DELTRAN

Clutches & Brakes

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*Helping you build a better machine, **faster.***

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Danaher Motion -
Helping you build a better machine, faster

Danaher Corporation combined over 30 industry-leading brands such as Kollmorgen, Thomson, Dover, Pacific Scientific, Portescap, Neff, Seidel and Bautz to establish a customer-focused motion control manufacturing company called Danaher Motion. We offer this powerful set of integrated motion control technologies under the Danaher Motion and Thomson brand names. We are a $1B+ global motion control leader, unique in our ability to marshal decades of application experience and technical innovation to help you build better machines, faster.

Danaher Motion defines high standards of quality, innovation and technology. We enable improved machine performance and reliability while controlling costs. Our global manufacturing footprint, rapid customization and prototyping capabilities drive quick lead times. Unmatched application experience and design expertise empowers you to commission machines faster.

Consider your options in today's market for a motion control partner. Select Danaher Motion and join a team with 6100 employees, over 60 years of application experience and 2000+ distributor locations around the globe. Danaher Motion serves industries as diverse as semiconductor, aerospace and defense, electric vehicle systems, packaging, printing, medical and robotics. We offer an unparalleled depth and breadth of motion control product solutions through a world-wide service and support infrastructure, field service engineers and support teams available when and where you need them.

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 Danaher Motion 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

Deltran Clutches & Brakes
Introduction

Building Our Business On a Strong Foundation

Danaher Motion has a long history of manufacturing quality clutches and brakes. Our roots are firmly planted in brand names such as Deltran, API (American Precision Industries), and Warner PSI bringing over 100 years of combined manufacturing experience.

Deltran joined Danaher Motion in March 2000, followed in July 2000 by the acquisition of Warner PSI. The Genuine Wrap Spring and electromagnetic friction products were then combined under the Deltran name within the Danaher Motion family. As we merged the manufacturing of these product lines into one facility in Amherst, NY we focused on keeping the engineering expertise at the forefront while practicing The Danaher Business System (DBS) of continuous improvement.

Today, our clutch and brake products are working in a wide range of applications specific to factory automation, material handling, automotive, aviation, defense, aerospace, medical, office machine, robotics and servo motor manufacturing industries. These products set the solid foundation for the broad range of standard and custom products currently available to our customers.

Danaher Motion's modern Amherst, NY facility is ISO 9001:2000 and AS9100-B certified for its Design, Manufacturing and Assembly of Motion Control Devices. Our brake and clutch manufacturing experience, technological know-how and commitment to bring our customers a quality product, delivered on time, every time are some of the reasons why Danaher Motion is the best choice for your next motion control product.

ISO 9001:2000
BUREAU VERITAS
Certification
No. 210038

For customer service and application support, please call the DMAC (Danaher Motion Assistance Center) at 1-540-633-3400. For other contact information, please see the back of this catalog.

Using Our Clutches and Brakes Catalog

Finding just the right clutch or brake product can be a daunting task. The selection process hinges on the application with many variables to take into consideration. Often times there are several brake or clutch options that might do the job—the key is finding the best solution for your application.

This catalog contains several aides to assist in the selection process.

- **CLUTCH AND BRAKE TECHNOLOGIES**—This catalog contains clutch and brake information for Wrap Spring and Electromagnetic Friction Clutches and Brakes. Pages 6-13 offer operation, design and application examples of both technologies. The printed tabs offer a quick way to find the technology and products you need. Engineering guidelines appear at the end of each section.

  THE GENUINE WRAP SPRING product section begins on page 15.
  THE FRICTION product section begins on page 97.

- **SELECTION BY MOTION TYPE**—The chart on pages 4 & 5 categorizes our clutches and brakes by type of motion. The basic motions are START, INDEX, SLIP, STOP and HOLD. Each of these motion types are noted by an icon on the left side of this chart. As you browse through this catalog, you will see these same motion icons in the top header of the product pages. If you know that your application requires a specific motion, this chart may be a helpful place to start your brake and clutch selection.

- **SELECTION BY CAPABILITY**—The chart on page 5 will help you to determine which technology may work best in your application: Wrap Spring or Friction. Your application may have specific requirements of a brake or clutch such as torque, speed, accuracy, etc. This chart may help you determine whether The Genuine Wrap Spring products or one of our Friction Clutches or Brakes will be best suited for your operation.

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ENGINEERED PRODUCTS

ENGINEERING GUIDELINES

FRICTION

Wrap Spring Products

THE GENUINE WRAP SPRING™ CLUTCH/BRAKE PACKAGES
CB Series combination clutch/brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 1800 RPM depending on size. Each unit is pre-engineered and pre-assembled for easy installation. Super CB clutch/brakes provide 3 to 5 times longer life.

THE GENUINE WRAP SPRING CLUTCHES
Four clutch series include: the Solenoid Actuated SAC Series; the accumulating conveyor clutches which include the ACCE and the ACCM Heavy Duty Clutch and the mechanically actuated basic wrap spring PSI Series clutch.

THE GENUINE WRAP SPRING ACCESSORIES
Several accessories are offered for The Genuine Wrap Spring products, including dust cover enclosures; heavy duty actuator and controls. The Heavy Duty Actuator is used with the PSI-6 and ACCM series clutches. A plug-in clutch/brake control designed for operation of D-frame, AC or DC wrap spring clutches and brakes is available, the One Shot Power Control.

THE GENUINE WRAP SPRING ENGINEERED PRODUCTS
Engineered products are specially designed to solve specific and unique application requirements. The products shown are the result of years of experience in providing innovative solutions for applications including paper feed drives, agriculture equipment, copiers, robotics, etc. These solutions are now available as "engineered" products which include the DL, MAC, BBC-29, SP, BIMAC, BDNB, BDSC and CTS Series.

Friction Products

FRICTION CLUTCHES & CLUTCH COUPLINGS
Electromagnetic clutches and clutch couplings are available in 6 frame sizes and offered as shaft mounted or flange mounted models. The CS, CSC, CF and CFC series provide an efficient, electrically switchable link between a motor and a load. These models offer full corrosion resistant, rotating components designed for low inertia and minimal drag, zero backlash and integral long-life bearings.

SPRING-SET FRICTION BRAKES
Electromagnetic power-on (BF) brakes provide an efficient, switchable means of stopping and/or holding a load. Spring-set electromagnetic power-off (BRP, SB, FSB, AKB & PMB) brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power.

FRICTION ENGINEERED PRODUCTS
Engineered products are specially designed to solve specific and unique application requirements. The products shown are the result of innovative solutions we provided for applications such as document handling, copiers, ATM machines, dispensing machines, robotics, and military aerospace actuators. The solutions we provided are now available as "engineered" products.

Several New Series are included in this section: TFD Series (Torque Feedback Device) and Metric MCS (Clutches) and Metric MBF (Brakes).

Clutches & Brakes
Product Selection

CLUTCHES & BRAKES SELECTION CHART—BY MOTION TYPE							
Motion Type	Type	Model/Sizes	Max Torque lb-in (Nm)	Bore Range	Max RPM	Actuation Method	Page
Starting START	Wrap Spring Clutch	DL-30, 33	30 (3.4)	English: $\frac{1}{4}$ - $\frac{5}{16}$" Metric: 6 - 8 mm	1200	DC	70
	Wrap Spring Clutch	MAC-30, 45, 45 w/BC	150 (16)	English: $\frac{1}{4}$ - $\frac{5}{8}$" Metric: 6 - 16 mm	1200	DC	73
	Wrap Spring Clutch	BBC-29	25 (2.83)	English: $\frac{1}{4}$" Metric: 6 mm	1800	DC	77
Motion icons are shown at the top of each product page to make selecting easier.	Friction Clutch	CS-11, 15, 17, 22, 26, 30 CSC-11, 15, 17, 22, 26, 30	125 (14.2)	English: $\frac{1}{4}$ - 1" Metric: 8 - 35 mm	5000	DC	100
	Friction Clutch	CF-11, 15, 17, 22, 26, 30 CFC-11, 15, 17, 22, 26, 30	125 (14.2)	English: $\frac{1}{4}$ - $\frac{5}{8}$" Metric: 8 - 16 mm	5000	DC	100
	Friction Clutch	TC-19, TCR-19 TCP-19	250 (28.2) 50 (5.6)	English: $\frac{3}{8}$ - $\frac{1}{2}$"	5000	DC	135
	Friction Clutch	MCS	Custom Engineered Product - Consult Factory				137
	Friction Clutch	MDC	Custom Engineered Product - Consult Factory				141
Indexing INDEX	Wrap Spring Clutch	PSI-2, 4, 5, 6, 8	2500 (282.5)	English: $\frac{1}{4}$ - $1\frac{1}{2}$" Metric: 6 - 40 mm	1800	Mechanical	60
	Wrap Spring Clutch	SAC-2, 4, 5, 6	500 (56.5)	English: $\frac{1}{4}$ - 1" Metric: 6 - 25 mm	1800	AC or DC Solenoid; AIR	46
	Wrap Spring Clutch/Brake	Super CB CB-5, 6, 7, 8, 10	5,000 (565)	English: $\frac{1}{2}$ - $1\frac{3}{4}$" Metric: 12 - 45 mm	750	AC or DC Solenoid; AIR	18
	Wrap Spring Clutch/Brake	Standard CB CB-2, 4, 5, 6, 7, 8, 10	5,000 (565)	English: $\frac{1}{4}$ - $1\frac{3}{4}$" Metric: 6 - 45 mm	1800	AC or DC Solenoid; AIR	30
	Wrap Spring Clutch	ACCE-7	1500 (169.5)	English: 1 - $1\frac{7}{16}$"	400	AC or DC Solenoid; AIR	54
	Wrap Spring Clutch	ACCE-7 Heavy Duty	2500 (282.5)	English: 1 - $1\frac{7}{16}$"	400	AC or DC Solenoid; AIR	54
	Wrap Spring Clutch	ACCM-7	1500 (169.5)	English: 1 - $1\frac{7}{16}$"	400	Mechanical	57
	Wrap Spring Clutch	ACCM-7 Heavy Duty	2500 (282.5)	English: 1 - $1\frac{7}{16}$"	400	Mechanical	57
	Wrap Spring Clutch	SP-2, 4, 5, 6	500 (56.5)	English: $\frac{3}{4}$ - 1" Metric: 20 - 25 mm	1500	AC or DC; AIR	78
	Wrap Spring Clutch	BIMAC B-1, B-2	75 (8.475)	English: $\frac{1}{4}$ - $\frac{3}{8}$"	1500	AC or DC Solenoid	80
Slipping SLIP	Wrap Spring Clutch	BDSC Sizes 2, 4	9 (1.059)	English: $\frac{1}{4}$ - $\frac{5}{8}$" Metric: 6-16 mm	200	N/A	82
	Wrap Spring Clutch	CTS-25, 50	28 (3.164)	English: $\frac{1}{4}$ - $\frac{5}{16}$"	150	N/A	83
	Feedback Device	TFD-30, 40	12 (106)	N/A	300/120**	DC	132
Stopping STOP	Friction Brake	BF-11, 15, 17, 22, 26, 30	125 (14.13)	English: $\frac{3}{16}$ -1" Metric: 3 - 35 mm	5000	DC	110
	Friction Brake	MBF-26, 30, 40, 50, 60, 80, 100 (L & S)	3540 (400)	Metric: 12 - 60 mm	5000	DC	139 & 140
	Consult factory for higher speeds		*Intermittent/Continuous*			*continued on next page.*	

Clutches & Brakes
Product Selection

BRAKES & CLUTCHES SELECTION CHART—BY MOTION TYPE							
Motion Type	Type	Model/Sizes	Max Torque lb-in (Nm)	Bore Range	Max RPM	Actuation Method	Page
Holding HOLD	Wrap Spring Brake	BDNB	250 (28.23)	English: $1/2$"	200	N/A	81
	Friction Brake	BF-11, 15, 17, 22, 26, 30	125 (14.13)	English: $3/16$ -1" Metric: 3 - 35 mm	5000	DC	110
	Friction Brake	BRP-15, 17, 19, 23, 26, 28, 30, 40, 50, 60, 70	1000 (113.0)	English: $1/4$ - 2" Metric: 3 - 45 mm	5000	DC	116
	Friction Brake	SB-15, 17, 19, 23, 26, 28, 30, 40, 50, 60, 70	1200 (135.6)	English: $1/4$ - 2" Metric: 3 - 45 mm	5000	DC	116
	Friction Brake	FSB-15, 17	3 (0.34)	English: $3/16$ - $3/8$" Metric: 3 - 8 mm	5000	DC	116
	Friction Brake	AKB-17, 19, 26, 30, 40, 50	470 (53.0)	English: $1/4$ - 1" Metric: 6 - 25 mm	5000	DC	116
	Friction Brake	PMB-30, 40, 50, 60, 65, 75, 85, 100, 120	4250 (480.0)	English: $3/8$ - 1 $5/8$" Metric: 11 - 45 mm	3000	DC	129
	Friction Brake	MBF-26, 30, 40, 50, 60, 80, 100 (L & S)	3540 (400)	Metric: 12 - 60 mm	5000	DC	139 & 140
	Friction Brake	MDB	Custom Engineered Product - Consult Factory				141
	Consult factory for higher speeds						

BRAKES & CLUTCHES SELECTION CHART—BY CAPABILITY		
This chart contains basic information to determine when to use a Wrap Spring or Friction product.*		
Capability	The Genuine Wrap Spring	Friction
Torque Capacity Per Unit Size	✓	
Low Power Consumption	✓	
Single Revolution	✓	
Random Start/Stop		✓
Brake: Power-On		✓
Brake: Power-Off		✓
Soft Start/Soft Stop		✓
Positive Engagement	✓	
Stopping Accuracy	✓	
Speeds Up To 1750	✓	✓
Speeds Over 1750		✓
Bi-Directional Rotation		✓
Rapid Cycling	✓	✓
Actuation - Electric	✓	✓
Actuation - Pneumatic	✓	
Actuation - Mechanical	✓	
Manual Release		✓
Torque Adjustment Feature		✓

Many applications require additional specifications not shown in the chart above.
Always review your application requirements before choosing a brake or clutch product.

The Genuine Wrap Spring Clutches & Brakes
Operation Design Principles
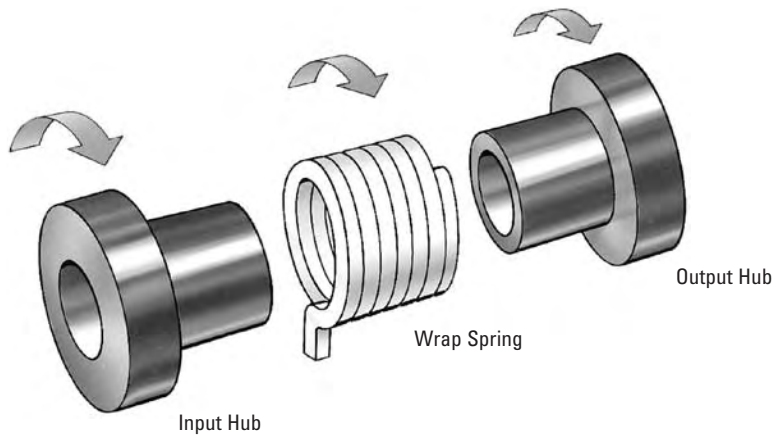
The basic wrap spring clutch consists of three elements: an input hub, an output hub, and a spring whose inside diameter is slightly smaller than the outside diameter of the two hubs.

When the spring is forced over the two hubs, rotation in the direction of the arrow wraps it down tightly on the hubs, positively engaging them. The greater the force of rotation, the more tightly the spring grips the hubs.

Output Hub

Wrap Spring

Input Hub

Wrap Spring Design Configurations

Output

Input — Model O

Control Tang

Input — Output — Model SS

Control Tang

Input — Output — Model S
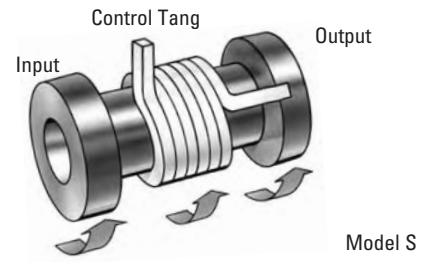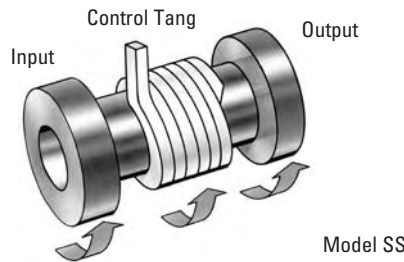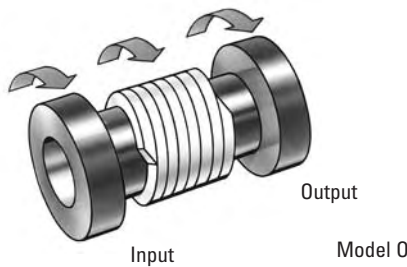
Overrunning Clutch

In its basic form, the wrap spring clutch operates as an overrunning clutch. When the input hub is rotated as shown, the spring wraps down to engage the two hubs. If the input is stopped or reversed, the spring unwraps to release the output hub, allowing the load to overrun. PSI Series overrunning clutches can also perform one-way indexing and backstopping functions.

Start-Stop Clutch
(Random Positioning)

Modifying the basic PSI Series clutch with a control tang allows the clutch to engage and then disengage the load when the control tang is locked in position by the stop collar. Once disengaged, the load coasts freely from the continuously running input.

Single Revolution Clutch

A second tang, secured to the output hub, allows PSI Series clutches to perform single revolution functions. When the control tang is engaged, the output hub cannot overrun because it is secured to the spring. Single revolution PSI, SP and SAC Series clutches are capable of stopping only 10% of their starting load capacity. A CB Series unit is recommended where higher braking torque is required.

Combination Clutch/Brake

The wrap spring clutch/brake utilizes two control tangs to hold either the clutch or brake spring open. When the clutch and brake control tangs rotate with the input hub, the input hub and output shaft are positively engaged by the clutch spring. When the brake control tang is locked by the stop collar, the brake spring wraps down
to engage the output shaft to the stationary brake hub. At the same time, the clutch spring unwraps slightly, allowing the input hub to rotate freely.

Brake Control Tang

Clutch Control Tang

Stationary Brake Hub

Output Shaft

Input Hub
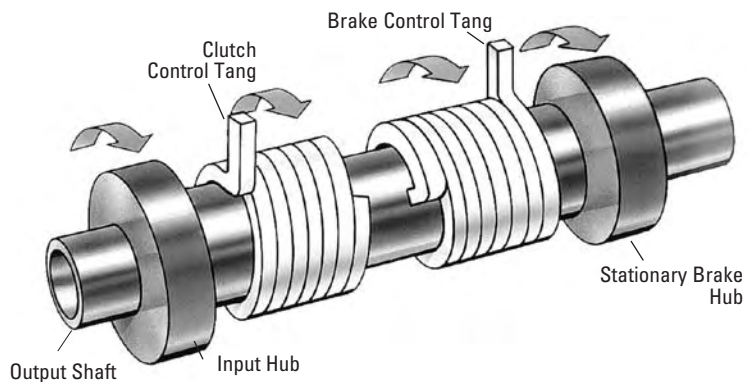
The Genuine Wrap Spring Clutches & Brakes
Applications

The Genuine Wrap Spring clutch/brakes provide hundreds of simple motion processes that can be controlled through the three basic wrap spring clutch functions: overrunning, start-stop, and single revolution.

Important Facts

- The torque capacity of a spring clutch or brake is a direct function of the diameter of the hub and the tensile strength of the spring.

- A spring clutch or brake will not slip. It will attempt to supply the torque demanded, up to the mechanical limitations of the spring.

- When the spring is allowed to wrap down (or grip the hubs) the output hub will accelerate to the input RPM in .003 seconds, the output in .0015 seconds.

- The dynamic torque of acceleration or deceleration is proportional to the RPM multiplied by the load inertia and divided by the acceleration time. This fact indicates that spring clutches and brakes are inertia sensitive—the more inertia, the higher the dynamic torque.

- The torque demand of the spring clutch is equal to the system frictional torque of the load plus the dynamic torque of acceleration.

- When coming to the stop position of the cycle, there must be enough energy in the rotating mass of the load to allow the spring to release its grip on the input hub. This means that if there is a large frictional load, or a torque demand such as coming up to the top of a cam, there must be sufficient energy in the rotating mass to open the spring. Failure to do so will result in possible input hub wear and/or noise.

Single Revolution

Riveter

Through a wrap spring clutch, the motor drives a large flywheel and a large eccentric mass connected to the piston-like riveting ram. The wrap spring clutch-brake always stops at just past top dead center position ready for the next cycle.
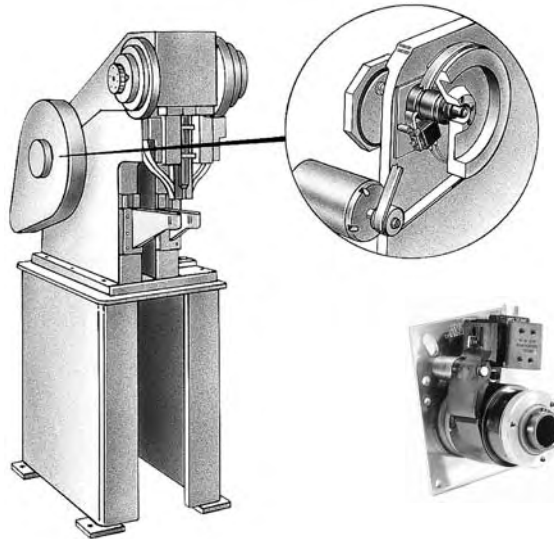
**Start-Stop
(Accurate Positioning)**
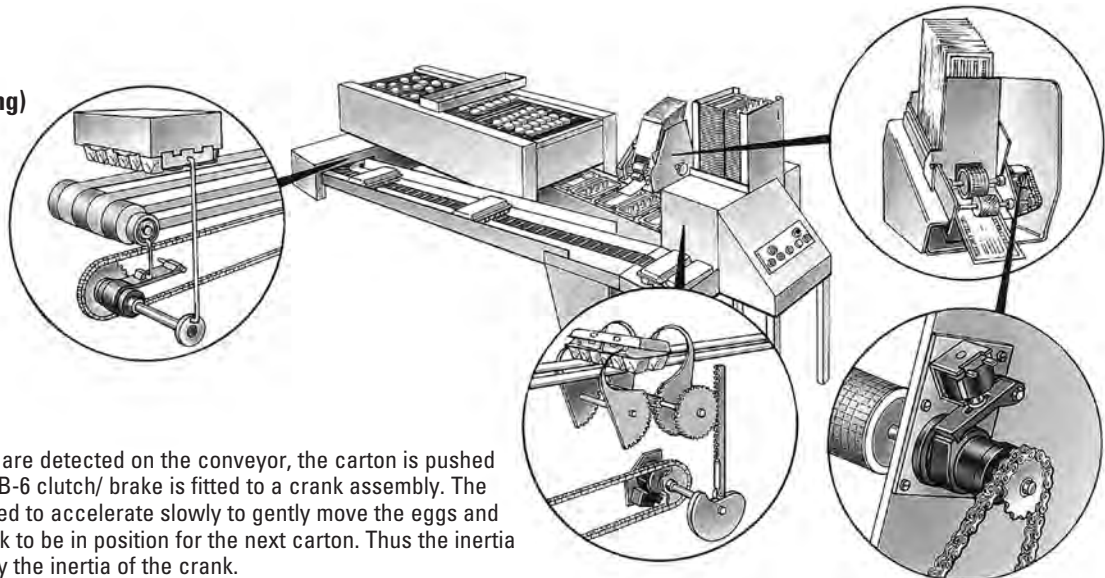
Egg Packaging

When cartons of eggs are detected on the conveyor, the carton is pushed off onto the pallet. A CB-6 clutch/ brake is fitted to a crank assembly. The crank profile is designed to accelerate slowly to gently move the eggs and accelerate rapidly back to be in position for the next carton. Thus the inertia at start and stop is only the inertia of the crank.

The Genuine Wrap Spring Clutches & Brakes
Start-Stop Applications

Literally hundreds of simple motion processes can be controlled through the three basic functions of wrap spring clutches and brakes—Overrunning, Start-Stop, and Single Revolution. Here are just a few examples:

- Mail openers and inserters, collators
- Bag making, paper feed
- Food processing
- Metal riveting, stapling and stitching
- Paper edge trimming
- Film advance
- Inclined conveyors
- Stackers
- Conveyor diverter gate
- Wire bending
- Money counter
- Paper printing and folding
- Newspaper vending machine door mechanism
- Wire windup machine/material cutoff
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

Single Revolution

Rotary Table

The worm drive in this application is in a 16:1 ratio to the indexing table so that each power supply pulse to the wrap spring clutch/brake solenoid indexes the table a single position for filling, sorting, inspecting, etc.
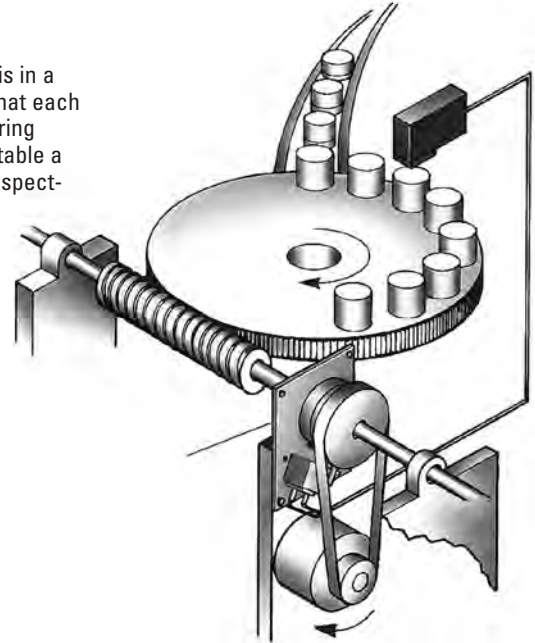
Product Selection

- Super CB
- Standard CB
- SAC
- PSI

Advantages

- Speed and accuracy increases productivity
- Excellent repeatability— no cumulative error
- Minimum system inertia

**Start-Stop
(Random Positioning)**
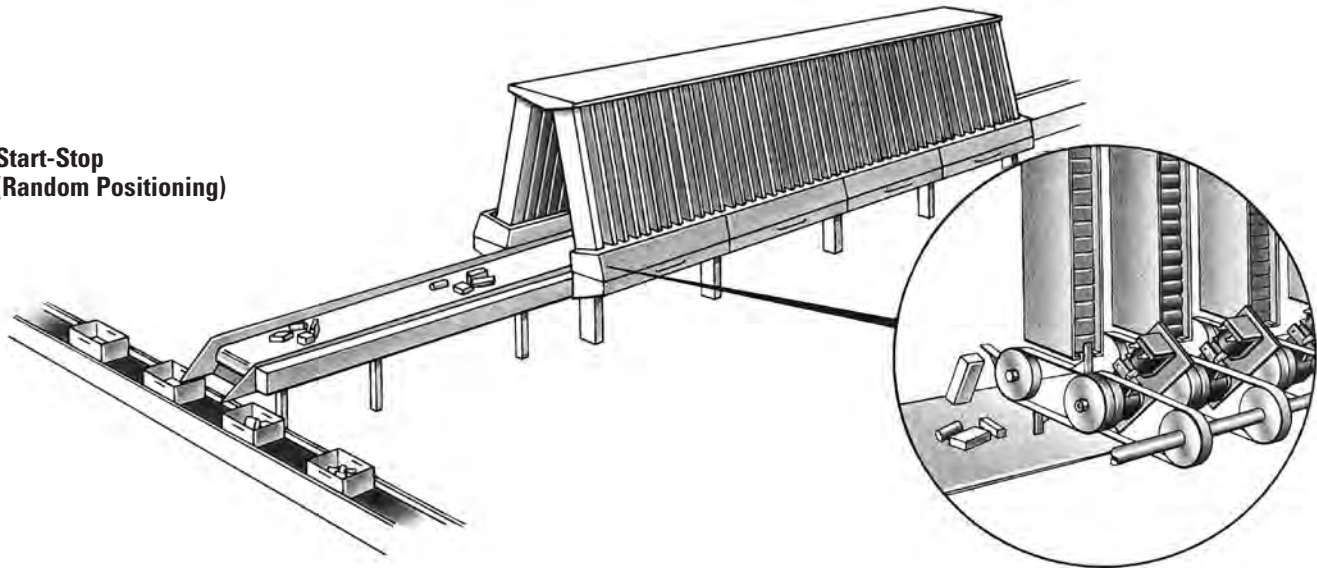
Computerized Order Picker

800 wrap spring clutches, one at each station, dispense packages at the rate of 3 per second, onto a constantly moving belt to make up various customer orders. The computer controlled system signals the appropriate clutch, which drives a paddle wheel type belt system, which in turn ejects one package per computer signal.

Advantages

- Positioned control of paddle ejector made possible with positive, single revolution type clutch
- No cumulative error assures that orders are filled properly
- Simple control. One drive motor for the complete system. Low cost.

Product Selection

- SAC
- ACCE
- ACCM
- PSI

The Genuine Wrap Spring Clutches & Brakes
Overrunning Applications

Incline Conveyor

Anti-backup, anti-back driving

The PSI Series mechanical wrap spring clutch acts as an anti-backup device on this inclined conveyor. When the conveyor is running, the wrap spring is disengaged, allowing the clutch output to freewheel. When the conveyor drive is disengaged, the conveyor starts to reverse and engages the wrap spring which then acts as an effective brake.

Advantages
• Uni-directional control facilitates low cost design
• Maintenance free

Product Selection
• ACCM
• PSI
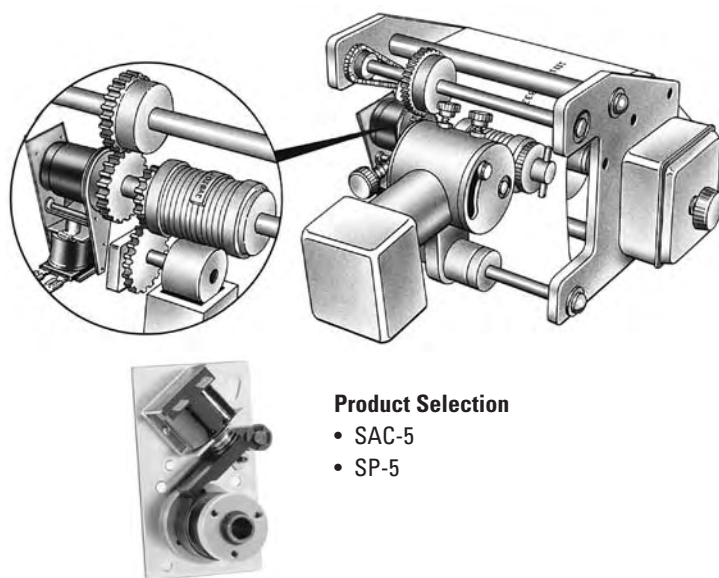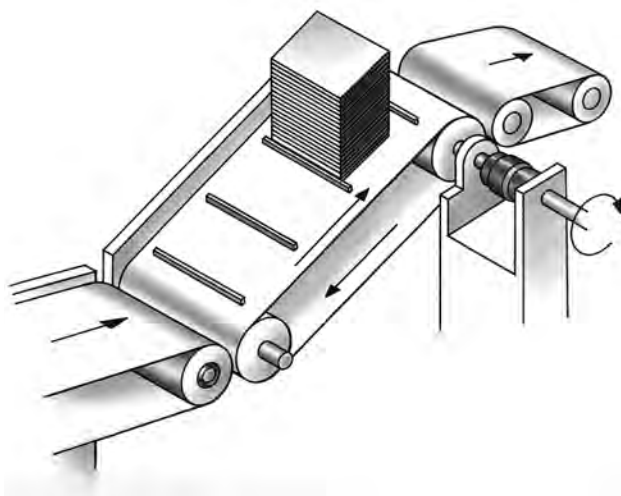
Precise Registration
Print Wheel

In this high speed code printing machine, a photo eye scans a mark on the web and signals a single revolution wrap spring clutch to drive the print wheel in exact registration with the continuously moving web. Variations in printing positioning cannot be tolerated.

Advantages
• Fast/Accurate—the wrap spring clutch rapidly accelerates the print wheel and returns it to home position with no cumulative error. Long acceleration times would cause smearing and misregistration.
• Compact—high torque to size ratio makes it easy to fit into the small space, thus reducing overall machine size and cost
• Control—electric actuation for simple interface with the photo eye signal

Product Selection
• SAC-5
• SP-5

Linear-to-Rotary Translation
Rack and Pinion Indexing Drive

Since wrap spring clutches are inherently uni-directional, the PSI/ACCM overrunning model "O" clutch in this application operates as a ratchet drive. When the rack is moved upward, the wrap spring clutch engages to translate torque to the feed conveyor. On the downward side of the stroke, the wrap spring clutch is disengaged.

Advantages
• Simple—requires no external controls or sensors
• Reliable
• Maintenance free

Product Selection
• PSI
• ACCM
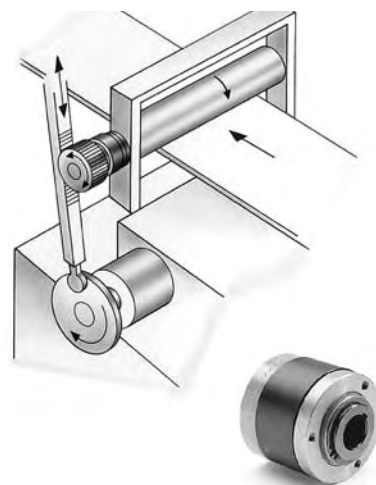
Friction Clutches & Brakes
Operation and Design Principles

Electromagnetic Clutch

An electromagnetic clutch in its simplest form is a device used to connect a motor to a load. Generally the motor shaft is pinned or keyed to the clutch rotor-shaft assembly (1) bore (input), with the load connected to the armature (output) of the clutch (2) by a pulley or gear. Until the coil (3) is energized, this armature assembly is not coupled, thus not rotating with the input rotor-shaft. Upon coil energization, the rotor-shaft assembly becomes part of an electromagnet, attracting the armature plate (4), engaging this with the rotor assembly, and thus driving the load. When the coil is de-energized, these two attracted elements are no longer attracted and are separated by a spring (5) within the armature assembly. The motor shaft and load are then no longer connected and therefore the load is not driven. The clutch enables the motor to remain on while the load is idle, benefiting in faster cycle time and better overall system efficiency.
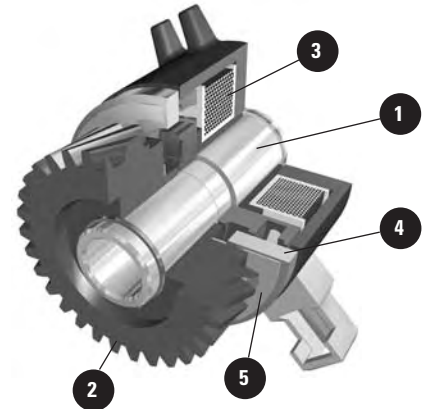
Power-On Electromagnetic Brake

A power-on electromagnetic brake operates using the same principle as the clutch, but with only a single rotating component, the armature assembly (1). The brake is generally positioned on the load shaft with the armature assembly secured to the shaft while the field assembly (2) is mounted to a non-rotating component or bulkhead. Until the coil is (3) energized, the armature assembly will rotate freely. Upon energization, the field assembly becomes an electromagnet, attracting the armature plate (4), thus braking the load.
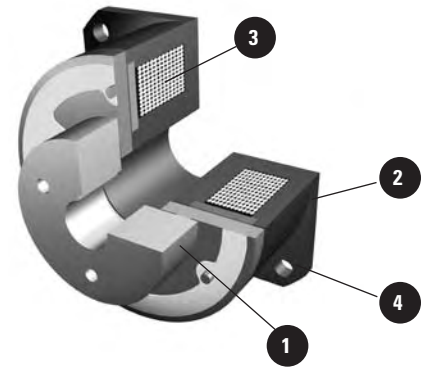
Power-Off Electromagnetic Spring-Set Brake

A power-off electromagnetic spring-set brake operates on a slightly different principle. The actual braking force is applied by the use of compression springs within the field assembly. In normal power-off mode these springs (1) apply pressure to the fixed (non-rotating) armature plate (2) which in-turn applies pressure to the rotor (3). This rotor has the ability to "float" back and forth under the applied pressure depending on the state of the coil. It is coupled to the load shaft by a spline or hex through a hub (4). Some rotors are suspended between two diaphragm-like springs to achieve the "floating" state.
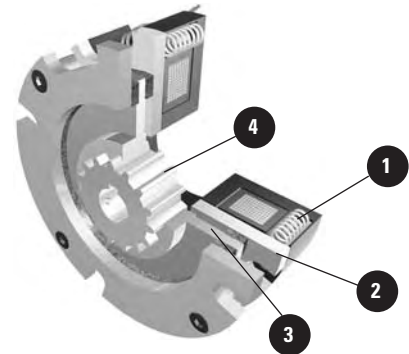
Power-Off Electromagnetic Permanent Magnet Brake

A power-off electromagnetic permanent magnet brake operates on the principle of the attractive force of a permanent magnet creating the braking action, while the electromagnet is used to negate this force allowing load rotation. In normal power-off mode the permanent magnet in the fixed field assembly (1) creates an attractive force on the armature assembly (2) which is attached to the load shaft by means of set screws or pins, hence stopping or holding the load. Upon coil energization, the electromagnet forms an opposing magnetic force to the permanent magnet, thus allowing the armature assembly free rotation (no brake).
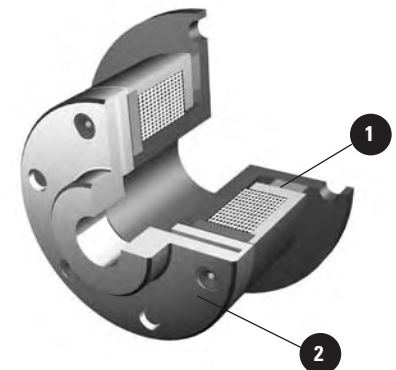
Friction Clutches & Brakes
Applications

Electromagnetic Clutches & Clutch Couplings

Electromagnetic clutches provide an efficient, electrically switchable link between a motor and a load. Clutches are used to couple two parallel shafts by the use of pulleys, gears or sheaves. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are mounted on a single shaft, with the rotor secured to the shaft. The armature is bearing mounted and free to rotate. When the coil is energized, the armature engages the friction surface of the rotor, thus driving the load.

Electromagnetic clutch couplings provide this same efficient, electrically switchable link between a motor and a load for in-line shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are securely mounted on opposing in-line shafts. When the coil is

Shafts must be fully bearing supported

energized, the armature engages the friction surface of the rotor, coupling the two in-line shafts, thus driving the load.

Electromagnetic Brakes

Electromagnetic power-on brakes provide an efficient, switchable means of stopping and/or holding the load. While the field (electromagnet) assembly is fixed and prevented from rotating by a flange, the armature assembly is secured to the shaft. When the coil is energized, the armature engages the friction surface of the fixed field (electromagnet) assembly, thus stopping and/or holding the load.

Offered in spring-set or permanent magnet

designs, electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. While the field (electromagnet) assembly is fixed and prevented from rotating, the rotor (spring-set design) or armature (permanent magnet design) assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized,

Shafts must be fully bearing supported

rotating components are disengaged thus allowing the shaft to freely rotate.

Tooth Brakes & Clutches

When used in either static or low speed engagement applications, tooth clutches and clutch couplings provide an efficient, positive, switchable link between a motor and load on in-line or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by a fixed flange, the rotor is generally attached to the input shaft. The armature assembly is securely mounted to either an in-line load shaft or a parallel shaft by means of pulleys or gears.

When the coil is energized, the tooth profile of the armature positively engages the tooth profile of the rotor, coupling the two in-line or parallel shafts, thus driving the load.

Tooth brakes provide an efficient, positive, switchable means of either holding a load or decelerating a load from a slow speed, generally 20 RPM or less. Utilizing the same principle as the tooth clutch, these brakes can be used to effectively hold a load in position. Available in power-on or

Shafts must be fully bearing supported

power-off models, tooth brakes are ideal for applications requiring very high torque in tight places.

Multi Disc Brakes & Clutches

Multiple Disc Clutches provide a smooth efficient, switchable link between a motor and a load on in-line or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor is securely mounted on the drive shaft. The armature assembly is then mounted either directly on an opposing in-line shaft, or indirectly on a parallel shaft by means of gears or pulleys. When the coil is energized, the armature

engages the friction surface of the rotor, further engaging the multiple discs within the assembly until full torque is achieved, thereby coupling the two in-line or parallel shafts, thus driving the load.

Multiple Disc Brakes offer the very same smooth efficient operation as a braking device. By eliminating the rotor component and using the electromagnet to engage a static field assembly and a rotating armature assembly, braking can be achieved.
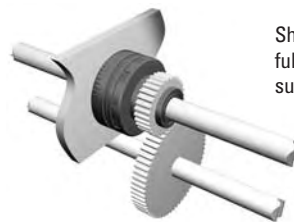
Shafts must be fully bearing supported

These units provide high torque in a compact package size primarily for custom applications in the aerospace industries.

Custom Assemblies (Value-Added Designs)

Variations of any device shown in this catalog can be adapted specifically to meet the most demanding needs of your application. Custom gears, pulleys, sprockets, integrally

mounted to the clutch can be combined with special shaft sizes, coil voltages, connector assemblies or any other type of design imaginable.

