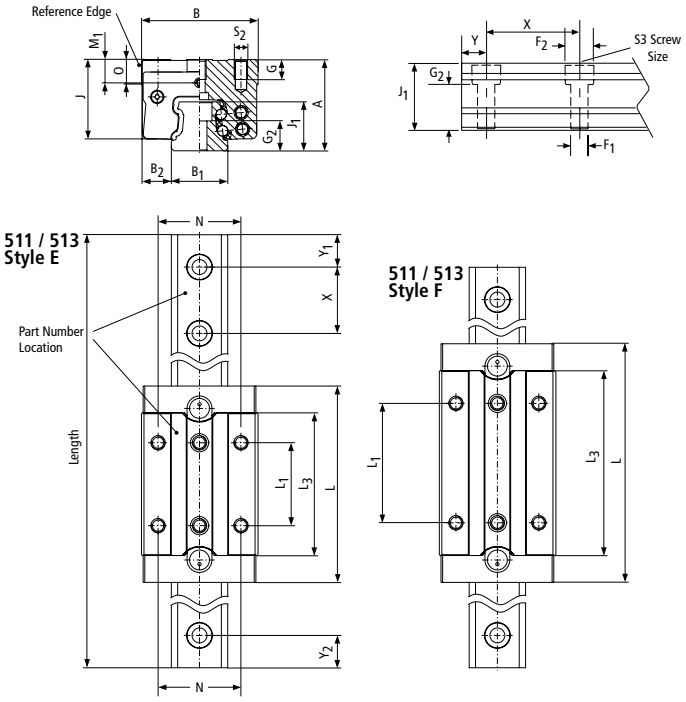
| **Operating Parameters:** | | |
|---|---|---|
| **Maximum Velocity:** | **5 m/s** | |
| **Maximum Acceleration:** | **100 m/s²** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |
| | | *without bellows |

**Conversion Factors:** See Page 128

# 500 Series Ball Profile Rail Linear Guide

## 511 / 513 Style E and F






## 511 / 513† Style E Narrow High

| Size | Dimensions (mm) A | B +0.0 -0.4 | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_3$ | X | N | $S_2/S_3$ | $F_1$ | $F_2$ | Ball Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 28 | 34 | 15 | 9.5 | 24.2 | 15.7 | 56.6 | 26 | 39.6 | 60 | 26 | M 4 | 4.5 | 8 | 3.2 | 6 | 9.5 | 8 | 6 |
| 25 | 40 | 48 | 23 | 12.5 | 34.5 | 22.7 | 84.5 | 35 | 59.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 9.5 | 11 |
| 30 | 45 | 60 | 28 | 16 | 38.9 | 26 | 97.4 | 40 | 69.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 10 | 11 |
| 35 | 55 | 70 | 34 | 18 | 48 | 29.5 | 111.6 | 50 | 79.6 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 14 | 15 |
| 45 | 70 | 86 | 45 | 20.5 | 60.8 | 37 | 137.1 | 60 | 99.1 | 105 | 60 | M 10 | 14 | 20 | 7.9 | 18 | 22 | 18 | 19 |

## 511 / 513† Style F Narrow Long High

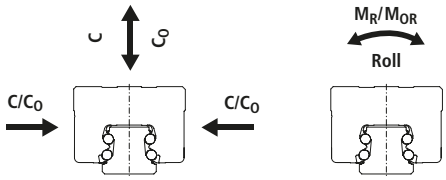
| Size | Dimensions (mm) A | B +0.0 -0.4 | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L | $L_1$ | $L_3$ | X | N | $S_2/S_3$ | $F_1$ | $F_2$ | Ball Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 40 | 48 | 23 | 12.5 | 34.5 | 22.7 | 103.5 | 50 | 78.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 9.5 | 11 |
| 30 | 45 | 60 | 28 | 16 | 38.9 | 26 | 119.4 | 60 | 91.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 10 | 11 |
| 35 | 55 | 70 | 34 | 18 | 48 | 29.5 | 137.1 | 72 | 105.1 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 14 | 15 |
| 45 | 70 | 86 | 45 | 20.5 | 60.8 | 37 | 168.6 | 80 | 130.6 | 105 | 60 | M 10 | 14 | 20 | 7.9 | 18 | 22 | 18 | 19 |

* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
† 513 Spacer ball not available in size 15.

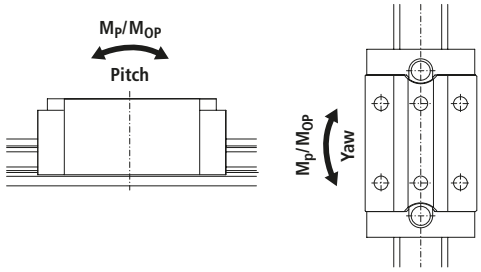
# 500 Series Ball

## 511 Style E and F

**Dynamic Load and Moment Ratings**
C = Dynamic load rating
$M_P$ = Dynamic pitch and yaw moment rating
$M_R$ = Dynamic roll moment rating




**Static Load and Moment Ratings**
$C_O$ = Static load rating
$M_{OP}$ = Static pitch and yaw moment rating
$M_{OR}$ = Static roll moment rating




| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Static | | | Dynamic | | | | | | Carriage | Rail |
| | | | | | 100 Km | | | 50 Km | | | | |
| | | $C_O$ (N) | $M_{OR}$ (Nm) | $M_{OP, OY}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P,Y}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P,Y}$ (Nm) | (kg) | (kg/m) |
| E | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.5 | 2.2 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 0.7 | 3.0 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.2 | 4.3 |
| | 45 | 134 800 | 3 193 | 2 498 | 61 900 | 1 466 | 1 147 | 77 989 | 1 847 | 1 445 | 1.8 | 5.4 |
| F | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.6 | 2.2 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 0.9 | 3.0 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 1.5 | 4.3 |
| | 45 | 176 300 | 4 175 | 4 199 | 74 700 | 1 769 | 1 779 | 94 116 | 2 229 | 2 241 | 2.3 | 5.4 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
3. For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

## Bearing Travel Life Calculation

**$L = (C/F)^3 \times 100$ km**
**where:**
**L = travel life, km**
**C = 100 km dynamic load rating**
**F = applied dynamic load, N**

$$C_{min} = \left(\frac{L}{100}\right)^{1/3} F$$

**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

**Operating Parameters:**

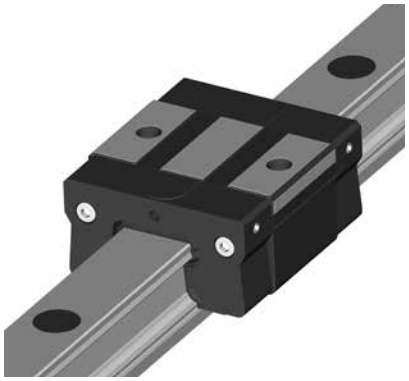
| | | |
|---|---|---|
| **Maximum Velocity:** | **5 m/s** | |
| **Maximum Acceleration:** | **100 m/s²** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |

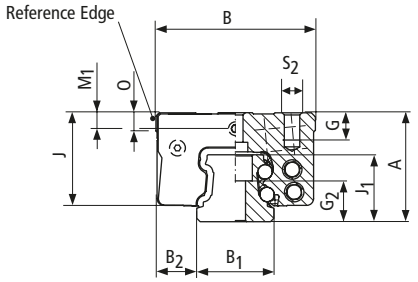
*without bellows

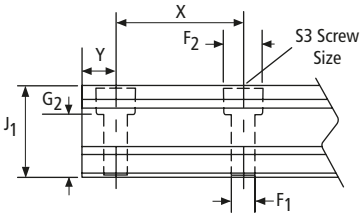
**Conversion Factors:** See Page 128

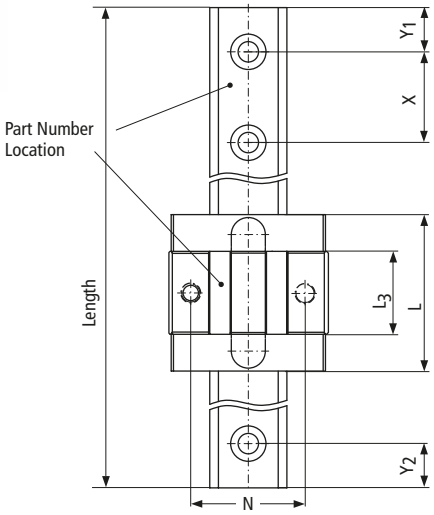
# 500 Series Ball Profile Rail Linear Guide

## 511 Style G






### 511 Style G Narrow Short

| Size | Dimensions (mm) A | B +0.0 -0.4 | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L | $L_3$ | X | N | $s_2/s_3$ | $F_1$ | $F_2$ | Ball Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 24 | 34 | 15 | 9.5 | 20.2 | 15.7 | 37.6 | 20.6 | 60 | 26 | M4 | 4.5 | 8 | 3.2 | 6 | 9.5 | 4 | 6 |
| 20 | 28 | 44 | 20 | 12 | 23.5 | 19 | 47.7 | 25.7 | 60 | 32 | M5 | 5.8 | 10 | 4.0 | 6 | 11.5 | 4.2 | 4 |

* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.

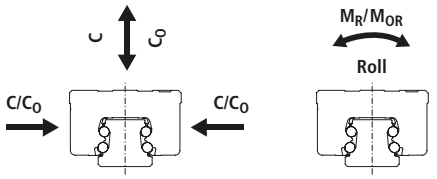
** When using additional modular seals or lubrication plates, the total length L will increase. Consult page 35-36 for additional information.

Length of rail to be specified at time of order, Y1 will equal Y2 unless specified otherwise at time of order.

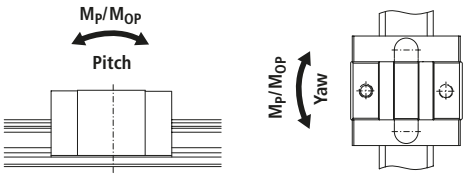
# 500 Series Ball

## 511 Style G

**Dynamic Load and Moment Ratings**
C = Dynamic load rating
$M_P$ = Dynamic pitch and yaw moment rating
$M_R$ = Dynamic roll moment rating




**Static Load and Moment Ratings**
$C_O$ = Static load rating
$M_{OP}$ = Static pitch and yaw moment rating
$M_{OR}$ = Static roll moment rating




| Style | Size | Load Rating | | | | | | | | | Weights | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Static | | | Dynamic | | | | | | Carriage | Rail |
| | | | | | 100 Km | | | 50 Km | | | | |
| | | $C_O$ (N) | $M_{OR}$ (Nm) | $M_{OP, OY}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P,Y}$ (Nm) | C (N) | $M_R$ (Nm) | $M_{P, Y}$ (Nm) | (kg) | (kg/m) |
| G | 15 | 8 500 | 78 | 30 | 5 200 | 48 | 18 | 6 552 | 60 | 23 | 0.2 | 1.4 |
| | 20 | 13 100 | 150 | 58 | 8 400 | 99 | 37 | 10 583 | 125 | 47 | 0.5 | 2.2 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
3. Deflection charts are available on www.thomsonlinear.com.

## Bearing Travel Life Calculation

**$L = (C/F)^3 \times 100$ km**
**where:**
**L = travel life, km**
**C = 100 km dynamic load rating**
**F = applied dynamic load, N**

$$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$$

**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

| **Operating Parameters:** | | |
|---|---|---|
| **Maximum Velocity:** | **5 m/s** | |
| **Maximum Acceleration:** | **100 m/s²** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |
| | *without bellows | |

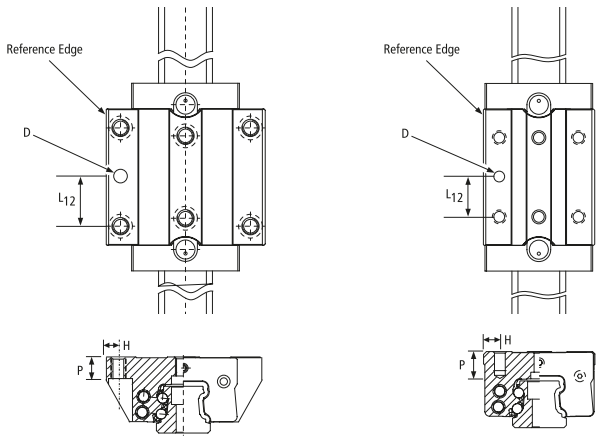
**Conversion Factors:** See Page 128

## Carriage Dowel Holes

Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard slip fit dowel hole options for the 500 series Standard Ball Carriages are:

**Style A and B** **Style C, D, E and F**

**Single Dowel**
**Slip Fit**



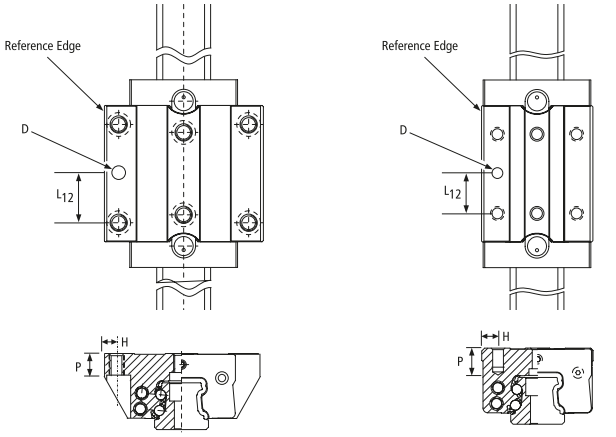

| 511 | | | ES1 | | | ES2 | | | ES3 | | | ES4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Style | Size | $L_{12}$ | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 15 | 6 | 4.5 | 7 | – | – | – | 1/4″ | 4.5 | 7 | – | – | – |
| | 20 | 20 | 6 | 5 | 9 | – | – | – | 1/4″ | 5 | 9 | – | – | – |
| | 25 | 22.5 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 26 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4″ | 9 | 12 | 3/8″ | 9 | 12 |
| | 35 | 31 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8″ | 9 | 14 |
| | 45 | 40 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| Type B | 20 | 20 | 6 | 5 | 9 | – | – | – | 1/4″ | 5 | 9 | – | – | – |
| | 25 | 22.5 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 26 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4″ | 9 | 12 | 3/8″ | 9 | 12 |
| | 35 | 31 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8″ | 9 | 14 |
| | 45 | 40 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| Type C | 15 | 13 | 6 | 4 | 6 | – | – | – | 1/4″ | 4 | 6 | – | – | – |
| | 20 | 18 | 6 | 6 | 9 | – | – | – | 1/4″ | 6 | 9 | – | – | – |
| | 25 | 17.5 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 20 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| Type D | 20 | 25 | 6 | 6 | 9 | – | – | – | 1/4″ | 6 | 9 | – | – | – |
| | 25 | 25 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 30 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 36 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| Type E | 15 | 13 | 6 | 4 | 6 | – | – | – | 1/4″ | 4 | 6 | – | – | – |
| | 25 | 17.5 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 20 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| | 45 | 30 | – | – | – | 10 | 13 | 12 | – | – | – | 3/8″ | 13 | 12 |
| Type F | 25 | 25 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 30 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 36 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| | 45 | 40 | – | – | – | 10 | 13 | 12 | – | – | – | 3/8″ | 13 | 12 |

All dimension in mm, unless otherwise specified.
Hole tolerance øD +0.013/-0

## Carriage Dowel Holes (continued)

**Style A and B** **Style C, D, E and F**

**Single Dowel**
**Press Fit**

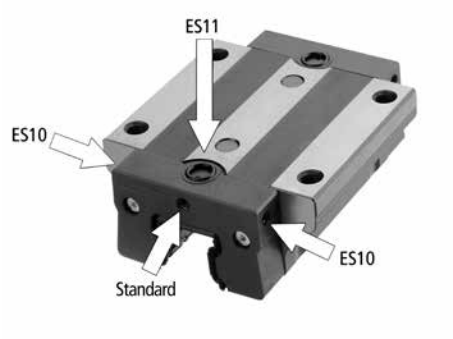



| 511 | | | ES12 | | | ES13 | | | ES14 | | | ES15 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Style | Size | $L_{12}$ | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 15 | 6 | 4.5 | 7 | – | – | – | 1/4“ | 4.5 | 7 | – | – | – |
| | 20 | 20 | 6 | 5 | 9 | – | – | – | 1/4“ | 5 | 9 | – | – | – |
| | 25 | 22.5 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 26 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4“ | 9 | 12 | 3/8“ | 9 | 12 |
| | 35 | 31 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8“ | 9 | 14 |
| | 45 | 40 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8“ | 10 | 18 |
| Type B | 20 | 20 | 6 | 5 | 9 | – | – | – | 1/4“ | 5 | 9 | – | – | – |
| | 25 | 22.5 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 26 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4“ | 9 | 12 | 3/8“ | 9 | 12 |
| | 35 | 31 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8“ | 9 | 14 |
| | 45 | 40 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8“ | 10 | 18 |
| Type C | 15 | 13 | 6 | 4 | 6 | – | – | – | 1/4“ | 4 | 6 | – | – | – |
| | 20 | 18 | 6 | 6 | 9 | – | – | – | 1/4“ | 6 | 9 | – | – | – |
| | 25 | 17.5 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 20 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4“ | 10 | 12 | 3/8“ | 10 | 12 |
| | 35 | 25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8“ | 10 | 12 |
| Type D | 20 | 25 | 6 | 6 | 9 | – | – | – | 1/4“ | 6 | 9 | – | – | – |
| | 25 | 25 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 30 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4“ | 10 | 12 | 3/8“ | 10 | 12 |
| | 35 | 36 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8“ | 10 | 12 |
| Type E | 15 | 13 | 6 | 4 | 6 | – | – | – | 1/4“ | 4 | 6 | – | – | – |
| | 25 | 17.5 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 20 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4“ | 10 | 12 | 3/8“ | 10 | 12 |
| | 35 | 25 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4“ | 10 | 12 | 3/8“ | 10 | 12 |
| | 45 | 30 | 6 | 13 | 12 | 10 | 13 | 12 | 1/4“ | 13 | 12 | 3/8“ | 13 | 12 |
| Type F | 25 | 25 | 6 | 6.5 | 9 | – | – | – | 1/4“ | 6.5 | 9 | – | – | – |
| | 30 | 30 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4“ | 10 | 12 | 3/8“ | 10 | 12 |
| | 35 | 36 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8“ | 10 | 12 |
| | 45 | 40 | – | – | – | 10 | 13 | 12 | – | – | – | 3/8“ | 13 | 12 |

All dimension in mm, unless otherwise specified.
Hole tolerance øD +0 / -0.013

## Lubrication Inlet Options

The standard carriage is supplied with a lubrication inlet centered over the rail. The carriage has multiple lubrication inlet point options. The options can be easily modified on-site in the field or can be supplied factory direct (Standard inlet hole is M3 for 15mm, M6 for 20mm, 25mm, 30mm 35mm, 45mm). See page 70 for available lubrication fittings.




**Option**

| | |
|---|---|
| ES10 | Inlets on side – both ends– all sides |
| ES11 | Inlet on top* – both ends |

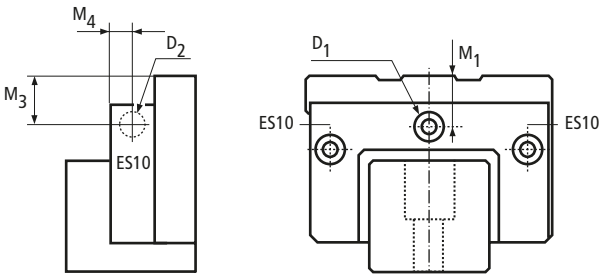
**Notes:**

1. *An O-Ring is required to properly seat the mating surfaces to prevent grease or oil from escaping.
   One is supplied with this option.
   Size 15 O-ring ID M3 x 1.78mm thick.
   Sizes 20–45 O-ring ID M6 x 1.78mm thick.
2. Set screw is installed in Standard inlet hole when ES10 and ES11 options are specified.
3. Inlets on side and top are solid plugs. When modified on-site, inlets must be punctured to be utilized.

**Lubrication inlet locates standard and ES10 option.**

| Size | Style | M1 | M3 | M4 | D1 | D2 |
|---|---|---|---|---|---|---|
| 15 | A | 4 | 4 | 4 | M3 | M3 |
| | C | | | | | |
| | E | 8 | 8 | | | |
| | G | 4 | 4 | | | |
| 20 | A | 5.2 | 5.2 | 5.2 | M6 | M3 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | G | 4.2 | 4.2 | 5 | M3 | M3 |
| 25 | A | 5.5 | 5.5 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | 9.5 | 9.5 | | | |
| | F | | | | | |
| 30 | A | 7 | 7 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | 10 | 10 | | | |
| | F | | | | | |
| 35 | A | 7 | 7 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | 14 | 14 | | | |
| | F | | | | | |
| 45 | A | 8 | 8 | 7.5 | M6 | M6 |
| | B | | | | | |
| | E | 18 | 18 | | | |
| | F | | | | | |

All dimensions in mm unless specified.

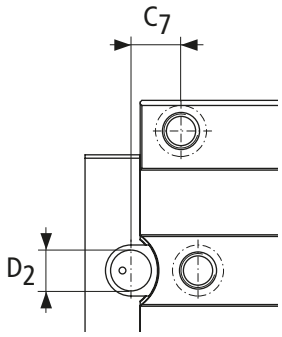



1. D1 and D2 are threaded holes in the end cap to ensure proper integrity and durability of connection.
2. Carriages are shipped with a grease fitting in the box.
   Size 15 include fitting 530LF3, Size 20 and up include fitting 530LN.
   See page 70 for more information.

### Lubrication inlet location ES11 option

| Size | Style | C7 | D1 | D2 | D3 | D4 |
|---|---|---|---|---|---|---|
| 15 | A | 8.000 | 4.47 | 8 | 1.78 | 4 |
| | C | 10.000 | | | | |
| | E | 10.000 | | | | |
| 20 | A | 10.500 | 6.75 | 10 | 1.78 | 6 |
| | B | 18.500 | | | | |
| | C | 12.500 | | | | |
| | D | 13.500 | | | | |
| 25 | A | 13.200 | 8.75 | 12 | 1.78 | 8 |
| | B | 22.700 | | | | |
| | C | 18.200 | | | | |
| | D | 20.200 | | | | |
| | E | 18.200 | | | | |
| | F | 20.200 | | | | |
| 30 | A | 13.200 | 8.75 | 12 | 1.78 | 8 |
| | B | 22.700 | | | | |
| | C | 18.200 | | | | |
| | D | 20.200 | | | | |
| | E | 18.200 | | | | |
| | F | 20.200 | | | | |
| 35 | A | 14.500 | 8.75 | 12 | 1.78 | 8 |
| | B | 27.250 | | | | |
| | C | 20.500 | | | | |
| | D | 22.250 | | | | |
| | E | 20.500 | | | | |
| | F | 22.250 | | | | |
| 45 | A | 17.000 | 8.75 | 12 | 1.78 | 8 |
| | B | 32.750 | | | | |
| | E | 27.000 | | | | |
| | F | 32.750 | | | | |

All dimensions in mm.




**D1** = O-Ring internal diameter
**D2** = Counterbore diameter
**D3** = O-Ring thickness
**D4** = Max. recommended diameter of lubrication inlet from above plate

## Grease Lubricants

Standard carriages are sold with oil preservative to protect the balls from corrosion during storage and transit. The carriages are available with the following assortment of lubricants. Additional greases are available upon request, please consult Thomson Application Engineering.

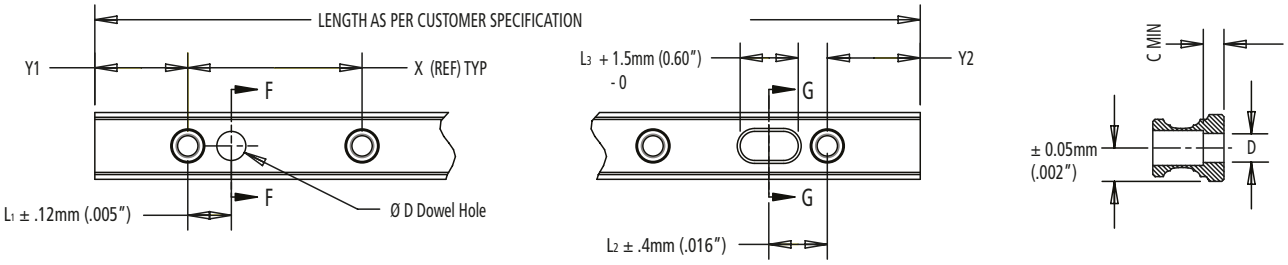
| Option | Type | Notes | Viscosity | Temperature Range |
|---|---|---|---|---|
| G1 | Mobilux® EP2 | All purpose NLGI2 grease | 160cSt @40°C | –20°C to 130°C |
| G2 | Krytox® GPL227 | High Temperature NLGI2 | 440cSt @40°C | –30°C to 288°C |
| G3 | Thomson LinearLube | Food Grade NLGI2 grease | 350cSt @40°C | –54°C to 230°C |
| GS | Customer specified at time of order | | | |

## Rail Length

### Maximum Length of One Piece Rail

| Size (mm) | 15 | 20 | 25 | 30 | 35 | 45 |
|---|---|---|---|---|---|---|
| One Piece Rail Length | 3000 mm | | 6000 mm | | | |

## Extended Standard Rail Options

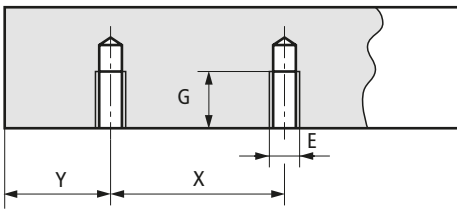



| Option | D | L1 | L2 | L3 | C |
|---|---|---|---|---|---|
| DH1 | 6mm | 30mm | 30mm | 10.2 mm | 9.5 mm |
| DH2 | 10mm | 30mm | 30mm | 13.8 mm | 9.5 mm |
| DH3 | 1/4" | 1.181" | 1.181" | .542" | 3/8" |
| DH4 | 3/8" | 1.181" | 1.181" | .542" | 3/8" |

Y1 = Y2 unless specified at time of ordering
*Size 25 and up step will be present around bottom of slot to control width tolerance during milling of slot.

The rail can be supplied with dowel holes, radial holes and coaxial holes to meet your application needs. Please provide a drawing of your requirement and our Application Engineering Team can provide a quote or select one of our extended standard options.

## 521 Type U Rail – Bolt Up From Bottom




| Size | X | E | G (mm) | Weight (kg/m) |
|---|---|---|---|---|
| 15 | 60 | M5 | 8 | 1.4 |
| 20 | 60 | M6 | 10 | 2.2 |
| 25 | 60 | M6 | 12 | 3 |
| 30 | 80 | M8 | 15 | 4.3 |
| 35 | 80 | M8 | 15 | 5.4 |
| 45 | 105 | M12 | 19 | 8.8 |

Customer to specify Y dimensions upon ordering $Y_1 = Y_2$ if not specified

## Thin Dense Chrome Plating

Rails and carriages are available with Thin Dense Chrome Plating with a thickness of 2–4 µm. As a result of the plating thickness range compared to the tolerance ranges in the different accuracy classes, it is only available in the High and Precision accuracy classes up to 3 meters long as a single rail; longer lengths require butt joints.

### Carriage assortment with Thin Dense Chrome

| | | | | | Preload | | |
|---|---|---|---|---|---|---|---|
| Type | Style | Size | Accuracy | Clearance | 0.03C | 0.08C | 0.13C |
| 511 | A | 15 | H | 511H15A0D | 511H15A1D | 511H15A2D | - |
| | | | P | - | 511P15A1D | 511P15A2D | 511P15A3D |
| | | 20 | H | 511H20A0D | 511H20A1D | 511H20A2D | - |
| | | | P | - | 511P20A1D | 511P20A2D | 511P20A3D |
| | | 25 | H | 511H25A0D | 511H25A1D | 511H25A2D | - |
| | | | P | - | 511P25A1D | 511P25A2D | 511P25A3D |
| | | 30 | H | 511H30A0D | 511H30A1D | 511H30A2D | - |
| | | | P | - | 511P30A1D | 511P30A2D | 511P30A3D |
| | | 35 | H | 511H35A0D | 511H35A1D | 511H35A2D | - |
| | | | P | - | 511P35A1D | 511P35A2D | 511P35A3D |
| | | 45 | H | 511H45A0D | 511H45A1D | 511H45A2D | - |
| | | | P | - | 511P45A1D | 511P45A2D | 511P45A3D |
| | B | 20 | H | 511H20B0D | 511H20B1D | 511H20B2D | - |
| | | | P | - | 511P20B1D | 511P20B2D | 511P20B3D |
| | | 25 | H | 511H25B0D | 511H25B1D | 511H25B2D | - |
| | | | P | - | 511P25B1D | 511P25B2D | 511P25B3D |
| | | 30 | H | 511H30B0D | 511H30B1D | 511H30B2D | - |
| | | | P | - | 511P30B1D | 511P30B2D | 511P30B3D |
| | | 35 | H | 511H35B0D | 511H35B1D | 511H35B2D | - |
| | | | P | - | 511P35B1D | 511P35B2D | 511P35B3D |
| | | 45 | H | 511H45B0D | 511H45B1D | 511H45B2D | - |
| | | | P | - | 511P45B1D | 511P45B2D | 511P45A3D |
| | C | 15 | H | 511H15C0D | 511H15C1D | 511H15C2D | - |
| | | | P | - | 511P15C1D | 511P15C2D | 511P15C3D |
| | | 20 | H | 511H20C0D | 511H20C1D | 511H20C2D | - |
| | | | P | - | 511P20C1D | 511P20C2D | 511P20C3D |
| | | 25 | H | 511H25C0D | 511H25C1D | 511H25C2D | - |
| | | | P | - | 511P25C1D | 511P25C2D | 511P25C3D |
| | | 30 | H | 511H30C0D | 511H30C1D | 511H30C2D | - |
| | | | P | - | 511P30C1D | 511P30C2D | 511P30C3D |
| | | 35 | H | 511H35C0D | 511H35C1D | 511H35C2D | - |
| | | | P | - | 511P35C1D | 511P35C2D | 511P35C3D |

| | | | | | | Preload | |
|---|---|---|---|---|---|---|---|
| Type | Style | Size | Accuracy | Clearance | 0.03C | 0.08C | 0.13C |
| 511 | D | 20 | H | 511H20D0D | 511H20D1D | 511H20D2D | - |
| | | | P | - | 511P20D1D | 511P20D2D | 511P20D3D |
| | | 25 | H | 511H25D0D | 511H25D1D | 511H25D2D | - |
| | | | P | - | 511P25D1D | 511P25D2D | 511P25D3D |
| | | 30 | H | 511H30D0D | 511H30D1D | 511H30D2D | - |
| | | | P | - | 511P30D1D | 511P30D2D | 511P30D3D |
| | | 35 | H | 511H35D0D | 511H35D1D | 511H35D2D | - |
| | | | P | - | 511P35D1D | 511P35D2D | 511P35D3D |
| | E | 15 | H | 511H15E0D | 511H15E1D | 511H15E2D | - |
| | | | P | - | 511P15E1D | 511P15E2D | 511P15E3D |
| | | 25 | H | 511H25E0D | 511H25E1D | 511H25E2D | - |
| | | | P | - | 511P25E1D | 511P25E2D | 511P25E3D |
| | | 30 | H | 511H30E0D | 511H30E1D | 511H30E2D | - |
| | | | P | - | 511P30E1D | 511P30E2D | 511P30E3D |
| | | 35 | H | 511H35E0D | 511H35E1D | 511H35E2D | - |
| | | | P | - | 511P35E1D | 511P35E2D | 511P35E3D |
| | | 45 | H | 511H45E0D | 511H45E1D | 511H45E2D | - |
| | | | P | - | 511P45E1D | 511P45E2D | 511P45E3D |
| | F | 25 | H | 511H25F0D | 511H25F1D | 511H25F2D | - |
| | | | P | - | 511P25F1D | 511P25F2D | 511P25F3D |
| | | 30 | H | 511H30F0D | 511H30F1D | 511H30F2D | - |
| | | | P | - | 511P30F1D | 511P30F2D | 511P30F3D |
| | | 35 | H | 511H35F0D | 511H35F1D | 511H35F2D | - |
| | | | P | - | 511P35F1D | 511P35F2D | 511P35F3D |
| | | 45 | H | 511H45F0D | 511H45F1D | 511H45F2D | - |
| | | | P | - | 511P45F1D | 511P45F2D | 511P45F3D |
| | G | 15 | H | 511H15G0D | 511H15G1D | 511H15G2D | - |
| | | | P | - | 511P15G1D | 511P15G2D | 511P15G3D |
| | | 20 | H | 511H20G0D | 511H20G1D | 511H20G2D | - |
| | | | P | - | 511P20G1D | 511P20G2D | 511P20G3D |

Chrome plated carriages and rails are designed and manufactured to be used together. If a non-chrome plated carriage is used on a chrome plated rail the clearance or preload of the carriage will be increased approximately one class. If a chrome plated carriage is used on a non-chrome plated rail the clearance or preload will be decreased approximately one class. This is the result of the coating thickness.

## Modular Accessory Combination Options and Screw Size

| Option | Description | Size | | | | | |
|---|---|---|---|---|---|---|---|
| | | 15 | | 20 | | 25 | |
| L[3] | "Lube for Life" Lube Block | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x35 |
| N[3] | Oil Reservoir | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x30 |
| V[3] | Viton Wiper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M4-0.7x25 |
| Z[3] | Metal Scraper | Low/socket head screw | M2.5-0.45x15 | Low/socket head screw | M2.5-0.45x15 | Low/socket head screw | M4-0.7x20 |
| C[3] | Bellows Clips | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M4-0.7x20 |
| LV | Lube Block + Wiper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| LVC | Lube Block, Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| LVZ | Lube Block, Wiper + Scraper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| LVZC | Lube Block, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| LZ | Lube Block + Scraper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x35 |
| LZC | Lube Block, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| LC | Lube Block + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| NV | Oil Reservoir + Wiper | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x40 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M2.5-0.45x35 | Low/socket head screw | M4-0.7x40 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x40 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M2.5-0.45x35 | Flat/socket head screw | M4-0.7x40 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| VC | Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M4-0.7x25 |
| VZC | Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x30 |
| VZ | Viton Wiper + Scraper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x25 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M4-0.7x20 |

1. All fasteners are standard threads.
2. Consult Thomson for options not listed, engineering review is required.
3. When ordering component only, two screws include.

| Option | Description | Size | | | | | |
|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | |
| L | "Lube for Life" Lube Block | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| N | Oil Reservoir | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M4-0.7x35 | Low/socket head screw | M5-0.8x45 |
| V | Viton Wiper | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M5-0.8x35 |
| Z | Metal Scraper | Low/socket head screw | M4-0.7x20 | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M5-0.8x30 |
| C | Bellows Clips | Flat/socket head screw | M4-0.7x20 | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M5-0.8x30 |
| LV | Lube Block + Wiper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LVC | Lube Block, Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LVZ | Lube Block, Wiper + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LVZC | Lube Block, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LZ | Lube Block + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LZC | Lube Block, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LC | Lube Block + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| NV | Oil Reservoir + Wiper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x55 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x55 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M4-0.7x50 | Flat/socket head screw | M5-0.8x55 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw | M4-0.7x35 | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M5-0.8x45 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw | M4-0.7x35 | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M5-0.8x50 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw | M4-0.7x35 | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M5-0.8x50 |
| VC | Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M5-0.8x35 |
| VZC | Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M5-0.8x35 |
| VZ | Wiper + Scraper | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M5-0.8x35 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x20 | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M5-0.8x30 |

Consult Thomson for options not listed, engineering review required.

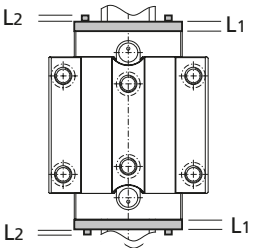
# Modular Accessories




## Additional Wiper

| Size | Viton® Part No. | L1 (mm) | L2 (mm) | Weight (kg) |
|---|---|---|---|---|
| 15 | 531VR15 | 7 | 4 | 0.005 |
| 20 | 531VR20 | 7 | 4 | 0.008 |
| 25 | 531VR25 | 7 | 4 | 0.010 |
| 30 | 531VR30 | 7 | 4 | 0.016 |
| 35 | 531VR35 | 7 | 4 | 0.022 |
| 45 | 531VR45 | 7 | 4 | 0.036 |

L1 – wiper thickness, L2 – max. screw head stickout
Can be installed without removing carriage from rail

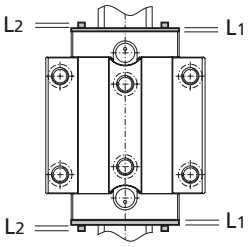





## Metal Scraper

| Size | Scraper Part No. | L1 (mm) | L2 (mm) | Weight (kg) |
|---|---|---|---|---|
| 15 | 531ZZ15 | 1.5 | 4 | 0.005 |
| 20 | 531ZZ20 | 1.5 | 4 | 0.009 |
| 25 | 531ZZ25 | 1.5 | 4 | 0.011 |
| 30 | 531ZZ30 | 1.5 | 4 | 0.018 |
| 35 | 531ZZ35 | 1.5 | 4 | 0.024 |
| 45 | 531ZZ45 | 1.5 | 4 | 0.057 |

L1 – scraper thickness, L2 – max. screw head stickout

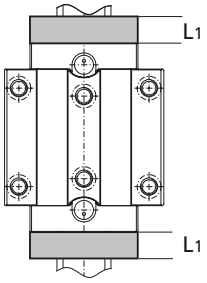


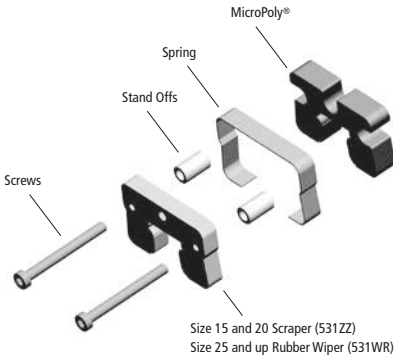



## Oil Reservoir

| Size | Lubrication Plate | L1 (mm) | Weight (kg) |
|---|---|---|---|
| 15 | 5310W15 | 8.5 | 0.004 |
| 20 | 5310W20 | 11 | 0.010 |
| 25 | 5310W25 | 12.7 | 0.017 |
| 30 | 5310W30 | 14 | 0.023 |
| 35 | 5310W35 | 16.2 | 0.039 |
| 45 | 5310W45 | 19.2 | 0.065 |

L1 = Oil reservoir thickness, screw heads are recessed in plate

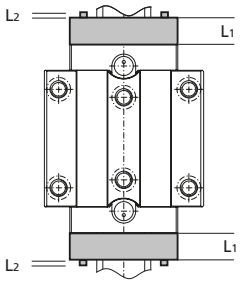





## Lube Block

| Size | Lubrication Plate | L1 (mm) | L2 (mm) | Weight (kg) |
|---|---|---|---|---|
| 15 | 531 LL 15 | 9.9 | 4 | 0.009 |
| 20 | 531 LL 20 | 11.9 | 4 | 0.024 |
| 25 | 531 LL 25 | 19.5 | 4 | 0.083 |
| 30 | 531 LL 30 | 21.2 | 4 | 0.213 |
| 35 | 531 LL 35 | 24.7 | 4 | 0.069 |
| 45 | 531 LL 45 | 26.9 | 4 | 0.123 |

L1 = Lube Block thickness, L2 = max. screw head stickout




When supplied from the factory as a complete unit the carriage is packed with EP2 grease and spring is loose for customer to install after assembling carriage on the rail.

Z scraper included in lube block assembly on sizes 15 and 20.
W wiper included on sizes 25 and up.

## Example

| **511 Size 45 carriage with 5310W and 531WR modular seals on both sides:** | |
|---|---|
| Carriage Length (L) | = 89.3 |
| 531 OW 45 $L_1$ x 2 | = 12.7 x 2 |
| 531 WR 45 $L_1$ x 2 | = 7 x 2 |
| 531 WR 45 $L_2$ x 2 | = 4 x 2 |
| Total Length | = 136.7 mm |

Each modular seal is supplied with the proper screws to install the seal over the standard end cap. When combinations of modular seals are used longer screws may be required, consult table on page 35 & 36 for proper screw size.

## Bellows Dimensional Information

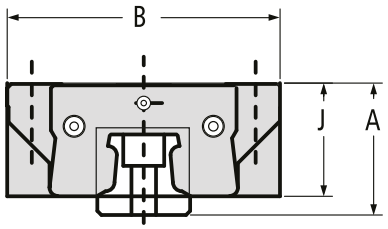
Bellows are available in three styles:

**531 BB** "Low Profile" with outside dimensions that do not exceed the carriage, constructed of polyurethane coated polyester, maximum ambient temperature of 80°C (175°F).

**531 BC** "High Compression" constructed of a spark resistant Teflon® coated fiberglass and designed to allow for higher compression, maximum ambient temperature exceeds maximum bearing peak temperatures.

**531 WC** "Walk On" capable of handling the harshest environments, including welding and grinding applications, with a 90 kg load bearing capacity.

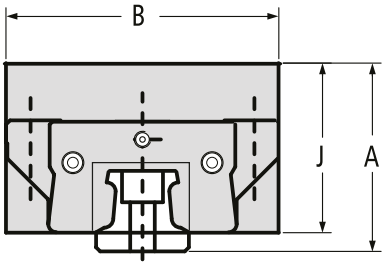
The bellows can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate, 531 CR. These can be easily installed on-site in the field or can be supplied from the factory.




### 531 BB "Low Profile" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 15 | 531 BB15 | 45 | 23 | 26 | 0.17 |
| 20 | 531 BB20 | 41.6 | 24 | 29 | 0.17 |
| 25 | 531 BB25 | 43.7 | 29 | 35.5 | 0.17 |
| 30 | 531 BB30 | 51.2 | 33.3 | 40.3 | 0.17 |
| 35 | 531 BB35 | 64 | 39.5 | 47.5 | 0.15 |
| 45 | 531 BB45 | 76 | 48 | 58 | 0.15 |

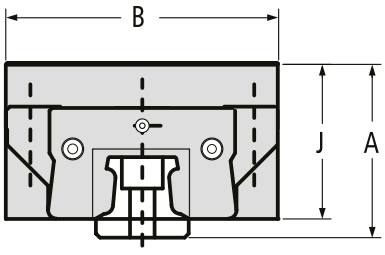
Customer to specify extended length at time of order, see page 122 for how to calculate.




### 531 BC "High Compression" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 15 | 531 BC15 | 59 | 33 | 36 | 0.10 |
| 20 | 531 BC20 | 61.6 | 34 | 39 | 0.10 |
| 25 | 531 BC25 | 63.7 | 39 | 45.5 | 0.10 |
| 30 | 531 BC30 | 71.5 | 43.3 | 50.3 | 0.10 |
| 35 | 531 BC35 | 84 | 49.5 | 57.5 | 0.07 |
| 45 | 531 BC45 | 76 | 58 | 68 | 0.07 |

Customer to specify extended length at time of order, see page 122 for how to calculate.




### 531 BW "Walk On" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 15 | 531 BW15 | 55 | 30 | 31 | 0.19 |
| 20 | 531 BW20 | 61 | 33 | 34 | 0.19 |
| 25 | 531 BW25 | 65 | 36 | 40.5 | 0.19 |
| 30 | 531 BW30 | 70 | 39 | 44.2 | 0.19 |
| 35 | 531 BW35 | 77 | 42 | 48 | 0.19 |
| 45 | 531 BW45 | 101 | 53 | 61 | 0.15 |

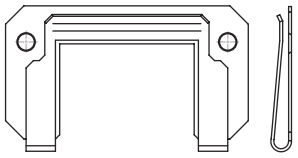
Customer to specify extended length at time of order, see page 122 for how to calculate.

# Bellow Clip Adapter Plates

### 531 CC Carriage Bellows Clips – Attachment Plate

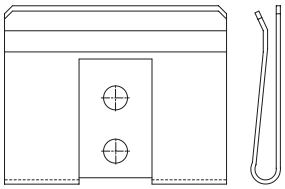
The 531 CC Carriage Bellows Clip – Attachment Plate is used to attach the bellows to the carriage. The bellows clip – adapter plate is made of steel.

| Size | Part No. |
|---|---|
| 15 | 531 CC15 |
| 20 | 531 CC20 |
| 25 | 531 CC25 |
| 30 | 531 CC30 |
| 35 | 531 CC35 |
| 45 | 531 CC45 |

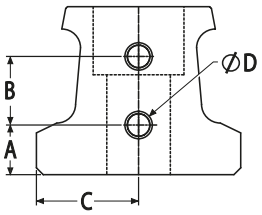


### 531 CR Rail Bellows Clips – Attachment Plate

The 531 CR Rail Bellow Clip – Attachment Plate is used to attach the bellows to the rail. The attaching holes can be drilled in the end of the rail if retrofitting or can be supplied from the factory. (Note: Size 15 rail is through hardened, annealing the end of the rail is required to properly drill end plate clip this results in an area on the end of the rail that will be soft and possibly out of tolerance). The bellows clip – adapter plate is made of steel.



**Rail End Machine Detail**




| Size | Part No. | Rail Machining Detail | | | | | Screw[1] | | | | MinY[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | Depth Min | Depth Max | Size | Pitch | Length | Type | |
| 15[3] | 531 CR15 | 3.50 | 8.00 | 7.50 | | | | | | | 14 |
| 20 | 531 CR20 | 5.00 | 8.00 | 10.00 | 5.70 | 7.70 | M3 | 0.5 | 8 | Button | 15 |
| 25 | 531 CR25 | 7.24 | 10.00 | 11.50 | | | | | | Head | 17 |
| 30 | 531 CR30 | 9.12 | 10.00 | 14.00 | 7.70 | 9.70 | M4 | 0.7 | 10 | Cap | 20 |
| 35 | 531 CR35 | 11.00 | 10.00 | 17.00 | | | | | | Screw | 20 |
| 45 | 531 CR45 | 15.01 | 10.00 | 22.50 | | | | | | | 22 |

All dimensions in mm, unless otherwise specified.

1. Two screws are supplied with each Rail Bellow Clip.
2. Min Y dimension to ensure drill depth does not break through rail mounting hole.
3. Rail end may require annealing, see note above.

## Maintenance and Installation Tools and Accessories

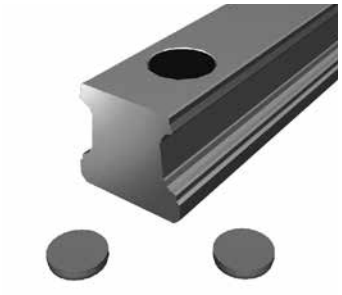
The assembly rail is required when the carriage must be removed from the rail and then reinstalled to ensure proper installation. It is recommended to leave the carriage on the assembly rail when it is removed to protect the balls against contamination. If necessary, the two internal mounting screws for fastening runner blocks to the carriage can be tightened to ensure the carriage remains on the assembly rail. The assembly rail is made of plastic.

### Assembly Rail – 531 MT



| Part Number | Size | Length (mm) | Weight (kg) |
|---|---|---|---|
| 531 MT 15 | 15 | 80 | 0.010 |
| 531 MT 20 | 20 | 115 | 0.021 |
| 531 MT 25 | 25 | 130 | 0.031 |
| 531 MT 30 | 30 | 160 | 0.061 |
| 531 MT 35 | 35 | 165 | 0.076 |
| 531 MT 45 | 45 | 200 | 0.135 |

### Standard Rail Plugs and Tape for use with to 500 Series Ball Carriage Type A



| Type HP plastic plugs | Size |
|---|---|
| 531 HP 15 | 15 |
| 531 HP 20 | 20 |
| 531 HP 25 | 25 |
| 531 HP 30 | 30 |
| 531 HP 35 | 35 |
| 531 HP 45 | 45 |

Material: Nylon

| Mylar Tape | Size | Length |
|---|---|---|
| 531 RT 15 | 15 | 3m |
| 531 RT 20 | 20 | 3m |
| 531 RT 25 | 25 | 3m |
| 531 RT 30 | 30 | 3m |
| 531 RT 35 | 35 | 3m |
| 531 RT 45 | 45 | 3m |

### 500 Series Rail with Stainless Steel Cover Strip

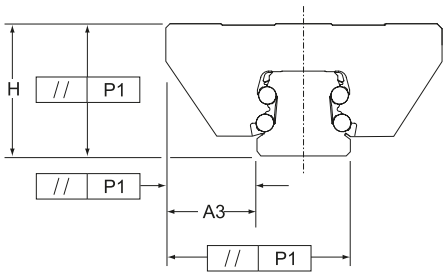


| Size | Rail Coverstrip End Caps Part Number[1] | Mounting Tool Part Number | Replacement End Caps Part Number[2] | Standard Coverstrip Rail Part Number[3] | Coverstrip Width (mm) | Max Single PC Length (mm) |
|---|---|---|---|---|---|---|
| 25 | 531RCS25 | 531RCT25 | 531RCP25 | 521H25C | 15 | 6000 |
| 30 | 531RCS30 | 531RCT30 | 531RCP30 | 521H30C | 19 | 6000 |
| 35 | 531RCS35 | 531RCT35 | 531RCP35 | 521H35C | 25 | 6000 |
| 45 | 531RCS45 | 531RCT45 | 531RCP45 | 521H45C | 25 | 6000 |

1. Customer to specify length of rail to be used on at time of order. Delivered piece will be 2 to 3.5 mm longer in order to properly install and fit end caps.
2. Two end caps are supplied with each piece of 531RCS ordered.
3. H grade accuracy shown for example purposes, P and U grade accuracy are available.
4. Cover strip should not be installed more than 3 times.

## Accuracy Class

Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

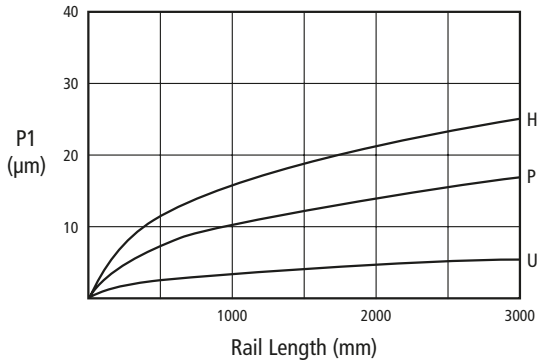



Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the rail. This is analogous to straightness of travel. As such, parallelism describes attributes of the rail only.

Assembly Accuracy describes the tolerance on H and A3 as a function of a carriage – rail assembly, measured from the nominal dimensions.

Pair Variation describes tolerance on H and A3 as a function of carriages at the same position on a common rail. Pair variation describes carriage precision only.

The accuracy class selected will partially determine the accuracy of the system. Other factors such as mounting surface flatness and straightness also significantly affect system accuracy.




### Tolerances

| | Accuracy Class | | |
|---|---|---|---|
| | H - High | P - Precision | U - Ultra Precision |
| Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail) | ±50 | ±20 | ±5 |
| Pair Variation Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at the middle of carriage at same position on rail) | 15 | 7 | 3 |
| Running Parallelism | 100 | 40 | 10 |

All values in µm

## Preload

Three Preload classes and one clearance class are available with the 500 Series Ball Profile Rail carriages. Preload will minimize elastic deformation caused by external forces resulting in increased rigidity. Preload will eliminate internal clearances between the rail and carriage resulting in zero backlash.

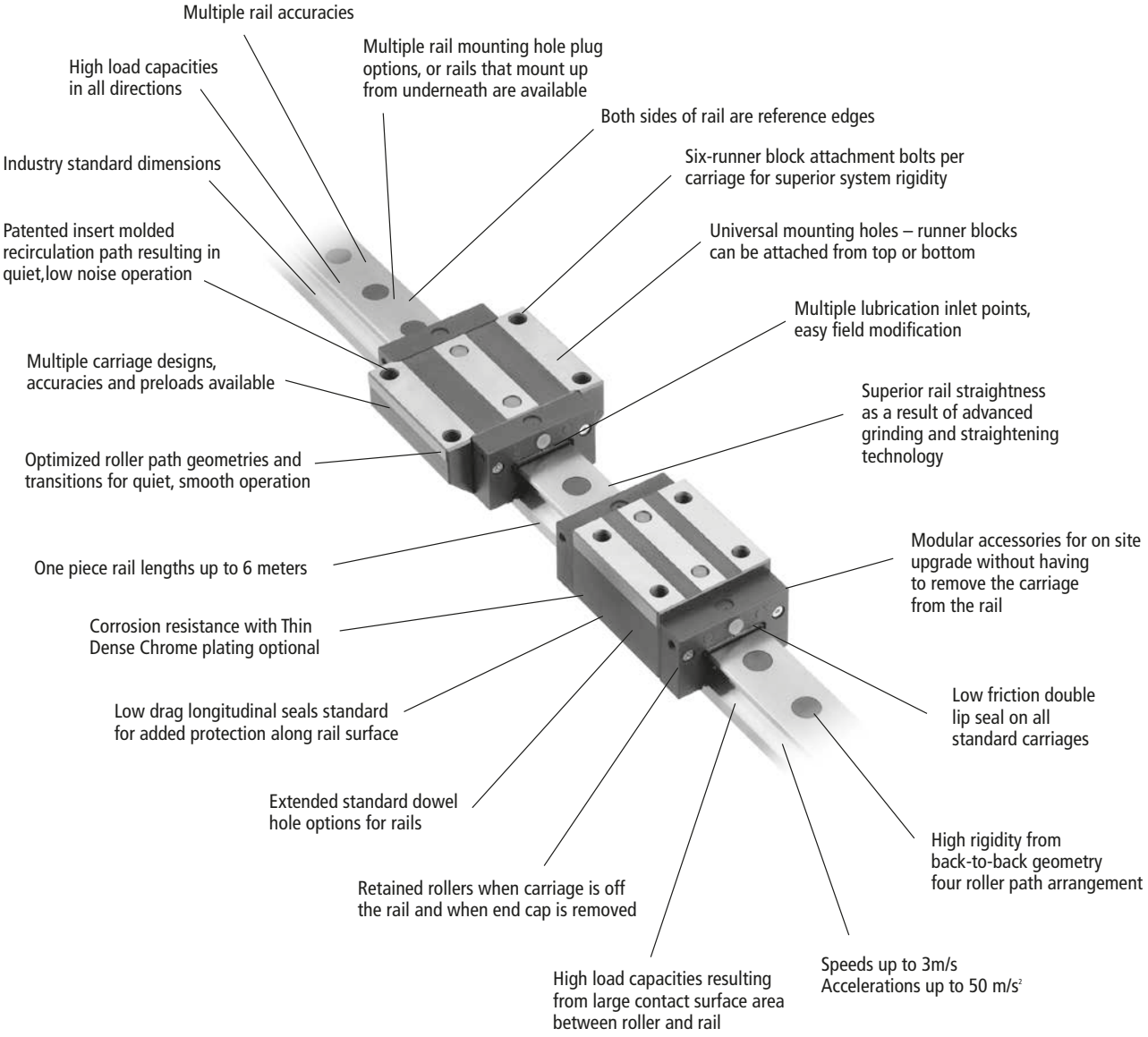
### Preload Accuracy Combinations

| Accuracy Class | Clearance | Preload | | |
|---|---|---|---|---|
| | | 0.03C[1] | 0.08C[1] | 0.13C[1] |
| H | 0 | 1 | 2 | |
| P, U | | 1 | 2 | 3 |

1. C = Dynamic load capacity of the bearing
2. A preloaded bearing loaded beyond the preload value has the same characteristics as a clearance bearing. Example: Size 25 A style carriage has dynamic load capacity of 21.1kN,
Medium Preload = 0.08C = 0.08 x 21.1kN = 1.7kN;
if applied load is greater than 1.7kN preload has no benefit.

**NOTES:**

# 500 Series Roller Profile Rail Linear Guide



## 500 Series Roller Profile Rail Linear Guide



**Features**
The Thomson 500 Series Linear Guide provides long life, exceptional rigidity, high dynamic and static load capacities, accommodation for high moment loads, high running accuracy, multiple sealing options and multiple lubrication inlet options. This allows for on-site field modification, and interchangeability with competitor offering.

These properties result in improved machine accuracies and rigidity resulting in reduced vibration extending machine and tool life. This has a direct effect on your operational efficiency resulting in cost savings for the user.

Available in 4 carriage designs.

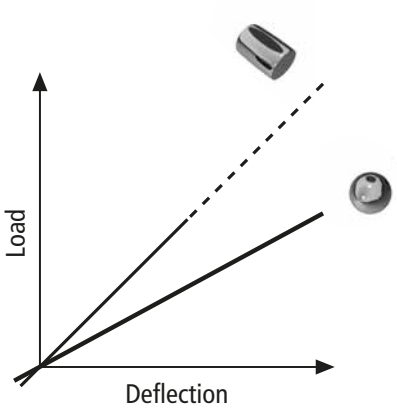
**Materials**
The 500 Series Roller Linear Guide is produced from high quality bearing steel. The end cap is made of a high strength, glass-filled nylon with a nitrile rubber seal. All carriages and rolling elements are through hardened and all rails are case hardened. Stringent quality controls are in place to ensure consistency of materials from the source, allowing us to ensure that we deliver the highest quality product.

**Interchangeability**
The 500 Series Roller Linear Guide is completely interchangeable. Any carriage can be run on any rail of the same accuracy without compromising system accuracy. This is the result of our stringent manufacturing process controls.

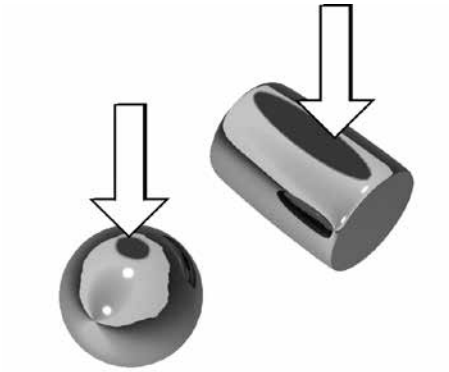
**Accuracy and Preload**
The 500 Series Roller Linear Guide is available in three different accuracy classes, and three different preloads ranges to allow for customization to your application needs.

**Straightness**
The 500 Series Roller rail is subjected to multiple straightening processes during and after grinding of the roller paths, on one piece rails up to 6 meters long.

These added processes and inspections result in some of the straightest rails in the market today, improving machine accuracies wherever the 500 Series Roller is used.



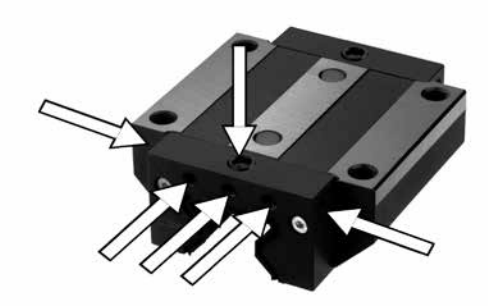

**Rigidity**
Profile Rail Linear Guide bearings have a significant effect on the overall system rigidity. The 500 Series Roller rigidity is achieved by using the equivalent of a back-to-back bearing arrangement, complemented by special rollers that are crowned to prevent roller edge loading when misalignment is present. This results in lower elastic deformation as the load increases compared to a ball carriage or face-to-face bearing arrangement.



**Load Capacity**
The roller has an increased load capacity over the ball as a result of the increased contacting surface across the length of the roller. A ball provides a single point contact area, while a roller provides a much greater line contact area. This results in a substantially higher load carrying capacity and lower wear with minimum rolling friction.



**Running Smoothness / Low Noise**
The running smoothness and low noise are the result of a propriety insert molded recirculation path that has an optimized geometric shape and minimal transitions. This ensures smooth, quiet operation.



**Multiple Lubrication Options**
The carriage standard end cap is designed for flexibility. The end cap is equipped with six lubrication inlet points and additional internal options for directing grease or oil to the proper location. These options are easily changed on-site in the field or can be supplied from the factory. Not all options available on size 25.

Unsure of the best lubrication inlet location? These carriages will allow the user to make these changes easily in the field to optimize the system performance. In addition, they allow for ease in maintenance.



**Modular Accessory Options**
The carriage is supplied standard with low friction double lip seals and longitudinal seals that completely enclose the bearing carriage to protect the rollers and track surfaces and minimize lubrication loss.

Optional metal scrapers or wiper and oil reservoir components can be easily added on-site in the field or can be supplied assembled from the factory.

These innovative design features allow users to easily, efficiently, and economically upgrade carriage sealing and lubrication without needing to replace the entire carriage assembly.



**Longitudinal Seals**
The carriage has built-in under carriage low drag longitudinal seals that protect the rollers and roller track surfaces from contamination. These longitudinal seals are an added protection to increase the life and overall performance.

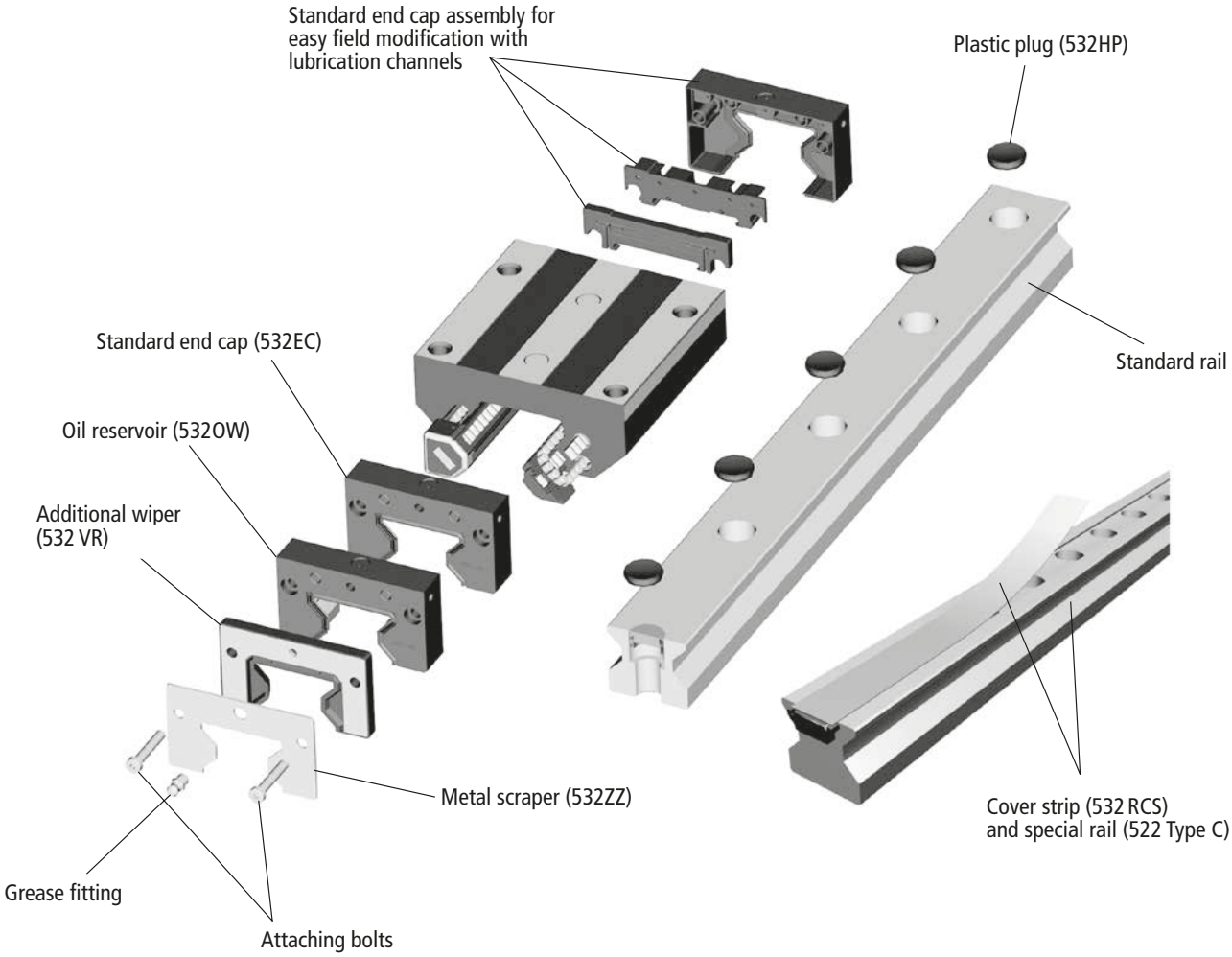


**Rail Accessories**
The rails have multiple options to fill the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plugs are available in plastic, brass, or stainless steel. A special rail is available that utilizes a custom cover strip. In addition, Thomson stocks an assortment of bellows to protect the entire assembly. All options are available from stock and represent another innovative design feature of the 500 Series. Mounting tools for easy and correct installation are available as well.

**Retained Rollers**
The rolling elements of the carriages are retained within the bearing so the carriage can be removed from the rail, or the end cap from the carriage, without worrying about the rollers falling out. It is recommended to place any removed carriage onto a mounting rail or shipping arbor to provide added protection to the rolling elements.

# 500 Series Roller Profile Rail Linear Guide

### Modular Design Exploded View

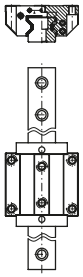
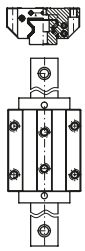
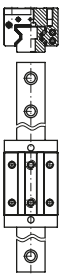
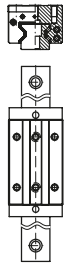



Also available (not shown):
- Stainless Steel Rail Plugs (532 HS)
- Brass Rail Plugs (532 HB)
- Mylar Tape (532 RT)
- Bolt up from bottom rail (522 Type U)

The modular, building block design of the 500 Series Roller Profile Rail Linear Guide assembly for easy on-site field upgrades, for quick seal or lubrication upgrades all without the need for new carriage or rails.

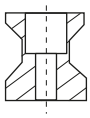
## 500 Series Roller Standard Carriages

Thomson offers four carriage styles with six mounting holes allowing for additional mounting configurations in the field or retrofitting. All provide superior rigidity and design flexibility.

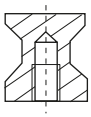
| Style | | | Size | Accuracy | Basic Part Number Preload | | | Standard Rail Part Number | Max. Single Piece Rail Length (mm) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0.03C | 0.08C | 0.13C | | |
| Standard Carriage | A |  | 25 | P | 512P25A1 | 512P25A2 | 512P25A3 | 522P25A | 6000 |
| | | | | S | 512S25A1 | 512S25A2 | 512S25A3 | 522S25A | |
| | | | | U | 512U25A1 | 512U25A2 | 512U25A3 | 522U25A | |
| | | | 35 | P | 512P35A1 | 512P35A2 | 512P35A3 | 522P35A | 6000 |
| | | | | S | 512S35A1 | 512S35A2 | 512S35A3 | 522S35A | |
| | | | | U | 512U35A1 | 512U35A2 | 512U35A3 | 522U35A | |
| | | | 45 | P | 512P45A1 | 512P45A2 | 512P45A3 | 522P45A | 6000 |
| | | | | S | 512S45A1 | 512S45A2 | 512S45A3 | 522S45A | |
| | | | | U | 512U45A1 | 512U45A2 | 512U45A3 | 522U45A | |
| | | | 55 | P | 512P55A1 | 512P55A2 | 512P55A3 | 522P55A | 6000 |
| | | | | S | 512S55A1 | 512S55A2 | 512S55A3 | 522S55A | |
| | | | | U | 512U55A1 | 512U55A2 | 512U55A3 | 522U55A | |
| Standard Long Carriage | B |  | 25 | P | 512P25B1 | 512P25B2 | 512P25B3 | 522P25A | 6000 |
| | | | | S | 512S25B1 | 512S25B2 | 512S25B3 | 522S25A | |
| | | | | U | 512U25B1 | 512U25B2 | 512U25B3 | 522U25A | |
| | | | 35 | P | 512P35B1 | 512P35B2 | 512P35B3 | 522P35A | 6000 |
| | | | | S | 512S35B1 | 512S35B2 | 512S35B3 | 522S35A | |
| | | | | U | 512U35B1 | 512U35B2 | 512U35B3 | 522U35A | |
| | | | 45 | P | 512P45B1 | 512P45B2 | 512P45B3 | 522P45A | 6000 |
| | | | | S | 512S45B1 | 512S45B2 | 512S45B3 | 522S45A | |
| | | | | U | 512U45B1 | 512U45B2 | 512U45B3 | 522U45A | |
| | | | 55 | P | 512P55B1 | 512P55B2 | 512P55B3 | 522P55A | 6000 |
| | | | | S | 512S55B1 | 512S55B2 | 512S55B3 | 522S55A | |
| | | | | U | 512U55B1 | 512U55B2 | 512U55B3 | 522U55A | |
| | | | 65 | P | 512P65B1 | 512P65B2 | 512P65B3 | 522P65A | 6000 |
| | | | | S | 512S65B1 | 512S65B2 | 512S65B3 | 522S65A | |
| | | | | U | 512U65B1 | 512U65B2 | 512U65B3 | 522U65A | |
| Narrow Carriage | C |  | 25 | P | 512P25C1 | 512P25C2 | 512P25C3 | 522P25A | 6000 |
| | | | | S | 512S25C1 | 512S25C2 | 512S25C3 | 522S25A | |
| | | | | U | 512U25C1 | 512U25C2 | 512U25C3 | 522U25A | |
| | | | 35 | P | 512P35C1 | 512P35C2 | 512P35C3 | 522P35A | 6000 |
| | | | | S | 512S35C1 | 512S35C2 | 512S35C3 | 522S35A | |
| | | | | U | 512U35C1 | 512U35C2 | 512U35C3 | 522U35A | |
| | | | 45 | P | 512P45C1 | 512P45C2 | 512P45C3 | 522P45A | 6000 |
| | | | | S | 512S45C1 | 512S45C2 | 512S45C3 | 522S45A | |
| | | | | U | 512U45C1 | 512U45C2 | 512U45C3 | 522U45A | |
| | | | 55 | P | 512P55C1 | 512P55C2 | 512P55C3 | 522P550A | 6000 |
| | | | | S | 512S55C1 | 512S55C2 | 512S55C3 | 522S55A | |
| | | | | U | 512U55C1 | 512U55C2 | 512U55C3 | 522U55A | |
| Narrow Long Carriage | D |  | 25 | P | 512P25D1 | 512P25D2 | 512P25D3 | 522P25A | 6000 |
| | | | | S | 512S25D1 | 512S25D2 | 512S25D3 | 522S25A | |
| | | | | U | 512U25D1 | 512U25D2 | 512U25D3 | 522U25A | |
| | | | 35 | P | 512P35D1 | 512P35D2 | 512S35D3 | 522P35A | 6000 |
| | | | | S | 512S35D1 | 512S35D2 | 512S35D3 | 522S35A | |
| | | | | U | 512U35D1 | 512U35D2 | 512U35D3 | 522U35A | |
| | | | 45 | P | 512P45D1 | 512P45D2 | 512P45D3 | 522P45A | 6000 |
| | | | | S | 512S45D1 | 512S45D2 | 512S45D3 | 522S45A | |
| | | | | U | 512U45D1 | 512U45D2 | 512U45D3 | 522U45A | |
| | | | 55 | P | 512P55D1 | 512P55D2 | 512P55D3 | 522P55A | 6000 |
| | | | | S | 512S55D1 | 512S55D2 | 512S55D3 | 522S55A | |
| | | | | U | 512U55D1 | 512U55D2 | 512U55D3 | 522U55A | |
| | | | 65 | P | 512P65D1 | 512P65D2 | 512P65D3 | 522P65A | 6000 |
| | | | | S | 512S65D1 | 512S65D2 | 512S65D3 | 522S65A | |
| | | | | U | 512U65D1 | 512U65D2 | 512U65D3 | 522U65A | |

## 500 Series Roller Rail Options

Bolt down from the top – 522 Type A

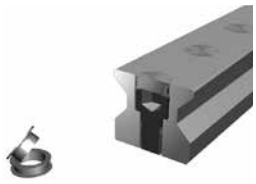


Bolt down from the bottom – 522 Type U













**Rail Types and Accessories**
The 500 Series Roller Profile Rail is available in two configurations:
- Bolt Down from the top – 522 Type A
- Bolt Up from the bottom – 522 Type U

The bolt down from the top design has various types of options to plug the holes.

The standard 522 Type A rail mounting holes can be plugged or sealed after installation using the options below.

**Plastic Plugs**
532 HP plastic plugs are an inexpensive and simple method to seal the rail attachment bolt area. The plastic plugs are easy driven in place to any rails with a soft non-metallic drift. They can easily be removed.

**Brass Plugs**
532 HB brass plugs are more rugged than the plastic plug, slightly more expensive, and require more precision during installation. They fit in all stand 500 Series Roller Rails and require some hand buffing or polishing of the rail surface after installation.

**Two-piece Stainless Steel Plugs**
532 HS two-piece stainless plugs are the most rugged plugs available for the roller rails. The two piece construction and design allows the plugs to lock into place and rest on the top of the socket head bolt. They require no post installation polishing. The recommended hex head socket must be used to properly install the 532 HS plugs. For correct installation, we recommend use of the 532 HST mounting tools found on page 69.

**Mylar Tape**
A simple and low cost alternative is specialty Mylar tape that can be placed quickly on the top surface of the rail. Part number 532 RT is available in 3 meter lengths.

**Optional 500 Series Rail**
Option 532 RC utilizes a special rail 522 Type C that is easily installed with the 532 RCT mounting tool found on page 69.

**Carriage Option**
The 500 Series Roller Profile carriages are also available with special lubrications. They can be ordered directly from stock or with a short lead-time.

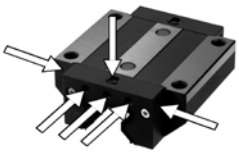
## 500 Series Roller Profile Rail



### Additional Seal Types and Lubrication Accessories

The carriages are designed with modular sealing and lubrication options for simple on-site field modification or factory direct.

The standard carriage end cap has an integral low friction double lip seal and longitudinal seals that completely enclose the bearing carriage. The double lip design keeps contaminants out and lubrication in. It also allows for grease to purge out of the carriage to prevent excessive lubrication, which can result in higher operating temperatures. This double lip design allows for use with oil lubrication.



This standard carriage end cap comes standard with a lubrication inlet centered in the end cap with specially designed and modified lubrication channels to direct the lubrication to the different roller tracks. The lubrication inlet can be easily changed in the field or supplied from the factory for side inlet, offset inlet or top inlet. Additionally, the internal configuration can be modified to allow for separating the lubrication paths for vertical mounting or oil lubrication.

The standard carriage end cap is equipped with lubrication channels directing lubrication to proper roller paths. The standard carriage end plate can be easily modified on-site in the field to channel lubrication separately or can be factory ordered.



### Optional – on site field installable modular seals and accessories

### Additional Seal

The **532 VR** seal provide an additional level of protection from contaminants to the assembly. This additional component can be easily added on-site. It is supplied with the required screws to make installation simple.

- 532 VR is made of durable Viton®

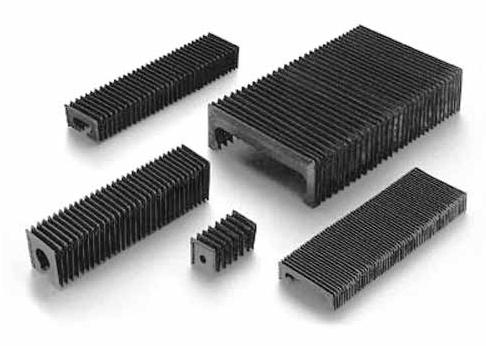
This seal can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. It can be easily installed on-site in the field or can be supplied from the factory.



### Metal Scraper

The **532 ZZ Metal Scraper** made of stainless steel, serves as an added protection to the seal lips against large dirt particles, metal shavings or chips. Large contaminants are easily pushed away for an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction with other optional modular accessories providing you with an easy upgrade to the standard seal. These are easily installed on-site in the field or can be supplied from the factory.





**Oil Reservoir**

The **532 OW Oil Reservoir** is a cost effective, automatic lubrication system. It is constructed with an integrated oil reservoir that provides a uniform, consistent lubricating oil to the roller paths for extended periods of time. The Type 532 OW oil reservoir eliminates the need for a routine maintenance schedule, assures lubrication gets to the required points, can be refilled if required, and can operate up to 5000 km of travel.

The Type 532 OW oil reservoir can be easily installed in conjunction with other optional modular seals for an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.

**Bellows**

**Standard bellows** are available for all assemblies. The bellows cover the entire length of the rail. The bellows are used to provide additional protection against dirt, dust and splashed liquid. Installation is simple and requires little time. Retrofitting is possible when the rail ends are drilled for the attachment of the rail clip 532 CR.

Bellows are available in three styles:

- Type B "Low Profile" with outside dimensions that do not exceed the carriage
- Type C "High Compression"
- Type W "Walk-On" capable of handling the harshest environments with a 90 kg load bearing capacity

The bellows can be easily installed in conjunction with the other optional modular accessories and are an easy upgrade to the standard seal. These can be easily installed on-site in the field.

Note: Additional Modular accessories add additional drag to the carriage assembly resulting in increased start-up friction and power consumption.

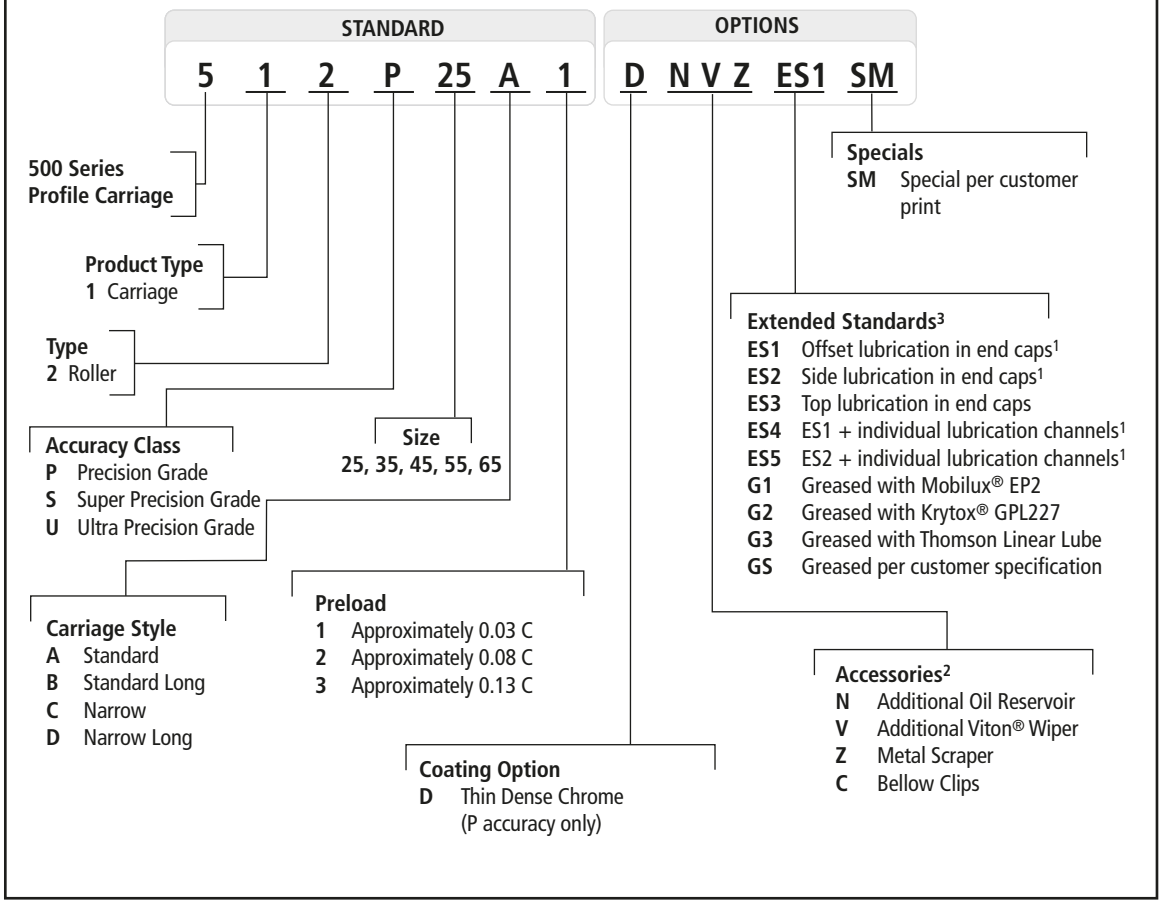
**Relative Drag Comparison for Design Consideration**

| Type | Relative Drag |
|---|---|
| Standard carriage | ● |
| Viton® Wiper (531 VR) | ● ● ● |
| Metal Scraper (531 ZZ) | ● |
| Oil Reservoir (531 OW) | ● ● |

• Low

**For ordering information or for additional Seal Types and Lubrication Accessories, see page 64.**

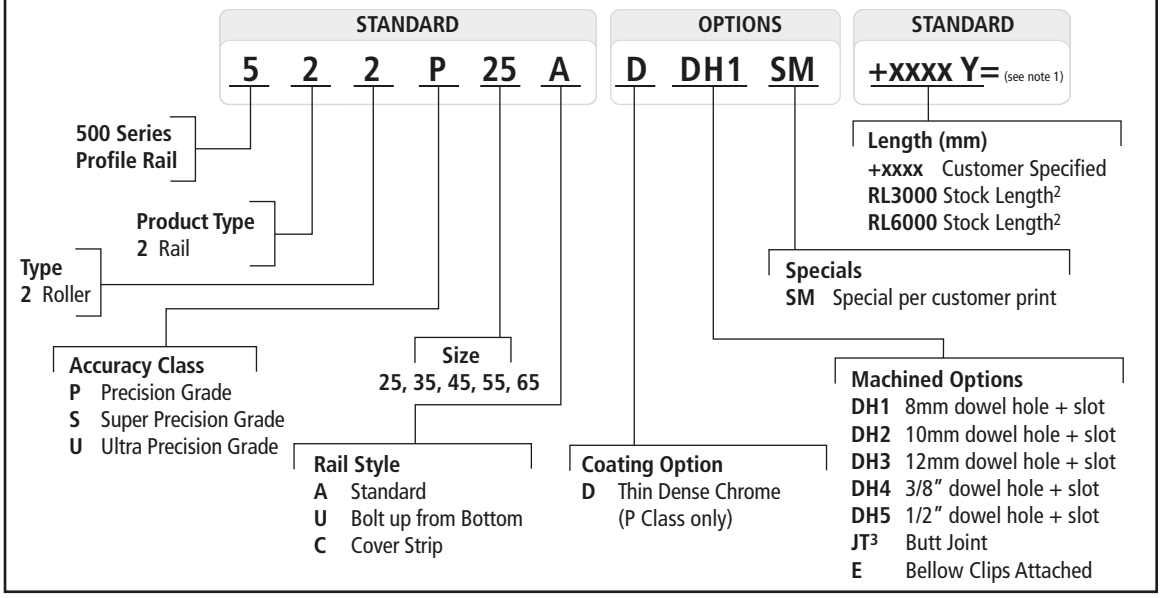
## Roller Carriage




1. ES1, ES2, ES4 and ES5 options are available size 35, 45, 55 and 65 only.
2. Accessory combination part numbers are listed from carriage end cap outward. Not all combinations are available. For specific combination availability see page 63 or consult Thomson.
3. Optional inlet and grease options may not be functional with all accessory combinations. (Example: G1 and Oil Reservoir "N"). Prior to selecting an inlet option review any interference or conflicts with the accessories selected.
4. Size 100 available upon request. Please contact customer service for more information.

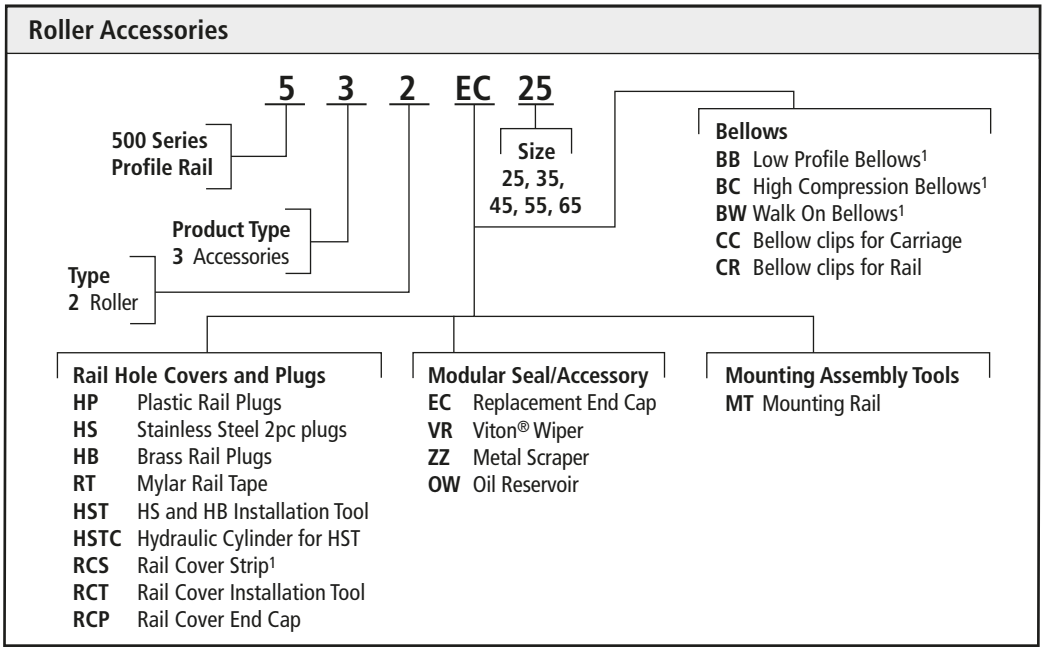
**Assemblies are available, please see page 124 for assembly part number details.**

## Roller Rail




1. Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified.
2. Stock length rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used by customer who will cut to length.
3. Customer drawing required at time of quote and order. See page 126for more information and templates.

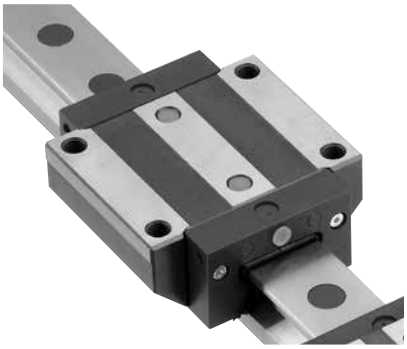
## Roller Accessories

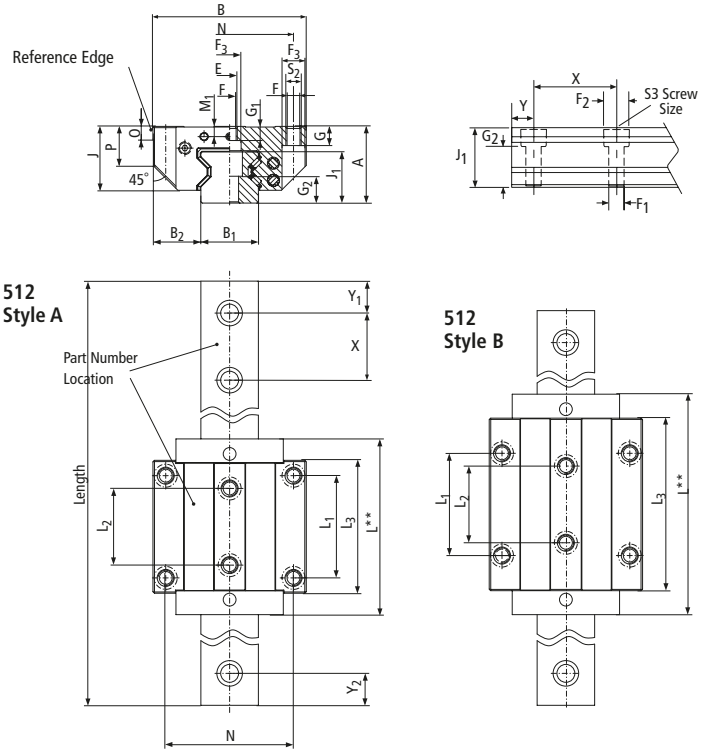



1. Bellows and rail cover strip must include length at time of order. (Example: 532BB35 + 1000 mm). See page 122 for how to calculate bellows length.

**Assemblies are available, please see page 124 for assembly part number details.**

## 512 Style A and B






## 512 Style A – Standard Roller

| Size | Dimensions (mm) | | | | | | | | | | | | | | | | | Roller | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | $B_1$* ±0.05 | $B_2$ | J | $J_1$ | L** | $L_1$ | $L_2$ | $L_3$ | X | N | $S_2$ | $S_3$ | F | $F_1$ | $F_2$ | $F_3$ | Ø | G | $G_1$ | $G_2$ | $M_1$ | O | P |
| 25 | 36 | 70 | 23 | 23.5 | 29.5 | 24.5 | 81 | 45 | 40 | 60 | 30 | 57 | M8 | M6 | 6.8 | 7 | 11 | 11 | 3.2 | 9 | 6.5 | 13 | 5.5 | 7.5 | 17.5 |
| 35 | 48 | 100 | 34 | 33 | 40 | 32 | 109 | 62 | 52 | 80 | 40 | 82 | M10 | M8 | 8.5 | 9 | 15 | 15 | 4.5 | 12 | 10 | 15 | 7 | 8 | 23 |
| 45 | 60 | 120 | 45 | 37.5 | 50 | 40 | 137.5 | 80 | 60 | 104 | 52.5 | 100 | M12 | M12 | 10.5 | 14 | 20 | 18 | 5 | 15 | 11 | 21 | 8 | 10 | 30.5 |
| 55 | 70 | 140 | 53 | 43.5 | 57 | 48 | 163.5 | 95 | 70 | 120 | 60 | 116 | M14 | M14 | 12.5 | 16 | 24 | 20 | 6 | 18 | 13.5 | 26 | 9 | 12 | 34.5 |

## 512 Style B – Standard Long Roller

| Size | Dimensions (mm) | | | | | | | | | | | | | | | | | Roller | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | $B_1$* ±0.05 | $B_2$ | J | $J_1$ | L** | $L_1$ | $L_2$ | $L_3$ | X | N | $S_2$ | $S_3$ | F | $F_1$ | $F_2$ | $F_3$ | Ø | G | $G_1$ | $G_2$ | $M_1$ | O | P |
| 25 | 36 | 70 | 23 | 23.5 | 29.5 | 24.5 | 103.4 | 45 | 40 | 79.4 | 30 | 57 | M8 | M6 | 6.8 | 7 | 11 | 11 | 3.2 | 9 | 6.5 | 13 | 5.5 | 7.5 | 17.5 |
| 35 | 48 | 100 | 34 | 33 | 40 | 32 | 136 | 62 | 52 | 103 | 40 | 82 | M10 | M8 | 8.5 | 9 | 15 | 15 | 4.5 | 12 | 10 | 15 | 7 | 8 | 23 |
| 45 | 60 | 120 | 45 | 37.5 | 50 | 40 | 172.5 | 80 | 60 | 135 | 52.5 | 100 | M12 | M12 | 10.5 | 14 | 20 | 18 | 5 | 15 | 11 | 21 | 8 | 10 | 30.5 |
| 55 | 70 | 140 | 53 | 43.5 | 57 | 48 | 205.5 | 95 | 70 | 162 | 60 | 116 | M14 | M14 | 12.5 | 16 | 24 | 20 | 6 | 18 | 13.5 | 26 | 9 | 12 | 34.5 |
| 65 | 90 | 170 | 63 | 53.5 | 76 | 58 | 251 | 110 | 82 | 201 | 75 | 142 | M16 | M16 | 14.5 | 18 | 26 | 25.5 | 7 | 23 | 19 | 32 | 13 | 15 | 51 |

* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.

** When using additional modular seals or lubrication plates, the total length L will increase. Consult page 64-65 for additional information.

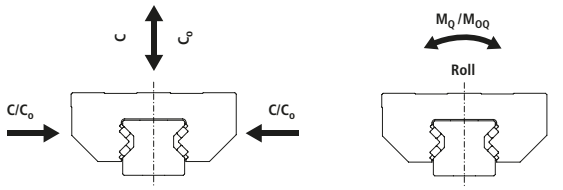
Length of rail to be specified at time of order, $Y_1 = Y_2$ unless specified otherwise at time of order.

# 500 Series Roller

## 512 Style A and B

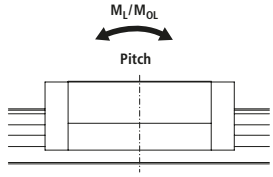
**Dynamic Load and Moment Ratings**
**C** = Dynamic load rating
$M_L$ = Dynamic pitch and yaw moment rating
$M_Q$ = Dynamic roll moment rating

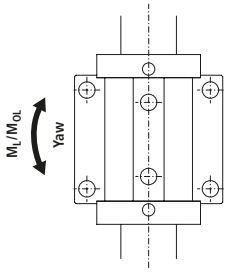
**Static Load and Moment Capacities**
$C_O$ = Static load capacity
$M_{OL}$ = Static pitch and yaw moment capacity
$M_O$ = Static roll moment capacity










| Size & Style | Loading Capabilities Co (N) | C (N) | Moments $M_{OQ}$ (Nm) | $M_Q$ (Nm) | $M_{OL}$ (Nm) | $M_L$ (Nm) | Weights Carriage (kg) | Rail (kg/m) |
|---|---|---|---|---|---|---|---|---|
| 25A | 49800 | 27700 | 733 | 408 | 476 | 265 | 0.7 | |
| 25B | 70300 | 39100 | 1035 | 576 | 936 | 521 | 0.9 | 3.4 |
| 35A | 93400 | 52000 | 2008 | 1118 | 1189 | 662 | 1.6 | |
| 35B | 128500 | 71500 | 2762 | 1537 | 2214 | 1232 | 2.2 | 6.5 |
| 45A | 167500 | 93400 | 4621 | 2577 | 2790 | 1556 | 3.2 | |
| 45B | 229500 | 127800 | 6333 | 3527 | 5161 | 2874 | 4.3 | 10.7 |
| 55A | 237000 | 131900 | 7771 | 4325 | 6650 | 2637 | 5.0 | |
| 55B | 324000 | 180500 | 10624 | 5919 | 8745 | 4872 | 6.8 | 15.2 |
| 65B | 530000 | 295000 | 20912 | 11640 | 17930 | 9980 | 13.5 | 22.5 |

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings take into consideration that some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based on 50 km travel life, divide the dynamic capacity of the bearing rated for 50 km by 1.23 to get an accurate comparison.
2. The static load and moment rating are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

## Bearing Travel Life Comparison

**$L = (C/F)^3 \times 100km$**
**where:**
**L = travel life, km**
**C = dynamic load rating, N**
**F = applied dynamic load, N**

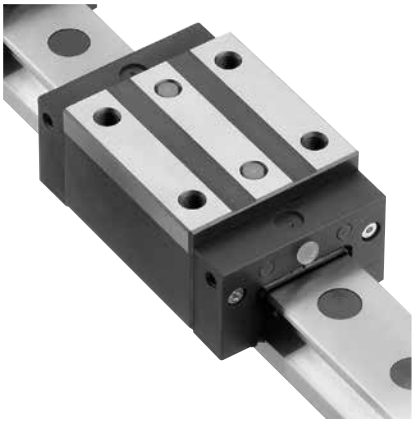
**$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$**
**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

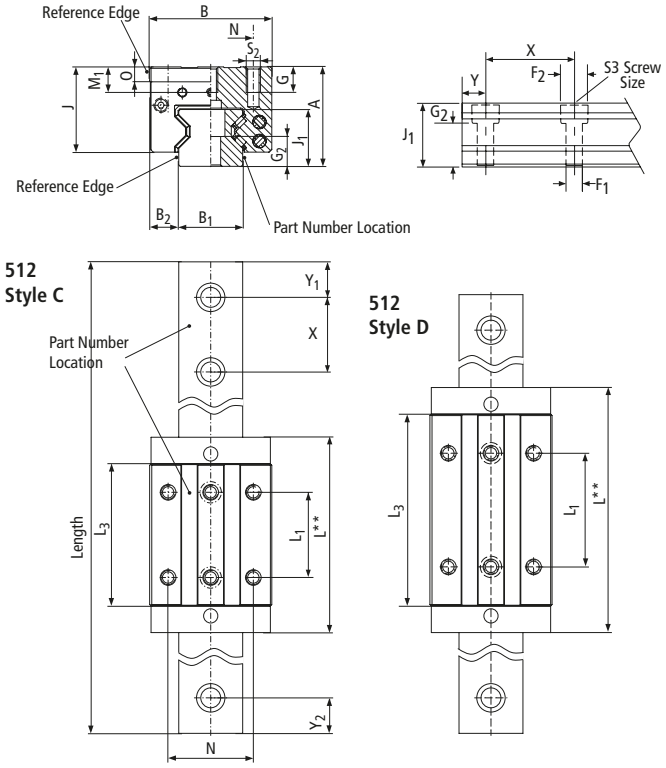
| **Operating Parameters:** | | |
|---|---|---|
| **Maximum Velocity:** | **3 m/s** | |
| **Maximum Acceleration:** | **50 m/s$^2$** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |

*without bellows

# 500 Series Roller

## 512 Style C and D






## 512 Style C Narrow Roller

| Size | Dimensions (mm) A | B | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L** | $L_1$ | $L_3$ | X | N | $S_2$ | $S_3$ | $F_1$ | $F_2$ | Roller Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 40 | 48 | 23 | 12.5 | 33.5 | 24.5 | 81 | 35 | 57 | 30 | 35 | M6 | M6 | 7 | 11 | 3.2 | 9 | 13 | 9.5 | 7.5 |
| 35 | 55 | 70 | 34 | 18 | 47 | 32 | 109 | 50 | 76 | 40 | 50 | M8 | M8 | 9 | 15 | 4.5 | 12 | 15 | 14 | 8 |
| 45 | 70 | 86 | 45 | 20.5 | 60 | 40 | 137.5 | 60 | 100 | 52.5 | 60 | M10 | M12 | 14 | 20 | 5 | 18 | 21 | 18 | 10 |
| 55 | 80 | 100 | 53 | 23.5 | 67 | 48 | 163.5 | 75 | 120 | 60 | 75 | M12 | M14 | 16 | 24 | 6 | 19 | 26 | 19 | 12 |

## 512 Style D Narrow Long Roller

| Size | Dimensions (mm) A | B | $B_1$* +0.05 | $B_2$ | J | $J_1$ | L** | $L_1$ | $L_3$ | X | N | $S_2$ | $S_3$ | $F_1$ | $F_2$ | Roller Ø | G | $G_2$ | $M_1$ | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 40 | 48 | 23 | 12.5 | 33.5 | 24.5 | 103.4 | 50 | 79.4 | 30 | 35 | M6 | M6 | 7 | 11 | 3.2 | 9 | 13 | 9.5 | 7.5 |
| 35 | 55 | 70 | 34 | 18 | 47 | 32 | 136 | 72 | 103 | 40 | 50 | M8 | M8 | 9 | 15 | 4.5 | 12 | 15 | 14 | 8 |
| 45 | 70 | 86 | 45 | 20.5 | 60 | 40 | 172.5 | 80 | 135 | 52.5 | 60 | M10 | M12 | 14 | 20 | 5 | 18 | 21 | 18 | 10 |
| 55 | 80 | 100 | 53 | 23.5 | 67 | 48 | 205.5 | 95 | 162 | 60 | 75 | M12 | M14 | 16 | 24 | 6 | 19 | 26 | 19 | 12 |
| 65 | 90 | 126 | 63 | 31.5 | 76 | 58 | 251 | 120 | 201 | 75 | 76 | M16 | M16 | 18 | 26 | 7 | 20 | 32 | 13 | 15 |

* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.

** When using additional modular seals or lubrication plates, the total length L will increase. Consult page 64-65 for additional information.

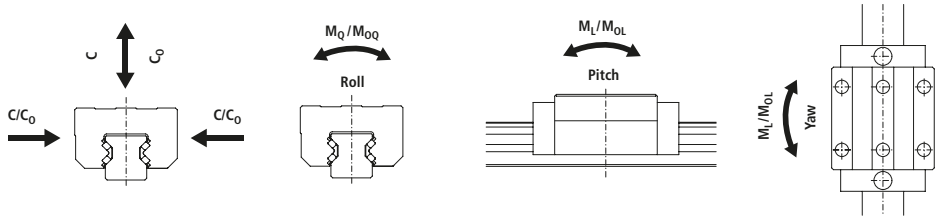
Length of rail to be specified at time of order, Y1 = Y2 unless specified otherwise at time of order.

# 500 Series Roller

## 512 Style C and D

**Dynamic Load and Moment Ratings**
**C** = Dynamic load rating
$M_L$ = Dynamic pitch and aw moment rating
$M_Q$ = Dynamic roll moment rating

**Static Load and Moment Capacities**
$C_0$ = Static load capacity
$M_{0L}$ = Static pitch and yaw moment capacity
$M_{0Q}$ = Static roll moment capacity




| Size & Style | Loading Capabilities Co (N) | C (N) | Moments $M_{0Q}$ (Nm) | $M_Q$ (Nm) | $M_{0L}$ (Nm) | $M_L$ (Nm) | Weights Carriage (kg) | Rail (kg/m) |
|---|---|---|---|---|---|---|---|---|
| 25C | 49800 | 27700 | 733 | 408 | 476 | 265 | 0.6 | |
| 25D | 70300 | 39100 | 1035 | 576 | 936 | 521 | 0.7 | 3.4 |
| 35C | 93400 | 52000 | 2008 | 1118 | 1189 | 662 | 1.5 | |
| 35D | 128500 | 71500 | 2762 | 1537 | 2214 | 1232 | 2.0 | 6.5 |
| 45C | 167500 | 93400 | 4621 | 2577 | 2790 | 1556 | 3.0 | |
| 45D | 229500 | 127800 | 6333 | 3527 | 5161 | 2874 | 4.0 | 10.7 |
| 55C | 237000 | 131900 | 7771 | 4325 | 4738 | 2637 | 4.5 | |
| 55D | 324000 | 180500 | 10624 | 5919 | 8745 | 4872 | 6.1 | 15.2 |
| 65D | 530000 | 295000 | 20912 | 11640 | 17930 | 9980 | 10.4 | 22.5 |

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings take into consideration some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based on 50 km travel life, divide the dynamic capacity of the bearing rated for 50 km by 1.23 to get an accurate comparison.
2. The static load and moment rating are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

## Bearing Travel Life Comparison

**$L = (C/F)^3 \times 100km$**
**where:**
**L = travel life, km**
**C = dynamic load rating, N**
**F = applied dynamic load, N**

**$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$**
**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

**Operating Parameters:**

| | | |
|---|---|---|
| **Maximum Velocity:** | **3 m/s** | |
| **Maximum Acceleration:** | **50 m/s²** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |

*without bellows

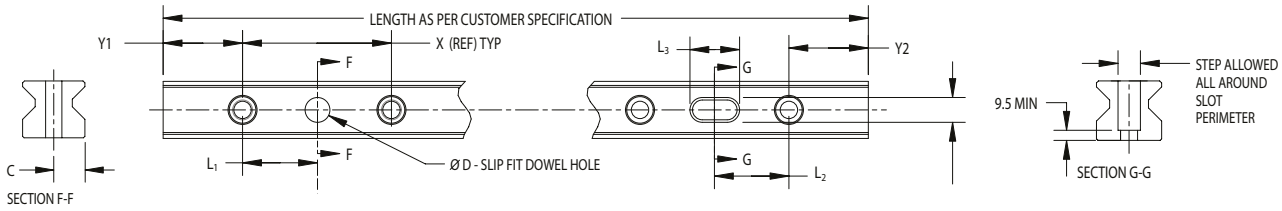
## Rail Modifications

The rails can be supplied with dowel holes, radial holes and coaxial holes. Please provide a drawing of your requirement and our Application Engineering Team can provide a quote.

### Maximum Length of Single Piece Rail

| Size (mm) | 25 | 35 | 45 | 55 | 65 |
|---|---|---|---|---|---|
| Maximum Length | 6000 mm | | | | |

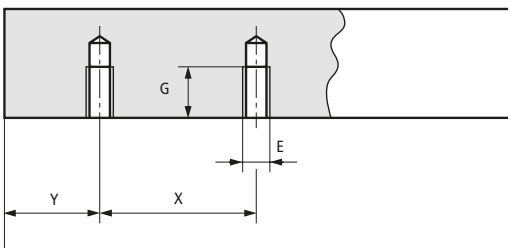
## Extended Standard Rail Options




| Option | Size | D +.013 -0 | $L_1$ ±0.12 | $L_2$ ±0.40 | $L_3$ +1.5 -0 | C ±0.05 |
|---|---|---|---|---|---|---|
| DH1 | 25 | 8 | 15 | 15 | 12 | 11.5 |
| | 35 | | 20 | 20 | | 17 |
| | 45 | | 30 | 30 | | 22.5 |
| | 55 | | | | | 26.5 |
| | 65 | | | | | 31.5 |
| DH2 | 25 | N/A | N/A | N/A | N/A | N/A |
| | 35 | 10 | 20 | 20 | 15 | 17 |
| | 45 | | 30 | 30 | | 22.5 |
| | 55 | | | | | 26.5 |
| | 65 | | | | | 31.5 |
| DH3 | 25 | N/A | N/A | N/A | N/A | N/A |
| | 35 | | | | | |
| | 45 | 12 | 30 | 30 | 18 | 22.5 |
| | 55 | | | | | 26.5 |
| | 65 | | | | | 31.5 |
| DH4 | 25 | N/A | N/A | N/A | N/A | N/A |
| | 35 | 3/8" | .787" | .787" | .550" | .669" |
| | 45 | | 1.181" | 1.181" | | .886" |
| | 55 | | | | | 1.043" |
| | 65 | | | | | 1.240" |
| DH5 | 25 | N/A | N/A | N/A | N/A | N/A |
| | 35 | | | | | |
| | 45 | 1/2" | 1.181" | 1.181" | .750" | .886" |
| | 55 | | | | | 1.043" |
| | 65 | | | | | 1.240" |

All dimensions in mm unless otherwise specified.
Y1 = Y2 unless otherwise specified.

## 522 Type U Rail Bolt Up From Bottom

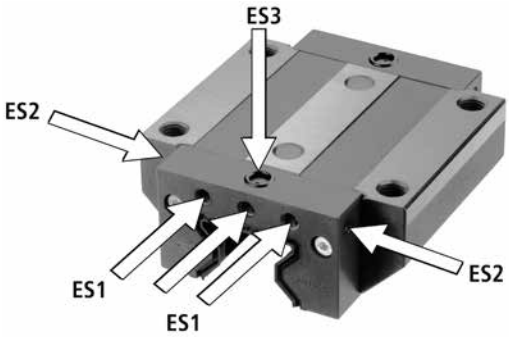



| Size | X | E | G (mm) | Weight (kg/in) |
|---|---|---|---|---|
| 25 | 30 | M6 | 12 | 3.4 |
| 35 | 40 | M8 | 15 | 6.5 |
| 45 | 52.5 | M12 | 19 | 10.7 |
| 55 | 60 | M14 | 22 | 15.2 |
| 65 | 75 | M16 | 25 | 22.5 |

Y1 = Y2 unless specified at time of ordering.

## Lubrication Inlet Options

The standard carriage is supplied with a straight lubrication fitting centered. The carriage end cap has multiple lubrication inlet points and lubrication channels options and is supplied standard with the end cap center inlet plugged. These options can be easily modified on-site in the field or can be supplied factory direct. (Not available for size 25.)



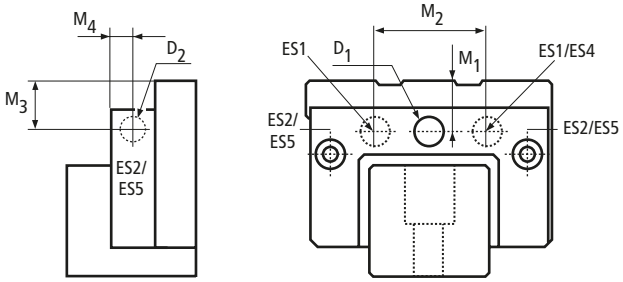

| Option | Inlet | Lubrication Channel |
|---|---|---|
| ES 1[2] | Inlets offset - both sides - all four | Standard channel |
| ES 2 | Inlets on side - both sides - all four | Standard channel |
| ES 3[1] | Inlet on top | Standard channel |
| ES 4[2] | Inlets offset - both sides - all four | Individually channeled path |
| ES 5 | Inlets offset - both sides - all four | Individually channeled path |

1. An O-Ring or adapter is required to properly seal the mating surfaces to prevent grease or oil from escaping. One is supplied with this option. The adapter is for C and D style carriages.
   Lubrication options available in size 35, 45, 55 and 65 only.
2. Option can not be used in combination with additional modular accessories.
3. Set screw is installed in Standard inlet hole when ES2 and ES3 options are specified.
4. Inlets on side and top are solid plugs. When modified on-site, inlets must be punctured to be utilized.

**Lubrication inlet locations. Front of end cap above rail and slide.**

| Size | Style | $M_1$ | $M_2$ | $M_4$ | $M_3$ | $D_1$ | $D_2$ |
|---|---|---|---|---|---|---|---|
| 25 | A | 5.5 | N/A | N/A | N/A | M6 | N/A |
| | B | | | | | | |
| | C | 9.5 | | | | | |
| | D | | | | | | |
| 35 | A | 7 | 32 | 6.5 | 7 | M6 | M6 |
| | B | | | | | | |
| | C | 14 | | | 14 | | |
| | D | | | | | | |
| 45 | A | 8 | 40 | 7.5 | 8 | M6 | M6 |
| | B | | | | | | |
| | C | 18 | | | 18 | | |
| | D | | | | | | |
| 55 | A | 9 | 50 | 8.5 | 9 | M6 | M6 |
| | B | | | | | | |
| | C | 19 | | | 19 | | |
| | D | | | | | | |
| 65 | B | 13 | 64 | 12.5 | 13 | M6 | M6 |
| | D | | | | | | |

All dimensions in mm.




1. D1 and D2 are threaded holes in the end cap to ensure proper integrity and durability of connection.
2. Carriages are shipped with a grease fitting in the box (fitting 530LN). See page 70 for more information.

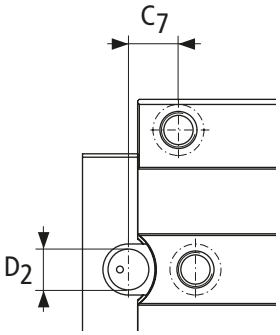
## Lubricant Inlet Options, cont'd

**Lubrication inlet locations. Inlet on top. "ES3"**

| Size | Style | C7 | D1 | D2 | D3 | D4 | Adapter[1] |
|---|---|---|---|---|---|---|---|
| 25 | A | 12.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 23.2 | | | | | |
| | C | 17.0 | | | | | 532ES3ADP25 |
| | D | 20.7 | | | | | |
| 35 | A | 14.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 27.5 | | | | | |
| | C | 20.0 | | | | | 532ES3ADP35 |
| | D | 22.5 | | | | | |
| 45 | A | 17.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 34.5 | | | | | |
| | C | 27.0 | | | | | 532ES3ADP45/55 |
| | D | 34.5 | | | | | |
| 55 | A | 21.5 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 42.5 | | | | | |
| | C | 31.5 | | | | | 532ES3ADP45/55 |
| | D | 42.5 | | | | | |
| 65 | B | 54.0 | 6.5 | 10 | 2 | 6 | N/A |
| | D | 49.0 | | | | | |

All dimensions in mm.

1. Adapter supplied when ordering ES3 option.




**D1** = O-Ring internal diameter
**D2** = Counterbore diameter
**D3** = O-Ring thickness
**D4** = Max. diameter of lubrication inlet diameter from above

## Grease Lubricants

Standard carriages are sold with oil preservative to protect the rollers from corrosion during storage and transit. The carriages are available with the following assortment of lubricants as standard.

| Option | Type | Notes | Viscosity | Temperature Range |
|---|---|---|---|---|
| G1 | Mobilux® EP2 | All purpose NLGI 2 grease | 160cSt @40°C | –20°C to 130°C |
| G2 | Krytox® GPL227 | High Temperature NLGI 2 | 440cSt @40°C | –30°C to 288°C |
| G3 | Thomson LinearLube | Food Grade NLGI2 grease | 350cSt @40°C | –54°C to 230°C |
| GS | Customer specified grease | | | |

Additional greases may be available upon request. Please consult Thomson Application Engineering.

## Thin Dense Chrome Plating

Rails and carriages are available with Thin Dense Chrome Plating with a thickness of 2-4 µm. As a result of the plating thickness range compared to the tolerance ranges in the different accuracy classes, it is only available with Precision accuracy classes up to 3 meters long as a single rail; long lengths can be butt jointed.

### Carriage Assortment with Thin Dense Chrome

| | | | | Preload | | | Appropriate Standard Rail | Max One Piece Rail Length (mm) |
|---|---|---|---|---|---|---|---|---|
| Type | Style | Size | Accuracy | 0.03C | 0.08C | 0.13C | | |
| 512 | A | 25 | P | 512P25A1D | 512P25A2D | 512P25A3D | 522P25AD | 3000 |
| | | 35 | P | 512P35A1D | 512P35A2D | 512P35A3D | 522P35AD | 3000 |
| | | 45 | P | 512P45A1D | 512P45A2D | 512P45A3D | 522P45AD | 3000 |
| | | 55 | P | 512P55A1D | 512P55A2D | 512P55A3D | 522P55AD | 3000 |
| | B | 25 | P | 512P25B1D | 512P25B2D | 512P25B3D | 522P25AD | 3000 |
| | | 35 | P | 512P35B1D | 512P35B2D | 512P35B3D | 522P35AD | 3000 |
| | | 45 | P | 512P45B1D | 512P45B2D | 512P45B3D | 522P45AD | 3000 |
| | | 55 | P | 512P55B1D | 512P55B2D | 512P55B3D | 522P55AD | 3000 |
| | | 65 | P | 512P65B1D | 512P65B2D | 512P65B3D | 522P65AD | 3000 |
| | C | 25 | P | 512P25C1D | 512P25C2D | 512P25C3D | 522P25AD | 3000 |
| | | 35 | P | 512P35C1D | 512P35C2D | 512P35C3D | 522P35AD | 3000 |
| | | 45 | P | 512P45C1D | 512P45C2D | 512P45C3D | 522P45AD | 3000 |
| | | 55 | P | 512P55C1D | 512P55C2D | 512P55C3D | 522P55AD | 3000 |
| | D | 25 | P | 512P25D1D | 512P25D2D | 512P25D3D | 522P25AD | 3000 |
| | | 35 | P | 512P35D1D | 512P35D2D | 512P35D3D | 522P35AD | 3000 |
| | | 45 | P | 512P45D1D | 512P45D2D | 512P45D3D | 522P45AD | 3000 |
| | | 55 | P | 512P55D1D | 512P55D2D | 512P55D3D | 522P55AD | 3000 |
| | | 65 | P | 512P65D1D | 512P65D2D | 512P65D3D | 522P65AD | 3000 |

Note: Chrome plated carriages and rails are designed and manufactured to be used together. If a non-chrome plated carriage is used on a chrome plated rail the preload of the carriage will be increased approximately one class.

If a chrome plated carriage is used on a non-chrome plated rail the preload will be decreased approximately one class. This is the result of the coating thickness.

## Modular Accessory Combination Options and Screw Size

| Option | Description | Size | | | | |
|---|---|---|---|---|---|---|
| | | 25 | 35 | 45 | 55 | 65 |
| N[3] | Oil Reservoir | Low/socket head screw M4x30 | Low/socket head screw M4x35 | Low/socket head screw M5x45 | Low/socket head screw M6x45 | Low/socket head screw M6x55 |
| V[3] | Viton Wiper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| Z[3] | Metal Scraper | Low/socket head screw M4x20 | Low/socket head screw M4x25 | Low/socket head screw M5x30 | Low/socket head screw M6x35 | Low/socket head screw M6x35 |
| C[3] | Bellows Clips | Flat/socket head screw M4x20 | Flat/socket head screw M4x25 | Flat/socket head screw M5x25 | Flat/socket head screw M6x30 | Flat/socket head screw M6x35 |
| NV | Oil Reservoir + Wiper | Low/socket head screw M4x40 | Low/socket head screw M4x45 | Low/socket head screw M5x50 | Low/socket head screw M6x55 | Low/socket head screw M6x65 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw M4x40 | Low/socket head screw M4x45 | Low/socket head screw M5x55 | Low/socket head screw M6x60 | Low/socket head screw M6x65 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw M4x40 | Flat/socket head screw M4x45 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x65 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw M4x40 | Flat/socket head screw M4x50 | Flat/socket head screw M5x55 | Flat/socket head screw M6x60 | Flat/socket head screw M6x65 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw M4x35 | Low/socket head screw M4x40 | Low/socket head screw M5x50 | Low/socket head screw M6x55 | Low/socket head screw M6x60 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw M4x35 | Flat/socket head screw M4x40 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x60 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw M4x35 | Flat/socket head screw M4x40 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x60 |
| VC | Wiper + Bellows Clip | Flat/socket head screw M4x25 | Flat/socket head screw M4x30 | Flat/socket head screw M5x30 | Flat/socket head screw M6x35 | Flat/socket head screw M6x40 |
| VZ | Wiper + Scraper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| VZ | Viton Wiper + Scraper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw M4x20 | Flat/socket head screw M4x25 | Flat/socket head screw M5x25 | Flat/socket head screw M6x30 | Flat/socket head screw M6x35 |

1. All fasteners standard thread.
2. Consult Thomson for options not listed, engineering review is required.
3. Each modular accessory is supplied with proper screws to install over end cap only and not combinations of modular accessories.

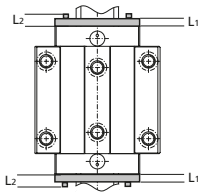
# Modular Seals and Lubrication Accessories



## Additional Wipers
## 532VR – Viton® Wiper

| Size | Viton® Part Number | L1 (mm) | L2 (mm) | Weight (kg) |
|---|---|---|---|---|
| 25 | 532VR25 | 7 | 4 | 0.005 |
| 35 | 532VR35 | 7 | 4 | 0.012 |
| 45 | 532VR45 | 7 | 4 | 0.024 |
| 55 | 532VR55 | 7 | 4 | 0.029 |
| 65 | 532VR65 | 7 | 4 | 0.040 |

L1 – wiper thickness, L2 – max. screw head stickout

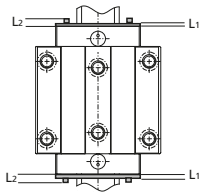





## Metal Scraper
## 532 ZZ

| Size | Part Number | L1 (mm) | L2 (mm) | Weight (kg) |
|---|---|---|---|---|
| 25 | 532ZZ25 | 1.5 | 4 | 0.011 |
| 35 | 532ZZ35 | 1.5 | 4 | 0.022 |
| 45 | 532ZZ45 | 1.5 | 4 | 0.034 |
| 55 | 532ZZ55 | 1.5 | 4 | 0.044 |
| 65 | 532ZZ65 | 1.5 | 4 | 0.078 |

L1 = scraper thickness, L2 = max. screw head stickout

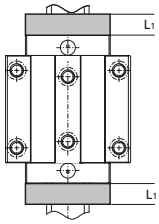





## Oil Reservoir
## 532 OW

| Size | Lubrication Plate | L1 (mm) | Weight (kg) |
|---|---|---|---|
| 25 | 532OW25 | 12.7 | 0.013 |
| 35 | 532OW35 | 16.7 | 0.032 |
| 45 | 532OW45 | 19 | 0.056 |
| 55 | 532OW55 | 22 | 0.103 |
| 65 | 532OW65 | 25.2 | 0.179 |

L1 = lubrication plate thickness, screw heads are recessed in plate



When using a combination of different plates, add the cumulative thickness of the plates to get an accurate overall carriage length.

**Example:**

**512 Size 45 carriage with 532 OW and 532 VR modular seals on both sides:**

| | |
|---|---|
| Carriage Length (L) | = 137.5 |
| 532 OW L1 x 2 | = 19 x 2 |
| 532 WR L1 x 2 | = 7 x 2 |
| 532 VR L2 x 2 | = 4 x 2 |
| Total Length | = 193.5 mm |

**511 Size 35 carriage with 531OW modular seal on both sides and 531VR modular seals on one side:**

| | |
|---|---|
| Carriage Length (L) | = 109 |
| 532 OW L1 x 2 | = 16.7 x 2 |
| 532 VR L1 x 1 | = 7 x 1 |
| 532 VR L2 x 1 | = 4 x 1 |
| Total Length | = 153.4 mm |

Each modular accessory is supplied with the proper screws to install them over the end cap. When combinations of modular seals are used longer screws may be required. The following sizes are available from our stock.

## Bellows Dimensional Information

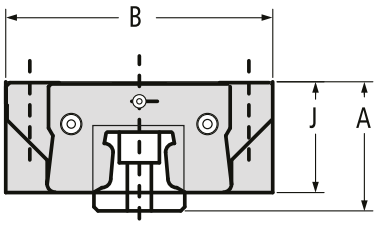
Bellows are available in three styles:

**532 BB** "Low Profile" with outside dimensions that do not exceed the carriage, constructed of polyurethane coated polyester, maximum ambient temperature of 80°C (175°F).

**532 BC** "High Compression" constructed of a spark resistant Teflon® coated fiberglass and designed to allow for higher compression, maximum ambient temperature exceeds maximum bearing peak temperatures.

**532 BW** "Walk On" capable of handling the harshest environments, including welding and grinding applications, with a 90 kg load bearing capacity.

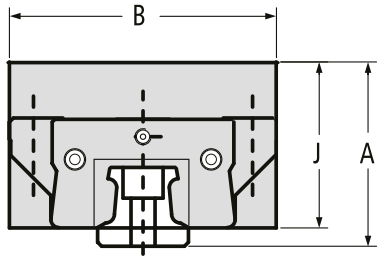
The bellows can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate, 532 CR. These can be easily installed on-site in the field or can be supplied from the factory.




### 532 BB " Profile" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 25 | 532 BB25 | 47 | 30.5 | 36 | 0.17 |
| 35 | 532 BB35 | 70 | 41.3 | 47.5 | 0.15 |
| 45 | 532 BB45 | 81 | 51 | 59 | 0.15 |
| 55 | 532 BB55 | 99 | 58 | 69 | 0.10 |
| 65 | 532 BB65 | 109 | 65 | 79 | 0.10 |

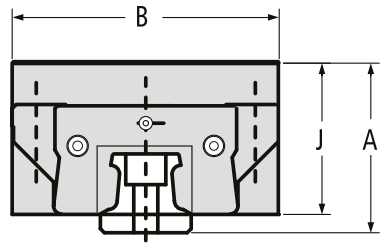
Customer to specify extended length at time of order, see page 118 for how to calculate.




### 532 BC "High Compression" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 25 | 532 BC25 | 67 | 40.5 | 46 | 0.10 |
| 35 | 532 BC35 | 90 | 51.3 | 57.5 | 0.07 |
| 45 | 532 BC45 | 101 | 61 | 69 | 0.07 |
| 55 | 532 BC55 | 119 | 68 | 79 | 0.06 |
| 65 | 532 BC65 | 129 | 75 | 89 | 0.06 |

Customer to specify extended length at time of order, see page 118 for how to calculate.




### 532 BW "Walk On" Bellows

| Size | Part No. | B | J | A | CR |
|---|---|---|---|---|---|
| 25 | 532 BW25 | 57 | 35,5 | 41 | 0.19 |
| 35 | 532 BW35 | 77 | 42 | 48.2 | 0.19 |
| 45 | 532 BW45 | 101 | 53 | 61 | 0.15 |
| 55 | 532 BW55 | 111 | 58 | 69 | 0.15 |
| 65 | 532 BW65 | 119 | 70 | 84 | 0.15 |

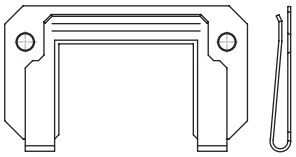
Customer to specify extended length at time of order, see page 118 for how to calculate.

## Bellow Clip Adapter Plates

### 532 CC Carriage Bellow Clips – Attachment Plate

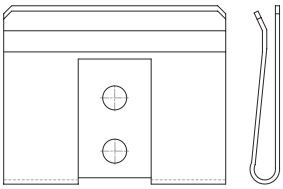
The 532 CC Carriage Bellow Clip – Attachment Plate is used to attach the bellows to the carriage. The bellows clip – adapter plate is made of steel.

| Size | Part No. |
|---|---|
| 25 | 532 CC25 |
| 35 | 532 CC35 |
| 45 | 532 CC45 |
| 55 | 532 CC55 |
| 65 | 532 CC65 |

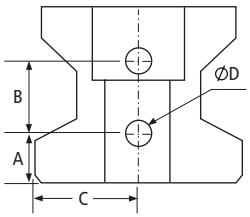


### 532 CR Rail Bellow Clips – Attachment Plate

The 532 CR Rail Bellow Clip – Attachment Plate is used to attach the bellows to the rail. The attaching holes can be drilled in the end of the rail if retrofitting or can be supplied from the factory. The bellows clip – adapter plate is made of steel.



| Size | Part No. | Rail Machining Detail | | | | | Screw[1] | | | | MinY[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | Depth Min | Depth Max | Size | Pitch | Length | Type | |
| 25 | 532 CR25 | 7.24 | 10 | 11.50 | 7.7 | 9.70 | M4 | 0.70 | 10.00 | Button Head Cap Screw | 12 |
| 35 | 532 CR35 | 11.00 | | 17.00 | | | | | | | 20 |
| 45 | 532 CR45 | 15.01 | | 22.50 | | | | | | | 22 |
| 55 | 532 CR55 | 18.01 | | 26.50 | | | | | | | 24 |
| 65 | 532 CR65 | 24.00 | | 31.50 | | | | | | | 28 |




All dimensions in mm.

1. Two screws are supplied with each Rail Bellow Clip.
2. Min Y dimension to ensure drill depth does not break through rail mounting hole.

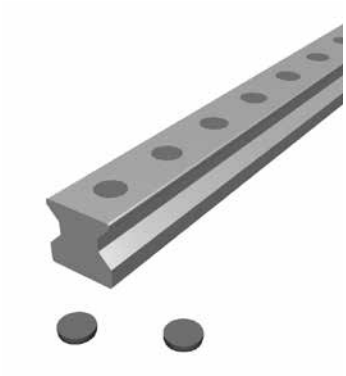
# 500 Series Roller Rail Information



**Maintenance and Installation Tools & Accessories: Assembly Rail – 532 MT**

An assembly rail is required when the carriage must be removed from the rail and then reinstalled during the installation. It is recommended to leave the carriage on the assembly rail to protect the rollers against con the carriage can be tightened. The assembly rail is made of plastic.

| Size | Standard Rail Part Number | Length (mm) | Weight (kg) |
|---|---|---|---|
| 25 | 532 MT25 | 145 | 0.062 |
| 35 | 532 MT35 | 185 | 0.152 |
| 45 | 532 MT45 | 230 | 0.317 |
| 55 | 532 MT55 | 265 | 0.525 |
| 65 | 532 MT65 | 320 | 0.914 |



**Standard Rail Plugs and Tape**

**HP plastic plugs**

| Size | Part Number | Qty per pack | Weight (kg) |
|---|---|---|---|
| 25 | 532 HP25 | 25 | .007 |
| 35 | 532 HP35 | 25 | .014 |
| 45 | 532 HP45 | 25 | .025 |
| 55 | 532 HP55 | 25 | .047 |
| 65 | 532 HP65 | 25 | .053 |



**HB brass plugs**

| Size | Part Number | Qty per pack | Weight (kg) |
|---|---|---|---|
| 25 | 532 HB 25 | 1 | .002 |
| 35 | 532 HB 35 | 1 | .005 |
| 45 | 532 HB 45 | 1 | .008 |
| 55 | 532 HB 55 | 1 | .011 |
| 65 | 532 HB 65 | 1 | .013 |



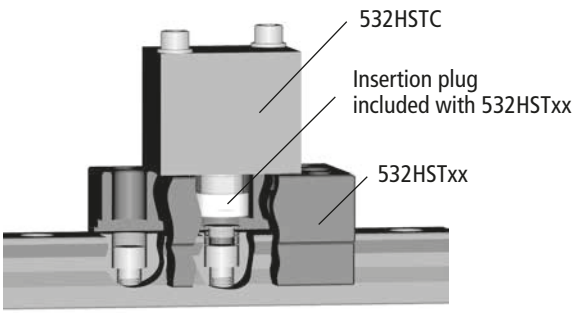
**HS two-piece stainless steel plugs**

| Size | Part Number | Qty per pack | Weight (kg) |
|---|---|---|---|
| 25 | 532 HS 25 | 1 set | .003 |
| 35 | 532 HS 35 | 1 set | .008 |
| 45 | 532 HS 45 | 1 set | .012 |
| 55 | 532 HS 55 | 1 set | .019 |
| 65 | 532 HS 65 | 1 set | .026 |

### Mylar tape

| Size | Part Number | Length |
|---|---|---|
| 25 | 532 RT 25 | 3 m |
| 35 | 532 RT 35 | 3 m |
| 45 | 532 RT 45 | 3 m |
| 55 | 532 RT 55 | 3 m |
| 65 | 532 RT 65 | 3 m |

### HST Stainless Steel and Brass installation tool



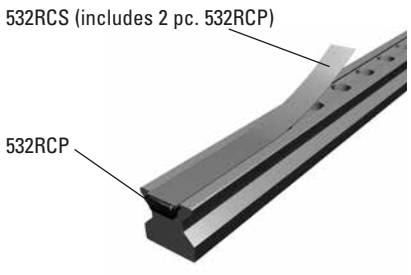

| Sliding Block with insertion plug | Weight (kg) |
|---|---|
| 532 HST 25 For size 25 rail | 2.0 |
| 532 HST 35 For size 35 rail | 3.5 |
| 532 HST 45 For size 45 rail | 3.9 |
| 532 HST 55 For size 55 rail | 5.4 |
| 532 HST 65 For size 65 rail | 6.5 |
| **Hydraulic cylinder (for all sizes)** | **Weight (kg)** |
| 532 HSTC[1] | 0.53 |

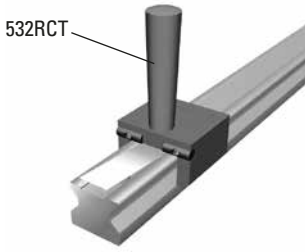
1. Hydraulic fitting size 1/4"-18 NPT, max pressure 120 x 103 hPa (120 bar).

### Optional 500 Series Rail with Stainless Steel Cover Strip

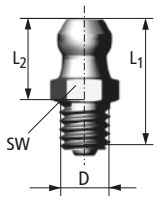
| | Rail Coverstrip End Caps | Mounting Tool | Replacement End Caps | Standard Coverstrip Rail | Coverstrip Width (mm) | Max Single PC Length (mm) |
|---|---|---|---|---|---|---|
| Size | Part Number[1] | Part Number | Part Number[2] | Part Number[3] | | |
| 25 | 532RCS25 | 532RCT25 | 532RCP25 | 522P25C | 15 | 6000 |
| 35 | 532RCS35 | 532RCT35 | 532RCP35 | 522P35C | 19 | 6000 |
| 45 | 532RCS45 | 532RCT45 | 532RCP45 | 522P45C | 25 | 6000 |
| 55 | 532RCS55 | 532RCT55 | 532RCP55 | 522P55C | 28.5 | 6000 |
| 65 | 532RCS65 | 532RCT65 | 532RCP65 | 522P65C | 32 | 6000 |

1. Customer to specify length of rail to be used on at time of order. Delivered piece will be 2 to 3.5 mm longer in order to properly install and fit end caps.
2. Two end caps are supplied with each piece of 532RCS ordered.
3. P grade accuracy shown for example purposes, S and U grade accuracy are available.
4. Cover strip should not be installed more than 3 times.



# Lubrication Fittings

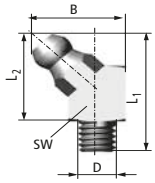



## 530LN

Hydraulic-type lubricating nipple, straight.
530BF6 = 2.5 mm / 530BF8 = 4mm

| D | $L_1$ | $L_2$ | SW |
|---|---|---|---|
| M6 | 16 | 10.5 | 7 |

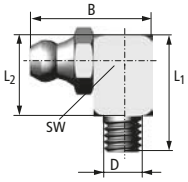
* Note: 1 pc included with each carriage




## 530LN45

Hydraulic-type lubricating nipple, 45° angle

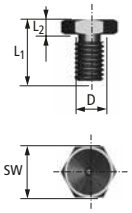
| D | $L_1$ | $L_2$ | B | SW |
|---|---|---|---|---|
| M6 | 21 | 15.5 | 15 | 9 |




## 530LN90

Hydraulic-type lubricating nipple, 90° angle

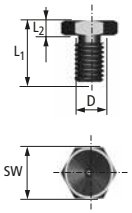
| D | $L_1$ | $L_2$ | B | SW |
|---|---|---|---|---|
| M6 | 18 | 12.5 | 19 | 9 |




## 530LF3

Funnel type lubricating nipple M3

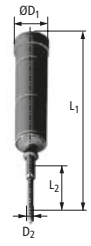
| D | $L_1$ | $L_2$ | SW |
|---|---|---|---|
| M3 | 6.6 | 1.6 | 5 |




## 530LF6

Funnel type lubricating nipple M6

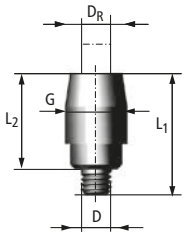
| D | $L_1$ | $L_2$ | SW |
|---|---|---|---|
| M6 | 9.5 | 3 | 7 |




## 530LG

Grease gun for funnel type lubricating nipple M3

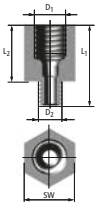
| $L_1$ | $L_1$ | $ØD_1$ | $ØD_2$ |
|---|---|---|---|
| 210 | 55 | 34 | 5.5 |




## 530LA3

Straight screw-in connection M3
For tubing with ext. diameter $D_R$ = 3 mm

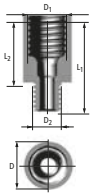
| D | ØG | $L_1$ | $L_2$ |
|---|---|---|---|
| M3 | 6 | 12 | 9.5 |




## 530LA... Adapter

Adapter with hexagon insert bit
For tubing with ext. diameter = 4 mm

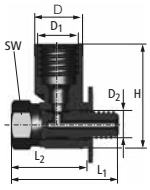
| PIN | $D_1$ | $D_2$ | $L_1$ | $L_2$ |
|---|---|---|---|---|
| 530LA4 | G1/8 | M6 | 20 | 14 |
| 530LA5 | M8x1 | M6 | 20 | 14 |




## 530LA6

Adapter, external round
For tubing with ext. diameter = 4 mm

| $D_1$ | $D_2$ | $L_1$ | $L_2$ | Ø |
|---|---|---|---|---|
| M8x1 | M6 | 20 | 14 | 10 |



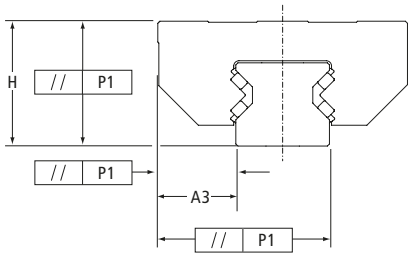

## 530BF... Banjo Fittings

For tubing with ext. diameter
530BF6=2.5 mm/530BF8 =4mm

| P/N | $D_1$ | $D_2$ | $L_1$ | $L_2$ | H |
|---|---|---|---|---|---|
| 530BF6 | M6x0.75 | M6 | 22 | 16 | 18 |
| 530BF8 | M8x1 | M6 | 22 | 15.5 | 22 |

## Accuracy Class

Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

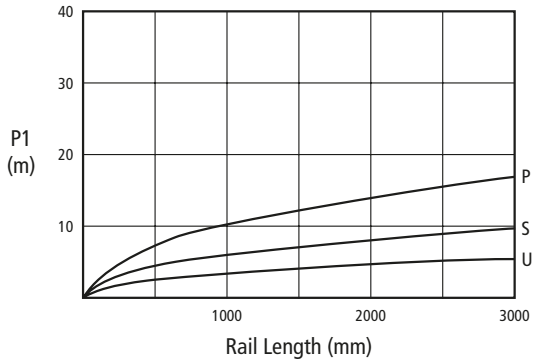



Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the rail. This is analogous to straightness of travel. As such, parallelism describes attributes of the rail only.

Assembly Accuracy describes the tolerance on H and A3 as a function of a carriage – rail assembly, measured from the nominal dimensions.

Pair Variation describes tolerance on H and A3 as a function of carriages at the same position on a common rail. Pair variation describes carriage precision only.

The accuracy class selected will partially determine the accuracy of the system. Other factors such as mounting surface flatness and straightness also significantly affect system accuracy.




### Tolerances

| | Accuracy Class | | |
|---|---|---|---|
| | P - Precision | S - Super Precision | U - Ultra Precision |
| Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail) | ±20 | ±10 | ±5 |
| Pair Variation Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at the middle of carriage at same position on rail) | 10 | 5 | 3 |
| Running Parallelism | 40 | 20 | 10 |

All values in µm

## Preload

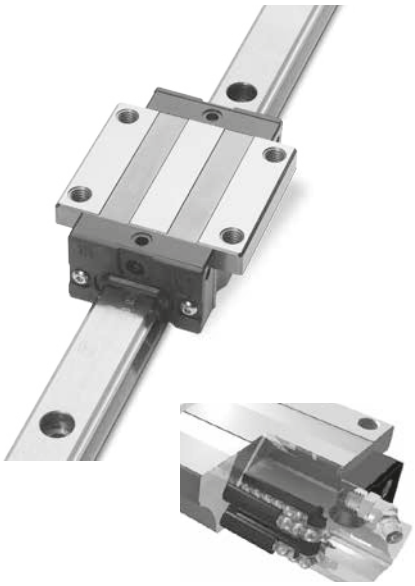
Three Preload classes are available with the 500 Series Roller Profile rail carriages. Preload will minimize elastic deformation caused by external forces resulting in increased rigidity.

### Preload Accuracy Combinations

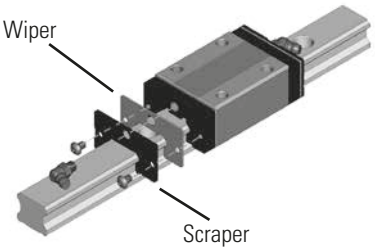
| Accuracy Class | Preload | | |
|---|---|---|---|
| | 0.03C[1] | 0.08C[1] | 0.13C[1] |
| P, S, U | 1 | 2 | 3 |

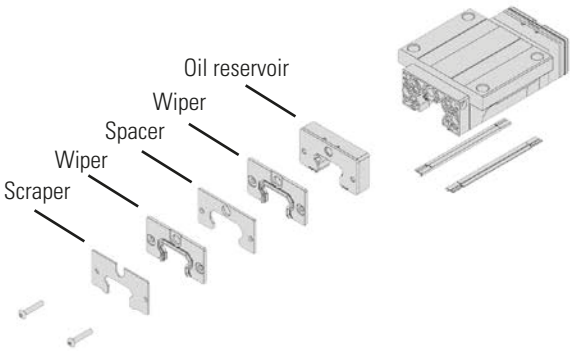
1. C = Dynamic load capacity of the bearing

## Overview of Thomson 400 Series Profile Rail Linear Guides








**Features and Benefits**
The 400 Series Profile Rail Linear Guide is the newest addition to the Thomson Linear Guide product line. The 400 Series is a cost effective, transport grade Profile Rail solution for cost-sensitive applications, and is a drop-in replacement with industry-standard envelope and hole patterns. Double-faced ball track bearing arrangements provide compliance during installation as well as equal load carrying capacity in all directions. Caged and non-caged carriages utilize the same rail design. This enables efficient use of inventory, as only one rail type needs to be stocked for either carriage type.

**Low Noise and Vibration**
Polymer ball-return tube reduces noise while retaining lubrication.

**Modular Accessory Options**
Standard double lip end and longitudinal seals retain lubrication while protecting the bearing from contamination. Additional seals and scrapers available.

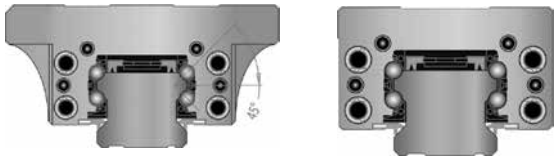
**Metal Scraper**
The **Type 431 ZZ Metal Scraper** made of stainless steel, serves as an added protection to the seal lips against large dirt particles, metal shavings or chips. Large contaminants are easily pushed away providing an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction with the other optional modular accessories providing you with an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.

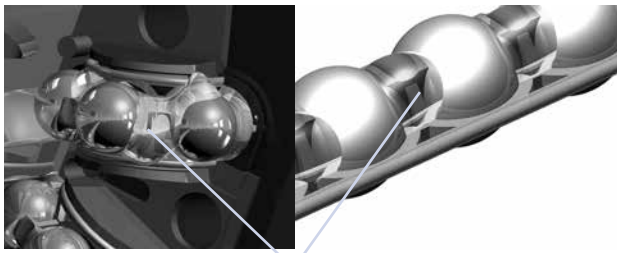
**Additional Seal**
The **431 WR seal** provide an additional level of protection from contaminants to the assembly. These additional components can easily be added on-site without removing the carriage from the rail. They are supplied with the required screws to make the installation simple and is constructed from SPCC Steel and are nickel plated. These seals can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory. When using double seals, a spacer is installed between the seals. This helps in better sealing of the carriage.

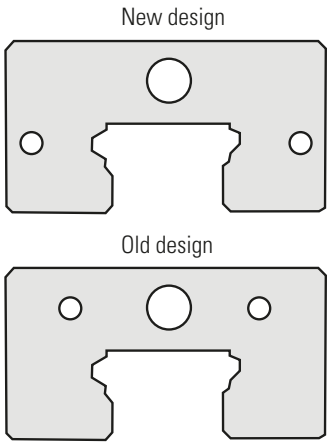
**Oil Reservoir**
The **Type 431 OW oil reservoir** is a cost effective, automatic lubrication system. It is constructed with an integrated oil reservoir that provides a uniform, consistent lubricating oil

## Overview of Thomson 400 Series Profile Rail Linear Guides








to the ball paths for extended periods of time. The Type 431 OW oil reservoir lubrication plate eliminates the need for a routine maintenance schedule, assures lubrication gets to the required points, can be refilled if required. I usually doubles the gap between service cycle. The Type 431 OW oil reservoir can be easily installed in conjunction with other optional modular accessories providing an easy upgrade to the standard seals. These can be easily installed on-site in the field or can be supplied from the factory .

**Lubrication Channels**
Channels direct lubricant to individual ball tracks to maximize lubrication effectiveness.

**Double-Faced Ball Tracks**
The 400 Series Linear Guide utilizes a 45°, face-to-face bearing arrangement, resulting in equal load-carrying capacity in all directions. The primary advantage of face-to-face configuration is that the rails are much more tolerant of mounting surface inaccuracies. This enables automation machine builders to reduce cost further by not having to prepare high tolerance mounting surfaces.

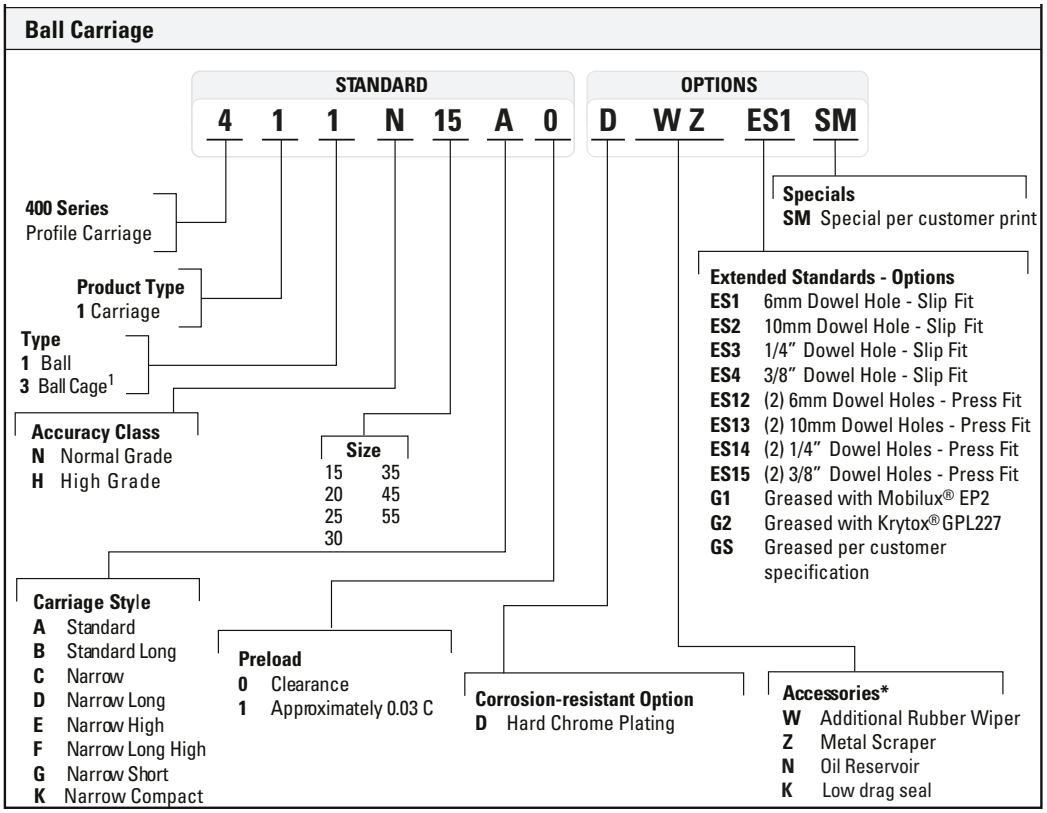
**400 Series Ball Cage**
The 413 ball cage option provides:
- Increased running smoothness
- Low noise at high speeds
- Individual ball lubricant reservoirs

**New endcap design on our 400 Series carriages**
The screw position on the end cap is being moved from top to center.

Advantages:
- Moving the screw position toward the center, helps to better secure the scrapper and efficiently scrap off dust on rail.
- This position provides better prevention from dust entering the ball tracks and improves carriage operation.
- All carriage dimensions remain exactly the same. Functioning of the carriage will not be affected.
- Accessories like wiper and scraper will also be changed accordingly to match the new hole pattern.
- New carriages will be available, once existing stock (with current/old endcap style) is used up.

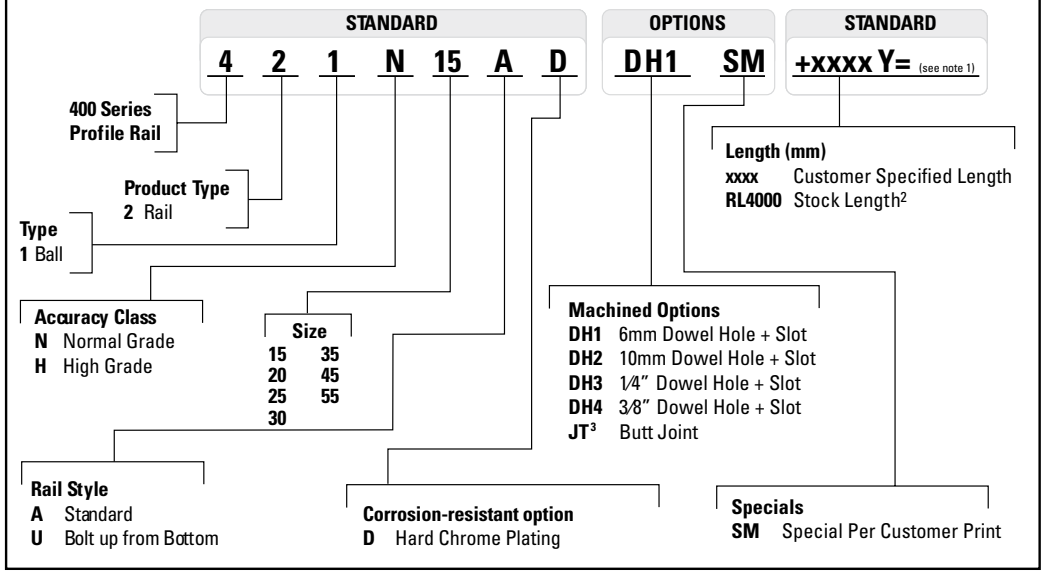
# 400 Series Part Numbering Description

## Ball Carriage




1. Carriage does not retain ball bearings when end cap is removed. Removal of end caps can result in loss of ball bearings.
* Long life lube block and bellows may be available as options if desired, based on the opportunity. Please contact Customer Support for more details.

## Ball Rail




1. Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified.
2. Stock length of rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used only by customer who will cut to length.
3. Customer drawing required at time of quote and order.

**Assemblies are available, please see page 125 for assembly part number details.**

## 400 Series Part Numbering Description

**Ball Accessories**

**4 3 1 WR 15**

**500 Series Profile Rail**

**Product Type**
**3** Accessory

**Type**
**1** Ball

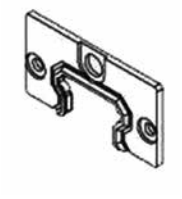
**Size**
15 35
20 45
25 55
30

**Modular Seal Accessories[2]**
**WR** Rubber Wiper
**ZZ** Metal Scraper
**OW** Oil Reservoir
**K** Low Drag Seal

**Assemblies are available, please see page 125 for assembly part number details.**

## Additional Seal Part Numbers

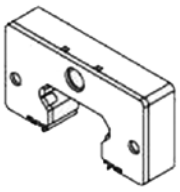
| Carriage Size | Wiper Part Number | Scraper Part Number | Oil Reservoir Part Number | Low Drag Seal |
|---|---|---|---|---|
| 15 | 431WR15 | 431ZZ15 | 431OW15 | 431K15 |
| 20 | 431WR20 | 431ZZ20 | 431OW20 | 431K20 |
| 25 | 431WR25 | 431ZZ25 | 431OW25 | 431K25 |
| 30 | 431WR30 | 431ZZ30 | 431OW30 | 431K30 |
| 35 | 431WR35 | 431ZZ35 | 431OW35 | 431K35 |
| 45 | 431WR45 | 431ZZ45 | 431OW45 | 431K45 |
| 55 | 431WR55 | 431ZZ55 | 431OW55 | 431K55 |



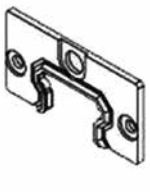
Wiper



Scraper

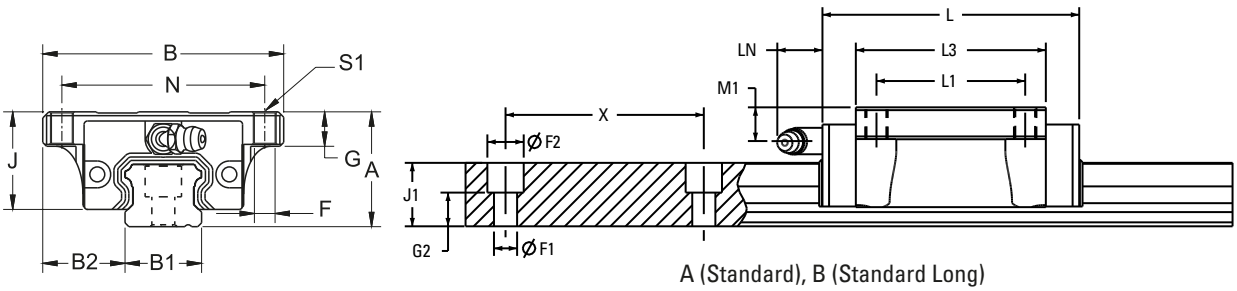


Oil Reservoir



Low Drag Seal

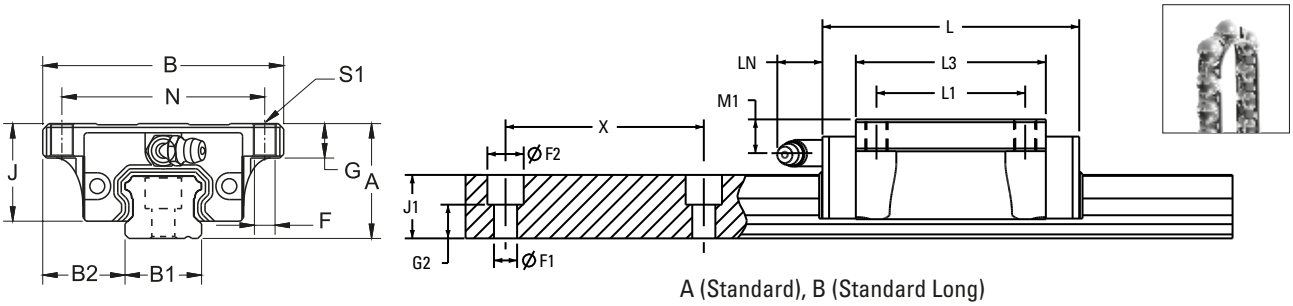
# 400 Series Specifications




A (Standard), B (Standard Long)

**411 Standard**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | F | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 411N15A0 | 24 | 47 | 16.0 | 20.7 | 58.6 | 38 | 30 | M5 | 4.4 | 8.0 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.21 | 1.28 |
| 411N15B0 | 24 | 47 | 16.0 | 20.7 | 66.1 | 38 | 30 | M5 | 4.4 | 8.0 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.23 | 1.28 |
| 411N20A0 | 30 | 63 | 21.5 | 25.5 | 69.3 | 53 | 40 | M6 | 5.4 | 9.0 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.40 | 2.15 |
| 411N20B0 | 30 | 63 | 21.5 | 25.5 | 82.1 | 53 | 40 | M6 | 5.4 | 9.0 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.46 | 2.15 |
| 411N25A0 | 36 | 70 | 23.5 | 30.2 | 79.2 | 57 | 45 | M8 | 7.0 | 10.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.57 | 2.88 |
| 411N25B0 | 36 | 70 | 23.5 | 30.2 | 93.9 | 57 | 45 | M8 | 7.0 | 10.0 | 72.2 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.72 | 2.88 |
| 411N30A0 | 42 | 90 | 31.0 | 35.0 | 94.8 | 72 | 52 | M10 | 8.6 | 11.0 | 67.8 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 1.10 | 4.45 |
| 411N30B0 | 42 | 90 | 31.0 | 35.0 | 105.0 | 72 | 52 | M10 | 8.6 | 11.0 | 78.0 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.34 | 4.45 |
| 411N35A0 | 48 | 100 | 33.0 | 40.5 | 111.5 | 82 | 62 | M10 | 8.6 | 12.0 | 80.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 411N35B0 | 48 | 100 | 33.0 | 40.5 | 123.5 | 82 | 62 | M10 | 8.6 | 12.0 | 92.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.90 | 6.25 |
| 411N45A0 | 60 | 120 | 37.5 | 51.1 | 129.0 | 100 | 80 | M12 | 10.6 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.27 | 9.60 |
| 411N45B0 | 60 | 120 | 37.5 | 51.1 | 145.0 | 100 | 80 | M12 | 10.6 | 15.5 | 110.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.68 | 9.60 |
| 411N55A0 | 70 | 140 | 43.5 | 57.3 | 155.0 | 116 | 95 | M14 | 12.6 | 18.5 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.44 | 13.80 |
| 411N55B0 | 70 | 140 | 43.5 | 57.3 | 193.0 | 116 | 95 | M14 | 12.6 | 18.5 | 154.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 4.63 | 13.80 |



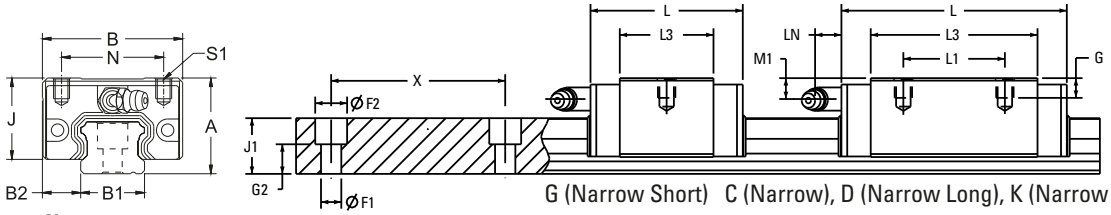



A (Standard), B (Standard Long)

**413 Standard (Caged)**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | F | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15A0 | 24 | 47 | 16.0 | 20.7 | 58.6 | 38 | 30 | M5 | 4.4 | 8.0 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.21 | 1.28 |
| 413N15B0 | 24 | 47 | 16.0 | 20.7 | 66.1 | 38 | 30 | M5 | 4.4 | 8.0 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.23 | 1.28 |
| 413N20A0 | 30 | 63 | 21.5 | 25.5 | 69.3 | 53 | 40 | M6 | 5.4 | 9.0 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.40 | 2.15 |
| 413N20B0 | 30 | 63 | 21.5 | 25.5 | 82.1 | 53 | 40 | M6 | 5.4 | 9.0 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.46 | 2.15 |
| 413N25A0 | 36 | 70 | 23.5 | 30.2 | 79.2 | 57 | 45 | M8 | 7.0 | 10.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.57 | 2.88 |
| 413N25B0 | 36 | 70 | 23.5 | 30.2 | 93.9 | 57 | 45 | M8 | 7.0 | 10.0 | 72.2 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.72 | 2.88 |
| 413N30A0 | 42 | 90 | 31.0 | 35.0 | 94.8 | 72 | 52 | M10 | 8.6 | 11.0 | 67.8 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 1.10 | 4.45 |
| 413N30B0 | 42 | 90 | 31.0 | 35.0 | 105.0 | 72 | 52 | M10 | 8.6 | 11.0 | 78.0 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.34 | 4.45 |
| 413N35A0 | 48 | 100 | 33.0 | 40.5 | 111.5 | 82 | 62 | M10 | 8.6 | 12.0 | 80.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 413N35B0 | 48 | 100 | 33.0 | 40.5 | 123.5 | 82 | 62 | M10 | 8.6 | 12.0 | 92.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.90 | 6.25 |
| 413N45A0 | 60 | 120 | 37.5 | 51.1 | 129.0 | 100 | 80 | M12 | 10.6 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.27 | 9.60 |
| 413N45B0 | 60 | 120 | 37.5 | 51.1 | 145.0 | 100 | 80 | M12 | 10.6 | 15.5 | 110.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.68 | 9.60 |
| 413N55A0 | 70 | 140 | 43.5 | 57.3 | 155.0 | 116 | 95 | M14 | 12.6 | 18.5 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.44 | 13.80 |
| 413N55B0 | 70 | 140 | 43.5 | 57.3 | 193.0 | 116 | 95 | M14 | 12.6 | 18.5 | 154.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 4.63 | 13.80 |

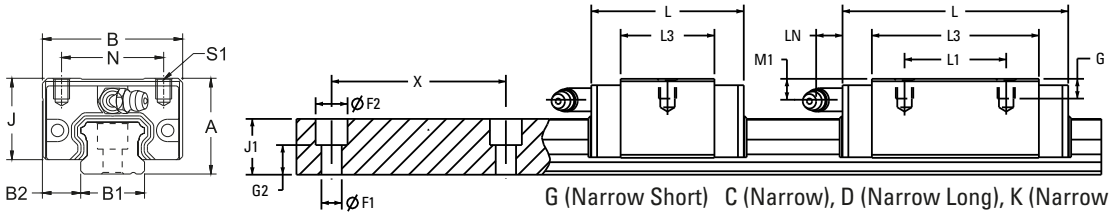
## 400 Series Specifications




G (Narrow Short) C (Narrow), D (Narrow Long), K (Narrow Compact)

**411 Narrow**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1 | F2 | G2 | C [N] | 0 [N] | [kg] | [kg/m] |
| 411N15G0 | 24 | 34 | 9.5 | 20.7 | 40.6 | 26 | -- | M4 | 4.8 | 22.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 4,600 | 9,800 | 0.10 | 1.28 |
| 411N15C0 | 24 | 34 | 9.5 | 20.7 | 58.6 | 26 | 26 | M4 | 4.8 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.17 | 1.28 |
| 411N15D0 | 24 | 34 | 9.5 | 20.7 | 66.1 | 26 | 26 | M4 | 4.8 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.18 | 1.28 |
| 411N20G0 | 28 | 42 | 11.0 | 23.5 | 48.3 | 32 | -- | M5 | 5.5 | 27.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 7,400 | 15,700 | 0.17 | 2.15 |
| 411N20C0 | 30 | 44 | 12.0 | 25.5 | 69.3 | 32 | 36 | M5 | 6.5 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.31 | 2.15 |
| 411N20K0 | 28 | 42 | 11.0 | 23.5 | 69.3 | 32 | 32 | M5 | 5.5 | 48.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.26 | 2.15 |
| 411N25G0 | 33 | 48 | 12.5 | 27.2 | 54.0 | 35 | -- | M6 | 6.8 | 32.3 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 10,300 | 21,000 | 0.21 | 2.88 |
| 411N25C0 | 36 | 48 | 12.5 | 30.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.40 | 2.88 |
| 411N25D0 | 36 | 48 | 12.5 | 30.2 | 108.6 | 35 | 50 | M6 | 9.0 | 86.9 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 29,200 | 63,300 | 0.67 | 2.88 |
| 411N25K0 | 33 | 48 | 12.5 | 27.2 | 79.2 | 35 | 35 | M6 | 6.8 | 57.5 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.38 | 2.88 |
| 411N30G0 | 42 | 60 | 16.0 | 35.0 | 64.2 | 40 | -- | M8 | 10.0 | 37.2 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 14,700 | 27,000 | 0.50 | 4.45 |
| 411N30C0 | 42 | 60 | 16.0 | 35.0 | 94.8 | 40 | 40 | M8 | 10.0 | 67.8 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.80 | 4.45 |
| 411N30D0 | 42 | 60 | 16.0 | 35.0 | 130.5 | 40 | 60 | M8 | 10.0 | 103.5 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 42,900 | 86,700 | 1.16 | 4.45 |
| 411N35G0 | 48 | 70 | 18.0 | 40.5 | 75.5 | 50 | -- | M8 | 10.0 | 44.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 21,200 | 40,700 | 0.80 | 6.25 |
| 411N35C0 | 48 | 70 | 18.0 | 40.5 | 111.5 | 50 | 50 | M8 | 10.0 | 80.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.20 | 6.25 |
| 411N35D0 | 48 | 70 | 18.0 | 40.5 | 153.5 | 50 | 72 | M8 | 10.0 | 122.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 58,300 | 125,300 | 1.84 | 6.25 |
| 411N45C0 | 60 | 86 | 20.5 | 51.1 | 129.0 | 60 | 60 | M10 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 1.64 | 9.60 |
| 411N45D0 | 60 | 86 | 20.5 | 51.1 | 174.0 | 60 | 80 | M10 | 15.5 | 139.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 79,700 | 163,300 | 2.42 | 9.60 |
| 411N55C0 | 70 | 100 | 23.5 | 57.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 2.67 | 13.80 |
| 411N55D0 | 70 | 100 | 23.5 | 57.3 | 210.0 | 75 | 95 | M12 | 18.0 | 171.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 157,700 | 253,600 | 3.97 | 13.80 |



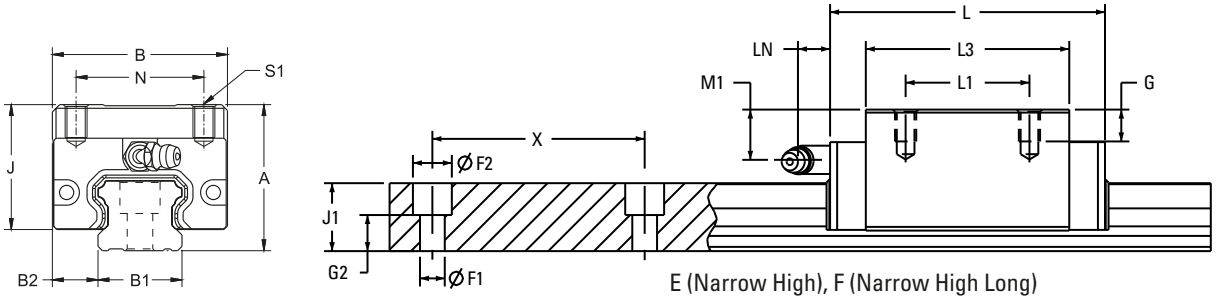



G (Narrow Short) C (Narrow), D (Narrow Long), K (Narrow Compact)

**413 Narrow (Caged)**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15G0 | 24 | 34 | 9.5 | 20.7 | 40.6 | 26 | -- | M4 | 4.8 | 22.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 4,600 | 9,800 | 0.10 | 1.28 |
| 413N15C0 | 24 | 34 | 9.5 | 20.7 | 58.6 | 26 | 26 | M4 | 4.8 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.17 | 1.28 |
| 413N15D0 | 24 | 34 | 9.5 | 20.7 | 66.1 | 26 | 26 | M4 | 4.8 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.18 | 1.28 |
| 413N20G0 | 28 | 42 | 11.0 | 23.5 | 48.3 | 32 | -- | M5 | 5.5 | 27.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 7,400 | 15,700 | 0.17 | 2.15 |
| 413N20C0 | 30 | 44 | 12.0 | 25.5 | 69.3 | 32 | 36 | M5 | 6.5 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.31 | 2.15 |
| 413N20K0 | 28 | 42 | 11.0 | 23.5 | 69.3 | 32 | 32 | M5 | 5.5 | 48.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.26 | 2.15 |
| 413N25G0 | 33 | 48 | 12.5 | 27.2 | 54.0 | 35 | -- | M6 | 6.8 | 32.3 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 10,300 | 21,000 | 0.21 | 2.88 |
| 413N25C0 | 36 | 48 | 12.5 | 30.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.40 | 2.88 |
| 413N25D0 | 36 | 48 | 12.5 | 30.2 | 108.6 | 35 | 50 | M6 | 9.0 | 86.9 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 29,200 | 63,300 | 0.67 | 2.88 |
| 413N25K0 | 33 | 48 | 12.5 | 27.2 | 79.2 | 35 | 35 | M6 | 6.8 | 57.5 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.38 | 2.88 |
| 413N30G0 | 42 | 60 | 16.0 | 35.0 | 64.2 | 40 | -- | M8 | 10.0 | 37.2 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 14,700 | 27,000 | 0.50 | 4.45 |
| 413N30C0 | 42 | 60 | 16.0 | 35.0 | 94.8 | 40 | 40 | M8 | 10.0 | 67.8 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.80 | 4.45 |
| 413N30D0 | 42 | 60 | 16.0 | 35.0 | 130.5 | 40 | 60 | M8 | 10.0 | 103.5 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 42,900 | 86,700 | 1.16 | 4.45 |
| 413N35G0 | 48 | 70 | 18.0 | 40.5 | 75.5 | 50 | -- | M8 | 10.0 | 44.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 21,200 | 40,700 | 0.80 | 6.25 |
| 413N35C0 | 48 | 70 | 18.0 | 40.5 | 111.5 | 50 | 50 | M8 | 10.0 | 80.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.20 | 6.25 |
| 413N35D0 | 48 | 70 | 18.0 | 40.5 | 153.5 | 50 | 72 | M8 | 10.0 | 122.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 58,300 | 125,300 | 1.84 | 6.25 |
| 413N45C0 | 60 | 86 | 20.5 | 51.1 | 129.0 | 60 | 60 | M10 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 1.64 | 9.60 |
| 413N45D0 | 60 | 86 | 20.5 | 51.1 | 174.0 | 60 | 80 | M10 | 15.5 | 139.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 79,700 | 163,300 | 2.42 | 9.60 |
| 413N55C0 | 70 | 100 | 23.5 | 57.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 2.67 | 13.80 |
| 413N55D0 | 70 | 100 | 23.5 | 57.3 | 210.0 | 75 | 95 | M12 | 18.0 | 171.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 157,700 | 253,600 | 3.97 | 13.80 |

# 400 Series Specifications

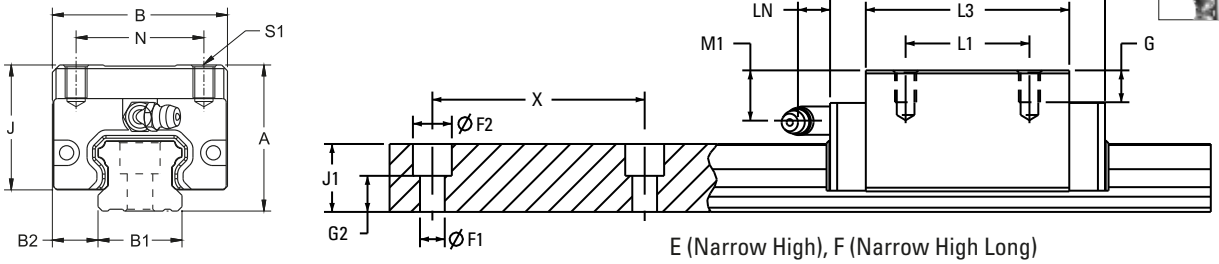



E (Narrow High), F (Narrow High Long)

**411 Narrow High**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 411N15E0 | 28 | 34 | 9.5 | 24.7 | 58.6 | 26 | 26 | M4 | 6.0 | 40.2 | M4 X 0.7 | 9.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.19 | 1.28 |
| 411N20F0 | 30 | 44 | 12.0 | 25.5 | 82.1 | 32 | 50 | M5 | 6.5 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.36 | 2.15 |
| 411N25E0 | 40 | 48 | 12.5 | 34.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.45 | 2.88 |
| 411N25F0 | 40 | 48 | 12.5 | 34.2 | 93.9 | 35 | 50 | M6 | 9.0 | 72.2 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.66 | 2.88 |
| 411N30E0 | 45 | 60 | 16.0 | 38.0 | 94.8 | 40 | 40 | M8 | 12.0 | 67.8 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.91 | 4.45 |
| 411N30F0 | 45 | 60 | 16.0 | 38.0 | 105.0 | 40 | 60 | M8 | 12.0 | 78.0 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.04 | 4.45 |
| 411N35E0 | 55 | 70 | 18.0 | 47.5 | 111.5 | 50 | 50 | M8 | 12.0 | 80.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 411N35F0 | 55 | 70 | 18.0 | 47.5 | 123.5 | 50 | 72 | M8 | 12.0 | 92.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.80 | 6.25 |
| 411N45E0 | 70 | 86 | 20.5 | 61.1 | 129.0 | 60 | 60 | M10 | 18.0 | 94.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.28 | 9.60 |
| 411N45F0 | 70 | 86 | 20.5 | 61.1 | 145.0 | 60 | 80 | M10 | 18.0 | 110.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.67 | 9.60 |
| 411N55E0 | 80 | 100 | 23.5 | 67.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.42 | 13.80 |
| 411N55F0 | 80 | 100 | 23.5 | 67.3 | 193.0 | 75 | 95 | M12 | 18.0 | 154.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 5.08 | 13.80 |






E (Narrow High), F (Narrow High Long)

**413 Narrow High (Caged)**

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +.02 -.05 | J1 | X | F1* | F2* | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15E0 | 28 | 34 | 9.5 | 24.7 | 58.6 | 26 | 26 | M4 | 6.0 | 40.2 | M4 X 0.7 | 9.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.19 | 1.28 |
| 413N20F0 | 30 | 44 | 12.0 | 25.5 | 82.1 | 32 | 50 | M5 | 6.5 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.36 | 2.15 |
| 413N25E0 | 40 | 48 | 12.5 | 34.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.45 | 2.88 |
| 413N25F0 | 40 | 48 | 12.5 | 34.2 | 93.9 | 35 | 50 | M6 | 9.0 | 72.2 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.66 | 2.88 |
| 413N30E0 | 45 | 60 | 16.0 | 38.0 | 94.8 | 40 | 40 | M8 | 12.0 | 67.8 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.91 | 4.45 |
| 413N30F0 | 45 | 60 | 16.0 | 38.0 | 105.0 | 40 | 60 | M8 | 12.0 | 78.0 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.04 | 4.45 |
| 413N35E0 | 55 | 70 | 18.0 | 47.5 | 111.5 | 50 | 50 | M8 | 12.0 | 80.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 413N35F0 | 55 | 70 | 18.0 | 47.5 | 123.5 | 50 | 72 | M8 | 12.0 | 92.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.80 | 6.25 |
| 413N45E0 | 70 | 86 | 20.5 | 61.1 | 129.0 | 60 | 60 | M10 | 18.0 | 94.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.28 | 9.60 |
| 413N45F0 | 70 | 86 | 20.5 | 61.1 | 145.0 | 60 | 80 | M10 | 18.0 | 110.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.67 | 9.60 |
| 413N55E0 | 80 | 100 | 23.5 | 67.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.42 | 13.80 |
| 413N55F0 | 80 | 100 | 23.5 | 67.3 | 193.0 | 75 | 95 | M12 | 18.0 | 154.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 5.08 | 13.80 |

*Note: Mounting hole dimensions of 411 and 413 F Style carriages are different.

# 400 Series Accuracy, Sizing and Running Smoothness

## Bearing Travel Life Calculation

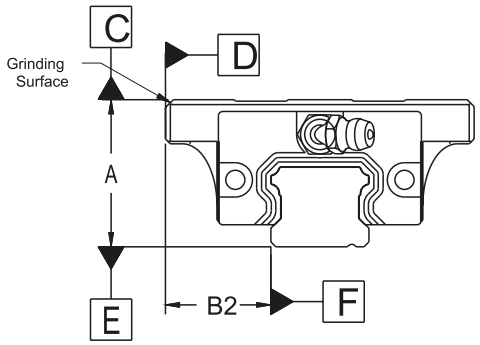
**$L = (C/F)^3 \times 50$ km**
**where:**
**L = travel life, km**
**C = 50 km dynamic load rating**
**F = applied dynamic load, N**

**$C_{min} = \left(\frac{L}{50}\right)^{1/3} F$**
**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

**Operating Parameters:**

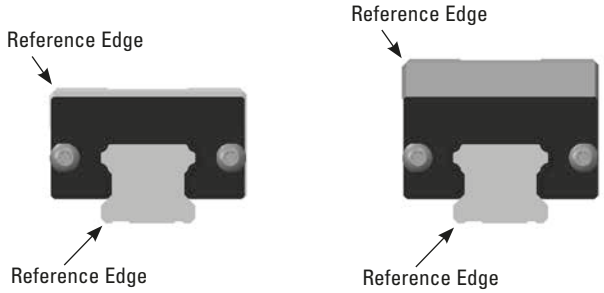
| | | |
|---|---|---|
| **Maximum Velocity:** | **5 m/s** | |
| **Maximum Acceleration:** | **100 m/s²** | |
| **Temperature:** | **Min:** | **– 40° C** |
| | **Max:** | **80° C** |
| | **Max peak:** | **120° C short time*** |
| | | *without bellows |

Deflection charts are available on www.thomsonlinear.com.




| Grade / Item | Normal (N) | High (H) |
|---|---|---|
| Height Tolerance (A) | ± 0.1 | ± 0.04 |
| Width Tolerance (B2) | ± 0.1 | ± 0.04 |
| Pair variation max (ΔA) | 0.03 | 0.02 |
| Pair variation max (ΔB2) | 0.03 | 0.02 |
| Running parallellism of carriage surface C with respect to surface E. | Δ C refer to Fig. 1-1 | |
| Running parallellsim of carriage surface D with respect to surface F. | Δ D refer to Fig. 1-1 | |

All items in mm.



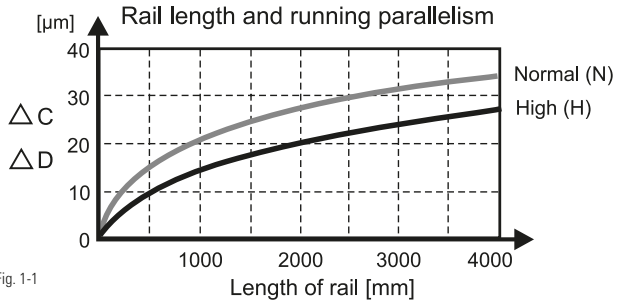
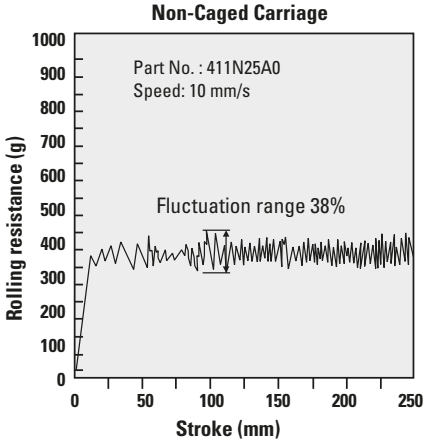
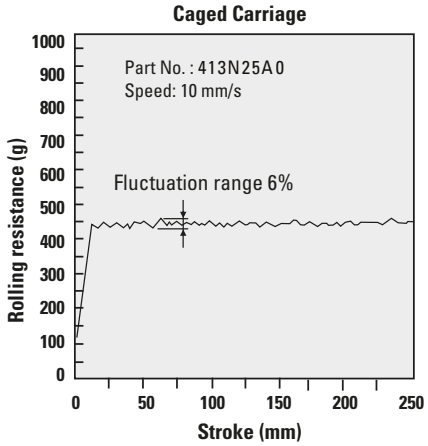




Fig. 1-1

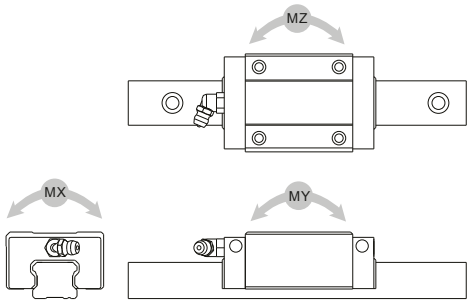
## 413 Caged Ball Carriage Increased Running Smoothness



# 400 Series - 411 Standard Carriage Nominal Moment

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.



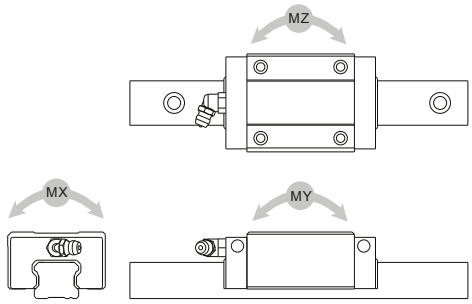

1. The dynamic load and moment ratings are based on the travel life of 50 km.
2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

## 411 Carriage Nominal Moment:

| Model | Basic permissible static moment (Nm) | | | Basic permissible dynamic moment (Nm) | | |
|---|---|---|---|---|---|---|
| | MX | MY | MZ | MX | MY | MZ |
| 411N15A0 | 135 | 118 | 118 | 65 | 56 | 56 |
| 411N15B0 | 164 | 169 | 169 | 78 | 80 | 80 |
| 411N15C0 | 135 | 118 | 118 | 65 | 56 | 56 |
| 411N15D0 | 170 | 168 | 168 | 78 | 80 | 80 |
| 411N15E0 | 135 | 118 | 118 | 65 | 65 | 56 |
| 411N15G0 | 68 | 32 | 32 | 32 | 16 | 16 |
| 411N20A0 | 285 | 221 | 221 | 134 | 104 | 104 |
| 411N20B0 | 370 | 361 | 361 | 174 | 170 | 170 |
| 411N20C0 | 285 | 221 | 221 | 134 | 104 | 104 |
| 411N20F0 | 370 | 361 | 361 | 174 | 170 | 170 |
| 411N20G0 | 146 | 65 | 65 | 69 | 30 | 30 |
| 411N20K0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 411N25A0 | 440 | 352 | 352 | 216 | 173 | 173 |
| 411N25B0 | 567 | 568 | 568 | 278 | 279 | 279 |
| 411N25C0 | 440 | 352 | 352 | 216 | 173 | 173 |
| 411N25D0 | 680 | 820 | 820 | 313 | 378 | 378 |
| 411N25E0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 411N25F0 | 567 | 568 | 568 | 278 | 279 | 279 |
| 411N25G0 | 226 | 101 | 101 | 111 | 49 | 49 |
| 411N25K0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 411N30A0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30B0 | 915 | 822 | 822 | 499 | 447 | 447 |
| 411N30C0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30D0 | 1123 | 1338 | 1338 | 555 | 661 | 661 |
| 411N30E0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30F0 | 915 | 822 | 822 | 499 | 447 | 447 |
| 411N30G0 | 350 | 150 | 150 | 191 | 81 | 81 |
| 411N35A0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35B0 | 1604 | 1398 | 1398 | 838 | 730 | 730 |
| 411N35C0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35D0 | 1983 | 2288 | 2288 | 922 | 1063 | 1063 |
| 411N35E0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35F0 | 1604 | 1398 | 1398 | 838 | 730 | 730 |
| 411N35G0 | 644 | 270 | 270 | 336 | 141 | 141 |
| 411N45A0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45B0 | 2739 | 2124 | 2124 | 1458 | 1130 | 1130 |
| 411N45C0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45D0 | 3452 | 3382 | 3382 | 1684 | 1651 | 1651 |
| 411N45E0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45F0 | 2739 | 2124 | 2124 | 1458 | 1130 | 1133 |
| 411N55A0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55B0 | 4431 | 4104 | 4104 | 2335 | 2162 | 2162 |
| 411N55C0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55D0 | 6284 | 6462 | 6462 | 3165 | 3255 | 3255 |
| 411N55E0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55F0 | 4431 | 4104 | 4104 | 2335 | 2162 | 2162 |

## 400 Series - 413 Caged Carriage Nominal Moment

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.




1. The dynamic load and moment ratings are based on the travel life of 50 km.
2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

### 413 Caged Carriage Nominal Moment

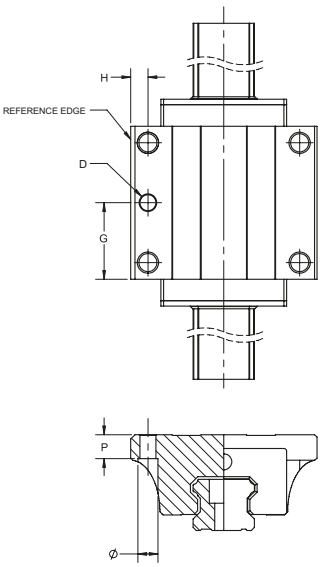
| Model | Basic permissible static moment (Nm) | | | Basic permissible dynamic moment (Nm) | | |
|---|---|---|---|---|---|---|
| | MX | MY | MZ | MX | MY | MZ |
| 413N15A0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15B0 | 164 | 169 | 169 | 96 | 99 | 99 |
| 413N15C0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15D0 | 170 | 168 | 168 | 96 | 99 | 99 |
| 413N15E0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15G0 | 68 | 32 | 32 | 39 | 19 | 19 |
| 413N20A0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N20B0 | 370 | 361 | 361 | 215 | 210 | 210 |
| 413N20C0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N20F0 | 370 | 361 | 361 | 215 | 210 | 210 |
| 413N20G0 | 146 | 65 | 65 | 85 | 37 | 37 |
| 413N20K0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N25A0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25B0 | 567 | 568 | 568 | 342 | 343 | 343 |
| 413N25C0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25D0 | 680 | 820 | 820 | 387 | 368 | 368 |
| 413N25E0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25F0 | 567 | 568 | 568 | 342 | 343 | 343 |
| 413N25G0 | 226 | 101 | 101 | 136 | 61 | 61 |
| 413N25K0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N30A0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30B0 | 915 | 822 | 822 | 616 | 552 | 552 |
| 413N30C0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30D0 | 1123 | 1338 | 1338 | 686 | 816 | 816 |
| 413N30E0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30F0 | 915 | 822 | 822 | 616 | 552 | 552 |
| 413N30G0 | 350 | 150 | 150 | 235 | 101 | 101 |
| 413N35A0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35B0 | 1604 | 1398 | 1398 | 1034 | 902 | 902 |
| 413N35C0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35D0 | 1983 | 2288 | 2288 | 1138 | 1314 | 1314 |
| 413N35E0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35F0 | 1604 | 1398 | 1398 | 1034 | 902 | 902 |
| 413N35G0 | 644 | 270 | 270 | 415 | 174 | 174 |
| 413N45A0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45B0 | 2739 | 2124 | 2124 | 1800 | 1396 | 1396 |
| 413N45C0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45D0 | 3452 | 3382 | 3382 | 2080 | 2038 | 2038 |
| 413N45E0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45F0 | 2739 | 2124 | 2124 | 1800 | 1396 | 1396 |
| 413N55A0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55B0 | 4431 | 4104 | 4104 | 2882 | 2669 | 2669 |
| 413N55C0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55D0 | 6284 | 6462 | 6462 | 3907 | 4018 | 4018 |
| 413N55E0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55F0 | 4431 | 4104 | 4104 | 2882 | 2669 | 2669 |

# 400 Series - Carriage Dowel Holes

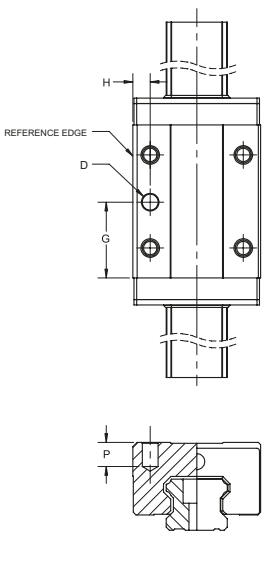
Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard press fit dowel hole options for the 400 series Standard Ball Carriages are:

**Single Dowel**
**Slip Fit**

**Style A and B**




**Style C, D, E and F**




| 400 | | | ES1 | | | ES2 | | | ES3 | | | ES4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Style | Size | G | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 20.10 | 6 | 4.5 | 7 | – | – | – | 1/4" | 4.5 | 7 | – | – | – |
| | 20 | 24.25 | 6 | 5 | 9 | – | – | – | 1/4" | 5 | 9 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 40.25 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8" | 9 | 14 |
| | 45 | 47.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8" | 10 | 18 |
| | 55 | 47.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8" | 10 | 18 |
| Type B | 20 | 30.65 | 6 | 5 | 9 | – | – | – | 1/4" | 5 | 9 | – | – | – |
| | 25 | 36.10 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 39.00 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 46.25 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8" | 9 | 14 |
| | 45 | 55.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8" | 10 | 18 |
| | 55 | 55.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8" | 10 | 18 |
| Type C | 15 | 20.10 | 6 | 4 | 4.8 | – | – | – | 1/4" | 4 | 4,8 | – | – | – |
| | 20 | 20.25 | 6 | 6 | 6.5 | – | – | – | 1/4" | 6 | 6.5 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| | 35 | 40.25 | – | – | – | 10 | 10 | 10 | – | – | – | 3/8" | 10 | 10 |
| Type D | 25 | 43.45 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 51.75 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| | 35 | 61.25 | – | – | – | 10 | 10 | 10 | – | – | – | 3/8" | 10 | 10 |
| Type E | 15 | 20.10 | 6 | 4 | 6 | – | – | – | 1/4" | 4 | 6 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 40.25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8" | 10 | 12 |
| | 45 | 47.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8" | 13 | 18 |
| | 55 | 47.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8" | 13 | 18 |
| Type F | 25 | 36.10 | 6 | 6.5 | 9 | – | – | – | 1/4" | 6.5 | 9 | – | – | – |
| | 30 | 39.00 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 46.25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8" | 10 | 12 |
| | 45 | 55.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8" | 13 | 18 |
| | 55 | 55.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8" | 13 | 18 |

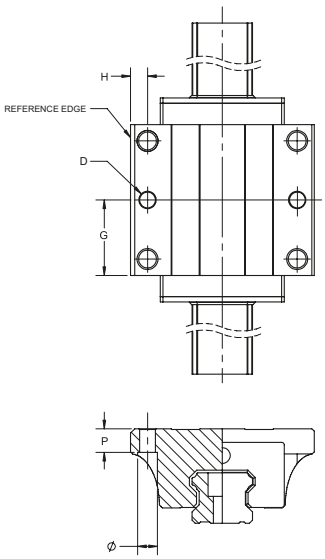
All dimension in mm, unless otherwise specified.
Hole tolerance øD +0.013/-0

## 400 Series - Carriage Dowel Holes (continued)

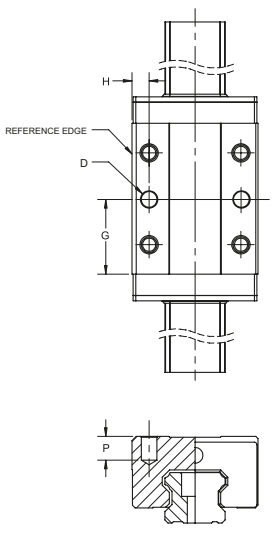
Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard slip fit dowel hole options for the 400 series Standard Ball Carriages are:

**Double Dowel**
**Press Fit**

**Style A and B**




**Style C, D, E and F**




| 400 | | | ES12 | | | ES13 | | | ES14 | | | ES15 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Style | Size | G | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 20.10 | 6 | 4.5 | 7 | – | – | – | 1/4″ | 4.5 | 7 | – | – | – |
| | 20 | 24.25 | 6 | 5 | 9 | – | – | – | 1/4″ | 5 | 9 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4″ | 9 | 12 | 3/8″ | 9 | 12 |
| | 35 | 40.25 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8″ | 9 | 14 |
| | 45 | 47.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| | 55 | 47.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| Type B | 20 | 30.65 | 6 | 5 | 9 | – | – | – | 1/4″ | 5 | 9 | – | – | – |
| | 25 | 36.10 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 39.00 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4″ | 9 | 12 | 3/8″ | 9 | 12 |
| | 35 | 46.25 | – | – | – | 10 | 9 | 14 | – | – | – | 3/8″ | 9 | 14 |
| | 45 | 55.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| | 55 | 55.00 | – | – | – | 10 | 10 | 18 | – | – | – | 3/8″ | 10 | 18 |
| Type C | 15 | 20.10 | 6 | 4 | 4.8 | – | – | – | 1/4″ | 4 | 4,8 | – | – | – |
| | 20 | 20.25 | 6 | 6 | 6.5 | – | – | – | 1/4″ | 6 | 6.5 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4″ | 10 | 10 | 3/8″ | 10 | 10 |
| | 35 | 40.25 | – | – | – | 10 | 10 | 10 | – | – | – | 3/8″ | 10 | 10 |
| Type D | 25 | 43.45 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 51.75 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4″ | 10 | 10 | 3/8″ | 10 | 10 |
| | 35 | 61.25 | – | – | – | 10 | 10 | 10 | – | – | – | 3/8″ | 10 | 10 |
| Type E | 15 | 20.10 | 6 | 4 | 6 | – | – | – | 1/4″ | 4 | 6 | – | – | – |
| | 25 | 28.75 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 33.90 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 40.25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| | 45 | 47.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8″ | 13 | 18 |
| | 55 | 47.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8″ | 13 | 18 |
| Type F | 25 | 36.10 | 6 | 6.5 | 9 | – | – | – | 1/4″ | 6.5 | 9 | – | – | – |
| | 30 | 39.00 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4″ | 10 | 12 | 3/8″ | 10 | 12 |
| | 35 | 46.25 | – | – | – | 10 | 10 | 12 | – | – | – | 3/8″ | 10 | 12 |
| | 45 | 55.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8″ | 13 | 18 |
| | 55 | 55.00 | – | – | – | 10 | 13 | 18 | – | – | – | 3/8″ | 13 | 18 |

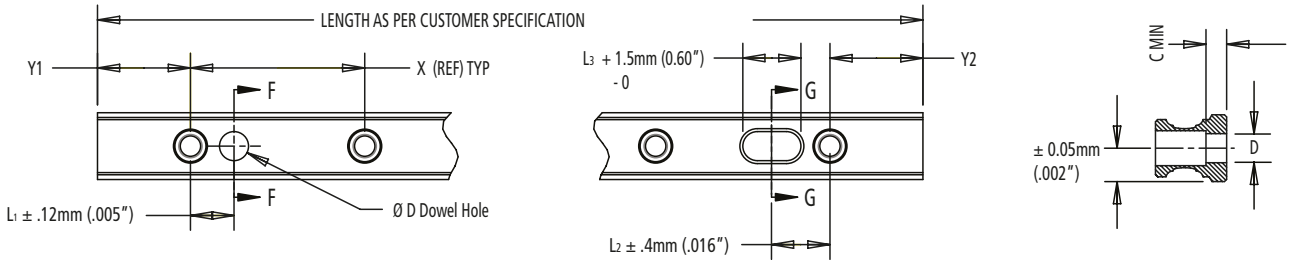
All dimension in mm, unless otherwise specified.
Hole tolerance øD +0/-0.013

## 400 Series - Rail Length

### Maximum Length of One Piece Rail

| Size (mm) | 15 | 20 | 25 | 30 | 35 | 45 | 55 |
|---|---|---|---|---|---|---|---|
| One Piece Rail Length | 4000 mm | | | | | | |

## Extended Standard Rail Options

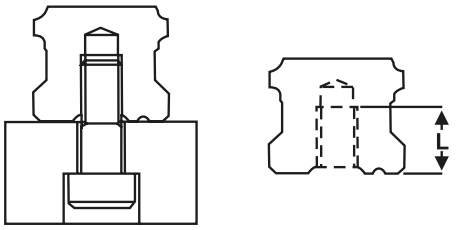



| Option | D | L1 | L2 | L3 | C |
|---|---|---|---|---|---|
| DH1 | 6mm | 30mm | 30mm | 10.2 mm | 9.5 mm |
| DH2 | 10mm | 30mm | 30mm | 13.8 mm | 9.5 mm |
| DH3 | 1/4" | 1.181" | 1.181" | .542" | 3/8" |
| DH4 | 3/8" | 1.181" | 1.181" | .542" | 3/8" |

Y1 = Y2 unless specified at time of ordering
*Size 25 and up step will be present around bottom of slot to control width tolerance during milling of slot.

The rail can be supplied with dowel holes, radial holes and coaxial holes to meet your application needs. Please provide a drawing of your requirement and our Application Engineering Team can provide a quote or select one of our extended standard options.

## Rail with Tapped Holes



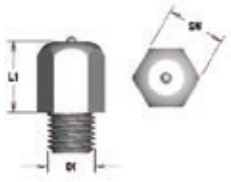

Bolting the rail from the underside allows for a clean top surface with no openings for debris and other particles to collect.

| Size (mm) | 15 | 20 | 25 | 30 | 35 | 45 | 55 |
|---|---|---|---|---|---|---|---|
| Screw | M5 | M6 | M6 | M8 | M8 | M12 | M14 |
| Length of thread | 8 mm | 10 mm | 12 mm | 15 mm | 17 mm | 24 mm | 24 mm |

## Thin Dense Chrome Plating

Rails and carriages are available with **Thin Dense Chrome Plating** with a thickness of 2 – 4 µm. It is only available in both High and Precision accuracy classes up to 4 meters long as a single rail; longer lengths require butt joints.

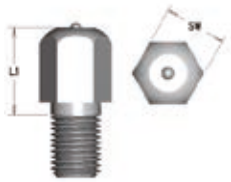
# 400 Series - Oil Fittings



**430LN15L3**

Hydraulic-type lubricating nipple.

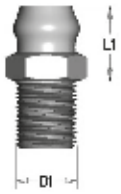
| SW | D1 | L1 |
|---|---|---|
| 5 | M4x0.7XL3.5 | 6 |



**430LN15L-/5**

Hydraulic-type lubricating nipple.

| Part No. | SW | D1 | L1 |
|---|---|---|---|
| 430LN15L5 | 5 | M4x0.7XL5 | 7 |
| 430LN15L | 5 | M4x0.7XL8 | 7 |



**430LN20L / 15L7 / 15L12**

Hydraulic-type lubricating nipple. Straight.

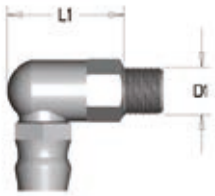
| Part No. | SW | D1 | L1 |
|---|---|---|---|
| 430LN20L | | M6x1.0xL5 | 7.3 |
| 430LN15L7 | | M6x1.0xL7 | 7.3 |
| 430LN15L12 | | M6x1.0xL12 | 7.3 |



**430LN35L / LNL**

Hydraulic-type lubricating nipple. Straight.

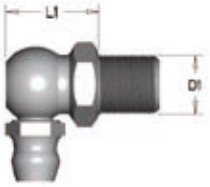
| Part No. | SW | D1 | L1 |
|---|---|---|---|
| 430LN35L | | M8x1.25xL8 | 10.2 |
| 430LNL | | M8x1.25xL12 | 10.2 |



**430LN90L5 / L7 / L12**

Hydraulic-type lubricating nipple. 90° angle.

| Part No. | SW | D1 | L1 |
|---|---|---|---|
| 430LN90L5 | | M6x1.0xL5 | 14.7 |
| 430LN90L7 | | M6x1.0xL7 | 14.7 |
| 430LN90L12 | | M6x1.0xL12 | 14.7 |

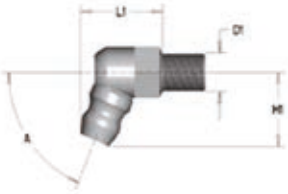


**430LN95L8 / L12**

Hydraulic-type lubricating nipple. 90° angle.

| Part No. | SW | D1 | L1 |
|---|---|---|---|
| 430LN95L8 | | M8x1.25xL8 | 12.5 |
| 430LN95L12 | | M8x1.25xL12 | 12.5 |

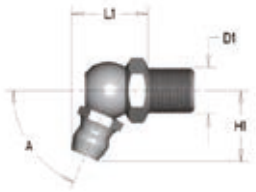
# 400 Series - Oil Fittings




### 430LN45L5 / 45L7 / 45L

Hydraulic-type lubricating nipple. 67.5° angle.

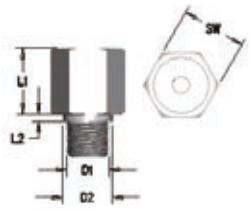
| Part No. | SW | D1 | L1 | H1 | A |
|---|---|---|---|---|---|
| 430LN45L5 | | M6x1.0xL5 | 13.5 | 11.4 | 67.5 |
| 430LN45L7 | | M6x1.0xL7 | 13.5 | 11.4 | 67.5 |
| 430LN45L | | M6x1.0xL12 | 13.5 | 11.4 | 67.5 |




### 430LN55L8 / L

Hydraulic-type lubricating nipple. 67.5° angle.

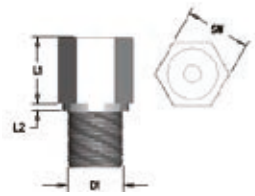
| Part No. | SW | D1 | L1 | H1 | A |
|---|---|---|---|---|---|
| 430LN55L8 | | M8x1.25xL8 | 13.3 | 12.3 | 67.5 |
| 430LN55L | | M8x1.25xL12 | 13.3 | 12.3 | 67.5 |




### 430LNS25L5 / L8 / L12

Hydraulic-type lubricating nipple. Straight.

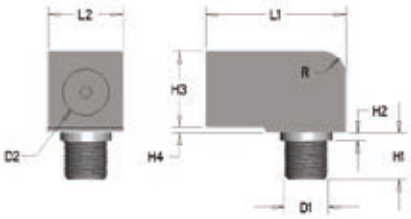
| Part No. | SW | D1 | D2 | L1 | L2 |
|---|---|---|---|---|---|
| 430LNS25L5 | 9.2 | M6x1.0xL5 | 7 | 9.4 | 1 |
| 430LNS25L8 | 9.2 | M6x1.0xL7 | 7 | 9.4 | 1 |
| 430LNS25L12 | 9.2 | M6x1.0xL12 | 7 | 9.4 | 1 |




### 430LNS35L8 / L12

Hydraulic-type lubricating nipple. Straight.

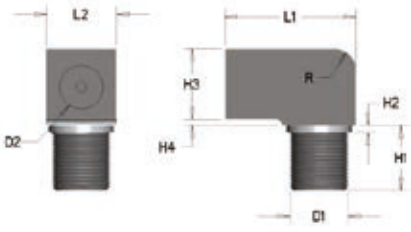
| Part No. | SW | D1 | L1 | H1 | A |
|---|---|---|---|---|---|
| 430LNS35L8 | 9.2 | M8x1.25xL8 | 13.3 | 12.3 | 67.5 |
| 430LNS35L12 | 9.2 | M8x1.25xL12 | 13.3 | 12.3 | 67.5 |




### 430LNA25L5 / L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

| Part No. | D1 | L1 | L2 | H1 | H2 | H3 | H4 | D2 | R |
|---|---|---|---|---|---|---|---|---|---|
| 430LNA25L5 | M6x1.0xL5 | 18.2 | 9.2 | 6 | 1 | 9.8 | .75 | M8x1 | 3 |
| 430LNA25L8 | M6x1.0xL7 | 18.2 | 9.2 | 8 | 1 | 9.8 | .75 | M8x1 | 3 |
| 430LNA25L12 | M6x1.0xL12 | 18.2 | 9.2 | 13 | 1 | 9.8 | .75 | M8x1 | 3 |



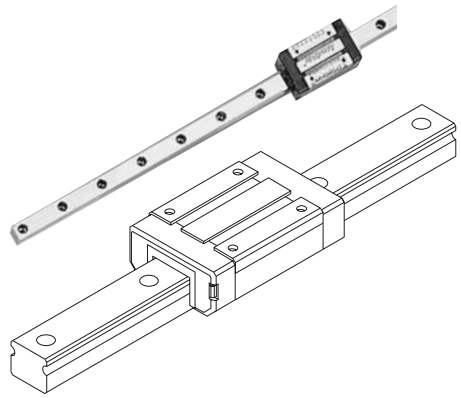

### 430LNA35L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

| Part No. | D1 | L1 | L2 | H1 | H2 | H3 | H4 | D2 | R |
|---|---|---|---|---|---|---|---|---|---|
| 430LNA35L8 | M8x1.25xL8 | 18.2 | 9.2 | 9 | 1 | 9.8 | .75 | M8x1 | 3 |
| 430LNA35L12 | M6x1.0xL12 | 18.2 | 9.2 | 13 | 1 | 9.8 | .75 | M8x1 | 3 |

# AccuMini Linear Ball Guides

### Ultra compact, high roll moment capacity



**Thomson AccuMini Linear Ball Guides offer:**

- Advanced Ball Control - reduces friction to provide smooth, quiet operation at high speeds.
- Full Length Integral Wiper - protects critical components from contamination to maximize system life.
- Gothic Arch Profile - provides high roll moment capacity, critical for single rail designs.
- Engineered Polymer Retainer - reduces system inertia and noise.
- Stainless Steel Ball Bearings - resist corrosion from harsh environments.



### Part Number Description and Specification

**AccuMini Assembly**

**1 AD 10 AA A H LXXXX Y= (See Note 1 Below) -XXX**

- **# of Carriages Per Rail**
- **AccuMini Assembly**
- **Size:** 10, 15, 20
- **Style** / **Description**: AA Standard
- **Preload Designation** / **Description**: A Clearance; B Approx. 0.03 C
- **Length**
- **Accuracy Class**: H = High; P = Precision
- **Options**: **-A** Armoloy Plating; **-LDS** Low Drag Seal; **-Mxx** Special Option

**AccuMini Carriage Only**

**CD 10 AA A H -XXX**

- **AccuMini Carriage**
- **Size:** 10, 15, 20
- **Style** / **Description**: AA Standard
- **Preload Designation** / **Description**: A Clearance; B Approx. 0.03 C
- **Accuracy Class**: H = High; P = Precision
- **Options**: **-A** Armoloy Plating; **-LDS** Low Drag Seal; **-Mxx** Special Option

**AccuMini Rail Only**

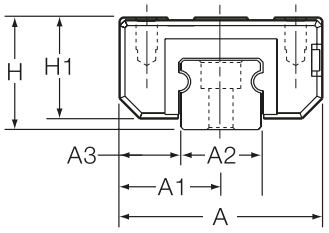
**RD 10 H LXXXX Y= (See Note 1 Below)**

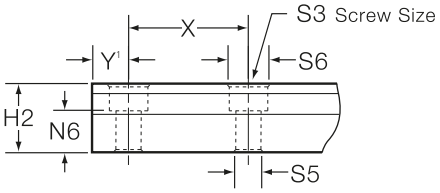
- **AccuMini Rail**
- **Size:** 10, 15, 20
- **Accuracy Class**: H = High; P = Precision
- **Length**

1. Y= Distance from end of rail to center of 1st mounting hole

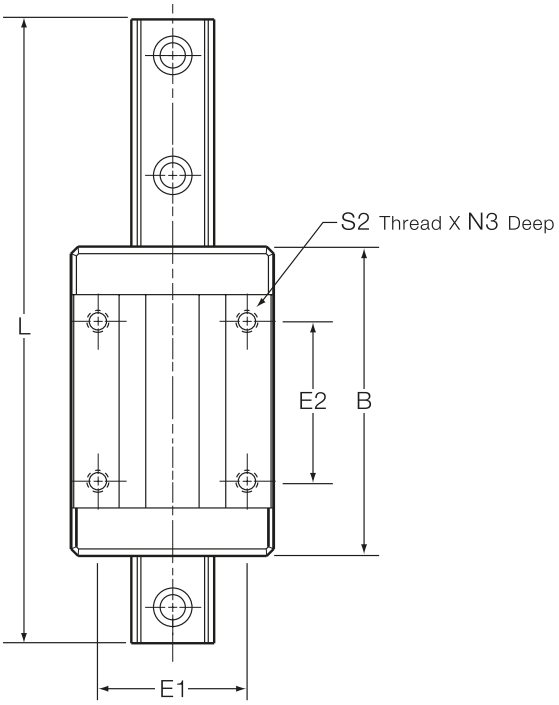
# AccuMini

**(Miniature Series)**
**Low Profile, Compact Design**




1. "Y" dimension will be equal on both ends unless specified by customer.

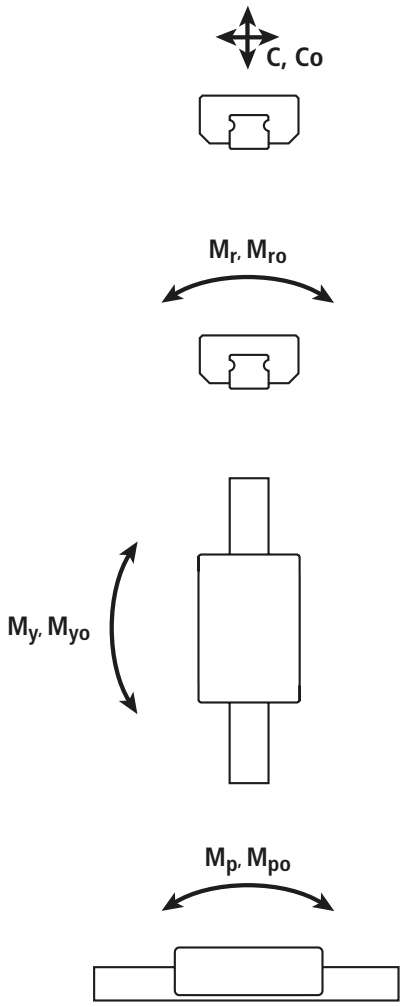



**NOTE:**
The AccuMini linear guide series carriages do not have retained balls. Removing the carriage from the rail without an arbor will result in the balls falling out.

**AccuMini Linear Guide Series**

| (mm) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | **A** | **A1** | **A2** | **A3** | **H** | **H1** | **H2** | **B** | **E1** | **E2** | **S2** | **S3** | **S5** | **S6** |
| 10 | 26 | 13 | 10 | 8 | 15 | 13 | 9 | 40 | 17 | 20 | M2,5 | M2,5 | 3 | 5,5 |
| 15 | 38 | 19 | 15 | 11,5 | 21 | 19 | 13 | 58 | 28 | 30 | M4 | M4 | 4,5 | 8 |
| 20 | 50 | 25 | 20 | 15 | 28 | 25,6 | 18 | 76 | 37 | 40 | M5 | M5 | 5,5 | 9,5 |

## AccuMini




### Dynamic Load and Moment Ratings

**C** = Dynamic load rating
**$M_p$** = Dynamic pitch moment rating
**$M_r$** = Dynamic roll moment rating
**$M_y$** = Dynamic yaw moment rating
The dynamic load and moment ratings are based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic capacity of the bearing rated for 50 km by 1.26.

### Static Load and Moment Capacities

**Co** = Static load capacity
**$M_{po}$** = Static pitch moment capacity
**$M_{ro}$** = Static roll moment capacity
**$M_{yo}$** = Static yaw moment capacity
The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

### Bearing Travel Life Comparison

**$L = (C/F)^3 \times 100$ km**
**where:**
**L = travel life, km**
**C = dynamic load rating, N**
**F = applied dynamic load, N**

**$C_{min} = F \left(\frac{L}{100}\right)^{1/3}$**
**where:**
**$C_{min}$ = minimum required dynamic load rating, N**
**F = applied dynamic load, N**
**L = required travel life, km**

### Operating Parameters

**Maximum Velocity = 3 m/s**
**Maximum Acceleration = 50 m/s²**
**Maximum Temperature = 80° C**

### AccuMini Series

| (mm) | | | | | Load Rating | N (lbf) | Moment Rating | | Nm (lbf-ft) | | MASS Carriage Rail | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | N3 | N6 | X | $L_{max}$‡ | C(@100 km) | $C_o$ | $M_p$, $M_y$ | $M_{po}$, $M_{yo}$ | $M_r$ | $M_{ro}$ | kg | kg/m |
| 10 | 4,5 | 5,5 | 25 | 3000 | 2820 (635) | 5300 1,190 | 10 (7) | 20 (15) | 15 (11) | 28 (21) | 0,045 | 0,65 |
| 15 | 6 | 7,5 | 40 | 3000 | 6375 (1,430) | 15200 (3,420) | 35 (26) | 66 (49) | 51 (38) | 96 (71) | 0,141 | 1,42 |
| 20 | 8 | 9,5 | 60 | 3000 | 11870 (2,670) | 23000 (5,170) | 75 (55) | 140 (105) | 125 (92) | 235 (175) | 0,345 | 2,55 |

‡ Maximum rail length in one section. Multiple sections can be butt jointed together for longer lengths.

# AccuMini

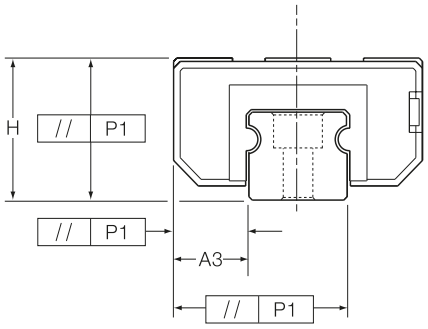
Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

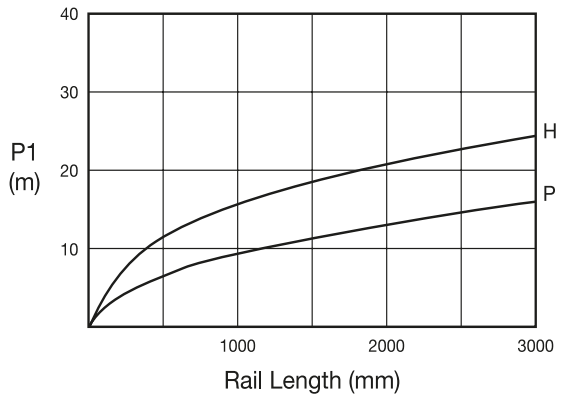
Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the rail. This is analogous to straightness of travel. As such, parallelism describes attributes of the rail only.

Assembly Accuracy describes the tolerance on H and A3 as a function of a carriage – rail assembly, measured from the nominal dimensions.

Pair Variation describes tolerance on H and A3 as a function of carriages at the same position on a common rail. Pair variation describes carriage precision only.

The accuracy class selected will partially determine the accuracy of the system. Other factors such as mounting surface flatness and straightness also significantly affect system accuracy.




## Tolerances

| | Accuracy Class | |
|---|---|---|
| | H - High | P - Precision |
| Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail) | ±40 | ±20 |
| Pair Variation Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at the middle of carriage at same position on rail) | 15 | 7 |
| Running Parallelism | See figures above. | |

All values in µm

## Preload Accuracy Combinations

| Accuracy Class | Preload | |
|---|---|---|
| | Clearance up to 10 µm | Light approximately 0,03C[1] |
| P | – | B |
| H | A | B |

1. C = Dynamic load capacity of the bearing.

## Calculations

To determine proper carriage size:

$$C_{min} = F \bullet \left(\frac{L}{100}\right)^{1/3}$$

$C_{min}$ = minimum required dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

L = required travel life (km)

To determine travel life:

$$L = \left(\frac{C}{F}\right)^{3} \bullet 100$$

L = normal travel life (km)

C = rated dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

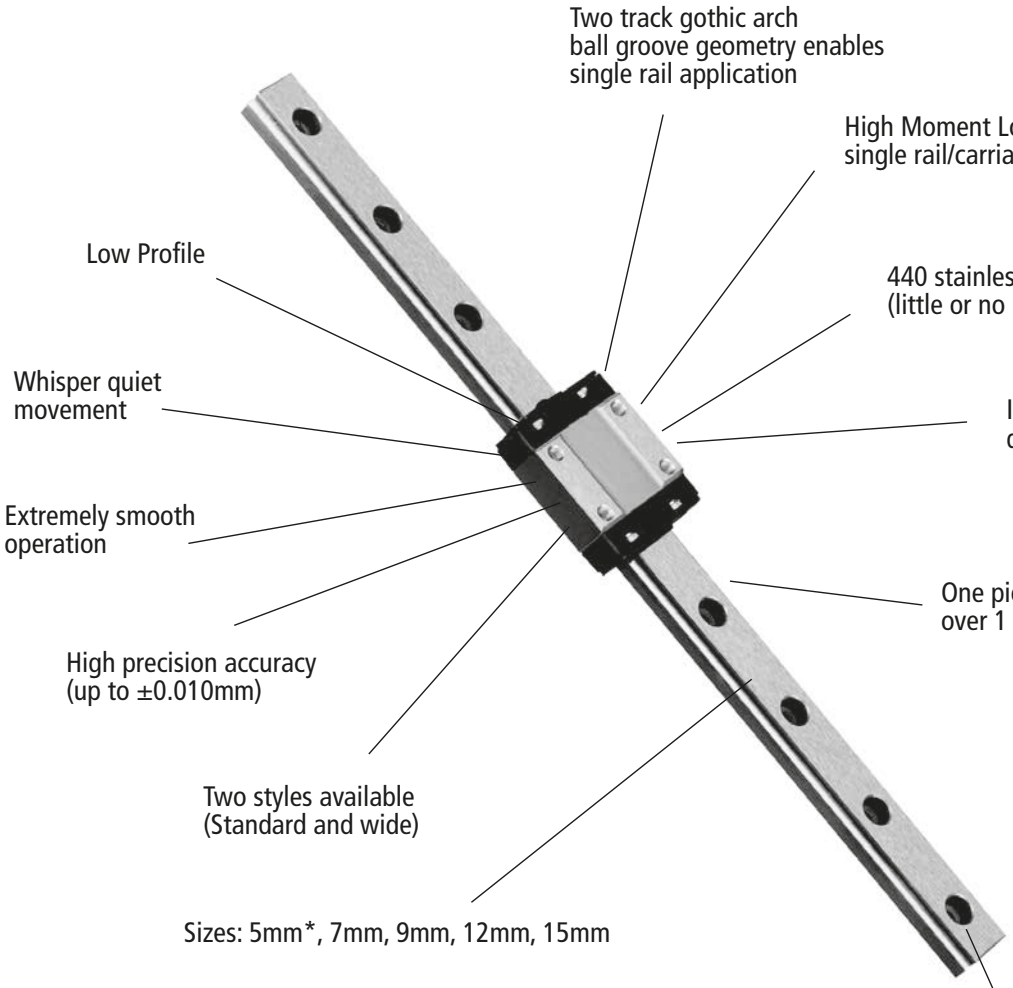
## Conversions

**1 $lb_f$ =** 4,448 N
**1 $kg_f$ =** 9,8 N
**1 km =** 39,370 inches
**1 Nm =** 0.7376 $lb_f$ - ft

## Operating Parameters

**Maximum Velocity =** 3 m/s
**Maximum Acceleration =** 50 $m/s^2$
**Maximum Temperature =** 80° C

## MicroGuide™ Profile Rail




Note! The Microguide linear guide series carriages do not have retained balls.
Removing the carriage from the rail without an arbor will result in the balls falling out.

**MicroGuide Part Numbering**

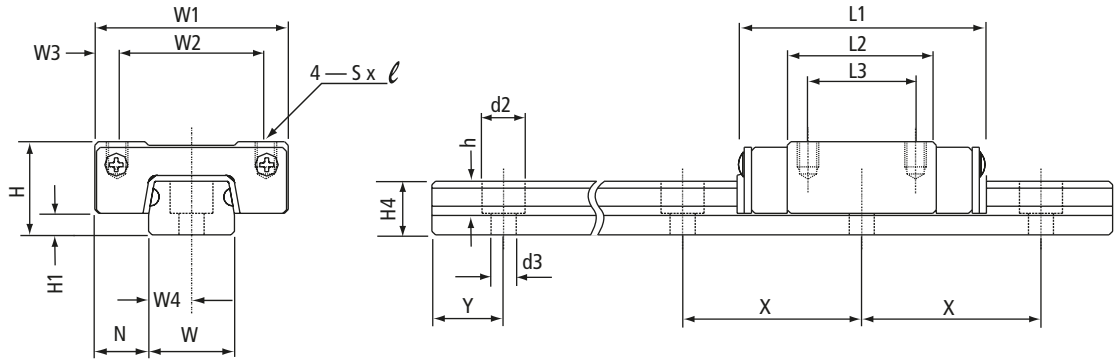
**2 TSR 12 WZ M UU C1 +350 P**

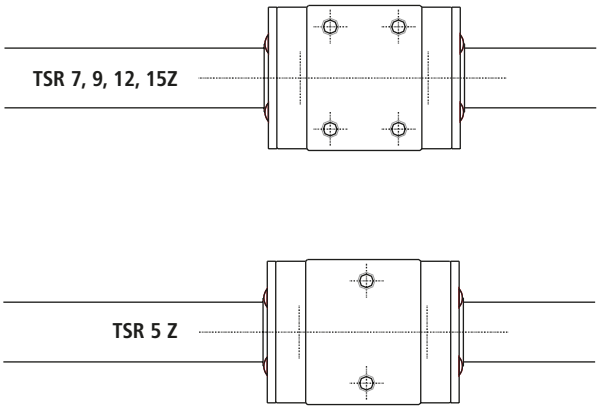
- **Number of Carriages**
- **Rail and Carriage Size**
  - **5** 5 mm*
  - **7** 7 mm
  - **9** 9 mm
  - **12** 12 mm
  - **15** 15 mm
- **Types TSR**
- **Style**
  - **Z** Standard
  - **WZ** Wide
- **Material**
  - **M** Stainless Steel (standard)
- **Seal Configuration**
  - **UU** Lip Seal Standard**
- **Preload**
  - Clearance Fit
  - **C1** Light Preload
- **Length**
- **Accuracy**
  - Normal
  - **H** High
  - **P** Precision

*For 5 mm size, there are only 2 mounting holes per carriage.
**Seals are not available for 5 mm size.

# MicroGuide™ Profile Rail

## TSR-Z Standard




**Standard Lengths of Rail**

| Sizes | 5 | 7 | 9 | 12 | 15 |
|---|---|---|---|---|---|
| Standard Lengths | 40<br>55<br>70<br>100<br>130<br>160 | 40<br>55<br>70<br>85<br>100<br>130<br>1000 | 55<br>75<br>95<br>115<br>135<br>155<br>175<br>195<br>275<br>1015 | 70<br>95<br>120<br>145<br>170<br>195<br>220<br>245<br>270<br>320<br>370<br>470<br>1020 | 150<br>230<br>310<br>430<br>550<br>670<br>1030 |
| X | 15 | 15 | 20 | 25 | 40 |
| Y | 5 | 5 | 7.5 | 10 | 15 |

Longer lengths may be supplied as single rail or butt joints. Please contact customer service for more information.

## MicroGuide™ TSR-Z (Standard)

| Size | Assembly Dimensions | | | Carriage Dimensions | | | | | | | Rail Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | H1 | N | W1 | W2 | W3 | L1 | L2 | L3 | Sxℓ | W | W4 | H4 | d2 | d3 | h | Y | X |
| 5 | 6 | 1.5 | 3.5 | 12 | 8 | 2 | 19 | 11 | - | M2X1.5[1] | 5 | 2.5 | 4 | 3.5 | 2.4 | 1 | 5 | 15 |
| 7 | 8 | 1.5 | 5 | 17 | 12 | 2.5 | 23.5 | 13.5 | 8 | M2X2.5 | 7 | 3.5 | 4.7 | 4.2 | 2.4 | 2.3 | 5 | 15 |
| 9 | 10 | 2.2 | 5.5 | 20 | 15 | 2.5 | 31 | 20.0 | 10 | M3X3 | 9 | 4.5 | 5.5 | 6 | 3.5 | 3.3 | 7.5 | 20 |
| 12 | 13 | 3 | 7.5 | 27 | 20 | 3.5 | 35 | 20.8 | 15 | M3X3.5 | 12 | 6 | 7.5 | 6 | 3.5 | 4.5 | 10 | 25 |
| 15 | 16 | 4 | 8.5 | 32 | 25 | 3.5 | 43 | 25.7 | 20 | M3X4 | 15 | 7.5 | 9.5 | 6 | 3.5 | 4.5 | 15 | 40 |

(1) For 5mm size, there are only 2 mounting holes per carriage.

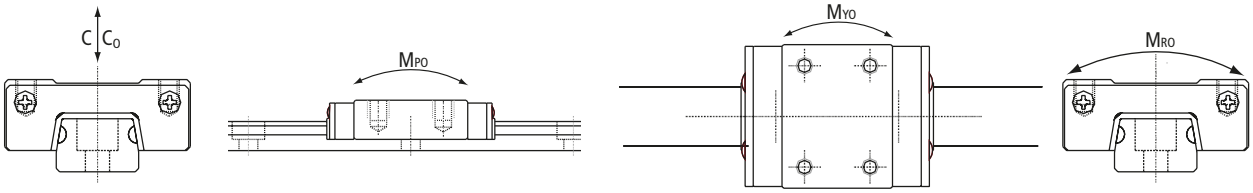
Note All: Dimensions in mm except where noted otherwise. Longer lengths are available with butt joints on sizes 7-15. Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering.

# MicroGuide™ Profile Rail

## TSR-Z Standard

**Dynamic Load and Moment Ratings**
C = Dynamic load rating

**Static Load and Moment Capacities**
$C_O$ = Static load rating
$M_{PO}$ = Static pitch moment capacity
$M_{YO}$ = Static yaw moment capacity
$M_{RO}$ = Static roll moment capacity




| | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|---|---|---|---|---|---|---|---|
| Size | Dynamic C[1] | Limit Co[2,3] | $M_{PO}$ | $M_{YO}$ | $M_{RO}$ | Carriage [kg] | Rail [kg/m] |
| 5[4] | 336 | 620 | 0.8 | 0.8 | 1.47 | 0.01 | 0.14 |
| 7 | 924 | 1440 | 2.55 | 2.55 | 5.10 | 0.02 | 0.23 |
| 9 | 1544 | 2360 | 5.10 | 5.10 | 10.4 | 0.02 | 0.32 |
| 12 | 2780 | 4220 | 8.04 | 8.72 | 14.7 | 0.04 | 0.58 |
| 15 | 4410 | 6570 | 16.5 | 17.9 | 30.2 | 0.07 | 0.93 |

Notes:
1. The dynamic load and moment ratings are based upon 50km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.
4. Size 5 does not have end seals. Pan head screws required to mount rail.

### Load/Life Calculations

To determine proper carriage size:

$C_{min} = F \bullet \left(\frac{50}{L}\right)^{1/3}$

$C_{min}$ = minimum required dynamic load capacity of carriage (N)
F = equivalent load on carriage (N)
L = required travel life (km)

To determine travel life:

$L = \left(\frac{C}{F}\right)^3 \bullet 50$

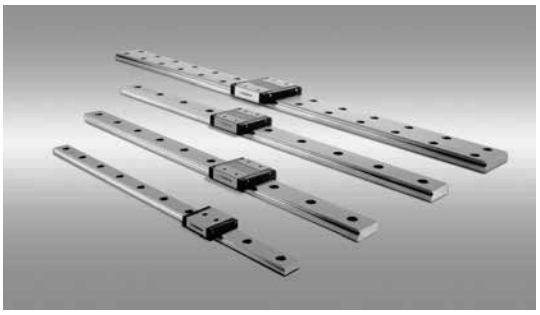
L = normal travel life (km)
C = rated dynamic load capacity of carriage (N)
F = equivalent load on carriage (N)

### Operating Parameters

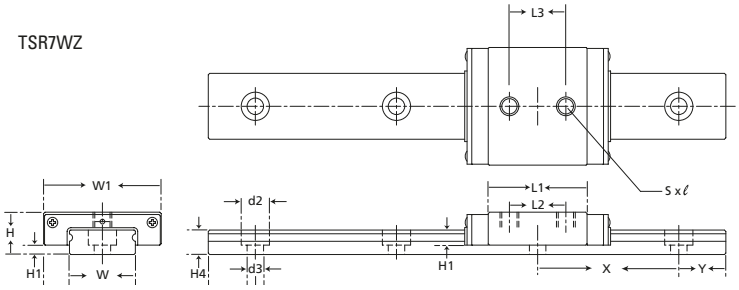
Maximum Velocity: 3 m/s
Maximum Acceleration: 50 m/s

# MicroGuide™ Profile Rail

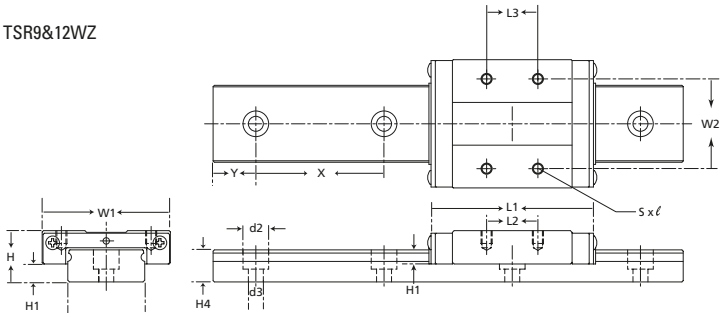
## TSR-WZ Wide



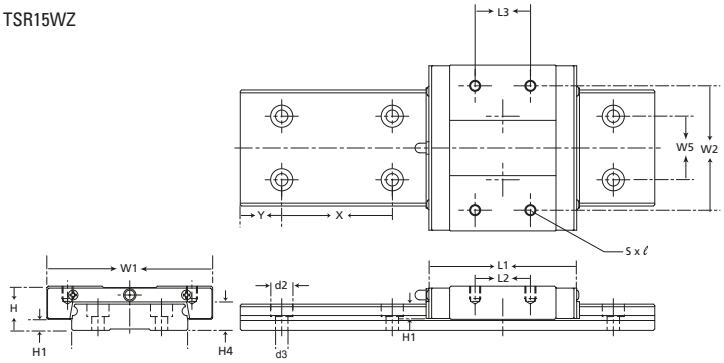
TSR7WZ




TSR9&12WZ




TSR15WZ




### Standard Lengths of Rail

| Sizes | 7 | 9 | 12 | 15 |
|---|---|---|---|---|
| Standard Lengths | 50<br>85<br>170<br>100<br>130<br>260<br>350<br>440<br>530<br>620<br>800<br>1010 | 50<br>110<br>260<br>350<br>440<br>530<br>620<br>800<br>1010 | 70<br>150<br>310<br>390<br>470<br>630<br>790<br>950<br>1030 | 110<br>190<br>270<br>430<br>590<br>750<br>910<br>1030 |
| X | 30 | 30 | 40 | 40 |
| Y | 10 | 10 | 15 | 15 |

## MicroGuide™ TSR-WZ Wide

| Size | Assembly Dimensions | | | Carriage Dimensions | | | | | | Rail Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H | H1 | N | W1 | W2 | L1 | L2 | L3 | Sxℓ | W | W5 | H4 | d2 | d3 | h | Y | X |
| 7* | 9 | 2 | 5.5 | 25 | - | 31 | 21.5 | 12 | M4X3.5 | 14 | - | 5.2 | 6 | 3.5 | 3.2 | 10 | 30 |
| 9 | 12 | 4.2 | 6 | 30 | 21 | 39 | 28 | 12 | M2.6X3 | 18 | - | 7.5 | 6 | 3.5 | 4.5 | 10 | 30 |
| 12 | 14 | 4 | 8 | 40 | 28 | 44.5 | 30.5 | 15 | M3X3.5 | 24 | - | 8.5 | 8 | 4.5 | 4.5 | 15 | 40 |
| 15 | 16 | 4 | 9 | 60 | 45 | 55.5 | 38.5 | 20 | M4X4.5 | 42 | 23 | 9.5 | 8 | 4.5 | 4.5 | 15 | 40 |

Note: All dimensions in mm except where noted otherwise. Longer lengths are available with butt joints.
Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering.

* For 7 mm size, there are only 2 mounting holes per carriage.

# MicroGuide™ Profile Rail

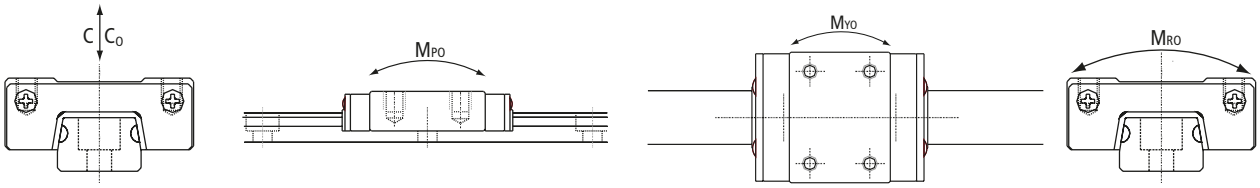
## TSR-WZ Wide

### Dynamic Load and Moment Ratings

C = Dynamic load rating

### Static Load and Moment Capacities

$C_O$ = Static load rating
$M_{PO}$ = Static pitch moment capacity
$M_{YO}$ = Static yaw moment capacity
$M_{RO}$ = Static roll moment capacity




| | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|---|---|---|---|---|---|---|---|
| Size | Dynamic C[1] | Limit Co[2,3] | $M_{PO}$ | $M_{YO}$ | $M_{RO}$ | Carriage [kg] | Rail [kg/m] |
| 7 | 1370 | 2160 | 5.39 | 5.39 | 15.2 | 0.03 | 0.51 |
| 9 | 2450 | 3920 | 16.3 | 16.3 | 36.0 | 0.04 | 1.08 |
| 12 | 4020 | 6080 | 17.2 | 18.6 | 47.6 | 0.08 | 1.5 |
| 15 | 6660 | 9800 | 35.2 | 38.2 | 137 | 0.17 | 3.0 |

Notes:
1. The dynamic load and moment ratings are based upon 50 km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.

## Load/Life Calculations

To determine proper carriage size:

$C_{min} = F \bullet \left(\frac{50}{L}\right)^{1/3}$

$C_{min}$ = minimum required dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

L = required travel life (km)

To determine travel life:

$L = \left(\frac{C}{F}\right)^3 \bullet 50$

L = normal travel life (km)

C = rated dynamic load capacity of carriage (N)

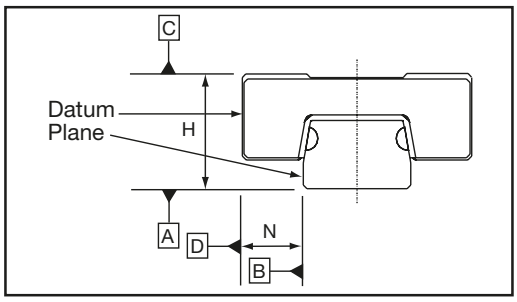
F = equivalent load on carriage (N)

### Operating Parameters

Maximum Velocity: 3 m/s
Maximum Acceleration: 50 $m/s^2$

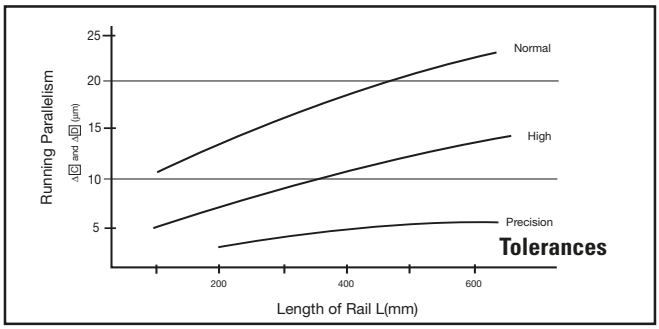
# MicroGuide™ Profile Rail

### TSR-Z (Standard) Accuracy Tolerance




| Accuracy of each part | | TSR5 Z | | TSR7 Z, TSR9 Z, TSR12 Z & TSR15 Z | | |
|---|---|---|---|---|---|---|
| | | Normal (blank) | Precision P | Normal (blank) | High H | Precision P |
| Height H | Dimensional Tolerance | ±0.030 | ±0.015 | ±0.040 | ±0.020 | ±0.010 |
| | Pair Tolerance | 0.015 | 0.005 | 0.030 | 0.015 | 0.007 |
| Width N | Dimensional Tolerance | ±0.030 | ±0.015 | ±0.040 | ±0.025 | ±0.015 |
| | Pair Tolerance | 0.015 | 0.005 | 0.030 | 0.020 | 0.010 |

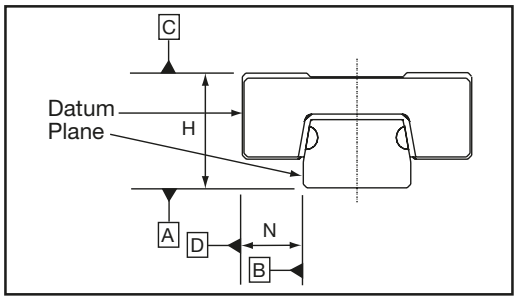
### TSR-Z (Standard) Running Parallelism




### TSR-Z (Standard) Fit Up

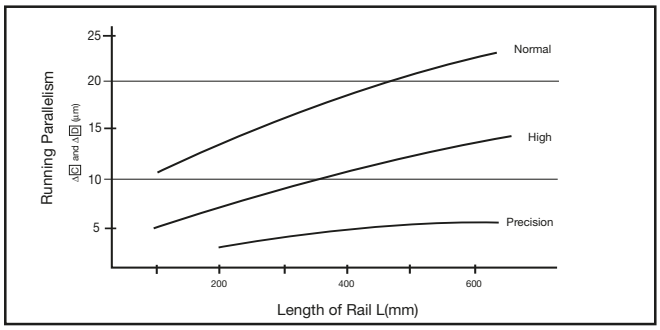
| Series Type, Size and Style | Radial Clearances (μm) | |
|---|---|---|
| | clearance fit (blank) | light preload C1 |
| TSR5 Z | 0~+1.5 | -1.5~0 |
| TSR7 Z | ±2 | -3~0 |
| TSR9 Z | ±2 | -4~0 |
| TSR12 Z | ±3 | -6~0 |
| TSR15 Z | ±5 | -10~0 |

### TSR-WZ (Wide) Accuracy Tolerance




| Accuracy of each part | | TSR WZ | | |
|---|---|---|---|---|
| | | Normal (blank) | High H | Precision P |
| Height H | Dimensional Tolerance | ±0.040 | ±0.020 | ±0.010 |
| | Pair Tolerance | 0.030 | 0.015 | 0.007 |
| Width N | Dimensional Tolerance | ±0.040 | ±0.025 | ±0.015 |
| | Pair Tolerance | 0.030 | 0.020 | 0.010 |

### TSR-WZ (Wide) Running Parallelism



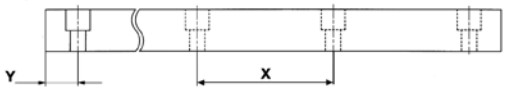

### TSR-WZ (Wide) Fit Up

| Series Type, Size and Style | Radial Clearances (μm) | |
|---|---|---|
| | clearance fit (blank) | light preload C1 |
| TSR7 WZ | ±2 | -3~0 |
| TSR9 WZ | ±2 | -4~0 |
| TSR12 WZ | ±3 | -6~0 |
| TSR15 WZ | ±5 | -10~0 |

# MicroGuide™ Profile Rail

## Standard Lengths of Rail

| Sizes | 7 WZ | 9 WZ | 12 WZ | 15 WZ |
|---|---|---|---|---|
| Standard Lengths | 50<br>110<br>170<br>260<br>350<br>440<br>530<br>620<br>800<br>1010 | 50<br>110<br>170<br>260<br>350<br>440<br>530<br>620<br>800<br>1010 | 70<br>150<br>230<br>310<br>390<br>470<br>630<br>790<br>950<br>1030 | 110<br>190<br>270<br>430<br>590<br>750<br>910<br>1030 |
| X | 30 | 30 | 40 | 40 |
| Y | 10 | 10 | 15 | 15 |




## Load/Life Calculations

To determine proper carriage size:

$C_{min} = F \bullet \left(\frac{50}{L}\right)^{1/3}$

$C_{min}$ = minimum required dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

L = required travel life (km)

To determine travel life:

$L = \left(\frac{C}{F}\right)^3 \bullet 50$

L = normal travel life (km)

C = rated dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

## Conversions

**1 $lb_f$** = 4.448 N

**1 $kg_f$** = 9.8 N

**1 km** = 39,370 inches

**1 Nm** = 0.7376 lbf - ft

**Maximum Travel Speed:** $V_{max}$ = 3 m/s

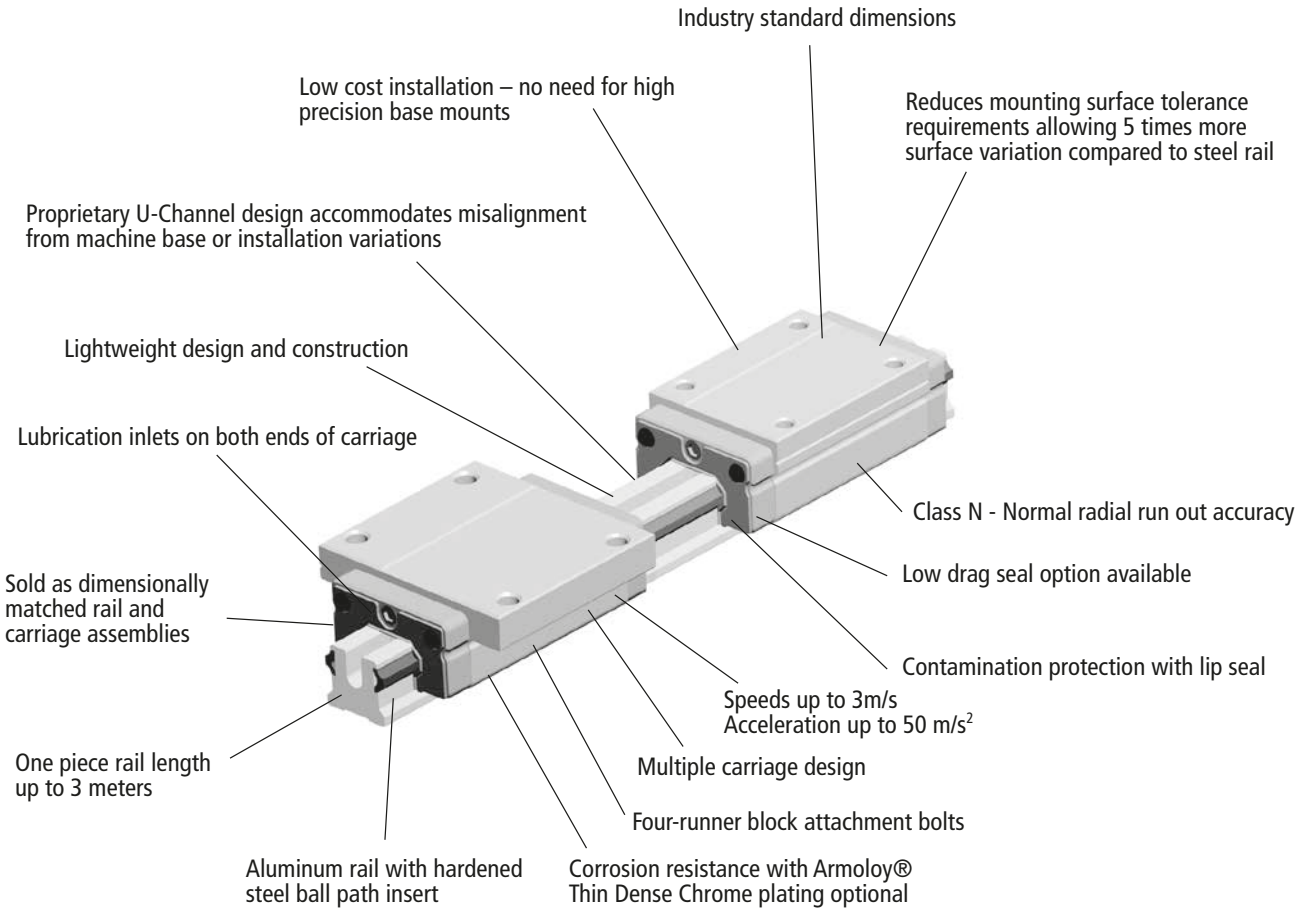
**Maximum Acceleration:** $a_{max}$ = 50 m/$s^2$

## How To Order

2 — TSR — 12 — WZ — M — UU — C1 — +350 — P

- **2** — Number of Carriages per rail
- **TSR** — Series Type: TSR
- **12** — Rail & Carriage Size
- **WZ** — Carriage Style: Z for standard style, WZ for wide style
- **M** — Stainless Steel Carriage and Rail: M for stainless steel (standard)
- **UU** — Seal Configuration: UU for end seals only (standard)
- **C1** — Preload: (blank) for clearance fit, C1 for light preload
- **+350** — Rail Length (mm)
- **P** — Accuracy Grade: (blank) for normal grade, H for high grade, P for precision grade

## T-Series Profile Rail




**T-Series**

2 AT 25 A LXXXX LDS Y=

- 2 — Number of Carriages
- AT — Product Type: AT T-Series
- 25 — Size
- A — Carriage Style
  - A Dimensionally Interchangeable with THK HSR A, B, CA & CB
  - E Dimensionally Interchangeable with THK HSR R & TR
  - F Dimensionally Interchangeable with THK SR W
  - G Dimensionally Interchangeable with THK SR TB
- LXXXX — Length
- LDS — Extended Standards
  - A Armoloy
  - LDS Low Drag Seal
  - S... Special Option – sequential numbers
- Y= — Y Dimension: The distance (from the rail end to the first hole) will be equal unless specified

Note: 1. Sold as assemblies only
2. Carriages are dimensionally matched to rails during assembly

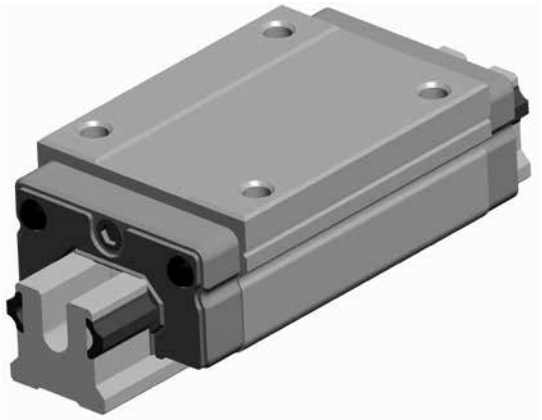
## T-Series Ball Profile Rail

Features

The Thomson T-Series Ball Profile Rail is lightweight, highly flexible and forgiving — an ideal choice for systems with low tolerance mounting surfaces.

Materials

The Thomson T-Series Ball Profile Rail carriage and rail is produced from high quality aircraft aluminum alloy. The carriage has hardened steel load bearing plates. The rail has a custom ball path insert made of hardened steel. Stringent quality controls are in place to ensure consistency of steel from the source, allowing Thomson to deliver the highest quality product.

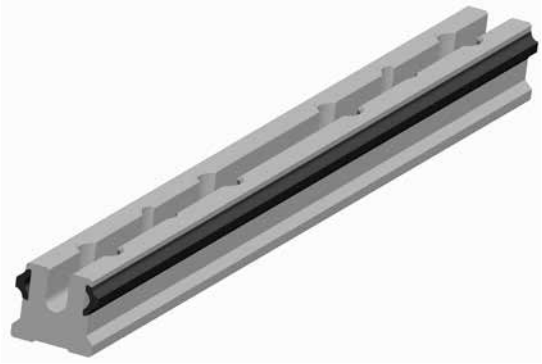


Lightweight

The aluminum carriage and rail dramatically reduce the total weight of the assembly making Thomson T-Series an ideal choice for applications requiring reduced weight or inertia such as airplanes, ships, automobiles, etc.

Accuracy

As a result of it's high tolerance for alignment errors, the T-Series Ball Profile Rail is available in an N class radial run out only.



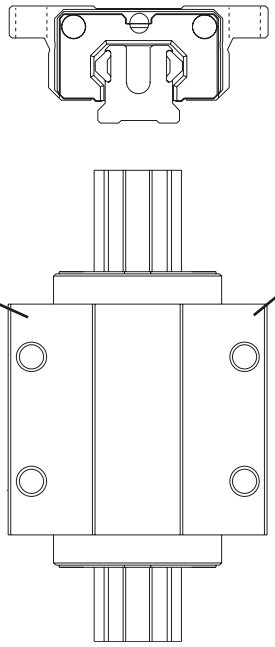
Easy Installation

The Thomson T-Series can be mounted direct to non-machined bases without sacrificing total operational efficiency or the need for special tools or gauges to ensure proper rail and base straightness. By eliminating the costly machined base and special tools the installation time or machine build time can be cut in half, saving valuable time and money.

Drop-in Replacement

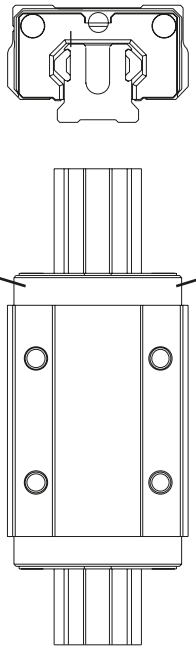
The Thomson T-Series is designed to industry standard dimensions and rail hole patterns. This means it can be used as a drop-in replacement for any conventional all steel profile linear guide in the market today.

## T-Series Carriage Styles



**Standard Carriage Style A**
Sizes 20, 25, 35
Dimensionally interchangeable to THK
HSR A, B, CA, CB and Thomson 511 A

**Standard Short Hole Spacing Style G**
Sizes 20, 25, 35
Dimensionally interchangeable to THK SR TB

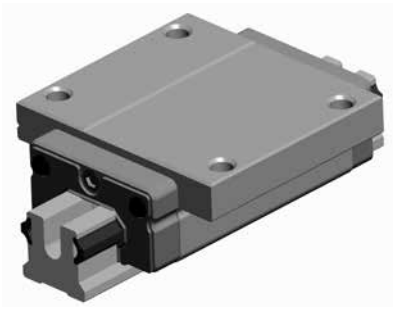


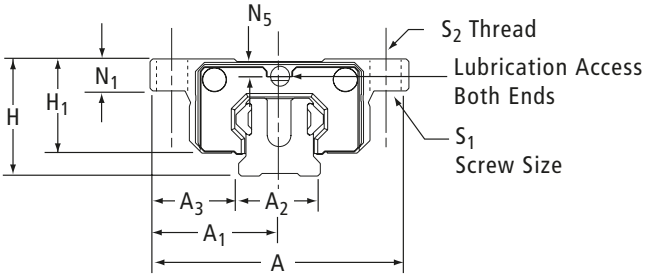
**Narrow Carriage Style E**
Sizes 20, 25, 35
Dimensionally interchangeable to THK
HSR R and TR and Thomson 511 E

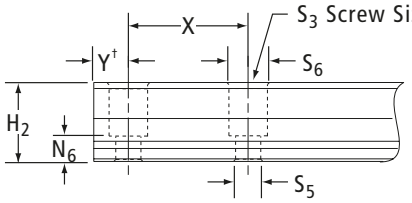
**Narrow High Style F**
Sizes 20, 25, 35
Dimensionally interchangeable
to THK SR W

# T-Series Ball Profile Rail

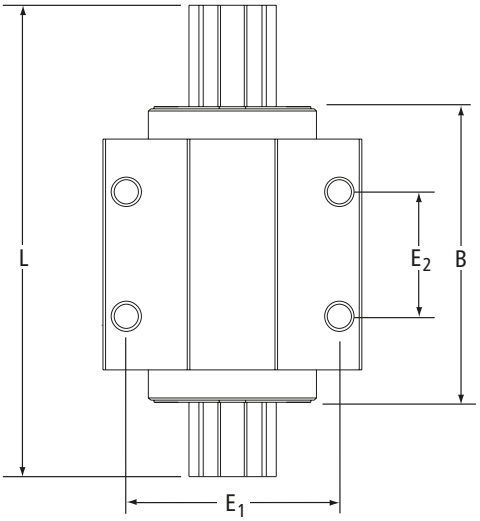
## Style A and G



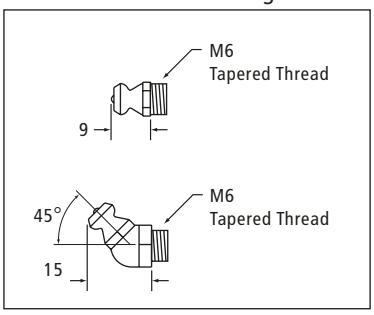



†- Will be equal on both ends, unless otherwise specified.




Supplied
Lubrication Fittings




**T-Series Profile Rail Standard High "A" Style**

| Size | A | A1 | A2 | A3 | H | H1 | H2 | B | E1 | E2 | S1 | S2 | S3 | S5 | S6 | N1 | N5 | N6 | X | $L_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 63 | 31.5 | 20 | 21.5 | 30 | 25 | 18 | 76 | 53 | 40 | M5 | M6 | M5 | 5.8 | 9.5 | 10 | 6.25 | 7,5 | 60 | 3000 |
| 25 | 70 | 35 | 23 | 23.5 | 36 | 29.5 | 22 | 88 | 57 | 45 | M6 | M8 | M6 | 7 | 10.7 | 12 | 8 | 10 | 60 | 3000 |
| 35 | 100 | 50 | 34 | 33 | 48 | 40 | 29 | 117 | 82 | 62 | M8 | M10 | M8 | 9 | 14 | 15.26 | 6.6 | 11 | 80 | 3000 |

All dimensions in mm unless shown otherwise

**T-Series Profile Rail Standard "G" Style**

| Size | A | A1 | A2 | A3 | H | H1 | H2 | B | E1 | E2 | S1 | S2 | S3 | S5 | S6 | N1 | N5 | N6 | X | $L_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 59 | 29.5 | 20 | 19.5 | 28 | 23 | 18 | 76 | 49 | 32 | M5 | M6 | M5 | 5.8 | 9.5 | 8 | 4.25 | 7.5 | 60 | 3000 |
| 25 | 73 | 36.5 | 23 | 25 | 33 | 26.5 | 22 | 88 | 60 | 35 | M6 | M8 | M6 | 7 | 10.7 | 9 | 5 | 10 | 60 | 3000 |
| 35 | 100 | 50 | 34 | 33 | 48 | 40 | 29 | 117 | 82 | 50 | M8 | M10 | M8 | 9 | 14 | 15.26 | 6.6 | 11 | 80 | 3000 |

# T-Series Ball Profile Rail

## Style A and G

### Dynamic Load Rating

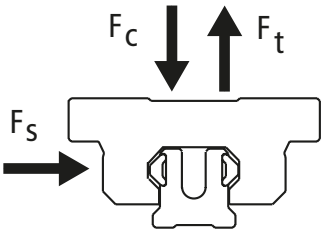
C = Dynamic load rating

The dynamic load rating is based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic rating of the bearing rated for 50 km by 1.26.

### Static Load Capacity

$C_o$ = Static load capacity

The static load capacity is the maximum radial load that should be applied to the bearing while there is no relative motion between the carriage and rail.




| Size | Style | Load Ratings N (lbf) C (@100km) | Load Ratings N (lbf) $C_o$ | Mass Carriage kg | Mass Rail kg/m |
|---|---|---|---|---|---|
| 20 | A G | 9000 (2025) | 11000 (2475) | 0.22 | 0.79 |
| 25 | A G | 13000 (2925) | 15000 (3375) | 0.30 | 1.06 |
| 35 | A G | 25000 (5620) | 28000 (6295) | 0.74 | 2.27 |

| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | C | 0.6C |
| $F_s$ | C | 0.6C |

### Bearing Travel Life Calculation

$L = (C/F)^3 \times 100$ km

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

### Operating Parameters

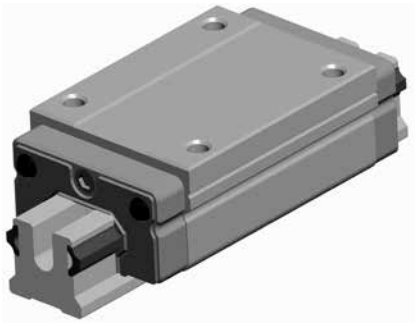
Maximum Velocity = 3 m/s

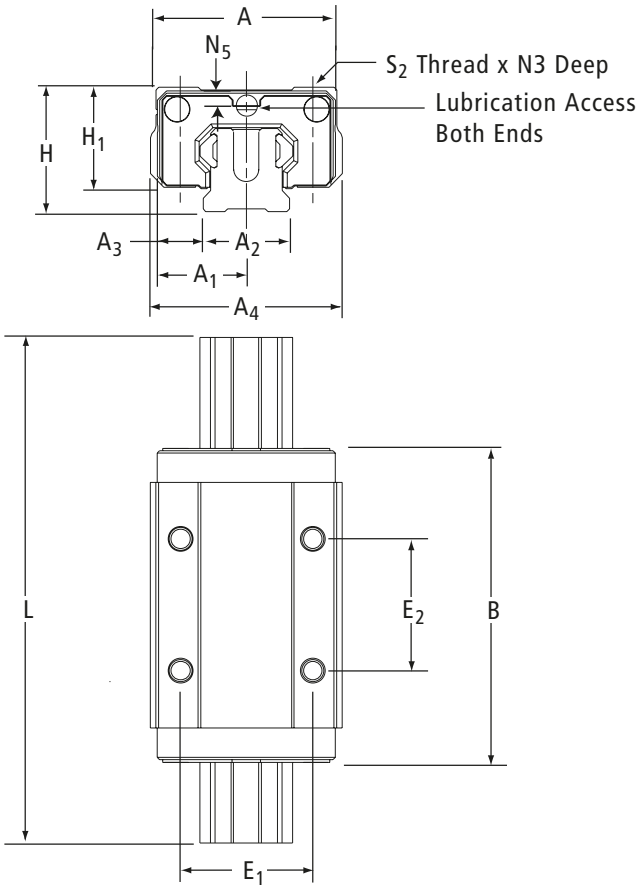
Maximum Acceleration = 50 m/s2

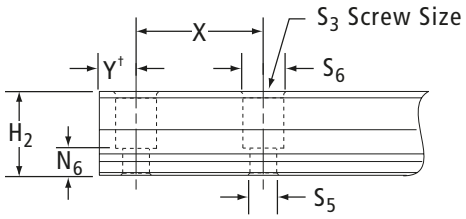
Maximum Temperature = 80°C

# T-Series Ball Profile Rail

## Style E and F

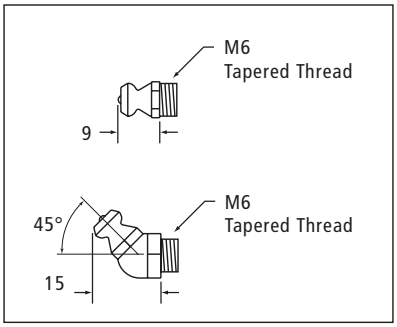





†- Will be equal on both ends, unless otherwise specified.

Supplied
Lubrication Fittings




**T-Series Profile Rail Narrow "E" Style**

| Size | A | A1 | A2 | A3 | A4 | H | H1 | H2 | B | E1 | E2 | S2 | S3 | S5 | S6 | N3 | N5 | N6 | X | $L_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 44 | 22 | 20 | 12 | 41.5 | 30 | 25 | 18 | 76 | 32 | 36 | M5 | M5 | 5.8 | 9.5 | 6 | 6.25 | 7.5 | 60 | 3000 |
| 25 | 48 | 24 | 23 | 12.5 | 50.9 | 40 | 33.5 | 22 | 88 | 35 | 35 | M6 | M6 | 7 | 10.7 | 8 | 12 | 10 | 60 | 3000 |
| 35 | 70 | 35 | 34 | 18 | 68.0 | 55 | 47 | 29 | 117 | 50 | 50 | M8 | M8 | 9 | 14 | 12 | 13.6 | 11 | 80 | 3000 |

All dimensions in mm unless shown otherwise

**T-Series Profile Rail Narrow High "F" Style**

| Size | A | A1 | A2 | A3 | A4 | H | H1 | H2 | B | E1 | E2 | S2 | S3 | S5 | S6 | N3 | N5 | N6 | X | $L_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 42 | 21 | 20 | 11 | 41.5 | 28 | 23 | 18 | 76 | 32 | 32 | M5 | M5 | 5.8 | 9.5 | 6 | 4.25 | 7.5 | 60 | 3000 |
| 25 | 48 | 24 | 23 | 12.5 | 51.0 | 33 | 26.5 | 22 | 88 | 35 | 35 | M6 | M6 | 7 | 10.7 | 8 | 5 | 10 | 60 | 3000 |
| 35 | 70 | 35 | 34 | 18 | 68.0 | 48 | 40 | 29 | 117 | 50 | 50 | M8 | M8 | 9 | 14 | 12 | 6.6 | 11 | 80 | 3000 |

All dimensions in mm unless shown otherwise

# T-Series Ball Profile Rail

## Style E and F

### Dynamic Load Rating

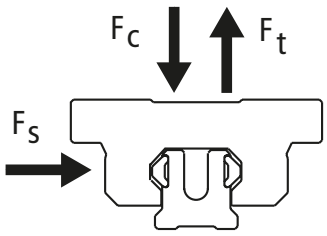
C = Dynamic load rating

The dynamic load rating is based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic rating of the bearing rated for 50 km by 1.26.

### Static Load Capacity

$C_o$ = Static load capacity

The static load capacity is the maximum radial load that should be applied to the bearing while there is no relative motion between the carriage and rail.




| Size | Style | Load Ratings N (lbf) C (@100km) | $C_o$ | Mass Carriage kg | Rail kg/m |
|---|---|---|---|---|---|
| 20 | E<br>F | 9000 (2025) | 11000 (2475) | 0.22 | 0.79 |
| 25 | E<br>F | 13000 (2925) | 15000 (3375) | 0.30 | 1.06 |
| 35 | E<br>F | 25000 (5620) | 28000 (6295) | 0.74 | 2.27 |

| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | C | 0.6C |
| $F_s$ | C | 0.6C |

### Bearing Travel Life Calculation

$L = (C/F)^3 \times 100$ km

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

### Operating Parameters

Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s2

Maximum Temperature = 80°C

**NOTES:**

## Installation Guidelines

**Figure 1**

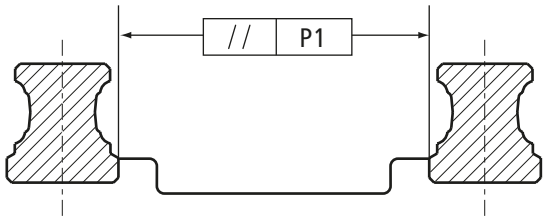



**Table 1. Parallelism Between Multiple Rails, mm**

| | | Preload | | |
|---|---|---|---|---|
| **Bearing Type** | **Clearance** | **0,03 C†** | **0,08 C†** | **0,13 C†** |
| 500 Series Ball Linear Guide | | | | |
| 15 | .015 | .010 | .007 | .003 |
| 20 | .017 | .012 | .008 | .004 |
| 25 | .024 | .016 | .010 | .005 |
| 30 | .024 | .016 | .010 | .005 |
| 35 | .032 | .021 | .014 | .008 |
| 45 | .036 | .024 | .016 | .009 |
| 500 Series Roller Linear Guide | | | | |
| 25 | – | .016 | .010 | .005 |
| 35 | – | .012 | .014 | .008 |
| 45 | – | .024 | .016 | .009 |
| 55 | – | .026 | .017 | .010 |
| 65 | – | .028 | .018 | .011 |
| AccuMini Linear Guide | | | | |
| 10 | .009 | .004 | – | – |
| 15 | .011 | .006 | – | – |
| 20 | .013 | .008 | – | – |
| T-Series* Linear Guide | | | | |
| 15 | .045 | – | – | – |
| 20 | .045 | – | – | – |
| 25 | .050 | – | – | – |
| 30 | .055 | – | – | – |
| 35 | .060 | – | – | – |
| 400 Series Ball Linear Guide | | | | |
| 15 | .025 | .018 | – | – |
| 20 | .025 | .020 | – | – |
| 25 | .025 | .020 | – | – |
| 30 | .040 | .030 | – | – |
| 35 | .050 | .035 | – | – |
| 45 | .060 | .040 | – | – |
| 55 | .070 | .050 | – | – |

† Where C = Dynamic Load Capacity

**Surface Preparation**

ProfileRail bearings are generally mounted to structures that are inherently stiffer than the rail. For this reason, the bearings tend to assume the orientation of the surfaces to which they are fastened, through bearing deflection. When a deflection is imposed upon a bearing, especially a preloaded one, resultant forces occur. These forces are transferred to the rolling elements and races, potentially resulting in an increase in system friction and a decrease in system resolution, precision and life.

Various sources can contribute to the overall error of the mounting surfaces. These include the surface flatness of the base surfaces, the location and parallelism of the reference surfaces, and the attendant errors of the bearing as described within the accuracy classes.

The surfaces that contact the base and reference edges may be milled, scraped, ground, or prepared by any other method that will produce a flat mounting surface free of inconsistencies, which would tend to distort or skew the bearing. A simple stone may be used to remove high spots. Dirt and debris should be cleaned off, as they could contribute to the inaccuracies.

Associated with preload is a slight potential concavity of the carriage top surface. The preload is established when all the carriage screws are affixed to a planar surface, flattening the carriage base. Deviations affecting the planarity of the carriage mounting surface could result in a preload change.

**Mounting Tolerances**

The tolerances found in Tables 1–3 are intended to provide an installation for which the associated derating is negligible. These specifications are based upon the assumption that the structures of the application are infinitely rigid and are of consideration for the bearing reactions only.

**Rail Parallelism (See Figure 1)**

A variation in the distance between the rails will induce a shear or side load on the bearings.

In order to minimize the effect of this shear load, tolerances for rail reference edge parallelism may be found in Table 1.

## Installation Guidelines

**Figure 2**

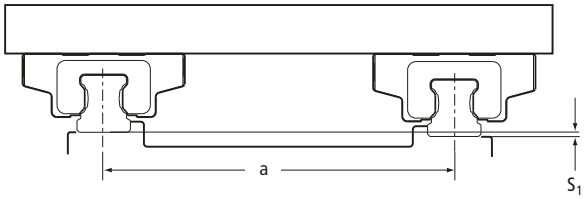



**Table 2. Allowable Vertical Offsets Between Rails (S1/a), inch**

| | Preload | | | |
|---|---|---|---|---|
| **Bearing Type** | **Clearance** | **0.03 C†** | **0.08 C†** | **0.13 C†** |
| 500 Series Ball | 0.0006 | 0.0004 | 0,0003 | 0.0002 |
| 500 Series Roller | – | 0.0007 | 0.0005 | 0.0004 |
| AccuMini Linear Guide | 0.0006 | 0.0004 | – | – |
| T-Series Linear Guide | 0.0020 | – | – | – |
| 400 Series 15, 20 & 25 | 0.0050 | 0.0030 | – | – |
| 400 Series 30 | 0.0060 | 0.0040 | – | – |
| 400 Series 35 | 0.0080 | 0.0050 | – | – |
| 400 Series 45 | 0.0090 | 0.0060 | – | – |
| 400 Series 55 | 0.0118 | 0.0080 | – | – |

†Where C = Dynamic Load Capacity

**Figure 3**

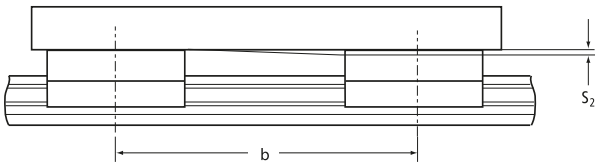



**Figure 4**

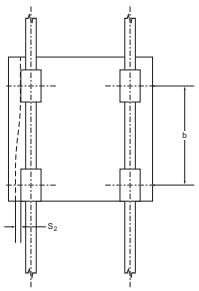



**Table 3. Allowable Carriage Offsets (S2/b)**

| | Preload | | | |
|---|---|---|---|---|
| **Bearing Type** | **Clearance** | **0.03 C†** | **0.08 C†** | **0.13 C†** |
| 500 Series (All) | 0,00006 | 0,00005 | 0,00004 | 0,00003 |
| 400 Series 15 & 20 | 0.0009 | 0.0007 | – | – |
| 400 Series 25 | 0.0011 | 0.0008 | – | – |
| 400 Series 30 | 0.0015 | 0.0011 | – | – |
| 400 Series 35 | 0.0019 | 0.0013 | – | – |
| 400 Series 45 | 0.0023 | 0.0015 | – | – |
| 400 Series 55 | 0.0027 | 0.0017 | – | – |

†Where C=Dynamic Load Capacity

| | |
|---|---|
| T-Series Linear Guide | 0,00012 |

**Rail Vertical Offset (See Figure 2)**
A vertical offset of the rails across the axis will induce a roll moment onto the carriages.

To minimize the effect of this roll moment, tolerances for the vertical offset may be found in Table 2. This tolerance describes the attributes of the mounting surface, perpendicular to the rail axis.

**Vertical Carriage Offset (See Figure 3)**
A vertical offset between fore and aft carriages will induce a pitch moment on the bearings.

**Lateral Carriage Offset (See Figure 4)**
A lateral offset of the carriage reference edges will induce a yaw moment.

In order to minimize the effects of these pitch and yaw moments, tolerances may be found in Table 3. This tolerance describes the attributes of the mounting surface parallel to the rail axis, and the reference edge straightness.

**NOTE:** All mounting tolerances should be inclusive of the H and A3 tolerances. Thus, a lower accuracy class bearing may require a more accurate installation.

**Mounting Hole Tolerances**
The positional tolerance between the through holes in the rails is 0.5 mm.

The positional tolerance of the first rail mounting hole dimensioned from the datum end (called the "Y-dimension") is ±1.0 mm.

The overall rail length tolerance is ±2.0 mm.

The positional tolerance between the mounting holes in the carriages is 0.2 mm.

**Reference Edge Specifications**
The maximum shoulder heights and corner radii are listed in Table 4.

## Installation Guidelines

**Table 4. Shoulder heights and corner radii, mm**

| Guide Type | Rail | | Carriage | |
|---|---|---|---|---|
| | h1 max | r1 max | h2 | r2 max |
| 500 Series Ball Linear Guide | | | | |
| 15 | 3.5 | .8 | 3.5 | .6 |
| 20 | 4 | .9 | 4 | .9 |
| 25 | 5 | 1.1 | 5 | 1.1 |
| 30 | 5.5 | 1.3 | 5.5 | 1.3 |
| 35 | 6 | 1.3 | 6 | 1.3 |
| 45 | 8 | 1.3 | 8 | 1.3 |
| 500 Series Roller Linear Guide | | | | |
| 25 | 5 | .8 | 5 | .8 |
| 35 | 6 | .8 | 6 | .8 |
| 45 | 8 | .8 | 8 | .8 |
| 55 | 10 | 1.2 | 10 | 1.2 |
| 65 | 10 | 1.5 | 10 | 1.5 |
| AccuMini Linear Guide | | | | |
| 10 | 1.75 | 0.4 | 3.5 | 0.4 |
| 15 | 1.75 | 0.4 | 5 | 0.4 |
| 20 | 2 | 0.5 | 7 | 0.5 |
| T-Series+ Linear Guide | | | | |
| 15 | 3 | .3 | 8 | .2 |
| 20 | 3.9 | 0.4 | 10 | 0.3 |
| 25 | 5.5 | 0.5 | 12 | 0.4 |
| 30 | 5.9 | 0.7 | 14 | 0.5 |
| 35 | 5.9 | 0.8 | 15 | 0.6 |
| 400 Series Ball Linear Guide | | | | |
| 15 | 2.8 | 0.6 | 5 | 0.6 |
| 20 | 4.3 | 0.9 | 6 | 0.9 |
| 25 | 5.6 | 1.1 | 7 | 1.1 |
| 30 | 6.8 | 1.4 | 8 | 1.4 |
| 35 | 7.3 | 1.4 | 9 | 1.4 |
| 45 | 8.7 | 1.6 | 12 | 1.6 |
| 55 | 11.8 | 1.6 | 17 | 1.6 |

**Table 5. Recommended Bolt Tightening Torque, Nm**

| Bolt Size | Class 8.8 | Class 12.9 |
|---|---|---|
| M2.5 | 0.7 | 1.2 |
| M4 | 2.8 | 4.6 |
| M5 | 5.7 | 9.5 |
| M6 | 9.5 | 16 |
| M8 | 23 | 39 |
| M10 | 46 | 77 |
| M12 | 80 | 135 |
| M14 | 129 | 215 |
| M16 | 198 | 330 |

**Installation Procedure**
Clean and inspect all mating surfaces for burrs, nicks, dirt, etc. A simple stone can be used to remove minor imperfections in the mounting surfaces.

**Note:** T-Series is not as sensitive to imperfections of the mounting surface.

**Rail Mounting**
1. Carefully place the rail on the mounting surface.

2. Insert screws into the mounting holes and tighten lightly.

3. Clamp the reference edge of the rail against a locating edge on the mounting surface.

   The locating edge can be a machined reference edge, a straight edge, a row of dowels or keys, or some other edge which the rail can be clamped against. It should be straight, either within the mounting tolerances shown in Table 3 or according to the application requirements, whichever is tighter.

4. Starting from the center of the rail moving outwards, tighten each screw to the recommended tightening torque in Table 5.

5. If parallel rails are to be used, one of the following methods may be employed to obtain the parallelism recommended in Table 1:
   a. two parallel locating edges
   b. a gage block or parallel between the rails
   c. the use of the top plate with the carriages mounted, to locate or "float" the second rail into place.

6. Repeat steps 1–4 to install the second rail.

7. Insert a rail plug into each counterbore in the rail. Carefully tap rail plugs into place using a soft material such as brass or wood. When properly installed, the rail plugs should be flush with the top surface of the rail. Do not countersink the rail plugs.

   **Note:** Rail plugs are available and are shipped with all rails except for the AccuMini Linear Guide size 10.

8. If desired, rail tape can then be applied to the top of the rail. For sizes 35 and below, the rail tape may be used without the rail plugs.

## Installation Guidelines

**Figure 5. Shoulder Heights and Corner Radii**

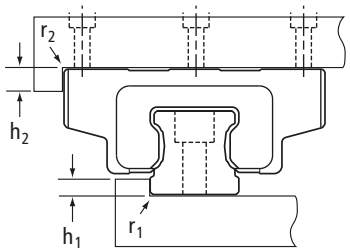



**Figure 6. Butt jointed rails**

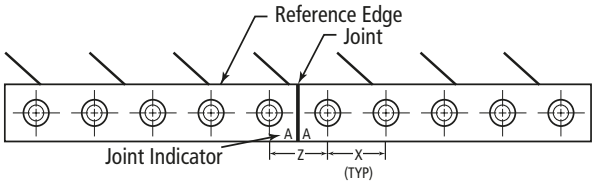
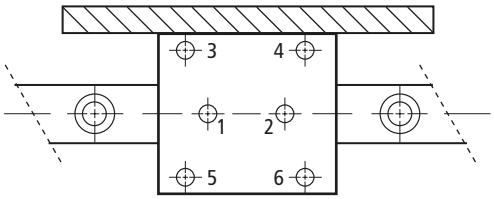



**Figure 7. Recommended Tightening Sequence**




**Butt Joints**

For rails longer than the longest length available in one piece, a butt joint is required. A butt joint is formed by butting the end of two matched rails together. The ends of rails to be butt jointed are specially machined and marked with same letter (A, B, C, etc.).

We strongly recommend the use of a locating edge when using butt jointed rails. This will ensure proper alignment of the raceways across the joint.

500 Series Ball, Roller and 400 Series linear guide rails, the mounting hole spacing across the joint, Z, will be equal to the standard mounting hole spacing, X.

Once mounted, a gap between the ends of the butt jointed rails of 0.5 mm or less is acceptable.

**Carriage Mounting**

1. Carefully place the table top on the carriages.

2. Insert the screws into the mounting holes and tighten lightly.

3. Clamp the reference edge of the carriages to locating edges under the top plate.

   **Note:** This is only required if the location of the center of the top plate is critical to the application, or if the top plate is being used to position a second rail parallel.

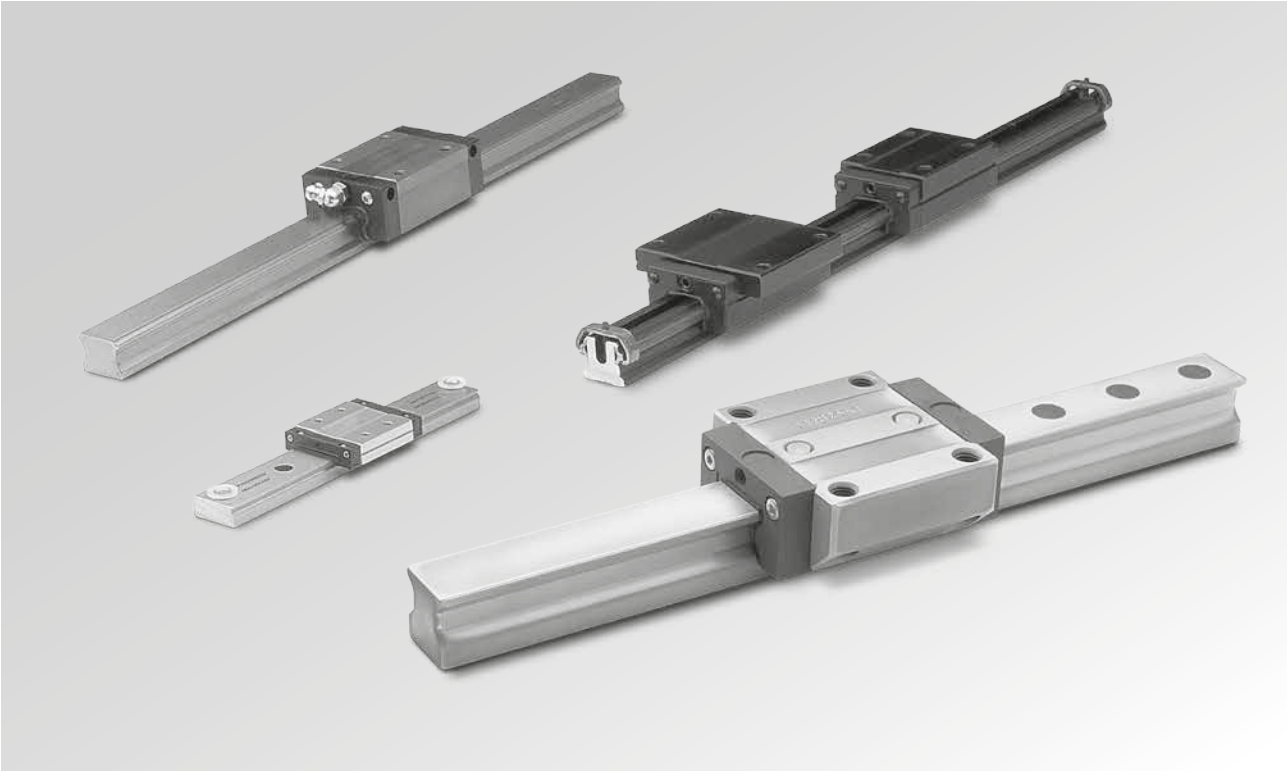
4. Tighten each screw to the recommended tightening torque in Table 5. For carriages with six mounting screws, the tightening sequence shown in Figure 7 is recommended.

5. Lubricate bearings.

   **Note:** Extreme care should be taken when mounting the carriages to the rails. Forcing a carriage onto a rail can knock out rolling elements and/or damage the carriage and rail.

   For large side forces, hard mounting is recommended to resist any translation. Some methods for hard mounting are the use of tapered gibs, retaining plates, or set screws in combination with machined reference edges. Other methods include the use of an epoxy/replicating material, dowels, and keys. Upon request, carriages and rails can be special machined to accommodate dowels or keys. Consult the factory for details.

## Profile Rail Engineering Guide



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## Profile Rail Selection

The selection of a linear guide can greatly affect machine performance and overall cost. In order to meet the wide variety of demands created by today's applications, proper selection from a broad range of linear guides is required.

For example, selecting a guide with too much rigidity will decrease the allowable installation tolerances, therefore, greatly increasing surface preparation costs. If the mounting surface is not prepared properly, the guide will run rough, and need to be replaced more frequently due to an unexpected reduction in travel life.

Consider all criteria appropriate for the application. Selection criteria include:

- Rigidity
- Travel accuracy
- Travel life
- Smoothness of travel
- Speed & Acceleration
- Envelope
- Environment
- Cost of Product
- Cost of Installation
- Cost of Replacement

Selection of the most appropriate type of guide, should be based on quantitative/qualitative requirements and ranking by importance of the above selection criteria, as well as the following guidelines for the technology available.

**Technology Overview**
The performance of a linear guide is based upon contact type, rolling element type, inner race geometry (Round Rail and Profile Rail), and other characteristics such as self-aligning capabilities. It is important to recognize that the options available for each characteristic have performance attributes. The selection process should be focused on matching these attributes with the most critical requirements of the application. The following technology guidelines can be used to assist in selecting the most appropriate type of profile rail. For a detailed application analysis, contact the **Thomson Customer Support** or your local Thomson distributor.

## Sizing & Defining Guide Characteristics

The following 9 step procedure can be used to select the characteristics necessary to generate the appropriate part number:

1. Determine the load on the most heavily loaded carriage or bearing (see Applied Loading Calculations). Multiply by a safety factor if desired in your application.

2. Determine the minimum required travel life for the application based on the intended duty cycle.

3. Calculate the **Minimum Required Dynamic Load Rating**, $C_{min}$.

4. Select the size which offers the load rating, C, equal to or greater than the minimum required dynamic load rating, $C_{min}$. Also, consider **Dynamic Load Limit** and **Static Capacities**.

5. If the guide selected offers various preload† levels, select a preload based upon the allowable bearing deflection. Contact the factory for detailed deflection information. Some carriage or bearing **Deflection Charts** are provided in this catalog.

6. If the guide selected offers various accuracy classes, select an accuracy class based upon the required travel accuracy.

7. Determine the need for accessories or options.

8. Calculate the guide length based upon the stroke and platten length. Remember to include additional length of accessories (i.e. self-lubricating option) and the stroke reduction caused by the use of bellows, if applicable.

9. Once the above characteristics have been determined, assign the appropriate part number based on the part numbering instructions located in the catalog section corresponding to the linear guide selected.

† Choosing a higher preload level will reduce the allowable installation tolerances. For this reason, the minimum preload which meets the applications requirements should be selected. If the highest preload level does not meet the deflection requirements, a larger size may be required.

## Applied Loading Calculations

The majority of applications utilize a four carriage or bearing and two rail design for stability. Shown are four typical configurations and calculations for the resultant loads applied to each bearing. Resultant loads are divided into a horizontal and a vertical components, which represent the static or constant velocity condition and account for gravity but not acceleration.

Use the appropriate configuration to determine the horizontal and vertical components of the resultant applied load on the most heavily loaded carriage or bearing. These values will be referred to henceforth as FH & FV, respectively.

**Terms:**

**$d_0$ =** distance between centerlines of carriages or bearings (in) or (mm)

**$d_1$ =** distance between centerlines of rails (in) or (mm)

**$d_2$ =** distance from centerline of carriage or bearing to load action point (in) or (mm)

**$d_3$ =** distance from centerline of carriage or bearing to load action point (in) or (mm)

**W =** Applied Load (lbf) or (N)

**FNH =** Horizontal component of resultant applied load with respect to each carriage or bearing (lbf) or (N)

**FNV =** Vertical component of resultant applied load with respect to each carriage or bearing (lbf) or (N)

**Reminder:**

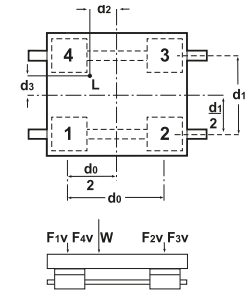
- Be sure to use consistent units (English or metric).
- Be sure to use the appropriate sign (positive or negative).
- A negative number is used when the actual force is in the opposite direction represented by the arrow.

$$F_{1v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{2v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{4v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$



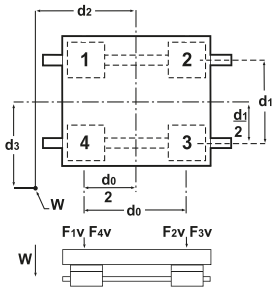

**Horizontal Application I**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{2v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{4v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$



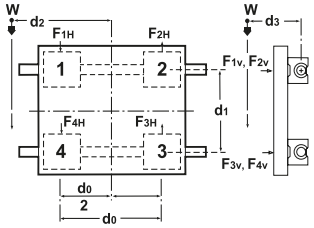

**Horizontal Application II**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = F_{2v} = -\left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = F_{4v} = +\left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{1H} = F_{4H} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

$$F_{1H} = F_{4H} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

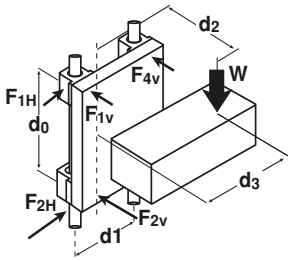



**Side Mounted Application**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = F_{4v} = -\left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

$$F_{3v} = F_{4v} = +\left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

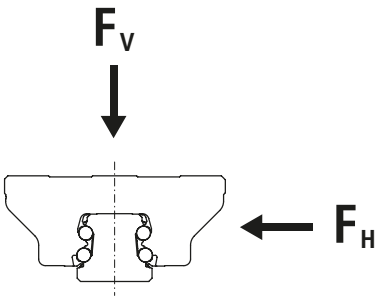
$$F_{1H} = -F_{2H} = -F_{3H} = F_{4H} = \frac{W}{2} \bullet \frac{d_3}{d_0}$$




**Vertical Application**
At the time of movement with uniform velocity or at the time of stop.
At the time of start & stop, the load varies because of inertia.

## Equivalent Applied Load†

An equivalent load is used to consolidate applied load components into one value which can later be used to calculate the minimum required load rating and the expected life of the carriage/bearing selected.




**For ProfileRail* Carriages & Closed RoundRail* Bearings:**

$$F_{EQ} = F_H + F_V$$

$F_{EQ}$ = Equivalent Load
$F_H$ = Horizontal Component of Resultant Applied Load
$F_V$ = Vertical Component of Resultant Applied Load

**For Single Carriage or Single Rail Configurations:**

$$F_{EQ} = F_H + F_V + (M/M_C) \times C$$

M = Applied Moment Load
$M_C$ = Dynamic Moment Capacity of Bearing
C = Dynamic Load Capacity of Bearing

**For Preloaded Carriages [Only when $F_{EQ} < (3 \times F_p)$]:**
Even with no external load applied, a preloaded bearing has a load on the races. A load greater than the externally applied load is present within a bearing with an externally applied load less than the preload end point. In order to calculate the loads on the load sets, the following formulae may be employed:

$$F_{EQ} = F_p + {}^{2}/_{3}\,(F_H + F_V)$$

$F_p$ = Initial Preload Force
(i.e., for 'B' Preload Designation $F_p = .03 \times C$)

† Before calculating $F_{EQ}$, make sure that neither $F_H$ or $F_V$ exceeds the Dynamic Load Limit of the guide intended for use. (See **Dynamic Load Limit** on Page 102).

‡ The 0.6 value used accounts for a derating factor of the capacity during tensile loading. Therefore, when calculating expected life based on $F_{EQ}$, the Full Dynamic Load Rating (C) may be used.

## Mean Dynamic Load

In applications with loads of varying magnitude, a mean dynamic load should be calculated.

$$F_{EQ} = \sqrt[P]{F_{EQ1}^{P}\left(\frac{d1}{D}\right) + F_{EQ2}^{P}\left(\frac{d2}{D}\right) + \ldots + F_{EQn}^{P}\left(\frac{dn}{D}\right)}$$

Where:
$F_{EQ1}\ldots F_{EQn}$ = equivalent dynamic load for distances d1 through dn
D = total distance of stroke = d1+d2…+dm
P = 3 (linear guides w/Ball Type Rolling Elements)
10/3 (linear guides w/Roller Type Rolling Elements)

## Load Ratings for Rolling Element Guides

**Dynamic Load Rating, C, and Travel Life**
The dynamic load rating, C, is the load at which when applied will yield the rated travel life. The rated travel life, Lr, for most linear guides is 100 km for metric products and 4 million inches for inch products (the rated travel life is listed on the page with the dynamic load rating). For a given applied load, P, the dynamic load rating and rated travel life are used to calculate the travel life using the following load/life equation:

$$\mathbf{L = (C/F_{EQ})^{n} \times L_{r}}$$

Where:
L = calculated travel life
C = dynamic load rating
$F_{EQ}$ = equivalent applied load
n = 3 for ball guides, 10/3 for roller guides
$L_r$ = rated travel life

Some manufacturers dynamic load ratings are based upon a 50 km life. To compare dynamic load ratings for guides with a 50 km rated life with a 100 km life, divide the 50 km dynamic load rating by 1.26.

**C 100 km = C 50 km / 1.26**

Some types of linear guides do not have the same dynamic load rating in all directions. The dynamic load rating for orthogonal load directions is shown as a percentage of C. It is not necessary to use this percentage of C in the load/life equation provided that the **Equivalent Applied Load Section** has been adhered to, because the calculations for equivalent applied load already account for it.

## Calculating the Minimum Required Dynamic Load Rating, $C_{min}$

The load/life equation above can be rewritten to calculate the minimum required dynamic load rating which should be selected for a given applied load and minimum required travel life:

$$C_{min} = P(L_m/L_r)^{1/n}$$

Where:
$C_{min}$ = minimum required dynamic load rating
$P$ = applied load
$L_m$ = minimum required travel life
$L_r$ = rated travel life
$n$ = 3 for ball guides, 10/3 for roller guides

Note: Check that the applied load, P does not exceed the dynamic load limit.

**Dynamic Load Limit**
The dynamic load limit, is the maximum load which should be applied to the carriage/pillowblock. In some cases, the dynamic load capacity equals the dynamic load rating. In others, a limit shown as a percentage of the dynamic load rating is the maximum load which should be applied. A dynamic load limit less than the dynamic load rating does not derate the life of the guide.

**Static Capacities**
The static capacities are the maximum loads that should be applied to the bearing while there is no relative motion between the rolling elements and the raceways. The value $C_0$ is the static load capacity for a radial load acting orthogonal to the axis of travel. The values $M_{0L}$ and $M_{0Q}$ are the static roll, pitch, and yaw moment capacities.

It is important to analyze the application so that shock loads do not exceed these capacities. Exceeding these capacities may permanently deform the rolling elements and raceways. This type of damage will be realized by an increase in friction, noise, and vibration, as well as by an increase in clearance between the carriage and the rail.

For systems experiencing repetitive shock loading less than the static load capacities, the bearing life should be determined by means of fatigue calculations.

## Preloading & Linear Guide Deflection

**Preload**
A preloaded bearing has a condition of interference between the races of the rails, the rolling elements, and the races of the carriage.

Preloading decreases the deflection due to external loads. This occurs because the contact reaction has already developed, eliminating much of the initial non-linear deflection associated with rolling elements.

The rolling element reactions within a preloaded bearing may be considered as having two components. One component acts in the direction of external load, and one component acts in the opposing direction in order to maintain static equilibrium. These components are referred to as load sets. As external load is applied, one load set increases in load, as the opposite load set decreases in load. At some point, the load on the decreasing load set becomes zero. This point, at which the preload is relieved, is called the preload end point. Preload end typically occurs when the external load is approximately three times the preload.

Preload end point:

$$F_{ext} = 3F_p$$

where:
$F_{ext}$ = externally applied load
$F_p$ = preload

By definition, a preloaded bearing, loaded beyond the preload endpoint, has the same deflection characteristics of an unpreloaded bearing externally loaded to that percentage of its dynamic load capacity. A preload level is assigned as a percentage of the dynamic load capacity of the bearing.

## Deflection Curves

Curves are available for Thomson 500 Series at: www.thomsonlinear.com.

## Example Applications

| Preload | Clearance | .03C | .08 - .13C |
|---|---|---|---|
| **Conditions** | 1. weak impact<br>2. 2 rails in pair<br>3. low accuracy<br>4. small resistance | 1. cantilever<br>2. single rail<br>3. light load<br>4. high accuracy | 1. strong impact<br>2. strong vibration<br>3. heavy machining |
| **Applications** | 1. welding machine<br>2. chopping machine<br>3. feeding mechanism<br>4. tool change mechanism<br>5. ordinary XY table | 1. NC lathe<br>2. EDM<br>3. precise XY table<br>4. ordinary Z-axis<br>5. industrial robot<br>6. PCB punching | 1. machining centre<br>2. NC lathe and milling machine<br>3. feeding axis of grinder<br>4. tool feeding axis |

## Actuation Force

The force required to actuate a linear guide (FA) has four basic components:

1. Frictional resistance ($F_f$)
2. Intrinsic resistance ($D_{int}$)
3. Inertia of the moving components ($F_{inertia}$)
4. Viscose drag of the lubrication ($D_l$)

$$\mathbf{F_A = F_f + D_{int} + F_{inertia} + D_l}$$

## Frictional Resistance

**Rolling Element Guides**
Friction occurs in rolling element guides as a result of slipping of the rolling elements on the raceways. The frictional resistance can be calculated by means of the following equation:

$$\mathbf{F_f = \mu \times F_i}$$

Where:
$\mu$ = coefficient of friction (dependent upon type of guide type, rolling element type and load)
$F_i$ = force internal to the linear guide

The following table lists the coefficient of friction for different types of guides:

| Profile Rail | |
|---|---|
| Ball Type | Roller Type |
| 0.002 - 0.003 | 0.001 - 0.002 |

The value for the coefficient of friction is a function of the applied load. The coefficient of friction increases as load is applied. This is due to the increased contact area between the rolling elements and races.

The force internal to the linear guide is equal to the external force ($F_{ext}$) applied to the linear guide in non-preloaded guides, and preloaded guides loaded beyond 3 times the preload value ($F_p$).

$$\mathbf{F_i = F_{ext}}$$

For preloaded guides loaded below a level of 3 times the preload value ($F_p$), the internal force can be approximated with the following equation:

$$\mathbf{F_i = 2F_p + 1/3\ F_{ext}}$$

## Intrinsic Resistance

The intrinsic resistance is the measured actuation force required to move the guide at a constant velocity, without lubrication, regardless of load. It consists of the seal drag (larger component) and force required to circulate the rolling elements (smaller component). The intrinsic resistance can be assumed to be a constant for linear guides carrying more than 5% of their dynamic load rating (C). For guides loaded below that value, the force required to circulate the rolling elements will increase.

The following chart shows the intrinsic resistance, $D_{int}$, for different types and sizes of linear guides.

**Inertia of Moving Components**
Inertia is directly related to the mass and acceleration by the following equation:

$$F_{inertia} = Ma$$

**Viscose Drag of the Lubrication**
The viscose drag of the lubricant is dependent upon the viscosity of the lubricant selected.

**Preload**
Preload of the assembly has an effect on intrinsic resistance, the greater the preload the greater the intrinsic resistance to move the guide.

**500 Series Ball Profile Rail**

| Size<br>$D_{int}$ (N) | Carriage Style A, C<br>$D_{int}$ (N) | | Carriage Style B, D<br>$D_{int}$ (N) | |
|---|---|---|---|---|
| Preload | 0.03C | 0.13C | 0.03C | 0.13C |
| 15 | 7 | 15 | 8 | 14 |
| 20 | 10 | 16 | 11 | 18 |
| 25 | 13 | 22 | 14 | 22 |
| 30 | 16 | 26 | 19 | 30 |
| 35 | 23 | 37 | 25 | 41 |
| 45 | 27 | 44 | 30 | 49 |

Values for lubricant oil VG 68, speed 0.1 m/s

**500 Series Roller Profile Rail**

| Size | Carriage Style A, C<br>$D_{int}$ (N) | Carriage Style B, D<br>$D_{int}$ (N) |
|---|---|---|
| 25 | 17 | 18 |
| 35 | 35 | 51 |
| 45 | 53 | 60 |
| 55 | 98 | 124 |
| 65 | — | 170 |

Value for 0.13 C Preload, lubricant oil VG68, speed 0.1 m/s

## Lubrication

Lubrication provides protection against wear, corrosion, heat, and friction. Application-specific variables, such as load, speed, and environmental conditions, determine the most suitable lubricant and lubrication schedule for that specific application.

Thomson's general lubricant recommendation for linear guides is a grade 2 grease. A maximum of one year or 100 km, whichever comes first, between applications of lubricant is recommended. A grease with an extreme pressure additive should be used for guides loaded beyond 50 of their dynamic load rating (C). Oil can also be used and is recommended in applications where the bearings experience high speeds. Use the uppermost lubrication port on oil-lubricated bearings that are vertically oriented to ensure gravity-assisted lubricant dispersal.

Linear guide products are supplied with a light coating of preservative oil. This preservative oil is for storage purposes only and is not recommended as lubrication for the bearing.

**Lubrication Procedure**
For best lubrication dispersal, the carriage should be moved on the rail while applying lubricant to ensure circulation to all internal bearing surfaces. It is not possible to over lubricate the bearings, as excess lubricant will merely exit the carriage under the seals.

Recommended initial volumes of lubricant for 500 Series bearings are shown in the tables. The recommended volume for relubrication is 1/2 the initial volume.

**Short Stroke**
In the case of a stroke less than 2X´s the carriage length, two lubrication connections are recommended, one at each end to ensure adequate lubrication to the entire ball or roller track.

**Oil Reservoir**
The oil reservoir is supplied from the factory ready for installation (filled with oil). Relubrication is dependent upon many factors such as speeds, temperature, cleanliness, etc. The following is a guideline for relubrication. (It is recommended to relubricate every 12 months.)

The oil reservoir is filled in the factory with Kluber Lamora D220 oil. If relubricating with different oil it is the responsibility of the user to determine oil compatibility. The recommended refill quantity is shown in the table.

**Initial Grease Volume for 500 Series Ball Bearings**

| Size | Carriage Style A, C, E ($cm^3$) | Carriage Style B, D, F ($cm^3$) |
|---|---|---|
| 15 | 0.9 | — |
| 20 | 1.7 | 2.1 |
| 25 | 2.8 | 3.5 |
| 30 | 4.7 | 5.8 |
| 35 | 6.6 | 8.1 |
| 45 | 12.6 | 15.6 |

**Initial Grease Volume for 500 Series Roller Bearings**

| Size | Carriage Style A, C ($cm^3$) | Carriage Style B, D ($cm^3$) |
|---|---|---|
| 25 | 1.9 | 2.2 |
| 35 | 2.9 | 3.7 |
| 45 | 5.3 | 6.6 |
| 55 | 10.6 | 10.6 |
| 65 | — | 18.9 |

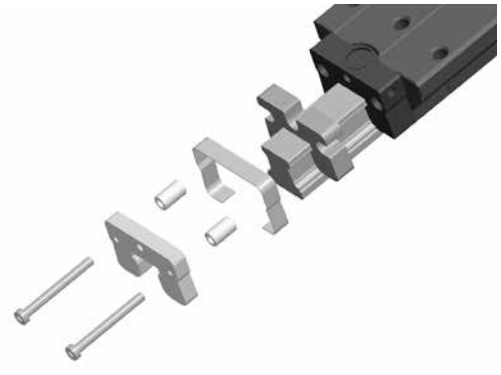
**Oil Reservoir Refill Quantity**

| Size | 500 Series Ball 5310W Oil ($cm^3$) | 500 Series Roller 5320W Oil Qty ($cm^3$) |
|---|---|---|
| 15 | 0.5 | — |
| 20 | 1.4 | — |
| 25 | 2.4 | 2.2 |
| 30 | 2.9 | — |
| 35 | 5. | 6 |
| 45 | 10.9 | 11 |
| 55 | — | 19 |
| 65 | — | 43 |

**Relubrication**

| Size | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 |
|---|---|---|---|---|---|---|---|---|
| Travel Distance | 2500 km | | | | | 5000 km | | |

## Self-Lubricating Profile Rail Lube Block



The self-lubricating Lube Block option offers maintenance free operation and enhanced protection for a broad range of applications. It offers:

- Reduced system cost by eliminating the need for designing, purchasing, and installing expensive lubrication systems.
- Environmentally friendly operation.
- Increased bearing life by offering enhanced protection.

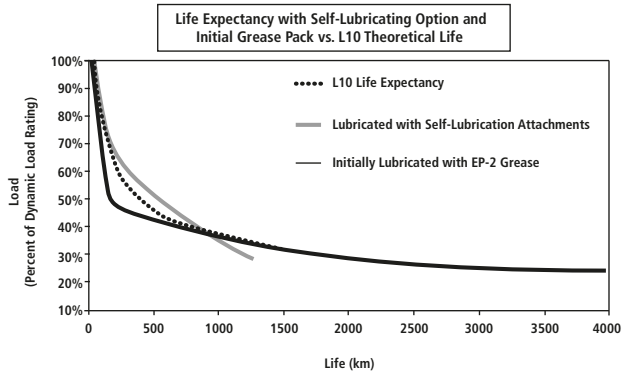
**Design**
The self-lubricating option utilizes self-lubricating attachments at both ends of the carriage and includes an initial EP2 grease pack of the carriage. The self-lubricating attachments consist of a section of oil saturated polymer actively compressed by a contact spring, inside a double lip seal.

A contact spring assures continuous contact with the rail, releasing oil as the carriage moves. This ensures a film of lubricant between the rolling elements and races. When the carriage is at rest, oil is re-absorbed by the polymer.

**Performance**
The design has incorporated a proven oil-saturated polymer used for over 10 years to lubricate radial bearings. This method of lubrication has a successful track record in applications ranging from food processing to automotive assembly.

The graph below shows the theoretical L10 life expectancy and actual test results for the following two methods of lubrication:

1. Bearing with self-lubricating attachments only.
2. Bearing initially packed with EP2 grease only.

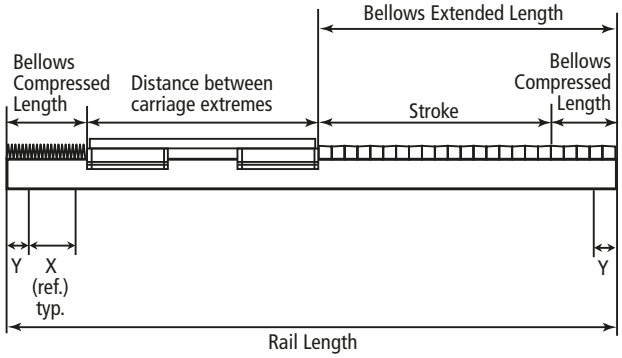



**Testing Parameters**
Stroke: 500 mm
Speed: 0,6 m/s

This chart illustrates how using the self-lubricating option, which combines the self-lubricating attachments and initial grease pack, will enable the bearing to achieve the L10 life expectancy under all loading condition. Note that for travel lives exceeding 30,000 km, recharging or replacing of the self-lubricating polymer is recommended.

## Calculations for Bellow Cover Extended Length & Rail Length

**Given the Stroke and Distance Between Carriage Extremes:**
Way Cover Extended Length (mm) = Stroke (mm) / (1-CR). After dividing, round number up to the next increment of 5 mm. This value is used as the length in the way cover part number when ordering.




The Way Cover Extended Length will be cut to next vee at the factory.

Way Cover Compressed Length (mm) =
Way Cover Extended Length (mm) - Stroke (mm).

Rail Length = Compressed Length + Extended Length + Distance Between Carriage Extremes.

**Example:**
Product: 500 Series Ball Linear Guide Size 35

Stroke Length = 200 mm
Distance Between Carriage Extremes = 520 mm
Bellows Type = Walk-On
CR = 0.19 for size 35 500 Series Ball Walk-on type bellows
Way Cover Extended Length = Stroke /
(1-CR) = 200 mm / (1-0.19) = 200 mm / .81 = 246.91 mm

Round up to next increment of 5 mm, therefore,
Way Cover Extended Length = 250 mm
Way Cover Compressed Length = Way Cover Extended Length - Stroke = 250 mm - 200 mm = 50 mm
Rail Length = Compressed Length + Extended Length + Distance Between Carriage Extremes = 50 mm + 250 mm + 520 mm = 820 mm

**Specification Sheet for the Butting of Rails**

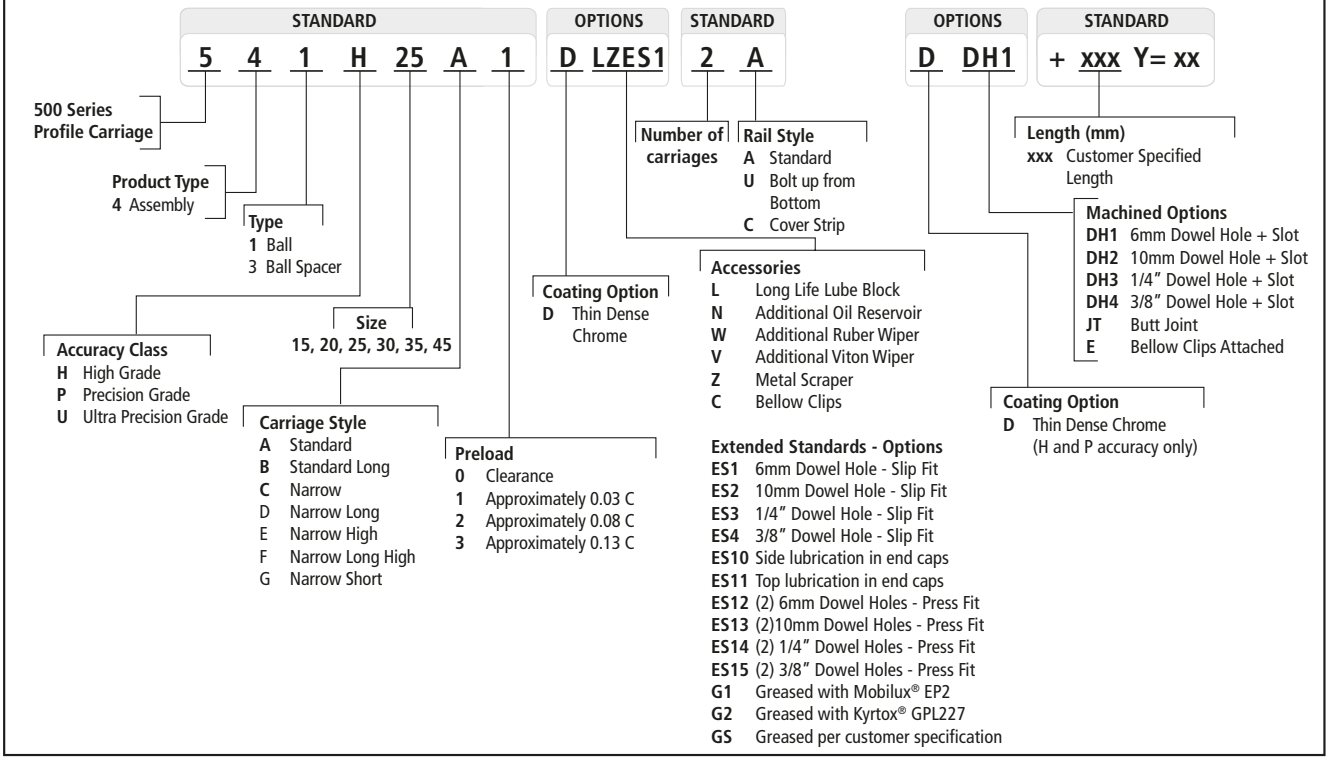
A butt joint will be require for rail lengths longer than the maximum shown in the chart below. If a butt joint is required, the 1st and 2nd rail lengths must each be less than the maximum shown. The "Y1" and "Y2" dimensions must be between the minimum and maximum shown below to avoid cutting into a mounting hole. The standard "Z" dimension should be used for best performance.

| Linear Guide Product | Size | "X" dim | Standard "Z" dim | Minimum "Y" dim | Maximum "Y" dim | Fastener size | Maximum length without a joint |
|---|---|---|---|---|---|---|---|
| 500 Series Ball | 15 | 60 | 60 | 8 | 52 | M4 | 1 500 |
| 500 Series Ball | 20 | 60 | 60 | 8 | 52 | M5 | 3 000 |
| 500 Series Ball | 25 | 60 | 60 | 8 | 52 | M5 | 6 000 |
| 500 Series Ball | 30 | 80 | 80 | 10 | 70 | M8 | 6 000 |
| 500 Series Ball | 35 | 80 | 80 | 10 | 70 | M8 | 6 000 |
| 500 Series Ball | 45 | 105 | 105 | 13 | 92 | M12 | 6 000 |
| 500 Series Roller | 25 | 30 | 30 | 8 | 52 | M6 | 6 000 |
| 500 Series Roller | 35 | 40 | 40 | 10 | 30 | M8 | 6 000 |
| 500 Series Roller | 45 | 52.5 | 52.5 | 13 | 39.5 | M12 | 6 000 |
| 500 Series Roller | 55 | 60 | 60 | 15 | 45 | M14 | 6 000 |
| 500 Series Roller | 65 | 75 | 75 | 17 | 58 | M16 | 6 000 |

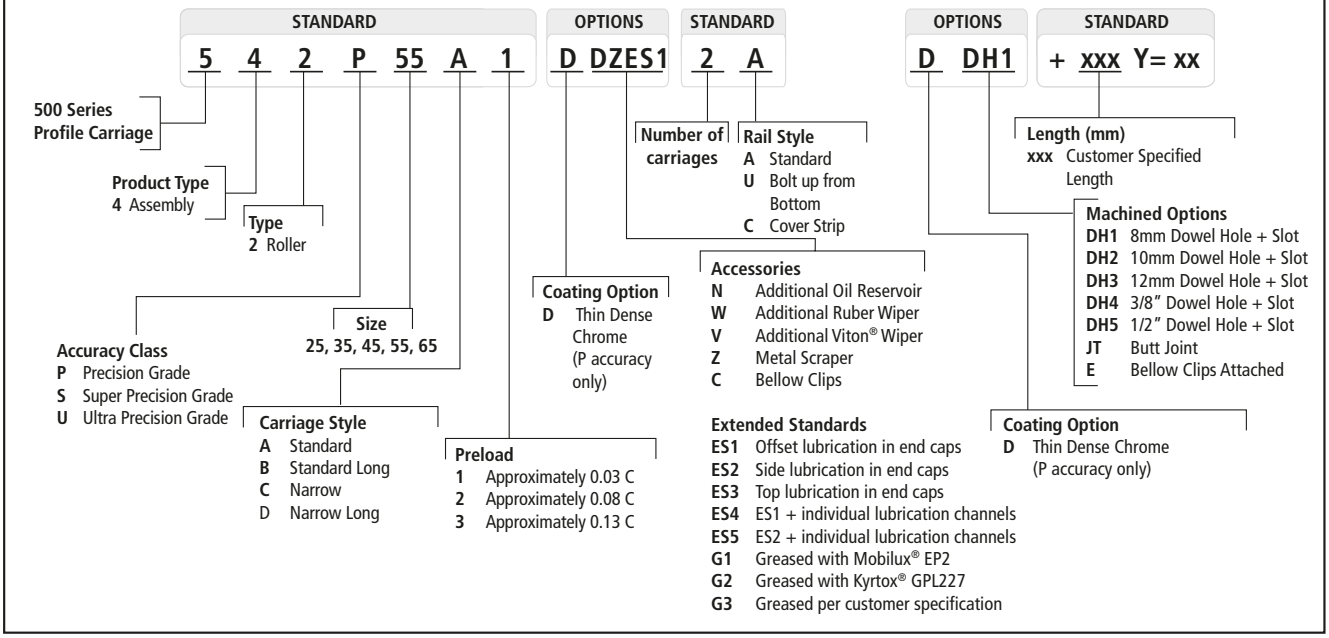
All dimensions in mm.

# 500 Series Part Numbering Description

## Ball Assembly

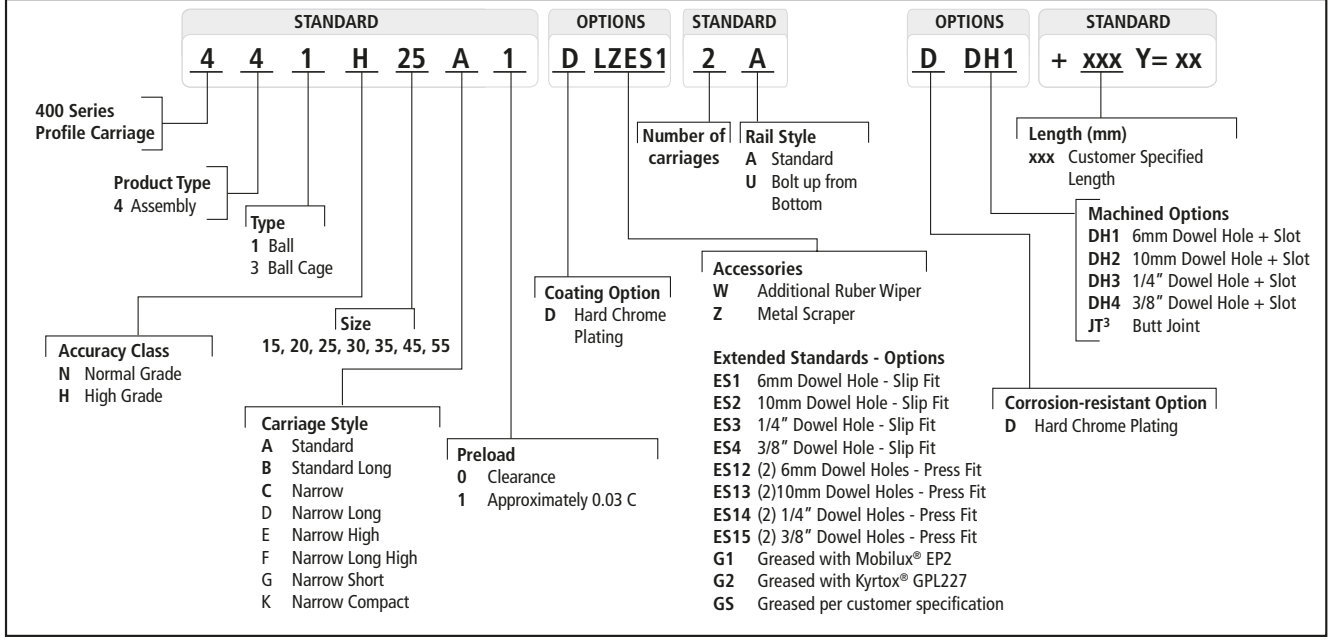



## Roller Assembly

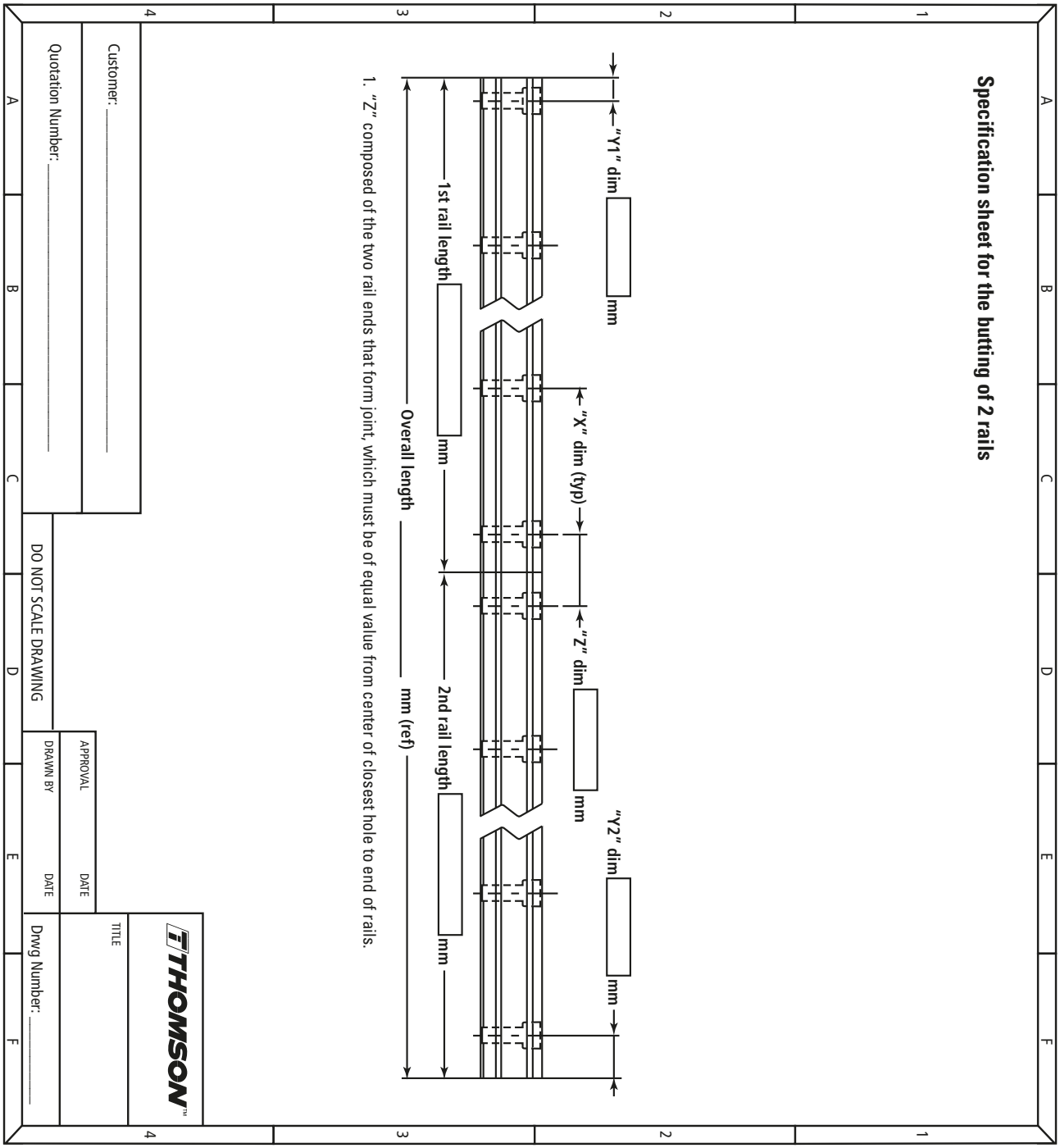


## 400 Series Part Numbering Description

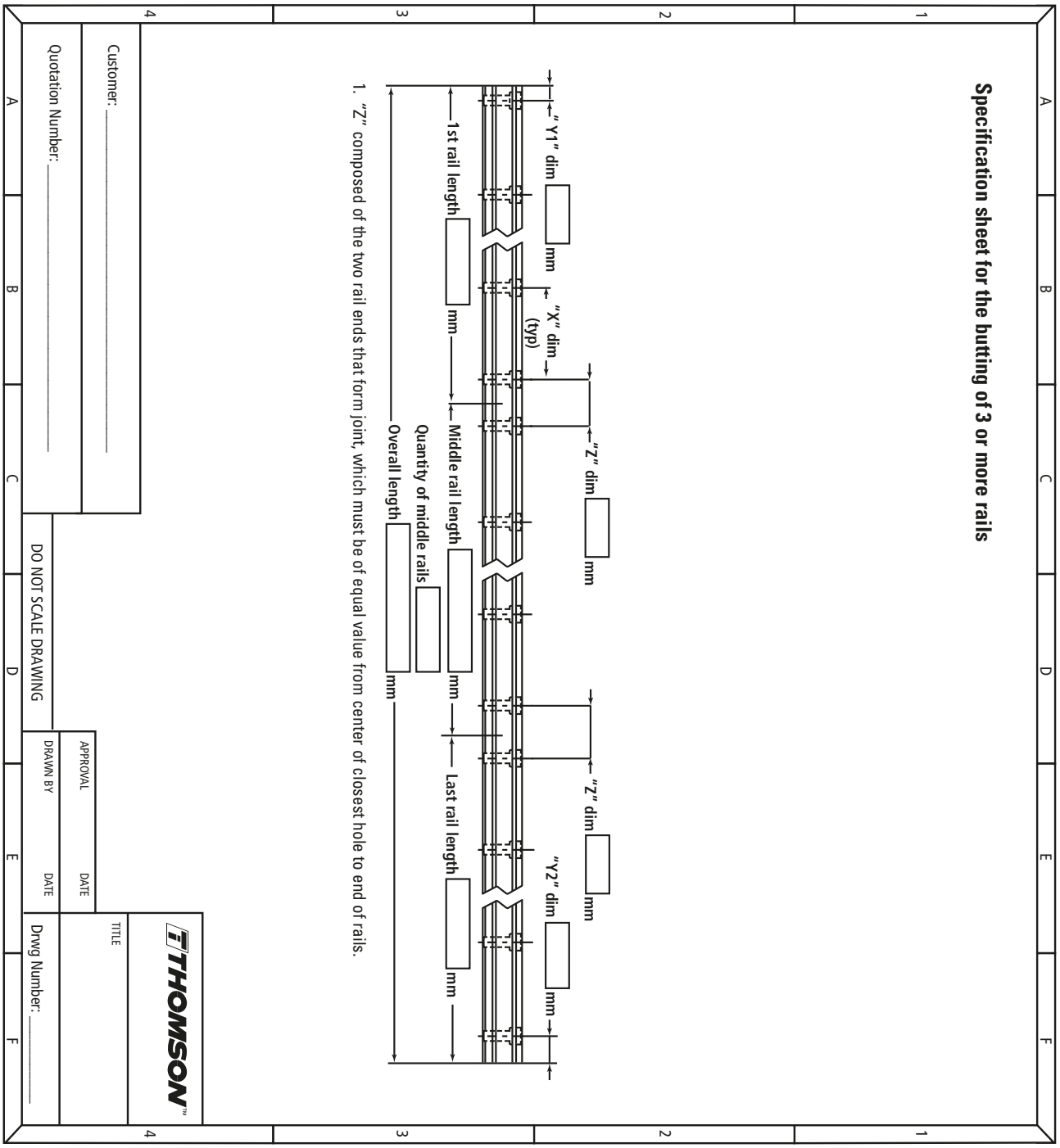
**Ball Assembly**



## Request for Quotation Form



## Request for Quotation Form



# Unit Conversion Table

| Quantity | Conventional | | SI Unit | Conversion Factors | |
|---|---|---|---|---|---|
| | Inch Unit | Metric Unit (MKS) | | | |
| **Length** | Inch<br>**in** | Meter<br>**m** | Metre<br>**m** | 1 in<br>1 mm<br>1 m<br>1 ft | = 25.4 mm<br>= 0.03937 in<br>= 3.2808 ft<br>= 0.3048 m |
| **Area** | Square Inch<br>**$in^2$** | Square Meter<br>**$m^2$** | Square Metre<br>**$m^2$** | 1 $in^2$<br>1 $cm^2$<br>1 $m^2$<br>1 $ft^2$ | = 6.4516 $cm^2$<br>= 0.155 $in^2$<br>= 10.764 $ft^2$<br>= 0.092903 $m^2$ |
| **Mass** | Pound<br>**$lb_m$** | Kilogram<br>**kg** | Kilogram<br>**kg** | 1 $lb_m$<br>1 kg | = 0.45359237 kg<br>= 2.2046 lb |
| **Force** | Pound Force<br>**$lb_f$** | Kilogram Force<br>**$kg_f$** | Newton<br>**N** | 1 $lb_f$<br>1 $lb_f$<br>1 $kg_f$<br>1 $kg_f$<br>1 N<br>1 N | = 0.45359237 $kg_f$<br>= 4.44822 N<br>= 2.2046 $lb_f$<br>= 9.80665 N<br>= 0.1019716 $kg_f$<br>= 0.224809 $lb_f$ |
| **Stress or Pressure** | Pounds per Square Inch<br>**$lb_f/in^2$** | Kilograms per Square Meter<br>**$kg_f/m^2$** | Pascal<br>**Pa** | 1 MPa<br>1 kPa<br>1 $lb_f/in^2$<br>1 $lb_f/in^2$<br>1 $lb_f/in^2$<br>1 $kg_f/cm^2$<br>1 $kg_f/cm^2$ | = $10^6$ $N/m^2$ = $N/mm^2$<br>= $10^3$ $N/m^2$<br>= 0.070307 $kg_f/cm^2$<br>= 7.0307 x $10^{-4}$ $kg_f/mm^2$<br>= 6.8947 x $10^{-3}$ $N/mm^2$ (MPa)<br>= 14.2233 $lb_f/in^2$<br>= 9.80665 x $10^{-2}$ $N/mm^2$ (MPa) |
| **Torque or Work** | Inch Pounds<br>**$lb_f$-in** | Kilogram Meters<br>**$kg_f$-m** | Newton-Metres<br>**Nm** | 1 $lb_f$-in<br>1 $kg_f$-cm<br>1 $lb_f$-in<br>1 $kg_f$-m<br>1 $kg_f$-cm<br>1 Nm<br>1 Nm | = 1.1521 $kg_f$-cm<br>= 0.8679 $lb_f$-in<br>= 0.1129848 Nm<br>= 9.80665 Nm<br>= 9.80665 x $10^{-2}$ Nm<br>= 8.85 $lb_f$-in<br>= 10.19716 $kg_f$-cm |
| **Power** | Foot Pound per Minute<br>**$lb_f$-ft/min** | Force per Second<br>**$kg_f$-m/s** | Newton Metre per Second<br>**Nm/s** | 1 kW<br>1 kW<br>1 kW<br>1 kW<br>1 hp<br>1 hp<br>1 hp<br>1 hp | = 1000 Nm/s<br>= 60,000 Nm/s<br>= 44,220 $lb_f$-ft/min<br>= 1.341 hp<br>= 75 $kg_f$-m/s<br>= 44,741 Nm/min<br>= 33,000 $lb_f$-ft/min<br>= 0.7457 kW |
| **Velocity** | Feet per Second<br>**ft/s** | Meters per Second<br>**m/s** | Metres per Second<br>**m/s** | 1 ft/sec<br>1 in/sec<br>1 ft/sec<br>1 mile/hr<br>1 km/hr<br>1 mile/hr | = 0.3048 m/s<br>= 2.54 cm/s<br>= 0.00508 m/s<br>= 0.44704 m/s<br>= 0.27777 m/s<br>= 1.609344 km/hr |
| **Acceleration** | Feet per Second Squared<br>**$ft/s^2$** | Meters per Second Squared<br>**$m/s^2$** | Metres per Second Squared<br>**$m/s^2$** | 1 $ft/s^2$ | = 0.3048 $m/s^2$ |

**NOTES:**

## Interchange Guide

| THK HSR LM GUIDE TO THOMSON 500 SERIES BALL PROFILE RAIL INTERCHANGE SHEET | |
|---|---|
| **THK HSR** | **THOMSON 500 SERIES BALL** |
| **Assembly Part Number**<br>HSR 20 A 2 SS C1 + 1000 P<br>1 2 3 4 9 5 7 6 | **Carriage Part Number**<br>(2) pcs 511 P 20 A 1 Z<br>4 1 6 2 3 5 9<br>and<br>**Rail Part Number**<br>(1) pc 521 P 20 A 1000<br>4 1 6 2 8 7 |
| **Carriage Part Number**<br>HSR 20 A UU<br>1 2 3 9 | **Carriage Part Number**<br>511 P 20 A 1<br>1 6 2 3 4 |
| **Rail Part Number**<br>HSR 20 + 1000L<br>1 2 7 | **Rail Part Number**<br>521 P 20 A 1000<br>1 6 2 8 7 |

| 1. TYPE | |
|---|---|
| **THK** | **THOMSON 500 SERIES BALL** |
| Carriage - HSR<br>Rail - HSR | Carriage - 511<br>Rail - 521 |
| **2. SIZE** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| 15 | 15 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 35 | 35 |
| 45 | 45 |
| 55 | N/A |
| **3. CARRIAGE STYLE** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| A | A |
| B | A |
| CA | A |
| CB | A |
| LA | B |
| LB | B |
| HA | B |
| HB | B |
| R | E |
| TR | E |
| LR | F |
| HTR | F |
| **4. CARRIAGES PER RAIL** | |

| 5. PRELOAD | |
|---|---|
| **THK** | **THOMSON 500 SERIES BALL** |
| blank | 0 |
| C1 | 1 |
| C2 | 2 |
| N/A | 3 |
| **6. ACCURACY** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| blank | H |
| H | H |
| P | P |
| SP | U |
| UP | U |
| **7. LENGTH** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| xxxxL | xxxx |
| **8. RAIL STYLE** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| blank | A |
| K | U |
| N/A | C |
| **9. SEALS** | |
| **THK** | **THOMSON 500 SERIES BALL** |
| SS | blank |
| UU | blank |
| ZZ | Z |
| DD | W |
| KK | WZ |
| QZ | N |
| N/A | L |

## Interchange Guide

| STAR BALL RAIL SYSTEMS TO THOMSON 500 SERIES BALL INTERCHANGE SHEET | |
|---|---|
| **STAR** | **THOMSON** |
| **Carriage Part Number**<br>16 / 1 51 / 2 - 8 / 3 1 / 4 2 / 5 - 10 / 7 | **Carriage Part Number**<br>511 / 1 P / 5 20 / 3 A / 2 1 / 4 |
| **Rail Part Number**<br>16 / 1 05 / 2 - 8 / 3 0 / 4 2 / 5 - 31, 1000 / 6 | **Rail Part Number**<br>521 / 1 P / 5 20 / 3 A / 2 + 1000 / 6 |

| 1. TYPE | | |
|---|---|---|
| | **STAR** | **THOMSON** |
| | 16 | Carriage - 511<br>Rail - 521 |
| **2. STYLE** | | |
| | **STAR** | **THOMSON** |
| CARRIAGE | 03 | B |
| | 04 | A |
| | 21 | E |
| | 22 | C |
| | 23 | D |
| | 24 | F |
| | 51 | A |
| | 53 | B |
| | 66 | G |
| RAIL | 1605-X0X-XX | A + 531HP |
| | 1605-X3X-XX | C + 531RCS (size 25 & up) |
| | 1605-X6X-XX | C + 531RCS (size 25 & up) |
| | 1607-XXX-XX | U |
| | 1645-X03-XX | AD + 531HP |
| | 1645-X33-XX | CD + 531RCS (size 25 & up) |
| | 1647-X03-XX | UD |

| 3. SIZE | |
|---|---|
| **STAR** | **THOMSON** |
| 1 | 15 |
| 2 | 25 |
| 3 | 35 |
| 4 | 45 |
| 5 | N/A |
| 6 | N/A |
| 7 | 30 |
| 8 | 20 |
| **4. PRELOAD** | |
| **STAR** | **THOMSON** |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 9 | 0 |
| **5. ACCURACY** | |
| **STAR** | **THOMSON** |
| 1 | U |
| 2 | P |
| 3 | H |
| 4 | H |
| 9 | 0 |
| **6. RAIL LENGTH** | |
| **STAR** | **THOMSON** |
| XXXX | +XXXXX |
| **7. REVISION** | |
| **STAR** | **THOMSON** |
| 10 | blank |
| 20 | blank |

## STAR ROLLER RAIL SYSTEM TO THOMSON 500 SERIES ROLLER PROFILE RAIL INTERCHANGE SHEET

| STAR | THOMSON |
|---|---|
| **Carriage Part Number**<br>18 / 1 51 / 2 - 2 / 3 1 / 4 2 / 5 - 10 / 7 | **Carriage Part Number**<br>512 / 1 P / 5 20 / 3 A / 2 1 / 4 |
| **Rail Part Number**<br>18 / 1 05 / 2 - 2 / 3 0 / 8 2 / 5 - 31 / 9 , 1000 / 6 | **Rail Part Number**<br>522 / 1 P / 5 25 / 3 A / 2 + 1000 / 6 |

| 1. TYPE | |
|---|---|
| **STAR** | **THOMSON** |
| 18 | Carriage - 512<br>Rail - 522 |

| 2. STYLE | | |
|---|---|---|
| | **STAR** | **THOMSON** |
| CARRIAGE | 51 | A |
| | 53 | B |
| | 21 | C |
| | 24 | D |
| | Rail - see RAIL STYLE - 1, 2, 8 and 9 Section | |

| 3. SIZE | |
|---|---|
| **STAR** | **THOMSON** |
| 2 | 25 |
| 3 | 35 |
| 4 | 45 |
| 5 | 55 |
| 6 | 65 |

| 4. PRELOAD | |
|---|---|
| **STAR** | **THOMSON** |
| 1* | 1 |
| 2 | 2 |
| 3 | 3 |

| 5. ACCURACY | |
|---|---|
| **STAR** | **THOMSON** |
| 3 | N/A |
| 2 | P |
| 1 | S |
| 9 | U |

| 6. LENGTH | |
|---|---|
| **STAR** | **THOMSON** |
| XXXX | +XXXX |

| 7. VERSION | |
|---|---|
| **STAR** | **THOMSON** |
| 10 | blank |
| 13 (ALUMINIUM END CAP) | N/A |
| 18 | ES4 |
| 60 | D-Thin Dense Chrome |

| RAIL STYLE 1,2,8 AND 9 | |
|---|---|
| **STAR** | **THOMSON** |
| 1805-x2x-31 | C |
| 1805-x3x-31 | C + 532RCS (size 25) |
| 1805-x3x-61 | C + 532RCS (size 35 & up) |
| 1805-x5x-31 | A |
| 1805-x6x-31 | C + 532RCS (size 25) |
| 1805-x6x-61 | C + 532RCS (size 35 & up) |
| 1806-x5x-31 | A |
| 1807-x0x-11 | U |
| 1845-x1x-31 | A + Thin Dense Chrome |
| 1845-x5x-31 | C + Thin Dense Chrome + 532RCS (size 25) |
| 1845-x5x-61 | C + Thin Dense Chrome + 532RCS (size 35 & up) |
| 1845-x8x-31 | C + Thin Dense Chrome + 532RCS |
| 1847-x1x-31 | U + Thin Dense Chrome |
| 18xx-xxx-41 | Coated End for Thin Dense Chrome options in place of -31 |
| 18xx-xxx-71 | Coated End for Thin Dense Chrome options in place of -61 |

**The Thomson 500 Series Ball Profile Rail replaces the Thomson AccuGlide Profile Rail.**

The 500 Series Ball Profile Rail provides the following advantages when compared to AccuGlide:

- Increased rail straightness through advanced grinding technologies
- Simpler installation and greater accuracy on joint-free rails up to 6 meters long
- Smoother, quieter movement through insert molded recirculation paths, minimized transitions and optimized geometries
- Increased load capacity from longer ball paths and total number of rolling elements
- On-site field modifiable and upgradeable easy-to-use modular carriage and seal designs
- Customization with expanded accessories offering

| THOMSON AccuGlide* TO THOMSON 500 SERIES BALL PROFILE RAIL INTERCHANGE SHEET | |
|---|---|
| **THOMSON AccuGlide*** | **THOMSON 500 SERIES BALL** |
| **Assembly Part Number**<br>CG 20 AA B P _<br>1 2 3 4 5 8<br><br>**Rail Part Number**<br>RG 20 P L1000 _<br>1 2 5 6 8 | **Carriage Part Number**<br>511 P 20 A 1 _<br>1 5 2 3 4 8<br><br>**Rail Part Number**<br>521 P 20 A _ 1000<br>1 5 2 7 8 6 |

| 1. TYPE | |
|---|---|
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| Carriage - CG<br>Rail - RG | Carriage - 511<br>Rail - 521 |
| **2. SIZE** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| 15 | 15 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 35 | 35 |
| 45 | 45 |
| 55 | N/A |
| **3. CARRIAGE STYLE** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| AA | A |
| BA | B |
| CE | C |
| DE | D |
| EE | E |
| HE | F |
| **4. PRELOAD** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| A | 0 |
| B | 1 |
| C | 2 |
| D | 3 |

| 5. ACCURACY | |
|---|---|
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| N | H |
| H | H |
| P | P |
| S | U |
| U | U |
| **6. LENGTH** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| Lxxxx | xxxx |
| **7. RAIL STYLE** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| – | A |
| N/A | U |
| N/A | C |
| **8. OPTIONS[1]** | |
| **AccuGlide** | **THOMSON 500 SERIES BALL** |
| A | D |
| C2C2 (plastic) | C (steel) |
| C3C3 | C |
| D#### | See pg. 132 or Consult Thomson |
| KK | W |
| LDS | Standard Longitudinal Seal is low drag |
| LL | L |
| M### | See pg. 132 or Consult Thomson |
| R2R2 | E |
| ZZ | Z |
| N/A | V (Viton Wiper) |
| N/A | N (Oil Reservoir) |

**The Thomson 500 Series Roller Profile Rail replaces the Thomson AccuMax Profile Rail**

The 500 Series Roller Profile Rail provides the following advantages when compared to AccuMax:

- Increased rail straightness through advanced grinding technologies
- Simpler installation and greater accuracy on joint-free rails up to 6 meters long
- Smoother, quieter movement through insert molded recirculation paths, minimized transitions and optimized geometries
- Increased load capacity from longer roller paths and total number of rolling elements
- Expanded offering of ultra-rigid roller carriage sizes and styles for all applications
- On-site field modifiable and upgradeable easy-to-use modular carriage and seal designs
- Customization with expanded accessories offering

| THOMSON AccuMax* TO THOMSON 500 SERIES ROLLER PROFILE RAIL INTERCHANGE SHEET | |
|---|---|
| **THOMSON AccuMAX*** | **THOMSON 500 SERIES ROLLER** |
| **Assembly Part Number**<br>CM 35 AA B S _<br>1 2 3 4 5 8 | **Carriage Part Number**<br>512 S 35 A 1 _<br>1 5 2 3 4 8 |
| **Rail Part Number**<br>RM 35 S L1000 _<br>1 2 5 6 8 | **Rail Part Number**<br>522 S 35 A _ 1000<br>1 5 2 7 8 6 |

| 1. TYPE | |
|---|---|
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| Carriage - CM<br>Rail - RM | Carriage - 512<br>Rail - 522 |
| **2. SIZE** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| N/A<br>35<br>45<br>55<br>N/A | 25<br>35<br>45<br>55<br>65 |
| **3. CARRIAGE STYLE** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| AA<br>N/A<br>N/A<br>N/A | A<br>B<br>C<br>D |
| **4. PRELOAD** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| B<br>C<br>D | 1<br>2<br>3 |

| 5. ACCURACY | |
|---|---|
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| P<br>S<br>U | P<br>S<br>U |
| **6. LENGTH** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| Lxxxx | xxxx |
| **7. RAIL STYLE** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| –<br>N/A<br>N/A | A<br>U<br>C |
| **8. OPTIONS[1]** | |
| **AccuMax** | **THOMSON 500 SERIES ROLLER** |
| A | D |
| C2C2 (plastic) | C (steel) |
| C3C3 | C |
| D#### | See pg. 132 or Consult Thomson |
| KK | W |
| LDS | Standard Longitudinal Seal is low drag |
| LL | L |
| M### | See pg. 132 or Consult Thomson |
| R2R2 | E |
| ZZ | Z |
| N/A | V (Viton Wiper) |

| THK SHS LM GUIDE TO THOMSON 400 SERIES BALL CAGE PROFILE RAIL INTERCHANGE SHEET | |
|---|---|
| **THK SHS** | **THOMSON 400 SERIES** |
| **Assembly Part Number**<br>SHS 25 LC 2 DD C1 + 1200L H<br>1 2 3 4 9 5 7 6 | **Carriage Part Number**<br>(2) pcs 413* H 25 B 1 W<br>4 1 6 2 3 5 9<br>and<br>**Rail Part Number**<br>(1) pc 421 H 25 A 1200<br>4 1 6 2 8 7 |
| **Carriage Part Number**<br>SHS 25 LC 2 SS C1 H (GK) BLOCK<br>1 2 3 4 9 5 6 | **Carriage Part Number**<br>413* H 25 B 1<br>1 6 2 3 5 |
| **Rail Part Number**<br>SHS 25 -1200L H (GK) RAIL<br>1 2 7 6 | **Rail Part Number**<br>421 H 25 A + 1000<br>1 6 2 8 7 |

| 1. TYPE | |
|---|---|
| **THK** | **THOMSON 400 SERIES** |
| Carriage - SHS<br>Rail - SHS | Carriage - 413*<br>Rail - 421 |
| **2. SIZE** | |
| **THK** | **THOMSON 400 SERIES** |
| 15 | 15 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 35 | 35 |
| 45 | 45 |
| 55 | 55 |
| 65 | N/A |
| **3. CARRIAGE STYLE** | |
| **THK** | **THOMSON 400 SERIES** |
| C | A |
| LC | B |
| V | C |
| LV | D |
| R | E |
| LR | F |
| **4. CARRIAGES PER RAIL** | |

* Thomson 400 Series carriages are available in both Ball (411) and Ball cage (413) design whereas, THK SHS carriages are only available in cage design. Thomson 400 Series Ball carriages can be substituted for THK SHS carriages if the application does not require low noise at high speeds. Ball carriages are more economical and dimensionally interchangeable to THK SHS carriages. When selecting the carriage type, 413 can be replaced by 411 to change from ball cage to ball type.

| 5. PRELOAD | |
|---|---|
| **THK** | **THOMSON 400 SERIES** |
| blank | 0 |
| C1 | 1 |
| C0 | N/A |
| **6. ACCURACY** | |
| **THK** | **THOMSON 400 SERIES** |
| blank | N |
| H | H |
| **7. LENGTH** | |
| **THK** | **THOMSON 400 SERIES** |
| xxxxL | xxxx |
| **8. RAIL STYLE** | |
| **THK** | **THOMSON 400 SERIES** |
| blank | A |
| K | U |
| **9. SEALS** | |
| **THK** | **THOMSON 400 SERIES** |
| UU | blank (standard) |
| SS | blank (standard) |
| DD | W |
| ZZ | Z |
| KK | WZ |

## Common AccuGlide Options

| Carriage Options | 500 Series Option |
|---|---|
| C2C2 | C |
| C3C3 | C |
| D035 | ES1 |
| D047 | ES10* |
| D065 | ES2 |
| D086 | ES1ES10* |
| D087 | ES8 or ES1ES10* |
| D088 | ES2ES10* |
| D089 | ES9 or ES2ES10* |
| D134 | ZCES1 |
| D135 | CES1 |
| D147 | CES10* |
| D150 | ZC |
| D164 | ZCES2 |
| D165 | CES2 |
| D186 | CES1ES10* |
| D187 | CES7 or CES10* |
| D188 | CES10* |
| D189 | CES9 or CES2ES10* |
| D192 | LCES9 or LCES2ES10* |
| D234 | LES1 |
| D235 | LZES1 |
| D236 | LZCES1 |
| D237 | LCES1 |
| D241 | LC |
| D251 | LZC |
| D262 | LES2 |
| D263 | LCES2 |
| D264 | ZES2 |
| D265 | LZES2 |
| D266 | LZCES2 |
| D267 | LCES2 |
| D274 | LES12 |
| D275 | LZES12 |
| D289 | LES9 or LES2ES10* |
| D292 | LZES9 or LZES2ES10* |
| LDS | now standard |
| LL | L |
| LLZZ | LZ |
| M035 | ES3 |
| M038 | CES3 |
| M041 | 1/4-28 in side options: ES7 or ES10 option* |
| M043 | C + 1/4-28 in side options: CES7 or CES10 option* |
| M047 | ES7 or ES10* |
| M049 | CES7 or CES10* |
| M063 | CES4 |
| M065 | ES4 |
| M075 | ES14 |
| M077 | ES14 + ES7 |
| M087 | ES5 |
| M088 | ES4ES10 |
| M089 | ES6 |
| M094 | ES7 + ES15 |
| M095 | ES15 |

| Carriage Options | 500 Series Option |
|---|---|
| M097 | ZES15 |
| M099 | CES15 |
| M125 | ES11 |
| M134 | ES6 |
| M147 | CES7 |
| M153 | W |
| M157 | WZ |
| M168 | Duralloy |
| M171 | Z |
| M183 | ZES5 |
| M186 | ES5 |
| M187 | CES5 |
| M188 | CES10* |
| M189 | CES6 |
| M192 | ZES6 |
| M209 | LES6 |
| M210 | WES7 |
| M234 | LES3 |
| M235 | LZES3 |
| M236 | LZCES3 |
| M241 | LC |
| M242 | Duralloy + L |
| M249 | LCES7 or LCES10* |
| M251 | LZC |
| M263 | LES4 |
| M264 | ZES4 |
| M265 | LZES4 |
| M266 | LZCES4 |
| M267 | LCES4 |
| M275 | LZES14G1 |
| M287 | LES5 |
| M289 | LES6 |
| M290 | LCES6 |
| M292 | LZES6 |
| M293 | WES5 |
| M294 | GS |
| ZZ | Z |

* ES10 option is side lube in end cap, size 15 = M3, size 20 and up=M6.

| Rail Options | 500 Series Designation |
|---|---|
| D080 | DH1 |
| D085 | DH2 |
| D181 | EDH1 |
| D185 | EDH2 |
| D187 | EDH2 |
| M080 | DH3 |
| M082 | EDH3 |
| M083 | EDH3 |
| M085 | DH4 |
| M088 | EDH4 |
| M091 | EDH4 |
| R2R2 | E |
| R3R3 | E |

**NOTES:**

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# Rodless Actuator LM80-H

## 12 and 24 Vdc - load up to 2000 N

» Ordering Key - see page 70
» Glossary - see page 72
» Electric Wiring Diagram - see page 45



## Standard Features and Benefits

- Rodless actuator for horizontal operation
- For use in domestic, office or medical applications
- Rigid self supporting extruded aluminum profile
- Durable and corrosion free
- Lightweight and quiet operation
- Safety nut on ball screw versions
- Easy and fast T-slot mounting
- Maintenance free

## General Specifications

| Parameter | LM80-H |
|---|---|
| Screw type | trapezoidal or ball |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | no |
| Holding brake | no |
| End of stroke protection | spring loaded soft stop |
| Mid stroke protection | no |
| Motor protection | no |
| Motor connection<br>with motor enclosure<br>no motor enclosure | <br>cable<br>no cable, clips on motor |
| Motor connector<br>with motor enclosure<br>no motor enclosure | <br>DIN 41524 8 pin plug<br>clips on motor |
| Certificates | CE |
| Options | • no motor enclosure<br>• manual override<br>• alternative motor positions<br>• stroke over 1500 mm*<br>• encoder * |

* Contact customer support

## Performance Specifications

| Parameter | | LM80-H |
|---|---|---|
| Maximum load (Fb) | [N] | 2000 |
| Maximum load torque (Mb)<br>DT•• -T68M ••••• H<br>DT•• -B61M ••••• H<br>DT•• -B62M ••••• H<br>DT•• -B65M ••••• H | [Nm] | <br>250<br>400<br>180<br>750 |
| Speed, at no load / at maximum load<br>DT•• -T68M ••••• H<br>DT•• -B61M ••••• H<br>DT12 -B62M ••••• H<br>DT24 -B62M ••••• H<br>DT•• -B65M ••••• H | [mm/s] | <br>44 / 37<br>55 / 50<br>110 / 73<br>110 / 87<br>28 / 28 |
| Available input voltages | [Vdc] | 12, 24 |
| Standard stroke lengths | [mm] | 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500 |
| Operating temperature limits | [°C] | 0 – +40 |
| Full load duty cycle @ 20 °C | [%] | 15 |
| Maximum on time | [s] | 120 |
| End play, maximum | [mm] | 1,0 |
| Restraining torque | [Nm] | 0 |
| Lead cross section<br>with / without motor enclosure | [$mm^2$] | <br>1,5 / – |
| Cable length<br>with / without motor enclosure | [mm] | <br>2000 / – |
| Protection class<br>with / without motor enclosure | | <br>IP44 / IP33 |

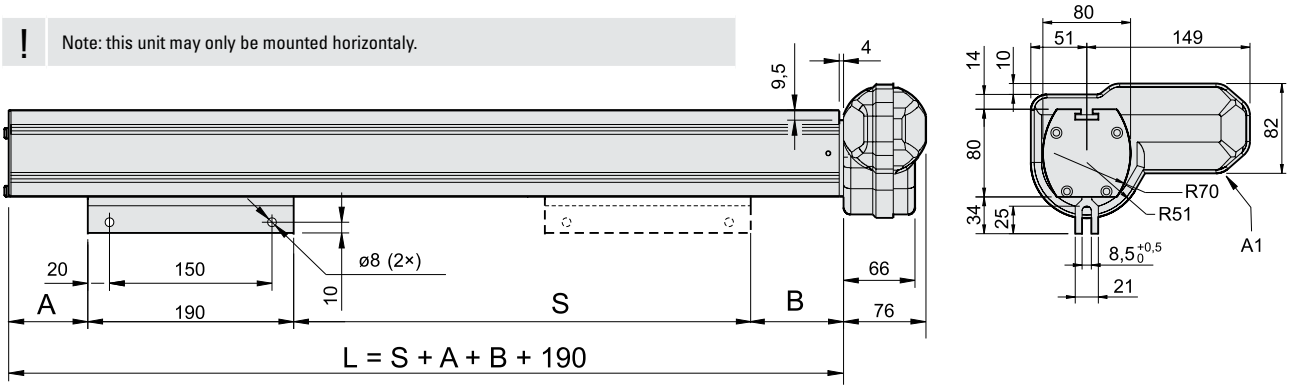
## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| DCG-170 | 54 |
| AC-247 ELS | 52 |

# Rodless Actuator LM80-H

## 12 and 24 Vdc - load up to 2000 N

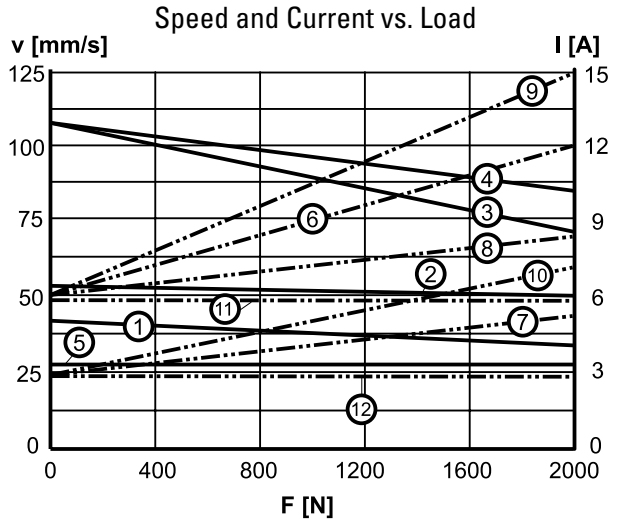
! Note: this unit may only be mounted horizontaly.