FRICTION

Friction Applications
Power-Off Brakes

Patient Lift

The BRP and SB can be used as a holding brake to consistently hold a load in position at a specific stopping point.

Advantages

- Uni-directional control
- Compact design
- Non-asbestos friction material
- Factory set air gaps (no need to adjust)
- Interchangeability with many existing brake designs

Product Selection

- BRP
- SB
- AKB
- LBRP
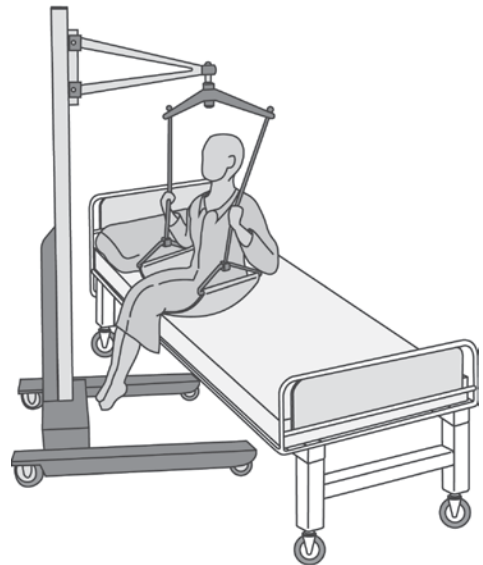
Floor Sweeper/Scrubber

BRP and SB are used as a parking brake to hold the vehicle on inclines, etc. The BRP/SB eliminates the need for manual brake linkage or expensive hydraulic brakes. TFD is used as a drive-by-wire feedback device.

Advantages

- Uni-directional control
- Compact design
- Non-asbestos friction material
- Factory set air gaps (no need to adjust)
- Manual release options
- Interchangeability with many existing brake designs

Product Selection

- PMB
- BRP
- SB
- AKB
- TFD

Transfer Case

The BRP is used to hold a rotary gear train in place when the transfer case is in the static mode.

Advantages

- Uni-directional control
- Compact design
- Factory set air gap
- Non-asbestos friction material

Product Selection

- BRP
- SB
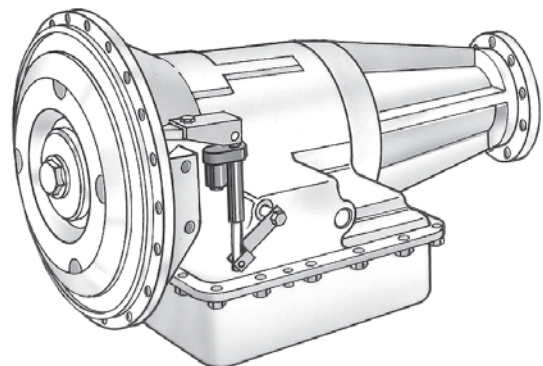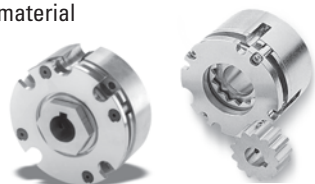
Friction Applications
Power-On Clutches & Brakes

Paper Feed

Power-On Clutch Application:
CS and CF products are used on paper feed applications. There is a prime motor that drives a series of belts/pulleys that drive feed rollers. The CS or CF are mounted on the feed roller shaft. When power is applied to the CS or CF, the clutch engages and then drives the feed roller. The clutch will continue to drive until power is removed.

Advantages

- Low inertia and minimal drag
- Fast response, repeatable performance
- Energy efficient
- Simple installation
- Non-asbestos friction material

Product Selection

- CS
- CF
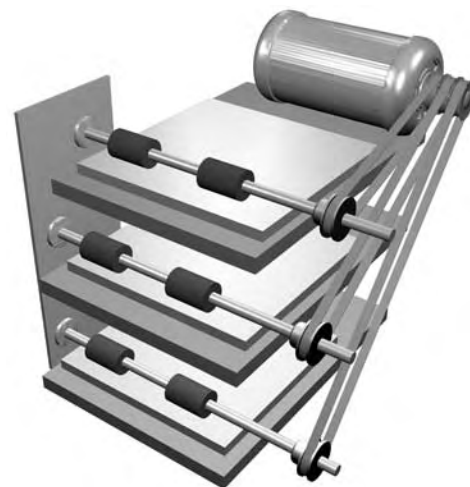
Power Sliding Door

Power-On Tooth Clutch Application:
TC is a power-on tooth clutch used to drive a mechanical drive assembly in either direction

Advantages

- Simple installation
- Energy efficient
- Torque to size ratio
- Positive engagement, indexing capability

Product Selection

- TC
- CS
- CF

Conveyor Drive System

Power-On Clutch and Brake Application:
CS, CF power-on clutches are used to drive the conveyor belt. The BF power-on brake is used to stop the conveyor belt.

Advantages

- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Energy efficient
- Economic cost
- Non-asbestos friction material

Product Selection

- CS
- CF
- BF

FRICTION
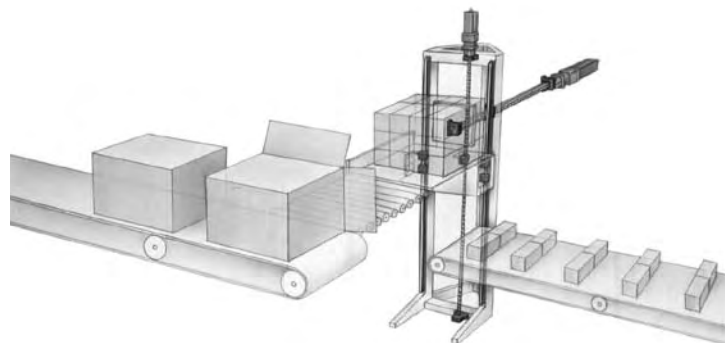
Application Data Form
Worksheet

Application Data Form			
Customer	Contact	Dept	
Address		City	State
Phone	Fax		Zip
E-mail			
Project Information			
Project Type	Price Target	Avg Yearly Qty	
Initial Release Date	Initial Ship Qty	Current Source	
Product Type	Project Life		
Application			
Application Data			
Function	Unit Type		
Other			
Min. Torque Required	Type	Inertia	
Input	Rotation	Friction	
Shaft or Bore Size	Other		
Life (Hours)	TTS		
Cycle Life (M)	TTZ		
On Time	Input Speed		
Off Time	Output Speed		
Power Source			
Actuation	Suppression		
Other			
Volts	DC Type		
Other Volts	Min. Res.		
External Environment			
Vibration g (max)	⟶ at Hz		
Shock g (max)	Rel. humidity % max		
Operating Temperature minus ° C	plus ° C		
Protection			
Corrosion Protection			
Special Protection	Other IP		
Miscellaneous			
Safety Requirements			
Fire Resistance			
If possible insert drawing or sketch below, otherwise indicate drawing reference			
Drawing / Comments			

The Genuine Wrap Spring™

The Genuine Wrap Spring™
How To Select

Three steps to select

Wrap spring clutches and brakes are pre-packaged, pre-assembled units that are as easy to select as they are to install. The simple three step selection process includes:

Step 1   Determine the clutch or brake function

Step 2   Determine the size

Step 3   Verify the design considerations

This selection process is based on the assumption that the diameter of the shaft at the clutch or clutch/brake location has been designed through good machine design practice. For most applications, this process will determine the right size product. When the performance requirements of a given application are marginally within the capabilities of a product, consider using the next larger size. In instances where required load/speed performance data is known and unit size is uncertain, use the technical selection process starting on page 84 which will help you review all necessary aspects of your application.

Step 1

Determine the clutch or brake function

Wrap spring clutches and brakes can perform three control functions—over-running, start-stop, and single revolution. Determine the function that will provide the best control for your application. The application ideas shown on pages 8–9 may be helpful. Select the Series which best fits your application requirements from the chart below.

Step 2

Determine the size

To select the correct size unit, determine the maximum RPM at which the clutch or brake will operate and the shaft diameter on which the wrap spring unit will be mounted. A wrap spring clutch engages almost instantly and, since spring wrap increases with load, the unit must be sized carefully to insure that it is correct for the application. If there is any uncertainty regarding the correct unit size, we recommend using the technical selection process starting on page 84. To select the correct wrap spring unit, locate the appropriate speed and shaft diameter points on the chart that correlates to the model that best suits your application. For applications requiring speed or diameter values higher than those illustrated, please contact your local Danaher Motion Distributor or your Sales Representative.

Step 3

Verify the design function considerations

Once the appropriate series and model size have been determined, review the design considerations. A complete checklist of these and other options are detailed in the "How to Order" section for each series.

Selection by Function

Function	Performance	Wrap Spring Product	Max Torque		Max.* RPM	Max. Cycles/ Minute	Actuation Method
			Starting lb-in (N-m)	Stopping lb-in (N-m)			
Overrunning	An overrunning clutch will transmit torque in one direction only when the input hub is stopped or reversed. Consequently, the load is dis-engaged and free to rotate or overrun. *Engaged in one direction only*	PSI Series Model O	2500 (282.5)	N/A	1800	N/A	Reverse input rotation
		ACCM	1500 (169.5)	N/A	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical
Start-Stop	A start-stop clutch will engage and disengage a load either by mechanical or electrical actuation. Start-stop clutches provide a random stop position for the load. *Random Positioning*	PSI Series Model SS	2500 (282.5)	0	1800	N/A	Mechanical
		SAC Series Model SS	500 (56.5)	0	1800	N/A	AC; DC Solenoid or AIR
		ACCE	1500 (169.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCE Heavy Duty	2500 (282.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCM	1500 (169.5)	0	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical
Single Revolution	A single revolution clutch or clutch/brake will accurately position a load with no cumu-lative error for each single revolution cycle. Multiple stop collars with up to 24 stops (per revolution) provide fractional revolution capability. *Accurate positioning for single or multiple*	PSI Series Model S	2500 (282.5)	250 (28.25)	1800	1800	Mechanical
		SAC Series Model S	500 (56.5)	50 (5.65)	1800	1200	AC; DC Solenoid or AIR
		Super CB	5000 (565.0)	5000 (565.0)	1800	1200	AC; DC Solenoid or AIR
		Standard CB	5000 (565.0)	5000 (565.0)	1800	1200	AC; DC Solenoid or AIR
		ACCE	1500 (169.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCE Heavy Duty	2500 (282.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCM	1500 (169.5)	0	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical

*For RPM ranges on specific models, see selection charts on page 17.

The Genuine Wrap Spring™
Selection

Design Considerations

All Models
• CW or CCW rotation
• Single or multiple stop collar
• Bore size

Super CB and CB Series
• AC or DC solenoid and pneumatic
• CB-5, CB-6, CB-7, CB-8 and CB-10 sizes available in the long life, Super CB Series. See pages 18–29 for specific details.

SAC Series
• AC or DC solenoid and pneumatic

ACCM/ACCE Series
• Hub input/shaft output or shaft input/hub output
• Start-stop Model SS or single revolution Model S
• AC or DC solenoid and pneumatic

PSI Series
• Hub input/shaft output or shaft input/hub output
• Overrunning Model O, start-stop Model SS or single revolution Model S

Selection Charts – RPM vs. Shaft Diameter

Super CB and Standard CB Series

Clutch Size	Bore Size	RPM range (shaded)
2	$1/4$	200–1800
4	$3/8$	200–1300
5	$1/2$	200–700
6	$3/4$	200–500
6	1	200–400
7	1	200–400
7	$1\,1/4$	200–400
7	$1\,1/2$	200–400
8	1	200–300
8	$1\,1/4$	200–300
8	$1\,3/8$	200–300
8	$1\,1/2$	200–300
10	$1\,1/2$	200
10	$1\,5/8$	200
10	$1\,3/4$	200

RPM axis: 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

SAC Series

Clutch Size	Bore Size	RPM range (shaded)
2	$1/4$	200–1800
4	$3/8$	200–1300
5	$1/2$	200–500
6	$3/4$	200–400
6	1	200–300

RPM axis: 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

ACCM/ACCE Series

Bore Size	RPM range (shaded)
1	200–400
$1\,1/4$	200–400
$1\,3/8$	200–400
$1\,7/16$	200–300

RPM axis: 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

PSI Series

Clutch Size	Bore Size	RPM range (shaded)
2	$1/4$	200–1800
4	$3/8$	200–1200
5	$1/2$	200–500
6	$3/4$	200–400
6	1	200–400
8	1	200–400
8	$1\,1/4$	200–300
8	$1\,3/8$	200–300
8	$1\,1/2$	200–300

RPM axis: 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

Super CB Series
Longer Life, Extra Performance Clutch/Brake Packages

Super CB Series combination clutches and brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 750 RPM, depending on size. Each unit is pre-engineered and pre-assembled for easy installation.

Super CB clutches and brakes provide 3 to 5 times longer life! The five sizes of Super CB clutch/brake packages offer extraordinary performance and durability for those applications requiring long life under high load, high duty cycle conditions. Danaher Motion will retrofit standard CB-5, CB-6, CB-7, CB-8, CB-10.

Features
- Available in 5 sizes
- Cost-effective design
- 3–5 times longer life than Standard CB
- Split cam design sizes CB-5, CB-6, CB-7, CB-8
- Adjustable control collars for easy and accurate output stop position setting
- RoHS compliant

- Load over-travel or back-up is eliminated since Super CB units lock the load in both directions when the solenoid is off
- Anti-overrun feature prevents the output from running faster than the input
- ***Roller bearings never need adjustment for wear***
- Bring loads up to speed in 3 milliseconds and stop within 1.5 milliseconds
- AC or DC operated—other voltages available
- See pages 68 and 69 for controls, power supplies
- Direct retrofit for Standard CB-5, CB-6, CB-7, CB-8, CB-10
- 1-, 2- or 4-stop collar with steel insert standard
- Reinforced plastic stop collars also available for up to 24 stop maximum
- Heavy-duty industrial grade coils
- High cycle rate capability
- High torque to size ratio
- Repeatable positioning within ±½°

Typical Applications
- Riveters
- Punch presses
- Packaging equipment
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

How to order

Super CB - 6 - CW - 24V - 3/4" bore - 2

Super CB Series	**Size**	**Coil Voltage**	**Bore Size**	**Stop Collar**
Specify: **Imperial or Metric**	CB-5 = **5** CB-6 = **6** CB-7 = **7** CB-8 = **8** CB-10 = **10**	**12V = 12VDC** **24V = 24VDC** **90V** = 90VDC **115V = 115VAC**	CB-5 = ½" CB-6 = ¾", **1"** CB-7 = **1", 1¼", 1½"** *¾" CB-8 = **1¼", 1½"** *1", *1³/₈" CB-10 = **1½"** *1⁵/₈", *1¾" *Special order	**1** = 1 stop **2** = 2 stop **4** = 4 stop Other stop collars are special order.

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise
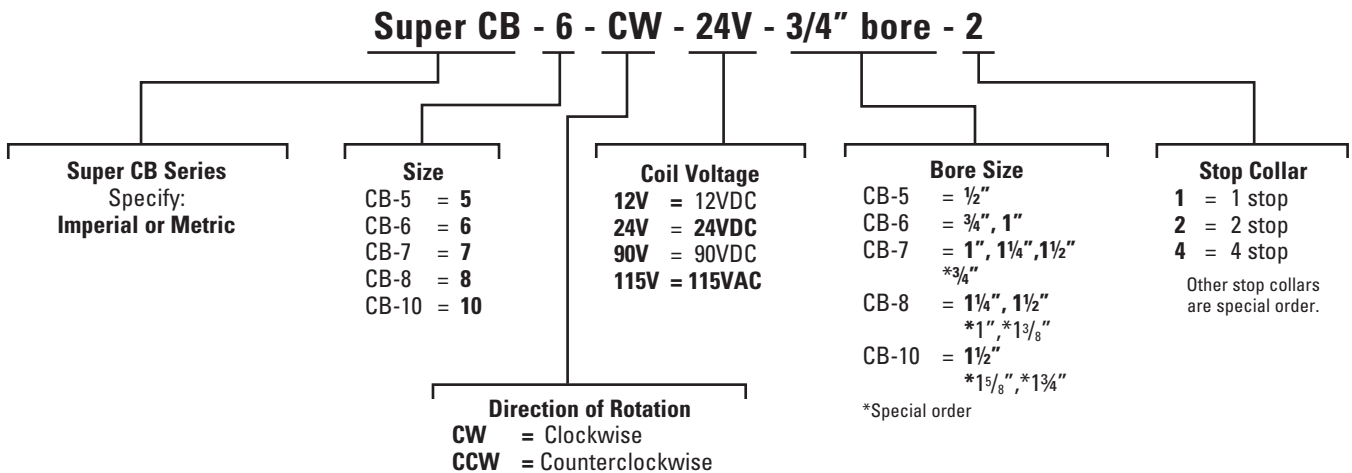
OPTIONS	
Dust Covers	See page 66
Stop Collars	See page 67
Pneumatic Actuators	See page 68

Super CB Series
Solenoid Operated Combination Clutch/Brake Packages

High torque in small package

Actuating solenoid is AC or DC operated

Brake engages automatically when de-clutched

Maintenance-free, self-lubricating hubs are 18% oil by volume

Hardened thrust washers on input and brake end

Sintered metal hub offers easy machining for custom drive attachments

Hub mounting holes for simple pulley or sprocket mounting

Steel tip insert on control cam collar

Hardened and ground shaft

Single or multi-stop collars control rotation, ±½° stop repeatability

Hardened crossover points on input, output and brake hubs provide increased life

PERFORMANCE					
	CB-5	**CB-6**	**CB-7**	**CB-8**	**CB-10**
Static torque	250 lb-in (28.25 Nm)	500 lb-in (56.5 Nm)	1,500 lb-in (169.5 Nm)	2,500 lb-in (282.5 Nm)	5,000 lb-in (565 Nm)
Maximum anti-overrun holding capability	45 lb-in (5.085 Nm)	300 lb-in (33.9 Nm)	600 lb-in (67.8 Nm)	600 lb-in (67.8 Nm)	1,200 lb-in (135.6 Nm)
Maximum anti-back holding capability	160 lb-in (18.08 Nm)	300 lb-in (33.9 Nm)	600 lb-in (67.8 Nm)	600 lb-in (67.8 Nm)	1,200 lb-in (135.6 Nm)
Inertia, rotating parts	.195 lb-in^2	1.718 lb-in^2	6.75 lb-in^2	12.84 lb-in^2	48.0 lb-in^2
Maximum radial bearing load at maximum speed	32 lbs.	63 lbs.	300 lbs.	300 lbs.	500 lbs.
Maximum operating speed	750 RPM	500 RPM	400 RPM	300 RPM	200 RPM
Response time, voltage on at full speed	27 MS	45 MS	50 MS	50 MS	70 MS
Weight	3 lbs.	7 lbs.	12 lbs.	15 lbs.	27 lbs

See page 84 for Minimum Inertia Requirements. See pages 91 & 92 for Mounting Requirements.

RPM vs. SHAFT BORE				
Size	**Max RPM**	**Shaft Bores Standard in (mm)**	**Shaft Bores Special in (mm)**	**Shaft Bores Metric in (mm)**
CB–5	750	$^1/_2$" (12.7)	—	.4724-.4741 (12.0)
CB–6	500	$^3/_4$" or 1" (19.05 or 25.4)	—	.7874-.7894 (20.0) .9842-.9862 (25.0)
CB–7	400	1", 1$^1/_4$" or 1$^1/_2$" (25.4, 31.75 or 38.10)	$^3/_4$" (19.05)	.9843-.9863 (25.0) 1.1811-1.8311 (30.0) 1.3780-1.3804 (35.0)
CB–8	300	1$^1/_4$" or 1$^1/_2$" (31.75 or 38.1)	1" or 1$^3/_8$" (25.4 or 34.925)	1.3780-1.3804 (35.0) 1.5784-1.5772 (40.0)
CB–10	200	1$^1/_2$" (38.1)	1$^5/_8$" or 1$^3/_4$" (41.275 or 44.45)	1.5749-1.5772 (40.0) 1.7717-1.7740 (45.0)

*Consult Factory

Super CB-5 Clutch/Brake
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	250 lb-in
Maximum anti-overrun holding capability	45 lb-in
Maximum anti-back holding capability	160 lb-in
Inertia, rotating parts	0.1950 lb-in²
Maximum radial bearing load at maximum speed	32 lbs
Maximum operating speed	750 RPM
Response time, voltage on at full speed	27 MS
Weight	3 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	Pin Hole B	Mtg. Hole C	Set Screws D
0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x #10-32 UNF-2B on 1.25 BC	#8-32 x 0.25 Lg. Hex Skt. Set Screw
METRIC BORES			
0.4724-4741 (12.0 H9)	0.117-0.121 (2.97-3.08)	3X M5 x 0.8 on 31.75 BC	M4 x 0.7 x 6.0 Lg. Hex Skt. Set Screw

Super CB-5 Clutch/Brake
Component Parts
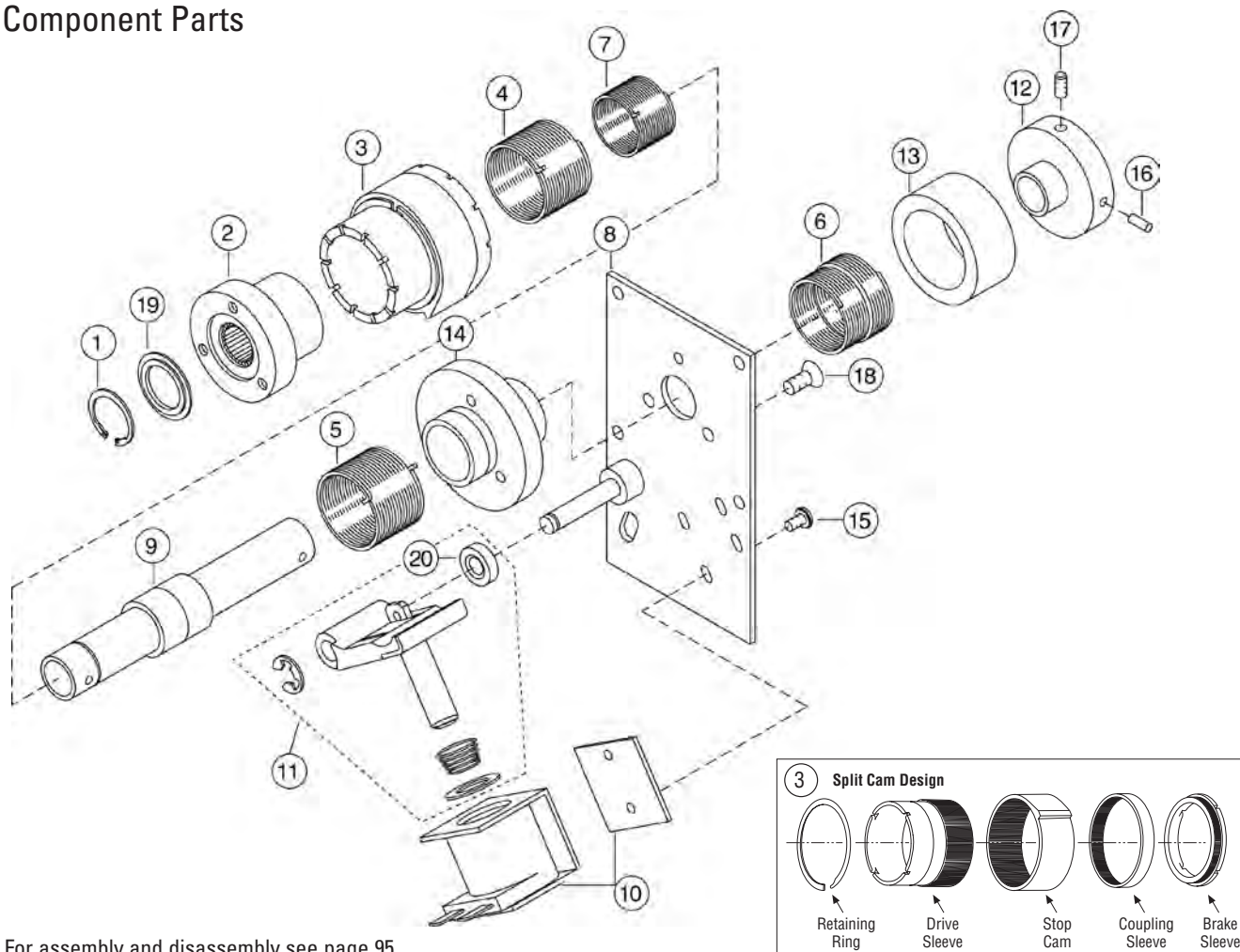
Split Cam Design

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

For assembly and disassembly see page 95.

COMPONENT PARTS			
Item	Description	Rotation	Part No.*
1	Retaining Ring		748-5-0006
2	Input Hub Anti-Overrun		541-5-0029 (541-5-0030)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-5-0801
4	Drive Spring	CW CCW	808-5-0001 808-5-0002
5	Brake Spring	CW CCW	808-5-0001 808-5-0002
6	Anti-Back Spring	CW CCW	808-5-0005 808-5-0006
7	Anti-Overrun Spring	CW CCW	808-5-0003 808-5-0004
8	Plate Assembly	CW CCW	686-5-0001 686-5-0002
9	Output Assembly 0.50 Bore (12.0 mm Bore)		824-5-0469 (824-5-0470)

COMPONENT PARTS			
Item	Description	Rotation	Part No.*
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		101-5-0003 101-5-0006 101-5-0002 101-5-0005
11	Actuator Assembly	CW CCW	101-5-0060 101-5-0061
12	Anti-Back Hub		540-5-0006 (540-5-0047)
13	Dust Cover (AB Spring)		287-5-9002
14	Brake Hub		541-5-0024
15	Pan Head Machine Screw (Sems) (2)		797-1-0414
16	Spring Pin		679-1-0024
17	Headless Socket Set Screw		797-1-0153 (797-1-0769)
18	Flat Head Socket Cap Screw		797-1-0322
19	Thrust Washer		950-5-0006
20	Spacer		807-1-9002

* Part numbers in ( ) are metric

Super CB-6 Clutch/Brake
Dimensions & Specifications

Ø .284 (7.21) 4 HOLE EQ. SP ON Ø 5.00 (127.0) B.C.

E

.31 (7.87) MAX THREAD ENGAGEMENT

2.12 (53.85)

5.75 (146.05)

2.92 (74.17)

.386 (9.80) WIDE X .80 (20.32) LONG R FULL - BOTH ENDS

1.38 (35.05)

25°

2.12 (53.85)

4.25 (107.95)

SPADE LUG 2X .25 (6.35) NOM WD X .03 (0.77) NOM THK

4.312 (109.53)

.528 (13.41)

.127 (3.23)

Ø 2.50 (63.50)

2X Ø .22 (5.59)

.37 (9.40)

D

2X Ø 1.181 (30.00)

Ø 1.559-1.562 (39.59-39.68)

2.25 (57.15) MAX

.19 (4.83)

B

C

A

BORE DETAIL

As shown viewed from input hub only CW

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	500 lb-in
Maximum anti-overrun holding capability	300 lb-in
Maximum anti-back holding capability	300 lb-in
Inertia, rotating parts	1.718 lb-in^2
Maximum radial bearing load at maximum speed	63 lbs
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	2x M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	2x 4.87-5.14 Hole (.191-.203)	3x M6 x 1.0 holes on 52.38 BC

INDEX

Super CB-6 Clutch/Brake
Component Parts

3 **Split Cam Design**

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

COMPONENT PARTS			
Item	Description	Rotation	Part No.*
1	Thrust Washer (Input)		950-6-0003
2	Input Hub Assembly with Roller Bearing		541-6-0035 (541-6-0036)
3	Control Collar Special Steel Insert (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0750
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
6	Output Assembly SPCL 0.750 Bore Hard Shaft and Wear Rings 1.000 Bore (20.0 mm Bore) (25.0 mm Bore)		824-6-0478 824-6-0481 (824-6-0482) (824-6-0483)
7	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004
8	Brake Spring	CW CCW	808-6-0001 808-6-0002
9	Brake Hub w/Roller Brg.		541-6-0045
10	Plate Assembly	CW CCW	686-6-0076 686-6-0077

COMPONENT PARTS			
Item	Description	Rotation	Part No.*
11	Thrust Washer (Plate Hub)		950-6-0004
12	Actuator Assembly Special Actuator (includes plunger & spacer)	CW CCW	102-1-0032 102-1-0033
13	Button Head Cap Screw (3)		797-1-0243
14	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030
14a	Flatwasher (2)		950-1-0006
14b	Lockwasher - Split (2)		950-1-0020
14c	Skt. Head Cap Screw (2)		797-1-0044
15	Headless Skt. Set Screw (2) (0.75 bore only)		797-1-0162 (797-1-0774)
16	Retaining Ring (2)		748-1-0036
17	Shim (2)		807-1-0001
18	Shim .005		807-1-0014
19	Spacer		807-1-9001

* Part numbers in ( ) are metric

CLUTCH/BRAKE PACKAGES

THE GENUINE WRAP SPRING™

Super CB-7 Clutch/Brake
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	1,500 lb-in
Maximum anti-overrun holding capability	600 lb-in
Maximum anti-back holding capability	600 lb-in
Inertia, rotating parts	6.75 lb-in^2
Maximum radial bearing load at maximum speed	300 lbs
Maximum operating speed	400 RPM
Response time, voltage on at full speed	50 MS
Weight	12 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
0.9843-0.9863 (25.0 H9)	0.3143-0.3156 (7.983-8.017)	1.1142-1.1241 (28.300-28.552)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.1811-1.1831 (30.0 H9)	0.3143-0.3156 (7.983-8.017)	1.3110-1.3209 (33.299-33.551)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

Super CB-7 Clutch/Brake
Component Parts

3 Split Cam Design

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

For assembly and disassembly see page 95.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		541-7-0027 (541-7-0030)
3	Control Collar (Steel Insert) (Specify No. of Stops) Standard • 1.6° Adjustable	CW/CCW	(541-7-8030) 266-1-0030
4	Drive Spring Standard	CW CCW	808-8-0007 808-8-0008
5	Anti-Overrun Spring	CW CCW	808-8-0009 808-8-0010
6	Output Assembly SPCL (25.0 mm Bore) (30.0 mm Bore) (35.0 mm Bore)		824-7-0143 (1.00) 824-7-0146 (1.50) (824-7-0144) (1.25) (824-7-0133) (824-7-0135) (824-7-0137)
7	Anti-Back Spring	CW CCW	808-1-0012 808-1-0013
8	Brake Spring	CW CCW	808-8-0005 808-8-0006
9	Brake Hub		541-7-0029

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
10	Plate Assembly	CW CCW	686-7-0009 686-7-0010
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Skt. Set Screw (2)		797-1-0174
15	Thrust Washer (2)		950-8-0001
16	Shim		807-1-0002
17	Shim 0.005 0.010		801-8-0001 801-8-0002
18	Spacer		807-1-9001

Shims used as required

* Part numbers in ( ) are metric

Super CB-8 Clutch/Brake
Dimensions & Specifications

Ø .384 (9.75)
2 HOLE EQ. SP.
ON Ø 5.875 (149.23) B.C.

.36 (9.14)
MAX THREAD
ENGAGEMENT

45°

E

2.50 (63.50)

7.00 (177.80)

3.118 (79.20)

1.80 (45.72)

2.50 (63.50)

5.02 (127.50)

.386 (9.80) WIDE X .80 (20.32) LONG
R FULL - BOTH ENDS

30°

6.125 (155.58)

.70 (17.78)

Ø 2.372-2.374 (60.24-60.30)

.190 (4.83)

.427 (10.85)

.40 (10.16)

.250 (6.35)

D

Ø 4.00 (101.60)

2X Ø 1.967 (49.96)

2X .25 (6.35)

D

2.31 (58.68) MAX

B

C

A

BORE DETAIL

As shown viewed from input hub only   CW

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	2,500 lb-in
Maximum anti-overrun holding capability	600 lb-in
Maximum anti-back holding capability	600 lb-in
Inertia, rotating parts	12.84 lb-in^2
Maximum radial bearing load at maximum speed	300 lbs
Maximum operating speed	300 RPM
Response time, voltage on at full speed	50 MS
Weight	15 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.940	25.4	Standard
12 DC	1.860	6.43	Modification
90 DC	0.240	378.6	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025* (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.3755-1.3775* (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.5784-1.5772 (40.0 H9)	—	—	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

* Special Order

Super CB-8 Clutch/Brake
Component Parts

3 **Split Cam Design**

Retaining Ring · Drive Sleeve · Stop Cam · Coupling Sleeve · Brake Sleeve

For assembly and disassembly see page 95.

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		541-8-0009 (541-8-0012)
3	Control Collar (Steel Insert) (Specify No. of Stops) Standard • 1.6° Adjustable	CW/CCW	266-8-0275
4	Drive Spring Standard	CW CCW	808-8-0003 808-8-0004
5	Anti-Overrun Spring	CW CCW	808-8-0025 808-8-0026
6	Output Assembly SPCL (35.0 mm Bore) (40.0 mm Bore		824-8-0579 (1.00) 824-8-0576 (1.50) 824-8-0577 (1.38) (824-8-0578) (1.25) (824-8-0589) A/R
7	Anti-Back Spring	CW CCW	808-8-0025 808-8-0026
8	Brake Spring	CW CCW	808-8-0003 808-8-0004
9	Brake Hub		541-8-0010
10	Plate Assembly	CW CCW	686-8-0051 686-8-0052

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger) AC AC DC DC	CW CCW CW CCW	102-1-0032 102-1-0033 102-1-0034 102-1-0035
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0053 101-1-0058 101-1-0052 101-1-0055
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Skt. Set Screw (2)		797-1-0174 (797-1-0783)
15	Thrust Washer (2)		950-8-0001
16	Shim (2)		807-1-0002
17	Shim 0.005 0.010		801-8-0001 801-8-0002
18	Spacer		807-1-9001

Shims used as required
* Part numbers in ( ) are metric

Super CB-10 Clutch/Brake
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	5,000 lb-in
Maximum anti-overrun holding capability	1,200 lb-in
Maximum anti-back holding capability	1,200 lb-in
Inertia, rotating parts	48.0 lb-in^2
Maximum radial bearing load at maximum speed	500 lbs
Maximum operating speed	200 RPM
Response time, voltage on at full speed	70 MS
Weight	27 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.174*	14.5	Standard
24 DC	0.940	25.4	Standard
12 DC	1.860	6.43	Modification
90 DC	0.240	378.6	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 2.9 amps / Holding current 0.1 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.669-1.679 (42.39-42.65)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.6255-1.6275 (41.287-41.339)	0.376-0.378 (9.55-9.61)	1.796-1.806 (45.61-45.88)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.7505-1.7525 (44.462-44.514)	0.376-0.378 (9.55-9.61)	1.922-1.932 (48.81-49.08)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
METRIC BORES				
1.5749-1.5772 (40.0 H9)	0.4717-0.4732 (11.979-12.021)	1.705-1.712 (43.300-43.491)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M6 x 1.25 12.70 DP on 86.79 BC
1.7717-1.7740 (45.0 H9)	0.5504-0.5520 (13.980-14.021)	1.922-1.929 (48.80-49.00)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M6 x 1.25 12.70 DP on 86.79 BC

INDEX

Super CB-10 Clutch/Brake
Component Parts

6 **Cam Design**

Retaining Ring   Stop Cam   Sleeve

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring-Truarc		748-1-0020
2	Input Hub Anti-Overrun		541-0-0017 (541-0-0022)
3	Retaining Ring		748-1-0217
4	Spacer		807-0-0013
5	Anti-Overrun Spring	CW CCW	808-0-0001 808-0-0002
6	Control Collar Steel Insert Assembly (Specify No. of Stops) Standard 1.5° • Adjustable	CW CCW	266-0-0201 266-0-0211
7	Drive Spring	CW CCW	808-0-0009 808-0-0010
8	Shaft Assembly (Specify Bore) Anti-Overrun (40.00 mm Bore)	1.500 1.625 1.750	824-0-0097 824-0-0098 824-0-0099 (824-0-0100)
9	Headless Set Screw		797-1-0173 (797-1-0784)
10	Skt Head Cap Screw		797-1-0055
11	Head Cap Screw		797-1-0044
12	Lockwasher—Split		950-1-0020

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
13	Actuator Plate Assembly	CW CCW	101-0-0052 101-0-0053
13a	Plate		686-0-0001
13b	Pivot Pin		679-0-0001
13c	Lock Nut		661-1-0010
14	DC Coil Assembly 24 DC 12 DC 90 DC		101-0-0003 101-0-0002 101-0-0004
15	Actuator Lever		102-0-9001
16	Brake Hub		541-0-0019
17	Brake Spring	CW CCW	808-0-0009 808-0-0010
18	Anti-Back Spring	CW CCW	808-0-0007 808-0-0008
19	AC Coil Assembly 115 AC	CW CCW	101-0-0005 101-0-0054
20	AC Actuator Return Assembly		101-0-0009
21	Thrust Washer (Input)		950-0-0002
22	Thrust Washer (Plate)		950-0-0003

* Part numbers in ( ) are metric

CLUTCH/BRAKE PACKAGES

THE GENUINE WRAP SPRING™

Standard CB Series
Solenoid Activated, Combination Clutch/Brakes

CB Series combination clutches and brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 1800 RPM, depending on size. Each unit is pre-engineered and pre-assembled for easy installation.

Features
- Available in 7 sizes
- Adjustable control collars for easy and accurate output stop position setting
- Load over-travel or back-up is eliminated since CB units lock the load in both directions when the solenoid is off
- RoHS compliant

- Cost-effective design
- Split cam design, Models CB-5, CB-6, CB-7, CB-8
- Anti-overrun feature prevents the output from running faster than the input
- Permanently lubricated—never needs adjustment for wear
- Brings load up to speed in 3 milliseconds and stops within 1.5 milliseconds
- Single, 2 and 4 stop collar standard, multi-stop collars with up to 24 stops available as specials
- AC or DC operated
- See pages 68 and 69 for controls and power supplies

Typical Applications
- Riveters
- Punch presses
- Packaging equipment
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

How to order

CB - 6 - CW - 24V - 3/4" bore - 2

CB Series
Specify:
Imperial or Metric

Size
CB-2 = **2**
CB-4 = **4**
CB-5 = **5**
CB-6 = **6**
CB-7 = **7**
CB-8 = **8**
CB-10 = **10**

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise

Coil Voltage
12V = 12VDC
24V = **24VDC**
90V = 90VDC
115V = 115VAC

Bore Size
CB-2 = ¼"
CB-4 = ³/₈"
CB-5 = ½"
CB-6 = ¾", **1"**
CB-7 = **1",1¼",1½"**
  *¾"
CB-8 = **1¼",1½"**
  *1", *1³/₈"
CB-10 = **1½"**
  *1⁵/₈", *1¾"
*Special order

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop

Other stop collars are special order.
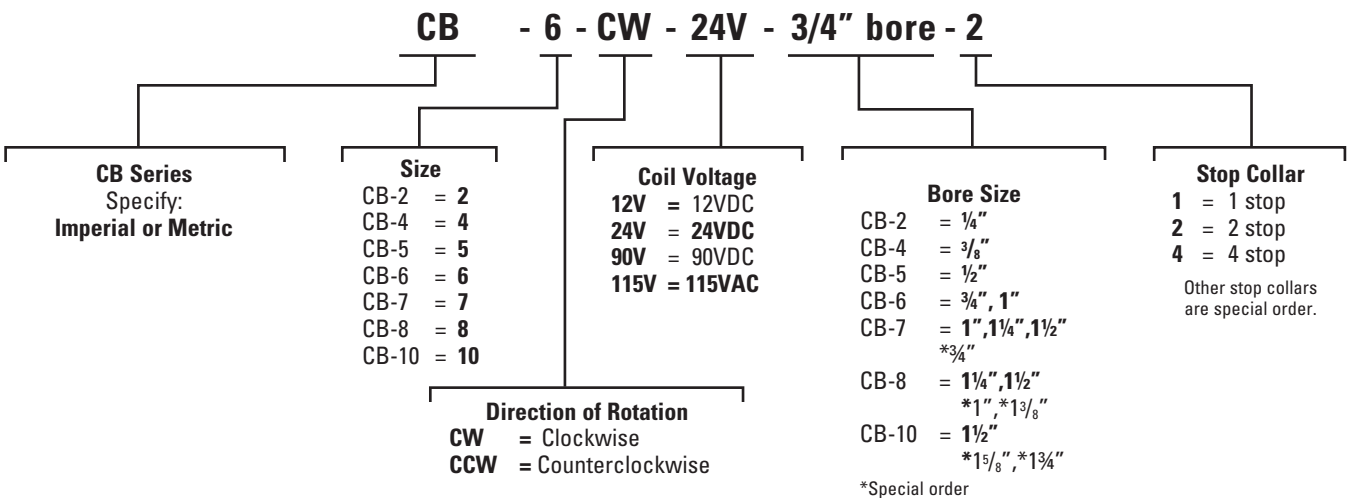
OPTIONS	
Dust Covers	See page 66
Stop Collars	See page 67
Pneumatic Actuators	See page 68

Standard CB Series
Combination Clutch/Brake Packages

- Plate
- Solenoid Coil
- Actuator
- Control Collar
- Input Hub
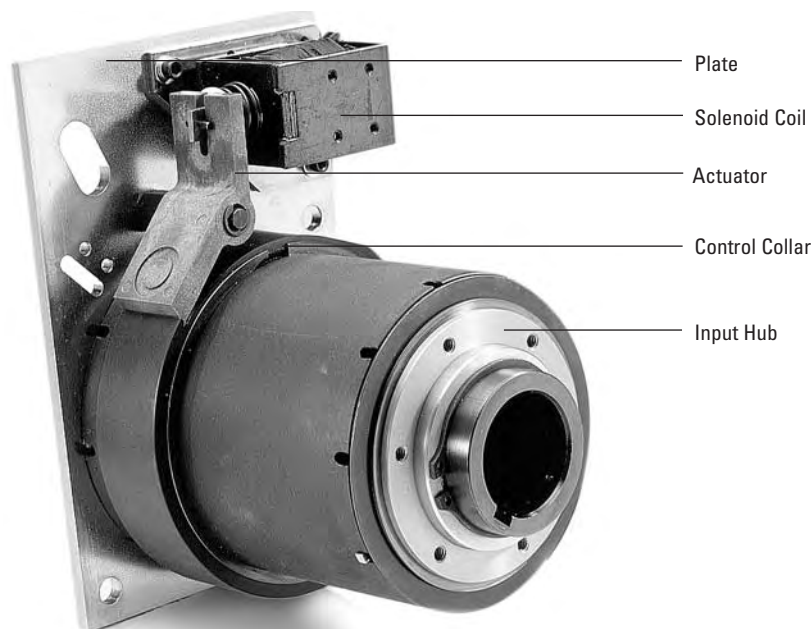
PERFORMANCE							
	CB-2	**CB-4**	**CB-5**	**CB-6**	**CB-7**	**CB-8**	**CB-10**
Static torque	25 lb-in (2.825 Nm)	120 lb-in (13.56 Nm)	250 lb-in (28.25 Nm)	500 lb-in (56.5 Nm)	1,500 lb-in (169.5 Nm)	2,500 lb-in (282.5 Nm)	5,000 lb-in (565 Nm)
Maximum anti-overrun holding capability	10 lb-in (1.13 Nm)	25 lb-in (2.825 Nm)	45 lb-in (5.085 Nm)	300 lb-in (33.9 Nm)	600 lb-in (67.8 Nm)	600 lb-in (67.8 Nm)	1,200 lb-in (135.6 Nm)
Maximum anti-back holding	18 lb-in (2.034 Nm)	80 lb-in (9.04 Nm)	160 lb-in (18.08 Nm)	300 lb-in (33.9 Nm)	600 lb-in (67.8 Nm)	600 lb-in (67.8 Nm)	1,200 lb-in (135.6 Nm)
Inertia, rotating parts	.0207 lb-in^2	.0636 lb-in^2	.1950 lb-in^2	1.718 lb-in^2	6.75 lb-in^2	12.84 lb-in^2	48.0 lb-in^2
Maximum radial bearing load at maximum speed	7.5 lbs.	14 lbs.	32 lbs.	63 lbs.	300 lbs.	300 lbs.	500 lbs.
Maximum operating speed	1,800 RPM	1,200 RPM	750 RPM	500 RPM	400 RPM	300 RPM	200 RPM
Response time, voltage on at full speed	20 MS	24 MS	27 MS	45 MS	50 MS	50 MS	70 MS
Weight	1 lb.	2 lbs.	3 lbs.	7 lbs.	12 lbs.	15 lbs.	27 lbs.