S: stroke
L: length of profile
A1: motor shown in position A (standard position)

| Stroke (S) | [mm] | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimensions (A) / (B)** | [mm] | | | | | | | | | | | |
| DT•• -T68M ••••• H | | | | | | | 54,0 / 77,0 | | | | | |
| DT•• -B61M ••••• H | | | | | | | 102,0 / 77,0 | | | | | |
| DT•• -B62M ••••• H | | | | | | | 102,0 / 77,0 | | | | | |
| DT•• -B65M ••••• H | | | | | | | 79,0 / 77,0 | | | | | |
| **Weight** | [kg] | | | | | | | | | | | |
| DT•• -T68M ••••• H | | 11,2 | 13,1 | 14,8 | 16,6 | 18,1 | 20,2 | 22,0 | 23,8 | 25,5 | 27,4 | 29,1 |
| DT•• -B61M ••••• H | | 12,1 | 13,9 | 15,7 | 17,5 | 19,3 | 21,0 | 22,9 | 24,6 | 26,3 | 28,2 | 30,0 |
| DT•• -B62M ••••• H | | 12,1 | 13,9 | 15,7 | 17,5 | 19,3 | 21,0 | 22,9 | 24,6 | 26,3 | 28,2 | 30,0 |
| DT•• -B65M ••••• H | | 11,7 | 13,5 | 15,3 | 17,1 | 18,9 | 20,6 | 22,4 | 24,2 | 26,0 | 27,8 | 29,6 |

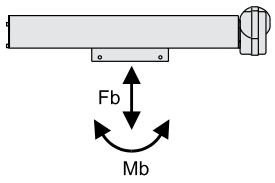
## Performance Diagrams



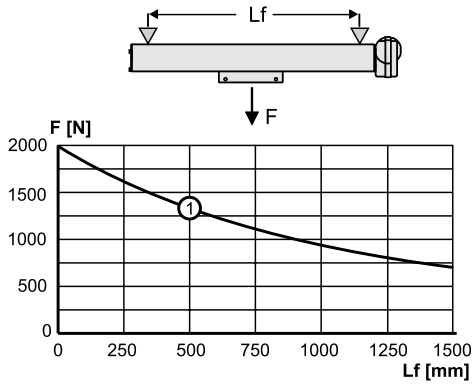

V: speed I: current F: load

1: speed DT •• -T68M ••••• H
2: speed DT •• -B61M ••••• H
3: speed DT12-B62M ••••• H
4: speed DT24-B62M ••••• H
5: speed DT •• -B65M ••••• H
6: current DT12-T68M ••••• H
7: current DT24-T68M ••••• H and DT24-B61M ••••• H
8: current DT12-B61M ••••• H
9: current DT12-B62M ••••• H
10: current DT24-B62M ••••• H
11: current DT12-B65M ••••• H
12: current DT24-B65M ••••• H

## Definition of Forces




## Deflection of Profile




F: load Lf: distance between mounting points

1: maximum allowed deflection

# Rodless Actuator LM80-V

## 12 and 24 Vdc - load up to 2000 N

» Ordering Key - see page 70
» Glossary - see page 72
» Electric Wiring Diagram - see page 45



## Standard Features and Benefits

- Rodless actuator for vertical operation with motor down
- For use in domestic, office or medical applications
- Rigid self supporting extruded aluminum profile
- Durable and corrosion free
- Holding brake prevents downward motion at power off
- Lightweight and quiet operation
- Safety nut on ball screw versions
- Easy and fast T-slot mounting
- Optional spline safety function
- Maintenance free

## General Specifications

| Parameter | LM80-V |
|---|---|
| Screw type | trapezoidal or ball |
| Internally restrained | yes |
| Manual override | no |
| Dynamic braking | no |
| Holding brake | yes |
| End of stroke protection | spring loaded soft stop |
| Mid stroke protection | no |
| Motor protection | no |
| Motor connection<br>with motor enclosure<br>no motor enclosure | <br>cable<br>no cable, clips on motor |
| Motor connector<br>with motor enclosure<br>no motor enclosure | <br>DIN 41524 8 pin plug<br>clips on motor |
| Certificates | CE |
| Options | • no motor enclosure<br>• manual override<br>• alternative motor positions<br>• spline safety function<br>• stroke over 1500 mm*<br>• encoder * |

* Contact customer support

## Performance Specifications

| Parameter | | LM80-V |
|---|---|---|
| Maximum load (Fa)<br>DT•• -T68M ••••• V(F)<br>DT•• -B61M ••••• V(F)<br>DT•• -B62M ••••• V(F)<br>DT•• -B65M ••••• V(F) | [N] | <br>650<br>1000<br>450<br>2000 |
| Maximum load torque (Ma)<br>DT•• -T68M ••••• V(F)<br>DT•• -B61M ••••• V(F)<br>DT•• -B62M ••••• V(F)<br>DT•• -B65M ••••• V(F) | [Nm] | <br>250<br>400<br>180<br>750 |
| Speed, at no load / at maximum load<br>DT12 -T68M ••••• V(F)<br>DT24 -T68M ••••• V(F)<br>DT12 -B61M ••••• V(F)<br>DT24 -B61M ••••• V(F)<br>DT12 -B62M ••••• V(F)<br>DT24 -B62M ••••• V(F)<br>DT12 -B65M ••••• V(F)<br>DT24 -B65M ••••• V(F) | [mm/s] | <br>44 / 29<br>44 / 35<br>55 / 37<br>55 / 43<br>110 / 67<br>110 / 83<br>28 / 19<br>28 / 22 |
| Available input voltages | [Vdc] | 12, 24 |
| Standard stroke lengths | [mm] | 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500 |
| Operating temperature limits | [°C] | 0 – +40 |
| Full load duty cycle @ 20 °C | [%] | 15 |
| Maximum on time | [s] | 120 |
| Restraining torque | [Nm] | 0 |
| Lead cross section<br>with / without motor enclosure | [mm²] | <br>1,5 / – |
| Cable length<br>with / without motor enclosure | [mm] | <br>2000 / – |
| Protection class<br>with / without motor enclosure | | <br>IP44 / IP33 |

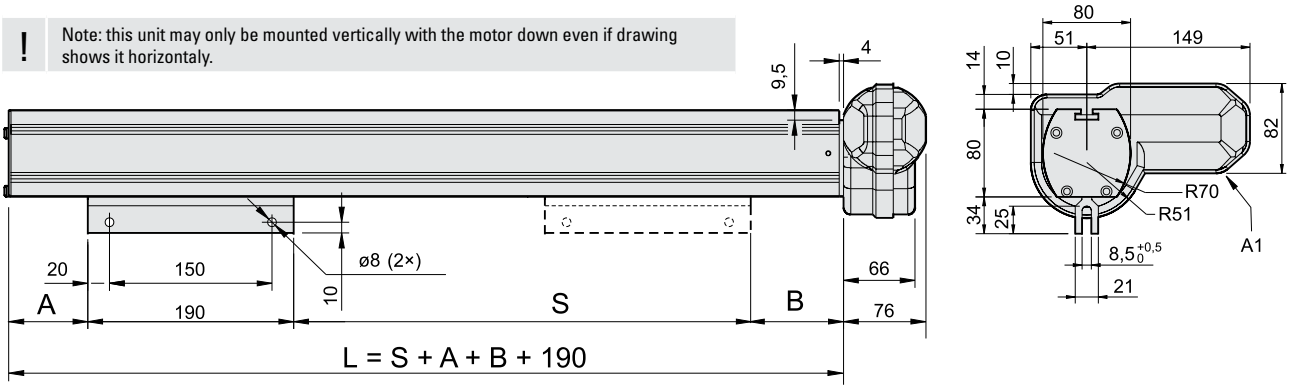
## Compatible Controls

| Control model | See page |
|---|---|
| DPDT switch | 48 |
| DPDT switch box | 49 |
| DCG-160 | 54 |
| AC-247 ELS | 52 |

# Rodless Actuator LM80-V

## 12 and 24 Vdc - load up to 2000 N

! Note: this unit may only be mounted vertically with the motor down even if drawing shows it horizontaly.

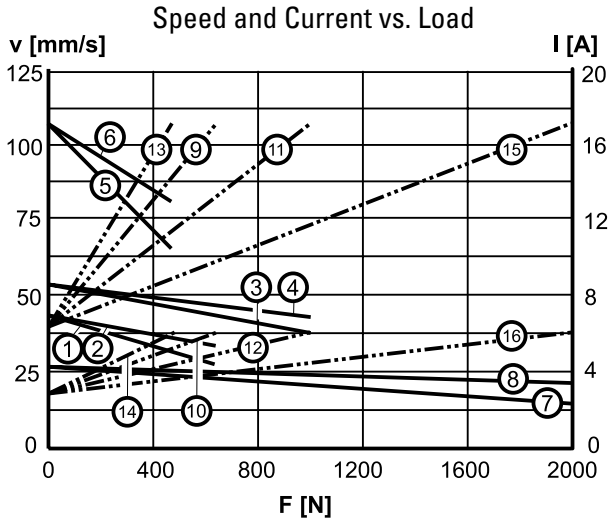



S: stroke
L: length of profile
A1: motor shown in position A (standard position)

| Stroke (S) | [mm] | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimensions (A) / (B)** | [mm] | | | | | | | | | | | |
| DT•• -T68M ••••• V | | | | | | | 50,0 / 71,0 | | | | | |
| DT•• -B61M ••••• V | | | | | | | 53,0 / 120,0 | | | | | |
| DT•• -B62M ••••• V | | | | | | | 53,0 / 120,0 | | | | | |
| DT•• -B65M ••••• V | | | | | | | 53,0 / 97,0 | | | | | |
| DT•• -T68M ••••• F | | | | | | | 50,0 / 90,0 | | | | | |
| DT•• -B61M ••••• F | | | | | | | 53,0 / 144,0 | | | | | |
| DT•• -B62M ••••• F | | | | | | | 53,0 / 144,0 | | | | | |
| DT•• -B65M ••••• F | | | | | | | 53,0 / 126,0 | | | | | |
| **Weight*** | [kg] | | | | | | | | | | | |
| DT•• -T68M ••••• V | | 11,1 | 12,9 | 14,7 | 16,5 | 18,2 | 20,0 | 21,8 | 23,6 | 25,4 | 27,2 | 28,9 |
| DT•• -B61M ••••• V | | 11,6 | 13,4 | 15,2 | 17,0 | 18,7 | 20,5 | 22,3 | 24,1 | 25,9 | 27,7 | 29,5 |
| DT•• -B62M ••••• V | | 11,6 | 13,4 | 15,2 | 17,0 | 18,7 | 20,5 | 22,3 | 24,1 | 25,9 | 27,7 | 29,5 |
| DT•• -B65M ••••• V | | 12,0 | 13,8 | 15,6 | 17,6 | 19,3 | 21,1 | 22,9 | 24,7 | 26,5 | 28,2 | 30,1 |

* Add 0,5 kg to the below weights to get the weights for DT•• -T68M ••••• F, DT•• -B61M ••••• F, DT•• -B62M ••••• F and DT•• -B65M ••••• F.

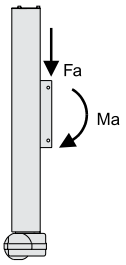
## Performance Diagrams

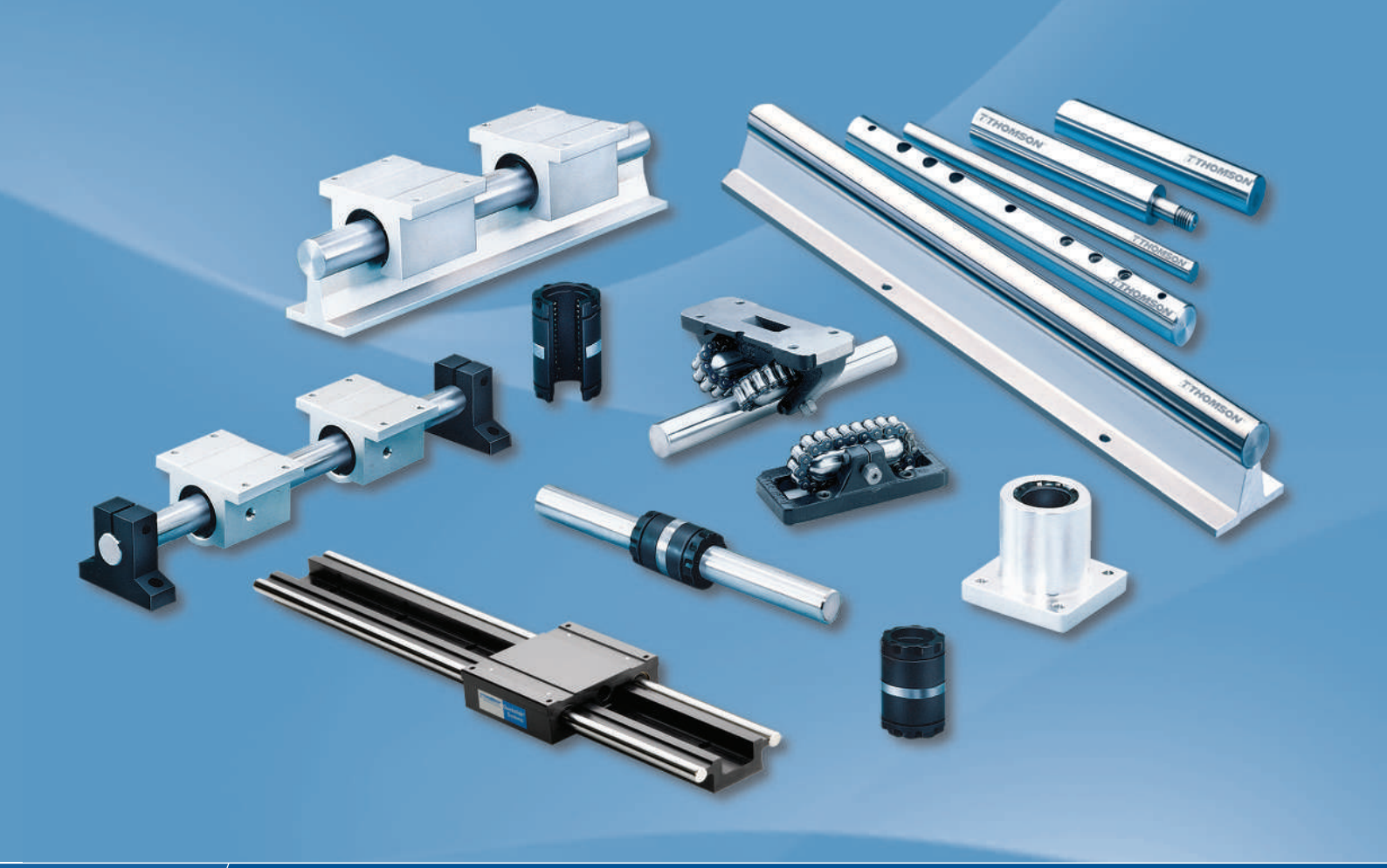



V: speed I: current F: load

1: speed DT12-T68M ••••• V(F)
2: speed DT24-T68M ••••• V(F)
3: speed DT12-B61M ••••• V(F)
4: speed DT24-B61M ••••• V(F)
5: speed DT12-B62M ••••• V(F)
6: speed DT24-B62M ••••• V(F)
7: speed DT12-B65M ••••• V(F)
8: speed DT24-B65M ••••• V(F)
9: current DT12-T68M ••••• V(F)
10: current DT24-T68M ••••• V(F)
11: current DT12-B61M ••••• V(F)
12: curent DT24-B61M ••••• V(F)
13: current DT12-B62M ••••• V(F)
14: current DT24-B62M ••••• V(F)
15: current DT12-B65M ••••• V(F)
16: current DT24-B65M ••••• V(F)

## Definition of Forces






# Thomson RoundRail Linear Guides and Components

Selection Guide for Inch and Metric Linear Ball Bushing Bearings, 60 Case Shafting and RoundRail Linear Guides

THOMSON™

*Linear Motion.* ***Optimized.***

THOMSON™

*Linear Motion.* ***Optimized.***

## Thomson -
Linear Motion. *Optimized.*

**Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.**

**Thomson is best positioned to help you most quickly configure the optimal linear motion solution for your application.**

- **Thomson invented anti-friction linear bearing technology. We own the broadest standard product offering of mechanical motion technologies in the industry.**
- **Modified versions of standard product are routine. White sheet design solutions available across our entire portfolio.**
- **Choose Thomson and gain access to over 70 years of global application experience in diverse industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.**
- **As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.**

Thomson is the name you can trust for quality, innovation, on-time delivery, controlled costs, and reduced risk.

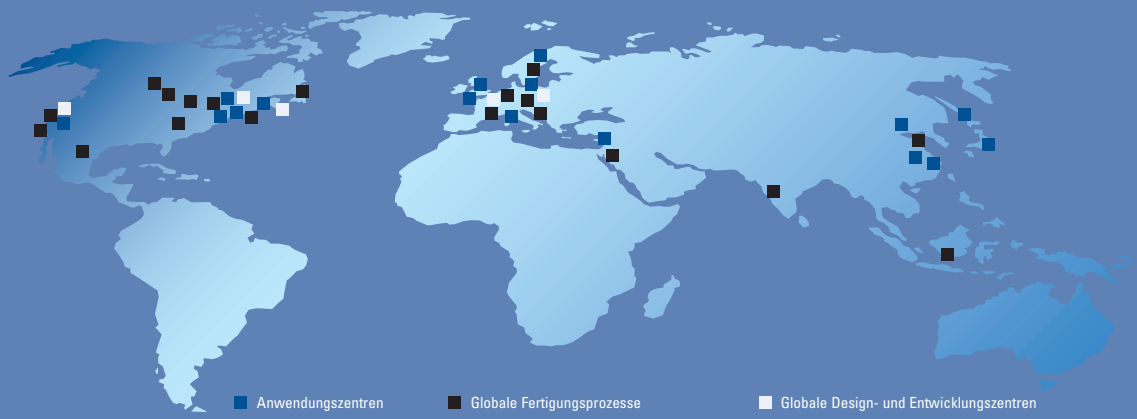
**In addition to the information contained in this document, a wealth of product and application information is available online at www.thomsonlinear.com. For assistance in Europe contact us at +44 1271 334 500 or email us at sales.uk@thomsonlinear.com**

**Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.**

## The Danaher Business System -
Building sustainable competitive advantage into your business

**The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.**

## Local Support Around the Globe
Application Centers Global Manufacturing Operations Global Design & Engineering Centers



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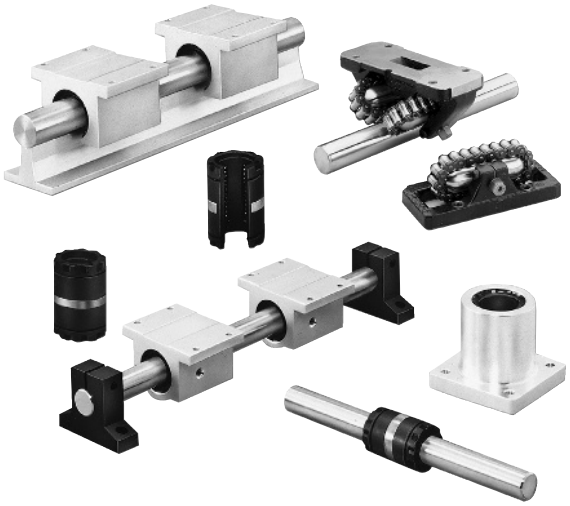
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### Thomson RoundRail Linear Guides and Components Overview

# Linear Bearings



Thomson offers an extensive family of Linear Bearings. Super Smart Ball Bushing Bearings are available in Inch and Metric sizes. Thomson uses the latest technology - Universally self-aligning Bearings. These Bearings are offered in a Dual Track Design and offer Load Capacities up to 7,760 $lb_f$ (30,000N). The Super Smart Ball Bushing Bearings are available in sizes .5 in to 1.5 in, 8 mm to 40mm. Super Ball Bushing Pillow Blocks are available in closed, adjustable and open styles in both single and twin versions. These are the original self aligning precision anti-friction linear bearing with load capacities up to 4,000 $lb_f$, and speed up to 10 ft/sec (3 m/s). Danaher offers the largest selection of sizes. 'A' Bearings are the original precision anti-friction linear bearing all steel construction with load capacities up to 5,000 $lb_f$ and high operating temperature capabilities. Thomson Die Set Ball Bushing Bearings offer high operating temperature capabilities, all steel construction and load capacities up to 1100 $lb_f$. Roundway Bearings are capable of load capacities up to 24,000 $lb_f$, with travel speeds up to 100 ft/sec. These Bearings offer high performance in highly contaminated environments. FluoroNyliner Ball Bushing Bearings are recommended for washdown and contaminated environments. These Bearings and pillow blocks offer load capacities up to 14,000 $lb_f$.

# Shafting

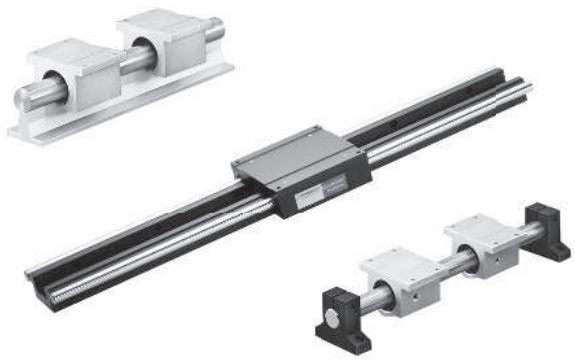


While Shafts may appear the same, there are significant performance differences due to the manufacturer's selected standards, and the manufacturing processes used to achieve them. The linear inner race demands the highest levels of material cleanliness, surface topography, surface hardening, diameter, taper and roundness, surface finish and straightness to provide optimum performance, minimal maintenance and long life. Unlike common shafting, Thomson 60 Case LinearRace shafting is manufactured to the highest quality standards. Our techniques are continuously upgraded with proprietary know-how gained from over 53 years of linear bearing design and manufacture. Using 60 Case LinearRace shafting with Thomson Ball Bushing Bearings ensures optimal bearing performance and travel life.

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## Thomson Product Line Overview

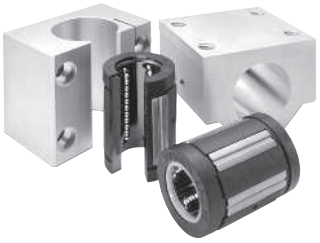
# RoundRail Linear Guides



Pre-assembled, ready to install stages providing low friction, smooth, accurate motion for a wide range of moment or normal loading configurations. Market applications include factory automation, medical, packaging, machine tool, semiconductor, printing, automotive assembly, aerospace and food processing. Slide tables are available as customizable RoundRail Linear Guides to multiaxis, turnkey systems complete with motors, drives, controls and electromechanical accessories.

- Applications-typically on factory machinery where accurate, smooth linear positioning is required
- Available with servo/stepper motor & drive packages
- Max thrust to 3100 lb
- Strokes to 120"
- Loads from 5 - 2000 lb
- Repeatability to 0.0002"

# New Thomson Linear Ball Bushing Bearings





Metric Super Ball Bushing Bearings offer high performance from superior design

A coefficient of friction as low as 0,001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings. A self-aligning capability up to 0,5° compensates for inaccuracies in base flatness or carriage machining. Achieved with Thomson Super Bearing plates which have defined radius crowns for maximized self-alignment accuracy. Accelerations as high as 150m/s$^2$ and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides. Quick to ship, drop-in replacement parts for existing applications.

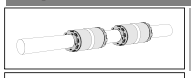
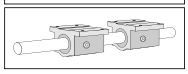
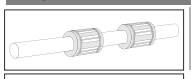
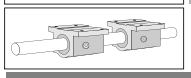
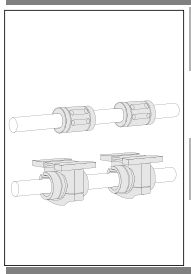
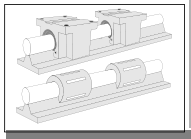
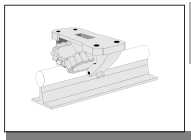
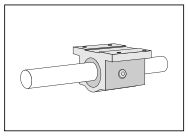
Stainless Steel MultiTrac and "A" Ball Bushing Bearings are ideal for harsh environments

Stainless steel (440) components resist rust and corrosion. "A" bearing withstands up to 600 degrees F (315°C). MultiTrac Ball Bushing bearings are rated at a maximum of 180 degrees F (82°C). MultiTrac has wear-resistant, engineered-polymer retainers to reduce inertia and noise levels. Quick to ship, drop-in replacement parts for existing applications:

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# Thomson Product Line Overview

## Ball Bushing Bearings

| | | Page Number | Imperial (Inch) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 |
| **Super Smart** | | | | | | | | | | |
|  | **Ball Bushing Bearings** corrosion resistant option available | inch: 20 metric: 120 | | | | | ⊙ | ⊙ | ⊙ | ⊙ |
|  | **Ball Bushing Pillow Blocks** corrosion resistant option available | inch: 27 metric: 126 | | | | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA |
| **Super** | | | | | | | | | | |
|  | **Ball Bushing Bearings** corrosion resistant option available | inch: 43 & 56 metric: 141 | | ● | ● | ● | ⊙ | ⊙ | ⊙ | ⊙ |
|  | **Ball Bushing Pillow Blocks** corrosion resistant option available | inch: 52 & 61 metric: 144 | | | ● STA | ● STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA |
| **Precision Bearings** | | | | | | | | | | |
|  | **A-Bearings and Pillow Blocks** available in stainless steel | 73 | | | ● | ● SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA |
| | **MultiTrac** available in stainless steel | 134 | | | | | | | | |
| | **Instrument** | 177 | ● | ● | ● | | | | | |
| | **Die Set** | 79 | | | | | | | | ● |
| **XR Extra Rigid** | | | | | | | | | | |
|  | **Ball Bushing Bearings and Pillow Blocks** | 87 | | | | | | | | |
| **Specialty** | | | | | | | | | | |
|  | Cartridge bearing | 50 | | | ● ST | ● ST | ● ST | | | |
| | RoundWay | 94 | | | | | ● | | | ● |
| **FluoroNyliner** | | | | | | | | | | |
|  | **Bushing bearings** | 102 | | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | **Pillow Blocks** | 107 | | | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF |

● Closed Type
○ Open Type
⊙ Closed and Open Type
S Single Configuration
T Twin Configuration
A Adjustable Configuration
F Flanged Configuration

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# Thomson Product Line Overview

| Imperial (Inch) | | | | | | Metric (mm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 1/4 | 1 1/2 | 2 | 2 1/2 | 3 | 4 | 5 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 50 |
| ⊙ | ⊙ | | | | | | ● | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | ⊙ | |
| ⊙ STA | ⊙ STA | | | | | | ● STA | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | | ⊙ STA | |
| ⊙ | ⊙ | ⊙ | | | | | ● | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | ⊙ | ⊙ |
| ⊙ STA | ⊙ STA | ⊙ STA | | | | | ● STA | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | | ⊙ STA | ⊙ STA |
| ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | | | | | | | | | | | |
| | | | | | | | ● SA | | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | | ⊙ SA | |
| | | | | | | | | | | | | | | | | |
| ● | ● | ● | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | ○ | | | ○ | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | ● | ● | | ● | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| ⊙ | ⊙ | ⊙ | | | | | | | | | | | | | | |
| ⊙ STF | ⊙ STF | ⊙ STF | | | | | | | | | | | | | | |

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# Thomson Product Line Overview

## Standard 60 Case Shaft Size and Availability Chart

| Material | Carbon Steel | | | | | | | | | | | 440 C Stainless Steel | | | | | 52100 Tubular | | 316 SS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardness | 60 min. | | | | | | | | | | | 50 min. | | | | 55 min. | 58 min. | | 20-25 |
| Tolerance Class | L | | | | | S | N | | D | XL | G | L | | S | G | Instrument | L | S | L |
| Optional Features | L | DC | PD CPPE | CPPE | PD | S | DC | N | | | | L | PD | | | | | | |
| 1/8" | | | | | | | | | | | | | | | | ● | | | |
| 3/16" | ● | | | | | | | | | | | | | | | ● | | | |
| 1/4" | ● | | | | | ● | | ● | | | ● | ● | | ● | ● | ● | | | |
| 3/8" | ● | | | | | ● | | ● | | | ● | ● | | ● | ● | | | | ● |
| 1/2" | ● | | ● | ● | ● | ● | | ● | | | ● | ● | ● | ● | ● | | | | ● |
| 5/8" | ● | | ● | ● | ● | ● | | ● | | | ● | ● | ● | ● | ● | | | | ● |
| 3/4" | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | | ● | ● | ● |
| 7/8" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 1" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | ● | ● | ● |
| 1 1/8" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 1 1/4" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | | | | | ● |
| 1 3/8" | ● | | | | | | | ● | | | | | | | | | | | |
| 1 1/2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | | | ● | ● | ● |
| 1 5/8" | ● | | | | | | | ● | | | | | | | | | | | |
| 1 3/4" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | |
| 2 1/4" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 2 1/2" | ● | ● | | | | ● | ● | ● | | | | ● | | ● | | | ● | ● | |
| 3" | ● | ● | | | | ● | ● | ● | | ● | | | | | | | ● | ● | |
| 3 1/2" | ● | ● | | | | | | | | | | | | | | | | | |
| 4" | ● | | | | | ● | | | | ● | | | | | | | ● | ● | |
| Catalog Page | 163 | 165 | 164 | 164 | 164 | 163 | 165 | 163 | 163 | 163 | 165 | 166 | 166 | 166 | 167 | 167 | 167 | 167 | 168 |

| Material | Carbon Steel | | | 440 C SS |
|---|---|---|---|---|
| Hardness | 60 min. | | | 50 min. |
| Tolerance Class | MM (ISO h6) | | | MM (ISO h6) |
| Optional Features | MM | T1 | T2 | |
| 5 mm | ● | | | ● |
| 8 mm | ● | | | ● |
| 10 mm | ● | | | ● |
| 12 mm | ● | ● | ● | ● |
| 15 mm | ● | | | |
| 16 mm | ● | ● | ● | ● |
| 20 mm | ● | ● | ● | ● |
| 25 mm | ● | ● | ● | ● |
| 30 mm | ● | ● | ● | ● |
| 40 mm | ● | ● | ● | ● |
| 50 mm | ● | | | ● |
| 60 mm | ● | | | ● |
| 80 mm | ● | | | |
| Catalog Page | 176 | 177 | 177 | 178 |

Thomson 60 Case shafting is sold as cut-to-length (CTL), random length (RL), special machined (SM), and as quick shaft (QS).

Since Thomson grinds and hardens all of its own shafting, diameters and tolerances not listed are available as special grind and are made to order. Minimum lots may apply.

**Tolerance Classes:**
- L - For use with XA, Open and Adjustable Ball Bushing Bearings and Pillow Blocks as well as Super Ball Bushing Bearings and Super Smart Ball Bushing Bearings
- S - For use with A type ball bushings
- N - For use with needle roller Bearings
- D - For use with Thomson Die Set Ball Bushing Bearings
- G - Ball Grooved for use with Thomson Super Ball bushing
- XL - For use with XR bearing (Carbon Steel)

**Optional Features:**
- PD - Predrilled
- CPPE - Chrome Plated Plain Ends
- DC - Deep Case

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# Thomson Product Line Overview

## Standard Support Rail Size and Availability Chart

| Type | SR | SR-PD | SRA | SRA-SS | SRA-TU | LSR | LSR-PD | LSRA | LSRA-CR | XSR | XSRA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Aluminum Support Rail | Aluminum Support Rail with Predrilled Holes | Aluminum Support Rail Carbon Steel Shaft | Aluminum Support Rail Assembly 440C SS Shaft | Aluminum Support Rail 51200 Tubular Shaft | Steel Lower Support Rail | Steel Lower Support Rail with Predrilled Holes | Steel Lower Support Rail Assembly Carbon Steel Shaft | Corrosion Resistant Steel Lower Support Rail Assembly 440C SS Shaft | Extra Rigid Cast Steel Support Rail | Extra Rigid Cast Steel Support Rail Assembly |
| 1/2" | ● | ● | ● | ● | | ● | ● | | | | |
| 5/8" | ● | ● | ● | ● | | ● | ● | ● | ● | | |
| 3/4" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 1" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 1 1/4" | ● | ● | ● | ● | | ● | ● | ● | ● | | |
| 1 1/2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 2" | ● | ● | ● | ● | ● | ● | ● | | | ● | ● |
| 2 1/2" | | | | | | ● | ● | | | | |
| 3" | | | | | | ● | ● | | | ● | ● |
| 4" | | | | | | ● | ● | | | | |
| Catalog Page | 171 | 171 | 172 | 172 | 172 | 171 | 171 | 172 | 172 | 171 | 172 |

## Standard Support Rail Assembly Size and Availability Chart

| Type | SRM | SRM T1 | SRM T2 | SRAM T1 | SRAM T2 | LSRM | LSRM T1 | LSRM T2 | LSRA M | LSRA M CR |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | | Steel Lower Support Rail Assembly Carbon Steel Shaft T1 Hole Pattern | Steel Lower Support Rail with Predrilled Holes T2 Hole Pattern | Aluminum Support Rail Assembly with Predrilled Holes T1 Hole Pattern | Aluminum Support Rail Assembly with Predrilled Holes T2 Hole Pattern | Steel Lower Support Rail | Steel Lower Support Rail with Predrilled Holes T1 Hole Pattern | Steel Lower Support Rail with Predrilled Holes T2 Hole Pattern | Steel Lower Support Rail Assembly Carbon Steel Shaft | Corrosion Resistant Steel |
| 12mm | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 16mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 20mm | ● | ● | ● | ● | ● | ●[1] | ●[1] | ●[1] | ●[1] | ●[1] |
| 25mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 30mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 40mm | ● | ● | ● | ● | ● | ●[1] | ●[1] | ●[1] | ●[1] | ●[1] |
| Catalog Page | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 |

## Standard Support Block Size and Availability Chart

| Type | ASB | FSB | SB | WM |
|---|---|---|---|---|
| Description | Aluminum Support Block | Flanged Aluminum Support Block | Steel Support Block | Waymount Support |
| 1/4" | ● | | ● | |
| 3/8" | ● | | ● | |
| 1/2" | ● | ● | ● | ● |
| 5/8" | | | ● | |
| 3/4" | ● | ● | ● | |
| 1" | ● | ● | ● | ● |
| 1 1/4" | | ● | ● | |
| 1 1/2" | ● | | ● | ● |
| 2" | | | | ● |
| 3" | | | | ● |
| 4" | | | | ● |
| Catalog Page | 174 | 175 | 174 | 175 |

| Type | ASBM | SBM |
|---|---|---|
| Description | Aluminum Support Block | Steel Support Block |
| 8mm | ● | ● |
| 12mm | ● | ● |
| 16mm | ● | ● |
| 20mm | ● | ● |
| 25mm | ● | ● |
| 30mm | ● | ● |
| 40mm | ● | ● |
| Catalog Page | 182 | 182 |

[1] Not all sizes are stocked, minimum order quantities may apply.

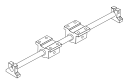
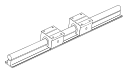
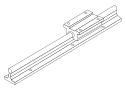
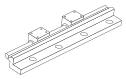
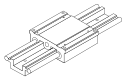
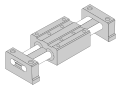
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## Thomson Product Line Overview

RoundRail Linear Guides are the non-driven building blocks for linear slide tables. They offer the end user flexiblity to fit specific envelopes by allowing customized separations between shafts and between Bearings on shafts to produce higher moment capacity. When combined with ballscrew assemblies, they become a driven slide table.

Because RoundRail Linear Guides are offered in a wide range of sizes, bearing types, and mounting configurations, they are typically selected by the qualitative attributes that are most appropriate for a given application (i.e. environmental considerations, mounting footprint). For this reason, we are providing the following selection chart and selection criteria for consideration:

## Systems Quick Reference Guide

| Application Criteria | | End Support | Continuous Support | FluoroNyliner | Side Mounted | Dual Shaft Rail | Twin Shaft Web |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  |  |
| | | 1BA / 1NA | 1 CA / 1PA | 1 VA | 1 DA | 2DA | 2CA |
| High Loads | | | • | • | | | |
| Equivalent Loads in All Directions | | • | | | | • | |
| Ultra Compactness | | • | | | | | • |
| Extreme Smoothness | | • | • | | • | | • |
| End Supported | | • | | | | • | • |
| Single Rail | | | | | | | • |
| Harsh Environment | | | | • | | | |
| Low Cost Installation (multiple rail) | | • | • | • | • | | |
| Complete Axis Solution | | | | | | | • |
| Available Sizes: | Inch | 4 thru 24 | 8 thru 24 | 8 thru 24 | • | • | |
| | Metric | 8 thru 40 | 12 thru 40 | | 8 thru 16 | 8 thru 16 | 8 thru 16 |
| Page Number | | 220/222 | 225/227 | 230 | 233 | 236 | 239 |

## Linear Guide Selection Criteria

- Load/Life
- Travel Accuracy
- Rigidity
- Smoothness of Travel
- Speed & Acceleration
- Envelope
- Environment
- Cost of Product
- Cost of Installation
- Cost of Replacement

## Application Examples

- Machine Tools
- Packaging Machinery
- Automotive Assembly Equipment
- Semiconductor Equipment
- Medical Equipment
- Food Processing Equipment

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# Round or Square?

## Thomson Product Line Overview

### Let Thomson help you choose the right rail type and carriage.

Since the introduction of the square, or profile rail, linear guide in the 1970's, the design engineer has been faced with the pivotal question: **round or square?**

While square rails initially cost many times more than round technology due to the extensive grinding requirements inherent in the design, new manufacturing techniques and economies of scale have allowed square rails to compete effectively in a broader application space. Once subjugated to the realm of machine tools, profile rails can now be found in many of the same applications that were once only supported by round rail. However, ball bushing guides remain popular due to some intrinsically unique and often advantageous characteristics that lend themselves to specific applications.

In order to apply the correct type of linear guide in a particular application, the design engineer must consider the advantages and capabilities of each. The cost of selecting the wrong technology can result in a lot of additional design complexity, poor function and cost in the overall assembly. As a first cut it is useful to have a general understanding of the strengths and weaknesses of each type of product.

The table below outlines typical performance characteristics of round and profile rails and where one is superior.

| Attribute | Round | Square |
|---|---|---|
| **Performance** | | |
| Load Capacity | medium | **high** |
| Accuracy | medium | **medium - high** |
| Stiffness | medium | **high** |
| Available preload | yes (light) | **yes (light - heavy)** |
| Single guide supports moments | no | **yes** |
| Same load capacity in all directions | no | **available (typical)** |
| Seal effectiveness | **high** | medium |
| Smoothness | **high** | medium - high |
| Drag | **low** | medium - high |
| **Total Cost of Ownership** | | |
| Ease of installation | **high** | medium |
| Required precision of mating component | **low** | high |
| Self aligning | **yes** | no |
| Life Expectancy | medium | **high** |
| Material Cost | **low** | medium |
| **Design Flexibility** | | |
| Ability to span gaps | **yes** | no |
| Can be used as structural frame member | **yes** | no |
| Ability to use as single rail & guide | no | **yes**[1] |
| Compactness (load capacity to size) | medium | **high** |
| Ease of modification/Interchangeability | **high** | low |
| **Rail Mounting** | | |
| Available end support mounting | **yes (preferred)** | no |
| Available continuous support mounting | yes | **yes (preferred)** |
| Available mounting from top of rail | yes | **yes (preferred)** |
| Available mounting from bottom of rail | **yes** | **yes** |

1. Depending on the application. Most square rail applications use dual rails.

This catalog includes detailed ordering information for RoundRail Linear Guides. Refer to the separate Thomson Profile Rail catalog for detailed square rail linear guides information.

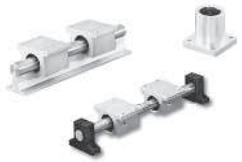
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# RoundRail Bearings

| | Description | Product Overview | Comments |
|---|---|---|---|
| **Plain Contact**<br> | Provides self-lubricating, low friction, smooth motion for high load conditions. | • PTFE tape is bonded to the ID of an aluminum housing.<br>• Suitable for wash-down & food applications.<br>• Can withstand high vibration & shock loads.<br>• Extremely smooth running; does not require an overly smooth surface to run on.<br>• Compensated<br>• Sizes ¼" – 2", closed, open, adjustable | |
| **Steel Sleeve (A)**<br> | The steel sleeve anti-friction recirculating ball bushing provides rigid low drag movement – ~100x lower drag coefficient than a plain contact bearing. | • A-Bearings – all steel (operates up to 450 °F) with 3 grades of precision available (A, XA, B); sizes ¼" – 4", closed, open, adjustable.<br>• MAM (MultiTrac A Metric) – twin track configuration, 440C Stainless Steel sleeve and a Delrin retainer; size 8 – 40mm, closed open, adjustable.<br>• INST BRGS – precision miniature stainless steel (corrosion resistant) - sizes: 1/8" – 1/4".<br>• Die Sets – designed specifically for die movement applications; size: 1" – 2". | • The patented MAM is the smoothest and highest load capacity A-type bearing in the market.<br>• Corrosion resistant versions available. |
| **Super**<br> | The self-aligning 52100 bearing plate has a ball conforming groove that, with the Delrin sleeve and retainer provide high load capacity smooth motion. | • The ball conforming groove enables the Super bearing to provide 3x the load capacity or 27X the L10 travel life of a conventional steel ball bushing bearing .<br>• Sizes ¼" – 2", 5 – 50mm, open/closed<br>• Ball Groove, Cartridge, Out- Rigger, Segment Bearings, XR's | • Additional seal option on outside of bearing and on the pillow blocks offers sealing preferred over competitors by our customers.<br>• Thomson has the largest installed base in North America.<br>• Competitors have modeled their products after Thomson. |
| **Super Smart**<br> | Truly self-aligning twin track linear bearing.<br>The 52100 Steel plate pitches, rocks and rolls on a precision hardened steel band to provide universal type alignment capability. | • 3 industry standards<br>• Imperial Sizes ½" – 1 1/2 "<br>• ISO Metric 16 – 40mm<br>• JIS Metric 16 – 40mm<br>• SS6U, E, J's available 16 – 40mm<br>• Closed and Open | • This patented product provides smooth, quiet, low drag linear movement at 6x the load capacity or 216 x the L10 travel life of a conventional steel linear ball bushing bearing.<br>• Also available in a low cost 6 track version.<br>• Its unique design with the steel band enables the bearing to preserve it's ID fit-up and self-aligning capability over extended use. |

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## 60 Case Shafting

| | Description | Product Overview | Comments |
|---|---|---|---|
| **Specialty Bearings**  | There are a multitude of specialty Bearings that can be configured or developed to suit almost any customers needs. | • Round Way - all steel construction and a chain that connects the rolling elements; Sizes ½" – 3".<br>• CMB Bearings (combination radial & linear Bearings), NB (nylon ball) Bearings, Smart MultiTracs, Cartridge Bearings, etc. | Round Way<br>• Highest load rating of the linear earings. The ratings are based on a longer travel than other linear Bearings use.<br>• The chain enables the bearing to withstand very high speeds and accelerations.<br>• Temperatures up to 450°F.<br>• Suitable for extremely harsh environments. |
| **Accessories/Options**  | The host of accessories and options associated with RoundRail Bearings are multitudinous. | • Steel Pillow Blocks, Aluminum Pillow Blocks, Singles, Twins, Closed, Opens, Adjustable, Flanged Pillow Blocks, Self-Aligning PB's, XPB's, XPBO's, RSPB's, RSPBO's, CR's, wipers, seals, DD's, stainless steel options, resilient mounts, Lube Fittings, etc. | • Largest variety in the industry of customized offerings, accessories, and options that allow for new and broader uses of Bearings in unusual, harsh, and state-of-the-art applications. |

## 60 Case Shafting

| | Description | Product Overview | Comments |
|---|---|---|---|
|  | 60 Case Shafting | • AISI 1566<br>• Sizes: 3/16"– 4" and 5– 80mm<br>• Bolt down from the top Smart Rail | *(applies to 60 Case Shafting, 440C & 300 Stainless Steel Shafting, 60 Case Tubular Shafting and their Accessories/Options)*<br>• High grade steel used for standard product – 1566 vs. competitor's 1060.<br>• Coil-to-bar mfg. technology permits sourcing of hot rolled material, lower costs, sourcing flexibility, high straightness levels, and controlled sizing prior to induction hardening.<br>• Precisely controlled case hardening to max. hardness (>62 HRc at highest bearing stress depth & Hertzian stress levels).<br>• Low stress precision grinding techniques to produce:<br>- Dia. tolerance control (<0.0002" - classes D & N)<br>- Roundness variation (<0.000080")<br>- Taper var. on 17' L or ½" dia. tolerance (<0.0002")<br>- Surface finish (< 6 Ra) defect free surface<br>- Straightness (capability to < 0.0005" / foot )<br>• Value added machining capabilities of hard turning, radial drill and tapping, milling; journal machining to 0.0002" max. dia. variation and <0.001" concentricity variation.<br>• Random lengths, cut to length, and special machined forms available.<br>• Engineered assembly solutions -- SR(M) and LSR (M).<br>• Standard product available for next day shipping. |
|  | 440C & 300 Stainless Steel Shafting | • AISI 440C<br>• Sizes: 1/8" – 3" and metric available<br>• AISI 316<br>• Sizes: 3/8" – 2" | |
|  | 60 Case Tubular Shafting | • AISI 52100 Tubular<br>• Size: ¾" – 4" | |
|  | Accessories/Options | • PD, SM, classes (S, L, D, N, XL, M, MN, G), deep case, SB, ASB, ASBM, FSB, Way Mounts, SR, SRA, LSR, LSRA, SRM, LSRM, XSR's, platings, coatings, metric, etc. | |

- Largest product breadth in the industry.
- Most technically advanced product offering that conforms to extremely stringent tolerance specifications.
- 60+ years of manufacturing experience.
- Thomson brand name known for consistent and unparalleled quality.

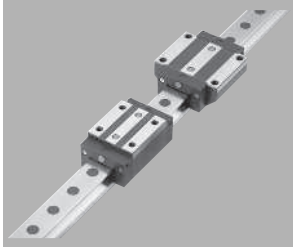
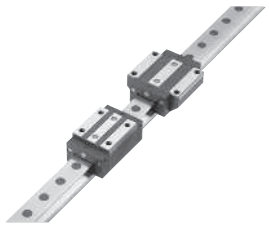
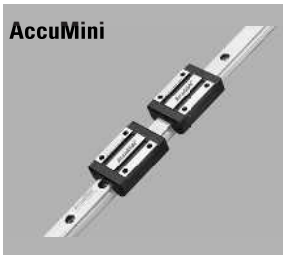
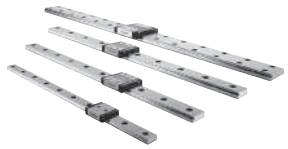
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## Profile Rail

# Profile Rail

Overview of Thomson Profile RoundRail Linear Guides

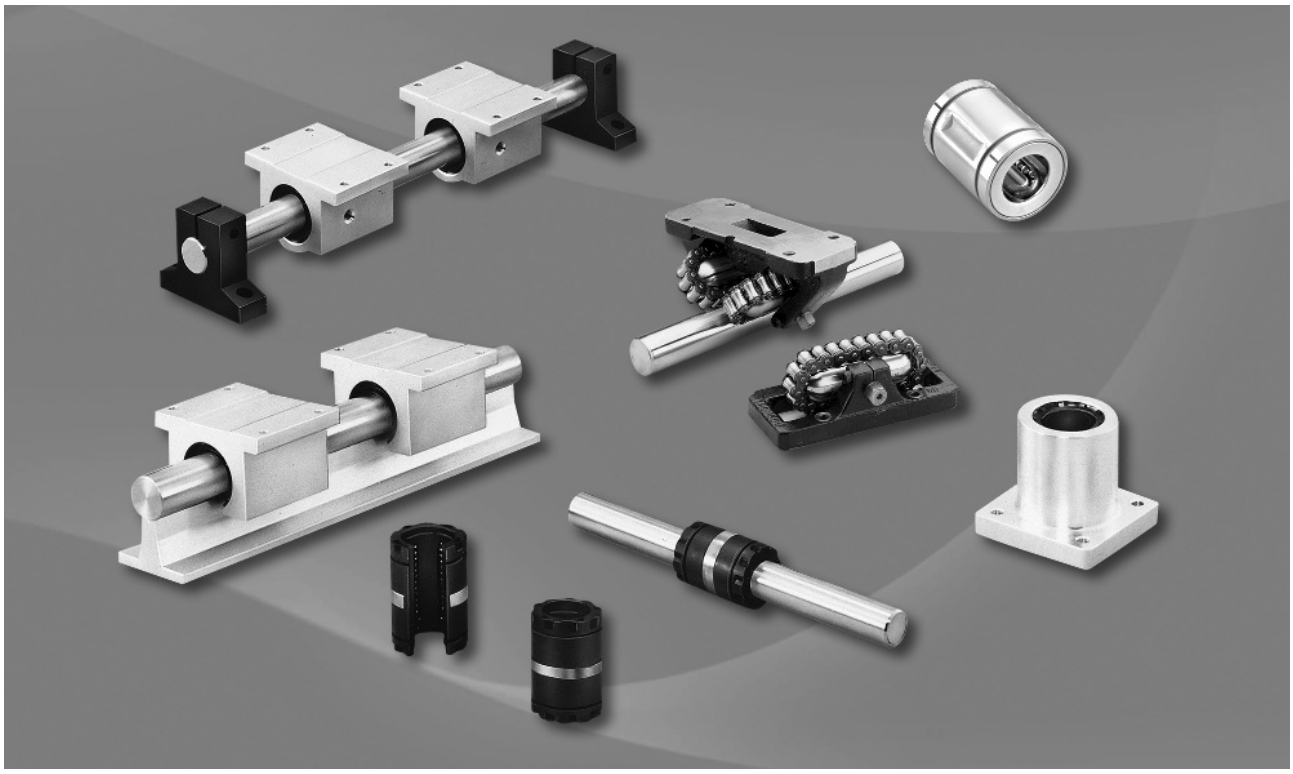
Since the invention of the linear anti-friction Ball Bushing bearing by Thomson over 50 years ago, the Thomson precision linear products have meant high quality, innovative products. Today, Thomson continues producing and developing these high quality, innovative products. The Thomson Profile Rail assortment consists of the Next Generation Profile Rail "500 Series" Ball and Roller Linear Guides, compact miniature "MicroGuide,TM" lightweight "T-Series," and AccuMini. This page is a quick overview of Thomson Profile Rail, complete details of which can be found in the Thomson Profile Rail Catalog.

| | Description | Product Overview | Comments |
|---|---|---|---|
| **500 Series Ball**<br> | Highly configurable standard ball guidance system designed per DIN standard 645 to support a load and allow low friction, precise linear translation of that load. | • High rigidity with high dynamic and static load capacities.<br>• 7 carriage designs with multiple accuracies and preloads available.<br>• Replaces Thomson AccuGlide.<br>• Sizes 15, 20, 25, 30, 35, 40mm | *(Applies to 500 Series Ball and 500 Series Roller)*<br>• Standard 6m lengths are longest offered in the industry - minimizes need for butt joints.<br>• "Lube for life" lubrication block allows for low maintenance and eliminates need for lube lines.<br>• Modular accessories allow for on-site upgrade without having to remove carriages from rail.<br>• Double back configuration provides high roll moment resistance - removes the need for dual or wide rails in some applications. |
| **500 Series Roller**<br> | Highly configurable standard roller guidance system designed per DIN standard 645 to support a load and allow low friction, precise linear translation of that load - larger contact surface of roller elements (versus ball) results in greater load capacity. | • Extremely high rigidity and dynamic/static load capacities<br>• 4 carriage designs with multiple accuracies and preloads<br>• Replaces Thomson AccuMax<br>• Sizes 25, 35, 45, 55, 65mm | |
| **AccuMini**<br> | Low profile design that provides high roll moment capacity in a smaller envelope. | • Sizes 10, 15, 20mm | • Gothic arch ball design allows for quiet, low friction movement at high speeds.<br>• Full-length integral wiper protects bearing from contaminants. |
| **MicroGuide**<br> | Stainless steel miniature guidance system that provides corrosion resistance for clean room and wash-down applications. | • 440C SS construction<br>• High precision accuracy (up to ±0.010mm)<br>• Standard and wide carriage styles<br>• Sizes 5, 7, 9, 12, 15mm | • Ideal for small design envelope requirements in semiconductor processing equipment and medical diagnostic equipment.<br>• Quiet operation |
| **T-Series**<br> | Aluminum guidance system utilizing hardened steel inserts in carriages and rails that, in turn, provide a low-weight solution for critical, high performance applications. | • U-channel design accommodates misalignment from machine bases or installation errors.<br>• Sizes 20, 25, 35mm | • An excellent high precision guide alternative for low-weight applications.<br>• No special tools or gauges to align rail, allowing for low cost of installation. |

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## Ball Bushing Bearings Overview

# Linear Bearings Overview



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# Thomson Linear Motion Components

## The RoundRail Advantage…



### Super Smart Ball Bushing Bearings

**Thomson Super Smart Ball Bushing Bearings represent a major advancement for Linear bearing technology, worldwide.**

This patented self-aligning linear bearing provides twice the load carrying capacity or eight times the travel life of the industry standard Thomson Super Ball Bushing bearing. This dramatic increase in load capacity allows the use of less expensive drive motors, linkages, gears and ball screws. The unique Super Smart design allows the bearing to maintain its diametrical fit up when installed in housings that are soft or slightly out-of-round. Super Smart Bearings utilize the RoundRail Advantage that eliminates the need for derating factors commonly used with linear guides. The Bearings are called "Smart" because their universally self-aligning, double-track design incorporates engineering concepts that literally render old style conventional Bearings obsolete. Available in inch and metric sizes from over 1800 distributors worldwide. (See Page 20)



### Super Smart Ball Bushing Pillow Blocks

**Thomson Super Smart Ball Bushing Pillow Blocks available in closed, adjustable and open styles in both single and twin versions.**

To minimize installation time and cost, the Super Smart Ball Bushing bearing can be ordered factory-installed in an industry standard single or twin pillow block. The closed type pillow block is used in end supported applications for spanning or bridging a gap. The open style is used in continuously supported applications when maximum rigidity and stiffness is required. Each Super Smart Pillow block is complete with integral double acting seals which keep out contaminants, retain lubrication and maximize bearing life. Since each Pillow Block is dimensionally interchangeable with the industry standard Thomson Super Ball Bushing Pillow Block, system performance improvements can be realized immediately. All Pillow Blocks are available and in stock from over 1800 authorized distributors worldwide. (See Page 27)



### Super Ball Bushing Bearings

**Industry standard self-aligning Super Ball Bushing Bearings available in twenty three sizes and configurations.**

Super Ball Bushing Bearings offer three times the load capacity or twenty seven times the life of conventional linear Bearings. Industry standard self-aligning Super Ball Bushing Bearings ease installation and minimize wear from minor bore misalignment. Super Ball Bushing Bearings can achieve speeds up to 10 ft/s and accelerations up to 450 ft/s$^2$ without the derating factors commonly found in linear guide products. With a coefficient of friction as low as .001, Super Ball Bushing Bearings provide a quick easy replacement for high friction plain Bearings. The wear-resistant, engineered-polymer retainers and outer sleeves reduce inertia and noise in critical, high speed applications. Super Ball Bushing Bearings are available in both open and closed versions from over 1800 distributors worldwide. (See Page 43)

## Ball Bushing Bearings Overview

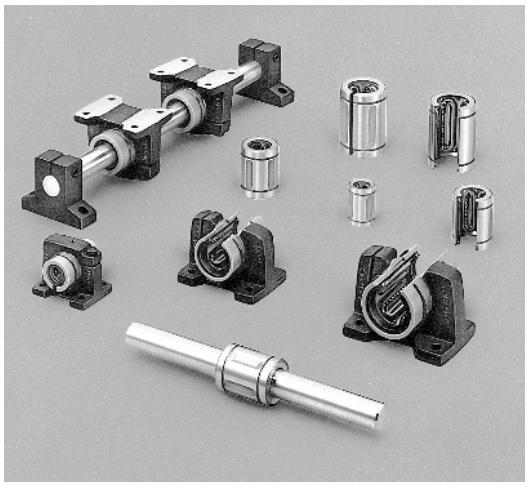
**. . .The RoundRail Advantage** - The inherent ability of a RoundRail Ball Bushing bearing system to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress to the bearing components.



### Super Ball Bushing Bearing Pillow Blocks

**Available in closed, adjustable and open styles in both single and twin versions.**

Thomson Super Ball Bushing Bearings are also available factory installed in single or twin pillow blocks. Super Ball Bushing bearing pillow blocks are provided with integral, double acting seals that keep out contaminants and retain lubrication, maximizing system performance and life. Twin versions provide up to twice the load capacity or eight times the life of single versions, allowing the use of smaller and less expensive drives, motors and ball screws. When replacing v-ways and flat-ways, the Super Pillow Block's low coefficient of friction reduces power consumption and provides important design economies. In stock and available in sizes from 1/4 to 2 inch from over 1800 distributors worldwide. (See Page 52)



### Precision Steel Ball Bushing Bearing Products

**Rigid, Precision Steel Ball Bushing Bearing design eliminates binding and chatter found in high friction plain Bearings.**

Precision Steel Ball Bushing Bearings are available in an open version for continuously supported applications and a closed version for end supported applications. Extra precision and adjustable versions are available for end supported applications requiring higher precision and repeatability. Precision Steel Ball Bushing bearing products are also available factory installed in a self-aligning, malleable iron pillow block minimizing installation time and cost. The all-steel design makes the Precision Steel Ball Bushing bearing product line perfect for replacing plain Bearings in high temperature applications. Available in 72 sizes and configurations from over 1800 distributors worldwide. Now available in 440 stainless steel, ideal for harsh and high temperature environments. (See Page 66)



### Miniature Instrument Ball Bushing Bearings

**High Accuracy and Compactness for Instrumentation Level Applications.**

The accuracy level and compact size make the Instrument Ball Bushing bearing ideal for small mechanisms or devices that require high repeatability and responsiveness. When replacing high friction plain Bearings, the Instrument Ball Bushing Bearings' constant low coefficient of friction eliminates stick-slip and provides smooth linear performance. Each Instrument Ball Bushing bearing can be provided with a matched 60 Case LinearRace shafting for minimum fit-up, optimizing system performance and accuracy. In stock and available in sizes 1/8, 3/16 and 1/4 inch from over 1800 distributors, worldwide. (See Page 77)

# Thomson Linear Motion Components

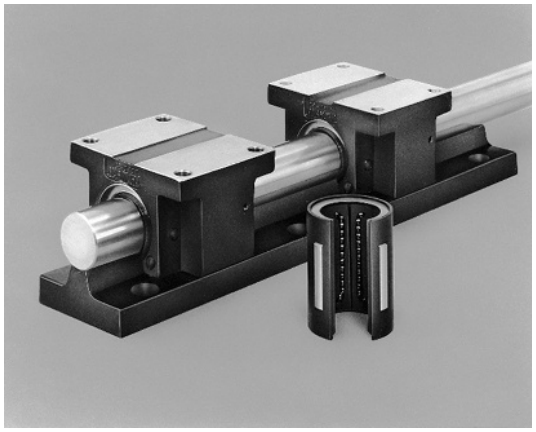
## The RoundRail Advantage…



### Die Set Ball Bushing Bearings

**Available in two accuracy classes and suitable for a variety of industrial applications.**

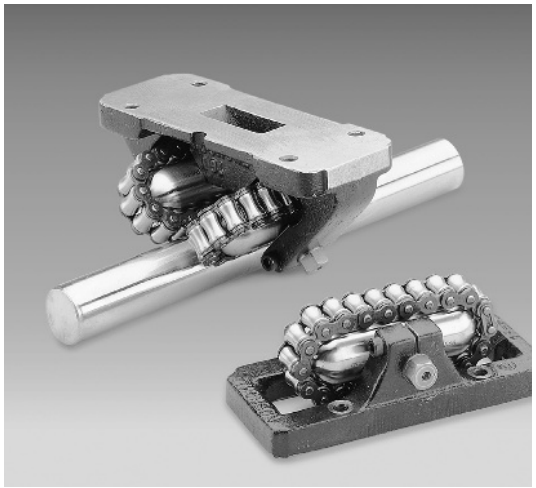
Thomson Die Set Ball Bushing Bearings are designed to fit the mounting holes of the punch holder in standard dies. When replacing high friction plain Bearings in standard dies, the result is less machine downtime and increased efficiency. With steady state speeds up to 10 ft/s, the Die Set bearing will provide faster cycle times, with improvements in production rates realized immediately. Matched precision ground 60 Case LinearRace allows for a close fit-up between the shaft and the LinearRace shafting and bearing providing critical die alignment. When normal machine service requires bearing replacement, the Die Set bearing can be removed by simply unbolting the toe clamps. Available in 1, 1 1⁄4, 1 1/2 and 2 inch sizes from over 1800 distributors worldwide. (See Page 79)



### XR Ball Bushing Bearing Products

**High load capacity and rigidity combined with the RoundRail Advantage.**

The XR Ball Bushing bearing provides five times the load capacity or 125 times the life of conventional linear Bearings. This increase in bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. When replacing v-ways and flat-ways, XR Ball Bushing Bearings allow travel speeds up to 5 ft/s and accelerations up to 225 ft/s$^2$ without a sharp increase in power consumption. XR Ball Bushing Bearings also provide three times the rigidity of conventional Ball Bushing Bearings reducing deflection in critical machining applications. Pillow Blocks are available with factory installed XR Ball Bushing Bearings and integral seals. 60 Case LinearRace shafting available pre-mounted on standard extra rigid LinearRace support rails. Available in 2, 3 and 4 inch sizes from over 1800 distributors worldwide. (See Page 87)



### RoundWay Linear Roller Bearings

**Low friction roller Bearings with up to 20 times the load capacity of conventional linear Bearings.**

These patented, self-aligning linear roller Bearings have over 20 times the load capacity of a conventional linear ball bearing. This dramatic increase in bearing load capacity allows designers to optimize system compactness and minimize hardware costs. Combining the self-aligning feature with the RoundRail Advantage minimizes installation time and assures trouble-free operation. RoundWay and RoundWay II Bearings can achieve operating speeds up to 10 ft/s without the derating factors commonly seen with linear guides. When normal machine maintenance is required, RoundWay Bearings can be quickly and cost-effectively replaced, without scrapping the entire system, a major problem when servicing some linear guides. RoundWay Bearings are available from over 1800 authorized distributors worldwide. (See Page 94)

# Thomson Linear Motion Components

## The RoundRail Advantage…



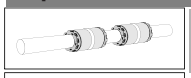
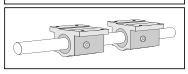
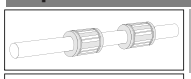
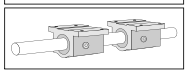
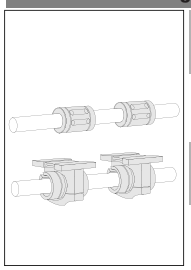
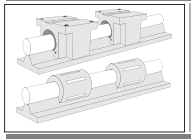
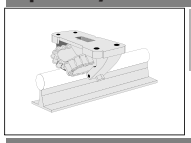
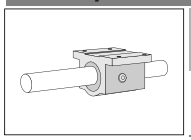
### FluoroNyliner Bushing Bearings

**Thomson FluoroNyliner Bushing Bearings offer:**

- High performance in contaminated, washdown, or submerged environments
- Proprietary, self-lubricating, composite bearing liner TEP 950
- Low friction, ideally suited for linear and rotary motion
- Precision machined aluminum sleeve
- Excellent performance in high vibration and mechanical shock applications
- Corrosion resistance
- Product availability in industry standard sizes from 0.25" to 2.00"
- Eight bearing configurations, include closed, open, self-aligning, precision and compensated IDs
- Load capacities up to 14,000 $lb_f$
- Integral seals
- Closed, Open, and Flanged Pillow Blocks available in single or twin versions
- Available from over 1800 distributors worldwide

# Thomson Product Line Overview

## Ball Bushing Bearings

| | | Page Number | Imperial (Inch) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 |
| **Super Smart** | | | | | | | | | | |
|  | **Ball Bushing Bearings**<br>corrosion resistant option available | inch: 20<br>metric: 120 | | | | | ⊙ | ⊙ | ⊙ | ⊙ |
|  | **Ball Bushing Pillow Blocks**<br>corrosion resistant option available | inch: 27<br>metric: 126 | | | | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA |
| **Super** | | | | | | | | | | |
|  | **Ball Bushing Bearings**<br>corrosion resistant option available | inch: 43 & 56<br>metric: 141 | | ● | ● | ● | ⊙ | ⊙ | ⊙ | ⊙ |
|  | **Ball Bushing Pillow Blocks**<br>corrosion resistant option available | inch: 52 & 61<br>metric: 144 | | | ● STA | ● STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA |
| **Precision Bearings** | | | | | | | | | | |
|  | **A-Bearings and Pillow Blocks**<br>available in stainless steel | 73 | | | ● | ● SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA |
| | **MultiTrac**<br>available in stainless steel | 134 | | | | | | | | |
| | **Instrument** | 177 | ● | ● | ● | | | | | |
| | **Die Set** | 79 | | | | | | | | ● |
| **XR Extra Rigid** | | | | | | | | | | |
|  | **Ball Bushing Bearings and Pillow Blocks** | 87 | | | | | | | | |
| **Specialty** | | | | | | | | | | |
|  | Cartridge bearing | 50 | | | ● ST | ● ST | ● ST | | | |
| | RoundWay | 94 | | | | | ● | | | ● |
| **FluoroNyliner** | | | | | | | | | | |
|  | **Bushing bearings** | 102 | | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| | **Pillow Blocks** | 107 | | | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF | ⊙ STF |

● Closed Type
○ Open Type
⊙ Closed and Open Type
S Single Configuration
T Twin Configuration
A Adjustable Configuration
F Flanged Configuration

# Thomson Product Line Overview

| Imperial (Inch) | | | | | | Metric (mm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 1/4 | 1 1/2 | 2 | 2 1/2 | 3 | 4 | 5 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 50 |
| ⊙ | ⊙ | | | | | | ● | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | ⊙ | |
| ⊙ STA | ⊙ STA | | | | | | ● STA | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | | ⊙ STA | |
| ⊙ | ⊙ | ⊙ | | | | | ● | | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | ⊙ | ⊙ |
| ⊙ STA | ⊙ STA | ⊙ STA | | | | | ● STA | | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | ⊙ STA | | ⊙ STA | ⊙ STA |
| ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | | | | | | | | | | | |
| | | | | | | | ● SA | | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | ⊙ SA | | ⊙ SA | |
| ● | ● | ● | | | | | | | | | | | | | | |
| | | ○ | | | ○ | | | | | | | | | | | |
| | ● | ● | | ● | | | | | | | | | | | | |
| ⊙ STF | ⊙ STF | ⊙ STF | | | | | | | | | | | | | | |

## Super Smart Ball Bushing Bearings

# Super Smart Ball Bushing Bearing Products



**Thomson Super Smart Ball Bushing Bearing products offer:**

- Up to six times the load capacity or 216 times the travel life of conventional linear bearings.
- Twice the load capacity or eight times the travel life of industry standard Thomson Super Ball Bushing bearings.
- A precision super finished, dual track bearing plate for optimum system smoothness and performance.
- A universal self-alignment feature, that compensates for misalignment of housing bores and 60 Case LinearRace shaft deflection, optimizes load distribution between ball tracks and assures uniform ball loading over the entire length of the bearing plate. Installation time and cost is minimized while bearing performance and life is maximized.
- A technologically advanced design that allows the bearing to maintain its diametrical fit-up when installed in a housing that is slightly out-of-round.
- Longer travel life and minimal machine downtime when replacing conventional linear bearings or the industry standard Super Ball Bushing bearing.
- The RoundRail Advantage combined with universal self-alignment eliminating the need for derating factors commonly required when using linear guides.
- A coefficient of friction as low as .001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings.
- Closed and open configurations.
- Double lip integral wipers that keep out dirt while retaining lubrication. Travel life is maximized.
- Worldwide availability from over 1500 authorized distributors.

## Super Smart Ball Bushing Bearings

The new Super Smart Ball Bushing Bearing represents a major advancement in linear bearing technology worldwide. The Super Smart Ball Bushing Bearing offers twice the load capacity or eight times the travel life of the industry standard Thomson Super Ball Bushing bearing. An enormous technological breakthrough, considering the Super Ball Bushing bearing already offers three times the load capacity or twenty-seven times the travel life of conventional linear bearings.

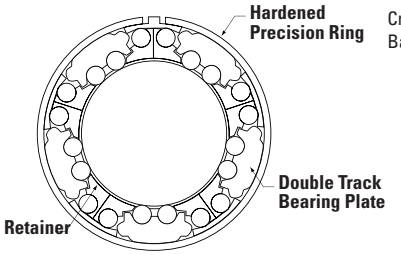



Figure 1

Cross-section of Super Smart Ball Bushing Bearing

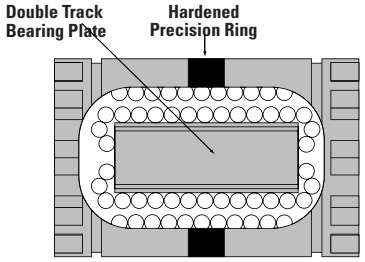



Figure 2

### Technologically Advanced Design

The load carrying component of the Super Smart Ball Bushing Bearing is the combination of four hardened bearing quality steel components (Figures 1 & 2).

The first component is the steel outer ring, which allows the bearing to maintain its diametrical fit-up even when installed in a housing that is slightly out-of-round. The unique ring design also allows for bearing adjustment and the removal of diametrical clearance. The second component is the precision super finished double track bearing plate that provides twice the load capacity and features universal self-alignment.

The third component is the rolling element. Each Super Smart Ball Bushing Bearing utilizes precision ground balls manufactured to the highest quality standards for roundness and sphericity. The result is maximum load capacity, travel life and performance.

The last component is the 60 Case LinearRace shaft that acts as the inner race to the Super Smart Ball Bushing Bearing. Each 60 Case LinearRace shaft is manufactured to the highest quality standards for roundness, straightness, surface finish and hardness. Roundness is held under eighty millionths of an inch; straightness to .002 inches per foot; surface finish under twelve microinch and hardness between 60-65 HRC. The combination of inner and outer race or 60 Case LinearRace shaft and Super Smart Ball Bushing Bearing provides the basis for the RoundRail Advantage.

### The RoundRail Advantage

The RoundRail Advantage is the inherent ability of a Super Smart Ball Bushing Bearing system to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress to bearing components. Installation time and cost are minimized and system performance is maximized.

# Super Smart Ball Bushing Bearings

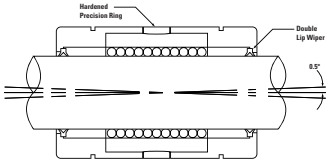



Figure 3

## Universal Self-Alignment

The bearing plate of the Super Smart Ball Bushing Bearing is designed with many unique and technologically advanced features. The universal self-alignment feature assures that the Super Smart Ball Bushing Bearing will achieve maximum performance regarding load capacity, travel life, smooth operation and coefficient of friction. The three components that make up universal self-alignment are **Rock**, **Roll** and **Yaw**.

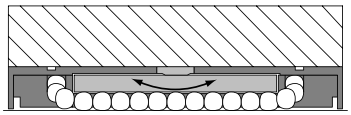


Figure 4

Close-up of hardened precision ring, showing how the bearing plate self-aligns (rocks) about the curved surface of the ring.

## Rock

The bearing plate is designed to rock 0.5° about the hardened precision ground outer ring (Figures 3 & 4). This self-aligning feature allows the Super Smart Ball Bushing Bearing to absorb misalignment caused by inaccuracies in housing bore alignment or 60 Case LinearRace shaft deflection. This rocking capability provides smooth entry and exit of the precision balls into and out of the load zone assuring a constant low coefficient of friction. By compensating for misalignment, each bearing ball in the load carrying area is uniformly loaded providing maximum load capacity.

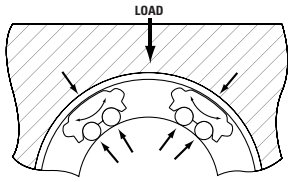



Figure 5

Close-up of double track bearing plates showing how they self-align (roll) to evenly distribute the load on each of their two ball tracks.

## Roll

The second key design feature of the Super Smart Ball Bushing Bearing plate is its ability to **Roll**. The bearing plate is designed with the radius of its outer surface smaller than the inside radius of the precision outer ring (Figure 5). This allows the bearing plate to compensate for torsional misalignment and evenly distribute the load on each of its two ball tracks. The roll component assures maximum load capacity and travel life.

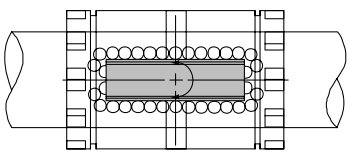


Figure 6

Bearing plates rotate about their center to prevent skewing relative to the 60 Case LinearRace shaft.

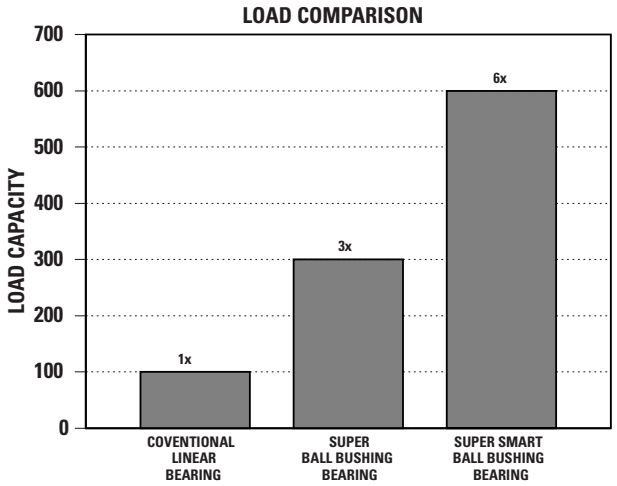
## Yaw

The shape formed by the **Rock** and **Roll** features allows the Super Smart Ball Bushing Bearing plate to rotate about its center (Figure 6). This allows the Super Smart Ball Bushing Bearing to absorb skew caused by misalignment. The result is a constant low coefficient of friction and maximum bearing performance.

# The Super Smart Advantage

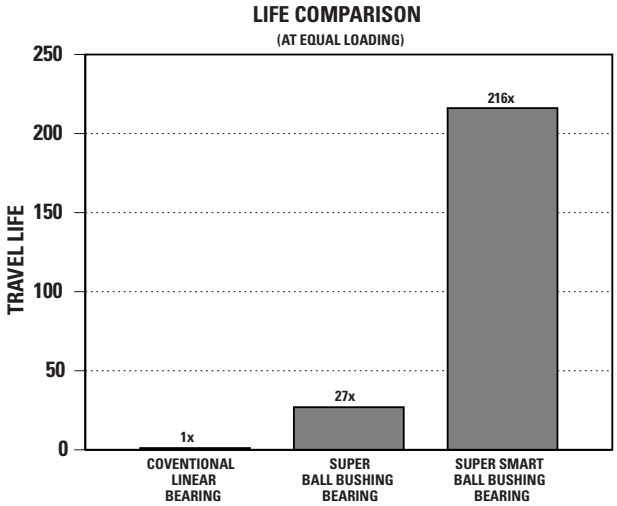
## Advantage: Load Capacity

The Super Smart Ball Bushing Bearing provides twice the load capacity of the industry standard Thomson Super Ball Bushing bearing and six times the load capacity of conventional linear bearings.




## Advantage: Travel Life

The Super Smart Ball Bushing Bearing provides eight times the travel life of the industry standard Thomson Super Ball Bushing bearing and 216 times the travel life of conventional linear bearings.



## Inch – Super Smart Ball Bushing Bearings

# Part Number Description and Specification

### Super Smart Ball Bushing Bearings (Closed Type) for End Supported Applications

**SSU-16-WW-CR**

| Type | Description |
|---|---|
| SSU | Super Smart Ball Bushing bearings |

| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |

| Option | Description |
|---|---|
| – | No Wipers |
| W | One Integral Wiper |
| WW | Two Integral Wipers |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| DP | Dry Packed |
| LL | Lubricated with Thomson LinearLube |

### Super Smart Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

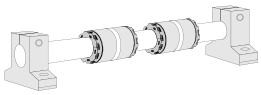
**SSUPB-16-CR**

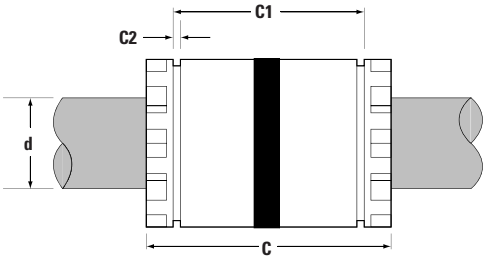
| Type | Description |
|---|---|
| SSUPB | Super Smart Ball Bushing Pillow Blocks |
| SSUPBA | Super Smart Ball Bushing Adjustable Pillow Blocks |
| SSUTWN | Super Smart Ball Bushing Twin Pillow Blocks |
| SSUTWNA | Super Smart Ball Bushing Twin Adjustable Pillow Blocks |
| SSUFB | Super Smart Ball Bushing Flanged Pillow Blocks |
| SSUTFB | Super Smart Ball Bushing Flanged Twin Pillow Blocks |

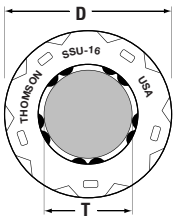
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |

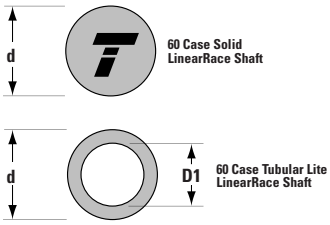
| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| LL | Lubricated with Thomson LinearLube |

# Super Smart Ball Bushing Bearings
## (Closed Type) for End Supported Applications






### Super Smart Ball Bushing Bearings (Closed Type) and 60 Case LinearRace Shafting (Dimensions in inches)

| Part Number [2] | | | | Nominal Diameter | Length C | C1 | C2 min. | Number of Ball Circuits | Ball Bushing bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | 60 Case Linear Race | | | | | | | | | | |
| SS6U-8 | SS6U-8-W | SS6U-8-WW | 1/2 L | .500 | 1.250/1.230 | 1.032/1.012 | .050 | 6 | .07 | .04 | .06 | – | – |
| SSU-10 | SSU-10-W | SSU-10-WW | 5/8 L | .625 | 1.500/1.480 | 1.125/1.095 | .055 | 10 | .12 | .04 | .09 | – | – |
| SSU-12 | SSU-12-W | SSU-12-WW | 3/4 L | .750 | 1.625/1.605 | 1.285/1.255 | .055 | 10 | .16 | .06 | .13 | .08 | .46/.41 |
| SSU-16 | SSU-16-W | SSU-16-WW | 1 L | 1.000 | 2.250/2.230 | 1.901/1.871 | .068 | 10 | .29 | .08 | .22 | .16 | .62/.56 |
| SSU-20 | SSU-20-W | SSU-20-WW | 1 1/4 L | 1.250 | 2.625/2.600 | 2.031/1.991 | .068 | 10 | .52 | .08 | .35 | – | – |
| SSU-24 | SSU-24-W | SSU-24-WW | 1 1/2 L | 1.500 | 3.000/2.970 | 2.442/2.402 | .086 | 10 | .99 | .08 | .50 | .33 | .93/.84 |

| Part Number [2] | | | Working Bore Diameter T | Recommended Housing Bore | | 60 Case LinearRace Diameter d | Ball Bushing bearing/60 Case LinearRace Fit Up ‡ | | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SS6U-8 | SS6U-8-W | SS6U-8-WW | .5000/.4995 | .8755/.8750 | .8760/.8750 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 265 |
| SSU-10 | SSU-10-W | SSU-10-WW | .6250/.6245 | 1.1255/1.1250 | 1.1260/1.1250 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 620 |
| SSU-12 | SSU-12-W | SSU-12-WW | .7500/.7495 | 1.2505/1.2500 | 1.2510/1.2500 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 1130 |
| SSU-16 | SSU-16-W | SSU-16-WW | 1.0000/.9995 | 1.5630/1.5625 | 1.5635/1.5625 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 1900 |
| SSU-20 | SSU-20-W | SSU-20-WW | 1.2500/1.2494 | 2.0008/2.0000 | 2.0010/2.0000 | 1.2495/1.2490 | .0018C/.0001P | .002C/.0001P | 2350 |
| SSU-24 | SSU-24-W | SSU-24-WW | 1.5000/1.4994 | 2.3760/2.3750 | 2.3760/2.3750 | 1.4994/1.4989 | .0021C/.0000 | .0021C/.0000 | 3880 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

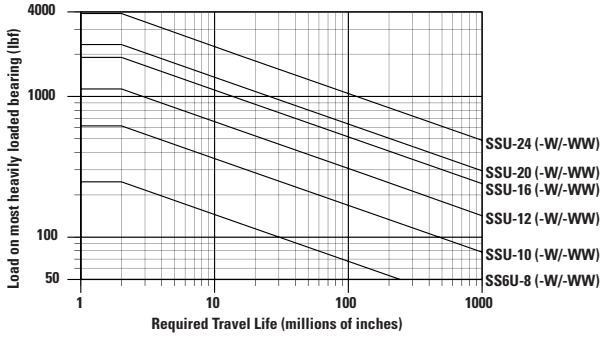
(2) For part number description and specifications see page 24. For specifications on seals and retaining rings see the Accessories section.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Smart Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

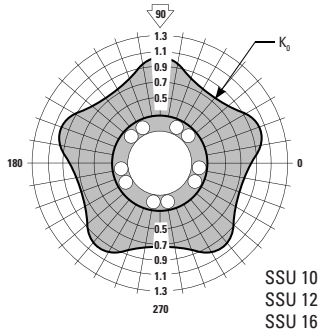
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

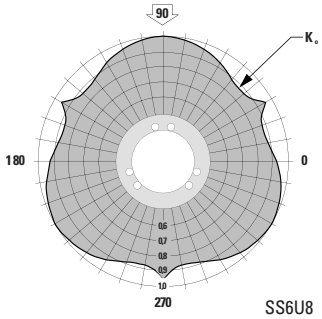
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

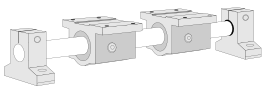


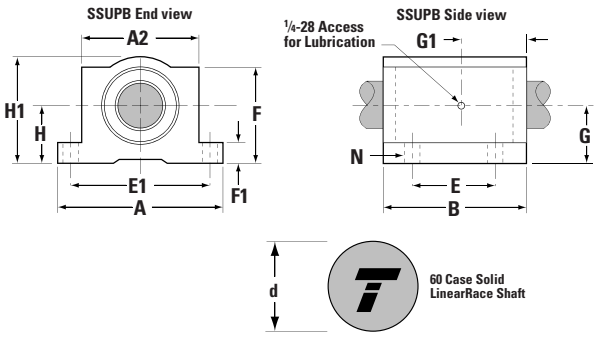

SSU 10
SSU 12
SSU 16
SSU 20
SSU 24




SS6U8

# Super Smart Ball Bushing Pillow Blocks
## (Closed and Adjustable Type) for End Supported Applications






### Super Smart Ball Bushing Pillow Blocks (Closed & Adjustable Types, seal at both ends) and LinearRace (Dim. in inches)

| Part Number [2] | | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | 60 Case LinearRace | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | |
| SS6UPB-8 | SS6UPBA-8 | 1/2 L | .500 | .687 | 1.25 | .4995/.4990 | .04 | .06 | – | – |
| SSUPB-10 | SSUPBA-10 | 5/8 L | .625 | .875 | 1.63 | .6245/.6240 | .04 | .09 | – | – |
| SSUPB-12 | SSUPBA-12 | 3/4 L | .750 | .937 | 1.75 | .7495/.7490 | .06 | .13 | .08 | .46/.41 |
| SSUPB-16 | SSUPBA-16 | 1 L | 1.000 | 1.187 | 2.19 | .9995/.9990 | .08 | .22 | .16 | .62/.56 |
| SSUPB-20 | SSUPBA-20 | 1 1/4 L | 1.250 | 1.500 | 2.81 | 1.2495/1.2490 | .08 | .35 | – | – |
| SSUPB-24 | SSUPBA-24 | 1 1/2 L | 1.500 | 1.750 | 3.25 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 |

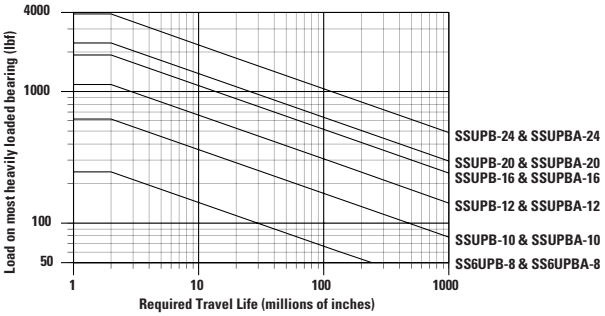
| Part Number [2] | | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | | | | | | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | | Hole | Bolt | | |
| SS6UPB-8 | SS6UPBA-8 | 2.00 | 1.38 | 1.69 | 1.000 | 1.688 | 1.13 | .25 | .69 | .72 | .16 | #6 | .23 | 265 |
| SSUPB-10 | SSUPBA-10 | 2.50 | 1.75 | 1.94 | 1.125 | 2.125 | 1.44 | .28 | .88 | .83 | .19 | #8 | .51 | 620 |
| SSUPB-12 | SSUPBA-12 | 2.75 | 1.88 | 2.06 | 1.250 | 2.375 | 1.56 | .31 | .94 | .89 | .19 | #8 | .62 | 1130 |
| SSUPB-16 | SSUPBA-16 | 3.25 | 2.38 | 2.81 | 1.750 | 2.875 | 1.94 | .38 | 1.19 | 1.27 | .22 | #10 | 1.24 | 1900 |
| SSUPB-20 | SSUPBA-20 | 4.00 | 3.00 | 3.63 | 2.000 | 3.500 | 2.50 | .44 | 1.50 | 1.68 | .22 | #10 | 2.57 | 2350 |
| SSUPB-24 | SSUPBA-24 | 4.75 | 3.50 | 4.00 | 2.500 | 4.125 | 2.88 | .50 | 1.75 | 1.86 | .28 | .25 | 3.94 | 3880 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.
(2) For part number description and specifications see page 24.
Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Smart Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

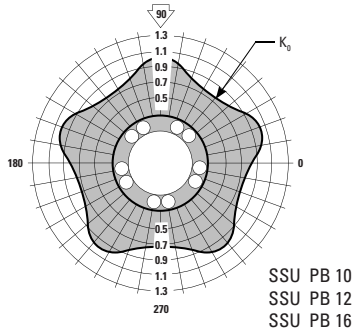
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

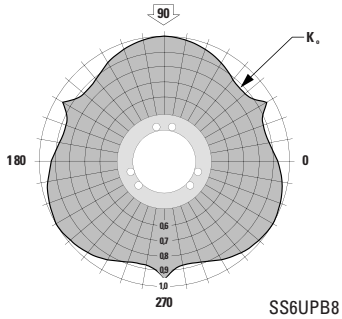
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.



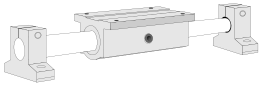

SSU PB 10
SSU PB 12
SSU PB 16
SSU PB 20
SSU PB 24

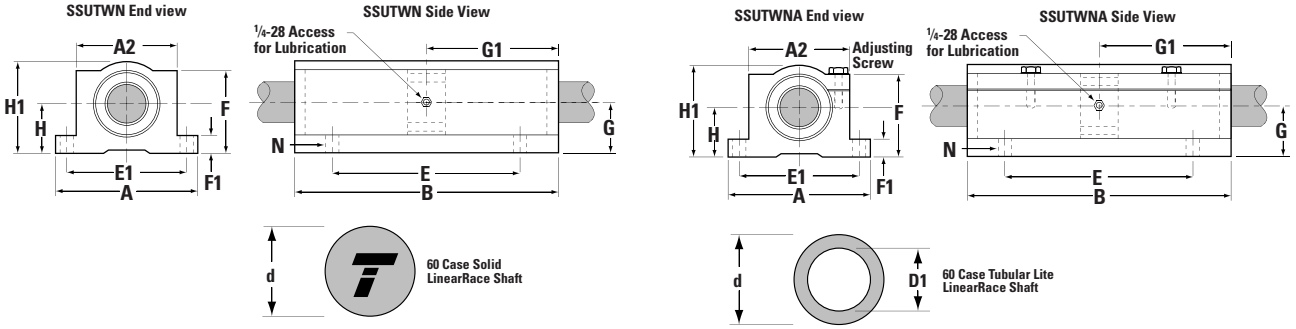



SS6UPB8

# Super Smart Ball Bushing Twin Pillow Blocks

## (Closed and Adjustable Type) for End Supported Applications






### Super Smart Ball Bushing Twin Pillow Blocks (Closed Type, seal at both ends) and 60 Case LinearRace Shaft (Dim. in in.)

| Part Number [2] | | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | 60 Case LinearRace | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | |
| SS6UTWN-8 | SS6UTWNA-8 | 1/2 L | .500 | .687 | 1.25 | .4995/.4990 | .04 | .06 | – | – |
| SSUTWN-10 | SSUTWNA-10 | 5/8 L | .625 | .875 | 1.63 | .6245/.6240 | .04 | .09 | – | – |
| SSUTWN-12 | SSUTWN-12 | 3/4 L | .750 | .937 | 1.75 | .7495/.7490 | .06 | .13 | .08 | .46/.41 |
| SSUTWN-16 | SSUTWN-16 | 1 L | 1.000 | 1.187 | 2.19 | .9995/.9990 | .08 | .22 | .16 | .62/.56 |
| SSUTWN-20 | SSUTWN-20 | 1 1/4 L | 1.250 | 1.500 | 2.81 | 1.2495/1.2490 | .08 | .35 | – | – |
| SSUTWN-24 | SSUTWN-24 | 1 1/2 L | 1.500 | 1.750 | 3.25 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 |

| Part Number [2] | | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | | | | | | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | | Hole | Bolt | | |
| SS6UTWN-8 | SS6UTWN-8 | 2.00 | 1.38 | 3.50 | 2.500 | 1.688 | 1.13 | .25 | .59 | 1.75 | .16 | #6 | .46 | 530 |
| SSUTWN-10 | SSUTWN-10 | 2.50 | 1.75 | 4.00 | 3.000 | 2.125 | 1.44 | .28 | .85 | 2.00 | .19 | #8 | 1.02 | 1240 |
| SSUTWN-12 | SSUTWN-12 | 2.75 | 1.88 | 4.50 | 3.500 | 2.375 | 1.56 | .31 | .94 | 2.25 | .19 | #8 | 1.24 | 2260 |
| SSUTWN-16 | SSUTWN-16 | 3.25 | 2.38 | 6.00 | 4.500 | 2.875 | 1.94 | .38 | 1.19 | 3.00 | .22 | #10 | 2.48 | 3800 |
| SSUTWN-20 | SSUTWN-20 | 4.00 | 3.00 | 7.50 | 5.500 | 3.500 | 2.50 | .44 | 1.50 | 3.75 | .22 | #10 | 5.14 | 4700 |
| SSUTWN-24 | SSUTWN-24 | 4.75 | 3.50 | 9.00 | 6.500 | 4.125 | 2.88 | .50 | 1.75 | 4.50 | .28 | .25 | 8.08 | 7760 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity is based on two bearings equally loaded.

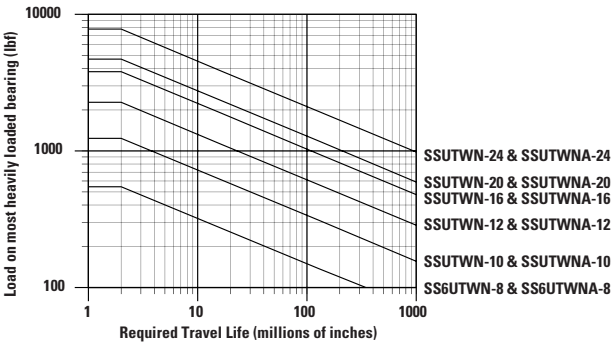
(2) For part number description and specifications see page 24.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Smart Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

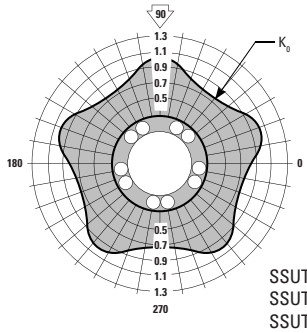
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

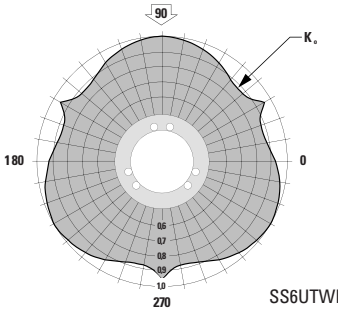
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

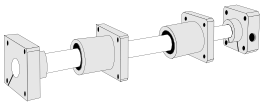


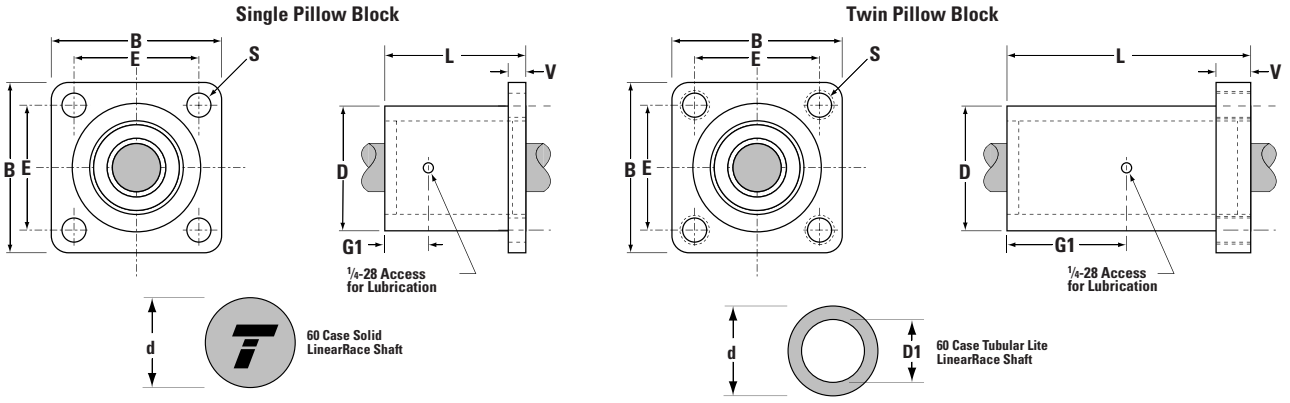

SSUTWN 10
SSUTWN 12
SSUTWN 16
SSUTWN 20
SSUTWN 24




SS6UTWN8

# Super Smart Ball Bushing Flanged Single and Twin Pillow Blocks for End Supported Applications






## Super Smart Ball Bushing Flanged Pillow Blocks and 60 Case LinearRace Shaft (Dimensions in inches)

| Part Number [2] | | Nominal Diameter | B | E ±.010 | L | D | V | G1 | S Hole Dia. | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 | Pillow Block Mass lb | Dyn. [1] Load Cap. $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Flanged Pillow Block | 60 Case LinearRace | | | | | | | | | | | | | | | |
| SS6UFB-8 | 1/2 L | .500 | 1.63 | 1.250 | 1.69 | 1.25 | .25 | .72 | .19 | .4995/.4990 | .04 | .06 | – | – | .23 | 265 |
| SSUFB-12 | 3/4 L | .750 | 2.38 | 1.750 | 2.06 | 1.75 | .38 | .89 | .22 | .7495/.7490 | .06 | .13 | .08 | .460/.416 | .52 | 1130 |
| SSUFB-16 | 1 L | 1.000 | 2.75 | 2.125 | 2.81 | 2.25 | .50 | 1.27 | .28 | .9995/.9990 | .08 | .22 | .16 | .629/.569 | 1.04 | 1900 |
| SSUFB-20 | 1 1/4 L | 1.250 | 3.50 | 2.750 | 3.63 | 3.00 | .63 | 1.67 | .35 | 1.2495/1.2490 | .08 | .35 | – | – | 2.21 | 2350 |
| SSUFB-24 | 1 1/2 L | 1.500 | 4.00 | 3.125 | 4.00 | 3.62 | .75 | 1.86 | .41 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 | 3.68 | 3880 |

## Super Smart Ball Bushing Flanged Twin Pillow Blocks and 60 Case LinearRace Shaft (Dimensions in inches)

| Part Number [2] | | Nominal Diameter | B | E ±.010 | L | D | V | G1 | S Thread | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 | Pillow Block Mass lb | Dyn. [1] Load Cap. $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Flanged Twin Pillow Block | 60 Case LinearRace | | | | | | | | | | | | | | | |
| SS6UTFB-8 | 1/2 L | .500 | 1.63 | 1.250 | 3.20 | 1.25 | .90 | 1.48 | 1/4-20 | .4995/.4990 | .04 | .06 | – | – | .45 | 530 |
| SSUTFB-12 | 3/4 L | .750 | 2.38 | 1.750 | 3.95 | 1.75 | .90 | 1.98 | 1/4-20 | .7495/.7490 | .06 | .13 | .08 | .460/.416 | 1.05 | 2260 |
| SSUTFB-16 | 1 L | 1.000 | 2.75 | 2.125 | 5.33 | 2.25 | .90 | 2.67 | 5/16-18 | .9995/.9990 | .08 | .22 | .16 | .629/.569 | 1.95 | 3800 |
| SSUTFB-20 | 1 1/4 L | 1.250 | 3.50 | 2.750 | 6.70 | 3.00 | .90 | 3.35 | 5/16-18 | 1.2495/1.2490 | .08 | .35 | – | – | 4.06 | 4700 |
| SSUTFB-24 | 1 1/2 L | 1.500 | 4.00 | 3.125 | 7.50 | 3.62 | 1.00 | 3.75 | 3/8-16 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 | 6.84 | 7760 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Twin Super Smart Flanged Pillow blocks is based on two bearings equally loaded.

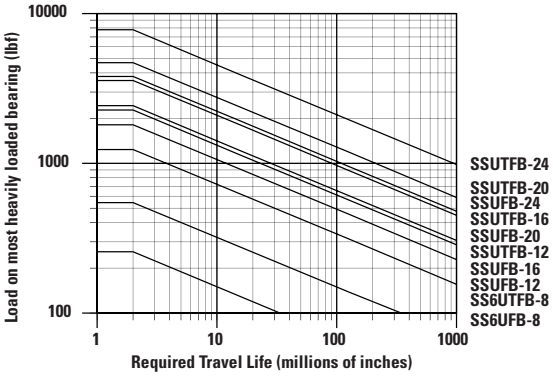
(2) For part number description and specifications see page 24.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Smart Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

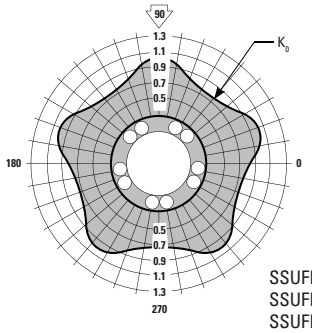
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

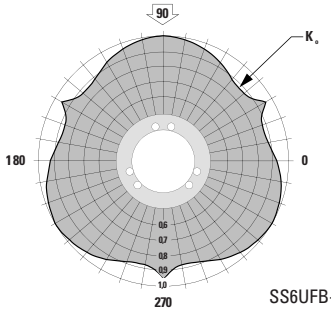
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




SSUFB-12
SSUFB-16
SSUFB-20
SSUFB-24
SSUTFB-12
SSUTFB-16
SSUTFB-20
SSUTFB-24




SS6UFB-8
SS6UTFB-8

# Part Number Description and Specification

## Super Smart Ball Bushing Bearings (Open Type) for Continuously Supported Applications

**SSU-16-OPN-WW-CR**

| Type | Description |
|---|---|
| SSU | Super Smart Ball Bushing bearings |

| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |

| Type | Description |
|---|---|
| OPN | Open for continuously supported applications |

| Option | Description |
|---|---|
| – | No Wipers |
| W | One Integral Wiper |
| WW | Two Integral Wipers |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| LL | Lubricated with Thomson LinearLube |

## Super Smart Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications

**SSUPBO-16-CR**

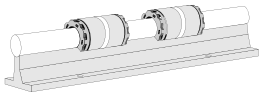
| Type | Description |
|---|---|
| SSUPBO | Super Smart Ball Bushing Pillow Blocks (Open Type) |
| SSUTWNO | Super Smart Ball Bushing Twin Pillow Blocks (Open Type) |
| SSURPBO | Super Smart Ball Bushing Rigid Steel Pillow Blocks (Open Type) |

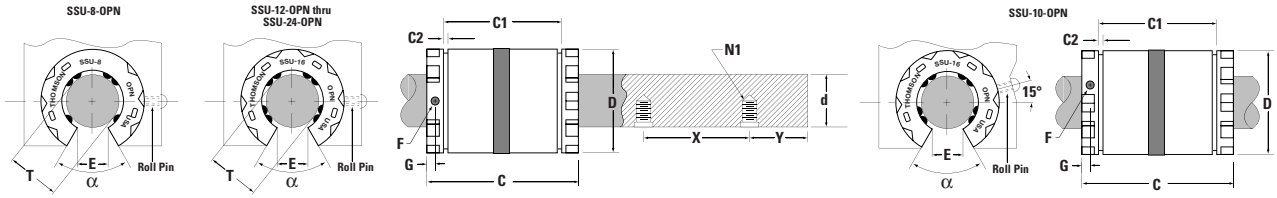
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| LL | Lubricated with Thomson LinearLube |

## Inch – Super Smart Ball Bushing Bearings

# Super Smart Ball Bushing Bearings
## (Open Type) for Continuously Supported Applications






### Super Smart Ball Bushing Bearings (Open Type) and 60 Case LinearRace Shafting (Dimensions in inches)

| Part Number (3) | | | | Nom. Dia. | Length C | C1 | C2 min. | Min. Slot Width E | Retention Hole | | Angle deg α | Number of Ball Circuits | Ball Bushing bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | 60 Case Linear Race | | | | | | Dia. F | Loc. G | | | | | | X | Y | N1 |
| SSU-8-OPN | SSU-8-OPN-W | SSU-8-OPN-WW | 1/2 L PD | .500 | 1.250/1.230 | 1.032/1.012 | .050 | .31 | .13 | .62 | 40 | 6 | .07 | .04 | .06 | 4 | 2 | #6-32 |
| SSU-10-OPN | SSU-10-OPN-W | SSU-10-OPN-WW | 5/8 L PD | .625 | 1.500/1.480 | 1.125/1.095 | .055 | .34 | .11 | .13 | 30 | 8 | .09 | .04 | .09 | 4 | 2 | #8-32 |
| SSU-12-OPN | SSU-12-OPN-W | SSU-12-OPN-WW | 3/4 L PD | .750 | 1.625/1.605 | 1.285/1.255 | .055 | .41 | .14 | .13 | 30 | 8 | .13 | .06 | .13 | 6 | 3 | #10-32 |
| SSU-16-OPN | SSU-16-OPN-W | SSU-16-OPN-WW | 1 L PD | 1.000 | 2.250/2.230 | 1.901/1.871 | .068 | .53 | .14 | .13 | 30 | 8 | .24 | .08 | .22 | 6 | 3 | 1/4-20 |
| SSU-20-OPN | SSU-20-OPN-W | SSU-20-OPN-WW | 1 1/4 L PD | 1.250 | 2.625/2.600 | 2.031/1.991 | .068 | .62 | .20 | .19 | 30 | 8 | .43 | .08 | .35 | 6 | 3 | 5/16-18 |
| SSU-24-OPN | SSU-24-OPN-W | SSU-24-OPN-WW | 1 1/2 L PD | 1.500 | 3.000/2.970 | 2.442/2.402 | .086 | .74 | .20 | .19 | 30 | 8 | .80 | .08 | .50 | 8 | 4 | 3/8-16 |

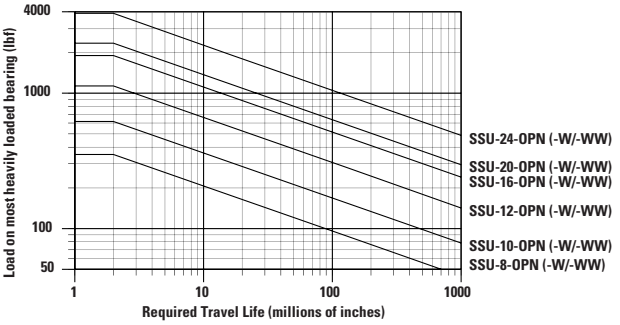
| Part Number (3) | | | Working Bore Diameter T | Recommended Housing Bore Dia. | | 60 Case LinearRace Diameter d | Ball Bushing bearing/LinearRace Fit Up ‡ | | Dynamic (‡‡) Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SSU-8-OPN | SSU-8-OPN-W | SSU-8-OPN-WW | .5000/.4995 | .8755/.8750 | .8760/.8750 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 360 |
| SSU-10-OPN | SSU-10-OPN-W | SSU-10-OPN-WW | .6250/.6245 | 1.1255/1.1250 | 1.1260/1.1250 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 620 |
| SSU-12-OPN | SSU-12-OPN-W | SSU-12-OPN-WW | .7500/.7495 | 1.2505/1.2500 | 1.2510/1.2500 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 1130 |
| SSU-16-OPN | SSU-16-OPN-W | SSU-16-OPN-WW | 1.0000/.9995 | 1.5630/1.5625 | 1.5635/1.5625 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 1900 |
| SSU-20-OPN | SSU-20-OPN-W | SSU-20-OPN-WW | 1.2500/1.2494 | 2.0008/2.0000 | 2.0010/2.0000 | 1.2495/1.2490 | .0018C/.0001P | .002C/.0001P | 2350 |
| SSU-24-OPN | SSU-24-OPN-W | SSU-24-OPN-WW | 1.5000/1.4994 | 2.3760/2.3750 | 2.3760/2.3750 | 1.4994/1.4989 | .0021C/.0000 | .0021C/.0000 | 3880 |

‡ P = Preload, C = Clearance
(††) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs to the right.
(3) For part number description and specifications see page 33.

# Inch – Super Smart Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

**Note: For the purpose of using this chart.**

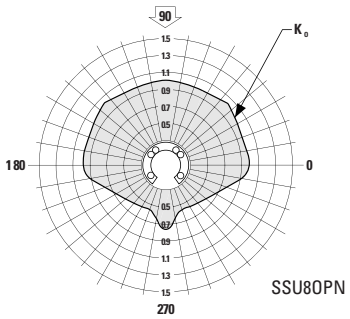
**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

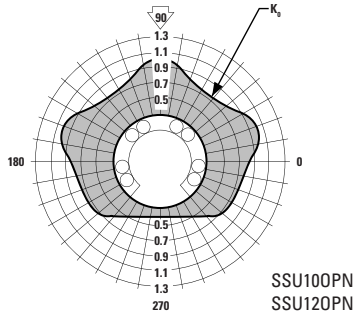
## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

Note: For Super Smart Ball Bushing bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized!



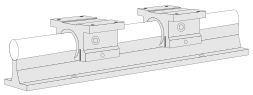

SSU8OPN



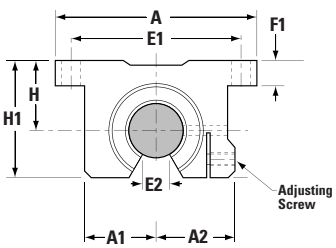

SSU10OPN
SSU12OPN
SSU16OPN
SSU20OPN
SSU24OPN

## Inch – Super Smart Ball Bushing Bearings

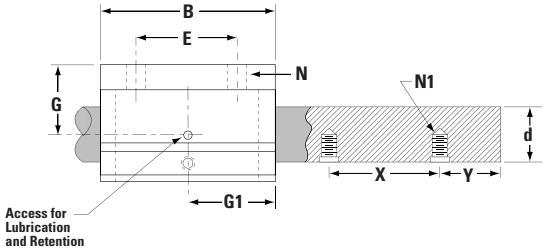
# Super Smart Ball Bushing Pillow Blocks
## (Open Type) for Continuously Supported Applications



SSUPBO End view




SSUPBO Side view




### Super Smart Ball Bushing Pillow Blocks (Open Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | 60 Case LinearRace | | | | | | | X | Y | N1 |
| SSUPBO-8 | 1/2 L PD | .500 | .687 | 1.13 | .4995/.4990 | .04 | .06 | 4 | 2 | #6-32 |
| SSUPBO-10 | 5/8 L PD | .625 | .875 | 1.44 | .6245/.6240 | .04 | .09 | 4 | 2 | #8-32 |
| SSUPBO-12 | 3/4 L PD | .750 | .937 | 1.56 | .7495/.7490 | .06 | .13 | 6 | 3 | #10-32 |
| SSUPBO-16 | 1 L PD | 1.000 | 1.187 | 2.00 | .9995/.9990 | .08 | .22 | 6 | 3 | 1/4-20 |
| SSUPBO-20 | 1 1/4 L PD | 1.250 | 1.500 | 2.56 | 1.2495/1.2490 | .08 | .35 | 6 | 3 | 5/16-18 |
| SSUPBO-24 | 1 1/2 L PD | 1.500 | 1.750 | 2.94 | 1.4994/1.4989 | .08 | .50 | 8 | 4 | 3/8-16 |

| Part Number [3] | A | A1 | A2 | B | E ±.010 | E1 ±.010 | E2 min. | F1 | G | G1 | N | N1 | Pillow Block Mass lb | Dynamic [††] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | | | | | | | | | | Hole | Bolt | | |
| SSUPBO-8 | 2.00 | .69 | .75 | 1.50 | 1.000 | 1.688 | .31 | .25 | .69 | .69 | .16 | #6 | .23 | 360 |
| SSUPBO-10 | 2.50 | .88 | .94 | 1.75 | 1.125 | 2.125 | .34 | .28 | .88 | .88 | .19 | #8 | .41 | 620 |
| SSUPBO-12 | 2.75 | .94 | 1.00 | 1.88 | 1.250 | 2.375 | .41 | .31 | .94 | .94 | .19 | #8 | .51 | 1130 |
| SSUPBO-16 | 3.25 | 1.19 | 1.25 | 2.63 | 1.750 | 2.875 | .53 | .38 | 1.19 | 1.32 | .22 | #10 | 1.03 | 1900 |
| SSUPBO-20 | 4.00 | 1.50 | 1.63 | 3.38 | 2.000 | 3.500 | .62 | .44 | 1.50 | 1.69 | .22 | #10 | 2.15 | 2350 |
| SSUPBO-24 | 4.75 | 1.75 | 1.88 | 3.75 | 2.500 | 4.125 | .74 | .50 | 1.75 | 1.88 | .28 | .25 | 3.29 | 3880 |

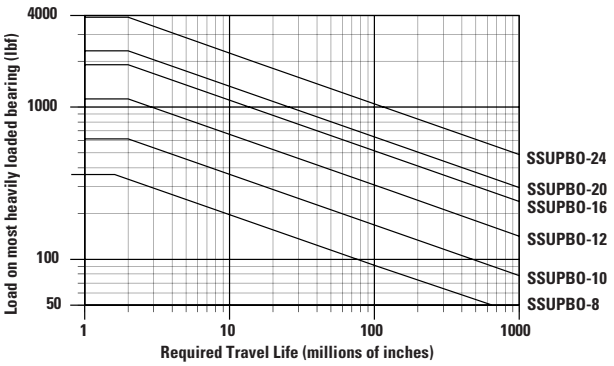
(††) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

(3) For part number description and specifications see page 33.

## Inch – Super Smart Ball Bushing Bearings

### Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

**Note: For the purpose of using this chart.**

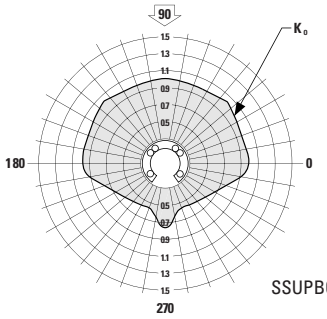
**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

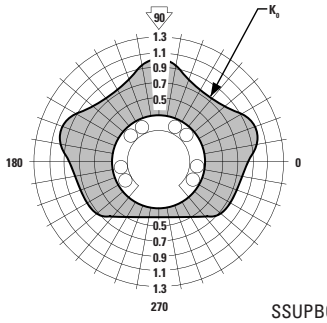
### Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

Note: For Super Smart Ball Bushing bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized!



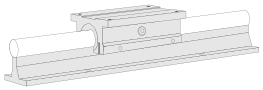

SSUPBO-8



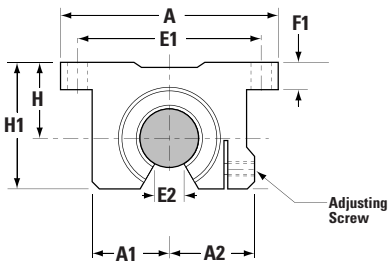

SSUPBO-10
SSUPBO-12
SSUPBO-16
SSUPBO-20
SSUPBO-24

## Inch – Super Smart Ball Bushing Bearings

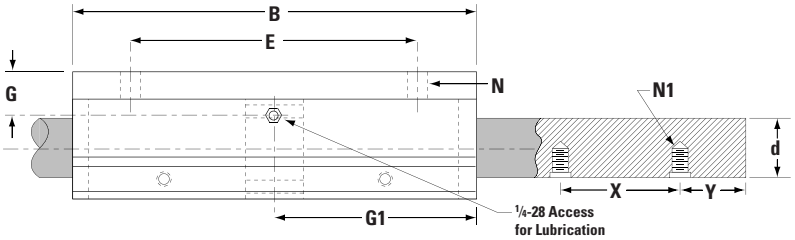
# Super Smart Ball Bushing Twin Pillow Blocks
## (Open Type) for Continuously Supported Applications



SSUTWNO End view




SSUTWNO Side view




### Super Smart Ball Bushing Twin Pillow Blocks (Open Type, seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | 60 Case LinearRace | | | | | | | X | Y | N1 |
| SSUTWNO-8 | 1/2 L PD | .500 | .687 | 1.13 | .4995/.4990 | .04 | .06 | 4 | 2 | #6-32 |
| SSUTWNO-10 | 5/8 L PD | .625 | .875 | 1.44 | .6245/.6240 | .04 | .09 | 4 | 2 | #8-32 |
| SSUTWNO-12 | 3/4 L PD | .750 | .937 | 1.56 | .7495/.7490 | .06 | .13 | 6 | 3 | #10-32 |
| SSUTWNO-16 | 1 L PD | 1.000 | 1.187 | 2.00 | .9995/.9990 | .08 | .22 | 6 | 3 | 1/4-20 |
| SSUTWNO-20 | 1 1/4 L PD | 1.250 | 1.500 | 2.56 | 1.2495/1.2490 | .08 | .35 | 6 | 3 | 5/16-18 |
| SSUTWNO-24 | 1 1/2 L PD | 1.500 | 1.750 | 2.94 | 1.4994/1.4989 | .08 | .50 | 8 | 4 | 3/8-16 |

| Part Number [3] | A | A1 | A2 | B | E ±.010 | E1 ±.010 | E2 min. | F1 | G | G1 | N | N1 | Pillow Block Mass lb | Dynamic [††] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Pillow Block | | | | | | | | | | | Hole | Bolt | | |
| SSUTWNO-8 | 2.00 | .69 | .75 | 3.50 | 2.500 | 1.688 | .31 | .25 | .56 | 1.75 | .16 | #6 | .46 | 720 |
| SSUTWNO-10 | 2.50 | .88 | .94 | 4.00 | 3.000 | 2.125 | .34 | .28 | .67 | 2.00 | .19 | #8 | .82 | 1240 |
| SSUTWNO-12 | 2.75 | .94 | 1.00 | 4.50 | 3.500 | 2.375 | .41 | .31 | .94 | 2.25 | .19 | #8 | 1.02 | 2260 |
| SSUTWNO-16 | 3.25 | 1.19 | 1.25 | 6.00 | 4.500 | 2.875 | .53 | .38 | 1.20 | 3.00 | .22 | #10 | 2.06 | 3800 |
| SSUTWNO-20 | 4.00 | 1.50 | 1.63 | 7.50 | 5.500 | 3.500 | .62 | .44 | 1.50 | 3.75 | .22 | #10 | 4.30 | 4700 |
| SSUTWNO-24 | 4.75 | 1.75 | 1.88 | 9.00 | 6.500 | 4.125 | .74 | .50 | 1.75 | 4.50 | .28 | .25 | 6.88 | 7760 |

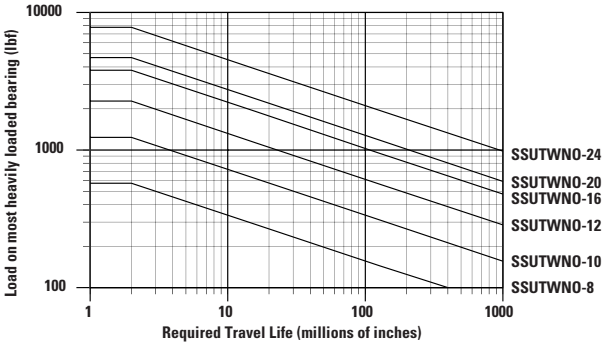
(††) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

(3) For part number description and specifications see page 33.

## Inch – Super Smart Ball Bushing Bearings

### Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

**Note: For the purpose of using this chart.**

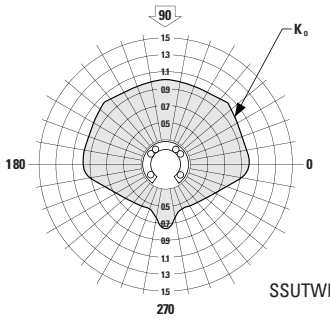
**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

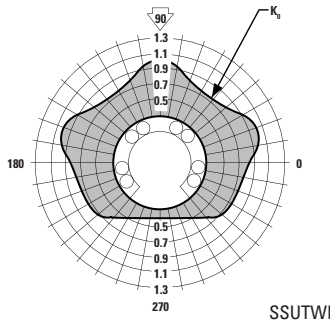
### Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

Note: For Super Smart Ball Bushing bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized!




SSUTWNO-8

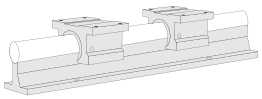



SSUTWNO-10
SSUTWNO-12
SSUTWNO-16
SSUTWNO-20
SSUTWNO-24

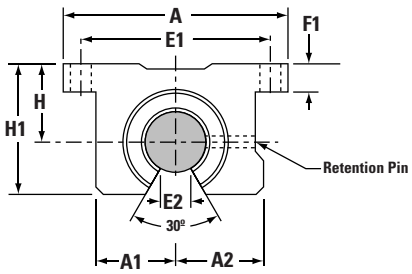
## Inch – Super Smart Ball Bushing Bearings

# Super Smart Ball Bushing Rigid Steel Pillow Blocks

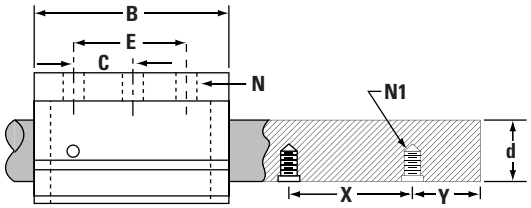
### (Open Type) for Continuously Supported Applications



End view




Side view




**Rigid steel housing and high performance Super Smart Ball Bushing Bearing combine to reduce deflection and cost up to 66%.**

**Super Smart Ball Bushing Bearing Rigid Steel Pillow Blocks (Open Type, seal at both ends) and LinearRace** (Dim. in in.)

| Part Number [3] | | Nominal Diameter | H ±.003 | H1 | A | A1 | A2 | B | 60 Case LinearRace Shaft Minimum Depth of Hardness | 60 Case Solid LinearRace Shaft Mass lb/in | 60 Case LinearRace Shaft Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Rigid Steel Pillow Block | 60 Case LinearRace Shaft | | | | | | | | | | X | Y | N1 |
| SSURPBO12 | 3/4 L PD | .750 | .937 | 1.56 | 2.75 | .94 | 1.00 | 1.88 | .06 | .13 | 6 | 3 | #10-32 |
| SSURPBO16 | 1 L PD | 1.000 | 1.187 | 2.00 | 3.25 | 1.19 | 1.25 | 2.63 | .08 | .22 | 6 | 3 | 1/4-20 |
| SSURPBO24 | 1 1/2 L PD | 1.500 | 1.750 | 2.94 | 4.75 | 1.75 | 1.88 | 3.75 | .08 | .50 | 8 | 4 | 3/8-16 |

| Part Number [3] | 60 Case LinearRace Diameter | E ±.010 | C ±.010 | E1 ±.010 | E2 min. | F1 | N | | Pillow Block Mass lb | Dynamic [††‡] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Smart Ball Bushing Rigid Steel Pillow Block | d | | | | | | Hole | Bolt | | |
| SSURPBO12 | .7495/.7490 | 1.250 | .625 | 2.375 | .43 | .31 | .19 | #8 | 1.10 | 1130 |
| SSURPBO16 | .9995/.9990 | 1.750 | .875 | 2.875 | .56 | .38 | .22 | #10 | 2.30 | 1900 |
| SSURPBO24 | 1.4994/1.4989 | 2.500 | 1.250 | 4.125 | .81 | .50 | .28 | .25 | 7.00 | 3880 |

(††) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

(3) For part number description and specifications see page 33.

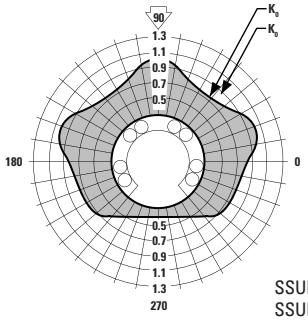
### Super Smart Ball Bushing Rigid Steel Pillow Blocks provide:

- **Faster settling time…Greater Productivity**
- **Less deflection…Greater Accuracy**
- **Highest Load Capacity…Smallest Envelope**
- **Longest Bearing Life…Greater Reliability**

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

Note: For Super Smart Ball Bushing bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized!




SSURPBO12
SSURPBO16
SSURPBO24

### Inch – Super Smart Ball Bushing Bearings

# Pick and Place X-Y System

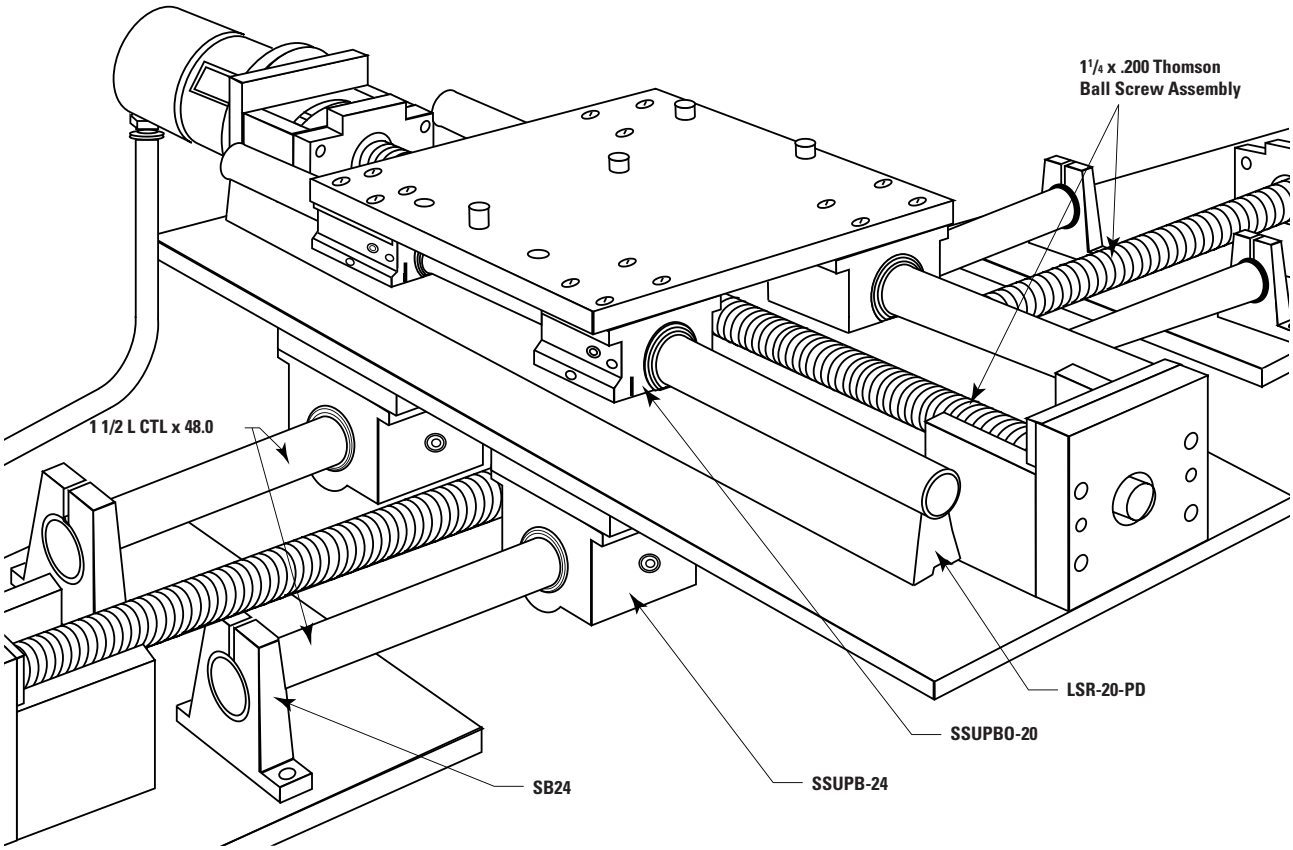
## Objective
Build an X-Y System that transfers the work piece between two separate machining stations.

## Solution
Assemble the X-Y System utilizing Super Smart pillow blocks on end supported 60 Case LinearRace for the X-axis and continuously supported 60 Case LinearRace on the Y-axis. Utilize Thomson Ball Screw Assemblies for high speed positioning.

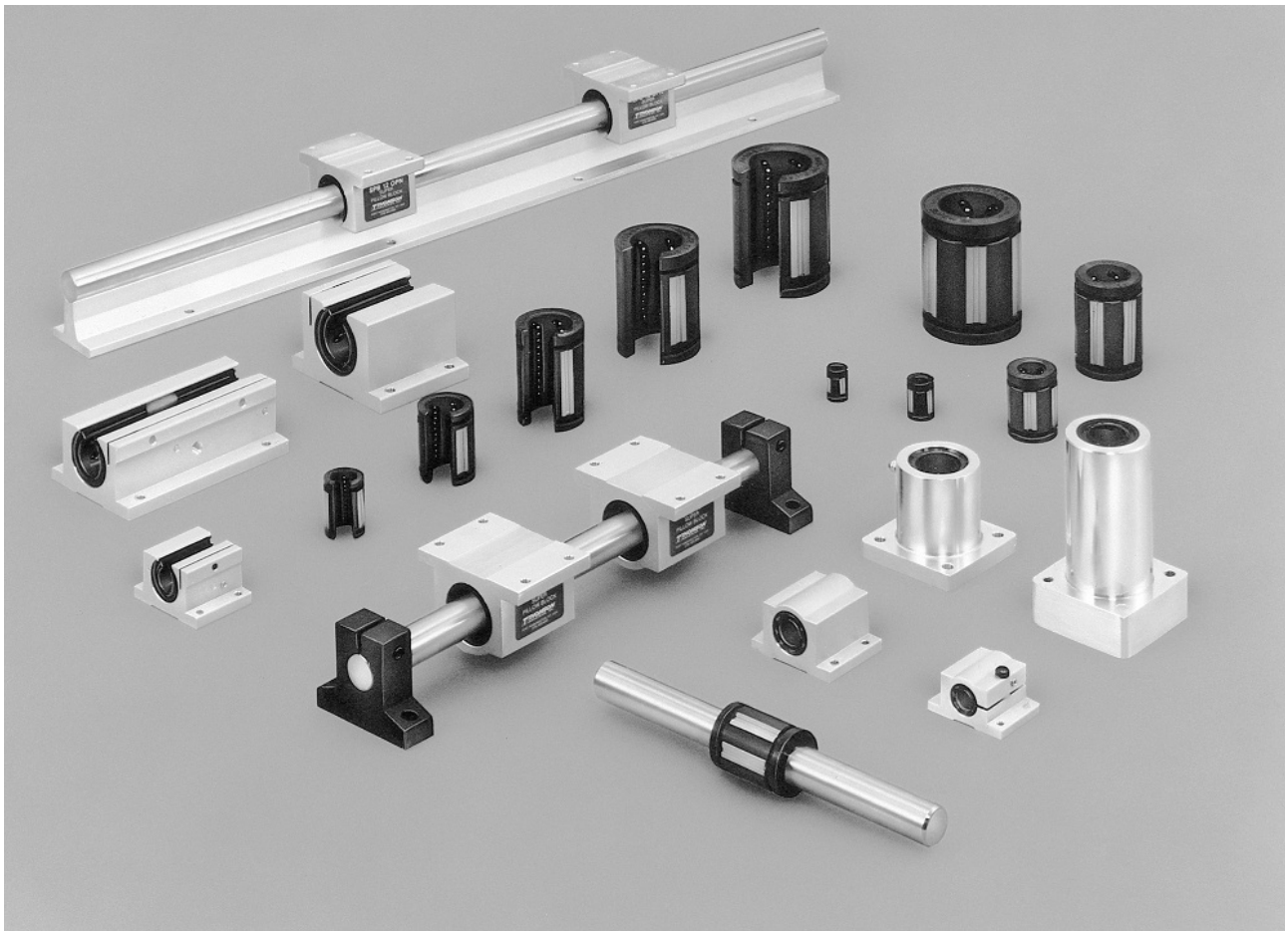
## Benefits
The 60 Case LinearRace and 60 Case LinearRace end support blocks provided an important bridge between machining stations. The Super Smart Ball Bushing pillow blocks and Thomson ball screws provided uninterrupted high speed movement of the work piece. Productivity increased by 200%.

## Products Specified
**X-axis**
2 - 1 1⁄2 L CTL x 48.00 in (60 Case LinearRace)
4 - SB24 (60 Case LinearRace End Support Blocks)
4 - SSUPB-24 (Super Smart Ball Bushing Pillow Blocks)
1 - 1 1⁄4 x .200 (Thomson Ball Screw Assembly)

**Y-axis**
2 - LSR-20 x 48.00 in (Low Profile 60 Case LinearRace Support Rail)
4 - SSUPBO-20 (Super Smart Ball Bushing Pillow Blocks)
1 - 1 1⁄4 x .200 (Thomson Ball Screw Assembly)
2 - 1 1⁄4 L CTL x 48.00 in (60 Case LinearRace)



# Super Ball Bushing Bearing Products



**Thomson Super Ball Bushing Bearing products offer:**

- A self-aligning capability up to .5° compensating for inaccuracies in base flatness or carriage machining.
- The RoundRail Advantage combined with the self-aligning feature, eliminating the need for derating factors commonly required for linear guides.
- Travel speeds up to 10 ft/s without a reduction in load capacity.
- Light weight, wear-resistant, engineered-polymer retainers and outer sleeves that reduce inertia and noise.
- Radially floating bearing plates. When installed in an adjustable housing, the Super Ball Bushing Bearing may be adjusted to a specific diametrical fit-up for accurate and repeatable movement.
- A constant coefficient of friction as low as .001.
- The use of smaller, less expensive drive motors, belts, linkages, gears and ball screws, when replacing high friction plain bearings.
- A closed configuration for end supported applications and an open configuration for continuously supported applications.
- Ready to install pillow blocks with double acting seals and an access for lubrication. Installation and downtime is minimized.
- Availability from over 1800 distributors, worldwide.

## Inch – Super Ball Bushing Bearings

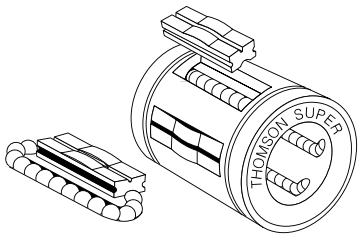



Figure 1

The Super Ball Bushing Bearing has been the industry standard for self-aligning linear bearings for over twenty years. This bearing provides three times the load capacity or 27 times the travel life of conventional linear bearings. This dramatic improvement in bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. Thomson Industries, Inc. invented the Super Ball Bushing Bearing with many unique design features. Besides the dramatic increase in load capacity, the Super Ball Bushing Bearing is self-aligning, light weight and adjustable with a low coefficient of friction (Figure 1).

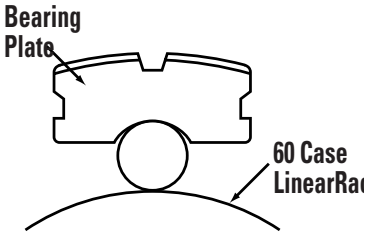



Figure 2

### Three Times the Load Capacity

The bearing plates are hardened, bearing quality steel with ball conforming grooves (Figure 2). The groove is slightly larger than the ball diameter, providing an optimal area for ball contact. The greater ball to bearing plate contact provides the increase in load capacity or travel life.

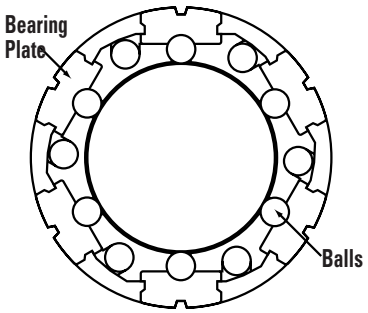



Figure 3

Cross-section of Super Ball Bushing Bearing

### Zero Clearance Fit

The bearing plates are also designed to float radially (Figure 3). When the bearing is mounted in an adjustable housing, selected fit-ups can be achieved on the 60 Case LinearRace (shaft).

### Self-Aligning

The Super Ball Bushing Bearing plates pivot .5º about their centers (Figure 4) to assure smooth entry and exit of the precision bearing balls. Each plate aligns itself automatically to compensate for inaccurate housing bore alignment, base flatness or carriage machining. This provides uniform ball loading, smooth ball recirculation and a constant coefficient of friction.

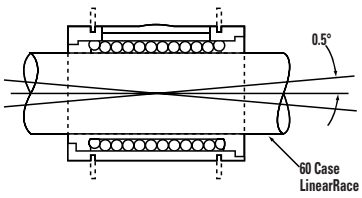



Figure 4

### Smooth, Quiet Operation

The Super Ball Bushing Bearing's outer sleeve and retainer are made of wear-resistant, low-friction engineering polymer. It reduces inertia and operating noise levels significantly.

# Part Number Description and Specification

## Super Ball Bushing Bearings (Closed Type) for End Supported Applications

**SUPER 16-CR**

| Type | Description |
|---|---|
| SUPER | Super Ball Bushing bearings |
| SCB | Super Ball Bushing Cartridge bearings |

| Size | Nominal Diameter |
|---|---|
| 3 | .188 |
| 4 | .250 |
| 6 | .375 |
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| DD | Integral Seals |
| NB | Nylon Balls |
| TWN | Twin (SCB Only) |
| DP | Dry Packed |
| LL | Lubricated with Thomson LinearLube |

## Super Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

**SPB-16-ADJ-CR**

| Type | Description |
|---|---|
| SPB | Super Ball Bushing Pillow Blocks |
| TWN | Super Ball Bushing Twin Pillow Blocks |

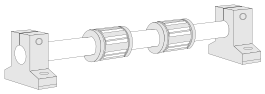
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

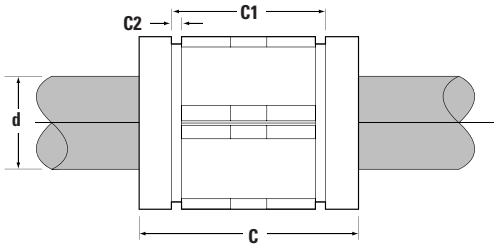
| Type | Description |
|---|---|
| – | Closed Type, Non-Adjustable |
| ADJ | Closed Type, Adjustable Pillow Block |

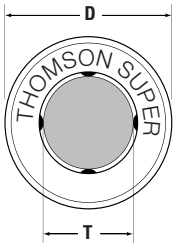
| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| LL | Lubricated with Thomson LinearLube |

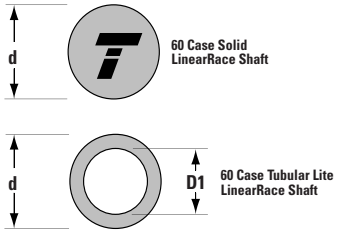
## Inch – Super Ball Bushing Bearings

# Super Ball Bushing Bearings
## (Closed Type) for End Supported Applications






### Super Ball Bushing Bearings (Closed Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | Nominal Diameter | Length C | Distance Between Retaining Ring Grooves C1 | Retaining Ring Groove min. C2 | Number of Ball Circuits | Ball Bushing Bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | 60 Case Linear Race | | | | | | | | | | |
| SUPER 3 | 3/16 L | .188 | .562/.547 | – | – | 4 | .003 | .027 | .008 | – | – |
| SUPER 4 | 1/4 L | .250 | .750/.735 | .511/.501 | .039 | 4 | .01 | .027 | .01 | – | – |
| SUPER 6 | 3/8 L | .375 | .875/.860 | .699/.689 | .039 | 4 | .02 | .027 | .03 | – | – |
| SUPER 8 | 1/2 L | .500 | 1.250/1.230 | 1.032/1.012 | .050 | 4 | .04 | .04 | .06 | – | – |
| SUPER 10 | 5/8 L | .625 | 1.500/1.480 | 1.105/1.095 | .056 | 5 | .10 | .04 | .09 | – | – |
| SUPER 12 | 3/4 L | .750 | 1.625/1.605 | 1.270/1.250 | .056 | 6 | .14 | .06 | .13 | .08 | .46/.41 |
| SUPER 16 | 1 L | 1.000 | 2.250/2.230 | 1.884/1.864 | .070 | 6 | .25 | .08 | .22 | .16 | .62/.56 |
| SUPER 20 | 1 1/4 L | 1.250 | 2.625/2.600 | 2.004/1.984 | .068 | 6 | .45 | .08 | .35 | – | – |
| SUPER 24 | 1 1/2 L | 1.500 | 3.000/2.970 | 2.410/2.390 | .086 | 6 | .85 | .08 | .50 | .33 | .93/.84 |
| SUPER 32 | 2 L | 2.000 | 4.000/3.960 | 3.193/3.163 | .105 | 6 | 1.45 | .10 | .89 | .54 | 1.31/1.18 |

| Part Number [2] | Working Bore Diameter T | Recommended Housing Bore | | 60 Case LinearRace Diameter d | Ball Bushing Bearing/LinearRace Fit Up ‡ | | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SUPER 3 | .1875/.1870 | .3755/.3750 | .3760/.3750 | .1870/.1865 | .0015C/.0000 | .002C/.0000 | 35 |
| SUPER 4 | .2500/.2495 | .5005/.5000 | .5010/.5000 | .2495/.2490 | .0015C/.0000 | .002C/.0000 | 60 |
| SUPER 6 | .3750/.3745 | .6255/.6250 | .6260/.6250 | .3745/.3740 | .0015C/.0000 | .002C/.0000 | 100 |
| SUPER 8 | .5000/.4995 | .8755/.8750 | .8760/.8750 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 255 |
| SUPER 10 | .6250/.6245 | 1.1255/1.1250 | 1.1260/1.1250 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 450 |
| SUPER 12 | .7500/.7495 | 1.2505/1.2500 | 1.2510/1.2500 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 600 |
| SUPER 16 | 1.0000/.9995 | 1.5630/1.5625 | 1.5635/1.5625 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 1050 |
| SUPER 20 | 1.2500/1.2494 | 2.0008/2.0000 | 2.0010/2.0000 | 1.2495/1.2490 | .0018C/.0001P | .002C/.0001P | 1500 |
| SUPER 24 | 1.5000/1.4994 | 2.3760/2.3750 | 2.3760/2.3750 | 1.4994/1.4989 | .0021C/.0000 | .0021C/.0000 | 2000 |
| SUPER 32 | 2.0000/1.9992 | 3.0010/3.0000 | 3.0010/3.0000 | 1.9994/1.9987 | .0023C/.0002P | .0023C/.0002P | 3000 |

‡ P = Preload, C = Clearance

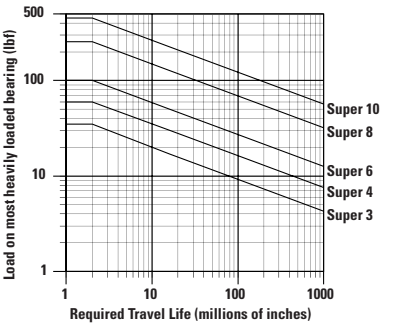
(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

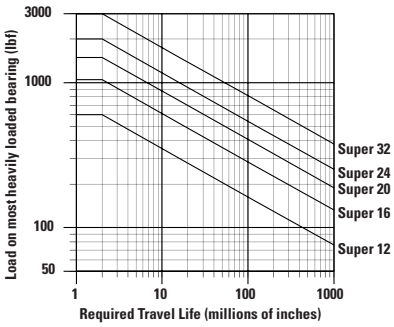
(2) For part number description and specifications see page 45.

Note: For additional technical information, see the Engineering section beginning on page 245.

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

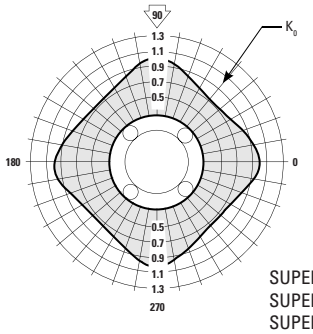
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

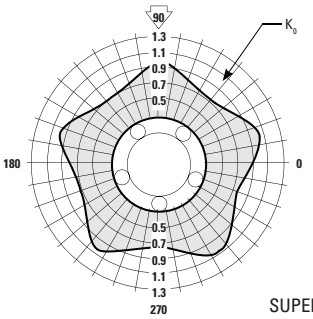
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

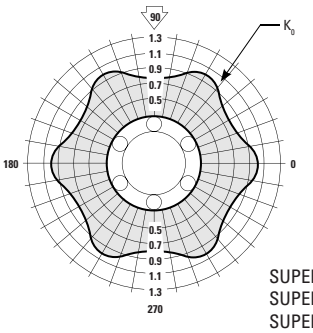
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SUPER 3
SUPER 4
SUPER 6
SUPER 8



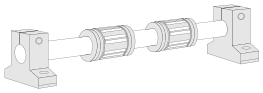

SUPER 10

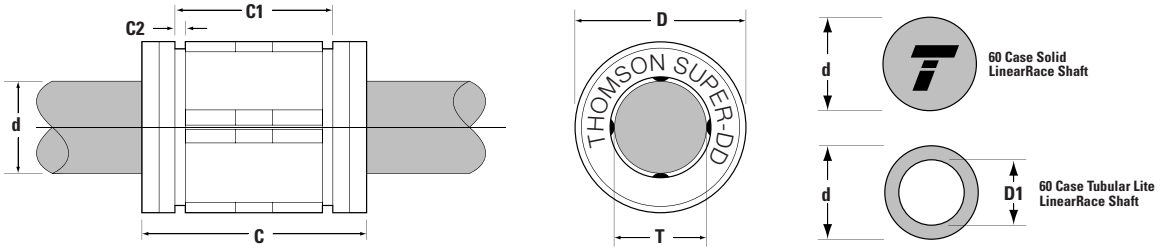



SUPER 12
SUPER 16
SUPER 20
SUPER 24
SUPER 32

## Inch – Super Ball Bushing Bearings

# Sealed Super Ball Bushing Bearings
## (Closed Type) for End Supported Applications






### Sealed Super Ball Bushing Bearings (Closed Type, seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | Nominal Diameter | Length C | Distance Between Retaining Ring Grooves C1 | Retaining Ring Groove min. C2 | Number of Ball Circuits | Ball Bushing Bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | 60 Case Linear Race | | | | | | | | | | |
| SUPER-8-DD | 1/2 L | .500 | 1.500/1.460 | 1.032/1.012 | .050 | 4 | .05 | .04 | .06 | – | – |
| SUPER-10-DD | 5/8 L | .625 | 1.750/1.710 | 1.105/1.095 | .056 | 5 | .11 | .04 | .09 | – | – |
| SUPER-12-DD | 3/4 L | .750 | 1.875/1.835 | 1.270/1.250 | .056 | 6 | .15 | .06 | .13 | .08 | .46/.41 |
| SUPER-16-DD | 1 L | 1.000 | 2.625/2.585 | 1.884/1.864 | .070 | 6 | .27 | .08 | .22 | .16 | .62/.56 |

| Part Number [2] | Working Bore Diameter T | Recommended Housing Bore Dia. | | 60 Case LinearRace Diameter d | Ball Bushing Bearing/LinearRace Fit Up ‡ | | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SUPER-8-DD | .5000/.4995 | .8750/.8755 | .8750/.8760 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 255 |
| SUPER-10-DD | .6250/.6245 | 1.1250/1.1255 | 1.1250/1.1260 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 450 |
| SUPER-12-DD | .7500/.7495 | 1.2500/1.2505 | 1.2500/1.2510 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 600 |
| SUPER-16-DD | 1.0000/.9995 | 1.5625/1.5630 | 1.5625/1.5635 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 1050 |

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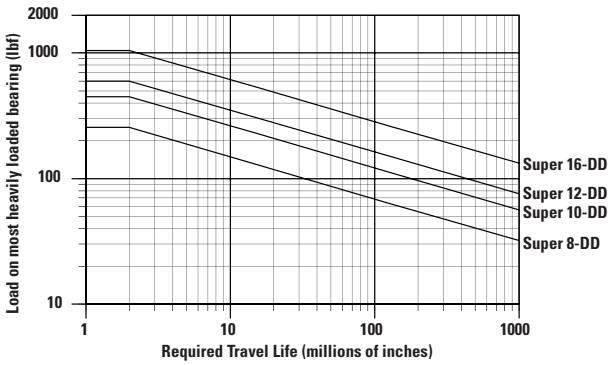
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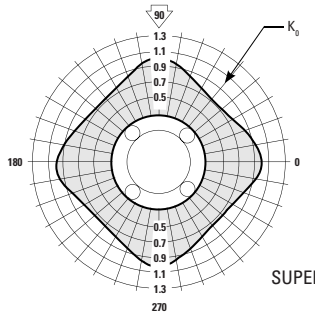
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

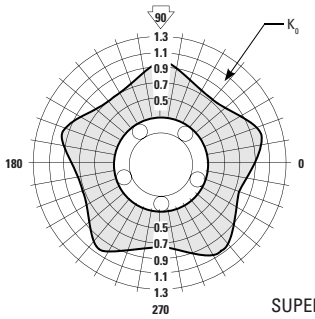
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

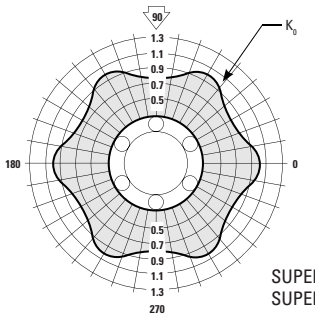
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




SUPER 8-DD



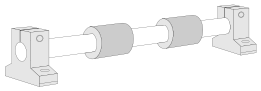

SUPER 10-DD

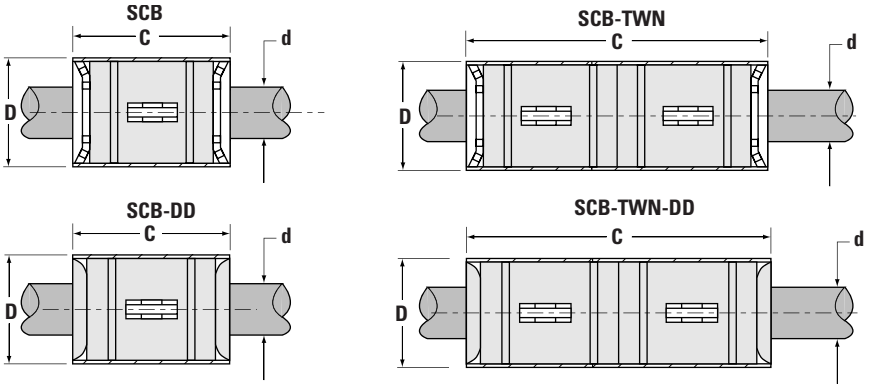



SUPER 12-DD
SUPER 16-DD

## Inch – Super Ball Bushing Bearings

# Super Ball Bushing Cartridge Bearings
## (Closed Type) for End Supported Applications






### Super Ball Bushing Cartridge Bearings and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | | Nominal Diameter | Length C ±.005 | Number of Ball Circuits | Ball Bushing Mass w/out Seals lb | Ball Bushing Mass with Seals lb | 60 Case LinearRace Diameter d | Nominal Outside Diameter D | Rec. Housing Bore Dia. Fixed | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Seals | With Seals | 60 Case Linear Race | | | | | | | | | | | |
| SCB-4 | SCB-4-DD | 1/4 L | .250 | 1.000 | 4 | .01 | .02 | .2495/.2490 | .531/.529 | .535/.533 | .027 | .01 | 60 |
| SCB-6 | SCB-6-DD | 3/8 L | .375 | 1.125 | 4 | .02 | .03 | .3745/.3740 | .656/.654 | .660/.658 | .027 | .03 | 100 |
| SCB-8 | SCB-8-DD | 1/2 L | .500 | 1.500 | 4 | .06 | .07 | .4995/.4990 | .906/.904 | .910/.908 | .04 | .06 | 255 |

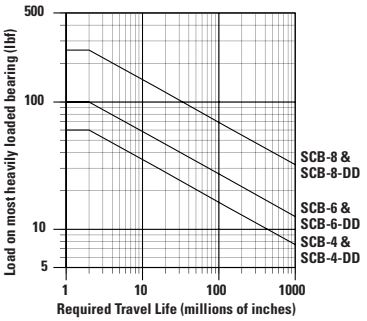
### Super Ball Bushing Twin Cartridge Bearings and 60 Case LinearRace (Dimensions in inches)

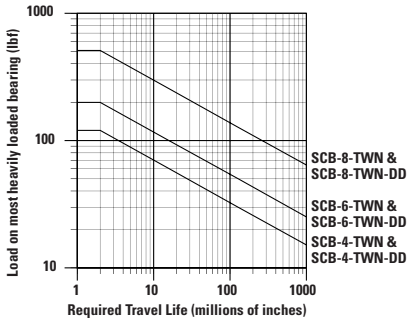
| Part Number [2] | | | Nominal Diameter | Length C ±.005 | Number of Ball Circuits | Ball Bushing Mass w/out Seals lb | Ball Bushing Mass with Seals lb | 60 Case LinearRace Diameter d | Nominal Outside Diameter D | Rec. Housing Bore Dia. Fixed | 60 Case LinearRace Minimum Depth of Hardness | 60 Case LinearRace Mass lb/in | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Seals | With Seals | 60 Case Linear Race | | | | | | | | | | | |
| SCB-4-TWN | SCB-4-TWN-DD | 1/4 L | .250 | 1.750 | 4 | .02 | .04 | .2495/.2490 | .531/.529 | .535/.533 | .027 | .01 | 120 |
| SCB-6-TWN | SCB-6-TWN-DD | 3/8 L | .375 | 2.000 | 4 | .03 | .04 | .3745/.3740 | .656/.654 | .660/.658 | .027 | .03 | 200 |
| SCB-8-TWN | SCB-8-TWN-DD | 1/2 L | .500 | 2.750 | 4 | .12 | .13 | .4995/.4990 | .906/.904 | .910/.908 | .04 | .06 | 510 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Twin Super Cartridge bearing is based on two bearings equally loaded.
(2) For part number description and specifications see page 45.
Note: For additional technical information, see the Engineering section beginning on page 245.

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Cartridge bearing)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

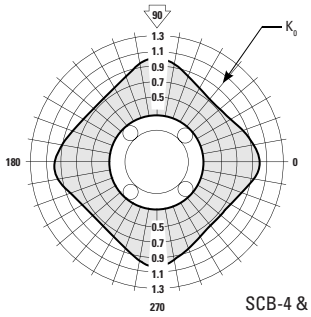
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

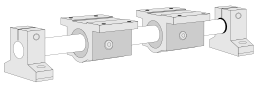
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

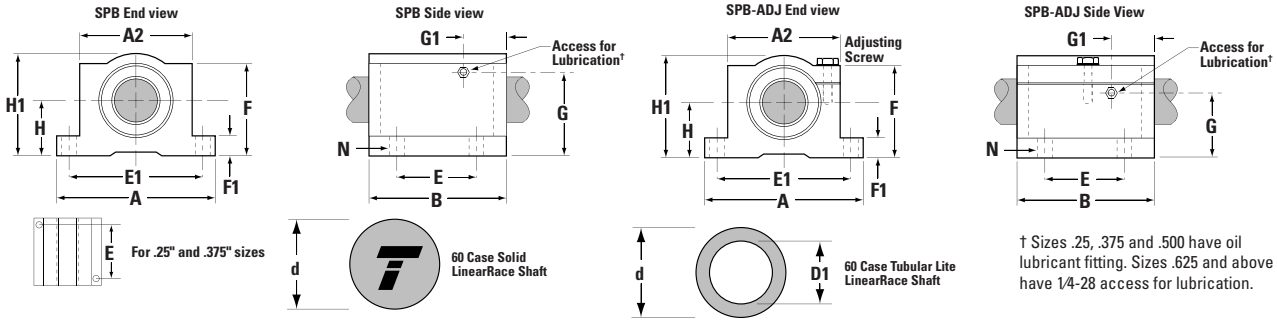



SCB-4 & SCB-4-DD
SCB-6 & SCB-6-DD
SCB-8 & SCB-8-DD
SCB-4-TWN & SCB-4-TWN-DD
SCB-6-TWN & SCB-6-TWN-DD
SCB-8-TWN & SCB-8-TWN-DD

## Inch – Super Ball Bushing Bearings

# Super Ball Bushing Pillow Blocks
### (Closed and Adjustable Type) for End Supported Applications






† Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.

### Super Ball Bushing Pillow Blocks (Closed and Adjustable Types, seal at both ends) and 60 Case LinearRace (Dim. in in.)

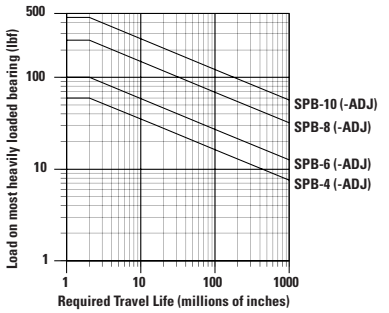
| Part Number (2) | | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Pillow Block | | 60 Case LinearRace | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | |
| SPB-4 | SPB-4-ADJ | 1/4 L | .250 | .437 | .81 | .2495/.2490 | .027 | .01 | – | – |
| SPB-6 | SPB-6-ADJ | 3/8 L | .375 | .500 | .94 | .3745/.3740 | .027 | .03 | – | – |
| SPB-8 | SPB-8-ADJ | 1/2 L | .500 | .687 | 1.25 | .4995/.4990 | .04 | .06 | – | – |
| SPB-10 | SPB-10-ADJ | 5/8 L | .625 | .875 | 1.63 | .6245/.6240 | .04 | .09 | – | – |
| SPB-12 | SPB-12-ADJ | 3/4 L | .750 | .937 | 1.75 | .7495/.7490 | .06 | .13 | .08 | .46/.41 |
| SPB-16 | SPB-16-ADJ | 1 L | 1.000 | 1.187 | 2.19 | .9995/.9990 | .08 | .22 | .16 | .62/.56 |
| SPB-20 | SPB-20-ADJ | 1 1/4 L | 1.250 | 1.500 | 2.81 | 1.2495/1.2490 | .08 | .35 | – | – |
| SPB-24 | SPB-24-ADJ | 1 1/2 L | 1.500 | 1.750 | 3.25 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 |
| SPB-32 | SPB-32-ADJ | 2 L | 2.000 | 2.125 | 4.06 | 1.9994/1.9987 | .10 | .89 | .54 | 1.31/1.18 |

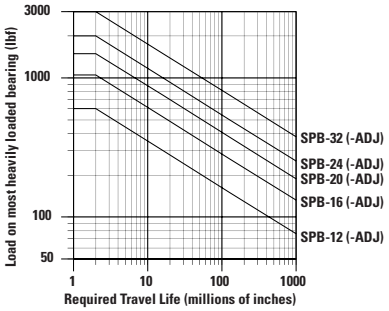
| Part Number (2) | | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic (1) Load Capacity $lb_t$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Pillow Block | | | | | | | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | | Hole | Bolt | | |
| SPB-4 | SPB-4-ADJ | 1.63 | 1.00 | 1.19 | .750 | 1.313 | .75 | .19 | .61 | .22 | .16 | #6 | .10 | 60 |
| SPB-6 | SPB-6-ADJ | 1.75 | 1.13 | 1.31 | .875 | 1.438 | .88 | .19 | .72 | .22 | .16 | #6 | .13 | 100 |
| SPB-8 | SPB-8-ADJ | 2.00 | 1.38 | 1.69 | 1.000 | 1.688 | 1.13 | .25 | .69 | .84 | .16 | #6 | .20 | 255 |
| SPB-10 | SPB-10-ADJ | 2.50 | 1.75 | 1.94 | 1.125 | 2.125 | 1.44 | .28 | .70 | .68 | .19 | #8 | .50 | 450 |
| SPB-12 | SPB-12-ADJ | 2.75 | 1.88 | 2.06 | 1.250 | 2.375 | 1.56 | .31 | .94 | .72 | .19 | #8 | .60 | 600 |
| SPB-16 | SPB-16-ADJ | 3.25 | 2.38 | 2.81 | 1.750 | 2.875 | 1.94 | .38 | 1.20 | .86 | .22 | #10 | 1.20 | 1050 |
| SPB-20 | SPB-20-ADJ | 4.00 | 3.00 | 3.63 | 2.000 | 3.500 | 2.50 | .44 | 1.50 | 1.20 | .22 | #10 | 2.50 | 1500 |
| SPB-24 | SPB-24-ADJ | 4.75 | 3.50 | 4.00 | 2.500 | 4.125 | 2.88 | .50 | 1.75 | 1.25 | .28 | 1/4 | 3.80 | 2000 |
| SPB-32 | SPB-32-ADJ | 6.00 | 4.50 | 5.00 | 3.250 | 5.250 | 3.63 | .63 | 2.12 | 1.58 | .41 | 3/8 | 7.00 | 3000 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.
(2) For part number description and specifications see page 45.
Note: For additional technical information, see the Engineering section beginning on page 245.

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

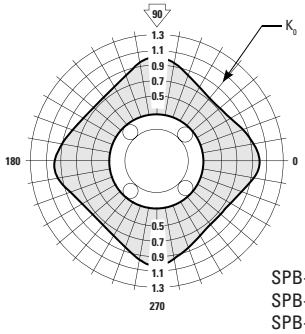
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

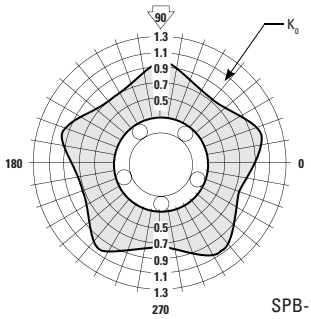
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

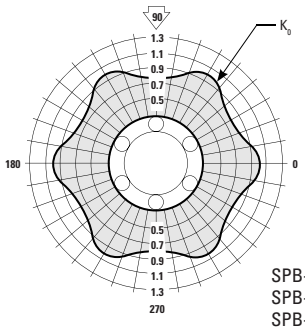
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




SPB-4 (-ADJ)
SPB-6 (-ADJ)
SPB-8 (-ADJ)



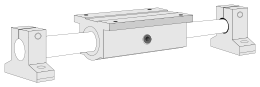

SPB-10 (-ADJ)

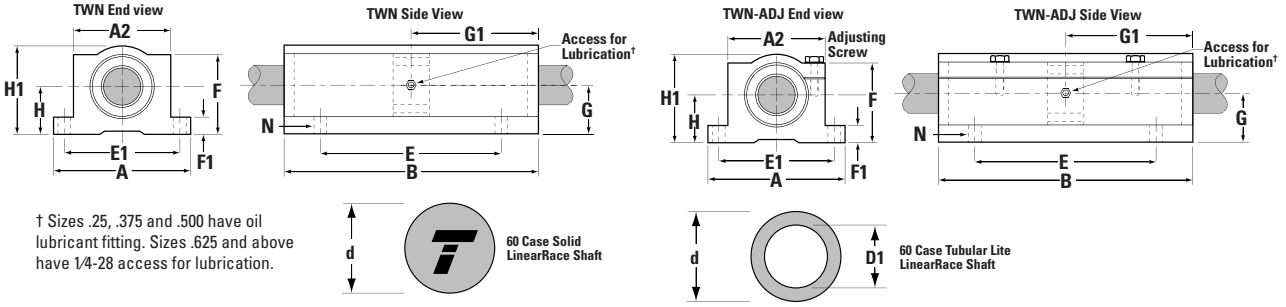



SPB-12 (-ADJ)
SPB-16 (-ADJ)
SPB-20 (-ADJ)
SPB-24 (-ADJ)
SPB-32 (-ADJ)

## Inch – Super Ball Bushing Bearings

# Super Ball Bushing Twin Pillow Blocks
## (Closed Type) for End Supported Applications






† Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.

### Super Ball Bushing Twin Pillow Blocks (Closed and Adjustable Type, seal at both ends) and LinearRace (Dim. in in.)

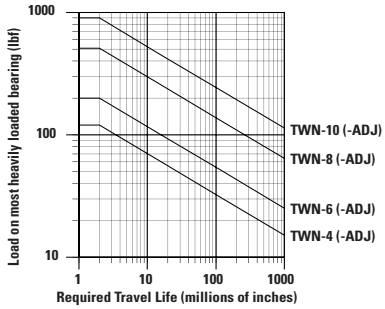
| Part Number [2] | | | Nominal Diameter | H ±.003 | H1 | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Twin Pillow Block | | 60 Case LinearRace | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | |
| TWN-4 | TWN-4-ADJ | 1/4 L | .250 | .437 | .81 | .2495/.2490 | .027 | .01 | – | – |
| TWN-6 | TWN-6-ADJ | 3/8 L | .375 | .500 | .94 | .3745/.3740 | .027 | .03 | – | – |
| TWN-8 | TWN-8-ADJ | 1/2 L | .500 | .687 | 1.25 | .4995/.4990 | .04 | .06 | – | – |
| TWN-10 | TWN-10-ADJ | 5/8 L | .625 | .875 | 1.63 | .6245/.6240 | .04 | .09 | – | – |
| TWN-12 | TWN-12-ADJ | 3/4 L | .750 | .937 | 1.75 | .7495/.7490 | .06 | .13 | .08 | .46/.41 |
| TWN-16 | TWN-16-ADJ | 1 L | 1.000 | 1.187 | 2.19 | .9995/.9990 | .08 | .22 | .16 | .62/.56 |
| TWN-20 | TWN-20-ADJ | 1 1/4 L | 1.250 | 1.500 | 2.81 | 1.2495/1.2490 | .08 | .35 | – | – |
| TWN-24 | TWN-24-ADJ | 1 1/2 L | 1.500 | 1.750 | 3.25 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 |

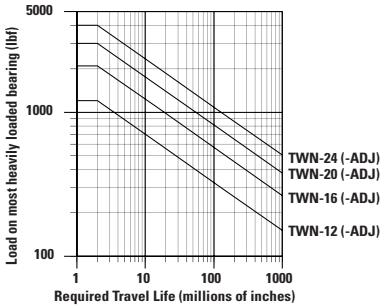
| Part Number [2] | | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Twin Pillow Block | | | | | | | | | | | | | | |
| Fixed | Adjustable | | | | | | | | | | Hole | Bolt | | |
| TWN-4 | TWN-4-ADJ | 1.63 | 1.00 | 2.50 | 2.000 | 1.313 | .75 | .19 | .44 | 1.25 | .16 | #6 | .19 | 120 |
| TWN-6 | TWN-6-ADJ | 1.75 | 1.13 | 2.75 | 2.250 | 1.438 | .88 | .19 | .50 | 1.37 | .16 | #6 | .25 | 200 |
| TWN-8 | TWN-8-ADJ | 2.00 | 1.38 | 3.50 | 2.500 | 1.688 | 1.13 | .25 | .59 | 1.75 | .16 | #6 | .40 | 510 |
| TWN-10 | TWN-10-ADJ | 2.50 | 1.75 | 4.00 | 3.000 | 2.125 | 1.44 | .28 | .85 | 2.00 | .19 | #8 | 1.00 | 900 |
| TWN-12 | TWN-12-ADJ | 2.75 | 1.88 | 4.50 | 3.500 | 2.375 | 1.56 | .31 | .94 | 2.25 | .19 | #8 | 1.20 | 1200 |
| TWN-16 | TWN-16-ADJ | 3.25 | 2.38 | 6.00 | 4.500 | 2.875 | 1.94 | .38 | 1.19 | 3.00 | .22 | #10 | 2.40 | 2100 |
| TWN-20 | TWN-20-ADJ | 4.00 | 3.00 | 7.50 | 5.500 | 3.500 | 2.50 | .44 | 1.50 | 3.75 | .22 | #10 | 5.00 | 3000 |
| TWN-24 | TWN-24-ADJ | 4.75 | 3.50 | 9.00 | 6.500 | 4.125 | 2.88 | .50 | 1.75 | 4.50 | .28 | 1/4 | 7.80 | 4000 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Super Ball Bushing Twin Pillow Blocks is based on two bearings equally loaded.
(2) For part number description and specifications see page 45.
Note: For additional technical information, see the Engineering section beginning on page 245.

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

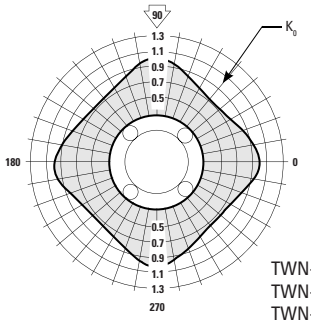
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

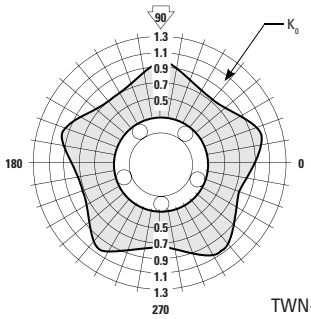
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

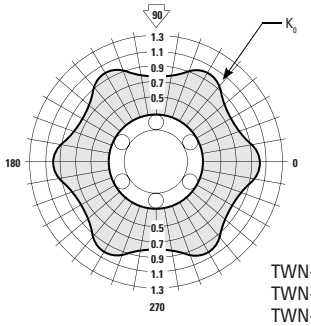
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




TWN-4 (-ADJ)
TWN-6 (-ADJ)
TWN-8 (-ADJ)




TWN-10 (-ADJ)




TWN-12 (-ADJ)
TWN-16 (-ADJ)
TWN-20 (-ADJ)
TWN-24 (-ADJ)

### Inch – Super Ball Bushing Bearings

# Part Number Description and Specification

### Super Ball Bushing Bearings (Open Type) for Continuously Supported Applications

**SUPER 16-OPN-CR**

| Type | Description |
|---|---|
| SUPER | Super Ball Bushing bearings |

| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

| Type | Description |
|---|---|
| OPN | Open Type for continuously supported applications |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| DD | Integral Seals |
| NB | Nylon Balls |
| DP | Dry Packed |
| LL | Lubricated with Thomson LinearLube |

### Super Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications

**SPB 16-OPN-CR**

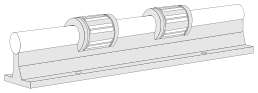
| Type | Description |
|---|---|
| SPB | Super Ball Bushing Pillow Blocks |
| TWN | Super Ball Bushing Twin Pillow Blocks |

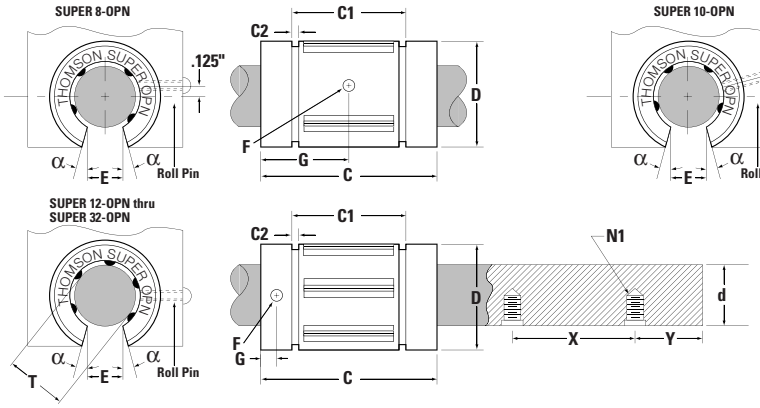
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

| Type | Description |
|---|---|
| OPN | Open Type for continuously supported applications |

| Option | Description |
|---|---|
| – | Standard |
| CR | Corrosion Resistant |
| NB | Nylon Balls |
| LL | Lubricated with Thomson LinearLube |

# Super Ball Bushing Bearings
## (Open Type) for Continuously Supported Applications






### Super Ball Bushing Bearings (Open Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | Length C | Distance Between Retaining Rings C1 | Ret. Ring Groove min. C2 | Min. Slot Width E | Retention Hole | | Angle deg α | Number of Ball Circuits | Ball Bushing Bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | 60 Case Linear Race | | | | | | Dia. F | Loc. G | | | | | | X | Y | N1 |
| SUPER8OPN | 1/2 L PD | .500 | 1.250/1.230 | 1.032/1.012 | .050 | .31 | .14 | .63 | 15 | 4 | .04 | .04 | .06 | 4 | 2 | #6-32 |
| SUPER10OPN | 5/8 L PD | .625 | 1.500/1.480 | 1.105/1.095 | .056 | .37 | .11 | .13 | 15 | 4 | .08 | .04 | .09 | 4 | 2 | #8-32 |
| SUPER12OPN | 3/4 L PD | .750 | 1.625/1.605 | 1.270/1.250 | .056 | .43 | .14 | .13 | 15 | 5 | .12 | .06 | .13 | 6 | 3 | #10-32 |
| SUPER16OPN | 1 L PD | 1.000 | 2.250/2.230 | 1.884/1.864 | .070 | .56 | .14 | .13 | 15 | 5 | .21 | .08 | .22 | 6 | 3 | 1/4-20 |
| SUPER20OPN | 1 1/4 L PD | 1.250 | 2.625/2.600 | 2.004/1.984 | .068 | .62 | .20 | .19 | 15 | 5 | .38 | .08 | .35 | 6 | 3 | 5/16-18 |
| SUPER24OPN | 1 1/2 L PD | 1.500 | 3.000/2.970 | 2.410/2.390 | .086 | .75 | .20 | .19 | 15 | 5 | .71 | .08 | .50 | 8 | 4 | 3/8-16 |
| SUPER32OPN | 2 L PD | 2.000 | 4.000/3.960 | 3.193/3.163 | .105 | 1.00 | .27 | .31 | 15 | 5 | 1.20 | .10 | .89 | 8 | 4 | 1/2-13 |

| Part Number [3] | Working Bore Diameter T | Recommended Housing Bore Dia. | | 60 Case LinearRace Diameter d | Ball Bushing Bearing/LinearRace Fit Up ‡ | | Dynamic [‡ 1] Load Capacity $lb_t$ |
|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SUPER8OPN | .5000/.4995 | .8755/.8750 | .8760/.8750 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 230 |
| SUPER10OPN | .6250/.6245 | 1.1255/1.1250 | 1.1260/1.1250 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 320 |
| SUPER12OPN | .7500/.7495 | 1.2505/1.2500 | 1.2510/1.2500 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 470 |
| SUPER16OPN | 1.0000/.9995 | 1.5630/1.5625 | 1.5635/1.5625 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 780 |
| SUPER20OPN | 1.2500/1.2494 | 2.0008/2.0000 | 2.0010/2.0000 | 1.2495/1.2490 | .0018C/.0001P | .002C/.0001P | 1170 |
| SUPER24OPN | 1.5000/1.4994 | 2.3760/2.3750 | 2.3760/2.3750 | 1.4994/1.4989 | .0021C/.0000 | .0021C/.0000 | 1560 |
| SUPER32OPN | 2.000/1.9992 | 3.0010/3.0000 | 3.0010/3.0000 | 1.9994/1.9987 | .0023C/.0002P | .0023C/.0002P | 2350 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

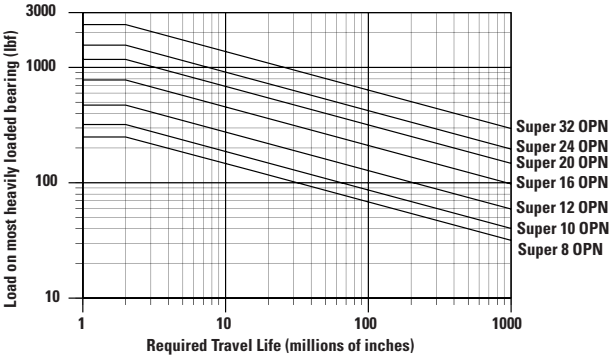
(3) For part number description and specifications see page 56.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

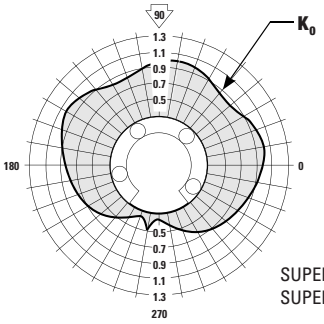
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

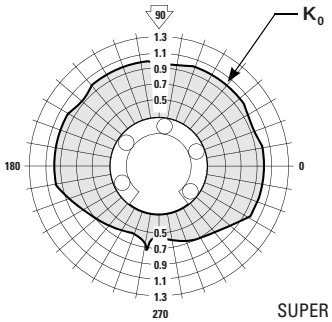
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

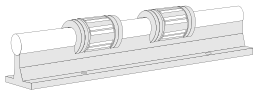


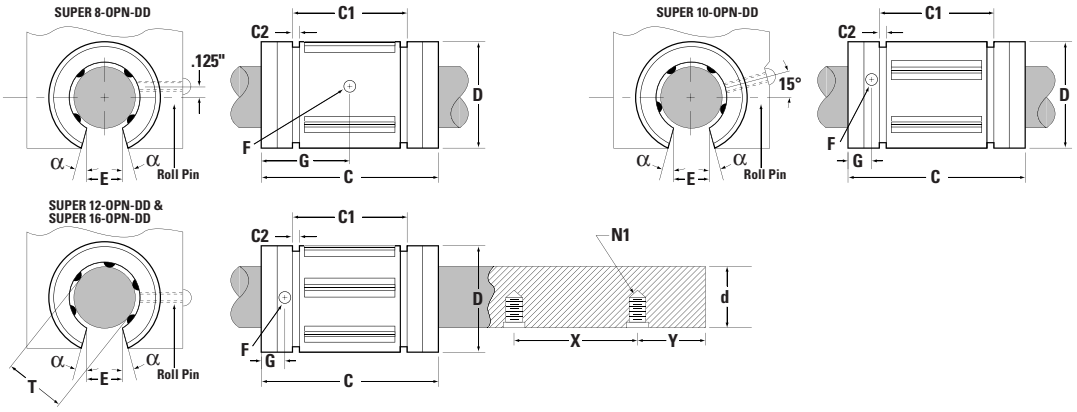

SUPER 8-OPN
SUPER 10-OPN




SUPER 12-OPN
SUPER 16-OPN
SUPER 20-OPN
SUPER 24-OPN
SUPER 32-OPN

# Sealed Super Ball Bushing Bearings
## (Open Type) for Continuously Supported Applications






### Sealed Super Ball Bushing Bearings (Open Type, seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nom. Dia. | Length C | Distance Between Retaining Rings C1 | Ret. Ring Groove min. C2 | Min. Slot Width E | Retention Hole | | Angle deg α | Number of Ball Circuits | Ball Bushing Bearing Mass lb | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | 60 Case Linear Race | | | | | | Dia. F | Loc. G | | | | | | X | Y | N1 |
| SUPER 8-OPN-DD | 1/2 L PD | .500 | 1.500/1.460 | 1.032/1.012 | .050 | .31 | .14 | .750 | 15 | 4 | .03 | .04 | .06 | 4 | 2 | #6-32 |
| SUPER 10-OPN-DD | 5/8 L PD | .625 | 1.750/1.710 | 1.105/1.095 | .056 | .37 | .11 | .250 | 15 | 4 | .08 | .04 | .09 | 4 | 2 | #8-32 |
| SUPER 12-OPN-DD | 3/4 L PD | .750 | 1.875/1.835 | 1.270/1.250 | .056 | .43 | .14 | .250 | 15 | 5 | .12 | .06 | .13 | 6 | 3 | #10-32 |
| SUPER 16-OPN-DD | 1 L PD | 1.000 | 2.625/2.585 | 1.884/1.864 | .070 | .56 | .14 | .313 | 15 | 5 | .21 | .08 | .22 | 6 | 3 | 1/4-20 |

| Part Number [3] | Working Bore Diameter T | Recommended Housing Bore Dia. | | 60 Case LinearRace Diameter d | Ball Bushing Bearing/LinearRace Fit Up ‡ | | Dynamic [1 ‡] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|
| Ball Bushing Bearing | | Fixed D | Adjustable D | | Fixed Diameter Housing | Adjustable Diameter Housing (Before Adjustment) | |
| SUPER 8-OPN-DD | .5000/.4995 | .8755/.8750 | .8760/.8750 | .4995/.4990 | .0015C/.0000 | .002C/.0000 | 230 |
| SUPER 10-OPN-DD | .6250/.6245 | 1.1255/1.1250 | 1.1260/1.1250 | .6245/.6240 | .0015C/.0000 | .002C/.0000 | 320 |
| SUPER 12-OPN-DD | .7500/.7495 | 1.2505/1.2500 | 1.2510/1.2500 | .7495/.7490 | .0015C/.0000 | .002C/.0000 | 470 |
| SUPER 16-OPN-DD | 1.0000/.9995 | 1.5630/1.5625 | 1.5635/1.5625 | .9995/.9990 | .0015C/.0000 | .002C/.0000 | 780 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

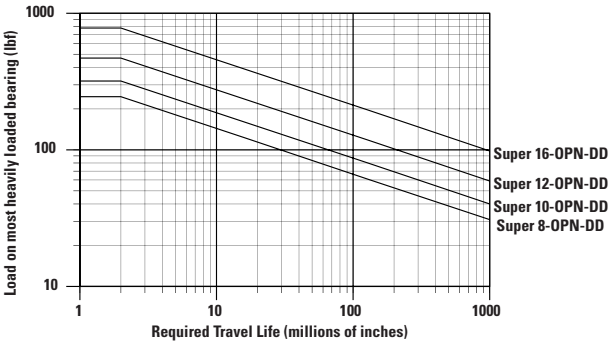
(3) For part number description and specifications see page 56.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

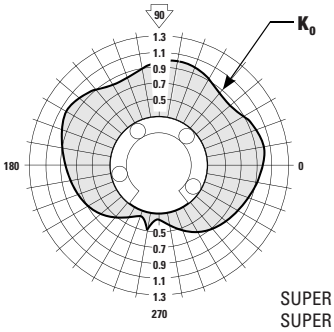
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

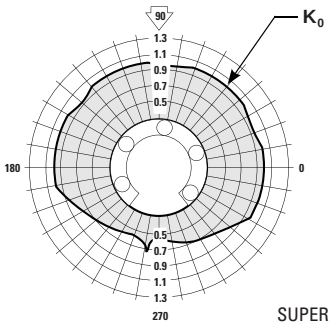
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

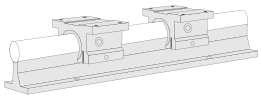



SUPER 8-OPN-DD
SUPER 10-OPN-DD

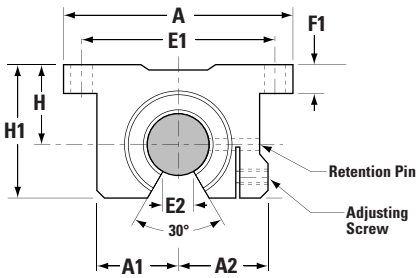



SUPER 12-OPN-DD
SUPER 16-OPN-DD

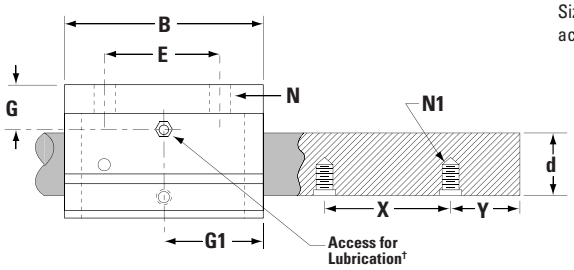
# Super Ball Bushing Pillow Blocks
## (Open Type) for Continuously Supported Applications



SPB-OPN End view




SPB-OPN Side view




† Size .500 has oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.

### Super Ball Bushing Pillow Blocks (Open Type, seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | H ±.003 | H1 | A | A1 | A2 | B | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Pillow Block | 60 Case LinearRace | | | | | | | | | | X | Y | N1 |
| SPB-8-OPN | 1/2 L PD | .500 | .687 | 1.13 | 2.00 | .69 | .75 | 1.50 | .04 | .06 | 4 | 2 | #6-32 |
| SPB-10-OPN | 5/8 L PD | .625 | .875 | 1.44 | 2.50 | .88 | .94 | 1.75 | .04 | .09 | 4 | 2 | #8-32 |
| SPB-12-OPN | 3/4 L PD | .750 | .937 | 1.56 | 2.75 | .94 | 1.00 | 1.88 | .06 | .13 | 6 | 3 | #10-32 |
| SPB-16-OPN | 1 L PD | 1.000 | 1.187 | 2.00 | 3.25 | 1.19 | 1.25 | 2.63 | .08 | .22 | 6 | 3 | 1/4-20 |
| SPB-20-OPN | 1 1/4 L PD | 1.250 | 1.500 | 2.56 | 4.00 | 1.50 | 1.63 | 3.38 | .08 | .35 | 6 | 3 | 5/16-18 |
| SPB-24-OPN | 1 1/2 L PD | 1.500 | 1.750 | 2.94 | 4.75 | 1.75 | 1.88 | 3.75 | .08 | .50 | 8 | 4 | 3/8-16 |
| SPB-32-OPN | 2 L PD | 2.000 | 2.125 | 3.63 | 6.00 | 2.25 | 2.44 | 4.75 | .10 | .89 | 8 | 4 | 1/2-13 |

| Part Number [3] | 60 Case LinearRace Diameter | E ±.010 | E1 ±.010 | E2 Min. | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Pillow Block | d | | | | | | | Hole | Bolt | | |
| SPB-8-OPN | .4995/.4990 | 1.000 | 1.688 | .31 | .25 | .69 | .75 | .16 | #6 | .2 | 230 |
| SPB-10-OPN | .6245/.6240 | 1.125 | 2.125 | .37 | .28 | .42 | .53 | .19 | #8 | .4 | 320 |
| SPB-12-OPN | .7495/.7490 | 1.250 | 2.375 | .43 | .31 | 1.08 | .55 | .19 | #8 | .5 | 470 |
| SPB-16-OPN | .9995/.9990 | 1.750 | 2.875 | .56 | .38 | 1.37 | .76 | .22 | #10 | 1.0 | 780 |
| SPB-20-OPN | 1.2495/1.2490 | 2.000 | 3.500 | .62 | .44 | 1.73 | 1.05 | .22 | #10 | 2.1 | 1170 |
| SPB-24-OPN | 1.4994/1.4989 | 2.500 | 4.125 | .75 | .50 | 2.03 | 1.12 | .28 | .25 | 3.2 | 1560 |
| SPB-32-OPN | 1.9994/1.9987 | 3.250 | 5.250 | 1.00 | .63 | 2.50 | 1.44 | .41 | .38 | 6.0 | 2350 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

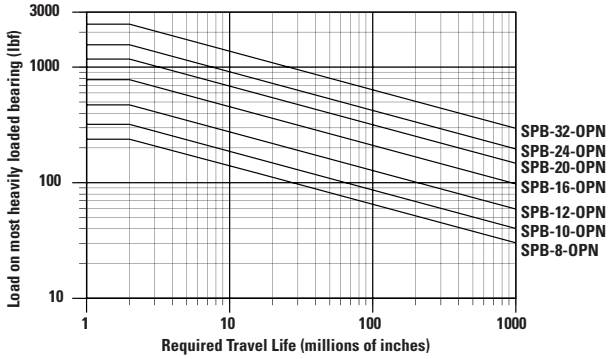
(3) For part number description and specifications see page 56.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

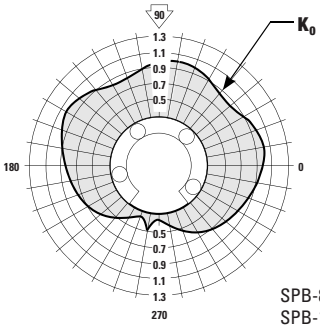
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

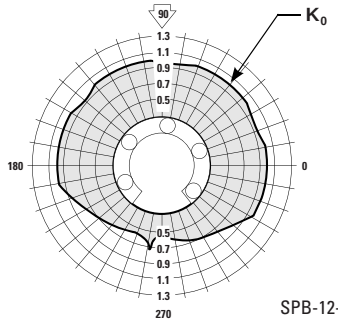
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

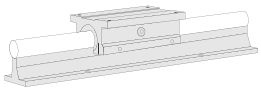



SPB-8-OPN
SPB-10-OPN

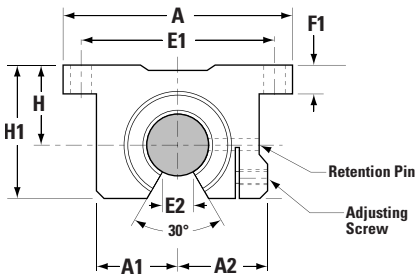



SPB-12-OPN
SPB-16-OPN
SPB-20-OPN
SPB-24-OPN
SPB-32-OPN

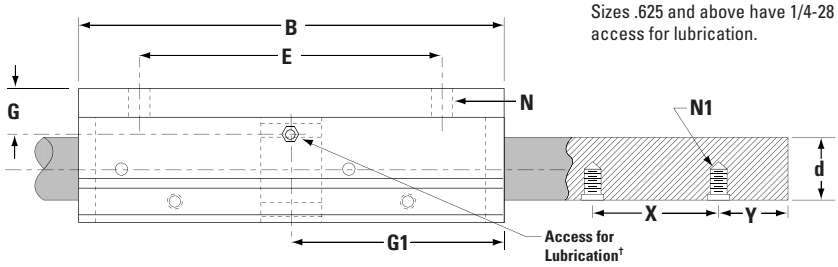
# Super Ball Bushing Twin Pillow Blocks
## (Open Type) for Continuously Supported Applications



**TWN-OPN End view**




**TWN-OPN Side view**




† Size .500 has oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.

### Super Ball Bushing Twin Pillow Blocks (Open Type, seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | H ±.003 | H1 | A | A1 | A2 | B | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Twin Pillow Block | 60 Case LinearRace | | | | | | | | | | X | Y | N1 |
| TWN-8-OPN | 1/2 L PD | .500 | .687 | 1.13 | 2.00 | .69 | .75 | 3.50 | .04 | .06 | 4 | 2 | #6-32 |
| TWN-10-OPN | 5/8 L PD | .625 | .875 | 1.44 | 2.50 | .88 | .94 | 4.00 | .04 | .09 | 4 | 2 | #8-32 |
| TWN-12-OPN | 3/4 L PD | .750 | .937 | 1.56 | 2.75 | .94 | 1.00 | 4.50 | .06 | .13 | 6 | 3 | #10-32 |
| TWN-16-OPN | 1 L PD | 1.000 | 1.187 | 2.00 | 3.25 | 1.19 | 1.25 | 6.00 | .08 | .22 | 6 | 3 | 1/4-20 |
| TWN-20-OPN | 1 1/4 L PD | 1.250 | 1.500 | 2.56 | 4.00 | 1.50 | 1.63 | 7.50 | .08 | .35 | 6 | 3 | 5/16-18 |
| TWN-24-OPN | 1 1/2 L PD | 1.500 | 1.750 | 2.94 | 4.75 | 1.75 | 1.88 | 9.00 | .08 | .50 | 8 | 4 | 3/8-16 |

| Part Number [3] | 60 Case LinearRace Diameter | E ±.010 | E1 ±.010 | E2 Min. | F1 | G | G1 | N | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Super Ball Bushing Twin Pillow Block | d | | | | | | | Hole | Bolt | | |
| TWN-8-OPN | .4995/.4990 | 2.500 | 1.688 | .31 | .25 | .56 | 1.75 | .16 | #6 | .4 | 460 |
| TWN-10-OPN | .6245/.6240 | 3.000 | 2.125 | .37 | .28 | .67 | 2.00 | .19 | #8 | .8 | 640 |
| TWN-12-OPN | .7495/.7490 | 3.500 | 2.375 | .43 | .31 | .94 | 2.25 | .19 | #8 | 1.0 | 940 |
| TWN-16-OPN | .9995/.9990 | 4.500 | 2.875 | .56 | .38 | 1.20 | 3.00 | .22 | #10 | 2.0 | 1560 |
| TWN-20-OPN | 1.2495/1.2490 | 5.500 | 3.500 | .62 | .44 | 1.50 | 3.75 | .22 | #10 | 4.2 | 2340 |
| TWN-24-OPN | 1.4994/1.4989 | 6.500 | 4.125 | .75 | .50 | 1.75 | 4.50 | .28 | .25 | 6.7 | 3120 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

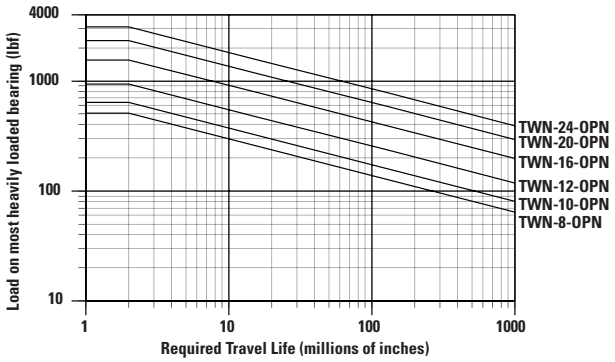
(3) For part number description and specifications see page 56.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Super Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Pillow Block)




**Determining Ball Bushing bearing Size**
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this application.

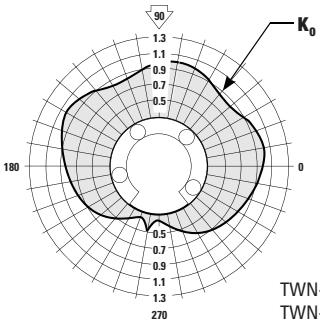
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

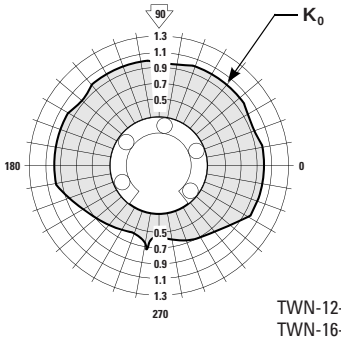
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




TWN-8-OPN
TWN-10-OPN




TWN-12-OPN
TWN-16-OPN
TWN-20-OPN
TWN-24-OPN

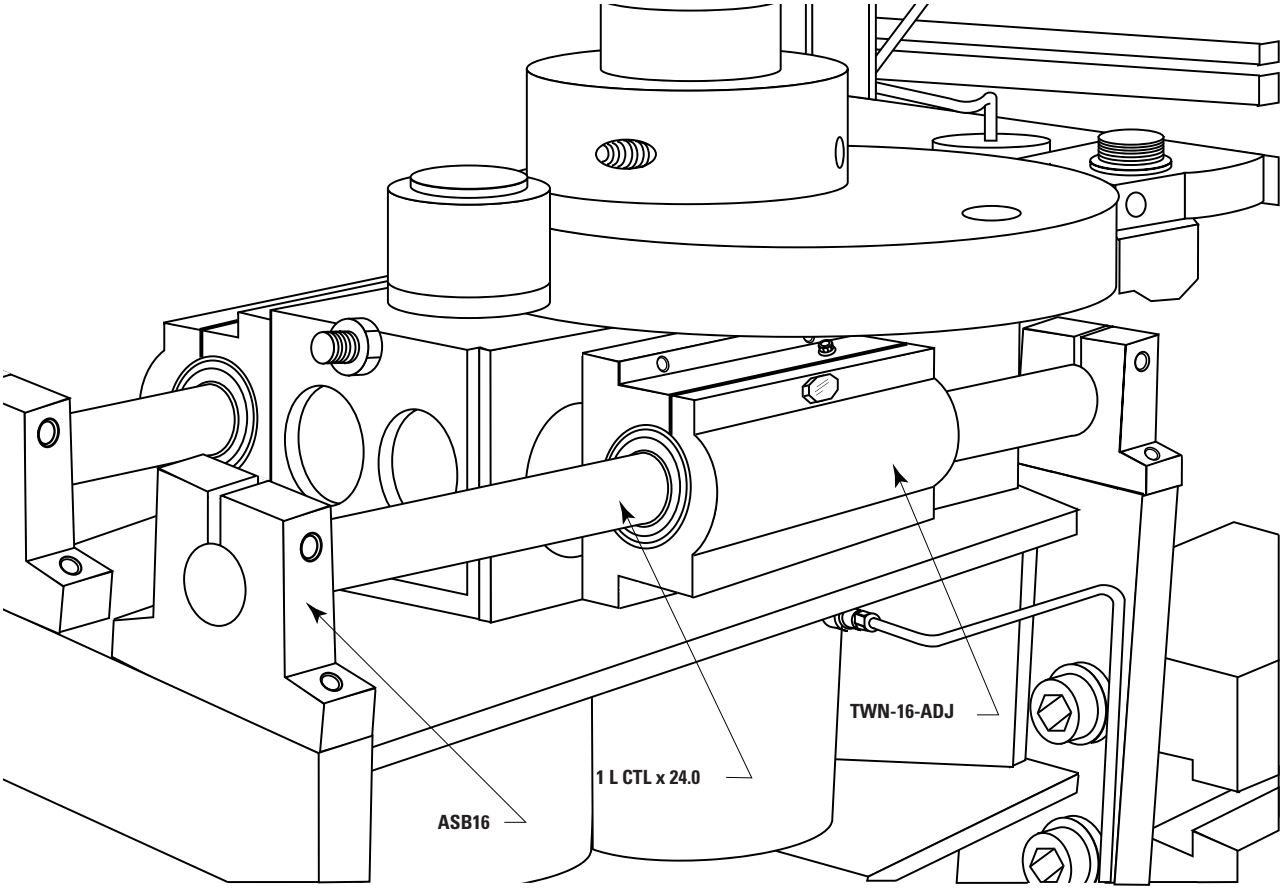
# Cam-Actuated Part Transfer Mechanism for Multiple-Transfer Press

## Objective
Improve production rate and increase the service life of a transfer table mechanism.

## Solution
Replace the conventional linear bearings with Adjustable Super Ball Bushing Twin Pillow Blocks. Bearing service life increased to 5 years.

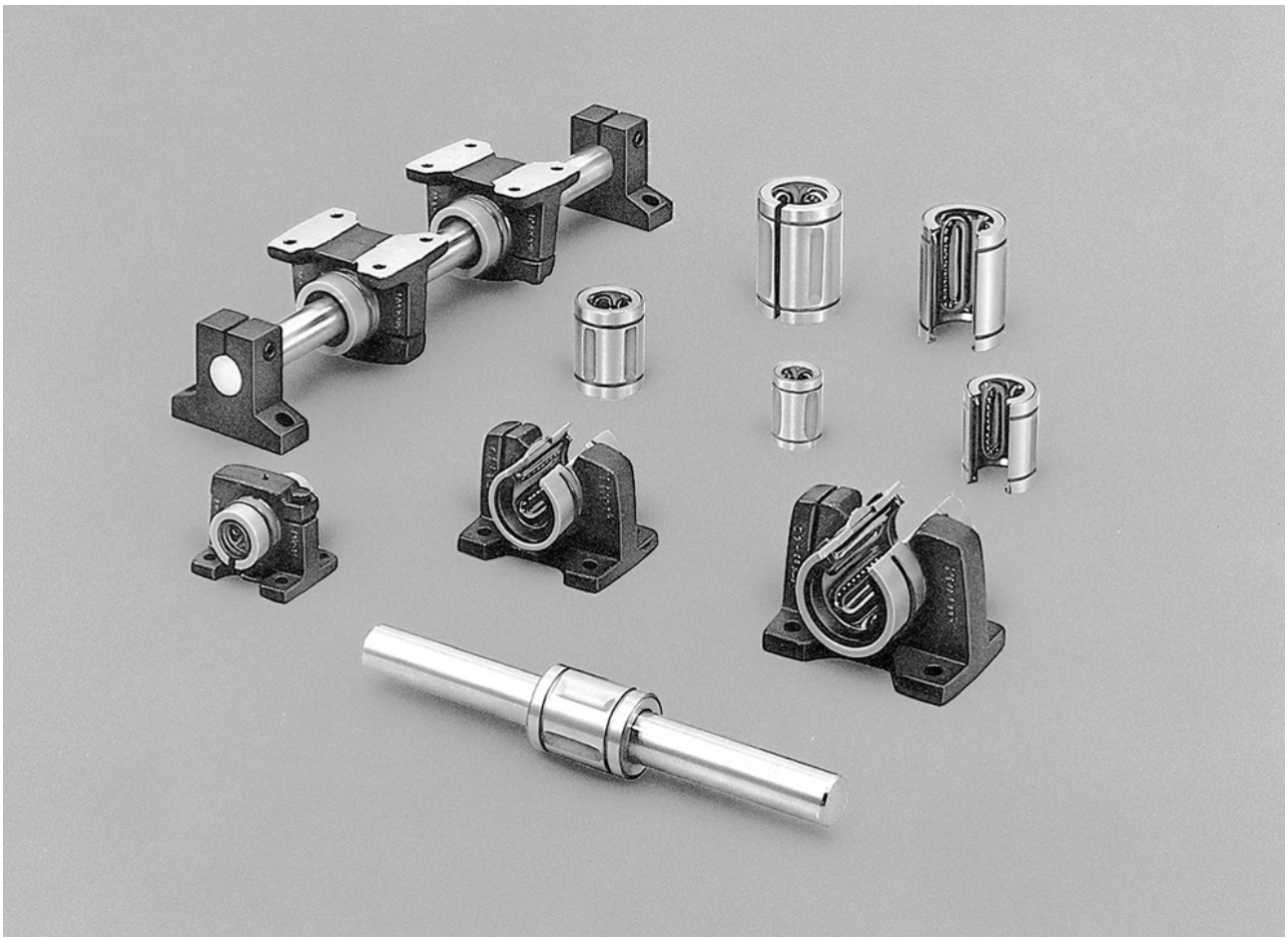
## Products Specified
2 - TWN16-ADJ (Super Ball Bushing Twin Pillow Blocks)
4 - ASB16 (60 Case LinearRace End Support Blocks)
2 - 1 L CTL x 24.00 in (60 Case LinearRace)

## Benefits
The table achieved maximum cycle efficiency by reducing costly downtime and improving service life.



## Inch – Precision Steel Ball Bushing Bearings

# Precision Steel Ball Bushing Bearing Products



**Thomson Precision Steel Ball Bushing Bearing Products offer:**

- A coefficient of friction as low as .001. When replacing high friction plain bearings, Precision Steel Ball Bushing Bearings dramatically improve machine productivity and efficiency.
- All-steel construction, for maximum system rigidity.
- Two accuracy classes allowing for immediate improvements in system positioning and repeatability.
- Availability in fourteen bore sizes and nine configurations.
- The RoundRail Advantage which minimizes installation time and cost.
- Steady state travel speeds up to 10 ft/s and accelerations to 450 ft/s$^2$ without the use of derating factors.
- An operating temperature up to 600° F.
- Availability in a self-aligning pillow block housing for ease of installation and use.
- Worldwide availability from over 1800 authorized distributors.

# Inch – Precision Steel Ball Bushing Bearings

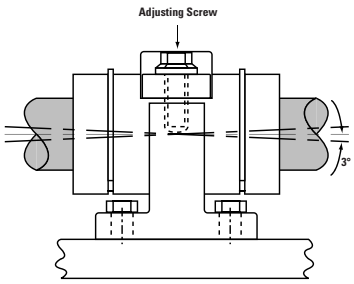



Figure 1

When the Precision Steel Ball Bushing Bearing is installed in its standard Pillow Block it will self-align up to 3 degrees in all directions.

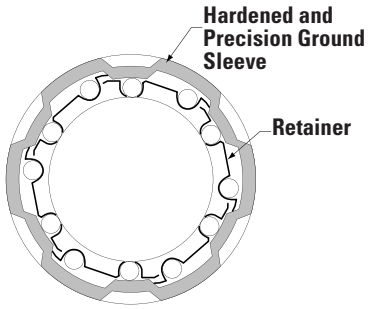



Figure 2

Precision Steel Ball Bushing Bearing Cross-section

The basis for the performance of all Precision Steel Ball Bushing Bearings is a simple but ingenious system of ball recirculation that permits almost frictionless, unlimited travel.

**Replace High Friction Plain Bearings**
Plain bearings cause friction, stick-slip, binding and chatter. The Precision Steel Ball Bushing Bearing's patented ball recirculation virtually eliminates wear and provides a constant coefficient of friction as low as .001. This dramatic reduction in friction allows the designer to use smaller less expensive drive motors, ball screws, belts, linkages and gears.

**Lasting Precision Alignment**
High friction plain bearings cause wear resulting in a loss in system alignment and repeatability. Each Precision Steel Ball Bushing Bearing is manufactured with high quality bearing steel that is hardened and precision ground. The rolling elements of each Ball Bushing Bearing are precision ground bearing balls that recirculate freely into and out of the load zone. The balls are guided through their recirculation path by a steel retainer and hardened sleeve. The inherent non-wear characteristics of each Precision Steel Ball Bushing Bearing assures maximum system accuracy and repeatability.

**High Travel Speeds**
Precision Steel Ball Bushing can operate at travel rates as high as 10 ft/s and accelerations as high as 450 ft/s$^2$. When replacing inefficient v-way or flat-way systems, this travel rate capability provides immediate improvements in machine efficiency and productivity.

**Ease of Installation**
The Precision Steel Ball Bushing Bearing can be retained in a housing, internally or externally. The retaining ring groove on the outside diameter allows the bearing to be captured and retained by an external retaining ring. If internal retention is required, the Ball Bushing Bearing can be installed in a housing and held in place with an internal retaining ring.

**Protection from Contamination**
Precision Steel Ball Bushing Bearings most popular sizes are available with double acting integral wipers that keep out contamination, retain lubrication and maximize travel life.

## Inch – Precision Steel Ball Bushing Bearings

# Part Number Description and Specification

### Precision Steel Ball Bushing Bearings (Closed Type) for End Supported Applications

**A-162536-DD**

| Type | Description |
|---|---|
| A | Precision Steel Ball Bushing Bearings |
| XA | Extra Precision Ball Bushing Bearings |
| ADJ | Adjustable Precision Steel Ball Bushing bearings |

| Size | Nom. Dia. |
|---|---|
| 4812 | .250 |
| 61014 | .375 |
| 81420 | .500 |
| 101824 | .625 |
| 122026 | .750 |
| 162536 | 1.000 |
| 203242 | 1.250 |
| 243848 | 1.500 |
| 324864 | 2.000 |
| 406080 | 2.500 |
| 487296 | 3.000 |
| 6496128 | 4.000 |

| Option | Description |
|---|---|
| – | Standard |
| DD | With Integral Wipers (1/2", 3/4" and 1" only) |
| NB | Nylon Balls |
| DP | Dry Packed |
| SS | Stainless Steel (up to and including 1") |
| LL | Lubricated with Thomson LinearLube |

### Precision Steel Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

**SPB-16-ADJ-CR**

| Type | Description |
|---|---|
| PB | Precision Steel Ball Bushing Pillow Blocks |

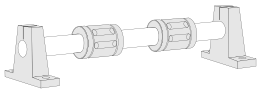
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

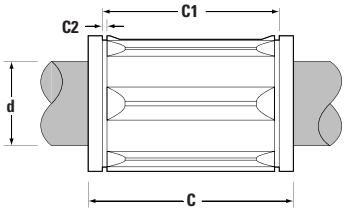
| Type | Description |
|---|---|
| A | Standard |
| ADJ | Adjustable Type |

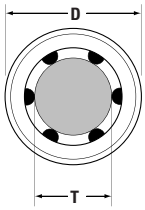
| Option | Description |
|---|---|
| – | Standard |
| SS | Stainless Steel |
| LL | Lubricated with Thomson LinearLube |

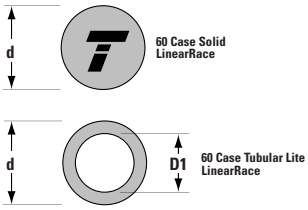
# Precision Steel Ball Bushing Bearings

## (Closed Type) for End Supported Applications






Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

### Precision Steel Ball Bushing Bearings (Closed Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | | Nominal Diameter | Length C | Distance Between Retaining Grooves C1 | Retaining Ring Groove min. C2 | Number of Ball Circuits | D | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearings | | 60 Case Linear Race | | | | | | | | | |
| w/o Seals | with Seals | | | | | | | | | | |
| A-4812 | – | 1/4 S | .250 | .750/.735 | .515/.499 | .039 | 3 | .5000/.4996 | .01 | – | – |
| A-61014 | – | 3/8 S | .375 | .875/.860 | .640/.624 | .039 | 4 | .6250/.6246 | .03 | – | – |
| A-81420 | A-81420-DD | 1/2 S | .500 | 1.250/1.235 | .967/.951 | .046 | 4 | .8750/.8746 | .06 | – | – |
| A-101824 | – | 5/8 S | .625 | 1.500/1.485 | 1.108/1.092 | 0.56 | 4 | 1.1250/1.1246 | .09 | – | – |
| A-122026 | A-122026-DD | 3/4 S | .750 | 1.625/1.610 | 1.170/1.154 | .056 | 5 | 1.2500/1.2496 | .13 | .08 | .46/.41 |
| A-162536 | A-162536-DD | 1 S | 1.000 | 2.250/2.235 | 1.759/1.741 | 0.68 | 5 | 1.5625/1.5621 | .22 | .16 | .62/.56 |
| A-203242 | | 1 1/4 S | 1.250 | 2.625/2.605 | 2.009/1.991 | .068 | 6 | 2.0000/1.9995 | .35 | – | – |
| A-243848 | | 1 1/2 S | 1.500 | 3.000/2.980 | 2.415/2.397 | 0.86 | 6 | 2.3750/2.3745 | .50 | .33 | .93/.84 |
| A-324864 | | 2 S | 2.000 | 4.000/3.980 | 3.195/3.177 | .103 | 6 | 3.0000/2.9994 | .89 | .54 | 1.31/1.18 |
| A-406080 | | 2 1/2 S | 2.500 | 5.000/4.975 | 3.978/3.958 | .120 | 6 | 3.7500/3.7492 | 1.39 | .75 | 1.84/1.66 |
| A-487296 | | 3 S | 3.000 | 6.000/5.970 | 4.728/4.708 | .120 | 6 | 4.5000/4.4990 | 2.00 | 1.11 | 2.20/1.80 |
| A-6496128 | | 4 S | 4.000 | 8.000/7.960 | 6.265/6.235 | .139 | 6 | 6.0000/5.9988 | 3.56 | 1.56 | 3.30/2.70 |

| Part Number [2] | | Working Bore Diameter T | Recommended Housing Bore | | 60 Case LinearRace Diameter d | Precision Steel Ball Bushing Bearing/ LinearRace Fit Up ‡ | Precision Steel Ball Bushing Bearing Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearings | | | Normal Fit | Press Fit | | | | |
| w/o Seals | with Seals | | | | | | | |
| A-4812 | – | .2500/.2495 | .5005/.5000 | .4995/.4990 | .2490/.2485 | .0015C/.0005C | .02 | 19 |
| A-61014 | – | .3750/.3745 | .6255/.6250 | .6245/.6240 | .3740/.3735 | .0015C/.0005C | .06 | 37 |
| A-81420 | A-81420-DD | .5000/.4995 | .8755/.8750 | .8745/.8740 | .4990/.4985 | .0015C/.0005C | .08 | 85 |
| A-101824 | – | .6250/.6245 | 1.1255/1.1250 | 1.1245/1.1240 | .6240/.6235 | .0015C/.0005C | .16 | 150 |
| A-122026 | A-122026-DD | .7500/.7495 | 1.2505/1.2500 | 1.2495/1.2490 | .7490/.7485 | .0015C/.0005C | .21 | 200 |
| A-162536 | A-162536-DD | 1.0000/.9995 | 1.5630/1.5625 | 1.5620/1.5615 | .9990/.9985 | .0015C/.0005C | .38 | 350 |
| A-203242 | – | 1.2500/1.2494 | 2.0010/2.0000 | 1.9993/1.9983 | 1.2490/1.2485 | .0015C/.0004C | 1.10 | 520 |
| A-243848 | – | 1.5000/1.4994 | 2.3760/2.3750 | 2.3743/2.3733 | 1.4989/1.4984 | .0016C/.0005C | 1.43 | 770 |
| A-324864 | – | 2.0000/1.9992 | 3.0010/3.0000 | 2.9992/2.9982 | 1.9987/1.9980 | .0020C/.0005C | 2.75 | 1100 |
| A-406080 | – | 2.5000/2.4990 | 3.7510/3.7500 | Not Normally Recommended | 2.4985/2.4977 | .0023C/.0005C | 5.50 | 1800 |
| A-487296 | – | 3.0000/2.9988 | 4.5010/4.5000 | | 2.9983/2.9974 | .0026C/.0005C | 9.50 | 2600 |
| A-6496128 | – | 4.0000/3.9980 | 6.0010/6.0000 | | 3.9976/3.9964 | .0036C/.0004C | 20.20 | 5000 |

‡ P = Preload, C = Clearance

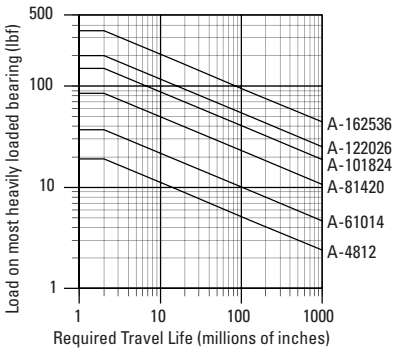
[1] The Dynamic Load Capacity is based on a rated travel life of 2 million inches.
The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

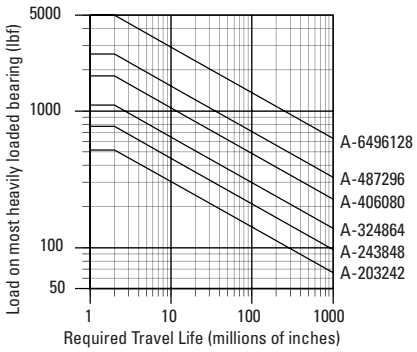
[2] For part number description and specifications see page 68.
Note: Precision Steel Ball Bushing Bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing Bearings. For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

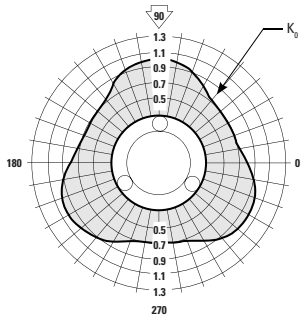
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

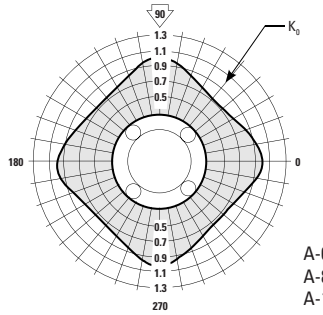
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

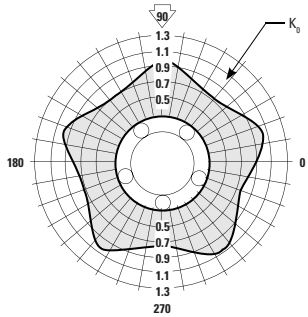
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.



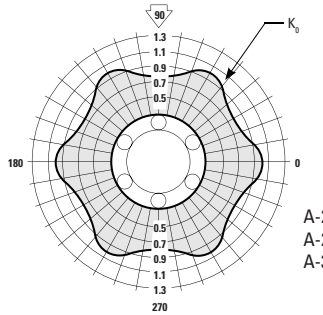

A-4812




A-61014
A-81420
A-101824

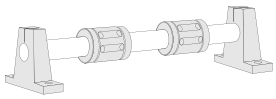


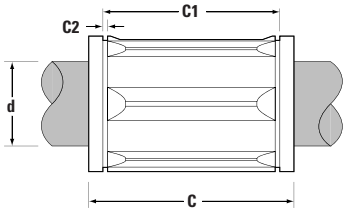

A-122026
A-162536

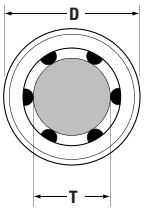


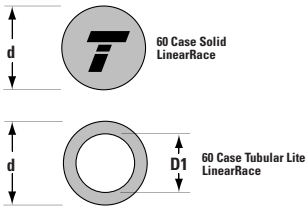

A-203242 A-406080
A-243848 A-487296
A-324864 A-6496128

# Extra Precision Steel Ball Bushing Bearings
## (Closed Type) for End Supported Applications






Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

### Extra Precision Steel Ball Bushing Bearings (Closed Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | | Nominal Diameter | Length C | Distance Between Retaining Grooves C1 | Retaining Ring Groove min. C2 | Number of Ball Circuits | D | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Extra Precision Steel Ball Bushing Bearing | | 60 Case Linear Race | | | | | | | | | |
| w/o Wipers | with Wipers | | | | | | | | | | |
| XA-4812 | – | 1/4 L | .250 | .750/.735 | .515/.499 | .039 | 3 | .5000/.4996 | .01 | – | – |
| XA-61014 | – | 3/8 L | .375 | .875/.860 | .640/.624 | .039 | 4 | .6250/.6246 | .03 | – | – |
| XA-81420 | XA-81420-DD | 1/2 L | .500 | 1.250/1.235 | .967/.951 | .046 | 4 | .8750/.8746 | .06 | – | – |
| XA-101824 | – | 5/8 L | .625 | 1.500/1.485 | 1.108/1.092 | 0.56 | 4 | 1.1250/1.1246 | .09 | – | – |
| XA-122026 | XA-122026-DD | 3/4 L | .750 | 1.625/1.610 | 1.170/1.154 | .056 | 5 | 1.2500/1.2496 | .13 | .08 | .46/.41 |
| XA-162536 | XA-162536-DD | 1 L | 1.000 | 2.250/2.235 | 1.759/1.741 | 0.68 | 5 | 1.5625/1.5621 | .22 | .16 | .62/.56 |
| XA-203242 | | 1 1/4 L | 1.250 | 2.625/2.605 | 2.009/1.991 | .068 | 6 | 2.0000/1.9995 | .35 | – | – |
| XA-243848 | | 1 1/2 L | 1.500 | 3.000/2.980 | 2.415/2.397 | 0.86 | 6 | 2.3750/2.3745 | .50 | .33 | .93/.84 |
| XA-324864 | | 2 L | 2.000 | 4.000/3.980 | 3.195/3.177 | .103 | 6 | 3.0000/2.9994 | .89 | .54 | 1.31/1.18 |
| XA-406080 | | 2 1/2 L | 2.500 | 5.000/4.975 | 3.978/3.958 | .120 | 6 | 3.7500/3.7492 | 1.39 | .75 | 1.84/1.66 |
| XA-487296 | | 3 L | 3.000 | 6.000/5.970 | 4.728/4.708 | .120 | 6 | 4.5000/4.4990 | 2.00 | 1.11 | 2.20/1.80 |
| XA-6496128 | | 4 L | 4.000 | 8.000/7.960 | 6.265/6.235 | .139 | 6 | 6.0000/5.9988 | 3.56 | 1.56 | 3.30/2.70 |

| Part Number [2] | | Working Bore Diameter T | Recommended Housing Bore | | 60 Case LinearRace Diameter d | Precision Steel Ball Bushing Bearing/ LinearRace Fit Up ‡ | Precision Steel Ball Bushing Bearing Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|
| w/o Seals | with Seals | | Normal Fit | Press Fit | | | | |
| XA-4812 | – | .2500/.2497 | .5005/.5000 | Not Normally Recommended | .2495/.2490 | .0010C/.0002C | .02 | 19 |
| XA-61014 | – | .3750/.3747 | .6255/.6250 | | .3745/.3740 | .0010C/.0002C | .06 | 37 |
| XA-81420 | XA-81420-DD | .5000/.4997 | .8755/.8750 | | .4995/.4990 | .0010C/.0002C | .08 | 85 |
| XA-101824 | – | .6250/.6247 | 1.1255/1.1250 | | .6245/.6240 | .0010C/.0002C | .16 | 150 |
| XA-122026 | XA-122026-DD | .7500/.7497 | 1.2505/1.2500 | | .7495/.7490 | .0010C/.0002C | .21 | 200 |
| XA-162536 | XA-162536-DD | 1.0000/.9997 | 1.5630/1.5625 | | .9995/.9990 | .0010C/.0002C | .38 | 350 |
| XA-203242 | – | 1.2500/1.2496 | 2.0010/2.0000 | | 1.2495/1.2490 | .0010C/.0001C | 1.10 | 520 |
| XA-243848 | – | 1.5000/1.4996 | 2.3760/2.3750 | | 1.4994/1.4989 | .0011C/.0002C | 1.43 | 770 |
| XA-324864 | – | 2.0000/1.9996 | 3.0010/3.0000 | | 1.9994/1.9987 | .0013C/.0002C | 2.75 | 1100 |
| XA-406080 | – | 2.5000/2.4995 | 3.7510/3.7500 | | 2.4993/2.4985 | .0015C/.0002C | 5.50 | 1800 |
| XA-487296 | – | 3.0000/2.9994 | 4.5010/4.5000 | | 2.9992/2.9983 | .0017C/.0002C | 9.50 | 2600 |
| XA-6496128 | – | 4.0000/3.9990 | 6.0010/6.0000 | | 3.9988/3.9976 | .0024C/.0002C | 20.20 | 5000 |

‡ P = Preload, C = Clearance

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

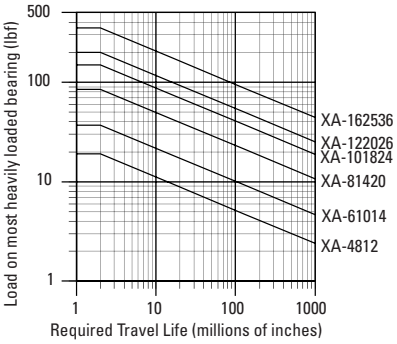
(2) For part number description and specifications see page 68.

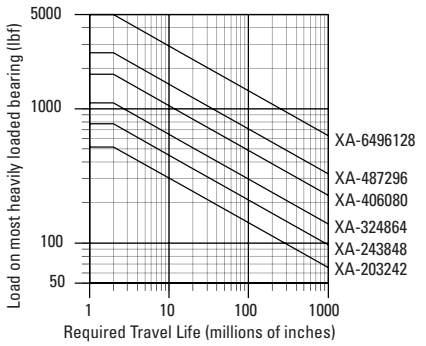
Note: Precision Steel Ball Bushing Bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing Bearings. For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

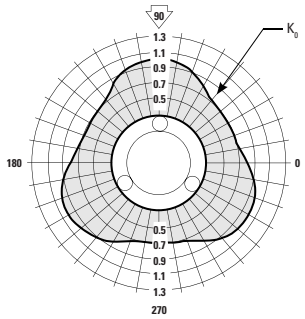
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

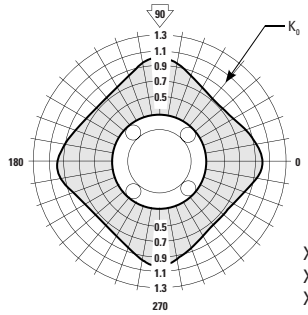
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

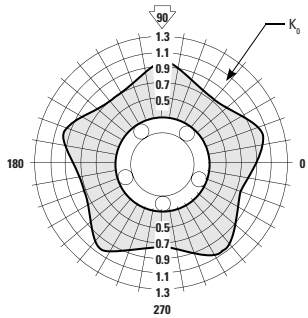
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.



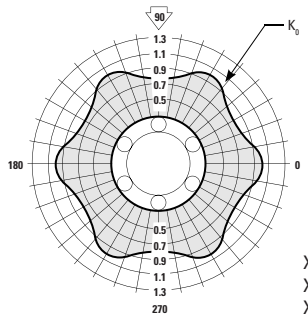

XA-4812




XA-61014
XA-81420
XA-101824



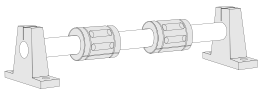

XA-122026
XA-162536

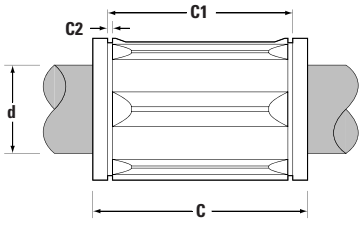


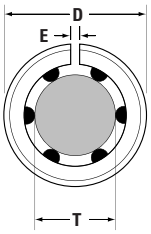

XA-203242 XA-406080
XA-243848 XA-487296
XA-324864 XA-6496128

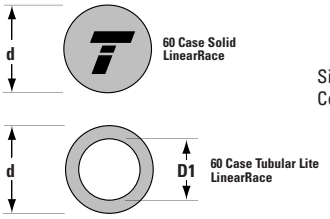
# Adjustable Precision Steel Ball Bushing Bearings

## (Closed Type) for End Supported Applications






Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

### Adjustable Precision Steel Ball Bushing Bearings and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | Nominal Diameter | Length C | Distance Between Retaining Grooves C1 | Retaining Ring Groove min. C2 | Min. Slot Width E | Number of Ball Circuits | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearing | 60 Case Linear Race | | | | | | | | | | |
| ADJ-81420 | 1/2 L | .500 | 1.250/1.235 | .967/.951 | .046 | .06 | 4 | .04 | .06 | – | – |
| ADJ-101824 | 5/8 L | .625 | 1.500/1.485 | 1.108/1.092 | 0.56 | .09 | 4 | .04 | .09 | – | – |
| ADJ-122026 | 3/4 L | .750 | 1.625/1.610 | 1.170/1.154 | .056 | .09 | 5 | .06 | .13 | .08 | .46/.41 |
| ADJ-162536 | 1 L | 1.000 | 2.250/2.235 | 1.759/1.741 | 0.68 | .09 | 5 | .08 | .22 | .16 | .62/.56 |
| ADJ-203242 | 1 1/4 L | 1.250 | 2.625/2.605 | 2.009/1.991 | .068 | .09 | 6 | .08 | .35 | – | – |
| ADJ-243848 | 1 1/2 L | 1.500 | 3.000/2.980 | 2.415/2.397 | 0.86 | .13 | 6 | .08 | .50 | .33 | .93/.84 |
| ADJ-324864 | 2 L | 2.000 | 4.000/3.980 | 3.195/3.177 | .103 | .13 | 6 | .10 | .89 | .54 | 1.31/1.18 |
| ADJ-406080 | 2 1/2 L | 2.500 | 5.000/4.975 | 3.978/3.958 | .120 | .13 | 6 | .10 | 1.39 | .75 | 1.84/1.66 |
| ADJ-487296 | 3 L | 3.000 | 6.000/5.970 | 4.728/4.708 | .120 | .13 | 6 | .10 | 2.00 | 1.11 | 2.20/1.80 |
| ADJ-6496128 | 4 L | 4.000 | 8.000/7.960 | 6.265/6.235 | .139 | .13 | 6 | .10 | 3.56 | 1.56 | 3.30/2.70 |

| Part Number [2] | Working Bore Diameter T | Recommended Housing Bore Diameter D | 60 Case LinearRace Diameter d | Precision Steel Ball Bushing Bearing Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearing | | Normal Fit | | | |
| ADJ-81420 | .5000/.4995 | .8755/.8750 | .4995/.4990 | .08 | 85 |
| ADJ-101824 | .6250/.6245 | 1.1255/1.1250 | .6245/.6240 | .16 | 150 |
| ADJ-122026 | .7500/.7495 | 1.2505/1.2500 | .7495/.7490 | .21 | 200 |
| ADJ-162536 | 1.0000/.9995 | 1.5630/1.5625 | .9995/.9990 | .38 | 350 |
| ADJ-203242 | 1.2500/1.2494 | 2.0010/2.0000 | 1.2495/1.2490 | 1.10 | 520 |
| ADJ-243848 | 1.5000/1.4994 | 2.3760/2.3750 | 1.4994/1.4989 | 1.43 | 770 |
| ADJ-324864 | 2.0000/1.9992 | 3.0010/3.0000 | 1.9994/1.9987 | 2.75 | 1100 |
| ADJ-406080 | 2.5000/2.4990 | 3.7510/3.7500 | 2.4993/2.4985 | 5.50 | 1800 |
| ADJ-487296 | 3.0000/2.9988 | 4.5010/4.5000 | 2.9992/2.9983 | 9.50 | 2600 |
| ADJ-6496128 | 4.0000/3.9980 | 6.0010/6.0000 | 3.9988/3.9976 | 20.20 | 5000 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

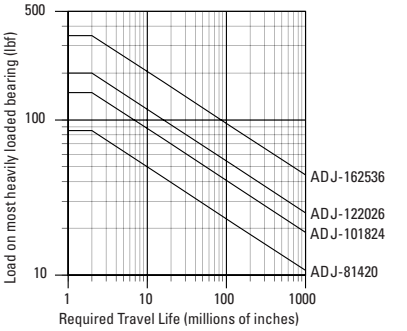
(2) For part number description and specifications see page 68.

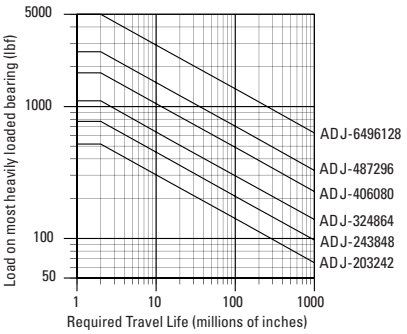
Note: Precision Steel Ball Bushing Bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing Bearings. For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

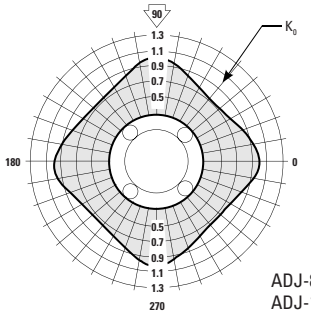
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

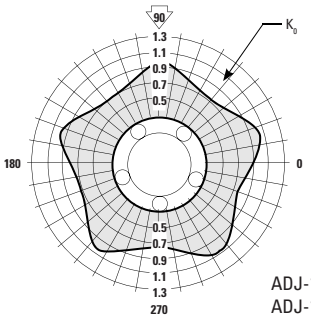
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

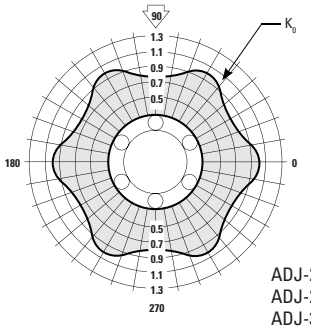
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




ADJ-81420
ADJ-101824



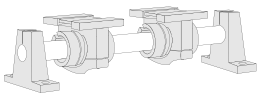

ADJ-122026
ADJ-162536

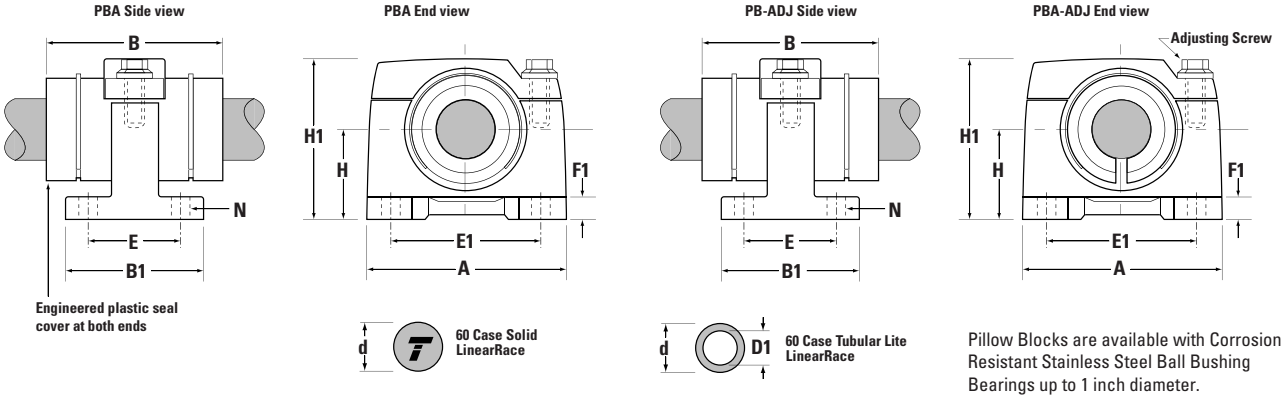



ADJ-203242
ADJ-243848
ADJ-324864
ADJ-406080
ADJ-487296
ADJ-6496128

# Precision Steel Ball Bushing Pillow Blocks

## (Closed and Adjustable Type) for End Supported Applications






Pillow Blocks are available with Corrosion Resistant Stainless Steel Ball Bushing Bearings up to 1 inch diameter.

### Precision Steel Ball Bushing Pillow Blocks (Closed and Adjustable Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [2] | | | | Nom. Dia. | H ±.005 | H1 | Class S 60 Case LinearRace Diameter d | Class L 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace Mass lb/in | 60 Case Tubular Lite LinearRace ID D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Pillow Block Closed | 60 Case LinearRace Class S | Precision Steel Ball Bushing Pillow Block Adjustable | 60 Case LinearRace Class L | | | | | | | | | |
| PB-8-A | 1/2 S | PB-8-ADJ | 1/2 L | .500 | .875 | 1.63 | .4990/.4985 | .4995/.4990 | .04 | .06 | – | – |
| PB-12-A | 3/4 S | PB-12-ADJ | 3/4 L | .750 | 1.125 | 2.13 | .7490/.7485 | .7495/.7490 | .06 | .13 | .08 | .46/.41 |
| PB-16-A | 1 S | PB-16-ADJ | 1 L | 1.000 | 1.375 | 2.56 | .9990/.9985 | .9995/.9990 | .08 | .22 | .16 | .62/.56 |
| PB-20-A | 1 1/4 S | PB-20-ADJ | 1 1/4 L | 1.250 | 1.750 | 3.25 | 1.2490/1.2485 | 1.2495/1.2490 | .08 | .35 | – | – |
| PB-24-A | 1 1/2 S | PB-24-ADJ | 1 1/2 L | 1.500 | 2.000 | 3.75 | 1.4989/1.4984 | 1.4994/1.4989 | .08 | .50 | .33 | .93/.84 |
| PB-32-A | 2 S | PB-32-ADJ | 2 L | 2.000 | 2.500 | 4.75 | 1.9987/1.9980 | 1.9994/1.9987 | .10 | .89 | .54 | 1.31/1.18 |

| Part Number [2] | | A | B | B1 | E ±.010 | E1 ±.010 | F1 | H | | Pillow Block Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Pillow Block | | | | | | | | Hole | Bolt | | |
| Closed | Adjustable | | | | | | | | | | |
| PB-8-A | PB-8-ADJ | 2.00 | 1.69 | 1.50 | 1.000 | 1.500 | .25 | .19 | #8 | .5 | 85 |
| PB-12-A | PB-12-ADJ | 2.75 | 2.06 | 2.00 | 1.375 | 2.000 | .31 | .22 | #10 | 1.3 | 200 |
| PB-16-A | PB-16-ADJ | 3.25 | 2.88 | 2.25 | 1.500 | 2.500 | .38 | .28 | 1/4 | 2.1 | 350 |
| PB-20-A | PB-20-ADJ | 4.00 | 3.63 | 2.75 | 1.875 | 3.000 | .44 | .34 | 5/16 | 4.4 | 520 |
| PB-24-A | PB-24-ADJ | 4.75 | 4.00 | 3.00 | 2.000 | 3.500 | .50 | .34 | 5/16 | 5.7 | 770 |
| PB-32-A | PB-32-ADJ | 6.00 | 5.00 | 3.50 | 2.500 | 4.500 | .63 | .41 | 3/8 | 10.5 | 1100 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

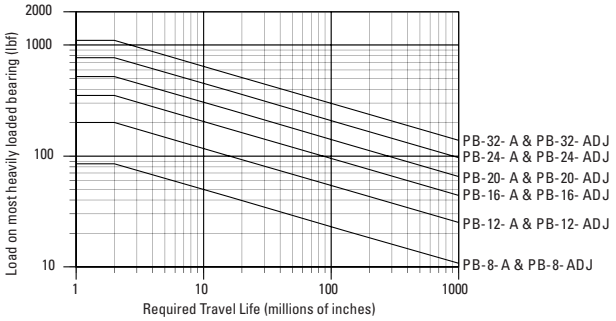
(2) For part number description and specifications see page 68.

Note: Precision Steel Ball Bushing Bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing Bearings. For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

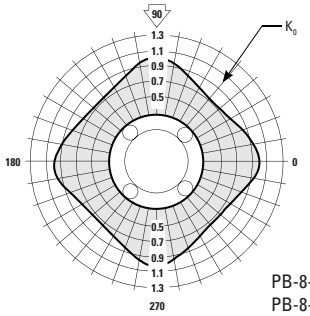
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

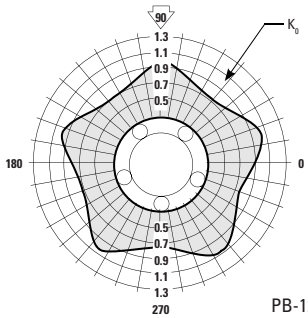
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

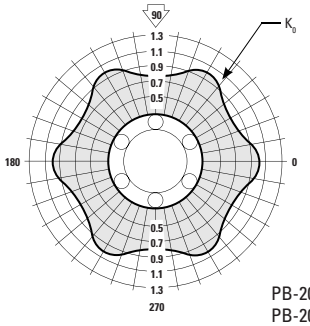
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




PB-8-A
PB-8-ADJ

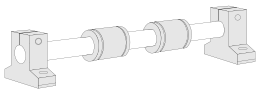


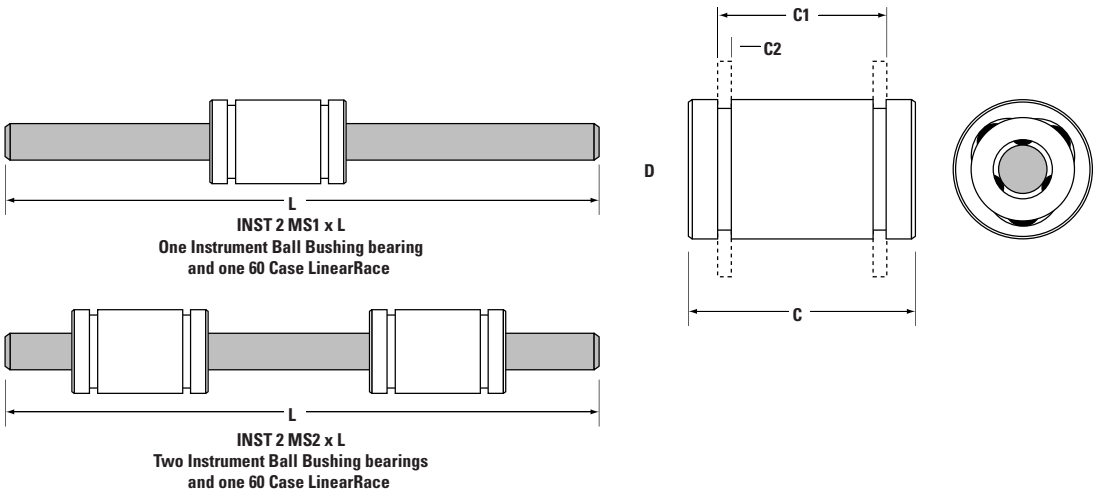

PB-12-A
PB-12-ADJ
PB-16-A
PB-16-ADJ




PB-20-A
PB-20-ADJ
PB-24-A
PB-24-ADJ
PB-32-A
PB-32-ADJ

# Miniature Instrument Ball Bushing Bearing and 60 Case LinearRace Sets






## Miniature Instrument Ball Bushing Bearings and 60 Case LinearRace Sets (Dimensions in inches)

| Part Number | | Nominal Diameter | Outside Diameter D | Ball Bushing Bearing Length C | Distance Between Retaining Rings C1 | Retaining Ring Groove min. C2 | Recommended ‡ Housing Bore | Number of Ball Circuits | Ball Bushing Bearing Mass lb/in | 60 Case LinearRace Mass lb/in |
|---|---|---|---|---|---|---|---|---|---|---|
| Miniature Instrument Ball Bushing and LinearRace Sets | | | | | | | | | | |
| One Bearing | Two Bearings | | | | | | | | | |
| INST 2 MS1 | INST 2 MS2 | .1250 | .3125/.3121 | .500/.485 | .354 | .028 | .3130/.3124 | 3 | .007 | .004 |
| INST 3 MS1 | INST 3 MS2 | .1875 | .3750/.3746 | .562/.547 | .417 | .028 | .3755/.3749 | 3 | .011 | .008 |
| INST 4 MS1 | INST 4 MS2 | .2500 | .5000/.4996 | .750/.735 | .499 | .039 | .5005/.4999 | 3 | .025 | .014 |

## Miniature Instrument Ball Bushing Bearings (Dimensions in inches)

| Part Number | Working Bore Diameter | 60 Case LinearRace Part Number | LinearRace Maximum Length | 60 Case LinearRace Diameter d | Instrument Ball Bushing Bearing/ LinearRace Set Fit Up | Dynamic (1) Load Capacity $lb_t$ |
|---|---|---|---|---|---|---|
| Miniature Instrument Ball Bushing Bearing | | | | | | |
| INST 258-SS | .1250/.1247 | LRI 2 | 12 | .1248/.1247 | .0003C/.0001C | 7 |
| INST 369-SS | .1875/.1872 | LRI 3 | 12 | .1873/.1872 | .0003C/.0001C | 9 |
| INST 4812-SS | .2500/.2497 | LRI 4 | 12 | .2498/.2497 | .0003C/.0001C | 19 |

‡ Press fit not recommended.

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches.
The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. The dynamic load capacity for MS2 configurations are based on two bearings equally loaded.

Note: For additional technical information, see the Engineering section beginning on page 245.

## Part Number Description

**INST 2 MS1 x L3.0**

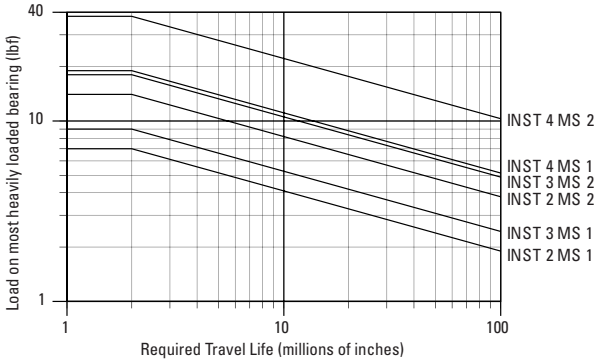
| Instrument Ball Bushing Product | 60 Case LinearRace diameter | | Type of Matched Set | | Length of 60 Case LinearRace in inches (3.0 in.) |
|---|---|---|---|---|---|
| | 2 | 1/8 in. | MS1 | one bearing and one 60 Case LinearRace | |
| | 3 | 3/16 in. | MS2 | two bearings and one 60 Case LinearRace | |
| | 4 | 1/4 in. | | | |

**60 Case LinearRace Specifications**
Material: 440 Stainless Steel
Hardness: 55 HRC minumum
Surface Finish: 4 $R_a$ microinch
Straightness: .0001 inch per inch

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

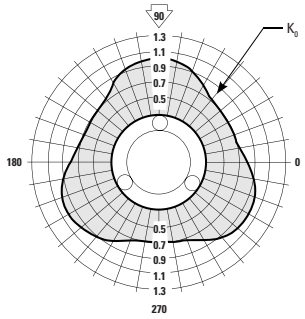
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

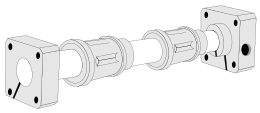
Where $K_0$ can be determined from the Polar Graph to the right.

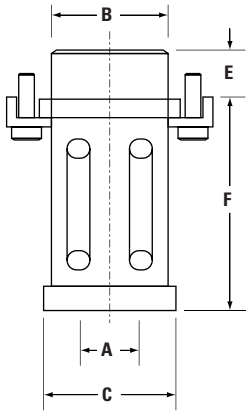
## Polar Graphs

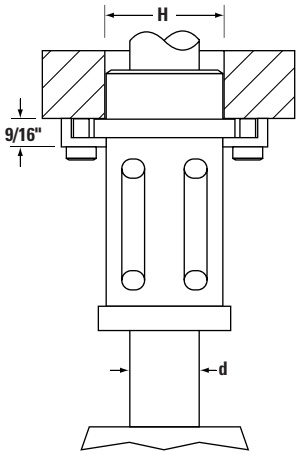
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.



# Die Set Ball Bushing Bearings
## for End Supported Applications






### Precision Series Die Set Ball Bushing Bearings and 60 Case LinearRace (Dimensions in inches)

| Part Number | | Nominal Diameter | 60 Case LinearRace Diameter d | Working Bore Diameter A | Ball Bushing Pilot Diameter B | O.D. C | Ball Bushing Bearing Pilot Length E | F | Recommended Mounting Hole Diameter H | Concentricity of Pilot (B) to Bearing Bore (A) (TIR) | Dynamic (1) Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DS Ball Bushing Bearing | 60 Case Linear Race | | | | | | | | | | |
| DS-16 | 1 D | 1.000 | 1.0003/1.0000 | .9999/.9996 | 1.5007/1.5003 | 1.91 | .94 | 3.17 | 1.5005/1.5000 | .0007 | 350 |
| DS-20 | 1 1/4 D | 1.250 | 1.2503/1.2500 | 1.2498/1.2495 | 1.7507/1.7503 | 2.31 | 1.19 | 3.67 | 1.7505/1.7500 | .0007 | 520 |
| DS-24 | 1 1/2 D | 1.500 | 1.5003/1.5000 | 1.4997/1.4994 | 2.0007/2.0003 | 2.72 | 1.44 | 4.17 | 2.0005/2.0000 | .0007 | 770 |
| DS-32 | 2 D | 2.000 | 2.0003/2.0000 | 1.9995/1.9992 | 2.5007/2.5003 | 3.53 | 1.94 | 4.42 | 2.5005/2.5000 | .0007 | 1100 |

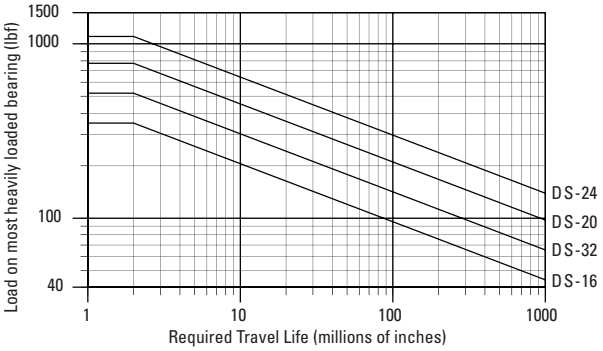
(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

Note: For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precision Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

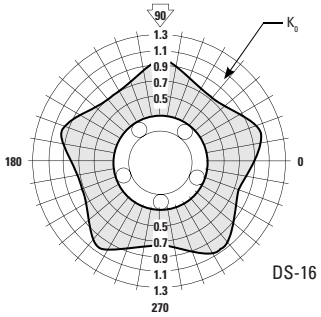
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

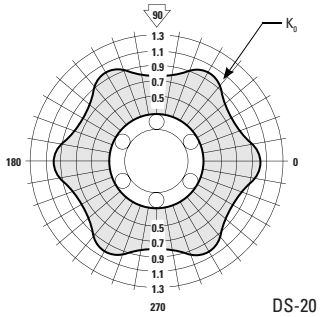
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




DS-16




DS-20
DS-24
DS-32

# Part Number Description and Specification

## Precision Steel Ball Bushing Bearings (Open Type) for Continuously Supported Applications

**OPN-162536-DD**

| Type | Description |
|---|---|
| OPN | Precision Steel Ball Bushing Bearings (Open type) |

| Size | Nominal Diameter |
|---|---|
| 81420 | .500 |
| 101824 | .625 |
| 122026 | .750 |
| 162536 | 1.000 |
| 203242 | 1.250 |
| 243848 | 1.500 |
| 324864 | 2.000 |
| 406080 | 2.500 |
| 487296 | 3.000 |
| 6496128 | 4.000 |

| Option | Description |
|---|---|
| – | Standard |
| SP | Stainless Steel Balls, Black Oxide Sleeve and Retainer |
| NB | Nylon Balls |
| DP | Dry Packed |
| SS | Stainless Steel With Integral Wipers |
| LL | Lubricated with Thomson LinearLube |

## Precision Steel Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications

**PBO-8-OPN-SS**

| Type | Description |
|---|---|
| PBO | Precision Steel Ball Bushing Pillow Blocks (Open Type) |

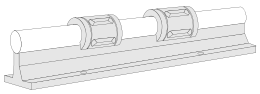
| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |

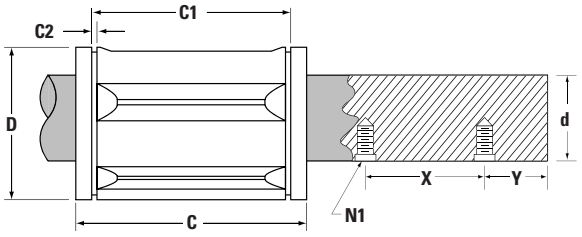
| Type | Description |
|---|---|
| OPN | Open Type |

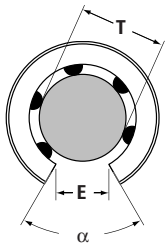
| Option | Description |
|---|---|
| SS | Stainless Steel |
| LL | Lubricated with Thomson LinearLube |

## Inch – Precision Steel Ball Bushing Bearings

# Precision Steel Ball Bushing Bearings
## (Open Type) for Continuously Supported Applications






Sizes .500 thru 1.00 available in Corrosion resistant Stainless Steel.

### Precision Steel Ball Bushing Bearings (Open Type) and 60 Case LinearRace (Dimensions in inches)

| Part Number [3] | | Nominal Diameter | Length C | Distance Between Retaining Rings C1 | Ret. Ring Groove min. C2 | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearing | 60 Case Linear Race | | | | | | | X | Y | N1 |
| OPN-81420 | 1/2 L PD | .500 | 1.250/1.235 | .967/.951 | .046 | .04 | .06 | 4 | 2 | #6-32 |
| OPN-101824 | 5/8 L PD | .625 | 1.500/1.485 | 1.108/1.092 | .056 | .04 | .09 | 4 | 2 | #8-32 |
| OPN-122026 | 3/4 L PD | .750 | 1.625/1.610 | 1.170/1.154 | .056 | .06 | .13 | 6 | 3 | #10-32 |
| OPN-162536 | 1 L PD | 1.000 | 2.250/2.235 | 1.759/1.741 | .068 | .08 | .22 | 6 | 3 | 1/4-20 |
| OPN-203242 | 1 1/4 L PD | 1.250 | 2.625/2.605 | 2.009/1.991 | .068 | .08 | .35 | 6 | 3 | 5/16-18 |
| OPN-243848 | 1 1/2 L PD | 1.500 | 3.000/2.980 | 2.415/2.397 | .086 | .08 | .50 | 8 | 4 | 3/8-16 |
| OPN-324864 | 2 L PD | 2.000 | 4.000/3.980 | 3.195/3.177 | .103 | .10 | .89 | 8 | 4 | 1/2-13 |
| OPN-406080 | 2 1/2 L | 2.500 | 5.000/4.975 | 3.978/3.958 | .120 | .10 | 1.39 | 8 | 4 | specify hole size |
| OPN-487296 | 3 L | 3.000 | 6.000/5.970 | 4.728/4.708 | .120 | .10 | 2.00 | 8 | 4 | specify hole size |
| OPN-6496128 | 4 L | 4.000 | 8.000/7.960 | 6.265/6.235 | .139 | .10 | 3.56 | 8 | 4 | specify hole size |

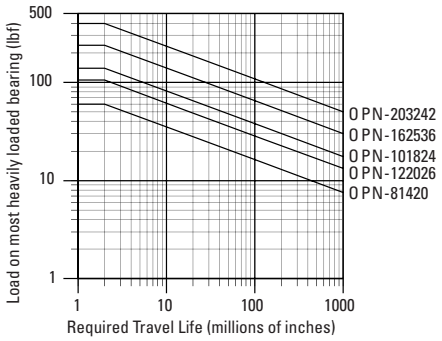
| Part Number [3] | Working Bore Diameter T | Recommended Housing Bore Before Adjustment D | 60 Case LinearRace Diameter d | Minimum Slot Width E | Angle deg α | Number of Ball Circuits | Ball Bushing Bearing Mass lb | Dynamic [1] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Bearing | | | | | | | | |
| OPN-81420 | .5005/.4995 | .8760/.8740 | .4995/.4990 | .31 | 50 | 3 | .07 | 60 |
| OPN-101824 | .6255/.6245 | 1.1260/1.1240 | .6245/.6240 | .38 | 60 | 3 | .11 | 105 |
| OPN-122026 | .7505/.7495 | 1.2510/1.2490 | .7495/.7490 | .44 | 60 | 4 | .17 | 140 |
| OPN-162536 | 1.0005/.9995 | 1.5635/1.5615 | .9995/.9990 | .56 | 60 | 4 | .32 | 240 |
| OPN-203242 | 1.2506/1.2494 | 2.0010/1.9990 | 1.2495/1.2490 | .63 | 50 | 5 | .90 | 400 |
| OPN-243864 | 1.5006/1.4994 | 2.3760/2.3740 | 1.4994/1.4989 | .75 | 50 | 5 | 1.12 | 600 |
| OPN-324864 | 2.0008/1.9992 | 3.0010/2.9990 | 1.9994/1.9987 | 1.00 | 50 | 5 | 2.16 | 860 |
| OPN-406080 | 2.5010/2.4990 | 3.7515/3.7485 | 2.4993/2.4985 | 1.25 | 50 | 5 | 4.24 | 1380 |
| OPN-487296 | 3.0012/2.9988 | 4.5015/4.4985 | 2.9992/2.9983 | 1.50 | 50 | 5 | 7.33 | 2000 |
| OPN-6496128 | 4.0020/3.9980 | 6.0020/5.9980 | 3.9988/3.9976 | 2.00 | 50 | 5 | 17.25 | 3800 |

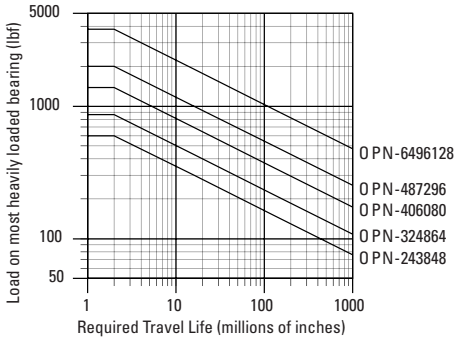
(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. See page 136 for Stainless Steel bearing derating.

(3) For part number description and specifications see page 81.

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

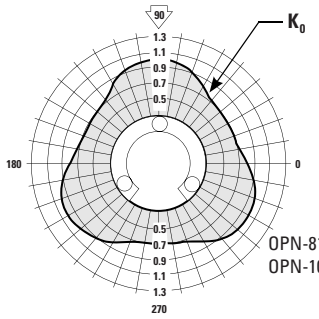
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

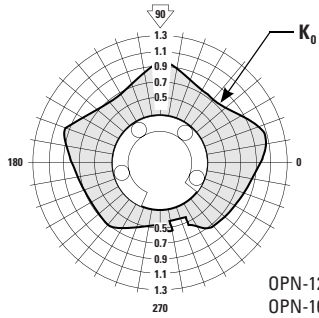
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

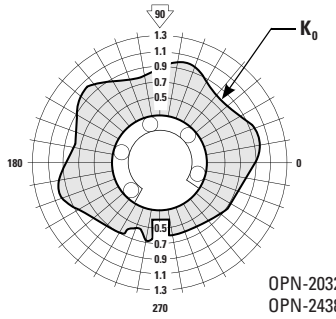
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




OPN-81420
OPN-101824




OPN-122026
OPN-162536

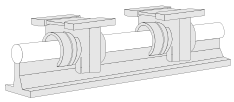


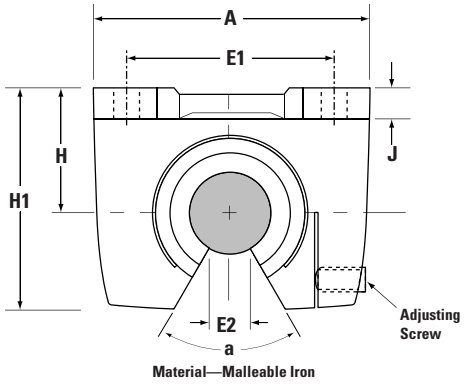

OPN-203242
OPN-243848
OPN-324864
OPN-406080
OPN-487296
OPN-6496128

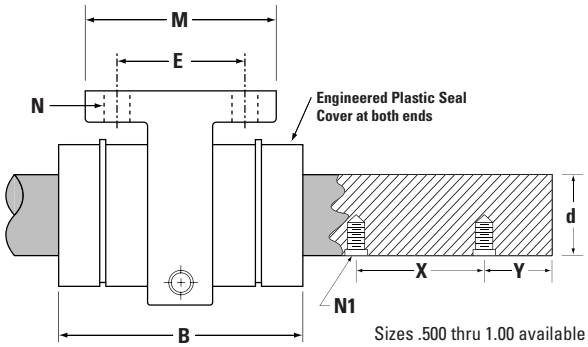
## Inch – Precision Steel Ball Bushing Bearings

# Precision Steel Ball Bushing Bearing Pillow Block

### (Open Type) for Continuously Supported Applications






Sizes .500 thru 1.00 available in Corrosion resistant Stainless Steel.

**Precision Steel Ball Bushing Bearing Pillow Blocks (Open Type, seal at both ends) and 60 Case LinearRace** (Dim. in inches)

| Part Number [3] | | Nominal Diameter | H ±.005 | H1 | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Pillow Block | 60 Case LinearRace | | | | | | X | Y | N1 |
| PBO-8-OPN | 1/2 L PD | .500 | .875 | 1.50 | .04 | .06 | 4 | 2 | #6-32 |
| PBO-12-OPN | 3/4 L PD | .750 | 1.125 | 2.00 | .06 | .13 | 6 | 3 | #10-32 |
| PBO-16-OPN | 1 L PD | 1.000 | 1.375 | 2.38 | .08 | .22 | 6 | 3 | 1/4-20 |
| PBO-20-OPN | 1 1/4 L PD | 1.250 | 1.750 | 3.06 | .08 | .35 | 6 | 3 | 5/16-18 |
| PBO-24-OPN | 1 1/2 L PD | 1.500 | 2.000 | 3.50 | .08 | .50 | 8 | 4 | 3/8-16 |
| PBO-32-OPN | 2 L PD | 2.000 | 2.500 | 4.50 | .10 | .89 | 8 | 4 | 1/2-13 |

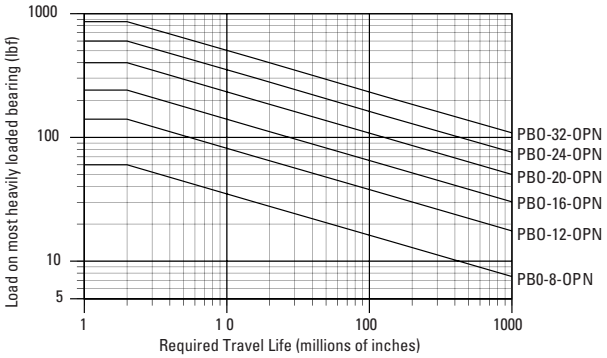
| Part Number [3] | 60 Case LinearRace Diameter | A | B | E ±.010 | E1 ±.010 | E2 min. | J | α deg | M | N | | Pillow Block Weight lb | Dynamic[T] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precision Steel Ball Bushing Pillow Block | d | | | | | | | | | Hole | Bolt | | |
| PBO-8-OPN | .4995/.4990 | 2.00 | 1.69 | 1.000 | 1.500 | .37 | .25 | 50 | 1.50 | .19 | #8 | .4 | 60 |
| PBO-12-OPN | .7495/.7490 | 2.75 | 2.06 | 1.375 | 2.000 | .43 | .31 | 60 | 2.00 | .22 | #10 | 1.0 | 140 |
| PBO-16-OPN | .9995/.9990 | 3.25 | 2.88 | 1.500 | 2.500 | .56 | .38 | 60 | 2.25 | .28 | 1/4 | 1.8 | 240 |
| PBO-20-OPN | 1.2495/1.2490 | 4.00 | 3.63 | 1.875 | 3.000 | .67 | .44 | 50 | 2.75 | .34 | 5/16 | 3.8 | 400 |
| PBO-24-OPN | 1.4994/1.4989 | 4.75 | 4.00 | 2.000 | 3.5000 | .81 | .50 | 50 | 3.00 | .34 | 5/16 | 4.8 | 600 |
| PBO-32-OPN | 1.9994/1.9987 | 6.00 | 5.00 | 2.500 | 4.500 | 1.00 | .63 | 50 | 3.50 | .41 | 3/8 | 8.5 | 860 |

(1) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.
(3) For part number description and specifications see page 81.
Note: Precision Steel Ball Bushing Bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing Bearings. For additional technical information, see the Engineering section beginning on page 245.

# Inch – Precison Steel Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

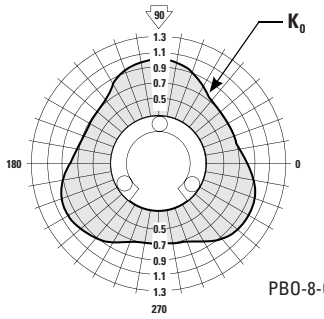
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

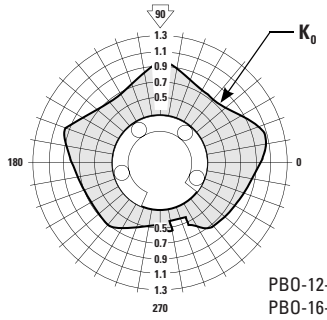
Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

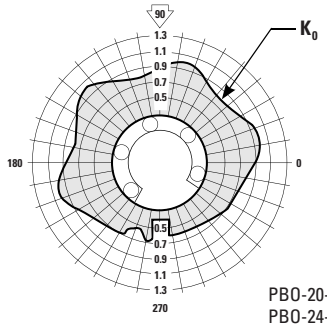
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.




PBO-8-OPN




PBO-12-OPN
PBO-16-OPN




PBO-20-OPN
PBO-24-OPN
PBO-32-OPN

## Inch – Precision Steel Ball Bushing Bearings

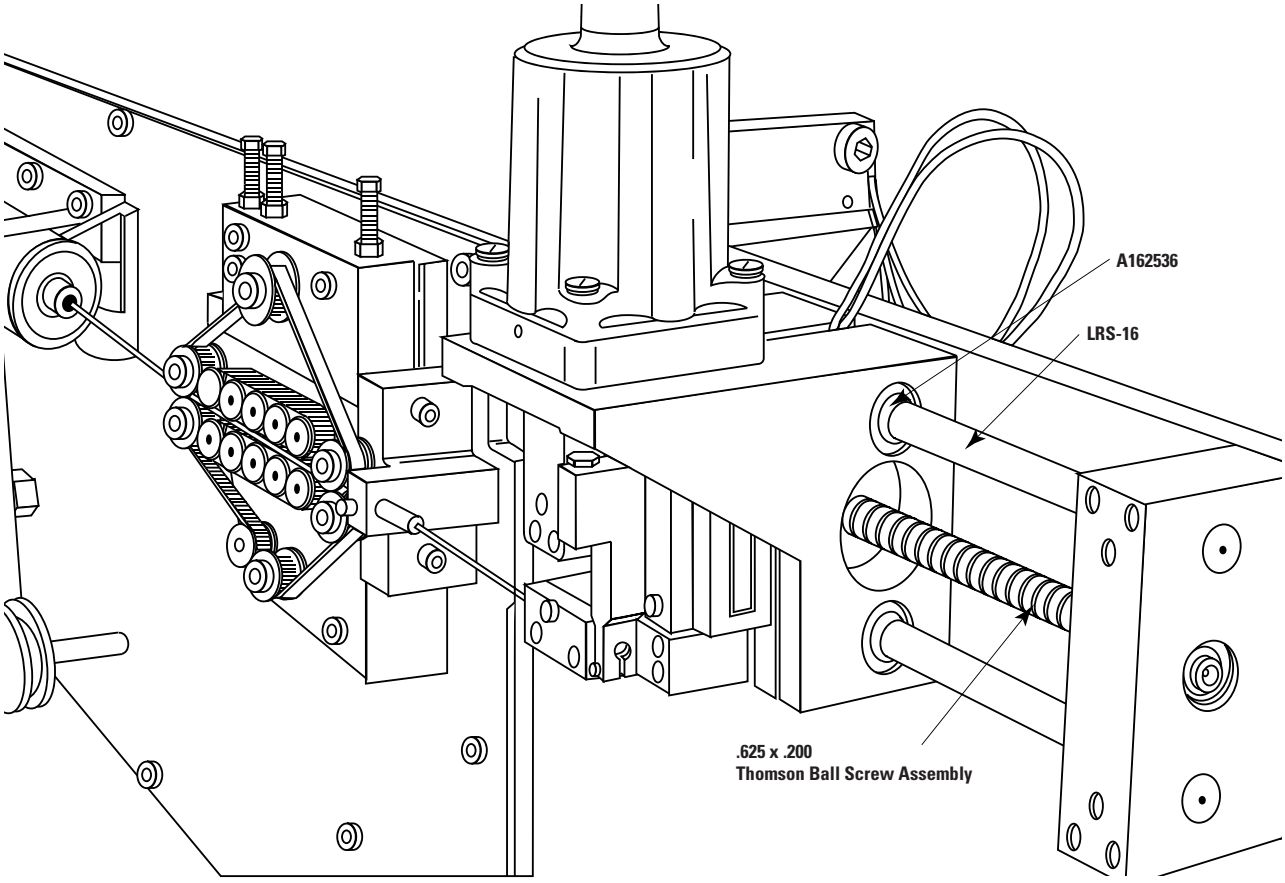
# Wire Straightening/Feeding Mechanism

### Objective
Redesign a wire straightening/feeding mechanism for a wire drawing machine that improves cycle time and minimizes downtime.

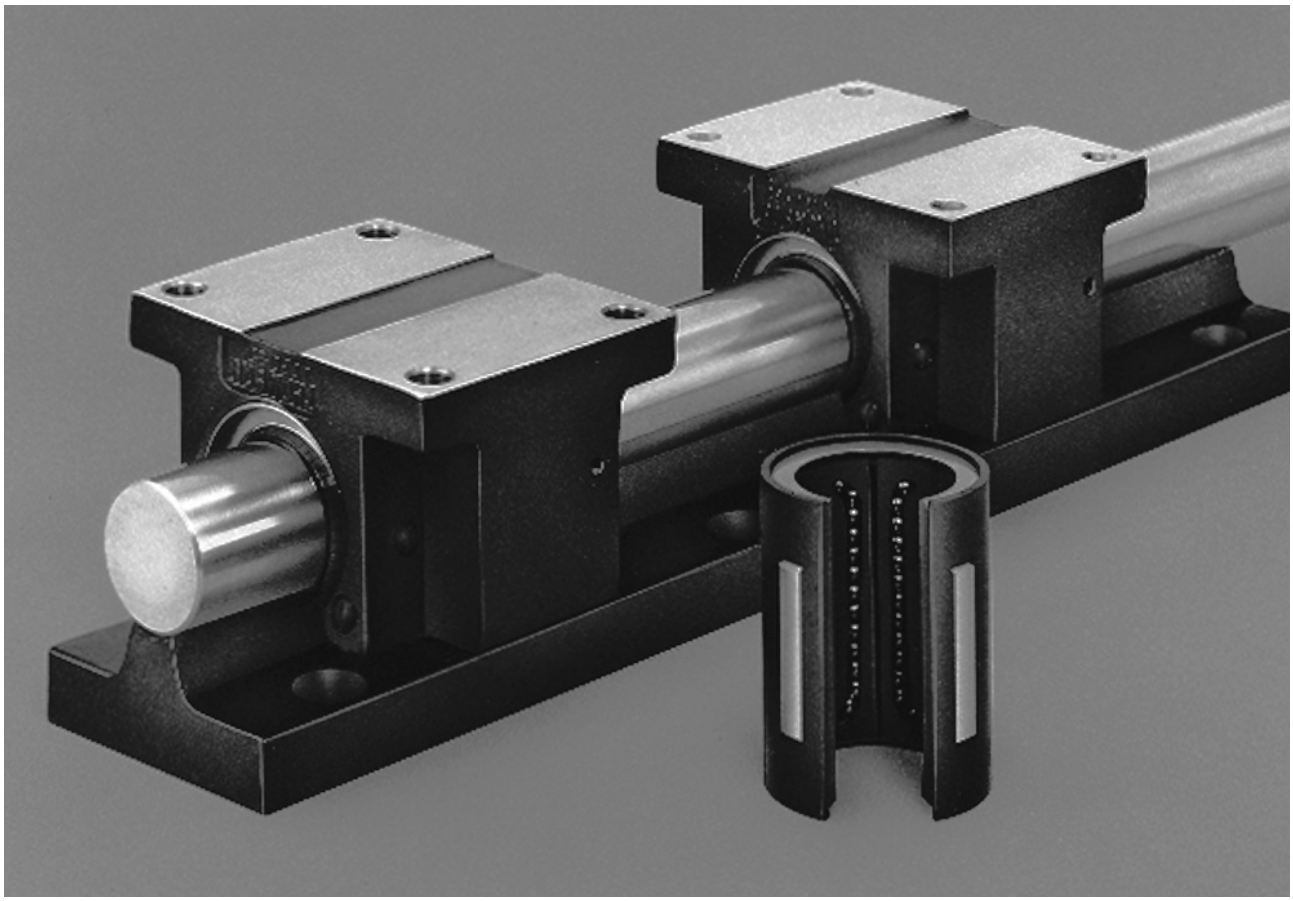
### Solution
Combine the performance advantages of the Precision Steel Ball Bushing Bearing wuth the operating effciency of Thomson ball screws.

### Products Specified
4 - A162536 (Precision Steel Ball Bushing Bearings)
2 - 1 S CTL (60 Case LinearRace )
1 - .625 x .200 (Thomson ball screw assembly)

### Benefits
By replacing high friction plain bearings with Precision Steel Ball Bushing Bearings, service life increased from six months to four years. This significantly reduced downtime and maintenance requirements and provided increased productivity with substantial.



# XR Ball Bushing Bearing Products



**Thomson XR Ball Bushing Bearing products offer:**

- Five times the load capacity or 125 times the travel life of conventional linear bearings. This dramatic increase in travel life reduces downtime and maximizes productivity.
- Three times the rigidity of conventional linear bearings. This increase in stiffness provides immediate improvements in machine positioning accuracy and repeatability.
- The RoundRail Advantage combined with travel speeds up to 5 ft/s. Derating factors commonly found in linear guide products are eliminated.
- Ease of maintenance. When normal maintenance requires bearing replacement, XR Ball Bushing Bearings can be quickly and cost-effectively replaced without scrapping the entire system – another shortcoming of some linear guides.
- Double acting seals at both ends that keep out contamination and retain lubrication.
- Lasting precision alignment by combining the non-wear characteristics of the XR Ball Bushing Bearing with a rigid ductile iron pillow block.
- High accelerations and operating speeds without a dramatic increase in the power consumption commonly seen with high friction v-way and flat-way systems.

# Inch – XR Ball Bushing Bearings

XR Ball Bushing Bearing products provide five times the load capacity or 125 times the travel life and three times the rigidity of conventional linear bearings. These improvements are centered around four technologically advanced components, the XR Ball Bushing Bearing, the XPBO Ball Bushing pillow block, the XL 60 Case LinearRace (shaft) and the XSR 60 Case LinearRace support rail.

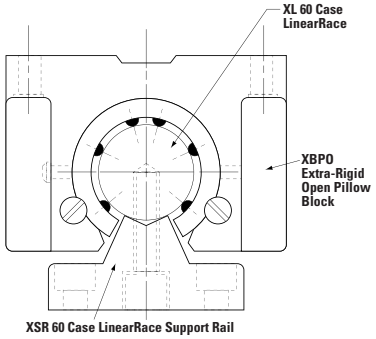



Figure 1

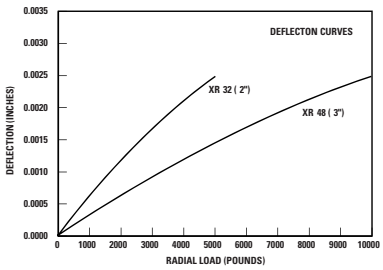



Figure 2

### XR Ball Bushing Bearing

The dramatic increase in load capacity and/or travel life is provided by the XR Ball Bushing Bearing's advanced plate design. Each ball conforming bearing plate is precision ground providing smooth and virtually friction free linear movement. The bearing plate length has also been maximized to increase the number of rolling elements in the load carrying zone. The position of each XR bearing plate helps to maximize the load capacity in both pull-off and down loading conditions.

### XPBO Ball Bushing Pillow Block

Each XR Ball Bushing Bearing can be housed in a rigid ductile iron pillow block (Figure 1). The XPBO pillow block provides the stiffness required in high load applications (Figure 2). Each XPBO is equipped with four mounting holes for easy assembly to the table surface.

### XL 60 Case LinearRace

Available factory mounted to XSR 60 Case LinearRace support rail is a hardened and precision ground 60 Case LinearRace (Figure 1). Each 60 Case LinearRace is ground to a surface finish less than 10 Ra microinch and is straight to .001 inch per foot cumulative. Roundness of each 60 Case LinearRace is controlled through proprietary techniques that results in a roundness of 80 millionths of an inch. Each XL 60 Case LinearRace is held to these world class quality standard to assure maximum system performance and travel life.

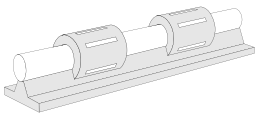
### XSR 60 Case LinearRace Support Rails

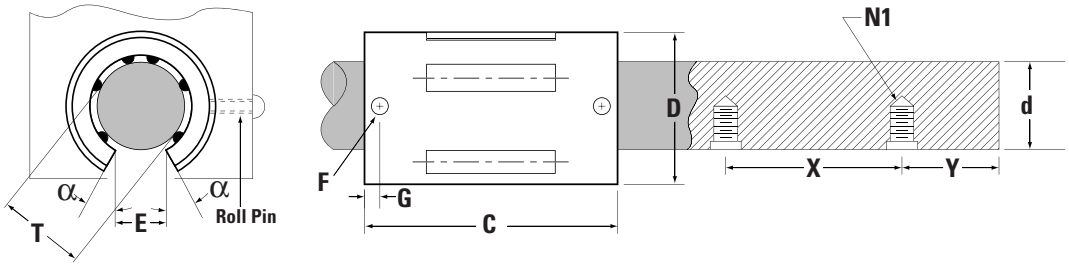
Rigidity always starts by continuously supporting the 60 Case LinearRace and bearing system (Figure 1). The large ductile iron alloy cross-section of the XSR provides maximum rigidity and stiffness (Figure 2). The increased number of standard 60 Case LinearRace mounting holes add further stiffness and stability to the system.

### The RoundRail Advantage

The RoundRail Advantage is the inherent ability of an XR Ball Bushing Bearing system to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress to bearing components. Installation time and cost are minimized and system performance is maximized.

# XR Ball Bushing Bearings
## for Continuously Supported Applications






### XR Ball Bushing Bearings and 60 Case LinearRace (Dimensions in inches)

| Part Number | | Nom. Dia. | Length C | 60 Case LinearRace Diameter d | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case Solid LinearRace Maximum Length | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|---|
| XR Ball Bushing Bearing | 60 Case Linear Race | | | | | | | X | Y | N1 |
| XR-32-OPN | 2 XL PD [4] | 2 | 4.000/3.970 | 1.9994/1.9991 | .100 | .89 | 178 | 4 | 2 | 1/2-13 |
| XR-48-OPN | 3 XL PD [4] | 3 | 6.000/5.940 | 2.9992/2.9989 | .100 | 2.00 | 178 | 6 | 3 | 3/4-10 |

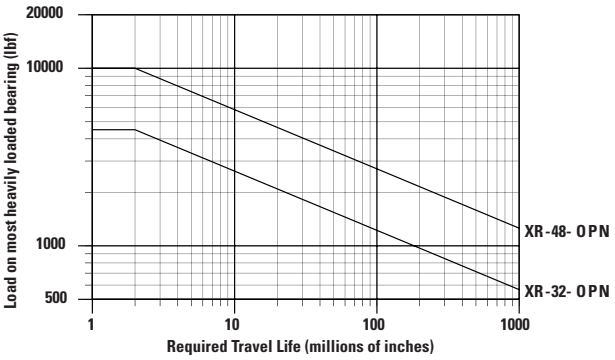
| Part Number | Working Bore Diameter T | Recommended Housing Bore Diameter D | Minimum Slot Width E | Retention Hole [2] | | Angle deg α | Number of Ball Circuits | Ball Diameter | Bearing Mass lb | Dynamic [3] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|
| XR Ball Bushing Bearing | | | | Diameter F | Loc. G | | | | | |
| XR-32-OPN | 2.0000/1.9992 | 3.0000 | 1.00 | .27 | .31 | 27 | 6 | .25 | 1.3 | 4500 |
| XR-48-OPN | 3.0000/2.9988 | 4.5000 | 1.50 | .27 | .42 | 30 | 6 | .38 | 4.4 | 10000 |

(1) When installed in a nominal housing bore D, before adjustment. Any deviation from nominal housing bore diameter will change the working bore T, an equal amount. Minimum recommended housing bores are 2.9980 for XR-32-OPN and 4.4975 for XR-48-OPN.
(2) Retention hole does not go through bearing retainer.
(3) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs opposite.
(4) Contact factory for availability.

# Inch – XR Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

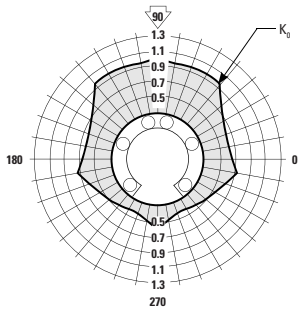
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

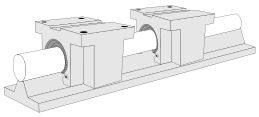
## Polar Graphs

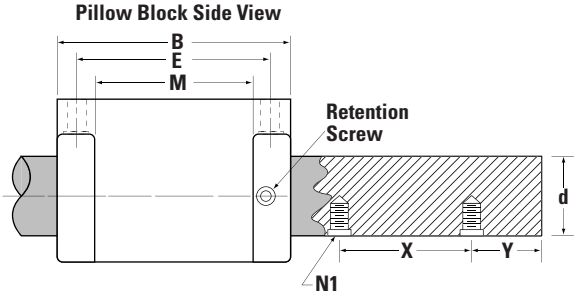
The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.

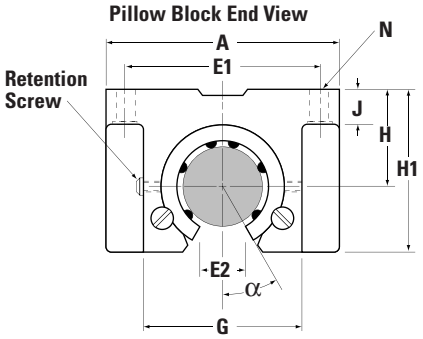


# XR Ball Bushing Pillow Blocks

## for Continuously Supported Applications






### XR Ball Bushing Pillow Blocks (seal at both ends) and 60 Case LinearRace (Dimensions in inches)

| Part Number | | Nominal Diameter | H +.000 -.001 | H1 | 60 Case LinearRace Minimum Depth of Hardness | 60 Case Solid LinearRace Mass lb/in | 60 Case LinearRace Mounting Holes | | |
|---|---|---|---|---|---|---|---|---|---|
| Extra Rigid Ball Bushing Bearing | 60 Case Linear Race | | | | | | X | Y | N1 |
| XPBO-32-OPN | 2 XL PD [3] | 2 | 2.375 | 3.875 | .10 | .89 | 4 | 2 | 1/2-13 |
| XPBO-48-OPN | 3 XL PD [3] | 3 | 3.500 | 5.875 | .10 | 2.00 | 6 | 3 | 3/4-10 |

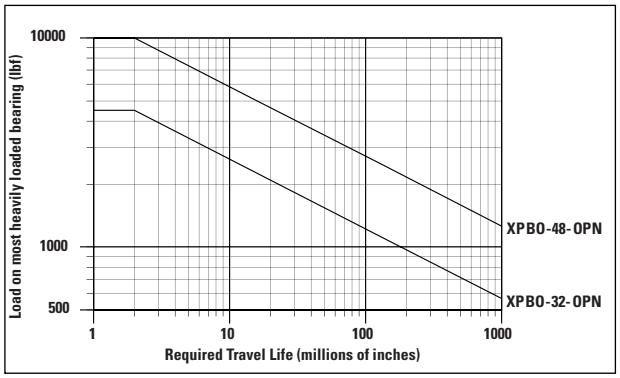
| Part Number | Working Bore Diameter | 60 Case LinearRace Diameter | Ball Bushing[1] Bearing/ LinearRace Fit Up | A | B | E | E1 | E2 | G | J | α | M | N | | Pillow Block Mass lb | Dynamic [2] Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extra Rigid Ball Bushing Pillow Block | T | d | | | | ±.010 | ±.010 | min. | | | deg | | | | | |
| XPBO-32-OPN | 1.9985/1.9972 | 1.9994/1.9991 | .0022P/.006P | 6.00 | 4.88 | 3.750 | 5.000 | 1.00 | 3.75 | .88 | 27 | 2.63 | .53 | 1/2 | 18 | 4500 |
| XPBO-48-OPN | 2.9980/2.9963 | 2.9992/2.9989 | .0029/.0009P | 8.38 | 7.25 | 5.875 | 7.000 | 1.50 | 5.50 | 1.25 | 30 | 4.13 | .66 | 5/8 | 55 | 10000 |

(1) XPBO pillow blocks are designed to give extra rigid support and are therefore dimensioned to provide the interference fits when used with 60 Case LinearRace class XL. If used with class L 60 Case LinearRace the fit-up values would be .0022P/.0002P for the 2 inch size and .0029P/.0003P for the 3 inch size.
(2) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs opposite.
(3) Contact factory for availability.

# Inch – XR Ball Bushing Bearings

## Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)




**Determining Ball Bushing Bearing Size**
To determine the proper Ball Bushing Bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

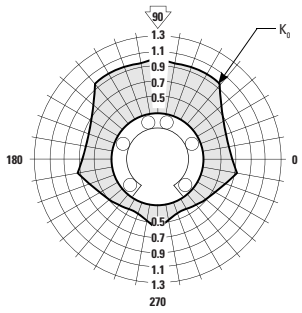
**Note: For the purpose of using this chart.**

**Load on most heavily loaded bearing = maximum applied load/$K_0$.**

Where $K_0$ can be determined from the Polar Graph to the right.

## Polar Graphs

The actual Dynamic Load Capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor $K_0$ is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual Dynamic Load Capacity, multiply the proper correction factor by the Dynamic Load Capacity listed in the product table on the previous page.



# X-Y-Z System

## Objective
Build a rigid X-Y-Z System designed to perform welding and flame cutting tasks.

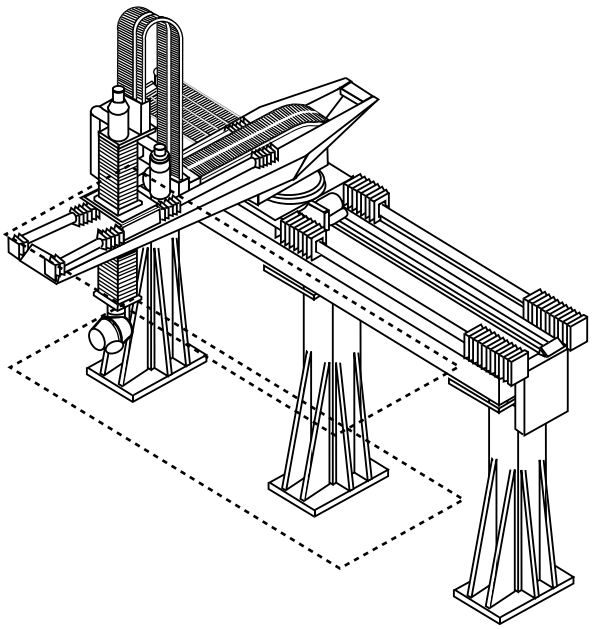
## Solution
Extra Rigid Ball Bushing Bearings will be used on the X-axis to minimize deflection of the cantilevered Y-axis. Self-aligning Super Smart Ball Bushing Bearings are used on the Y and Z axis to simplify the assembly.

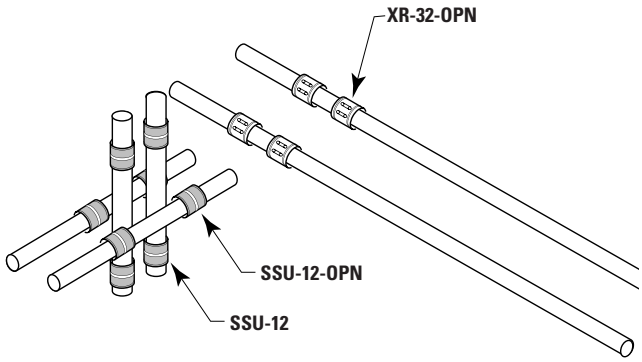
## Products Specified
**X-axis**
4 - XR-32-OPN (XR Ball Bushing Bearing)
2 - XSRA-32 x 108 in (60 Case LinearRace Support Rail Assembly)

**Y-axis**
4 - SSU-12-OPN (Super Smart Ball Bushing Bearing [Open Type])
2 - LSR-12-PD x 48 in (Low Profile 60 Case LinearRace Support Rail)
2 - 3/4 L PD CTL x 48 in (60 Case LinearRace)

**Z-axis**
4 - SSU-12 (Super Smart Ball Bushing Bearing)
2 - 3/4 L CTL x 36 in (60 Case LinearRace)

## Benefits
The high load capacity, rigidity and RoundRail Advantage of the Super Smart and XR Ball Bushing Bearings provided an easy to assemble system with a repeatability of ±.005 in.





## Inch – RoundWay Linear Roller Bearings

# RoundWay Linear Roller Bearing Products



**Thomson RoundWay Linear Roller Bearings offer:**

- Up to twenty times the load capacity of conventional linear ball bearings. This dramatic increase allows for more compact machine designs with a reduction in hardware costs.
- A rigid design that provides high accuracy while tolerating the high shock loads common to machine tool applications.
- A coefficient of friction as low as .005. When replacing v-ways or flat-ways, RoundWay linear roller bearings allow for the use of smaller less expensive drives, motors, belts, gears and ball screws.
- A self-aligning capability that reduces installation time and cost.
- An eccentric trunnion pin that adjusts bearing height to compensate for minor inaccuracies in mounting base flatness or machining accuracy. Installation is quicker and easier than old style, conventional way systems.
- Availability of an integral wiper that protects against contamination while retaining lubrication.
- Interchangeable components for quick, cost-effective machine maintenance. There is no need to scrap the entire way system, a problem with some linear guide products.
- The RoundRail Advantage combined with the self aligning feature, eliminates the need for derating factors commonly seen with linear guides.
- Availability from over 1800 distributors worldwide.

## Inch – RoundWay Linear Roller Bearings

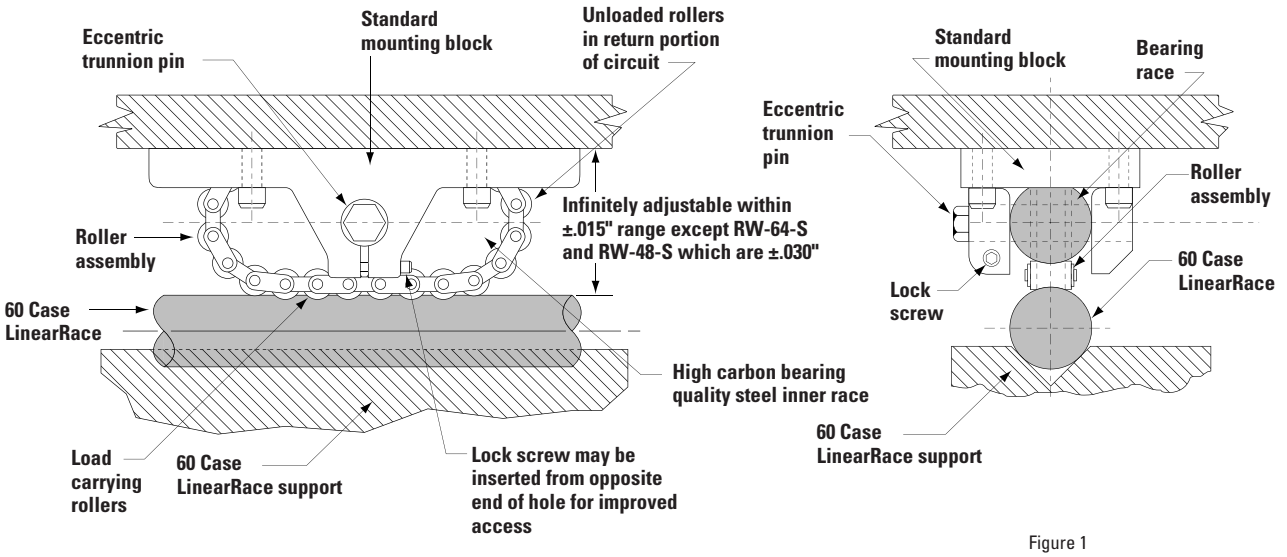



Figure 1

RoundWay Operating Principle

Thomson invented the RoundWay Linear roller bearing for use in high load, heavy duty applications. Each RoundWay bearing combines the high load capacity of hardened and ground steel recirculating rollers with a rigid malleable iron pillow block providing extremely high load capacity with smooth linear travel. The RoundWay linear roller bearing comes in both a single and dual version. A single RoundWay linear roller bearing does not resist side loads and is therefore always used in conjunction with a dual version, unless used in a configuration as shown in Figures 2, 3 and 4 on page 96.

Each RoundWay linear roller bearing is designed for use on 60 Case LinearRace. The 60 Case LinearRace shaft an be continuously supported using type LSR, SR, FLSR or XSR 60 Case LinearRace support rails or intermittently supported using the adjustable Waymount* LinearRace supports type WM.

The RoundWay linear roller bearing consists of four basic parts: the bearing race, the roller assembly, the eccentric trunnion pin and the mounting block. The rolling elements of a RoundWay linear roller bearing are a series of concave rollers interconnected and linked by a chain assembly. As load is applied to the mounting block it is transferred through the bearing race and roller assembly to the supported 60 Case LinearRace. Connecting the mounting block to the RoundWay bearing and roller assembly is an eccentric trunnion pin that allows the height of the RoundWay linear roller bearing to be adjusted to compensate for variations in the mounting surfaces or the build-up of tolerances between component elements. The eccentric trunnion pin can also be used to preload the RoundWay bearing by eliminating internal bearing clearance. After the eccentric trunnion pin has been adjusted it can be held in place by simply tightening the lock screw.

### Self-Aligning

The RoundWay single and dual bearings are designed with a built-in self-aligning capability that absorbs misalignment caused by inaccuracies in carriage or base machining. The RoundWay single bearing has an additional built-in self-aligning capability that allows it to absorb misalignment caused by two slightly out of parallel 60 Case LinearRace ways. This feature is realized when two RoundWay single bearings are mounted on one 60 Case LinearRace and two dual RoundWay bearings are on a parallel 60 Case LinearRace (Figure 1 on page 96).

* Trademark of Thomson. THOMSON is registered in the U.S. Patent and Trademark Office and in other countries.

## Inch – RoundWay Linear Roller Bearings

# RoundWay Linear Roller Bearing Mounting Configurations

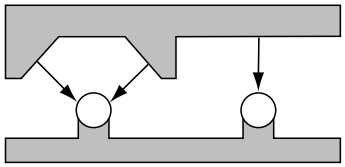


Figure 1

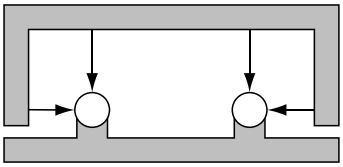


Figure 2

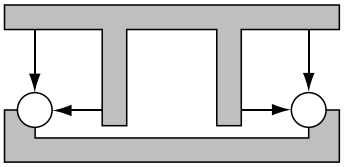


Figure 3

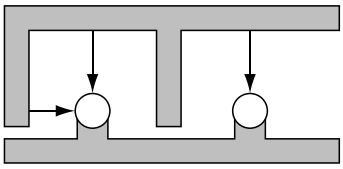


Figure 4

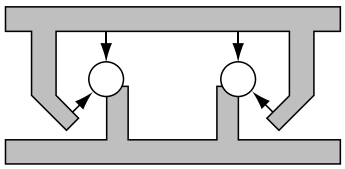


Figure 5

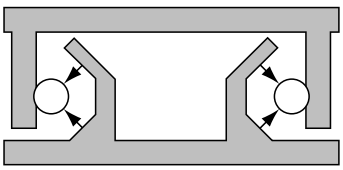


Figure 6

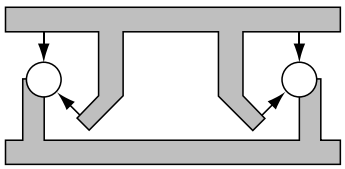


Figure 7

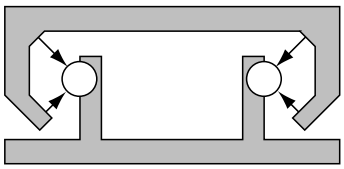


Figure 8

### RoundWay Bearing Mounting Arrangements

RoundWay bearings are available in single mounting blocks or dual V-blocks. The basic race and roller assembly can be purchased separately, along with the suitable type of trunnion pin for mounting directly in the carriage or other machine elements (see page 110). When using either type of cantilever mounting trunnion pin, deflection may be experienced under heavy loads.

The above illustrations are a few schematic suggestions for arrangements of RoundWay bearings and 60 Case LinearRace ways. The load directions of the bearings are indicated by arrows.

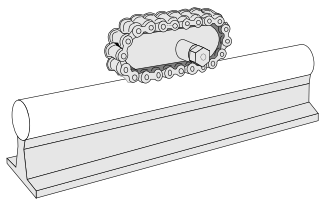
The first group (Figs. 1 through 4) depends on gravity to hold the carriage on the ways.

The second group shows arrangements which will carry loads in any direction. The first two figures (Figs. 5 and 6) are similar to the second two figures (Figs. 7 and 8), except for reverse orientation of horizontal load-carrying bearings.

All schematics on this page can be pre-loaded except Fig. 1. In the Fig. 1 arrangement, the maximum side load permitted is 50% of the applied vertical load on the Dual RoundWay bearing.

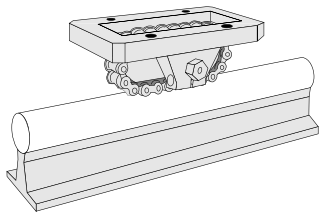
**IMPORTANT!**
A single RoundWay bearing does not resist side loads. Therefore, dual RoundWay bearings or the equivalent are always used in combination with single units.

# RoundWay Linear Roller Bearings
## for Continuously Supported Applications



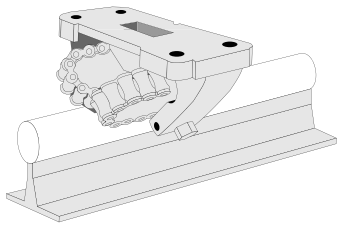
**RoundWay Linear Roller Bearing Type (Type A,B,C)**

- Available in 1⁄2 through 3 inch diameters.
- Load capacity range between 970 and 24,000 $lb_f$.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 $ft/s^2$.
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Designed to compensate for two 60 Case LinearRace ways that are slightly out of parallel
- Can be mounted in a custom housing.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.



**RoundWay Linear Roller Bearing (Single Type)**

- Available in 1⁄2 through 3 inch diameters.
- Load capacity range between 970 and 24,000 $lb_f$.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 $ft/s^2$.
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Designed to compensate for two 60 Case LinearRace ways that are slightly out of parallel
- Should always be used in conjunction with RoundWay Dual version.
- Can be mounted in a custom housing.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.
- Easily mounted to carriage with four mounting bolts.

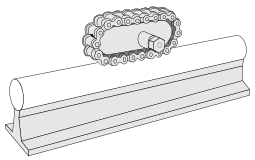


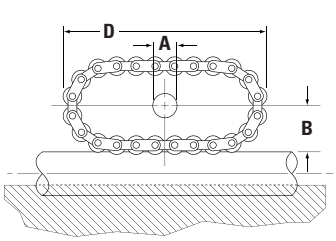
**RoundWay Linear Roller Bearing (Dual Type)**

- Available in 1⁄2 through 3 inch diameters.
- Load capacity range between 1370 and 35,000 $lb_f$.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 $ft/s^2$.
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.
- Easily mounted to carriage with four mounting bolts.

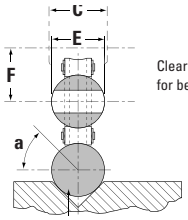
## Inch – RoundWay Linear Roller Bearings

# RoundWay Linear Roller Bearing
## Type A, B and C





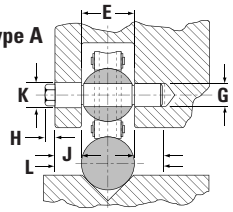

All Trunnion Pins make height of bearings infinitely adjustable within ±.015" RW-48-A, B or C which are ±.030"




Clearance required for bearing

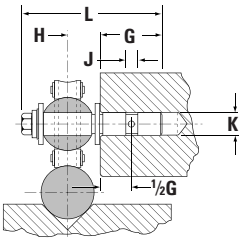
60 Case LinearRace

Type A



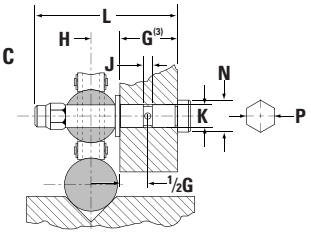

If set screws are used to lock pin they should be at right angles to applied load
Straddle Type Trunnion Pin

Type B




If set screws are used to lock pin they should be at right angles to applied load
Cantilever Type Trunnion Pin—Blind Hole

Type C




If set screws are used to lock pin they should be at right angles to applied load
Cantilever Type Trunnion Pin—Thru-hole

### RoundWay Linear Roller Bearing (Type A, B and C) and 60 Case LinearRace (Dimensions in inches)

| Part Number | | | | Nom. Dia. | A +.0005 -.0000 | B | C | D | E ±.001 | F | α deg | 60 Case LinearRace Diameter d | 60 Case LinearRace Maximum Length | 60 Case Solid LinearRace Mass lb/in | Dynamic (1) Load Capacity $lb_t$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bearing Type A | Bearing Type B | Bearing Type C | 60 Case LinearRace | | | | | | | | | | | | |
| RW-8-A | RW-8-B | RW-8-C | 1/2 L PD | .500 | .2500 | .45 | .63 | 2.38 | .502 | .56 | 50 | .4995/.4990 | 168 | .06 | 970 |
| RW-16-A | RW-16-B | RW-16-C | 1 L PD | 1.000 | .4688 | .80 | 1.00 | 3.75 | 1.002 | .94 | 50 | .9995/.9990 | 180 | .22 | 3020 |
| RW-24-A | RW-24-B | RW-24-C | 1 1/2 L PD | 1.500 | .7188 | 1.15 | 1.50 | 5.38 | 1.502 | 1.38 | 55 | 1.4994/1.4989 | 204 | .50 | 6020 |
| RW-32-A | RW-32-B | RW-32-C | 2 L PD | 2.000 | .9688 | 1.50 | 2.00 | 7.38 | 2.002 | 1.75 | 55 | 1.9994/1.9987 | 204 | .89 | 12360 |
| RW-48-A | RW-48-B | RW-48-C | 3 L PD (2) | 3.000 | 1.5626 | 2.30 | 3.00 | 11.00 | 3.002 | 2.75 | 50 | 2.9992/2.9983 | 204 | 2.00 | 24000 |

### Trunion Type A

| Round Way Bearing Part Number | G | H | J | K +.0000 -.0005 | L | Bearing Mass lb |
|---|---|---|---|---|---|---|
| RW-8-A | .2187 | .19 | .31 | .2812 | 1.13 | .30 |
| RW-16-A | .4375 | .25 | .50 | .5000 | 2.00 | 1.10 |
| RW-24-A | .6875 | .31 | .63 | .7500 | 2.75 | 3.10 |
| RW-32-A | .9375 | .38 | .75 | 1.0000 | 3.50 | 7.3 |
| RW-48-A | 1.5000 | .59 | 1.25 | 1.6250 | 5.53 | 24.0 |

### Trunion Type B

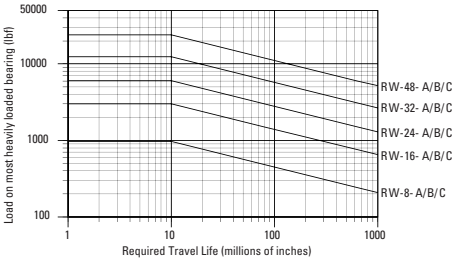
| Round Way Bearing Part Number | G (2) +.0000 -.0005 | H | J | K +.000 -.001 | L | Bearing Mass lb |
|---|---|---|---|---|---|---|
| RW-8-B | .75 | .31 | .13 | .3105 | 1.63 | .30 |
| RW-16-B | 1.25 | .59 | .19 | .498 | 2.78 | 1.10 |
| RW-24-B | 1.75 | .88 | .25 | .748 | 3.94 | 3.10 |
| RW-32-B | 2.25 | 1.13 | .31 | .998 | 5.06 | 7.70 |
| RW-48-B | 3.50 | 1.75 | .50 | 1.623 | 8.00 | 24.80 |

### Trunion Type C

| Round Way Bearing Part Number | G (2) +.060 -.000 | H | J | K +.000 -.001 | L | M | N | P Std. Hex across Flats | Bearing Mass lb |
|---|---|---|---|---|---|---|---|---|---|
| RW-8-C | .719 | .31 | .13 | .311 | 1.69 | .22 | .44 | – | .30 |
| RW-16-C | 1.188 | .59 | .19 | .498 | 2.88 | .31 | .75 | – | 1.10 |
| RW-24-C | 1.656 | .88 | .25 | .748 | 4.13 | .50 | 1.00 | – | 3.20 |
| RW-32-C | 2.094 | 1.13 | .31 | .998 | 5.25 | .63 | 1.31 | – | 7.90 |
| RW-48-C | 3.063 | 1.75 | .50 | 1.623 | 7.25 | 1.00 | – | 2.25 | 25.60 |

(1) Dynamic Load Capacity is based on 10 million inches of travel. (2) Thickness of mounting member.

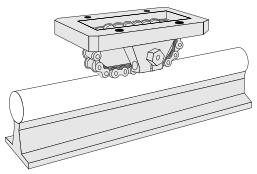
## Load/Life Graph (Lines indicate limiting load for given RoundWay bearing)

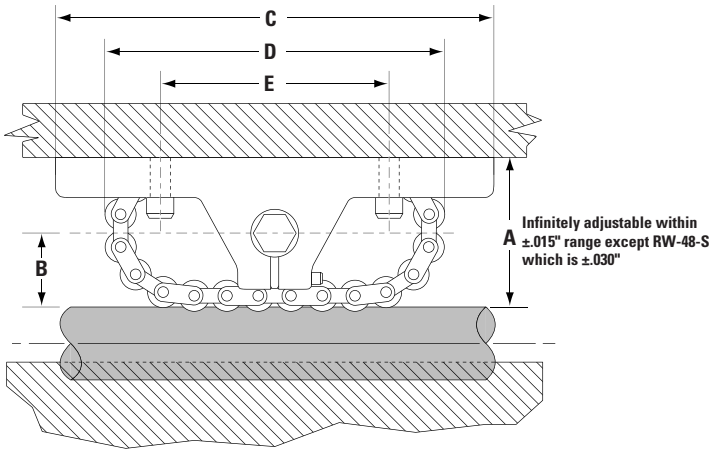


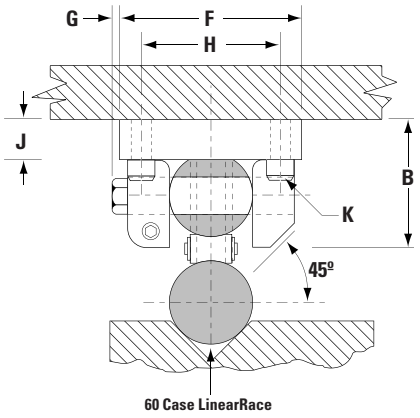

### Determining RoundWay Bearing Size

The primary factors that influence the choice of bearing size are maximum load on a single RoundWay bearing and the required travel life. To determine the proper RoundWay bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All RoundWay bearing sizes that pass through or above and to the right of this point may be suitable for this application.

# RoundWay Linear Roller Bearing
## (Single Type)





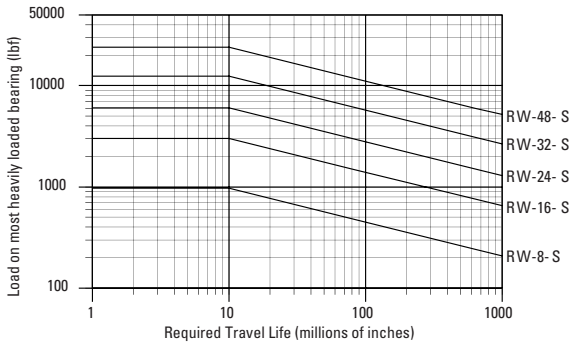




**RoundWay Linear Roller Bearing (Single Type) and 60 Case LinearRace** (Dimensions in inches)

| Part Number | | Nom. Dia. | A | B | C | D | E | F | G | H | J | K | | L | 60 Case LinearRace Diameter d | 60 Case LinearRace Maximum Length | 60 Case Solid LinearRace Mass lb/in | Bearing Mass lb | Dynamic (1) Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RoundWay Bearing | 60 Case LinearRace | | | | | | | | | | | Bolt | Hole | | | | | | |
| RW-8-S | 1/2 L PD | .500 | 1.00 | .45 | 3.0 | 2.38 | 1.50 | 1.25 | .19 | .94 | .31 | #6 | .16 | .88 | .4995/.4990 | 168 | .06 | .50 | 970 |
| RW-16-S | 1 L PD | 1.000 | 1.75 | .80 | 5.0 | 3.75 | 2.50 | 2.13 | .25 | 1.63 | .50 | #10 | .25 | 1.50 | .9995/.9990 | 180 | .22 | 2.20 | 3020 |
| RW-24-S | 1 1/2 L PD | 1.500 | 2.50 | 1.15 | 6.5 | 5.38 | 3.50 | 2.88 | .31 | 2.13 | .63 | .31 | .38 | 2.13 | 1.4994/1.4989 | 204 | .50 | 5.60 | 6020 |
| RW-32-S | 2 L PD | 2.000 | 3.25 | 1.50 | 8.5 | 7.38 | 4.50 | 3.63 | .38 | 2.75 | .75 | .38 | .44 | 2.88 | 1.9994/1.9987 | 204 | .89 | 12.40 | 12360 |
| RW-48-S | 3 L PD | 3.000 | 5.00 | 2.30 | 13.0 | 11.00 | 7.00 | 6.00 | .50 | 4.25 | 1.25 | .63 | .69 | 4.25 | 2.9992/2.9983 | 204 | 2.00 | 48.00 | 24000 |

(1) Dynamic Load Capacity is based on 10 million inches of travel.

## Load/Life Graph
### (Lines indicate limiting load for given RoundWay bearing)

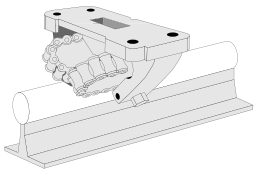


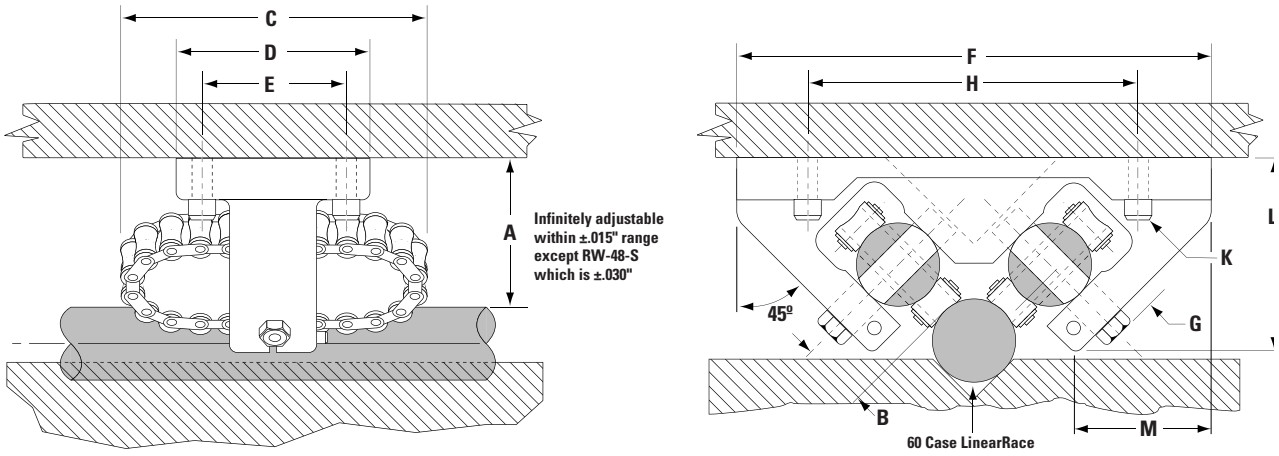

### Determining RoundWay Bearing Size

The primary factors that influence the choice of bearing size are maximum load on a single RoundWay bearing and the required travel life. To determine the proper RoundWay bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All RoundWay bearing sizes that pass through or above and to the right of this point may be suitable for this application.

## Inch – RoundWay Linear Roller Bearings

# RoundWay Linear Roller Bearing
### (Dual Type)



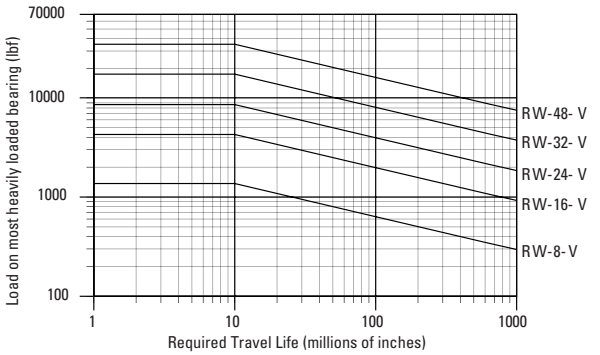



**RoundWay Linear Roller Bearing (Dual Type) and 60 Case LinearRace** (Dimensions in inches)

| Part Number | | Nom. Dia. | A | B | C | D | E | F | G | H | J | K | | L | M | 60 Case LinearRace Diameter d | 60 Case LinearRace Maximum Length | 60 Case Solid LinearRace Mass lb/in | Bearing Mass lb | Dynamic (1) Load Capacity $lb_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RoundWay Bearing | 60 Case LinearRace | | | | | | | | | | | Bolt | Hole | | | | | | | |
| RW-8-V | 1/2 L PD | .500 | 1.00 | .45 | 2.38 | 1.38 | 1.00 | 3.00 | .19 | 2.25 | .31 | #8 | .19 | 1.38 | .69 | .4995/.4990 | 168 | .06 | 1.10 | 1370 |
| RW-16-V | 1 L PD | 1.000 | 1.75 | .80 | 3.75 | 2.25 | 1.63 | 5.75 | .25 | 4.0 | .50 | #10 | .25 | 2.38 | 1.56 | .9995/.9990 | 180 | .22 | 4.90 | 4300 |
| RW-24-V | 1 1/2 L PD | 1.500 | 2.50 | 1.15 | 5.38 | 2.75 | 2.00 | 7.88 | .31 | 6.0 | .63 | .31 | .38 | 3.38 | 2.13 | 1.4994/1.4989 | 204 | .50 | 11.70 | 8600 |
| RW-32-V | 2 L PD | 2.000 | 3.25 | 1.50 | 7.38 | 3.50 | 2.50 | 9.75 | .38 | 7.5 | .75 | .38 | .44 | 4.38 | 2.50 | 1.9994/1.9987 | 204 | .89 | 25.20 | 17500 |
| RW-48-V | 3 L PD | 3.000 | 5.00 | 2.30 | 11.00 | 5.50 | 4.00 | 15.50 | .63 | 1.25 | 1.25 | .63 | .69 | 7.00 | 4.25 | 2.9992/2.9983 | 204 | 2.00 | 90.00 | 35000 |

(1) Dynamic Load Capacity is based on 10 million inches of travel.

## Load/Life Graph
### (Lines indicate limiting load for given RoundWay bearing)




**Determining RoundWay Bearing Size**

The primary factors that influence the choice of bearing size are maximum load on a single RoundWay bearing and the required travel life. To determine the proper RoundWay bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All RoundWay bearing sizes that pass through or above and to the right of this point may be suitable for this application.

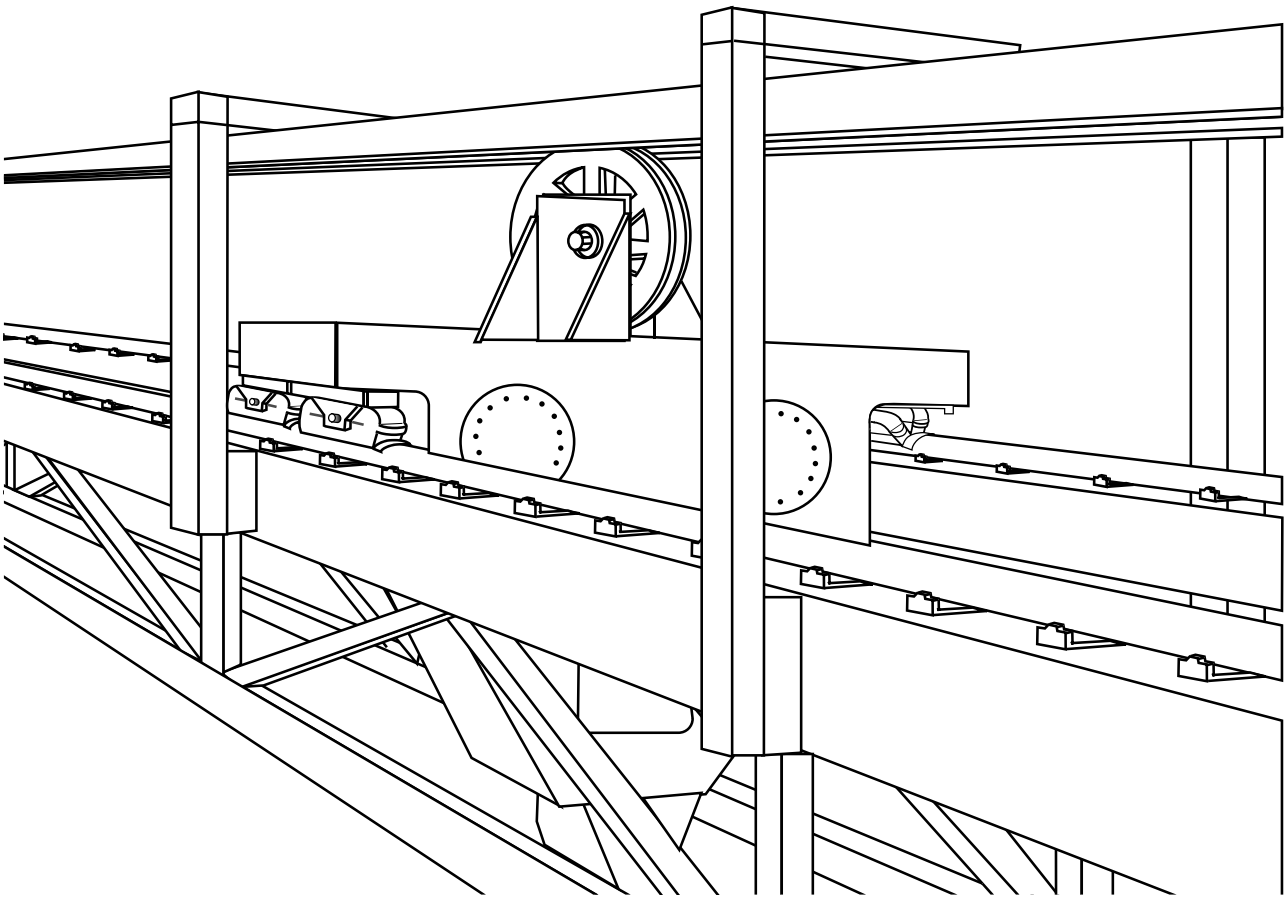
# Overhead Carriage for Log-Processing Machine

## Objective
Design overhead carriage system using RoundWay linear roller bearings mounted on 60 Case LinearRace ways.

## Solution
RoundWay linear roller bearings' high load capacity will be used to move heavy logs into and out of the band saws. The carriages shuttle back and forth on 100 foot long 60 Case LinearRace ways until the final cut is made.

## Products specified
2 - RW-32-V (RoundWay Linear Roller bearing Dual Type)
2 - RW-32-S (RoundWay Linear Roller bearing Single Type)
2 - 2 L PD CTL x 100 ft (60 Case LinearRace)

## Benefits
RoundWay linear roller bearings provide operating speeds up to 100 ft/s, optimizing productivity and minimizing cost. The RoundWay bearings' low coefficient of friction allows the use of smaller, less expensive drive motors, belts, linkages and gears. The seal keeps out wood chips and other contaminants and maximizes bearing life.



## Inch – FluoroNyliner Bushing Bearings

# FluoroNyliner Bushing Bearings




**Thomson FluoroNyliner Bushing Bearings offer:**

- High performance in contaminated, washdown, or submerged environments
- Proprietary, self-lubricating, composite bearing liner TEP 950
- Low friction, ideally suited for linear and rotary motion
- Precision machined aluminum sleeve
- Excellent performance in high vibration and mechanical shock applications
- Corrosion resistance
- Product availability in industry standard sizes from 0.25" to 2.00"
- Eight bearing configurations, include closed, open, self-aligning, precision and compensated IDs
- Load capacities up to 14,000 $lb_f$
- Integral seals
- Closed, Open, and Flanged Pillow Blocks available in single or twin versions
- Available from over 1800 distributors worldwide

# FluroNyliner Bushing Bearings

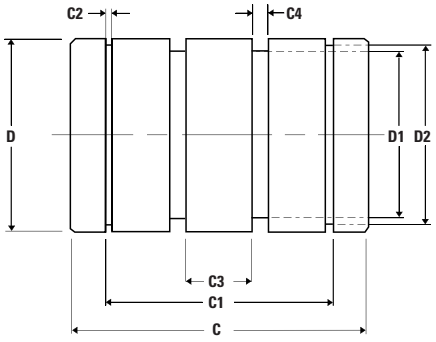
## Common Specifications

| Nominal Bearing Diameter (in.) | 60 Case LinearRace Shafting | | Recommended Shaft Diameter (in.) | | Weight (lbs.) | Effective Surface Area ($in^2$) | Max. Static Load[1] ($lb_f$) |
|---|---|---|---|---|---|---|---|
| | Carbon Steel | 316 Stainless Steel | Min. | Max. | | | |
| .250 | 1/4 L | 1/4 L 316 SS | .2490 | .2495 | .008 | .19 | 300 |
| .375 | 3/8 L | 3/8 L 316 SS | .3740 | .3745 | .013 | .33 | 500 |
| .500 | 1/2 L | 1/2 L 316 SS | .4990 | .4995 | .030 | .63 | 970 |
| .625 | 5/8 L | 5/8 L 316 SS | .6240 | .6245 | .072 | .94 | 1450 |
| .750 | 3/4 L | 3/4 L 316 SS | .7490 | .7495 | .090 | 1.22 | 1900 |
| 1.000 | 1 L | 1 L 316 SS | .9990 | .9995 | .190 | 2.25 | 3500 |
| 1.250 | 1 1/4 L | 1 1/4 L 316 SS | 1.2490 | 1.2495 | .380 | 3.28 | 5100 |
| 1.500 | 1 1/2 L | 1 1/2 L 316 SS | 1.4989 | 1.4994 | .610 | 4.51 | 7000 |
| 2.000 | 2 L | 2 L 316 SS | 1.9987 | 1.9994 | 1.230 | 8.01 | 12500 |

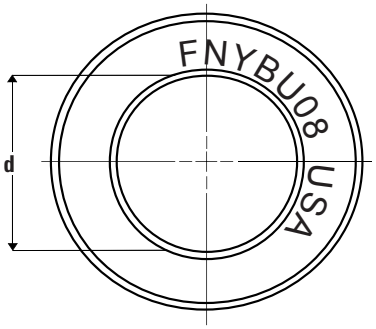
(1) Open bearings operating in shear should be derated by 40%. Open bearings operating in tension should be derated by 70%.

## Closed Bearing



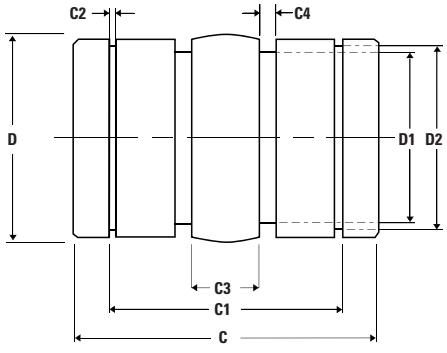



Side View




Front View

## Self-Aligning Bearing




*Side View*



# Inch – FluoroNyliner Bushing Bearings

## Standard Bearings

| Precision I.D. | | | Compensated I.D.[1] | | | Closed Bearing Dimensions (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | d (in.) | | Part Number | d (in.) | | Nom. Bearing Dia. | D | | D1 | D2 | C | | C1 Min. | C2 Min. | C3 | C4 |
| | Min. | Max. | | Min. | Max. | | Min. | Max. | | | Min. | Max. | | | | |
| FNYBU-04 | .2510 | .2520 | FNYBU-04-L | .2530 | .2540 | .250 | .4990 | .5000 | .399 | .467 | .735 | .750 | .519 | .041 | .125 | .080 |
| FNYBU-06 | .3760 | .3770 | FNYBU-06-L | .3780 | .3790 | .375 | .6240 | .6250 | .524 | .596 | .860 | .875 | .634 | .041 | .187 | .080 |
| FNYBU-08 | .5010 | .5020 | FNYBU-08-L | .5030 | .5040 | .500 | .8740 | .8750 | .712 | .833 | 1.235 | 1.250 | .956 | .046 | .250 | .125 |
| FNYBU-10 | .6260 | .6270 | FNYBU-10-L | .6280 | .6290 | .625 | 1.1240 | 1.1250 | .962 | 1.070 | 1.485 | 1.500 | 1.101 | .056 | .312 | .125 |
| FNYBU-12 | .7510 | .7520 | FNYBU-12-L | .7540 | .7550 | 1.750 | 1.2490 | 1.2500 | 1.187 | 1.195 | 1.610 | 1.625 | 1.163 | .056 | .312 | .125 |
| FNYBU-16 | 1.0010 | 1.0010 | FNYBU-16-L | 1.0040 | 1.0050 | 1.000 | 1.5614 | 1.5625 | 1.402 | 1.490 | 2.235 | 2.250 | 1.745 | .068 | .500 | .125 |
| FNYBU-20 | 1.2520 | 1.2520 | FNYBU-20-L | 1.2550 | 1.2560 | 1.250 | 1.9990 | 2.0000 | 1.837 | 1.889 | 2.605 | 2.625 | 2.015 | .070 | .625 | .125 |
| FNYBU-24 | 1.5010 | 1.5022 | FNYBU-24-L | 1.5050 | 1.5062 | 1.500 | 2.3740 | 2.3750 | 2.152 | 2.265 | 2.985 | 3.000 | 2.402 | .086 | .750 | .165 |
| FNYBU-32 | 2.0010 | 2.0024 | FNYBU-32-L | 2.0060 | 2.0074 | 2.000 | 2.9990 | 3.0000 | 2.775 | 2.860 | 3.985 | 4.000 | 3.180 | .103 | 1.000 | .188 |

## Standard Self-Aligning Bearings

| Precision I.D. | | | Compensated I.D. [1] | | | Closed Bearing Dimensions (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | d (in.) | | Part Number | d (in.) | | Nom. Bearing Dia. | D | | D1 | D2 | C | | C1 Min. | C2 Min. | C3 | C4 |
| | Min. | Max. | | Min. | Max. | | Min. | Max. | | | Min. | Max. | | | | |
| FNYBU-04-A | .2510 | .2520 | FNYBU-04-AL | .2530 | .2540 | .250 | .4990 | .5000 | .399 | .467 | .735 | .750 | .519 | .041 | .125 | .080 |
| FNYBU-06-A | .3760 | .3770 | FNYBU-06-AL | .3780 | .3790 | .375 | .6240 | .6250 | .524 | .596 | .860 | .875 | .634 | .041 | .187 | .080 |
| FNYBU-08-A | .5010 | .5020 | FNYBU-08-AL | .5030 | .5040 | .500 | .8740 | .8750 | .712 | .833 | 1.235 | 1.250 | .956 | .046 | .250 | .125 |
| FNYBU-10-A | .6260 | .6270 | FNYBU-10-AL | .6280 | .6290 | .625 | 1.1240 | 1.1250 | .962 | 1.070 | 1.485 | 1.500 | 1.101 | .056 | .312 | .125 |
| FNYBU-12-A | .7510 | .7520 | FNYBU-12-AL | .7540 | .7550 | 1.750 | 1.2490 | 1.2500 | 1.187 | 1.195 | 1.610 | 1.625 | 1.163 | .056 | .312 | .125 |
| FNYBU-16-A | 1.0010 | 1.0010 | FNYBU-16-AL | 1.0040 | 1.0050 | 1.000 | 1.5614 | 1.5625 | 1.402 | 1.490 | 2.235 | 2.250 | 1.745 | .068 | .500 | .125 |
| FNYBU-20-A | 1.2520 | 1.2520 | FNYBU-20-AL | 1.2550 | 1.2560 | 1.250 | 1.9990 | 2.0000 | 1.837 | 1.889 | 2.605 | 2.625 | 2.015 | .070 | .625 | .125 |
| FNYBU-24-A | 1.5010 | 1.5022 | FNYBU-24-AL | 1.5050 | 1.5062 | 1.500 | 2.3740 | 2.3750 | 2.152 | 2.265 | 2.985 | 3.000 | 2.402 | .086 | .750 | .165 |
| FNYBU-32-A | 2.0010 | 2.0024 | FNYBU-32-AL | 2.0060 | 2.0074 | 2.000 | 2.9990 | 3.0000 | 2.775 | 2.860 | 3.985 | 4.000 | 3.180 | .103 | 1.000 | .188 |

1 Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.