See page 84 for Minimum Inertia Requirements. See pages 91 & 92 for Mounting Requirements.

RPM vs. SHAFT BORE				
Size	**Max RPM**	**Shaft Bores Standard in (mm)**	**Shaft Bores Special in (mm)**	**Shaft Bores Metric Standard in (mm)**
CB–2	1,800	$1/_4$" (6.35)	—	.2362-.2374 (6.0)
CB–4	1,200	$3/_8$" (9.525)	—	.3937-.3951 (10.0)
CB–5	750	$1/_2$" (12.70)	—	.4724-.4741 (12.0)
CB-6	500	$3/_4$" or 1" (19.05 or 25.0)	—	7874-.7894 (20.0) or .9842-.9862 (25.0)
CB-7	400	1", $1^1/_4$" or $1^1/_2$" (25.4, 31.75 or 38.10)	$3/_4$" (19.05)	.9843-.9863 (25.0), 1.1811-1.1831 (30.0) or 1.3780-1.3804 (35.0)
CB-8	300	$1^1/_4$" or $1^1/_2$" (31.75 or 38.1)	1" or $1^3/_8$" (25.4 or 34.925)	1.3780-1.3804 (35.0) or 1.5784-1.5772 (40.0)
CB-10	200	$1^1/_2$" (38.1)	$1^5/_8$" or $1^3/_4$" (41.275 or 44.45)	1.5749-1.5722 (40.0) or 1.7717-1.7740 (45.0)

*Consult Factory

Standard CB-2 Clutch/Brake
Dimensions & Specifications
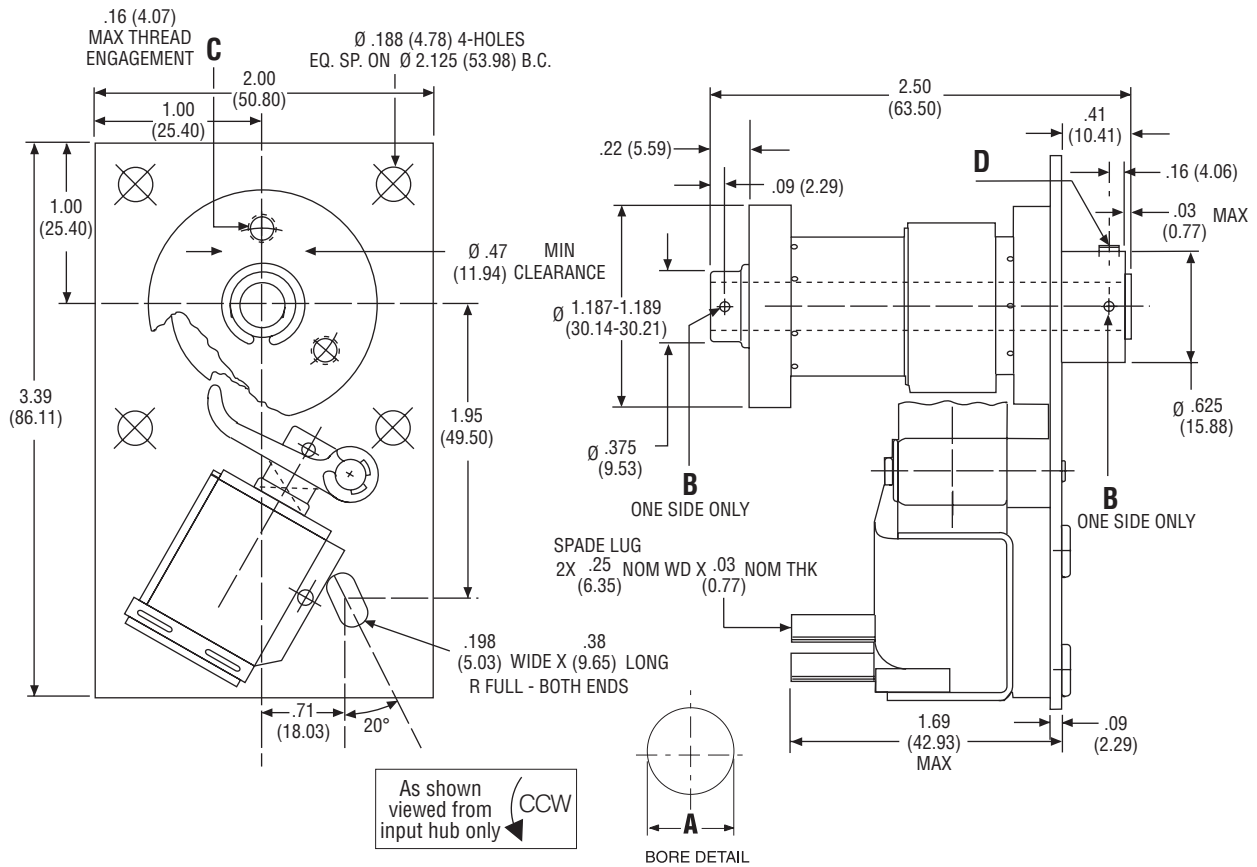
Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	25 lb-in
Maximum anti-overrun holding capability	10 lb-in
Maximum anti-back holding capability	18 lb-in
Inertia, rotating parts	0.0207 lb-in^2
Maximum radial bearing load at maximum speed	7.5 lbs
Maximum operating speed	1800 RPM
Response time, voltage on at full speed	20 MS
Weight	1 lb.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.104*	825	Standard
24 DC	0.230	104	Standard
12 DC	0.460	26	Modification
90 DC	0.059	1510	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current .10 amps / Holding current .04 amps

BORE & KEYWAY DATA			
Bore A	Pin Hole B	Mtg. Hole C	Set Screws D
0.2505-0.2525 (6.362-6.414)	0.061-0.065 (1.54-1.66)	3x #6-32 UNC-2B on 0.938 BC	#8-32 x 0.190 Lg. Hex Skt. Set Screw
METRIC BORES			
0.2362-0.2374 (6.0 H9)	0.055-0.062 (1.4-1.57)	3X M4 x 0.7 on 23.83 BC	M4 x 0.7 x 5.0 Lg. Hex Skt. Set Screw

INDEX

Standard CB-2 Clutch/Brake
Component Parts
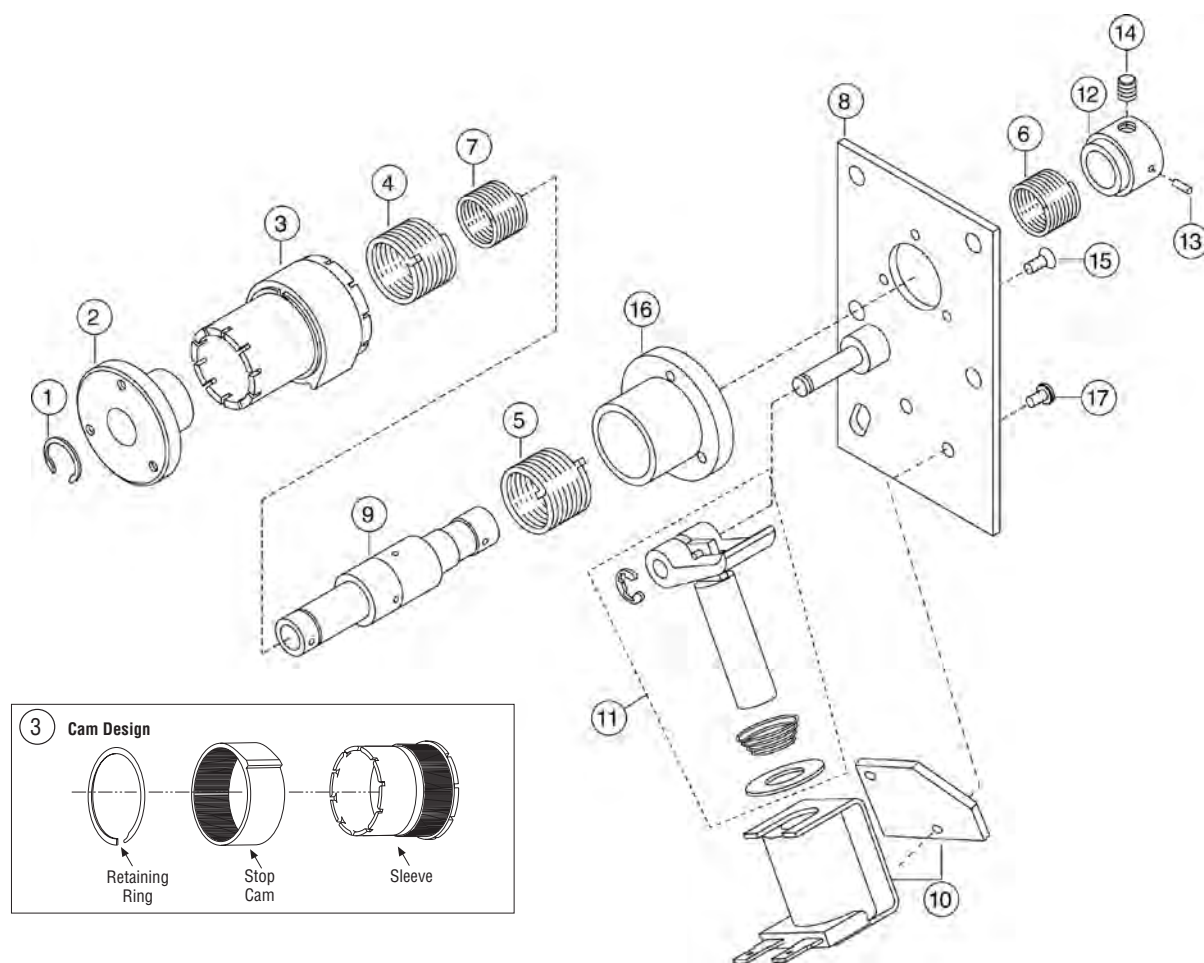
③ **Cam Design**

Retaining Ring — Stop Cam — Sleeve

For assembly and disassembly see page 95.

	COMPONENT PARTS		
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0085
2	Input Hub Anti-Overrun		540-2-0004 (540-2-0107)
3	Control Collar (Specify No. of Stops) Standard - 2.8° Adjustable	CW CCW	266-2-0001 266-2-0031
4	Drive Spring	CW CCW	808-2-0108 808-2-0109
5	Brake Spring	CW CCW	808-2-0101 808-2-0100
6	Anti-Back Spring	CW CCW	808-2-0004 808-2-0003
7	Anti-Overrun Spring	CW CCW	808-2-0003 808-2-0004
8	Plate Assembly	CW CCW	686-2-0001 686-2-0002
9	Output Assembly with Anti-Overrun (0.25 Bore) (6.0 mm Bore)		824-2-0006 (824-2-0319)

	COMPONENT PARTS		
Item	**Description**	**Rotation**	**Part No. ***
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		275-1-0003 275-1-0006 275-1-0002 275-1-0005
11	Actuator Assembly (kit w/ plunger)		101-2-0001
12	Anti-Back Hub		540-2-0003 (540-2-0109)
13	Spring Pin	CCW	679-1-0019
14	Headless Socket Set Screw		797-1-0152 (797-1-0768)
15	Flat Head Socket Cap Screw (3)		797-1-0311
16	Brake Hub		540-2-0006
17	Pan Head Machine Screw (Sems) (2)		797-1-0415

* Part numbers in ( ) are metric

Standard CB-4 Clutch/Brake
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see pages 91 & 92.

As shown viewed from input hub only CW

BORE DETAIL

PERFORMANCE	
Static torque	120 lb-in
Maximum anti-overrun holding capability	25 lb-in
Maximum anti-back holding capability	80 lb-in
Inertia, rotating parts	0.0636 lb-in²
Maximum radial bearing load at maximum speed	14 lbs
Maximum operating speed	1200 RPM
Response time, voltage on at full speed	24 MS
Weight	2 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	Pin Hole B	Mtg. Hole C	Set Screws D
0.376-0.378 (9.55-9.61)	0.115-0.135 (2.92-3.43)	3x #6-32 UNC-2B on .938 BC	#8-32 x 0.188 Lg. Hex Skt. Set Screw
METRIC BORES			
0.3937-0.3951 (10.0 H9)	0.117-0.121 (2.97-3.08)	3X M4 x 0.7 on 23.83 BC	M4 x 0.7 x 5.0 Lg. Hex Skt. Set Screw

INDEX

Standard CB-4 Clutch/Brake
Component Parts
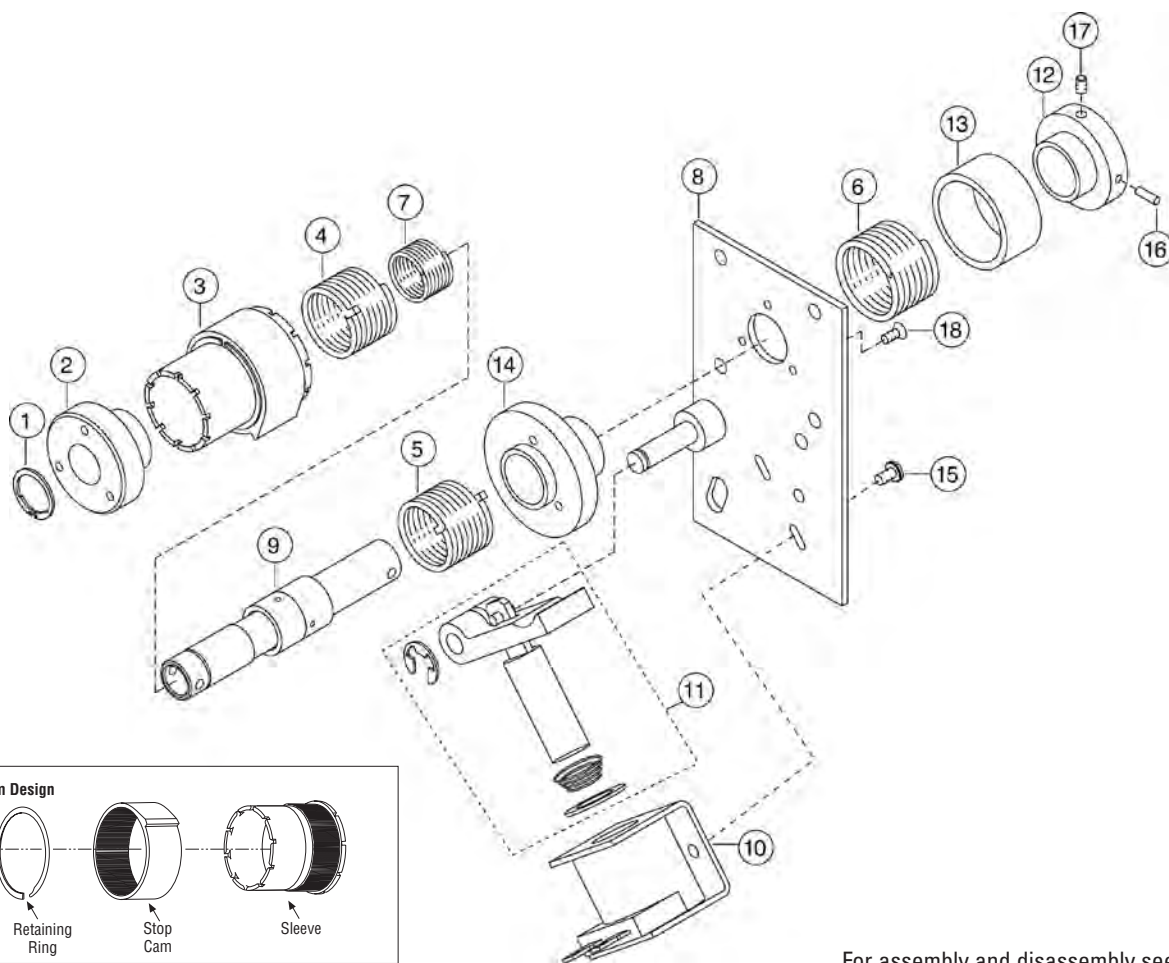
③ **Cam Design**

Retaining Ring   Stop Cam   Sleeve

For assembly and disassembly see page 95.

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0027
2	Input Hub Anti-Overrun		540-4-0021 (540-4-0077)
3	Control Collar (Specify No. of Stops) Standard - 2.4° Adjustable	CW CCW	266-4-0051 266-4-0081
4	Drive Spring	CW CCW	808-4-0066 808-4-0059
5	Brake Spring	CW CCW	808-4-0016 808-4-0017
6	Anti-Back Spring	CW CCW	808-4-0018 808-4-0019
7	Anti-Overrun Spring	CW CCW	808-4-0022 808-4-0023
8	Plate Assembly	CW CCW	686-4-0001 686-4-0002
9	Output Assembly with Anti-Overrun 0.38 Bore (10.0 mm Bore)		824-4-0015 (824-4-0300)

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		275-1-0163 275-1-0166 275-1-0162 275-1-0165
11	Actuator Assembly		102-4-0005
12	Anti-Back Hub		540-4-0018 (540-4-0078)
13	Dust Cover (AB Spring)		287-4-9002
14	Brake Hub		540-4-0015
15	Pan Head Machine Screw (Sems) (2)		797-1-0412
16	Spring Pin		679-1-0022
17	Headless Socket Set Screw		797-1-0152 (797-1-0768)
18	Flat Head Socket Cap Screw (3)		797-1-0311

* Part numbers in ( ) are metric

Standard CB-5 Clutch/Brake
Dimensions & Specifications

.32 (8.13)
MAX THREAD
ENGAGEMENT

C

2.62
(66.55)

1.31
(33.27)

Ø .187 (4.75) 4-HOLES
EQ. SP. ON
Ø 3.125 (79.38) B.C.

1.31
(33.27)

4.56
(115.82)

2.50
(63.50)

4.375
(111.13)

1.09
(27.69)

.46
(11.68)

.25
(6.35)

.09 (2.29)

D

.19 (4.83)

.045
(1.14)
MAX

Ø .625
(15.88)

Ø 1.5610-1.5625
(39.649-39.688)

Ø 1.56
(39.62)

B
ONE SIDE ONLY

B
ONE SIDE ONLY

.26
(6.60) WIDE X .50
(12.70) LONG
R FULL - BOTH ENDS

.91
(23.11)

20°

SPADE LUG
2X .25
(6.35) NOM WD .03
(0.77) NOM THK

2.06
(52.33)
MAX

As shown
viewed from
input hub only CCW

A

BORE DETAIL

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	250 lb-in
Maximum anti-overrun holding capability	45 lb-in
Maximum anti-back holding capability	160 lb-in
Inertia, rotating parts	0.1950 lb-in^2
Maximum radial bearing load at maximum speed	32 lbs
Maximum operating speed	750 RPM
Response time, voltage on at full speed	27 MS
Weight	3 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	Pin Hole B	Mtg. Hole C	Set Screws D
0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x #10-32 UNF-2B on 1.25 BC	#8-32 x 0.25 Lg. Hex Skt. Set Screw
METRIC BORES			
0.4724-4741 (12.0 H9)	0.117-0.121 (2.97-3.08)	3X M5 x 0.8 on 31.75 BC	M4 x 0.7 x 6.0 Lg. Hex Skt. Set Screw

Standard CB-5 Clutch/Brake
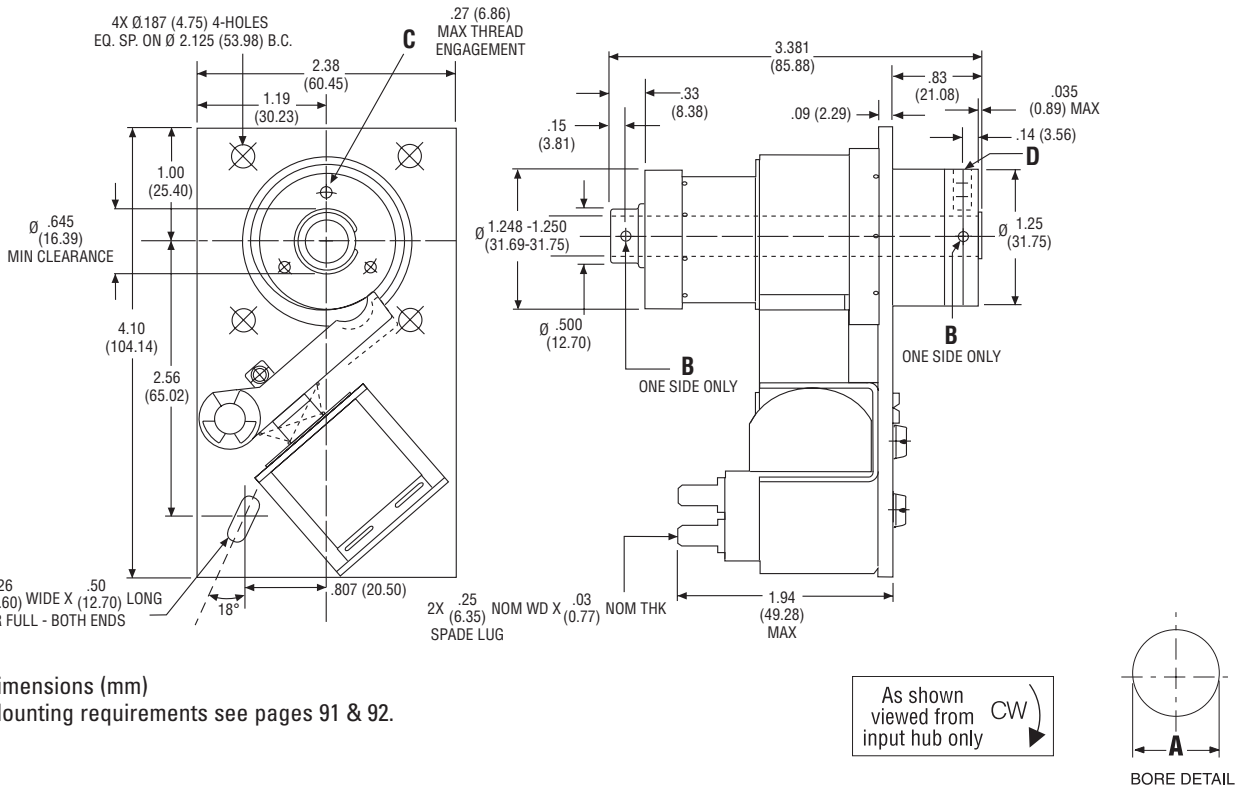Component Parts
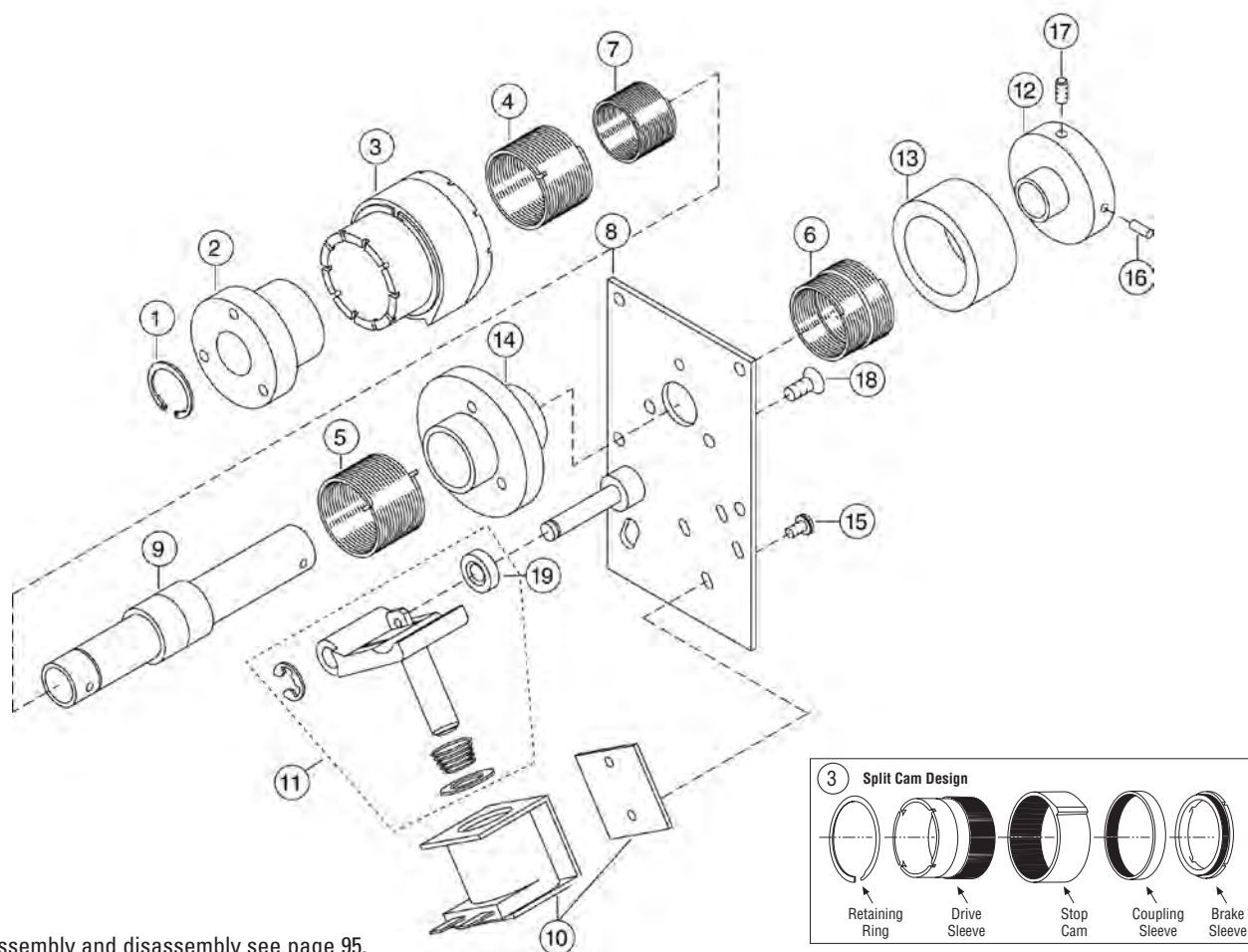
For assembly and disassembly see page 95.

3 Split Cam Design

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0030
2	Input Hub Anti-Overrun		540-5-0007 (540-5-0018)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-5-0801
4	Drive Spring	CW CCW	808-5-0001 808-5-0002
5	Brake Spring	CW CCW	808-5-0001 808-5-0002
6	Anti-Back Spring	CW CCW	808-5-0005 808-5-0006
7	Anti-Overrun Spring	CW CCW	808-5-0003 808-5-0004
8	Plate Assembly	CW CCW	686-5-0001 686-5-0002
9	Output Assembly with Anti-Overrun (0.50 Bore) (12.0 mm Bore)		824-5-0002 (824-5-0107)

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***

10	Coil Assembly
	    24 DC
	    115 AC
	    12 DC
	    90 DC
			101-5-0003
			101-5-0006
			101-5-0002
			101-5-0005

11	Actuator Assembly	CW CCW	101-5-0058 101-5-0059
12	Anti-Back Hub		540-5-0006 (540-5-0047)
13	Dust Cover (AB Spring)		287-5-9002
14	Brake Hub		540-5-0004
15	Pan Head Machine Screw (Sems) (2)		797-1-0414
16	Spring Pin		679-1-0024
17	Headless Socket Set Screw		797-1-0153 (797-1-0769)
18	Flat Head Socket Cap Screw (3)		797-1-0322
19	Spacer		807-1-9002

* Part numbers in ( ) are metric

Standard CB-6 Clutch/Brake
Dimensions & Specifications

Ø .284 (7.21) 4 HOLE EQ. SP.
ON Ø 5.00 (127.0) B.C.

E
.31 (7.87)
MAX THREAD ENGAGEMENT

2.12 (53.85)

5.75 (146.05)

2.92 (74.17)

2.12 (53.85)

1.38 (35.05)

25°

4.25 (107.95)

.386 (9.80) WIDE X .80 (20.32) LONG
R FULL - BOTH ENDS

SPADE LUG
2x .25 (6.35) NOM WD X .03 (0.77) NOM THK

As shown viewed from input hub only   CW

.528 (13.41)
.127 (3.23)
Ø 2.50 (63.50)
2X Ø .22 (5.59)
4.312 (109.53)
.37 (9.40)

D

2X Ø 1.250 (31.75)

Ø 1.559–1.562 (39.59–39.68)

2.25 (57.15) MAX

.19 (4.83)

B

C

A

BORE DETAIL

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	500 lb-in
Maximum anti-overrun holding capability	300 lb-in
Maximum anti-back holding capability	300 lb-in
Inertia, rotating parts	1.718 lb-in²
Maximum radial bearing load at maximum speed	63 lbs
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x 0.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	2x M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	2x 4.87-5.14 Hole (.191-.203)	3x M6 x 1.0 holes on 52.38 BC

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Standard CB-6 Clutch/Brake
Component Parts

Split Cam Design

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0038
2	Input Hub Anti-Overrun		540-6-0003 (540-6-0059)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0726
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
6	Output Assembly 0.750 Bore 1.000 Bore (20.0 mm Bore) (25.0 mm Bore)		824-6-0002 824-6-0003 (824-6-0348) (824-6-0349)
7	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004
8	Brake Spring	CW CCW	808-6-0001 808-6-0002
9	Brake Hub		540-6-0001

* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
10	Plate Assembly	CW CCW	686-6-0076 686-6-0077
11	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
12	Button Head Cap Screw (3)		797-1-0243
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher		950-1-0006
13b	Lockwasher—Split		950-1-0020
13c	Skt. Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2) (.75 Bore only) Set Screw (2) (20.0 mm Bore only)		797-1-0162 (797-1-0774)
15	Shim (2)		807-1-0001
16	Shim .005 .010		807-1-0014 807-1-0017
17	Spacer		807-1-9001

Shims used as required

Standard CB-7 Clutch/Brake
Dimensions & Specifications

Ø.384 (9.75)
3 HOLES 90° APART
ON Ø 5.875 (149.23) B.C.

6X 60°

E

.28 (7.12)
MAX. THREAD
ENGAGEMENT

5.02
(127.50)

7.00
(177.80)

2.50
(63.50)

3.118
(79.20)

1.80
(45.72)

2.80
(63.50)

30°

.386
(9.80) WIDE X .80
(20.32) LONG
R FULL BOTH ENDS

As shown
viewed from CW
input hub only

.89
(22.60)

.25
(6.38)

2X

.38
(9.65)

Ø 2.368 2.372
(60.14 60.25)

Ø 4.00
(101.60)

4.90
(124.46)

4.05
(10.28)

.25
(6.35)

D

2X Ø 1.936
(49.17)

D

2.31
(58.68)
MAX

B

C

A

BORE DETAIL

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	1,500 lb-in
Maximum anti-overrun holding capability	600 lb-in
Maximum anti-back holding capability	600 lb-in
Inertia, rotating parts	6.75 lb-in²
Maximum radial bearing load at maximum speed	300 lbs
Maximum operating speed	400 RPM
Response time, voltage on at full speed	50 MS
Weight	12 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

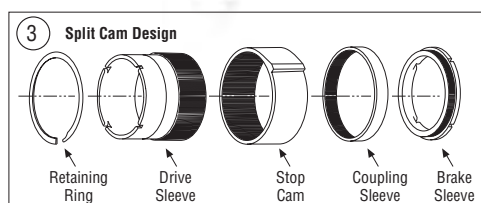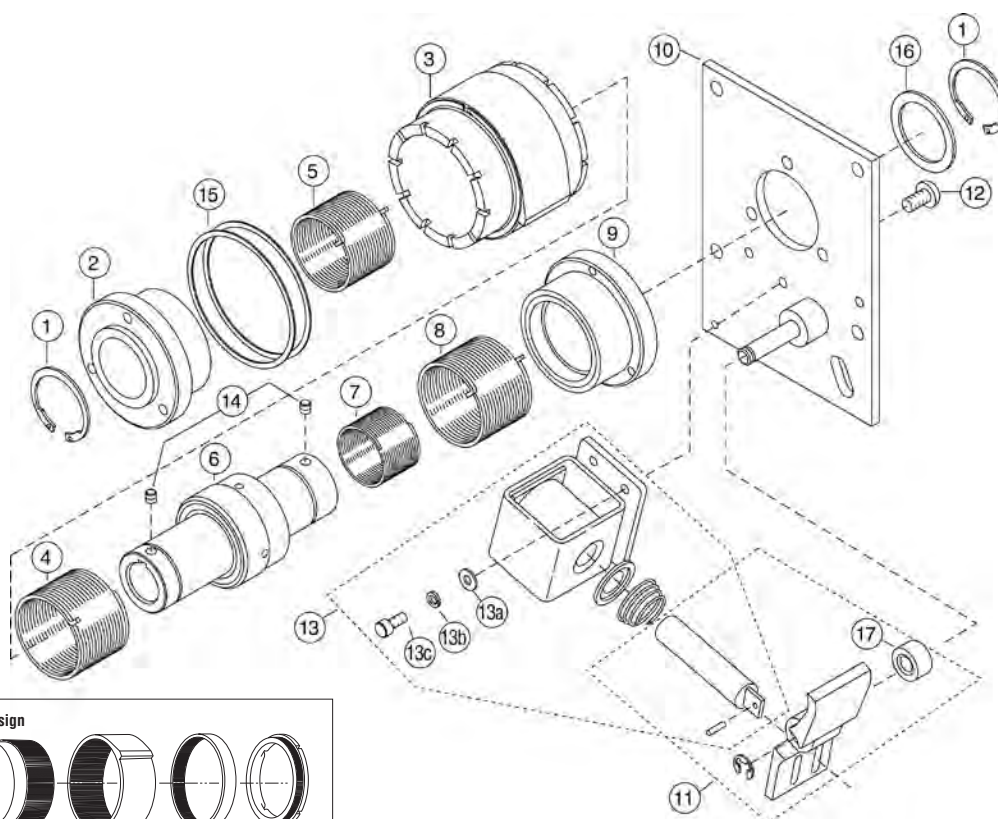(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
0.9843-0.9863 (25.0 H9)	0.3143-0.3156 (7.983-8.017)	1.1142-1.1241 (28.300-28.552)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.1811-1.1831 (30.0 H9)	0.3143-0.3156 (7.983-8.017)	1.3110-1.3209 (33.299-33.551)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

INDEX

Standard CB-7 Clutch/Brake
Component Parts

Split Cam Design

| Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve |

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		540-8-0009 (540-7-0048)
3	Control Collar (Specify No. of Stops) Standard - 1.6° Adjustable	CW/CCW	266-1-0026
4	Drive Spring	CW CCW	808-8-0007 808-8-0008
5	Anti-Overrun Spring	CW CCW	808-8-0009 808-8-0010
6	Output Assembly 1.00 1.50 Anti-Overrun 1.25 (25.0 mm Bore) (30.0 mm Bore) (35.0 mm Bore)		824-7-0114 824-7-0117 824-7-0115 (824-7-0123) (824-7-0125) (824-7-0127)
7	Anti-Back Spring	CW CCW	808-1-0012 808-1-0013
8	Brake Spring	CW CCW	808-8-0005 808-8-0006
9	Brake Hub		540-7-0030

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
10	Plate Assembly	CW CCW	686-8-0051 686-8-0052
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2)		797-1-0174
15	Shim		807-1-0002
16	Shim .005 .010		807-8-0001 807-8-0004
17	Spacer		807-1-9001

Shims used as required

* Part numbers in ( ) are metric

Standard CB-8 Clutch/Brake
Dimensions & Specifications

.36 (9.14) MAX THREAD ENGAGEMENT

5.02 (127.50)

2.50 (63.50)

2.50 (63.50)

7.00 (177.80)

3.118 (79.20)

.386 (9.80) WIDE X .80 (20.32) LONG R FULL - BOTH ENDS

1.80 (45.72)

30°

Ø .384 (9.75) 3 HOLES 90 APART

ON Ø .5.875 (149.23) B.C.

6.125 (155.58)

.427 (10.85)

.190 (4.83)

.70 (17.78)

2X .25 (6.35)

.40 (10.16)

Ø 4.00 (101.60)

D

2X Ø 1.937 (49.20)

D

Ø 2.372-2.374 (60.24-60.30)

2.31 (58.68) MAX

2.50 (6.35)

B

C

A

BORE DETAIL

As shown viewed from input hub only   CW

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	2,500 lb-in
Maximum anti-overrun holding capability	600 lb-in
Maximum anti-back holding capability	600 lb-in
Inertia, rotating parts	12.84 lb-in²
Maximum radial bearing load at maximum speed	300 lbs
Maximum operating speed	300 RPM
Response time, voltage on at full speed	50 MS
Weight	15 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025* (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.3755-1.3775* (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.5784-1.5772 (40.0 H9)	—	—	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

* Special Order

Standard CB-8 Clutch/Brake
Component Parts

3 **Split Cam Design**

Retaining Ring · Drive Sleeve · Stop Cam · Coupling Sleeve · Brake Sleeve

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		540-8-0014 (540-8-0041)
3	Control Collar (Specify No. of Stops) Standard - 1.6° Adjustable	CW/CCW	266-8-0251
4	Drive Spring Standard	CW CCW	808-8-0003 808-8-0004
5	Anti-Overrun Spring	CW CCW	808-8-0025 808-8-0026
6	Output Assembly 1.00 1.50 Anti-Overrun 1.38 1.25 (35.0 mm Bore) (40.0 mm Bore)		824-8-0329 824-8-0326 824-8-0327 824-8-0328 (824-8-0420) A/R
7	Anti-Back Spring	CW CCW	808-8-0025 808-8-0026
8	Brake Spring	CW CCW	808-8-0003 808-8-0004

* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
9	Brake Hub		540-8-0016
10	Plate Assembly	CW	686-8-0051
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2)		797-1-0174 (797-1-0784)
15	Shim (2)		807-1-0002
16	Shim .005 .010		807-8-0001 807-8-0004
17	Spacer		807-1-9001

Standard CB-10 Clutch/Brake
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see pages 91 & 92.

PERFORMANCE	
Static torque	5,000 lb-in
Maximum anti-overrun holding capability	1,200 lb-in
Maximum anti-back holding capability	1,200 lb-in
Inertia, rotating parts	48.0 lb-in²
Maximum radial bearing load at maximum speed	500 lbs
Maximum operating speed	200 RPM
Response time, voltage on at full speed	70 MS
Weight	27 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	174*	14.5	Standard
24 DC	0.94	25.4	Standard
12 DC	1.86	6.43	Modification
90 DC	0.24	378.6	Modification

(Coils are rated for continuous duty)
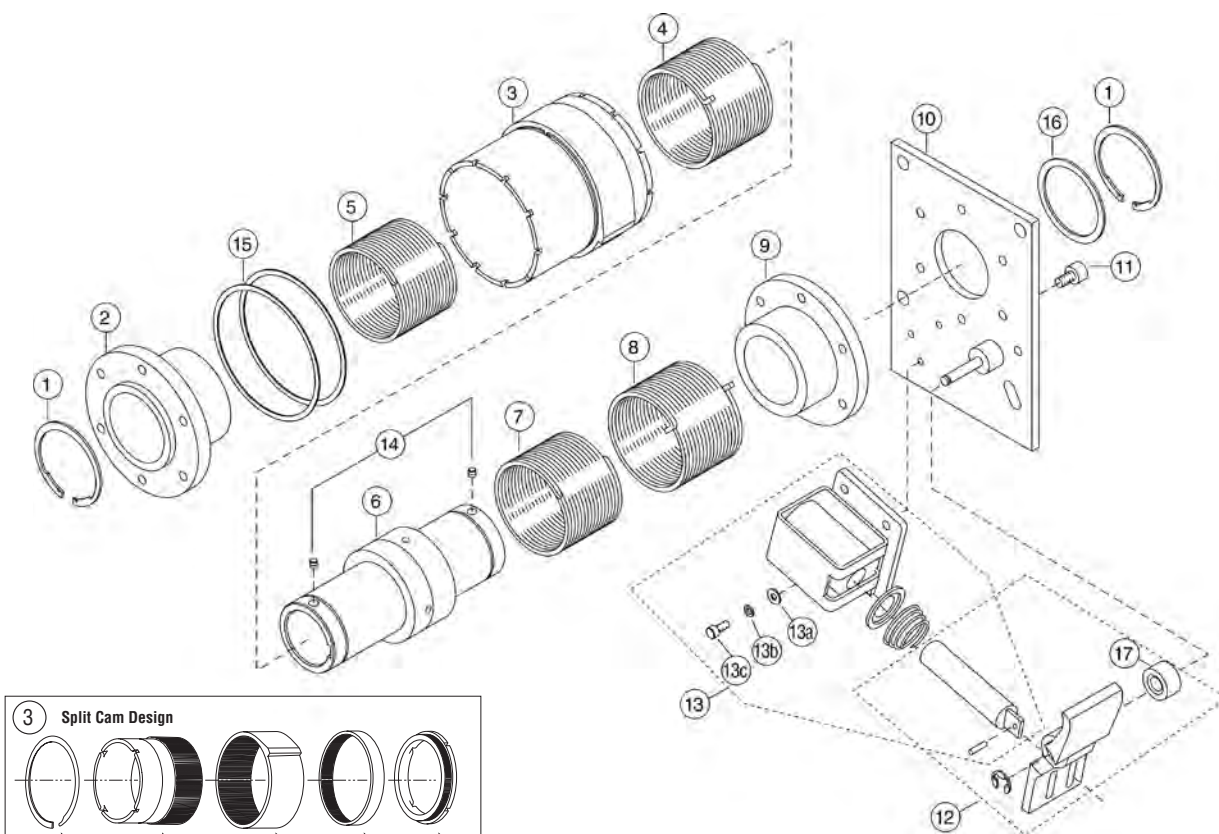
*115 AC - In rush current 2.9 amps / Holding current 0.1 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.669-1.679 (42.39-42.65)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.6255-1.6275 (41.287-41.339)	0.376-0.378 (9.55-9.61)	1.796-1.806 (45.61-45.88)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.7505-1.7525 (44.462-44.514)	0.376-0.378 (9.55-9.61)	1.922-1.932 (48.81-49.08)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
METRIC BORES				
1.5749-1.5772 (40.0 H9)	0.4717-0.4732 (11.979-12.021)	1.705-1.712 (43.300-43.491)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 12.70 DP on 86.79 BC
1.7717-1.7740 (45.0 H9)	0.5504-0.5520 (13.980-14.021)	1.922-1.929 (48.80-49.00)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 12.70 DP on 86.79 BC

Standard CB-10 Clutch/Brake
Component Parts

6 **Cam Design**

Retaining Ring   Stop Cam   Sleeve

For assembly and disassembly see page 95.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring-Truarc		748-1-0020
2	Input Hub Anti-Overrun		541-0-0002 (541-0-0012)
3	Retaining Ring		748-1-0217
4	Spacer		807-0-0013
5	Anti-Overrun Spring	CW CCW	808-0-0001 808-0-0002
6	Control Collar (Specify No. of Stops) Standard - 1.5° Adjustable	CW CCW	266-0-0127 266-0-0151
7	Drive Spring Standard	CW CCW	808-0-0009 808-0-0010
8	Shaft Assembly 1.500 1.625 Anti-Overrun 1.750 (40.0 mm Bore) (45.0 mm Bore)		824-0-0005 824-0-0006 824-0-0007 (824-0-0039) (824-0-0040)

 * Part numbers in ( ) are metric

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
9	Headless Set Screw (2)		797-1-0173 (797-1-0784)
10	Skt. Head Cap Screw (6)		797-1-0055
11	Actuator Plate Assembly 11a Plate 11b Pivot Pin 11c Lock Nut	CW CCW	101-0-0052 101-0-0053 686-0-0001 679-0-0001 661-1-0010
12	DC Coil Assembly 24 DC 12 AC 90 DC		101-0-0003 101-0-0002 101-0-0004
13	Actuator Lever		102-0-9001
14	Brake Hub		541-0-0013
15	Brake Spring	CW CCW	808-0-0009 808-0-0010
16	Anti-Back Spring	CW CCW	808-0-0007 808-0-0008
17	AC Coil Assembly 115 AC 115 AC	CW CCW	101-0-0005 101-0-0054
20	AC Actuator Return Assembly		101-0-0009
21	Head Cap Screw (2)		797-1-0044
22	Lockwasher—Split (2)		950-1-0020

CLUTCH/BRAKE PACKAGES

THE GENUINE WRAP SPRING™

DELTRAN

SAC Series
Solenoid Actuated, Wrap Spring Clutches

The SAC Series features four models of pre-assembled, solenoid actuated, wrap spring clutch packages. SAC units operate from a single AC or DC pulse to accurately start loads at speeds up to 1800 RPM, depending on size. Adjustable stop control collars provide easy and accurate output stop position settings. A typical SAC Series clutch will bring the load up to speed within 3 milliseconds. They are easy to interface with PCs and industrial control systems. SAC Series clutches are accurate, repeatable, fast acting, simple, maintenance free, and low cost.

Features
- Available in 4 sizes
- Solenoid actuated, wrap spring clutch package
- 4 standard model sizes
- Torque range from 25 lb. in. to 500 lb. in.
- 1, 2 and 4 stops standard—other stops available, up to 24 maximum
- Hub input (shaft input available, consult factory)
- RoHS compliant

Typical Applications
- Computer peripherals
- Business machines
- Packaging equipment
- Check cancellers
- Riveters

How to order

SAC - 6 - CW - 24V - 3/4" bore - 2

SAC Series
Specify:
Imperial or Metric

Size
SAC-2 = **2**
SAC-4 = **4**
SAC-5 = **5**
SAC-6 = **6**

Coil Voltage
12V **= 12VDC**
24V = 24VDC
90V = 90VDC
115V = 115VAC

Bore Size
SAC-2 = ¼"
SAC-4 = ³/₈"
SAC-5 = ½"
SAC-6 = ¾", 1"

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order.

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise
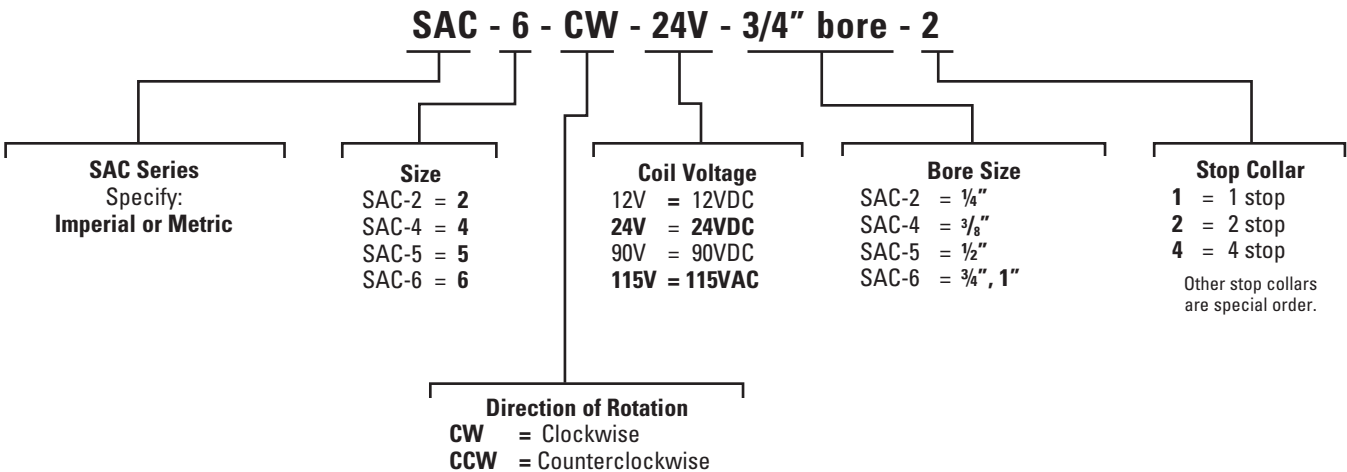
OPTIONS	
Dust Covers	See page 66
Stop Collars	See page 67
Pneumatic Actuators	See page 68

SAC Series
Wrap Spring Clutches

High torque in small package

Actuating solenoid is AC or DC operated

Anti-rotation slot for simple pin mounting

Maintenance-free, self-lubricating hubs are 18% oil by volume

Hub mounting holes for simple pulley or sprocket mounting

Sintered metal hub offers easy machining for custom drive attachments

Single or multi-stop collars control rotation
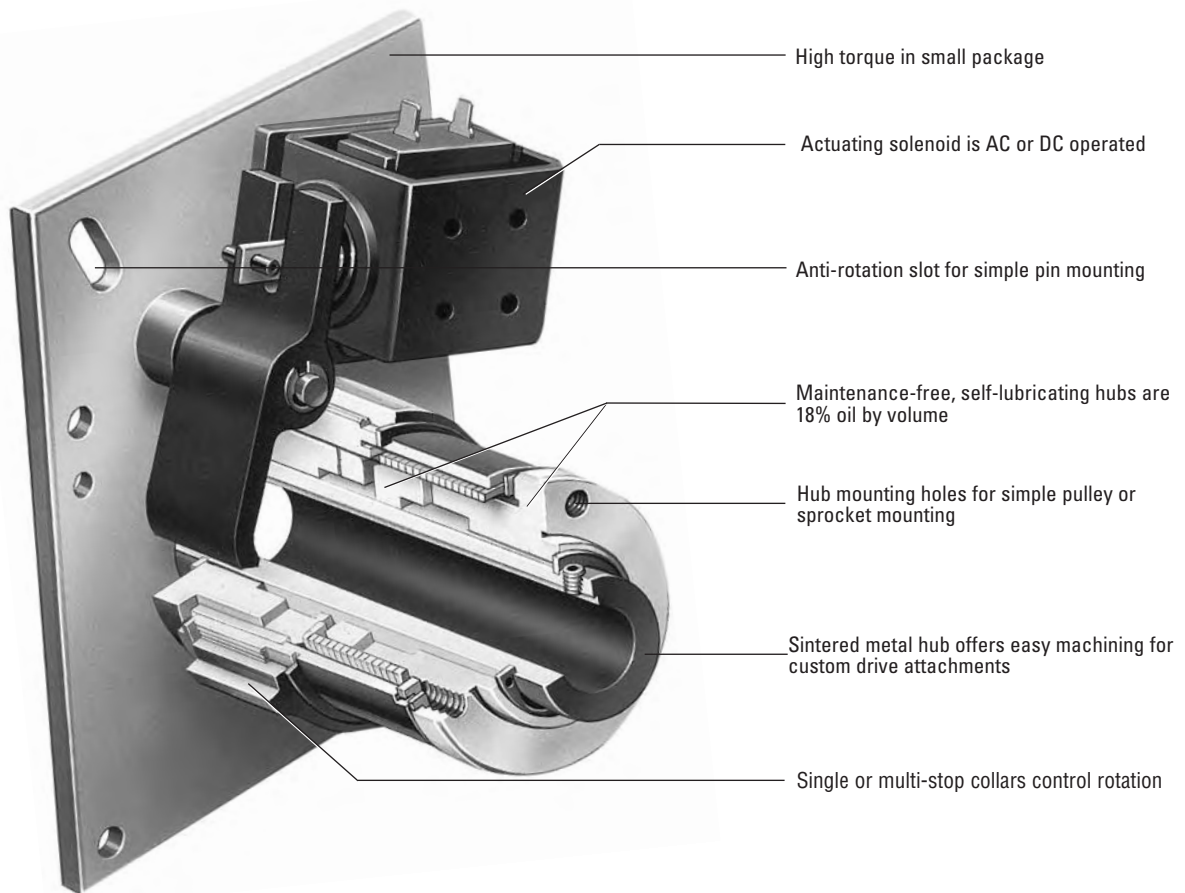
PERFORMANCE				
	SAC-2	**SAC-4**	**SAC-5**	**SAC-6**
Static torque	25 lb-in (2.825 Nm)	120 lb-in (13.56 Nm)	250 lb-in (28.25 Nm)	500 lb-in (56.5 Nm)
Shaft bores (standard)	0.250 (6.35 mm)	0.375 (9.525 mm)	0.500 (12.70 mm)	0.750 or 1.00 (19.05 mm or 25.40 mm)
RPM (maximum)	1,800 RPM	1,200 RPM	750 RPM	500 RPM
Inertia, rotating parts	0.0207 lb-in^2	0.0636 lb-in^2	0.1950 lb-in^2	1.718 lb-in^2
Maximum radial bearing load at maximum speed	7.5 lbs	14.0 lbs	32.0 lbs	63.0 lbs
Response time, voltage on at full speed	20 MS	24 MS	27 MS	45 MS
Weight	1 lb.	2 lbs.	3 lbs.	7 lbs.

RPM vs. SHAFT BORE			
Size	**Max. RPM**	**Shaft Bores Standard in (mm)**	**Shaft Bores Metric in (mm)**
SAC-2	1,800	$^1/_4$" (6.35)	0.2362-0.2374 (6.0)
SAC-4	1,200	$^3/_8$" (9.525)	0.3937-0.3951 (10.0)
SAC-5	750	$^1/_2$" (12.70)	0.4724-0.4741 (12.0)
SAC-6	500	$^3/_4$" or 1" (19.05 or 25.40)	0.7874-0.7894 (20) or 0.9842-0.9862 (25)

SAC-2, SAC-4, SAC-5 Clutches
Dimensions

Dimensions (mm)
Mounting requirements see pages 91 & 92.

BORE DETAIL

As shown viewed from input hub only CW
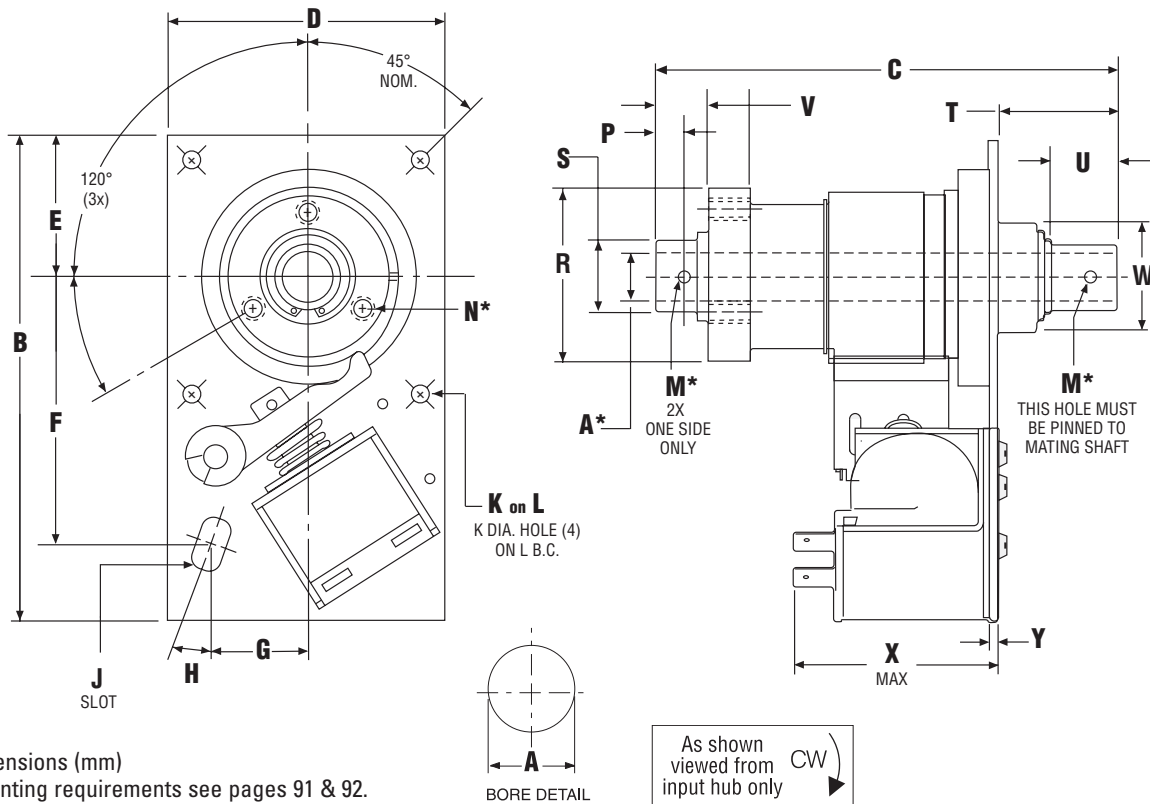
DIMENSIONS											
Model	Torque (lb-in)	B Nom.	C Nom.	D Nom.	E Nom.	F Nom.	G Nom.	H Nom.	J Nom.	K Nom.	L Nom.
SAC-2	25	3.39 (86.11)	2.50 (63.50)	2.00 (50.80)	1.00 (25.40)	1.95 (49.53)	0.71 (18.03)	20.0°	0.201 W x 0.375 L (5.10 x 9.53)	0.194 (4.93)	2.125 (53.98)
SAC-4	120	4.10 (104.14)	3.38 (85.85)	2.38 (50.45)	1.00 (25.40)	2.56 (65.02)	0.807 (20.50)	17.5°	.26 W x 50 L (6.60 x 12.70)	0.187 (4.75)	2.125 (53.98)
SAC-5	250	4.56 (115.82)	4.37 (111.00)	2.62 (66.55)	1.31 (33.27)	2.50 (63.50)	0.91 (23.11)	20.0°	.26 W x .50 L (6.60 x 12.70)	0.187 (4.75)	3.125 (79.38)
Model	Torque (lb-in)	P Nom.	R Nom.	S Nom.	T Nom.	U Min.	V Nom.	W Max.	X Max.	Y Nom.	
SAC-2	25	0.09 (2.29)	1.188 (30.17)	0.375 (9.525)	0.405 (10.29)	0.13 (3.30)	0.215 (5.46)	0.62 (15.75)	1.70 (43.18)	0.09 (2.29)	
SAC-4	120	0.15 (3.81)	1.249 (31.72)	0.500 (12.70)	0.83 (21.08)	0.51 (12.95)	0.330 (8.38)	0.75 (19.05)	1.94 (49.28)	0.09 (2.29)	
SAC-5	250	0.25 (6.35)	1.562 (39.67)	0.625 (15.87)	1.09 (27.69)	0.73 (18.54)	0.470 (11.94)	1.00 (25.40)	2.00 (50.80)	0.09 (2.29)	

*See bore data on next page

INDEX

SAC-2, SAC-4, SAC-5 Clutches
Specifications

| PERFORMANCE			
	SAC-2	**SAC-4**	**SAC-5**
Static torque	25 lb-in (2.825 Nm)	120 lb-in (13.56 Nm)	250 lb-in (28.25 Nm)
Shaft bores (standard)	0.250 (6.35 mm)	0.375 (9.525 mm)	0.500 (12.70 mm)
RPM (maximum)	1,800 RPM	1,200 RPM	750 RPM
Inertia, rotating parts	0.0207 lb-in^2	0.0636 lb-in^2	0.1950 lb-in^2
Maximum radial bearing load at maximum speed	7.5 lbs	14 lbs	32 lbs
Response time, voltage on at full speed	20 MS	24 MS	27 MS
Weight	1 lb.	2 lbs.	3 lbs.

See page 84 for Minimum Inertia Requirements. See pages 91 & 92 for Mounting Requirements.

SAC-2 ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
120 AC 60 Hz	0.104*	825	Standard
24 DC	0.230	104	Standard
12 DC	0.460	26	Modification
90 DC	0.059	1510	Modification

(Coils are rated for continuous duty)

*120 AC - In rush current .10 amps / Holding current .04 amps

SAC-4 and 5 ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.103*	280	Standard
24 DC	0.325	74	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Model	**Bore A**	**M**	**Mtg. Holes N**
SAC-2	0.2505-0.2525 (6.362-6.414)	0.061-0.065 (1.55-1.65)	3x 6-32 UNC-2B on .938 BC
SAC-4	0.376-0.378 (9.55-9.61)	0.124-0.129 (3.14-3.28)	3x 6-32 UNC-2B on .938 BC
SAC-5	0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x 10-32 UNC-2B on 1.250 BC
METRIC BORES			
SAC-2	0.2362-0.2374 (6.0 H9)	2x 1.49-1.58 (2x 0.059-0.062)	3x M4 x 0.7 on 23.83 BC
SAC-4	0.3937-0.3951 (10.0 H9)	2x 2.97-3.08 (2x 0.117-0.121)	3x M4 x 0.7 on 23.83 BC
SAC-5	0.4724-0.4741 (12.0 H9)	2x 2.97-3.08 (2x 0.117-0.121)	3x M5 x 0.8 on 31.75 BC

*For assembly and disassembly see page 96

SAC-2, SAC-4, SAC-5 Clutches
Component Parts

Split Cam Design
Retaining Ring · Drive Sleeve · Stop Cam · Coupling Sleeve · Brake Sleeve

Sizes 5 and 6 only

Cam Design
Retaining Ring · Stop Cam · Sleeve
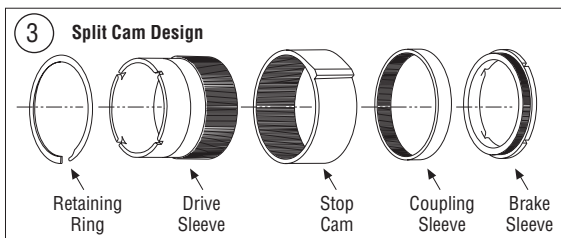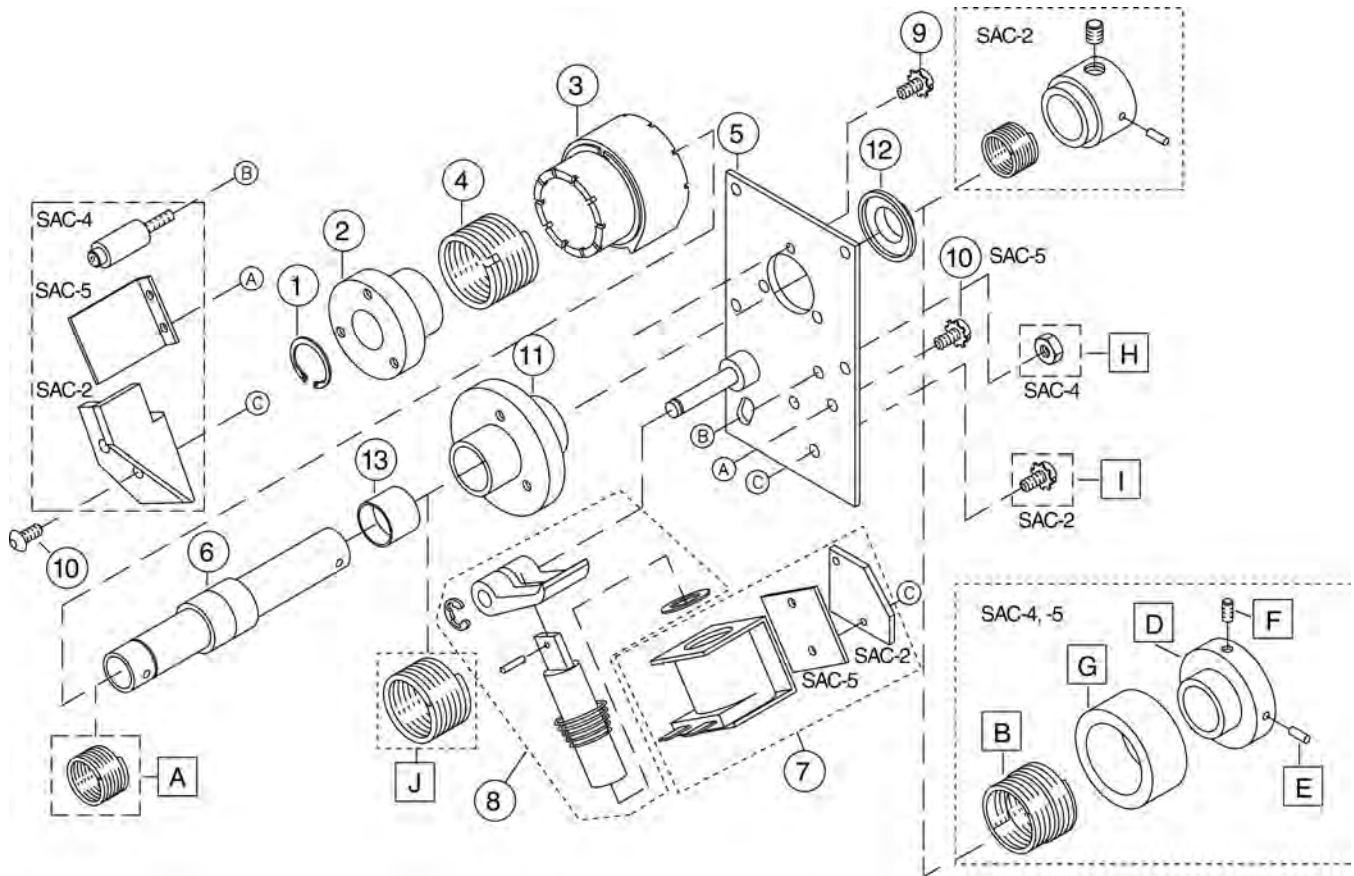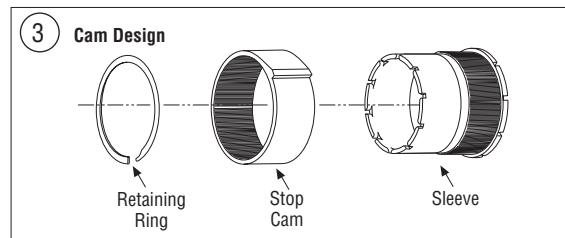
Sizes 2 and 4 only

For assembly and disassembly see page 96.

INDEX

SAC-2, SAC-4, SAC-5 Clutches
Component Parts

COMPONENTS				
Item	Description	SAC-2	SAC-4	SAC-5
1	Retaining Ring	748-1-0085	748-1-0027	748-1-0030
2	Input Hub	540-2-0004	540-4-0021	540-5-0007

3	Stop Collar (Specify no. of stops)
	    Standard CW (1)
	    Standard CCW (1)
		
		266-2-0001
		266-2-0031
			
			266-4-0051
			266-4-0081
				
				266-5-0801
				266-5-0801

4	Drive Spring CW Drive Spring CCW	808-2-0108 808-2-0109	808-4-0066 808-4-0059	808-5-0001 808-5-0002
5	Plate Assembly CW Plate Assembly CCW	686-2-0001 686-2-0002	686-4-0001 686-4-0002	686-5-0001 686-5-0002
6	Output Assembly	824-2-0006	824-4-0015	824-5-0002

7	Coil Assembly (Specify voltage)
	    24 DC
	    115 AC
	    *12 DC (optional)
	    *90 DC (optional)
		
		275-1-0003
		275-1-0006
		275-1-0002
		275-1-0005
			
			275-1-0163
			275-1-0166
			275-1-0162
			275-1-0165
				
				101-5-0003
				101-5-0006
				101-5-0002
				101-5-0005

8	Actuator Assembly (kit w/plunger)	101-2-0001	102-4-0005	101-5-0058 CW 101-5-0059 CCW
9	Flat Head Socket Cap Screw (3)	797-1-0311	797-1-0311	797-1-0322
10	Pan Head Machine Screw (Sems) (2)	797-1-0415	797-1-0412	797-1-0414
11	Plate Hub	540-2-0006	540-4-0015	540-5-0004
12	Grooveless Retaining Ring	748-1-0384	748-1-0377	748-1-0398
13	Sleeve	803-2-003	803-4-0010	803-5-0014

COMPONENTS				
Item	Description	SAC-2	SAC-4	SAC-5
A	Anti-Overrun Spring CW Anti-Overrun Spring CCW	808-2-0003 808-2-0004	808-4-0022 808-4-0023	808-5-0003 808-5-0004
B	Anti-Back Spring CW Anti-Back Spring CCW	808-2-0004 808-2-0003	808-4-0018 808-4-0019	808-5-0005 808-5-0006
C	Actuator Limit Stop Actuator Limit Stop	816-2-0001 CW 816-2-0002 CCW	816-1-0003 CW 816-1-0003 CCW	816-5-0013 CW 816-5-0013 CCW
D	Anti-Back Hub	540-2-0003	540-4-0018	540-5-0006
E	Spring Pin	679-1-0019	679-1-0022	679-1-0024
F	Headless Socket Set Screw	797-1-0152	797-1-0152	797-1-0153
G	Dust Cover (AB spring)	—	287-4-9002	287-5-9002
H	Hex Nut	—	661-1-0022	—
I	Pan Head Machine Screw (Sems)	—	797-1-0412	797-1-0414
J	Brake Spring	808-2-0101 CW 808-2-0100 CCW	808-4-0016 CW 808-4-0017 CCW	808-5-0001 CW 808-5-0002 CCW

SAC-6 Clutches
Dimensions

Dimensions (mm)
Mounting requirements see pages 91 & 92.

BORE DETAIL

As shown viewed from input hub only   CW

PERFORMANCE	
Static torque	500 lb-in (58.5 Nm)
Inertia, rotating parts	1.718 lb-in^2
Maximum radial bearing load at maximum speed	63 lbs
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x 0.19 (4.83) Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B on 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B on 2.062 BC
METRIC BORES				
.7874-.7894 (20.0 H9)	.2356-.2368 (5.985-6.015)	.8976-.9015 (22.800-22.900)	2x M5 x 0.8 x 5.00 Nom. Lg. Hex Skt. Set Screw	3x M6 x 1.0 on 52.38 BC
.9842-.9862 (25.0 H9)	—	—	2x 4.87-5.14	3x M6 x 1.0 on 52.38 BC

SAC-6
Component Parts

Split Cam Design

Retaining Ring | Drive Sleeve | Stop Cam | Coupling Sleeve | Brake Sleeve

(Sizes 5 & 6 only)

For assembly and disassembly see page 96.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.**
1	Retaining Ring		748-1-0038
2	Input Hub Anti-Overrun		540-6-0003
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0726
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Output Assembly 0.750 Bore 1.000 Bore		824-6-0002 824-6-0003
6	Brake Hub		540-6-0001
7	Plate Assembly	CW CCW	686-6-0076 686-6-0077
8	Actuator Assembly Includes Plunger	CW CCW	102-1-0032 102-1-0033
9	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		101-1-0028 101-1-0058 101-1-0027 101-1-0030

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.**
9a	Flatwasher (2)		950-1-0006
9b	Lockwasher – Split (2)		950-1-0020
9c	Skt. Head Cap Screw (2)		797-1-0044
10	Headless Skt. Set Screw (0.75 Bore only)		797-1-0162
11	Button Head Cap Screw (3)		797-1-0243
12	Sleeve		803-6-0014
13	Shim (2)		807-1-0001
*14	Shim 0.005 0.010		807-1-0014 807-1-0017
15	Spacer		807-1-9001
Options			
A	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
B	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004

Shims used as required

ACCE Series
Solenoid Actuated, Accumulating Conveyor Clutches

Solenoid actuated for start-stop operation

The ACCE accumulating conveyor clutch offers extraordinary performance and durability.

Designed expressly for industrial use, ACCE units are suitable for indexing and rapid cycling in heavy-duty machining such as packaging equipment and conveyors.

Operation

With the stop collar released and the input hub rotating in a specified direction, the lay of helical spring around the input and output hubs is such that the spring grips both hubs, connecting them in a positive-displacement drive.

If the stop collar is engaged, the spring tang connected to it is forced back, and the spring opens. This allows the input hub to continue rotating without transmitting torque to the output hub.

The solenoid actuator provides for the

electrical control of engagement through the stop collar (power ON-clutch driving; power OFF-clutch disengaged).
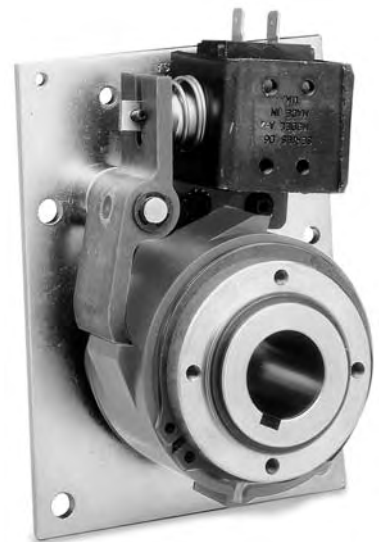
The heavy-duty actuator is offered as a simple laminated AC solenoid actuated mechanical device to operate in conjunction with PSI–6, –8 and ACCE clutches. Mounted in the proper proximity to the clutches, it will control single, multiple or partial revolutions. It is designed as a no power, no revolution device. The actuator is ruggedly constructed for maximum strength and long life.
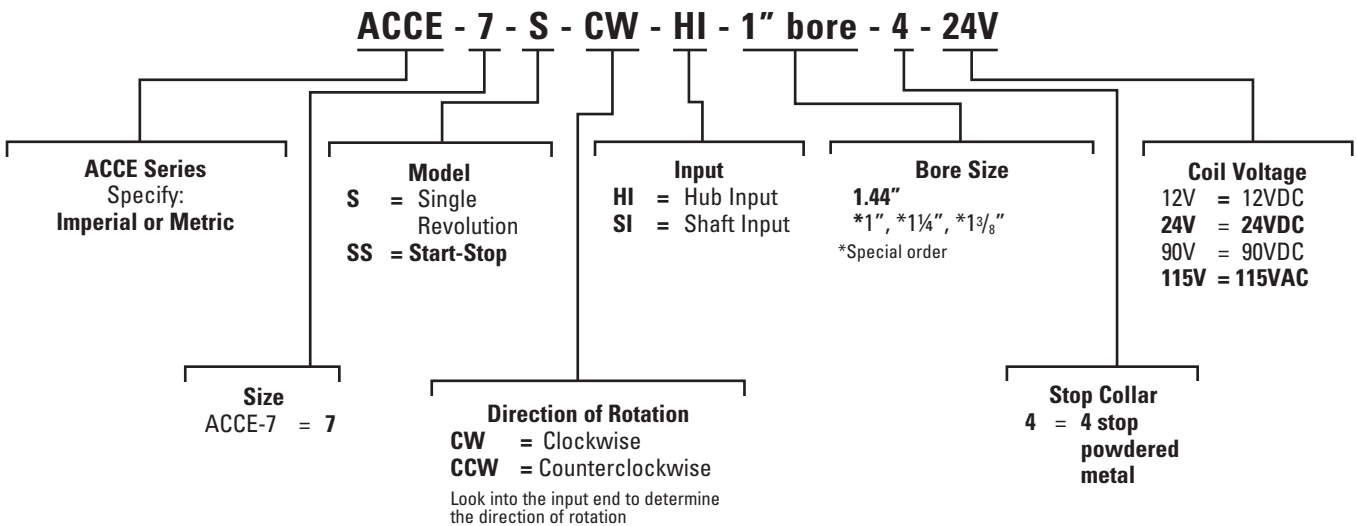
Terminals

1/4" spade lug connectors

Features

• Low cost
• Trouble-free design for long life
• Complete package for immediate installation
• High torque, 1500 lb.-in. at speeds to 400 RPM
• 2500 lb.-in. available, consult factory
• RoHS compliant

Typical Applications

• Material conveyors
• Packaging equipment

How to order

ACCE - 7 - S - CW - HI - 1" bore - 4 - 24V

ACCE Series Specify: **Imperial or Metric**	**Model** S = Single Revolution SS = Start-Stop	**Input** HI = Hub Input SI = Shaft Input	**Bore Size** 1.44" *1", *1¼", *1³/₈" *Special order	**Coil Voltage** 12V = 12VDC 24V = 24VDC 90V = 90VDC 115V = 115VAC

Size ACCE-7 = 7	**Direction of Rotation** CW = Clockwise CCW = Counterclockwise Look into the input end to determine the direction of rotation		**Stop Collar** 4 = 4 stop powdered metal

OPTIONS	
Pneumatic Actuators	See page 68

INDEX

ACCE Clutch
Dimensions

Dimensions (mm)
Mounting requirements see pages 91 & 92.

| PERFORMANCE	

Static torque
   Standard
   Heavy Duty
	1,500 lb-in
	(2,500 lb-in available)
	Consult factory

Inertia, rotating parts	2.0 lb-in²
Maximum radial bearing load at maximum speed	150 lbs
Maximum operating speed	400 RPM
Response time, voltage on at full speed	60 MS
Weight	12 lbs.

ELECTRICAL DATA		
Voltage	Current (amps)	Resistance (ohms)
115 AC 60 Hz	0.334*	57.5
24 DC	0.586	41.0
12 DC	1.150	10.4
90 DC	0.151	598.0

(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	#1/4-20 x 0.5 Hex Skt. Set Screw	4x #10-32 UNF on 2.125 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	#1/4-20 x 0.5 Hex Skt. Set Screw	4x #10-32 UNF on 2.125 BC
1.3755-1.3775 (34.937-34.989)	—	—	2x 0.376-0.382 Hole @ 180°	4x #10-32 UNF on 2.125 BC
1.4380-1.4400 (STD) (36.525-36.576)	—	—	2x 0.376-0.382 Hole @ 180°	4x #10-32 UNF on 2.125 BC

ACCE Clutch
Component Parts
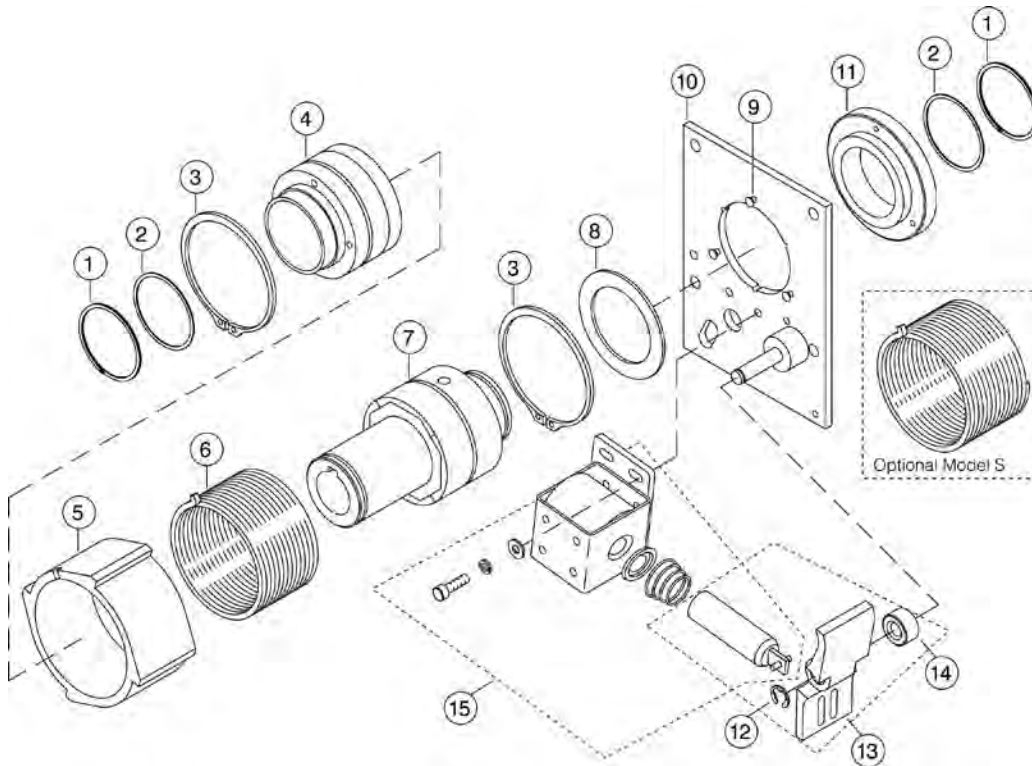
Optional Model S

For assembly and disassembly see page 96.