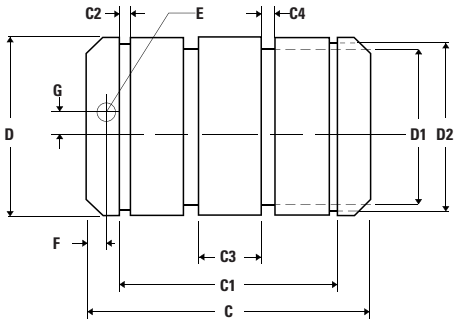
# Inch – FluoroNyliner Bushing Bearings

## Common Open Bearing Dimensions (in.)

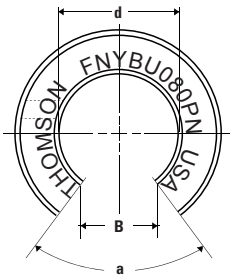
| Nominal Bearing Diameter (in.) | E | F | G | B | a (*) |
|---|---|---|---|---|---|
| .250 | .094 | .375 | .125 | .188 | 60 |
| .375 | .094 | .438 | .146 | .250 | 60 |
| .500 | .136 | .625 | .000 | .313 | 66 |
| .625 | .104 | .125 | .000 | .375 | 60 |
| .750 | .136 | .125 | .000 | .438 | 66 |
| 1.000 | .136 | .125 | .000 | .563 | 64 |
| 1.250 | .201 | .197 | .000 | .625 | 60 |
| 1.500 | .201 | .193 | .000 | .750 | 60 |
| 2.000 | .265 | .292 | .000 | 1.000 | 60 |

## Open Bearing



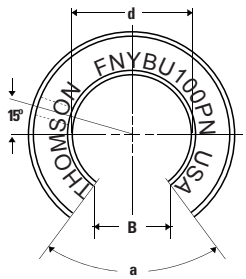



Side View



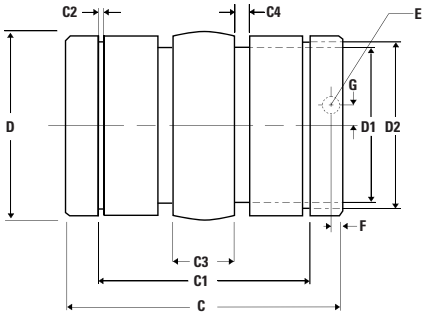

Front View

## Self-Aligning Open Bearing




FNYBU-10-OPN and
FNYBU-10-L-OPN ONLY

Front View




Side View



# Inch – FluoroNyliner Bushing Bearings

## Standard Open Bearings

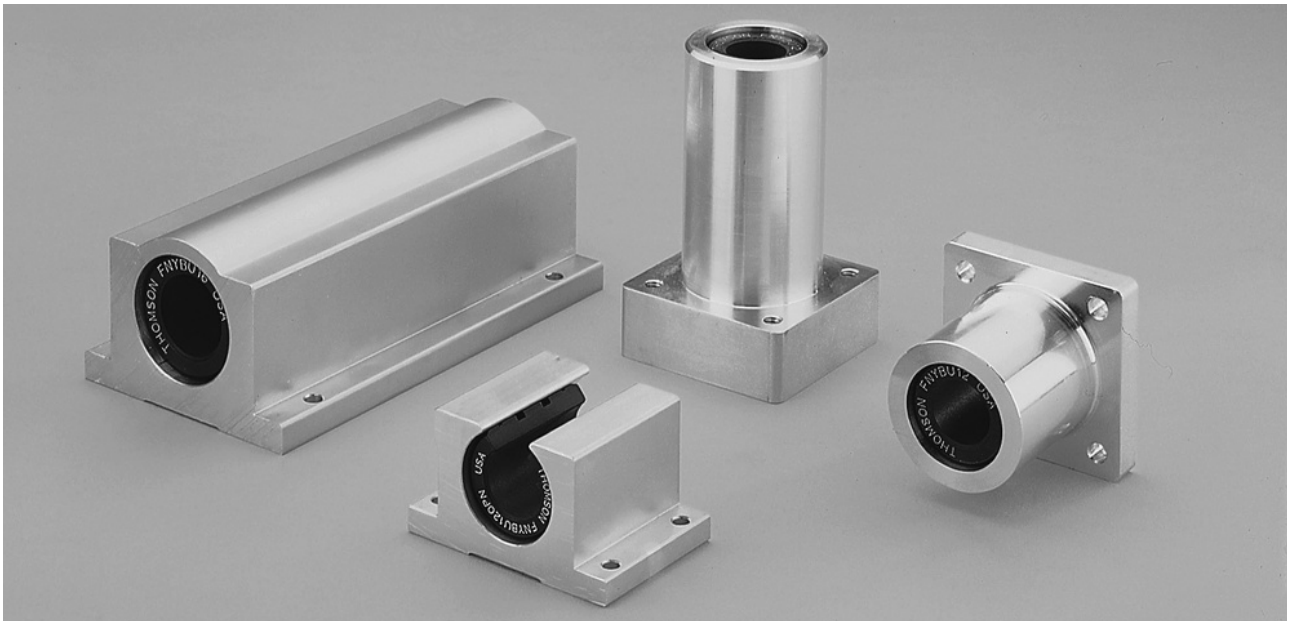
| Precision I.D. | | | Compensated I.D. [1] | | | | Open Bearing Dimensions (in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | d (in.) | | Part Number | d (in.) | | Nom. Bearing Dia. | D | | D1 | D2 | C | | C1 Min. | C2 Min. | C3 | C4 |
| | Min. | Max. | | Min. | Max. | | Min. | Max. | | | Min. | Max. | | | | |
| FNYBU-04-OPN | .2510 | .2520 | FNYBU-04-L-OPN | .2530 | .2540 | .250 | .4990 | .5000 | .399 | .467 | .735 | .750 | .519 | .041 | .125 | .080 |
| FNYBU-06-OPN | .3760 | .3770 | FNYBU-06-L-OPN | .3780 | .3790 | .375 | .6240 | .6250 | .524 | .596 | .860 | .875 | .634 | .041 | .187 | .080 |
| FNYBU-08-OPN | .5010 | .5020 | FNYBU-08-L-OPN | .5030 | .5040 | .500 | .8740 | .8750 | .712 | .833 | 1.235 | 1.250 | .956 | .046 | .250 | .125 |
| FNYBU-10-OPN | .6260 | .6270 | FNYBU-10-L-OPN | .6280 | .6290 | .625 | 1.1240 | 1.1250 | .962 | 1.070 | 1.485 | 1.500 | 1.101 | .056 | .312 | .125 |
| FNYBU-12-OPN | .7510 | .7520 | FNYBU-12-L-OPN | .7540 | .7550 | 1.750 | 1.2490 | 1.2500 | 1.187 | 1.195 | 1.610 | 1.625 | 1.163 | .056 | .312 | .125 |
| FNYBU-16-OPN | 1.0010 | 1.0010 | FNYBU-16-L-OPN | 1.0040 | 1.0050 | 1.000 | 1.5614 | 1.5625 | 1.402 | 1.490 | 2.235 | 2.250 | 1.745 | .068 | .500 | .125 |
| FNYBU-20-OPN | 1.2520 | 1.2520 | FNYBU-20-L-OPN | 1.2550 | 1.2560 | 1.250 | 1.9990 | 2.0000 | 1.837 | 1.889 | 2.605 | 2.625 | 2.015 | .070 | .625 | .125 |
| FNYBU-24-OPN | 1.5010 | 1.5022 | FNYBU-24-L-OPN | 1.5050 | 1.5062 | 1.500 | 2.3740 | 2.3750 | 2.152 | 2.265 | 2.985 | 3.000 | 2.402 | .086 | .750 | .165 |
| FNYBU-32-OPN | 2.0010 | 2.0024 | FNYBU-32-L-OPN | 2.0060 | 2.0074 | 2.000 | 2.9990 | 3.0000 | 2.775 | 2.860 | 3.985 | 4.000 | 3.180 | .103 | 1.000 | .188 |

## Standard Self-Aligning Open Bearings

| Precision I.D. | | | Compensated I.D. [1] | | | | Self-Aligning Bearing Dimensions (in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | d (in.) | | Part Number | d (in.) | | Nom. Bearing Dia. | D | | D1 | D2 | C | | C1 Min. | C2 Min. | C3 | C4 |
| | Min. | Max. | | Min. | Max. | | Min. | Max. | | | Min. | Max. | | | | |
| FNYBU-04-OPN | .2510 | .2520 | FNYBU-04-AL-OPN | .2530 | .2540 | .250 | .4990 | .5000 | .399 | .467 | .735 | .750 | .519 | .041 | .125 | .080 |
| FNYBU-06-OPN | .3760 | .3770 | FNYBU-06-AL-OPN | .3780 | .3790 | .375 | .6240 | .6250 | .524 | .596 | .860 | .875 | .634 | .041 | .187 | .080 |
| FNYBU-08-OPN | .5010 | .5020 | FNYBU-08-AL-OPN | .5030 | .5040 | .500 | .8740 | .8750 | .712 | .833 | 1.235 | 1.250 | .956 | .046 | .250 | .125 |
| FNYBU-10-OPN | .6260 | .6270 | FNYBU-10-AL-OPN | .6280 | .6290 | .625 | 1.1240 | 1.1250 | .962 | 1.070 | 1.485 | 1.500 | 1.101 | .056 | .312 | .125 |
| FNYBU-12-OPN | .7510 | .7520 | FNYBU-12-AL-OPN | .7540 | .7550 | 1.750 | 1.2490 | 1.2500 | 1.187 | 1.195 | 1.610 | 1.625 | 1.163 | .056 | .312 | .125 |
| FNYBU-16-OPN | 1.0010 | 1.0010 | FNYBU-16-AL-OPN | 1.0040 | 1.0050 | 1.000 | 1.5614 | 1.5625 | 1.402 | 1.490 | 2.235 | 2.250 | 1.745 | .068 | .500 | .125 |
| FNYBU-20-OPN | 1.2520 | 1.2520 | FNYBU-20-AL-OPN | 1.2550 | 1.2560 | 1.250 | 1.9990 | 2.0000 | 1.837 | 1.889 | 2.605 | 2.625 | 2.015 | .070 | .625 | .125 |
| FNYBU-24-OPN | 1.5010 | 1.5022 | FNYBU-24-AL-OPN | 1.5050 | 1.5062 | 1.500 | 2.3740 | 2.3750 | 2.152 | 2.265 | 2.985 | 3.000 | 2.402 | .086 | .750 | .165 |
| FNYBU-32-OPN | 2.0010 | 2.0024 | FNYBU-32-AL-OPN | 2.0060 | 2.0074 | 2.000 | 2.9990 | 3.0000 | 2.775 | 2.860 | 3.985 | 4.000 | 3.180 | .103 | 1.000 | .188 |

1 Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.
2 Open bearings operating in shear should be derated by 40%. Open bearings operating in tension should be derated by 70%.

# FluoroNyliner Bushing Bearing Pillow Blocks

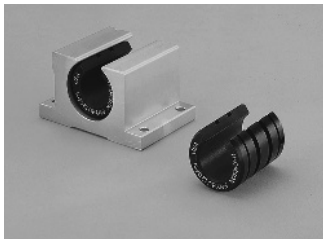


For the easiest installation, order Pillow Blocks with factory installed FluoroNyliner Bushing Bearings.

## Three Pillow Block Configurations



**Closed Bearing Pillow Blocks**
- For end supported applications
- Choose twin pillow blocks for twice the load capacity
- Order with seals for heavily contaminated environments
- Available as single or twin pillow blocks



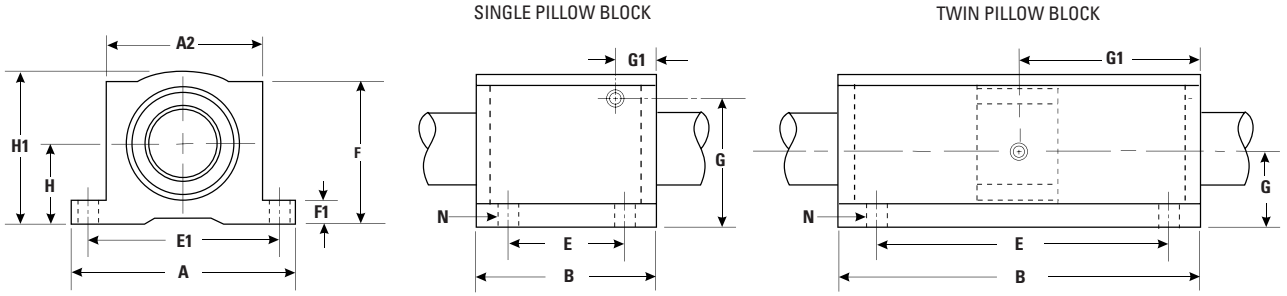
**Open Bearing Pillow Blocks**
- For continuously supported applications
- Choose compensated I.D. bearings for non-parallel shafting
- Order with seals for heavily contaminated environments
- Available as single or twin pillow blocks



**Flanged Pillow Blocks with Closed Bearings**
- For low profile applications such as packaging equipment
- Choose precision I.D. bearings for precision fit-up
- Available with self-aligning or compensated I.D. bearings
- Available as single or twin pillow blocks

# Inch – FluoroNyliner Bushing Bearings

## Closed Pillow Blocks with Self-Aligning Bearings




## Closed Single Pillow Blocks with Self-Aligning Bearings

| Precision I.D. | Compensated I.D.[1] | Single Pillow Block Dimensions (in.) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | H ±.003 | H1 | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass (lb) | Max. Static Load ($lb_f$) |
| | | | | | | | | | | | | | Hole | Bolt | | |
| FNYBU-PB-04-A-LS | FNYBU-PB-04-AL-LS | .437 | .81 | 1.63 | 1.00 | 1.19 | .750 | 1.313 | .75 | .19 | .44 | .22 | .16 | #6 | .10 | 300 |
| FNYBU-PB-06-A-LS | FNYBU-PB-06-AL-LS | .500 | .94 | 1.75 | 1.13 | 1.31 | .875 | 1.438 | .88 | .19 | .50 | .22 | .16 | #6 | .13 | 500 |
| FNYBU-PB-08-A-LS | FNYBU-PB-08-AL-LS | .687 | 1.25 | 2.00 | 1.38 | 1.69 | 1.000 | 1.688 | 1.13 | .25 | .59 | .84 | .16 | #6 | .40 | 970 |
| FNYBU-PB-10-A-LS | FNYBU-PB-10-AL-LS | .875 | 1.63 | 2.50 | 1.75 | 1.94 | 1.125 | 2.125 | 1.44 | .28 | .85 | .68 | .19 | #8 | 1.00 | 1450 |
| FNYBU-PB-12-A-LS | FNYBU-PB-12-AL-LS | .937 | 1.75 | 2.75 | 1.88 | 2.06 | 1.250 | 2.375 | 1.56 | .31 | .94 | .72 | .19 | #8 | 1.20 | 1900 |
| FNYBU-PB-16-A-LS | FNYBU-PB-16-AL-LS | 1.187 | 2.19 | 3.25 | 2.38 | 2.81 | 1.750 | 2.875 | 1.94 | .38 | 1.19 | .86 | .22 | #10 | 2.40 | 3500 |
| FNYBU-PB-20-A-LS | FNYBU-PB-20-AL-LS | 1.500 | 2.81 | 4.00 | 3.00 | 3.63 | 2.000 | 3.500 | 2.50 | .44 | 1.50 | 1.20 | .22 | #10 | 5.00 | 5100 |
| FNYBU-PB-24-A-LS | FNYBU-PB-24-AL-LS | 1.750 | 3.25 | 4.75 | 3.50 | 4.00 | 2.500 | 4.125 | 2.88 | .50 | 1.75 | 1.25 | .28 | 1/4 | 7.80 | 7000 |
| FNYBU-PB-32-A-LS | FNYBU-PB-32-AL-LS | 2.125 | 4.06 | 6.00 | 4.50 | 5.00 | 3.250 | 3.250 | 3.63 | .63 | 2.12 | 1.58 | .41 | 1/4 | 7.80 | 12500 |

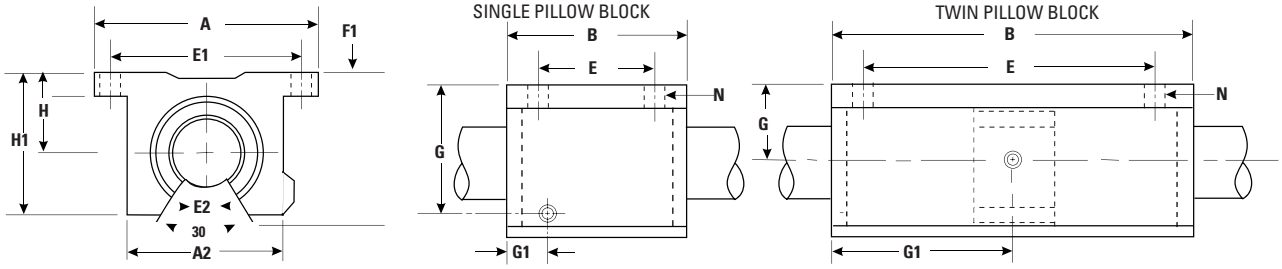
## Closed Twin Pillow Blocks with Self-Aligning Bearings

| Precision I.D. | Compensated I.D.[1] | Twin Pillow Block Dimensions (in.) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | H ±.003 | H1 | A | A2 | B | E ±.010 | E1 ±.010 | F | F1 | G | G1 | N | | Pillow Block Mass (lb) | Max. Static Load ($lb_f$) |
| | | | | | | | | | | | | | Hole | Bolt | | |
| FNYBU-TWN-04-A-LS | FNYBU-TWN-04-AL-LS | .437 | .81 | 1.63 | 1.00 | 2.50 | 2.000 | 1.313 | .75 | .19 | .44 | 1.25 | .16 | #6 | .19 | 600 |
| FNYBU-TWN-06-A-LS | FNYBU-TWN-06-AL-LS | .500 | .94 | 1.75 | 1.13 | 2.75 | 2.050 | 1.438 | .88 | .19 | .50 | 1.37 | .16 | #6 | .25 | 1000 |
| FNYBU-TWN-08-A-LS | FNYBU-TWN-08-AL-LS | .687 | 1.25 | 2.00 | 1.38 | 3.50 | 2.000 | 1.688 | 1.13 | .25 | .59 | 1.75 | .16 | #6 | .40 | 1940 |
| FNYBU-TWN-10-A-LS | FNYBU-TWN-10-AL-LS | .875 | 1.63 | 2.50 | 1.75 | 4.00 | 3.000 | 2.125 | 1.44 | .28 | .85 | 2.00 | .19 | #8 | 1.00 | 2900 |
| FNYBU-TWN-12-A-LS | FNYBU-TWN-12-AL-LS | .937 | 1.75 | 2.75 | 1.88 | 4.50 | 3.500 | 2.375 | 1.56 | .31 | .94 | 2.25 | .19 | #8 | 1.20 | 3800 |
| FNYBU-TWN-16-A-LS | FNYBU-TWN-16-AL-LS | 1.187 | 2.19 | 3.25 | 2.38 | 6.00 | 4.500 | 2.875 | 1.94 | .38 | 1.19 | 3.00 | .22 | #10 | 2.40 | 7000 |
| FNYBU-TWN-20-A-LS | FNYBU-TWN-20-AL-LS | 1.500 | 2.81 | 4.00 | 3.00 | 7.50 | 5.500 | 3.500 | 2.50 | .44 | 1.50 | 3.75 | .22 | #10 | 5.00 | 10200 |
| FNYBU-TWN-24-A-LS | FNYBU-TWN-24-AL-LS | 1.750 | 3.25 | 4.75 | 3.50 | 9.00 | 6.500 | 4.125 | 2.88 | .50 | 1.75 | 4.50 | .28 | 1/4 | 7.80 | 14000 |

1 Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.
2 All dimensions in inches unless otherwise noted.
Note: For Pillow Block Seals or non-self-aligning bearings see Part Number Matrix on page 110.

# Inch – FluoroNyliner Bushing Bearings

## Open Pillow Blocks with Self-Aligning Bearings




END VIEW SIDE VIEW SIDE VIEW

## Open Single Pillow Blocks with Self-Aligning Bearings

| Precision I.D. | Compensated I.D.[1] | Single Pillow Block Dimensions (in.) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | H ±.003 | H1 | A | A2 | B | E ±.010 | E1 ±.010 | F1 | G | G1 | N | | Pillow Block Mass (lb) | Max. Static Load ($lb_f$) |
| | | | | | | | | | | | | Hole | Bolt | | |
| FNYBU-PBO-08-A-LS | FNYBU-PBO-08-AL-LS | .687 | 1.13 | 2.00 | 1.38 | 1.69 | 1.000 | 1.688 | .25 | .69 | .84 | .16 | #6 | .20 | 970 |
| FNYBU-PBO-10-A-LS | FNYBU-PBO-10-AL-LS | .875 | 1.44 | 2.50 | 1.75 | 1.94 | 1.125 | 2.125 | .28 | .70 | .68 | .19 | #8 | .50 | 1450 |
| FNYBU-PBO-12-A-LS | FNYBU-PBO-12-AL-LS | .937 | 1.56 | 2.75 | 1.88 | 2.06 | 1.250 | 2.375 | .31 | .94 | .72 | .19 | #8 | .60 | 1900 |
| FNYBU-PBO-16-A-LS | FNYBU-PBO-16-AL-LS | 1.187 | 2.00 | 3.25 | 2.38 | 2.81 | 1.750 | 2.875 | .38 | 1.20 | .86 | .22 | #10 | 1.20 | 3500 |
| FNYBU-PBO-20-A-LS | FNYBU-PBO-20-AL-LS | 1.500 | 2.56 | 4.00 | 3.00 | 3.63 | 2.000 | 3.500 | .44 | 1.50 | 1.20 | .22 | #10 | 2.50 | 5100 |
| FNYBU-PBO-24-A-LS | FNYBU-PBO-24-AL-LS | 1.750 | 2.94 | 4.75 | 3.50 | 4.00 | 2.500 | 4.125 | .50 | 1.75 | 1.25 | .28 | 1/4 | 3.80 | 7000 |
| FNYBU-PBO-32-A-LS | FNYBU-PBO-32-AL-LS | 2.125 | 3.63 | 6.00 | 4.50 | 5.00 | 3.250 | 5.250 | .63 | 2.12 | 1.58 | .41 | 3/8 | 7.00 | 12500 |

## Open Twin Pillow Blocks with Self-Aligning Bearings

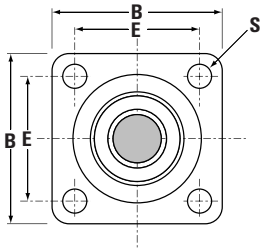
| Precision I.D. | Compensated I.D.[1] | Twin Pillow Block Dimensions (in.) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | H ±.003 | H1 | A | A2 | B | E ±.010 | E1 ±.010 | F1 | G | G1 | N | | Pillow Block Mass (lb) | Max. Static Load ($lb_f$) |
| | | | | | | | | | | | | Hole | Bolt | | |
| FNYBU-TWNO-08-A-LS | FNYBU-TWNO-08-AL-LS | .687 | 1.13 | 2.00 | 1.38 | 3.50 | 2.000 | 1.688 | .25 | .59 | 1.75 | .16 | #6 | .40 | 1940 |
| FNYBU-TWNO-10-A-LS | FNYBU-TWNO-10-AL-LS | .875 | 1.44 | 2.50 | 1.75 | 4.00 | 3.000 | 2.125 | .28 | .85 | 2.00 | .19 | #8 | 1.00 | 2900 |
| FNYBU-TWNO-12-A-LS | FNYBU-TWNO-12-AL-LS | .937 | 1.56 | 2.75 | 1.88 | 4.50 | 3.500 | 2.375 | .31 | .94 | 2.25 | .19 | #8 | 1.20 | 3800 |
| FNYBU-TWNO-16-A-LS | FNYBU-TWNO-16-AL-LS | 1.187 | 2.00 | 3.25 | 2.38 | 6.00 | 4.500 | 2.875 | .38 | 1.20 | 3.00 | .22 | #10 | 2.40 | 7000 |
| FNYBU-TWNO-20-A-LS | FNYBU-TWNO-20-AL-LS | 1.500 | 2.56 | 4.00 | 3.00 | 7.50 | 5.500 | 3.500 | .44 | 1.50 | 3.75 | .22 | #10 | 5.00 | 10200 |
| FNYBU-TWNO-24-A-LS | FNYBU-TWNO-24-AL-LS | 1.750 | 2.94 | 4.75 | 3.50 | 9.00 | 6.500 | 4.125 | .50 | 1.75 | 4.50 | .28 | 1/4 | 7.80 | 14000 |

1 Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.
2 All dimensions in inches unless otherwise noted.
3 Open bearings operating in shear should be derated by 40%. Open bearings operating in tension should be derated by 70%.
Note: For Pillow Block Seals or non-self-aligning bearings see Part Number Matrix on page 110.

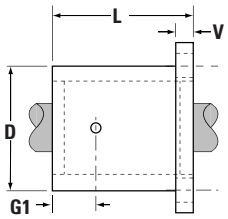
# Inch – FluoroNyliner Bushing Bearings

## Flanged Pillow Blocks with Self-Aligning Bearings

SINGLE PILLOW BLOCK

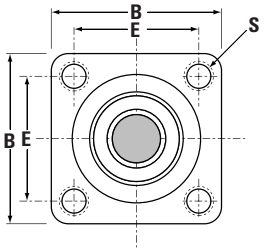



END VIEW

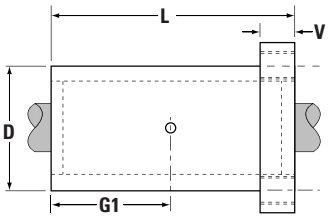



SIDE VIEW

TWIN PILLOW BLOCK




END VIEW




SIDE VIEW

## Flanged Single Pillow Blocks with Self-Aligning Bearings

| Precision I.D. | Compensated I.D.[1] | Single Pillow Block Dimensions (in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | Nominal Bearing Diameter | B | E ±.010 | L | D | V | G1 ±.010 | S Shaft Hole Diameter | 60 Case LinearRace Shaft Diameter | |
| | | | | | | | | | | Min. | Mx. |
| FNYBU-FB-08-A-LS | FNYBU-FB-08-AL-LS | .500 | 1.63 | 1.250 | 1.69 | 1.25 | .25 | .72 | .19 | .4990 | .4995 |
| FNYBU-FB-12-A-LS | FNYBU-FB-12-AL-LS | .750 | 2.38 | 1.750 | 2.06 | 1.75 | .38 | .89 | .22 | .7490 | .7495 |
| FNYBU-FB-16-A-LS | FNYBU-FB-16-AL-LS | 1.00 | 2.75 | 2.125 | 2.81 | 2.25 | .50 | 1.27 | .28 | .9990 | .9995 |
| FNYBU-FB-20-A-LS | FNYBU-FB-20-AL-LS | 1.25 | 3.50 | 2.750 | 3.63 | 3.00 | .63 | 1.67 | .35 | 1.2490 | 1.2495 |
| FNYBU-FB-24-A-LS | FNYBU-FB-24-AL-LS | 1.50 | 4.00 | 3.125 | 4.00 | 3.62 | .75 | 1.86 | .41 | 1.4989 | 1.4994 |

## Flanged Twin Pillow Blocks with Self-Aligning Bearings

| Precision I.D. | Compensated I.D.[1] | Twin Pillow Block Dimensions (in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Part Number | Part Number | Nominal Bearing Diameter | B | E ±.010 | L | D | V | G1 ±.010 | S Thread | 60 Case LinearRace Shaft Diameter | |
| | | | | | | | | | | Min. | Mx. |
| FNYBU-TFB-08-A-LS | FNYBU-FB-08-AL-LS | .500 | 1.63 | 1.250 | 3.20 | 1.25 | .90 | 1.48 | 1/4 - 20 | .4990 | .4995 |
| FNYBU-TFB-12-A-LS | FNYBU-FB-10-AL-LS | .750 | 2.38 | 1.750 | 3.95 | 1.75 | .90 | 1.98 | 1/4 - 20 | .7490 | .7495 |
| FNYBU-TFB-16-A-LS | FNYBU-FB-12-AL-LS | 1.00 | 2.75 | 2.125 | 5.33 | 2.25 | .90 | 2.67 | 1/4 - 18 | .9990 | .9995 |
| FNYBU-TFB-20-A-LS | FNYBU-FB-16-AL-LS | 1.25 | 3.50 | 2.750 | 6.70 | 3.00 | .90 | 3.35 | 5/16 - 18 | 1.2490 | 1.2495 |
| FNYBU-TFB-24-A-LS | FNYBU-FB-24-AL-LS | 1.50 | 4.00 | 3.125 | 7.50 | 3.62 | .100 | 3.75 | 5/16 - 16 | 1.4989 | 1.4994 |

1 Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.
2 All dimensions in inches unless otherwise noted.
Note: For Pillow Block Seals or non-self-aligning bearings see Part Number Matrix at bottom of this page.

**FNYB U -PB XX -L -OPN -LS**

- **FNYB** — FluoroNyliner Bushing Bearing
- **U** — USA inch
- **-PB** — Bearing ID
  - **No Entry** Standard Plain Bearing
  - **PB** Closed Pillow Block
  - **PBO** Open Pillow Block
  - **FB** Flanged Pillow Block
  - **TFB** Twin Flanged Pillow Block
  - **TWN** Twin Pillow Block
  - **TWNO** Open Twin Pillow Block
- **XX** — Bearing ID
- **-L** —
  - **No Entry** Standard
  - **L** Compensated I.D.
  - **A** Aligning (Crowned O.D.)
  - **AL** Compensated I.D. & Aligning
- **-OPN** —
  - **No Entry** Closed
  - **OPN** Open (unmounted bearings only)
- **-LS** — Less Seals (For Pillow Blocks Only)

ATTENTION: Thomson FluoroNyliner Bushing Bearings are precision components. For best result and to preserve the bearing's warranty you must use the specified Thomson 60 Case LinearRace shafting.

## Frictional Characteristics:

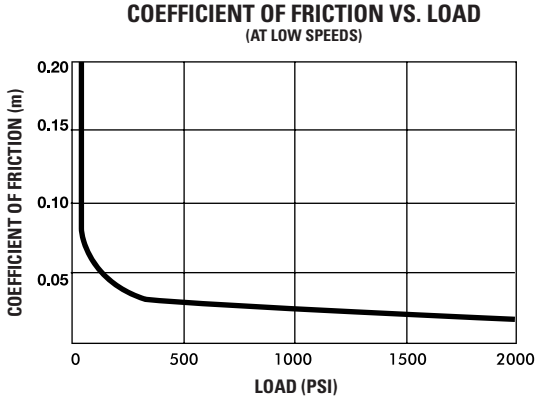
I) Static: Tests performed on dry FNYBU-16 bearings indicate that the force required to initiate motion is dependent upon the applied load according to the following equation:

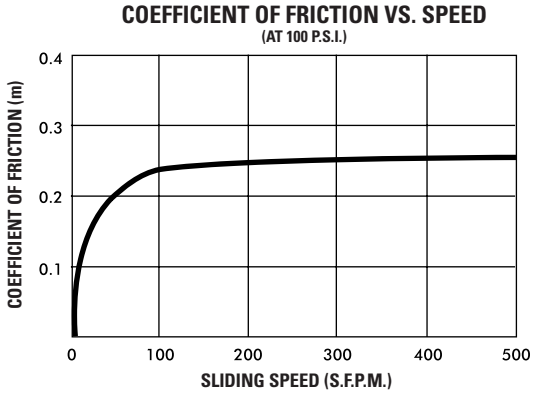
$F_f = 1.3 + 0.18\ F_a$

Where:
$F_f$ = Friction force, static ($lb_f$)
$F_a$ = Applied force ($lb_f$)

| Characteristic | Limit |
|---|---|
| Linear Temperature Range | -400˚ F to 550˚ F (-240˚ C to 288˚ C) |
| Velocity, dry | 140 ft/min. Continuous |
| Velocity, dry | 400 ft/min. Intermittent |
| Velocity, Lubricated | 400 ft/min. Continuous |
| Pressure | 1500 psi |
| PV | 10,000 psi ft/min |

II) Dynamic: The coefficient of friction is dependent upon both the pressure and the velocity.
Pressure: Coefficient of friction decreases rapidly with increase in pressure.
Velocity: Coefficient of friction increases with an increase in velocity, and quickly stabilizes.
For example, at 100 psi, the coefficient of friction is approximately 0.25 for velocities of 100ft/min and higher.




## Wear Rates and Life Expectancy:

I) Wear rates: The wear rates of a plain bearing are dependent upon a number of variables, including characteristics of the counter-face, velocity, lubrication, load and contamination. Tests conducted on FNYBU-16 bearings operating in the linear mode at approximately 70 ft/min, and at a pressure of approximately 33 psi, demonstrated an average radial wear change of 0.0011 inches, after 80 million inches of travel. This yields the following formula:

$W_R = 14x(10^{-6})xT$

Where:
$W_R$ = Radial Wear (micro-inches)
T = Travel (inches)

II) Life expectancy: The life expectancy may be calculated from the wear rate. This is normally associated with the allowable radial clearance for a given application. The absolute wear limit is the bearing material thickness, which is 0.028 inches.

## Inch – FluoroNyliner Bushing Bearings

# FluoroNyliner Bushing Bearing Chemical Resistance Chart

| Chemical | Rating ** | | |
|---|---|---|---|
| | Part Number | Standard Aluminum | Optional Hardcoat Anodized Aluminum |
| 2-butanone | A | | |
| Acetic Acid, 20% | A | C | C |
| Acetone | A | B | B |
| Acetylene | A | | |
| Alkalines | E | | |
| Ammonia | E | | |
| Ammonia Anhydrous | | B | B |
| Ammonium Chloride, 10% | | D | D |
| Ammonium Hydroxide, 10% | | D | D |
| Amyl Chloride | A | | |
| Analine | A | | |
| Barium Hydroxide | | D | D |
| Beer | A | B | B |
| Benzaldehyde or Benzonitrile | A | | |
| Benzenesulfonic Acid | A | A | A |
| Boric Acid Solutions | A | B | B |
| Bromine | A | | |
| Butane | | C | C |
| Calcium Chloride, 20% | A | C | C |
| Calcium Hydroxide, 10% | E | C | C |
| Calcium Hypochlorite | A | C | C |
| Camphor Oil or Carbon Sulfide | A | | |
| Carbon Dioxide | A | | |
| Carbon Monoxide | A | B | B |
| Carbon Tetrachloride | A | B | B |
| Chloral Hydrate or Chloroacetic Acid | A | | |
| Chlorine gas, dry | A | C | C |
| Chlorine gas, wet | A | D | D |
| Chloroform or Chlorosulfonic Acid | A | | |
| Chromic Acid, 10% | A | C | B |
| Citric Acid, 5% | A | B | B |
| Concentrated Oxidizing Acids | A | | |
| Creosote or Cresol | A | | |
| Decalin or Dichlorobenzene | A | | |
| Diethyl Ether or Dimethylamine | A | | |
| Dimethyl Sulfoxide | A | | |
| Ethyl Acetate | A | | |
| Ethyl Alcohol | A | B | B |
| Ethylene Glycol | A | B | B |
| Ferric Chloride, 50% | A | D | D |
| Ferric Nitrate | A | | |
| Ferric Sulfate | A | | |
| Ferrous Sulfate | A | | |
| Fluoboric Acid | E | | |
| Fluorinating Agents, strong | E | | |
| Fluorine > 140˚F & dry gas > 250˚F | E | | |
| Fluosilicic Acid | E | | |
| Gasoline | A | C | C |
| Hydrobromic Acid | A | | |

| Chemical | Rating ** | | |
|---|---|---|---|
| | Part Number | Standard Aluminum | Optional Hardcoat Anodized Aluminum |
| Hydrochloric Acid, 20% or 35% | A | D | D |
| Hydrocyanic Acid | A | D | D |
| Hydrocyanic Acid, 10% | | C | C |
| Hydrofluoric Acid | E | D | D |
| Hydrofluosilicic Acid | E | | |
| Hydrogen Fluoride, dry > 250˚F | E | | |
| Hydrogen Peroxide - dilute | A | B | B |
| Hydrogen Sulfide, dry | A | C | B |
| Hydrogen Sulfide, moist | A | | |
| Hydroxides | E | | |
| Kerosene | | C | C |
| Lactic Acid, 10% | A | C | C |
| Magnesium Chloride, 50% | A | D | D |
| Mercury or Silver Salts | A | D | D |
| Methyl Alcohol | | C | C |
| Methylene Chloride | A | B | B |
| Methylethyl Ketone | A | C | C |
| Mineral Oil | A | C | C |
| Molten Alkali Metals | E | | |
| Molten Anhydrous Base | E | | |
| Naptha | A | C | C |
| Nitric Acid, 70% | E | D | D |
| Nitro Benzene | A | | |
| Oleum | A | | |
| Phosphoric Acid, 10% | A | D | D |
| Potassium Chlorate | E | | |
| Potassium or Sodium Cyanide | A | | |
| Potassium Dichromate or Nitrate | A | | |
| Potassium Hydroxide | E | | |
| Sea Water | A | C | B |
| Sodium Chlorate | A | | |
| Sodium Chloride | A | | |
| Sodium Hydroxide, 20% | C | D | D |
| Sodium Hypochlorite, 20% | A | C | C |
| Sodium Peroxide, 10% | | C | C |
| Stannous Chloride | A | | |
| Sulfur Dioxide, dry | A | C | C |
| Sulfur Dioxide, 5% +$H_2O$ | A | D | D |
| Sulfuric Acid, 50% | A | D | D |
| Trichlorethylene | A | | |
| Toluene (122˚F/50˚C) | A | B | B |
| Trifluoroacetic Acid | A | | |
| Turpentine | A | C | B |
| Water, demineralized | A | C | B |
| Water, distilled | A | D | C |
| Water, sewage | | D | C |
| Xylene | A | C | C |
| Zinc Chloride solutions | A | D | D |

** Rating Key
A = No Attack B = Minimal Material Loss C = Moderate Material Loss D = Significant Material Loss E = Not Recommended
Chemical effects are at room temperature unless otherwise noted.

All information contained herein is believed to be correct but is presented without any guaranty, warranty or representation of any kind, express or implied. Changes in temperature, concentration and/or combinations of chemicals may cause different results. Prior to use, it is recommended that the material be tested to determine its compatibility with a specific application. Contact Thomson applications engineers for more detailed information at +44 1525 243 243.

# Accessories



Described here are accessories for Linear Ball Bushing Bearings and pillow blocks including retaining rings, external seals, integral seals and resilient mounts.

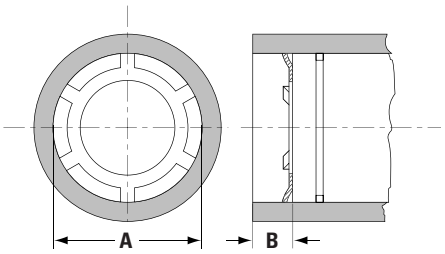
## Inch – Accessories

# Retaining Rings

## Internal Retaining Rings (Type PR)

Push-in retaining rings, as shown, are for use with Super Smart, Super and Precision Steel Ball Bushing closed type bearings. Each retaining ring is installed inside the housing bore at each end of the Ball Bushing bearing.

(Dimensions in inches)




| Part Number | Use with Ball Bushing bearing Part Number | Nominal Housing Bore A | Minimum End Space required B |
|---|---|---|---|
| PR-250 | SUPER-4 or 4812 [1] | .500 | .060 |
| PR-375 | SUPER-6 or 61014 [1] | .625 | .060 |
| PR-500 | SUPER-8 or 81420 [1] | .875 | .080 |
| PR-625 | SSU-10 or SUPER-10 or 101824 [1] | 1.125 | .080 |
| PR-750 | SSU-12 or SUPER-12 or 122026 [1] | 1.250 | .080 |
| PR-1000 | SSU-16 or SUPER-16 or 162536 [1] | 1.563 | .080 |
| PR-1250 | SSU-20 or SUPER-20 or 203242 [1] | 2.000 | .080 |
| PR-1500 | SSU-24 or SUPER-24 or 243848 [1] | 2.375 | .100 |
| PR-2000 | SUPER-32 or 324864 [1] | 3.000 | .100 |

[1]Applies to A and XA Type Precision Steel Ball Bushing Bearings

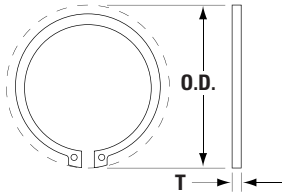
## External Retaining Rings (Types C and W)

**Type W:** External retaining rings fit into the retaining ring grooves on the outside diameter of Super Smart, Super and Precision Steel Ball Bushing Bearings to provide external mounting retention. Available in standard and stainless steel versions.

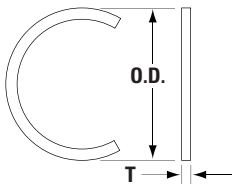
**Type C:** External retaining rings fit into the retaining ring grooves on the outside diameter of Super Smart, Super and Precision Steel Ball Bushing Bearings (Open and Closed Type) to provide external mounting retention. Available in standard and stainless steel versions.

(Dimensions in inches)

**External Retaining Rings (Type W)**




**External Retaining Rings (Type C)**




| Standard Steel Part Number | Stainless Steel Part Number | Use with Ball Bushing bearing Part Number | T | O.D. |
|---|---|---|---|---|
| - | W-125-SS | INST-258-SS [1] | .025 | .520 |
| - | W-187-SS | INST-369-SS [1] | .025 | .560 |
| W-250 | W-250-SS | SUPER-4 or 4812 [1] | .035 | .720 |
| C-250 | C-250-SS | | .035 | .550 |
| W-375 | W-375-SS | SUPER-6 or 61014 [1] | .035 | .850 |
| C-375 | C-375-SS | | .035 | .673 |
| W-500 | W-500-SS | SUPER-8 or 81420 [1] | .042 | 1.150 |
| C-500 | C-500-SS | | .042 | .923 |
| W-625 | W-625-SS | SSU-10 or SUPER-10 | .050 | 1.510 |
| C-625 | C-625-SS | or 101824 [1] | .050 | 1.180 |
| W-750 | W-750-SS | SSU-12 or SUPER-12 | .050 | 1.620 |
| C-750 | C-750-SS | or 122026 [1] | .050 | 1.301 |
| W-1000 | W-1000-SS | SSU-16 or SUPER-16 | .062 | 2.040 |
| C-1000 | C-1000-SS | or 162536 [1] | .062 | 1.620 |
| W-1250 | - | SSU-20 or SUPER-20 | .062 | 2.500 |
| C-1250 | - | or 203242 [1] | .062 | 2.040 |
| W-1500 | - | SSU-24 or SUPER-24 | .078 | 2.910 |
| C-1500 | - | or 243848 [1] | .078 | 2.429 |
| W-2000 | - | SUPER-32 or 324864 [1] | .093 | 3.600 |
| W-2500 | - | 406080 [1] | .109 | 4.420 |
| W-3000 | - | 487296 [1] | .109 | 5.310 |
| W-4000 | - | 6496128 [1] | .125 | 7.100 |

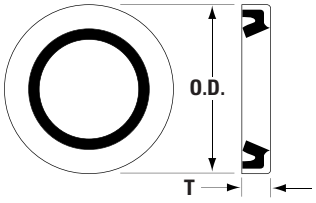
[1]Applies to A, XA and OPN Type Precision Steel Ball Bushing Bearings

# External Seals

## Seals for Fixed Diameter Housings

Double acting seals for Super Smart, Super and Precision Steel closed type Ball Bushing Bearings. Standard and stainless versions. Sizes 1 1/2 inch and above use spring fingers to reinforce sealing capability which could add to seal drag.

(Dimensions in inches)



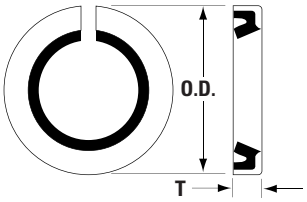

| Standard Steel Seal Part Number | Stainless Steel Seal Part Number | Use with Ball Bushing Bearing Part Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|---|
| S-250 | S-250-SS | SUPER-4 or 4812 [1] | .250 | .125 | .504 |
| S-375 | S-375-SS | SUPER-6 or 61014 [1] | .375 | .125 | .629 |
| S-500 | S-500-SS | SUPER-8 or 81420 [1] | .500 | .125 | .879 |
| S-625 | S-625-SS | SSU-10 or SUPER-10 or 101824 [1] | .625 | .125 | 1.129 |
| S-750 | S-750-SS | SSU-12 or SUPER-12 or 122026 [1] | .750 | .125 | 1.254 |
| S-1000 | S-1000-SS | SSU-16 or SUPER-16 or 162536 [1] | 1.000 | .187 | 1.567 |
| S-1250 | - | SSU-20 or SUPER-20 or 203242 [1] | 1.250 | .375 | 2.004 |
| S-1500 | - | SSU-24 or SUPER-24 or 243848 [1] | 1.500 | .375 | 2.379 |
| S-2000 | - | SUPER-32 or 324864 [1] | 2.000 | .375 | 3.004 |
| S-2500 | - | 406080 [1] | 2.500 | .375 | 3.756 |
| S-3000 | - | 487296 [1] | 3.000 | .500 | 4.506 |
| S-4000 | - | 6496128 [1] | 4.000 | .500 | 6.006 |

[1]Applies to Aand XA Precision Steel Ball Bushing Bearings

## Seals for Adjustable Housing

Double acting seals for Super Smart, Super and Precision Steel Ball Bushing Bearings. Seals have a radial slot through the circumferences to facilitate diameter adjustment. Standard and stainless steel versions.

(Dimensions in inches)




[2]Applies to ADJ Type Precision Steel Ball Bushing Bearings

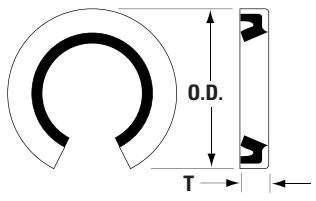
| Standard Steel Seal Part Number | Stainless Steel Seal Part Number | Use with Adjustable Type Ball Bushing Bearing Part Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|---|
| ADJ-S-500 | ADJ-S-500-SS | SUPER-8 or 81420 [2] | .500 | .125 | .879 |
| ADJ-S-625 | ADJ-S-625-SS | SSU-10 or SUPER-10 or 101824 [2] | .625 | .125 | 1.129 |
| ADJ-S-750 | ADJ-S-750-SS | SSU-12 or SUPER-12 or 122026 [2] | .750 | .125 | 1.254 |
| ADJ-S-1000 | ADJ-S-1000-SS | SSU-16 or SUPER-16 or 162536 [2] | 1.000 | .187 | 1.567 |
| ADJ-S-1250 | - | SSU-20 or SUPER-20 or 203242 [2] | 1.250 | .375 | 2.004 |
| ADJ-S-1500 | - | SSU-24 or SUPER-24 or 243848 [2] | 1.500 | .375 | 2.379 |
| ADJ-S-2000 | - | SUPER-32 or 324864 [2] | 2.00 | .375 | 3.004 |
| ADJ-S-2500 | - | 406080 [2] | 2.500 | .375 | 3.756 |
| ADJ-S-3000 | - | 487296 [2] | 3.000 | .500 | 4.506 |
| ADJ-S-4000 | - | 6496128 [2] | 4.000 | .500 | 6.006 |

[2]Applies to ADJ type Precision Steel Ball Bushing Bearings

## Seals for Open Type Housing

Double acting seals for Super Smart, Super and Precision Steel Ball Bushing Open Type bearings. Standard and stainless steel versions.

(Dimensions in inches)




[3]Applies to OPN Type Precision Steel Ball Bushing Bearings

| Standard Steel Seal Part Number | Stainless Steel Seal Part number | Use with Adjustable Type Ball Bushing Bearing Part Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|---|
| OPN-S-500 | OPN-S-500-SS | SUPER-8 or 81420 [3] | .500 | .125 | .879 |
| OPN-S-625 | OPN-S-625-SS | SSU-10 or SUPER-10 or 101824 [3] | .625 | .125 | 1.129 |
| OPN-S-750 | OPN-S-750-SS | SSU-12 or SUPER-12 or 122026 [3] | .750 | .125 | 1.254 |
| OPN-S-1000 | OPN-S-1000-SS | SSU-16 or SUPER-16 or 162536 [3] | 1.000 | .187 | 1.567 |
| OPN-S-1250 | - | SSU-20 or SUPER-20 or 203242 [3] | 1.250 | .375 | 2.004 |
| OPN-S-1500 | - | SSU-24 or SUPER-24 or 243848 [3] | 1.500 | .375 | 2.379 |
| OPN-S-2000 | - | SUPER-32 or 324864 [3] | 2.000 | .375 | 3.004 |
| OPN-S-2500 | - | 406080 [3] | 2.500 | .375 | 3.756 |
| OPN-S-3000 | - | 487296 [3] | 3.000 | .500 | 4.506 |
| OPN-S-4000 | - | 6496128 [3] | 4.000 | .500 | 6.006 |

[3]Applies to OPN type Precision Steel Ball Bushing Bearings

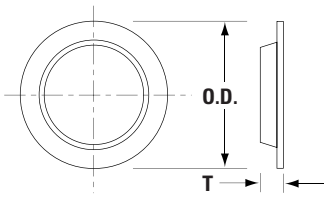
## Inch – Accessories

# Integral Seals

## Seals for Sealed Super Ball Bushing Bearings (Closed Type)

Double acting replacement seals for the Sealed Super Ball Bushing* bearing.

(Dimensions in inches)

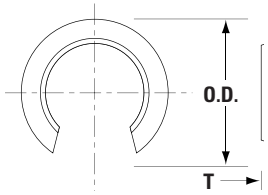



| Part number | Use with Super Ball Bushing Bearing Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|
| S-500-DD | SUPER-8-DD | .500 | .120 | .770 |
| S-625-DD | SUPER-10-DD | .625 | .120 | 1.010 |
| S-750-DD | SUPER-12-DD | .750 | .120 | 1.110 |
| S-1000-DD | SUPER-16-DD | 1.000 | .180 | 1.390 |

## Seals for Sealed Super Ball Bushing Bearings (Open Type)

Double acting replacement seals for the Sealed Super Ball Bushing bearing.

(Dimensions in inches)

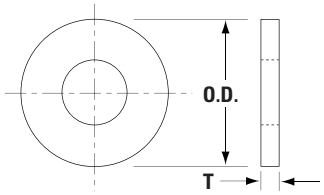



| Part Number | Use with Super Ball Bushing Bearing Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|
| S-500-OPN-DD | SUPER-8-DD-OPN | .500 | .120 | .770 |
| S-625-OPN-DD | SUPER-10-DD-OPN | .625 | .120 | 1.010 |
| S-750-OPN-DD | SUPER-12-DD-OPN | .750 | .120 | 1.110 |
| S-1000-OPN-DD | SUPER-16-DD-OPN | 1.000 | .180 | 1.390 |

## Felt Seals for Closed Type Ball Bushing Bearings

Felt seals for Super Smart, Super and Precision Steel closed type Ball Bushing Bearings. Felt seals reduce drag for applications where reduced friction is critical. Felt seals provide minimal protection from the ingress of contamination. Use PR type external retaining rings for retention.

(Dimensions in inches)




| Standard Felt Seal Part Number | Use with Ball Bushing Bearing Part Number | Nominal LinearRace Diameter | T | O.D. |
|---|---|---|---|---|
| FS-250 | SUPER-4 or 4812 [1] | .250 | .125 | .500 |
| FS-375 | SUPER-6 or 61014 [1] | .375 | .125 | .625 |
| FS-500 | SUPER-8 or 81420 [1] | .500 | .125 | .875 |
| FS-625 | SSU-10 or SUPER-10 or 101824 [1] | .625 | .125 | 1.125 |
| FS-750 | SSU-12 or SUPER-12 or 122026 [1] | .750 | .125 | 1.250 |
| FS-1000 | SSU-16 or SUPER-16 or 162536 [1] | 1.000 | .125 | 1.563 |
| FS-1250 | SSU-20 or SUPER-20 or 203242 [1] | 1.250 | .188 | 2.000 |
| FS-1500 | SSU-24 or SUPER-24 or 243848 [1] | 1.500 | .188 | 2.375 |
| FS-2000 | SUPER-32 or 324864 [1] | 2.000 | .188 | 3.000 |

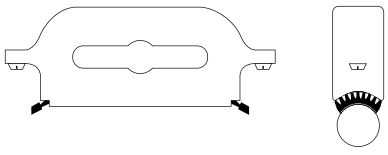
[1]Applies to A, XA and ADJ Type Precision Steel Ball Bushing Bearings

[1]Applies to A, XA and ADJ type Precision Steel Ball Bushing Bearings

## Seals for Roundway Linear Roller Bearings

Standard seals for both single and dual types.

(Dimensions in inches)

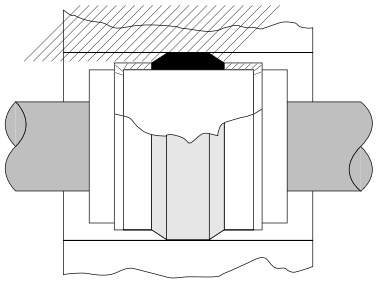


| Seal Number | Nominal LinearRace Diameter | Overall Length L | Overall Width W | Overall Height from Centerline of LinearRace H |
|---|---|---|---|---|
| RS-16 | 1.000 | 5.00 | 1.00 | 2.25 |
| RS-24 | 1.500 | 6.50 | 1.38 | 3.25 |
| RS-32 | 2.000 | 8.50 | 1.88 | 4.25 |
| RS-48 | 3.000 | 13.00 | 2.63 | 6.50 |
| RS-64 | 4.000 | 17.00 | 3.38 | 8.50 |

# Resilient Mounts

## Resilient Ball Bushing Bearing Mounts for Ease of Installation

Used with Precision Steel Ball Bushing Bearings Type A and XA. Resilient Ball Bushing bearing mounts are sometimes used when absolute rigidity is not essential and where a slightly larger housing bore can be accommodated. The self-aligning feature of these mounts guarantee uniform load distribution over the entire length of the load carrying balls and compensates for slight errors in housing bores and parallel 60 Case LinearRace alignment. The mount consists of a band of resilient material that can be easily mounted to the outside diameter of the Ball Bushing bearing. After it is installed in the housing bore it provides permanent resilient, self-aligning support for the bearing. Resilient mounts consist of one rubber ring, 2 spacers and 2 retaining rings. Ball Bushing Bearings must be purchased separately.



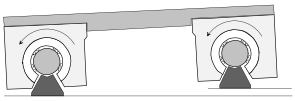
(Dimensions in inches)

| Resilient Mount Assembly Part Number | Use with Ball Bushing Bearing Number | Nominal LinearRace Diameter | Recommended Housing Bore ±.005 |
|---|---|---|---|
| RSL-250 | A or XA-4812 | .250 | .625 |
| RSL-375 | A or XA-61014 | .375 | .750 |
| RSL-500 | A or XA-81420 | .500 | 1.000 |
| RSL-625 | A or XA-101824 | .625 | 1.313 |
| RSL-750 | A or XA-122026 | .750 | 1.438 |
| RSL-1000 | A or XA-162536 | 1.000 | 1.813 |
| RSL-1250 | A or XA-203242 | 1.250 | 2.313 |
| RSL-1500 | A or XA-243848 | 1.500 | 2.750 |

## Metric - General Product Overview

# Thomson Linear Motion Metric Components

**The RoundRail Advantage** - The inherent ability of a RoundRail Ball Bushing bearing system to absorb torsional misalignment caused by inaccuracies in carriage or base machining or machine deflection...with little increase in stress to bearing components.

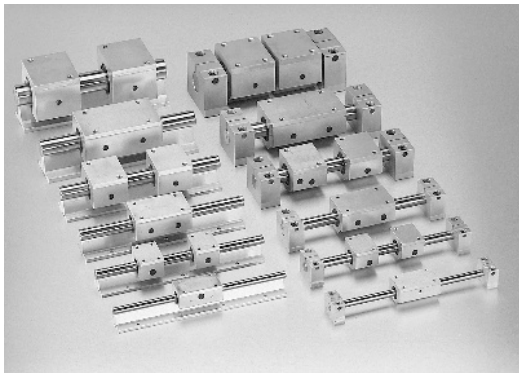




## Super Smart Ball Bushing Bearings

**Thomson Super Smart Ball Bushing Bearings represent a major advancement for Linear bearing technology, worldwide.**

This patented self-aligning linear bearing provides two times the load carrying capacity of the industry standard Thomson Super Ball Bushing bearing. Super Smart Ball Bushing Bearings also provide eight times the bearing life and up to five times the LinearRace shaft life when used in place of standard Super type bearings. (See page 120)



## Super Smart Ball Bushing Pillow Blocks

**Thomson Super Smart Ball Bushing Pillow Blocks available in closed, adjustable and open styles in both single and twin versions.**

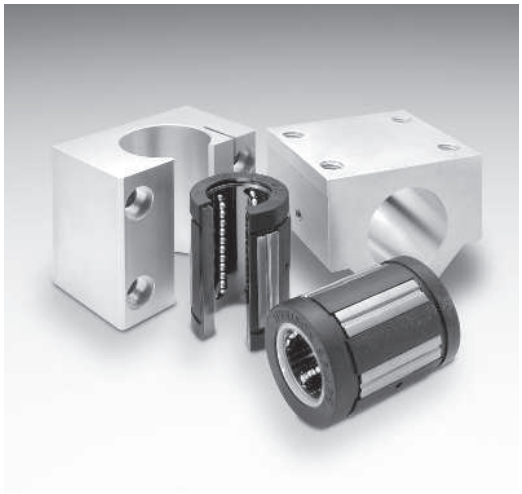
To minimize installation time and cost, the Super Smart Ball bushing bearing can be ordered factory-installed in an industry standard single or twin pillow block. The closed type pillow block is used in end supported applications for spanning or bridging a gap. The open style is used in continuously supported applications when maximum rigidity and stiffness is required. Each Super Smart Pillow Block is complete with integral double acting seals which keep out contaminants, retain lubrication and maximize bearing life. Since each pillow block is dimensionally interchangeable with industry standard pillow blocks, system performance improvements can be realized immediately. All pillow blocks are available and in stock from 1800 authorized distributors worldwide. (See page 126)



## MultiTrac Ball Bushing Bearings

**Rigid, high load capacity, linear bearings**

Extremely rigid MultiTrac Ball Bushing Bearing gives you less deflection and twice the load capacity or eight times the travel life of conventional Ball Bushing bearings. This increased bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. The improvement in bearing capacity permits designers to optimize system compactness and minimizes hardware costs. The bearing's patented ball control technology eliminates binding and chatter (stick-slip) common to high friction, plain bushings. Available and stocked in 7 standard sizes from over 1800 distributor locations worldwide. (See page 134)



## NEW: Super Ball Bushing Bearings and Pillow Blocks

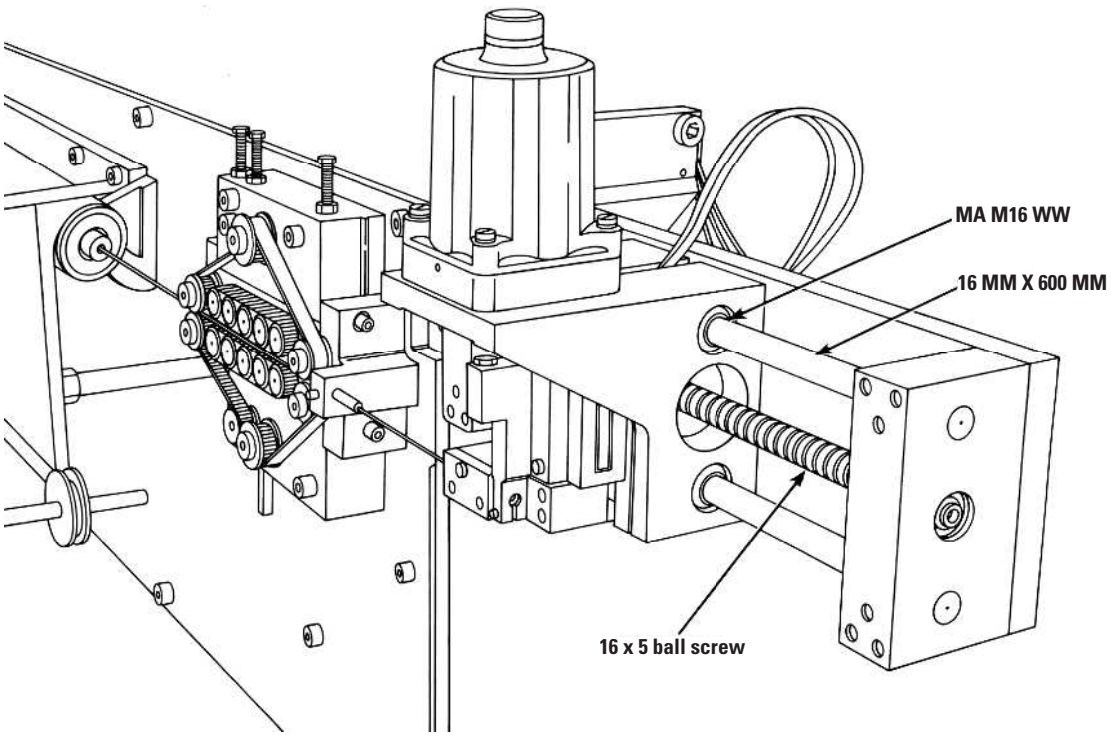
**High performance from superior design:**
A coefficient of friction as low as 0,001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings. A self-aligning capability up to 0,5° compensates for inaccuracies in base flatness or carriage machining. Achieved with Thomson Super Bearing plates which have defined radius crowns for maximized self-alignment accuracy. Accelerations as high as 150m/s$^2$ and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides. Quick to ship, drop-in replacement parts for existing applications. Twin version with two Super Ball Bushing bearings providing twice the load capacity or 8 times more travel life than the single version. (See page 141)



# Application

Thomson products are engineered to world-class performance standards, so that you can specify them with confidence worldwide. This Engineering Support section provides charts, formulas and technical information for:

- Ball Bushing bearing selection
- Load considerations for horizontal, side and vertical mounted applications
- Shaft deflection
- Installation
- Tolerance zones for internal and external diameters



## Metric – Super Smart Ball Bushing Bearings

# Super Smart Ball Bushing Bearings



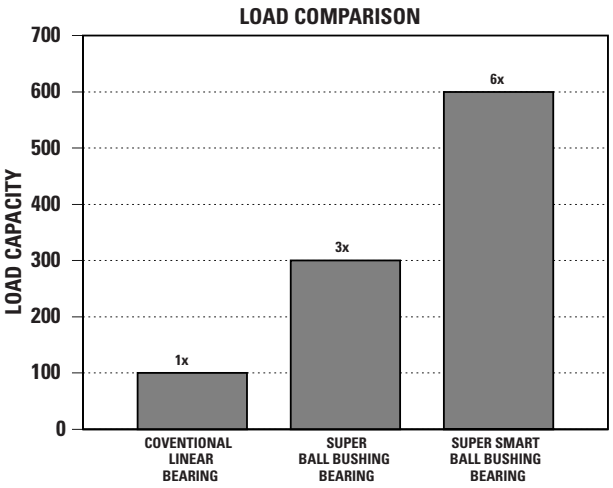
**Thomson Super Smart Ball Bushing Bearing products offer:**

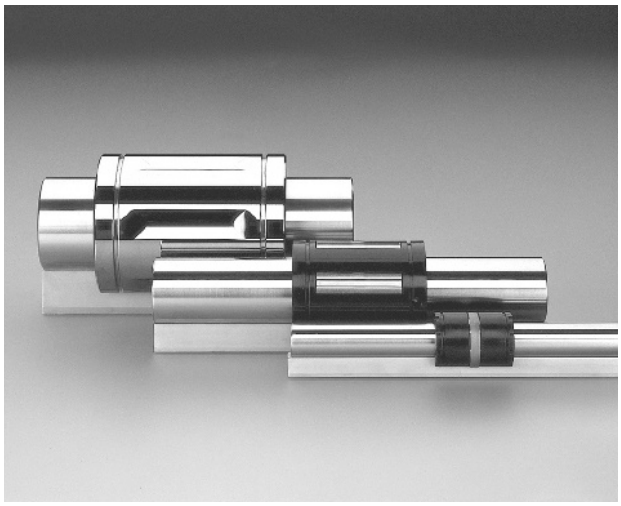
- Up to six times the load capacity or 216 times the travel life of conventional linear bearings.
- Twice the load capacity or eight times the travel life of industry standard Thomson Super Ball Bushing Bearings.
- Universal self-alignment feature, that compensates for misalignment of housing bores and 60 Case LinearRace shaft deflection, optimizes load distribution between ball tracks and assures uniform ball loading over the entire length of the bearing plate. Installation time and cost is minimized while bearing performance and life is maximized.
- Technologically advanced design that allows the bearing to maintain its diametral fit-up when installed in a housing that is slightly out-of-round.
- Up to 400% longer LinearRace shaft life and minimal machine downtime when replacing conventional linear bearings or the standard Super Ball Bushing Bearing.
- RoundRail Advantage combined with universal self-alignment eliminating the need for derating factors commonly required when using linear guides.
- Coefficient of friction as low as 0,001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings.
- Closed and open configurations.
- Double lip integral wipers that keep out dirt while retaining lubrication. Travel life is maximized.
- Worldwide availability from over 1800 authorized distributors.

# The Super Smart Advantage

## Advantage: Load Capacity

The Super Smart Ball Bushing Bearing provides twice the load capacity of the industry standard Thomson Super Ball Bushing Bearing and six times the load capacity of conventional linear bearings.



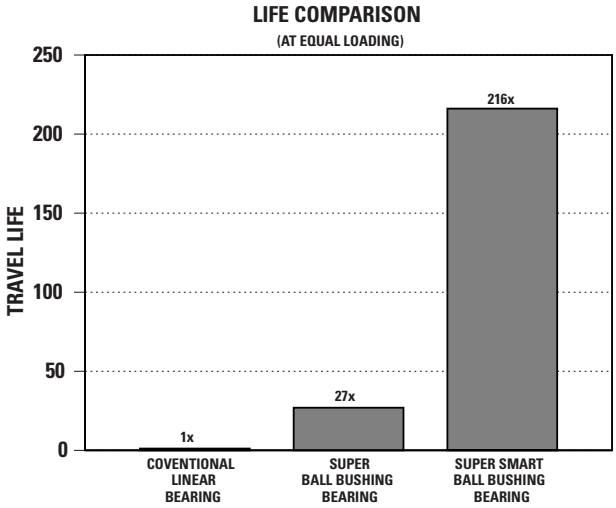



### Downsizing

The photograph above shows a conventional Ball Bushing bearing, Super Ball Bushing Bearing and Super Smart Ball Bushing Bearing, all of which have the same load capacity.

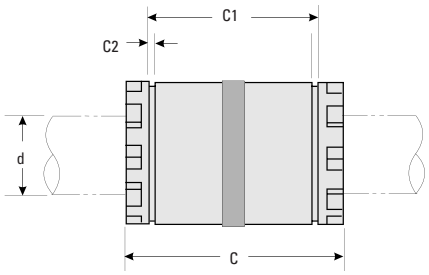
## Advantage: Travel Life

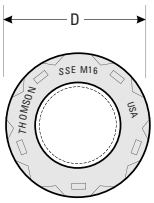
The Super Smart Ball Bushing Bearing provides eight times the travel life of the industry standard Thomson Super Ball Bushing Bearing and 216 times the travel life of conventional linear bearings.

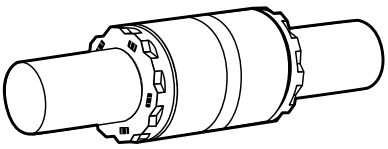


## Metric – Super Smart Ball Bushing Bearings

# Super Smart Ball Bushing Bearings
## (Closed Type)



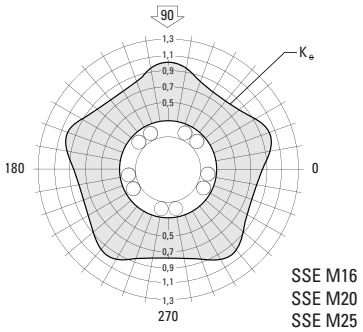



### Super Smart Ball Bushing Bearings (Closed Type) (Dimensions in mm)

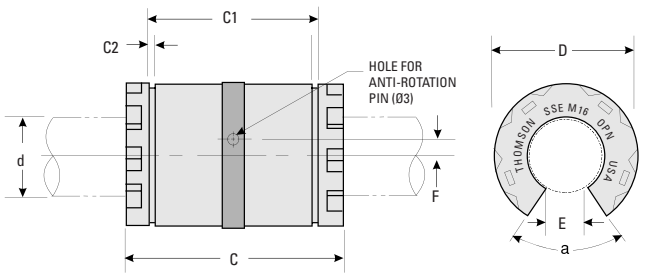
| Part Number | | | d(4) | D | C h14 | C1 H13 | C2 min. | Number of Ball Tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | | | | | | | | |
| SSE M16 | SSE M16 W | SSE M16 WW | 16 | 26 | 36 | 24,6 | 1,30 | 10 | 0,030 | 2200 | 2400 |
| SSE M20 | SSE M20 W | SSE M20 WW | 20 | 32 | 45 | 31,2 | 1,60 | 10 | 0,066 | 4000 | 4400 |
| SSE M25 | SSE M25 W | SSE M25 WW | 25 | 40 | 58 | 43,7 | 1,85 | 10 | 0,135 | 6700 | 7300 |
| SSE M30 | SSE M30 W | SSE M30 WW | 30 | 47 | 68 | 51,7 | 1,85 | 10 | 0,206 | 8300 | 9100 |
| SSE M40 | SSE M40 W | SSE M40 WW | 40 | 62 | 80 | 60,3 | 2,15 | 10 | 0,392 | 13700 | 15000 |

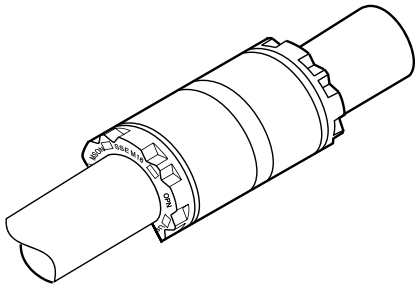
(1) For rated travel life of 100 km. For longer travel lives, reduce load to •(100/L)$^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock do not exceed the Load Limit.
(3) The load capacities W and Wq are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor Kq, should be applied to W and Wq respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(4) Internal bearing diameter is affected by the housing bore, see Table 1.
(5) Hole for anti-rotation pin is below centerline.
NOTE: External seals and retaining rings are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.
NOTE: For a corrosion resistant bearing add suffix-cr to the part number and reduce the load capacity by 30%.




SSE M16
SSE M20
SSE M25
SSE M30
SSE M40

# Super Smart Ball Bushing Bearings
## (Open Type)



### Super Smart Ball Bushing Bearings (Open Type) (Dimensions in mm)

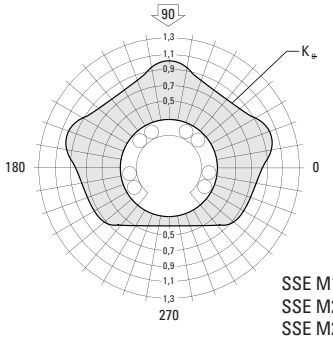
| Part Number | | | d(4) | D | C h14 | C1 H13 | C2 min. | E | F | Angle α (deg) | Number of Ball Tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | | | | | | | | | | | |
| SSE M16 OPN | SSE M16 OPN W | SSE M16 OPN WW | 16 | 26 | 36 | 24,6 | 1,30 | 9,0 | 0 | 70 | 8 | 0,023 | 2200 | 2400 |
| SSE M20 OPN | SSE M20 OPN W | SSE M20 OPN WW | 20 | 32 | 45 | 31,2 | 1,60 | 10,0 | 0 | 50 | 8 | 0,054 | 4000 | 4400 |
| SSE M25 OPN | SSE M25 OPN W | SSE M25 OPN WW | 25 | 40 | 58 | 43,7 | 1,85 | 12,5 | 1,50(5) | 60 | 8 | 0,107 | 6700 | 7300 |
| SSE M30 OPN | SSE M30 OPN W | SSE M30 OPN WW | 30 | 47 | 68 | 51,7 | 1,85 | 13,7 | 2,00 | 55 | 8 | 0,163 | 8300 | 9100 |
| SSE M40 OPN | SSE M40 OPN W | SSE M40 OPN WW | 40 | 62 | 80 | 60,3 | 2,15 | 19,0 | 1,50 | 54 | 8 | 0,315 | 13700 | 15000 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to •(100/L)$^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock do not exceed the Load Limit.
(3) The load capacities W and Wq are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor Kq, should be applied to W and Wq respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(4) Internal bearing diameter is affected by the housing bore, see Table 1.
(5) Hole for anti-rotation pin is below centerline.
NOTE: External seals and retaining are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.

### Table 1 - Standard Diametral Clearances

| Nominal Shaft Diameter d (mm) | Nominal Housing Bore Diameter d (mm) | Diametral Clearance | |
|---|---|---|---|
| | | Housing Bore H7 (µm) | Housing Bore H6 (µm) |
| 16 | 26 | +33 +4 | +26 +3 |
| 20 | 32 | +37 +6 | +30 +4 |
| 25 | 40 | +37 +6 | +30 +4 |
| 30 | 47 | +37 +6 | +30 +4 |
| 40 | 62 | +44 +7 | +35 +5 |

For Super Smart Ball Bushing Bearings mounted in a housing and with LinearRace shafts, h6 tolerance




SSE M16 OPN
SSE M20 OPN
SSE M25 OPN
SSE M30 OPN
SSE M40 OPN

## Metric – Super Smart Ball Bushing Bearings

# Application

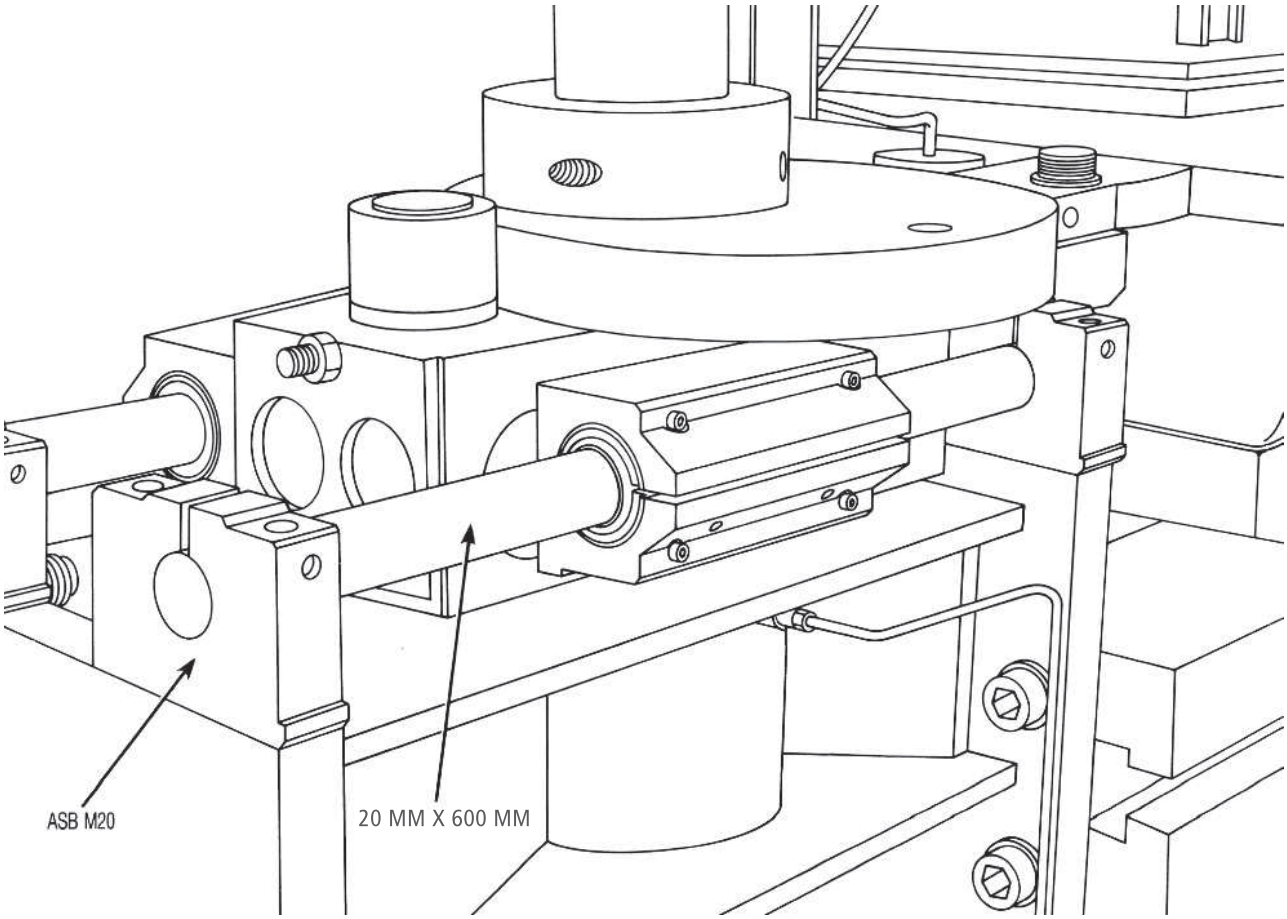
### Cam-Actuated Part Transfer Mechanism for Multiple-Transfer Press

### Objective
Improve production rate and increase the service life of a transfer table mechanism.

### Solution
Replace the conventional linear bearings with adjustable Super Smart twin pillow blocks.

### Products Specified
2 - SSE TWNA M20 DD (Super Smart Twin Pillow Blocks)
4 - ASB M20 (Shaft support blocks) Blocks
2 - 20 MM X 600 mm 60 Case LinearRace Shaft

### Benefits
The table achieved maximum cycle efficiency by reducing costly downtime and improving service life. Bearing life is increased from 1 to 8 years.



# X-Y Inspection System

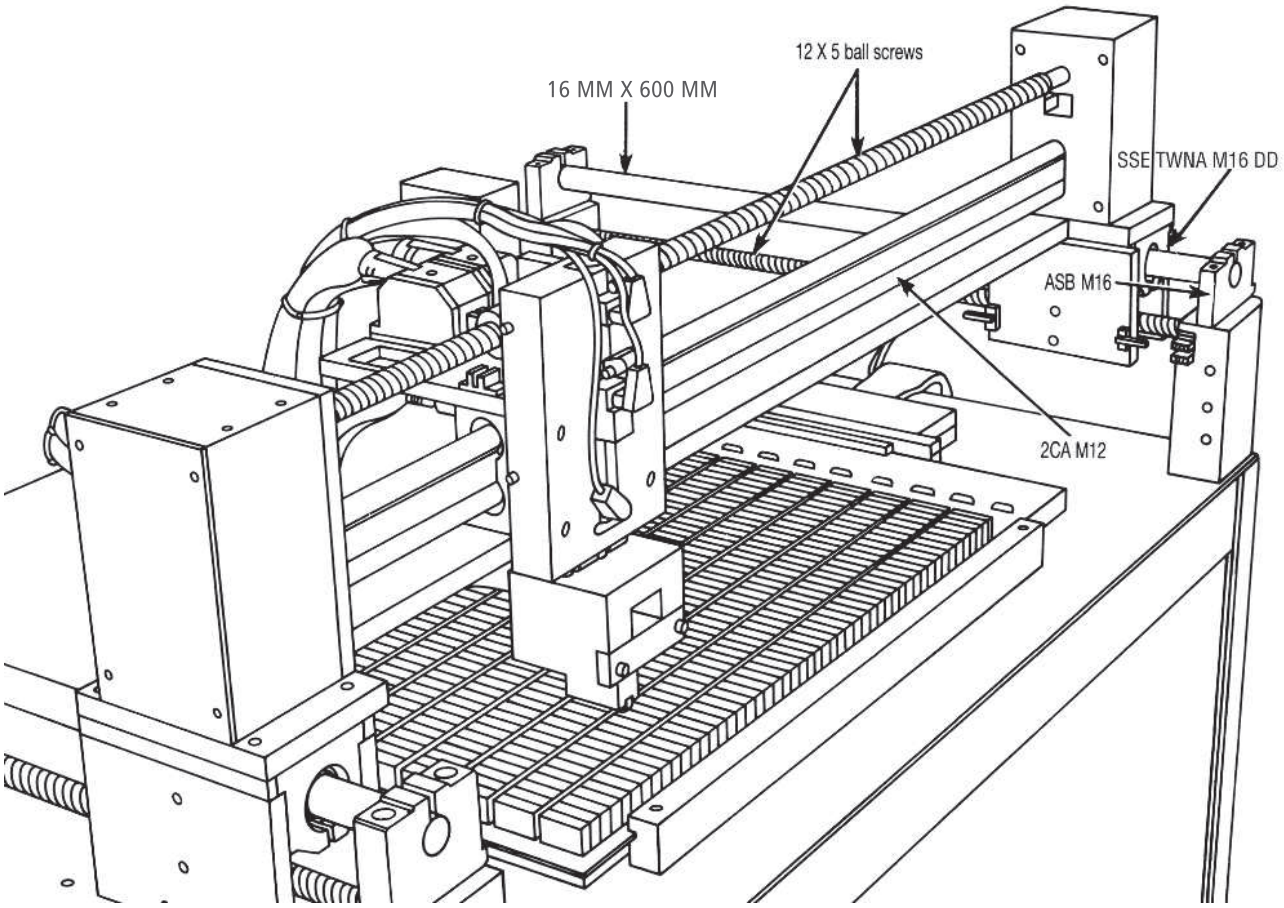
## Objective
Accurately position an inspection probe of an X-Y system over small electronic components.

## Solution
Design an X-Y system with Super Smart Ball Bushing pillow blocks to provide accurate and repeatable movement of the test probe. Utilize Thomson Industries linear motion systems on the Y-axis to reduce cost and installation time.

## Benefits
Outstanding positioning accuracy and repeatability was provided by the adjustable pillow blocks and ball screws. The use of a pre-engineered, pre-assembled linear motion system on the Y-axis saved valuable design and assembly time.

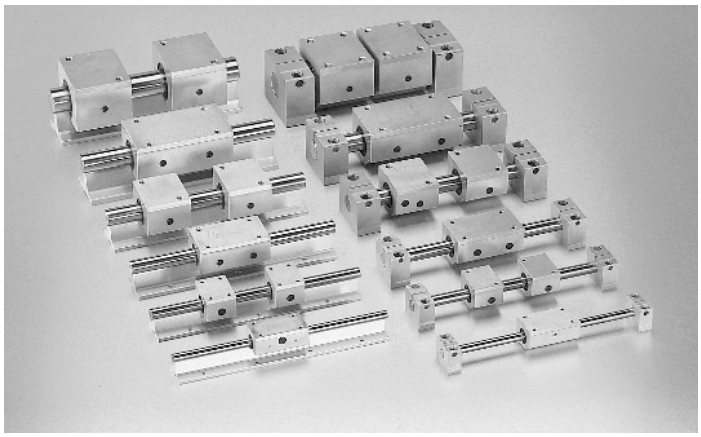
## Products Specified
**X–axis**
2 - SSE TWNA M16 DD (Super Smart Twin pillow blocks)
4 - ASB M16 (Shaft support blocks)
2 - 16 MM X 600 MM (60 Case LinearRace shaft)
2 - 12 x5 Thomson ball screw assemblies

**Y-axis**
1 - 2CA M12 (pre-assembled linear motion system)
1 - 12 x5 Thomson ball screw assembly



## Metric – Super Smart Pillow Blocks

# Super Smart Pillow Blocks

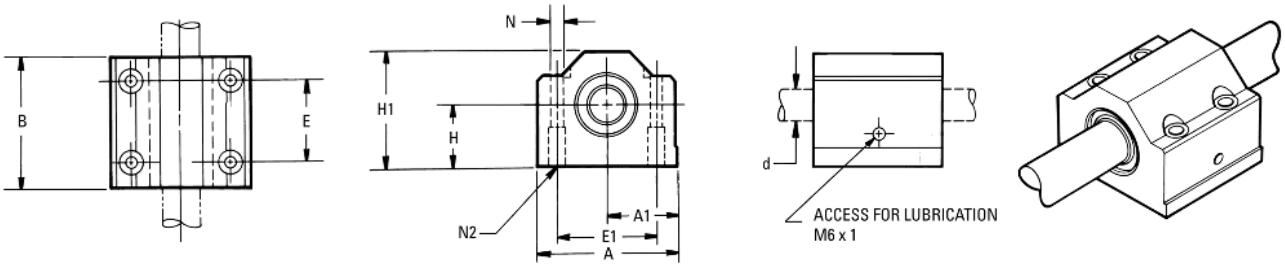


**Thomson Pillow Blocks with factory-installed Super Smart Ball Bushing Bearings offer:**

- Up to 6 times the load capacity or 216 times the travel life and 5 times the LinearRace shaft life when replacing conventional linear bearing pillow blocks.
- Accelerations as high as 150 m/s$^2$ and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides.
- Replaceable bearing components for quick, cost effective machine maintenance and minimal downtime.
- Standard, double-acting, integral seals at both ends which keep out dirt, grit and other contaminants, retain lubrication and maximize bearing life.
- Adjustable, closed, and open styles.
- Lubrication hole for easy maintenance.
- Tapped or thru hole mounting configuration for ease of installation.
- Twin version with two Super Smart Ball Bushing Bearings providing twice the load capacity or 8 times more travel life than the single version.
- A single bearing version that self aligns in all directions, minimizing installation time and cost.

Note: See page 120 for information on Thomson Super Smart Ball Bushing Bearings.

# Super Smart Pillow Blocks
## (Closed Type)




### Super Smart Pillow Blocks (Closed Type) (Dimensions in mm)

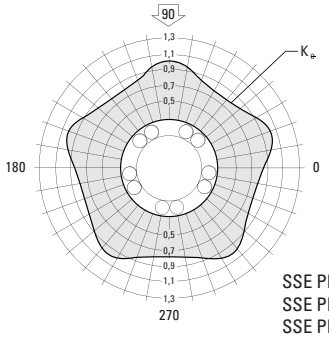
| Part Number | d(5) | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE PB M16 DD | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 5,3 | M6 | 0,21 | 2200 | 2400 |
| SSE PB M20 DD | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 6,6 | M8 | 0,35 | 4000 | 4400 |
| SSE PB M25 DD | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 8,4 | M10 | 0,67 | 6700 | 7300 |
| SSE PB M30 DD | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 8,4 | M10 | 0,99 | 8300 | 9100 |
| SSE PB M40 DD | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 10,5 | M12 | 1,84 | 13700 | 15000 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \cdot (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100km.
(2) The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so the peak and/or shock loads do not exceed the Load Limit.
(3) For bearing diametral clearances, see Table 1.
NOTE: For additional technical information, see the Engineering section beginning on page 245.

### Table 1- Standard Diametral Clearances (Closed Type)

| Nominal Size d (mm) | Diametral Clearance (µm) |
|---|---|
| 16 | +26 +3 |
| 20 | +30 +4 |
| 25 | +30 +4 |
| 30 | +30 +4 |
| 40 | +35 +5 |

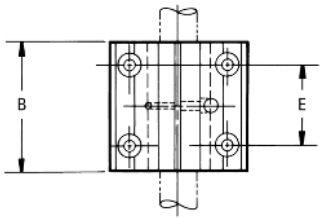
For Pillow Blocks used with LinearRace Shaft, h6 tolerance

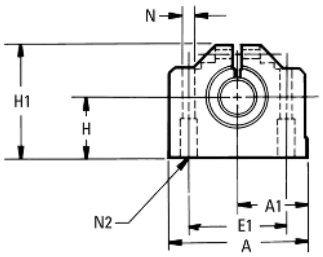


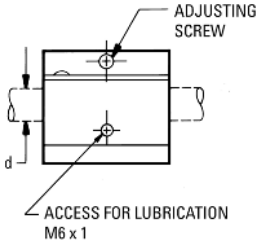

SSE PB M16 DD
SSE PB M20 DD
SSE PB M25 DD
SSE PB M30 DD
SSE PB M40 DD

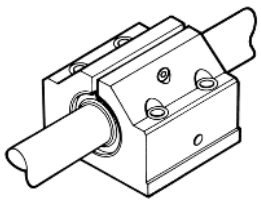
## Metric – Super Smart Pillow Blocks

# Super Smart Pillow Blocks
## (Closed Adjustable Type)



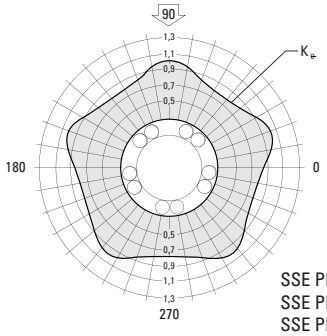



### Super Smart Pillow Blocks (Closed Adjustable Type) (Dimensions in mm)

| Part Number | d(5) | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Mass (kg) | Dynamic Load W(1)(2) (N) | Load Limit $W_0$(2)(4) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE PB M16 DD | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 5,3 | M6 | 0,21 | 2200 | 2400 |
| SSE PB M20 DD | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 6,6 | M8 | 0,35 | 4000 | 4400 |
| SSE PB M25 DD | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 8,4 | M10 | 0,67 | 6700 | 7300 |
| SSE PB M30 DD | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 8,4 | M10 | 0,99 | 8300 | 9100 |
| SSE PB M40 DD | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 10,5 | M12 | 1,84 | 13700 | 15000 |

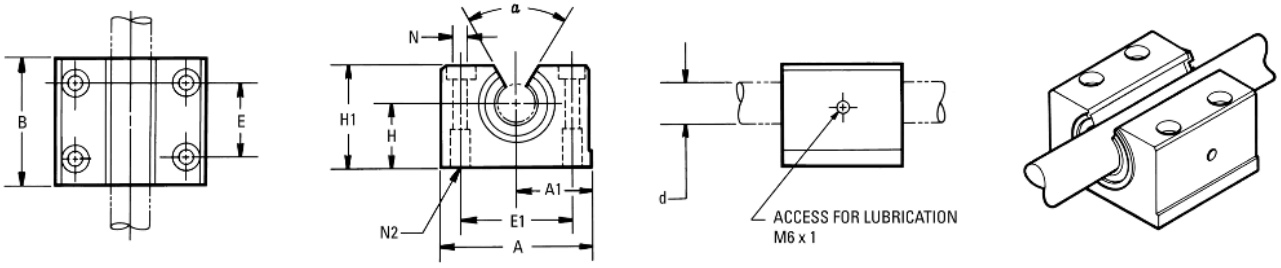
(4) The load capacities W and $W_0$ are valid for a resultant load applied at 90˚ with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor, Kq, should be applied to W and $W_0$ respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(5) Adjusted to nominal.

NOTE: For additional technical information, see the Engineering section beginning on page 245.




SSE PBA M16 DD
SSE PBA M20 DD
SSE PBA M25 DD
SSE PBA M30 DD
SSE PBA M40 DD

# Super Smart Pillow Blocks
## (Open Type)




### Super Smart Pillow Blocks (Open Type) (Dimensions in mm)

| Part Number | d[5] | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Angle α (deg) | Mass (kg) | Dynamic Load W[1][2] (N) | Load Limit $W_0$[2][4] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE PBO M16 DD | 16 | 22 | 35 | 53 | 26,5 | 43 | 26 | 40 | 5,3 | M6 | 70 | 0,19 | 2200 | 2400 |
| SSE PBO M20 DD | 20 | 25 | 42 | 60 | 30,0 | 54 | 32 | 45 | 6,6 | M8 | 50 | 0,30 | 4000 | 4400 |
| SSE PBO M25 DD | 25 | 30 | 51 | 78 | 39,0 | 67 | 40 | 60 | 8,4 | M10 | 60 | 0,60 | 6700 | 7300 |
| SSE PBO M30 DD | 30 | 35 | 60 | 87 | 43,5 | 79 | 45 | 68 | 8,4 | M10 | 55 | 0,93 | 8300 | 9100 |
| SSE PBO M40 DD | 40 | 45 | 77 | 108 | 54,0 | 91 | 58 | 86 | 10,5 | M12 | 54 | 1,66 | 13700 | 15000 |

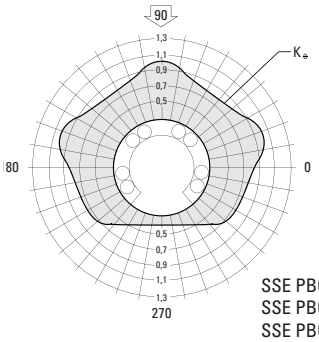
(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100km.
(2) The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) For bearing diametral clearances, see Table 2.

NOTE: For additional technical information, see the Engineering section beginning on page 245.

### Table 2 - Standard Diametral Clearances (Open Type)

| Nominal Size d (mm) | Diametral Clearance (µm) |
|---|---|
| 16 | +26 +3 |
| 20 | +30 +4 |
| 25 | +30 +4 |
| 30 | +30 +4 |
| 40 | +35 +5 |

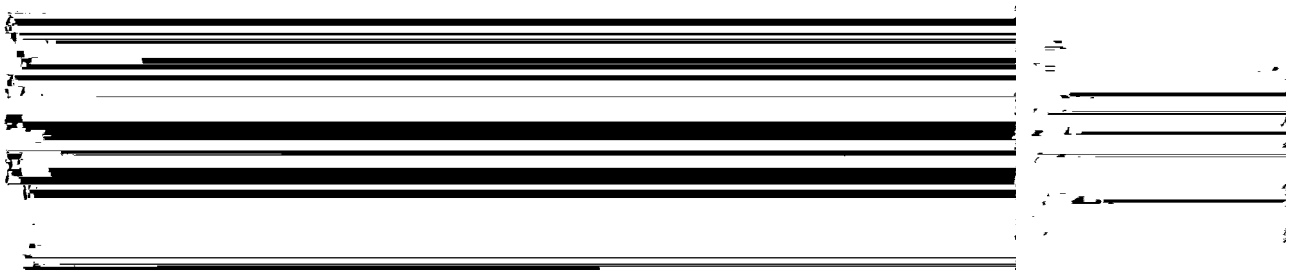
For Pillow Blocks used with LinearRace Shaft, h6 tolerance




SSE PBO M16 DD
SSE PBO M20 DD
SSE PBO M25 DD
SSE PBO M30 DD
SSE PBO M40 DD

## Metric – Super Smart Pillow Blocks

# Super Smart Pillow Blocks
## (Open Adjustable Type)

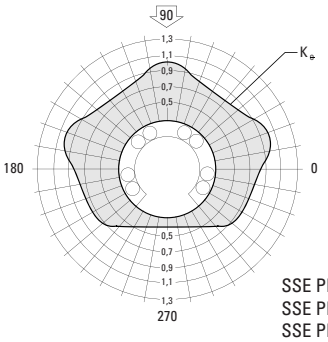


### Super Smart Pillow Blocks (Open Adjustable Type) (Dimensions in mm)

| Part Number | d(5) | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Angle α (deg) | Mass (kg) | Dynamic Load W(1)(2) (N) | Load Limit $W_0$(2)(4) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE PBOA M16 DD | 16 | 22 | 35 | 53 | 26,5 | 43 | 26 | 40 | 5,3 | M6 | 70 | 0,19 | 2200 | 2400 |
| SSE PBOA M20 DD | 20 | 25 | 42 | 60 | 30,0 | 54 | 32 | 45 | 6,6 | M8 | 50 | 0,30 | 4000 | 4400 |
| SSE PBOA M25 DD | 25 | 30 | 51 | 78 | 39,0 | 67 | 40 | 60 | 8,4 | M10 | 60 | 0,60 | 6700 | 7300 |
| SSE PBOA M30 DD | 30 | 35 | 60 | 87 | 43,5 | 79 | 45 | 68 | 8,4 | M10 | 55 | 0,93 | 8300 | 9100 |
| SSE PBOA M40 DD | 40 | 45 | 77 | 108 | 54,0 | 91 | 58 | 86 | 10,5 | M12 | 54 | 1,66 | 13700 | 15000 |

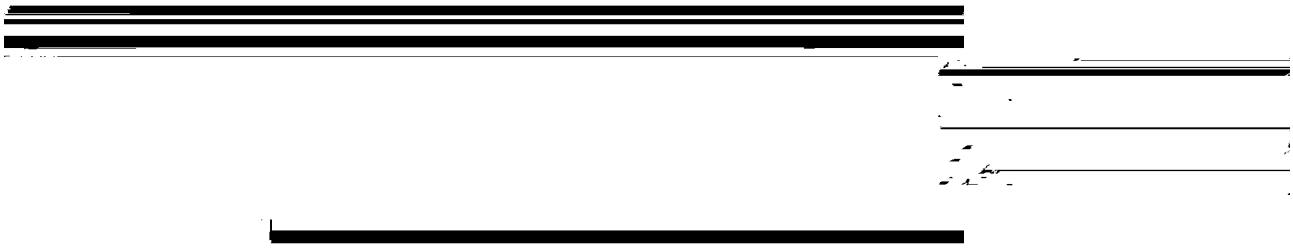
(4) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor, Kq, should be applied to W and $W_0$ respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(5) Adjusted to nominal.

NOTE: For additional technical information, see the Engineering section beginning on page 245.




SSE PBOA M16 DD
SSE PBOA M20 DD
SSE PBOA M25 DD
SSE PBOA M30 DD
SSE PBOA M40 DD

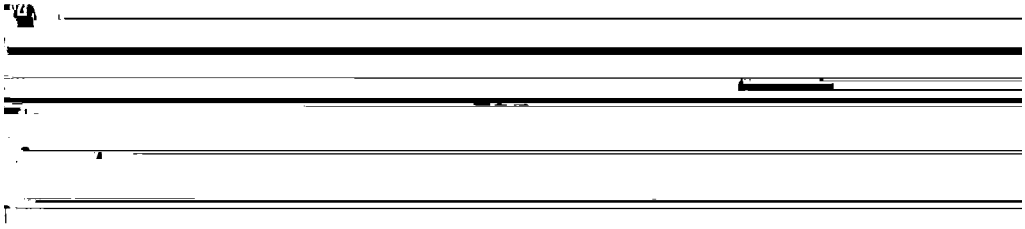
# Super Smart Twin Pillow Blocks
## (Closed Type)



### Super Smart Twin Pillow Blocks (Closed Type) (Dimensions in mm)

| Part Number | d[5] | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Mass (kg) | Dynamic Load W[1][2] (N) | Load Limit $W_0$[2][4] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE TWN M16 DD | 16 | 22 | 42 | 53 | 26,5 | 84 | 64 | 40 | 5,3 | M6 | 0,41 | 4400 | 4800 |
| SSE TWN M20 DD | 20 | 25 | 51 | 60 | 30,0 | 104 | 76 | 45 | 6,6 | M8 | 0,67 | 8000 | 8800 |
| SSE TWN M25 DD | 25 | 30 | 60 | 78 | 39,0 | 130 | 94 | 60 | 8,4 | M10 | 1,24 | 13400 | 14600 |
| SSE TWN M30 DD | 30 | 35 | 71 | 87 | 43,5 | 152 | 106 | 68 | 8,4 | M10 | 1,94 | 16600 | 18200 |
| SSE TWN M40 DD | 40 | 45 | 91 | 108 | 54,0 | 176 | 124 | 86 | 10,5 | M12 | 3,63 | 27400 | 30000 |

## (Closed Adjustable Type)



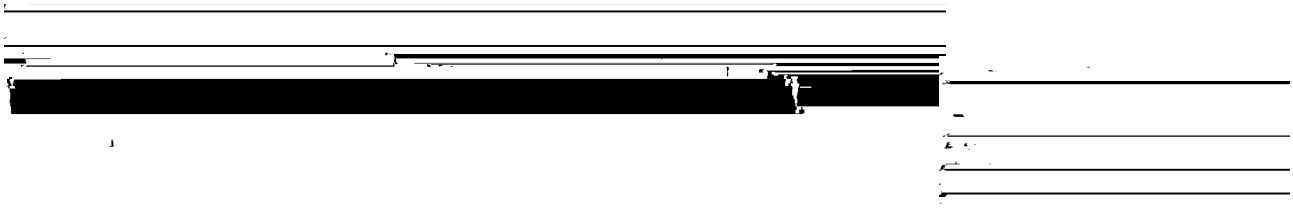
### Super Smart Twin Pillow Blocks (Closed Adjustable Type) (Dimensions in mm)

| Part Number | d[5] | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Mass (kg) | Dynamic Load W[1][2] (N) | Load Limit $W_0$[2][4] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE TWNA M16 DD | 16 | 22 | 42 | 53 | 26,5 | 84 | 64 | 40 | 5,3 | M6 | 0,41 | 4400 | 4800 |
| SSE TWNA M20 DD | 20 | 25 | 50 | 60 | 30,0 | 104 | 76 | 45 | 6,6 | M8 | 0,67 | 8000 | 8800 |
| SSE TWNA M25 DD | 25 | 30 | 60 | 78 | 39,0 | 130 | 94 | 60 | 8,4 | M10 | 1,24 | 13400 | 14600 |
| SSE TWNA M30 DD | 30 | 35 | 71 | 87 | 43,5 | 152 | 106 | 68 | 8,4 | M10 | 1,94 | 16600 | 18200 |
| SSE TWNA M40 DD | 40 | 45 | 91 | 108 | 54,0 | 176 | 124 | 86 | 10,5 | M12 | 3,63 | 27400 | 30000 |

See footnotes (1) (2) (3) (4) (5) on pages 129-130. For diametral clearances, see single versions of pillow block.

## Metric – Super Smart Pillow Blocks

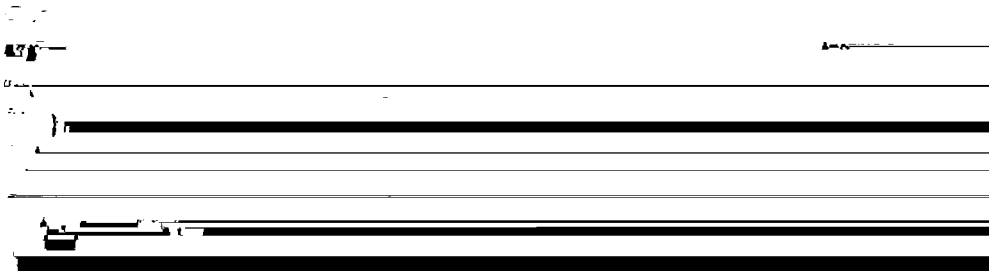
# Super Smart Twin Pillow Blocks
## (Open Type)



### Super Smart Twin Pillow Blocks (Open Type) (Dimensions in mm)

| Part Number | d(5) | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Angle α (deg) | Mass (kg) | Dynamic Load W(1)(2) (N) | Load Limit $W_0$(2)(4) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE TWNO M16 DD | 16 | 22 | 35 | 53 | 26,5 | 84 | 64 | 40 | 5,3 | M6 | 70 | 0,37 | 4400 | 4800 |
| SSE TWNO M20 DD | 20 | 25 | 41 | 60 | 30,0 | 104 | 76 | 45 | 6,6 | M8 | 50 | 0,58 | 8000 | 8800 |
| SSE TWNO M25 DD | 25 | 30 | 50 | 78 | 39,0 | 130 | 94 | 60 | 8,4 | M10 | 60 | 1,16 | 13400 | 14600 |
| SSE TWNO M30 DD | 30 | 35 | 60 | 87 | 43,5 | 152 | 106 | 68 | 8,4 | M10 | 55 | 1,78 | 16600 | 18200 |
| SSE TWNO M40 DD | 40 | 45 | 77 | 108 | 54,0 | 176 | 124 | 86 | 10,5 | M12 | 54 | 3,25 | 27400 | 30000 |

## (Open Adjustable Type)



### Super Smart Twin Pillow Blocks (Open Adjustable Type) (Dimensions in mm)

| Part Number | d(5) | H ± 0,020 | H1 | A | A1 ± 0,020 | B | E ± 0,1 | E1 ± 0,1 | N Dia. | N2 | Angle α (deg) | Mass (kg) | Dynamic Load W(1)(2) (N) | Load Limit $W_0$(2)(4) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSE TWNOA M16 DD | 16 | 22 | 35 | 53 | 26,5 | 84 | 64 | 40 | 5,3 | M6 | 70 | 0,37 | 4400 | 4800 |
| SSE TWNOA M20 DD | 20 | 25 | 41 | 60 | 30,0 | 104 | 76 | 45 | 6,6 | M8 | 50 | 0,58 | 8000 | 8800 |
| SSE TWNOA M25 DD | 25 | 30 | 50 | 78 | 39,0 | 130 | 94 | 60 | 8,4 | M10 | 60 | 1,16 | 13400 | 14600 |
| SSE TWNOA M30 DD | 30 | 35 | 60 | 87 | 43,5 | 152 | 106 | 68 | 8,4 | M10 | 55 | 1,78 | 16600 | 18200 |
| SSE TWNOA M40 DD | 40 | 45 | 77 | 108 | 54,0 | 176 | 124 | 86 | 10,5 | M12 | 54 | 3,25 | 27400 | 30000 |

See footnotes (1) (2) (3) (4) (5) on pages 129-130. For diametral clearances, see single versions of pillow block.

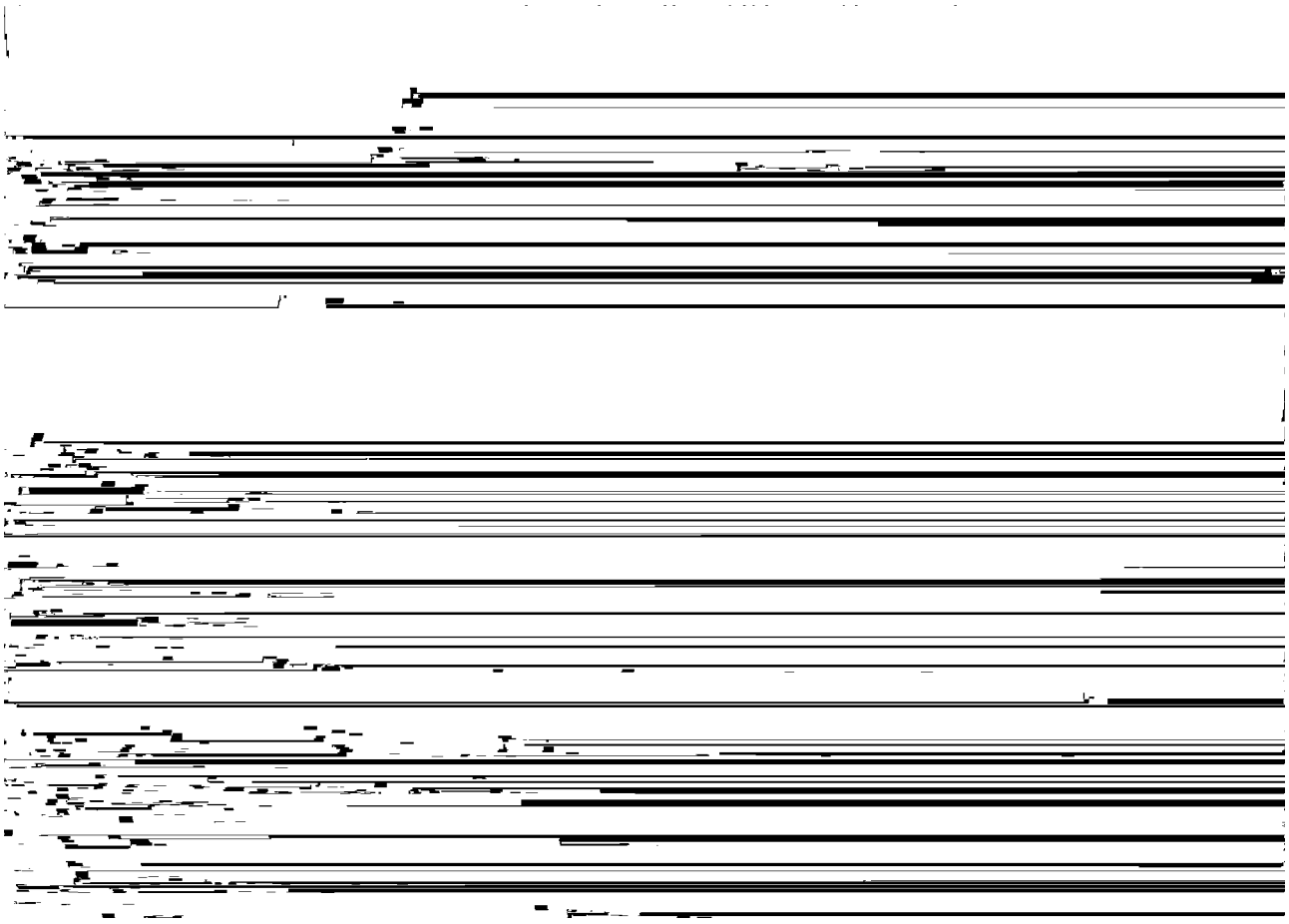
# Application
## Punch Press

### Objective
Reduce deflection of plate loader to minimize scrap and improve cycle speed.

### Solution
Replace super type linear bearings with Super Smart pillow blocks and Smart Rail assemblies to improve accuracy, load capacity, service life, efficiency and reduce downtime.

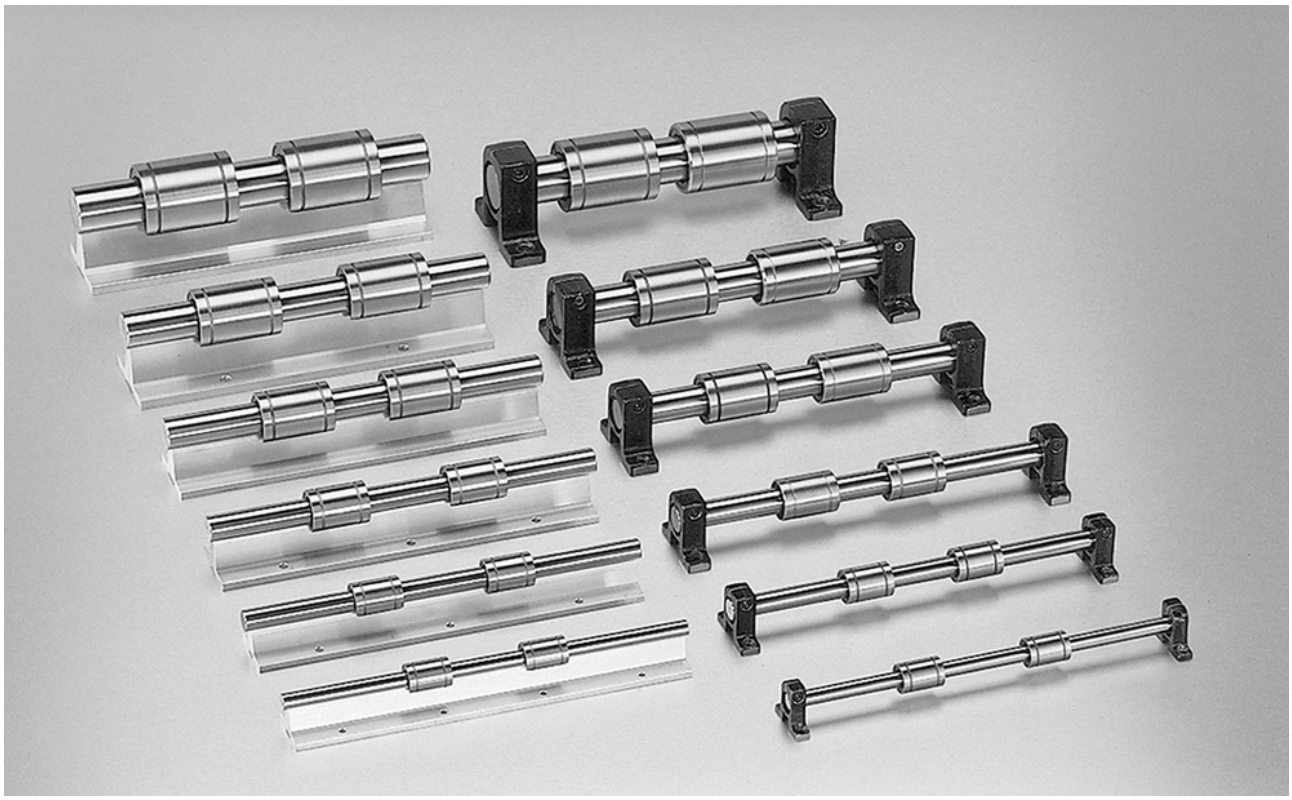
### Products Specified
4 - SSE PBOA M25 DD (Super Smart Pillow Blocks)
2 - LSRA M25 T4 900 mm Smart Rail assemblies

### Benefits
By retrofitting with Super Smart Pillow Blocks, machine productivity increased 700%. Smart Rail assemblies provided reduced deflection during plate loading. The retrofit required minimum downtime due to the pillow blocks' ease of installation.



## Metric – MultiTrac Ball Bushing Bearings

# MultiTrac Ball Bushing Bearings



**Thomson MultiTrac Ball Bushing Bearings offer:**

- Patented, multiple-track design with up to twice the load carrying capacity, or 8 times the life, of conventional linear bearings.
- Rigid design for minimal deflection assuring accurate, precise positioning.
- Coefficient of friction as low as 0,001.
- Patented ball control technology which eliminates binding and chatter (stick-slip) common to high-friction, plain bushings and sliding-way bearings.
- RoundRail Advantage which, combined with the advanced MultiTrac Ball Bushing Bearing design, eliminates the need for the derating factors commonly required with square rail linear guides.
- Steady state speeds up to 3 m/s and accelerations up to 150 $m/s^2$, without the use of derating factors.
- Wear-resistant, engineered-polymer retainers to reduce inertia and noise levels.
- Adjustable, closed and open configurations.
- Stainless steel (440C) option available in all sizes for for corrosive environments.

# MultiTrac Ball Bushing Bearings
## (Closed Type)





### MultiTrac Ball Bushing Linear Bearings (Closed Type) (Dimensions in mm)

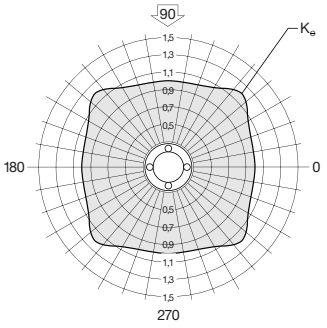
| Part Number | | | d(4) | D | C h14 | C1 H13 | C2 min. | Number of ball tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | | | | | | | | |
| MA M08 | MA M08 W | MA M08 WW | 8 | 16 | 25 | 16,2 | 1,10 | 4 | 0,02 | 180 | 330 |
| MA M12 | MA M12 W | MA M12 WW | 12 | 22 | 32 | 22,6 | 1,30 | 5 | 0,04 | 350 | 880 |
| MA M16 | MA M16 W | MA M16 WW | 16 | 26 | 36 | 24,6 | 1,30 | 8 | 0,06 | 550 | 1300 |
| MA M20 | MA M20 W | MA M20 WW | 20 | 32 | 45 | 31,2 | 1,60 | 8 | 0,11 | 1000 | 2360 |
| MA M25 | MA M25 W | MA M25 WW | 25 | 40 | 58 | 43,7 | 1,85 | 8 | 0,20 | 1980 | 5100 |
| MA M30 | MA M30 W | MA M30 WW | 30 | 47 | 68 | 51,7 | 1,85 | 8 | 0,33 | 2060 | 5800 |
| MA M40 | MA M40 W | MA M40 WW | 40 | 62 | 80 | 60,3 | 2,15 | 8 | 0,63 | 3820 | 9250 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) For diametral clearance, see Table 1.
NOTE: External seals and retaining rings are available. See page 151 for specifications.
NOTE: For additional technical data, see Engineering Support section.

### Table 1 - Standard Diametral Clearances Closed Type

| Nominal Size d (mm) | Diametral Clearance (µm) |
|---|---|
| 8 | +15 +3 |
| 12 | +19 +3 |
| 16 | +19 +3 |
| 20 | +22 +4 |
| 25 | +22 +4 |
| 30 | +22 +4 |
| 40 | +27 +5 |

For closed type bearings with LinearRace shaft, h6 tolerance




MA M16 MA M16 ADJ
MA M20 MA M20 ADJ
MA M25 MA M25 ADJ
MA M30 MA M30 ADJ
MA M40 MA M40 ADJ

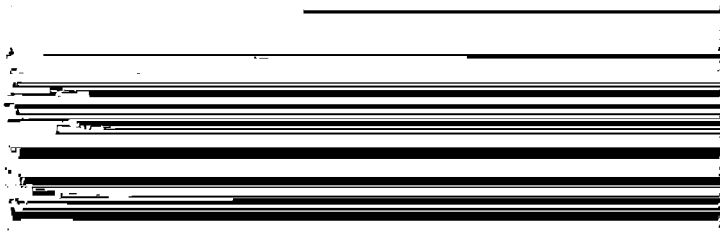
### Table 2 - Stainless Steel Part Numbers

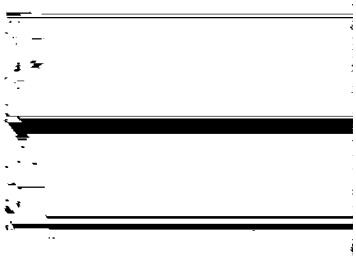
| Part Number | | |
|---|---|---|
| Without Integral Wipers | With One Integral Wiper | With Two Integral Wipers |
| MAM08SS | MAM08WSS | MAM08WWSS |
| MAM12SS | MAM12WSS | MAM12WWSS |
| MAM16SS | MAM16WSS | MAM16WWSS |
| MAM20SS | MAM20WSS | MAM20WWSS |
| MAM25SS | MAM25WSS | MAM25WWSS |
| MAM30SS | MAM30WSS | MAM30WWSS |

All dimensional information and load ratings for the stainless steel MultiTrac Ball Bushing Bearings are identical to those shown above. If run on stainless steel shafting, load ratings of these bearings are 80% of the above stated values.

## Metric – MultiTrac Ball Bushing Linear bearings

# MultiTrac Ball Bushing Linear bearings
## (Closed adjustable type)

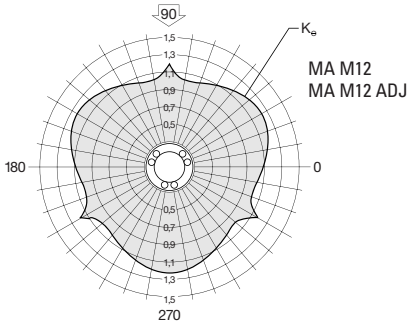




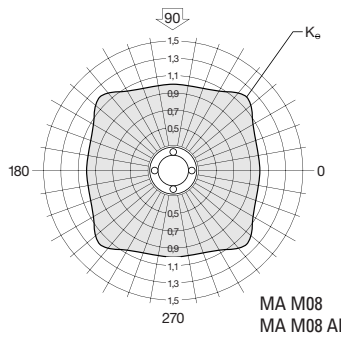
### MultiTrac Ball Bushing Linear Bearings (Closed Adjustable Type) (Dimensions in mm)

| Part Number | | | d(4) | D | C h14 | C1 H13 | C2 min. | Number of ball tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_q$ (2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | | | | | | | | |
| MA M08 ADJ | MA M08 ADJ W | MA M08 ADJ WW | 8 | 16 | 25 | 16,2 | 1,10 | 4 | 0,002 | 180 | 330 |
| MA M12 ADJ | MA M12 ADJ W | MA M12 ADJ WW | 12 | 22 | 32 | 22,6 | 1,30 | 6 | 0,04 | 350 | 880 |
| MA M16 ADJ | MA M16 ADJ W | MA M16 ADJ WW | 16 | 26 | 36 | 24,6 | 1,30 | 8 | 0,06 | 550 | 1300 |
| MA M20 ADJ | MA M20 ADJ W | MA M20 ADJ WW | 20 | 32 | 45 | 31,2 | 1,60 | 8 | 0,11 | 1000 | 2360 |
| MA M25 ADJ | MA M25 ADJ W | MA M25 ADJ WW | 25 | 40 | 58 | 43,7 | 1,85 | 8 | 0,20 | 1980 | 5100 |
| MA M30 ADJ | MA M30 ADJ W | MA M30 ADJ WW | 30 | 47 | 68 | 51,7 | 1,85 | 8 | 0,33 | 2060 | 5800 |
| MA M40 ADJ | MA M40 ADJ W | MA M40 ADJ WW | 40 | 62 | 80 | 60,3 | 2,15 | 8 | 0,63 | 3820 | 9250 |

(4) The load capacities W and Wq are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor Kq, should be applied to W and Wq respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(5) Diametral fit-up is determined by the housing diameter. See Table 2.
NOTE: External seals and retaining are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.




MA M12
MA M12 ADJ




MA M08
MA M08 ADJ

### Table 3 - Standard Diametral Clearances Adjustable and Open Type

| Nominal Shaft Diameter d (mm) | Diametral Housing Bore H6 (µm) |
|---|---|
| 8 | +28 +7 |
| 12 | +33 +9 |
| 16 | +33 +9 |
| 20 | +40 +10 |
| 25 | +40 +10 |
| 30 | +40 +10 |
| 40 | +48 +12 |

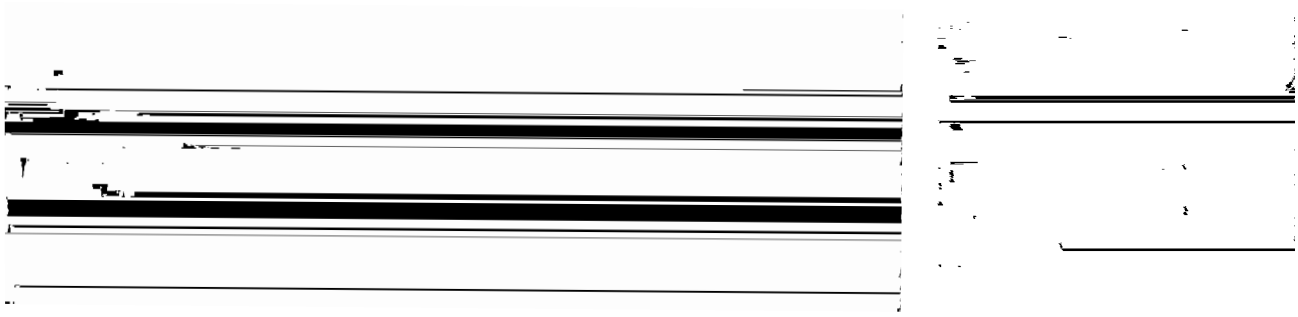
For adjustable and open type bearings with LinearRace shaft, h6 tolerance

### Table 4 - Stainless Steel Part Numbers

| Part Number | | |
|---|---|---|
| Without Integral Wipers | With One Integral Wiper | With Two Integral Wipers |
| MAM08ADJSS | MAM08ADJWSS | MAM08ADJWWSS |
| MAM12ADJSS | MAM12ADJWSS | MAM12ADJWWSS |
| MAM16ADJSS | MAM16ADJWSS | MAM16ADJWWSS |
| MAM20ADJSS | MAM20ADJWSS | MAM20ADJWWSS |
| MAM25ADJSS | MAM25ADJWSS | MAM25ADJWWSS |
| MAM30ADJSS | MAM30ADJWSS | MAM30ADJWWSS |

All dimensional information and load ratings for the stainless steel MultiTrac Ball Bushing Bearings are identical to those shown above.

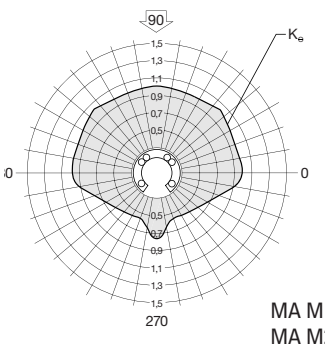
# MultiTrac Ball Bushing Bearings
## (Open Type)



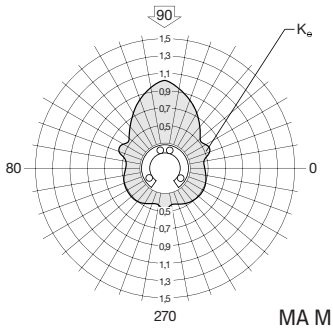
### MultiTrac Ball Bushing Linear Bearings (Open Type) (Dimensions in mm)

| Part Number | | | d[4] | D | C h14 | C1 H13 | C2 min. | E | F | Angle α (deg) | Number of ball tracks | Mass (kg) | Dynamic Load W[1][3] (N) | Load Limit $W_0$[2][3] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With one Integral Wiper | With two Integral Wipers | | | | | | | | | | | | |
| MA M12 | MA M12 W | MA M12 WW | 12 | 22 | 32 | 22,6 | 1,30 | 7,3 | 1,35 | 120 | 4 | 0,04 | 440 | 1100 |
| MA M16 | MA M16 W | MA M16 WW | 16 | 26 | 36 | 24,6 | 1,30 | 10,6 | 0 | 90 | 6 | 0,06 | 600 | 1500 |
| MA M20 | MA M20 W | MA M20 WW | 20 | 32 | 45 | 31,2 | 1,60 | 11,5 | 0 | 90 | 6 | 0,11 | 1100 | 2720 |
| MA M25 | MA M25 W | MA M25 WW | 25 | 40 | 58 | 43,7 | 1,85 | 13,9 | 1,50[6] | 90 | 6 | 0,20 | 2170 | 5300 |
| MA M30 | MA M30 W | MA M30 WW | 30 | 47 | 68 | 51,7 | 1,85 | 20,3 | 2,00 | 90 | 6 | 0,33 | 2260 | 6710 |
| MA M40 | MA M40 W | MA M40 WW | 40 | 62 | 80 | 60,3 | 2,15 | 20,9 | 1,50 | 90 | 6 | 0,63 | 4200 | 10700 |

(6) Hole for anti-rotation pin is below centerline.
For footnotes 1-5, see pages 135-136.
Note: External seals and retaining rings are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.




MA M16 OPN
MA M20 OPN
MA M25 OPN
MA M30 OPN
MA M40 OPN




MA M12 OPN

### Table 5 - Stainless Steel Part Numbers

| Part Number | | |
|---|---|---|
| Without Integral Wipers | With One Integral Wiper | With Two Integral Wipers |
| MAM12OPNSS | MAM12OPNWSS | MAM12OPNWWSS |
| MAM16OPNSS | MAM16OPNWSS | MAM16OPNWWSS |
| MAM20OPNSS | MAM20OPNWSS | MAM20OPNWWSS |
| MAM25OPNSS | MAM25OPNWSS | MAM25OPNWWSS |
| MAM30OPNSS | MAM30OPNWSS | MAM30OPNWWSS |

All dimensional information and load ratings for the stainless steel MultiTrac Ball Bushing Bearings are identical to those shown above.

## Metric – MultiTrac Ball Bushing Bearings

# MultiTrac Ball Bushing Bearings

Our Thomson MultiTrac Ball Bushing Bearings are designed with greater rigidity and up to twice the load capacity of conventional linear bearings. The design incorporates a one-piece, bearing quality steel sleeve (see Figure 1) for maximum rigidity. The single-piece engineered polymer ball retainer provides smooth, quiet operation.

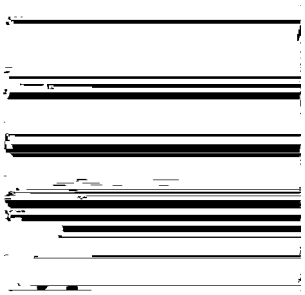


Figure 1

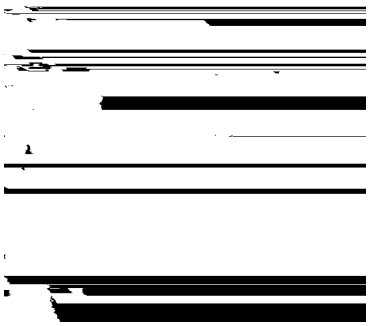


Figure 2

**Twice the Load Capacity**
The bearing's load capacity is improved by the optimal positioning of the load tracks. This places the maximum number of load-bearing balls in the load zone (see Figure 1).

**High Speed Operation**
The advanced design also improves the bearing's ball control. This allows accelerations as high as 150 $m/s^2$ and travel speeds up to 3 m/s.

**Integral Seals**
The bearing includes double acting integral wipers, which keep out dirt, grit and other contaminants, and retain bearing lubrication.

**Improved Ball Control**
Through advanced computer-aided design techniques, ball control improvements assure smooth entry and exit of the balls in and out of the load zone.

**Ideal for Corrosive Environments**
Optional stainless steel (440C) resists rust and corrosion.

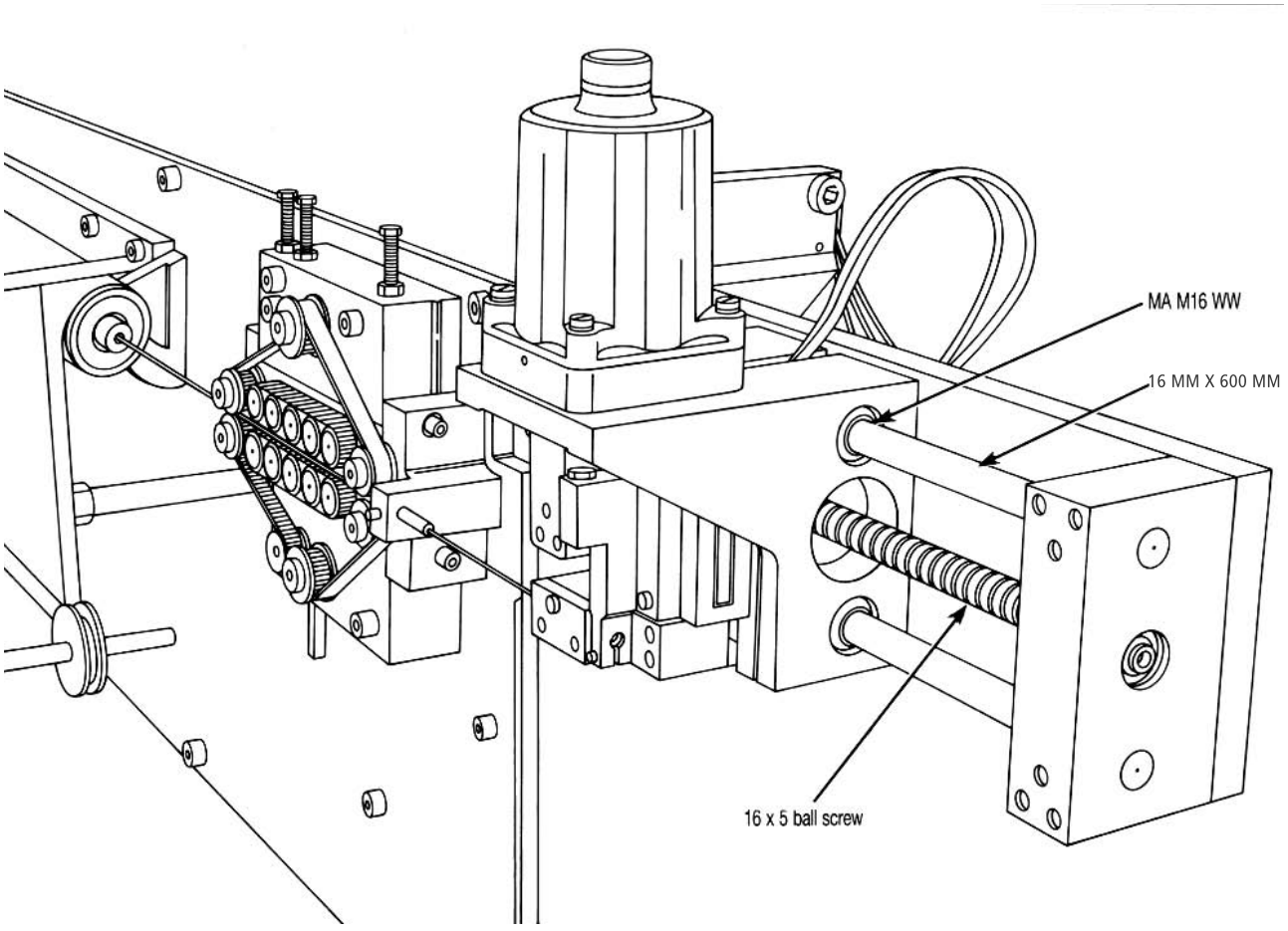
# Application
## Wire Straightening/Feeding Machine

### Objective
Redesign a wire straightening/feeding mechanism for a wire drawing machine that improves cycle time and minimizes downtime.

### Solution
Combine the performance advantages of the Multitrac Ball Bushing Linear bearings with the operating efficiency of Thomson all screws.

### Products Specified
4 - MA M16 WW (MultiTrac Ball Bushing linear bearings)
2 - 16 MM X 600 MM (60 Case LinearRace shaft)
1 - 16 x 5 Thomson ball screw assembly

### Benefits
Because MultiTrac Ball Bushing Linear bearings have twice the load capacity of conventional linear bearings, service life increased from six months to four years. This significantly reduced downtime and maintenance requirements and provided increased productivity with substantial cost savings.



## Metric – MultiTrac Ball Bushing Bearings

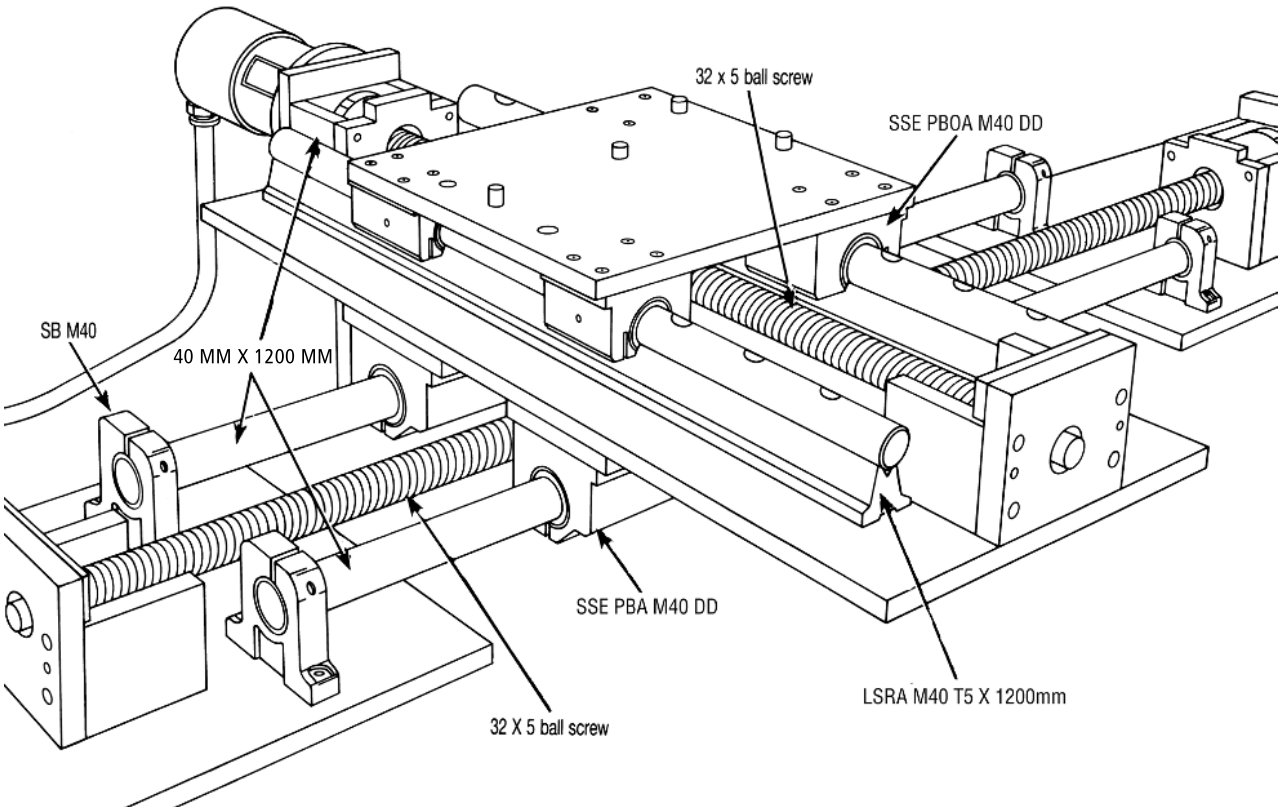
# Application
### Pick and Place X-Y System

### Objective
Build an X-Y System that transfers the work piece between two separate machining stations.

### Solution
Assemble the X-Y System utilizing Super Smart Ball Bushings Bearing pillow blocks on end supported shafts for the X-axis and continuous supported 60 Case LinearRace shaft on the Y-axis. Utilize Thomson Saginaw* ball screws for high speed positioning.

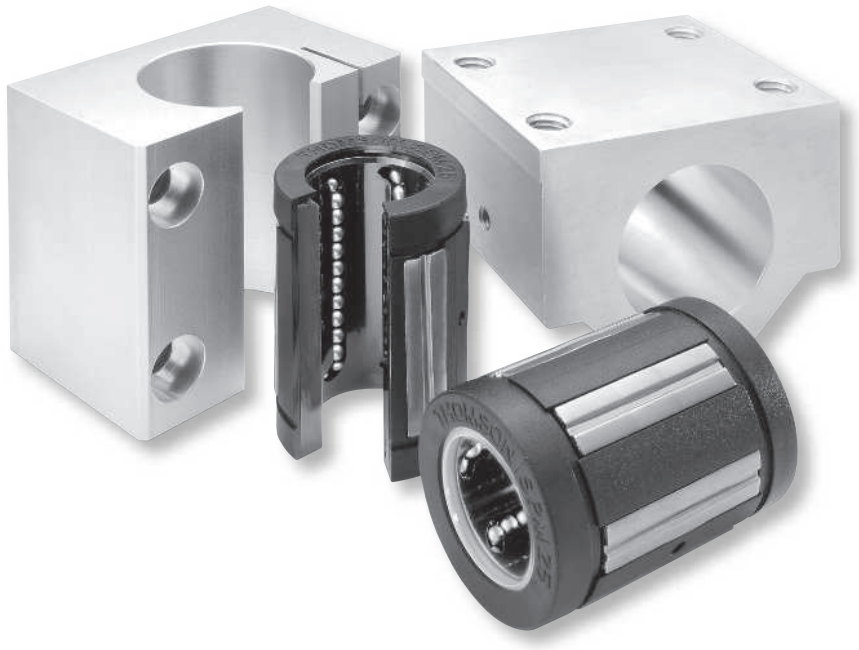
### Products Specified
X–axis
2 - 40 MM X 1200 MM (60 Case LinearRace)
4 - SB M40 (shaft support blocks)
4 - SSE PBA M40 DD (Super Smart pillow blocks)
1 - 32 x 5 Thomson ball screw assembly Y-axis
2 - LSRA M40 T5 X 1200 mm (Smart RailTM guides)
4 - SSE PBOA M40 DD (Super Smart pillow blocks)
1 - 32 x 5 Thomson ball screw assembly

### Benefits
The 60 Case LinearRace shafts and shaft support end blocks provided an important bridge between machining stations. The Super Smart pillow blocks and Thomson ball screws provided uninterrupted high speed movement of the work piece. Productivity increased by 200%




*Trademark of Thomson. THOMSON is registered in the U.S. Patent and Trademark Office and in other countries.

# Super Ball Bushing* Bearings





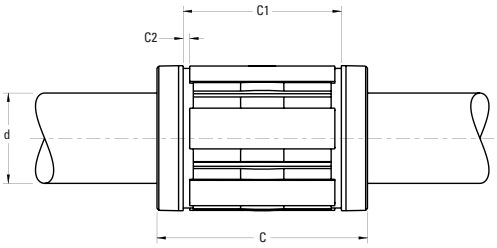
**High performance from superior design:**
- A coefficient of friction as low as 0,001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings.
- A self-aligning capability up to 0,5° compensates for inaccuracies in base flatness or carriage machining. Achieved with Thomson Super Bearing plates which have defined radius crowns for maximized self-alignment accuracy.
- Accelerations as high as 150 m/s$^2$ and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides.
- Double lip integral wipers that keep out dirt while retaining lubrication. Travel life is maximized.
- Light weight, wear-resistant, engineered polymer retainers and outer sleeves that reduce inertia and noise.
- Adjustable, closed and open configurations.

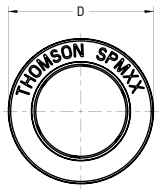
**Quick to ship, drop-in replacement parts for existing applications:**
- Dimensional interchangeable with competitive and legacy applications.
- Easy to order with local manufacturer's stock available in Europe and North America.
- Plus worldwide availability from over 1800 authorized distributors.

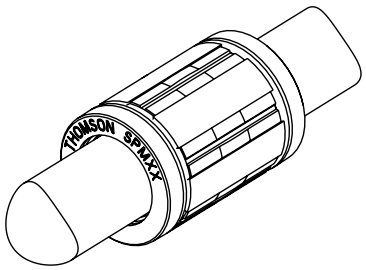
**Genuine Thomson Quality:**
- Thomson Ball Bushing Bearings in combination with 60 Case* shafting last longer and carry significantly more load than conventional linear bearings, allowing you to reduce component size, saving space and cost. Thomson is the one and only name you'll need when choosing a round rail solution.
- To complete your application with genuine Thomson 60 Case shafting and shaft supports, please visit www.danahermotion.com/shafting.htm.
- Thomson is the innovator of linear bearings and has supplied superior quality product to the linear industry for 60 years. Superior Thomson quality translates into better reliability and performance.

## Metric – Super Ball Bushing Bearings

# Super Ball Bushing Bearings
## (Closed Type) for End Supported Applications



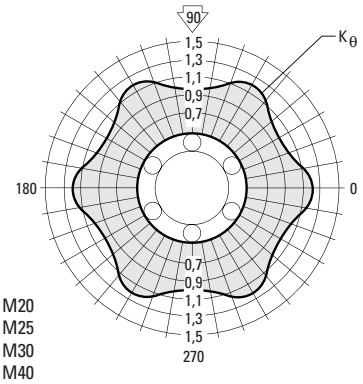



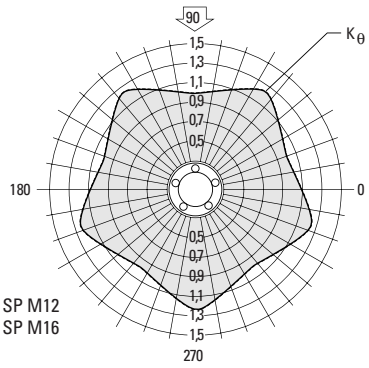

### Super Metric Ball Bushing Bearings (Closed Type)

| Part Number | | | Dimensions (mm) | | | | | Number of ball tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With One Integral Wiper | With Two Integral Wipers | ⌀d(4) | ⌀D | C h14 | C1 h13 | C2 min | | | | |
| SPM 08 | SPM 08 W | SPM 08 WW | 8 | 16 | 25 | 16.2 | 1.10 | 4 | 0.02 | 310 | 340 |
| SPM 12 | SPM 12 W | SPM 12 WW | 12 | 22 | 32 | 22.6 | 1.30 | 5 | 0.02 | 830 | 910 |
| SPM 16 | SPM 16 W | SPM 16 WW | 16 | 26 | 36 | 24.6 | 1.30 | 5 | 0.03 | 1020 | 1120 |
| SPM 20 | SPM 20 W | SPM 20 WW | 20 | 32 | 45 | 31.2 | 1.60 | 6 | 0.06 | 2020 | 2220 |
| SPM 25 | SPM 25 W | SPM 25 WW | 25 | 40 | 58 | 43.7 | 1.85 | 6 | 0.13 | 3950 | 4350 |
| SPM 30 | SPM 30 W | SPM 30 WW | 30 | 47 | 68 | 51.7 | 1.85 | 6 | 0.19 | 4800 | 5280 |
| SPM 40 | SPM 40 W | SPM 40 WW | 40 | 62 | 80 | 60.3 | 2.15 | 6 | 0.36 | 8240 | 9060 |
| SPM 50 | SPM 50 W | SPM 50 WW | 50 | 75 | 100 | 77.3 | 2.65 | 6 | 0.66 | 12060 | 13270 |

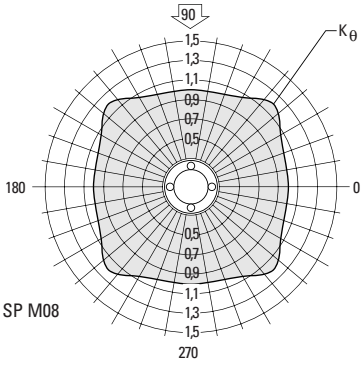
(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \cdot (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing and shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor $K_\theta$, should be applied to W and $W_0$ respectively.
(4) Internal bearing diameter is affected by the housing bore, see Table 1.
NOTE: External seals and retaining rings are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.
NOTE: For a corrosion resistant bearing add suffix-CR to the part number and reduce the load capacity by 30%.




SP M20
SP M25
SP M30
SP M40
SP M50

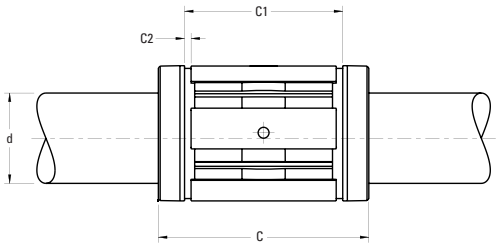


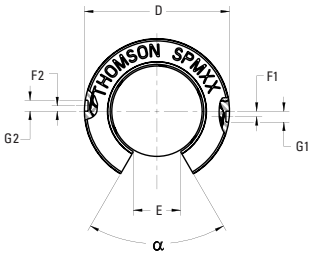

SP M12
SP M16

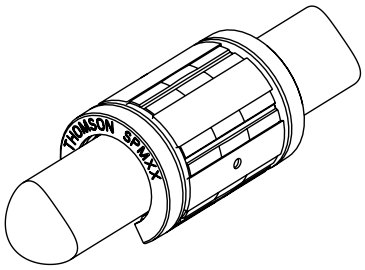



SP M08

# Super Ball Bushing Bearings
## (Open Type) for Continuously Supported Applications




### Super Metric Ball Bushing Bearings (Open Type)

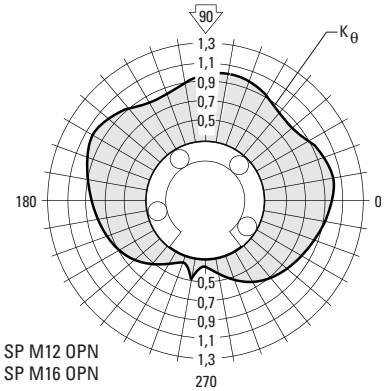
| Part Number | | | Dimensions (mm) | | | | | | | | | | Angle α (deg) | Number of ball tracks | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Without Integral Wipers | With One Integral Wiper | With Two Integral Wipers | ⌀d(4) | ⌀D | C h14 | C1 h13 | C2 min | E +/-0,1 | F1 | ⌀G1 | F2 | ⌀G2 | | | | | |
| SPM 12 OPN | SPM 12 OPN W | SPM 12 OPN WW | 12 | 22 | 32 | 22,3 | 1,30 | 7,0 | 1,35 (5) | 3,0 | - | - | 70 | 4 | 0,02 | 1060 | 1170 |
| SPM 16 OPN | SPM 16 OPN W | SPM 16 OPN WW | 16 | 26 | 36 | 24,6 | 1,30 | 9,8 | 0 | 3,0 | - | - | 70 | 4 | 0,02 | 1280 | 1410 |
| SPM 20 OPN | SPM 20 OPN W | SPM 20 OPN WW | 20 | 32 | 45 | 31,2 | 1,60 | 10,5 | 0 | 3,0 | - | - | 58 | 5 | 0,05 | 2100 | 2310 |
| SPM 25 OPN | SPM 25 OPN W | SPM 25 OPN WW | 25 | 40 | 58 | 43,7 | 1,85 | 13,0 | 1,50 | 3,0 | 0 | 3,5 | 60 | 5 | 0,10 | 4130 | 4540 |
| SPM 30 OPN | SPM 30 OPN W | SPM 30 OPN WW | 30 | 47 | 68 | 51,7 | 1,85 | 15,3 | 0 | 3,5 | 2,0 | 3,0 | 60 | 5 | 0,15 | 5020 | 5520 |
| SPM 40 OPN | SPM 40 OPN W | SPM 40 OPN WW | 40 | 62 | 80 | 60,3 | 2,15 | 21,4 | 0 | 3,5 | 1,5 | 3,0 | 58 | 5 | 0,30 | 8620 | 9480 |
| SPM 50 OPN | SPM 50 OPN W | SPM 50 OPN WW | 50 | 75 | 100 | 77,3 | 2,65 | 24,0 | 0 | 4,5 | 2,5 | 5,0 | 55 | 5 | 0,55 | 12500 | 13750 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to W • $(100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing andshaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor Kθ, should be applied to W and $W_0$ respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(4) Internal bearing diameter is affected by the housing bore, see Table 1.
(5) Hole for anti-rotation pin is above centerline.
NOTE: External seals and retaining are available. See page 151 for specifications.
NOTE: For additional technical information, see the Engineering section beginning on page 245.
NOTE: For corrosion resistant bearing add suffix-CR to the part number and reduce the load capacity by 30%.

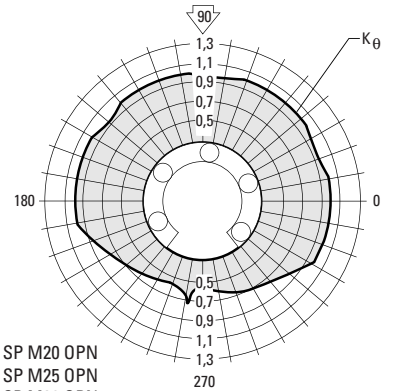
### Table 1 - Standard Diametral Clearances

| Nominal Shaft Diameter d (mm) | Nominal Housing Bore Diameter D (mm) | Diametral Clearance | |
|---|---|---|---|
| | | Housing Bore H7 (µ) | Housing Bore H6 (µ) |
| 12 | 22 | +33 +4 | +26 +3 |
| 16 | 26 | +33 +4 | +26 +3 |
| 20 | 32 | +37 +6 | +30 +4 |
| 25 | 40 | +37 +6 | +30 +4 |
| 30 | 47 | +37 +6 | +30 +4 |
| 40 | 62 | +44 +7 | +35 +5 |
| 50 | 75 | +44 +7 | +35 +5 |

For Super Metric Ball Bushing Bearings mounted in a housing and with LinearRace® shafts, h6 tolerance



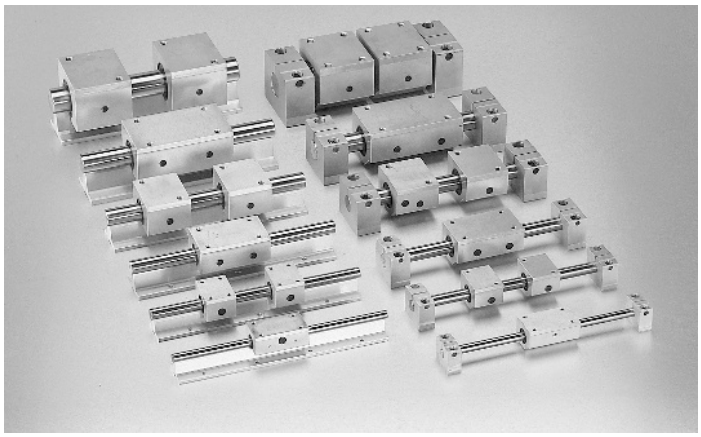

SP M12 OPN
SP M16 OPN




SP M20 OPN
SP M25 OPN
SP M30 OPN
SP M40 OPN
SP M50 OPN

## Metric – Super Pillow Blocks

# Super Pillow Blocks

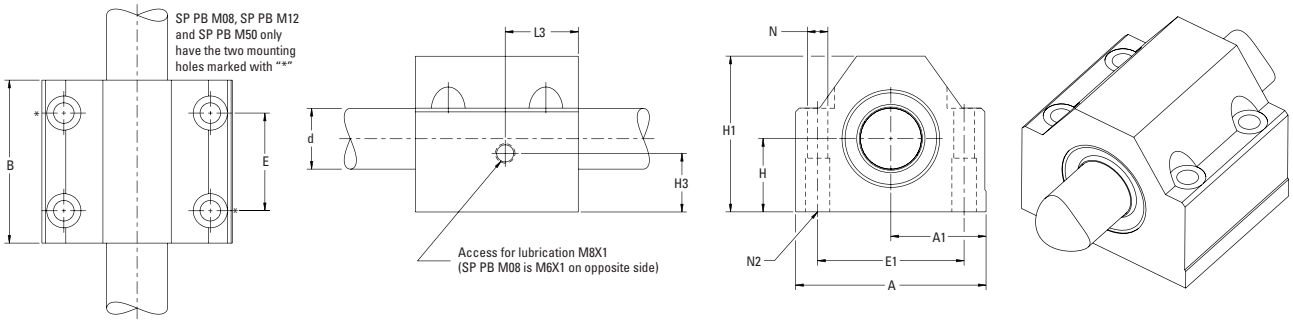


**Thomson Pillow Blocks with factory-installed Super Metric Ball Bushing Bearings offer:**

- Accelerations as high as 150 m/s$^2$ and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides.
- Replaceable bearing components for quick, cost-effective machine maintenance and minimal downtime.
- Light weight, wear-resistant, engineered polymer retainers and outer sleeves that reduce inertia and noise.
- Standard, double-acting, integral seals at both ends which keep out dirt, grit and other contaminants, retain lubrication and maximize bearing life.
- Lubrication hole for easy maintenance.
- Tapped or thru hole mounting configuration for ease of installation.
- Twin version with two Super Ball Bushing Bearings providing twice the load capacity or 8 times more travel life than the single version.
- A single bearing version that self aligns in all directions, minimizing installation time and cost.

Note: See page 141 for information on Thomson Super Metric Ball Bushing Bearings.

# Super Pillow Blocks
## (Closed Type) for End Supported Applications




### Super Pillow Blocks (Closed Type)

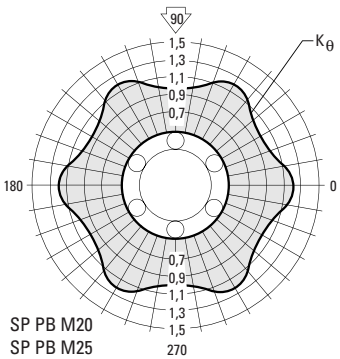
| Part Number | Dimensions (mm) | | | | | | | | | | | | Mass (kg) | Dynamic Load W[1][3] (N) | Load Limit $W_0$[2][3] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d[4] | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3[5] | ⌀N | N2 | | | |
| SP PB M08 | 8 | 15 | 28 | 35 | 17,5 | 32 | 20[6] | 25[6] | 12[5] | 8,5 | 3,3 | M4 | 0,07 | 310 | 340 |
| SP PB M12 | 12 | 18 | 35 | 43 | 21,5 | 39 | 23[6] | 32[6] | 10 | 10,5 | 4,3 | M5 | 0,13 | 830 | 910 |
| SP PB M16 | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 12 | 16,5 | 5,3 | M6 | 0,21 | 1020 | 1120 |
| SP PB M20 | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 13 | 20,5 | 6,6 | M8 | 0,35 | 2020 | 2220 |
| SP PB M25 | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 15 | 23 | 8,4 | M10 | 0,66 | 3950 | 4350 |
| SP PB M30 | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 20 | 27 | 8,4 | M10 | 0,97 | 4800 | 5280 |
| SP PB M40 | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 21,5 | 30 | 10,5 | M12 | 1,81 | 8240 | 9060 |
| SP PB M50 | 50 | 50 | 105 | 132 | 66,0 | 113 | 50 | 108 | 12,5 | 22 | 13,5 | M16 | 3,00 | 12060 | 13270 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing and shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor $K_\theta$, should be applied to W and $W_0$ respectively.
(4) For bearing diametral clearances, see Table 2.
(5) SP PB M08 lube hole is M6X1 tapped hole located on opposite side
(6) SP PB M08, SP PB M12 and SP PB M50 pillow blocks have only 2 mounting holes. The mounting holes on these sizes are marked in the chart above with "*"

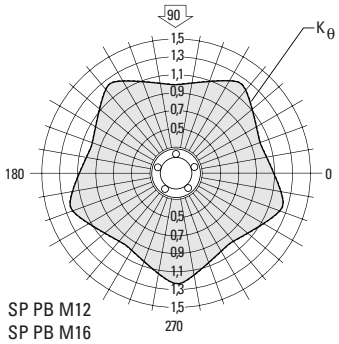
### Table 2 - Standard Diametral Clearances (Closed Type)

| Nominal Size d (mm) | Diametral Clearance (mm) |
|---|---|
| 8 | +23 +2 |
| 12 | +26 +3 |
| 16 | +26 +3 |
| 20 | +30 +4 |
| 25 | +30 +4 |
| 30 | +30 +4 |
| 40 | +35 +5 |
| 50 | +35 +5 |

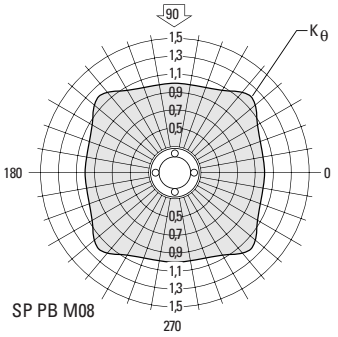
For Pillow Blocks used with LinearRace Shaft, h6 tolerance




SP PB M20
SP PB M25
SP PB M30
SP PB M40
SP PB M50



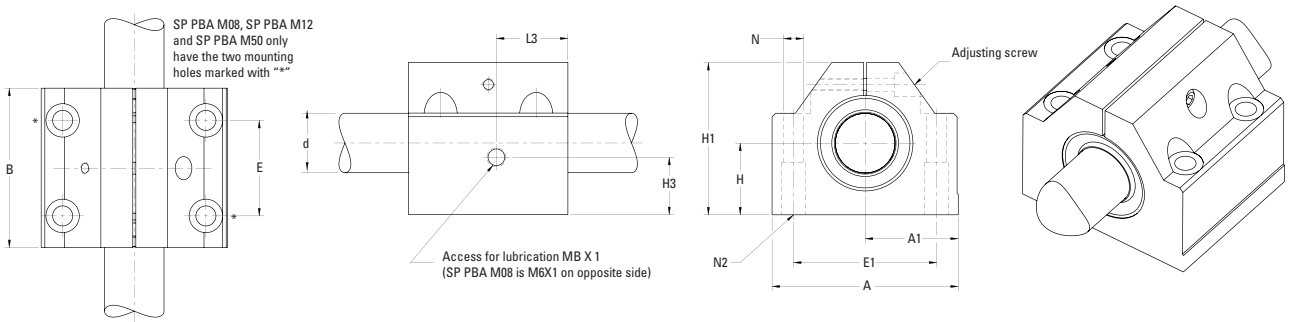

SP PB M12
SP PB M16




SP PB M08

## Metric – Super Pillow Blocks

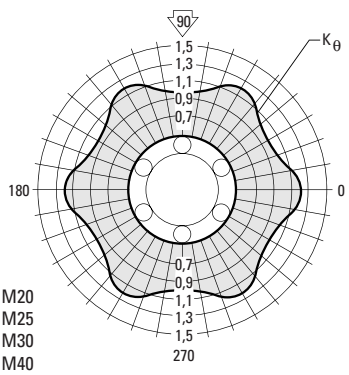
# Super Pillow Blocks
## (Closed Adjustable Type) for End Supported Applications



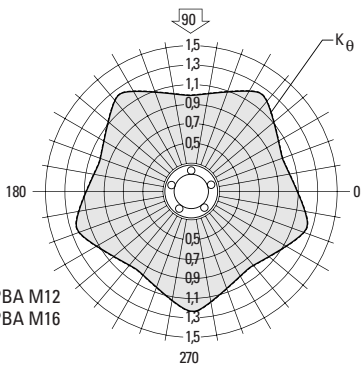

### Super Pillow Blocks (Closed Adjustable Type)

| Part Number | Dimensions (mm) | | | | | | | | | | | | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | |
| SP PBA M08 | 8 | 15 | 28 | 35 | 17,5 | 32 | 20(6) | 25(6) | 12(5) | 8,5(5) | 3,3 | M4 | 0,07 | 310 | 340 |
| SP PBA M12 | 12 | 18 | 35 | 43 | 21,5 | 39 | 23(6) | 32(6) | 10 | 10,5 | 4,3 | M5 | 0,13 | 830 | 910 |
| SP PBA M16 | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 16 | 15,7 | 5,3 | M6 | 0,21 | 1020 | 1120 |
| SP PBA M20 | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 13 | 20 | 6,6 | M8 | 0,35 | 2020 | 2220 |
| SP PBA M25 | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 15 | 23 | 8,4 | M10 | 0,66 | 3950 | 4350 |
| SP PBA M30 | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 16 | 26,5 | 8,4 | M10 | 0,97 | 4800 | 5280 |
| SP PBA M40 | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 21,5 | 30 | 10,5 | M12 | 1,81 | 8240 | 9060 |
| SP PBA M50 | 50 | 50 | 105 | 132 | 66,0 | 113 | 50 | 108 | 12,5 | 22 | 13,5 | M16 | 3,00 | 12060 | 13270 |

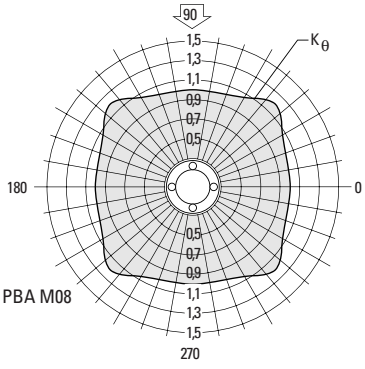
(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing and shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor $K_\theta$, should be applied to W and $W_0$ respectively.
(4) For bearing diametral clearances, see Table 2.
(5) SP PBA M08 lube hole is M6X1 tapped hole located on opposite side
(6) SP PBA M08, SP PBA M12 and SP PBA M50 pillow blocks have only 2 mounting holes. The mounting holes on these sizes are marked in the chart above with "*"




SP PBA M20
SP PBA M25
SP PBA M30
SP PBA M40
SP PBA M50

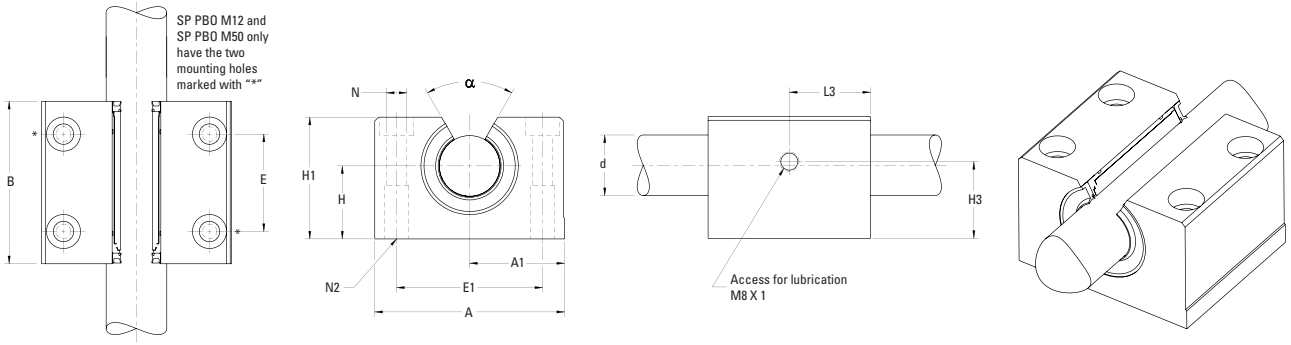



SP PBA M12
SP PBA M16




SP PBA M08

# Super Pillow Blocks
## (Open Type) for Continuously Supported Applications




### Super Pillow Blocks (Open Type)

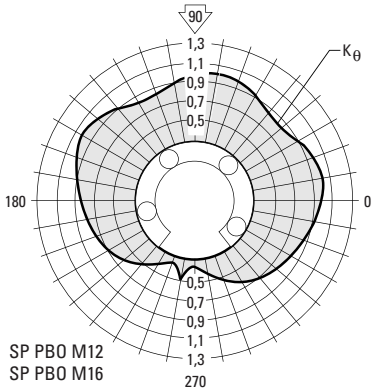
| Part Number | Dimensions (mm) | | | | | | | | | | | | Angle α (deg) | Mass (kg) | Dynamic Load W[1][3] (N) | Load Limit $W_0$[2][3] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d[4] | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | | |
| SP PBO M12 | 12 | 18 | 35 | 43 | 21,5 | 39 | 23[6] | 32[6] | 10 | 10,5 | 4,3 | M5 | 70 | 0,11 | 1060 | 1170 |
| SP PBO M16 | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 10,8 | 15,7 | 5,3 | M6 | 58 | 0,19 | 1280 | 1410 |
| SP PBO M20 | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 13 | 20 | 6,6 | M8 | 60 | 0,30 | 2100 | 2310 |
| SP PBO M25 | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 15 | 23 | 8,4 | M10 | 60 | 0,60 | 4130 | 4540 |
| SP PBO M30 | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 20,5 | 27 | 8,4 | M10 | 58 | 0,92 | 5020 | 5520 |
| SP PBO M40 | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 21,5 | 30 | 10,5 | M12 | 55 | 1,65 | 8620 | 9480 |
| SP PBO M50 | 50 | 50 | 113 | 132 | 66,0 | 113 | 50 | 108 | 12,5 | 22 | 13,5 | M16 | 55 | 2,60 | 12500 | 13750 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing and shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor $K\theta$, should be applied to W and $W_0$ respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(4) For bearing diametral clearances, see Table 3.
(5) SP PBO M12 and SP PBO M50 pillow blocks have only 2 mounting holes. The mounting holes on these sizes are marked in the chart above with "*"

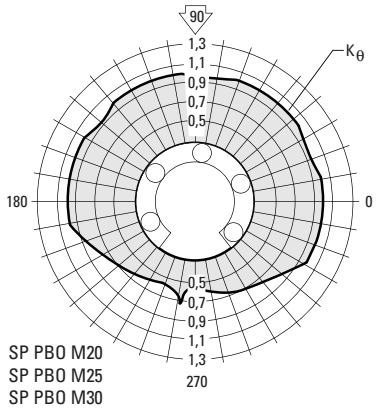
### Table 3 - Standard Diametral Clearances (Open Type)

| Nominal Size d (mm) | Diametral Clearance (µ) |
|---|---|
| 12 | +26 +3 |
| 16 | +26 +3 |
| 20 | +30 +4 |
| 25 | +30 +4 |
| 30 | +30 +4 |
| 40 | +35 +5 |
| 50 | +35 +5 |

For Pillow Blocks used with Linear-Race Shaft, h6 tolerance



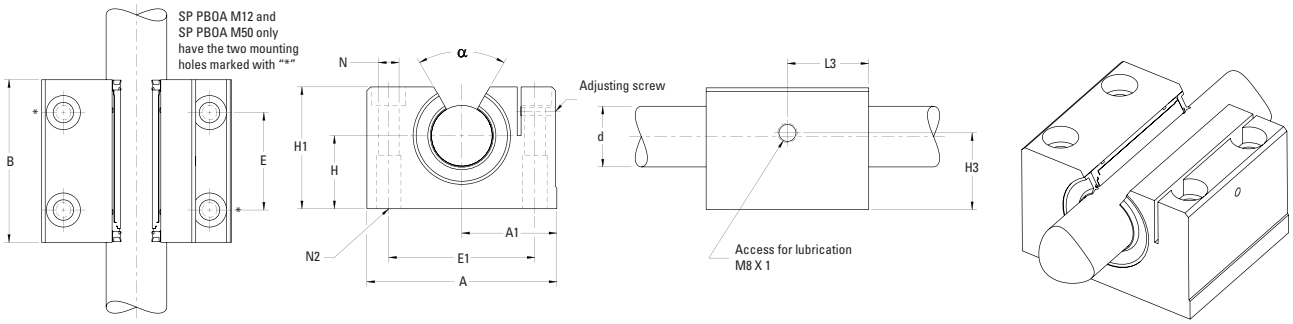

SP PBO M12
SP PBO M16




SP PBO M20
SP PBO M25
SP PBO M30
SP PBO M40
SP PBO M50

## Metric – Super Pillow Blocks

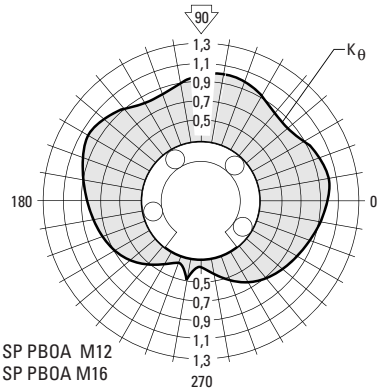
# Super Pillow Blocks
## (Open Adjustable Type) for Continuously Supported Applications



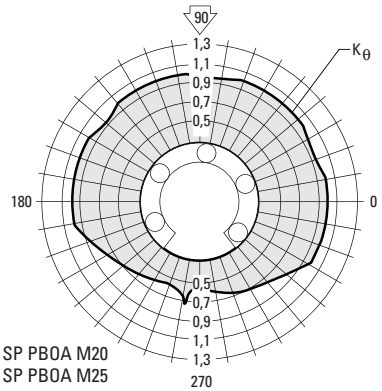

### Super Pillow Blocks (Open Adjustable Type)

| Part Number | Dimensions (mm) | | | | | | | | | | | | Angle α (deg) | Mass (kg) | Dynamic Load W(1)(3) (N) | Load Limit $W_0$(2)(3) (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | | |
| SP PB0A M12 (4) | 12 | 18 | 35 | 43 | 21,5 | 39 | 23 | 32 | 10 | 10,5 | 4,3 | M5 | 70 | 0,11 | 1060 | 1170 |
| SP PB0A M16 | 16 | 22 | 42 | 53 | 26,5 | 43 | 26 | 40 | 10,8 | 15,7 | 5,3 | M6 | 58 | 0,19 | 1280 | 1410 |
| SP PB0A M20 | 20 | 25 | 50 | 60 | 30,0 | 54 | 32 | 45 | 13 | 20 | 6,6 | M8 | 60 | 0,30 | 2100 | 2310 |
| SP PB0A M25 | 25 | 30 | 60 | 78 | 39,0 | 67 | 40 | 60 | 15 | 23 | 8,4 | M10 | 60 | 0,60 | 4130 | 4540 |
| SP PB0A M30 | 30 | 35 | 71 | 87 | 43,5 | 79 | 45 | 68 | 20,5 | 27 | 8,4 | M10 | 58 | 0,92 | 5020 | 5520 |
| SP PB0A M40 | 40 | 45 | 91 | 108 | 54,0 | 91 | 58 | 86 | 21,5 | 30 | 10,5 | M12 | 55 | 1,65 | 8620 | 9480 |
| SP PB0A M50 | 50 | 50 | 113 | 132 | 66,0 | 113 | 50 | 108 | 12,5 | 22 | 13,5 | M16 | 55 | 2,60 | 12500 | 13750 |

(1) For rated travel life of 100 km. For longer travel lives, reduce load to $W \cdot (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.
(2) The Load Limit is the maximum load that may be applied to a bearing and shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.
(3) The load capacities W and $W_0$ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor $K_\theta$, should be applied to W and $W_0$ respectively. Open type bearings have reduced load capacities when used in pull-off situations.
(4) SP PB0A M12 and SP PB0A M50 pillow blocks have only 2 mounting holes. The mounting holes on these sizes are marked in the chart above with "*"



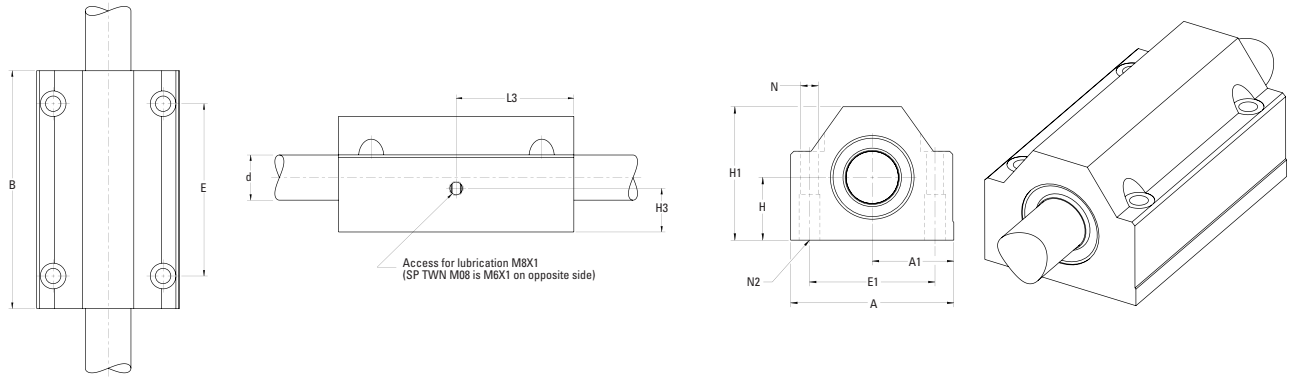

SP PB0A M12
SP PB0A M16




SP PB0A M20
SP PB0A M25
SP PB0A M30
SP PB0A M40
SP PB0A M50

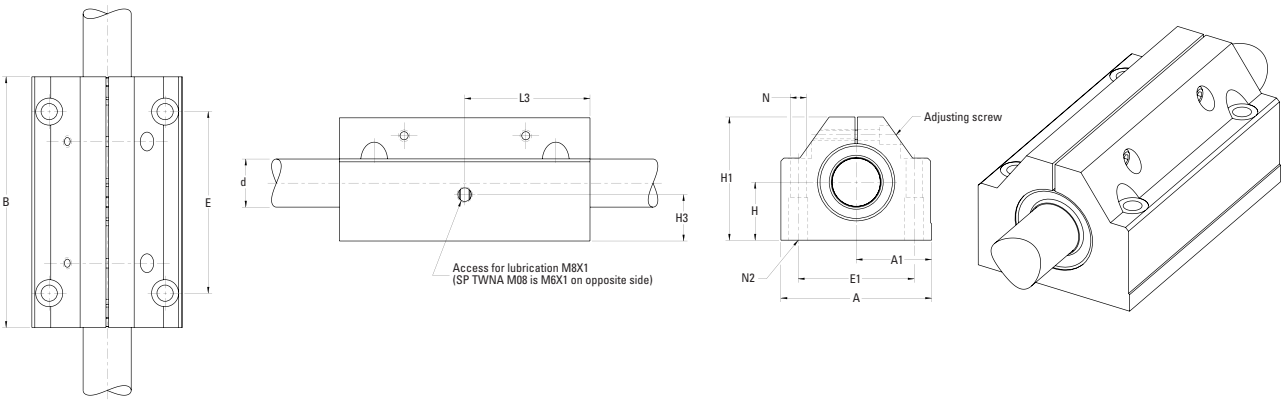
# Super Twin Pillow Blocks

## (Closed Type) for End Supported Applications




| Part Number | Dimensions (mm) | | | | | | | | | | | | Mass (kg) | Dynamic Load W[1][3] (N) | Load Limit $W_0$[2][3] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d[4] | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | |
| SP TWN M08 | 8 | 15 | 28 | 35 | 17,5 | 62 | 50 | 25 | 12[5] | 31[5] | 3,3 | M4 | 0,15 | 500 | 550 |
| SP TWN M12 | 12 | 18 | 35 | 43 | 21,5 | 76 | 56 | 32 | 10 | 38 | 4,3 | M5 | 0,27 | 1350 | 1490 |
| SP TWN M16 | 16 | 22 | 42 | 53 | 26,5 | 84 | 64 | 40 | 16 | 42 | 5,3 | M6 | 0,41 | 1660 | 1830 |
| SP TWN M20 | 20 | 25 | 50 | 60 | 30,0 | 104 | 76 | 45 | 13 | 52 | 6,6 | M8 | 0,66 | 3280 | 3610 |
| SP TWN M25 | 25 | 30 | 60 | 78 | 39,0 | 130 | 94 | 60 | 15 | 65 | 8,4 | M10 | 1,22 | 6410 | 7050 |
| SP TWN M30 | 30 | 35 | 71 | 87 | 43,5 | 152 | 106 | 68 | 16 | 76 | 8,4 | M10 | 1,90 | 7800 | 8580 |
| SP TWN M40 | 40 | 45 | 91 | 108 | 54,0 | 176 | 124 | 86 | 21,5 | 88 | 10,5 | M12 | 3,57 | 13380 | 14720 |
| SP TWN M50 | 50 | 50 | 105 | 132 | 66,0 | 224 | 160 | 108 | 20 | 112 | 13,5 | M16 | 6,30 | 19590 | 21550 |

## (Closed Adjustable Type) for End Supported Applications

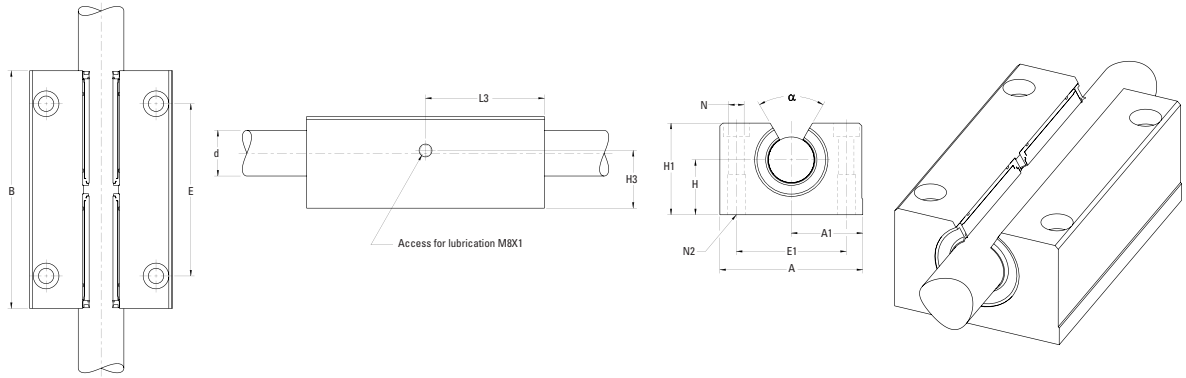



| Part Number | Dimensions (mm) | | | | | | | | | | | | Mass (kg) | Dynamic Load W[1][3] (N) | Load Limit $W_0$[2][3] (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | |
| SP TWNA M08 | 8 | 15 | 28 | 35 | 17.5 | 62 | 50 | 25 | 12[5] | 31[5] | 3,3 | M4 | 0,15 | 500 | 550 |
| SP TWNA M12 | 12 | 18 | 35 | 43 | 21.5 | 76 | 56 | 32 | 10 | 38 | 4,3 | M5 | 0,27 | 1350 | 1490 |
| SP TWNA M16 | 16 | 22 | 42 | 53 | 26.5 | 84 | 64 | 40 | 12 | 42 | 5,3 | M6 | 0,41 | 1660 | 1830 |
| SP TWNA M20 | 20 | 25 | 50 | 60 | 30.0 | 104 | 76 | 45 | 13 | 52 | 6,6 | M8 | 0,66 | 3280 | 3610 |
| SP TWNA M25 | 25 | 30 | 60 | 78 | 39.0 | 130 | 94 | 60 | 15 | 65 | 8,4 | M10 | 1,22 | 6410 | 7050 |
| SP TWNA M30 | 30 | 35 | 71 | 87 | 43.5 | 152 | 106 | 68 | 20 | 76 | 8,4 | M10 | 1,90 | 7800 | 8580 |
| SP TWNA M40 | 40 | 45 | 91 | 108 | 54.0 | 176 | 124 | 86 | 21,5 | 88 | 10,5 | M12 | 3,57 | 13380 | 14720 |
| SP TWNA M50 | 50 | 50 | 105 | 132 | 66.0 | 224 | 160 | 108 | 20 | 112 | 13,5 | M16 | 6,30 | 19590 | 21550 |

See footnotes (1) (2) (3) (4) (5) (6) on page 146. For diametral clearances, see single versions of pillow block.

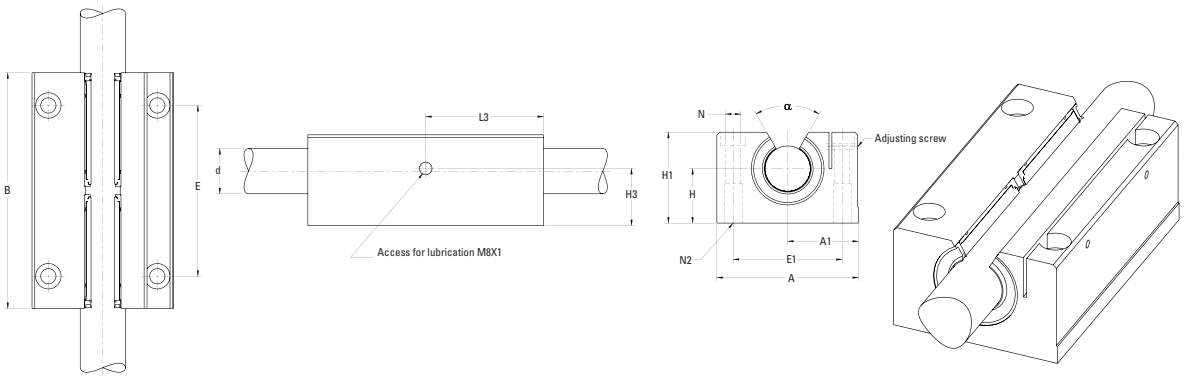
# Super Twin Pillow Blocks

## (Open Type) for Continuously Supported Applications




| Part Number | Dimensions (mm) | | | | | | | | | | | | Angle α (deg) | Mass (kg) | Dynamic Load $W^{(1)(3)}$ (N) | Load Limit $W_0^{(2)(3)}$ (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d[4] | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | | |
| SP TWN0 M12 | 12 | 18 | 28 | 43 | 21.5 | 76 | 56 | 32 | 10 | 38 | 4,3 | M5 | 70 | 0,22 | 1350 | 1490 |
| SP TWN0 M16 | 16 | 22 | 35 | 53 | 26.5 | 84 | 64 | 40 | 18 | 42 | 5,3 | M6 | 58 | 0,37 | 1660 | 1830 |
| SP TWN0 M20 | 20 | 25 | 41 | 60 | 30.0 | 104 | 76 | 45 | 16 | 52 | 6,6 | M8 | 60 | 0,57 | 3280 | 3610 |
| SP TWN0 M25 | 25 | 30 | 50 | 78 | 39.0 | 130 | 94 | 60 | 15 | 65 | 8,4 | M10 | 60 | 1,15 | 6410 | 7050 |
| SP TWN0 M30 | 30 | 35 | 60 | 87 | 43.5 | 152 | 106 | 68 | 16 | 76 | 8,4 | M10 | 58 | 1,76 | 7800 | 8580 |
| SP TWN0 M40 | 40 | 45 | 77 | 108 | 54.0 | 176 | 124 | 86 | 21,5 | 88 | 10,5 | M12 | 55 | 3,22 | 13380 | 14720 |
| SP TWN0 M50 | 50 | 50 | 88 | 130 | 66.0 | 224 | 160 | 108 | 20 | 112 | 13,5 | M16 | 55 | 5,50 | 19590 | 21550 |

## (Open Adjustable Type) for Continuously Supported Applications




| Part Number | Dimensions (mm) | | | | | | | | | | | | Angle α (deg) | Mass (kg) | Dynamic Load $W^{(1)(3)}$ (N) | Load Limit $W_0^{(2)(3)}$ (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⌀d | H +/-0,020 | H1 | A | A1 +/-0,020 | B | E +/-0,1 | E1 +/-0,1 | H3 | L3 | ⌀N | N2 | | | | |
| SP TWN0A M12 | 12 | 18 | 28 | 43 | 21.5 | 76 | 56 | 32 | 10 | 38 | 4,3 | M5 | 70 | 0,22 | 1350 | 1490 |
| SP TWN0A M16 | 16 | 22 | 35 | 53 | 26.5 | 84 | 64 | 40 | 18 | 42 | 5,3 | M6 | 58 | 0,37 | 1660 | 1830 |
| SP TWN0A M20 | 20 | 25 | 41 | 60 | 30.0 | 104 | 76 | 45 | 16 | 52 | 6,6 | M8 | 60 | 0,57 | 3280 | 3610 |
| SP TWN0A M25 | 25 | 30 | 50 | 78 | 39.0 | 130 | 94 | 60 | 15 | 65 | 8,4 | M10 | 60 | 1,15 | 6410 | 7050 |
| SP TWN0A M30 | 30 | 35 | 60 | 87 | 43.5 | 152 | 106 | 68 | 16 | 76 | 8,4 | M10 | 58 | 1,76 | 7800 | 8580 |
| SP TWN0A M40 | 40 | 45 | 77 | 108 | 54.0 | 176 | 124 | 86 | 21,5 | 88 | 10,5 | M12 | 55 | 3,22 | 13380 | 14720 |
| SP TWN0A M50 | 50 | 50 | 88 | 130 | 66.0 | 224 | 160 | 108 | 20 | 112 | 13,5 | M16 | 55 | 5,50 | 19590 | 21550 |

See footnotes (1) (2) (3) (4) on page 147. For diametral clearances, see single versions of pillow block.

# Accessories



Described here are accessories for Linear Ball Bushing Bearings and pillow blocks including retaining rings, external seals, integral seals and resilient mounts.

## Metric – Accessories

# Retaining Rings

### Internal Retaining Rings

Push-in internal retaining rings, as shown, are for use with Metric Ball Bushing Bearings. Each retaining ring is installed inside the housing bore at each end of the bearing.



(Dimensions in mm)

| Part Number | Use with Ball Bushing Bearing Number | Nominal Shaft Diameter | Nominal Housing Bore A | Minimum End Space required B |
|---|---|---|---|---|
| PR M08 | SP M08 or MA M08 | 8 | 16 | 1,5 |
| PR M12 | SP M12 or MA M12 | 12 | 22 | 2,0 |
| PR M16 | SSE M16 or MA M16 | 16 | 26 | 2,0 |
| PR M20 | SSE M20 or MA M20 | 20 | 32 | 2,0 |
| PR M25 | SSE M25 or MA M25 | 25 | 40 | 2,0 |
| PR M30 | SSE M30 or MA M30 | 30 | 47 | 2,0 |
| PR M40 | SSE M40 or MA M40 | 40 | 62 | 2,5 |

### External Retaining Rings

External retaining rings are used to form one or two shoulders on the O.D. of the Metric Ball Bushing Bearings.



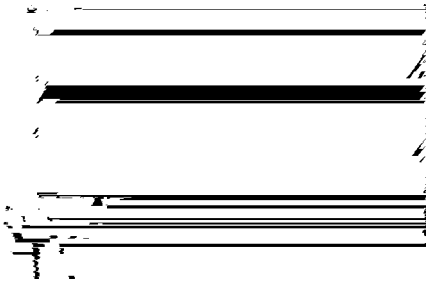
(Dimensions in mm)

| Part Number | Use with Ball Bushing Bearing Number | Nominal Shaft Diameter | T | Free Diameter D |
|---|---|---|---|---|
| WR M08 | SP M08 or MA M08 | 8 | 1,00 | 14,7 |
| WR M12 | SP M12 or MA M12 | 12 | 1,20 | 20,5 |
| WR M16 | SSE M16 or MA M16 | 16 | 1,20 | 24,2 |
| WR M20 | SSE M20 or MA M20 | 20 | 1,50 | 29,6 |
| WR M25 | SSE M25 or MA M25 | 25 | 1,75 | 36,5 |
| WR M30 | SSE M30 or MA M30 | 30 | 1,75 | 43,5 |
| WR M40 | SSE M40 or MA M40 | 40 | 2,00 | 57,8 |

# External Seals

## External Seals for Closed Metric Ball Bushing Bearings

Double-acting seals for use in fixed diameter housings.

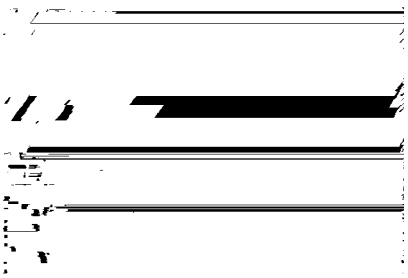


(Dimensions in mm)

| Part Number | Use with Ball Bushing Bearing Number | Nominal Shaft Diameter | T | Nominal (1) Housing Diameter D |
|---|---|---|---|---|
| SM 08 | SP M08 or MA M08 | 8 | 3,0 | 16 |
| SM 12 | SP M12 or MA M12 | 12 | 3,0 | 22 |
| SM 16 | SSE M16 or MA M16 | 16 | 3,0 | 26 |
| SM 20 | SSE M20 or MA M20 | 20 | 4,0 | 32 |
| SM 25 | SSE M25 or MA M25 | 25 | 4,0 | 40 |
| SM 30 | SSE M30 or MA M30 | 30 | 5,0 | 47 |
| SM 40 | SSE M40 or MA M40 | 40 | 5,0 | 62 |

## External Seals for Adjustable Metric Ball Bushing Bearings

Double-acting seals for use in adjustable diameter housings. Series ADJ seals have a radial slot through the circumference to facilitate diameter adjustment.

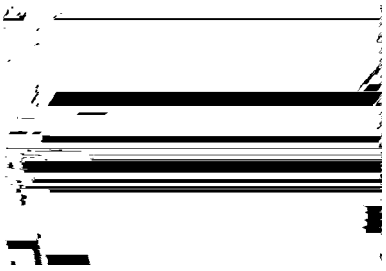


(Dimensions in mm)

| Part Number | Use with Ball Bushing Bearing Number | Nominal Shaft Diameter | T | Nominal (1) Housing Diameter D |
|---|---|---|---|---|
| SM 08 ADJ | SP M08 or MA M08 | 8 | 3,0 | 16 |
| SM 12 ADJ | SP M12 or MA M12 | 12 | 3,0 | 22 |
| SM 16 ADJ | SSE M16 or MA M16 | 16 | 3,0 | 26 |
| SM 20 ADJ | SSE M20 or MA M20 | 20 | 4,0 | 32 |
| SM 25 ADJ | SSE M25 or MA M25 | 25 | 4,0 | 40 |
| SM 30 ADJ | SSE M30 or MA M30 | 30 | 5,0 | 47 |
| SM 40 ADJ | SSE M40 or MA M40 | 40 | 5,0 | 62 |

## External Seals for Open Metric Ball Bushing Bearings

Double-acting seals for use in open type housings.



(Dimensions in mm)

| Part Number | Use with Ball Bushing Bearing Number | Nominal Shaft Diameter | T | Free Diameter D |
|---|---|---|---|---|
| SM 12 OPN | SP M12 or MA M12 | 12 | 3,20 | 22 |
| SM 16 OPN | SSE M16 or MA M16 | 16 | 3,20 | 26 |
| SM 20 OPN | SSE M20 or MA M20 | 20 | 4,20 | 32 |
| SM 25 OPN | SSE M25 or MA M25 | 25 | 4,20 | 40 |
| SM 30 OPN | SSE M30 or MA M30 | 30 | 5,15 | 47 |
| SM 40 OPN | SSE M40 or MA M40 | 40 | 5,15 | 62 |

(1) For use in tolerance zones up to H7.

# 60 Case Shafting




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60 Case Product Overview ..... 157 - 161
**Inch 60 Case Shafting ..... 162 - 175**
Support Rails and Support Rail Assemblies ..... 169 - 172
Support Block ..... 173 - 175
**Metric 60 Case Shafting ..... 176 - 182**
Support Rails and Support Rail Assemblies ..... 179 - 181
Support Block ..... 182
Quick Shaft ..... 183 - 186
Special Machining ..... 187 - 208

## Standard 60 Case Shaft Size and Availability Chart

| Material | Carbon Steel | | | | | | | | | | | 440 C Stainless Steel | | | | | 52100 Tubular | | 316 SS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardness | 60 min. | | | | | | | | | | | 50 min. | | | | 55 min. | 58 min. | | 20-25 |
| Tolerance Class | L | | | | | S | N | | D | XL | G | L | | S | G | Instrument | L | S | L |
| Optional Features | L | DC | PD CPPE | CPPE | PD | S | DC | N | | | | L | PD | | | | | | |
| 1/8" | | | | | | | | | | | | | | | | ● | | | |
| 3/16" | ● | | | | | | | | | | | | | | | ● | | | |
| 1/4" | ● | | | | | ● | | ● | | | ● | ● | | ● | ● | ● | | | |
| 3/8" | ● | | | | | ● | | ● | | | ● | ● | | ● | ● | | | | ● |
| 1/2" | ● | | ● | ● | ● | ● | | ● | | | ● | ● | ● | ● | ● | | | | ● |
| 5/8" | ● | | ● | ● | ● | ● | | ● | | | ● | ● | ● | ● | ● | | | | |
| 3/4" | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | | ● | ● | ● |
| 7/8" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 1" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | ● | ● | ● |
| 1 1/8" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 1 1/4" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | | | | | |
| 1 3/8" | ● | | | | | | | ● | | | | | | | | | | | |
| 1 1/2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | | | ● | ● | ● |
| 1 5/8" | ● | | | | | | | ● | | | | | | | | | | | |
| 1 3/4" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | |
| 2 1/4" | ● | ● | | | | | ● | ● | | | | | | | | | | | |
| 2 1/2" | ● | ● | | | | | ● | ● | | | | ● | | ● | | | ● | ● | |
| 3" | ● | ● | | | | | ● | ● | | ● | | | | | | | ● | ● | |
| 3 1/2" | ● | ● | | | | | ● | | | | | | | | | | | | |
| 4" | ● | | | | | | | | | ● | | | | | | | ● | ● | |
| Catalog Page | 163 | 165 | 164 | 164 | 164 | 163 | 165 | 163 | 163 | 163 | 165 | 166 | 166 | 166 | 167 | 167 | 167 | 167 | 168 |

| Material | Carbon Steel | | | 440 C SS |
|---|---|---|---|---|
| Hardness | 60 min. | | | 50 min. |
| Tolerance Class | MM (ISO h6) | | | MM (ISO h6) |
| Optional Features | MM | T1 | T2 | |
| 5 mm | ● | | | ● |
| 8 mm | ● | | | ● |
| 10 mm | ● | | | ● |
| 12 mm | ● | ● | ● | ● |
| 15 mm | ● | ● | ● | |
| 16 mm | ● | ● | ● | ● |
| 20 mm | ● | ● | ● | ● |
| 25 mm | ● | ● | ● | ● |
| 30 mm | ● | ● | ● | ● |
| 40 mm | ● | ● | ● | ● |
| 50 mm | ● | | | ● |
| 60 mm | ● | | | ● |
| 80 mm | ● | | | |
| Catalog Page | 176 | 177 | 177 | 178 |

Thomson 60 Case shafting is sold as cut-to-length (CTL), random length (RL), special machined (SM), and as quick shaft (QS).

Since Thomson grinds and hardens all of its own shafting, diameters and tolerances not listed are available as special grind and are made to order. Minimum lots may apply.

**Tolerance Classes:**

L - For use with XA, Open and Adjustable Ball Bushing bearings and Pillow Blocks as well as Super Ball Bushing bearings and Super Smart Ball Bushing bearings
S - For use with A type ball bushings
N - For use with needle roller bearings
D - For use with Thomson Die Set Ball Bushing bearings
G - Ball Grooved for use with Thomson Super Ball bushing
XL - For use with XR bearing (Carbon Steel)

**Optional Features:**

PD - Predrilled
CPPE - Chrome Plated Plain Ends
DC - Deep Case

## Standard Support Rail Size and Availability Chart

| Type | SR | SR-PD | SRA | SRA-SS | SRA-TU | LSR | LSR-PD | LSRA | LSRA-CR | XSR | XSRA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Aluminum Support Rail | Aluminum Support Rail with Predrilled Holes | Aluminum Support Rail Carbon Steel Shaft | Aluminum Support Rail Assembly 440C SS Shaft | Aluminum Support Rail 51200 Tubular Shaft | Steel Lower Support Rail | Steel Lower Support Rail with Predrilled Holes | Steel Lower Support Rail Assembly Carbon Steel Shaft | Corrosion Resistant Steel Lower Support Rail Assembly 440C SS Shaft | Extra Rigid Cast Steel Support Rail | Extra Rigid Cast Steel Support Rail Assembly |
| 1/2" | ● | ● | ● | ● | | ● | ● | | | | |
| 5/8" | ● | ● | ● | ● | | ● | ● | ● | ● | | |
| 3/4" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 1" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 1 1/4" | ● | ● | ● | ● | | ● | ● | ● | ● | | |
| 1 1/2" | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 2" | ● | ● | ● | ● | ● | ● | ● | | | ● | ● |
| 2 1/2" | | | | | | ● | ● | | | | |
| 3" | | | | | | ● | ● | | | ● | ● |
| 4" | | | | | | ● | ● | | | | |
| Catalog Page | 171 | 171 | 172 | 172 | 172 | 171 | 171 | 172 | 172 | 171 | 172 |

## Standard Support Rail Assembly Size and Availability Chart

| Type | SRM | SRM T1 | SRM T2 | SRAM T1 | SRAM T2 | LSRM | LSRM T1 | LSRM T2 | LSRA M | LSRA M CR |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | | Steel Lower Support Rail Assembly Carbon Steel Shaft | Steel Lower Support Rail with Predrilled Holes T2 Hole Pattern | Aluminum Support Rail Assembly with Predrilled Holes T1 Hole Pattern | Aluminum Support Rail Assembly with Predrilled Holes T2 Hole Pattern | Steel Lower Support Rail | Steel Lower Support Rail with Predrilled Holes T1 Hole Pattern | Steel Lower Support Rail with Predrilled Holes T2 Hole Pattern | Steel Lower Support Rail Assembly Carbon Steel Shaft | Corrosion Resistant Steel |
| 12mm | ● | ● | ● | ● | ● | ● | ● | ● | | |
| 16mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 20mm | ● | ● | ● | ● | ● | ●[1] | ●[1] | ●[1] | ●[1] | ●[1] |
| 25mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 30mm | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| 40mm | ● | ● | ● | ● | ● | ●[1] | ●[1] | ●[1] | ●[1] | ●[1] |
| Catalog Page | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 | 181 |

## Standard Support Block Size and Availability Chart

| Type | ASB | FSB | SB | WM |
|---|---|---|---|---|
| Description | Aluminum Support Block | Flanged Aluminum Support Block | Steel Support Block | Waymount Support |
| 1/4" | ● | | ● | |
| 3/8" | ● | | ● | |
| 1/2" | ● | ● | ● | ● |
| 5/8" | | | ● | |
| 3/4" | ● | ● | ● | |
| 1" | ● | ● | ● | ● |
| 1 1/4" | | ● | ● | |
| 1 1/2" | ● | | ● | |
| 2" | | | | ● |
| 3" | | | | ● |
| 4" | | | | ● |
| Catalog Page | 174 | 175 | 174 | 175 |

| Type | ASBM | SBM |
|---|---|---|
| Description | Aluminum Support Block | Steel Support Block |
| 8mm | ● | ● |
| 12mm | ● | ● |
| 16mm | ● | ● |
| 20mm | ● | ● |
| 25mm | ● | ● |
| 30mm | ● | ● |
| 40mm | ● | ● |
| Catalog Page | 182 | 182 |

[1] Not all sizes are stocked, minimum order quantities may apply.

# 60 Case Product Overview

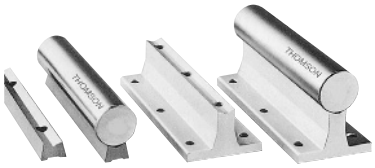
For over 50 years Thomson has been producing Precision Linear Shafting for the Thomson Linear Ball Bushing and various other applications.

- We are one of a few Linear Motion component suppliers producing their own shafting.
- We offer the largest selection of linear shafting, not just the popular sizes.
- We offer a complete Linear Motion solution not just one component of a linear system.
- We offer the widest range of inch and metric shafting, support rails and support blocks in the market today.
- We continually optimize our processes to ensure optimal bearing performance and extended life.
- We perform thousands of hours of laboratory testing per year to continually evaluate our products.

While shafts may appear the same to the untrained eye on the surface, there are significant performance differences due to the manufacturer's selected standards and the manufacturing processes used to achieve them. Thomson 60 Case was developed and is continually enhanced because of our goal to provide a consistent finish, roundness, straightness, cylindricity case hardness and depth on all shafting for the demands of a linear bearing. Unlike common shafting, Thomson 60 Case shafting is manufactured to the highest quality standards in an ISO 9000:2000 registered facility. Our techniques have been continuously upgraded with proprietary knowledge gained from over 50 years of manufacturing experience. Using Thomson 60 Case with Thomson Ball Bushing bearings ensures optimal bearing performance and travel life.

## Assortment

Thomson 60 Case is available from stock in Carbon Steel, 440 C Stainless Steel, 52100 Tubular, 316 Stainless Steel, Carbon Steel Chrome Plated, Carbon Steel Predrilled, and 440 C Stainless Predrilled from 3/16 to 4". Thomson 60 Case can be mounted or delivered pre-assembled, in three configurations: type SR standard support rails, type LSR low profile support rails and type XSR extra rigid support rails. Contact Thomson or review the catalog datasheets to see available diameters for the different materials. Thomson has the widest range of materials and diameters available on the market from one source.



## Material

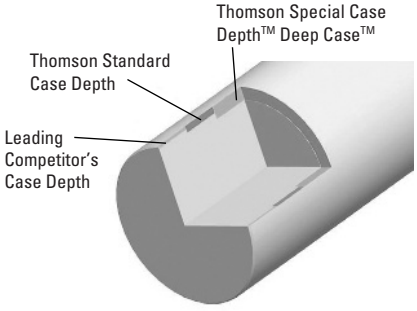
Thomson 60 Case carbon steel shafting is made of high quality specially developed alloy steel. When it comes to linear shafting no other manufacturers have set such high standards or specifications for the raw steel used in the production of linear shafting. The chemical properties of the steel are customized to provide consistent, homogenous microstructure and proper response to thermal processing. When you use Thomson 60 Case you can be confident you get consistent material from shaft to shaft.

## Case Hardness

All Thomson 60 Case is induction hardened and the hardness varies by material type. Thomson 60 Case carbon steel shaft is induction hardened to a 60 Rc min. The Thomson 440C "corrosion resistant" stainless steel shafting is hardened to a min. The 316 Thomson "corrosion proof" stainless steel is not hardened. The Thomson 52100 Tubular shafting is hardened to a 58 Rc min.

## Case Depth

The case depth on all Thomson 60 Case Shafting is precisely controlled for consistent quality and optimal performance. The extremely hard surface minimizes wear when acting as an inner race of a linear bearing, is resistant to seal lip wear, nicks and scratches for your application needs. The Thomson 60 Case standard case depth is, in some cases, double competitor shafting. This deeper standard case depth provides a stronger, more consistent homogenous microstructure for a linear bearing to run on leading to an increase in shaft life. For special applications Thomson offers deep case in carbon steel, where the case depth is two times the normal depth. For specific case depths refer to catalog datasheets.



# Introduction

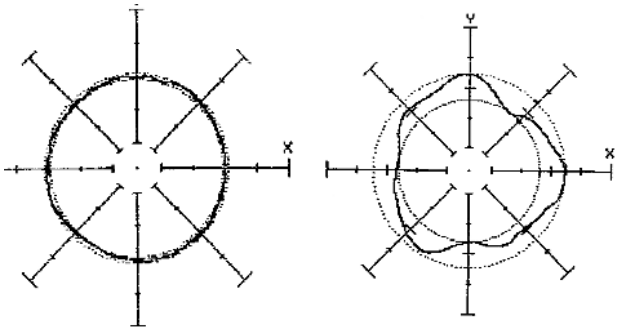
## Surface Finish

Surface is the key factor affecting travel life, load levels, frictional resistance, and smoothness of travel. Thomson 60 Case shafting is centerless ground for a consistent smooth and industry leading cataloged surface finish of 8 Ra max. Excellent surface finish and hardness maximize the efficiency and life of linear bearings, shaft riding seals, and overall visual appearance. When 8 Ra is not good enough we can provide 6 Ra surface finishes at an additional cost. Smoother equals longer bearing life.

## Roundness

Shaft roundness is vital for linear race applications such as spindles and guide rods where accuracy, life or precision is paramount. Roundness ensures uniform distribution of bearing loads for maximized bearing life, longer travel life and improved positional accuracy. Shafts that look round can be deceiving to the eye and anything but round when properly evaluated, using precision tracing techniques. Thomson 60 Case shaft roundness is within 0.000080" for Class L, S, D, M and .000050" for Class N. Our leading competitors don't catalog roundness and some are .0002". Rounder equals longer bearing life.

These two graphs taken from a roundness trace display the major roundness difference between Thomson 60 Case LinearRace shafting products and competitor shafting.



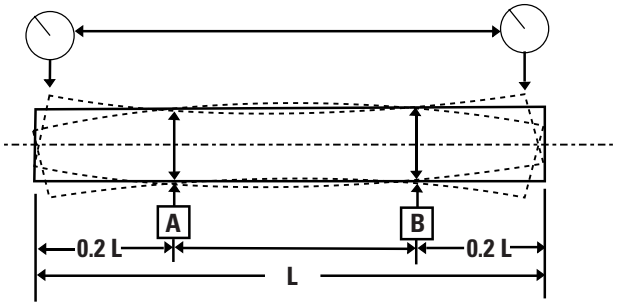

60 Case LinearRace  Competitor Shafting

## Straightness

Straightness is the most vital parameter to positioning accuracy for a linear ball bushing system. Thomson 60 Case shafts are straight within 0.001" per foot cumulative (TIR .002") when shipped from the factory. Handling or machining of shafting can cause the material to bend once they leave the factory. When straightness is critical let Thomson provide the special machined shaft; let us machine and straighten the shaft for you using our proprietary straightening and measurement techniques.

Our leading competitor does not catalog straightness. Straighter equals higher precision.

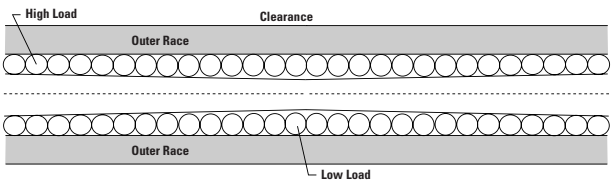
60 Case LinearRace shafting is inspected to ensure that it meets the highest quality standards. Standard straightness for all 60 Case LinearRace shafting is .001 inch per foot (25mm/300mm) cumulative .002 inch (50mm) TIR, with special straightness of .0005 inch per foot (12 mm/300mm) cumulative .001 inch (25mm) TIR available.




## Cylindricity

Cylindricity is a measure of the degree of conformance of the outside surface (diameter along the length of the shaft) to a true cylinder. True conformance (high cylindricity) ensures the benefits of roundness, diameter and straightness are present over the shaft length, or working surface, and not just in a particular location. This ensures uniform distribution of bearing loads, increases load capacity in the working area of the bearing, maximizes bearing life, and increases travel life. Taper is a component of cylindricity and all Thomson 60 Case shafts are produced with a maximum taper of 1/2 the diameter tolerance over the entire length of the shaft.

In linear bearing applications, taper found in competitor shafting can cause one portion of the linear bearing to be loaded higher than the other. This can cause dramatic reduction in travel life or load capacity. As taper increases, balls go in and out of preload causing premature wear and reduction in travel life.



# 60 Case Product Overview (continued)

## Length Tolerance

Thomson 60 Case shafting can be cut to your specified length. It will have a standard length tolerance of ±1/32" for diameters less than 2 inches and ± 1/16" for all larger diameters. Special length tolerances are available for an additional charge. All cut shafting is subject to a deburring process to remove sharp edges. The size of the standard chamfer is approximately 1/32" x 45 degrees for diameters less than 1" and 1/16" x 45 degrees for diameters 1" and larger. Special chamfer sizes can be provided for an additional charge.




## Predrilled and Tapped Holes

Thomson 60 Case shafting is stocked with radial holes drilled and tapped to accept a continuous shaft support rail in both carbon steel and 440 C stainless steel. Continuous support prevents shaft deflection when used to support heavy loads or for long travel lengths.

## Precision Special Machining

Thomson 60 Case can be supplied specially machined to your drawing and or application requirements. Leave your special machining needs to us. With over 50 years of experience, we can provide a high quality special machined shaft to your specifications allowing you to focus on your core competency. Fax us a detailed sketch or drawing and let our engineers provide you with a quotation. See page 187 for a sample of machining offered.

## Special Coatings

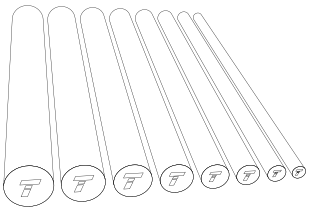
Thomson offers a variety of corrosion resistant products to meet the needs of specific corrosive environments. Thomson 60 Case is available as thin dense chrome plated with plain ends from stock or 100% chrome plated, black oxide, or Armoloy™ plated to name a few. Contact our application engineering team or see page 189 for more information.



## How does Thomson 60 Case compare to our leading competitor shafting?

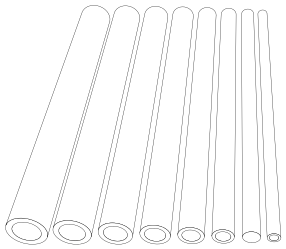
| | Thomson | Competitor 1 | Competitor 2 |
|---|---|---|---|
| **Materials** | Carbon Steel | Carbon Steel | Carbon Steel |
| | 440 C SS | 440 C SS | 440 C SS or equiv. |
| | 316 SS | | 52100 Tubular |
| | 52100 Tubular | | |
| **Tolerance Classes** | L, N, S, D, G, MM | L, S, MM | L, S, MM |
| **Case Depth** | .080" | .080" | .035" |
| **Surface Finish** | 8 Ra Max | 10-12 RMS | 12 RMS |
| **Roundness (L class)** | .000080" | not cataloged | .0002" |
| **Straightness** | .001"/foot | .001-.002"/foot .0012" | not cataloged |
| **Taper** | .0001" | not cataloged | .0004" |

# 60 Case LinearRace Shafting
## for End Supported Applications



**Solid 60 Case LinearRace Shafting Features:**

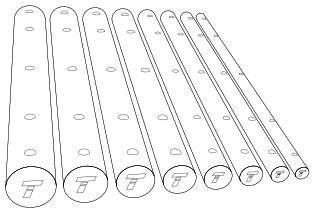
- Diameter range between 3/16 and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 60 HRC minimum.
- Surface finish 8 Ra microinch.
- Available in corrosion resistant 440C stainless steel (50 HRC minimum).
- Available with PrePlate* chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite* LinearRace Shafting Features:

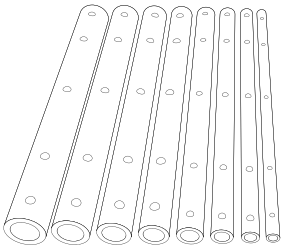
- Hollow inner diameter reduces weight and inertia.
- Diameter range between 3/4 and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58 HRC minimum.
- Surface finish 8 Ra microinch.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

# 60 Case LinearRace Shafting (PreDrilled)
## for Continuously Supported Applications



**Solid 60 Case LinearRace Shafting with Mounting Holes Features:**

- Radial drilled and tapped holes ready for immediate use with standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1/2 and 4 inches, special machining (SM) required over 2 inches.
- Surface finish 8 Ra microinch.
- Hardness 60 HRC minimum.
- Roundness 80 millionths of an inch.
- Available in corrosion resistant 440C stainless steel (50 HRC min).
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite LinearRace Shafting with Mounting Holes Features:

- Hollow design reduces weight and inertia.
- Can be supplied with radial drilled and tapped holes, ready for immediate use.
- Standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1 1/2 and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58 HRC minimum.
- Surface finish 8 Ra microinch.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

*Trademark of Thomson. THOMSON is registered in the U.S. Patent and Trademark Office and in other countries.

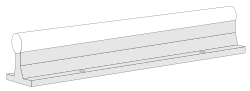
# 60 Case LinearRace Support Rails and Assemblies

## for Continuously Supported Applications



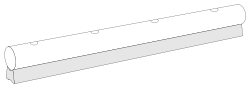
**LSR Low Profile 60 Case LinearRace Support Rail Features:**

- Diameter range between 1/2 and 4 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for custom hole spacing.
- Low Profile design.
- Unlimited travel lengths.



**SR 60 Case LinearRace Support Rail and SRA 60 Case LinearRace Support Rail Assembly Features:**

- Diameter range between 1/2 and 2 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for customized hole spacing.
- Available as a pre-engineered, ready to install assembly.
- Light weight, high strength aluminum alloy rail.
- Unlimited travel lengths.

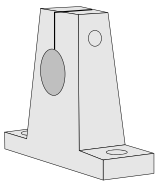


**LSRA Smart Rail* Assembly Features:**

- Diameter range between 5/8 and 1 1/2 inch.
- Bolt-down-from-the-top mounting.
- Single piece lengths up to 15 feet long.
- Low profile design.

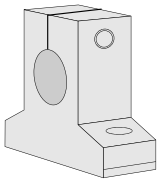
# 60 Case LinearRace Supports

## for End Supported Applications



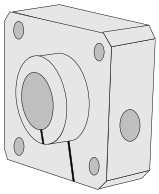
**SB 60 Case LinearRace Shafting End Support Block Features:**

- Size range between 1/4 and 2 inch.
- Easily secured with two mounting bolts.
- Malleable iron alloy for sizes 1/2 to 2 inch diameter.
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction for sizes 1/4 and 3/8 inch.



**ASB Low Profile 60 Case LinearRace Shafting End Support Block Features:**

- Size range between 1/4 and 1 1/2 inch.
- Low profile design.
- Easily secured with two mounting bolts.
- Protected by corrosion resistant anodized coating.
- Light weight, high strength aluminum alloy construction.



**FSB Flanged 60 Case LinearRace End Support Block Features:**

- Available in 1/2, 3/4, 1 and 1 1/4 inch diameters.
- Flanged mounting surface for easy assembly.
- Easily secured with four mounting bolts.
- Designed specifically for use with Super Smart Flanged Pillow Blocks
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction.

## Inch - 60 Case Shafting

# Hardened and Ground 60 Case Precision LinearRace Shafting

### Part Number Description

**1 L PD SS CTL**

**Nominal Shaft Diameter**

**Class Description**

| | |
|---|---|
| L | For use with XA, Open and Adjustable Ball Bushing bearings and Pillow Blocks as well as Super Ball Bushing bearings and Super Smart Ball Bushing bearings |
| S | For use with A type ball bushings |
| N | For use with needle roller bearings |
| D | For use with Thomson Die Set Ball Bushing bearings |
| XL | For use with XR bearing Soft (Carbon Steel) |
| G | Ball Groove Shafting for use with Thomson Super Ball bushing |

**Material**

| | |
|---|---|
| – | Carbon Steel |
| SS | 440 C Stainless Steel |
| TU | 52100 Tubular |
| SS316 | 316 Stainless Steel |

**Type**

| | |
|---|---|
| CTL | Cut to Length |
| RL | Random Length |
| RLL | Random Length Long |
| SM | Special Machined (see page 32) |

**Option**

| | |
|---|---|
| PD | Predrilled |
| CPPE | Chrome Plated Plain Ends (Carbon Steel Only) |
| DC | Deep Case (Carbon Steel Only - Random Length) |

CTL = Cut to length is Thomson 60 Case cut to your specified length.

RL = Random length is full bar or long length shafting. It is called random length because we start with a raw bar 4" to 6" longer than the min. usable but guarantee only the min. usable. We mark the ends of what is out of our own tolerance. This is the result of the manufacturing process and tightly controlled roundness specifications.

### Look for the Brand Logo




If you specify Thomson, look for the logo. Do not be fooled when ordering linear shafting. All Thomson 60 Case LinearRace shafting is etched with the Thomson logo as shown in the picture. If the shaft you have does not have the logo, it may not be a true Thomson 60 Case. Thomson 60 Case is etched approximately every 18 to 22 inches.

# Inch - 60 Case Shafting

## Solid Carbon Steel

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080" Class L and S / .000050" Class N
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Class L | | | Class S | | | Class N | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter To lerance (in) | Max. Length (in) | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 3/16" | 3/16 L | .1870<br>.1865 | 22 | – | – | – | – | – | – | .027 | .008 |
| 1/4" | 1/4 L | .2495<br>.2490 | 94 | 1/4 S | .2490<br>.2485 | 94 | 1/4 N | .2500<br>.2498 | 94 | .027 | .014 |
| 3/8" | 3/8 L | .3745<br>.3740 | 166 | 3/8 S | .3740<br>.3735 | 166 | 3/8 N | .3750<br>.3748 | 166 | .027 | .031 |
| 1/2" | 1/2 L | .4995<br>.4990 | 166 | 1/2 S | .4990<br>.4985 | 166 | 1/2 N | .5000<br>.4998 | 166 | .040 | .055 |
| 5/8" | 5/8 L | .6245<br>.6240 | 178 | 5/8 S | .6240<br>.6235 | 178 | 5/8 N | .6250<br>.6248 | 178 | .040 | .086 |
| 3/4" | 3/4 L | .7495<br>.7490 | 178/202 | 3/4 S | .7490<br>.7485 | 178 | 1/4 N | .7500<br>.7498 | 178 | .060 | .125 |
| 7/8" | 7/8 L | .8745<br>.8740 | 178 | – | –<br>– | – | 3/8 N | .8750<br>.8748 | 178 | .060 | .170 |
| 1" | 1 L | .9995<br>.9990 | 178/202 | 1 S | .9990<br>.9985 | 178 | 1/2 N | 1.0000<br>.9998 | 178 | .080 | .222 |
| 1 1/8" | 1 1/8 L | 1.1245<br>1.1240 | 178 | – | – | – | – | 1.1250<br>1.1248 | 178 | .080 | .281 |
| 1 1/4" | 1 1/4 L | 1.2495<br>1.2490 | 178/202 | 1 1/4 S | 1.2490<br>1.2485 | 178 | 1 1/4 N | 1.2500<br>1.2498 | 178 | .080 | .348 |
| 1 3/8" | 1 3/8 L | 1.3745<br>1.3740 | 178 | – | – | – | 1 3/8 N | 1.3750<br>1.3747 | 178 | .080 | .420 |
| 1 1/2" | 1 1/2 L | 1.4994<br>1.4989 | 178/202 | 1 1/2 S | 1.4989<br>1.4984 | 178 | 1 1/2 N | 1.5000<br>1.4997 | 178 | .080 | .500 |
| 1 5/8" | 1 5/8 L | 1.6245<br>1.6240 | 178 | – | – | – | 1 5/8 N | 1.6250<br>1.6247 | 178 | .080 | .587 |
| 1 3/4" | 1 3/4 L | 1.7495<br>1.7490 | 178 | – | – | – | 1 3/4 N | 1.7500<br>1.7497 | 178 | .100 | .681 |
| 2" | 2 L | 1.9994<br>1.9987 | 178/202 | 2 S | 1.9987<br>1.9980 | 178 | 2 N | 2.000<br>1.9997 | 178 | .100 | .890 |
| 2 1/4" | 2 1/4 L | 2.2494<br>2.2487 | 178/202 | – | –<br>– | – | 2 1/4 N | 2.2500<br>2.2497 | 178 | .100 | 1.153 |
| 2 1/2" | 2 1/2 L | 2.4993<br>2.4985 | 178/202 | 2 1/2 S | 2.4985<br>2.4977 | 178 | 2 1/2 N | 2.5000<br>2.4996 | 178 | .100 | 1.391 |
| 3" | 3 L | 2.9992<br>2.9983 | 178/202 | 3 S | 2.9983<br>2.9974 | 178 | 3 N | 3.0000<br>2.9996 | 178 | .100 | 2.003 |
| 3 1/2" | 3 1/2 L | 3.4990<br>3.4980 | 202 | – | – | – | – | – | – | .100 | 2.726 |
| 4" | 4 L | 3.9988<br>3.9976 | 202 | 4 S | 3.9976<br>3.9964 | 202 | – | | – | .100 | 3.560 |

Standard random length (RL) min usable length is 178", optional extra long random length (RLL) min usable length is 202"

## Solid Carbon Steel

Hardness: 60 ROCKWELL C Min.
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"
Roundness: .000080'' Class D and XL

| Nominal Diameter (in) | Class D | | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Surface Finish | Max. Length (in) | | |
| 1" | 1 D | 1.0003<br>1.0000 | 8 Ra Max. | 178 | .080 | .222 |
| 1 1/4" | 1 1/4 D | 1.2503<br>1.2500 | 8 Ra Max. | 178 | .080 | .348 |
| 1 1/2" | 1 1/2 D | 1.5003<br>1.5000 | 8 Ra Max. | 178 | .080 | .500 |
| 2" | 2 D | 2.0003<br>2.0000 | 8 Ra Max. | 178 | .100 | .890 |

| Nominal Diameter (in) | Class XL | | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Surface Finish | Max. Length (in) | | |
| 2" | 2 XL | 1.9994<br>1.9991 | 4-8 Ra Max. | 178 | .100 | .890 |
| 3" | 3 XL | 2.9992<br>2.9989 | 4-8 Ra Max. | 178 | .100 | 2.003 |
| 4" | 4 XL | 3.9988<br>3.9983 | 6-10 Ra Max. | 202 | .100 | 3.560 |

# Inch - 60 Case Shafting

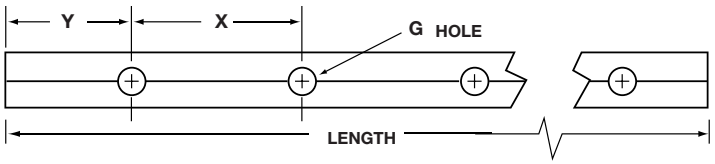
## Standard Options for Carbon Steel Shafting
## Chrome Plated Ends (CPPE), Predrilled (PD), Predrilled Chrome Plated Plain Ends (PDCPPE), Solid Steel

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Chrome Plated Plain Ends | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|
| | Part Number | Tolerance Class L | Max. Length (in) | | |
| 1/2" | 1/2 L CPPE | .4995<br>.4990 | 166 | .040 | .055 |
| 5/8" | 5/8 L CPPE | .6245<br>.6240 | 178 | .040 | .086 |
| 3/4" | 3/4 L CPPE | .7495<br>.7490 | 178 | .060 | .125 |
| 1" | 1 L CPPE | .9995<br>.9990 | 178 | .080 | .222 |
| 1 1/4" | 1 1/4 L CPPE | 1.2495<br>1.2490 | 178 | .080 | .348 |
| 1 1/2" | 1 1/2 L CPPE | 1.4994<br>1.4989 | 178 | .080 | .500 |
| 2" | 2 L CPPE | 1.9994<br>1.9987 | 178 | .100 | .890 |

CPPE - Chrome Plated Plain Ends which means ends and chamfers are not plated.

Completely plated chamfers are available as a special machine part. See page 32.




| Nominal Diameter (in) | Predrilled | | Predrilled Chrome Plated | | Hole Spacing | | G Standard Thread Size | Length Tolerance (in) | Max. Length (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Part Number Predrilled | L PD Tolerance Class | Part Number Predrilled Chrome Plated Ends | L PD Tolerance Class | X (inch +/- 1/64) (noncumulative) | Standard Y (in) | | | | | |
| 1/2" | 1/2 L PD | .4995<br>.4990 | 1/2 L PDCPPE | .4995<br>.4990 | 4 | 2 | #6-32 | +/- 1/32 | 166 | .040 | .055 |
| 5/8" | 5/8 L PD | .6245<br>.6240 | 5/8 L PDCPPE | .6245<br>.6240 | 4 | 2 | #8-32 | +/- 1/32 | 178 | .040 | .086 |
| 3/4" | 3/4 L PD | .7495<br>.7490 | 3/4 L PDCPPE | .7495<br>.7490 | 6 | 3 | #10-32 | +/- 1/32 | 178 | .060 | .125 |
| 1" | 1 L PD | .9995<br>.9990 | 1 L PDCPPE | .9995<br>.9990 | 6 | 3 | 1/4-20 | +/- 1/32 | 178 | .080 | .222 |
| 1 1/4" | 1 1/4 L PD | 1.2495<br>1.2490 | 1 1/4 L PDCPPE | 1.2495<br>1.2490 | 6 | 3 | 5/16-18 | +/- 1/32 | 178 | .080 | .348 |
| 1 1/2" | 1 1/2 L PD | 1.4994<br>1.4989 | 1 1/2 L PDCPPE | 1.4994<br>1.4989 | 8 | 4 | 3/8-16 | +/- 1/32 | 178 | .080 | .500 |
| 2" | 2 L PD | 1.9994<br>1.9987 | 2 L PDCPPE | 1.9994<br>1.9987 | 8 | 4 | 1/2-13 | +/- 1/16 | 178 | .100 | .890 |

Holes are drilled and tapped to the center of the shaft. Different 'Y' dimensions are available upon request. Please specify when ordering. Chrome plating is thin, dense chrome with an average thickness of .0005".

## Inch - 60 Case Shafting

### Solid Steel Deep Case - Available in Random Length Only

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080" Class L and S / .000050" Class N
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Class L Deep Case | | | Class N Deep Case | | | Min. Hardness SS Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 3/4" | 3/4 L DC | .7495<br>.7490 | 178/202 | 3/4 N DC | .7500<br>.7498 | 178 | .120 | .125 |
| 7/8" | 7/8 L DC | .8745<br>.8740 | 178 | 7/8 N DC | .8750<br>.8748 | 178 | .120 | .170 |
| 1" | 1 L DC | .9995<br>.9990 | 178/202 | 1 N DC | 1.0000<br>.9998 | 178 | .160 | .222 |
| 1 1/8" | 1 1/8 L DC | 1.1245<br>1.1240 | 178 | 1 1/8 N DC | 1.1250<br>1.1248 | 178 | .160 | .281 |
| 1 1/4" | 1 1/4 L DC | 1.2495<br>1.2490 | 178/202 | 1 1/4 N DC | 1.2500<br>1.2498 | 178 | .180 | .348 |
| 1 1/2" | 1 1/2 L DC | 1.4994<br>1.4989 | 178/202 | 1 1/2 N DC | 1.5000<br>1.4997 | 178 | .180 | .500 |
| 1 3/4" | 1 3/4 L DC | 1.7495<br>1.7490 | 178 | 1 3/4 N DC | 1.7500<br>1.7497 | 178 | .250 | .681 |
| 2" | 2 L DC | 1.9994<br>1.9987 | 178/202 | 2 N DC | 2.0000<br>1.9997 | 178 | .250 | .890 |
| 2 1/4" | 2 1/4 L DC | 2.2494<br>2.2487 | 202 | 2 1/4 N DC | 2.2500<br>2.2497 | 178 | .250 | 1.153 |
| 2 1/2" | 2 1/2 L DC | 2.4993<br>2.4985 | 178/202 | 2 1/2 N DC | 2.5000<br>2.4996 | 178 | .250 | 1.391 |
| 3" | 3 L DC | 2.9992<br>2.9983 | 178/202 | 3 N DC | 3.0000<br>2.9996 | 178 | .250 | 2.003 |
| 3 1/2" | 3 1/2 L DC | 3.4990<br>3.4980 | 202 | – | – | – | .250 | 2.726 |

Standard random length (RL) min usable length is 178", optional extra long random length (RLL) min usable length is 202"

### Ball Groove LinearRace Shaft - Solid Carbon Steel

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"
Straightness: Shaft Groove .002" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Class G | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 1/4" | 1/4 G | .2495<br>.2490 | 45 | .027 | .014 |
| 3/8" | 3/8 G | .3745<br>.3740 | 45 | .027 | .031 |
| 1/2" | 1/2 G | .4995<br>.4990 | 45 | .040 | .055 |
| 5/8" | 5/8 G | .6245<br>.6240 | 45 | .040 | .086 |
| 3/4" | 3/4 G | .7495<br>.7490 | 45 | .060 | .125 |
| 1" | 1 G | .9995<br>.9990 | 45 | .080 | .222 |

# Inch - 60 Case Shafting

## 440C Stainless Steel

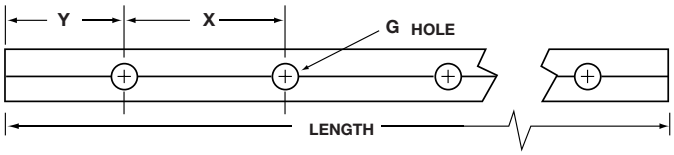
Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Class L | | | Class S | | | Min. Hardness SS Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 1/4" | 1/4 L SS | .2495<br>.2490 | 54 | 1/4 S SS | .2490<br>.2485 | 54 | .027 | .014 |
| 3/8" | 3/8 L SS | .3745<br>.3740 | 166 | 3/8 S SS | .3740<br>.3735 | 166 | .027 | .031 |
| 1/2" | 1/2 L SS | .4995<br>.4990 | 166 | 1/2 S SS | .4990<br>.4985 | 166 | .040 | .055 |
| 5/8" | 5/8 L SS | .6245<br>.6240 | 178 | 5/8 S SS | .6240<br>.6235 | 178 | .040 | .086 |
| 3/4" | 3/4 L SS | .7495<br>.7490 | 178 | 3/4 S SS | .7490<br>.7485 | 178 | .060 | .125 |
| 1" | 1 L SS | .9995<br>.9990 | 178 | 1 S SS | .9990<br>.9985 | 178 | .080 | .222 |
| 1 1/4" | 1 1/4 L SS | 1.2495<br>1.2490 | 178 | 1 1/4 S SS | 1.2490<br>1.2485 | 178 | .080 | .348 |
| 1 1/2" | 1 1/2 L SS | 1.4994<br>1.4989 | 178 | 1 1/2 S SS | 1.4989<br>1.4984 | 178 | .080 | .500 |
| 2" | 2 L SS | 1.9994<br>1.9987 | 178 | 2 S SS | 1.9987<br>1.9980 | 178 | .100 | .890 |
| 2 1/2" | 2 1/2 L SS | 2.4993<br>2.4985 | 178 | 2 1/2 S SS | 2.4985<br>2.4977 | 178 | .100 | 1.391 |

440C stainless is "corrosion resistant"; it contains some carbon which allows for hardening. Carbon can result in corrosion over time.

## Standard Options for 440C Stainless Steel Predrilled (PD)

Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative (.002" TIR)
Roundness: .000080"
Taper: .0001"




| Nominal Diameter (in) | Predrilled | | Hole Spacing | | G Standard Thread Size | Length Tolerance (in) | Max. Length (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|---|
| | Part Number Predrilled | L PD Tolerance Class | X (inch +/- 1/64) (noncumulative) | Standard Y (in) | | | | | |
| 1/2" | 1/2 L PD SS | .4995<br>.4990 | 4 | 2 | #6-32 | +/- 1/32 | 166 | .040 | .055 |
| 5/8" | 5/8 L PD SS | .6245<br>.6240 | 4 | 2 | #8-32 | +/- 1/32 | 178 | .040 | .086 |
| 3/4" | 3/4 L PD SS | .7495<br>.7490 | 6 | 3 | #10-32 | +/- 1/32 | 178 | .060 | .125 |
| 1" | 1 L PD SS | .9995<br>.9990 | 6 | 3 | 1/4-20 | +/- 1/32 | 178 | .080 | .222 |
| 1 1/4" | 1 1/4 L PD SS | 1.2495<br>1.2490 | 6 | 3 | 5/16-18 | +/- 1/32 | 178 | .080 | .348 |
| 1 1/2" | 1 1/2 L PD SS | 1.4994<br>1.4989 | 8 | 4 | 3/8-16 | +/- 1/32 | 178 | .080 | .500 |
| 2" | 2 L PD SS | 1.9994<br>1.9987 | 8 | 4 | 1/2-13 | +/- 1/16 | 178 | .100 | .890 |

Holes are drilled and tapped to the center of the shaft. Different 'Y' dimensions are available upon request. Please specify when ordering.

# Inch - 60 Case Shafting

## Ball Groove LinearRace Shaft - 440C Stainless Steel

Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: Shaft Groove .002" Per Foot Cumulative
Roundness: .000080"
Taper: .0001"

| Nominal Diameter (in) | Class G | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 1/4" | 1/4 G SS | .2495<br>.2490 | 45 | .027 | .014 |
| 3/8" | 3/8 G SS | .3745<br>.3740 | 45 | .027 | .031 |
| 1/2" | 1/2 G SS | .4995<br>.4990 | 45 | .040 | .055 |
| 5/8" | 5/8 G SS | .6245<br>.6240 | 45 | .040 | .086 |
| 3/4" | 3/4 G SS | .7495<br>.7490 | 45 | .060 | .125 |
| 1" | 1 G SS | .9995<br>.9990 | 45 | .080 | .222 |

## Instrument 440C Stainless Steel LinearRace shafting for use with Thomson Instrument Ball bushing bearings

Hardness: 55 ROCKWELL C Min.
Surface Finish: 4 Ra Max
Roundness: .000080"
Straightness: .001" Per Inch Cumulative
Taper: .0001"

| Nominal Diameter (in) | INST Class | | | Max. Length (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | | |
| 1/8" | 1/8 INST | .1248<br>.1247 | +/- .005 | 12 | .027 | .004 |
| 3/16" | 3/16 INST | .1873<br>.1872 | +/- .005 | 12 | .027 | .008 |
| 1/4" | 1/4 INST | .2498<br>.2497 | +/- .005 | 12 | .027 | .014 |

## 52100 Tubular

Hardness: 58 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative (.002" TIR)
Roundness: .000080" Class L and S
Taper: .0001"

| Nominal Diameter (in) | Nominal I.D. (in) | Class L | | | Class S | | | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|---|
| | | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | | |
| 3/4" | .438<br>+/- 5% | 3/4 L TU | .7495<br>.7490 | 142 | 3/4 S TU | .7490<br>.7485 | 142 | .060 | .0754 |
| 1" | .599<br>+/- 5% | 1 L TU | .9995<br>.9990 | 173 | 1 S TU | .9990<br>.9985 | 173 | .080 | .158 |
| 1 1/2" | .890<br>+/- 5% | 1 1/2 L TU | 1.4994<br>1.4989 | 173 | 1 1/2 S TU | 1.4989<br>1.4984 | 173 | .080 | .328 |
| 2" | 1.250<br>+/- 5% | 2 L TU | 1.9994<br>1.9987 | 173 | 2 S TU | 1.9987<br>1.9980 | 173 | .100 | .542 |
| 2 1/2" | 1.750<br>+/- 5% | 2 1/2 L TU | 2.4993<br>2.4985 | 173 | 2 1/2 S TU | 2.4985<br>2.4977 | 173 | .100 | .749 |
| 3" | 2.000<br>+/- 10% | 3 L TU | 2.9992<br>2.9983 | 173 | 3 S TU | 2.9983<br>2.9974 | 173 | .100 | 1.112 |
| 4" | 3.000<br>+/- 10% | 4 L TU | 3.9988<br>3.9976 | 173 | 4 S TU | 3.9976<br>3.9964 | 173 | .100 | 1.558 |

# Inch - 60 Case Shafting

## 316 Stainless Steel

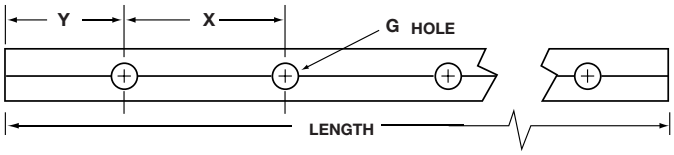
Hardness: 20-25 ROCKWELL C Min.
Roundness: .000080"
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"

| Nominal Diameter (in) | Class L | | | Weight Per Inch (lb) |
|---|---|---|---|---|
| | Basic Part Number | Diameter Tolerance (in) | Max. Length (in) | |
| 1/4" | 1/4 L SS316 | .2495<br>.2490 | 94 | .014 |
| 3/8" | 3/8 L SS316 | .3745<br>.3740 | 166 | .031 |
| 1/2" | 1/2 L SS316 | .4995<br>.4990 | 166 | .055 |
| 5/8" | 5/8 L SS316 | .6245<br>.6240 | 178 | .086 |
| 3/4" | 3/4 L SS316 | .7495<br>.7490 | 178 | .125 |
| 1" | 1 L SS316 | .9995<br>.9990 | 178 | .222 |
| 1 1/4" | 1 1/4 L SS316 | 1.2495<br>1.2490 | 178 | .348 |
| 1 1/2" | 1 1/2 L SS316 | 1.4994<br>1.4989 | 178 | .500 |
| 2" | 2 L SS316 | 1.9994<br>1.9987 | 178 | .890 |

316 Stainless Steel is corrosion proof steel and has no carbon content which will result in corrosion.

## Standard Options for 316 Stainless Steel Predrilled (PD)

Hardness: 20-25 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"
Straightness: .001" Per Foot Cumulative (.002" TIR)
Taper: .0001"




| Nominal Diameter (in) | Predrilled | | Hole Spacing | | G Standard Thread Size | Length Tolerance (in) | Max. Length (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|---|
| | Part Number Predrilled | L PD Tolerance Class | X (inch +/- 1/64) (noncumulative) | Standard Y (in) | | | | |
| 1/2" | 1/2 L SS316PD | .4995<br>.4990 | 4 | 2 | #6-32 | +/- 1/32 | 166 | .055 |
| 5/8" | 5/8 L SS316PD | .6245<br>.6240 | 4 | 2 | #8-32 | +/- 1/32 | 178 | .086 |
| 3/4" | 3/4 L SS316PD | .7495<br>.7490 | 6 | 3 | #10-32 | +/- 1/32 | 178 | .125 |
| 1" | 1 L SS316PD | .9995<br>.9990 | 6 | 3 | 1/4-20 | +/- 1/32 | 178 | .222 |
| 1 1/4" | 1 1/4 SS316PD | 1.2495<br>1.2490 | 6 | 3 | 5/16-18 | +/- 1/32 | 178 | .348 |
| 1 1/2" | 1 1/2 SS316PD | 1.4994<br>1.4989 | 8 | 4 | 3/8-16 | +/- 1/32 | 178 | .500 |
| 2" | 2 L SS316PD | 1.9994<br>1.9987 | 8 | 4 | 1/2-13 | +/- 1/16 | 178 | .890 |

Holes are drilled and tapped to the center of the shaft. Different 'Y' dimensions are available upon request. Please specify when ordering.

# Support Rails and Assemblies for Continuously Supported Applications

## Part Number Description

**SR 16 PD CTL**

| Type | Description |
|---|---|
| SR | Aluminum Support Rail |
| LSR | Low Profile Steel Support Rail |
| XSR | Extra Rigid Support Rail |

| Type | Description |
|---|---|
| – | Without PreDrilled Holes |
| PD | PreDrilled Holes |

**SRA 16 SS CTL**

| Type | Description |
|---|---|
| SRA | Aluminum Support Rail Assembly |
| LSRA | Low Profile Steel Support Rail Assembly |
| XSRA | Extra Rigid Support Rail Assembly |

| Size | Nominal Diameter |
|---|---|
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |
| 40 | 2.500 (LSR only) |
| 48 | 3.000 (LSR only) |
| 64 | 4.000 (LSR only) |

| Type | Description |
|---|---|
| – | Standard Assembly |
| SS | With 440C Stainless Steel Shafting |
| TU | With 52100 Tubular Lite shafting |
| CP | With PrePlate Chrome Shafting |
| CR | LSRA Corrosion Resistant with 440C Stainless Steel |

| Type | Description |
|---|---|
| CTL | Cut to Length |
| SM | Special Machined |

# Inch - Support Rails and Support Rail Assemblies

## Shaft Rail Supports Type SR & SR-PD

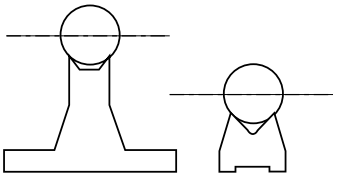
**The low cost way of mounting Thomson 60 Case Shafts**

Shaft supports simplify mounting of Thomson 60 Case shafts. Users of Thomson 60 Case shafting should carefully consider the use of these low cost shaft supports. They are standard, available from stock, and simplify shaft mounting. In addition to other benefits, they eliminate many problems encountered in designing and manufacturing shaft supporting devices. These versatile mounts can be used horizontally or vertically, and in many different arrangements. Shaft support rails are available without pre-drilled holes (SR) or pre-drilled (SR-PD) shaft rails to support 1/2 inch through 2 inch diameter shafts are available in standard 24, 48 and 72 inch lengths. Where shorter lengths are needed, rails are easily cut to length. For longer shafts they can be mounted end to end, using shims or grout, if necessary, to compensate for slight variation within manufacturing tolerance. Thomson offers shaft support rails with pre-drilled holes to simplify shaft mounting.

## Low Shaft Support Rails Type LSR & LSR-PD

**For compact designs**

Low Shaft Rails allow the design of more compact linear motion systems. The height from the base to the mean shaft center ranges from 9/16 inch for supporting a 1/2 inch diameter shaft to a maximum 3 1/2 inches when supporting a 4 inch diameter shaft – 40% lower than standard support rails. Low Shaft Rails are made of steel to maintain optimum shaft rigidity. Either continuous or intermittent support is possible when using Thomson open-type linear ball bearings. Low Shaft Rails are furnished in standard 4-foot lengths. Where shorter lengths are required, rails can easily be cut. For supporting longer shafts, rails can be mounted end-to-end without limit. Low Shaft Rails are available without pre-drilled mounting holes (LSR) or with pre-drilled mounting holes (LSR-PD) to match Thomson drilled and tapped shafts (PD). When using LSR-PD, the attachment bolts are underneath, so you must have access under your machine base plate. The LSRA assemblies highlighted below utilize attachment bolts from above. If one of the standard pre-drilled Low Shaft Rails is not appropriate for your design needs, Low Shaft Rails can be custom drilled by Thomson to your specifications. Send a print with all required dimensions, tolerances, and quantities needed to our application engineering team.

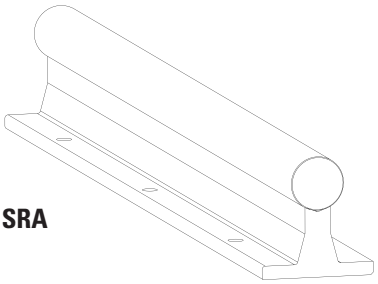


**SR** **LSR**

## Extra-Rigid Shaft Support Rails

**For XR Ball Bushing bearing systems**

Extra-rigid shaft support rails (XSR) are designed specifically for use with our extra-rigid Series XR Ball Bushing bearings. XSR support rails are available in nominal 24 inch lengths and are made of ductile iron and powder expoxy coated to provide the most deflection-resistant shaft support of all Thomson supports. To facilitate quick and easy installation, each extra-rigid shaft support is drilled and counter-bored for securing a drilled and tapped shaft into it and for bolting it to a flat, rigid base. For supporting long shafts, XSR support rails can be mounted end-to-end.



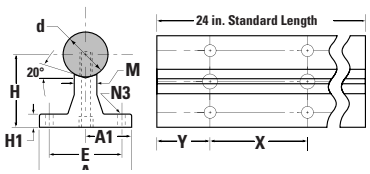
**SRA**

## Pre-Assembled Shaft Rail Assemblies Type SRA & LSRA

Thomson 60 Case steel shafts mounted on shaft support rails are now available for instant bolt-down installation. Assemblies are supplied cut to any length, with no limit on the overall length (long lengths are butt jointed together unless specified otherwise). Either solid or light-weight tubular shafting can be assembled to the standard Thomson support rails, which come with base mounting holes spaced evenly along the overall length of the assembly. The LSRA uses a special shaft unlike the LSR-PD. The attachment bolts for the LSRA are from the top down so you can easily mount into a machine base plate. The LSRA bolt pattern closely matches Profile Rail Linear Guides and can easily be used as a drop-in substitute to replace linear guides (ensure you review loading requirements). Corrosion resistant lower support rail assemblies (LSRA) are available. The support is zinc plated and shaft is 440C.

# Support Rails and Assemblies for Continuously Supported Applications

## Type SR/SR-PD 60 Case LinearRace Support Rails and Assemblies (Dimensions in inches)

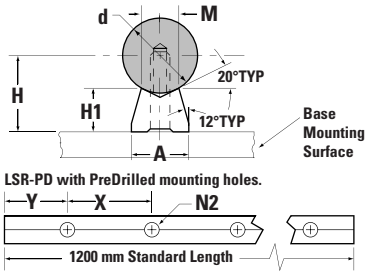



Material: Aluminum Alloy
(Longer Lengths are Available)

| SR Without Holes | SR-PD With PreDrilled Holes | Nominal LinearRace Diameter d | H ±.002 | H1 | A | A1 | E | M | N3 | | LinearRace Mounting Bolt N1 (PD only) | X | Y | Weight lb/ft |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Hole | Bolt | | | | |
| SR-8 | SR-8-PD | .500 | 1.125 | .19 | 1.50 | .750 | 1.00 | .25 | .17 | #6 | #6-32 x .88 | 4 | 2 | .60 |
| SR-10 | SR-10-PD | .625 | 1.125 | .25 | 1.63 | .813 | 1.13 | .31 | .19 | #8 | #8-32 x .88 | 4 | 2 | .80 |
| SR-12 | SR-12-PD | .750 | 1.500 | .25 | 1.75 | .875 | 1.25 | .38 | .22 | #10 | #10-32 x 1.25 | 6 | 3 | 1.00 |
| SR-16 | SR-16-PD | 1.000 | 1.750 | .25 | 2.13 | 1.063 | 1.50 | .50 | .28 | 1/4 | 1/4-20 x 1.5 | 6 | 3 | 1.40 |
| SR-20 | SR-20-PD | 1.250 | 2.125 | .31 | 2.50 | 1.250 | 1.88 | .56 | .34 | 5/16 | 5/16-18 x 1.75 | 6 | 3 | 2.10 |
| SR-24 | SR-24-PD | 1.500 | 2.500 | .38 | 3.00 | 1.500 | 2.25 | .69 | .34 | 5/16 | 3/8-16 x 1.75 | 8 | 4 | 2.60 |
| SR-32 | SR-32-PD | 2.000 | 3.250 | .50 | 3.75 | 2.750 | 2.75 | .88 | .406 | 3/8 | 1/2-13 x 2.50 | 8 | 4 | 4.20 |

N1 Hole Dia. includes counterbore for socket head cap screw. Alignment and location of holes are are ± .010, noncumulative.

## Type LSR and LSR-PD 60 Case LinearRace Support Rails (Dimensions in inches)



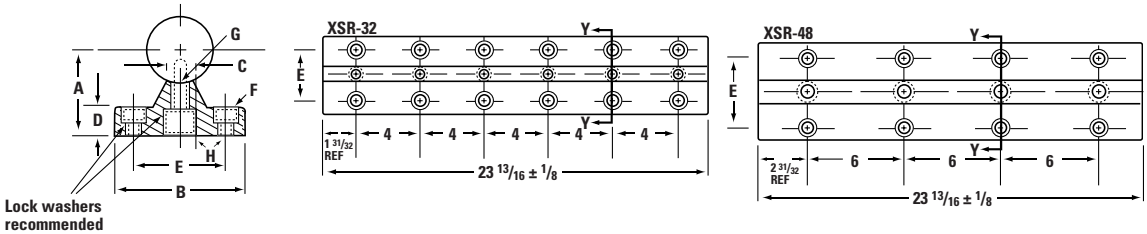

Material: Steel Alloy
(Longer Lengths are Available)

| LSR Standard Without Holes | LSR-PD Standard w/PreDrilled Holes | Nominal LinearRace Diameter d | H ±.002 | H1 | A | M | N2 | N1 | X | Y | Weight lb/ft |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Hole | Bolt | | | |
| LSR-8 | LSR-8-PD | .500 | .562 | .34 | .37 | .25 | .17 | #6-32 | 4 | 2 | .32 |
| LSR-10 | LSR-10-PD | .625 | .687 | .41 | .45 | .31 | .19 | #8-32 | 4 | 2 | .49 |
| LSR-12 | LSR-12-PD | .750 | .750 | .42 | .51 | .38 | .22 | #10-32 | 6 | 3 | .59 |
| LSR-16 | LSR-16-PD | 1.000 | 1.000 | .56 | .69 | .50 | .28 | 1/4-20 | 6 | 3 | 1.01 |
| LSR-20 | LSR-20-PD | 1.250 | 1.187 | .63 | .78 | .56 | .34 | 5/16-18 | 6 | 3 | 1.27 |
| LSR-24 | LSR-24-PD | 1.500 | 1.375 | .70 | .93 | .69 | .41 | 3/8-16 | 8 | 4 | 1.68 |
| LSR-32 | LSR-32-PD | 2.000 | 1.750 | .845 | 1.180 | .875 | .531 | 1/2-13 | 8 | 4 | 2.59 |
| LSR-40 | LSR-40-PD | 2.500 | 2.250 | 1.125 | 1.500 | 1.125 | .687 | 5/8-11 | 8 | 4 | 4.48 |
| LSR-48 | LSR-48-PD | 3.000 | 2.750 | 1.404 | 1.875 | 1.375 | .812 | 3/4-10 | 8 | 4 | 6.68 |
| LSR-64 | LSR-64-PD | 4.000 | 3.500 | 1.750 | 2.500 | 1.875 | 1.060 | 1-8 | 8 | 4 | 11.8 |

## Type XSR Shaft Support Rails (Dimensions in inches)

| Part Number | Nominal Shaft Diameter | A† +.000/-.001 | B | C | D | E | Screw Diameter | F | C Bore | Recommended Screw | G | C Bore | H | Weight lb/ft |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hole | | | Hole | | Degrees | |
| XSR-32 | 2 | 2.750 | 4-1/2 | 7/8 | 1 | 3-1/8 | 1/2 | 9/16 | 1 x 5/8 DP | 1/2-13 x 2 | 9/16 | 1 x 3/4 DP | 15 | 16 |
| XSR-48 | 3 | 4.000 | 6 | 1-1/4 | 1-5/16 | 4-1/4 | 5/8 | 11/16 | 1 1/4 x 3/4 DP | 3/4-10 x 2-3/4 | 13/16 | 1 7/16 x 1 1/8 DP | 25 | 31 |

† Centerline of shaft will be parallel to base within .0005.
Surface dimensions as cast

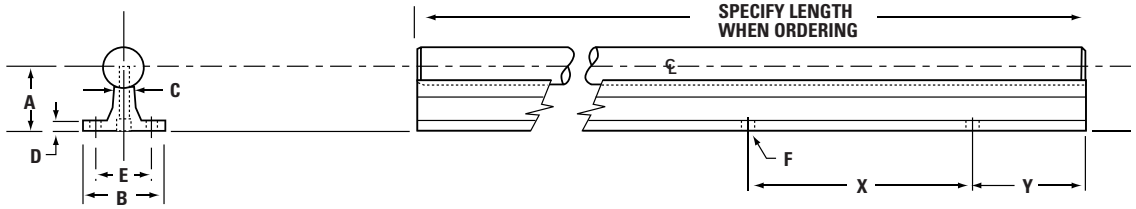


# Inch - Support Rails and Support Rail Assemblies

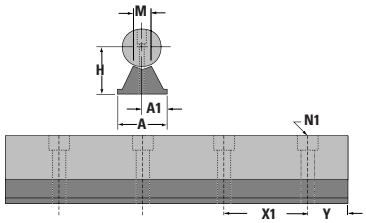
## Standard Shaft Rail Assemblies (Dimensions in inches)

| Assembly Number | | | Nominal Linear Bearning Race Dia. | Dimensions | | | | | | | Base Holes | | Weight lb/ft | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Solid Carbon Steel Shaft | With Solid Stainless Steel Shaft | With Tubular 52100 | | A ±.002 | B | C | D | E | F | | X | Y | SRA and SRA-SS | SRA-TU |
| | | | | | | | | | Bolt | Hole | | | | |
| SRA-8 | SRA-8-SS | – | 1/2 | 1.125 | 1 1/2 | 1/4 | 3/16 | 1 | #6 | .169 | 4 | 2 | 1.26 | – |
| SRA-10 | SRA-10-SS | – | 5/8 | 1.125 | 1 5/8 | 5/16 | 1/4 | 1 1/8 | #8 | .193 | 4 | 2 | 1.83 | – |
| SRA-12 | SRA-12-SS | SRA-12-TU | 3/4 | 1.500 | 1 3/4 | 3/8 | 1/4 | 1 1/4 | #10 | .221 | 6 | 3 | 2.50 | 1.90 |
| SRA-16 | SRA-16-SS | SRA-16-TU | 1 | 1.750 | 2 1/8 | 1/2 | 1/4 | 1 1/2 | 1/4 | .281 | 6 | 3 | 4.06 | 3.30 |
| SRA-20 | SRA-20-SS | – | 1 1/4 | 2.125 | 2 1/2 | 9/16 | 5/16 | 1 7/8 | 5/16 | .343 | 6 | 3 | 6.28 | – |
| SRA-24 | SRA-24-SS | SRA-24-TU | 1 1/2 | 2.500 | 3 | 11/16 | 3/8 | 2 1/4 | 5/16 | .343 | 8 | 4 | 8.60 | 6.54 |
| SRA-32 | SRA-32-SS | SRA-32-TU | 2 | 3.250 | 3 3/4 | 7/8 | 1/2 | 2 3/4 | 3/8 | .406 | 8 | 4 | 14.88 | 10.70 |

Support Rail Material: Aluminum alloy extrusion. Base mounting hole locations are within ±.010 (noncumulative).
Notes: Lengths longer than 48" will use end to end support rails.




## Type LSRA 60 Case Smart Rail Guides (Dimensions in inches)




(Bolt down from top)
Material: Steel Alloy (Longer Lengths are Available)

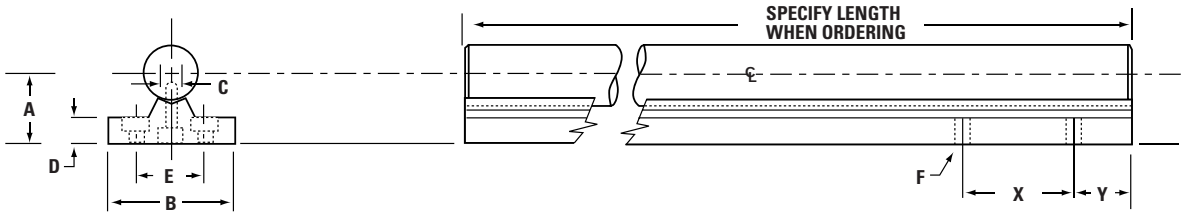
| Part Number (3) | | LinearRace Shafting Diameter | H ±.002 | A | A1 | M | Mounting Holes | | Weight lb/ft |
|---|---|---|---|---|---|---|---|---|---|
| Smart Rail Assembly (1) | Smart Rail Assembly (2) | | | | | | X1 | N1 | |
| LSRA10 | LSRA10 CR | .625 | .687 | .45 | .225 | .31 | 2 | #5 | 1.57 |
| LSRA12 | LSRA12 CR | .750 | .750 | .51 | .255 | .38 | 3 | #6 | 2.09 |
| LSRA16 | LSRA16 CR | 1.000 | 1.000 | .69 | .345 | .5 | 3 | #10 | 3.67 |
| LSRA20 | LSRA20 CR | 1.250 | 1.187 | .78 | .390 | .56 | 3 | 5/16 | 5.86 |
| LSRA24 | LSRA24 CR | 1.500 | 1.375 | .93 | .465 | .69 | 4 | 3/8 | 7.68 |

(1) Consists of black oxide steel rail and high carbon steel LinearRace shafting (HRC 60 min.).
(2) Consists of zinc plated steel rail and 440C stainless steel LinearRace shafting (HRC 50 min.).
(3) Specify length of assembly when ordering. For example, LSRA12CR x 24.00 inches.
Y dimension is equal on each end unless specified by customer.
NOTE: LSRAs do not use standard "PD" shafting. The shafting requires a different hole pattern and configuration.

## XSRA Extra Rigid Shaft Rail Assemblies (Dimensions in inches)

| Assembly Number | | LinearRace Shafting Diameter | Dimensions | | | | | | | | Base Holes | | Weight lb/ft | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Solid Carbon Steel Shaft | With Tubular Carbon Steel Shaft | | A +.000/-.001 | B | C | D | E | F | | | X | Y | XSRA | XSRA-TU |
| | | | | | | | | Screw Dia. | Hole | C Bore | | | | |
| XSRA-32 | XSRA-32-TU | 2 | 2.750 | 4 1/2 | 7/8 | 1 | 3 1/8 | 1/2 | 9/16 | 1 x 5/8 DP | 4 | 1 31/32 | 40.04 | 22.50 |
| XSRA-48 | XSRA-48-TU | 3 | 4.000 | 6 | 1 1/4 | 1 5/16 | 4 1/4 | 5/8 | 11/16 | 1 1/4 x 3/4 DP | 6 | 2 31/32 | 73.72 | 49.70 |

Note: Lengths longer than 24" will use end to end support rails.



# Support Blocks for End Supported Applications

## Part Number Description

**ASB 16**

| Type | Description |
|---|---|
| ASB | Low Profile 60 Case LinearRace End Support Block |
| SB | Standard 60 Case LinearRace End Support Block |
| FSB | Flanged 60 Case LinearRace End Support Block |
| WM | Waymount Support |

| Size | Nominal Diameter |
|---|---|
| 4 | .250 |
| 6 | .375 |
| 8 | .500 |
| 10 | .625 |
| 12 | .750 |
| 16 | 1.000 |
| 20 | 1.250 |
| 24 | 1.500 |
| 32 | 2.000 |
| 48 | 3.000 |
| 64 | 4.000 |

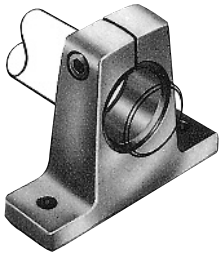
All sizes are not available for all support block types.
See specific product charts for size availability.

# Inch - Support Blocks

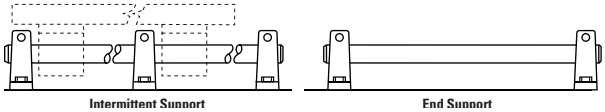
## Shaft Support Blocks – Type ASB and SB

**For end support or intermittent support**

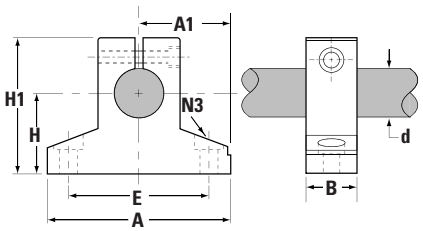
Shaft support blocks are used for end or intermittent support where loads are light and deflection between supports is not a problem. Unlike shaft support rails, blocks do not permit longitudinal passage of open-type Ball Bushing bearings. Type SB shaft support blocks enable clamping of shafts and eliminate the need for bolts, etc. to maintain shaft position. Shimming is suggested for high precision applications to eliminate the effect of variations in surface of base or manufacturing tolerances between supports.



Type ASB shaft blocks, manufactured from high strength extruded aluminum, provide either end or intermittent support in applications where loads are designed with a reference edge on one side of the base. This provides a surface parallel to the center of the shaft within ±.001" that can be used to simplify shaft alignment.



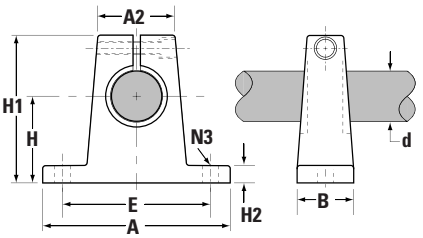

### Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)




Material: Aluminum Alloy

| Part [2] Number | Nominal LinearRace Diameter d | H ±.001 | H1 | A | A1 ±.001 | B | E | N3 | | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hole | Bolt | |
| ASB-4 | .250 | .500 | .89 | 1.50 | .750 | .50 | 1.12 | .16 | #6 | .06 |
| ASB-6 | .375 | .562 | 1.00 | 1.62 | .813 | .56 | 1.25 | .16 | #6 | .08 |
| ASB-8 | .500 | .875 | 1.48 | 2.00 | 1.000 | .63 | 1.50 | .19 | #8 | .11 |
| ASB-12 | .750 | 1.125 | 1.95 | 2.50 | 1.250 | .75 | 2.00 | .22 | #10 | .22 |
| ASB-16 | 1.000 | 1.375 | 2.48 | 3.25 | 1.625 | 1.00 | 2.50 | .28 | 1/4 | .44 |
| ASB-24 | 1.500 | 2.000 | 3.50 | 4.75 | 2.375 | 1.25 | 3.50 | .34 | 5/16 | 1.16 |

### Type SB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)




Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

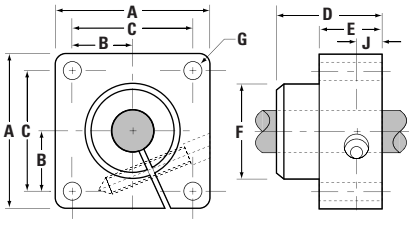
| Part [2] Number | Nominal LinearRace Diameter d | H ±.002 | H1 | H2 | A | A2 | B | E ±.010 | N3 | | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Hole | Bolt | |
| SB-4 | .250 | .687 | 1.06 | .25 | 1.50 | .63 | .50 | 1.125 | .16 | #6 | .03 |
| SB-6 | .375 | .750 | 1.19 | .25 | 1.63 | .69 | .56 | 1.250 | .16 | #6 | .05 |
| SB-8 | .500 | 1.000 | 1.63 | .25 | 2.00 | .75 | .63 | 1.500 | .19 | #8 | .30 |
| SB-10 | .625 | 1.000 | 1.75 | .31 | 2.50 | .88 | .69 | 1.875 | .22 | #10 | .40 |
| SB-12 | .750 | 1.250 | 2.13 | .31 | 2.75 | 1.00 | .75 | 2.000 | .22 | #10 | .50 |
| SB-16 | 1.000 | 1.500 | 2.56 | .38 | 3.25 | 1.38 | 1.00 | 2.500 | .28 | .25 | 1.0 |
| SB-20 | 1.250 | 1.750 | 3.00 | .44 | 4.00 | 1.75 | 1.13 | 3.000 | .34 | .31 | 2.0 |
| SB-24 | 1.500 | 2.000 | 3.50 | .50 | 4.75 | 2.00 | 1.25 | 3.500 | .34 | .31 | 2.6 |
| SB-32 | 2.000 | 2.500 | 4.50 | .63 | 6.00 | 2.63 | 1.50 | 4.500 | .41 | 3/8 | 4.8 |

# Inch - Shaft Support Blocks

## Shaft Support Blocks – Type FSB

Thomson Flanged Support Blocks offer perpendicular mounting without the need for special adaptor brackets.

### Type FSB Flanged 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)




Material: Aluminum Alloy

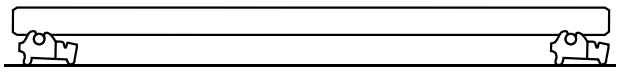
| Part Number | Nominal LinearRace Diameter d | A ±.001 | B | C ±.010 | D | E | F | G | | J | Weight lb |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hole | Bolt | | |
| FSB-8 | .500 | 1.63 | .63 | 1.250 | .88 | .50 | 1.00 | .81 | #8 | .25 | .3 |
| FSB-12 | .750 | 2.38 | .88 | 1.750 | 1.00 | .63 | 1.25 | .21 | #10 | .31 | .6 |
| FSB-16 | 1.000 | 2.75 | 1.06 | 2.125 | 1.25 | .63 | 1.50 | .27 | 1/4 | .31 | .8 |
| FSB-20 | 1.250 | 3.13 | 1.19 | 2.375 | 1.38 | .75 | 1.75 | .27 | 1/4 | .38 | .9 |

## Waymount Support

### For adjustable support




Designed for use with Roundway bearings. Two or more can be used to provide intermittent support and adjustment along the length of the shaft. Unlike shaft support rails, Waymount supports do not permit longitudinal passage of open-type Ball Bushing bearings. When it is necessary to travel over Waymount supports, Roundway bearings should be used. Open-type Ball Bushing bearings can be used only if side loads are light and an adapter block is used (consult factory for recommendation).



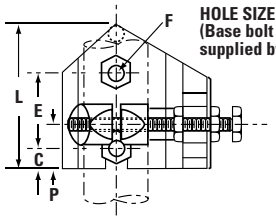
**End Support**

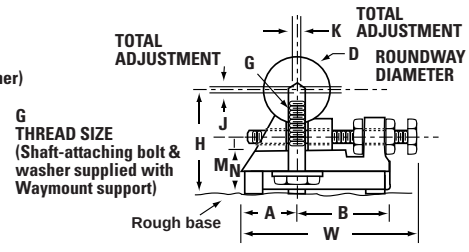
### Waymount Supports (Dimensions in inches)

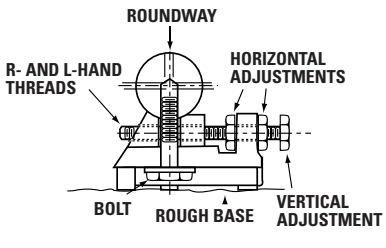
| Waymount Part Number | D RoundWay Diameter | L | H † | W | A | B | C | E | F | G | J | K | M | N | P | Weight (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WM-8 | 1/2 | 1 1/2 | 1 1/16 | 1 3/4 | 1/2 | 7/8 | 1/4 | 3/4 | 7/32 | 8-32 | 3/64 | 3/32 | 11/16 | 1/2 | 7/16 | .2 |
| WM-16 | 1 | 2 | 1 1/2 | 2 1/2 | 3/4 | 1 1/4 | 5/16 | 1 1/16 | 9/32 | 1/4-28 | 1/16 | 1/8 | 13/16 | 11/16 | 11/16 | .5 |
| WM-24 | 1 1/2 | 2 1/2 | 2 | 3 1/2 | 1 3/16 | 1 5/8 | 7/16 | 1 3/16 | 11/32 | 5/16-24 | 1/8 | 1/8 | 1 | 3/4 | 3/4 | 1.1 |
| WM-32 | 2 | 3 | 2 1/2 | 4 | 1 7/16 | 1 7/8 | 1/2 | 1 3/8 | 13/32 | 3/8-24 | 1/8 | 1/8 | 1 1/4 | 15/16 | 1 | 1.8 |
| WM-48 | 3 | 5 | 4 5/16 | 6 3/4 | 2 3/8 | 3 3/8 | 3/4 | 2 5/8 | 21/32 | 5/8-18 | 1/8 | 1/8 | 2 1/4 | 1 5/8 | 1 1/2 | 10.2 |
| WM-64 | 4 | 6 1/2 | 5 7/16 | 8 1/2 | 3 | 4 1/4 | 1 | 3 1/8 | 25/32 | 3/4-16 | 1/8 | 1/8 | 2 3/4 | 2 | 2 | 21.2 |

In-Between Shaft Sizes: Waymount supports will accommodate all shaft sizes from approximately 3/8" to 6" diameter. Use the Waymount support size nearest to your particular shaft diameter. Favor the next largest Waymount support if the shaft size falls midway between two of them. The mean centering height "H" will vary somewhat with different diameter shafts.

† Please note difference in dimension between shaft centerline of rails, blocks and Waymount supports. Shimming or blocking is suggested when these are used on a single shaft.



## Metric - 60 Case Shafting

# Hardened and Ground 60 Case Precision LinearRace Shafting

### Part Number Description

**10 MM T1 SS CTL**

**Nominal Shaft Diameter**

**Class Description**

MM For use with metric ball bushing (iso h6 tolerance). Since Thomson grinds and hardens all of its own shafting, diameters and materials not listed are available as special rind and are made to order. Minimum lots may apply ISO tolerance h4 and g6 are common special options.

**Material**

– Carbon Steel
SS 440 C Stainless Steel

**Type**

CTL Cut to length
RL Random Length
SM Special Machined (see page 33)

**Option**

T1 Predrilled T1 Hole Pattern
T2 Predrilled T2 Hole Pattern

CTL = Cut to length is Thomson 60 Case cut to your specified length.
RL = Random length is full bar or long length shafting. It is called random length because we start with a raw bar 4" to 6" longer than the minimum usable but guarantee only the minimum visable. We mark the ends of what is out of our own tolerance. This is the result of the manufacturing process and tightly controlled roundness specifications.

### Solid Carbon Steel

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .0254mm (.001") Per Foot Cumulative (.051mm (.002") TIR)
Roundness: .0020mm (.000080") Class MM
Taper: .0025mm (.001")

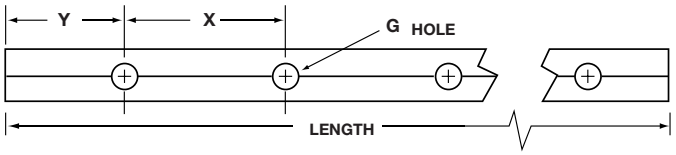
| Nominal Diameter (mm) | Basic Part Number | Diameter Tolerance (mm) | Diameter Tolerance (inch) | Min. Usable Length (mm) | Min. Usable Length (inch) | Min. Hardness Depth (mm) | Min. Hardness Depth (inch) | Weight per mm (kg) | Weight per inch (lb) |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 MM | 5.00<br>4.49 | .1969<br>.1965 | 1905 | 75 | 0.69 | 0.027 | 0.001 | 0.009 |
| 8 | 8 MM | 8.00<br>7.99 | .3150<br>.3146 | 4216 | 166 | 0.69 | 0.027 | 0.003 | 0.022 |
| 10 | 10 MM | 10.00<br>9.99 | .3937<br>.3932 | 4216 | 166 | 0.69 | 0.027 | 0.0035 | 0.035 |
| 12 | 12 MM | 12.00<br>11.99 | .4724<br>.4720 | 4216 | 166 | 1.02 | 0.04 | 0.0050 | 0.050 |
| 15 | 15 MM | 15.00<br>14.99 | .5609<br>.5902 | 4521 | 178 | 1.02 | 0.04 | 0.0085 | 0.077 |
| 16 | 16 MM | 16.00<br>15.99 | .6299<br>.6295 | 4521 | 178 | 1.02 | 0.04 | 0.0096 | 0.088 |
| 20 | 20 MM | 20.00<br>19.99 | .7874<br>.7869 | 4521 | 178 | 1.52 | 0.06 | 0.012 | 0.138 |
| 25 | 25 MM | 25.00<br>24.99 | .9843<br>.9838 | 4521 | 178 | 2.03 | 0.08 | 0.019 | 0.216 |
| 30 | 30 MM | 30.00<br>29.99 | 1.1811<br>1.1806 | 4521 | 178 | 2.03 | 0.08 | 0.027 | 0.311 |
| 40 | 40 MM | 40.00<br>39.99 | 1.5748<br>1.5743 | 4521 | 178 | 2.03 | 0.08 | 0.048 | 0.553 |
| 50 | 50 MM | 50.00<br>49.98 | 1.9685<br>1.9679 | 4521 | 178 | 2.54 | 0.1 | 0.075 | 0.864 |
| 60 | 60 MM | 60.00<br>59.98 | 2.3622<br>2.3615 | 4521 | 178 | 2.54 | 0.1 | 0.108 | 1.240 |
| 80 | 80 MM | 80.00<br>79.97 | 3.1496<br>3.1486 | 5130 | 178 | 2.54 | 0.1 | 0.192 | 2.210 |

Standard random length (RL) minimum usable length is 4521mm (178").

## Metric - 60 Case Shafting

### Standard Options for Carbon Steel Shafting Predrilled (T1 and T2)

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .0020mm (.000080") Class MM
Straightness: .0254mm (.001") Per Foot Cumulative
(.051mm (.002") TIR)
Taper: .0025mm (.001")




#### T1 Predrilled

| Nominal Diameter (mm) | Basic Part Number | MMT1 Diameter Tolerance (mm) | MMT1 Diameter Tolerance (inch) | X (mm) | X (inch) | Standard Y (mm) | Standard Y (inch) | G Standard Size | Min. Usable Length (mm) | Min. Usable Length (in) | Min. Hardenss Depth (mm) | Min. Hardenss Depth (in) | Weight Per mm (kg) | Weight Per in (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 12 MM T1 | 12.00<br>11.99 | 0.4724<br>0.4720 | 75 | 2.953 | 37.5 | 1.476 | M4 | 4216 | 166 | 1.02 | 0.04 | 0.0050 | 0.050 |
| 16 | 16 MM T1 | 16.00<br>15.99 | 0.6299<br>0.6295 | 100 | 3.937 | 50 | 1.968 | M5 | 4521 | 178 | 1.02 | 0.04 | 0.0096 | 0.088 |
| 20 | 20 MM T1 | 20.00<br>19.99 | 0.7874<br>0.7869 | 100 | 3.937 | 50 | 1.968 | M6 | 4521 | 178 | 1.52 | 0.06 | 0.012 | 0.138 |
| 25 | 25 MM T1 | 25.00<br>24.99 | 0.9843<br>0.9838 | 120 | 4.724 | 60 | 2.362 | M8 | 4521 | 178 | 2.03 | 0.08 | 0.019 | 0.216 |
| 30 | 30 MM T1 | 30.00<br>29.99 | 1.1811<br>1.1806 | 150 | 5.906 | 75 | 2.953 | M10 | 4521 | 178 | 2.03 | 0.08 | 0.027 | 0.311 |
| 40 | 40 MM T1 | 40.00<br>39.99 | 1.5748<br>1.5743 | 200 | 7.874 | 100 | 3.937 | M10 | 4521 | 178 | 2.03 | 0.08 | 0.048 | 0.553 |

#### T2 Predrilled

| Nominal Diameter (mm) | Basic Part Number | MMT1 Diameter Tolerance (mm) | MMT1 Diameter Tolerance (inch) | X (mm) | X (inch) | Standard Y (mm) | Standard Y (inch) | G Standard Size | Min. Usable Length (mm) | Min. Usable Length (in) | Min .Hardenss Depth (mm) | Min .Hardenss Depth (in) | Weight Per mm (kg) | Weight Per in (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 12 MM T2 | 12.00<br>11.99 | 0.4724<br>0.4720 | 120 | 4.724 | 60.0 | 2.362 | M4 | 4216 | 166 | 1.02 | 0.04 | 0.0050 | 0.050 |
| 16 | 16 MM T2 | 16.00<br>15.99 | 0.6299<br>0.6295 | 150 | 5.906 | 75 | 2.953 | M5 | 4521 | 178 | 1.02 | 0.04 | 0.0096 | 0.088 |
| 20 | 20 MM T2 | 20.00<br>19.99 | 0.7874<br>0.7869 | 150 | 5.906 | 75 | 2.953 | M6 | 4521 | 178 | 1.52 | 0.06 | 0.012 | 0.138 |
| 25 | 25 MM T2 | 25.00<br>24.99 | 0.9843<br>0.9838 | 200 | 7.874 | 100 | 2.937 | M8 | 4521 | 178 | 2.03 | 0.08 | 0.019 | 0.216 |
| 30 | 30 MM T2 | 30.00<br>29.99 | 1.1811<br>1.1806 | 200 | 7.874 | 100 | 3.937 | M10 | 4521 | 178 | 2.03 | 0.08 | 0.027 | 0.311 |
| 40 | 40 MM T2 | 40.00<br>39.99 | 1.5748<br>1.5743 | 300 | 11.811 | 150 | 5.906 | M10 | 4521 | 178 | 2.03 | 0.08 | 0.048 | 0.553 |

# Metric - 60 Case Shafting

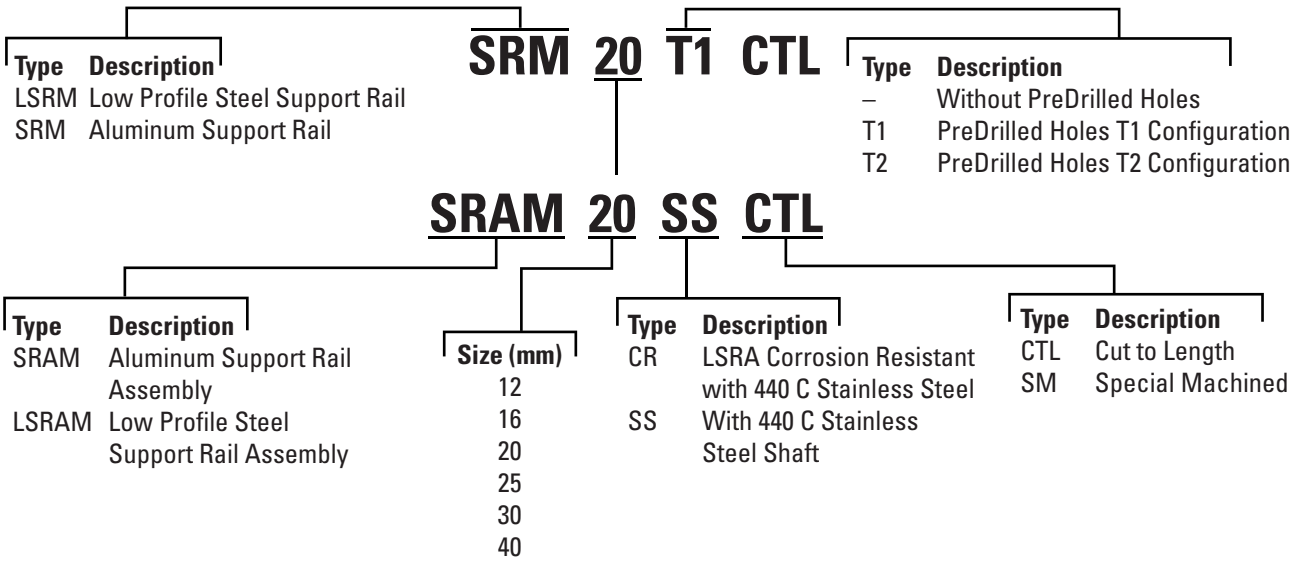
## 440 C Stainless Steel

Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .0254mm (.001") Per Foot Cumulative
(.051mm (.002") TIR)
Roundness: .0020mm (.000080") Class MM
Taper: .0025mm (.001")

| Nominal Dia. (mm) | Basic Part Number | Diameter Tolerance | | Min. Usable Length | | Min. Hardenss Depth | | Weight Per mm (kg) | Weight Per in (lb) |
|---|---|---|---|---|---|---|---|---|---|
| | | (mm) | (inch) | (mm) | (in) | (mm) | (in) | | |
| 5 | 5 MM SS | 5.00<br>4.49 | 0.1969<br>0.1965 | 1905 | 75 | 0.69 | 0.027 | 0.001 | 0.009 |
| 8 | 8 MM SS | 8.00<br>7.99 | 0.3150<br>0.3146 | 4216 | 166 | 0.69 | 0.027 | 0.003 | 0.022 |
| 10 | 10 MM SS | 10.00<br>9.99 | .03937<br>0.3932 | 4216 | 166 | 0.69 | 0.027 | 0.0035 | 0.035 |
| 12 | 12 MM SS | 12.00<br>11.99 | 0.4724<br>0.4720 | 4216 | 166 | 1.02 | 0.04 | 0.0050 | 0.050 |
| 16 | 16 MM SS | 16.00<br>15.99 | 0.6299<br>0.6295 | 4521 | 178 | 1.02 | 0.04 | 0.0096 | 0.088 |
| 20 | 20 MM SS | 20.00<br>19.99 | 0.7874<br>0.7869 | 4521 | 178 | 1.52 | 0.06 | 0.012 | 0.138 |
| 25 | 25 MM SS | 25.00<br>24.99 | 0.9843<br>0.9838 | 4521 | 178 | 2.03 | 0.08 | 0.019 | 0.216 |
| 30 | 30 MM SS | 30.00<br>29.99 | 1.1811<br>1.1806 | 4521 | 178 | 2.03 | 0.08 | 0.027 | 0.311 |
| 40 | 40 MM SS | 40.00<br>39.99 | 1.5748<br>1.5743 | 4521 | 178 | 2.03 | 0.08 | 0.048 | 0.553 |
| 50 | 50 MM SS | 50.00<br>49.98 | 1.9685<br>1.9679 | 4521 | 178 | 2.54 | 0.1 | 0.075 | 0.864 |
| 60 | 60 MM SS | 60.00<br>59.98 | 2.3622<br>2.3615 | 4521 | 178 | 2.54 | 0.1 | 0.108 | 1.240 |

# Support Rails and Assemblies for Continuously Supported Applications

## Part Number Description




## Shaft Rail Supports Type SRM, SRM-T1 & SRM-T2

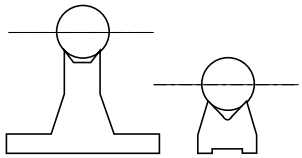
**The low cost way of mounting Thomson 60 Case shafts**

Shaft supports simplify mounting of Thomson 60 Case shafts. Users of Thomson 60 Case shafting should carefully consider the use of these low cost shaft supports. They are standard, available from stock, and simplify shaft mounting. In addition to many other benefits, they eliminate many problems encountered in designing and manufacturing shaft supporting devices. These versatile mounts can be used horizontally or vertically, and in many different arrangements. Shaft support rails are available without pre-drilled holes(SR) or pre-drilled (SR-PD) shaft rails to support 12mm to 40mm diameter shafts are available in standard 600mm where shorter lengths are needed, rails are easily cut to length. For longer shafts they can be mounted end to end, using shims or grout, if necessary, to compensate for slight variation within manufacturing tolerance. Thomson offers shaft support rails with pre-drilled holes to simplify shaft mounting.

# Metric - Support Rails and Support Rail Assembies

## Low Shaft Support Rails Type LSR, LSR-T2

**For compact designs**

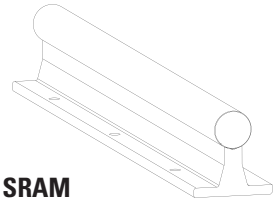


SRM LSRM

Low Shaft Rails allow the design of more compact linear motion systems. The height from the base to the mean shaft center ranges from 14mm for supporting a 12mm diameter shaft to a maximum 39mm when supporting a 40mm diameter shaft – 40% lower than standard support rails. Low Shaft Rails are made of steel to maintain optimum shaft rigidity. Either continuous or intermittent support is possible when using Thomson open-type linear ball bearings. Low Shaft Rails are furnished in standard 1200mm lengths. Where shorter lengths are required, rails can easily be cut. For supporting longer shafts, rails can be mounted end-to-end without limit. Low Shaft Rails are available without pre-drilled mounting holes (LSRM) or with pre-drilled mounting holes (LSRM-T2) to match Thomson drilled and tapped shafts (T2).

**Note:** When using LSRM-T2, the attachment bolts are from underneath, so you must have access under your machine base plate. The LSRAM assemblies highlighted below utilize attachment bolts from above. If one of the standard pre-drilled Low Shaft Rails is not appropriate for your design needs, Low Shaft Rails can be custom drilled by Thomson to your specifications. Send a print with all required dimensions, tolerances, and quantities needed to our application engineering team.

## Pre-Assembled Shaft Rail Assemblies Type SRAM & LSRAM



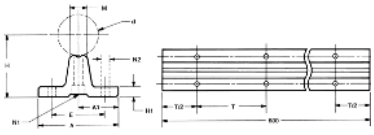
**SRAM**

Thomson 60 Case steel shafts mounted on shaft support rails are now available for instant bolt-down installation. Assemblies are supplied cut to any length, with no limit on the overall length (long lengths are butt jointed together unless specified otherwise). Either solid or light-weight tubular shafting can be assembled to the standard Thomson support rails, which come with base mounting holes spaced evenly along the overall length of the assembly. The LSRAM uses a special shaft unlike the LSRM-T2. The attachment bolts for the LSRA are from the top down so you can easily mount into a machine base plate. The LSRAM bolt pattern closely matches Profile Rail Linear Guides and can easily be used as a drop-in substitute to replace linear guides (ensure you review loading requirements).

# 60 Case LinearRace Support Rails

## for Continuously Supported Applications

### Type SR/SR-PD LinearRace Support Rails and Assemblies (Dimensions in mm)

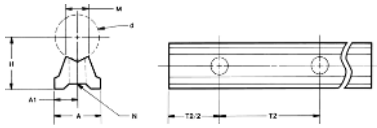


Material: Aluminum Alloy
(Longer Lengths are Available)

| Without Holes | With T1 Hole Spacing | With T2 Hole Spacing | D h6 | H ±.02 | H1 | A | A1 ±.02 | M | E ±.015 | Bolt Hole | | | | Shaft(1) Rail Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Spacing | | Sizes | | |
| | | | | | | | | | | T1 | T2 | N1 | N2 | |
| SRM12 | SRM12 T1 | SRM12 T2 | 12 | 28 | 5 | 43 | 21.5 | 9 | 29 | 75 | 120 | M4 | 4.5 | 1.9 |
| SRM16 | SRM16 T1 | SRM16 T2 | 16 | 30 | 5 | 48 | 24.0 | 10 | 33 | 100 | 150 | M5 | 5.5 | 2.8 |
| SRM20 | SRM20 T1 | SRM20 T2 | 20 | 38 | 6 | 56 | 28.0 | 11 | 37 | 100 | 150 | M6 | 6.6 | 4.2 |
| SRM25 | SRM25 T1 | SRM25 T2 | 25 | 42 | 6 | 60 | 30.0 | 14 | 42 | 120 | 200 | M8 | 6.6 | 5.9 |
| SRM30 | SRM30 T1 | SRM30 T2 | 30 | 53 | 8 | 74 | 37.0 | 14 | 51 | 150 | 200 | M10 | 8.6 | 8.7 |
| SRM40 | SRM40 T1 | SRM40 T2 | 40 | 60 | 8 | 78 | 39.0 | 18 | 55 | 200 | 300 | M10 | 8.6 | 13.6 |

N1 Hole Dia. includes counterbore for socket head cap screw. Mounting hole patterns for various sizes. Alignment and location of holes are ± .010, noncumulative.
(1) Standard Length 600mm.

### Type LSRM/LSRM-T2 LinearRace Support Rails and Assemblies (Dimensions in mm)



Material: Steel

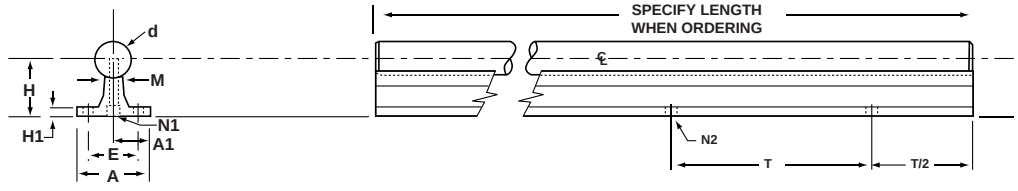
| Without Holes | With T2 Hole Spacing | D h6 | H ±.02 | A | A1 ±.02 | M ±.15 | Bolt Hole | | Shaft(2) Rail Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Spacing | Sizes | |
| | | | | | | | T2 | N | |
| LSRM12 | LSRM12 T2 | 12 | 14 | 12 | 6.0 | 6.0 | 120 | M4 | 1.5 |
| LSRM16 | LSRM16 T2 | 16 | 18 | 14 | 7.0 | 7.0 | 150 | M5 | 2.4 |
| LSRM20 | LSRM20 T2 | 20 | 22 | 17 | 8.5 | 8.3 | 150 | M6 | 3.7 |
| LSRM25 | LSRM25 T2 | 25 | 26 | 21 | 10.5 | 10.8 | 200 | M8 | 5.6 |
| LSRM30 | LSRM30 T2 | 30 | 30 | 23 | 11.5 | 11.0 | 200 | M10 | 9.0 |
| LSRM40 | LSRM40 T2 | 40 | 39 | 30 | 15.0 | 15.0 | 300 | M12 | 13.3 |

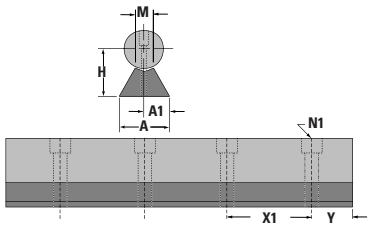
(2) Standard Length 1200mm

### Type SRAMT1 or SRAMT2 LinearRace Shafting Support Rail Assemblies (Dimensions in mm)

| Part Number | | d | H ±.02 | H1 | A | A1 ±.02 | M | E ±.015 | N1 | N2 | T1 | T2 | Mass (kg/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRAM T1 Assembly with LinearRace shafting | SRAM T2 Assembly with LinearRace shafting | | | | | | | | | | | | |
| SRAM12 T1 | SRAM12 T2 | 12 | 28 | 5 | 43 | 21.5 | 9 | 29 | M4 | 4.5 | 75 | 120 | 4,06 |
| SRAM16 T1 | SRAM16 T2 | 16 | 30 | 5 | 48 | 24 | 10 | 33 | M5 | 5.5 | 100 | 150 | 6,24 |
| SRAM20 T1 | SRAM20 T2 | 20 | 38 | 6 | 56 | 28 | 11 | 37 | M6 | 6.6 | 100 | 150 | 10,44 |
| SRAM25 T1 | SRAM25 T2 | 25 | 42 | 6 | 60 | 30 | 14 | 42 | M8 | 6.6 | 120 | 200 | 13,69 |
| SRAM30 T1 | SRAM30 T2 | 30 | 53 | 8 | 74 | 37 | 14 | 51 | M10 | 8.6 | 150 | 200 | 20,02 |
| SRAM40 T1 | SRAM40 T2 | 40 | 60 | 8 | 78 | 39 | 18 | 55 | M10 | 8.6 | 200 | 300 | 32,54 |

### Type LSRAM Smart Rail Assemblies (Dimensions in mm)




Material: Steel Alloy (Longer Lengths are Available)

| Part Number (3) | | LinearRace Diameter h6 | H ±.002 | A | A1 ±.002 | M ±.15 | Bolt Hole | | Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|
| Smart Rail Assembly(1) Shafting | Smart Rail Assembly(2) Shafting | | | | | | T4 | N1 | |
| LSRAM16 | LSRAM16 CR | 16 | 18 | 14 | 7.0 | 7.0 | 40 | M3 | 3.6 |
| LSRAM20 | LSRAM20 CR | 20 | 22 | 17 | 8.5 | 8.3 | 60 | M4 | 5.5 |
| LSRAM25 | LSRAM25 CR | 25 | 26 | 21 | 10.5 | 10.8 | 60 | M5 | 8.5 |
| LSRAM30 | LSRAM30 CR | 30 | 30 | 23 | 11.5 | 11.7 | 80 | M6 | 13.0 |
| LSRAM40 | LSRAM40 CR | 40 | 39 | 30 | 15.0 | 15.0 | 105 | M10 | 21.0 |

(1) = Consists of black oxide steel rail and high carbon steel LinearRace shafting (HRC 60 min.).
(2) = Consists of zinc plated steel rail and 440C stainless steel LinearRace shafting (HRC 50 min.).
(3) = Specify length of Smart Rail when ordering. For example, LSRA M20 x 1200mm.
S dimension is equal on each end unless specified by customer.

## Metric - Support Block

# Support Block for End Supported Applications

## Part Number Description

**ASBM 16**

| Type | Description |
|---|---|
| ASBM | Low Profile 60 Case LinearRace End Support Block |
| SBM | Standard 60 Case LinearRace End Support Block |

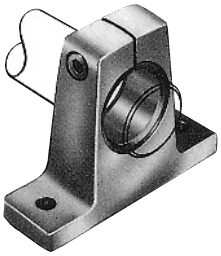
| Size | mm |
|---|---|
| 8 | 12 |
| 6 | 20 |
| 20 | 25 |
| 30 | 40 |

All sizes are not available for all support block types. See specific product charts for size availability.

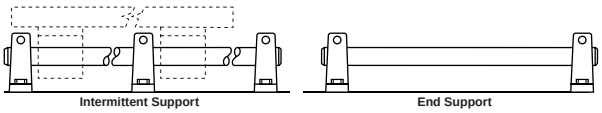
## Shaft Support Blocks – Type SB and ASB

**For end support or intermittent support**

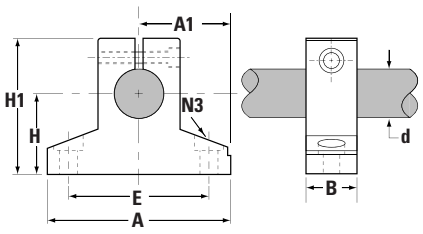
Shaft support blocks are used for end or intermittent support where loads are light and deflection between supports is not a problem. Unlike shaft support rails, blocks do not permit longitudinal passage of open-type Ball Bushing bearings. Type SB shaft support blocks enable clamping of shafts and eliminate the need for bolts, etc. to maintain shaft position. Shimming is suggested for high precision applications to eliminate the effect of variations in surface of base or manufacturing tolerances between supports.



Type ASB shaft blocks, manufactured from high strength extruded aluminum, provide either end or intermittent support in applications where loads are designed with a reference edge on one side of the base. This provides a surface parallel to the center of the shaft within ±.001" that can be used to simplify shaft alignment.



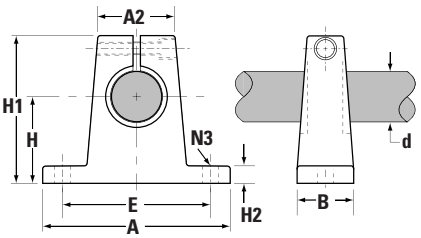

### Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)




Material: Aluminum Alloy

| Part Number | d | H ±.001 | H1 | H2 | A | A1 ±.012 | B | E ±.012 | N | N2 | Support Block Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ASBM08 | 8 | 15 | 28 | 9 | 32 | 16.0 | 18 | 22 | 3.5 | M4 | 0.04 |
| ASBM12 | 12 | 20 | 36 | 13 | 43 | 21.5 | 20 | 30 | 5.3 | M60 | 0.10 |
| ASBM16 | 16 | 25 | 43 | 18 | 53 | 26.5 | 24 | 38 | 6.6 | M8 | 0.15 |
| ASBM20 | 20 | 30 | 51 | 22 | 60 | 30.0 | 30 | 42 | 8.4 | M10 | 0.23 |
| ASBM25 | 25 | 35 | 61 | 26 | 78 | 39.0 | 38 | 56 | 10.5 | M12 | 0.41 |
| ASBM30 | 30 | 40 | 71 | 26 | 87 | 43.5 | 40 | 64 | 10.5 | M12 | 0.53 |
| ASBM40 | 40 | 50 | 88 | 34 | 108 | 54.0 | 48 | 82 | 13.5 | M160 | 0.99 |

### Type SB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)




Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

| Part Number | d | H ±.001 | H1 | H2 | A | A1 ±.012 | B | E ±.012 | N | Support Block Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| SBM08 | 8 | 15 | 27 | 5.2 | 32 | 16 | 10 | 25 | 4.5 | 0.03 |
| SBM12 | 12 | 20 | 35 | 5.5 | 40 | 21 | 12 | 32 | 5.5 | 0.06 |
| SBM16 | 16 | 25 | 42 | 6.5 | 50 | 25 | 16 | 40 | 5.5 | 0.11 |
| SBM20 | 20 | 30 | 50 | 8.0 | 60 | 30 | 20 | 45 | 5.5 | 0.21 |
| SBM25 | 25 | 35 | 58 | 9.0 | 74 | 37 | 25 | 60 | 6.6 | 0.35 |
| SBM30 | 30 | 40 | 68 | 10.0 | 84 | 42 | 28 | 68 | 9.0 | 0.52 |
| SBM40 | 40 | 50 | 86 | 12.0 | 108 | 54 | 32 | 86 | 11.0 | 0.92 |

# Thomson 60 Case Quick Shaft

## "Quick shaft" is precut and packaged stock length shafting in popular:

- **Inch and metric sizes**
- **L tolerance class and MM tolerance class**
- **Materials (carbon steel, 440C stainless steel, lightweight 52100 tubular)**
- **Standard options (predrilled and chrome plated plain ends)**




Thomson 60 Case Quick Shaft can be easily stocked by authorized Thomson distributors or end users.

You may want to have a few pieces of Thomson Quick Shaft in your stock room if you are not sure of the exact length you may need for that potential 3rd shift breakdown or you perform your own special machining of various lengths and do not want to carry different cut to length sizes.

All Thomson Quick Shaft shafting are oil preserved and placed in a VCI bag for long-term storage and labeled for your convenience.

## Part Number Description

**QS SS 1 L PD 24**

| Type | Description |
|---|---|
| - | Carbon Steel |
| CP | Chrome Plated Carbon Steel |
| SS | 440C Stainless Steel |
| TU | 52100 Tubular |

**DIA.**

**Length**

| Type | Description |
|---|---|
| L | L Class |
| MM | Metric (Carbon Steel only) |

| Type | Description |
|---|---|
| - | Standard |
| PD | Predrilled (Carbon Steel only) |

## Quick Shaft

# 60 Case Quick Shaft

## Carbon Steel - Inch

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative
Roundness: .000080"
Taper: .0001"

| Part Number | Stock Lengths (in) | Diameter Tolerance (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|
| QS 1/4 L | 6, 9 ,12, 15, 18, 24, 30, 36, 42, 48, 60 | .2495<br>.2490 | .027 | .014 |
| QS 3/8 L | 6,12, 18, 24, 30, 36, 48, 60 | .3745<br>.3740 | .027 | .031 |
| QS 1/2 L | 6, 9 ,12, 15, 18, 24, 30, 36, 42, 48, 54, 60 | .4995<br>.4990 | .040 | .055 |
| QS 5/8 L | 12, 15, 18, 24, 30, 36, 42, 48, 54, 60 | .6245<br>.6240 | .040 | .086 |
| QS 3/4 L | 12, 15, 18, 24, 30 36, 42, 48, 60, 66, 72 | .7495<br>.7490 | .060 | .125 |
| QS 1 L | 12, 18, 24, 30, 36, 42, 48, 60, 66, 72 | .9995<br>.9990 | .080 | .222 |
| QS 1 1/4 L | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.2495<br>1.2490 | .080 | .348 |
| QS 1 1/2 L | 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | 1.4994<br>1.4989 | .080 | .500 |
| QS 1 3/4 L | 12, 18, 24, 30, 36, 42, 48, 60, 72 | 1.7495<br>1.7490 | .100 | .681 |
| QS 2 L | 12, 18, 24, 30, 36, 42, 48, 60, 72 | 1.9994<br>1.9987 | .100 | .890 |

## Carbon Steel - Metric

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative
Roundness: .000080"
Taper: .0001"

| Part Number | Stock Lengths (mm) | Diameter | | Min. Hardness Depth | | Weight Per mm | Weight Per inch |
|---|---|---|---|---|---|---|---|
| | | (mm) | (in) | (mm) | (in) | (kg) | (lb) |
| Q10MM | 500,1000 | 10.00<br>9.99 | .3937<br>.3932 | .069 | .027 | .0035 | .035 |
| QS12MM | 250, 500, 750, 1000, 1200, 1500, 2000 | 12.00<br>11.99 | .4724<br>.4720 | 1.02 | .040 | .005 | .05 |
| QS16MM | 250, 500, 750, 1000, 1200, 1500, 2000 | 16.00<br>15.99 | .6299<br>.6295 | 1.02 | .040 | .0096 | .088 |
| QS20MM | 250, 500, 750, 1000, 1200, 1500, 2000 | 20.00<br>19.99 | .7874<br>.7869 | 1.52 | .060 | .012 | .13 |
| QS25MM | 500, 750, 1000, 1200, 1500, 2000 | 25.00<br>24.99 | .9843<br>.9838 | 2.03 | .080 | .019 | .216 |
| QS30MM | 500, 750, 1000, 1500, 2000 | 30.00<br>29.99 | 1.1811<br>1.1806 | 2.03 | .080 | .027 | .311 |
| QS40MM | 500, 750, 1000, 1500, 2000 | 40.00<br>39.99 | 1.5748<br>1.5743 | 2.03 | .080 | .048 | .553 |

## Quick Shaft

### 440C Steel - Inch

Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"

Straightness: .001" Per Foot Cumulative
Taper: .0001"

| Part Number | Stock Lengths (in) | Diameter Tolerance (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|
| QSSS 1/4 L | 6, 12, 18, 24, 30, 36, 48, 60 | .2495<br>.2490 | .027 | .014 |
| QSSS 3/8 L | 6,12, 18, 24, 30, 36, 48, 60 | .3745<br>.3740 | .027 | .031 |
| QSSS 1/2 L | 12, 18, 24, 30, 36, 42, 48, 54, 60 | .4995<br>.4990 | .040 | .055 |
| QSSS 5/8 L | 12, 18, 24, 30, 36, 42, 48, 54, 60 | .6245<br>.6240 | .040 | .086 |
| QSSS 3/4 L | 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | .7495<br>.7490 | .060 | .125 |
| QSSS 1 L | 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | .9995<br>.9990 | .080 | .222 |
| QSSS 1 1/4 L | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.2495<br>1.2490 | .080 | .348 |
| QSSS 1 1/2 L | 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | 1.4994<br>1.4989 | .080 | .500 |

### 52100 Tubular - Inch

Hardness: 58 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"

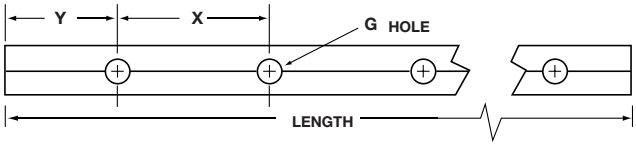
Straightness: .001" Per Foot Cumulative
Taper: .0001"

| Part Number | Stock Lengths (in) | Nominal I.D. | Diameter Tolerance (in) | Min. Hardness Depth (in) | Weight Per Inch (lb/in) |
|---|---|---|---|---|---|
| QSTU 1 L | 12, 18, 24, 48, 60 | .599 ± 5% | .9995<br>.9990 | .080 | .158 |
| QSTU 1 1/2 L | 12, 18, 24, 48, 60 | .890 ± 5% | 1.4994<br>1.4989 | .080 | .328 |
| QSTU 2 L | 12, 24, 48, 60 | 1.250 ± 5% | 1.9994<br>1.9987 | .100 | .542 |

# Quick Shaft

## Carbon Steel Predrilled - Inch

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative
Roundness: .000080"
Taper: .0001"




| Part Number | Stock Lengths (in) | Diameter Tolerance (in) | X (in) | Y (in) | G Thread Size | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|
| QS 1/2 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | .4995<br>.4990 | 4 | 2 | #6-32 | .040 | .055 |
| QS 5/8 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | .6245<br>.6240 | 4 | 2 | #8-32 | .040 | .086 |
| QS 3/4 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | .7490<br>.7485 | 6 | 3 | #10-32 | .060 | .125 |
| QS 1 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | .9995<br>.9990 | 6 | 3 | 1/4-20 | .080 | .222 |
| QS 1 1/4 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.2490<br>1.2485 | 6 | 3 | 5/16-18 | .080 | .348 |
| QS 1 1/2 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.4994<br>1.4989 | 8 | 4 | 3/8-16 | .080 | .500 |

## 440C Stainless Steel Predrilled - Inch

Hardness: 50 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Roundness: .000080"
Straightness: .001" Per Foot Cumulative
Taper: .0001"

| Part Number | Stock Lengths (in) | Diameter Tolerance (in) | X (in) | Y (in) | G Thread Size | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|---|---|---|
| QSSS 1/2 L PD | 24, 30, 36, 42, 48, 60, 72 | .4995<br>.4990 | 4 | 2 | #6-32 | .040 | .055 |
| QSSS 5/8 L PD | 24, 30, 36, 42, 48, 54, 60, 72 | .6245<br>.6240 | 4 | 2 | #8-32 | .040 | .086 |
| QSSS 3/4 L PD | 24, 30, 36, 42, 48, 54, 60, 72 | .7490<br>.7485 | 6 | 3 | #10-32 | .060 | .125 |
| QSSS 1 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | .9995<br>.9990 | 6 | 3 | 1/4-20 | .080 | .222 |
| QSSS 1 1/4 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.2490<br>1.2485 | 6 | 3 | 5/16-18 | .080 | .348 |
| QSSS 1 1/2 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 72 | 1.4994<br>1.4989 | 8 | 4 | 3/8-16 | .080 | .500 |

## Chrome Plated Plain Ends - Inch

Hardness: 60 ROCKWELL C Min.
Surface Finish: 8 Ra Max
Straightness: .001" Per Foot Cumulative
Roundness: .000080"
Taper: .0001"

| Part Number | Stock Lengths (in) | Diameter Tolerance (in) | Min. Hardness Depth (in) | Weight Per Inch (lb) |
|---|---|---|---|---|
| QSSS 1/2 L PD | 6, 12, 18, 24, 30, 36, 42, 48, 60 | .4995<br>.4990 | .040 | .055 |
| QSSS 5/8 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60 | .6245<br>.6240 | .040 | .086 |
| QSSS 3/4 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60 | .7595<br>.7490 | .060 | .125 |
| QSSS 1 L PD | 12, 18, 24, 30, 36, 42, 48, 54, 60, 72 | .9995<br>.9990 | .080 | .222 |
| QSSS 1 1/4 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | 1.2495<br>1.2490 | .080 | .348 |
| QSSS 1 1/2 L PD | 18, 24, 30, 36, 42, 48, 54, 60, 66, 72 | 1.4994<br>1.4989 | .080 | .500 |

# Special Machining

For over 50 years Thomson has been providing custom special machining on 60 Case Linear Shafting. Our skilled machinists can perform a wide variety of special machining operations on the ends or along the length of the 60 Case Shaft to provide exactly the part needed for your application.

Standard 60 Case shafting, which is available from stock, can be cut with special length tolerances. 60 Case shafting may also be drilled with a variety of radial holes and tapped if needed. Shafts can be supplied with flats, keyways and reduced diameters. Shafts can also be plated.

There is an extra charge for all special machining operations. For specific prices, send your drawing or technical description to Thomson or utilize a copy of the request for quotation and templates found on pages 37-53.

## Special Length Tolerances

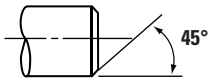
Standard length tolerance is for ± 1/32" for shafts less than 2" diameter and ± 1/16" for 2" diameter and larger. Special length tolerances of ± .010", ± .005" and ± .002" can be achieved on shafts up to 4" in diameter.

## Special Straightness Tolerances

Standard straightness is .001" per foot., cumulative (.002" TIR). Special straightness tolerances is .0005" per foot, cumulative (.001" TIR), for all diameters.

## Special Chamfer

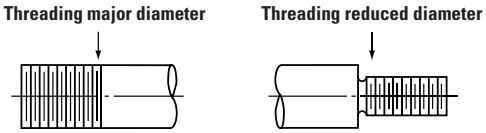
Standard chamfer is 1/16" x 45°. Standard chamfer is approximately 1/16" x 45°. Special chamfer at any angle can be supplied for an additional charge.




## Machining Shaft Ends

For all machining requirements with turned ends, Thomson will anneal the end. The annealing process may cause approximately 1/4" to 1/2" of heat travel from machined area (depending on major shaft O.D.). Hardness of major shaft diameter near the machined area will be below the Rockwell for the material. If annealing effects are objectionable, alternate machining processes can be used which prevent major diameter softening. Contact factory for special options. (See relevant sections following).

## Threaded Shaft Diameter




Standard threads are either Unified National Coarse or Unified National Fine, Class 2-A fit. Shafts will be annealed and soft around the circumference of threaded areas within the case.

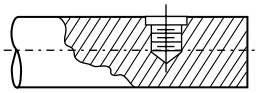
## Reduced Shaft Diameter




Standard diameter tolerance on turned down diameters is ± .001". Special tolerance of ± .0001" is available. Concentricity is within .001" total indicator reading roundness and taper of ± .0001" min. capability exists. Shafts are annealed and soft in turned down sections within case. Two-step shaft diameter reduction is also available.

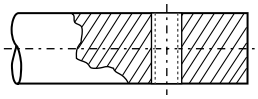
## Radial Holes Drilled and Tapped to Center of Shaft

U.N.C. or U.N.F. Class 2-B thread. Tolerances for hole alignment and location are ± 1/64", ± .010" and ± .005".



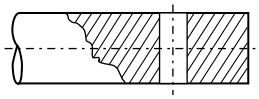
## Radial Holes Drilled and Tapped thru Shaft

U.N.C. or U.N.F. Class 2-B thread. Alignment and location tolerance ± .010" shaft annealed and soft around circumference in hole area.



## Radial Holes Drilled through Shaft

Alignment and location tolerance ± .010".

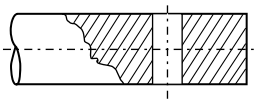


**For requests for quotation and ordering custom machined 60 Case LinearRace shafting see the convenient templates on pages 192 through 208.**

# Special Machining

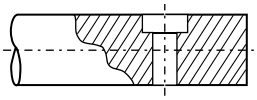
## Radial Holes Drilled and Reamed through Shafts

Alignment and location tolerance ± .010". Hole diameter tolerance ± .001". Shaft annealed and soft around circumference in hole area.



## Radial Holes Drilled through Shaft and Counterbored for Cap Screw

Alignment and location tolerance ± .010". Tolerance for body diameter and head diameter for American Std. cap screw is + 1/32". Shaft remains hard in hole area (not annealed).

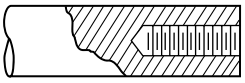


## Radial Hole Location Tolerance

Unless specified standard location tolerance between holes is ± .1/64", optional ± .010" capability exists for all through hole ± .005" for hole to center.

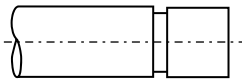
## Coaxial Holes Drilled and Tapped in Center of End of Shaft

U.N.C. or U.N.F. Class 2-B thread. Concentricity ± .005". Certain diameters and materials will be annealed and remain soft around the circumference. Note: Holes may also be located on a "bolt" circle. Location tolerance is .010".



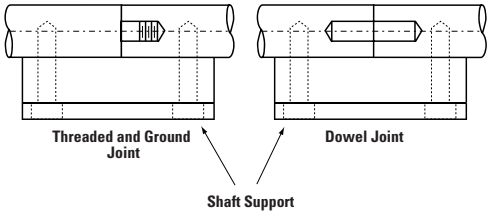
## Retaining Ring Groove

Location tolerances between grooves ± 1/64" or ± .005". Tolerance of ± .005" for maximum ring groove spacing is 96".



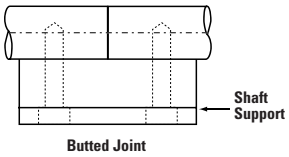
## Joining Shafts to Obtain Longer Lengths

Threaded and ground joints for 3/4" through 4" and 20mm thru 80mm diameter shaft for lengths up to 20 feet. Dowled joints with concentricity ± .010" for 1/2" thru 4" and 12mm thru 80mm diameter shaft. The feasibility of butted joints should be considered as possibly the most economical solution before considering either of the previous alternatives.




## Butted Joints

Ends machined square, no chamfer. Available for all nominal shaft diameters.

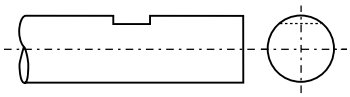



## Flats

Flats are available. Flats extending over large portion or entire length of shaft are not available. Cutting into hardened layer would cause considerable warping and subsequent straightening cost is prohibitive.

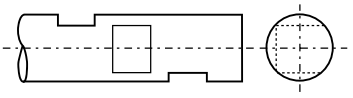
## One Flat on a Shaft

Location tolerance ± .015".



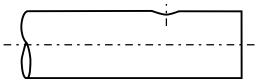
## Multiple Flats on a Shaft

Alignment and location tolerance ± .005".



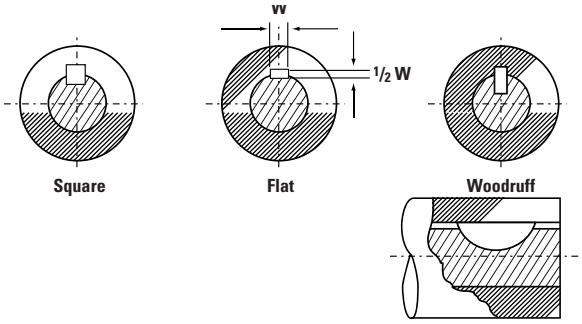
## Drilled Spot for Set Screws

Location tolerance ± .1/64". Capability exists for ± .002". Drill sizes 1/8" thru 3/4".



## Keyways

Keyways may be square, flat or American Standard Woodruff. Available for nominal shaft diameters from 1/2" through 4".




**For requests for quotation and ordering custom machined 60 Case LinearRace shafting see the convenient templates on pages 192 through 208.**

# Example of Our Popular Plating Options

## Chrome Plating

The standard chrome plating option is offered per AMS 2460, Class 1 (Corrosion Protective Plating), Type I (Bright finish). Other plating options are available for quote, including, but not limited to Thin Dense Chrome plating per MIL-S-13165 and MIL-R-81841..

As a result of the plating process and the need to hold parts during plating, coaxial holes may be added as follows:

Up to 1 1/4" diameter shaft any length over 72".
Over 1 1/4" to 2" diameter shaft any length over 48".
Over 2" diameter shaft all lengths.

**Note:** Our CPPE (chrome plated with plain ends) do not have coaxial holes in any length, but the chamfered edges are not plated.

## Black Oxide

The benefits of black oxide is corrosion resistance and black color. Military and industrial specifications satisfied with our Black Oxide are Mil-C13924C and AMS-2485.

## ARMOLOY™

The benefit of Armoloy™ plating are a 78 RC surface finish, reduction of wear and friction in moving parts, and absolute adhesion to base metal (no chipping, cracking, flaking, or peeling will occur). The Armoloy thickness is .0001". Final plated shaft is within specified tolerance class.

As a result of the plating process and the need to hold parts during plating, coaxial holes may be added as follows:

Up to 1 1/4" diameter shaft any length over 66".
Over 1 1/4" all lengths.

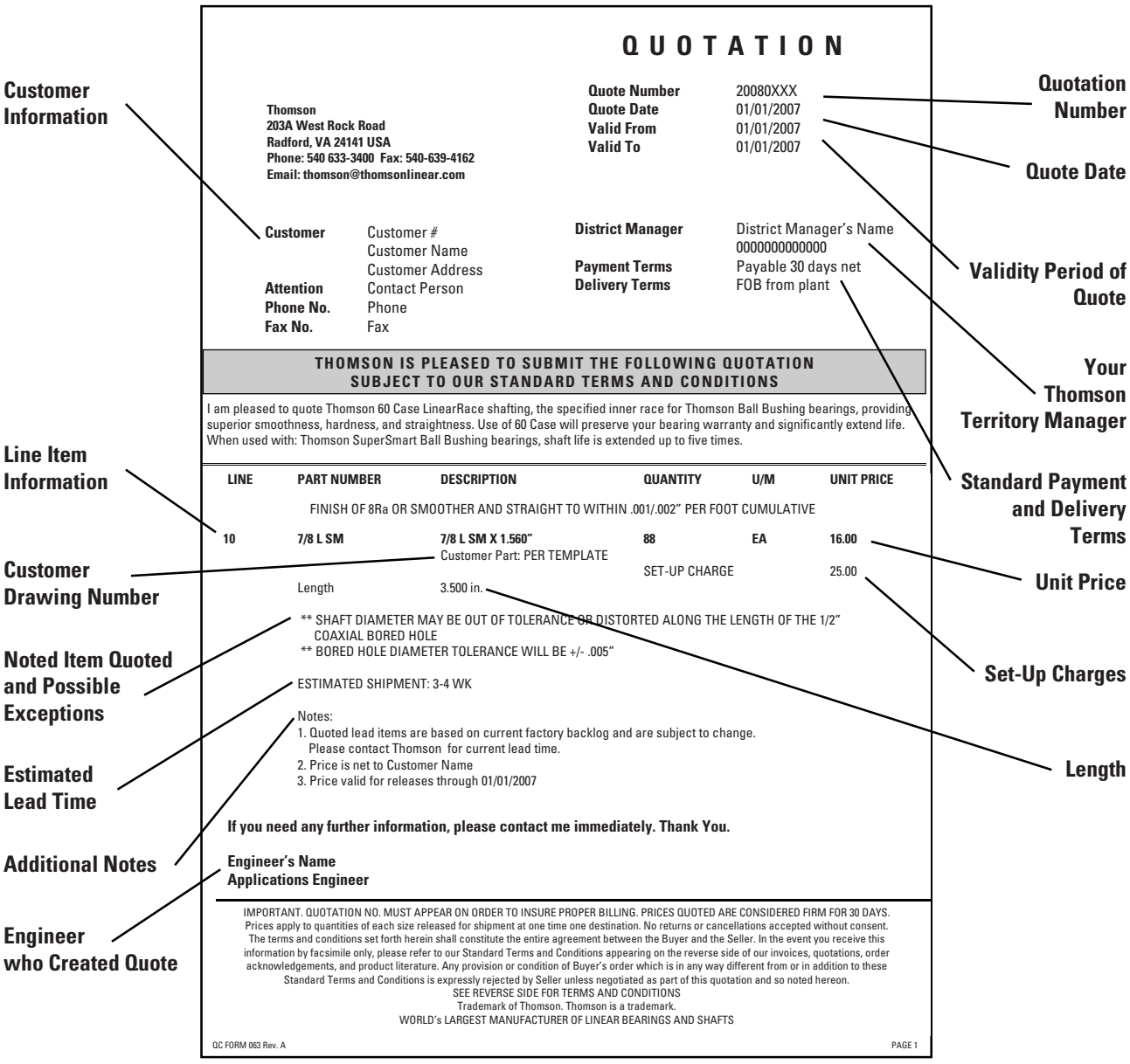
Military and industrial specifications satisfied with Armoloy™ plating are AMS-2438, AMS QQ-C-320 and AMS-2406.

Each supplier used for plating has different capabilities to hold the parts, so requirements for coaxial holes may change over time. These should be used as a rule of thumb with an understanding that longer lengths may have coaxial holes. These holes allow the plater to hold the shaft during the plating process. When a coaxial hole is not used it means special tooling is available or the ability exists to pinch the part. If coaxial holes are a problem, please contact us and we can work with our supplier to determine what options exist.

# Special Machining Quoting

Thomson will be happy to quote any of your special machining needs. In order for us to properly quote the product, we will require an original product drawing or technical description to be sent to our Application Engineering support team at 1-540-639-4162 (fax). Our Application Engineering team will contact you if they have any questions, require more information, or a better drawing or sketch. This drawing is important to us to ensure we quote exactly what is required at time of quotation instead of when you place your order. Upon ordering, it is important that you reference the quotation number listed at the top right of the quote and have reviewed the entire quotation, including all the notes associated and exceptions to the line item you are ordering. Quantity quoted and price listed is based on one time manufacturing lot quantity not blanket order unless otherwise stated. Thomson reserves the right to requote if quantity ordered is less than quoted quantity. Upon receipt of order, Thomson assumes you have read and understand the quotation and Thomson will assume no responsibility of exceptions on quotation and failure by customer to read.

Our standard quotations are in the format shown below.



**QUOTATION**

**Thomson**
**203A West Rock Road**
**Radford, VA 24141 USA**
**Phone: 540 633-3400 Fax: 540-639-4162**
**Email: thomson@thomsonlinear.com**

| | |
|---|---|
| **Quote Number** | 20080XXX |
| **Quote Date** | 01/01/2007 |
| **Valid From** | 01/01/2007 |
| **Valid To** | 01/01/2007 |

**Customer** Customer #
Customer Name
Customer Address
**Attention** Contact Person
**Phone No.** Phone
**Fax No.** Fax

**District Manager** District Manager's Name
0000000000000
**Payment Terms** Payable 30 days net
**Delivery Terms** FOB from plant

**THOMSON IS PLEASED TO SUBMIT THE FOLLOWING QUOTATION SUBJECT TO OUR STANDARD TERMS AND CONDITIONS**

I am pleased to quote Thomson 60 Case LinearRace shafting, the specified inner race for Thomson Ball Bushing bearings, providing superior smoothness, hardness, and straightness. Use of 60 Case will preserve your bearing warranty and significantly extend life. When used with: Thomson SuperSmart Ball Bushing bearings, shaft life is extended up to five times.

| LINE | PART NUMBER | DESCRIPTION | QUANTITY | U/M | UNIT PRICE |
|---|---|---|---|---|---|
| | | FINISH OF 8Ra OR SMOOTHER AND STRAIGHT TO WITHIN .001/.002" PER FOOT CUMULATIVE | | | |
| **10** | **7/8 L SM** | **7/8 L SM X 1.560"** | **88** | **EA** | **16.00** |
| | | Customer Part: PER TEMPLATE | | | |
| | | | SET-UP CHARGE | | 25.00 |
| | Length | 3.500 in. | | | |

** SHAFT DIAMETER MAY BE OUT OF TOLERANCE OR DISTORTED ALONG THE LENGTH OF THE 1/2" COAXIAL BORED HOLE
** BORED HOLE DIAMETER TOLERANCE WILL BE +/- .005"

ESTIMATED SHIPMENT: 3-4 WK

Notes:
1. Quoted lead items are based on current factory backlog and are subject to change. Please contact Thomson for current lead time.
2. Price is net to Customer Name
3. Price valid for releases through 01/01/2007

**If you need any further information, please contact me immediately. Thank You.**

**Engineer's Name**
**Applications Engineer**

IMPORTANT. QUOTATION NO. MUST APPEAR ON ORDER TO INSURE PROPER BILLING. PRICES QUOTED ARE CONSIDERED FIRM FOR 30 DAYS. Prices apply to quantities of each size released for shipment at one time one destination. No returns or cancellations accepted without consent. The terms and conditions set forth herein shall constitute the entire agreement between the Buyer and the Seller. In the event you receive this information by facsimile only, please refer to our Standard Terms and Conditions appearing on the reverse side of our invoices, quotations, order acknowledgements, and product literature. Any provision or condition of Buyer's order which is in any way different from or in addition to these Standard Terms and Conditions is expressly rejected by Seller unless negotiated as part of this quotation and so noted hereon.
SEE REVERSE SIDE FOR TERMS AND CONDITIONS
Trademark of Thomson. Thomson is a trademark.
WORLD's LARGEST MANUFACTURER OF LINEAR BEARINGS AND SHAFTS

QC FORM 063 Rev. A PAGE 1

**Customer Information**
**Quotation Number**
**Quote Date**
**Validity Period of Quote**
**Your Thomson Territory Manager**
**Standard Payment and Delivery Terms**
**Line Item Information**
**Unit Price**
**Customer Drawing Number**
**Set-Up Charges**
**Noted Item Quoted and Possible Exceptions**
**Length**
**Estimated Lead Time**
**Additional Notes**
**Engineer who Created Quote**

# Request for Quotation

Custom Machined Thomson 60 Case LinearRace Shafting

Customer: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Name: _____

Phone: _____ Fax: _____

E-mail: _____

| Template Number | Quantity |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

1. Send a copy of your drawing or sketch. If you do not have one, select the Thomson 60 Case LinearRace shaft template that best matches your requirements.

    A. Fill in all available data with tolerances in either inch or metric units.

    B. If a feature is not on the template that you are using, add it, and the applicable dimensions.

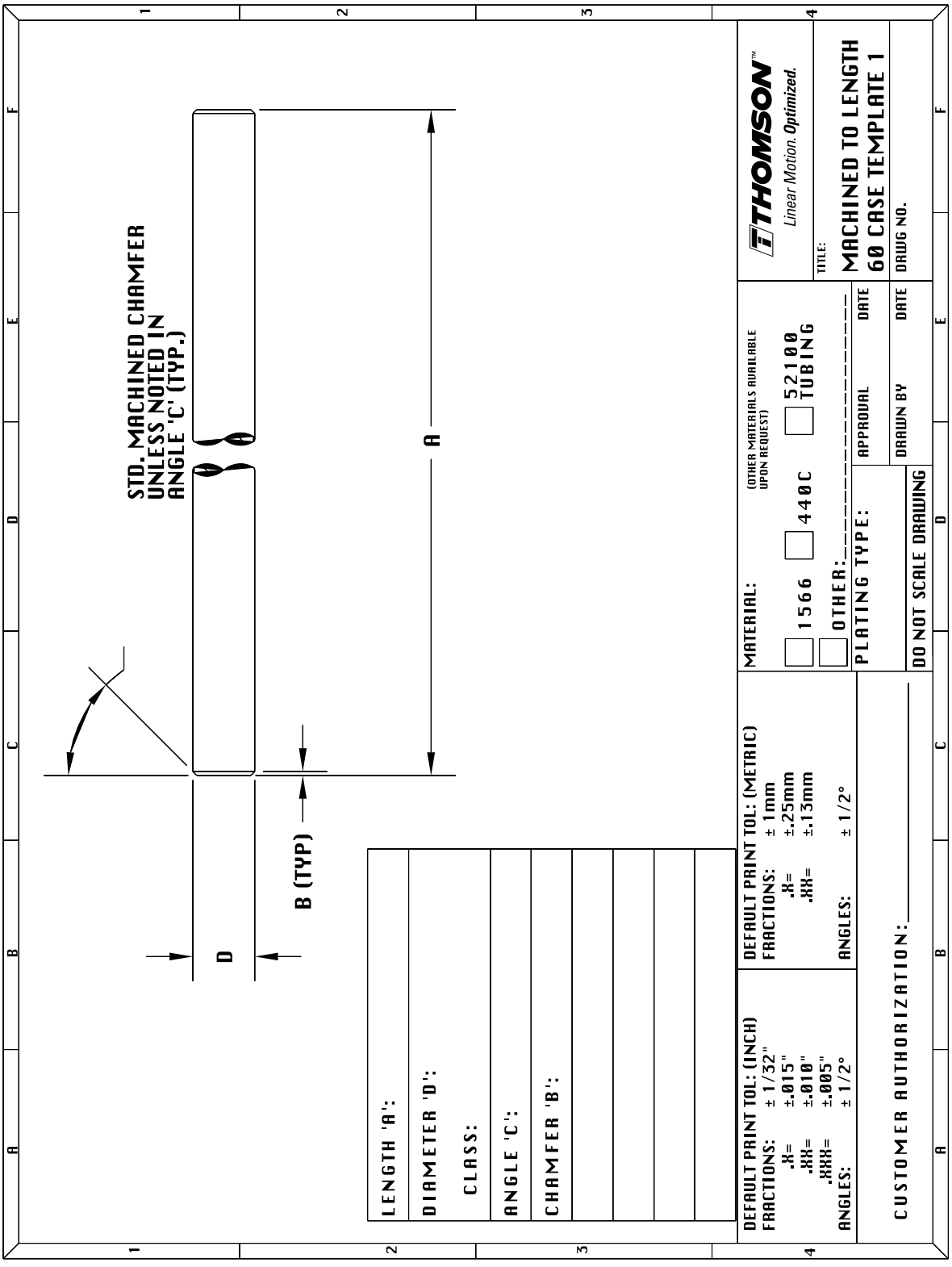
    C. If a feature is not required but is on the template, draw a line through the feature, and mark the dimension block with a line or N/A.