COMPONENT PARTS			
Item	Description	Rotation	Part No.
1	Retaining Ring (2)		748-1-0213
2	Thrust Washer (2)		950-7-0003
3	Retaining Ring (2)		748-1-0022
4	Hub Assembly		541-7-0016
5	Control Collar		266-7-9024
6	Drive Spring, HI/SI	CW CCW	808-7-0003 808-7-0004

7	Shaft Assembly
	  1.000″
	  1.250″
	  1.375″
	  1.440″
			
			824-7-0058
			824-7-0059
			Consult factory
			824-7-0060

8	Washer		950-7-0005

COMPONENT PARTS			
Item	Description	Rotation	Part No.
9	Flat Head Cap Screw (3)		797-1-0373
10	Plate Assembly	HI-CW/SI-CCW HI-CCW/SI-CW	686-7-0001 686-7-0002
11	Plate Bearing		166-7-0001
12	Retaining Ring		748-1-0044
13	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
14	Actuator Spacer		807-1-9001

15	Coil Assembly
	"D" Frame
	  24 DC
	  115 AC
	  12 DC
	  90 DC
			
			101-1-0028
			101-1-0058
			101-1-0027
			101-1-0030

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ACCM Series
Mechanically Actuated, Accumulating Conveyor Clutches

Heavy-duty operation

The ACCM accumulating conveyor clutch offers extraordinary performance and durability.

Designed specifically for industrial equipment applications, ACCM clutches are suitable for indexing, rapid cycling and positive displacement clutching drives.

Operation

With the stop collar released and the input hub rotating in a specified direction, the lay of helical spring around the input and output hubs is such that the spring grips both hubs, connecting them in a positive-displacement drive.

If the stop collar is engaged, the spring tang connected to it is forced back, and the spring opens. This allows the input hub to continue rotating without transmitting torque to the output hub.

Features

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque, 1500 lb.-in. at speeds to 400 RPM
- 2500 lb.-in. available, consult factory.
- RoHS compliant

Available in three design styles

Standard: Model SS–Start-Stop

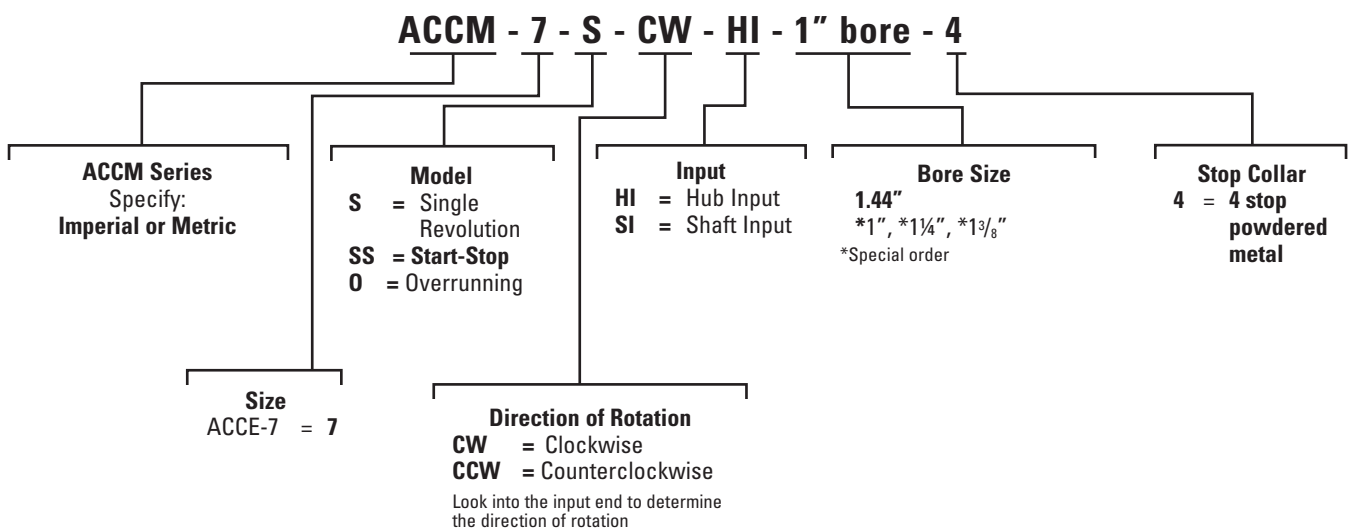Optional: Model S–Single Revolution
           Model O–Overrunning

Typical Applications
- Material conveyors
- Packaging equipment

CLUTCHES

THE GENUINE
WRAP SPRING™

How to order

ACCM - 7 - S - CW - HI - 1" bore - 4

ACCM Series
Specify:
Imperial or Metric

Size
ACCE-7 = **7**

Model
S   = Single Revolution
SS = **Start-Stop**
O = Overrunning

Direction of Rotation
CW   **=** Clockwise
CCW   **=** Counterclockwise
Look into the input end to determine the direction of rotation

Input
HI **=** Hub Input
SI **=** Shaft Input

Bore Size
1.44"
*1", *1¼", *1³/₈"
*Special order

Stop Collar
4 **=** **4 stop powdered metal**

ACCM Clutch
Dimensions & Specifications

E
.75 MAX THREAD
(19.05) ENGAGEMENT

3.75
(95.25)

1.66
(42.16)

.51
(12.95)

.80
(20.32)

.225
(5.72)

Ø 1.873-1.875
(47.57-47.63)

Ø 2.50
(63.50)

2.52
(64.01)

4.38
(11.13)

D

Dimensions (mm)

4x .19
(4.83)

Ø 3.16
(80.26)

B

C

A

BORE DETAIL

PERFORMANCE	

Static torque
    Standard
    Heavy Duty
	1,500 lb-in
	(2,500 lb-in available)
	Consult factory

Inertia, rotating parts	2.0 lb-in^2
Maximum radial bearing load at maximum speed	150 lbs
Maximum operating speed	400 RPM
Response time, voltage on at full speed	60 MS
Weight	4 lbs.

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	#1/4-20 x 0.5 Hex Skt. Set Screw	4x #10-32 UNF on 2.125 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	#1/4-20 x 0.5 Hex Skt. Set Screw	4x #10-32 UNF on 2.125 BC
1.3755-1.3775 (34.937-34.989)	—	—	2x 0.376-0.382 Hole @ 180°	4x #10-32 UNF on 2.125 BC
1.4380-1.4400 (STD) (36.525-36.576)	—	—	2x 0.376-0.382 Hole @ 180°	4x #10-32 UNF on 2.125 BC

ACCM Clutch
Component Parts

Model SS only
Model S consult factory
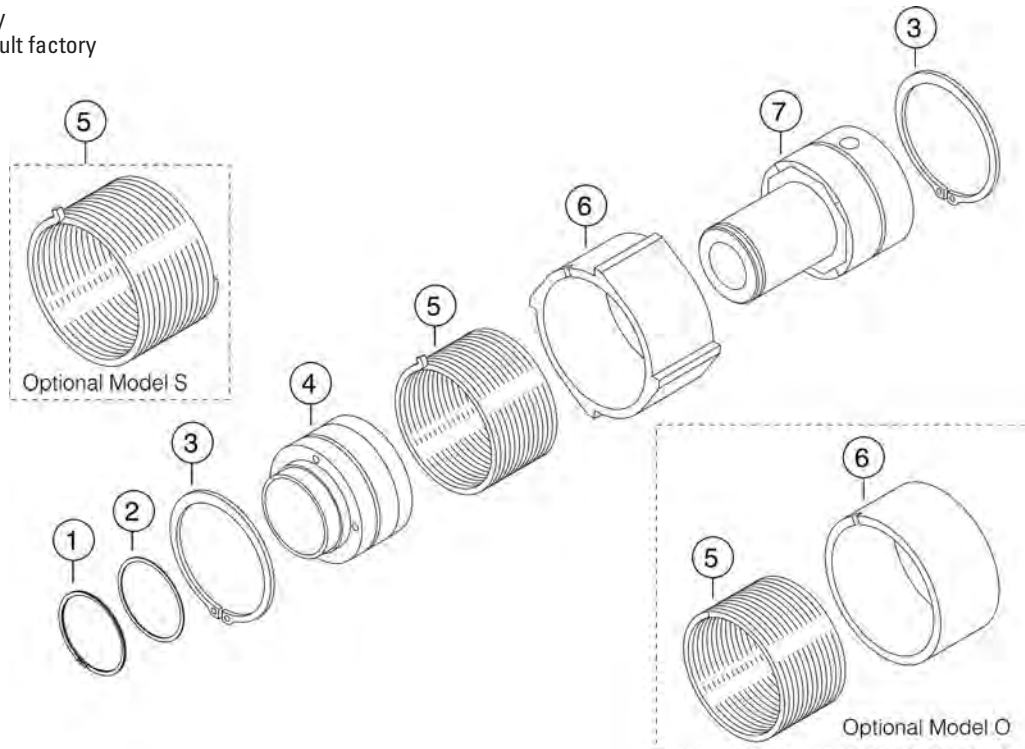
For assembly and disassembly see page 96.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.**
1	Retaining Ring		748-1-0213
2	Thrust Washer		950-7-0003
3	Retaining Ring (2)		748-1-0022
4	Free Hub		541-7-0016
5	Drive Spring Model SS	CW CCW	808-7-0003 808-7-0004
6	Control Collar	CW CCW	266-7-9024 266-7-9024
7	Shaft Assembly 1.000″ 1.250″ 1.375″ 1.440″		 Consult factory Consult factory Consult factory 824-7-0053

*Note: Consult factory for heavy duty parts.

PSI Series
Mechanically Actuated, Basic Wrap Spring Clutch Design

Ideal for Overrunning, Start-Stop and Single Revolution Applications.

PSI Series clutches represent the most fundamental wrap spring clutch design. As a start-stop or single revolution clutch, it is actuated simply by external blocking or releasing of the stop collar. As a simple overrunning clutch it provides positive engagement of load to power source, but permits free overrunning when input power is slowed, stopped or reversed.

All units can be supplied with hub input/ shaft output or vice versa. Designed for applications where direct mechanical control is desired, the PSI Series clutch is a reliable, easily applied, low cost solution.
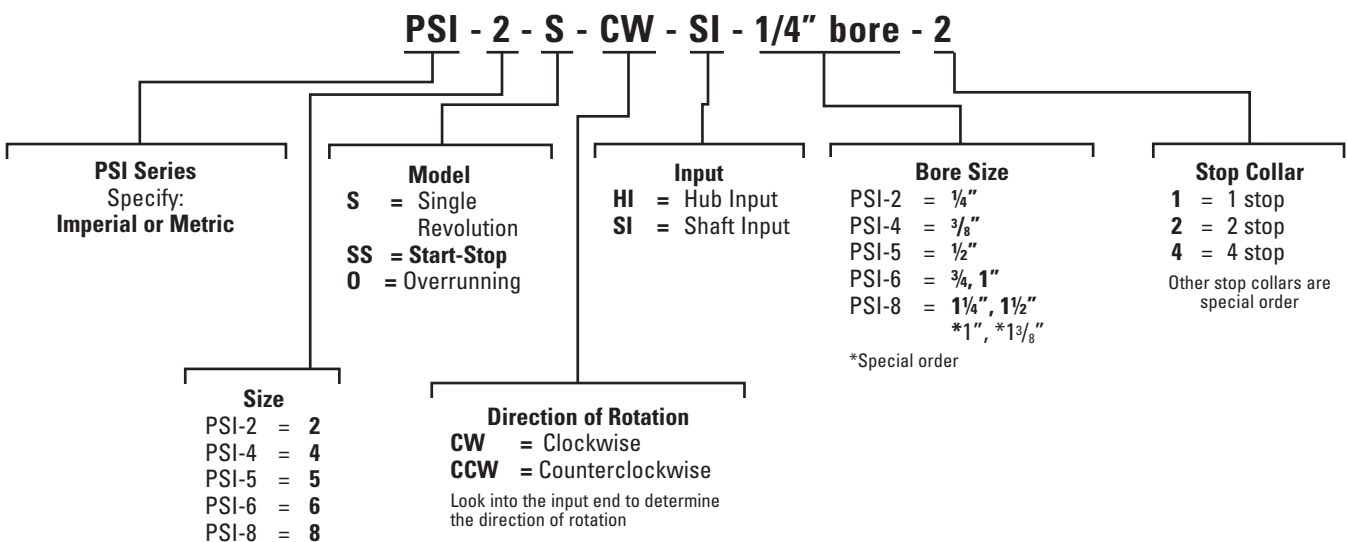
Features
- Single revolution models can stop 10% of rated drive torque capacity
- Mechanically actuated clutches
- 5 models fit ¼″ to 1½″ shafts
- Torque ranges from 25 lb.-in. to 2500 lb.-in.
- Single revolution, start-stop or overrunning clutch functions
- RoHS compliant

Typical Applications
- Business machines
- Copying machines
- Material handling conveyors
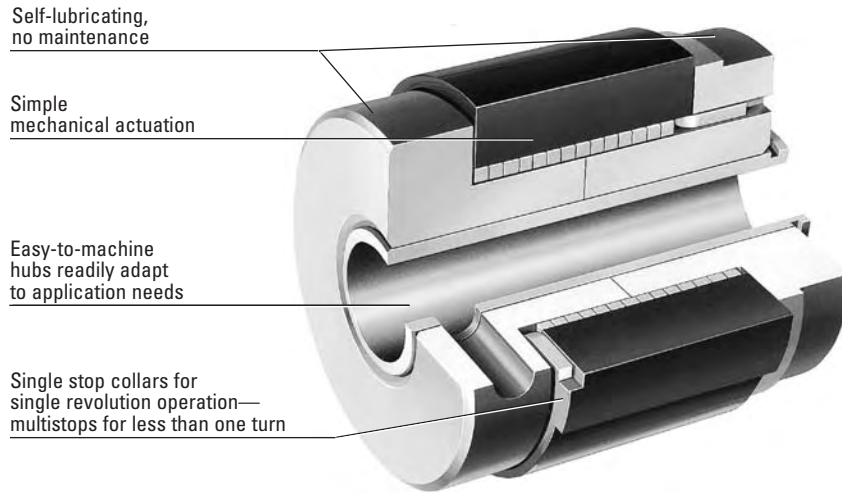- Packaging equipment
- Ribbon drives

How to order

PSI - 2 - S - CW - SI - 1/4″ bore - 2

PSI Series
Specify: **Imperial or Metric**

Model
S = Single Revolution
SS = Start-Stop
O = Overrunning

Input
HI = Hub Input
SI = Shaft Input

Bore Size
PSI-2 = ¼″
PSI-4 = ³/₈″
PSI-5 = ½″
PSI-6 = ¾, 1″
PSI-8 = 1¼″, 1½″
*1″, *1³/₈″
*Special order

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order

Size
PSI-2 = 2
PSI-4 = 4
PSI-5 = 5
PSI-6 = 6
PSI-8 = 8

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise
Look into the input end to determine the direction of rotation

OPTIONS	
Stop Collars	See page 67

INDEX

PSI Series
Wrap Spring Clutch Specifications & Capabilities

Self-lubricating,
no maintenance

Simple
mechanical actuation

Easy-to-machine
hubs readily adapt
to application needs

Single stop collars for
single revolution operation—
multistops for less than one turn

| PERFORMANCE						
		PSI-2	**PSI-4**	**PSI-5**	**PSI-6**	**PSI-8**
Static torque		25 lb-in (2.825 Nm)	120 lb-in (13.56 Nm)	250 lb.in (28.25 Nm)	500 lb.in (56.5 Nm)	2500 lb.in (282.5 Nm)
Inertia, rotating parts	SI HI	0.006 lb-in² 0.008 lb-in²	0.015 lb-in² 0.023 lb-in²	0.059 lb-in² 0.069 lb-in²	0.570 lb-in² 0.73 lb-in²(0.75 bore) 0.68 lb-in²(1.00 bore)	4.990 lb-in² 11.91 lb-in²(1.25 bore) 11.60 lb-in²(1.50 bore)
Weight		0.132 lbs.	0.22 lbs.	0.62 lbs.	2.60 lbs.	8.25 lbs.
Maximum radial bearing load at max. speed		6.75 lbs.	13.50 lbs.	31.50 lbs.	63.0 lbs.	300.0 lbs.
Maximum operating speed		1,800 RPM	1,200 RPM	750 RPM	500 RPM	300 RPM

Operation Capabilities

Overrunning Model O

The overrunning clutch (Model O) transmits torque up to the rated value in the positive direction, when disengaged it only transmits some drag torque in the reverse direction. Major applications for this unit are anti-overrun protection and anti-backup devices.

Output

Input
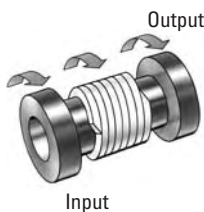
Start-Stop (random positioning) Model SS

The start-stop clutch (Model SS) accelerates the load just after the control collar has been released, thus the collar is free to rotate allowing the spring to grip both hubs together. To disconnect the clutch, the collar must be restrained, stopping the collar from rotating via the stop face. The spring will then be opened and the clutch will be disengaged. The output is free to rotate and will be stopped by system friction and clutch drag torque.

Control Tang
Output
Input
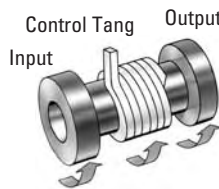
Single Revolution Model S

The single revolution clutch (Model S) accelerates in the same manner as the model SS. The deceleration starts when the collar is restrained, and the spring is opened, disengaging the clutch.
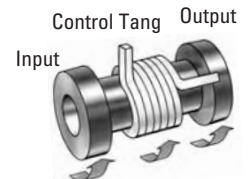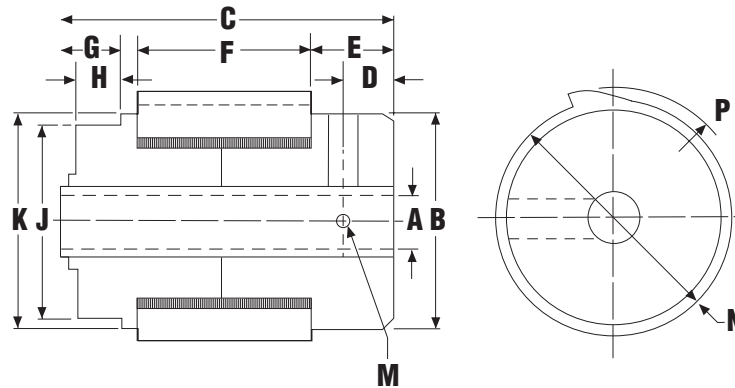
For Model S, the brake torque capability is limited to 10% of the rated torque.

All PSI Series clutches are easy to install. The shaft can be pinned or, on larger units, delivered with keyways.

Control Tang
Output
Input

PSI-2, PSI-4, PSI-5 Clutches
Dimensions & Specifications

Dimensions (mm)

									J	K		P
Model	Torque lb-in	B	C	D	E	F	G	H	Dia	Dia.	N	Rad.
PSI-2	25	0.94 (23.90)	1.25 (31.75)	0.16 (4.10)	0.34 (8.60)	0.49 (12.4)	0.33 (8.40)	0.25 (6.35)	0.8765-0.8775 (22.263-22.289)	0.94 (23.9)	1.00 (25.4)	0.57 (14.76)
PSI-4	120	1.25 (31.75)	1.38 (35.05)	0.16 (4.05)	0.28 (7.10)	0.68 (17.27)	0.34 (8.64)	0.25 (6.35)	1.1265-1.1275 (28.639-28.613)	1.25 (31.75)	1.31 (33.27)	0.72 (18.29)
PSI-5	250	1.56 (39.60)	1.88 (47.75)	0.22 (5.56)	0.38 (9.70)	1.00 (25.4)	0.34 (8.64)	0.25 (6.35)	1.502-1.503 (38.15-38.18)	1.56 (39.60)	1.69 (42.93)	0.96 (24.38)

Table header: **DIMENSIONS (mm)**

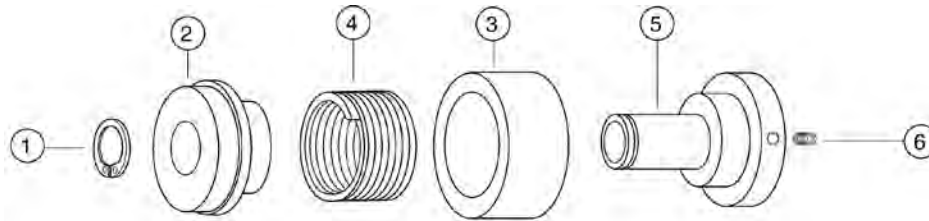| BORE DATA		
Model	Bore A	M
PSI-2	0.2515-0.2525 (6.36-6.39)	#8-32
PSI-4	0.376-0.378 (9.55-9.61)	0.125 Dia. (3.175 Dia.)
PSI-5	0.501-0.503 (12.725-12.776)	0.188 Dia. (4.775 Dia.)
METRIC BORES		
PSI-2	0.2362-0.2374 (6.0 H9)	M3 x 0.5, 5.0 Lg. Set Screw (2@120)°
PSI-4	0.3937-0.3951 (10.0 H9)	M4 x 0.7, 5.0 Lg. Set Screw (2@120)°
PSI-5	0.4724-0.4741 (12.0 H9)	0.197 Dia. (5.0 Dia.)

PSI-2, PSI-4, PSI-5 Clutches
Component Parts
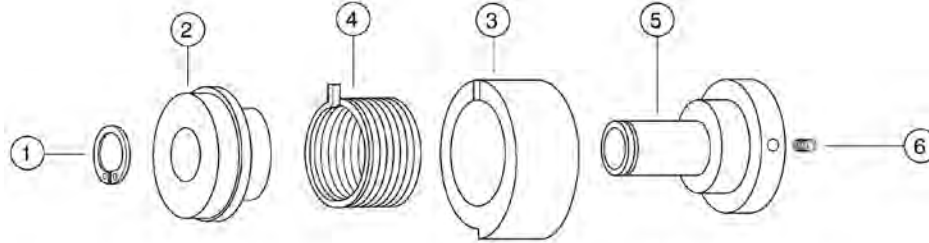
Model "O"

Model "SS"

Model "S"
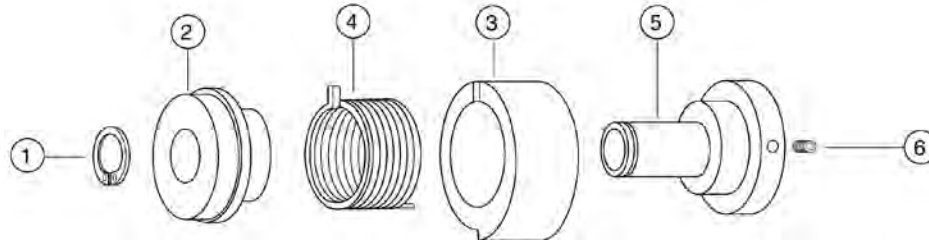
| COMPONENT PARTS					
Item	Description	Rotation	PSI-2 Part No.	PSI-4 Part No.	PSI-5 Part No.
1	Retaining Ring		748-1-0005	748-1-0087	748-1-0090
2	Free Hub		540-2-0047	540-4-0027	540-5-0113
3	Control Collar	CW	266-2-9046	266-4-9005	266-5-9010
		CCW	266-2-9046	266-4-9005	266-5-9010
		Model O	287-2-0003	287-4-0001	287-5-0015
4	Drive Spring	Model S CW	808-2-0036	808-4-0024	808-5-0030
		Model S CCW	808-2-0037	808-4-0030	808-5-0034
		Model SS CW	808-2-0051	808-4-0026	808-5-0031
		Model SS CCW	808-2-0052	808-4-0033	808-5-0035
		Model O CW	808-2-0040	808-4-0042	808-5-0033
		Model O CCW	808-2-0041	808-4-0043	808-5-0037
5	Shaft Assembly		824-2-0048	824-4-0037	824-5-0110
6	Headless Skt. Set Screw		797-1-0152	0.125 dia. hole	0.188 dia. hole

CLUTCHES

THE GENUINE
WRAP SPRING™

PSI-6, PSI-8 Clutches
Dimensions & Specifications

PSI-6
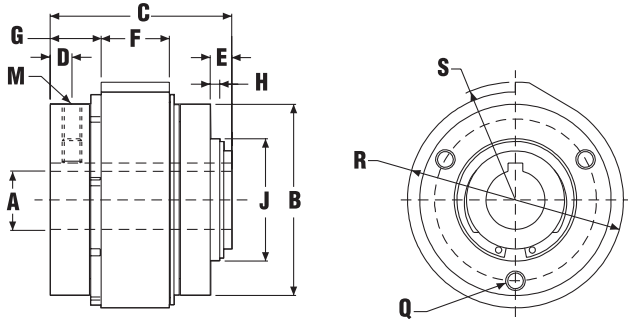
PSI-8
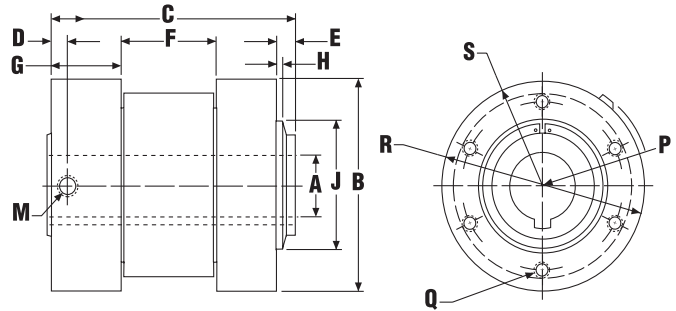
Dimensions (mm)
For assembly and disassembly see page 96.

| DIMENSIONS (mm)											
Model	Torque lb-in	B Dia.	C	D	E	F	G	H	J Dia	R Dia.	S Rad.
PSI-6	500	Ø 2.437 Ø (61.90)	2.312 (58.72)	0.28 (7.10)	0.27 (6.86)	0.87 (22.1)	0.63 (16.00)	0.12 (3.05)	1.559-1.562 (39.60-39.67)	2.75 (69.85)	1.50 (38.1)
PSI-8	2500	Ø 4.00 Ø (101.6)	4.25 (107.95)	0.62 (15.75)	0.35 (8.89)	2.20 (55.9)	1.27 (32.26)	0.188 (4.78)	2.372-2.374 (60.25-60.30)	4.00 (101.6)	2.00 (50.8)

BORE & KEYWAY DATA					
Model	Bore A	Keyway Width B	Keyway Height C	M	Q
PSI-6	0.7505-0.7525 (19.063-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.52	#1/4-20 Tap	#1/4-20 x 1/2 DP 3 on 2.062 BC Max. Thread Engage Free Hub 0.312
PSI-6	1.0005-1.0025 (25.412-25.464)	—	—	0.25 Dia. (6.35)	#1/4-20 x 1/2 DP 3 on 2.062 BC Max. Thread Engage Free Hub 0.312
PSI-8	1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	3/8-16 Tap 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.3755-1.3775 (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
METRIC BORES					
PSI-6	0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.80-22.90)	M5 x 0.8 Tap	M6 x 1.0 THD 3 Holes on a 52.37 BC
PSI-6	0.9842-0.9862 (25.0 H9)	—	—	5.0 Dia. (1.97 Dia.)	M6 x 1.0 THD 3 Holes on a 52.37 BC
PSI-8	1.378-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.508-1.516 (38.30-38.50)	M10 x 1.5, 25.0 Lg. Set Screw 2 @ 120°	M8 x 1.25 THD 6 Holes on a 85.73 BC
PSI-8	1.5748-1.5772 (40.0 H9)	—	—	M10 x 1.5, 25.0 Lg. Set Screw 2 @ 120°	M8 x 1.25 THD 6 Holes on a 85.73 BC

INDEX

PSI-6, PSI-8 Clutches
Component Parts

Model "O"

Model "SS"

Model "S"
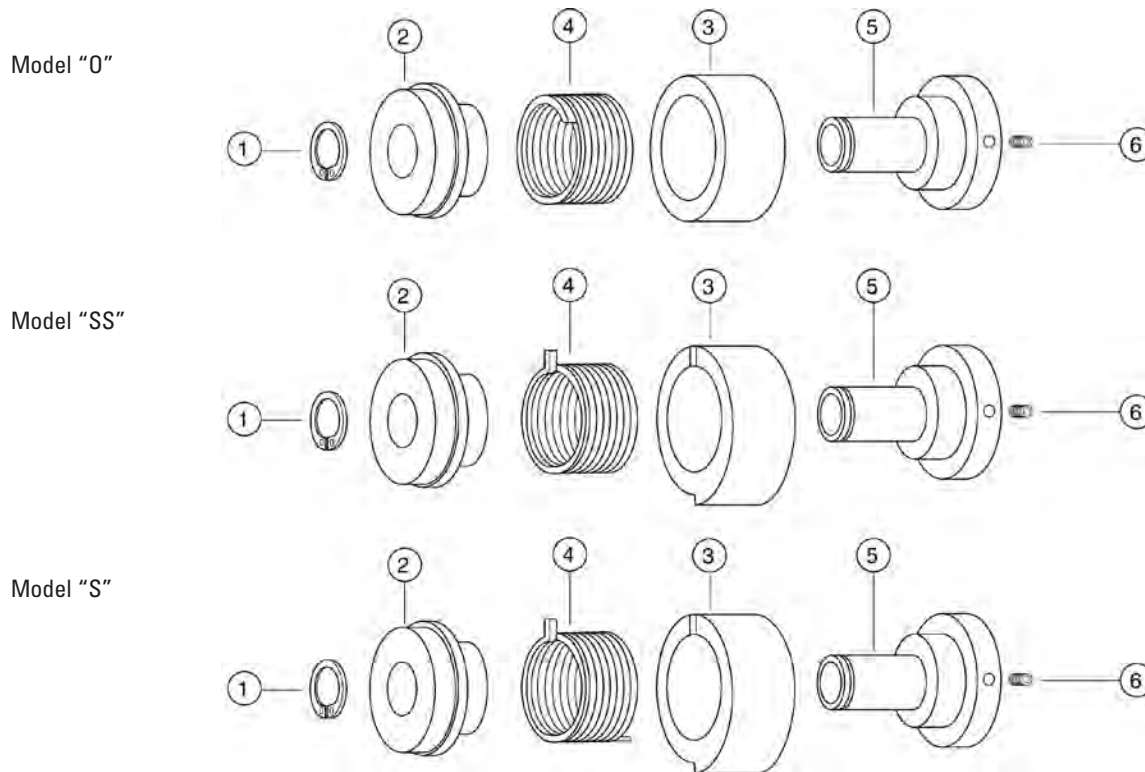
COMPONENT PARTS				
Item	Description	Rotation	PSI-6 Part No.	PSI-8 Part No.
1	Retaining Ring		748-1-0038	748-1-0039
2	Free Hub		540-6-0009	540-8-0014
3	Control Collar	CW	266-6-0301	266-8-0127
		CCW	266-6-0401	266-8-0127
		Model O	287-6-0001	287-8-0002
4	Drive Spring	Model S CW	808-6-0001	808-8-0011
		Model S CCW	808-6-0002	808-8-0012
		Model SS CW	808-6-0007	808-8-0013
		Model SS CCW	808-6-0008	808-8-0014
		Model O CW	808-6-0009	808-8-0015
		Model O CCW	808-6-0010	808-8-0016
5	Shaft Assembly		0.75" 824-6-0052	1.000" 824-8-0213
			1.00" 824-6-0056	1.250" 824-8-0212
				1.375" 824-8-0211
				1.500" 824-8-0210
6	Headless Skt. Set Screw		797-1-0174	797-1-0199 (2)

Dust Cover Clutch Enclosures
Provide protection from contaminants for Super CB, CB and SAC Series Models

Plastic Clutch Cover

We offer plastic enclosures designed to complement the following clutches: Super CB-6, -8, -10; CB-2, -4, -5, -6, -8, -10 and SAC-2, -4, -5, -6.

Plastic Cover

• Protect units from dirt, contaminants and moisture
• Help to assure longer life
• Flexible soft plastic construction is very durable
• Simple to remove and reinstall
• Low cost

Plastic

Model	Part No.
Super CB-6	287-6-0007
Super CB-8	287-8-0003
Super CB-10	287-0-0002
CB-2	287-2-0007
CB-4	287-4-0002
CB-5	287-5-0007
CB-6	287-6-0007
CB-8	287-8-0003
CB-10	287-0-0002
SAC-2	287-2-0007
SAC-4	287-4-0002
SAC-5	287-5-0007
SAC-6	287-6-0007

Aluminum Clutch Cover Kits

The environmentally designed cast aluminum enclosure will protect a CB-6, Super CB-6 or SAC-6 clutch from indoor and outdoor hazards such as falling dirt, non-corrosive liquids, dust, rain, sleet and snow.

• Sturdy cast aluminum construction
• Offers NEMA 3 & 12 protection
• Can be installed at any time
• Quieter clutch operation
• USDA Approved Black Powder Coat Paint Finish

Benefits

• Prevents premature failure of clutches caused by moisture, dust and debris
• Extends clutch life
• Seals and protects bearings
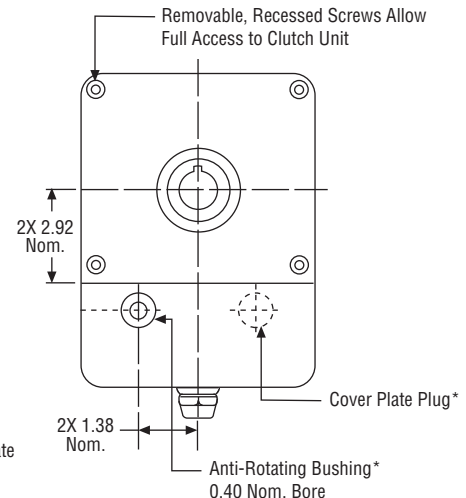• Reduces clutch operating temperature

Typical Applications

• Food processing
• Packaging
• Material handling
• Medical equipment
• Agriculture

Aluminum
(Size 6 only)

Model	Part No.
Super CB-6	101-6-0096
CB-6 (Std.)	101-6-0095
SAC-6	101-6-0095

Note: A kit contains all components and hardware necessary to enclose a Super CB-6, CB-6 and SAC-6 clutch.

Dimensions (Aluminum)

5.30 Nom.
7.18 Nom.
.88 Nom.

3.734 Nom.
.812 Nom.
3.00 Nom.
Shaft Seal
Hub/Shaft Shield
Hub Seal
Clutch
Cover
Egress for Coil Lead Wires (Accepts 0.231-.394 Cable)
Cover/Cover Plate Seal
Cover Plate

Removable, Recessed Screws Allow Full Access to Clutch Unit
2X 2.92 Nom.
2X 1.38 Nom.
Cover Plate Plug*
Anti-Rotating Bushing* 0.40 Nom. Bore
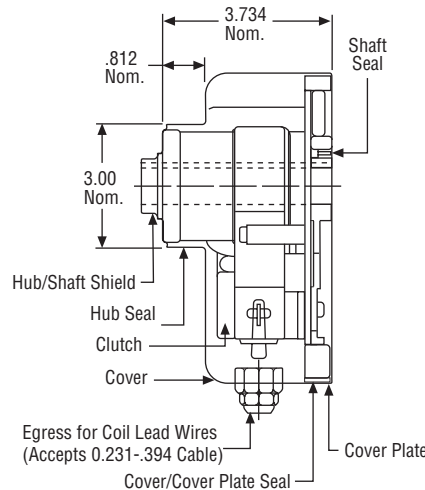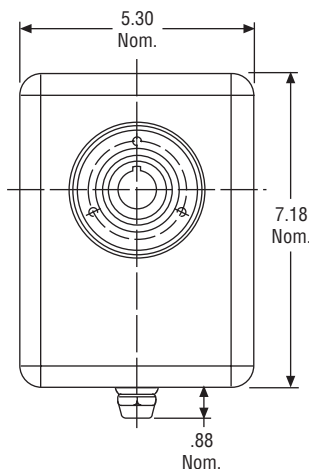
Stop Collars
Specifications and Adjustments

Stop Collars

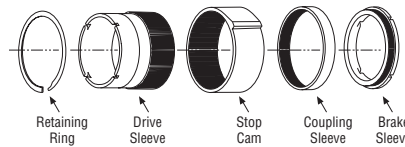| Stop Collars			
Model	**Collar Type**	**Stops**	**Status**
Super CB	Reinforced Plastic with steel insert Reinforced Plastic	1, 2 or 4 3, 5 through 24 stops	Standard Optional
Standard CB	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
PSI	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
SAC	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
ACCM	Powder Metal	4	Standard
ACCE	Powder Metal	4	Standard

* Consult factory for complete information

Stop Collar Adjustments

Unique splined stop collars are a standard feature of Super and Standard CB, as well as the PSI and SAC model clutches. These stop collars can be adjusted radially in fine increments. This feature allows the user to reposition the output to comply with specified shaft and keyway placements. Standard stop collar positioning increments are shown at right.

Split Cam Design

Retaining Ring   Drive Sleeve   Stop Cam   Coupling Sleeve   Brake Sleeve

The Split Cam stop collar design is a standard feature on Super CB Sizes 5, 6, 7, 8; Standard CB Sizes 5, 6, 7, 8 and SAC Sizes 5, 6.

#### Traditional Cam Design

Retaining Ring   Stop Cam   Sleeve
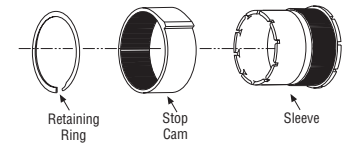
The Cam stop collar design is a standard feature on Super CB Size 10; Standard CB Sizes 2, 4, 10 and SAC Sizes 2, 4.

Stop Collar Removal and Adjustment

To adjust the stop collar, remove retaining ring A, slide cam B off sleeve C, rotate the cam to the desired position, slide it onto the sleeve again, and replace the retaining ring.

A Retaining Ring
B Cam
C Sleeve
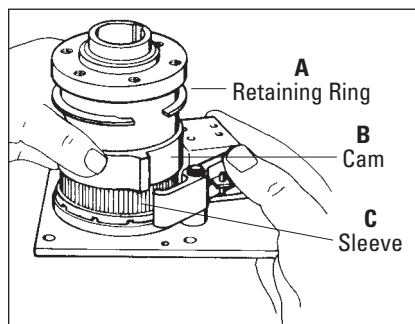
Note: While adjusting the stop collar on split cam units, the coupling sleeve must be held secure so that it does not move.

Standard Stop Collar Adjustments			
Series	**Size**	**Collar Design**	**Adjustment**
Super CB	CB-5	Split Cam	1.8°
Super CB	CB-6	Split Cam	1.8°
Super CB	CB-7	Split Cam	1.6°
Super CB	CB-8	Split Cam	1.6°
Super CB	CB-10	Cam	1.5°
Standard CB	CB-2	Cam	2.8°
Standard CB	CB-4	Cam	2.4°
Standard CB	CB-5	Split Cam	1.8°
Standard CB	CB-6	Split Cam	1.8°
Standard CB	CB-7	Split Cam	1.6°
Standard CB	CB-8	Split Cam	1.6°
Standard CB	CB-10	Cam	1.5°
SAC	SAC-2	Cam	2.8°
SAC	SAC-4	Cam	2.4°
SAC	SAC-5	Split Cam	1.8°
SAC	SAC-6	Split Cam	1.8°

Consult factory for complete information on non-standard stop collars.

Heavy Duty Actuator
## For use with PSI-6, PSI-8 and ACCM Series Clutches

The Heavy Duty Actuator is offered as a simple laminated AC solenoid actuated mechanical device to operate in conjunction with the PSI-6 and PSI-8 clutches. Mounted in the proper proximity to the clutches, it will control single, multiple, or partial revolution. It is designed as a no power, no revolution device. Ruggedly constructed from steel and nylon for maximum strength and long life.

Operation

When voltage is applied to the coil, the stop block is pulled back from the clutch stop collar allowing the clutch to engage. It is not necessary to hold power on the coil for the entire revolution. A pulse to the coil will allow the clutch to start, the return spring pressure on the collar will not disengage the clutch and the stop block will be in position to disengage the clutch after one revolution. No "On" timing is necessary.
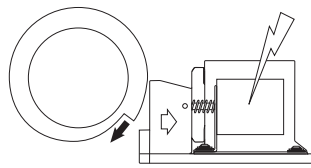
Energized
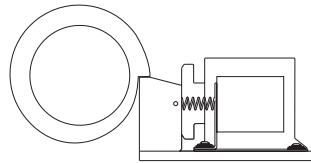
De-Energized

PN 901-00-002

Dimensions

SPECIFICATIONS	
Input	Line power 120 AC, 60 Hz
DC Resistance	14.5 ohms
Load current	In rush current 2.9 amps
Holding current	0.1 amps
Terminals	1/4" spade lug connections
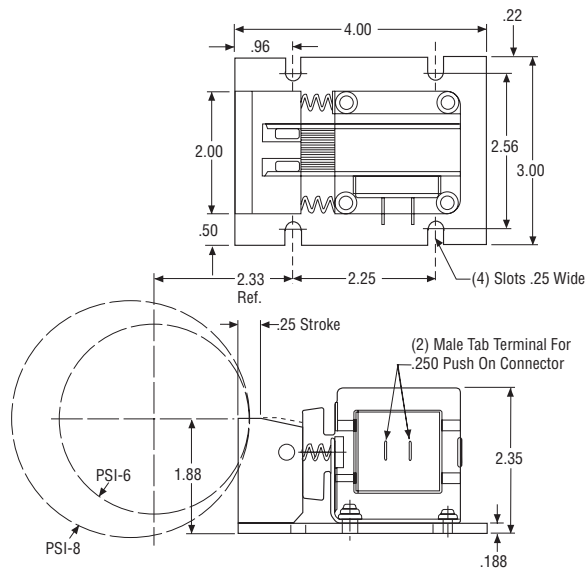
Pneumatic Actuation

Pneumatic actuation is available on the Standard CB-4, -5, -6, -7, -8 and -10 as well as the respective Super CB models; SAC-4, -5, -6, -8 and the ACCE clutches.

• No electrical sparks
• Not subject to power line voltage fluctuations
• Longer life of control members

Air pressure required: 4,5 - 16,5 bar

Retrofit kits available.
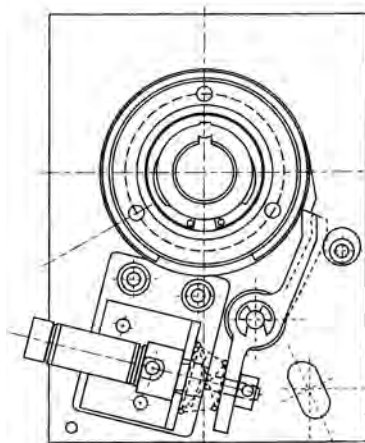
One Shot Power Supply
Plug-in Clutch/Brake Control

The One Shot Power Supply is a plug-in clutch/brake control designed for operation of D-frame, AC or DC wrap spring clutches and brakes. The One Shot provides a single voltage pulse of 160 or 325 VDC for approximately 20ms, whether the customer supplied switch is momentarily closed or held closed.

The One Shot Power Supply is UL® Listed when used with octal socket Part No. 805-1-0001, or DIN rail mount octal socket, Part No. 805-1-0002 (each purchased separately) and only UL-recognized when used with other sockets. This unit may be mounted in any convenient position using the two mounting holes provided on the socket. For use with D-frame coils only.

Note: Actuator Limit Stop required when using the One Shot Power Supply.

Actuating the single pole, double throw (SPDT) switch energizes the solenoid coil. Releasing or resetting the switch charges an internal capacitor. A minimum of 20 milliseconds cycle time is required between operations.

Installation

Warning: *To avoid serious injury, always make certain all power is off before attempting to install this control or any electrical equipment.*

1. Connect the two leads from the wrap spring solenoid to terminals 6 and 7 of the octal socket.

2. Connect the common of the relay to terminal 1 of the socket, the normally closed to terminal 2, and normally open to terminal 8.

3. Connect the HOT AC input wire to terminal 3 of the socket and the neutral wired to terminal 4.

SPECIFICATIONS	
Input	120/240 VAC, 50/60 Hz
Output	160/325 VDC peak, 3 amps max with 160 VDC output 5 amps max with 325 VDC output
Ambient Temperature	+32° to +122°F (0° to 50°C)
Cycle Rate	The maximum cycle rate is 200 CPM at 120V The maximum cycle rate is 100 CPM at 240V
Contact Rating	10 amp minimum

One Shot Control
PN 901-00-019
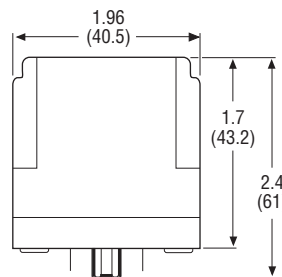
One Shot Control
PN 901-00-019
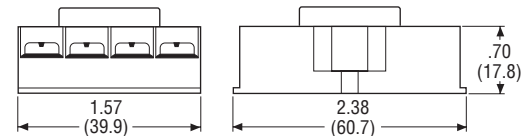
Dimensions (mm)

Octal Socket P/N 805-1-0001

DIN Rail Mount 05 P/N 805-1-0002

Connection Diagram

NOTE: ACTUATOR LIMIT STOP REQUIRED WHEN USING THE ONE SHOT POWER SUPPLY.

START

DL Series
DuraLIFE™ Clutches

DuraLIFE Series clutches (DL) are electro-mechanical wrap spring clutches that combine high torque, reliability and rapid acceleration into one small package at a very competitive cost. It is offered in two configurations: headed coil or flying leads.

Wrap spring technology provides very fast response to bring loads up to speed in less than 3 milliseconds (after spring wrap-down and depending on rpm).

The DL-33 is a drop-in alternative for high cost clutches used in office automation applications such as printers and copiers. The long life and reliable performance makes the DL-33 an ideal clutch for many packaging and automotive applications.

Features

• Wrap spring technology
• High torque, small package
• Rapid acceleration
• Consistent performance
• Low wattage required
• RoHS compliant

Applications

The DL-33 is suitable for high load, tight-fitting applications requiring quick response, rapid acceleration and high torque. These requirements are common in office automation, packaging and auto-motive markets.

Application Considerations

Single Direction
Wrap spring clutches provide torque only in the direction in which they wrap down. This allows for overrunning.

Relative High Shock
Due to the rapid acceleration of the DL-33, system inertia effects can be significant. In some applications, an in-line slip device may be used for shock absorption.

Engagement Relative to Speed
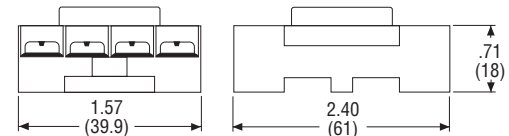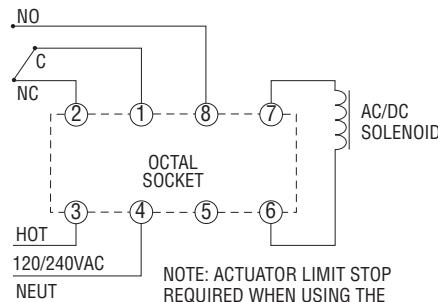The DL-33 relies on relative motion between the input and output for engage-ment. Thus the slower the speed, the lon-ger the time until engagement.

Typical Applications

Office Automation
• Copiers & Printers
• Paper feed systems
• Collators & Sorters
• Mailing equipment
• Ticket & receipt dispensers
Packaging
• Labeller
• Dispensing machines
• Conveyors
Automotive
• Cruise control
• Power lift gate
• Trunk cinch actuator systems
• Trunk power door closer

How to order

DL - 33 - HI - CW - 24 - MC - 1/4" - P

Series	Input	Coil Voltage	Electrical Connection	Drive Type
DL = DuraLIFE Clutch Imperial Metric	**HI** = Hub Input **SI** = Shaft Input	**12** = 12DC **24** = 24DC **90** = 90DC	**MC** = Molded Connector **FL** = Flying Leads	**P** = Pin **D** = "D" Bore

Size	Direction of Rotation	Bore Size
30 = 30 mm **33** = 33 mm	**CW** = Clockwise **CCW** = Counterclockwise Look into the 3-lug drive end to deter-mine the direction of rotation	1/4" 5/16" 6mm 8mm

OPTIONS
3-Dog Drive Adapter
Flexible Coupling

START

DL-30 Clutches
Dimensions & Specifications
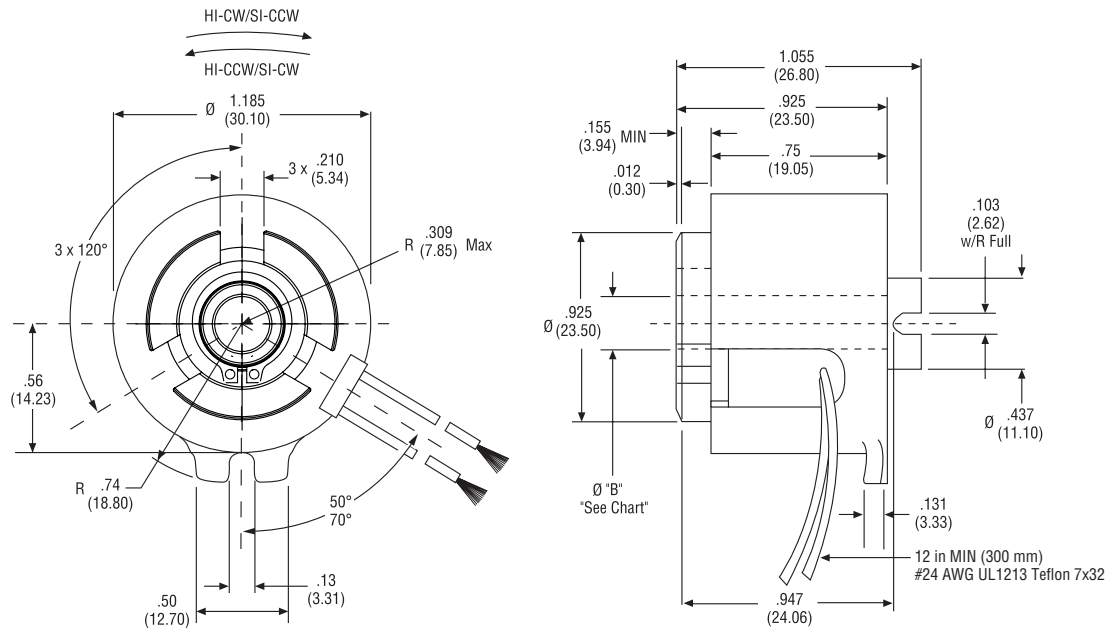
Dimensions (mm)
For more information see page 87.

PERFORMANCE	
Static torque	25 lb-in (2.8 Nm)
Inertia, rotating parts	0.016 lb-in^2
Maximum operating speed	1,200 RPM
Temperature	32°-140° F (0-60° C)
Cycle Life	15 x 10^6 @ 25 lb-in Total Load
Weight	0.22 lbs.

ELECTRICAL DATA			
Voltage*	Current (amps)	Resistance (ohms ±10%)	Status
24 DC	0.110	227.0	Standard
12 DC	0.243	49.0	Modification
90 DC			Available

*Custom voltages available

(Coils are rated for continuous duty; 3.5 watts nominal)

Molded connector or 12" flying leads

BORE DATA	
Bore Sizes	Bore B Ø
1/4 inch	0.2505-0.2530 (6.362-6.427)
5/16 inch	0.3130-0.3155 (7.950-8.014)
METRIC BORES	
6 mm	0.237-0.239 (6.01-6.09)
8 mm	0.315-0.319 (8.01-8.103)

Cross Pin or Standard "D" Bores available, consult factory.

THE GENUINE WRAP SPRING™

ENGINEERED PRODUCTS

START

DL-33 Clutches
Dimensions & Specifications

HI-CW/SI-CCW
1.
HI-CCW/SI-CW

.31
(7.87)

1.10 +.15/-.05
(27.94 +3.81/-1.27)

3X120°

Ø .737 MAX
(18.72)

Ø 1.05
(26.67)

Ø 1.312 -.010
(33.32 -0.25)

3X .210 -.003
(5.33 -0.08)

⊕ .005 (0.13) Ⓜ A Ⓜ

1.055 -.010
(26.80 -0.25)

.755 -.010
(19.18 -0.25)

.157 MIN
(4)

.272 -.010
(6.91 -0.25)

.096 -.010
(2.44 -0.25)

Ø .5115 -.0015
(12.99 -0.038)

Ø "B"

2X .103 -.003
(2.62 -0.08) RAD. FULL

⊕ .004 (0.01) Ⓜ A Ⓜ

.945 -.010
(24 -0.25)

.013 -.013
(0.33 -0.33)

FLYING LEADS
12 in LENGTH (300 mm)
#24 AWG
UL1213 Teflon 7x32

NOTES:

1. INPUT AND ROTATION (VIEWED THIS END):
   HUB INPUT-CW/SHAFT INPUT-CCW OR
   HUB INPUT-CCW/SHAFT INPUT-CW

RECOMMENDED MATING CONNECTORS:
    TERMINAL -   POLARIZED LATCHING
                   CRIMP ON CONTACTS
    HOUSING: AMP NO 104257-1
    CONTACTS:
            LOOSE: AMP NO 1-530151-0
            STRIP: AMP NO 530151-9
    ALTERNATE TERMINAL-
            INSUL. DISPLACEMENT CONTACTS
            ASSEMBLY - AMP NO 103956-1
            ASSEMBLY - MOLEX NO 70400-0141

Dimensions (mm)
For more information see page 87.

PERFORMANCE	
Static torque	30 lb-in (3.4 Nm)
Inertia, rotating parts	0.016 lb-in^2
Maximum operating speed	1,200 RPM
Temperature	32°-140° F (0-60° C)
Cycle Life	1 x 10^6 @ 30 lb-in Total Load
Weight	0.22 lbs.

ELECTRICAL DATA			
Voltage*	Current (amps)	Resistance (ohms ±10%)	Status
24 DC	0.130	185.0	Standard
12 DC	0.267	45.0	Standard
90 DC	0.034	2670.0	Standard

*Custom voltages available

(Coils are rated for continuous duty; 3.5 watts nominal)

Molded connector or 12" flying leads

BORE DATA	
Bore Sizes	Bore B Ø
1/4 inch	0.2505-0.2530 (6.362-6.427)
5/16 inch	0.3130-0.3181 (7.950-8.090)
METRIC BORES	
6 mm	0.237-0.239 (6.01-6.09)
8 mm	0.315-0.318 (8.01-8.09)

Cross Pin or Standard "D" Bores available, consult factory.

START

MAC Series
High Performance Clutches at a Low Cost

Years of experience in developing mag-netically actuated clutches for paper transport drives are all wrapped up in the MAC 30 & 45. These units meet the high-est industry performance standards at an outstanding price, using state-of-the-art engineering, materials, and processes.

- Wrap spring technology allows for very fast response to bring loads up to speed within 50 milliseconds (less depending on RPM)
- Exceeds industry life requirements with little cycle-to-cycle variation
- Enclosed construction effectively elimi-nates contaminants
- Electrical actuation for simple control interface
- Drag free, friction free operation results in less wear
- Unidirectional input
- Output freewheels when disengaged
- RoHS compliant

Design Advantages
- Optional new connector head plugs directly into wire harnesses
- Eliminate the need to custom fit lead lengths with new connector head
- No leads to get tangled or damaged with new connector head
- Rapid engagement time
- High torque to size ratio
- Simple construction – only three main assemblies
- High performance at low cost
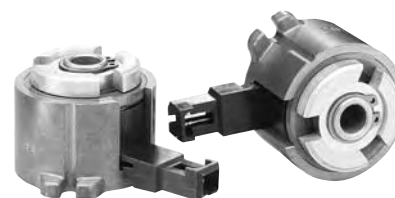
Typical Applications
- Paper transport drives
- Forms handling equipment
- Sheet feeders
- Conveyors
- Film processing machines
- Copiers
- Printers
- Collators

THE GENUINE WRAP SPRING™

ENGINEERED PRODUCTS

PERFORMANCE		
	MAC-30	**MAC-45**
Static torque	25 lb-in (2.83 Nm)	150 lb-in (16 Nm)
Maximum radial bearing load	15 lbs.	30 lbs.
Maximum operating speed	1,200 RPM	1,000 RPM
Response time, voltage on at full speed	50 MS Max. 20 MS Nom.	150 MS Max. 40 MS Nom.
Input configuration	Hub input or shaft input	
Bearing	Reinforced polyetherimide with internal lubricant	
Weight	0.22 lb.	1.00 lb

For more information see page 87.

MAC-30 Clutch
Dimensions & Specifications

HI-CW/SI-CCW

HI-CCW/SI-CW

Ø 1.185 (30.10)

3 x .210 (5.34)

3 x 120°

R .309 (7.85) Max

.56 (14.23)

R .74 (18.80)

50° 70°

.50 (12.70)

.13 (3.31)

1.055 (26.80)

.155 (3.94) MIN

.925 (23.50)

.75 (19.05)

.012 (0.30)

.103 (2.62) w/R Full

.925 Ø (23.50)

Ø .437 (11.10)

Ø "B" "See Chart"

.131 (3.33)

12 in MIN (300 mm) #24 AWG UL1213 Teflon 7x32

.947 (24.06)
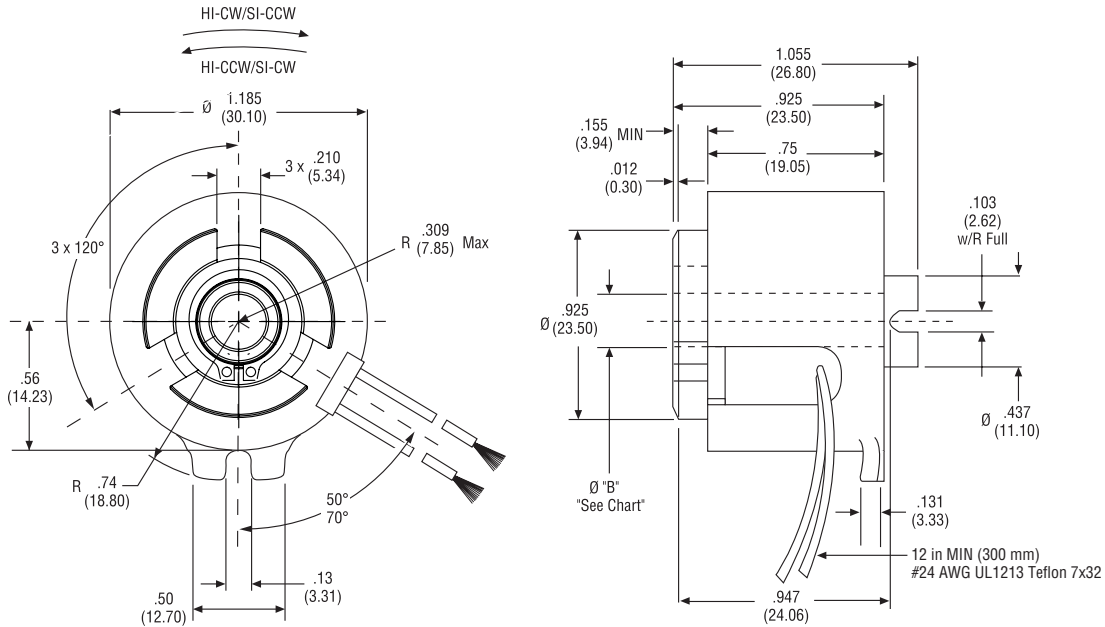
Dimensions (mm)
For more information see page 87.

BORE DATA	
Bore B	Status
0.2505-0.2530 (6.362-6.427)	Standard
0.3130-0.3155 (7.950-8.014)	Optional
METRIC BORES	
0.2366-0.2394 (6.009-6.081)	Standard
0.3153-0.3190 (8.008-8.103)	Standard

OPTIONS
Lug Drive Adapter
Connector Head
Consult Factory

ELECTRICAL DATA			
MAC-30			
Voltage	Current (amps)	Resistance (ohms)	Status
24 DC	0.110	227 ±21	Standard

Leads: 12.0 inches (300 mm) long standard
Ends stripped: .19/.31 inches (4.9/7.8 mm) (Optional: terminated with a connector of your choice)

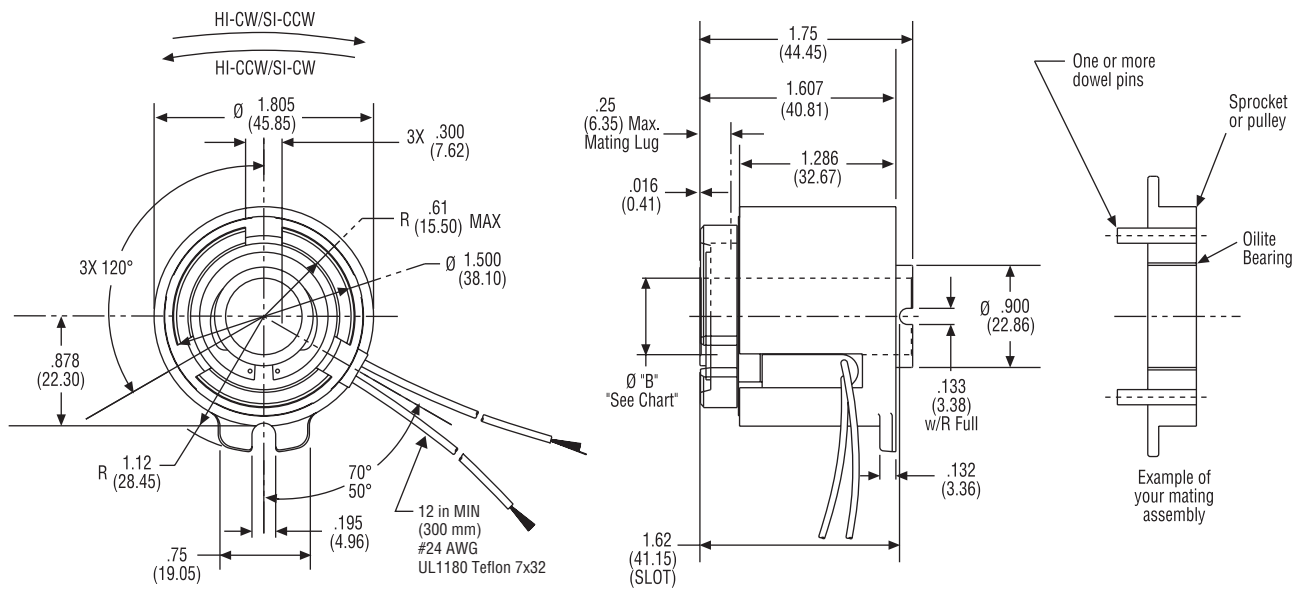| MAC-30 with Connector Head			
Voltage	Current (amps)	Resistance (ohms)	Status
24 DC	0.110	227	Standard
12 DC	0.243	49	Modification
90 DC			Available

Termination: 2 x .023 - .027 x .24 (0.58 - 0.69 x (6.09) square pin, pre-tinned alloy (Molex #08-52-0601)
Leadsets: Teflon insulated lead wires per UL1213 are available to suit any wire harness

START

MAC-45 Clutch
Dimensions & Specifications

Dimensions (mm)
For more information see page 87.

BORE DATA	
Bore B	**Status**
0.3755-0.3780 (9.537-9.602)	Optional
0.5010-0.5035 (12.725-12.789)	Optional
0.6260-0.6295 (15.900-15.990)	Standard
METRIC BORES	
0.3941-0.3968 (10.010-10.079)	Optional
0.4729-0.4755 (12.011-12.078)	Optional
0.5516-0.5555 (14.010-14.110)	Optional
0.6304-0.6346 (16.012-16.119)	Optional

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms +/-10%)**	**Status**
24 DC	0.257	93	Standard
12 DC	0.526	23	Modification
90 DC	0.054	1680	Modification

Leads:	12.0 inches (300 mm) long standard
Ends stripped:	0.19/0.31 inches (4.9/7.8 mm) (Optional: terminated with a connector of your choice)

PERFORMANCE
Bolt Circle Attachment
Ball Bearing Design
Lug Drive Adapter
Integral Connector Block (future option)
Consult factory

THE GENUINE WRAP SPRING™

ENGINEERED PRODUCTS

START

MAC-45 Clutch with Bolt Circle Attachment
Dimensions & Specifications

Dimensions (mm)
For more information see page 87.

BORE DATA	
Bore B	**Status**
0.3755-0.3780 (9.537-9.602)	Optional
0.5010-0.5035 (12.725-12.789)	Optional
0.6260-0.6295 (15.900-15.990)	Standard
METRIC BORES	
0.3941-0.3968 (10.010-10.079)	Optional
0.4729-0.4755 (12.011-12.078)	Optional
0.5516-0.5555 (14.010-14.110)	Optional
0.6304-0.6346 (16.012-16.119)	Optional

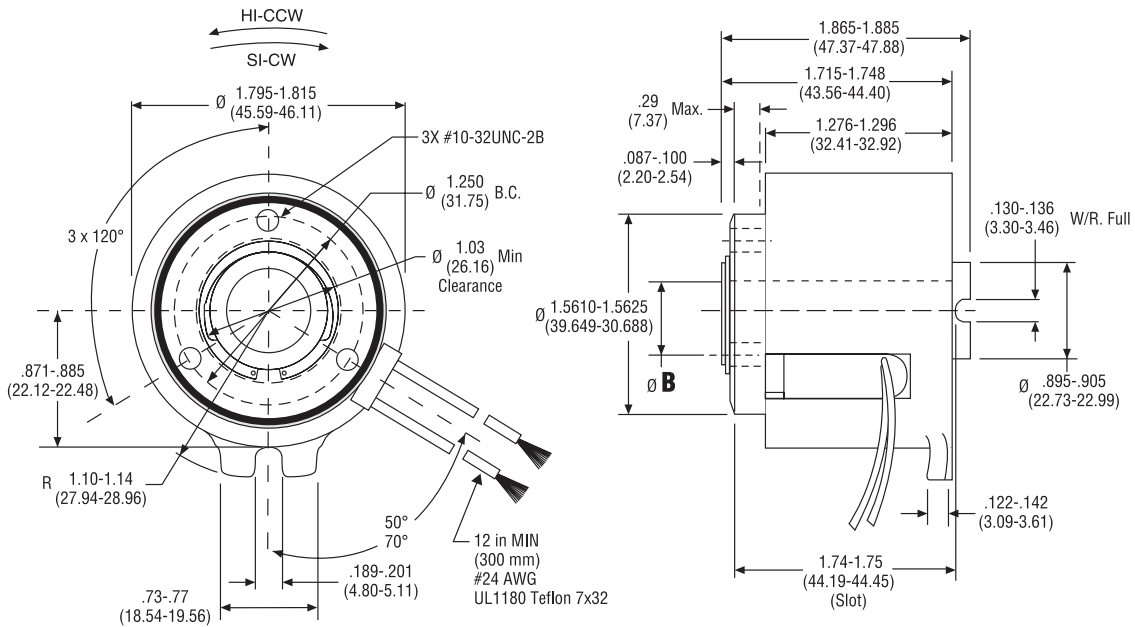| ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms +/-10%)**	**Status**
24 DC	0.257	93	Standard
12 DC	0.526	23	Modification
90 DC	0.054	1680	Modification

Leads: 12.0 inches (300 mm) long standard

Ends stripped: 0.19/0.31 inches (4.9/7.8 mm)
(Optional: terminated with a connector of your choice)

PERFORMANCE
Ball Bearing Design
Lug Drive Adapter
Integral Connector Block (future option)
Consult factory

START

BBC Series
Spring Actuated Ball Bearing Clutch

The model BBC-29 clutch combines the ease of direct electromagnetic actuation with the quick response and high torque offered by wrap spring technology. This improved clutch design features a ball bearing drive and a new magnetic circuit to enhance its performance and effi-ciency and greatly increase its life.

Bearing life effectively determines clutch life. Clutch performance has been signifi-cantly improved by replacing the sleeve bearing, commonly used in this type of clutch, with a shielded, prelubricated ball bearing. Life expectancy may now exceed 50 million cycles.

- Electromagnetic actuation
- High torque in a small package
- Corrosion protected
- Ball bearing mounted coil housing
- Bearing shielded against contamination and lubricant loss
- Redesigned, high efficiency magnetic circuit
- Drag free, engaged or disengaged
- High speed operation—up to 1800 RPM
- Housing assembly can be used as shaft bearing support
- Uni-directional input
- Freewheeling output when disengaged
- Simple installation—no adjustments required
- Custom configurations
- RoHS compliant

Typical Applications

- Forms handling equipment
- Paper feed drives
- Copiers
- Photographic processing equipment
- Printers
- Collating machines
- Automatic bank tellers
- Check processing machines
- Feed rollers for paper, film, etc.

Dimensions (mm)
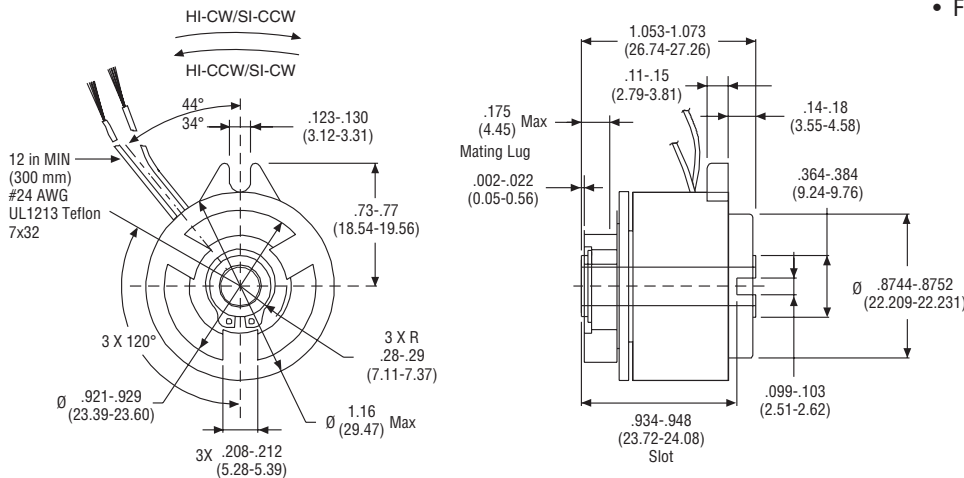
| PERFORMANCE	
Static torque	25 lb-in (2.83 Nm)
Maximum radial bearing load at minimum speed	7.5 lbs. (3.41 Kg)
Maximum operating speed	1,800 RPM
Response time, voltage on at full speed	40 MS Max. 20 MS Nom.
Bore sizes	English: 0.250 inch (6.35 mm) Metric: 0.2632 inch (6 mm)
Input configuration	Hub input or shaft input
Bearing	Shielded ball bearing
Weight	1.0 lb.

THE GENUINE WRAP SPRING™

ENGINEERED PRODUCTS

SP-2, 4, 5 Clutches
Dimensions & Specifications

Designed specifically for computer periph-
eral and business machine applications,
these clutches and brakes are suitable for
indexing, rapid cycling, and positive dis-
placement clutching drives.

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque
- Standard hub input; shaft input special
- RoHS compliant
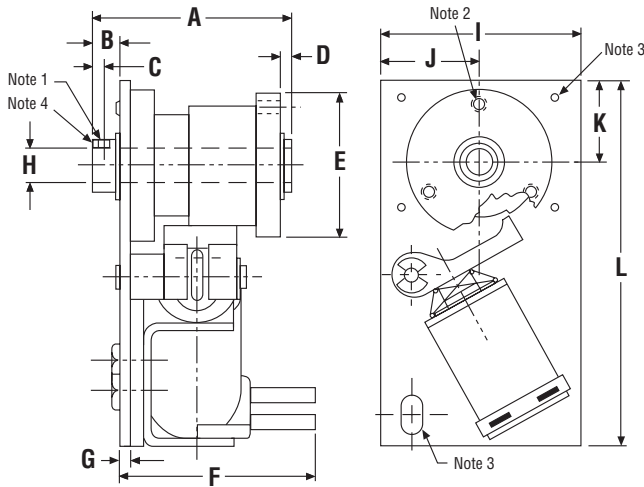
Notes
1. Output connection
   SP-2: .062 dia. hole
   SP-4: .125 dia. hole
   SP-5: .125 dia hole
2. Tapped holes on input hub:
   SP-2: 3 holes, #6-32 on .938 B.C.
   SP-4: 3 holes, #6-32 on .938 B.C.
   SP-5: 3 holes, #10-32 on 1.250 B.C.
3. Mounting holes:
   SP-2: .187 x .312 slot
   SP-4: 4 holes, .187 dia. on 2.125 B.C.
   SP-5: 4 holes, .187 dia. on 3.125 B.C.

Options
- Anti-overrun
- Anti-back (HI only)
- Overtravel stop

Typical Applications
- Paper drives
- Card readers and sorters
- Copying machines
- Ribbon drives
- Material handling conveyors

Dimensions (mm)

DIMENSIONS (mm)												
Model	A	B	C	D	E	F	G	H	I	J	K	L
SP-2	1.670	0.250	0.125	0.080	1.188 1.187	1.620	0.090	0.2515 0.2505	1.620	0.810	0.690	3.00
SP-4	2.000	0.430	0.160	0.080	1.250 1.249	1.910	0.090	0.376 0.378	2.380	1.190	1.00	4.10
SP-5	2.375	0.340	0.150	0.090	1.5625 1.5615	2.180	0.090	0.5015 0.5005	2.620	1.310	1.310	4.56

PERFORMANCE		SP-2	SP-4	SP-5
Static torque	lb-in (Nm)	25 (2.825)	120 (13.56)	250 (28.25)
Maximum anti-overrun holding capability	lb-in (Nm)	10 (1.13)	25 (2.825)	60 (6.78)
Inertia, rotating parts	lb-in²	0.0086	0.0522	0.09774
Maximum radial bearing load at maximum speed	lb	7.5	13	31
Maximum operating speed	RPM	1500	1200	750
Response time, voltage on at full speed	MS	25	30	30
Optional – Anti-overrun operation				
Weight	lb	0.55	0.88	1.32

ELECTRICAL DATA				
Voltage	Current (amps)	Current (amps)	Resistance (ohms)	Resistance (ohms)
	SP-2	SP-4, SP-5	SP-2	SP-4, SP-5
115 AC 60 Hz	0.104	0.103	825	280
24 DC	0.230	0.325	104	74.0
12 DC*	0.460	0.732	26	16.4
90 DC*	0.059	0.096	1510	936

*Modifications

Note: By adding an optional over travel stop (OTS), the braking torque is increased from 10% to 20% of the rated clutch torque.
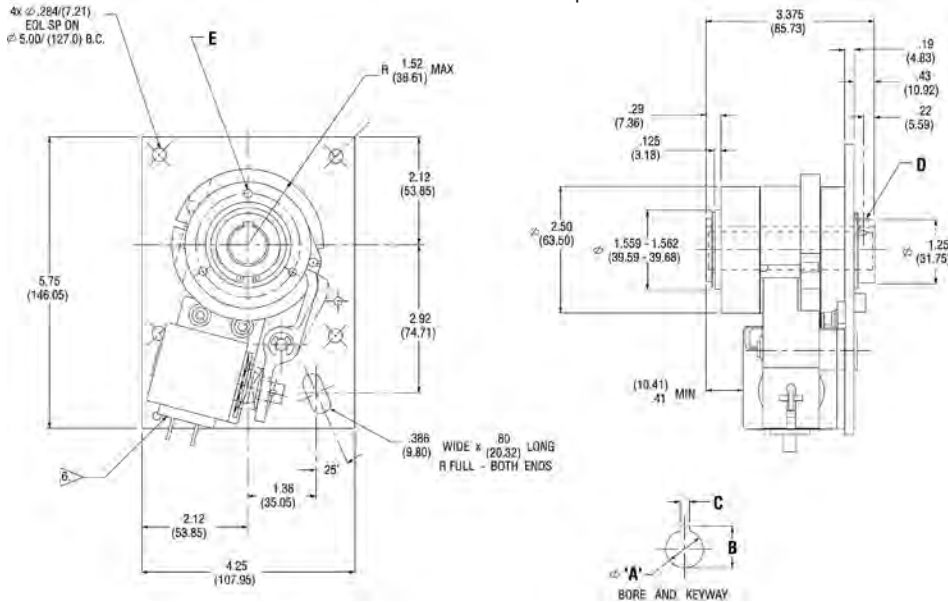
SP-6 Clutch
Dimensions & Specifications

Designed specifically for computer periph-
eral and business machine applications,
these clutches and brakes are suitable for
indexing, rapid cycling, and positive dis-
placement clutching drives.

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque
- Standard Hub input; Shaft input special
- RoHS compliant

Options
- Anti-overrun
- Anti-back (HI only)
- Overtravel stop

Typical Applications
- Paper drives
- Card readers and sorters
- Copying machines
- Ribbon drives
- Material handling conveyors

Dimensions (mm)

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	#10-32 UNC-2B x0.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 0.48 MIN DP 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 0.48 MIN DP 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	4.87-5.14 Hole (0.191-0.203)	3x M6 x 1.0 holes on 52.38 BC

PERFORMANCE	
Static torque	500 lb-in (56.5 Nm)
Maximum anti-overrun holding capability	300 lb-in (33.9 Nm)
Inertia, rotating parts	2.0 lb-in^2
Maximum radial bearing load at maximum speed	63 lb
Maximum operating speed	500 RPM
Response time, voltage on at full speed	60 MS
Optional – Anti-overrun operation	Hub input or Shaft input
Weight	5.29 lbs.

ELECTRICAL DATA		
Voltage	Current (amps)	Resistance (ohms)
115 AC 60 Hz	0.334	57.5
24 DC	0.586	41.0
12 DC*	1.150	10.4
90 DC*	0.151	598

*Modifications

Note: By adding an optional over travel stop (OTS), the braking torque is increased from 10% to 20% of the rated clutch torque

BIMAC Series
Low Cost Solenoid Actuated Clutches for AC or DC Operation

Designed initially for the computer peripheral equipment and business machine market, the BIMAC Series of solenoid actuated clutches is ideal for a wide range of indexing and rapid cycling applications.

The BIMAC Series is available in start-stop and single revolution configurations. Single revolution models are rated for 10% braking load (20% with overtravel stop/anti-back option).

In operation, when the coil is energized the actuator pulls away from the control collar, allowing the drive spring to wrap down onto the input and output hubs for positive torque transmission. When the coil is de-energized, the actuator engages the control collar which unwraps the spring and disconnects the hubs.

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque
- 25 or 75 lb-in of torque
- Speeds up to 1500 RPM
- Fits up 1/4" and 3/8" shafts
- RoHS compliant

Typical Applications

- Paper drives
- Card readers and sorters
- Copying machines
- Ribbon drives
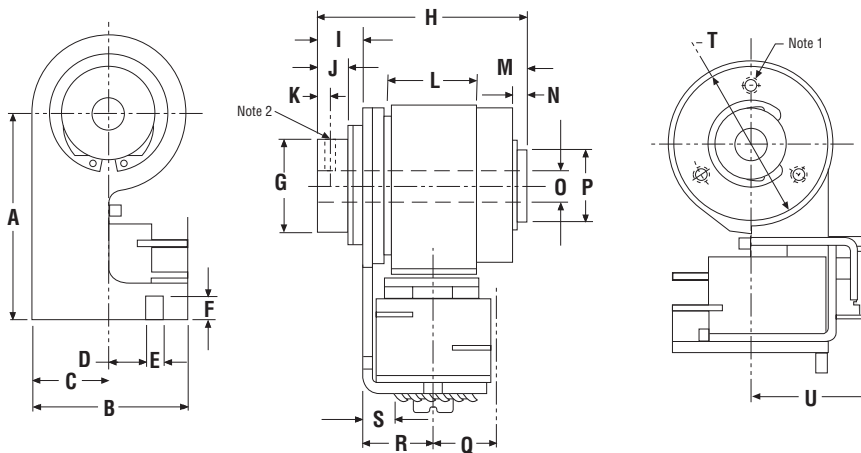
Notes
1. #6-32 tap. 3 holes, on .938 B.C.
2. .062 dia. hole

DIMENSIONS (mm)																					
Mod.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
B1	1.45	1.25	0.62	0.30	0.14	0.19	0.562 0.561	1.62	0.31	0.20	0.09	0.55	0.44	0.09	.2505 .2515	0.375 0.374	0.50	0.56	0.25	1.188 1.187	1.06
B2	1.69	1.25	0.62	0.30	0.14	0.19	0.743 0.742	1.72	0.41	0.27	0.125	0.68	0.43	0.10	0.376 0.378	0.562 0.561	0.50	0.56	0.25	1.25	1.06

PERFORMANCE		
	BIMAC I Series	**BIMAC II Series**
Static torque	25 lb-in (2.83 Nm)	75 lb-in (8.475 Nm)
Inertia, rotating parts	0.0117 lb-in^2	0.0427 lb-in^2
Maximum radial bearing load at maximum speed	12 lbs	17 lbs.
Maximum operating speed	1500 RPM	1000 RPM
Response time, voltage on at full speed	20 MS	20 MS
Weight	5 oz.	7 oz.

ELECTRICAL DATA		
Voltage	Current (amps)	Resistance (ohms)
115 AC 60 Hz	0.15	785
24 DC	0.25	96
12 DC*	0.40	30
90 DC*	0.50	1800

*Modifications

HOLD

BDNB Series
Bi-Directional No-Back Design Clutches

The Bi-Directional No-Back offers an extraordinary combination of functions at low cost. The basic function of this unit may be easily adapted to a large range of applications requiring automatic position holding with rotary driven capability.

The BDNB can be turned only when torque is applied to the input shaft. The input shaft may be driven in either direction with torque being transmitted directly to the output shaft.

When there is no torque on the input, the output shaft is "locked" and cannot be rotated in either direction. Any torque applied to the output shaft is transmitted directly to the clutch body, and will not be reflected to the input.

- Input operates in CW and CCW direction; output will hold loads within specified torque ranges
- Modifications and special design variations available
- Maximum operating speed 200 RPM
- Flange can be oriented on the bi-side or the brake side, depending on the application
- RoHS compliant

Typical Applications

- Tank turret drives
- Boat or aircraft trim tabs
- Robotics
- Rudderlocks
- Hoists
- Manlifts
- Actuator holdbacks

THE GENUINE WRAP SPRING™

ENGINEERED PRODUCTS

Dimensions (mm)
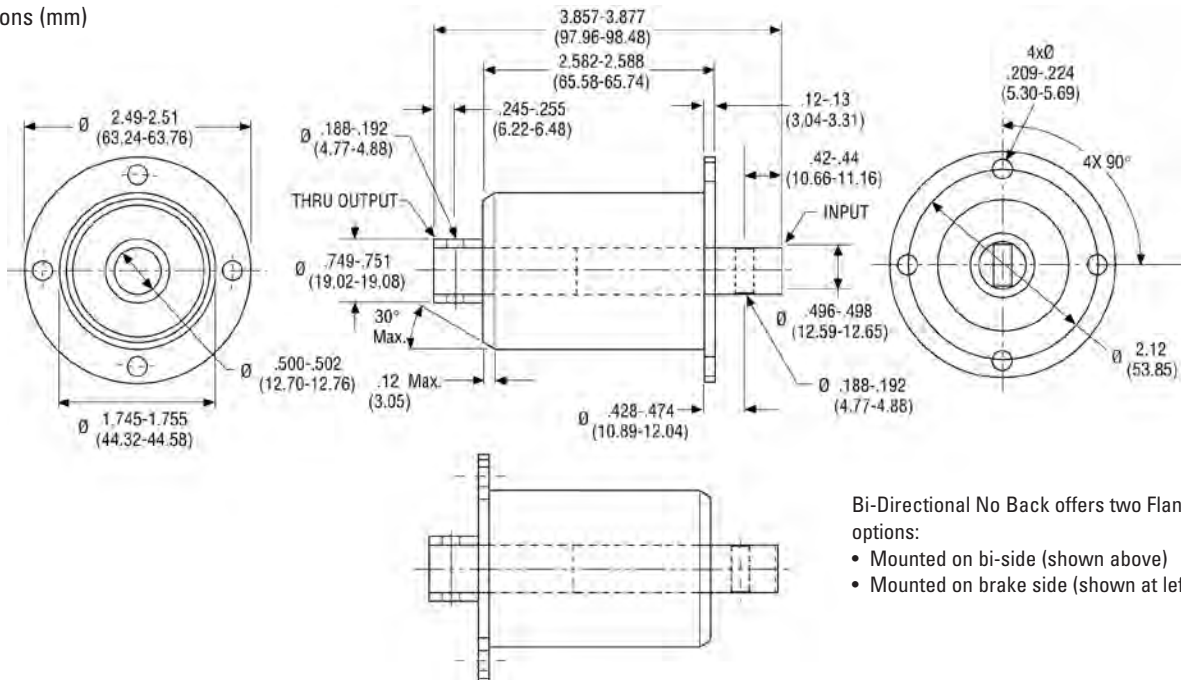
Bi-Directional No Back offers two Flange options:
- Mounted on bi-side (shown above)
- Mounted on brake side (shown at left)

PERFORMANCE	
Torque ratings	250 lb-in (28.23)
Clutch holding torque, both directions	250 lb-in (28.23)
Output to housing lost motion	6°†
Input to output lost motion	25°
Maximum additional input torque	10*
Weight	2 lbs.