    D. Make any additional notes to the template to aid in quoting and manufacturing.

2. Fax this information with the template drawing to: Quotation Department at +44 1271 334 501.

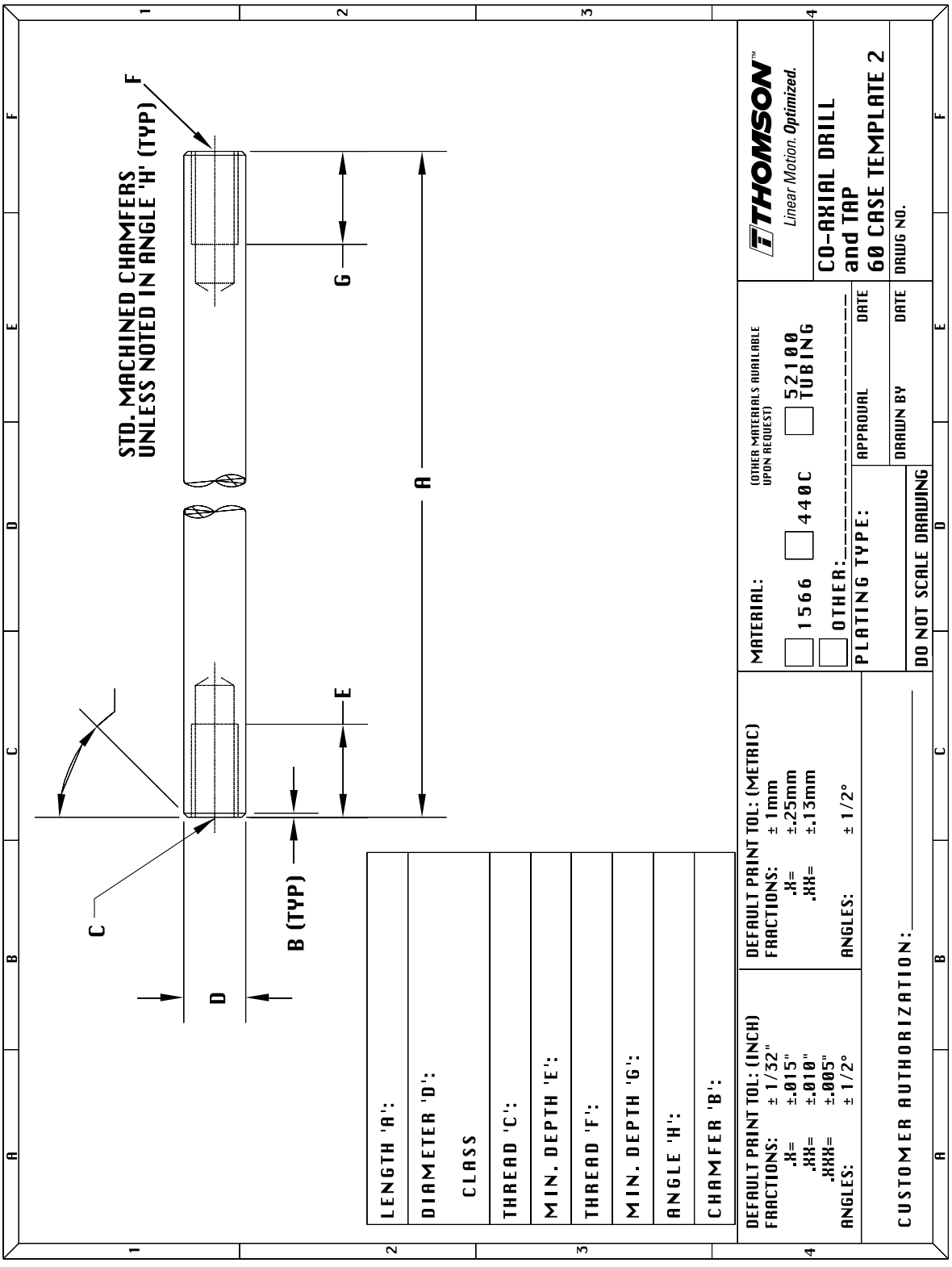
For any questions or help in determining the best solution to your Thomson 60 Case LinearRace shafting requirements, please contact Application Engineering at:
Phone: +44 1271 334 500
E-mail: sales.uk@thomsonlinear.com

## Special Machining



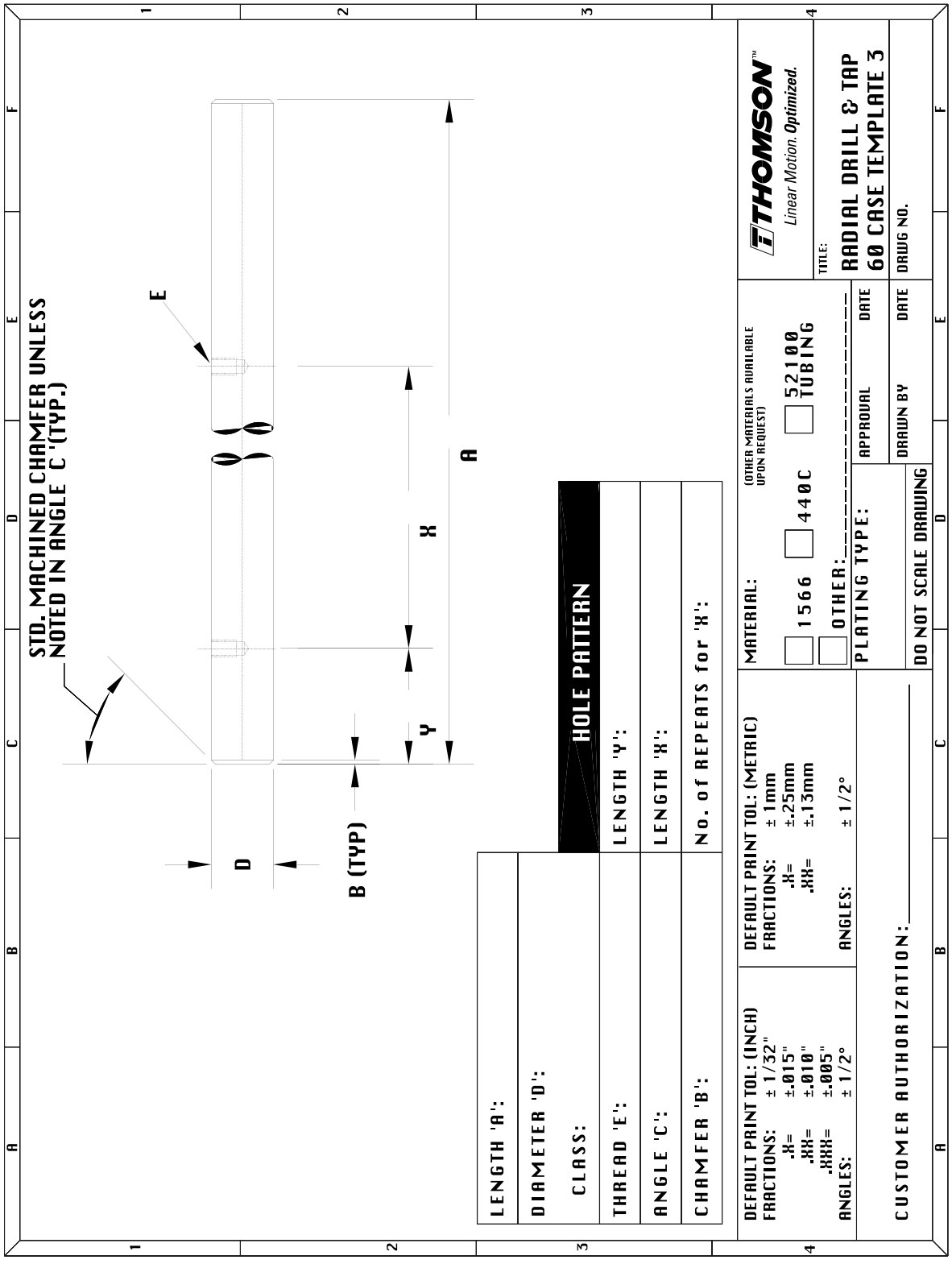

FAX A COPY OF THIS FORM TO QUOTATION DEPARTMENT, THOMSON +44 1271 334 501

## Special Machining



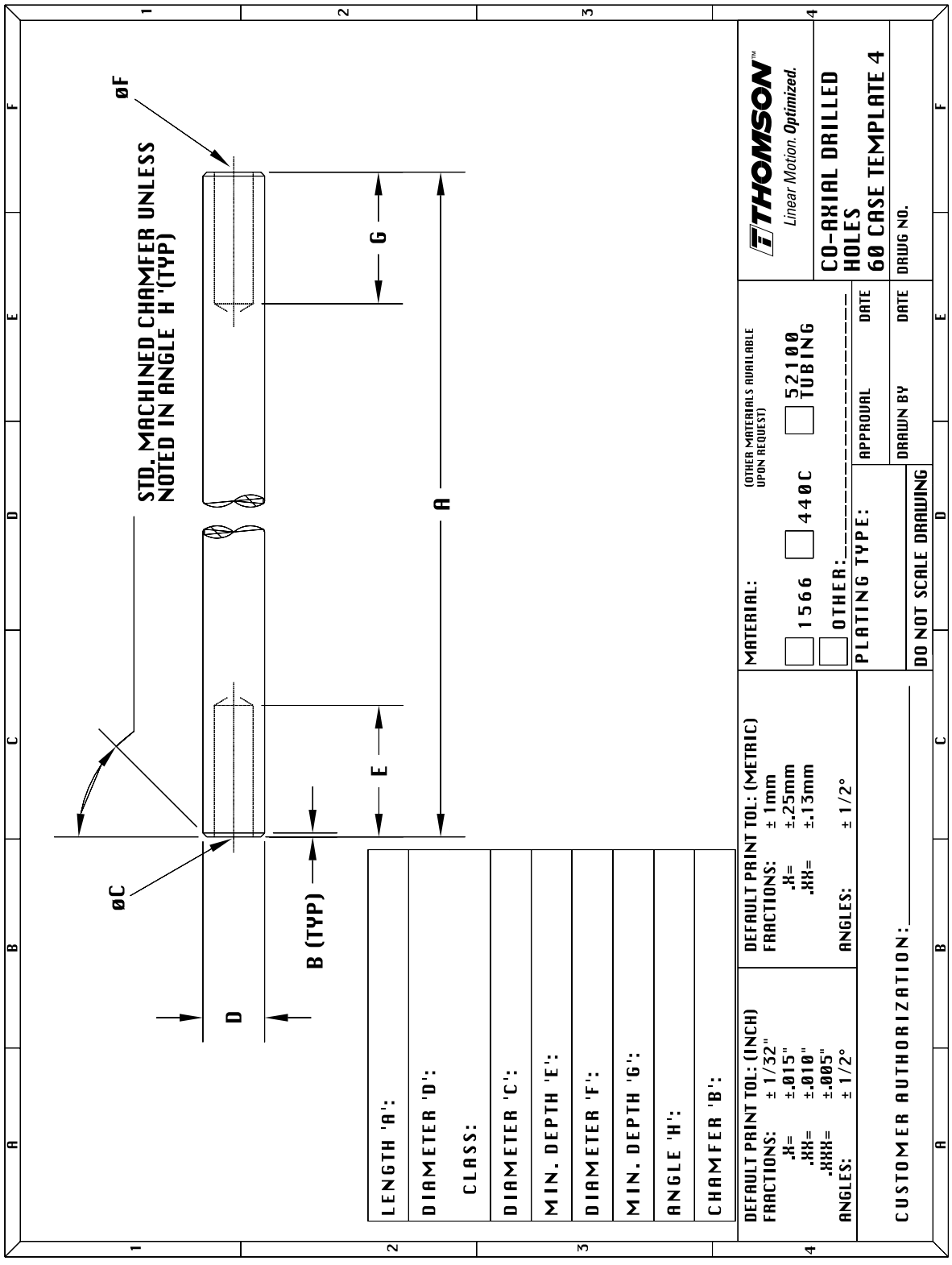

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## Special Machining



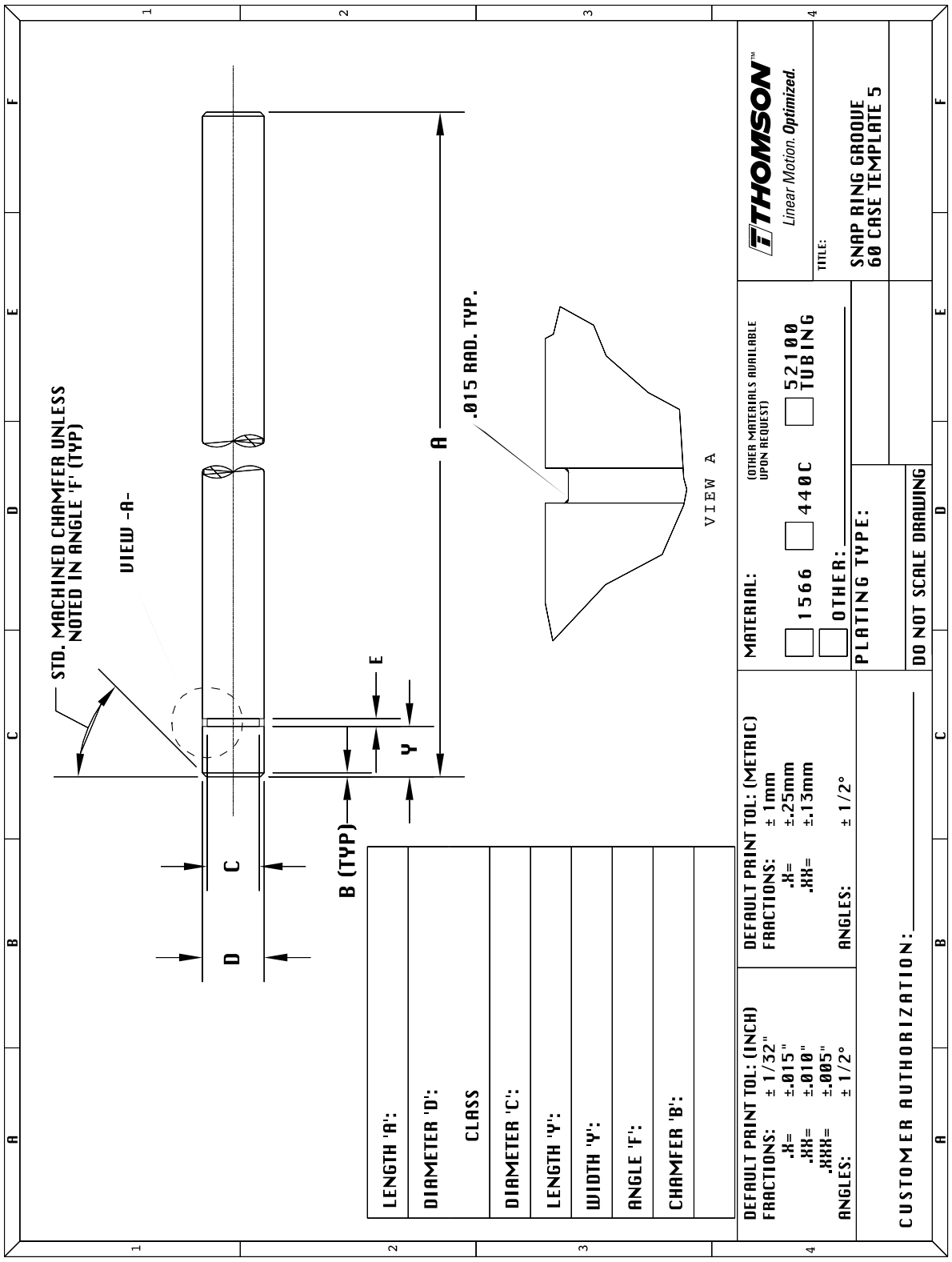

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## Special Machining

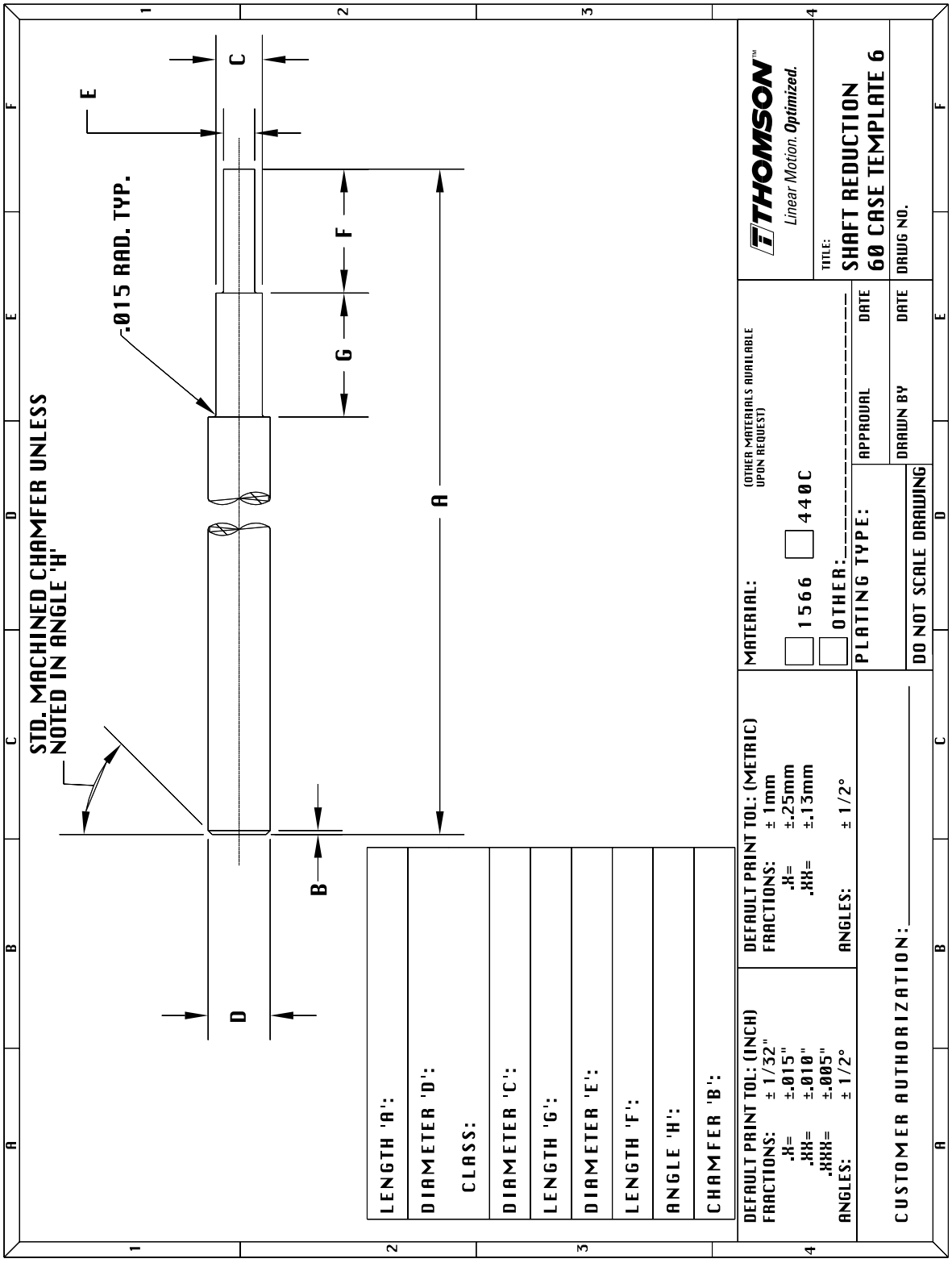



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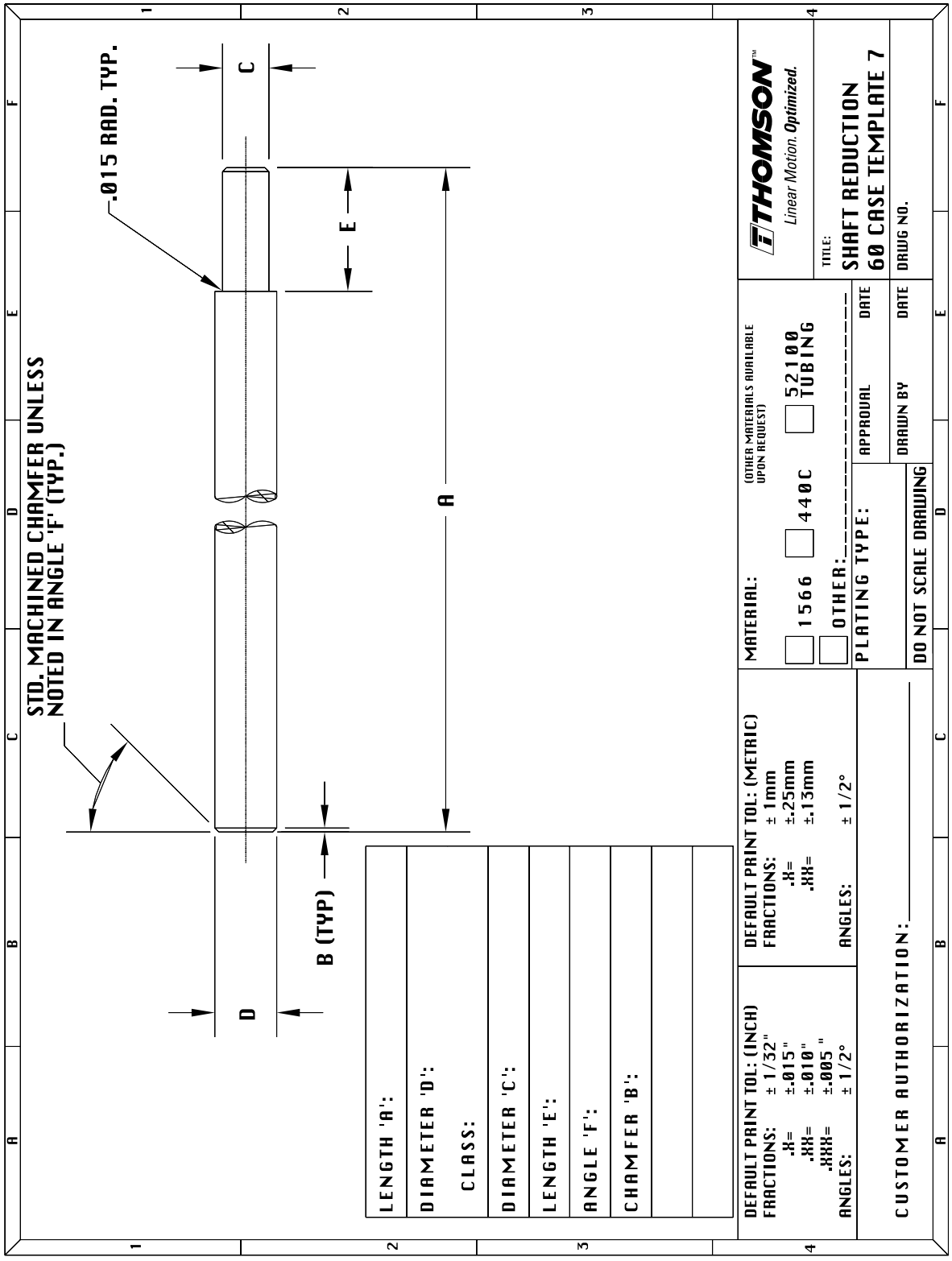


## Special Machining



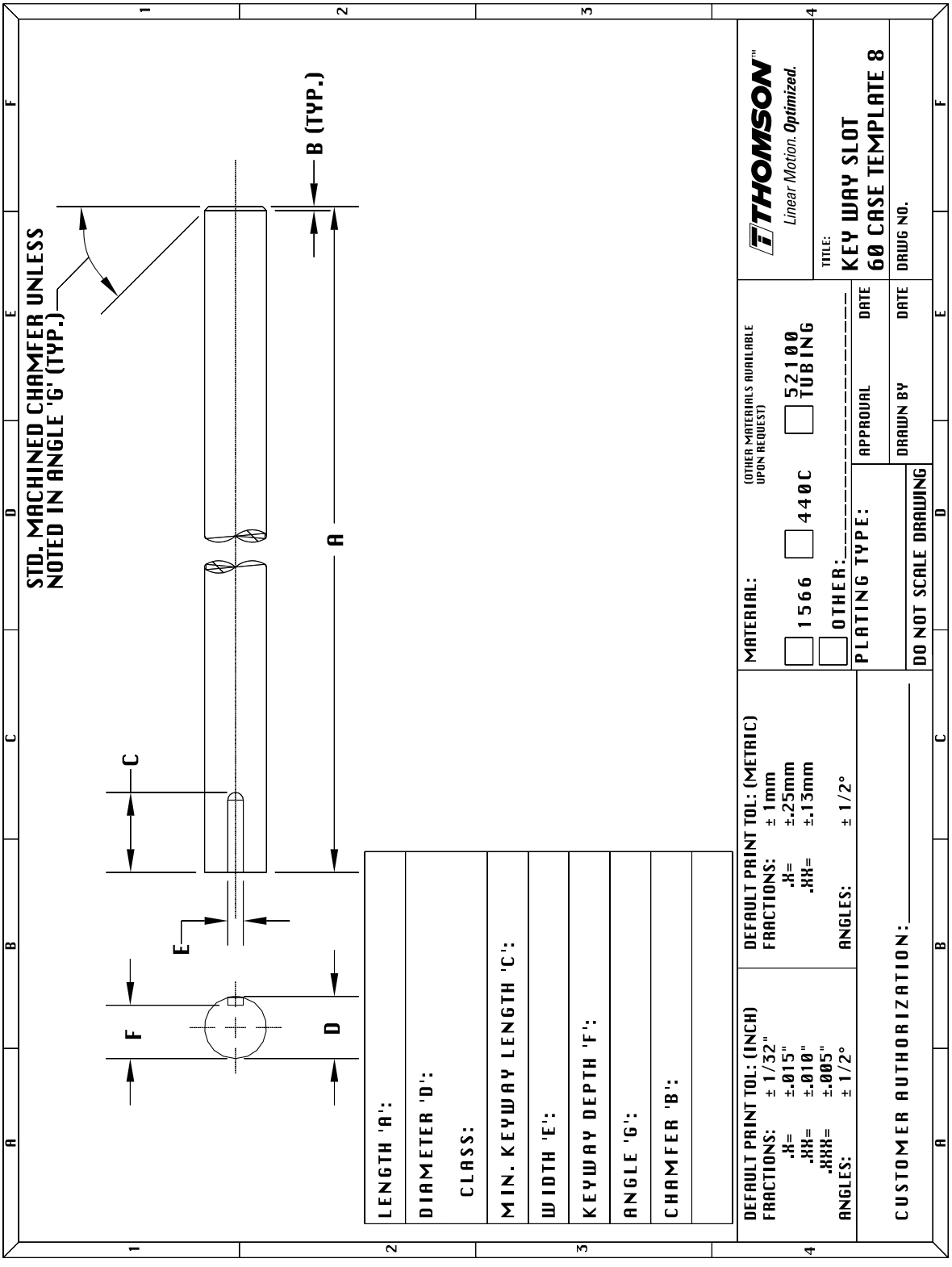

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## Special Machining



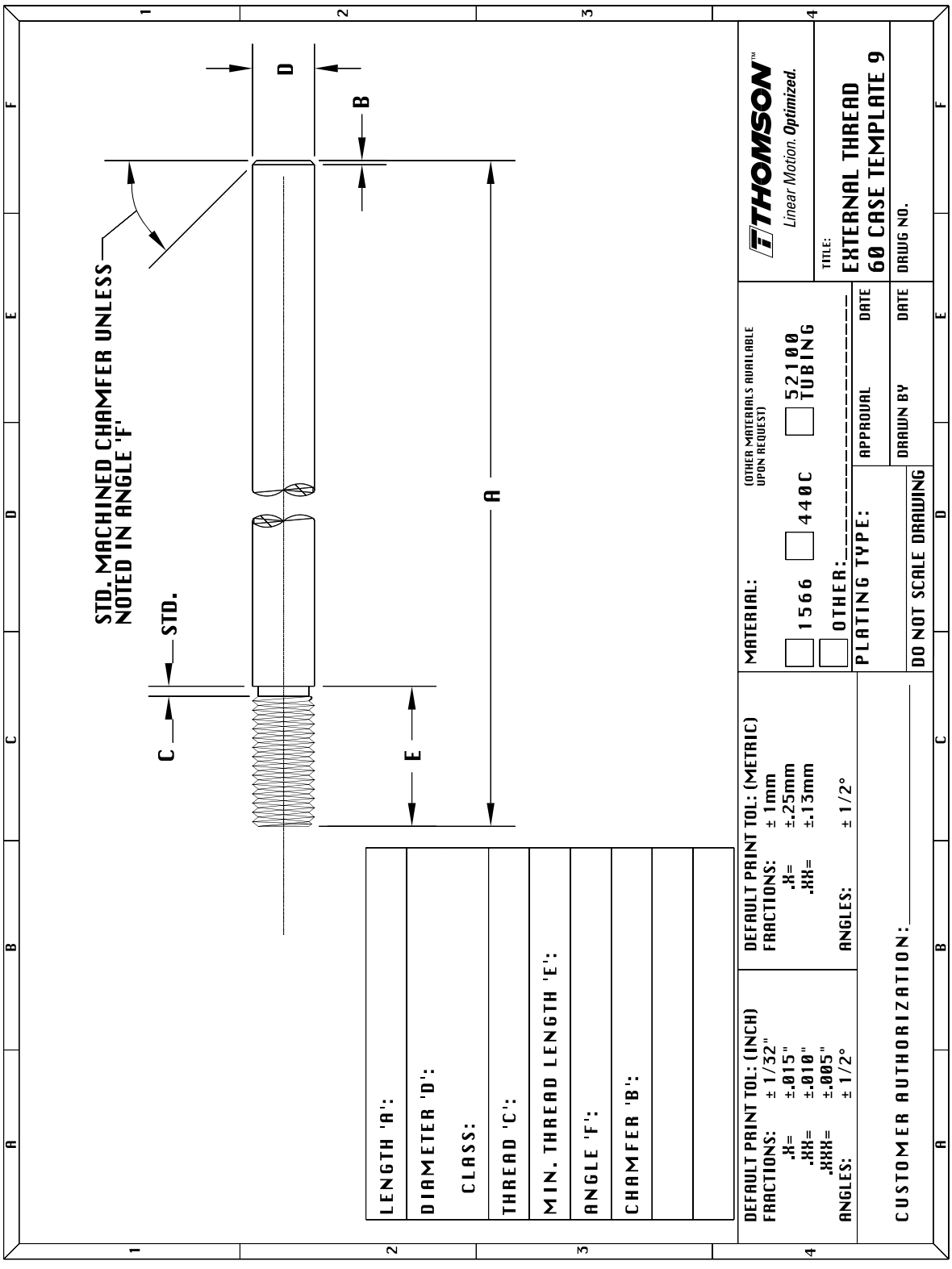

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## Special Machining



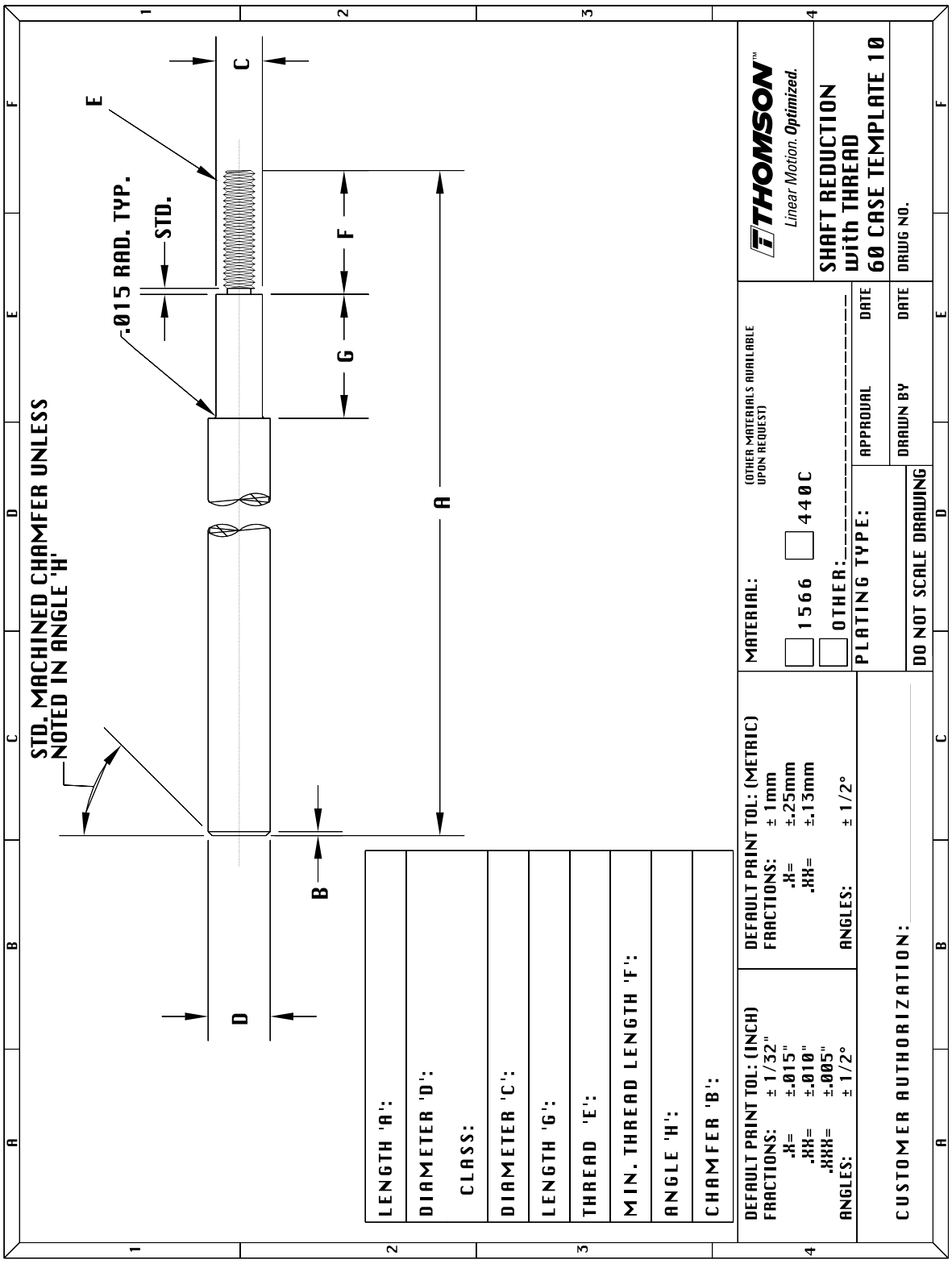

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## Special Machining



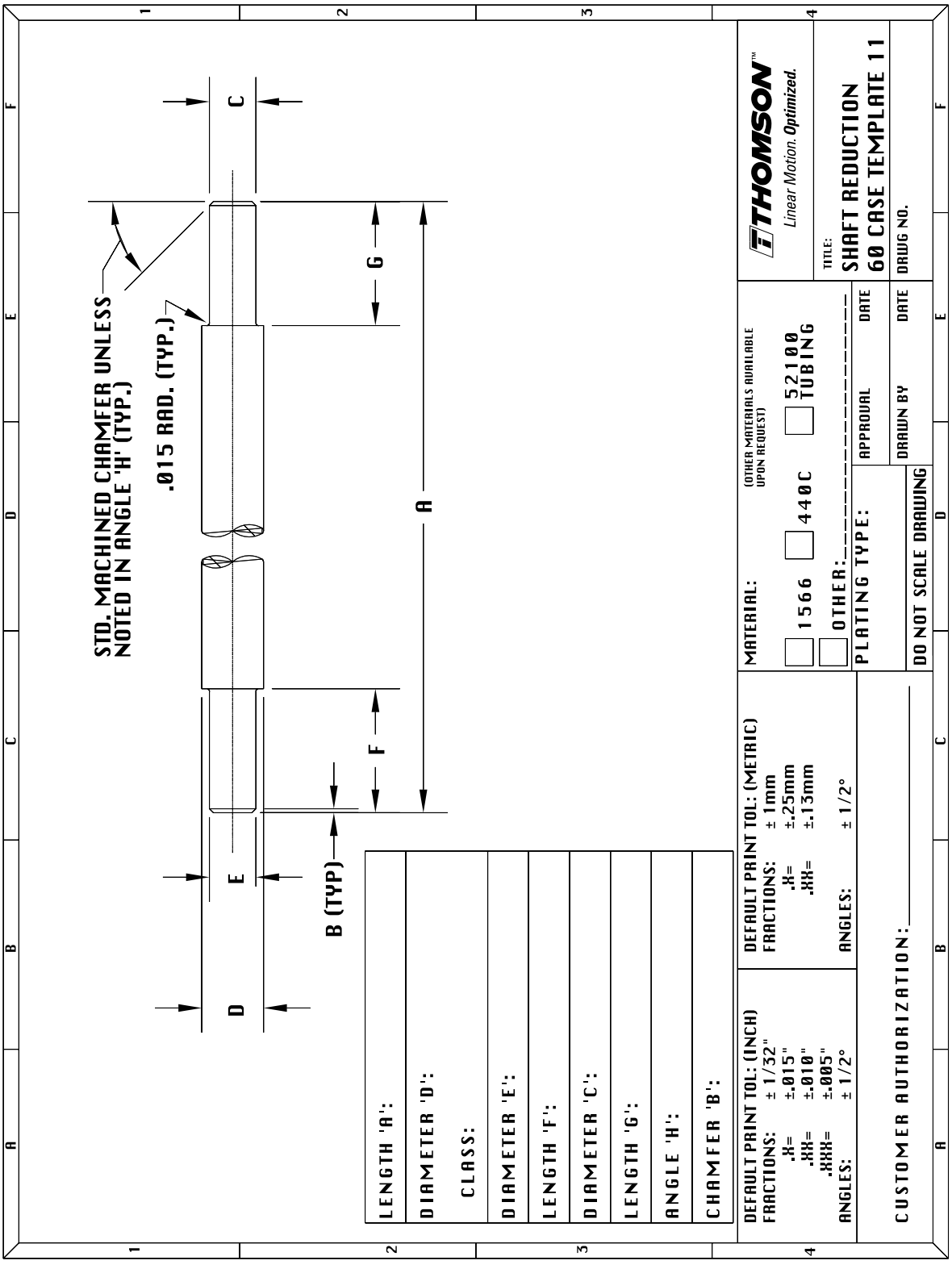

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## Special Machining



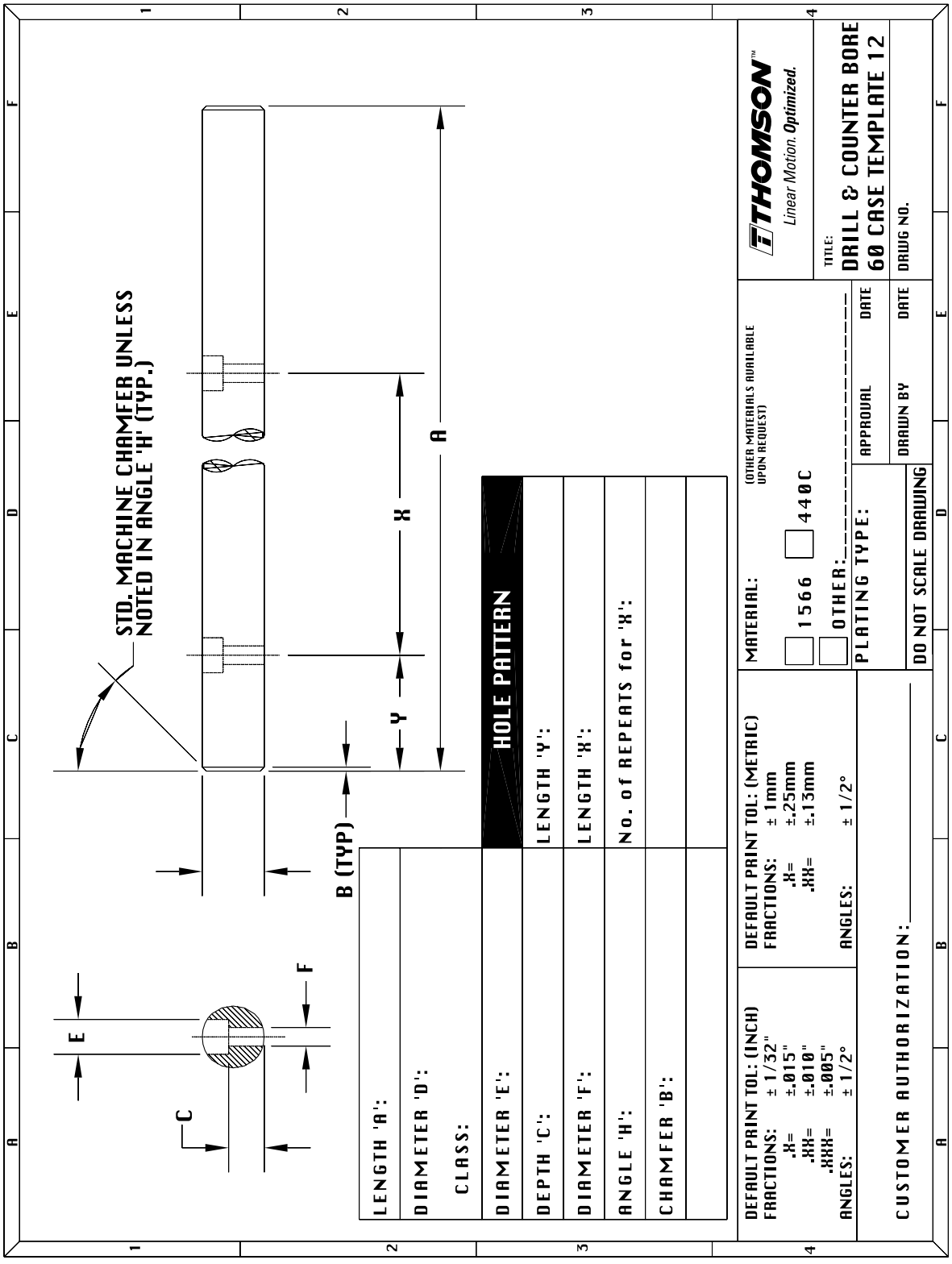

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## Special Machining



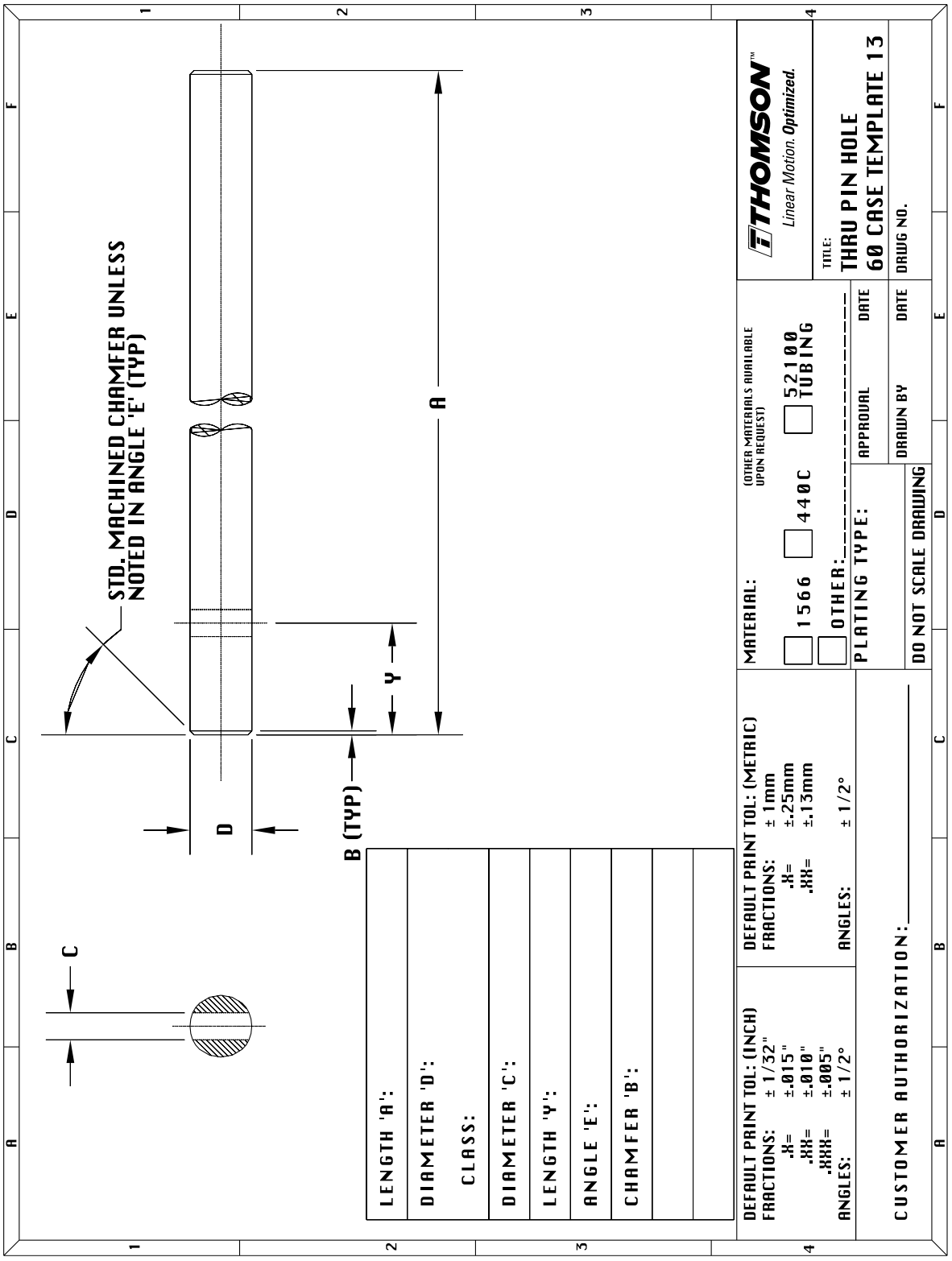

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## Special Machining



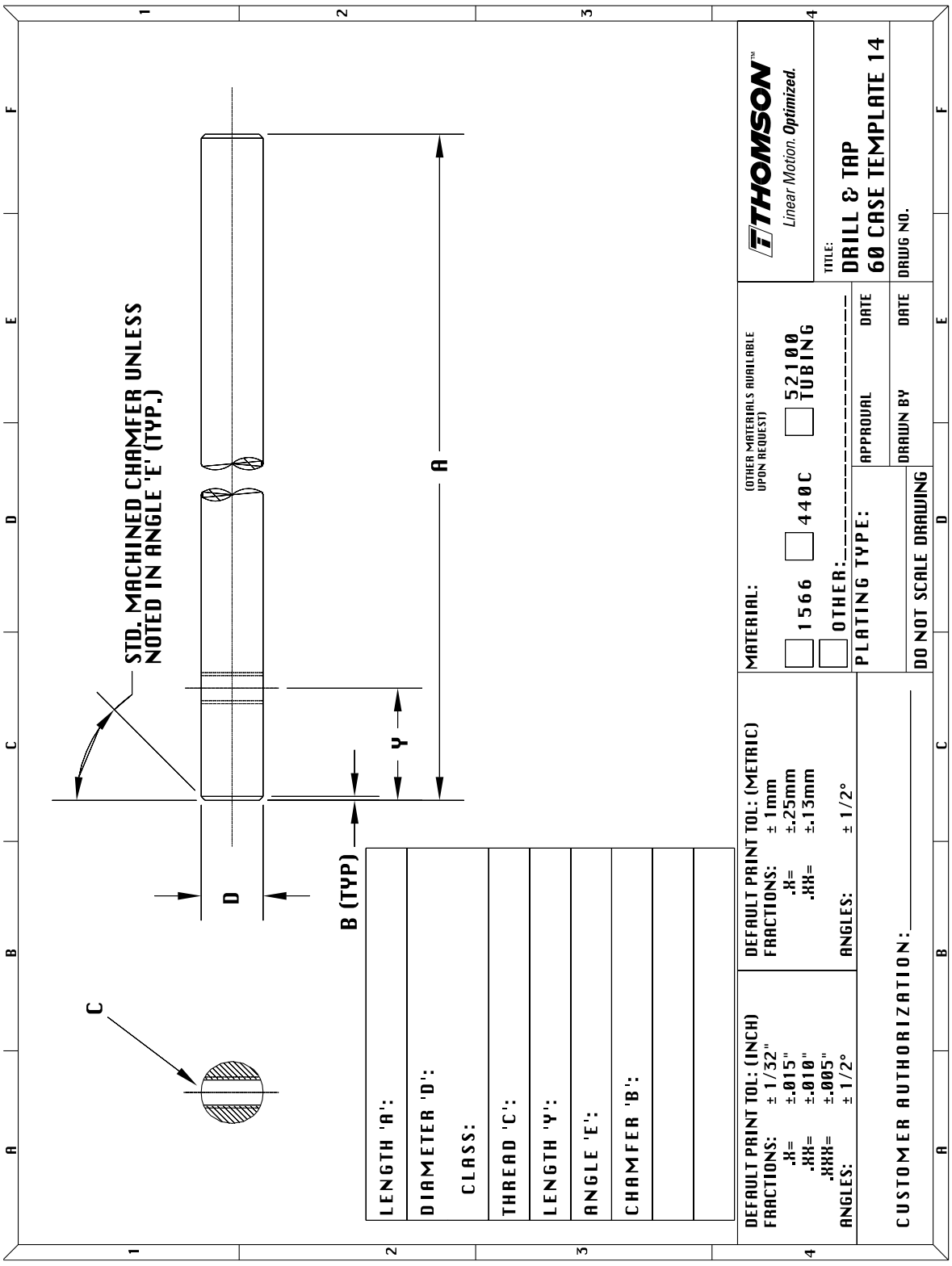

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## Special Machining



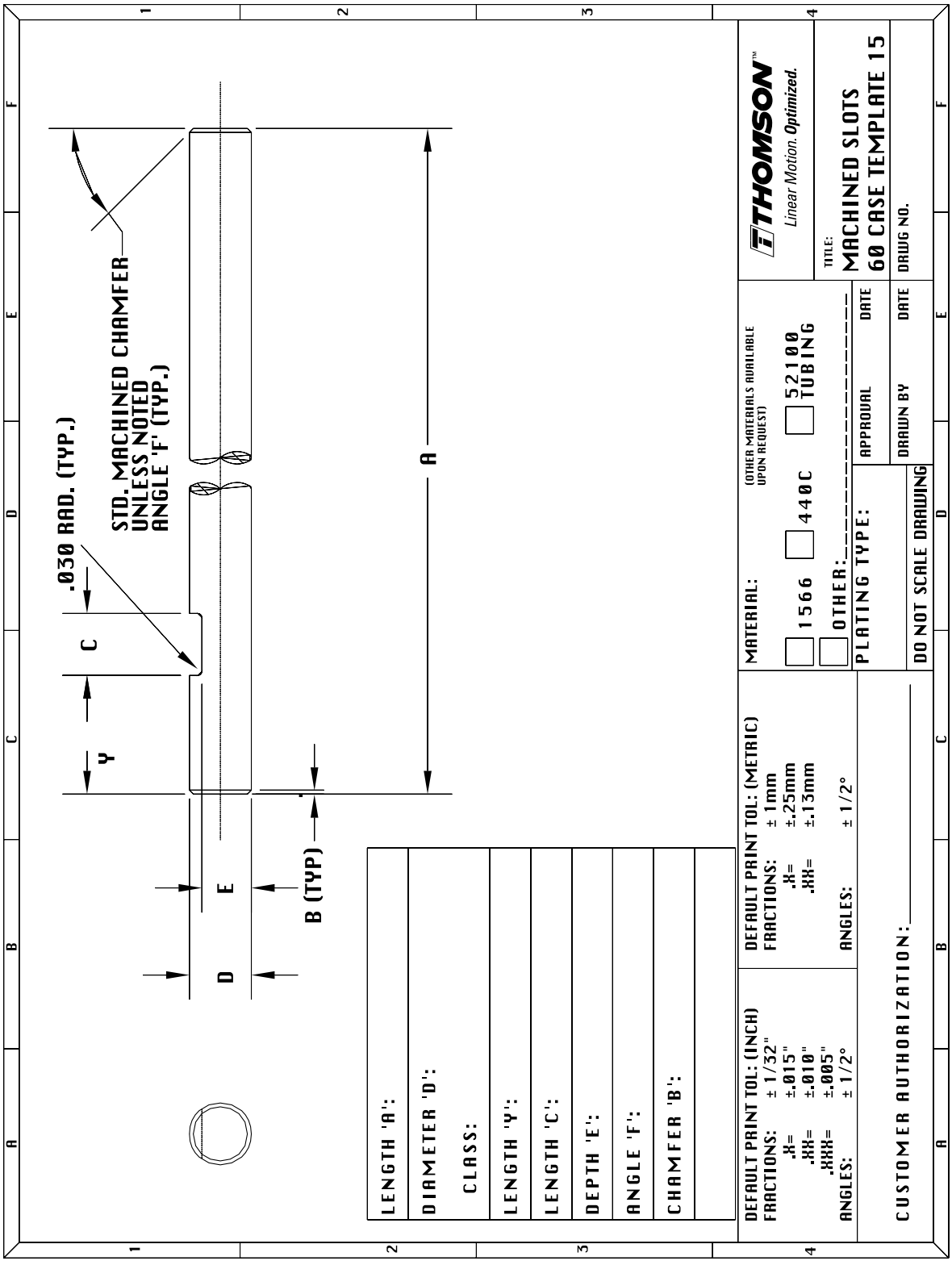

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## Special Machining



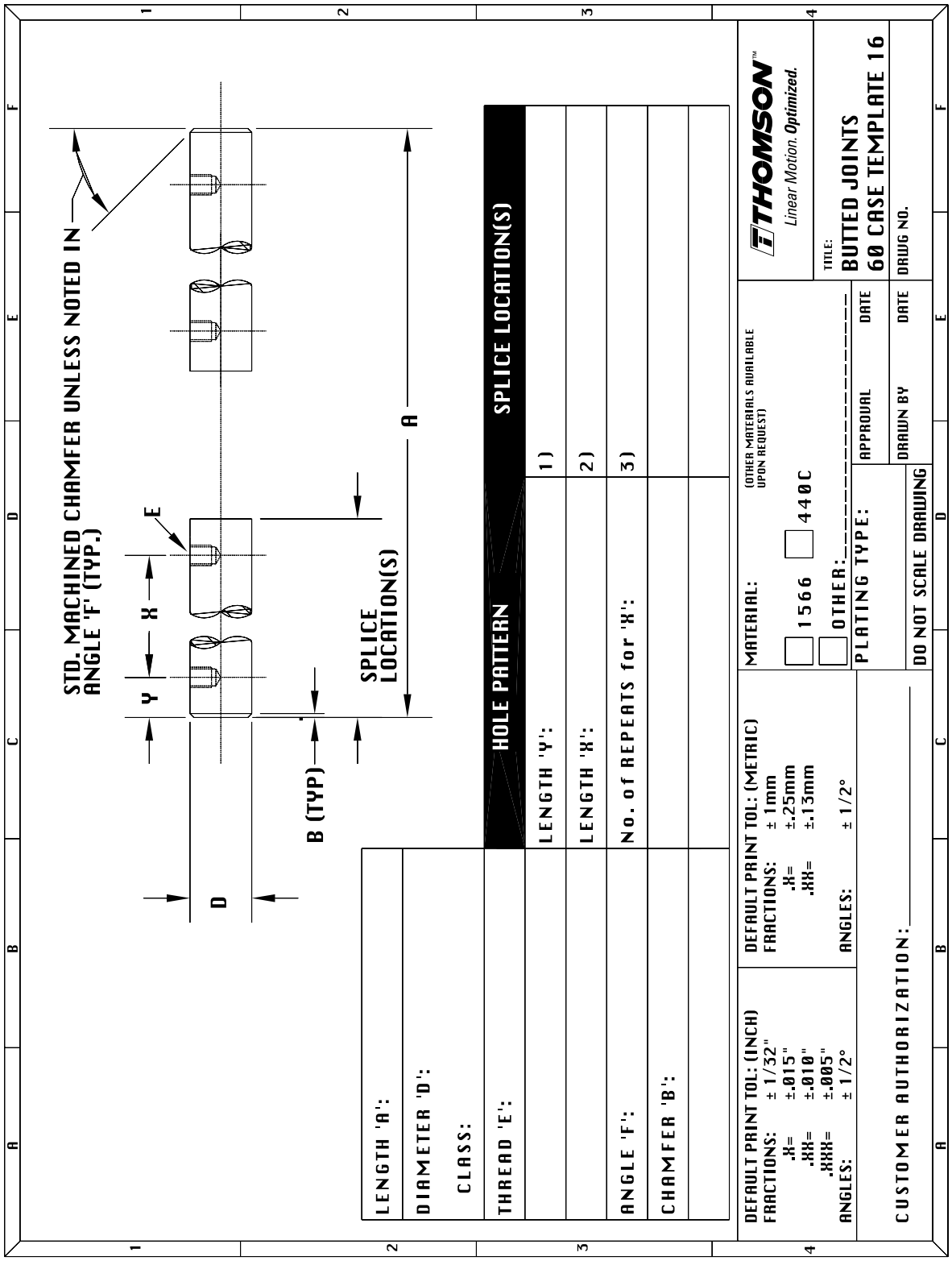

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## Special Machining



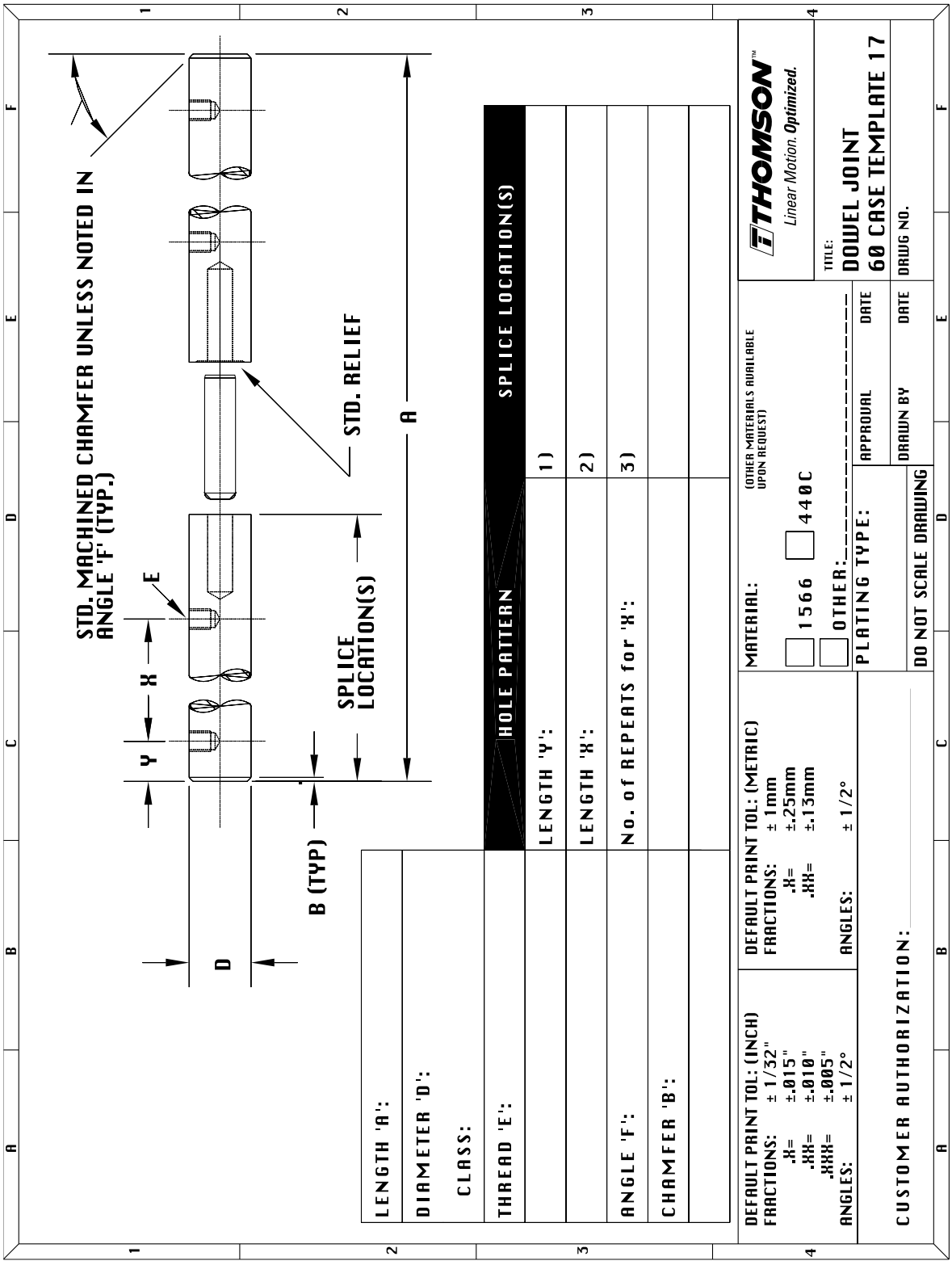

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## Special Machining



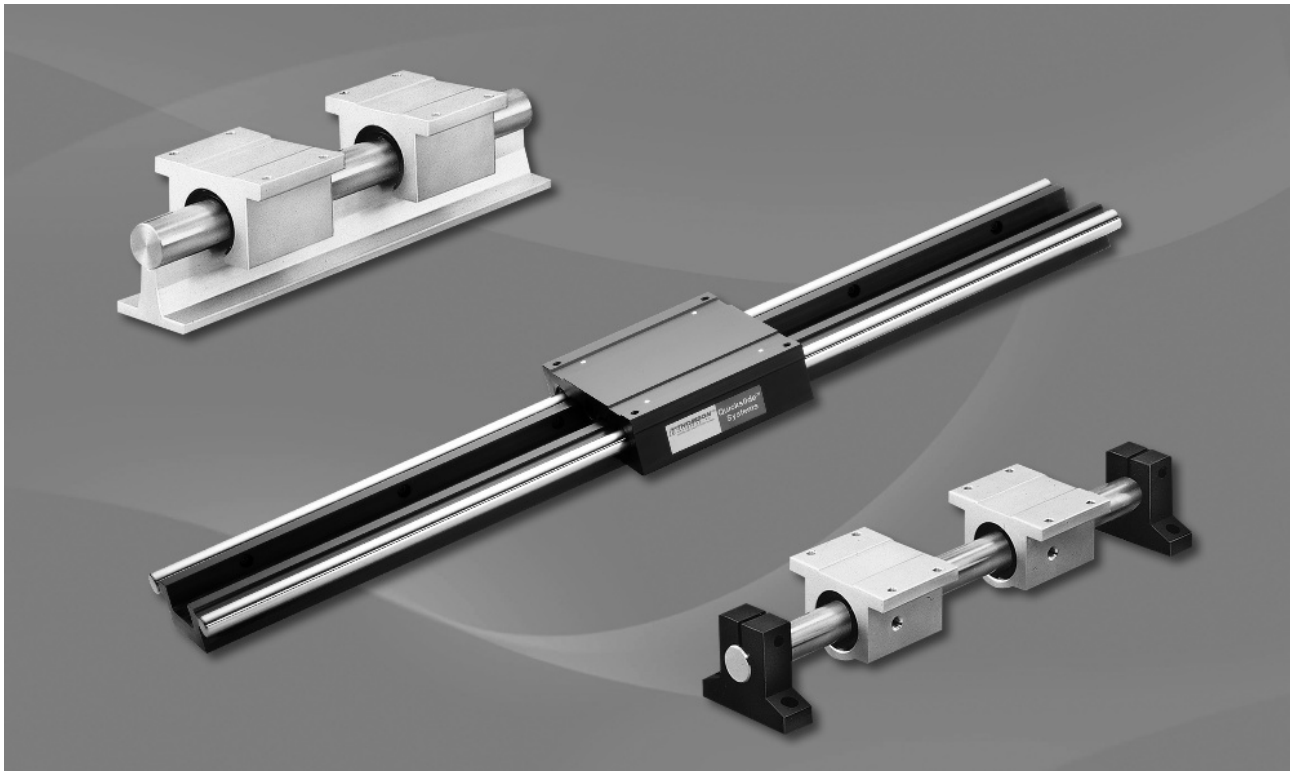

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## Special Machining




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# RoundRail Linear Guides

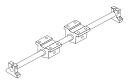
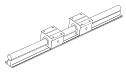
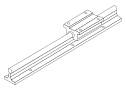
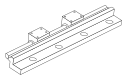
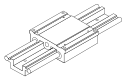
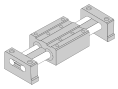


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Side Mounted 1DA. ..... 233 - 234
Dual Shaft Rail 2DA ..... 236 - 237
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RoundRail Linear Guides are the non-driven building blocks for linear slide tables. They offer the end user flexiblity to fit specific envelopes by allowing customized separations between shafts and between bearings on shafts to produce higher moment capacity. When combined with ballscrew assemblies, they become a driven slide table.

Because RoundRail Linear Guides are offered in a wide range of sizes, bearing types, and mounting configurations, they are typically selected by the qualitative attributes that are most appropriate for a given application (i.e. environmental considerations, mounting footprint). For this reason, we are providing the following selection chart and selection criteria for consideration:

## Systems Quick Reference Guide

| Application Criteria | | End Support | Continuous Support | FluoroNyliner | Side Mounted | Dual Shaft Rail | Twin Shaft Web |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  |  |
| | | 1BA / 1NA | 1 CA / 1PA | 1 VA | 1 DA | 2DA | 2CA |
| High Loads | | | • | • | | | |
| Equivalent Loads in All Directions | | • | | | | • | |
| Ultra Compactness | | • | | | | | • |
| Extreme Smoothness | | • | • | | • | | • |
| End Supported | | • | | | | • | • |
| Single Rail | | | | | | | • |
| Harsh Environment | | | | • | | | |
| Low Cost Installation (multiple rail) | | • | • | • | • | | |
| Complete Axis Solution | | | | | | | • |
| Available Sizes: | Inch | 4 thru 24 | 8 thru 24 | 8 thru 24 | • | • | |
| | Metric | 8 thru 40 | 12 thru 40 | | 8 thru 16 | 8 thru 16 | 8 thru 16 |
| Page Number | | 220/222 | 225/227 | 230 | 233 | 236 | 239 |

## Linear Guide Selection Criteria

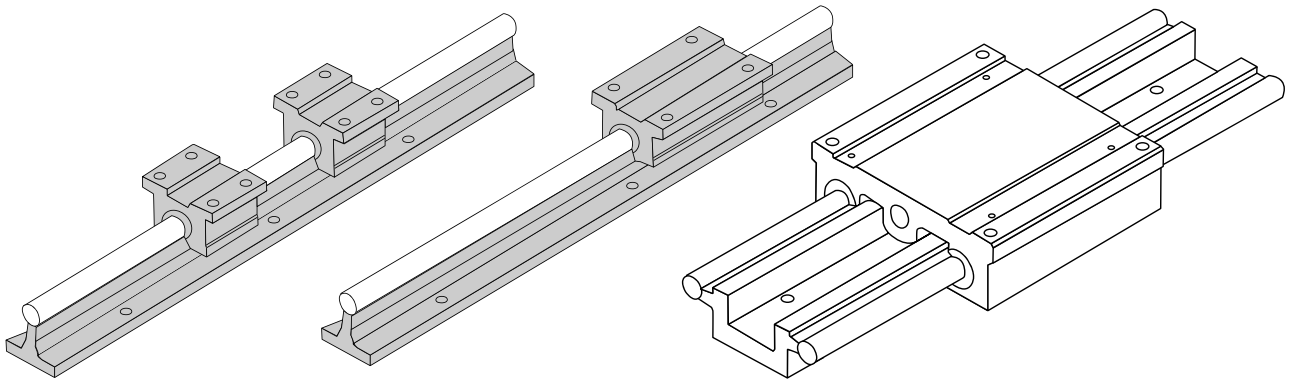
- Load/Life
- Travel Accuracy
- Rigidity
- Smoothness of Travel
- Speed & Acceleration
- Envelope
- Environment
- Cost of Product
- Cost of Installation
- Cost of Replacement

## Application Examples

- Machine Tools
- Packaging Machinery
- Automotive Assembly Equipment
- Semiconductor Equipment
- Medical Equipment
- Food Processing Equipment

# RoundRail Linear Guides

**Thomson RoundRail Linear Guide products offer:**



Pre-assembled, ready to install stages providing low friction, smooth, accurate motion for a wide range of moment or normal loading configurations. Market applications include factory automation, medical, packaging, machine tool, semiconductor, printing, automotive assembly, aerospace and food processing. Slide tables are available as customizable linear guides to multiaxis, turnkey systems complete with motors, drives, controls and electromechanical accessories.

- Applications-typically on factory machinery where accurate, smooth linear positioning is required
- Available with servo/stepper motor & drive packages
- Max thrust to 3100 lb
- Strokes to 120"
- Loads from 5 - 2000 lb
- Repeatability to 0.0002"

Linear Guides are the non-driven building blocks for linear slide tables. They offer the end user flexibility to fit specific envelopes by allowing customized separations between shafts and between bearings on shafts to produce higher moment capacity. When combined with ballscrew assemblies, they become a driven slide table.

Because RoundRail Linear Guides are offered in a wide range of sizes, bearing types, and mounting configurations, they are typically selected by the qualitative attributes that are most appropriate for a given application (i.e. environmental considerations, mounting footprint). For this reason, we are providing the following selection chart and selection criteria for consideration:

## RoundRail Linear Guide Selection Criteria

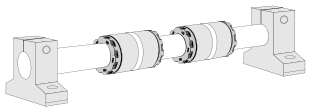
- Load/Life
- Travel Accuracy
- Rigidity
- Smoothness of Travel
- Speed & Acceleration
- Envelope
- Environment
- Cost of Product
- Cost of Installation
- Cost of Replacement

## Application Examples

- Machine Tools
- Packaging Machinery
- Automotive Assembly Equipment
- Semiconductor Equipment
- Medical Equipment
- Food Processing Equipment

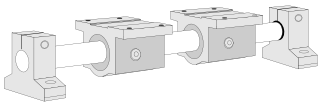
## RoundRail Linear Guides

# Super Smart Ball Bushing Bearings and Pillow Blocks
### for End Supported Applications



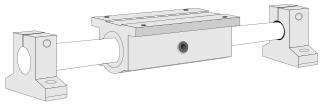
**Super Smart Ball Bushing Bearings (Closed Type) Features:**

- Available in sizes 1/2 to 1 1/2 inch diameters.
- Load capacity range from 265 to 3,880 $lb_f$.
- Available with one, two or without integral double lip wipers.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a customized housing.
- Travel speeds up to 10 ft/s.
- Interchangeable with the industry standard Thomson Super Ball Bushing bearing.



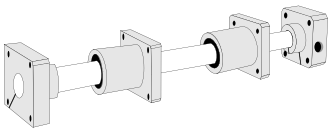
**Super Smart Ball Bushing Pillow Blocks (Closed & Adjustable Type) Features:**

- Available in sizes 1/2 to 1 1/2 inch diameters.
- Load capacity range from 265 to 3,880 $lb_f$.
- Available with standard integral double acting seals.
- Available with or without adjustment capability.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Pillow Blocks.



**Super Smart Ball Bushing Twin Pillow Blocks (Closed & Adjustable Type) Features:**

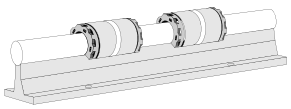
- Available in sizes 1/2 to 1 1/2 inch diameters.
- Load capacity range from 530 to 7,760 $lb_f$.
- Available with standard integral double acting seals.
- Available with or without adjustment capability.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Easily mounted and secured with four mounting bolts.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Twin Pillow Block.



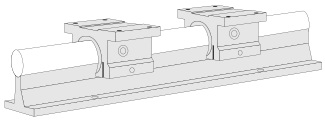
**Super Smart Ball Bushing Flanged Single and Twin Pillow Blocks Features:**

- Available in sizes 1/2 and 1 1/2 inch diameters.
- Load capacity range from 265 to 7,760 $lb_f$.
- Available with standard integral double acting seals.
- Without adjustment capability.
- Can be mounted perpendicular to table surface.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Flanged Single and Twin Pillow Block.

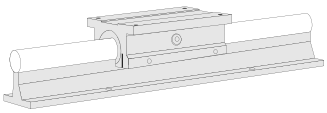
# Super Smart Ball Bushing Bearings and Pillow Blocks
## (Open Type) for Continuously Supported Applications



**Super Smart Ball Bushing bearing (Open Type) Features:**
- Available in sizes 1/2 to 1 1/2 inch diameter.
- Load capacity range from 360 to 3,880 $lb_f$.
- Pull off load capacity range from 250 to 1,750 $lb_f$.
- Available with one, two or without double lip integral wipers.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a customized open style pillow block.
- Travel speeds up to 10 ft/s.
- Interchangeable with the industry standard Thomson Super Ball Bushing bearing (Open type).



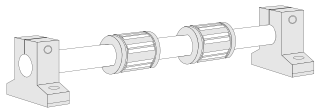
**Super Smart Ball Bushing Pillow Blocks (Open Type) Features:**
- Available in sizes 1/2 to 1 1/2 inch diameter.
- Load Capacity range from 360 to 3,880 $lb_f$.
- Pull off load capacity range from 250 to 1,750 $lb_f$.
- Available with standard double acting integral seals.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication access.
- Interchangeable with the industry standard Thomson Super Ball Bushing Pillow Block (Open Type).



**Super Smart Ball Bushing Twin Pillow Blocks (Open Type) Features:**
- Available in sizes 1/2 to 1 1/2 inch diameter.
- Load Capacity range from 720 to 7,760 $lb_f$.
- Pull off load capacity range from 500 to 3,500 $lb_f$.
- Available with standard double acting integral seals.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication access.
- Interchangeable with the industry standard Thomson Super Ball Bushing Twin Pillow Block (Open Type).

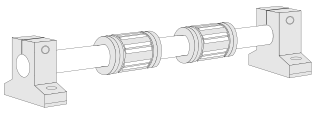
## RoundRail Linear Guides

# Super Ball Bushing Bearings and Pillow Blocks
### for End Supported Applications



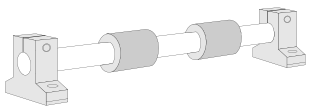
**Super Ball Bushing Bearings (Closed type) Features:**

- Available in sizes 3/16 to 2 inch diameter.
- Load Capacity range from 35 to 3,000 $lb_f$.
- Self-aligning in all directions.
- Can be mounted in a custom housing.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



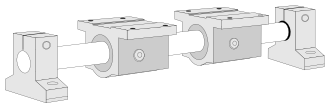
**Sealed Super Ball Bushing Bearings (Closed type) Features:**

- Integral double acting seals retain lubrication and keep out contamination.
- Available in sizes 1/2, 3/4 and 1 inch nominal diameter.
- Load capacity range from 255 to 1,050 $lb_f$.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



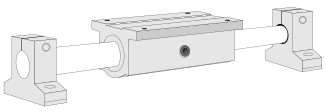
**Super Ball Bushing Cartridge Bearings Features:**

- Available in sizes 1/4, 3/8 and 1/2 inch diameter.
- Can be easily installed into a soft or slightly out-of-round housing.
- Available in both single or twin versions and with or without integral double acting seals.
- Single versions are self-aligning in all directions.
- Twin versions minimize installation time and cost.
- Available with corrosion resistant components.



**Super Ball Bushing Pillow Blocks (Closed and Adjustable Type) Features:**

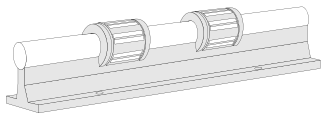
- Available in sizes 1/4 to 2 inch diameter.
- Load capacity range between 60 and 3,000 $lb_f$.
- Available with standard integral double acting seals.
- Travel speeds up to 10 ft/s.
- Available with or without diameter adjustment capability.
- Easily mounted and secured with four mounting bolts (sizes 1/4 and 3/8 secured with two mounting bolts).
- Available with a standard lubrication access.



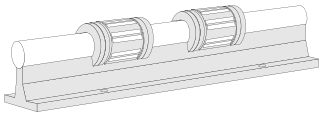
**Super Ball Bushing Twin Pillow Blocks (Closed and Adjustable Type) Features:**

- Available in sizes 1/4 to 1 1/2 inch diameter.
- Load capacity range between 120 and 4,000 $lb_f$.
- Available with standard integral double acting seals.
- Travel speeds up to 10 ft/s.
- Available with or without diameter adjustment capability.
- Easily mounted and secured with four mounting bolts.
- Available with a standard lubrication access.

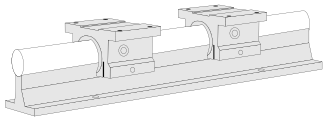
# Super Ball Bushing Bearings and Pillow Blocks
## (Open Type) for Continuously Supported Applications



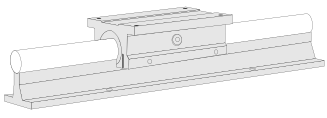
**Super Ball Bushing Bearings (Open Type) Features:**
- Available in sizes 1/2-2 inch diameter.
- Load capacity ranges from 230 to 2,350 $lb_f$.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in customized housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



**Sealed Super Ball Bushing Bearings (Open Type) Features:**
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Available in sizes 1/2, 3/4 and 1 inch diameter.
- Load capacity ranges from 230 to 780 $lb_f$.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in customized housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



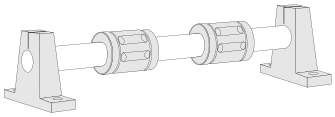
**Super Ball Bushing Pillow Blocks (Open Type) Features:**
- Available in sizes 1/2-2 inch diameter.
- Load capacity ranges from 230 to 2,350 $lb_f$.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Available with corrosion resistant components.
- Easily mounted and secured with four mounting bolts.
- Available with standard lubrication access. Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.



**Super Ball Bushing Twin Pillow Blocks (Open Type) Features:**
- Available in sizes 1/2-1 1/2 inch diameter.
- Load capacity ranges from 460 to 3,120 $lb_f$.
- Can be adjusted to take out diametrical clearance.
- Available with corrosion resistant components.
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Easily mounted and secured with four mounting bolts.
- Maximum travel speeds up to 10 ft/s.
- Available with standard lubrication access. Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.
- Built-in lubrication wick for continuous lubrication.

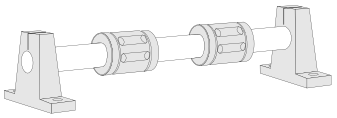
## RoundRail Linear Guides

# Precision Steel Ball Bushing Bearings and Pillow Blocks
## for End Supported Applications



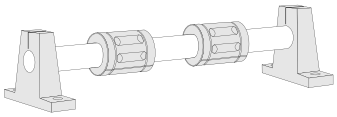
**Precision Steel Ball Bushing Bearings (Closed type) Features:**

- Coefficient of friction as low as .001.
- Load capacity range from 19 to 5,000 $lb_f$.
- High operating temperature capability.
- Available in sizes 1/4 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available in corrosion resistant stainless steel for diameters up to 1 inch
- All steel construction for increased rigidity.
- Sizes 1/2, 3/4 and 1 inch available with integral, double acting wipers.



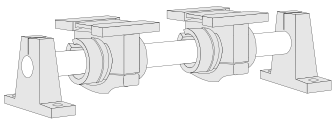
**Extra Precision Steel Ball Bushing Bearings (Closed type) Features:**

- Increased precision for high accuracy positioning and repeatability
- Coefficient of friction as low as .001.
- Load capacity range from 19 to 5,000 $lb_f$.
- High operating temperature capability.
- Available in sizes 1⁄4 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available in corrosion resistant stainless steel for diameters up to 1 inch.
- All steel construction for increased rigidity.
- Sizes 1/2, 3/4 and 1 inch available with integral, double acting wipers.



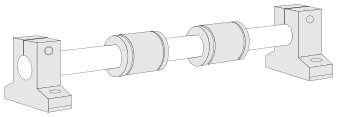
**Adjustable Precision Steel Ball Bushing Bearings (Closed Type) Features:**

- Adjustment capability provides minimum 60 Case LinearRace shaft and bearing clearance for improvements in positioning accuracy and repeatability.
- Coefficient of friction as low as .001.
- Load capacity range from 85 to 5,000 $lb_f$.
- High operating temperature capability.
- Available in sizes 1⁄2 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- All steel construction for increased rigidity.
- Available in corrosion resistant stainless steel for diameters up to 1 inch.



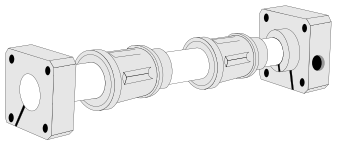
**Precision Steel Ball Bushing Pillow Blocks (Closed and Adjustable Type) Features:**

- Coefficient of friction as low as .001.
- Load capacity range from 85 to 1,100 $lb_f$.
- High operating temperature capability.
- Available in sizes 1⁄2 to 2 inch bore diameter.
- Self-aligning for easy installation.
- Travel speeds up to 10 ft/s.
- Pillow Blocks are available with corrosion resistant stainless steel Ball Bushing bearings up to 1 inch.
- Easily mounted and secured with four mounting bolts.
- All metal construction for increased rigidity.
- Available with integral, double acting seals.
- Adjustment capability provides minimum 60 Case LinearRace and bearing clearance for improvements in positioning accuracy and repeatability.



**Miniature Instrument Ball Bushing Bearings Features:**

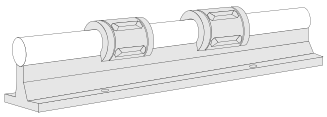
- Available in sizes 1/8, 3/16 and 1/4 inch bore diameter.
- Available with a matched 60 Case LinearRace
- Coefficient of friction as low as .001.
- Compact size for low inertia and weight.
- Precision bearing balls, sleeve and 60 Case LinearRace manufactured of corrosion resistant stainless steel.
- Load Capacity range between 7 and 19 $lb_f$.



**Die Set Ball Bushing Bearings Features:**

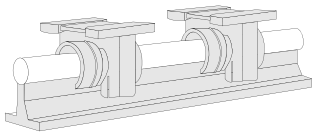
- Available in sizes 1, 1 1⁄4, 1 1⁄2 and 2 inch bore diameter.
- Load Capacity range between 350 and 1,100 $lb_f$.
- All steel construction for maximum rigidity.
- Travel speeds up to 10 ft/s.
- Easily mounted by simply bolting toe clamps in place.
- Can be mounted perpendicular to mounting surface.
- High operating temperature capability.
- Coefficient of friction as low as .001.

# Precision Steel Ball Bushing Bearings and Pillow Blocks
## (Open Type) for Continuously Supported Applications



**Precision Steel Ball Bushing Bearings (Open type) Features:**

- Coefficient of friction as low as .001.
- Load Capacity range from 60 to 3,800 $lb_f$.
- Can be mounted in a custom housing.
- Available in sizes 1⁄2 to 4 inch diameter.
- All steel construction for maximum rigidity.
- Can be adjusted to remove clearance between the Ball Bushing bearing and 60 Case LinearRace.
- Available in corrosion resistant stainless steel in sizes up to 1 inch diameter.
- Travel speeds up to 10 ft/s.
- High operating temperature capability.
- Available with corrosion resistant components.

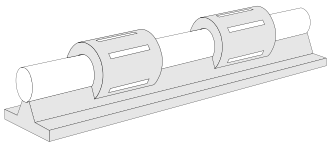


**Precision Steel Ball Bushing Bearings and Pillow Blocks (Open type) Features:**

- Self-aligning for easy installation.
- Easily secured to table surface with four mounting bolts.
- Coefficient of friction as low as .001.
- Load capacity range from 60 to 860 $lb_f$.
- Available in sizes 1⁄2 to 2 inch diameter.
- Available with seals at both ends.
- All steel construction for maximum rigidity.
- Can be adjusted to remove clearance between the Ball Bushing bearing and 60 Case LinearRace.
- Available with corrosion resistant stainless steel Ball Bushing bearing in sizes up to 1 inch diameter.
- Travel speeds up to 10 ft/s.

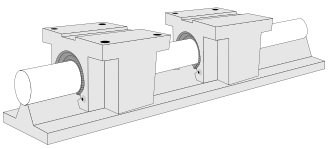
## RoundRail Linear Guides

# XR Ball Bushing bearing Products
### for Continuously Supported Applications



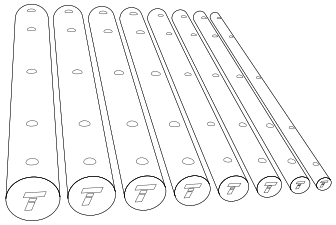
**XR Ball Bushing Bearings Features:**

- Available in sizes 2 and 3 inch bore diameter.
- Load capacity range from 4,500 to 10,000 $lb_f$.
- Pull of load capacity range between 2,100 to 8,000 $lb_f$.
- Can be mounted in a custom housing.
- Travel speeds up to 5 ft/s.
- System accelerations up to 160 $ft/s^2$.



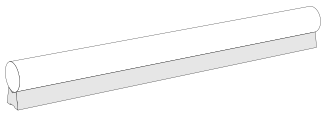
**XPBO Ball Bushing Pillow Blocks Features:**

- Available in 2 and 3 inch diameter sizes.
- Load capacity range from 4,500 to 10,000 $lb_f$.
- Pull of load capacity range between 2,100 to 4,500 $lb_f$.
- Easily secured to table or carriage surface with four mounting bolts.
- Travel speeds up to 5 ft/s.
- System accelerations up to 160 $ft/s^2$.
- When used with XL 60 Case LinearRace internal clearance is minimized.
- Integral double acting seals at both ends.



**XL 60 Case LinearRace Features:**

- Case hardness to 60 HRC minimum.
- Surface finish is 8 Ra microinch for 2 and 3 inch diameter and 10 Ra microinch for 4 inch diameter.
- Roundness 80 millionths of an inch.
- Straightness of .0005 inch per foot (.001 TIR) cumulative.
- Available with standard radial drilled and tapped holes.
- Minimum depth of hardness is .100 inch.

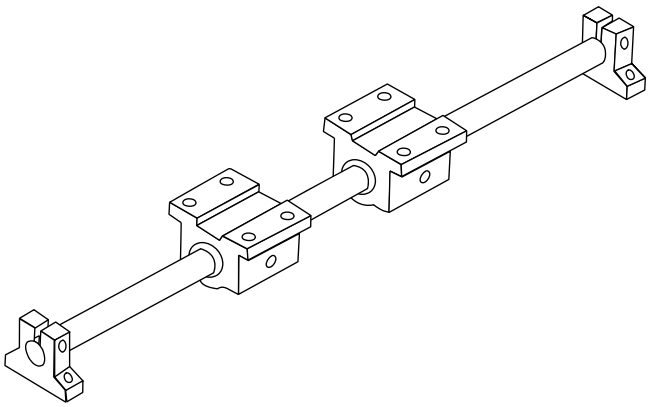


**XSR 60 Case LinearRace Support Rails Features:**

- All ductile iron, heavy duty design and construction.
- Available in 2 and 3 inch diameter sizes.
- Equipped with drilled thru and counterbored base mounting holes.
- Can be pre-assembled with a 60 Case LinearRace for quick and easy installation.
- Precision ground surfaces for 60 Case LinearRace and base mounting.
- Reference edge for ease of installation.

# End Support Linear Ball Guides

**Easy to install, smooth operation, self-aligning, high speed**



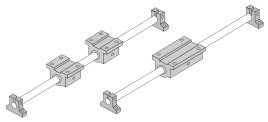
**End Support Linear Ball Guides Offer:**

- Increased life within the same envelope. RoundRail linear guides feature the new patented Super Smart Ball Bushing Bearings for up to 216X the life or 6X the load capacity of conventional bearings.
- Cost savings: save time and money preparing your mounting surfaces before bolting down RoundRail linear guides
- End supported for gantry style or 'bridge' applications
- The RoundRail Advantage. The inherent self-aligning-in-all-directions design of the Super Smart Ball Bushing bearing allows for ultra smooth travel when mounted to wider toleranced prepared surfaces
- The Super Smart Ball Bushing bearing... the most technologically advanced and most robust linear bearing in the world
- Corrosion resistant versions for maximum performance in harsh environments.

## RoundRail Linear Guides

# End Support 1BA

### End Supported, Industry Standard Dimension Inch



**Features**

- Requires only one part number to specify entire linear guide.
- Available with 60 Case LinearRace Shaft end support blocks in either light weight aluminum or rigid iron materials
- Used to provide increased stability or torque resistance in linear system applications

**Components**

- 2 Super Smart Ball Bushing pillow blocks or 1 Super Smart Ball Bushing twin pillow block.
- 1 60 Case LinearRace shaft
- 2 shaft end support blocks

**Specifying this Thomson Linear Guide**

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

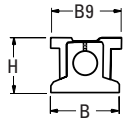
**Part Numbering System**

**1BA-12-AHO L24**

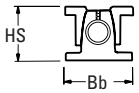
- **1BA** — Linear Guide Designation
- **12** — Nominal Diameter
- **A** — Type of Bearing Block
- **HO** — Type of Support
- **L24** — Linear Guide Length

**Dimensions (Inch)**

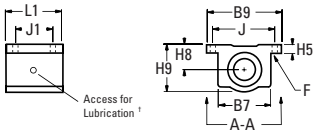
Type ASB End Support Block



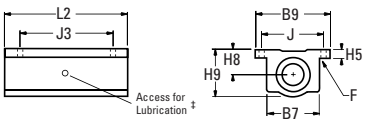

Type SB End Support Block




Type SSUPB Super Smart and SPB Super Ball Bushing Pillow Blocks

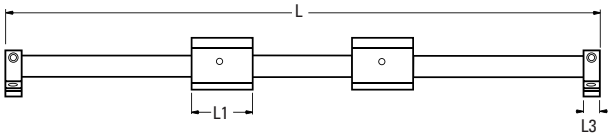



Type SSUTWN Super Smart and TWN Super Ball Bushing Twin Pillow Blocks

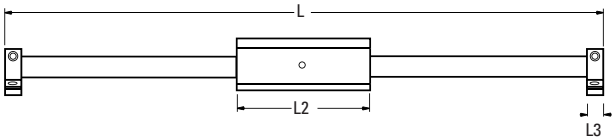



‡ Sizes .250, .375 and .500 have oil lubricant fitting. Sizes .625 and above have 1/4-28 access for lubrication.

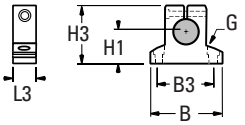
Single End Supported Linear Guide with 2 Pillow Blocks



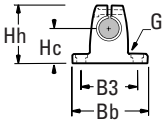

Single End Supported Linear Guide with 1 Twin Pillow Block



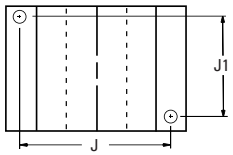

**Aluminum**
Type ASB LinearRace Shaft End Support Block




**Steel**
Type SB LinearRace Shaft End Support Block




Type SPB Super Ball Bushing Pillow Block Mounting Hole Position for Sizes .250 and .375




View A-A

# RoundRail Linear Guides

### End Support Linear Guide 1BA with 2 Pillow Blocks (Dimensions in inches)

| Part Number | | Nominal Diameter | L1 | L3 | H | HS | B | Bb | B9 | Pillow Block | Shaft Support | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Type ASB Shaft Supports | With Type SB Shaft Supports | | | | | | | | | | Type ASB | Type SB |
| 1BA-04-AHO | – | .250 | 1.19 | .50 | .937 | – | 1.50 | – | 1.63 | SPB-4-XS | ASB-4-XS | – |
| 1BA-06-AHO | – | .375 | 1.31 | .56 | 10.62 | – | 1.63 | – | 1.75 | SPB-6-XS | ASB-6-XS | – |
| 1BA-08-AHO | 1BA-08-AJO | .500 | 1.69 | .63 | 1.562 | 1.687 | 2.00 | 2.00 | 2.00 | SSPB-8-XS | ASB-8-XS | SB-8-XS |
| 1BA-12-AHO | 1BA-12-AJO | .750 | 2.06 | .75 | 2.062 | 2.187 | 2.50 | 2.75 | 2.75 | SSPB-12-XS | ASB-12-XS | SB-12-XS |
| 1BA-16-AHO | 1BA-16-AJO | 1.000 | 2.81 | 1.00 | 2.562 | 2.687 | 3.25 | 3.25 | 3.25 | SSPB-16-XS | ASB-16-XS | SB-16-XS |
| – | 1BA-20-AJO | 1.250 | 3.63 | 1.13 | – | 3.250 | – | – | 4.00 | SSPB-20-XS | – | SB-20-XS |
| 1BA-24-AHO | 1BA-24-AJO | 1.500 | 4.00 | 1.25 | 3.750 | 3.750 | 4.75 | 4.75 | 4.75 | SSPB-24-XS | ASB-24-XS | SB-24-XS |

### End Support Linear Guide 1BA with 1 Twin Pillow Block (Dimensions in inches)

| Part Number | | Nominal Diameter | L2 | L3 | H | HS | B | Bb | B9 | Max Stroke Length | Pillow Block | Shaft Support | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Type ASB Shaft Supports | With Type SB Shaft Supports | | | | | | | | | | | Type ASB | Type SB |
| 1BA-04-BHO | – | .250 | 2.50 | .50 | .937 | – | 1.50 | – | 1.63 | L-(3.50) | TWN-4-XS | ASB-4-XS | – |
| 1BA-06-BHO | – | .375 | 2.75 | .56 | 10.62 | – | 1.63 | – | 1.75 | L-(3.88) | TWN-6-XS | ASB-6-XS | – |
| 1BA-08-BHO | 1BA-08-BJO | .500 | 3.50 | .63 | 1.562 | 1.687 | 2.00 | 2.00 | 2.00 | L-(4.75) | SSUTWN-8-XS | ASB-8-XS | SB-8-XS |
| 1BA-12-BHO | 1BA-12-BJO | .750 | 4.50 | .75 | 2.062 | 2.187 | 2.50 | 2.75 | 2.75 | L-(6.00) | SSUTWN-12-XS | ASB-12-XS | SB-12-XS |
| 1BA-16-BHO | 1BA-16-BJO | 1.000 | 6.00 | 1.00 | 2.562 | 2.687 | 3.25 | 3.25 | 3.25 | L-(8.00) | SSUTWN-16-XS | ASB-16-XS | SB-16-XS |
| – | 1BA-20-BJO | 1.250 | 7.50 | 1.13 | – | 3.250 | – | – | 4.00 | L-(9.75) | SSUTWN-20-XS | – | SB-20-XS |
| 1BA-24-BHO | 1BA-24-BJO | 1.500 | 9.00 | 1.25 | 3.750 | 3.750 | 4.75 | 4.75 | 4.75 | L-(11.50) | SSUTWN-24-XS | ASB-24-XS | SB-24-XS |

Shaft Deflection Note: Load limit may be below the dynamic load rating due to shaft deflection. Bearings can accommodate up to 1/2° deflection. See Engineering section (page 257) for Deflection calculations.

### Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|---|
| 1BA-04-AHO | – | 100 | SPB-4-XS | 50 |
| 1BA-06-AHO | – | 160 | SPB-6-XS | 80 |
| 1BA-08-AHO | 1BA-08-AJO | 800 | SSPB-8-XS | 400 |
| 1BA-12-AHO | 1BA-12-AJO | 1800 | SSPB-12-XS | 900 |
| 1BA-16-AHO | 1BA-16-AJO | 3000 | SSPB-16-XS | 1500 |
| – | 1BA-20-AJO | 3730 | SSPB-20-XS | 1865 |
| 1BA-24-AHO | 1BA-24-AJO | 6160 | SSPB-24-XS | 3080 |

### Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|---|
| 1BA-04-BHO | – | 100 | TWN-4-XS | 100 |
| 1BA-06-BHO | – | 160 | TWN-6-XS | 160 |
| 1BA-08-BHO | 1BA-08-BJO | 800 | SSUTWN-8-XS | 800 |
| 1BA-12-BHO | 1BA-12-BJO | 1800 | SSUTWN-12-XS | 1800 |
| 1BA-16-BHO | 1BA-16-BJO | 3000 | SSUTWN-16-XS | 3000 |
| – | 1BA-20-BJO | 3730 | SSUTWN-20-XS | 3730 |
| 1BA-24-BHO | 1BA-24-BJO | 6160 | SSUTWN-24-XS | 6160 |

† Super Ball Bushing Bearings are used in .250 and .375 inch size pillow blocks.

## Replacement Component Dimensions

### Type SPB and SSUPB Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L1 | H9 | H8 | H5 | B9 | B7 | J | J1 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bolt | Hole | |
| SPB-4-XS | .250 | 1.19 | .81 | .437 | .19 | 1.63 | 1.00 | 1.31 | .75[2] | #6 | .16 | .10 |
| SPB-6-XS | .375 | 1.31 | .94 | .500 | .19 | 1.75 | 1.12 | 1.44 | .88[2] | #6 | .16 | .13 |
| SSPB-8-XS | .500 | 1.69 | 1.25 | .687 | .25 | 2.00 | 1.38 | 1.69 | 1.00 | #6 | .16 | .20 |
| SSPB-12-XS | .750 | 2.06 | 1.75 | .937 | .31 | 2.75 | 1.88 | 2.38 | 1.25 | #8 | .19 | .62 |
| SSPB-16-XS | 1.000 | 2.81 | 2.19 | 1.187 | .38 | 3.25 | 2.38 | 2.88 | 1.75 | #10 | .22 | 1.24 |
| SSPB-20-XS | 1.250 | 3.63 | 2.81 | 1.500 | .43 | 4.00 | 3.00 | 3.50 | 2.00 | #10 | .22 | 2.57 |
| SSPB-24-XS | 1.500 | 4.00 | 3.25 | 1.750 | .50 | 4.75 | 3.50 | 4.12 | 2.50 | 1/4 | .28 | 3.94 |

Housing Material: Aluminum Alloy Black Anodized. (2) Two mounting holes as shown in view A-A for sizes .250 and .375. Top plates are sold separately. Please refer to page 243 under Accessories for P/N and dimensions.

### Type TWN and SSUTWN Pillow Blocks

| Part Number | Nom. Dia. | L2 | J3 | Wt. (lb) |
|---|---|---|---|---|
| TWN-4-XS | .25 | 2.50 | 2.00 | .19 |
| TWN-6-XS | .375 | 2.75 | 2.25 | .25 |
| SSUTWN-8-XS | .500 | 3.50 | 2.50 | .40 |
| SSUTWN-12-XS | .750 | 4.50 | 3.50 | 1.24 |
| SSUTWN-16-XS | 1.000 | 6.00 | 4.50 | 2.48 |
| SSUTWN-20-XS | 1.250 | 7.50 | 5.50 | 5.14 |
| SSUTWN-24-XS | 1.500 | 9.00 | 6.50 | 8.08 |

Housing Material: Aluminum Alloy Black Anodized and

### Type ASB LinearRace Shaft End Support Block (Dim. in in.)

| Part Number | Nom. Dia. | L3 | H3 | H1 | B | B3 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Bolt | Hole | |
| ASB-4-XS | .250 | .50 | .88 | .500 | 1.50 | 1.12 | #6 | .16 | .06 |
| ASB-6-XS | .375 | .56 | 1.00 | .562 | 1.62 | 1.25 | #6 | .16 | .08 |
| ASB-8-XS | .500 | .63 | 1.48 | .875 | 2.00 | 1.50 | #8 | .19 | .11 |
| ASB-12-XS | .750 | .75 | 1.95 | 1.125 | 2.50 | 2.00 | #10 | .22 | .22 |
| ASB-16-XS | 1.000 | 1.00 | 2.48 | 1.375 | 3.25 | 2.50 | 1/4 | .28 | .44 |
| ASB-24-XS | 1.500 | 1.25 | 3.50 | 2.000 | 4.75 | 3.50 | 5/16 | .34 | 1.16 |

End Support Material: Aluminum Alloy Black Anodized

### Type SB LinearRace Shaft End Support Block (Dim. in in.)

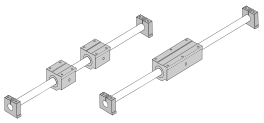
| Part Number | Nom. Dia. | L3 | Hh | Hc | Bb | B3 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Bolt | Hole | |
| SB-8-XS | .500 | .63 | 1.62 | 1.000 | 2.00 | 1.50 | #8 | .16 | .3 |
| SB-12-XS | .750 | .75 | 2.12 | 1.250 | 2.75 | 2.00 | #10 | .16 | .5 |
| SB-16-XS | 1.000 | 1.00 | 2.56 | 1.500 | 3.25 | 2.50 | 1/4 | .19 | 1.0 |
| SB-20-XS | 1.250 | 1.13 | 3.00 | 1.750 | 4.00 | 3.00 | 5/16 | .22 | 2.0 |
| SB-24-XS | 1.500 | 1.25 | 3.50 | 2.000 | 4.75 | 3.50 | 5/16 | .28 | 2.6 |

Material: Iron

## RoundRail Linear Guides

# End Support 1NA

### End Supported, Industry Standard Dimension Metric



**Features**
- Requires only one part number to specify entire linear guide.
- Available with 60 Case LinearRace Shaft end support blocks in either light weight aluminum or rigid iron materials
- Used to provide increased stability or torque resistance in linear system applications

**Components**
- 2 Super Smart Ball Bushing pillow blocks or 1 Super Smart Ball Bushing twin pillow block.
- 1 60 Case LinearRace shaft
- 2 shaft end support blocks

**Specifying this Thomson Linear Guide**
1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

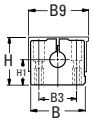
**Part Numbering System**

**1NA-M12-NMO L600**

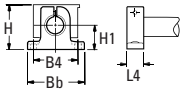
- **1NA** — Linear Guide Designation
- **M12** — Nominal Diameter
- **N** — Type of Bearing Block
- **MO** — Type of Support
- **L600** — Linear Guide Length

**Dimensions (Inch)**

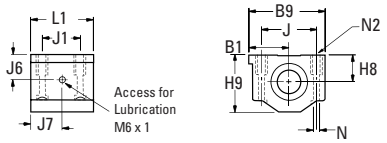
Type ASB End Support Block



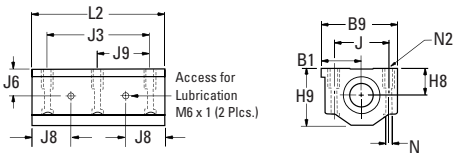

Type SB End Support Block



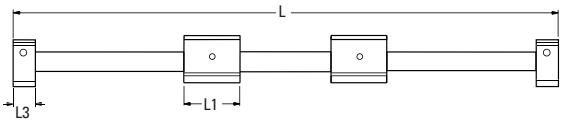

Type SPPB Super Plus and SSEPB Super Smart Ball Bushing Pillow Blocks



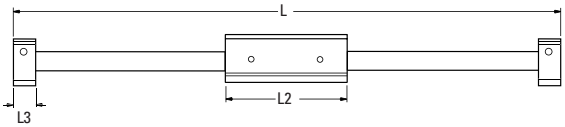

Type SPTWN Super Plus and SSETWN Super Smart Ball Bushing Twin Pillow Blocks




Supported Linear Guide with 2 Pillow Blocks

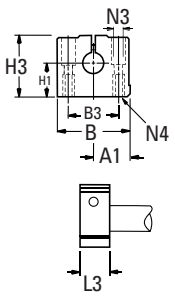



Supported Linear Guide with 1 Twin Pillow Block

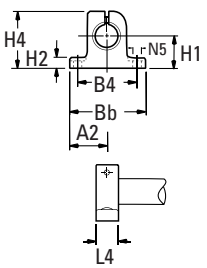



Maximum Stroke Length is determined by subtracting pillow block length (L2) and 2x support block length (L3) or (L4) from total Linear Guide length (L).

**Aluminum**
Type ASB LinearRace Shaft End Support Block




**Steel**
Type SB LinearRace Shaft End Support Block



# RoundRail Linear Guides

## End Support Linear Guide 1NA with 2 Pillow Blocks (Dimensions in mm)

| Part Number | | Nom. Dia. | L1 | L3 | L4 | H | H1 | B | Bb | B9 | Pillow Block | Shaft Support | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Type ASB Shaft Supports | With Type SB Shaft Supports | | | | | | | | | | | Type ASB | Type SB |
| 1NA-M08-NM0 | 1NA-M08-NN0 | 8 | 32 | 18 | 10 | 30 | 15 | 32 | 32 | 35 | SPPB-M08-XS | ASB-M08-XS | SB-M08-XS |
| 1NA-M12-NM0 | 1NA-M12-NN0 | 12 | 39 | 20 | 12 | 38 | 20 | 43 | 42 | 43 | SSEPB-M12-XS | ASB-M12-XS | SB-M12-XS |
| 1NA-M16-NM0 | 1NA-08-NN0 | 16 | 43 | 24 | 16 | 47 | 25 | 43 | 50 | 53 | SSEPB-M16-XS | ASB-M16-XS | SB-M16-XS |
| 1NA-M20-NM0 | 1NA-12-NN0 | 20 | 54 | 30 | 20 | 55 | 30 | 60 | 60 | 60 | SSEPB-M20-XS | ASB-M20-XS | SB-M20-XS |
| 1NA-M25-NM0 | 1NA-16-NN0 | 25 | 67 | 38 | 25 | 65 | 35 | 78 | 74 | 78 | SSEPB-M25-XS | ASB-M25-XS | SB-M25-XS |
| 1NA-M30-NM0 | 1NA-20-NN0 | 30 | 79 | 40 | 28 | 75 | 40 | 87 | 84 | 87 | SSEPB-M30-XS | ASB-M30-XS | SB-M30-XS |
| 1NA-M40-NM0 | 1NA-24-NN0 | 40 | 91 | 48 | 32 | 95 | 50 | 108 | 108 | 108 | SSEPB-M40-XS | ASB-M40-XS | SB-M40-XS |

## End Support Linear Guide 1NA with 1 Twin Pillow Block (Dimensions in mm)

| Part Number | | Nom. Dia. | L2 | L3 | L4 | H | H1 | B | Bb | B9 | Pillow Block | Shaft Support | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| With Type ASB Shaft Supports | With Type SB Shaft Supports | | | | | | | | | | | Type ASB | Type SB |
| 1NA-M08-PM0 | 1NA-M08-PN0 | 8 | 62 | 18 | 10 | 30 | 15 | 32 | 32 | 35 | SPTWN-M08-XS | ASB-M08-XS | SB-M08-XS |
| 1NA-M12-PM0 | 1NA-M12-PN0 | 12 | 76 | 20 | 12 | 38 | 20 | 43 | 42 | 43 | SSETWN-M12-XS | ASB-M12-XS | SB-M12-XS |
| 1NA-M16-PM0 | 1NA-08-PN0 | 16 | 84 | 24 | 16 | 47 | 25 | 43 | 50 | 53 | SSETWN-M16-XS | ASB-M16-XS | SB-M16-XS |
| 1NA-M20-PM0 | 1NA-12-PN0 | 20 | 104 | 30 | 20 | 55 | 30 | 60 | 60 | 60 | SSETWN-M20-XS | ASB-M20-XS | SB-M20-XS |
| 1NA-M25-PM0 | 1NA-16-PN0 | 25 | 130 | 38 | 25 | 65 | 35 | 78 | 74 | 78 | SSETWN-M25-XS | ASB-M25-XS | SB-M25-XS |
| 1NA-M30-PM0 | 1NA-20-PN0 | 30 | 152 | 40 | 28 | 75 | 40 | 87 | 84 | 87 | SSETWN-M30-XS | ASB-M30-XS | SB-M30-XS |
| 1NA-M40-PM0 | 1NA-24-PN0 | 40 | 176 | 48 | 32 | 95 | 50 | 108 | 108 | 108 | SSETWN-M40-XS | ASB-M40-XS | SB-M40-XS |

Shaft Deflection Note: Load limit may be below the dynamic load rating due to shaft deflection. Bearings can accommodate up to 1/2° deflection. See Engineering section (page 257) for Deflection calculations.

## Dynamic Load Capacity Matrix (100 km travel)

| Linear Guide Assembly Part Number | | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|---|
| 1NA-M08-NM0 | 1NA-M08-NN0 | 100 | SPPB-M08-XS | 50 |
| 1NA-M12-NM0 | 1NA-M12-NN0 | 160 | SSEPB-M12-XS | 80 |
| 1NA-M16-NM0 | 1NA-08-NN0 | 800 | SSEPB-M16-XS | 400 |
| 1NA-M20-NM0 | 1NA-12-NN0 | 1800 | SSEPB-M20-XS | 900 |
| 1NA-M25-NM0 | 1NA-16-NN0 | 3000 | SSEPB-M25-XS | 1500 |
| 1NA-M30-NM0 | 1NA-20-NN0 | 3730 | SSEPB-M30-XS | 1865 |
| 1NA-M40-NM0 | 1NA-24-NN0 | 6160 | SSEPB-M40-XS | 3080 |

## Dynamic Load Capacity Matrix (100 km travel)

| Linear Guide Assembly Part Number | | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|---|
| 1NA-M08-PM0 | 1NA-M08-PN0 | 100 | SPTWN-M08-XS | 100 |
| 1NA-M12-PM0 | 1NA-M12-PN0 | 160 | SSETWN-M12-XS | 160 |
| 1NA-M16-PM0 | 1NA-08-PN0 | 800 | SSETWN-M16-XS | 800 |
| 1NA-M20-PM0 | 1NA-12-PN0 | 1800 | SSETWN-M20-XS | 1800 |
| 1NA-M25-PM0 | 1NA-16-PN0 | 3000 | SSETWN-M25-XS | 3000 |
| 1NA-M30-PM0 | 1NA-20-PN0 | 3730 | SSETWN-M30-XS | 3730 |
| 1NA-M40-PM0 | 1NA-24-PN0 | 6160 | SSETWN-M40-XS | 6160 |

† Super Plus Ball Bushing Bearings are used in 8 mm size pillow blocks.

# Replacement Component Dimensions

## Type SPB and SSUPB Pillow Blocks (Dimensions in mm)

| Part Number | Nom. Dia. | L1 | H9 | H8 | H5 | B9 | B7 | J | J1 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bolt | Hole | |
| SPPB-M08-XS | .250 | 1.19 | .81 | .437 | .19 | 1.63 | 1.00 | 1.31 | .75[2] | #6 | .16 | .10 |
| SSEPB-M12-XS | .375 | 1.31 | .94 | .500 | .19 | 1.75 | 1.12 | 1.44 | .88[2] | #6 | .16 | .13 |
| SSEPB-M16-XS | .500 | 1.69 | 1.25 | .687 | .25 | 2.00 | 1.38 | 1.69 | 1.00 | #6 | .16 | .20 |
| SSEPB-M20-XS | .750 | 2.06 | 1.75 | .937 | .31 | 2.75 | 1.88 | 2.38 | 1.25 | #8 | .19 | .62 |
| SSEPB-M25-XS | 1.000 | 2.81 | 2.19 | 1.187 | .38 | 3.25 | 2.38 | 2.88 | 1.75 | #10 | .22 | 1.24 |
| SSEPB-M30-XS | 1.250 | 3.63 | 2.81 | 1.500 | .43 | 4.00 | 3.00 | 3.50 | 2.00 | #10 | .22 | 2.57 |
| SSEPB-M40-XS | 1.500 | 4.00 | 3.25 | 1.750 | .50 | 4.75 | 3.50 | 4.12 | 2.50 | 1/4 | .28 | 3.94 |

Housing Material: Aluminum Alloy Grey Anodized.
Top plates are sold separately. Please refer to page 243 under Accessories.

## Type TWN and SSUTWN Pillow Blocks

| Part Number | Nom. Dia. | L2 | J3 | Wt. (lb) |
|---|---|---|---|---|
| SPTWN-M08-XS | .25 | 2.50 | 2.00 | .19 |
| SSETWN-M12-XS | .375 | 2.75 | 2.25 | .25 |
| SSETWN-M16-XS | .500 | 3.50 | 2.50 | .40 |
| SSETWN-M20-XS | .750 | 4.50 | 3.50 | 1.24 |
| SSETWN-M25-XS | 1.000 | 6.00 | 4.50 | 2.48 |
| SSETWN-M30-XS | 1.250 | 7.50 | 5.50 | 5.14 |
| SSETWN-M40-XS | 1.500 | 9.00 | 6.50 | 8.08 |

Housing Material: Aluminum Alloy Black Anodized

## Type ASB LinearRace Shaft End Support Block (Dim. in mm)

| Part Number | Nom. Dia. | A1 | B | B3 | H1 | H3 | L3 | N3 Bolt | N4 | Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| ASB-M08-XS | 8 | 16,0 | 32 | 22 | 15 | 28 | 18 | 3,5 | M4 | 0,04 |
| ASB-M12-XS | 12 | 21,5 | 43 | 30 | 20 | 36 | 20 | 5,3 | M6 | 0,10 |
| ASB-M16-XS | 16 | 26,5 | 53 | 38 | 25 | 43 | 24 | 6,6 | M8 | 0,15 |
| ASB-M20-XS | 20 | 30,0 | 60 | 42 | 30 | 51 | 30 | 8,4 | M10 | 0,23 |
| ASB-M25-XS | 25 | 39,0 | 78 | 56 | 35 | 61 | 38 | 10,5 | M12 | 0,41 |
| ASB-M30-XS | 30 | 43,5 | 87 | 64 | 40 | 71 | 40 | 10,5 | M12 | 0,53 |
| ASB-M40-XS | 40 | 54,0 | 108 | 82 | 50 | 88 | 48 | 13,5 | M16 | 0,99 |

End Support Material: Aluminum Alloy Grey Anodized

## Type SB LinearRace Shaft End Support Block (Dim. in mm)

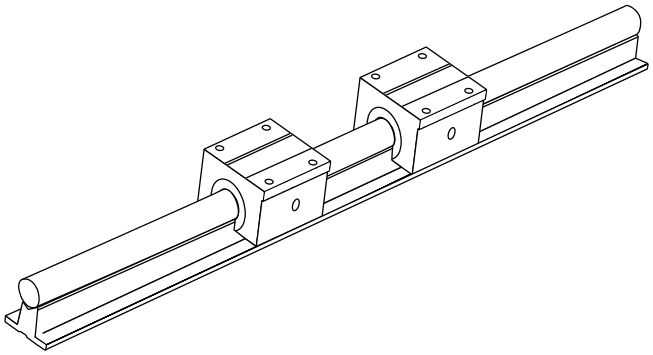
| Part Number | Nom. Dia. | A2 | B4 | Bb | H1 | H2 | H4 | L4 | N5 Dia. | Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| SB-M08-XS | 8 | 16 | 25 | 32 | 15 | 5,2 | 27 | 10 | 4,5 | 0,03 |
| SB-M12-XS | 12 | 21 | 32 | 42 | 20 | 5,5 | 35 | 12 | 5,5 | 0,06 |
| SB-M16-XS | 16 | 25 | 40 | 50 | 25 | 6,5 | 42 | 16 | 5,5 | 0,11 |
| SB-M20-XS | 20 | 30 | 45 | 60 | 30 | 8,0 | 50 | 20 | 5,5 | 0,21 |
| SB-M25-XS | 25 | 37 | 60 | 74 | 35 | 9,0 | 58 | 25 | 6,6 | 0,35 |
| SB-M30-XS | 30 | 42 | 68 | 84 | 40 | 10,0 | 68 | 28 | 9,0 | 0,52 |
| SB-M40-XS | 40 | 54 | 86 | 108 | 50 | 12,0 | 86 | 32 | 11,0 | 0,92 |

End Support Material: Iron

## RoundRail Linear Guides

# Continuous Support Linear Ball Guides

**High speed, smooth operation, easy to install**

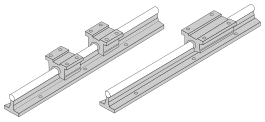


**Continuous Support Linear Ball Guides Offer:**

- Increased life within the same envelope. RoundRail linear guides feature the new patented Super Smart Ball Bushing Bearings for up to 216X the life or 6X the load capacity of conventional bearings.
- Cost savings: save time and money preparing your mounting surfaces before bolting down RoundRail linear guides
- Superior performance. Continuously supported for maximum (down- & side-) load applications without concerns for shaft deflection
- The RoundRail Advantage. The inherent self-aligning-in-all-directions design of the Super Smart Ball Bushing bearing allows for ultra smooth travel when mounted to wider toleranced prepared surfaces
- Unlimited travel lengths without concerns for machined reference edges or butt joint alignment
- The Super Smart Ball Bushing bearing... the most technologically advanced and most robust linear bearing in the world

# Continuous Support 1CA

## Fully Supported, Highest Performance, Industry Standard Dimension Inch



### Features

- Requires only one part number to specify the entire linear guide
- Used as a load support, transport, and guidance solution
- Used in continuously supported applications when rigidity is required

### Components

- 2 Super Smart Ball Bushing opentype pillow blocks or 1 Super Smart Ball Bushing open twin pillow blocks
- 1 60 Case LinearRace shaft support rail assembly

### Specifying this Thomson Linear Guide

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

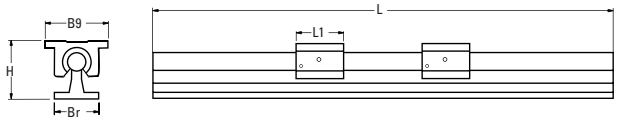
### Part Numbering System

**1CA-12-FAO L24**

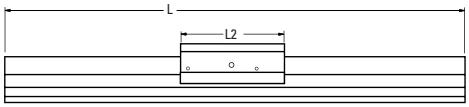
- **1CA** — Linear Guide Designation
- **12** — Nominal Diameter
- **FAO** — Type of Bearing Block
- **L24** — Linear Guide Length

### Dimensions (Inch)

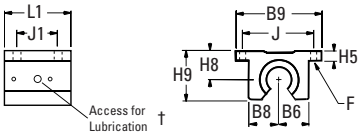
Single Continuously Supported Linear Guide with 2 Pillow Blocks



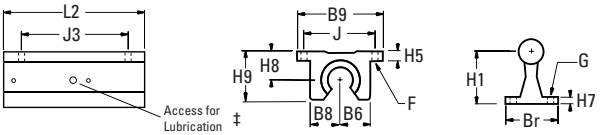

Single Continuously Supported Linear Guide with 1 Twin Pillow Block



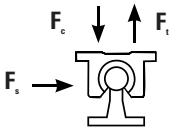

Type SSUPBO Open Type Super Smart and SPB-OPN Open Type Ball Bushing Pillow Blocks




Type SSUTWN Open Type Super Smart and TWN-OPN Open Type Ball Bushing Twin Pillow Blocks



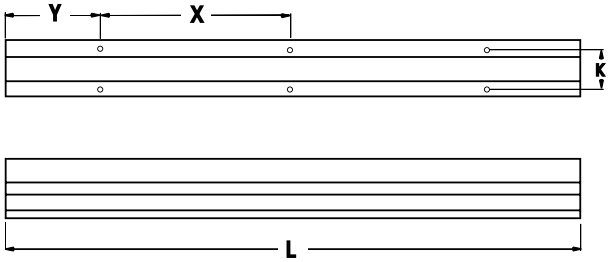

Load Rating and Limit by Direction




| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | 0.5C | 0.5C |
| $F_s$ | C | 0.5C |

Dynamic Load Rating: Load value used in life calculation.
Load Limit: Maximum allowable load applied to bearing.

Type SRA LinearRace Shaft Support Rail Assembly




‡ Size .500 inch has oil lubricant fitting.
Sizes .625 and above have 1/4-28 access for lubrication.

# RoundRail Linear Guides

### Continuously Supported Linear Guide 1CA Single with 2 Pillow Blocks (Dimensions in inches)

| Part Number | Nominal Diameter | L1 | H | Br | B9 | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|
| 1CA-08-FHO | .500 | 1.50 | 1.812 | 1.50 | 2.00 | SPB-8-OPN-XS | SRA-8-XS |
| 1CA-12-FHO | .750 | 1.88 | 2.437 | 1.75 | 2.75 | SSUPBO-12-XS | SRA-12-XS |
| 1CA-16-FHO | 1.000 | 2.63 | 2.937 | 2.13 | 3.25 | SSUPBO-16-XS | SRA-16-XS |
| 1CA-20-FHO | 1.250 | 3.38 | 3.625 | 2.50 | 4.00 | SSUPBO-20-XS | SRA-20-XS |
| 1CA-24-FHO | 1.500 | 3.75 | 4.250 | 3.00 | 4.75 | SSUPBO-24-XS | SRA-24-XS |

### Continuously Supported Linear Guide 1CA Single with 1 Twin Pillow Block (Dimensions in inches)

| Part Number | Nominal Diameter | L2 | H | Br | B9 | Maximum Stroke Length | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|---|
| 1CA-08-HAO | .50 | 3.5 | 1.812 | 1.50 | 2.00 | L-(3.5) | TWN-8-OPN-XS | SRA-8-XS |
| 1CA-12-HAO | .75 | 4.5 | 2.437 | 1.75 | 2.75 | L-(4.5) | SSUTWNO-12-XS | SRA-12-XS |
| 1CA-16-HAO | 1.00 | 6.0 | 2.937 | 2.13 | 3.25 | L-(6.0) | SSUTWNO-16-XS | SRA-16-XS |
| 1CA-20-HAO | 1.25 | 7.5 | 3.625 | 2.50 | 4.00 | L-(7.5) | SSUTWNO-20-XS | SRA-20-XS |
| 1CA-24-HAO | 1.50 | 9.0 | 4.250 | 3.00 | 4.75 | L-(9.0) | SSUTWNO-24-XS | SRA-24-XS |

### Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|
| 1CA-08-FHO | 290 | SPB-8-OPN-XS | 400 |
| 1CA-12-FHO | 1800 | SSUPBO-12-XS | 900 |
| 1CA-16-FHO | 3000 | SSUPBO-16-XS | 1500 |
| 1CA-20-FHO | 3730 | SSUPBO-20-XS | 1865 |
| 1CA-24-FHO | 6160 | SSUPBO-24-XS | 3080 |

### Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|---|
| 1CA-08-HAO | 290 | TWN-8-OPN-XS | 800 |
| 1CA-12-HAO | 1800 | SSUTWNO-12-XS | 1800 |
| 1CA-16-HAO | 3000 | SSUTWNO-16-XS | 3000 |
| 1CA-20-HAO | 3730 | SSUTWNO-20-XS | 3730 |
| 1CA-24-HAO | 6160 | SSUTWNO-24-XS | 6160 |

† Super Ball Bushing Bearings are used in .500 inch size pillow blocks.

## Replacement Component Dimensions

### Type SPB-OPN and SSUPBO Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L1 | H9 | H8 | H5 | B9 | B8 | B6 | J | J1 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Bolt | Hole | |
| SPB-8-OPN-XS | .500 | 1.69 | 1.25 | .687 | .25 | 2.00 | .75 | .69 | 1.69 | 1.00 | #6 | .16 | .20 |
| SSUPBO-12-XS | .750 | 2.06 | 1.75 | .937 | .31 | 2.75 | 1.00 | .94 | 2.38 | 1.25 | #8 | .19 | .62 |
| SSUPBO-16-XS | 1.000 | 2.81 | 2.19 | 1.187 | .38 | 3.25 | 1.25 | 1.19 | 2.88 | 1.75 | #10 | .22 | 1.24 |
| SSUPBO-20-XS | 1.250 | 3.63 | 2.81 | 1.500 | .43 | 4.00 | 1.63 | 1.50 | 3.50 | 2.00 | #10 | .22 | 2.57 |
| SSUPBO-24-XS | 1.500 | 4.00 | 3.25 | 1.750 | .50 | 4.75 | 1.88 | 1.75 | 4.12 | 2.50 | 1/4 | .28 | 3.94 |

Top plates are sold separately. Please refer to page 243 under Accessories for P/N and dimensions.

### Type TWN-OPN and SSUTWNO Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L2 | J3 | Wt. (lb) |
|---|---|---|---|---|
| TWN-8-OPN-XS | .500 | 3.50 | 2.50 | .40 |
| SSUTWNO-12-XS | .750 | 4.50 | 3.50 | 1.24 |
| SSUTWNO-16-XS | 1.000 | 6.00 | 4.50 | 2.48 |
| SSUTWNO-20-XS | 1.250 | 7.50 | 5.50 | 5.14 |
| SSUTWNO-24-XS | 1.500 | 9.00 | 6.50 | 8.08 |

Housing Material: Aluminum Alloy Black Anodized

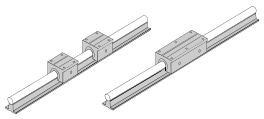
### Type SRA LinearRace Shaft Support Rail Assembly (Dimensions in inches)

| Part Number | Nom. Dia. | H1 | H7 | Br | K | X | Y | G | | Wt. (lb/ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Bolt | Hole | |
| SRA-8-XS | .500 | 1.125 | .19 | 1.50 | 1.00 | 4 | 2 | #8 | .17 | 1.26 |
| SRA-12-XS | .750 | 1.500 | .25 | 1.75 | 1.25 | 6 | 3 | #10 | .22 | 2.50 |
| SRA-16-XS | 1.000 | 1.750 | .25 | 2.13 | 1.50 | 6 | 3 | 1/4 | .28 | 4.06 |
| SRA-20-XS | 1.250 | 2.125 | .31 | 2.50 | 1.88 | 6 | 3 | 5/16 | .34 | 6.30 |
| SRA-24-XS | 1.500 | 2.500 | .38 | 3.00 | 2.25 | 8 | 4 | 5/16 | .34 | 8.60 |

LinearRace Shaft Support Rail Material: Aluminum Alloy Black Anodized
Support rails are supplied in 24 inch lengths unless quoted otherwise. Maximum length of LinearRace Shaft Support Rail is 72 inches. If longer continuous one-piece LinearRace Shaft Support Rails are required, contact the Thomson Linear Guides Application Engineering department.

# Continuous Support 1PA

## Fully Supported, Highest Performance, Industry Standard Dimension Metric



### Features

- Requires only one part number to specify the entire linear guide
- Used as a load support, transport, and guidance solution
- Used in continuously supported applications when rigidity is required

### Components

- 2 Super Smart Ball Bushing opentype pillow blocks or 1 Super Smart Ball Bushing open twin pillow blocks
- 1 60 Case LinearRace shaft support rail assembly

### Specifying this Thomson Linear Guide

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

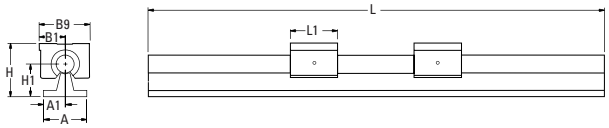
### Part Numbering System

**1PA-M12-LWO L600**

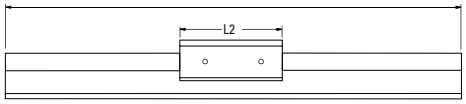
- **1PA** — Linear Guide Designation
- **M12** — Nominal Diameter
- **LWO** — Type of Bearing Block
- **L600** — Linear Guide Length

### Dimensions (Inch)

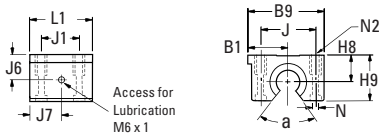
Single Continuously Supported Linear Guide with 2 Pillow Blocks



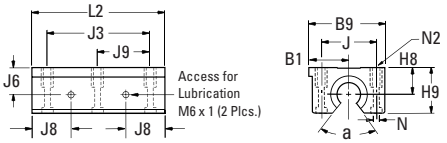

Single Continuously Supported Linear Guide with 1 Twin Pillow Block



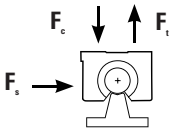

Type SSEPBO Open Type Super Smart Ball Bushing Pillow Blocks




Type SSETWNO Open Type Super Smart Ball Bushing Twin Pillow Blocks



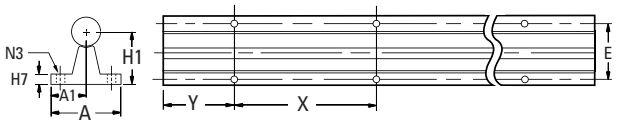

Load Rating and Limit by Direction




| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | 0.5C | 0.5C |
| $F_s$ | C | 0.5C |

Dynamic Load Rating: Load value used in life calculation.
Load Limit: Maximum allowable load applied to bearing.

Type SRA LinearRace Shaft Support Rail Assembly



# RoundRail Linear Guides

### Continuously Supported Linear Guide 1PA Single with 2 Pillow Blocks (Dimensions in inches)

| Part Number | Nominal Diameter | L1 | H | H1 | A | A1 | B1 | B9 | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|
| 1PA-M12-LWO | 12 | 39 | 46 | 28 | 43 | 21,5 | 21,5 | 43 | SPPBO-M12-XS† | SRA-M12-XS |
| 1PA-M16-LWO | 16 | 43 | 52 | 30 | 48 | 24,0 | 26,5 | 53 | SSEPBO-M16-XS | SRA-M16-XS |
| 1PA-M20-LWO | 20 | 54 | 63 | 38 | 56 | 28,0 | 30,0 | 60 | SSEPBO-M20-XS | SRA-M20-XS |
| 1PA-M25-LWO | 25 | 67 | 72 | 42 | 60 | 30,0 | 39,0 | 78 | SSEPBO-M25-XS | SRA-M25-XS |
| 1PA-M30-LWO | 30 | 79 | 88 | 53 | 74 | 37,0 | 43,5 | 87 | SSEPBO-M30-XS | SRA-M30-XS |
| 1PA-M40-LWO | 40 | 91 | 105 | 60 | 78 | 39,0 | 54,0 | 108 | SSEPBO-M40-XS | SRA-M40-XS |

### Continuously Supported Linear Guide 1PA Single with 1 Twin Pillow Block (Dimensions in inches)

| Part Number | Nominal Diameter | L2 | H | H1 | A | A1 | B1 | B9 | Maximum Stroke Length | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1PA-M12-MWO | 12 | 76 | 46 | 28 | 43 | 21,5 | 21,5 | 43 | L-(76) | SPTWNO-M12-XS† | SRA-M12-XS |
| 1PA-M16-MWO | 16 | 84 | 52 | 30 | 48 | 24,0 | 26,5 | 53 | L-(84) | SSETWNO-M16-XS | SRA-M16-XS |
| 1PA-M20-MWO | 20 | 104 | 63 | 38 | 56 | 28,0 | 30,0 | 60 | L-(104) | SSETWNO-M20-XS | SRA-M20-XS |
| 1PA-M25-MWO | 25 | 130 | 72 | 42 | 60 | 30,0 | 39,0 | 78 | L-(130) | SSETWNO-M25-XS | SRA-M25-XS |
| 1PA-M30-MWO | 30 | 152 | 88 | 53 | 74 | 37,0 | 43,5 | 87 | L-(152) | SSETWNO-M30-XS | SRA-M30-XS |
| 1PA-M40-MWO | 40 | 176 | 105 | 60 | 78 | 39,0 | 54,0 | 108 | L-(176) | SSETWNO-M40-XS | SRA-M40-XS |

### Dynamic Load Capacity Matrix (100 km travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity (N) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity (N) |
|---|---|---|---|
| 1PA-M12-LWO | 1500 | SPPBO-M12-XS | 750 |
| 1PA-M16-LWO | 4400 | SSEPBO-M16-XS | 2200 |
| 1PA-M20-LWO | 8000 | SSEPBO-M20-XS | 4000 |
| 1PA-M25-LWO | 13400 | SSEPBO-M25-XS | 6700 |
| 1PA-M30-LWO | 16600 | SSEPBO-M30-XS | 8300 |
| 1PA-M40-LWO | 27400 | SSEPBO-M40-XS | 13700 |

### Dynamic Load Capacity Matrix (100 km travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity (N) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity (N) |
|---|---|---|---|
| 1PA-M12-MWO | 1220 | SPTWNO-M12-XS | 1500 |
| 1PA-M16-MWO | 4400 | SSETWNO-M16-XS | 4400 |
| 1PA-M20-MWO | 8000 | SSETWNO-M20-XS | 8000 |
| 1PA-M25-MWO | 13400 | SSETWNO-M25-XS | 13400 |
| 1PA-M30-MWO | 16600 | SSETWNO-M30-XS | 16600 |
| 1PA-M40-MWO | 27400 | SSETWNO-M40-XS | 27400 |

† Super Plus Ball Bushing Bearings are used in 12 mm size pillow blocks.

## Replacement Component Dimensions

### Type SSEPBO Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L1 | H8 | H9 | B1 | B9 | J6 | J7 | J | J1 | N Dia. | N2 | a Deg. | Mass (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPPBO-M12-XS | 12 | 39 | 18 | 28 | 215 | 43 | 16,7 | 19,5 | 32 | 23 | 43 | M5 | 66 | 0,11 |
| SSEPBO-M16-XS | 16 | 43 | 22 | 35 | 265 | 53 | 22,0 | 21,5 | 40 | 26 | 53 | M6 | 66 | 0,17 |
| SSEPBO-M20-XS | 20 | 54 | 25 | 41 | 300 | 60 | 25,0 | 27,0 | 45 | 32 | 66 | M8 | 60 | 0,30 |
| SSEPBO-M25-XS | 25 | 67 | 30 | 50 | 390 | 78 | 31,5 | 33,5 | 46 | 40 | 84 | M10 | 60 | 0,57 |
| SSEPBO-M30-XS | 30 | 79 | 35 | 60 | 435 | 87 | 33,0 | 39,5 | 68 | 45 | 84 | M10 | 60 | 0,87 |
| SSEPBO-M40-XS | 40 | 91 | 45 | 77 | 540 | 108 | 43,5 | 45,5 | 86 | 58 | 105 | M12 | 60 | 1,62 |

Housing Material: Aluminum Alloy Grey Anodized.
Top plates are sold separately. Please refer to page 243 under Accessories for P/N and dimensions.

### Type SSETWNO Pillow Blocks (Dim. in in.)

| Part Number | Nom. Dia. | L2 | J3 | J8 | J9 | Mass (kg) |
|---|---|---|---|---|---|---|
| SPTWNO-M12-XS | 12 | 76 | 56 | 19,5 | 28 | 0,22 |
| SSETWNO-M16-XS | 16 | 84 | 64 | 21,5 | 32 | 0,34 |
| SSETWNO-M20-XS | 20 | 104 | 76 | 27,0 | 38 | 0,63 |
| SSETWNO-M25-XS | 25 | 130 | 94 | 33,6 | 47 | 1,18 |
| SSETWNO-M30-XS | 30 | 152 | 106 | 39,5 | 53 | 1,70 |
| SSETWNO-M40-XS | 40 | 176 | 124 | 45,5 | 62 | 3,18 |

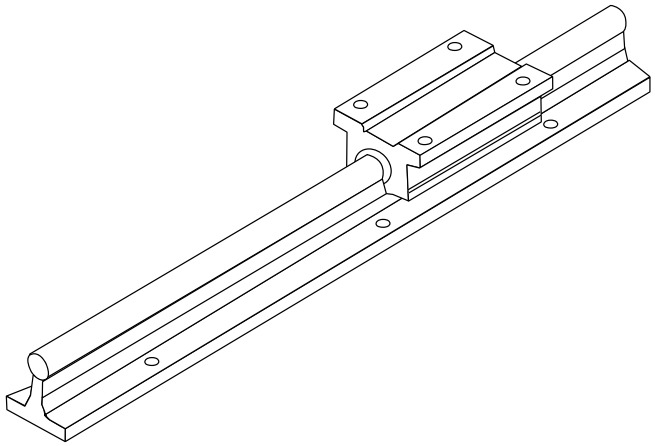
Housing Material: Aluminum Alloy Grey Anodized

### Type SRA LinearRace Shaft Support Rail Assembly (Dimensions in inches)

| Part Number | Nom. Dia. | H1 | H7 | A | A1 | E | X | Y | N3 Dia. | Mass (kg/m) |
|---|---|---|---|---|---|---|---|---|---|---|
| SRA-M12-XS | 12 | 28 | 5 | 43 | 21,5 | 29 | 75 | 375 | 4,5 | 4,1 |
| SRA-M16-XS | 16 | 30 | 5 | 48 | 24,0 | 33 | 100 | 50 | 5,5 | 6,2 |
| SRA-M20-XS | 20 | 38 | 6 | 56 | 28,0 | 37 | 100 | 50 | 6,6 | 9,5 |
| SRA-M25-XS | 25 | 42 | 6 | 60 | 30,0 | 42 | 120 | 60 | 6,6 | 13,7 |
| SRA-M30-XS | 30 | 53 | 8 | 74 | 37,0 | 51 | 150 | 75 | 8,6 | 20,0 |
| SRA-M40-XS | 40 | 60 | 8 | 78 | 39,0 | 55 | 200 | 100 | 8,6 | 32,5 |

LinearRace Shaft Support Rail Material: Aluminum Alloy Grey Anodized
Support rails are supplied in 600mm lengths unless quoted otherwise. Maximum length of LinearRace Shaft Support Rail is 600mm. If longer continuous one-piece LinearRace Shaft Support Rails are required, contact the Thomson Linear Guides Application Engineering department.

# FluoroNyliner Linear Guides



**Corrosion resistant, smooth, quiet, industry standard envelope**

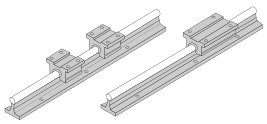
**FluoroNyliner Linear Guides Offer:**

- Thomson's new FluoroNyliner Bushing Bearings that are made from the most advanced polymer components to achieve maximum performance levels
- Contamination resistance. The FluoroNyliner Linear Guides are practically immune to adverse environments, such as water wash-down conditions and magnetic interference
- Self-Aligning Pillow Blocks for ease of use
- Increased bearing load capacities (or 'PV' ratings) and obtainable travel life, when used with Thomson stainless steel, 60 Case Linear Race shaft, when compared to competitive assemblies.
- Specification conformance with FDA and non-lubricated applications
- Use in linear and rotary motion applications
- Operates in temperatures from -400 °F (-240 °C) to 550 °F (270 °C)

## RoundRail Linear Guides

# FluoroNyliner 1VA

### Corrosive/Contaminated Environments Inch



**Features**

- Requires only one part number to specify the entire linear guide
- Used as a load support, transport, and guidance solution
- Used in continuously supported applications when rigidity is required

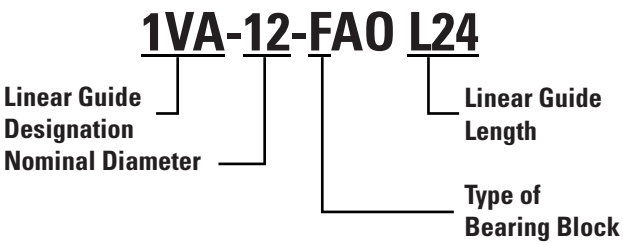
**Components**

- 2 self-aligning FluoroNyliner Bushing bearing open pillow blocks or
- 1 self-aligning FluoroNyliner Bushing bearing open twin pillow block
- 1 stainless steel 60 Case LinearRace shaft support rail assembly

**Specifying this Thomson Linear Guide**

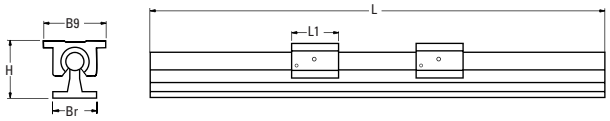
1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

**Part Numbering System**

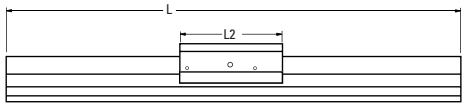



**Dimensions (Inch)**

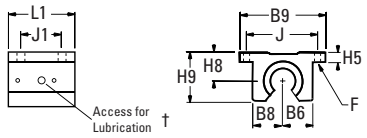
Single Continuously Supported Linear Guide with 2 Pillow Blocks



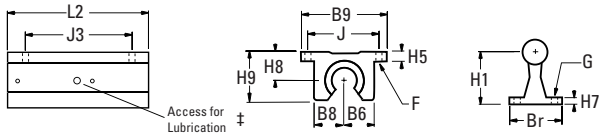

Single Continuously Supported System with 1 Twin Pillow Block



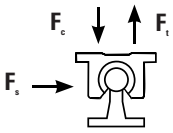

FluoroNyliner Linear Guide Pillow Block Dimensions




FluoroNyliner Linear Guide Twin Pillow Block Dimensions



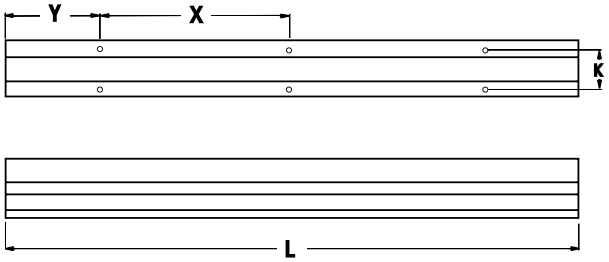

Load Rating and Limit by Direction




| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | 0.5C | 0.5C |
| $F_s$ | C | 0.5C |

Dynamic Load Rating: PV value used in life calculation.
Load Limit: Maximum allowable PV applied to bearing.

Type SRA LinearRace Shaft Support Rail Assembly



# RoundRail Linear Guides

### FluoroNyliner Linear Guide 1VA Single Continuously Supported with 2 Pillow Blocks (Dimensions in inches)

| Part Number | Nominal Diameter | L1 | H | Br | B9 | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|
| 1VA-08-FAO | .500 | 1.50 | 1.812 | 1.50 | 2.00 | FNYBUPBO08A-XS | SRA-8-XS-SS |
| 1VA-12-FAO | .750 | 1.88 | 2.437 | 1.75 | 2.75 | FNYBUPBO12A-XS | SRA-12-XS-SS |
| 1VA-16-FAO | 1.000 | 2.63 | 2.937 | 2.13 | 3.25 | FNYBUPBO16A-XS | SRA-16-XS-SS |
| 1VA-20-FAO | 1.250 | 3.38 | 3.625 | 2.50 | 4.00 | FNYBUPBO20A-XS | SRA-20-XS-SS |
| 1VA-24-FAO | 1.500 | 3.75 | 4.250 | 3.00 | 4.75 | FNYBUPBO24A-XS | SRA-24-XS-SS |

### FluoroNyliner Linear Guide 1VA Single Continuously Supported with 1 Twin Pillow Block (Dimensions in inches)

| Part Number | Nominal Diameter | L2 | H | Br | B9 | Maximum Stroke Length | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|---|
| 1VA-08-HAO | .50 | 3.5 | 1.812 | 1.50 | 2.00 | L-(3.5) | FNYBUTWNO08A-XS | SRA-8-XS-SS |
| 1VA-12-HAO | .75 | 4.5 | 2.437 | 1.75 | 2.75 | L-(4.5) | FNYBUTWNO12A-XS | SRA-12-XS-SS |
| 1VA-16-HAO | 1.00 | 6.0 | 2.937 | 2.13 | 3.25 | L-(6.0) | FNYBUTWNO16A-XS | SRA-16-XS-SS |
| 1VA-20-HAO | 1.25 | 7.5 | 3.625 | 2.50 | 4.00 | L-(7.5) | FNYBUTWNO20A-XS | SRA-20-XS-SS |
| 1VA-24-HAO | 1.50 | 9.0 | 4.250 | 3.00 | 4.75 | L-(9.0) | FNYBUTWNO24A-XS | SRA-24-XS-SS |

### Maximum Operating Parameters per Bearing

| Characteristic | Limit |
|---|---|
| Linear Temperature Range | -240˚ C to 288˚ C (-400˚ F to 550˚ F) |
| Velocity, dry | 42.7 m/min. Continuous |
| Velocity, dry | 122 m/min. Intermittent |
| Velocity, lubricated | 122 m/min. Continuous |
| Pressure | 10.35 MPa |
| PV | 21 MPa/m/min |

## Replacement Component Dimensions

### Self-Aligning Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L1 | H9 | H8 | H5 | B9 | B8 | B7 | J | J1 | F | | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Bolt | Hole | |
| FNYBUPBO08A-XS | .500 | 1.69 | 1.25 | .687 | .25 | 2.00 | .75 | .69 | 1.69 | 1.00 | #6 | .16 | .20 |
| FNYBUPBO12A-XS | .750 | 2.06 | 1.75 | .937 | .31 | 2.75 | 1.00 | .94 | 2.38 | 1.25 | #8 | .19 | .51 |
| FNYBUPBO16A-XS | 1.000 | 2.81 | 2.19 | 1.187 | .38 | 3.25 | 1.25 | 1.19 | 2.88 | 1.75 | #10 | .22 | 1.03 |
| FNYBUPBO20A-XS | 1.250 | 3.63 | 2.81 | 1.500 | .43 | 4.00 | 1.63 | 1.50 | 3.50 | 2.00 | #10 | .22 | 2.15 |
| FNYBUPBO24A-XS | 1.500 | 4.00 | 3.25 | 1.750 | .50 | 4.75 | 1.88 | 1.75 | 4.12 | 2.50 | 1/4 | .28 | 3.29 |

Housing Material: Aluminum Alloy Black Anodized

### Self-Aligning Pillow Blocks (Dim. in in.)

| Part Number | Nom. Dia. | L2 | J3 | Wt. (lb) |
|---|---|---|---|---|
| FNYBUTWNO08A-XS | .500 | 3.50 | 2.50 | .40 |
| FNYBUTWNO12A-XS | .750 | 4.50 | 3.50 | 1.02 |
| FNYBUTWNO16A-XS | 1.000 | 6.00 | 4.50 | 2.06 |
| FNYBUTWNO20A-XS | 1.250 | 7.50 | 5.50 | 4.30 |
| FNYBUTWNO24A-XS | 1.500 | 9.00 | 6.50 | 6.88 |

Housing Material: Aluminum Alloy Black Anodized

Performance Note: For detailed explanations of FluoroNyliner Linear Guide Dynamic and Static Load Capacities, Frictional Characteristics, Wear Rates, Speeds, and Life Expectancy please contact the Thomson Linear Guides Applications Engineering department.

Product Note: FluoroNyliner linear guides are shipped free of all lubricants. It is the responsibility of the product user to determine lubricant compatibility with the FluoroNyliner bearing material.

Product Options: FluoroNyliner linear guides are available with variousinner race materials and platings to accommodate different environments.

Top plates are sold separately. Please refer to page 243 under accessories for P/N and dimensions.

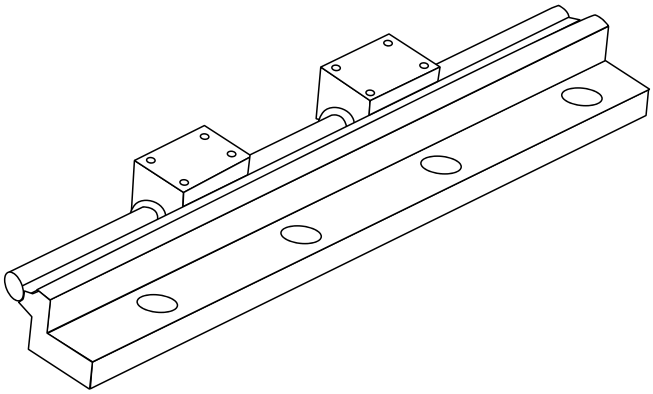
### Type SRA LinearRace Shaft Support Rail Assembly (Dimensions in inches)

| Part Number | Nom. Dia. | H1 | H7 | Br | K | X | Y | G | | Wt. (lb/ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Bolt | Hole | |
| SRA-8-XS | .500 | 1.125 | .19 | 1.50 | 1.00 | 4 | 2 | #8 | .17 | 1.26 |
| SRA-12-XS | .750 | 1.500 | .25 | 1.75 | 1.25 | 6 | 3 | #10 | .22 | 2.50 |
| SRA-16-XS | 1.000 | 1.750 | .25 | 2.13 | 1.50 | 6 | 3 | 1/4 | .28 | 4.06 |
| SRA-20-XS | 1.250 | 2.125 | .31 | 2.50 | 1.88 | 6 | 3 | 5/16 | .34 | 6.30 |
| SRA-24-XS | 1.500 | 2.500 | .38 | 3.00 | 2.25 | 8 | 4 | 5/16 | .34 | 8.60 |

LinearRace Shaft Support Rail Material: Aluminum Alloy Black Anodized
Support rails are supplied in 24 inch lengths unless quoted otherwise. Maximum length of LinearRace Shaft Support Rail is 72 inches. If longer continuous one-piece LinearRace Shaft Support Rails are required, contact the Thomson Linear Guide Application Engineering department.

## RoundRail Linear Guides

# Side Mounted Linear Ball Guides



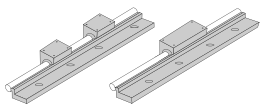
**Low profile, high loads in all directions, easy to install**

**Side Mounted Linear Ball Guides Offer:**

- Increased life within the same envelope. RoundRail linear guides feature the new patented Super Smart Ball Bushing Bearings for up to 216X the life or 6X the load capacity of conventional bearings.
- Cost savings: save time and money preparing your mounting surfaces before bolting down RoundRail linear guides
- Slide mounted geometry for increased mounting flexibility
- Superior performance. Continuously supported for maximum (down- & side-) load applications without concerns for shaft deflection
- The RoundRail Advantage. The inherent self-aligning-in-all-directions design of the Super Smart Ball Bushing bearing allows for ultra smooth travel when mounted to wider toleranced prepared surfaces
- Unlimited travel lengths without concerns for machined reference edges or butt joint alignment
- The Super Smart Ball Bushing bearing... the most technologically advanced and most robust linear bearing in the world
- Corrosion resistant versions for maximum performance in harsh environments.

# Side Mounted 1DA

## Side Mounted for Low Profile Inch



### Features

- Continuously supported design increases rigidity and provides for unlimited linear guide travel lengths
- Versatile Side Support Rail Assembly geometry for optimizing mounting ability
- Side mounted design provides an increase in pull-off load capacity

### Components

- 2 Super Smart Ball Bushing modified open type pillow blocks or 1 Super Smart Ball Bushing modified open type twin pillow block.
- 1 60 Case LinearRace shaft side mounted support rail assembly

### Specifying this Thomson Linear Guide

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

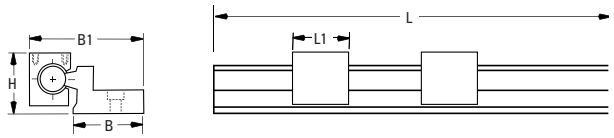
### Part Numbering System

**1DA-12-J00 L24**

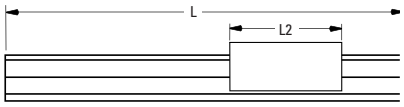
- **1DA** — Linear Guide Designation
- **12** — Nominal Diameter
- **J00** — Type of Bearing Block
- **L24** — Linear Guide Length

### Dimensions (Inch)

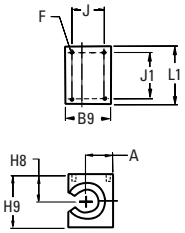
Single Side Mounted Linear Guide with 2 Pillow Blocks



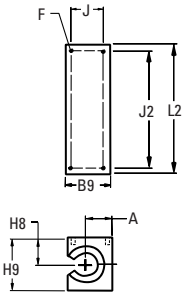

Single Side Mounted Linear Guide with 1 Twin Pillow Block



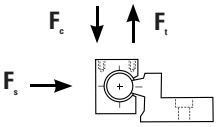

Type SSUPBO-MOD and SPB-OPN-MOD Open Type Pillow Blocks




Type SSUTWNO-MOD and TWN-OPN-MOD Pillow Blocks



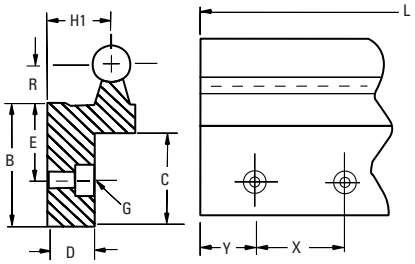

Load Rating and Limit by Direction




| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | C |
| $F_t$ | 0.5C | 0.5C |
| $F_s$ | C | 0.5C |

Dynamic Load Rating: Load value used in life calculation.
Load Limit: Maximum allowable load applied to bearing.

Type SSRA Side Mounted LinearRace Shaft Support Rail Assembly



# RoundRail Linear Guides

### Side Mounted Linear Guide 1DA Single Side Mounted with 2 Pillow Blocks (Dimensions in inches)

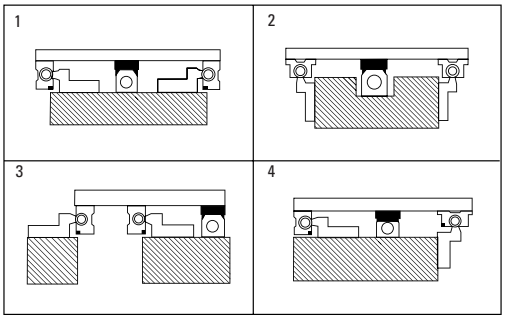
| Part Number | Nominal Diameter | H | B | B1 | L1 | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|
| 1DA-08-J00 | .500 | 1.562 | 1.44 | 2.61 | 1.50 | SPB-8-0PN-MOD | SSRA-8 |
| 1DA-12-J00 | .750 | 2.062 | 1.94 | 3.55 | 1.88 | SSUPB0-12-MOD | SSRA-12 |
| 1DA-16-J00 | 1.000 | 2.562 | 2.44 | 4.49 | 2.63 | SSUPB0-16-MOD | SSRA-16 |

### Side Mounted Linear Guide 1DA Single Side Mounted with 1 Twin Pillow Block (Dimensions in inches)

| Part Number | Nominal Diameter | H | B | B1 | L2 | Maximum Stroke Length | Pillow Block | Shaft Support Rail Assembly |
|---|---|---|---|---|---|---|---|---|
| 1DA-08-K00 | .50 | 1.562 | 1.44 | 2.61 | 3.5 | L-(3.5) | TWN-8-0PN-MOD | SSRA-8 |
| 1DA-12-K00 | .75 | 2.062 | 1.94 | 3.55 | 4.5 | L-(4.5) | SSUTWN0-12-MOD | SSRA-12 |
| 1DA-16-K00 | 1.00 | 2.562 | 2.44 | 4.49 | 6.0 | L-(6.0) | SSUTWN0-16-MOD | SSRA-16 |

### Mounting Configurations

The following mounting configurations depict ideas for combining the Side Mounted Continuously Supported Linear Guides into your linear motion application. If you need further information, contact the Thomson Application Engineering Department.




Pillow blocks shown are the standard SSUPB0 or SPB-0PN style. To order System 1DA with standard pillow blocks, order the Side Mounted Shaft Rail Assembly (SSRA) and the SSUPB0 or SPB-0PN separately.

### Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity (N) (Even Distribution) | Pillow Block Part Number | Pillow Block Dynamic Load Capacity (N) |
|---|---|---|---|
| 1DA-08-J00 | 240 | SPB-8-0PN-MOD | 120 |
| 1DA-12-J00 | 1600 | SSUPB0-12-MOD | 800 |
| 1DA-16-J00 | 2700 | SSUPB0-16-MOD | 1350 |
| | | | |
| 1DA-08-K00 | 240 | TWN-8-0PN-MOD | 240 |
| 1DA-12-K00 | 1600 | SSUTWN0-12-MOD | 1600 |
| 1DA-16-K00 | 2700 | SSUTWN0-16-MOD | 2700 |

† Super Ball Bushing Bearings are used in .500 inch size pillow blocks.

## Replacement Component Dimensions

### Type SPB-0PN-MOD and SSUPB0-MOD Pillow Block (Dimensions in inches)

| Part Number | Nom. Dia. | H8 | H9 | A | B9 | L1 | J | J1 | F | Wt. (lb) |
|---|---|---|---|---|---|---|---|---|---|---|
| SPB-8-0PN-MOD | .500 | .687 | 1.44 | .67 | 1.12 | 1.50 | .812 | 1.250 | #8-32 | .18 |
| SSUPB0-12-MOD | .750 | .937 | 1.94 | .92 | 1.56 | 1.88 | 1.187 | 1.562 | #10-32 | .45 |
| SSUPB0-16-MOD | 1.000 | 1.187 | 2.44 | 1.17 | 2.00 | 2.63 | 1.438 | 2.250 | 1/4-20 | .98 |

Housing Material: Aluminum Alloy Black Anodized

Top plates are sold separately. Please refer to page 243 under accessories for P/N and dimensions.

### Type TWN-0PN-MOD and SSUTWN0-MOD Pillow Blocks (Dimensions in inches)

| Part Number | Nom. Dia. | L2 | J2 | Wt. (lb) |
|---|---|---|---|---|
| TWN-8-0PN-MOD | .500 | 3.5 | 3.00 | .39 |
| SSUTWN0-12-MOD | .750 | 4.5 | 4.00 | 1.00 |
| SSUTWN0-16-MOD | 1.000 | 6.0 | 5.25 | 2.11 |

Housing Material: Aluminum Alloy Black Anodized

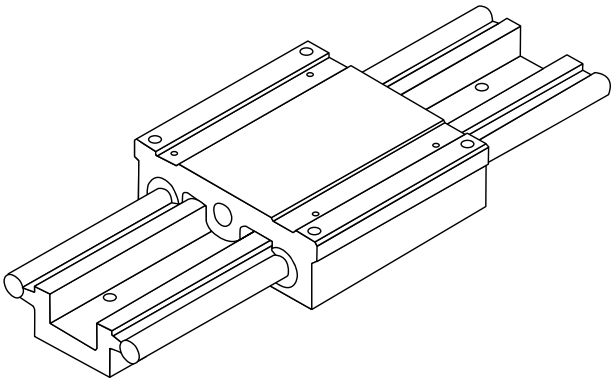
### Type SSRA LinearRace Shaft Support Rail Assembly (Dimensions in inches)

| Part Number | Nom. Dia. | H1 | B | R | E | D | C | X | Y(1) | G | | Wt. (lb/ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bolt | Hole | |
| SSRA-8-XS | .500 | .875 | 1.44 | .500 | 1.00 | .49 | 1.06 | 4 | 2 | 1/4 | .28 | 2.05 |
| SSRA-12-XS | .750 | 1.125 | 1.94 | .688 | 1.31 | .75 | 1.44 | 6 | 3 | 5/16 | .34 | 4.00 |
| SSRA-16-XS | 1.000 | 1.375 | 2.44 | .875 | 1.63 | .88 | 1.81 | 6 | 3 | 3/8 | .41 | 6.25 |

(1) For standard lengths LinearRace Shaft Support Rail Material: Aluminum Black Anodized
Support rails are supplied in 24 inch lengths unless quoted otherwise. Maximum length of LinearRace Shaft Support Rail is 72 inches. If longer continuous one-piece LinearRace Shaft Support Rails are required, contact the Thomson Linear Guides Application Engineering department.

# Dual Shaft

**Low profile, high loads in all directions, easy to install**



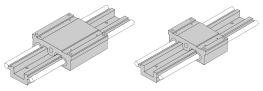
**Dual Shafts Offer:**

- This performance proven Linear guide has an extremely low profile and features external rails with maximum bearing spacing. This provides the user with high pitch, yaw and roll moment capability. The load capacity is the same when mounted in the inverted position
- Corrosion resistant options are also available for demanding environmental conditions. These include chrome plated or stainless steel shafting and corrosion resistant bearings
- The inherent self aligning design of the Super Smart Ball Bushing bearings allow for more deviation in the flatness of the mounting surface. This can dramatically reduce the installed cost of the Linear Guide
- The base extrusion has a reference edge for registration in your machine. Unlimited travel lengths can be realized by combining base and shaft segments. The shafts and bases are staggered to allow keying of the subsequent stage.

## RoundRail Linear Guides

# Dual Shaft Rail 2DA

### with Integrated Carriage Unpack and Install Inch



**Features**

- Used in continuously supported applications when rigidity is required
- Adaptable to any drive system
- Pre-aligned and preassembled for immediate installation and use
- Designed for medium to heavy loads

**Components**

- 1 Dual LinearRace shaft rail assembly
- 1 integrated carriage with 4 open type Super Smart Ball Bushing Bearings

**Specifying this Thomson Linear Guide**

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

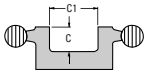
**Part Numbering System**

**2DA-12-00B L24**

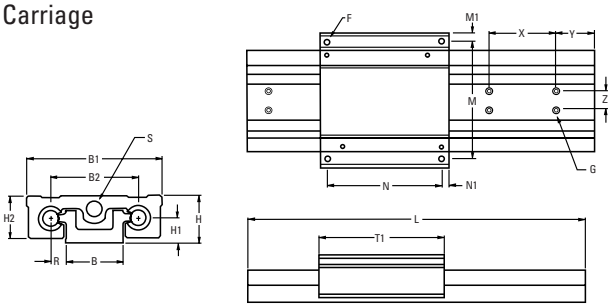
- **2DA** — Linear Guide Designation
- **12** — Nominal Diameter
- **00** — Type of Carriage
- **B** — Width of Carriage (A = Narrow, B = Wide)
- **L24** — Linear Guide Length

**Dimensions (Inch)**

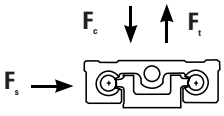
2DA XX 00B
Rail Cross Section




Dual Shaft Rail Linear Guide with Integrated Full Length Carriage



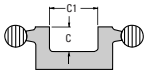

Load Rating and Limit by Direction



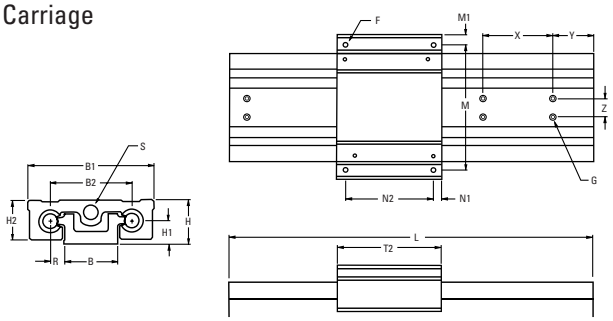

| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | 0.5C |
| $F_t$ | C | 0.5C |
| $F_s$ | 0.5C | 0.5C |

Dynamic Load Rating: load value used in life calculation.
Load Limit: Maximum allowable load applied to bearing.

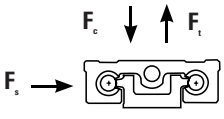
2DA XX 00A
Rail Cross Section




Dual Shaft Rail Linear Guide with Integrated Short Length Carriage




Load Rating and Limit by Direction




| | Dynamic Load Rating | Load Limit |
|---|---|---|
| $F_c$ | C | 0.5C |
| $F_t$ | C | 0.5C |
| $F_s$ | 0.5C | 0.5C |

Dynamic Load Rating: load value used in life calculation.
Load Limit: Maximum allowable load applied to bearing.

# RoundRail Linear Guides

## Dual Shaft Rail Linear Guide 2DA with Integrated Carriage (Dimensions in inches)

| Part Number | Nominal Diameter | T1 | H | H1 | H2 | B | R | B1 | B2 | C | C1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2DA-08-00B | .500 | 4.5 | 1.625 | .875 | 1.43 | 2.00 | .500 | 4.6 | 3.0 | .64 | 1.25 |
| 2DA-12-00B | .750 | 6.0 | 2.125 | 1.125 | 1.93 | 2.63 | .688 | 6.1 | 4.0 | .75 | 1.662 |
| 2DA-16-00B | 1.000 | 7.5 | 2.625 | 1.375 | 2.44 | 3.25 | .875 | 7.6 | 5.0 | .99 | 2.00 |

## Dual Shaft Rail Linear Guide 2DA with Integrated Carriage (Dimensions in inches)

| Part Number | N | N1 | M | M1 | X | Y | Z | S As Extruded | F | G | | Maximum Stroke Length | Carriage | Dual Shaft Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bolt | Hole | | | |
| 2DA-08-00B | 4.00 | .25 | 4.00 | .30 | 4.0 | 2.0 | .75 | .50 | #10-32 | 1/4 | .28 | L-(4.5) | DSRC-08-SB | DSRA-08 |
| 2DA-12-00B | 5.25 | .37 | 5.25 | .42 | 6.0 | 3.0 | 1.0. | .70 | 1/4-20 | 5/16 | .34 | L-(6.0) | DSRC-12-SB | DSRA-12 |
| 2DA-16-00B | 6.75 | .37 | 6.75 | .42 | 6.0 | 3.0 | 1.25 | .90 | 5/16-18 | 3/8 | .41 | L-(7.5) | DSRC-16-SB | DSRA-16 |

Support rails are supplied in 24 inch lengths unless quoted otherwise.
Dual Shaft Rail Support Material: Black Anodized Aluminum Alloy
Maximum continuous length of support rails is 72". If longer continuous shaft support rails are required, please contact the Thomson Linear Guides Application Engineering department.

## Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Dynamic Roll Moment ($in\text{-}lb_f$) |
|---|---|---|
| 2DA-08-00B | 480 | 720 |
| 2DA-12-00B | 3200 | 6400 |
| 2DA-16-00B | 5400 | 13500 |

Note: Above load ratings used for life calculations. Load limit of assembly 50%.

## Dual Shaft Rail Linear Guide 2DA with Integrated Carriage (Dimensions in inches)

| Part Number | Nominal Diameter | T2 | H | H1 | H2 | B | R | B1 | B2 | C | C1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2DA-08-00A | .500 | 3.5 | 1.625 | .875 | 1.43 | 2.00 | .500 | 4.6 | 3.0 | .64 | 1.25 |
| 2DA-12-00A | .750 | 4.5 | 2.125 | 1.125 | 1.93 | 2.63 | .688 | 6.1 | 4.0 | .75 | 1.662 |
| 2DA-16-00A | 1.000 | 6.0 | 2.625 | 1.375 | 2.44 | 3.25 | .875 | 7.6 | 5.0 | .99 | 2.00 |

## Dual Shaft Rail Linear Guide 2DA with Integrated Carriage (Dimensions in inches)

| Part Number | N | N2 | M | M1 | X | Y | Z | S As Extruded | F | G | | Maximum Stroke Length | Carriage | Dual Shaft Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bolt | Hole | | | |
| 2DA-08-00A | .25 | 3.00 | 4.00 | .30 | 4.0 | 2.0 | .75 | .50 | #10-32 | 1/4 | .28 | L-(3.5) | DSRC-08-SB | DSRA-08 |
| 2DA-12-00A | .37 | 3.75 | 5.25 | .42 | 6.0 | 3.0 | 1.0. | .70 | 1/4-20 | 5/16 | .34 | L-(4.5) | DSRC-12-SB | DSRA-12 |
| 2DA-16-00A | .37 | 5.25 | 6.75 | .42 | 6.0 | 3.0 | 1.25 | .90 | 5/16-18 | 3/8 | .41 | L-(6.0) | DSRC-16-SB | DSRA-16 |

Support rails are supplied in 24 inch lengths unless quoted otherwise.
Dual Shaft Rail Support Material: Black Anodized Aluminum Alloy
Maximum continuous length of support rails is 72". If longer continuous shaft support rails are required, please contact the Thomson Linear Guides Application Engineering department.

† Super Ball Bushing Bearings are used in 500 inch size carriages.

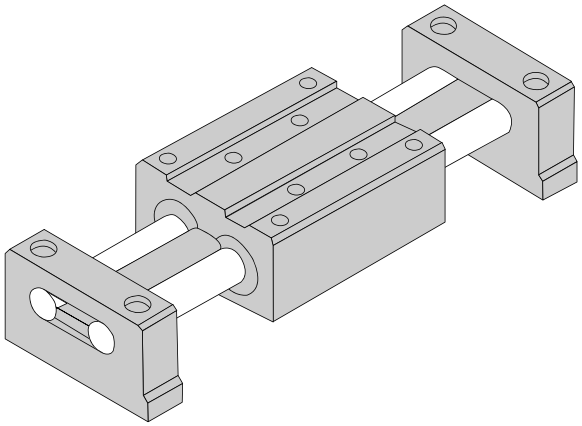
## Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Dynamic Roll Moment ($in\text{-}lb_f$) |
|---|---|---|
| 2DA-08-00A | 480 | 720 |
| 2DA-12-00A | 3200 | 6400 |
| 2DA-16-00A | 5400 | 13500 |

Note: Above load ratings used for life calculations. Load limit of assembly 50%.

## RoundRail Linear Guides

# Twin Shaft Web



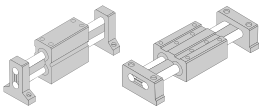
**High roll moment torque resistance, high rigidity, smooth, easy to install**

**Twin Shaft Web Linear Ball Guides Offer:**

- Twin Shaft Web design for high roll moment capacity, high rigidity and ultra smooth travel
- Pre-aligned shafts, end supported for gantry style or 'bridge' applications
- Available in horizontal and vertical orientations for increased mounting flexibility
- End supported for quicker and easy installation
- The Super Smart Ball Bushing bearing... the most technologically advanced and most robust linear bearing in the world
- The RoundRail Advantage. The inherent self-aligning-in-all-directions design of the Super Smart Ball Bushing bearing allows for ultra smooth travel when mounted to wider toleranced prepared surfaces
- Cost savings: save time and money preparing your mounting surfaces before bolting down RoundRail linear guides
- Corrosion resistant versions for maximum performance in harsh environments.

# Twin Shaft Web 2CA

## with Universal Carriage Unpack and Install Inch



### Features

- Used when spanning or bridging a gap
- Double LinearRace shaft and welded integral web design maximizes torque and dramatically improves deflection characteristics
- Pre-aligned for quick and easy installation
- Designed to move medium loads with virtually frictionless travel

### Components

- Universal integrated, carriage with 4 open type Super Smart Ball Bushing Bearings
- Twin welded 60 Case LinearRace shafts with integral web
- 2 vertical or horizontal double end supports

### Specifying this Thomson Linear Guide

1. Determine the proper Linear Guide for your load and life requirements.
2. Select the part number.
3. Add the letter "L" followed by the overall length in inches, as a suffix to the part number.

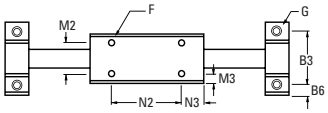
### Part Numbering System

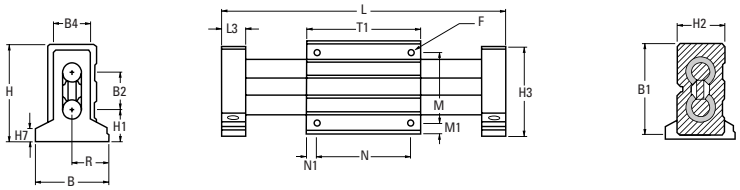
**2CA-12-0ME L24**

- **2CA** — Linear Guide Designation
- **12** — Nominal Diameter
- **0** — Support Orientation (Horizontal or Vertical)
- **M** — Support Orientation (Horizontal or Vertical)
- **E** — Type of Carriage
- **L24** — Linear Guide Length

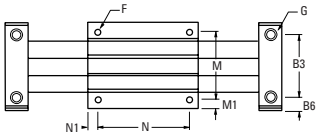
### Dimensions (Inch)

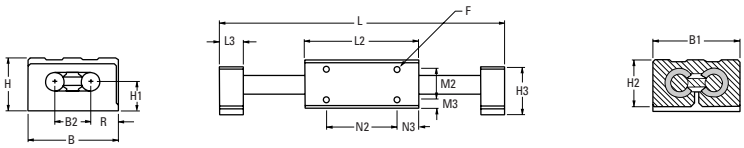
Twin Shaft Web Linear Guide with Universal Carriage (Vertical Configuration)




Twin Shaft Web Linear Guide with Universal Carriage (Horizontal Configuration)



# RoundRail Linear Guides

## Twin Shaft Web Linear Guide End Supported 2CA (Vertical Configuration) (Dimensions in inches)

| Part Number | Nominal Diameter | L3 | H | H1 | H3 | H7 | B | R | B2 | B3 | B4 | B6 | T1 | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2CA-08-OKE | .500 | .63 | 2.750 | .875 | 2.56 | .38 | 2.25 | 1.125 | 1.13 | 1.63 | 1.12 | .31 | 3.5 | 3.00 |
| 2CA-12-OKE | .750 | .75 | 3.625 | 1.125 | 3.44 | .56 | 3.00 | 1.500 | 1.50 | 2.25 | 1.63 | .38 | 4.5 | 4.00 |
| 2CA-16-OKE | 1.000 | 1.00 | 4.625 | 1.375 | 4.50 | .75 | 4.00 | 2.00 | 2.00 | 3.00 | 2.25 | .50 | 6.0 | 5.25 |

## Twin Shaft Web Linear Guide End Supported 2CA (Vertical Configuration) (Dimensions in inches)

| Part Number | N1 | N2 | N3 | H2 | B1 | M | M1 | M2 | M3 | F | G | | Maximum Stroke Length | Dual Shaft Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Bolt | Hole | | |
| 2CA-08-OKE | .25 | 2.5 | .50 | 1.5 | 2.62 | 2.00 | .31 | .88 | .31 | #10-32 | #10 | .22 | L-(4.75) | TSW-08 |
| 2CA-12-OKE | .25 | 3.5 | .50 | 2.0 | 3.50 | 2.87 | .31 | 1.38 | .31 | 1/4-20 | 1/4 | .28 | L-(6.00) | TSW-12 |
| 2CA-16-OKE | .38 | 4.5 | .75 | 2.5 | 4.50 | 3.62 | .44 | 1.62 | .44 | 5/16-18 | 5/16 | .34 | L-(8.00) | TSW-16 |

Maximum Length is 72 inches.