†Angular movement is determined with 25 lb-in of torque applied to output.
*Or less than 1.15 times the output shaft load, whichever is greater

BDSC Series
Bi-Directional Slip Clutch

The BDSC clutch is a customer driven, special unit designed for high volume usage. It consists of just four components: one snap ring, two hubs and one spring. Like the CTS series, these clutches are designed to slip whenever a preset torque limit is exceeded. Torque ratings range from 2 to 32 in.-oz.

By attaching various pulleys, sprockets and other input devices, BDSC clutches are easily adapted for a wide variety of applications.

- Low cost design
- Custom configurations
- Torque ratings from 2 in.oz. to 30 oz.in.
- 200 RPM maximum speed
- Suitable for 100% duty cycle
- Torque can be varied with direction of rotation
- Low cost
- RoHS compliant

Size 2
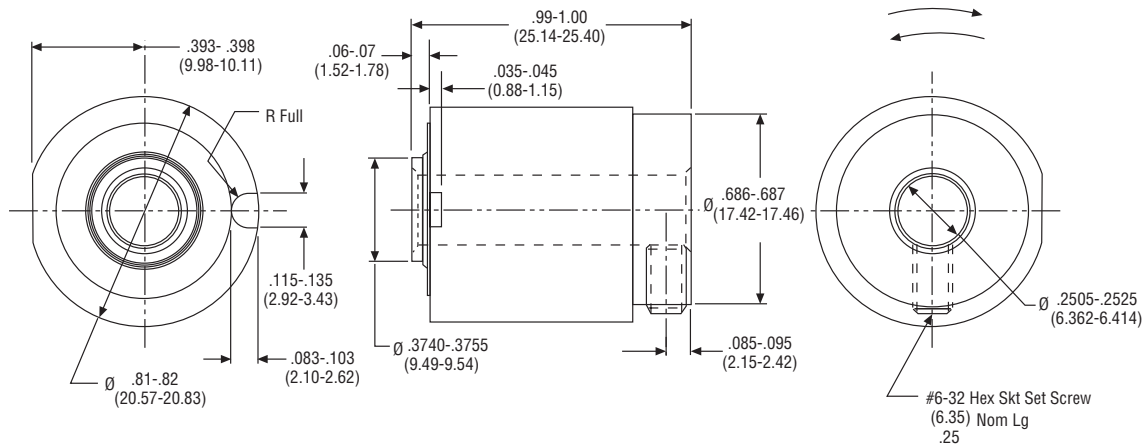
Size 4
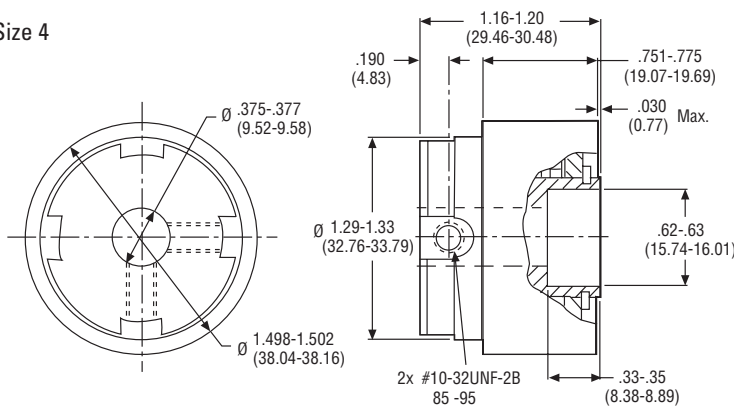
Dimensions (mm)

Typical Applications
- Turntable drives
- Machine doors
- Conveyor drive systems for poly film bag manufacturing
- Gear boxes
- Servo systems
- Tension devices
- Ribbon winding
- Paper feed

PERFORMANCE	
Torque ratings	2 in-oz to 9 lb-in (.014–1.017 Nm) – Torques held within ± 10% – Can provide different torques in different directions – 25 in-oz CW, 5 in-oz CCW
Bore Sizes	English: .25-.625 inch (6.35-15.88 mm) Metric: .2362-.629 inch (6-16 mm)
Weight	1.0 lb.

SLIP

CTS Series
Constant Torque Slip Clutch

The unique feature of the CTS series is that the clutch is designed to slip whenever a preset torque limit is exceeded. CTS clutches can also be used to apply drag in a system for tensioning requirements. While standard wrap spring units are designed to drive and/or brake, the CTS clutch is an inexpensive solution when a slip function is needed.

- Suitable for 100% duty cycle
- 7 watts maximum power dissipation
- 150 RPM maximum speed
- Torque ratings from 2 lb-in to 28 lb-in
- RoHS compliant

Typical Applications

- Cable winding equipment
- Torque wrenches
- Data handling devices
- Dispensing equipment
- Gear boxes
- Web tensioning
- Servo systems

Constant Torque Slip Clutch - CTS Series

CTS-25

B

.19 .25 .062

8-32 SOC SET SCREW

.2505 / .2525

BORE

.3130 / .3150

.686-.687 DIA

A

1.35 DIA

#8-32 UNC-2B 3 HOLES EQ. SP. ON 1.000 DIA B.C.

1.25 DIA
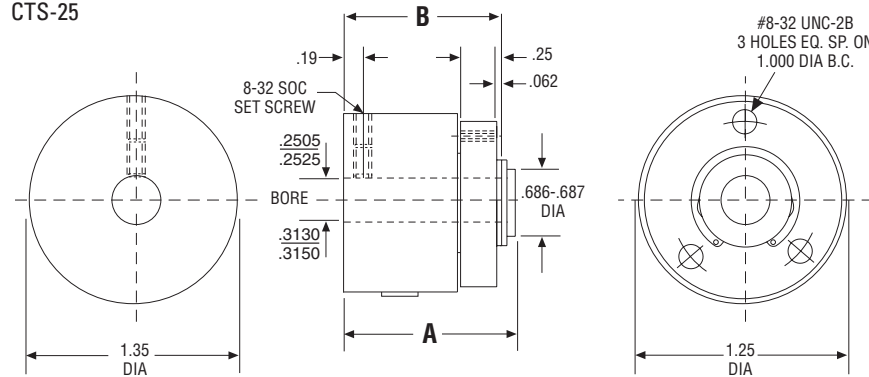
CTS-25 Clutch Data		
Torque	A	B
2 lb-in	0.95	0.845
4 lb-in	0.95	0.845
6 lb-in	0.95	0.845
8 lb-in	1.09	0.982
10 lb-in	1.09	0.982
12 lb-in	1.227	1.117
14 lb-in	1.227	1.117

CTS-50

B

.22 .30

#10-32 SOC SET SCREW

.5005 / .5025

.750 DIA

A

1.81 DIA

#10-32 UNF - 2B 3 HOLES EQ. SP. ON 1.250 DIA B.C.

1.5625-1.5610 DIA
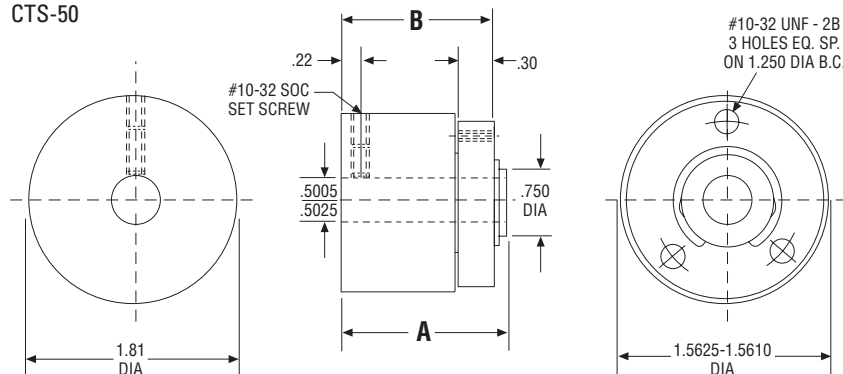
CTS-50 Clutch Data		
Torque	A	B
4 lb-in	1.243	1.125
8 lb-in	1.243	1.125
12 lb-in	1.243	1.125
16 lb-in	1.469	1.352
20 lb-in	1.469	1.352
24 lb-in	1.695	1.578
28 lb-in	1.695	1.578

PERFORMANCE		
	CTS-25	CTS-50
Torque ratings up to	14 lb-in (1.582 Nm)	28 lb-in (3.164 Nm)
Shaft sizes	1/4″ (6.35) and 5/16″ (7.938)	1/2″ (12.7)

Selection Considerations
Inertia and Torque Values

Application Analysis

1. Function
The process for establishing the clutch or brake function is illustrated in Step 1 on page 16. In review, the three functions and the appropriate series selections are noted below.

Overrunning
Unidirectional torque transmission with free wheeling in opposite direction.
Selection
PSI (Model O)

Start-Stop
Engage/disengage with random stop position.
Selection
SAC (Model SS)   ACCE
PSI (Model SS)   ACCM

Single Revolution
Accurate stop position in single or fraction revolution cycles.
Selection
CB Model S   SAC Model S
PSI Model S

2. Calculate load inertia (WR2)
Use the inertia chart on page 85 to determine the inertia of the application components. To determine WR^2 of a given shaft or disc, multiply the WR^2 from the chart by the length of shaft or thickness of disc in inches.
Note: For hollow shafts, subtract WR^2 of the I.D. from the WR^2 of the O.D. and multiply by length.

In order to calculate the inertias of components which are made of material other than steel, use the multipliers found in the conversion chart (right) to establish the inertias of these components.

Inertia Conversion Chart

In order to determine the inertia of a rotating member (shaft, disc, etc.) of a material other than steel, multiply the inertia of the appropriate steel diameter from the chart on page 85 by:

Material	Multiplier
Bronze	1.05
Steel	1.00
Iron	.92
Powdered Metal Bronze	.79
Powdered Metal Iron	.88
Aluminum	.35
Nylon	.17

3. Determine clutch or brake torque value
With the inertia value calculated in Step 2, determine the torque requirement for the function determined in Step 1.

A) For Overrunning and Start-Stop (random start-stop) (SAC and PSI Models SS and O)
$$T = \frac{WR^2 \times RPM}{3700 \times t} + \text{friction torque*}$$

Where—
T = Torque required from wrap spring
WR^2 = load inertia (Step 2)
RPM = shaft speed at clutch location
t = time to engagement (.003 for clutch)

B) For single revolution applications (CB, SAC and PSI Models S)
$$T = \frac{WR^2 \times RPM}{3700 \times t} - \text{friction torque*}$$

Where—
T = torque required from wrap spring
WR^2 = Load inertia (Step 2)
RPM = Shaft speed at clutch or brake location
t = time to disengagement (.0015 for brake)

Find the value of T on the Torque vs. Model Comparison Chart below.

*Frictional (drag) torque is the torque necessary to overcome static friction. It may be measured by a spring-scale or by dead-weights, applied to a known moment arm so gradually as to make inertia negligible. It is that torque found just sufficient to induce motion.

Torque vs. Model Comparison

Torque (lb. ins.)

CB Series Single Rev.   2 4 5 6 7 8 10

PSI Series Overrunning-Start/Stop   2 4 5 6 8

SAC Series Single Rev.   2 4 5 6
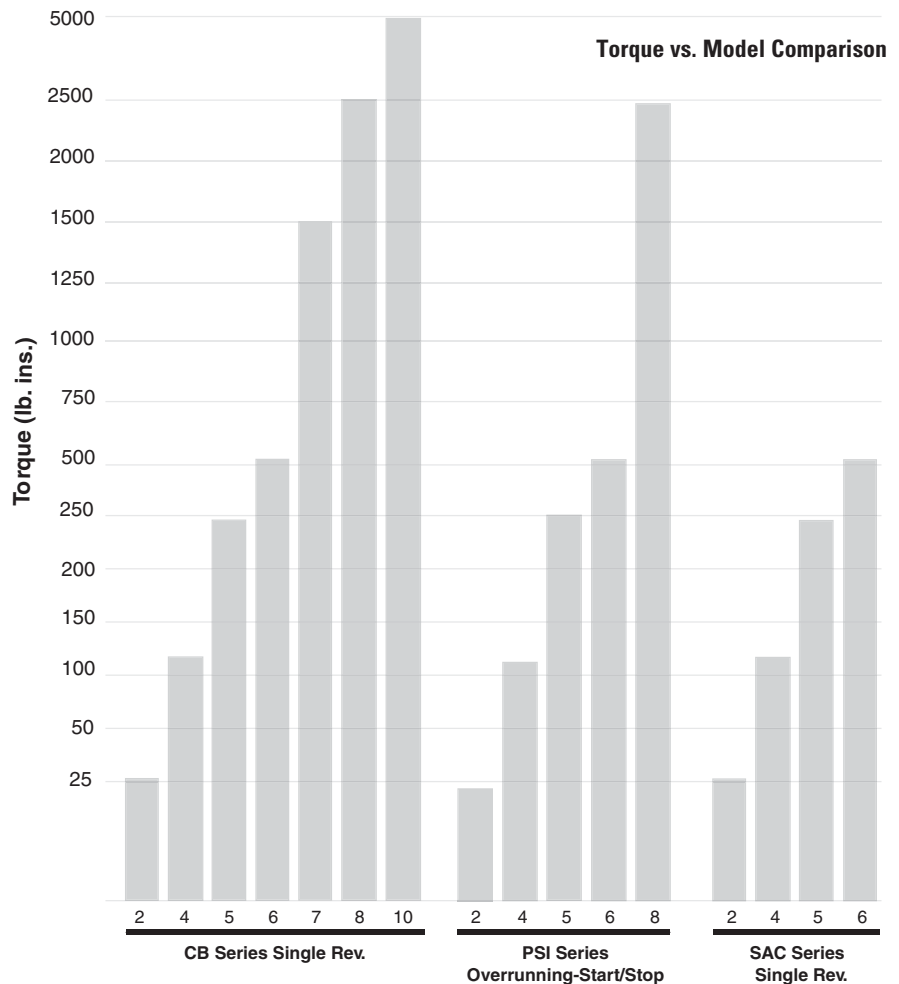
Selection Considerations
Inertia and Torque Values

4. Verify selection with unit inertia

From the individual product specifications find the unit inertia of the model selected in Step 3. Add this to the load inertia previously determined to arrive at the total torque requirement.

A) For Overrunning and On-Off (PSI Models SS and O)

A) $T_t = \dfrac{(WR^2_{LOAD} + WR^2_{UNIT})RPM}{3700 \times t}$ + friction torque

B) For Single Revolution Start-Stop (CB, SAC-S and PSI Models S)

A) $T_t = \dfrac{(WR^2_{LOAD} + WR^2_{UNIT})RPM}{3700 \times t}$ – friction torque

Where–T_t = total system torque
(WR^2_{LOAD}) = load inertia
(WR^2_{UNIT}) = clutch inertia

Find this new torque value on the Torque vs. Model Comparison Chart on page 84 to verify the model selected in Step 3.

**Minimum Load Inertia—
Super CB and CB Clutch/Brakes**

In order to achieve the CB accuracy capability of ±1/2°, a minimum load inertia is required to fully engage the brake spring and disengage the clutch spring. This minimum inertia (I) can be calculated from the accompanying formula and chart:

$I = (t)\dfrac{(T_c + T_0)\ (3700)}{RPM} - I_c$

I = Minimum inertia required to fully activate the clutch/brake—lb-in^2
t = Time—Seconds
T_c = Torque required to fully activate the clutch/brake—lb-in
T_0 = Drag torque—lb-in

RPM = Revolutions per minute

I_c = Inertia at the output side of the clutch—lb-in^2

EXAMPLE:

CB-6 in a system running at 200 RPM with 3/4" bore and 20 lb-in drag. What inertia is required to fully activate the clutch/brake?

$I = \dfrac{(0.005)\ (8.75 + 20)\ (3700)}{(200)} - 1.221 = 1.438$ lb-in^2

NOTE: When calculated inertia is zero or negative, no further action is required. If the calculation result is positive, additional inertia equal to or exceeding the result should be added.

INERTIA OF STEEL SHAFTING (Per Inch of Length or Thickness)					
Dia. (in.)	WR^2 (lb-in^2)	Dia. (in.)	WR^2 (lb-in^2)	Dia. (in.)	WR^2 (lb-in^2)
1/4	.00011	7	66.816	13	803.52
3/8	.00055	7 1/4	77.04	13 1/4	858.24
1/2	.00173	7 1/2	87.984	13 1/2	924.48
3/4	.00864	7 3/4	100.656	13 3/4	995.04
1	.0288	8	113.904	14	1068.48
1 1/4	.072	8 1/4	128.88	14 1/4	1147.68
1 1/2	.144	8 1/2	144	14 1/2	1229.75
1 3/4	.288	8 3/4	162.72	14 3/4	1317.6
2	.432	9	182.88	15	1404
2 1/4	.72	9 1/4	203.04	16	1815.84
2 1/2	1.152	9 1/2	223.2	17	2314.08
2 3/4	1.584	9 3/4	252	18	2910.24
3	2.304	10	277.92	19	3611.52
3 1/2	4.176	10 1/4	306.72	20	4433.76
3 3/4	5.472	10 1/2	338.4	21	5389.92
4	7.056	10 3/4	371.52	22	6492.96
4 1/4	9.072	11	407.52	23	7757.28
4 1/2	11.376	11 1/4	444.96	24	9195.84
5	17.28	11 1/2	486.72	25	10827.36
5 1/2	25.488	11 3/4	529.92	26	12666.24
6	36	12	576	27	14731.2
6 1/4	42.624	12 1/4	626.4	28	17036.64
6 1/2	49.68	12 1/2	679.68	29	19604.16
6 3/4	57.888	12 3/4	735.84	30	22452.48

TORQUE & INERTIA VALUES			
Model	T_C	t	I_C
CB-2	1.65	0.003	0.0116
CB-4	6.60	0.004	0.0450
CB-5	6.88	0.004	0.1663
CB-6	8.75	0.005	1.221 (0.75 in. bore) 1.138 (1.0 in. bore)
CB-7	17.0	0.005	9.43 (0.75 in. bore) 7.72 (1.0 in. bore) 6.70 (1.25 in. bore) 6.55 (1.50 in. bore)
CB-8	20.0	0.005	9.32 (1.0 in. bore)
			8.15 (1.5 in. bore)
CB-10	50.0	0.006	30 (1.5 in. bore)

How to determine maximum inertia load of CBs

$\dfrac{T \times 3700 \times t}{RPM} = WR^2$

T = Clutch Torque
t = .0015

Selection Considerations
Example

Nip Feed for Ribbon (Tape) Cut-Off—
Indexes 180° for 5½″ Length

Determine Correct Size
Clutch/Brake
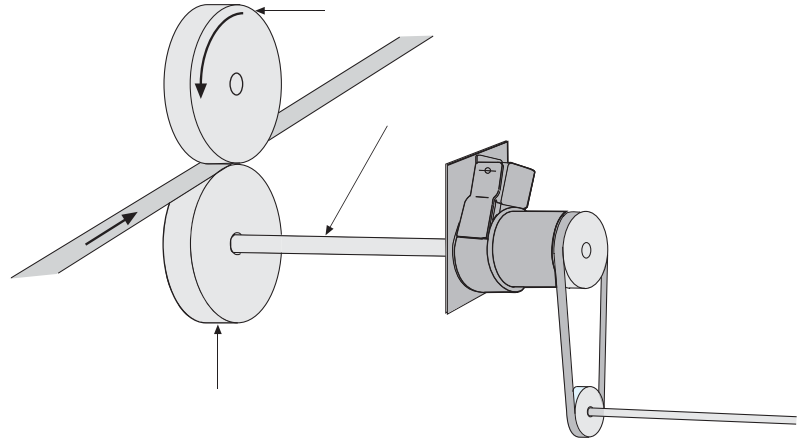
Nip Feed for Ribbon (Tape) Cut-Off—
Indexes 180° for 5½″ Lengths

1. Determine function: Application requires accurate 180° start and stop positioning, therefore a CB or PSI Model S is chosen.

2. Calculate Load Inertia (WR^2)
   WR^2 NIPS (2) = 4.176 lb-in^2 each
   (ref. inertia chart, pg. 85)

$$\text{x } 2 = 8.352 \text{ lb-in}^2$$

$WR^2_{SHAFT} = .0288 \text{ x } 6 = .1728 \text{ lb-in}^2$

$WR^2_{LOAD} = 8.5248 \text{ lb-in}^2$
      TOTAL

3. Apply results to Step 3 formulas to determine torque required for start/stop.

   T = 8.5248 x 200/5.55 − 20 = 287.2 lb-in

   Estimate friction torque (about 20 lb-in for this example).

   Make initial unit selection from Torque vs. Model Comparison Chart (pg. 84) based on load torque requirements:

   i.e., 287.2 in.lb.   Size CB-6

4. After making initial unit selection, add unit inertia (ref. Torque and Inertia Values, pg. 85) to load inertia (rotating components).

i.e.: 8.525 lb-in^2 (Load WR^2)
+1.718 lb-in^2*
10.268 lb-in^2 (Total System WR^2)

   Double-check size by computing new data with torque formula.

* (CB-6 WR^2—Pg. 25)

$$T = \frac{WR^2 \text{ x RPM}}{5.55} \text{ (for brake)}$$

$$T = \frac{10.268 \text{ x } 200}{5.55} = 370 \text{ lb-in}$$
CB-6 is correct size.

Note: All calculations shown assume zero compliance in driven, as well as driving, components. Compliance in the system reduces the torque required to accelerate the total inertial load to full RPM.

START

Magnetically Actuated Clutch Operation Principles & Performance
DL, MAC & BBC Series
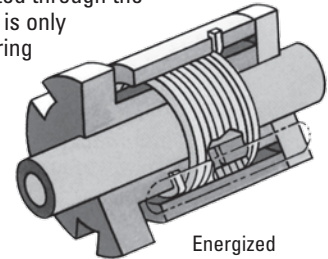
Clutch Operation

The inside diameter of the spring is larger than the outside diameter of the shaft hub. One end of the spring (control tang) is fastened to the control collar (or armature). When the coil is de-energized, the hubs rotate independently of each other. The free hub (affixed to the spring) the spring, and the collar rotate as a unit. The opposing shaft hub is not fastened to the spring and rotates as another unit. The coil housing is stationary and piloted on the shaft bearing. A ground pin placed in the retaining tab secures the coil housing from rotating.
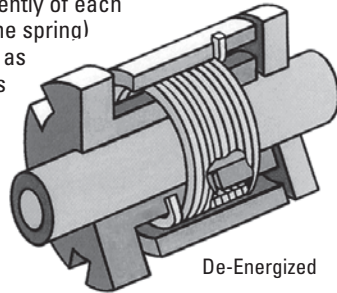
De-Energized

When the coil is energized, the control collar is pulled and held against the shaft flange. The momentary relative motion between spring and hubs "wraps" the spring, coupling the two hubs positively. All torque is transmitted through the wrapped spring. Magnetic force is only necessary to maintain a tight spring grip for total torque transfer.

Energized

Operational Performance

The time-to-speed of the DL, MAC and BBC Series clutches is defined as the time required to accelerate the load to 100% of the input speed from the initial voltage pulse. The spring wrap down time is the only portion dependent on the input speed. Variation in time-to-speed is caused by:

1. Clutch to Clutch — statistical variation due to piece part tolerance

2. Cycle to Cycle — comprised of speed, voltage, and temperature changes

3. Lifetime — enlargement of the normal band due to component wear.

If dictated by the application, cycle-to-cycle variation can be minimized by careful selection of system hardware and software. Statistical variation may also be reduced through tighter part tolerance, but would result in a higher cost.

Performance Profile

VOLTAGE

CURRENT

TIME

LOAD
RPM

0   T_1 T_2 T   3 T_4 T_5
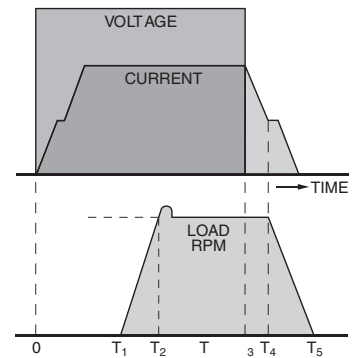
Current and speed response profile

T_1 = Time to engage (TTE) (Electrical build up and collar movement and spring wrap time).

T_2 = Time to speed (TTS).

T_3 - T_4 = Armature disengagement time (ADT).

T_5 - T_3 = Time to zero (TTZ) (Load and speed dependent).

Characteristics of Disengagement

Control collar release time (ADT) is affected somewhat by speed, load, and the above three variables. The electrical circuit, however, has a major impact on the MAC-45's disengagement performance. Voltage transients and bleed down time should be minimized. The optimum suppression network for an application using the MAC-45

is represented by circuit C which incorporates a 1N4004 series diode and a zener diode with two times the coil voltage. Omitting the zener (circuit B) would result in a less expensive circuit but at the expense of minor decrease in performance. Circuit A represents the quickest disengagement time but provides no protection for voltage transients.

A   NO SUPPRESSION

B   IN4004 SUPPRESSION

C   IN4004 AND 12V ZENER SUPPRESSION
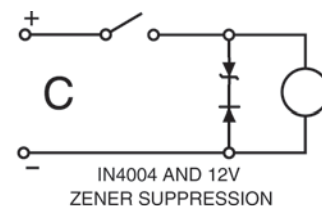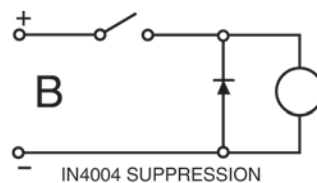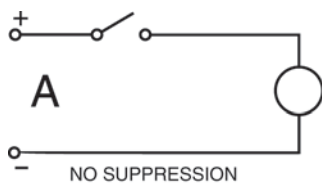
Questions & Answers
Relating to Standard Genuine Wrap Spring Products

1. Question: What changes are necessary to convert a CB series clutch from CW to CCW and vice versa?

Answer: For all CB units, the following parts must be changed; the drive spring, brake spring, anti-overrun spring, anti-back spring, and plate subassembly. The cams must also be reversed. Additional requirements: On CB-5, -6, and -8 units, the actuator subassembly must be changed. On CB-6, -8, and -10 (DC only) the coil subassembly must be changed. On CB-10 (AC only) the coil subassembly would require a new coil kit. All other components can be reused. The differential must also be reset after the unit has been reassembled.

2. Question: How is the spring differential set on a CB Series clutch? Why is this important?

Answer: This setting is important because it establishes the relationship of the clutch spring to the brake spring. If the setting is incorrect, the unit may fail due to excessive wear or may not operate at all. The differential setting has been preset by the factory for "out-of-the-box" CB Series clutches. See page 90 for a detailed explanation of spring differential adjustment.

3. Question: Can the input or output of a CB Series clutch/brake be reversed?

Answer: The standard CB Series clutch (which includes the anti-overrun clutch feature) cannot readily be reversed. However, if input reversal is required, please contact your local Danaher Motion Representative for additional information.

One of the standard features of the CB Series clutch/brake is the anti-back spring. While this spring is required to achieve stopping accuracy, it also prevents the output from being reversed. Therefore, like the input of a standard CB Series clutch/brake (incorporating the AO feature), the output cannot and should not be reversed.

4. Question: How often should a Deltran wrap spring clutch be lubricated?

Answer: Under normal operating conditions, lubrication is not necessary because the bearing surface components are manufactured from oil impregnated powdered metal materials.

5. Question: Can a single stop CB Series clutch readily be changed to a multiple stop unit and vice versa?

Answer: The serrated control of the CB collar design facilitates easy changeover to a multiple stop collar. Please refer to the assembly/disassembly instructions for the appropriate CB model. See Stop Collars, page 67.

6. Question: Can the output of the CB Series clutch be adjusted after installation?

Answer: Certainly. The serrated design of the control collar assembly allows repositioning the cam after the unit has been installed. See page 67.

7. Question: How is rotation determined?

Answer: For the CB, SAC & SP Series, determine the proper rotation by viewing the unit from the input hub end. For sizes 2 through 6, the input hub has 3 holes, while sizes 8 and 10 input hubs each have 6 holes. For the PSI Series, determine the proper rotation by viewing the clutch from the input end. For HUB input units, look at the free hub when determining rotation, for SHAFT input units, look at the shaft hub when determining rotation. Also, see the appropriate pages of this catalog or contact your local Danaher Motion representative.

8. Question: What is necessary to assure that a CB model wrap spring clutch/brake stops consistently and accurately?

Answer: In most cases when a CB does not position accurately, there is insufficient inertia to fully wrap down the brake spring. This situation can easily be resolved by either adding additional mass to the output or increasing machine speed.

Remember, the CB Series clutch is an RPM-inertia sensitive device. The specified minimum inertia must be met for the CB Series clutch/brake to operate properly.

9. Question: What are the possible causes of CB Series clutch slippage?

Answer: Any slippage in a CB is usually caused by an incorrect differential setting. See the adjustment and repair section of this catalog page 90.

10. Question: What does the anti-overrun spring do?

Answer: The anti-overrun spring feature prevents overhauling loads from over-running the input. The anti-overrun is an internal spring with an interference fit that slips in one direction, but transmits torque in the other.

11. Question: Can the anti-overrun feature easily be incorporated into a non-anti-overrun CB Series clutch?

Answer: This is easily accomplished on the CB-5, 6, 7 & 8 units which only require a new input hub and anti-overrun spring. All other CB models must be completely disassembled to replace the output shaft assembly and input hub and add the anti-overrun spring.

The "standard" CB Series clutch has the anti-overrun spring included. We recommend all CB Series clutches be purchased with the AO spring, if possible.

Anti-overrun Spring
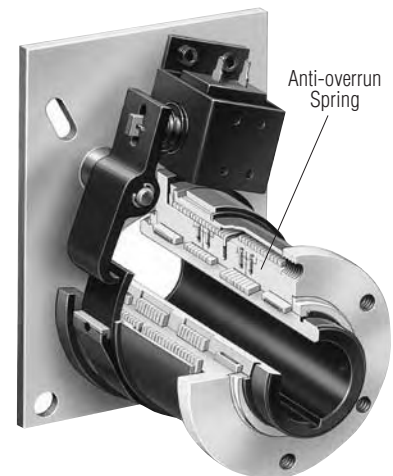
12. Question: How much torque can a Genuine Wrap Spring unit brake?

Answer: The PSI, SAC & SP model S units are capable of braking 10% of their static torque rating. By incorporating the over-travel stop feature into the PSI and SP series model S units, brake torque increases to 20% of static torque rating.

In general, the CB Series clutch is capable of stopping 50% of the unit's static torque rating.

Questions & Answers
Relating to Standard Genuine Wrap Spring Products

13. Question: What should be checked when a CB Series unit doesn't actuate on each revolution?

Answer:
a) Check for coil input voltage.

b) Check actuator cam clearance. With the collar biased towards the actuator there should be a .010" to .030" air gap between the bottom of the actuator and tip of the cam.

c) Check the setting. See Question 21 to reset or replace the solenoid.

14. Question: Can I use any coil with a one-shot power supply?

Answer: Yes, the one-shot power supply can be used with either AC or DC coils. However, when selecting a coil, remember that higher resistance results in slower response and conversely, lower resistance increases response speed.

15. Question: What is the purpose of the holes in the CB, SAC & SP Series plate assembly?

Answer: There are either 3 or 4 holes plus an anti-rotation slot on the CB, SAC & SP Series plate assemblies. These holes are intended for mounting convenience. These clutch/brake units are shaft mounted, so the plate should simply be restricted from rotating. These units must have some axial compliance to operate properly.

16. Question: How can coil voltage of a wrap spring clutch coil be determined?

Answer: Models CB-6, 7, 8 and 10 have voltage markings near the terminal tabs. CB-2, 4 and 5, as well as SAC models, show the voltage on the back of the coil bracket.

17. Question: What is the meaning of the numbers stamped on The Genuine Wrap Spring clutches?

Answer: The Genuine Wrap Spring clutches are given an eight-digit number. This number translates into a description of your product. Example: 123-45-678

#1 identifies the product series.

#2 identifies whether the unit is domestic or metric.

#3 identifies the size of the unit.

#4 identifies hub input and rotation.

#5 identifies special features.

#6, #7, #8—this three-digit number is serial number assigned to identify specific features of each unit.

18. Question: Why doesn't a model CB-6 with 1" bore include a keyway?

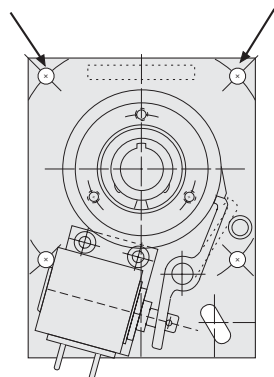**Answer:** There is not enough material in the shaft of a 1" bore CB-6 to accommodate a keyway. If a keyway is necessary for a specific application requiring a CB-6, the ¾" bore size should be chosen.

19. Question: How do I know if my clutch was made with the old style, one piece collar or the split cam design?

Answer: Currently, all new Genuine Wrap Spring Standard and Super CB-5, -6, -7, -8, and SAC-5, and SAC-6 units are manufactured with the split cam design. The easiest way to identify the split cam design is by looking at the pivot pin and actuator. If the unit is configured with the split cam design there will be a small plastic spacer between the pivot pin and the actuator. The actuator will also have two slots for the plunger. The older design had no spacer, and there was only one slot for the plunger and actuator interface.

20. Question: How can I convert my existing one piece collar to the split cam design?

Answer: To upgrade an older style (single piece) collar to the split cam design the sleeve must be replaced. (For CB-5, 6, 7 & 8 models only). The single piece unit is replaced by a brake sleeve, coupling sleeve and a drive sleeve. In addition to changing the sleeve, the actuator must also be replaced. The position of the actuator on the cam is slightly different, and the new actuator compensates for this change. Refer to the appropriate pages of this catalog for replacement part numbers.

21. Question: How can the solenoid be reset or replaced?

Answer: The following instructions are to be used when resetting or replacing the solenoid.

Collar-Actuator Clearance
1. Loosen the solenoid adapter plate such that the solenoid can be easily repositioned.
2. If the clutch is equipped with an actuator limit stop, loosen it and move it out of the way.
3. Energize the solenoid.
4. Align the cam face and actuator tip as shown in Figure 1.
5. Push the collar as indicated by the arrow in Figure 1 to take up the free collar play.
6. Check to ensure that the plunger is properly seated.
7. Using a shim between the actuator tip and cam face, set the collar actuator clearance between .010 and .030 by repositioning the solenoid assembly.
8. Tighten the solenoid adapter plate screws.
9. De-energize the solenoid and repeat steps 2 through 5.
10. Re-check the clearance.
11. If equipped with an actuator limit stop, re-energize the coil and set the limit stop as follows:
DC Coils – Set the limit stop so it just contacts the actuator.
AC Coils – Set the actuator-limit stop clearance of .005-.020 at the closest point.
NOTE: It may not be possible to completely eliminate solenoid buzzing on AC solenoids.

Figure 1

THE GENUINE WRAP SPRING™　ENGINEERING GUIDELINES
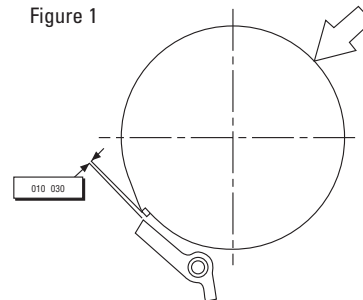
CB Spring Differential Adjustments
Non-Split and Split Cam units

All Super CB and all CB series clutch/brakes are factory preset to the proper spring differential overtravel. Should a component require replacement and the springs are affected, it is advisable to mark the two spring tang slots to ensure correct reassembly. If this is not possible, use the following procedure to reset the springs.

Non-Split Cam Units

Retaining Ring
Stop Cam
Sleeve
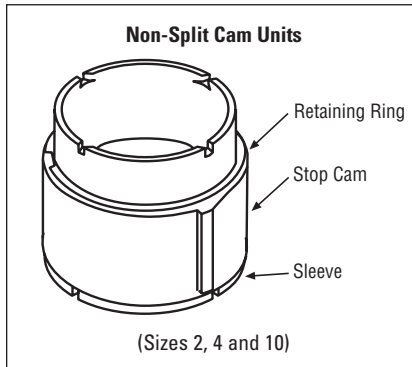
(Sizes 2, 4 and 10)

Spring Differential Adjustments for Non-Split Cam Units
Super CB and CB Series
(Sizes 2, 4 and 10 Only)

1. Remove the retaining ring from the input hub.

2. Rotate the clutch so the brake spring is fully wrapped down.
   Note: Merely rotating the unit until the actuator hits the cam will not fully engage the brake spring. The output shaft must be rotated in the driving direction until the brake spring fully wraps down.

3. With the brake fully engaged (per step 2), pull the clutch spring out of its slot and allow it to jump to wherever it comes to rest.

4. The clutch spring should be between two slots. Unwrap the spring and push it back into the nearest slot.

5. Push the input hub back into place, release the actuator.

6. Rotate the clutch until the brake spring fully wraps down again.

7. With the brake fully engaged, hold the shaft with one hand and release the actuator.

8. The collar will jump forward as the brake is released and the clutch engages.

The amount of overtravel varies with the unit.

Model	Overtravel
CB-2	.09 to .19"
CB-4	.19 to .31"
CB-10	.62 to .75"

Note: Non-Split Cam design units

9. To obtain the overtravel, use a scale to measure the distance between the tip of the actuator and the tip of the cam. (See picture below)

10. If the overtravel is within specified limits, reinstall the retaining ring, the unit is set.

11. If the overtravel exceeds the specified amount, move the brake spring back one slot against the direction of rotation and repeat steps two through nine.

12. If the overtravel is less than the specified amount, move the brake spring forward one slot in the direction of rotation.

Note: If the unit is disassembled and the drive and/or brake springs do not need to be replaced, proceed as follows:

— Reposition the drive and brake springs to their original positions onto the output shaft assembly.

— Reassemble the clutch and position the spring tangs of the drive and brake springs in the factory marked locations on the control collar assembly (on the control collar there are designated slots marked with a recessed punch mark).

— After the unit is completely assembled, the differential setting should be back to its original setting.

Split Cam Units

Retaining Ring
Stop Cam
Coupling Sleeve
Brake Sleeve
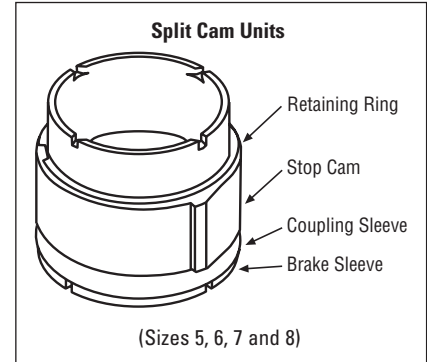
(Sizes 5, 6, 7 and 8)

Spring Differential Adjustments For Split Cam Units (5, 6, 7, and 8)

To adjust the differential on split cam units (Sizes 5, 6, 7 and 8) use the following procedure:

1. Slide the retaining ring, stop cam, and coupling towards the free hub (input) separating the two split sleeves.

2. Move the brake sleeve spline in the opposite direction of the drive to wrap down the brake spring.

3. Hold the brake spring sleeve spline in place and slide the coupling onto the splines to secure the two sleeves.

4. Slide the stop cam onto the splined section and re-insert the retaining ring into the groove.

5. Rotate the clutch until the brake spring fully wraps down again.

6. With the brake fully engaged, hold the shaft with one hand and release the actuator.

7. The collar will jump forward as the brake is released and the clutch engages.

8. To obtain the overtravel, use a scale to measure the distance between the tip of the actuator and the tip of the cam. (See picture at left)

If the overtravel is too small or large, repeat steps 1-8 above.

The amount of overtravel varies with the unit.

Model	Overtravel
CB-5	.15 to .25"
CB-6	.19 to .37"
CB-7	.37 to .50"
CB-8	.37 to .50"

Note: Split Cam design units

Mounting Requirements
Super CB, Standard CB, SAC, SP, ACCE and BIMAC units

(All plated mounted wrap spring products)

Horizontal & Vertical Mounting

The Genuine Wrap Spring clutches are self-contained packaged products which are easy to mount. A few simple precautions should be taken to ensure maximum life.