## 2CA (Vertical Config.) Carriage and End Support Part No.

| Linear Guide Part Number | Carriage Part Number | End Support Part Number |
|---|---|---|
| 2CA-08-OKE | WC-08 | WSB-08-V |
| 2CA-12-OKE | WC-12 | WSB-12-V |
| 2CA-16-OKE | WC-16 | WSB-16-V |

Shaft Deflection Note:
Load limit may be below the dynamic load rating due to shaft deflection.
Bearings can accommodate up to 1/2° deflection.
See Engineering section (page 257) for Deflection calculations.

## Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|
| 2CA-08-OKE | 290 | 165 |
| 2CA-12-OKE | 1800 | 1350 |
| 2CA-16-OKE | 3000 | 3000 |

† Super Ball Bushing Bearings are used in .500 inch size carriages.

## Twin Shaft Web Linear Guide End Supported 2CA (Horizontal Configuration) (Dimensions in inches)

| Part Number | Nominal Diameter | L3 | H | H1 | H3 | H7 | B | R | B2 | B3 | B4 | B6 | T1 | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2CA-08-OME | .500 | .63 | 2.750 | .875 | 2.56 | .38 | 2.25 | 1.125 | 1.13 | 1.63 | 1.12 | .31 | 3.5 | 3.00 |
| 2CA-12-OME | .750 | .75 | 3.625 | 1.125 | 3.44 | .56 | 3.00 | 1.500 | 1.50 | 2.25 | 1.63 | .38 | 4.5 | 4.00 |
| 2CA-16-OME | 1.000 | 1.00 | 4.625 | 1.375 | 4.50 | .75 | 4.00 | 2.00 | 2.00 | 3.00 | 2.25 | .50 | 6.0 | 5.25 |

## Twin Shaft Web Linear Guide End Supported 2CA (Horizontal Configuration) (Dimensions in inches)

| Part Number | N1 | N2 | N3 | H2 | B1 | M | M1 | M2 | M3 | F | G | | Maximum StrOME Length | Dual Shaft Rail Assembly |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Bolt | Hole | | |
| 2CA-08-OME | .25 | 2.5 | .50 | 1.5 | 2.62 | 2.00 | .31 | .88 | .31 | #10-32 | #10 | .22 | L-(4.75) | TSW-08 |
| 2CA-12-OME | .25 | 3.5 | .50 | 2.0 | 3.50 | 2.87 | .31 | 1.38 | .31 | 1/4-20 | 1/4 | .28 | L-(6.00) | TSW-12 |
| 2CA-16-OME | .38 | 4.5 | .75 | 2.5 | 4.50 | 3.62 | .44 | 1.62 | .44 | 5/16-18 | 5/16 | .34 | L-(8.00) | TSW-16 |

Maximum Length is 72 inches.

## 2CA (Vertical Config.) Carriage and End Support Part No.

| Linear Guide Part Number | Carriage Part Number | End Support Part Number |
|---|---|---|
| 2CA-08-OME | WC-08 | WSB-08-V |
| 2CA-12-OME | WC-12 | WSB-12-V |
| 2CA-16-OME | WC-16 | WSB-16-V |

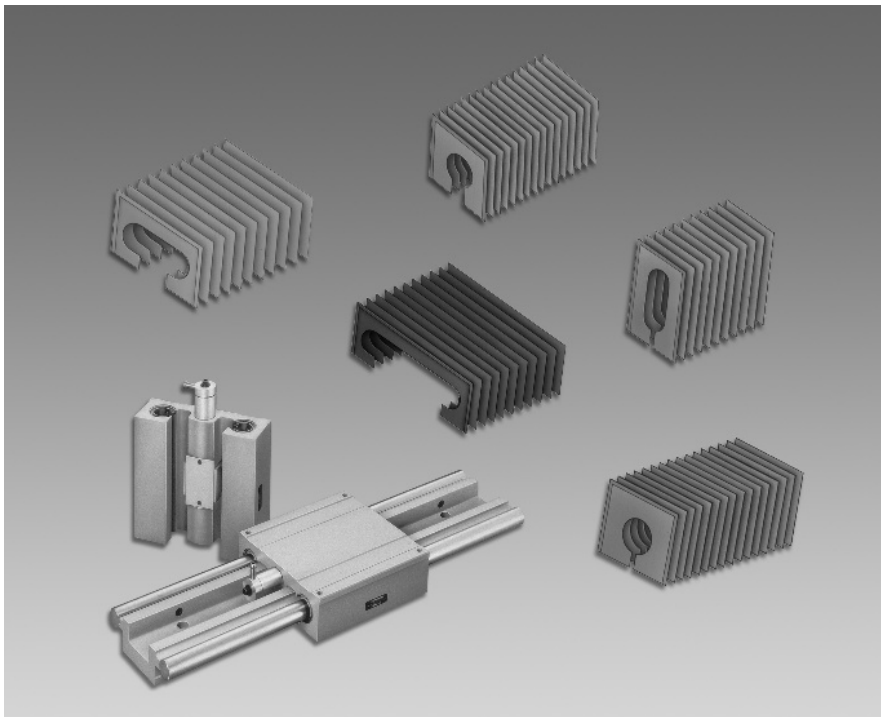
Shaft Deflection Note:
Load limit may be below the dynamic load rating due to shaft deflection.
Bearings can accommodate up to 1/2° deflection.
See Engineering section (page 257) for Deflection calculations.

## Dynamic Load Capacity Matrix (4 million inches travel)

| Linear Guide Assembly Part Number | Dynamic Load Capacity ($lb_f$) (Even Distribution) | Pillow Block Dynamic Load Capacity ($lb_f$) |
|---|---|---|
| 2CA-08-OME | 290 | 165 |
| 2CA-12-OME | 1800 | 1350 |
| 2CA-16-OME | 3000 | 3000 |

† Super Ball Bushing Bearings are used in .500 inch size carriages.

# Accessories



**We offer a variety of accessories for the Thomson line of RoundRail Linear Guides.**

* Protective bellows are available on select models for applications where protection of the round rail guides and carriage bearings are required within harsh or dirty operating environments.

* Some linear guide models are available with manually operated locking brakes for vertical applications and operations requiring unlimited carriage position alignment in the available range of stroke.

* We encourage you to inquire about linear guide accessories not shown here or any custom application needs which you may have.

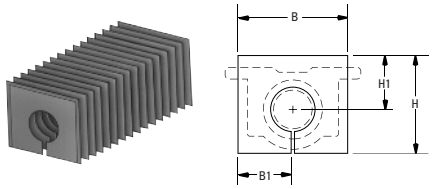
## Accessories

# Collapsable Bellows

Bellows will reduce available stroke length of slide by approximately 28%.
Bellows P/N should be succeeded by a length when ordering.

Bellows Materials:
- Polyester Cover
- PVC Stiffeners

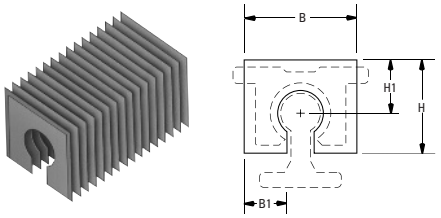
## BEL-1B† (For 1BA) Moveable Protective Bellows (Dimensions in inches)




| Part Number | Nominal Shaft Diameter | H | H1 | B | CR |
|---|---|---|---|---|---|
| BEL-1B-04 | 1/4 | 1.187 | .906 | 1.182 | .163 |
| BEL-1B-06 | 3/8 | 1.312 | .968 | 1.937 | .108 |
| BEL-1B-08 | 1/2 | 1.687 | 1.156 | 2.062 | .160 |
| BEL-1B-12 | 3/4 | 2.000 | 1.156 | 2.312 | .108 |
| BEL-1B-16 | 1 | 2.375 | 1.281 | 2.625 | .163 |
| BEL-1B-24 | 1 1/2 | 3.062 | 1.531 | 3.125 | .108 |

† Each moveable bellows comes with 1 section of bellows and 2 pairs of Velcro® Fasteners.

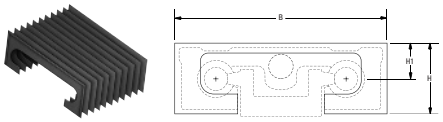
## BEL-1C† (For 1CA) Moveable Protective Bellows (Dimensions in inches)




| Part Number | Nominal Shaft Diameter | H | H1 | B | CR |
|---|---|---|---|---|---|
| BEL-1C-08 | 1/2 | 1.375 | .968 | 2.062 | .088 |
| BEL-1C-12 | 3/4 | 1.812 | 1.062 | 2.312 | .120 |
| BEL-1C-16 | 1 | 2.375 | 1.218 | 2.625 | .088 |
| BEL-1C-24 | 1 1/2 | 3.125 | 1.531 | 3.125 | .088 |

† Each moveable bellows comes with 1 section of bellows and 2 pairs of Velcro® Fasteners.

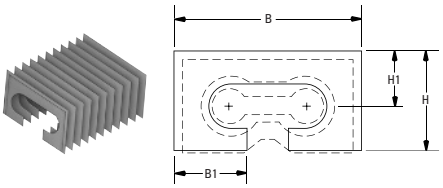
## BEL-2D (For QuickSlide System 2DA) Dual Shaft Rail Bellows (Dimensions in inches)



| Part Number | Nominal Shaft Diameter | H | H1 | B |
|---|---|---|---|---|
| BEL-2DA-08 | 1/2 | 1.50 | .85 | 4.60 |
| BEL-2DB-08 | 1/2 | 1.89 | 1.34 | 5.13 |
| BEL-2D-12 | 3/4 | 2.406 | 1.437 | 6.00 |
| BEL-2D-16 | 1 | 2.875 | 1.687 | 7.50 |

Each moveable bellows comes with 1 section of bellows and 2 mounting brackets and mounting screws.
† Appropriate arrangements for afixing the Bellows at each end of the QuickSlide 2DA System are required.

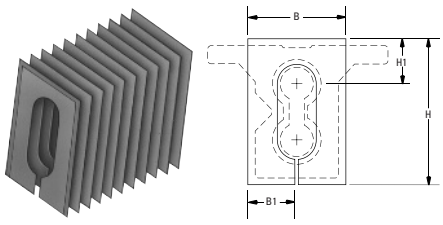
## BEL-2C-H (For Horizontal Twin Shaft Web QuickSlide System 2CA) Moveable Protective Bellows (Dimensions in inches)




| Part Number | Nominal Shaft Diameter | H | H1 | B | CR |
|---|---|---|---|---|---|
| BEL-2C-08-H | 1/2 | 1.688 | 1.031 | 3.250 | .108 |
| BEL-2C-12-H | 3/4 | 2.062 | 1.156 | 3.812 | .108 |
| BEL-2C-16-H | 1 | 2.437 | 1.281 | 4.62 | .108 |

Each moveable bellows comes with 1 section of bellows and 2 pairs of Velcro® Fasteners.

## BEL-2C-V (For Vertical Twin Shaft Web QuickSlide System 2CA) Dual Shaft Rail Bellows (Dim. in in.)




| Part Number | Nominal Shaft Diameter | H | H1 | B | CR |
|---|---|---|---|---|---|
| BEL-2C-08-V | 1/2 | 2.750 | 1.000 | 2.125 | .163 |
| BEL-2C-12-V | 3/4 | 3.750 | 1.125 | 2.375 | .163 |
| BEL-2C-16-V | 1 | 4.375 | 1.250 | 2.625 | .108 |

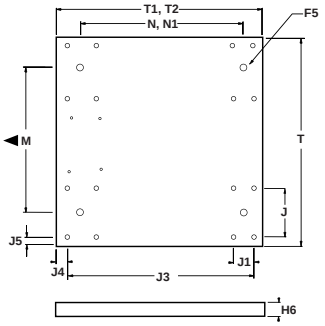
Each moveable bellows comes with 1 section of bellows and 2 pairs of Velcro® Fasteners.

# Table Tops

## Carriage Top Plates for Linear Guides

### 1BA Mounting Table Top [1] (Two mounting holes as shown in view A-A for sizes .250 and .375. Dim. in inches)

| Nominal Diameter | All Table Tops | | | | | Table Top Size B | | | | | Table Top Size A | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | N1 |
| .250 | 4.0 | 2.25 | 1.31 | .250 | #8-32 | 4.0 | .75 (2) | .22 | .22 | 3.50 | 2.50 | 2.00 | .25 | .22 | 2.0 |
| .375 | 4.5 | 2.50 | 1.44 | .250 | #10-32 | 4.5 | .88 (2) | .22 | .28 | 3.75 | 2.75 | 2.25 | .25 | .28 | 2.0 |
| .500 | 5.5 | 3.25 | 1.69 | .375 | 1/4-20 | 5.5 | 1.00 | .34 | .28 | 4.50 | 3.50 | 2.50 | .50 | .31 | 2.5 |
| .750 | 7.5 | 4.50 | 2.38 | .500 | 5/16-18 | 7.5 | 1.25 | .41 | .31 | 6.00 | 4.50 | 3.50 | .50 | .31 | 3.0 |
| 1.000 | 9.0 | 5.50 | 2.88 | .500 | 3/8-16 | 9.0 | 1.75 | .53 | .31 | 7.00 | 6.00 | 4.50 | .75 | .31 | 4.0 |
| 1.250 | 11.0 | 6.75 | 3.50 | .750 | 1/2-13 | 11.0 | 2.00 | .82 | .38 | 8.50 | 7.50 | 5.50 | 1.00 | .38 | 5.0 |
| 1.500 | 13.0 | 8.00 | 4.12 | .750 | 1/2-13 | 13.0 | 2.50 | .75 | .44 | 10.00 | 9.00 | 6.50 | 1.25 | .44 | 6.0 |




### 1NA Mounting Table Top [2] (Custom mounting hole. Dimensions in mm)

| Nominal Diameter | All Table Tops | | | | | Table Top Size B | | | | | Table Top Size A | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | J9 | N1 |
| 1NC-M08 | 85 | 50 | 25 | 10 | M6 | 85 | 20 | 6,0 | 5,0 | 50 | 62 | 50 | 6 | 5,0 | 25 | 35 |
| 1NC-M12 | 100 | 55 | 32 | 10 | M6 | 100 | 23 | 8,0 | 6,5 | 55 | 76 | 56 | 10 | 6,5 | 28 | 40 |
| 1NC-M16 | 125 | 70 | 40 | 13 | M6 | 125 | 26 | 10,0 | 7,5 | 70 | 84 | 64 | 10 | 7,5 | 32 | 45 |
| 1NC-M20 | 175 | 110 | 45 | 16 | M8 | 175 | 32 | 11,0 | 10,0 | 110 | 104 | 76 | 14 | 10,0 | 38 | 55 |
| 1NC-M25 | 225 | 140 | 60 | 20 | M8 | 225 | 40 | 13,5 | 12,5 | 140 | 130 | 94 | 18 | 12,5 | 47 | 65 |
| 1NC-M30 | 275 | 180 | 68 | 20 | M8 | 275 | 45 | 17,0 | 13,5 | 180 | 152 | 106 | 23 | 13,5 | 53 | 75 |
| 1NC-M40 | 325 | 210 | 86 | 25 | M10 | 325 | 58 | 16,5 | 14,5 | 210 | 176 | 124 | 26 | 14,5 | 62 | 85 |

### 1CA Mounting Table Top [1] (Dimensions in inches)

| Nominal Diameter | All Table Tops | | | | | Table Top Size B | | | | | Table Top Size A | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | N1 |
| .50 | 5.5 | 3.25 | 1.69 | .375 | 1/4-20 | 5.5 | 1.00 | .34 | .28 | 4.5 | 3.5 | 2.5 | .50 | .31 | 2.5 |
| .75 | 7.5 | 4.50 | 2.38 | .500 | 5/16-18 | 7.5 | 1.25 | .41 | .31 | 6.0 | 4.5 | 3.5 | .50 | .31 | 3.0 |
| 1.00 | 9.0 | 5.50 | 2.88 | .500 | 3/8-16 | 9.0 | 1.75 | .53 | .31 | 7.0 | 6.0 | 4.5 | .75 | .31 | 4.0 |
| 1.25 | 11.0 | 6.75 | 3.50 | .750 | 1/2-13 | 11.0 | 2.00 | .82 | .38 | 8.5 | 7.5 | 5.5 | 1.00 | .38 | 5.0 |
| 1.50 | 13.0 | 8.00 | 4.12 | .750 | 1/2-13 | 13.0 | 2.50 | .75 | .44 | 10.0 | 9.0 | 6.5 | 1.25 | .44 | 6.0 |

### 1PA Mounting Table Top [2] (Dimensions in mm)

| Nominal Diameter | All Table Tops | | | | | Table Top Size B | | | | | Table Top Size A | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | J9 | N1 |
| PC-M12 | 100 | 55 | 32 | 10 | M6 | 100 | 23 | 8,0 | 6,5 | 55 | 76 | 56 | 10 | 6,5 | 28 | 40 |
| 1PC-M16 | 125 | 70 | 40 | 13 | M6 | 125 | 26 | 10,0 | 7,5 | 70 | 84 | 64 | 10 | 7,5 | 32 | 45 |
| 1PC-M20 | 175 | 110 | 45 | 16 | M8 | 175 | 32 | 11,0 | 10,0 | 110 | 104 | 76 | 14 | 10,0 | 38 | 55 |
| 1PC-M25 | 225 | 140 | 60 | 20 | M8 | 225 | 40 | 13,5 | 12,5 | 140 | 130 | 94 | 18 | 12,5 | 47 | 65 |
| 1PC-M30 | 275 | 180 | 68 | 20 | M8 | 275 | 45 | 17,0 | 13,5 | 180 | 152 | 106 | 23 | 13,5 | 53 | 75 |
| 1PC-M40 | 325 | 210 | 86 | 25 | M10 | 325 | 58 | 16,5 | 14,5 | 210 | 176 | 124 | 26 | 14,5 | 62 | 85 |

### 1VA Mounting Table Top [1] (2 mounting holes as shown in view A-A for size .375. Dimensions in inches)

| Nominal Diameter | All Table Tops | | | | | Table Top Size B | | | | | Table Top Size A | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | N1 |
| .375 | 4.5 | 2.50 | 1.44 | .250 | #10-32 | 4.5 | .88 (2) | .22 | .28 | 3.75 | 2.75 | 2.25 | .25 | .28 | 2.0 |
| .500 | 5.5 | 3.25 | 1.69 | .375 | 1/4-20 | 5.5 | 1.00 | .34 | .28 | 4.50 | 3.50 | 2.50 | .50 | .31 | 2.5 |
| .625 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| .750 | 7.5 | 4.50 | 2.38 | .500 | 5/16-18 | 7.5 | 1.25 | .41 | .31 | 6.00 | 4.50 | 3.50 | .50 | .31 | 3.0 |
| 1.000 | 9.0 | 5.50 | 2.88 | .500 | 3/8-16 | 9.0 | 1.75 | .53 | .31 | 7.00 | 6.00 | 4.50 | .75 | .31 | 4.0 |
| 1.250 | 11.0 | 6.75 | 3.50 | .750 | 1/2-13 | 11.0 | 2.00 | .82 | .38 | 8.50 | 7.50 | 5.50 | 1.00 | .38 | 5.0 |
| 1.500 | 13.0 | 8.00 | 4.12 | .750 | 1/2-13 | 13.0 | 2.50 | .75 | .44 | 10.00 | 9.00 | 6.50 | 1.25 | .44 | 6.0 |

### 1DA Mounting Table Top (Dimensions in inches)

| Nominal Diameter | All Table Tops | | | | | Table Top Size D | | | | | Table Top Size C | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | M | J | H6 | F5 | T1 | J1 | J4 | J5 | N | T2 | J3 | J4 | J5 | N1 [3] |
| .5 | 7.25 | 4.0 | .91 | .50 | 1/4-20 | 5.5 | 1.25 | .25 | .28 | 2.63 | 3.5 | 3.00 | .25 | .28 | .75 |
| .75 | 9.75 | 6.0 | 1.19 | .50 | 5/16-18 | 7.5 | 1.58 | .25 | .38 | 3.50 | 4.5 | 4.00 | .25 | .38 | 1.00 |
| 1.00 | 12.00 | 6.0 | 1.44 | .50 | 3/8-16 | 9.0 | 2.25 | .34 | .40 | 4.38 | 6.0 | 5.25 | .38 | .40 | 1.25 |

(1) Carriage material: Aluminum Alloy Black Anodized
(2) Carriage material: Aluminum Alloy Grey Anodized
(3) Mounting hole spacing facilitates attachment of Dual Shaft Rail 2DA Linear Guide in an X-Y orientation.

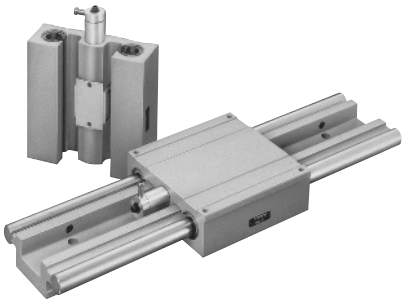
## Accessories

# 2DA QuickSlide System with Brake

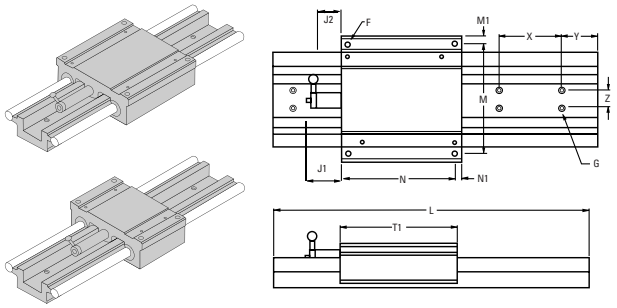
### A manual locking mechanism for the Dual Shaft Rail System

**2DA QuickSlide System with Brake offers:**

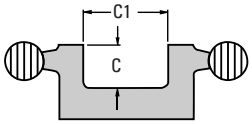
- A manual locking mechanism with infinite positioning capability.
- No carriage mounting surface deflection when the locking mechanism is activated.
- Immediate off-the-shelf availability in 1/2, 3/4 and 1 inch sizes.
- A locking mechanism that, when activated, will not apply an increase in load on the system's Ball Bushing bearing.
- Zero axial movement during the activation of the locking mechanism.
- A fully supported Dual Shaft assembly for maximum rigidity and unlimited travel.
- High load capacity in any direction.



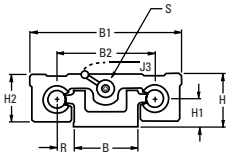
Dual Shaft Rail Fully Supported System with Integrated Carriage




Dual Shaft Rail Supported Cross-Section




Maximum Stroke Length is determined by subtracting the carriage length (T1 or T2) plus the brake handle length (J1) from the total system length.




## Dual Shaft Rail Fully Supported System with Integrated Carriage (Long Style) (Dimensions in inches)

| Part Number | Nominal Shaft Diameter | Max. Load on System (1) ($lb_f$) | Max. Load on One Bearing (1) ($lb_f$) | T1 | H | H1 | H2 | B | R | B1 | B2 | C | C1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2DA-08-00L | 1/2 | 600 | 150 | 4.50 | 1.625 | 0.875 | 1.43 | 2.00 | 0.500 | 4.60 | 3.00 | .64 | 1.25 |
| 2DA-12-00L | 3/4 | 1880 | 470 | 6.00 | 2.125 | 1.125 | 1.93 | 2.63 | 0.688 | 6.10 | 4.00 | .75 | 1.62 |
| 2DA-16-00L | 1 | 3120 | 780 | 7.50 | 2.625 | 1.375 | 2.44 | 3.25 | 0.875 | 7.60 | 5.00 | .99 | 2.00 |

(1) For rated travel life of 2 million inches. Note: Manual Brake can be adjusted in order to position handle to any radial location. Dual Shaft Rail Support Material: Aluminum Alloy Black Anodized. Standard length of one-piece Aluminum Dual Shaft Rails is 72".

## Dual Shaft Rail Fully Supported System with Integrated Carriage (Long Style) (Dimensions in inches)

| Part Number | N | N1 | M | M1 | X | Y | Z | J1 | J2 | J3 | F | G | | Max. Stroke Length | Carriage Part Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Bolt | Hole | | |
| 2DA-08-00L | 4.00 | .25 | 4.00 | .30 | 4.00 | 2.00 | .75 | 1.63 | 1.19 | .88 | #10-32 | 1/4 | .28 | L-(6.13) | DSRC-08-SL |
| 2DA-12-00L | 4.25 | .37 | 5.25 | .42 | 6.00 | 3.00 | 1.00 | 1.63 | 1.19 | 1.00 | 1/4-20 | 5/16 | .34 | L-(7.63) | DSRC-12-SL |
| 2DA-16-00L | 6.75 | .37 | 6.75 | .42 | 6.00 | 3.00 | 1.25 | 1.63 | 1.19 | 1.00 | 5/16-18 | 3/8 | .41 | L-(9.13) | DSRC-16-SL |

## Dual Shaft Rail Fully Supported System with Integrated Carriage (Short Style) (Dim. in inches)

| Part Number | Nom. Shaft Diameter | T2 | N2 | Max. Stroke Length | Carriage Part Number |
|---|---|---|---|---|---|
| 2DA-08-00M | 1/2 | 3.50 | 3.00 | L-(5.13) | DSRC-08-SM |
| 2DA-12-00M | 3/4 | 4.50 | 3.75 | L-(6.13) | DSRC-12-SM |
| 2DA-16-00M | 1 | 6.00 | 5.25 | L-(7.63) | DSRC-16-SM |

## System 2DA Standard Lengths (Dim. in inches)

| System | 8" | 12" | 16" | 18" | 20" | 24" | 28" | 30" | 32" | 36" | 40" | 42" | 44" | 48" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2DA-08 | • | • | • | | • | • | • | | • | • | • | | • | • |
| 2DA-12 | | • | | • | | • | | • | | • | | • | | • |

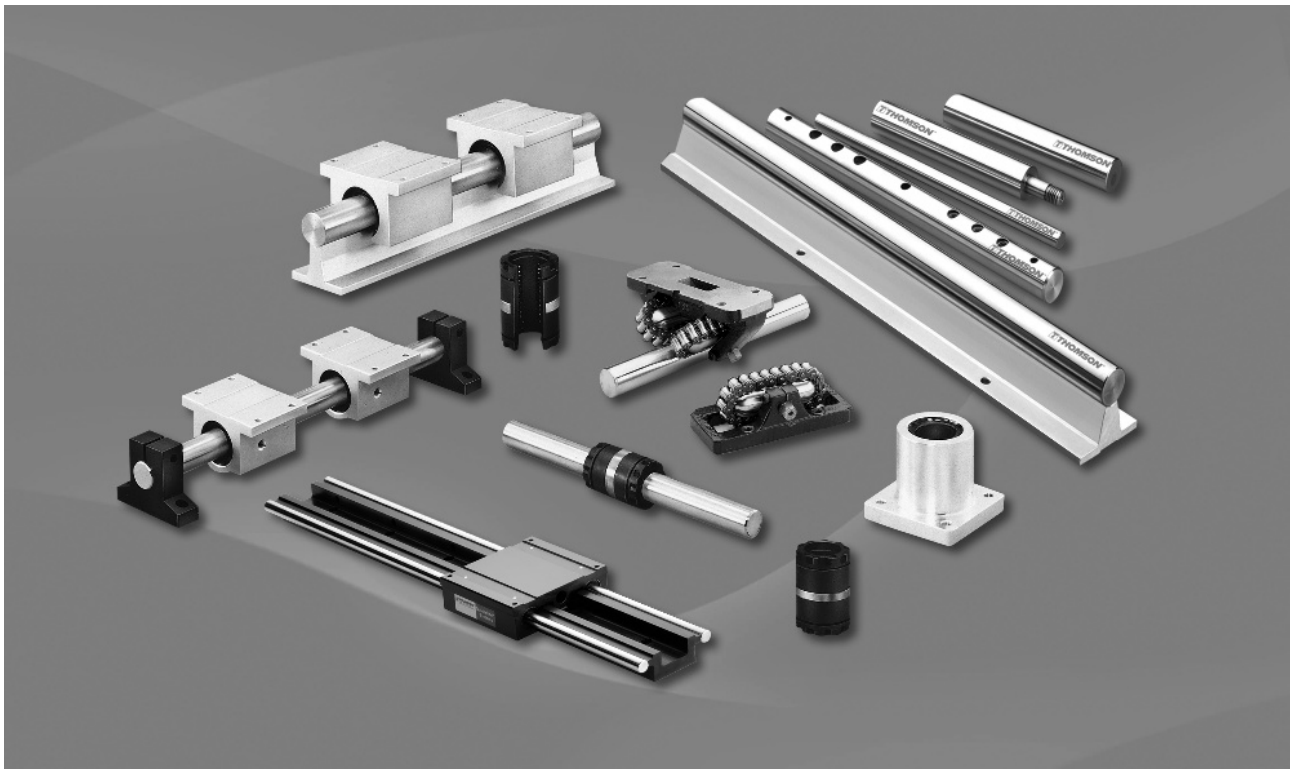
## Quick Slide Brake Holding Force

| System | Axial Holding Force ($lb_f$) |
|---|---|
| 2DA-08 | 125 |
| 2DA-12 | 130 |
| 2DA-16 | 140 |

## Custom Lengths and Delivery Information

Custom length systems are available. For special requirements, please contact the Thomson Systems application engineering department.

# Engineering



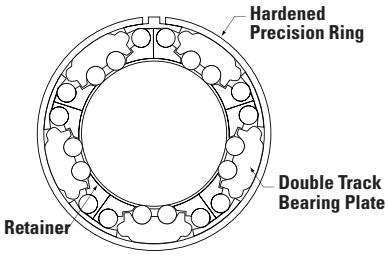
The Engineering Appendix contains valuable information on the application and use of Thomson Ball Bushing Bearings, pillow blocks, 60 Case LinearRace shafts, 60 Case LinearRace supports and accessories.

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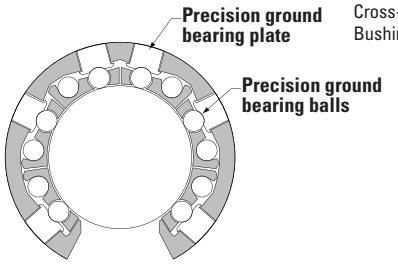
## Engineering

# Performance Criteria

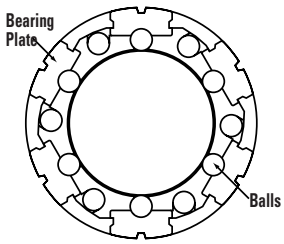
The following performance criteria relates to the use, installation and specification of Thomson Ball Bushing Bearings. Each performance criteria plays an important role in maximizing system effectiveness and life.



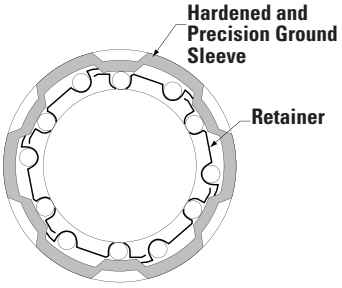

Cross-section of Super Smart Ball Bushing Bearing



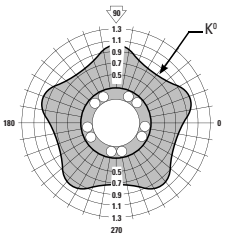

Cross-section of XR Ball Bushing Bearing




Cross-section of Super Ball Bushing Bearing




Cross-section of Precision Steel Ball Bushing Bearing




Polar Graph

## Dynamic Load Capacity

The Dynamic load capacity of a Ball Bushing Bearing is determined by the reaction between the rolling elements and the inner and outer race. The rolling elements in a Ball Bushing Bearing are a series of hardened and precision ground bearing balls. The inner race is a hardened and precision ground 60 Case LinearRace.

The outer race can be a hardened and precision ground, ball conforming, steel bearing plate or a hardened and precision ground steel bearing sleeve. The dynamic load capacity is also affected by the orientation of the ball tracks, the size of the balls, the shape of the ball conforming groove, the number of balls that are in load contact and more.

Since the introduction of the Ball Bushing Bearing in 1945, Thomson has designed and developed Ball Bushing Bearing products that have continuously achieved dramatic increases in dynamic load capacity and life. Our most recent innovation is the Super Smart Ball Bushing Bearing which has six times the dynamic load capacity or 216 times greater life than the traditional Ball Bushing Bearing.

This increase in load capacity was achieved by maximizing the load reaction between the inner and outer races. This break-through in load capacity rivals that of linear guides while still retaining the added benefits of the RoundRail Advantage enabling the linear bearing to avoid many of the derating factors that can diminish the load/life performance of square rail products.

The dynamic load capacity of all Thomson Ball Bushing Bearings is based on a L10 life of two million inches (100 km for Metric bearings) of travel. The dynamic load capacity can be affected by the orientation of the bearing with respect to the load or the direction of the applied load. A polar graph is included with each product specification to assist you in optimizing the load capacity as well as the performance of the Ball Bushing Bearing. To determine the resultant load capacity find the angle at which the load is applied to the bearing, and move in radially along that line until it intersects the curve. Move around circumferentially to the polar correction value located on the vertical axis. Next, multiply the proper correction factor by the dynamic load capacity listed in each product specification table.

# Performance Criteria (cont'd)

## The RoundRail Advantage

The RoundRail Advantage is the inherent ability of a RoundRail bearing to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress to bearing components (Figure 1). This important feature to all Thomson Ball Bushing Bearing systems reduces installation time and cost, while maximizing performance.

**Ball Bushing Bearing vs. Linear Guide**

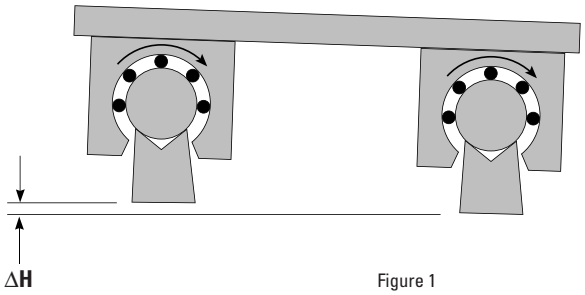



Figure 1

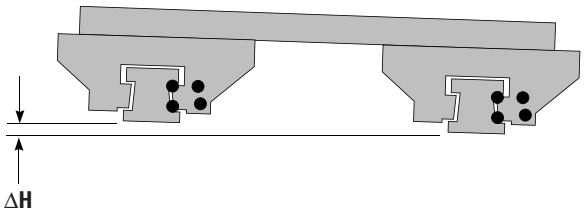



Figure 2

The major difference between a Ball Bushing Bearing and linear guide system is primarily in the design of the inner race. The linear guide inner race has two, four or six ground grooves that guide the carriage and the precision balls. Due to the ball conforming nature of the grooves, the carriage is prevented from accommodating torsional misalignment (Figure 2). If torsional misalignment is introduced to a linear guide system, the component stress increases, reducing life and performance. In a Ball Bushing Bearing system the inner race is a hardened and ground 60 Case LinearRace. Since there are no grooves, the Ball Bushing Bearing system can accommodate torsional misalignment and operate without added stress to bearing components.

**60 Case LinearRace/Ball Bushing Bearing Fit-up**

There are three basic fit-up conditions of a Ball Bushing Bearing and 60 Case LinearRace: clearance, line-to-line and preload. In most product sections there are specification tables that detail the Ball Bushing Bearing working bore diameter and 60 Case LinearRace diameter tolerance as well as the fit-up between them. The clearance, line-to-line and preload conditions are shown by the abbreviation C for clearance, P for preload and .0000 for a line-to-line condition.

**Clearance**

The clearance between a Ball Bushing Bearing and a 60 Case LinearRace is a result of the Ball Bushing Bearing working bore diameter and the diameter tolerance of the 60 Case LinearRace. The working bore diameter of a Super Smart or Super Ball Bushing Bearing is a function of the housing bore diameter tolerance. In applications where high accuracy and repeatability is not required, clearance is acceptable. Clearance can be achieved by following the recommended housing bore guidelines found in the product specification sections. To check for a clearance condition, rotate the 60 Case LinearRace inside the Ball Bushing Bearing while installed in a housing bore. If you can freely rotate the 60 Case LinearRace then a clearance condition is present. For more details see the product specification sections.

**Preload**

In applications where accuracy and repeatability are critical, the Super Smart, Super and Precision Steel Ball Bushing Bearings can be adjusted to a preload fit-up. The Super Smart and Super Ball Bushing Bearings are inherently adjustable and when installed in a adjustable housing bore a preload condition can be achieved. In a nonadjustable housing a preload condition can be obtained by making the size of the housing bore smaller or by increasing the diameter of the 60 Case LinearRace. To test for a preload condition in an adjustable or nonadjustable housing, simply rotate the 60 Case LinearRace inside the Ball Bushing Bearing while it is installed in the housing bore. If a slight drag is felt then a preload condition is present. When an adjustable housing is used the preload can be altered slightly. The Super Smart and Super Ball Bushing Bearing are more tolerant to preload than the Precision Steel Ball Bushing Bearing. Preload on a Super Smart and Super Ball Bushing Bearing should be a maximum of .001 inch per inch of 60 Case LinearRace diameter. Preload on a Precision Steel Ball Bushing Bearing should be a maximum of .0001 inch per inch of 60 Case LinearRace diameter. When all Ball Bushing Bearings are preloaded, extra care must be taken in mounting the 60 Case LinearRace parallel.

**Line-to-Line**

A line-to-line fit-up condition between a Ball Bushing Bearing and 60 Case LinearRace is when no clearance or preload is present. A line-to-line fit-up can be achieved in an adjustable or fixed diameter housing. For more details see the product specification sections.

Examples of Ball Bushing Bearing/60 Case LinearRace Fit-ups (in.)

| Ball Bushing Bearing Part Number | Working Bore Diameter | Recommended Housing Bore Diameter (fixed) | Actual Working Bore Diameter | 60 Case LinearRace Diameter | Ball Bushing Bearing/60 Case LinearRace Fit Up |
|---|---|---|---|---|---|
| SUPER 20 | 1.2500/1.2494 | 2.0008/2.0000 | 1.2508/1.2494 | 1.2495/1.2490 | .0018C/.0001P |
| A-203242 | 1.2500/1.2494 | – | 1.2500/1.2494 | 1.2490/1.2485 | .0015C/.0004C |
| XA-203242 | 1.2500/1.2496 | – | 1.2500/1.2496 | 1.2495/1.2490 | .0010C/.0001C |

## Engineering

The new Super Smart Ball Bushing Bearing represents a major advancement in linear bearing technology worldwide. The Super Smart Ball Bushing Bearing offers twice the load capacity or eight times the travel life of the industry standard Super Ball Bushing Bearing. An enormous technological breakthrough, considering the Super Ball Bushing Bearing already offers three times the load capacity or twenty-seven times the travel life of conventional Ball Bushing Bearings.

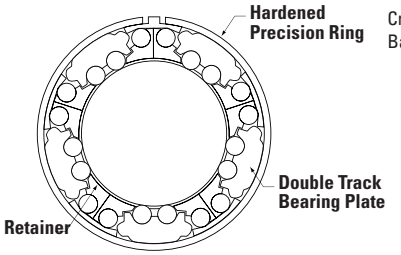



Figure 1

Cross-section of Super Smart Ball Bushing Bearing

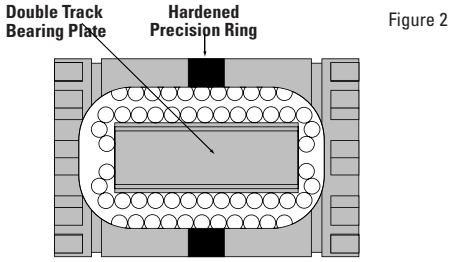



Figure 2

**Technologically Advanced Design**

The load carrying component of the Super Smart Ball Bushing Bearing is the combination of four hardened bearing quality steel components (Figures 1 & 2).

The first component is the hardened precision outer ring, which enables the bearing to maintain its diametral fit-up even after extended use, when standard self-aligning bearing plates would imbed into the housing. The unique ring design also allows for bearing adjustment and the removal of diametral clearance. The second component is the precision super finished double track bearing plate that provides twice the load capacity and in combination with the hardened precision stell band provides true universal self-alignment; which means optimum performance even with slight installation imperfections including housing bore out of roundness..

The third component is the rolling element. Each Super Smart Ball Bushing Bearing features precision ground balls manufactured to the highest quality standards for roundness and sphericity. The result is maximum load capacity, travel life and performance.

The last component is the 60 Case LinearRace shaft that functions as the inner race to the Super Smart Ball Bushing Bearing. Each 60 Case LinearRace is manufactured to the highest quality standards for roundness, straightness, surface finish and hardness. Roundness is held under .000080"; straightness to .001" per 12"; surface finish under 8 Ra and hardness between 60-65 HRC. The combination of inner and outer race or 60 Case LinearRace and Super Smart Ball Bushing Bearing provides the fullest embodiment of the RoundRail Advantage.

## Self-Alignment

The Super Smart and Super Ball Bushing Bearings are equipped with a built-in self-alignment feature that allows the bearing to absorb misalignment up to 0.5° per inch (Figure 3 and 4). This self-aligning feature allows the Super Smart and Super Ball Bushing Bearing to absorb misalignment caused by inaccuracies in housing bore alignment or 60 Case LinearRace deflection.

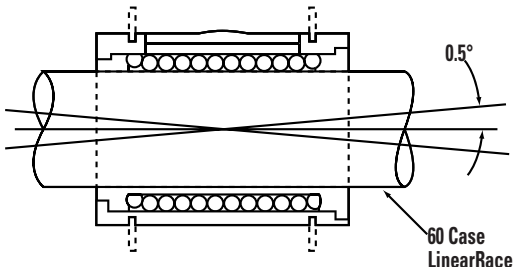



Figure 3

Super Ball Bushing Bearing Self-Alignment Feature

This rocking capability also provides smooth entry and exit of the precision balls into and out of the load zone assuring a constant low coefficient of friction. By compensating for misalignment, each bearing ball in the load carrying area is uniformly loaded providing maximum load capacity. Besides this rocking capability, only the Super Smart Ball Bushing Bearing provides two additional self-alignment features. They are Roll and Yaw.

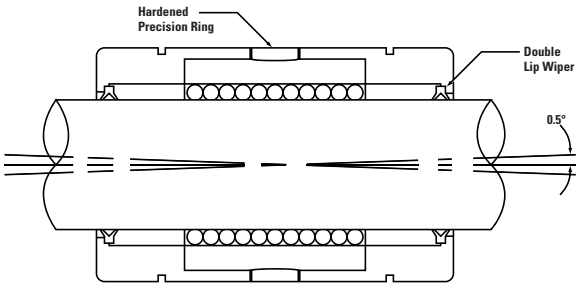



Figure 4

Super Smart Ball Bushing Bearing Self-Alignment Feature

**Roll**

The Super Smart Ball Bushing Bearing plate is designed with the radius of its outer surface smaller than the inside radius of the precision outer ring (Figure 5). This feature allows the bearing plate to compensate minor torsional misalignment still distribute the load on each of its two ball tracks. The roll component assures maximum load capacity and travel life.

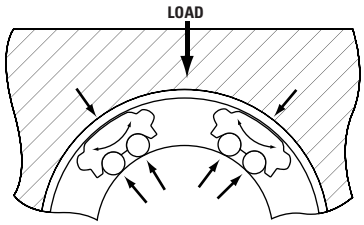



Figure 5

Super Smart Ball Bushing Bearing Self-Alignment Feature

**Yaw**

The shape formed by the Rock and Roll features enables the Super Smart Ball Bushing Bearing plate to even rotate about its center (Figure 6). This allows the Super Smart Ball Bushing Bearing to also absorb skew caused by misalignment. The result is a constant low coefficient of friction and maximum bearing performance.

Figure 7 below describes the conditions to which Super Smart and Super Ball Bushings automatically self-align. It is important to note that even though the Super Smart and Super Ball Bushing Bearings self-align, they still cannot absorb an out-of-parallel 60 Case LinearRace condition. Tolerance to 60 Case LinearRace out-of-parallelism is a function of clearance between the bearing and its 60 Case LinearRace.

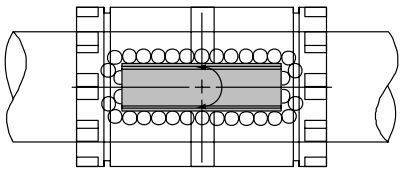


Figure 6

Bearing plates rotate about their center to prevent skewing relative to the 60 Case LinearRace.

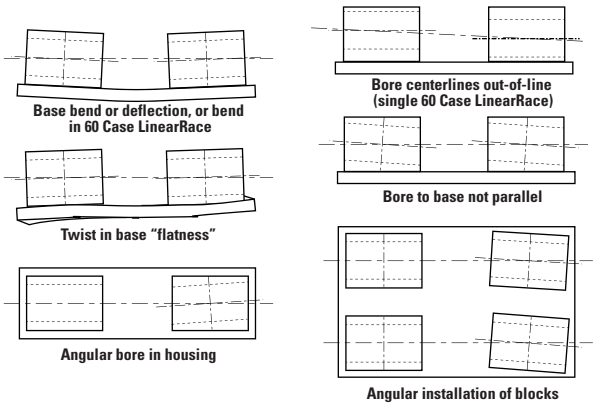



Figure 7

## Engineering

# Ball Bushing Bearing Life Expectancy and Load Capacity

There are many factors that affect Ball Bushing Bearing travel life such as 60 Case LinearRace hardness, the resultant load, the direction of the resultant load and Ball Bushing Bearing orientation. The dynamic load capacities and travel life graphs given in the specification tables found in each product section are based on a load applied at 90° relative to the horizontal plane with the Ball Bushing Bearing oriented as shown in each corresponding polar graph. Note: For Super Smart Ball Bushing Bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized! The dynamic load capacity is also based on using only Thomson specified 60 Case LinearRace that is hardened to HRC 60 to 65.

For considerations other than those described above, the following formula is used:

$$W_R = \frac{P}{K_0 \bullet K_S \bullet K_L}$$

Where:

$W_R$ = required dynamic load capacity ($lb_f$ or N)
P = resultant of externally applied loads ($lb_f$ or N)
$K_0$ = factor for direction of resultant load
$K_S$ = shaft hardness factor (Equals 1.0 for 60 Case LinearRace)
$K_L$ = load correction factor

## Travel Life

The load correction factor, $K_L$, can be found from Figure 1 for inch product, and Figure 2 for Metric product. To determine $K_L$, for your required travel life, look for the value on the horizontal axis – Travel Life Factor – left side of the chart. (Interpolate as necessary – this is a Log-Log curve.) That is the value of your load correction factor.

Figure 1

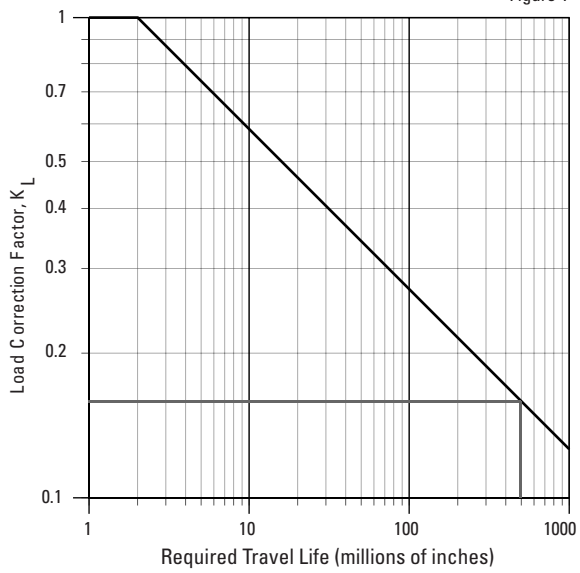
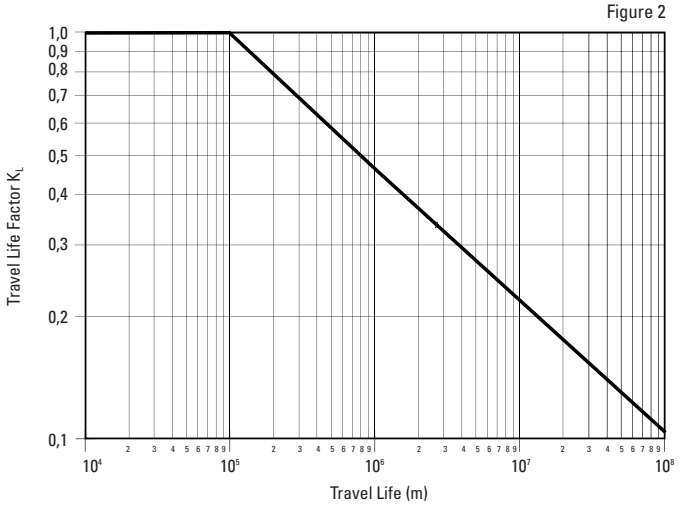


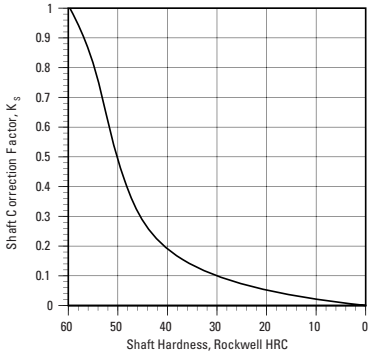

Figure 2




## 60 Case LinearRace Hardness

For shafts that do not meet 60 Case LinearRace hardness specifications of 60 HRc, shaft hardness factor $K_S$ must be applied. To determine $K_S$, simply enter Figure 3 with your shaft Rockwell hardness, find the value on the horizontal axis – Shaft Hardness – bottom of chart. Move vertically up until you intersect the curve. Then move hoizontally until you reach the vertical axis – Shaft Correction Factor – left side of chart..

Figure 3



## Load Direction

In applications where the direction of the applied load is known, refer to the polar graphs on the product specification pages for the orientation factor (load correction factor is KL). A polar graph is referenced in Figure 4 for example.

Once you have determined your required dynamic load capacity refer to the product specification table for the proper Ball Bushing Bearing size. Note: For Super Smart Ball Bushing bearings and other extremely high load bearings, the bearing load capacity as indicated by the polar charts may be be practically limited by the degree of shaft flexure acceptable, or the capacity of the shaft rail assembly fasteners. In such cases, the loads should be kept below these practical limits, however, the full corresponding life capacity benefits are still realized!

Note: Thomson Linear Ball Bushing Bearings are precision components.
To preserve bearing warranty you must use the specified Thomson 60 Case LinearRace.

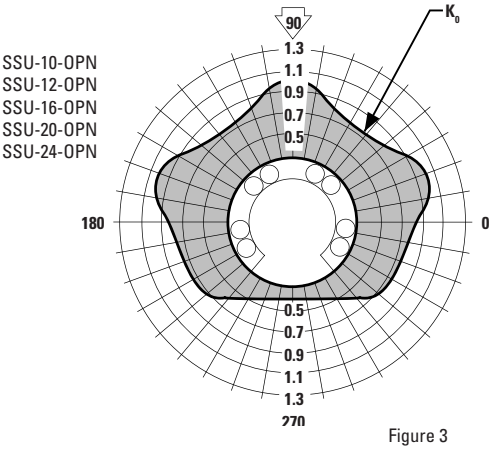



Figure 3

## Load Limit

The load limit is the maximum load which can be applied to the bearing. It is important to analyze your application so that peak and shock loading does not exceed the
load limit.

## Dynamic Load Rating

The dynamic load rating is the maximum continuous load that can be applied to the bearing with a 90% reliability of achieving life of two million inches (100 km for Metric bearings) under conventional operating conditions. However, it is important to remember that very short strokes and the direction of the applied load can be significant factors.

The following formula may be used to determine travel life for Metric bearings (SSEM, SPM, and MAM):

$$L_m = \left(\frac{W}{P} \bullet K_q \bullet K_s\right)^3 \bullet 10^5 m$$

Where: $L_m$ = travel life (m)
$W$ = dynamic load rating from tables (N)
$P$ = resultant from externally applied loads (N)
$K_o$ = factor for direction of resultant load
$K_S$ = shaft hardness factor

**Sample Calculations:**
Determine the correct Ball Bushing Bearing size for your application. In this example, the bearing/shaft system is subjected to a load of 2300 N perpendicular to the direction of travel. The load is distributed equally among four closed type MultiTrac Ball Bushing Bearings. The carriage reciprocates over a 0,3 m stroke at a frequency of 100 complete cycles per minute. The minimum service life required is 3500 hours. 60 Case LinearRace shafting is used.

The first step is to determine the average load on each Ball Bushing Bearing.

$$P = \frac{W}{P} = 575\ N$$

Next, determine the equivalent travel life in meters:

$L_m = 2 \bullet s \bullet f \bullet L_h \bullet 60$
$L_m = 2 \bullet 0{,}3 \bullet 100 \bullet 3500 \bullet 60$
$L_m = 1{,}26 \bullet 10^7 m$

Where: $s$ = stroke in meters
$f$ = frequency in cycles per minute
$L_h$ = required life in hours

From Figure 1 (Travel Life Chart), the travel life factor ($K_L$) is 0,2.

From Figure 2 (Shaft Hardness Chart), the shaft hardness factor ($K_S$) is 1.

For closed type MultiTrac Ball Bushing Bearings, the minimum value of Ko is 1, the assumed value for this calculation.

The required dynamic load capacity is obtained by using the following formula:

$$W_R = \frac{P}{K_L \bullet K_S \bullet K_q} = 575\ N \qquad W_R = \frac{575}{2{,}0 \bullet 1 \bullet 1} = 2875\ N$$

By referring to the product specification and dimension sections of this catalog, the linear bearing with the next higher load capacity is the MultiTrac MA M40 with a dynamic load capacity of 3820 N.

## Determining the Travel Life

The expected travel life of the MultiTrac MA M40 bearing under the conditions described in the example is:

$W$ = 3820 N is the rated dynamic load capacity
$P$ = 575 N is resultant of external loads
$K_o$ = 1 is the orientation factor
$K_S$ = 1 is the shaft hardness factor

The values are substituted into the following formula:

$$L_m = \left(\frac{W}{P} \bullet K_0 \bullet K_s\right)^3 \bullet 10^5 m \qquad L_m = \frac{575}{2{,}0 \bullet 1 \bullet 1} = 2875\ N$$

$$L_m = \frac{293 \bullet 10^7}{2 \bullet 60 \bullet 0{,}3 \bullet 100}$$

This is converted into hours by the following:

$$L_h = \frac{L_m}{2 \bullet 60 \bullet s \bullet f} \qquad L_h = \frac{293 \bullet 10^7}{2 \bullet 60 \bullet 0{,}3 \bullet 100}$$

$L_h$ = 8139 h

## Engineering

# 60 Case LinearRace Shafting Specifications

Thomson 60 Case LinearRace provides the inner race for Thomson Ball Bushing Bearings. All 60 Case LinearRace is manufactured to extremely close tolerances for surface finish, roundness, hardness and straightness to provide long service life with reduced maintenance.

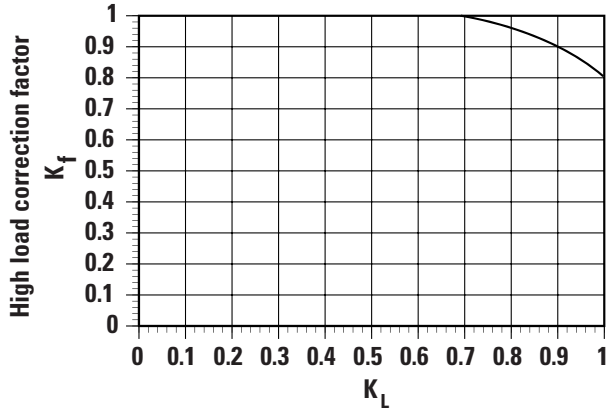
## Specifications

| | |
|---|---|
| Hardness: | HRC 60 minimum |
| Surface Finish: | 8 $R_a$ microinch |
| Roundness: | 80 millionths of an inch |
| Straightness: | Standard—.001 inch per foot cumulative (.002 TIR)<br>Special—.0005 inch per foot cumulative (.001 TIR) |
| Length Tolerance: | Standard +/–.030 inch for diameters up to 2 inches and +/–.060 for diameters 2 inch and over. Special length tolerances available. |
| Chamfer: | Standard chamfer on diameters up to 1 inch is .030 x 45° and .060 x 45° for diameters larger than 1 inch. |
| Tensile Strength: | Case: 335,000 psi, Core: 100,000 psi |
| Yield Strength: | Case: 250,000 psi, Core: 75,000 psi |

## Load Factor

In applications where the applied load exceeds 70% of the maximum dynamic load capacity of Super Smart Ball Bushing Bearings, a high load correction factor $K_f$ must be applied to $W_R$ when calculating travel life. (Figure 1)

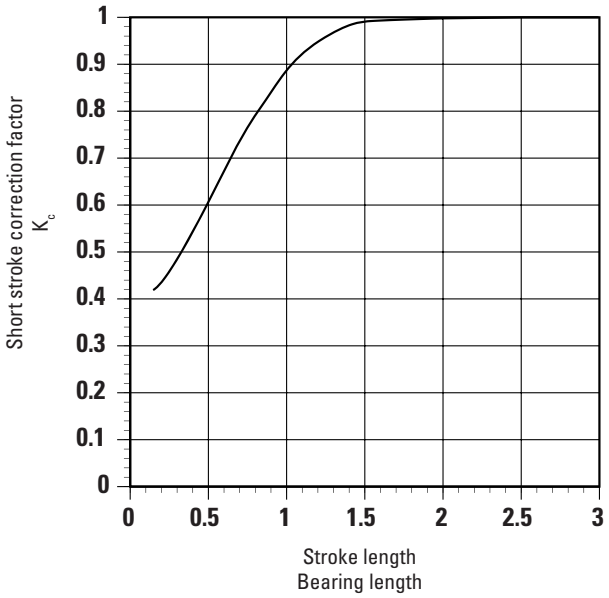
Figure 1




## Short Stroke Applications

In applications when the stroke length is short, the life of the shaft is shorter than that of the Ball Bushing Bearing. In short stroke applications, the required dynamic load capacity must be multiplied by the factor $K_C$ found on Figure 2.

Figure 2



# Load Consideration

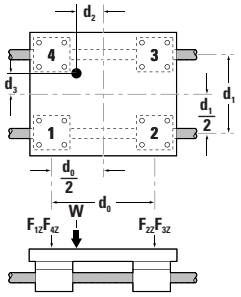
When designing a linear motion system it is necessary to consider how the variables of operation will affect performance.

The following examples demonstrate how the position of the load and the center of gravity can influence the product selection. When evaluating your application, review each of the forces acting on your system and determine the product best for your needs.

## Terms:

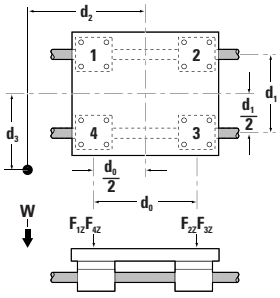
$d_0$ = distance between centerlines of pillow blocks
$d_1$ = distance between centerlines of 60 Case LinearRace ways
$d_2$ = distance from centerline of carriage to load action point
d3 = distance from centerline of carriage to load action point
W = Load (lb)
$F_{NX}$ = Force in the X-axis direction ($lb_f$ or N)
$F_{NY}$ = Force in the Y-axis direction ($lb_f$ or N)
$F_{NZ}$ = Force in the Z-axis direction ($lb_f$ or N)

$$F_{1Z} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{2Z} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$



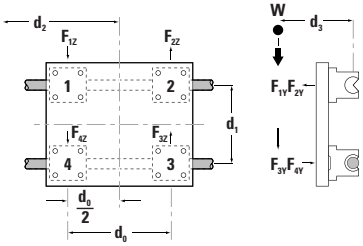

**Horizontal Application I**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1Z} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{2Z} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$



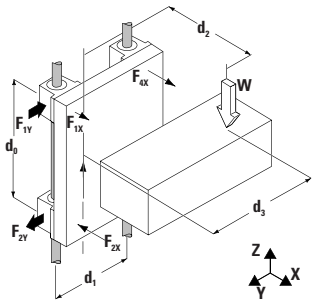

**Horizontal Application II**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1Y} \approx F_{4Y} = \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$
$$F_{1Z} = F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$
$$F_{2Z} = F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$




**Side Mounted Application**
At the time of movement with uniform velocity or at the time of stop.

$$F_{1X} \approx F_{4X} = \frac{W}{2} \bullet \frac{d_2}{d_0}$$
$$F_{1Y} \approx F_{4Y} = \frac{W}{2} \bullet \frac{d_3}{d_0}$$
$$F_{1X} + F_{4X} \approx F_{2X} + F_{3X}$$
$$F_{1Y} + F_{4Y} \approx F_{2Y} + F_{3Y}$$




**Vertical Application**
At the time of movement with uniform velocity or at the time of stop. At the time of start and stop, the load varies because of inertia.

## Engineering

# Coefficient of Friction

The coefficient of friction of Thomson Ball Bushing Bearings ranges from 0.001 to 0.004. There are two components of the coefficient of friction: the rolling or operating friction and the static or breakaway friction.

**Coefficient of Rolling Friction**
The rolling coefficient of friction is measured by the force required to operate the Ball Bushing at a constant rate of travel. The formula for determining frictional resistance during operation is as follows:

$P_f = P \times f_r$

Where,
$P_f$ = Frictional resistance ($lb_f$)
P = Resultant of externally applied loads ($lb_f$)
$f_r$ = Coefficient of rolling friction

The following table describes the coefficient of rolling friction of Ball Bushing Bearings operating on Thomson 60 Case LinearRace. These values are grouped according to the number of ball circuits in each bearing. Friction coefficients are constant among bearings having three and four ball circuits, but slightly less for bearings with five or six ball circuits. A dry Ball Bushing Bearing has the lowest coefficient of friction due to the complete absence of lubricant surface tension effects. Values for grease lubrication ranges from 100% greater in the smaller sizes to 20% to 50% greater in the larger sizes. Oil lubrication (medium/heavy, viscosity 64 cs @ 100° F) achieves frictional values slightly higher than those for grease lubrication.

Ball Bushing Bearing coefficients of rolling friction ($f_r$)

| Bearing I.D. | Number of Ball Circuits | Condition of Lubrication | Load in % of Rolling Load Rating (for 2,000,000 inches of travel) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 125% | 100% | 75% | 50% | 25% |
| 1/4, 3/8, 1/2, 5/8 | 3 & 4 | No Lube | .0011 | .0011 | .0012 | .0016 | .0025 |
| | | Grease Lube | .0019 | .0021 | .0024 | .0029 | .0044 |
| | | Oil Lube | .0022 | .0023 | .0027 | .0032 | .0045 |
| 3/4, 1 | 5 | No Lube | .0011 | .0011 | .0012 | .0015 | .0022 |
| | | Grease Lube | .0018 | .0019 | .0021 | .0024 | .0033 |
| | | Oil Lube | .0020 | .0021 | .0023 | .0027 | .0036 |
| 1 1/4 thru 1 | 6 | No Lube | .0011 | .0011 | .0012 | .0014 | .0019 |
| | | Grease Lube | .0016 | .0016 | .0017 | .0018 | .0022 |
| | | Oil Lube | .0018 | .0018 | .0019 | .0021 | .0027 |
| 5/8 thru 1 1/2 | 10 | No Lube | .0011 | .0011 | .0012 | .0013 | .0018 |
| | | Grease Lube | .0014 | .0014 | .0015 | .0016 | .0019 |
| | | Oil Lube | .0016 | .0016 | .0017 | .0019 | .0025 |

**Coefficient of Static Friction**
The coefficient of static or breakaway friction is measured by the force required to initiate Ball Bushing Bearing movement. The formula used to determine static frictional resistance is:

$P_f = P \times f_0$
where $f_0$ = Coefficient of static friction

The values for the coefficient of static friction or breakaway friction are not measurably affected by the number of ball circuits in the bearing or by the lubrication condition.

Ball Bushing Bearing coefficients of static friction ($f_0$)

| Load in % of Rolling Load Rating | | | | |
|---|---|---|---|---|
| 125% | 100% | 75% | 50% | 25% |
| .0028 | .0030 | .0033 | .0036 | .0040 |

**Seal Drag**
Another variable that affects the frictional resistance in a Ball Bushing Bearing system is seal drag. When seals are used to retain lubricant or to prevent entry of foreign particles, frictional resistance must be taken into account for determining total frictional drag. In applications where contamination is minimal, the seals can be removed to reduce frictional drag. In highly contaminated applications, seals, wipers and or scrapers are used to minimize the ingress of contamination into the bearing. This protective measure adds to the frictional drag of the bearing system. There is a fine line between minimizing frictional drag and maximizing contaminant protection which is controlled by the addition or removal of seals, wipers or scrapers. In applications that require low frictional drag in highly contaminated environments, contact Thomson application engineering.

Thomson can provide a specially formulated lubricant, specifically developed to meet a broad range of linear bearing applications. Thomson LinearLube lubricant is a synthetic lubricant that utilizes suspended Teflon® in a specially formulated compound. LinearLube lubricant provides excellent performance characteristics in a wide range of applications. It is FDA listed, non-polluting and non-corrosive. LinearLube lubricant will not stain and adheres tightly to parts forming a virtually water resistant barrier.

- Maintains properties in operating temperatures from –65°F to 450°F
- USDA Rated HL (Non-Toxic)
- Will not oxidize in use
- 100% water resistant

# System Replacement Components

Replacement components for systems are available from Thomson. Assure the accuracy and repeatability of your system by specifying a -XS after the component part number.

Thomson Linear Motion systems are designed and manufactured through advanced processes with high grade materials chosen for their strength, durability, and hardness. The following is a comprehensive list of the materials utilized throughout Thomson systems.

# System Maintenance and Service

All Thomson ball-Bushing Bearings require a small amount of grease or oil to operate. For general applications, EP2 (extreme pressure NLGI grade2) lubricant is recommended to prevent wearing and rusting of the bearing surfaces. For food grade applications, Linear Lube (teflon-based synthetic grease) is recommended. When linear speeds are high, light oil should be used and the bearing should be prevented from running dry for a prolonged period of time. A medium to heavy oil or light grease has greater adhesion properties that afford longer bearing protection and minimize sealing problems.

All Thomson ball-Bushing Bearings are shipped with rust preventative oil. It is recommended that you lubricate the ball bushing prior to installation and periodically during operation to assure that the ball bushing does not run dry. Bearing lube cycle not to exceed 1 year or 100 km of travel (whichever comes first), but more frequent application may be required based on duty cycle, usage, environment and level of contamination.
Thomson can provide a specially formulated lubricant, specifically developed to meet a broad range of linear bearing applications. Thomson LinearLube lubricant is a synthetic lubricant that utilizes suspended Teflon® in a specially formulated compound. LinearLube lubricant provides excellent performance characteristics in a wide range of applications. It is FDA listed, non-polluting and non-corrosive. LinearLube lubricant will not stain and adheres tightly to parts forming a virtually water resistant barrier.

- Maintains properties in operating temperatures from –65°F to 450°F
- USDA Rated HL (Non-Toxic)
- Will not oxidize in use
- 100% water resistant

# Material Engineering Specifications

## Ball Bushing Bearing materials

The following is a tabulation of the materials used for the components of the various types of Ball Bushing Bearings

| Type | Outer Sleeve | Ball Retainers | Bearing Plates | Balls | End Rings/ Band |
|---|---|---|---|---|---|
| SSU, SSJM, SSEM, SPM, SUPER Ball Bushing Bearings | Delrin | Delrin | 52100 | Chrome Steel | None/ Steel |
| Series A, B, XA, ADJ, OPN and DS | 52100 | Steel | – | Chrome Steel | Steel |
| Stainless Steel (SS) to 1" I.D. Series A, XA, ADJ and OPN | 440A | Type 305SS | – | 440C | Type 303SS |
| Series MAM | – | Delrin | – | Chrome Steel | Steel |
| Series INST-SS | 440C | Brass | – | 440C | None |
| Series XR | Reinforce Nylon | Reinforce Polyester | 8620 | Chrome Steel | Steel |

Note: Materials called out are typical, certain series and sizes may vary.

## Corrosion Resistance

Super and Super Smart Ball Bushing Bearings can be supplied corrosion resistant with hard chrome plated bearing plates and stainless steel balls. Load capacity will be 70% of regular Super Ball Bushing Bearings. To order, add suffix "CR" following the Super Ball Bushing Bearing part number.

Large sizes (over 1" diameter) of series A, XA, ADJ, OPN and B, Ball Bushing Bearings can be supplied with stainless steel balls and black oxide sleeves for limited protection against atmospheric corrosion. Load capacity will be 70% of regular steel bearings. To order, add suffix "SP" following the bearing part number.

## Stainless Steel Ball Bushing Bearings

Precision and Multitrack Ball Bushing Bearings can be supplied with stainless steel ball and end rings. To order, add suffix "SS" following the bearing part number. Precision bearings are made entirely of stainless steel components. Multitrack bearings have stainless steel balls, end rings and outer sleeves.

**Sizes available:**
Series A and XA: 1/4", 3/8", 1/2", 5/8", 3/4" and 1"
Series ADJ and OPN: 1/2", 5/8", 3/4" and 1"
Series MAM: 8mm, 12mm. 16mm, 20mm, 25mm, 30mm

## Ball Bushing Bearings with nylon balls

For extremely quiet operation, Ball Bushing Bearings fitted with Nylon balls can be supplied in sizes 1/2" and larger. For estimating purposes load ratings should be considered about 10% of those listed for Ball Bushing Bearings with steel balls. Prices and other information available on request.

## 60 Case shafts – hardened and ground

| Material Type | AISI | Rockwell "C" |
|---|---|---|
| Solid 60 Case | Bearing-quality, high carbon alloy steel | 60 min |
| Tubular 60 Case | Bearing-quality, high carbon alloy steel | 58 min |
| Solid Stainless Steel | 440C Stainless | 50 min |

## Maximum recommended operating temperatures for RoundRail Bearings

The following are general recommendations. For additional information or more specific recommendations please contact factory with full application details.

| Type of Ball Bushing Bearings | Maximum Operating Temperature | Load Rating at Maximum Operating Temperature as % of Catalog Load Rating |
|---|---|---|
| Series Super Smart, Super, MultiTrac & XR | 185° F | 100% |
| Series A, B, XA, ADJ & OPN[t], Series DS, and Series RW S, V, A, B & C | 500° F | 70% |
| Series A-SS, XA-SS, ADJ-SS, OPN-SS & INST-SS Stainless Steel (through 1" I.D.)[t] | 600° F | 60% |

†Maximum operating temperature for these two series for full catalog load rating is 300°F.
[t]Note: Type PB-A, PB-ADJ, and PBO-OPN pillow blocks are assembled with Delrin plastic seal covers with a maximum operating temperature at 185°F.

## Pillow blocks and shaft supports

| Part Type | Material |
|---|---|
| Type Super Smart and Super – Pillow Blocks, Flanged Blocks and Aluminum Shaft Blocks | Type 6061-T6511 Aluminum |
| Type PB pillow blocks | Ductile Iron |
| Type PBO & XPBO pillow blocks | Malleable/Ductile Iron |
| Type SR shaft support rails (std. lgth. 24") | Type 6061-T6511 Aluminum |
| Type LSR shaft support rails | 1010 Steel |
| Type XSR shaft support rails (std. lgth. 24") | Ductile Iron |
| Type SB shaft support blocks | Malleable Iron†† |
| Waymount shaft supports | Malleable Iron Base with steel adjustment elements |

††Type 6061-T6511 Aluminum for 1/4" and 3/8" sizes only

| Components | | Material |
|---|---|---|
| Supports | Type ASB End Support | Aluminum Alloy † |
| | Type SB End Support | Iron |
| | Type SRA End Support | Aluminum Alloy † |
| | Twin Shaft End Support | Aluminum Alloy † |
| | Twin Shaft Web End Support | Aluminum Alloy † |
| | Integrated End Support | Aluminum Alloy † |
| | Dual Shaft Support Rail | Aluminum Alloy † |
| | Inner Race (60 Case™ Shafting) | Case Hardened High Carbon Steel |
| Carriage | Universal Carriage | Aluminum Alloy † |
| | Twin Shaft Carriage | Aluminum Alloy † |
| | Twin Shaft Web Carriage | Aluminum Alloy † |
| | Modular Dual Shaft Carriage | Aluminum Alloy † |
| | Integrated Dual Shaft Carriage | Aluminum Alloy † |

† Custom Black Anodized for inch size systems. Custom Grey Anodized for metric size systems. Custom system lengths may require black paint to protect machine cut-off ends on Dual Shaft Rail Assemblies and Shaft support Rails. If a specific surface finish is required contact the Thomson Systems application engineering department.
†† Limited to a Max. Temperature of 185˚F (85˚C)

# 60 Case LinearRace Deflection

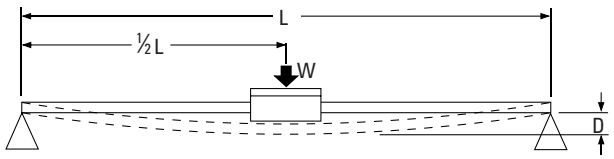
When Thomson 60 Case LinearRace is used in an end supported configuration it is important to ensure that 60 Case LinearRace deflections at the bearing locations are kept within performance limitations.

These equations give the deflection at the center of an end supported 60 Case LinearRace. Systems with continuous 60 Case LinearRace support are not subject to the same types of deflection.

For more detailed information of the deflection characteristics of Thomson linear motion products contact application engineering.

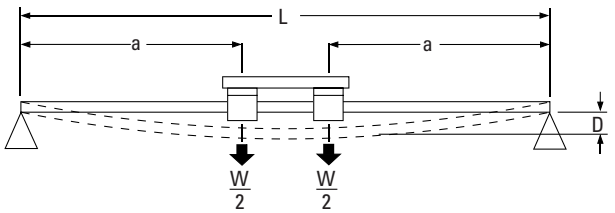
Simply Supported 60 Case LinearRace with One Block

DEFLECTION AT CENTER (D)




$$D = \frac{WL^3}{48\,EI} + \frac{5SL^4}{384\,EI}$$

Simply Supported 60 Case LinearRace with Two Blocks




$$D = \frac{Wa(3L^2 - 4a^2)}{48\,EI} + \frac{5SL^4}{384\,EI}$$

**LEGEND:**

| | | |
|---|---|---|
| **D** | = | **(in) (mm)** |
| **W** | = | **($lb_f$) (N)** |
| **L** | = | **(in) (mm)** |
| **a** | = | **(in) (mm)** |
| **S** | = | **($lb_f$/in) (N/mm)** |
| **E** | = | **($lb_f$/in²) (N/mm²)** |
| **I** | = | **(in⁴)(mm⁴)** |

**Values for Thomson 60 Case LinearRace**

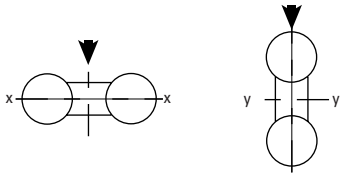
| LinearRace Diameter (In) | Solid | | Tubular | |
|---|---|---|---|---|
| | EI ($lb_f$ / in²) | Weight (S) ($lb_f$ / in) | EI ($lb_f$ • in²) | Weight (S) ($lb_f$ / in) |
| .187 | 1.8E+03 | .008 | – | – |
| .250 | 5.8E+03 | .014 | – | – |
| .375 | 2.9E+04 | .031 | – | – |
| .500 | 9.2E+04 | .055 | – | – |
| .625 | 2.3E+05 | .086 | – | – |
| .750 | 4.7E+05 | .125 | 4.6E+05 | .075 |
| 1.000 | 1.5E+06 | .222 | 1.3E+06 | .158 |
| 1.250 | 3.6E+06 | .348 | – | – |
| 1.500 | 7.5E+06 | .500 | 6.3E+06 | .328 |
| 2.000 | 2.4E+07 | .890 | 1.9E+07 | .542 |
| 2.500 | 5.8E+07 | 1.391 | 4.2E+07 | .749 |
| 3.000 | 1.2E+08 | 2.003 | 9.3E+07 | 1.112 |
| 4.000 | 3.8E+08 | 3.560 | 2.5E+08 | 1.558 |

| LinearRace Diameter (mm) | EI (N/m²) | Weight (S) (N / mm) |
|---|---|---|
| 5mm | 5.838 | 0.0016 |
| 8mm | 38.26 | 0.0038 |
| 10mm | 93.41 | 0.0061 |
| 12mm | 193.7 | 0.0087 |
| 16mm | 612.2 | 0.0154 |
| 20mm | 1495 | 0.0240 |
| 25mm | 3649 | 0.0379 |
| 30mm | 7566 | 0.0542 |
| 40mm | 2.391E+04 | 0.0968 |
| 50mm | 5.838E+04 | 0.1513 |
| 60mm | 1.211E+05 | 0.2172 |
| 80mm | 3.826E+05 | 0.3870 |

**Deflection for Twin Shaft Web System**

Since the Twin Shaft Web rail has different stiffness depending on its orientation, an appropriate EI value must be used based upon the direction of loading. Select the orientation of your load from the figure below and then use the appropriate EI value in the deflection equation.

| Shaft Diameter (in) | EI Horizontal ($lb_f$ • in²) | EI Vertical ($lb_f$ • in²) |
|---|---|---|
| 1/2 | $1.9 \times 10^5$ | $3.7 \times 10^6$ |
| 3/4 | $9.4 \times 10^5$ | $1.5 \times 10^6$ |
| 1 | $3.0 \times 10^6$ | $4.7 \times 10^6$ |



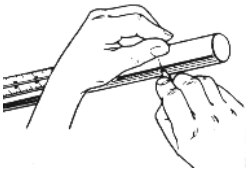
## Engineering

# How to Cut 60 Case LinearRace Shafting

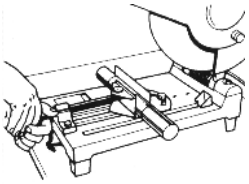
Genuine 60 Case LinearRace shafting has an extremely hard outer surface, HRC 60, and a soft core. The following steps will guide you in cutting 60 Case shafts. Remember: Always use goggles and normal shop safety precautions.

**With an abrasive cut-off saw. . .**
**(preferred method)**

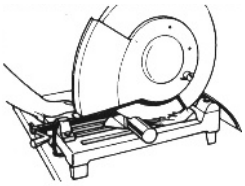
**Step 1:**
Mark the shaft at the desired length.



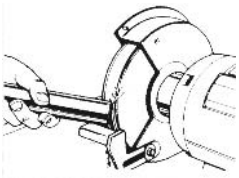
**Step 2:**
Secure shaft in vise with longer end clamped.



**Step 3:**
Cut the shaft at the mark.

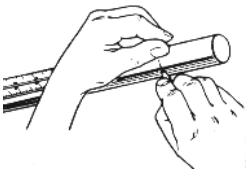


**Step 4:**
Chamfer the shaft by rotating it by hand while holding it against an abrasive wheel at approximately 45°. Use an emery cloth to remove burrs and discoloration.

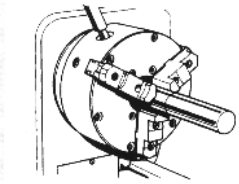


**With a lathe. . .**
**(using a collect type or standard 3-jaw chuck)**

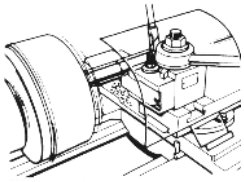
**Step 1:**
Mark the shaft at the desired length.



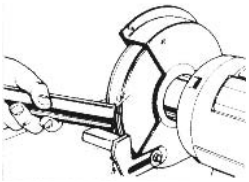
**Step 2:**
Secure shaft in lathe with longer end in spindle.



**Step 3:**
Use a sharp, carbide cut-off tool with shaft turning at approx. the following speeds: 400 rpm for dia. 1/4" - 1", and 300 rpm for dia. 1" or larger



**Step 4:**
Chamfer the shaft using a standard carbide turning tool or an abrasive wheel. Use an emery cloth to remove burrs and discoloration.



# Application Tips

**Two Ball Bushing Bearings per 60 Case LinearRace**
When using the Super Smart, Super or Precision Steel Ball Bushing Bearing it is recommended that two Ball Bushings bearings be used on each 60 Case LinearRace. This will assure system stability as well optimum performance. If envelope constraints prohibit the use of two Ball Bushing Bearings per 60 Case LinearRace contact application engineering.

**Ball Bushing Bearing Spacing vs. 60 Case LinearRace Spacing**
In parallel 60 Case LinearRace applications, the ratio of 60 Case LinearRace spacing to Ball Bushing Bearing spacing should always be less than three to one. This will assure a constant breakaway and operating friction.

**60 Case LinearRace Parallelism**
In most applications the maximum acceptable out of parallelism condition is .001 inch over the entire full system length. In applications where preload is present (such as when using Die Set Ball Bushing Bearings) a closer 60 Case LinearRace parallelism is recommended.

**Three or More Parallel 60 Case LinearRace Ways**
When aligning two 60 Case LinearRace ways parallel great care is required to assure a parallelism within .001 inch over the entire length of travel. When aligning multiple 60 Case LinearRace ways, parallelism between each 60 Case LinearRace should be held within the .001 inch specification.

**Measuring 60 Case LinearRace Alignment**
Methods for establishing or checking 60 Case LinearRace straightness and parallelism depends on the accuracy required. Lasers, collimator or alignment telescopes can be used for very precise applications, while accurate levels, straight edges, micrometers and indicators will suffice for the majority of applications which have less stringent accuracy requirements.

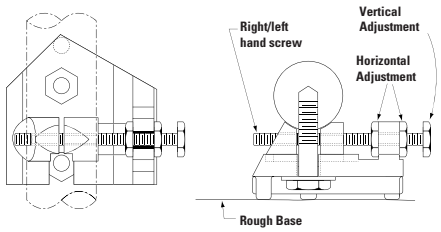
**Installation of Super and Precision Steel Adjustable Type Ball Bushing Bearings**
When installing a Super Ball Bushing Bearing into a slotted adjustable housing, the bearing plate should not align with the adjustment slot. When installing a Precision Steel Adjustable Type Ball Bushing Bearing into a slotted adjustable housing, the bearing adjustment slot should be 90° to the pillow block adjustment slot. These important steps will assure accurate bearing adjustment.

**Access for Lubrication**
Thomson Super Smart and Super Ball Bushing Pillow Blocks are equipped with either an oil lubrication fitting or a 1⁄4-28 access for lubrication. To use the oil fitting simply insert a lubrication device into the oil nipple by depressing the spring loaded ball. The 1⁄4-28 tapped hole is a standard size for most grease and lubrication fittings. Simply install the lubrication fitting of your choice and it is ready for immediate use. Super Ball Bushing Pillow blocks in sizes .250 through .500 inch diameter are equipped with oil lubrication fittings. Super Ball Bushing pillow blocks in sizes .625 inch and above and all Super Smart Ball Bushing Pillow Blocks are equipped with a 1⁄4-28 access for lubrication. Metric Super Smart Pillow Blocks are equipped with a M6X1 access for lubrication.

**Waymount Support Block for Roundway Bearing Installation**
Standard Waymount LinearRace Support Blocks provide 60 Case LinearRace adjustment in both the horizontal and vertical direction. This product reduces installation time dramatically, while assuring precise 60 Case LinearRace alignment. This versatile design allows the

Waymount support to be mounted vertically or horizontally and in many different Roundway bearing applications. The number of Waymounts to be used is based on the maximum allowable 60 Case LinearRace deflection between supports and the accuracy required. Ordinarily indicators, sensitive levels and straight edges are adequate for most alignment conditions.

**Waymount Support Block**




**RoundWay Bearing/60 Case LinearRace Installation Using Grout**
Grouting is a very simple method of mounting a 60 Case LinearRace on almost any kind of surface, smooth or uneven. Grouting can also be used in conjunction with standard Waymount LinearRace support blocks or other 60 Case LinearRace supports to obtain maximum rigidity. Dams are fastened to the bed parallel to the 60 Case LinearRace which is then aligned with its mating 60 Case LinearRace (Figure 1). A compound, such as Thomson Waystone, is then poured under and around the lower circumference of the 60 Case LinearRace. This dries quickly forming a solid support of high compressive strength (over 12,000 psi) without affecting the initial straightness of the LinearRace.

If the bearing arrangement permits the grout to flow substantially around the circumference of the 60 Case LinearRace and side loads are light, Waymount LinearRace supports or other hold down bolts along the length made be unnecessary (Figure 2). Just one support at each end of the 60 Case LinearRace will usually provide final alignment and hold the 60 Case Linear-Race in position for grouting. If the length to diameter ratio is large, Waymount LinearRace supports should be equally spaced to minimize 60 Case LinearRace deflection. Grout should always be in direct contact with the surface of the bed or whatever base member provides primary rigidity and support.

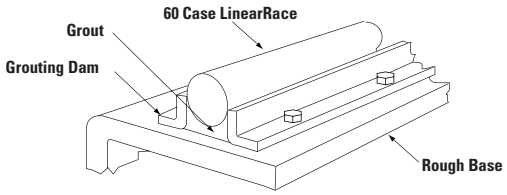



Figure 1

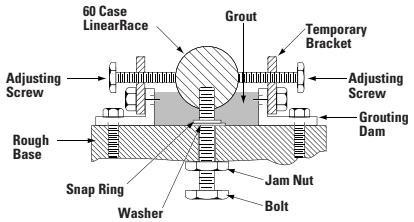



Figure 2

# Installation Guidelines

Thomson Ball Bushing bearings are manufactured to exceptionally close tolerances and offer smooth, virtually friction-free motion. The performance features of the bearings will only be realized, however, if care is taken during their installation.

Two areas of primary importance are the bearings alignment and the shaft parallelism. Two bearings are normally used on each shaft to assure smooth operation. The housing should be carefully aligned using the method given below. If a single twin-type housing is used, these procedures are not necessary. It is also necessary to assure that the height from the housing mounting surface to the shaft is consistent within .001 inch. Shimming may be necessary depending on the accuracy of the mounting surfaces to which the housings are bolted.

The housing can be mounted to the plate using the following procedure:

a. Prepare the carriage plate with one side having an abutting surface.
b. Mount two housings with the reference edges located against the abutting surface and tighten the hold down bolts. Figure #1
c. Mount the second pair of housings on the opposite side of the carriage and tighten the bolts finger tight.
d. Insert a location shaft of correct diameter and tolerance (h6) through these two housings and reference the distance from the abutting surface in [b] above, to this locating shaft. Figure #2
e. After appropriate alignment of this pair of housings, tighten bolts to secure housings to carriage.

After the carriage is properly prepared, the shafts must be mounted to the surface. To achieve smooth, accurate motion, the shafts must be mounted parallel within .001 inch over the length of the stroke. This can be done by using the following procedure:

a. Mount one shaft (either end-supported or fully supported) to the surface with mounting bolts finger tight.
b. Using an aligning device such as a laser, auto-collimator or other optics, sight the shaft straight and secure to mounting surface.
c. After this first shaft is fixed, the second shaft can be positioned and held down with bolts finger tight.
d. The carriage is then mounted and its movement will pull this second shaft parallel to the first. Figures #3 and #4
e. If the second shaft is then secured into position, the procedure is complete. Note that for fully supported systems, this securing should be done when the carriage is close to the bolts. For end supported systems, the securing should be done when the carriage is at the ends of the shafts. Figure #5
f. An additional check can be done at this time to assure that the carriage is tracking correctly (i.e., that the carriage edge is moving parallel to the shaft). An indicator touching the carriage edge should not vary, as the carriage is moved along the shafts. Figure #6

Figure 1

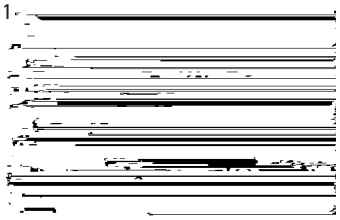


Figure 2

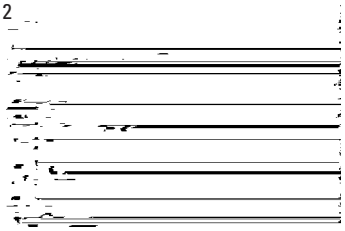


Figure 3

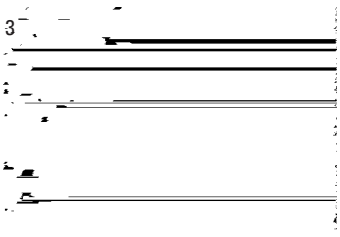


Figure 4

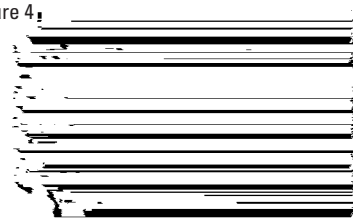


Figure 5



Figure 6

# Tolerance Charts

**Tolerance zones for internal (hole) dimensions (H15 through H5)** (Dimensions in mm)

| Basic Size | H15 | H14 | H13 | H12 | H11 | H10 | H9 | H8 | H7 | H6 | H5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Over 6 | +0,580 | +0,360 | +0,220 | +0,150 | +0,090 | +0,058 | +0,036 | +0,022 | +0,015 | +0,009 | +0,006 |
| To 10 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 10 | +0,700 | +0,430 | +0,270 | +0,180 | +0,110 | +0,070 | +0,043 | +0,027 | +0,018 | +0,011 | +0,008 |
| To 14 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 14 | +0,700 | +0,430 | +0,270 | +0,180 | +0,110 | +0,070 | +0,043 | +0,027 | +0,018 | +0,011 | +0,008 |
| To 18 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 18 | +0,840 | +0,520 | +0,330 | +0,210 | +0,130 | +0,084 | +0,052 | +0,033 | +0,021 | +0,013 | +0,009 |
| To 24 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 24 | +0,840 | +0,520 | +0,330 | +0,210 | +0,130 | +0,084 | +0,052 | +0,033 | +0,021 | +0,013 | +0,009 |
| To 30 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 30 | +1,000 | +0,620 | +0,390 | +0,250 | +0,160 | +0,100 | +0,062 | +0,039 | +0,025 | +0,016 | +0,011 |
| To 40 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 40 | +1,000 | +0,620 | +0,390 | +0,250 | +0,160 | +0,100 | +0,062 | +0,039 | +0,025 | +0,016 | +0,011 |
| To 50 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 50 | +1,200 | +0,740 | +0,460 | +0,300 | +0,190 | +0,120 | +0,074 | +0,046 | +0,030 | +0,019 | +0,013 |
| To 65 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 65 | +1,200 | +0,740 | +0,460 | +0,300 | +0,190 | +0,120 | +0,074 | +0,046 | +0,030 | +0,019 | +0,013 |
| To 80 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 80 | +1,400 | +0,870 | +0,540 | +0,350 | +0,220 | +0,140 | +0,087 | +0,054 | +0,035 | +0,022 | +0,015 |
| To 100 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 100 | +1,400 | +0,870 | +0,540 | +0,350 | +0,220 | +0,140 | +0,087 | +0,054 | +0,035 | +0,022 | +0,015 |
| To 120 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 120 | +1,600 | +1,000 | +0,630 | +0,400 | +0,250 | +0,160 | +0,100 | +0,063 | +0,040 | +0,025 | +0,018 |
| To 140 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 140 | +1,600 | +1,000 | +0,630 | +0,400 | +0,250 | +0,160 | +0,100 | +0,063 | +0,040 | +0,025 | +0,018 |
| To 160 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 160 | +1,600 | +1,000 | +0,630 | +0,400 | +0,250 | +0,160 | +0,100 | +0,063 | +0,040 | +0,025 | +0,018 |
| To 180 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| Over 180 | +1,850 | +1,150 | +0,720 | +0,460 | +0,290 | +0,185 | +0,115 | +0,072 | +0,046 | +0,029 | +0,020 |
| To 200 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |

**Tolerance zones for external LinearRace shaft dimensions (h15 through h5)** (Dimensions in mm)

| Basic Size | h15 | h14 | h13 | h12 | h11 | h10 | h9 | h8 | h7 | h6 | h5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Over 6 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 10 | -0,580 | -0,360 | -0,220 | -0,150 | -0,090 | -0,058 | -0,036 | -0,022 | -0,015 | -0,009 | -0,006 |
| Over 10 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 14 | -0,700 | -0,430 | -0,270 | -0,180 | -0,110 | -0,070 | -0,043 | -0,027 | -0,018 | -0,011 | -0,008 |
| Over 14 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 18 | -0,700 | -0,430 | -0,270 | -0,180 | -0,110 | -0,070 | -0,043 | -0,027 | -0,018 | -0,011 | -0,008 |
| Over 18 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 24 | -0,840 | -0,520 | -0,330 | -0,210 | -0,130 | -0,084 | -0,052 | -0,033 | -0,021 | -0,013 | -0,009 |
| Over 24 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 30 | -0,840 | -0,520 | -0,330 | -0,210 | -0,130 | -0,084 | -0,052 | -0,033 | -0,021 | -0,013 | -0,009 |
| Over 30 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 40 | -1,000 | -0,620 | -0,390 | -0,250 | -0,160 | -0,100 | -0,062 | -0,039 | -0,025 | -0,016 | -0,011 |
| Over 40 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 50 | -1,000 | -0,620 | -0,390 | -0,250 | -0,160 | -0,100 | -0,062 | -0,039 | -0,025 | -0,016 | -0,011 |
| Over 50 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 65 | -1,200 | -0,740 | -0,460 | -0,300 | -0,190 | -0,120 | -0,074 | -0,046 | -0,030 | -0,019 | -0,013 |
| Over 65 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 80 | -1,200 | -0,740 | -0,460 | -0,300 | -0,190 | -0,120 | -0,074 | -0,046 | -0,030 | -0,019 | -0,013 |
| Over 80 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 100 | -1,400 | -0,870 | -0,540 | -0,350 | -0,220 | -0,140 | -0,087 | -0,054 | -0,035 | -0,022 | -0,015 |
| Over 100 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 120 | -1,400 | -0,870 | -0,540 | -0,350 | -0,220 | -0,140 | -0,087 | -0,054 | -0,035 | -0,022 | -0,015 |
| Over 120 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 140 | -1,600 | -1,000 | -0,630 | -0,400 | -0,250 | -0,160 | -0,100 | -0,063 | -0,040 | -0,025 | -0,018 |
| Over 140 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 160 | -1,600 | -1,000 | -0,630 | -0,400 | -0,250 | -0,160 | -0,100 | -0,063 | -0,040 | -0,025 | -0,018 |
| Over 160 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 180 | -1,600 | -1,000 | -0,630 | -0,400 | -0,250 | -0,160 | -0,100 | -0,063 | -0,040 | -0,025 | -0,018 |
| Over 180 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| To 200 | -1,850 | -1,150 | -0,720 | -0,460 | -0,290 | -0,185 | -0,115 | -0,072 | -0,046 | -0,029 | -0,020 |

# Engineering

| QUANTITY | CONVENTIONAL | | SI Unit | Conversion Factors | |
|---|---|---|---|---|---|
| | Inch Unit | Metric Unit (MKS) | | | |
| LENGTH | Inch<br>in. | Meter<br>m | Metre<br>m | 1 in. | = 25.4 mm |
| | | | | 1 mm | = 0.03937 in. |
| | | | | 1 m | = 3.2808 ft. |
| | | | | 1 ft. | = 0.3048 m |
| AREA | Square Inch<br>$in.^2$ | Square Meter<br>$m^2$ | Square Metre<br>$m^2$ | $1\ in.^2$ | $= 6.4516\ cm^2$ |
| | | | | $1\ cm^2$ | $= 0.155\ in.^2$ |
| | | | | $1\ m^2$ | $= 10.764\ ft^2$ |
| | | | | $1\ ft.^2$ | $= 0.092903\ m^2$ |
| MASS | Pound<br>$lb_m$ | Kilogram<br>kg | Kilogram<br>kg | $1\ lb_m$ | $= 0.45359237$ kg |
| | | | | 1 kg | $= 2.2046$ lb |
| FORCE | Pound Force<br>$lb_f$ | Kilogram Force<br>$kg_f$ | Newton<br>N | $1\ lb_f$ | $= 0.45359237\ kg_f$ |
| | | | | $1\ lb_f$ | $= 4.44822$ N |
| | | | | $1\ kg_f$ | $= 2.2046$lbf |
| | | | | $1\ kg_f$ | $= 9.80665$ N |
| | | | | 1 N | $= 0.1019716\ kg_f$ |
| | | | | 1 N | $= 0.224809\ lb_f$ |
| STRESS<br>or<br>PRESSURE | Pounds per<br>square inch<br>$lb_f/in.^2$ | Kilograms per<br>square meter<br>$kg_f/m^2$ | Pascal<br>Pa | 1 MPa | $= 10^6\ N/m^2 = N/mm^2$ |
| | | | | 1 kPa | $= 10^3\ N/m^2$ |
| | | | | $1\ lb_f/inch^2$ | $= 0.070307\ kg_f/cm^2$ |
| | | | | $1\ lb_f/inch^2$ | $= 7.0307 \times 10^{-4}\ kg_f/mm^2$ |
| | | | | $1\ lb_f/inch^2$ | $= 6.8947 \times 10^{-3}\ N/mm^2$ (MPa) |
| | | | | $1\ kg_f/cm^2$ | $= 14.2233\ lb_f/in.^2$ |
| | | | | $1\ kg_f/cm^2$ | $= 9.80665$ x 10-2 $N/mm^2$(MPa) |
| TORQUE<br>or<br>WORK | Inch Pounds<br>$lb_f$-in. | Kilogram Meters<br>$kg_f$-m | Newton-<br>Metres<br>Nm | 1 lbf-in. | $= 1.1521\ kg_f$-cm |
| | | | | $1\ kg_f$-cm | $= 0.8679\ lb_f$-in. |
| | | | | $1\ lb_f$-in. | $= 0.1129848$ Nm |
| | | | | $1\ kg_f$-m | $= 9.80665$ Nm |
| | | | | $1\ kg_f$-cm | $= 9.80665 \times 10^{-2}$ Nm |
| | | | | 1 Nm | $= 8.85\ lb_f$-in. |
| | | | | 1 Nm | $= 10.19716\ kg_f$-cm |
| POWER | Foot pound per<br>minute<br>$lb_f$-ft./min. | Force per<br>second<br>$kg_f$-m/s | Newton Metre per<br>second<br>Nm/s | 1 kW | = 1000Nm/s |
| | | | | 1 kW | = 60,000 Nm/s |
| | | | | 1 kW | $= 44{,}220\ lb_f$-ft./min. |
| | | | | 1 kW | = 1.341 hp |
| | | | | 1 hp | $= 75\ kg_f$-m/s |
| | | | | 1 hp | = 44,741 Nm/min. |
| | | | | 1 hp | $= 33{,}000\ lb_f$-ft.min. |
| | | | | 1 hp | = 0.7457 kW |
| VELOCITY | Feet per<br>second<br>ft./s | Meters per<br>second<br>m/s | Meters per<br>second<br>m/s | 1 ft./sec. | = 0.3048 m/s |
| | | | | 1 in./sec. | = 2.54 cm/s |
| | | | | 1 ft./sec. | = 0.00508 m/s |
| | | | | 1 mile/hr. | = 0.44704 m/s |
| | | | | 1 km/hr. | = 0.27777 m/s |
| | | | | 1 mile/hr | = 1.609344 km/hr. |
| ACCELERATION | Feet per second<br>squared<br>$ft./s^2$ | Meters per second<br>squared<br>$m/s^2$ | Metres per second<br>squared<br>$m/s^2$ | $1\ ft./s^2$ | $= 0.3048\ m/s^2$ |

## Notes

## Notes

# Shafting Color Code Chart

| Material | Class | Random Length | |
|---|---|---|---|
| Carbon Steel | S | Painted |  |
| Carbon Steel | L | 1/2 Black<br>1/2 Red |  |
| Carbon Steel | N | Gray |  |
| Carbon Steel | D | 1/2 Gray<br>1/2 Green |  |
| Carbon Steel | Metric H6 | Orange |  |
| Carbon Steel | Metric H4 | 1/2 Blue<br>1/2 Orange |  |
| Carbon Steel | Metric G6 | 1/2 Green<br>1/2 Orange |  |
| Carbon Steel Chrome | All | 1/2 Blue |  |
| 440C Stainless Steel | S | No Color |  |
| 440C Stainless Steel | L | 1/2 Orange |  |
| 316 Stainless Steel | L | 1/2 Cyan |  |
| 440C Stainless Steel | Metric | 1/2 Yellow |  |
| 52100 Tubular | S | No Color |  |
| 52100 Tubular | L | 1/2 Black<br>1/2 Red |  |
| Carbon Steel Deep Case | L | 1/2 Beige<br>1/2 Pink |  |
| Carbon Steel Deep Case | N | 1/2 Gray<br>1/2 Pink |  |
| Carbon Steel Deep Case | Metric H6 | Pink |  |

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# T90

## Ball Screw Drive, Slide Guide

» Ordering key - see page 208
» Accessories - see page 127
» Additional data - see page 187

## General Specifications

| Parameter | T90 |
|---|---|
| Profile size (w × h) [mm] | 90 × 92 |
| Type of screw | ball screw with single nut |
| Protection class | IP65 |
| Lubrication | One point lubrication of ballscrew |
| Included accessories | – |

## Performance Specifications

| Parameter | | T90 |
|---|---|---|
| Stroke length (S max), maximum | [mm] | 1500 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum<br>screw diameter/lead 25/05 mm<br>screw diameter/lead 25/10, 25/25 mm<br>screw diameter/lead 32/20, 32/32 mm | [rpm] | <br>4000<br>4800<br>3750 |
| Operation temperature limits | [°C] | -20 – 70 |
| Dynamic load (Fx), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>10000<br>20000 |
| Dynamic load (Fy), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>300[1]<br>500[1] |
| Dynamic load (Fz), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>300[1]<br>500[1] |
| Dynamic load torque (Mz, My), maximum | [Nm] | 150[1] |
| Drive shaft force (Frd), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [N] | <br>1000<br>1300 |
| Drive shaft torque (Mta), maximum<br>screw diameter 25 mm<br>screw diameter 32 mm | [Nm] | <br>48<br>93 |

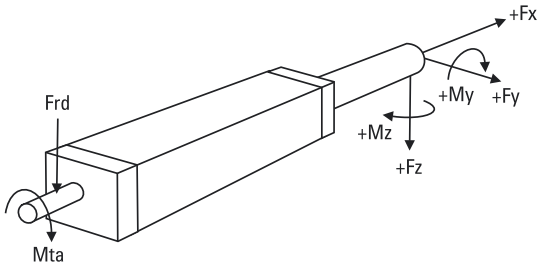
[1] Value for the complete unit

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | | | |
|---|---|---|---|---|---|
| | p = 5 | p = 10 | p = 20 | p = 25 | p = 32 |
| 500 | 1,5 | 1,5 | 3,0 | 2,0 | 3,5 |

M idle = the input torque needed to move the rod with no load on it.

## Definition of Forces



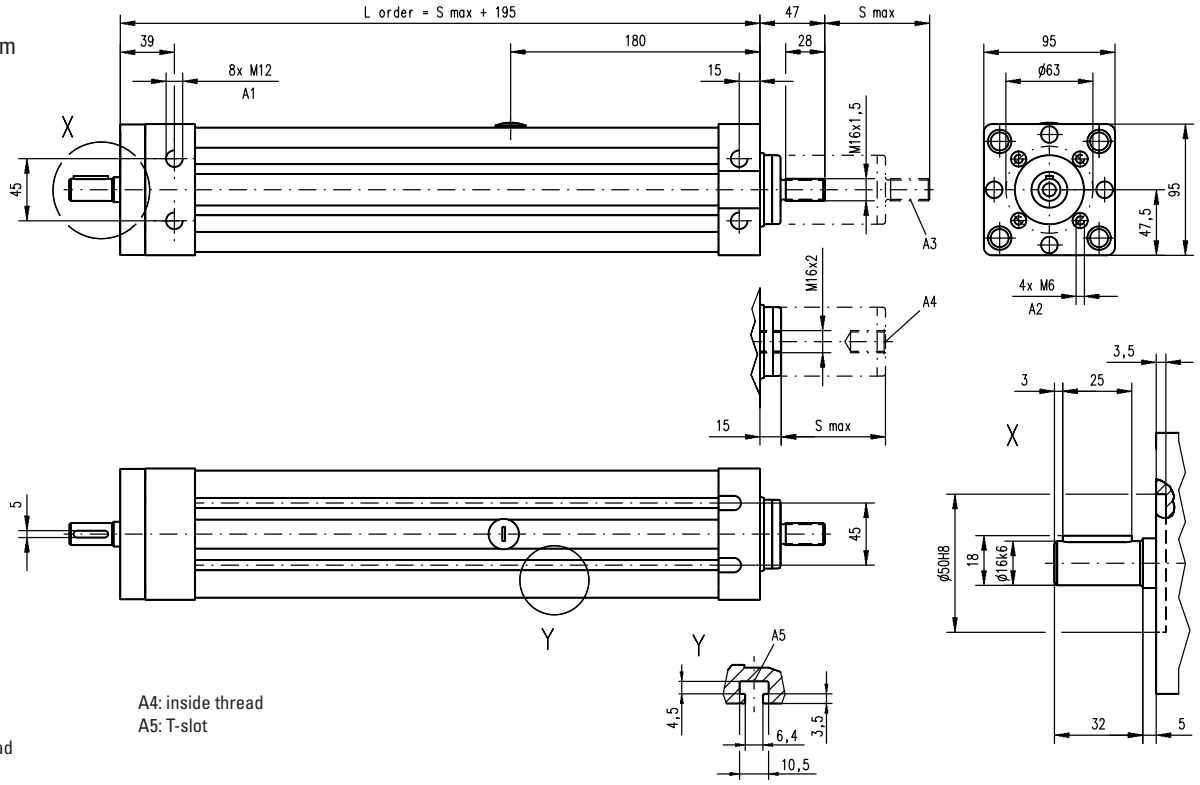

## Performance Specifications

| Parameter | | T90 |
|---|---|---|
| Screw versions, diameter (d0) / lead (p) | [mm] | 25/05, 25/10, 25/25<br>32/20, 32/32 |
| Weight of units<br>with screw diameter 25 mm<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of the rod with zero stroke<br>of every 100 mm of rod | [kg] | <br><br>8,16<br>1,62<br>0,52<br>0,60 |
| Weight of units<br>with screw diameter 32 mm<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of the rod with zero stroke<br>of every 100 mm of rod | [kg] | <br><br>10,64<br>1,80<br>0,55<br>0,60 |

# T90

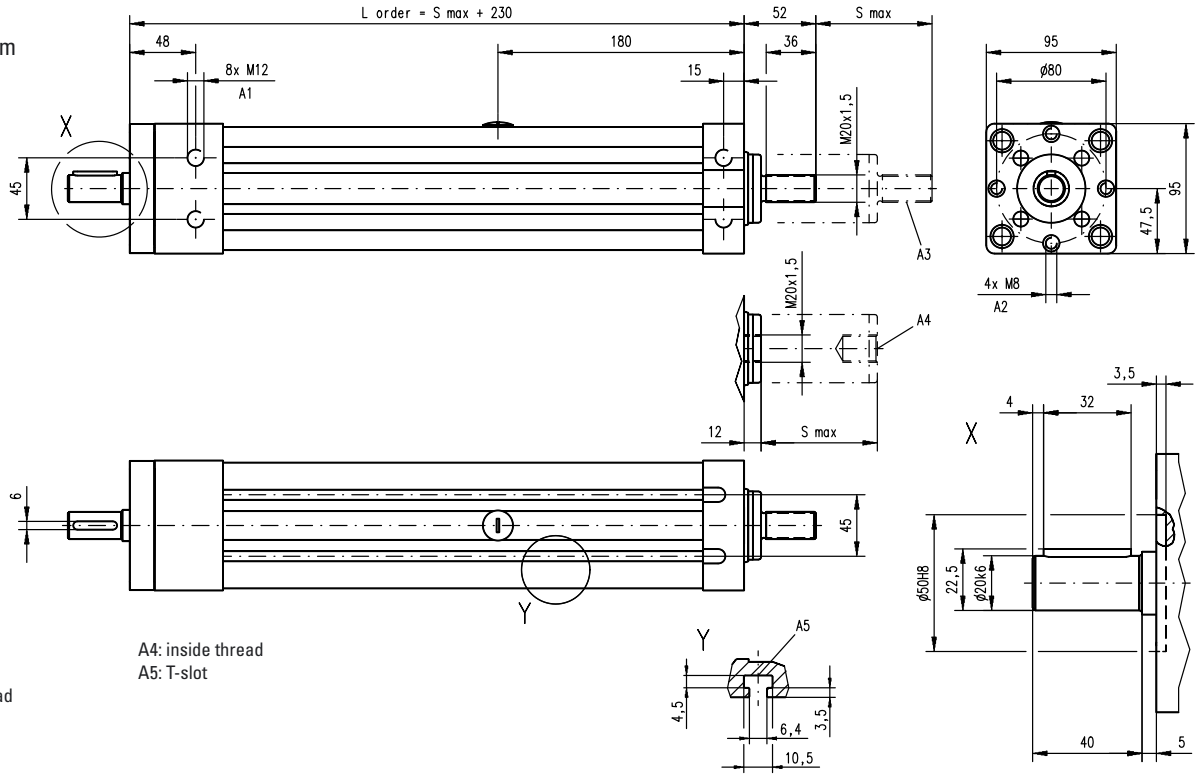
## Ball Screw Drive, Slide Guide

T09-B25
screw ø25 mm




A1: depth 18
A2: depth 33
A3: outside thread
A4: inside thread
A5: T-slot

T09-B32
screw ø32 mm




A1: depth 18
A2: depth 43
A3: outside thread
A4: inside thread
A5: T-slot

# T130

## Ball Screw Drive, Slide Guide

» Ordering key - see page 208
» Accessories - see page 127
» Additional data - see page 187

## General Specifications

| Parameter | T130 |
|---|---|
| Profile size (w × h) [mm] | 130 × 130 |
| Type of screw | ball screw with single nut |
| Protection class | IP65 |
| Lubrication | One point lubrication of ballscrew |
| Included accessories | – |

## Performance Specifications

| Parameter | | T130 |
|---|---|---|
| Stroke length (S max), maximum | [mm] | 2000 |
| Linear speed, maximum | [m/s] | 2,0 |
| Acceleration, maximum | [m/s²] | 8 |
| Repeatability | [± mm] | 0,05 |
| Input speed, maximum<br>screw lead 10 mm<br>screw lead 20, 40 mm | [rpm] | <br>2500<br>3000 |
| Operation temperature limits | [°C] | - 20 – 70 |
| Dynamic load (Fx), maximum<br>screw lead 10 mm<br>screw lead 20 mm<br>screw lead 40 mm | [N] | <br>40000<br>35000<br>15000 |
| Dynamic load (Fy), maximum | [N] | 800[1] |
| Dynamic load (Fz), maximum | [N] | 800[1] |
| Dynamic load torque (My, Mz), maximum | [Nm] | 300[1] |
| Drive shaft force (Frd), maximum | [N] | 3000 |
| Drive shaft torque (Mta), maximum | [Nm] | 140 |
| Ball screw diameter (p) | [mm] | 40 |
| Ball screw leads (d0) | [mm] | 10, 20, 40 |
| Weight<br>of unit with zero stroke<br>of every 100 mm of stroke<br>of the rod with zero stroke<br>of every 100 mm of rod | [kg] | <br>18,50<br>3,00<br>1,25<br>0,77 |

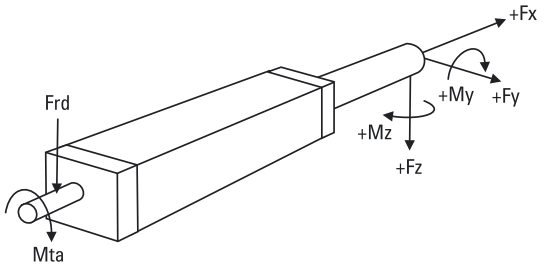
[1] Value for the complete unit

## Rod Idle Torque (M idle) [Nm]

| Input speed [rpm] | Screw lead [mm] | | |
|---|---|---|---|
| | p = 10 | p = 20 | p = 40 |
| 500 | 4,5 | 4,5 | 5,5 |

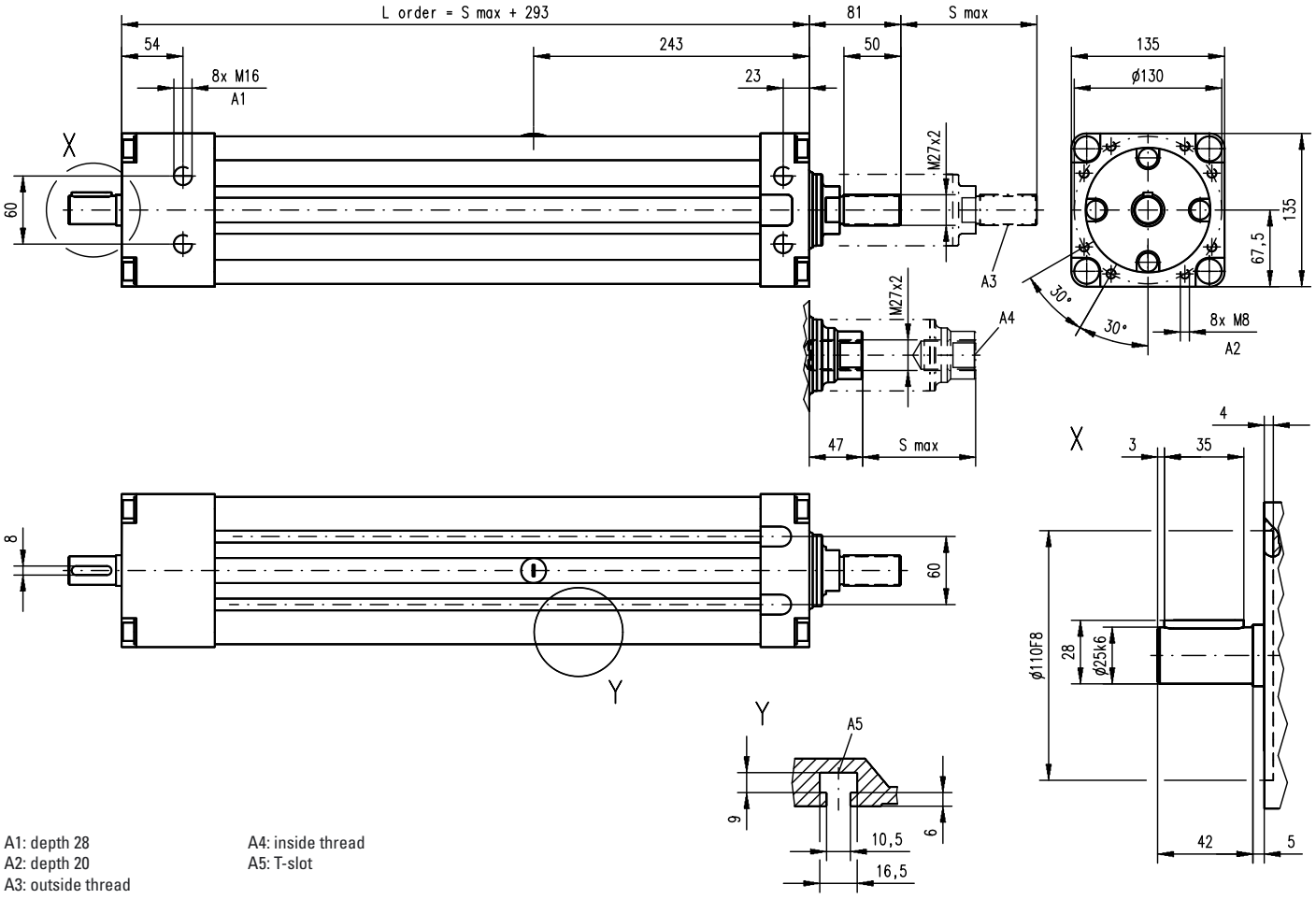
M idle = the input torque needed to move the rod with no load on it.

## Definition of Forces



# T130

## Ball Screw Drive, Slide Guide




A1: depth 28
A2: depth 20
A3: outside thread
A4: inside thread
A5: T-slot

# Applications

Movoact TC16 is designed to be used in domestic, medical and office environments, as well as in disability equipment. Some typical applications are among reclining beds, dental chairs, adjustable computer tables, X-ray equipment, wheelchairs, fitness equipment and in the adaptation of vehicles for the disabled.



**Adjustable chairs**
- Dental chairs
- Barber chairs
- Make up chairs



**Hospital equipment**
- X-ray machines
- Operating tables
- Hospital beds
- Massage tables
- Patient lifts



**Handicap equipment**
- Lifting aids
- Adaptation of vehicles for the disabled



**Furniture**
- Desks
- Tables





**Health and fitness equipment**
- Training machines



**Wheelchairs**

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# Telescopic Lifting Column



## New Unique Product!

- *Telescopic motion*
- *Fast, quiet and light weight*
- *Modern aluminium extrusion design*
- *Favourable ratio between the stroke and the retracted length minimises space required.*

**Movoact TC16**

GB

Solutions by DANAHER MOTION

# Presentation

The new Thomson Movoact TC16 is another product innovation from Danaher Motion. The TC16 will make the utilisation of linear motion products easier. It has all the hallmarks that you would expect from a Thomson actuator; quality, easy installation and long, trouble free life.

Designed to suit many applications, the Movoact TC16 will fit perfectly into all kinds of medical, disability, rehabilitation and health and fitness equipment. With a low retracted versus stroke length ratio, the Movoact TC16 is the ideal product for applications that demand a high load in a space critical environment.

The innovative and aesthetic design of the aluminium extrusions allows the Movoact TC16 to be a visible component. This will eliminate the need for cover plates or enclosures thus reducing material cost, assembly time and in addition, it makes servicing easy.



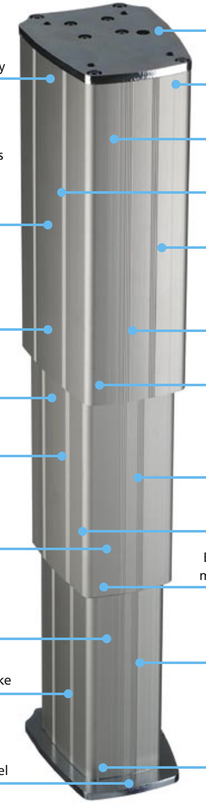
The Movoact TC16 is built around a unique combination of double-telescoping lead screws with a belt driven gear and the latest in motor technology. This unique design ensures quiet operation in a highly efficient package, giving a high load capacity with minimum current consumption.

The guiding technology between the aluminium extrusions offers smooth, quiet, rigid and maintenance free operation. The innovative design utilises the latest anti-friction material giving a high moment load capability in a very small envelope.



Please contact your nearest Danaher Motion office, where we will be more than happy to provide you with additional information on the Movoact TC16 and how it can help to improve on your existing designs.

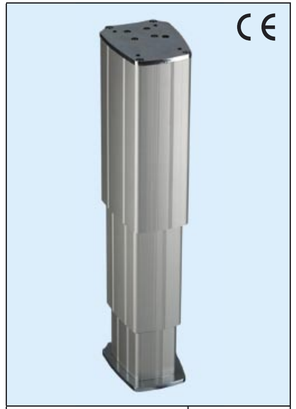
# Overview



- CE approved
- Quiet operation, suitable for domestic use
- Aesthetic design
- Load up to 2000 N
- Very low retracted height
- Dynamic braking
- Low weight
- Self supporting
- Smooth operation
- EMC recognised according to medical equipment standards
- Simple to install
- Built in end of stroke limit switches
- High moment load capability
- Anodised aluminium profiles with 20 µ anodisation and surface tolerance class 3 (furniture standard)
- Very favourable ratio between the stroke and the retracted length
- Telescopic screw drive
- IP 44 protection degree
- Maintenance free
- Speed up to 19 mm/s
- Integrated load holding brake
- End plates in zinc plated steel

# Technical Data

## Technical data



| | |
|---|---|
| Input voltage [Vdc] | 24 |
| Max. current draw [A] | 8 |
| Max. speed [mm/s] | 19 |
| Screw type | Trapezoidal |
| Max. load [N] | 2000 |
| Max. static load torque [Nm] | 500 |
| Max. dynamic load torque [Nm] | 150 |
| Min. / max. standard stroke [mm] | 200 / 400 |
| Duty cycle @ 20° C [%] | 15 |
| Max. on time @ 20° C [s] | 60 |
| Temperature limits at operation [°C] | 0 to + 40 |
| Weight [kg] | 8,7 - 13 |
| Protection degree | IP44 |
| End of stroke protection | internal limit swiches |
| Wire cross section [mm²] | 1,5 |
| Wire length [mm] | 1000 |
| Connector included | no |

## Features

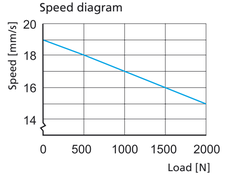
- Telescopic screw drive
- Quiet operation
- Very low retracted height
- High moment load capability
- 24 Vdc supply voltage
- Self locking/static load holding
- Integrated load holding brake
- Dynamic braking
- Load up to 2000 N
- Speed up to 19 mm/s
- Modern aluminium extrusion design
- CE approval
- EMC approved according to medical standards (emission: EN 61000-6-3:2001, EN 60601-1-2:1993, EN 55011 Class B, immunity: EN61000-6-2:2001, EN 61000-4-2, EN 61000-4-3)

## Options

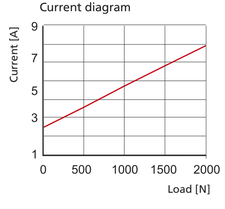
- Encoder feedback

## Performance

Speed diagram

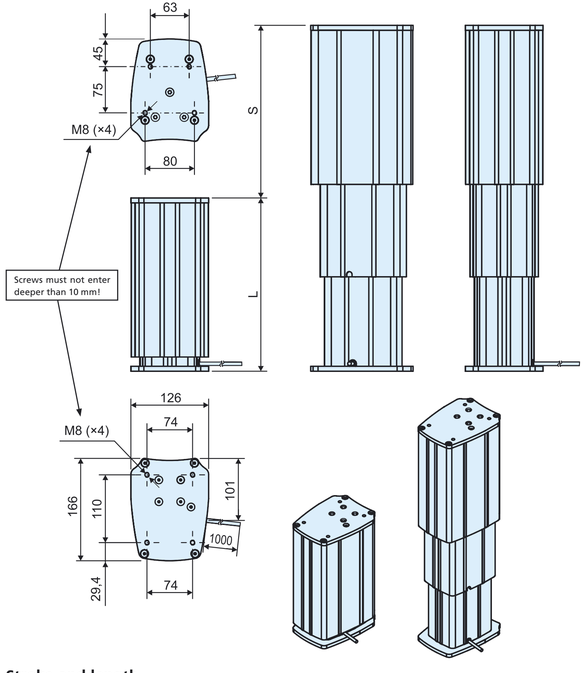



Current diagram




# Dimensions

## Dimensions




## Stroke and length

S = stroke (Smin. = 200 mm, Smax. = 400 mm)
L = retracted length ( Lmin. = 250 mm, Lmax. = 400 mm
Longest possible S for a given retracted length = L × 2 - 282
Shortest possible L for a given stroke = (S + 282)/2

# Ordering Key

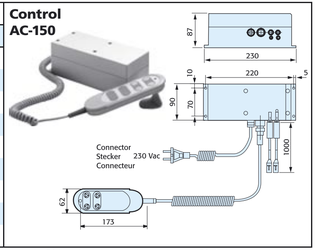
## Movoact TC16

| Designation example | TC | 16 | – | 24 | T12 | M | 250 | 300 | X |
|---|---|---|---|---|---|---|---|---|---|
| **Actuator type** Telescopic column | TC | | | | | | | | |
| **Profile size** 166 × 126 mm | | 16 | | | | | | | |
| **Hyphen** | | | – | | | | | | |
| **Supply voltage** 24 Vdc | | | | 24 | | | | | |
| **Transmission type** Trapezoidal screw / diameter 12 mm / lead 12 mm | | | | | T12 | | | | |
| **Engineering unit** Metric | | | | | | M | | | |
| **Ordering stroke S [mm]** (Smin. = 200 mm, Smax. = 400 mm, Max. possible stroke = L × 2 - 282) | | | | | | | ••• | | |
| **Ordering length L [mm]** (Lmin. = 250 mm, Lmax. = 400 mm, ) | | | | | | | | ••• | |
| **Option** No option / Encoder | | | | | | | | | X / E |

## Accessories

| Control model | AC-150 | |
|---|---|---|
| Part number | DCF24-1F | DCF24-2F |
| Input voltage [Vac] | 1 × 230 | 1 × 230 |
| Input frequency [Hz] | 50 | 50 |
| Output voltage [Vdc] | 24 | 24 |
| Number of ouputs | 1 | 2* |
| Max. output current [A] | 8 | 8 |
| Duty cycle @ 20° C [%] | 10 | 10 |
| Electronic limit switches | yes | yes |
| Limit switch inputs | no | no |
| Hand control | included | included |

**Control AC-150**




* Both outputs share the max. output current, i.e if the max. output current is 8A then the total current can not exceed 8A if using one or two ouputs.



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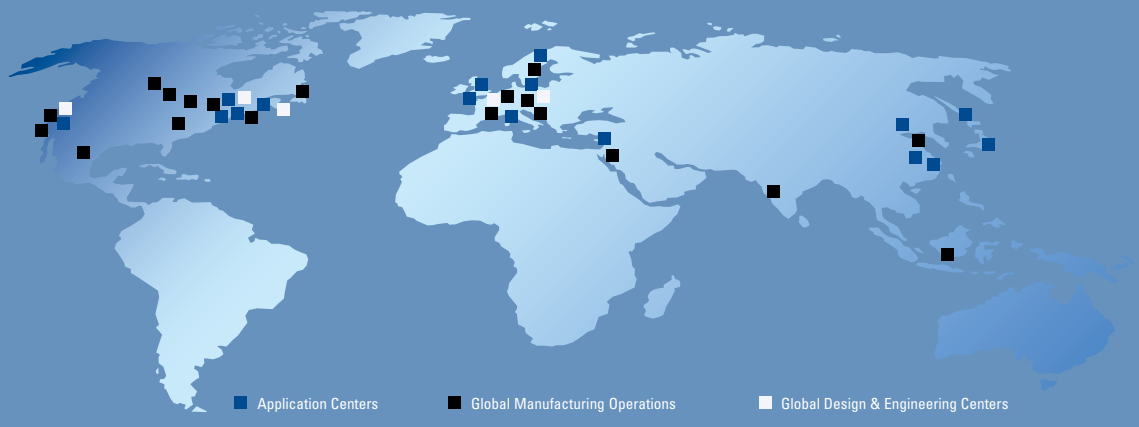
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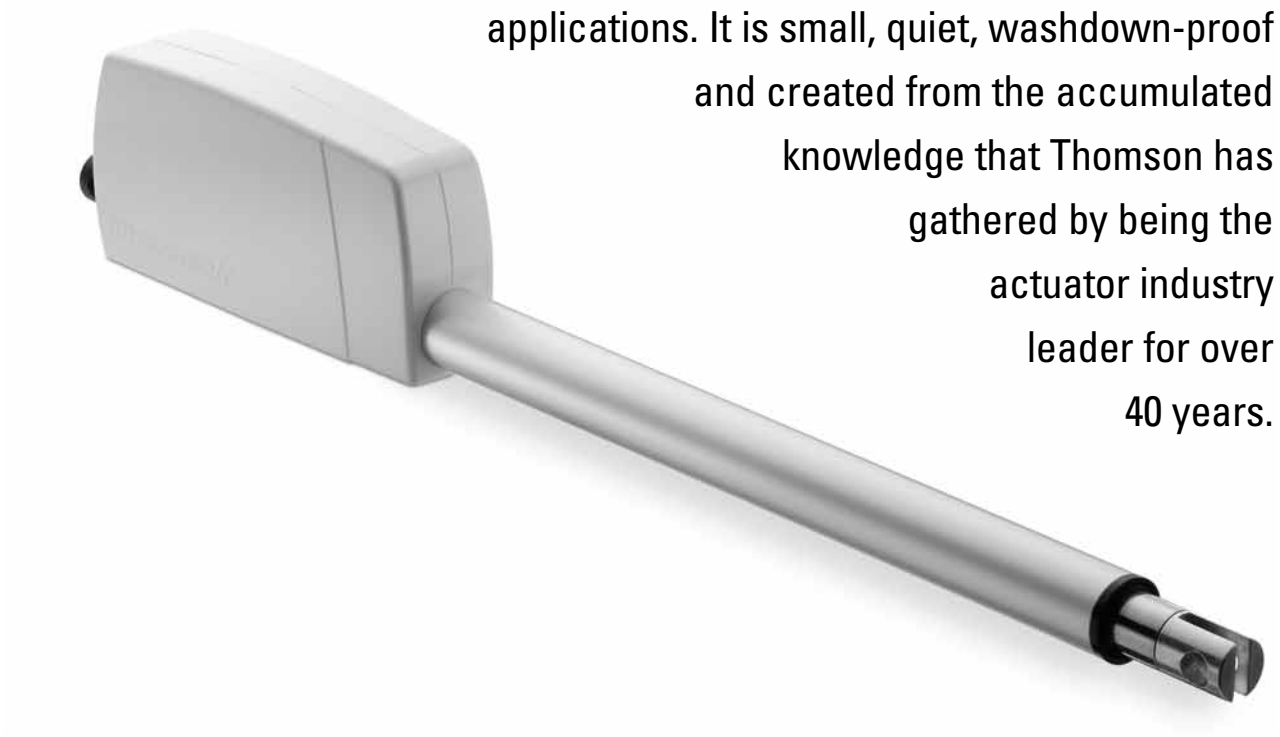
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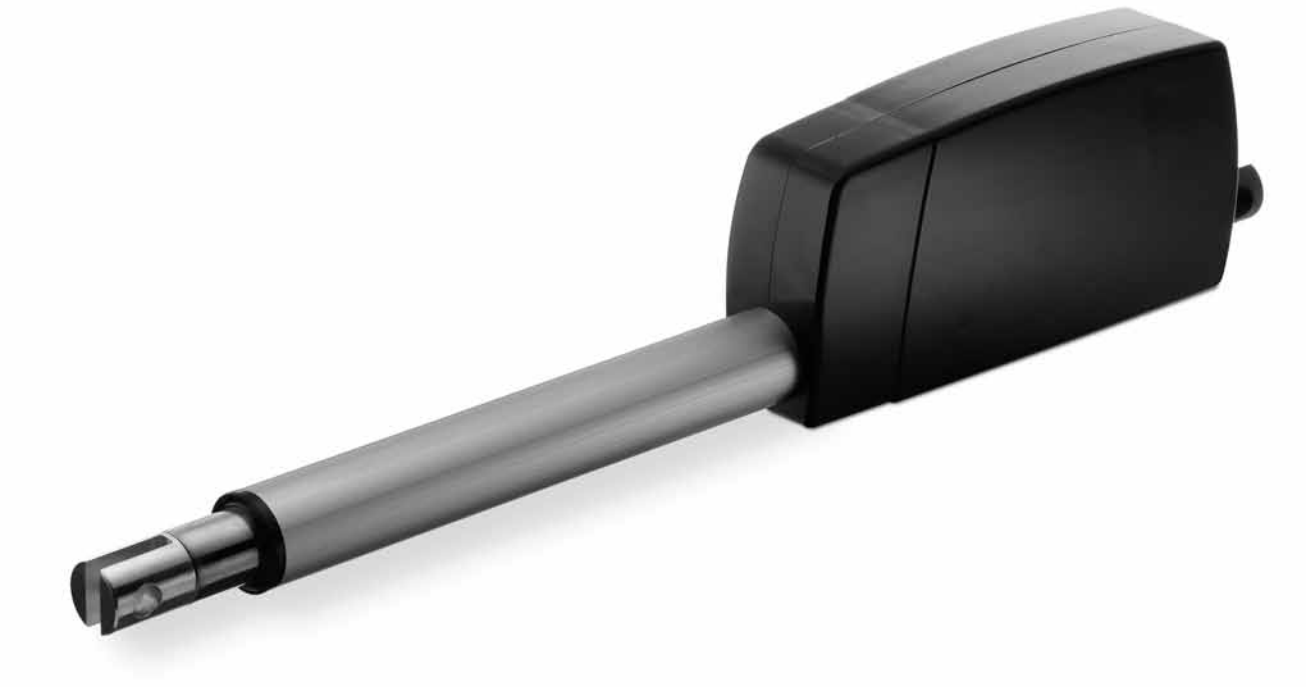
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# Thomson WhisperTrak™ Linear Actuators

Thomson WhisperTrak™ Linear Actuators are the newest addition to our well-known electric linear actuator family. This new actuator sets a new standard for personal mobility, medical, rehab, office and domestic applications. It is small, quiet, washdown-proof and created from the accumulated knowledge that Thomson has gathered by being the actuator industry leader for over 40 years.





# Features and Benefits

Thomson WhisperTrak™ linear actuators were designed to incorporate features that enable machine builders the greatest flexibility in their design. A sleek and compact design, washdown protection, electronic limit switches and a global sales and service organization are just some of the features offered. The result is the optimum actuator for the applications it is built to serve.

**Exceptionally quiet**
Thomson WhisperTrak linear actuators boast a low sound level of less than 45 dBa, about the same as an average library. This quiet, consistent low sound level is conducive to personal mobility applications and provides unobtrusive linear motion in an elegant package.

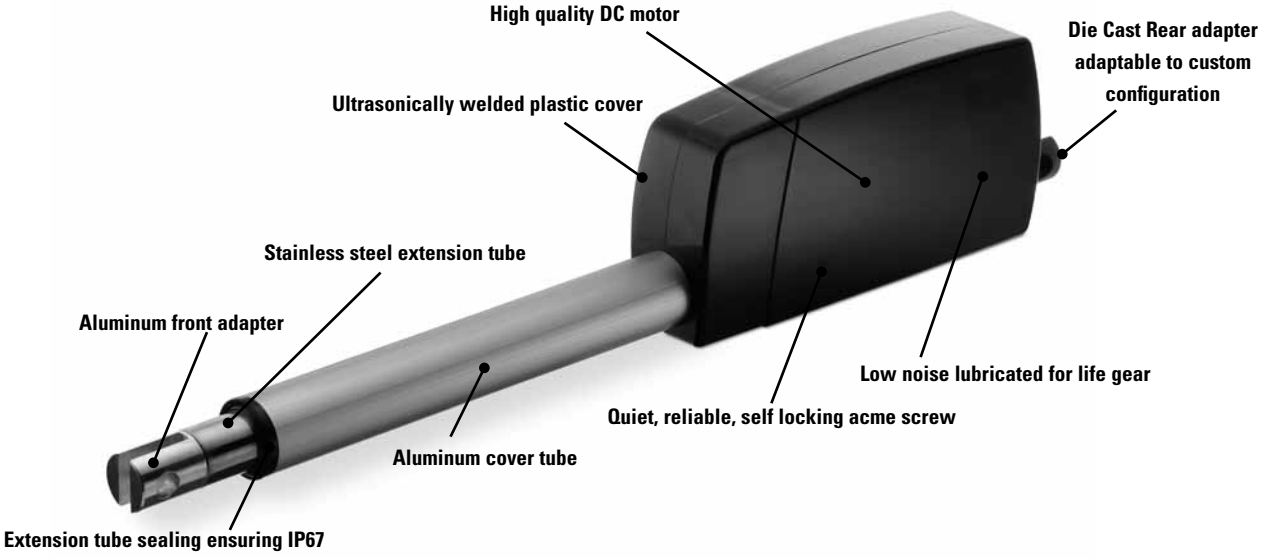
**Permanent sealing for environmental protection**
The actuator is able to operate in harsh conditions where it is exposed to washdown, rain, dust, or other particulate without the use of any additional cover. The Thomson WhisperTrak linear actuator is rated for protection class IP67.

**Compact and compatible**
The Thomson WhisperTrak linear actuator is one of the most compact actuators on the market and pin to pin compatible with virtually all competitor actuators in this segment. This allows you to easily replace an existing actuator with the Thomson WhisperTrak linear actuator and gain the space saving benefits while reducing weight.

**Maintenance free**
Our new actuator is unique in that it requires zero maintenance throughout the entire life of the actuator. The average life is 10,000 cycles (one full stroke back and forth) at the maximum load. Once properly installed, the Thomson WhisperTrak linear actuator will provide trouble-free operation with zero maintenance, thereby reducing the total cost of ownership.

**Unique options**
The Thomson WhisperTrak linear actuator is unique in that it offers a compact machine footprint and robust features that are unavailable anywhere else. The electronic limit switches (ELS) and anti-rotation options are available off the shelf and fit within the compact envelope of the standard model. Mounting options include standard as pictured or rotated 90 degrees.

**World wide representation**
For over 40 years Thomson has provided simple, innovative, and dependable linear actuator solutions. With global sales and manufacturing facilities, Thomson is able to respond quickly to all customer needs. The Thomson WhisperTrak linear actuator is designed to meet all relevant certificates and is built in accordance with ISO 9000.



# Applications

The Thomson WhisperTrak electric linear actuator offers incredible flexibility. Any application which requires a small footprint or quiet operation would benefit from it. Specifically, personal mobility, rehab, medical equipment, office and domestic machines, are well suited as a result of its compact envelope and unique operating features such as quiet operation and one piece housing.

**Rehab and handicap equipment**
Personal mobility is a growing area for linear actuators. Equipment designed to offer mobility or rehabilitation to disabled, elderly, or injured people can include wheel chairs, patient lifts, handicapped accessible cars/trucks, and other rehabilitation equipment.

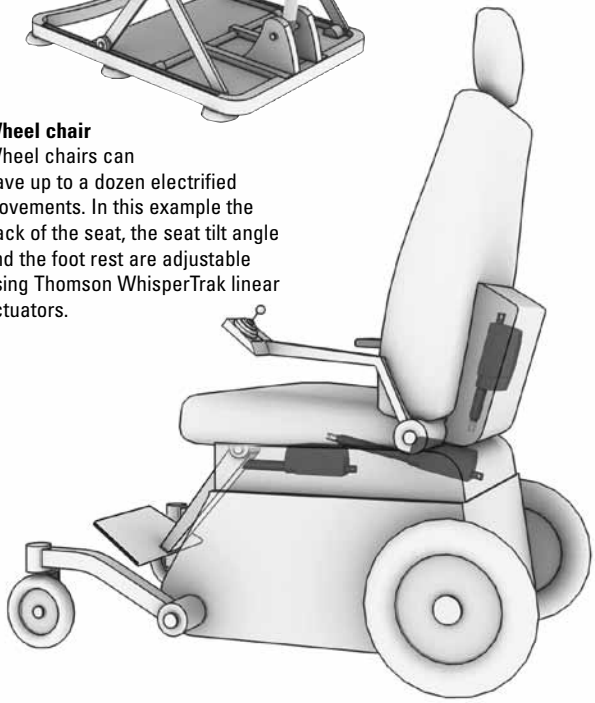
**Medical/hospital equipment**
Patient beds, x-ray machines and examination chairs are just a few examples where linear actuators are used. In fact, every place where a simple, reliable and electrified movement is needed a linear actuator is likely the answer.

**Furniture**
The quiet operation and small footprint of the Thomson WhisperTrak linear actuator make it ideal for home or office furniture requirements where silent operation is an issue. Adjustable desks, beds, reclining chairs, and the positioning of heavy TV screens benefit from the quiet, precise actuation of the WhisperTrak linear actuator.

**Limitless possibilities**
Whether the standard product meets your specifications or you require a more customized solution, Thomson engineers are available to discuss any of your application needs.



**Bath chair lift**
For simple and safe handling the lift movement is electrically actuated. The Thomson WhisperTrak linear actuator is light-weight and quiet and makes cleaning easy without worry of water ingression or exposure to detergents.



**Wheel chair**
Wheel chairs can have up to a dozen electrified movements. In this example the back of the seat, the seat tilt angle and the foot rest are adjustable using Thomson WhisperTrak linear actuators.



**Beds**
Beds in hospitals or at home are commonly equipped with actuators to adjust different functions. In this image the back and the leg angles are adjustable but actuators are also used to tilt, turn, and position beds in almost any way imaginable to make life easier for the patient, nurse and the cleaning staff.

# Specifications

Specifications are subject to change without notice. It is the responsibility of the product user to determine the suitability of this product for a specific application.

| Technical Specification | | 2000N | |
|---|---|---|---|
| **Voltage** | | | |
| Input voltage | [VDC] | 12 | 24 |
| **Load** | | | |
| Static load (Fx), maximum | [N] | 2000 (450 lbs) | |
| Dynamic load (Fx), maximum | [N] | 2000 (450 lbs) | |
| **Stroke** | | | |
| Stroke lengths, standard | [cm] | 10, 20, 30, 40, 50 | |
| **Current** | | | |
| Current consumption, rated load | [A] | 4.5 | 2.2 |
| Current consumption, stall/in-rush | [A] | 14 | 8.0 |
| **General data** | | | |
| Speed, no load | [mm/s] | 5.8 (.23"/s) | |
| Speed, rated load | [mm/s] | 4.0 (.16"/s) | |
| Operating temperature limits | [°C] | -25 to +40<br>(-13F to 104F) | |
| Duty cycle, maximum | [%] | 10 | |
| Life, average | [cycles] | 10 000 | |
| Sound level | [dBa] | < 45 | |
| Lead screw type | | acme | |
| Protection class | | IP67 | |
| Certificates | | CE (EN60601-1)<br>UL (UL60601-1) | |

**Features**

- Maintenance free
- Very high sealing degree due to ultrasonic welding of enclosure
- Washdown proof during operation
- Can be submerged when not operating
- Compact and light weight

**Options**

- Electronic limit switches (ELS)[1]
- Anti rotation mechanism [2]
- Mounting adapters turned 90°

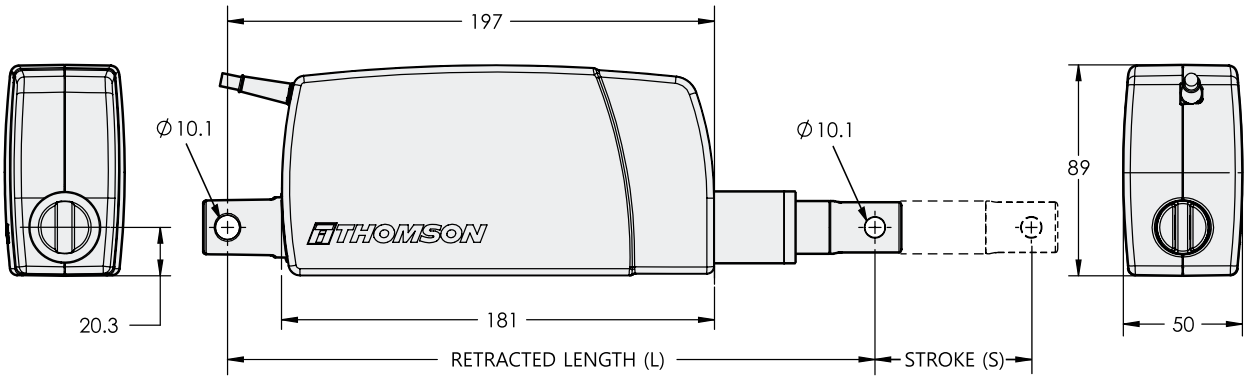
[1] Shuts off power at the end of stroke and all along the stroke at overload conditions.
ELS is normally set for 120% of the rated dynamic maximum load.

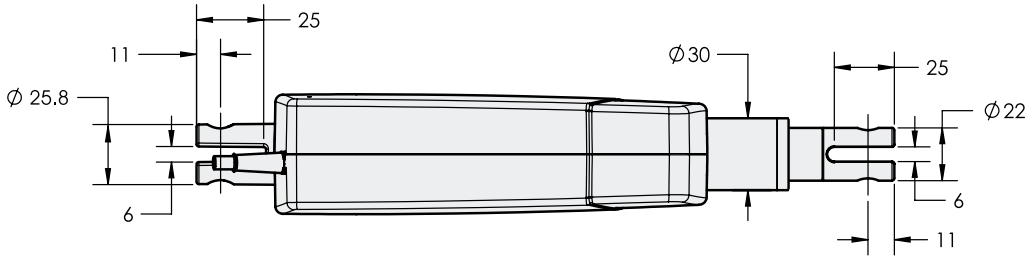
[2] Prevents the extension tube from rotating if it is not fixed in the end.

# Dimensions

Cable length, see ordering key page 10

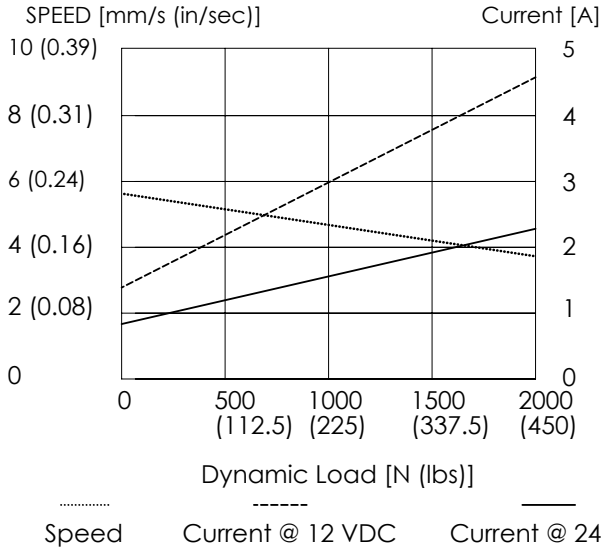
W • • 02 (max. load 2000 N (450 lbs)




| | | | | | |
|---|---|---|---|---|---|
| Stroke "S" mm (inch) | 100 (3.94) | 200 (7.87) | 300 (11.81) | 400 (15.75) | 500 (19.69) |
| Retracted Length "L" mm (inch) | 238 (9.37) | 338 (12.31) | 438 (17.24) | 589 (23.19) | 689 (27.13) |
| Weight kg (lbs) | 1.20 (2.65) | 1.35 (2.98) | 1.5 (3.31) | 1.65 (3.64) | 1.80 (3.97) |

# Performance Diagram



# Actuator Limit Switch and Feedback Options

**Electronic Limit Switches / Low Level Switching, ELS (Option E)**
An optional Electric Limit Switch (ELS) can be integrated into Thomson WhisperTrak electric linear actuators. This electronic control automatically turns off power to the motor when current exceeds a preset threshold either at ends of stroke or due to a mid-stroke overload condition. This current threshold is directly related to thrust and can be set at the factory during assembly to independently control extend and retract travel. The default setting is rated dynamic load plus 20% (2.4KN).

# Ordering Key

| Ordering Key | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| W12 | 02- | 58A | 10- | N | S | 1 | B |

**1. Model and input voltage**

W12 = WhisperTrak™, 12 VDC
W24 = WhisperTrak™, 24 VDC

**2. Maximum dynamic force**

02- = 2000 N (450 lbs)

**3. Lead screw diameter, TPI (threads / inch) and type**

58A = 5 (0.465 inches), 8 threads / inch, acme

**4. Maximum stroke length**

10- = 100 mm
20- = 200 mm
30- = 300 mm
40- = 400 mm
50- = 500 mm

**5. Limit switch and feedback options**

N = no option - for use with Thomson DCG Control
E = electronic limit switches / low level switching (ELS)

**6. Adapter position[1] and anti-rotation mechanism options**

S = standard mounting adapter position, no anti rotation
3 = mounting adapters turned 90°, no anti rotation
A = standard mounting adapter position with anti-rotation
M = mounting adapters turned 90° with anti-rotation

**7. Cable and Connector Options**

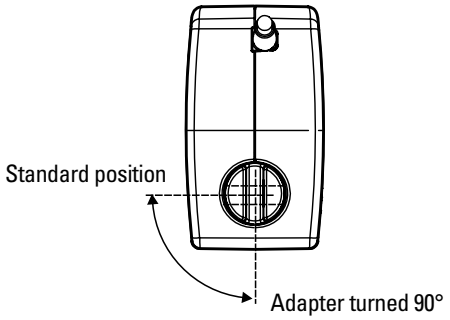
1 = 1 meter long cable with flying leads (for customer supplied connectors)
2 = 1 meter long cable with phono type connector, Ø 6.3 mm
3 = 2 meter long cable with DIN type connector (used with DCG Control)
4 = 1 meter long cable with Pac Con type connector (includes mating connector)
5 = 1 meter long cable with Pac Con type connector for the actuator motor (includes mating connector) and flying leads for limit switch and feedback options

**8. Enclosure color**

B = black
W = white

The Thomson Whispertrak is warranted to be free from defects in materials and workmanship for a period of twelve (12) months from date of delivery. The application of this product is the responsibility of the buyer and Thomson makes no representation or warranty as to the suitability of the product for any particular use or purpose. For a copy of the entire warranty for this product that is contained in our standard terms and conditions of sale, please go to http://www.thomsonlinear.com/website/com/eng/support/terms_and_conditions.php

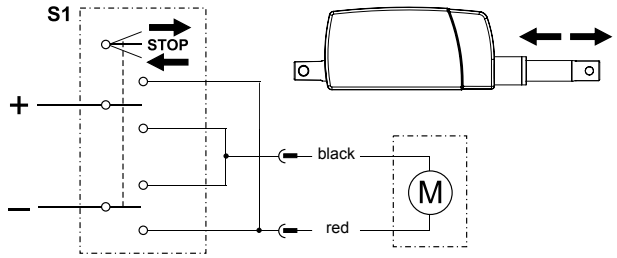
[1] Definition of rear adapter hole positions.



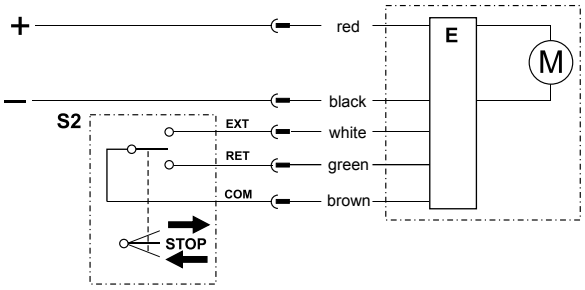
# Electrical Wiring Diagrams

## DC-actuators

**N - standard (no option)** - **for use with Thomson DCG Control**




**E - with ELS / Low Level Switching (optional)**




M Actuator motor
S1 Double pole double throw (DPDT) switch
S2 Single pole double throw (SPDT) switch
E Electronic limit switches

By switching the polarity of the voltage to the motor the extension tube will change direction (example N). When using the ELS option the direction of the extension tube travel is controlled by switching the COM (common) output to the EXT (extend) or RET (retract) inputs.

When switching the motor voltage directly (example N), make sure that the switch and the wiring can handle the maximum motor current.

Always protect the actuator and the wiring by using a fuse between the actuator and the power source.

**Actuators without ELS option (N version):** the actuator voltage must be switched off when reaching the ends of stroke or due to a mid-stroke overload to avoid causing damage to the actuator. If Thomson DCG Control (P 13) is not used the application must be approved by factory.

**Actuator with ELS option (E version):** the actuator will automatically switch off when reaching the ends of stroke or a mid-stroke overload. E version for use where customer provides power supply, but requires Electronic load limiting, or low level switching.

# Actuator Controls

## Control DCG

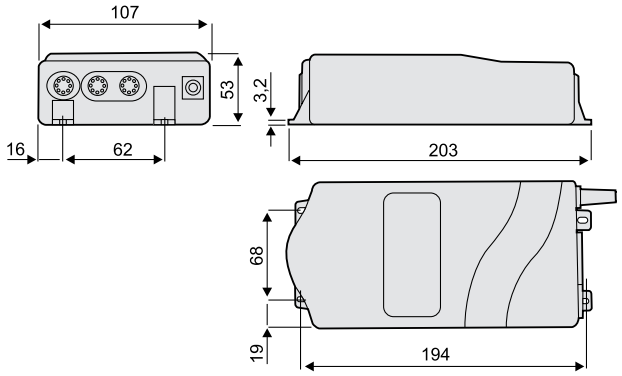


- Controls available for single actuator operation.
- Small and light weight control operated via a control pendant which is ordered separately.
- Built in Electronic Limit Switches (ELS) stop the actuator automatically at end of stroke or mid stroke stall.
- The control pendant is ordered separately.
- Use of this control limits the duty cycle to the actuator to 10%.
- If you choose to use an alternative controller other than the DCG units specified, please contact Thomson Application Engineers for further information.

| Actuator Compatibility | |
|---|---|
| DCG-152 - 2KN | Single 24V WhisperTrak Linear Actuator with "N" option. |

Power Cords included:
DCG24-1U (U.S. version) has 3 m long with US three prong power plug or for DCG24-1M (EU) units 3 m Long with Europlug (CEE 7/16) power plug.

## Dimensions




## Wiring Diagram

Actuators used with the DCG control have integral plugs for direct connection. (Cable option 3.) See order key for more information.

# Actuator Controls

## Control DCG

| Specifications | | |
|---|---|---|
| | DCG - 152 | |
| Compatible with actuator | W2402-58A•••N | |
| Input voltage [Vac] | 1 × 230 ± 6% | 1 × 115 ± 6% |
| Input frequency [Hz] | 50 | 60 |
| Output voltage [Vdc] | 24 | |
| Output current, max. [A] | 2,4 | |
| Operating temperature limits [°C] | +5 – +45 | |
| Max. duty cycle @ 25 °C [%] | 10 | |
| Maximum on time [s] | 180 | |
| Weight of control [kg] | 1.9 | |
| Protection class | double insulated | |
| Electronic limit switches | yes | |
| Included control pendant | no | |
| Certificates | CE | |
| Part number | DCG24-1M-0152 | DCG24-1U-0152 |

These controls are current limited. Review the current/load curves for the actuator you selected to make sure the control will provide enough current for the thrust you need.

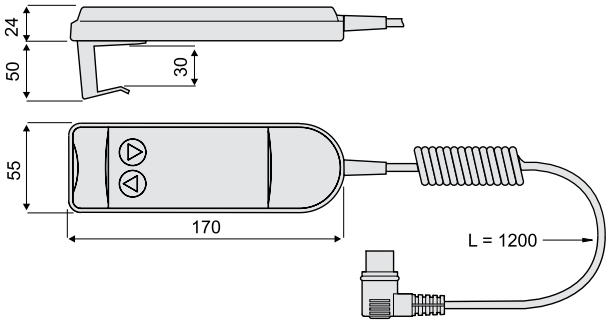
Control will shut off if duty cycle is exceeded and automatically reset when cooled off.

Control pendant type DCG14-1H is recommended, see page 14.

# Actuator Controls

## Control Accessories

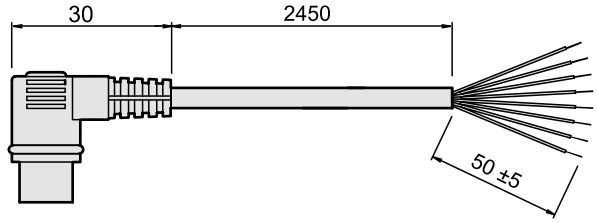
## DCG Control Pendant




| Specifications | |
|---|---|
| Parameter | DCG14-1H |
| Weight [kg] | 0,4 |
| Cable length [mm] | 1200 |
| Certificates | CE |
| Part number | DCG14-1H |

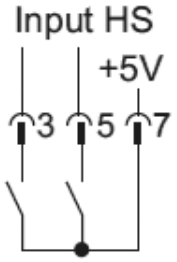
- Handy and light weight control pendant with spiral cord cable which connects to the DCG to control one or synchronous WhisperTrak linear actuators via momentary push buttons.

## Control to Control Cable for DCG




| Specifications | |
|---|---|
| Parameter | |
| Lead cross section [mm$^2$] | 7 × 0,14 |
| Cable length [mm] | 2450 |
| Part number | D620 095 |

- This cable connects with its plug to the control pendant input on DCG in order to connect the control to another device than the DCG control pendant.



# Glossary

## A – In

### Acme Screw
Acme screws typically have low efficiencies, which self lock and resist back driving. The low efficiency suits applications with shock and vibration.

### Actuator Housing
The actuator housing provides environmental protection for the internal components and may also be a structural member of the actuator.

### Adapters (Front and Rear Clevis)
The front and rear adapters are the connection points for mounting most Thomson actuators. The front adapter is usually a cross hole but optionally may be a tapped hole, threaded rod, universal rod end, or slotted adapter with cross hole. The rear adapter may be cast into the actuator housing or held in place with a nut.

### Anti Rotation Mechanism
A feature available on some actuators that resolves the restraining torque within the actuator. The extension tube will not rotate on actuators with this feature.

### Certificates
CE certification and UL listing are the two main third party approvals available for actuators. All actuators sold in the EU are CE certified while some actuators sold outside of the EU may not be. If you order your actuator outside of the EU and need a CE certification, contact the factory to verify availability and be sure to include the request on your order.

### Controls
Controls can be external to the actuator and provide the actuator with the correct voltage, have either membrane or pendant operators and some have position indicators. The Thomson WhisperTrak series of electric linear actuators also has optional internal controls that continuously monitor the operation of the actuator.

### Cover Tube
The cover tube provides protection for the lead screw and provides protection and support for the extension tube. For the Thomson WhisperTrak actuators, the cover tube can also provide the rear mounting connection.

### Customization
Even the most versatile actuator may not always suit all applications. But whatever your need is, our engineers are ready to help you to customize the actuators according to your requirements. We build more exclusive actuators than anyone else and have decades of experience of producing actuators to meet special needs.

### Duty Cycle
$$\text{Duty cycle} = \frac{\text{on time}}{(\text{on time} + \text{off time})}$$

Example: 10 seconds on, 90 seconds off

$$\frac{10\ \text{s}}{(10\ \text{s} + 90\ \text{s})} = 10\%\ \text{duty cycle}$$

The duty cycle is a function of the maximum rated load and the ambient temperature. Ambient temperatures above the stated will affect the duty cycle negatively while lower temperatures and/or lower load will affect it positively.

### Dynamic Load
The dynamic load rating is how much load the actuator will move when power is applied. Also see “load rating”.

### Electronic Limit Switches (ELS)
ELS stands for Electronic Limit Switches and it is a current sensing function used in some actuator control models. The ELS senses the current and if the current exceeds a pre-set level the control cuts the power to the motor. This function can be used to detect and stop at the ends of the actuator stroke or to stop the actuator if it runs into an obstacle.

### End Play (Backlash)
The stack up of tolerances within the lead screw assembly and gearing allowing some linear movement of the extension tube without rotating the motor.

### Extension Tube
The extension tube slides in and out of the actuator and is connected via the front adaptor to the load being moved or positioned.

### Input Voltage
The nominal voltage required to operate the actuator. All actuators will accept at least a ± 10 % variation of the nominal voltage but a change in the voltage will result in a change of the speed of dc actuators. Controls are available that accept 115 or 230 Vac input and provide 24 Vdc output to operate 24 Vdc actuators.

# Glossary

## In – Re

### Installation Instructions
Each actuator has an installation manual to answer typical questions about mounting and wiring the actuators.

### Lifetime Expectancy
Life is a function of load and stroke length.

### Linear Actuators
Actuators providing a linear thrust via an extension tube to lift, lower, push, pull or position a load.

### Load Rating
The load rating is the minimum amount of force the actuator will provide during its lifetime. The load rating of all rod style actuators is the same for both compression and tension loads. Also see "dynamic load", "static load" and "tension and compression load".

### Maximum On Time
The maximum amount of time an actuator may operate without stopping to "cool off". For high load and long stroke actuators this may be one extend or retract cycle. The actuator should not exceed 10% duty cycle at full rated load. The maximum on time for WhisperTrak is 180 seconds.

### Mounting
Electrak actuators are quickly and easily mounted by slipping pins through the holes on each end of the unit and into brackets on the machine frame and the load. Roll or spring type mounting pins should be avoided. The mounting pins must be parallel to each other as shown below (Fig. a). Pins which are not parallel may cause the actuator to bind. The load should act along the axis of the actuator since off center loads may cause binding (Fig. b).

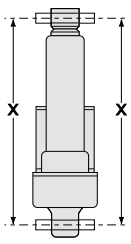
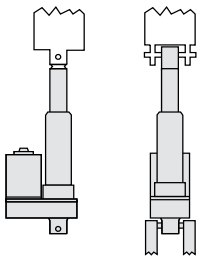



Fig. a



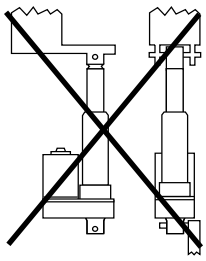


Fig. b

### Operating and Storage Temperature
The operating temperature is the range in which the actuator may be safely operated. At higher temperatures the duty cycle needs to be lower than 10%. All actuators can be stored or transported at the same temperature as the operating temperature. Contact customer support if the operating temperature will be exceeded during storage or transportation.

### Output Voltage
Output voltage is the voltage from the control to run the actuator. The controls for dc actuators have 24 Vdc output. The controls for ac actuators have either 115 or 230 Vac output.

### Protection Class
The protection class refers to the environmental rating of the enclosure. The first digit applies to airborne contaminants and the second digit to water/moisture.

IP33: protected against the penetration of solid objects with a diameter greater than 12 mm and against direct sprays of water up to 60 degrees from vertical.

IP44: protected against the penetration of solid objects with a diameter greater than 1 mm and against water sprayed from any direction.

IP45: protected against the penetration of solid objects with a diameter greater than 1 mm and low pressure water jets from any direction.

IP51: protected from dust and vertical dripping water/condensation.

IP52: protected from dust and dripping water/condensation falling at an angle up to 15 degrees from vertical.

IP56: protected from dust and high pressure water jets from any direction.

IP65: dust tight and protected against low pressure water jets from any direction.

IP66: dust tight and protected against high pressure water jets from any direction.

IP67: dust tight and protected against the effect of immersion in water between 150 mm (5.9 inch) and 1 meter (39.4 inch).

### Restraining Torque
The torque which is developed between the clevis on the extension tube and rear mount(clevis or trunnion) when the unit extends or retracts (Fig. c).

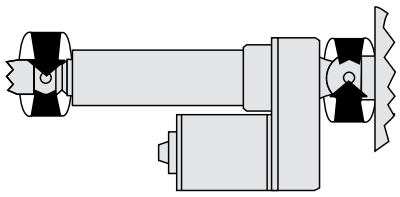


Fig. c

# Glossary

## Ro – Vo

### RoHS Compliance
All actuators, controls and accessories sold in the EU are RoHS compliant unless otherwise stated, while products sold outside of the EU may not be. If you order an actuator outside of the EU and need it to be RoHS compliant, contact the factory to verify availability and be sure to include the request on your order.

### Service and Maintenance
Actuators are maintenance free.

### Sizing and Selection
The Thomsonlinear.com web site includes a product advisor that can be used to walk through the decision process for picking the best actuator and to get the ordering data for your choice. Go to www.thomson.com/linear_actuator_advisor to find out more.

### Speed
DC actuators have a direct load/speed relationship. As the load increases, the speed of the dc actuators decreases. There are curves to show the speed from no load to full rated load.

### Static Load
The static load rating is how much load the actuator will hold with power off. Also see “load rating”. If nothing else is stated the static load rating is for the actuator extension tube being fully retracted. The static load rating will decrease as the tube extends.

### Synchronous Operation
Motor speed cannot be controlled with enough precision to ensure that the actuators will remain synchronized and a binding effect could take place. Actuators equipped with a digital feedback encoder can also be synchronized using controls designed for synchronous operation.

### Tension and Compression Load
A tension load tries to stretch the actuator and a compression load tries to compress the actuator (Fig. d). Most actuators can manage the same tension and compression load. Also see “load rating”.

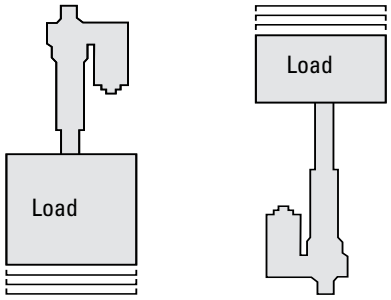



Fig. d

### Trapezoidal Screw
Screw type with similar characteristics as an acme screw. Also see “acme screw”.

### Vent
The Thomson WhisperTrak electric actuator has a breather in the housing to allow the actuator to operate without creating a vacuum and drawing water through the seals on the cover tube.

### Voltage Drop
Long leads/cables between the power source and the actuator will result in a voltage drop for DC units. This voltage drop can be avoided by sizing the leads in accordance with the following lead
cross section selection table. The table is based on an ambient temperature of 30 °C or less. A higher ambient temperature may result in the need for a greater lead cross section.

Lead Cross Section Selection Table [$mm^2$]

| Current draw [A] | Cable length [m] | Actuator input voltage [Vdc} | |
|---|---|---|---|
| | | 12 | 24 |
| 0 - 10 | 0 - 3 | 1,5 | 1,5 |
| | 3 - 6 | 2,5 | 1,5 |
| | 6 - 10 | 4 | 1,5 |
| 10 - 15 | 0 - 3 | 1,5 | 2,5 |
| | 3 - 6 | 2,5 | 2,5 |
| | 6 - 10 | 4 | 2,5 |
| 15 - 20 | 0 - 3 | 2,5 | - |
| | 3 - 6 | 4 | - |
| | 6 - 10 | 6 | - |

# Application Data Form*

## Worksheet

| Submitted by: | Phone: | Date: |
|---|---|---|
| 1. Company name | 20. Do you need any special retracted length (cross hole c/c in mm)? | |
| 2. Street address | 21. Is anti-rotation of the extension tube required (yes/no)? | |
| 3. City-state, zip | 22. What is the input voltage? | |
| 4. Contact name | 23. Do you need any of the optional features of the actuator? | |
| 5. Phone | 24. How will the actuator be connected (standard or special cabling)? | |
| 6. Fax | 25. Is mating connector required if connector is included in the actuator? | |
| 7. E-mail | 26. Do you need any special paint or finish? | |
| 8. What is the estimated annual volume? | 27. Is manual override necessary? | |
| 9. What is the target price? | 28. What are the environmental conditions (dusty, outdoors, wash down)? | |
| 10. What is the current or alternative solution? | 29. What is the operation temperature range in Celsius? | |
| 11. How much load is moved in Newton? | 30. What is the duty cycle (on-time / on-time + off-time) in seconds? | |
| 12. How much load do you need to hold in Newton? | 31. Do you need any certificate (UL, CE, etc.)? | |
| 13. How will the actuator be mounted (horizontal/vertical)? | 32. Do you require any print (dwg, dxf, faxed, email)? | |
| 14. Is the load trying to stretch or/and compress the actuator? | 33. Describe any additional requirements (packaging, labeling, etc.) | |
| 15. What speed do you want the actuator to move in mm/s? | | |
| 16. What is the life of the unit in cycles (one cycle = extend and retract)? | | |
| 17. What is the stroke length? | | |
| 18. How will the actuator be mounted to the extension tube? | | |
| 19. How will the actuator be mounted to the rear adaptor? | | |

* Please enter all fields in the form and send it and any drawing to customer service by mail, fax or email. See the back of the catalog for the nearest location.

**NOTES:**

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