All Genuine Wrap Spring clutch products are designed for parallel shaft applications where they are fully supported by the shaft on which they are mounted. In the case of wrap spring clutch/brakes (CB) the through shaft is always the output. Connecting the parallel shaft to the CB input can be accomplished by use of a belt, chain or gear drive. CB models must be mounted with the shaft(s) in a horizontal position (Figure 1). If vertical mounting is required, see Figure 2.

Preferred horizontal mounting

Input member counterbored to center mass over clutch bearing

Clutch fully supported by the shaft with bearing support on both ends

Figure 1

Plate restrained from rotating by pin or shoulder bolt. No axial binding
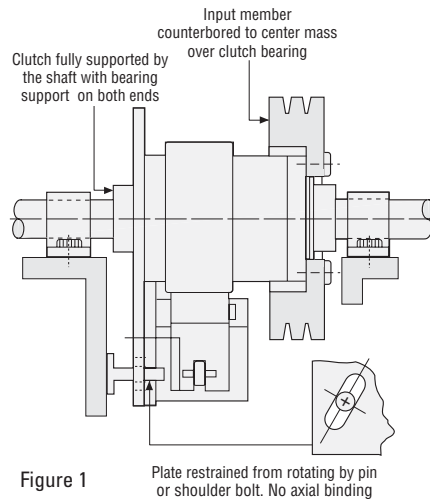
Optional vertical mounting
See Figure 2 note.

Set Collar

Bearing-mounted pulley

Pin drive not bolted to input
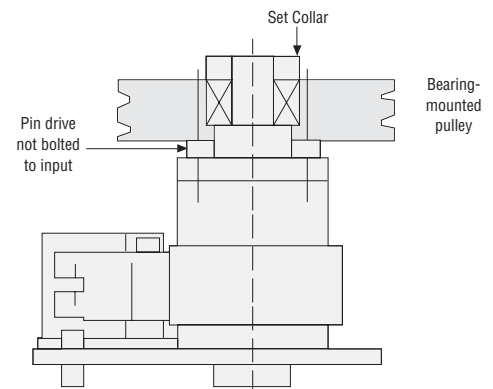
Figure 2

Preferred Horizontal Mounting
Figure 1 - Shows an ideal CB mounting. The unit is locked to the output shaft with a key and set screws. The mounting plate is restrained from rotating with a pin, but is not restrained axially, reducing the load on the CBs internal plate bearing.

The anti-rotation device employed must be able to withstand the braking torque required by the load.

It may be desirable to have easy access to the input for changing belts, etc. In this case, the clutch/brake can be mounted on a stub shaft. If so, the unit must still be fully supported. Overhung loads on the input member must be avoided to secure long radial bearing life.

Optional Vertical Mounting
Figure 2 - When applying a wrap spring vertically, the mating drive member (pulley, sprocket, or sheave must be bearing-supported as shown in Figure 2. This is necessary to eliminate the axial loading that will occur from the weight of the mating drive member (pulley, sprocket or sheave).

Optional Mounting Configurations

Figures 3 and 4

Illustrate how proper support can be provided. Input members are generally face-mounted to the input hub of the unit as shown on Figure 1. This is facilitated by drilled and tapped holes provided in the free hub flange.

The set-up shown in Figure 3 is possible if the radial load to the input hub of the clutch is small compared to the specified load. With a substantial load, arrange the pulley over the centerline of clutch free hub as shown in Figure 4.

Preferred pulley mounting

Set Collar

Double Bearing Support for Stub Shaft

Figure 3

Pin Drive Not Bolted to Input

Double Bearing Support for Stub Shaft Input Member Inboard
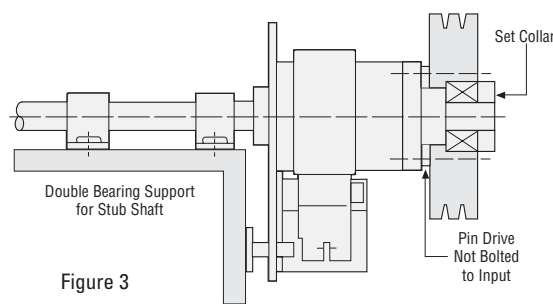
Figure 4

The solution presented here is better than that in Figure 3. Place one support bearing as close to the pulley as possible. Use a torque arm for anti-rotation.
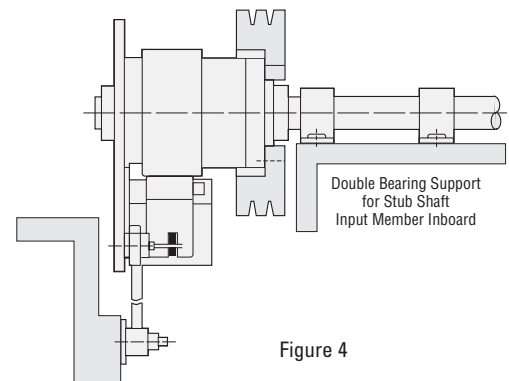
Small units (size 2, 4, and 5) are provided with pilot holes in the output shaft. These guide drilling through the machine shaft for attachment of the unit, accomplished by a pin.

Mounting Requirements
Mounting Thread Engagement

Thread Engagement Requirements

Just a reminder . . . While mounting a sprocket or pulley to the input hub of your CB-2, -4, -5, -6, -7, -8, -10 or SAC-2, -4, -5 or -6 the screws/ bolts used must not protrude through the flange or hub. This will interfere or jam the control collar assembly, therefore causing the clutch to malfunction by failing to "drive" or causing the clutch to "slip." Please refer to the following chart for maximum thread engagement:

Maximum thread engagement specified by factory

Thread engagement exceeds factory specifications. This causes interference which results in clutch malfunction.
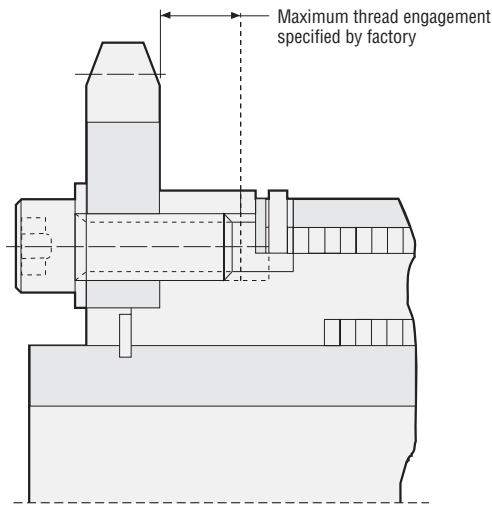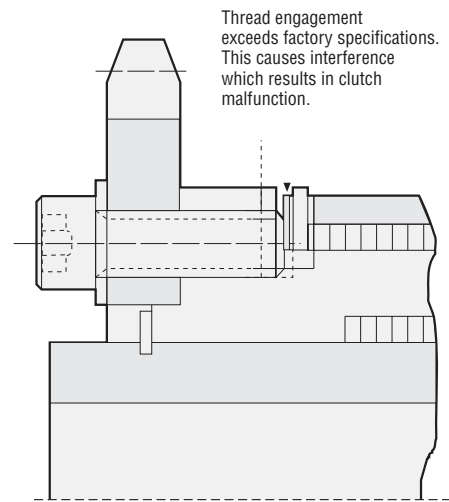
Correct Mounting

Incorrect Mounting

CB/SAC-2 = .150	CB-7 = .280
CB/SAC-4 = .280	CB-8 = .360
CB/SAC-5 = .350	CB-10 = .500
CB/SAC-6 = .312	

Application Analysis

1. Function to Be Performed

1.1 What work is to be done?

Give a basic description of the type of machine and what the clutch/brake is to do. This is important for the application engineers since they may have had experience with this type of application previously.

Example: The application is on a new design for a riveting machine. The clutch will control an eccentric which will drive home the rivet.

Example: A new automatic bank teller will require a clutch or clutch/brake to deliver the money to the customer after transaction.

1.2 Is it bi-directional?

There are certain applications which require torque to be transmitted in both directions of rotation with one clutch. When this is the case, a friction clutch is generally considered, NOT a wrap spring clutch. There are applications, however, where special wrap spring clutches can be designed for bi-directional applications.

Example: A clutch coupling is required to transmit torque in both CW and CCW rotation and to decouple the load from the drive upon command. PSI engineers designed a wrap spring clutch which can drive in both directions of rotation and, when commanded, will completely decouple the load from the drive, all with a single spring.

1.3 Will it require torque modulation?

Certain applications require "soft" starts or stops. A friction clutch or brake can accomplish this by reduced voltage to the coil. A wrap spring clutch or brake CANNOT be torque modulated, BUT the effects can be minimized by use of a flexible coupling or a properly shaped cam.

Example: A conveyor which contains high but small bottles may require soft starts so that the bottles do not fall over.

Example: A reversing drive for a moving platen copying machine may require a soft start so as not to put vibrations into the machine during the copying cycle, but, during the return, these vibrations may be of no consequence. Thus a friction clutch could be used for the copy cycle and a spring clutch (MSC) for the return.

Example: To minimize the shock and vibration during braking when using a CB or SP"S" style clutch, compliance can be introduced into the plate retention method.

1.4 Start, Stop, or Start/Stop?

1.4.1 START.

Some applications require starting the load periodically but are not critical in the final stopping position when the clutch is released.

Example: Application is feeding wire or paper into a set of rollers which then continue to draw the wire or paper off the larger spool, independent of the clutch. A PSI or SAC style model SS could be used. The SS style clutch would allow the output of the clutch to overrun the input, allowing the continued motion of the wire when the clutch is no longer engaged. An MSC or MAC may also be suitable.

Example: Application is to use clutches for a two speed drive. This would not require an accurate stopping position. The PSI model SS or SAC could be used.

1.4.2 STOP.

Certain applications require only stopping or holding. In the wrap spring section of the catalog there would not be a unit specifically designated as a brake; however, a PSI style clutch could be used as a brake by tying one of the hubs to mechanical ground. MAC, BBC or MSC can be configured for limited braking.

Example: The vertical axis of robot is controlled by a ball screw. A brake can be used to hold that position in the event of power failure.

1.4.3 START/STOP.

Single revolution applications require a start/stop function. This insures that the load is in a known position at all times. The PSI, SP and SAC style model S clutches plus the CB style clutch/brake are used for these types of requirements.

Example: Most any cam controlling application will require accurate positional control of the start of the cycle. At the end of the cycle the brake stops the motion where the cam is again in its known starting position for the next cycle.

2. Load

START   STOP
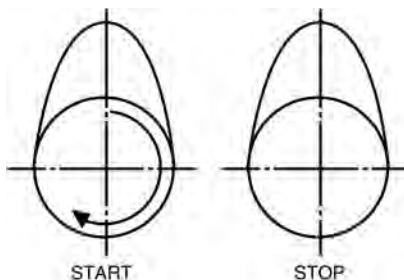
2.1 Inertia—does it vary?

An important factor to consider is that a friction clutch's starting time is inertial and frictional load dependent while that of the wrap spring clutch is not. The time to speed of a wrap spring is, for all practical purposes, constant irrespective of load, within its torque capacity.

Example: A printer will use rolls of paper and it will require a clutch to provide accurate linear positioning. A spring clutch may be the better choice for this situation since it is not affected by the changing inertia of the roll as the paper is used.
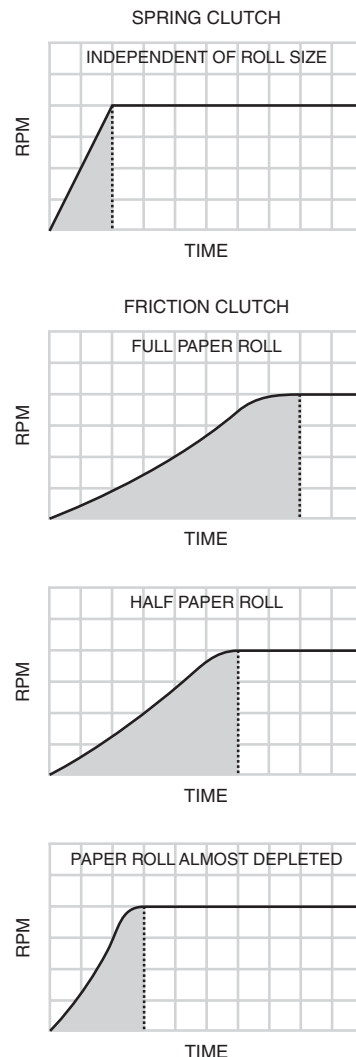
2.1 Friction—does it vary? How?

Load friction varies with bearing wear and over time will increase the friction seen by the clutch. More important, the load may vary through the cycle and be both positive and negative as with most cam type applications. The importance of knowing how this varies and to what extent should be known for proper clutch application.

3. RPM

3.1 Is the RPM constant?

Many complaints come from users of CBs because of inaccurate stopping position. Upon investigation it is found that one RPM is used to initially set up the machine and then a faster RPM used for operation. This inaccuracy happens because at lower RPM there is less energy contained in the load and the brake spring does not fully wrap down; when the RPM is increased to the run speed the brake spring fully wraps down and the stop position changes.

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Application Analysis

It also is common that, to increase production of a machine, the RPM has been increased, and the clutch no longer functions the same. As the RPM goes up, the dynamic torque increases proportionately and can cause an over torque condition.

It is important to know the RPM and if it changes during set up.

3.2 Is the rotation always in the same direction?

There can be situations when the input rotation direction changes during manual set up operations or normal operation of the machine. If the wrap spring clutch has the anti-overrun (AO) feature, this can not be done. Without anti-overrun, the input can be rotated in the opposite direction of rotation. The spring will tend to open and slip on the input hub.

4. Timing Requirements

The time of initiating motion or stopping motion is always important in any mechanical system.

4.1 TTS — Time To Speed

This is the time from initially applying voltage to the coil or solenoid of the clutch until the load has reached full RPM.

The machine synchronization and permissible cycle rate can depend on this parameter. Spring clutches are very consistent in TTS since they are not dependent on the load; thus they will allow certain variations in load and still have consistency in timing.
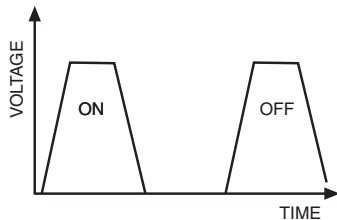
$$\text{Duty Cycle} = \frac{t_{ON}}{t_{ON} + t_{OFF}} \times 100 = \underline{}\%$$

4.2 Duty Cycle

Duty cycle is most often used as a means to determine heat build up of an electrical device.

For single revolution spring clutches, the cycle duration is dependent on the number of stops on the control collar and the RPM. Cycle rate is the number of cycles per minute. Both are important to know.

5. Stopping Position

5.1 Cycle-to-cycle accuracy requirements

Cycle-to-cycle accuracy is usually given as angular accuracy for single revolution, indexing style clutches; PSI, SP, SAC and CBs.

Example: The application is that a clutch is to control a cut-off knife and will require stopping position accuracy of 5 degrees cycle to cycle.

Stopping position depends on system conditions at the time of stopping. This means that if system conditions, such as RPM or friction, change from one stop to the next, the stopping position may also change. For stopping accuracy the brake must come to a positive, known position. For the PSI or SP style models with overtravel stop, this would mean that the pin comes all the way to the limit stop. For the CBs it would mean that the brake spring wraps fully down on the brake hub. Once the actuator contacts the control collar to disconnect the clutch, the stop point is dependent on the system inertia to carry the load forward to this brake position. If the system friction is high, there may not be enough inertia; or if the RPM decreases, the energy of the inertia also decreases and may no longer be enough to reach full brake.

Example: A CB with a 2 stop collar is not realizing 180 degrees between stops. This could be because system friction is different at each stop.

Example: A system runs at low RPM for initial set up of the machine, then increases to a normal run speed. The stopping position is no longer the same. The energy of inertia is now higher and the stopping position will advance since at the lower RPM the brake spring might not have been fully wrapped down on the brake hub.

6. Life Requirements

6.1 Cycles

Cycle life is the required number of times the clutch is engaged and disengaged during its desired operating life. Based on the application data given, an estimate can often be made on the number of cycles which can be expected. This is a common request, but each application is somewhat different and life testing in the machine is the best way to give an accurate value.

6.2 Time

In certain applications this may be of greater concern than the number of cycles.

Example: A clutch is to be used to control a fire damper door as a safety device which must be able to function over a minimum life of ten years. Hopefully the clutch will never have to be used, but this information will determine, perhaps, surface treatment and/or materials.

Example: The main drive clutch of a machine will be engaged 10-20 times per day, 200 days, over 5 years. Life of the machine is to be 10,000 hours minimum. This may dictate the type of bearings required in the clutch.

7. Environment

7.1 Business or office equipment

This is usually a well known type of environment but can sometimes differ from the norm.

Example: The clutch in a copier will be located adjacent to the heat lamp and can have a local temperature of 130 degrees C. This situation would require careful consideration for the clutch to properly perform over the expected life, such as special bearing oil.

7.2 Industrial

Most industrial environments can be assumed, but there may be unusual conditions which must be considered.

Example: The clutch will operate a wrapping mechanism on a textile machine. There will be cotton fiber in the air. This cotton fiber can collect on the actuator and not allow proper function, but it will also collect on the oil of the powdered metal bearings. This will act as a wick to draw the oil out and cause premature bearing failure if not adequately protected from the cotton fiber. The solution in this case could be an enclosure/ cover.

7.3 Agricultural or outdoor

This type of application will require the clutch to be constructed with materials to meet harsh conditions of weather and contamination.

Example: The clutch will control a grain drill. The PSI-5 and PSI-6 farm clutches are constructed using special control collars with dirt seals and shaft materials which will stand up to this operating environment.

8. Special Requirements

8.1 Input and direction of rotation

With the exception of the CBs, spring clutches can be operated either as a shaft or hub input. The CBs can only be operated as hub input.

The direction of rotation can be either clockwise or counter clockwise. The direction of rotation is determined by looking from the free hub end.

8.2 Bore size

Always try to use the catalog standard sizes for best economy and delivery. If this is not possible, special bore sizes can be obtained.

8.3 Voltage of coil

Always try to use the catalog standard coil voltages. The most popular is 24 VDC; however, special voltages can be supplied if required.

8.4 Gears, pulleys, or special free hub configuration

If the anticipated volume in the application will allow, it may be more economical for the factory to supply the clutch directly with the requested gear, pulley, sprocket, or other special feature. It should be noted that Danaher Motion has an in-house powdered metal facility so that the input hub and the special feature could be molded as an integral part. Consult with the factory to determine the best method of manufacture.

Disassembly & Assembly Instructions

CB-2 and -4

Disassembly
1. Important—Insure that the spring tang location is marked before the unit is taken apart.
2. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
3. Remove the retaining ring from the input hub end.
4. Remove input hub – turn in direction of rotation only.
5. Release the actuator so that the brake is disengaged.
6. Remove the collar assembly – extract the collar toward the clutch spring end.

Assembly
1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the input hub – turn in direction of rotation only.
4. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 90.)
5. Install the retaining ring with smooth surface facing input hub.

Note: Anti-back springs and hubs should not be disassembled because of the difficulty in maintaining endplay setting between hubs. The unit should be returned to the factory for service.

CB-5 and Super CB-5

Disassembly
1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove thrust washer (Super CB-5 only).
4. Remove input hub – turn in direction of rotation only.
5. Release the actuator so that the brake is disengaged.
6. Remove the collar assembly (see split cam design) by extracting the collar toward the clutch spring end.

Assembly
1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the input hub – turn in direction of rotation only.
4. Install thrust washer (Super CB-5 only).
5. Install the retaining ring with smooth surface facing input hub.
6. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 90.)

Note: Anti-back springs and hubs should not be disassembled because of the difficulty in maintaining endplay setting between hubs. The unit should be returned to the factory for service.

CB-6, -7 and -8

Disassembly
1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove input hub – turn in direction of rotation only.
4. Remove the retaining ring from the mounting plate end.
5. Remove the output shaft and collar assembly (see split cam design) from the mounting plate – turn in direction of rotation only. **Do not remove brake hub from mounting plate.**
6. Remove the collar assembly (see split cam design) from the output shaft by extracting the collar toward the brake side of the output shaft.

Assembly
1. Replace parts as needed.
2. Install the collar assembly (see split cam design) over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install retaining ring on the mounting plate end with its smooth surface facing brake hub.
5. Install the input hub.
6. Install the retaining ring on the input hub with smooth surface facing the hub.
7. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 90.)

Super CB-6, -7 and -8

Disassembly
1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove the input hub with thrust washer — turn in direction of rotation only. (Super CB-7 and 8 note the orientation of the flange for assembly.)
4. Remove the retaining ring from the mounting plate end.
5. Remove the output shaft and collar assembly (see split cam design) from the mounting plate – turn in direction of rotation only. Do not remove brake hub from mounting plate.
6. Remove the collar assembly (see split cam design) from the output shaft by extracting the collar toward the brake side of the output shaft.

Assembly
1. Replace parts as needed.
2. Install the collar assembly (see split cam design) over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring on the mounting plate end with its smooth surface facing the brake hub.
5. Install the input hub with thrust washer (flange oriented correctly on Super CB-7 and 8).
6. Install the retaining ring on the input hub with its smooth surface facing the hub.
7. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 90.)

CB-10 and Super CB-10

Disassembly
1. Important—Insure that the spring tang location is marked before the unit is taken apart.
2. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
3. Remove the retaining ring from the input hub end.
4. Remove the input hub – turn in direction of rotation only (CB-10). (Super CB-10 remove the input hub with the thrust washer – turn in direction of rotation only and note the orientation of the flange for assembly.
5. Remove the retaining ring from the mounting plate end.
6. Remove the output shaft and collar assembly from the mounting plate – turn in direction of rotation only. Do not remove brake hub from mounting plate.
7. Remove the collar assembly from the output shaft by extracting the collar toward the brake side of the output shaft.

THE GENUINE
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Disassembly & Assembly Instructions

Assembly
1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring on the mounting plate end with its smooth surface facing the brake hub.
5. Install the input hub and reset spring differential as needed (CB-10). Install the input hub with thrust washer flange oriented correctly and reset the spring differential as needed (Super CB-10). (See "CB Spring Differential Adjustments" on page 90.)
6. Install the retaining ring with smooth surface facing the hub.

SAC-2, -4 and -5

Disassembly
1. Remove the retaining ring from the input hub end.
2. Remove input hub – turn in direction of rotation only.
3. Remove the stop collar by extracting the collar toward the clutch spring end.

Assembly
1. Replace parts as needed.
2. Install the stop collar over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install input hub – turn in direction of rotation only.
4. Install retaining ring.

SAC-6

Disassembly
1. Remove the retaining ring from the input hub end.
2. Remove input hub – turn in direction of rotation only.
3. Remove the retaining ring from the mounting plate end.
4. Remove the output shaft and stop collar assembly from the mounting plate – turn in the direction of rotation only. Do not remove plate hub from mounting plate.
5. Remove the control stop from the output shaft by extracting the collar towards plate side of the output shaft.

Assembly
1. Replace parts as needed.
2. Install the stop collar over the output shaft and spring assembly.
3. Install the output shaft and stop collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring to output shaft.
5. Install the input hub.
6. Install the retaining ring on the shaft input end.

ACCE

Disassembly
1. Remove spiral ring and thrust washer from both ends of the shaft.
2. Rotate clutch and remove it from the plate. Remove the large thrust washer.
3. For shaft input units, remove the shaft assembly by rotating opposite to drive direction.
4. For hub input units, remove the hub by rotating opposite to drive direction.
5. For Model SS, remove the stop collar and spring by rotating opposite to drive direction and pulling the drive spring off the output hub.
6. For Model S, pull the stop collar axially to release it from the spring. Rotate the spring opposite to drive direction until the down tang can be pried from its hole.

Assembly
1. For Model S, assemble spring to output hub by rotating opposite to drive direction until the down tang is seated in the hole.
2. For Model SS, assemble spring to output hub by rotating opposite to drive direction until the spring is seated against the large retaining ring.
3. Assemble stop collar over spring by deflecting the input tang with long-nose pliers (reach through the collar with the pliers).
4. Assemble input by rotating opposite to drive direction.
5. Install large thrust washer and slide clutch assembly onto the plate.
6. Install thrust washers and spiral rings on both ends of the shaft.

ACCM

Disassembly
1. Remove spiral ring and thrust washer from the shaft.
2. For shaft input units, remove the shaft assembly by rotating opposite to drive direction.
3. For hub input units, remove the hub by rotating opposite to drive direction.
4. For Model SS, remove the stop collar and spring by rotating opposite to drive direction and pulling the drive spring off the output hub.
5. For Model S, pull the stop collar axially to release it from the spring. Rotate the spring opposite to drive direction until the down tang can be pried from its hole.

Assembly
1. For Model S, assemble spring to output hub by rotating opposite to drive direction until the down tang is seated in the hole.
2. For Model SS, assemble spring to output hub by rotating opposite to drive direction until the spring is seated against the large retaining ring.
3. Assemble stop collar over spring by deflecting the input tang with long-nose pliers (reach through the collar with the pliers).
4. Assemble input by rotating opposite to drive direction.
5. Install thrust washer and spiral ring on the shaft.

PSI

Disassembly
1. Remove retaining ring from shaft.
2. Remove hub end by rotating opposite to drive direction.
3. For Model S, remove stop collar and spring by rotating opposite to drive direction and pulling to remove output tang from hub.

Assembly Model S
1. Assemble spring to output hub by rotating opposite to direction of rotation. Output tang must be inserted completely into hole in hub during this assembly.
2. Assemble stop collar over spring by deflecting input tang with long-nose pliers. (Reach through collar with pliers.)
3. Assemble input hub by rotating opposite to direction of rotation.
4. Assemble retaining ring to shaft.

Assembly Model O & SS
1. Assemble spring and stop collar (or sleeve) with control tang located in slot in collar.
2. Assemble spring and collar to output hub by rotating opposite to direction of rotation.
3. Assemble input hub by rotating opposite to direction of rotation.
4. Assemble retaining ring to shaft.

Friction Clutches & Brakes

How to Select

Brake Selection

Step 1

Determine if the application requires a *static* (holding) or *dynamic* (stopping) brake.

Step 2

For *static brake applications*, determine the required static torque to hold the load under worst case conditions, considering system drag. Skip to Step 5.

Step 3

For *dynamic braking applications* with a specific stopping time requirement, first calculate the dynamic torque necessary to decelerate the load, using the ***inertia-time*** equation:

$$T_D = (0.1047 (I \times \omega) / t) - D$$

where I = total system inertia lb-in-sec^2, ω = shaft speed in RPM, t = time to zero and D = load drag. Next multiply by 1.25 to convert to static torque. Skip to Step 5.

Step 4

For those *dynamic braking applications* requiring only an ability to stall a load, calculate the appropriate static torque using the ***horsepower-RPM*** equation:

$$T_S = 1.25 \times 63000 \times (HP \times K) / \omega$$

where HP = horsepower, K = service factor and ω = RPM ***OR*** refer to the charts found on page 99.

Step 5

Select a brake model from the catalog with a static torque rating greater than the required torque (service factor dependent). Verify that the selected brake fits into the available application envelope and mounting configuration.

Note: When braking dynamically, careful consideration must be given to proper energy dissipation. Calculate the total kinetic energy dissipation per cycle (E_k), and compare this to the allowable braking energy (E_b) based on the frequency of engagement (N) given in the Energy Dissipation Chart on page 143. If the total kinetic energy dissipation **per cycle** is more than allowable, given the frequency of engagement, then consider using a larger series brake.

Clutch Selection

Step 1

For clutch applications with a *specific acceleration time* requirement, first calculate the dynamic torque (T_D) required to accelerate the load using the ***inertia-time*** equation:

$$T_D = 0.1047 (I \times \omega) / t + D$$

where I = rotational load inertia in lb-in-sec^2 units, ω = differential slip speed in RPM, t = time to speed, and D = load drag torque reflected to the clutch. Next convert to static torque by multiplying by 1.25. Skip to Step 3.

Step 2

For clutch applications requiring only an *ability* to *accelerate a load*, calculate the appropriate static torque using the ***horsepower-RPM*** equation:

$$T_S = 1.25 \times 63000 \times (HP \times K) / \omega$$

where HP = horsepower, K = service factor, and ω = differential slip speed in RPM ***OR*** refer to the charts in the engineering guidelines section.

Step 3

Select a clutch model from the catalog with a static torque rating greater than the required torque (service factor dependent). Verify that the selected clutch fits into the available application envelope and mounting configuration.

Note: When engaging a clutch dynamically (under load at speed), careful consideration must be given to proper energy dissipation. Calculate the total energy dissipated per minute:

$$E = (E_k + E_s) \times N$$

where E_k = kinetic energy, E_s = slip energy, and N = cycle rate. If the total energy dissipation is more than allowable (see performance data tables), then consider using a larger series clutch.

General Notes

In some applications it may be necessary to consider clutch or brake inertia and engagement time in calculating load acceleration. If the inertia or engagement time of the clutch or brake selected represents more than 10% of the load inertia or acceleration time, use the above referenced ***Inertia-time*** equation to solve for acceleration time **(t)**, using an inertia equivalent to the sum of the load inertia and the clutch or brake inertia (see performance data tables). Then verify that the sum of the acceleration and clutch or brake engagement times is still within the required acceleration time for the application.

For more information on other key factors that greatly affect clutch or brake life, such as ambient temperature, slip-speed and load energy, please contact us at 1-540-633-3400.

Selecting a Clutch or Brake

Torque, Horsepower & Speed

Disregarding frictional losses in a pulley, gear or sprocket system incorporating a clutch and running at a constant speed, the HP delivered by the clutch equals the HP of the prime mover. However, the torque imposed on the clutch may be greater or less than the torque on the prime mover depending on the ratio of the speed of the shafts. Generally, the faster the clutch shaft speed, the lower the torque required to drive the load.

The application charts below can be used as a quick and easy reference to determine the proper sizing of a clutch or brake based on motor horsepower and speed. However, when precise control and life expectancy are critical all design considerations should be evaluated.

Light to Medium Duty Applications (K = 1.5)

		Clutch or Brake Shaft Speed in RPM																				
		100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4600	5000
H	1/50																					
O	1/20								Series 17													
R	1/12																					
S	1/8																					
E	1/6								Series 19													
P	1/4																					
O	1/3									Series 22/23												
W	1/2																					
E	3/4									Series 26/28												
R	1																					
	1 1/2											Series 30										
	2																					
	3																					
	5												Series 40									
	7 1/2																					

Heavy Duty Applications (K = 3.0)

		Clutch or Brake Shaft Speed in RPM																				
		100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4600	5000
H	1/50								Series 17													
O	1/20																					
R	1/12								Series 19													
S	1/8																					
E	1/6								Series 22/23													
P	1/4																					
O	1/3									Series 26/28												
W	1/2																					
E	3/4										Series 30											
R	1																					
	1 1/2																					
	2												Series 40									
	3																					
	5																					
	7 1/2																					

FRICTION

CS/CSC and CF/CFC Series
Shaft and Flange Mounted Clutches and Clutch Couplings

Electromagnetic clutches provide an efficient, electrically switchable link between a motor and a load. Clutches are used to couple two parallel shafts by the use of pulleys, gears or sheaves. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are mounted on a single shaft, with the rotor secured to the shaft. The armature is bearing mounted and free to rotate. When the coil is energized, the armature engages the friction surface of the rotor, thus driving the load.

Electromagnetic clutch couplings provide this same efficient, electrically switchable link between a motor and a load for in-line shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are securely mounted on opposing in-line shafts. When the coil is energized, the armature engages the friction surface of the rotor, coupling the two in-line shafts, thus driving the load.

- Torque: 2.5 to 125 lb-in (0.28 to 14.12 Nm)
- Diameters: 1.25 to 3.27 in (31.8 to 83.1 mm)
- Efficient means of cycling load
- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Economic cost
- Energy efficient

How to order

CS – 11 B 24* – E04 – E04

Series		Frame Size	Coil Voltage	Rotor Bore	Armature Bore
CS = Shaft Mounted Clutch		**11** = 1.25 (31.8)	**12** = 12VDC		
CSC = Shaft Mounted Clutch Coupling		**15** = 1.53 (38.9)	**24** = **24VDC**		
CF = Flange Mounted Clutch		**17** = 1.78 (45.2)	**90** = 90VDC		
CFC = Flange Mounted Clutch Coupling		**22** = 2.26 (57.4)			
		26 = 2.63 (66.8)			
		30 = 3.27 (83.1)			

B = Burnished
U = Unburnished

English		Metric	
E03 = .1875		**M06** = 6mm	
E04 = .2500		**M08** = 8mm	
E05 = .3125		**M10** = 10mm	
E06 = .3750		**M12** = 12mm	
E08 = .5000		**M20** = 20mm	
E10 = .6250		**M25** = 25mm	

*   Other voltages available upon request

General Notes
- The air gap should be checked periodically to insure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Consult factory for additional options.

- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Flying leads are provided as standard, terminal style connection available upon request.

- Armature and rotor bore dimensions are minimums, with tolerance generally .001/.002 larger to accommodate varying environmental conditions.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

START

Clutches and Clutch Couplings

Full corrosion protection

Rotating components designed for low inertia and minimal drag

Efficient, low power consumption coil, UL class B insulation system

Integral long-life bearings of advanced structural components

Shaft mounting (bulkhead mounting available)

Long-life wear surfaces

Zero backlash

Standard hub supplied, integrated gears, pulley and other custom drive components available.

Typical Applications

- Document handling
- Copiers
- Printers
- Collators
- Sorters
- Finishers
- ATM machines
- Currency counters
- Vending machines
- Postal handling equipment
- Ticket & receipt dispensing
- Packaging
- Material handling
- Office automation

CLUTCH &
CLUTCH
COUPLINGS

FRICTION

CS-11 Clutches & CSC-11 Clutch Couplings
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see page 144.

CS Model   CSC Model   CS Model Shown

DIMENSIONS											
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	F: Tab Height in (mm)	G: Slot Height in (mm)	H: Tab Width in (mm)	J: Slot Width in (mm)	K: Tab Thickness in (mm)	L: Length in (mm)	M: Mtg Ø x N: Length in (mm)
CS-11B24-E04-E04	5.0 (0.56)	1.25 (31.8)	1.38 (35.1)	.250 (6.4)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	.507 x 0.33 (12.9 x 8.4)
CS-11B24-E05-E05	5.0 (0.56)	1.25 (31.8)	1.38 (35.1)	.312 (7.9)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	.507 x 0.33 (12.9 x 8.4)
CSC-11B24-E04-E04	5.0 (0.56)	1.25 (31.8)	1.28 (32.5)	.250 (6.4)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	NA
CSC-11B24-E05-E05	5.0 (0.56)	1.25 (31.8)	1.28 (32.5)	.312 (7.9)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	NA

PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Armature Engage. msec	Armature Disengage. msec	Armature Inertia lb-in-sec²	Rotor Inertia lb-in-sec²	Weight lb (kg)	Energy Dissipation ft-lb/min
CS-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.5×10^{-5}	2.6×10^{-5}	0.2 (0.1)	175
CSC-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.4×10^{-5}	2.6×10^{-5}	0.2 (0.1)	175

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain concentricity between armature assembly and rotor shaft within .003 T.I.R.
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Other voltages available upon request.

- Initial working air gap at installation shall be .004/.009.
- Customer supplied gear/pulley/sprocket is press-fit on the clutch armature assembly knurl.
- Rotor is secured to shaft by set screw or roll pin.

- Clutch coupling armature assembly is secured to shaft by set screws and key.
- Metric bores available
- Static torque values above are burnished

START

CS-15, 17 Clutches & CSC-15, 17 Clutch Couplings
Dimensions & Specifications

12 in MIN (300 mm)
#22 AWG Irradiated Polyethelene (CS-15 & CSC-15)
#22 AWG PVC (CS-17 & CSC-17)

Dimensions (mm)
Mounting requirements see page 144.

CS Model   CSC Model   CS Model Shown

				DIMENSIONS								
Model*	Static Torque in (mm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Tab Height in (mm)	G: Slot Height in (mm)	H: Tab Width in (mm)	J: Slot Width in (mm)	K: Tab Thick. in (mm)	L:Lngth in (mm)	M: Mtg Ø x N: Lg in (mm)
CS-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.83 (46.5)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CS-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.83 (46.5)	. 312 (7.9)	.364 (9.2)	.094 (2.4)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CS-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.83 (46.5)	. 375 (9.5)	NA	NA	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CSC-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CSC-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 312 (7.9)	.364 (9.2)	.094 (2.4)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CSC-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 375 (9.5)	NA	NA	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CS-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.85 (47.0)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CS-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.85 (47.0)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CS-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.85 (47.0)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CSC-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.55 (39.4)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA
CSC-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.55 (39.4)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA
CSC-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.55 (39.4)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA

				PERFORMANCE					
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engage. msec	Armature Diseng. msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CS-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	5.9×10^{-5}	5.2×10^{-5}	0.4 (0.2)	295
CSC-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	6.6×10^{-5}	5.2×10^{-5}	0.4 (0.2)	295
CS-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	7.3×10^{-5}	11.4×10^{-5}	0.6 (0.3)	420
CSC-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	8.1×10^{-5}	11.4×10^{-5}	0.6 (0.3)	420

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Initial working air gap at installation shall be .004/.009.
- Static torque values above are burnished.
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Metric bores available
- Other voltages available upon request.

CLUTCH & CLUTCH COUPLINGS

FRICTION

CS-22, 26 Clutches & CSC-22, 26 Clutch Couplings

Dimensions & Specifications

Dimensions (mm)
Mounting requirements see page 144.

CS Model

CSC Model

CSC Model Shown

DIMENSIONS															
Model*	Static Torque in (mm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Tab Height in (mm)	G: Slot Height in (mm)	H: Tab Width in (mm)	J: Slot Width in (mm)	K: Tab Thick. in (mm)	L: Lngth in (mm)	M: Mtg Ø x R: Lngth in (mm)	N: (3) Mtg. Holes	P: Mtg. Hole BC Ø in (mm)
CS-22B24-E05-E05	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CS-22B24-E06-E06	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CS-22B24-E08-E08	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CSC-22B24-E05-E05	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CSC-22B24-E06-E06	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CSC-22B24-E08-E08	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CS-26B24-E06-E06	80 (9.04)	2.63 (66.8)	2.47 (62.7)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	.999 x 0.47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CS-26B24-E08-E08	80 (9.04)	2.63 (66.8)	2.47 (62.7)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	.999 x 0.47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CSC-26B24-E06-E06	80 (9.04)	2.63 (66.8)	2.10 (53.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	NA	NA	NA
CSC-26B24-E08-E08	80 (9.04)	2.63 (66.8)	2.10 (53.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	NA	NA	NA

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CS-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.4 x 10^{-5}	32.3 x 10^{-5}	1.1 (0.5)	1400
CSC-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.1 x 10^{-5}	32.3 x 10^{-5}	1.1 (0.5)	1400
CS-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	80.0 x 10^{-5}	62.0 x 10^{-5}	1.4 (0.6)	2600
CSC-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	81.0 x 10^{-5}	62.0 x 10^{-5}	1.4 (0.6)	2600

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.
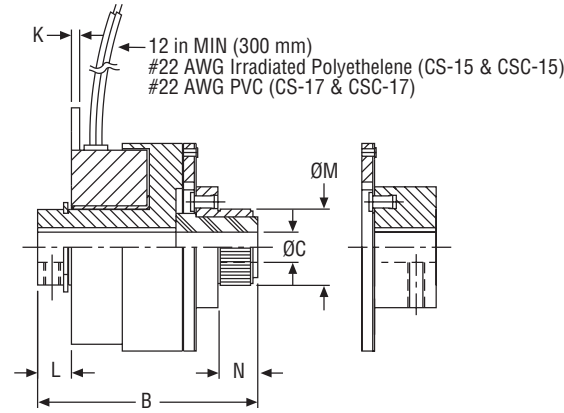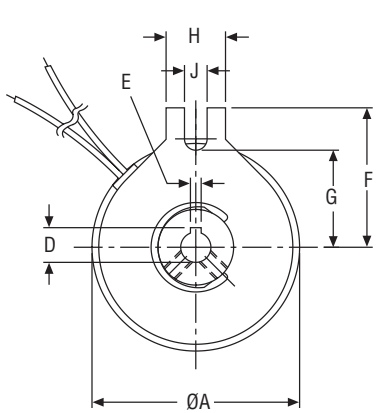
General Notes
- Initial working air gap at installation shall be .006/.013.
- Static torque values above are burnished
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Metric bores available
- Other voltages available upon request.

CS-30 Clutches & CSC-30 Clutch Couplings
Dimensions & Specifications

Dimensions (mm)
Mounting requirements see page 144.

CS Model

CSC Model

CSC Model Shown

Model*	Static Torque in (mm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Tab Height in (mm)	G: Slot Height in (mm)	H: Tab Width in (mm)	J: Slot Width in (mm)	K: Tab Thick. in (mm)	L:Lngth in (mm)	M: Mtg Ø x R: Lngth in (mm)	N: (3) Mtg. Holes	P: Mtg. Hole BC Ø in (mm)
CS-30B24-E06-E06	125 (14.12)	3.27 (83.1)	2.81 (71.4)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CS-30B24-E08-E08	125 (14.12)	3.27 (83.1)	2.81 (71.4)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CS-30B24-E10-E10	125 (14.12)	3.27 (83.1)	2.81 (71.4)	.625 (15.9)	.709 (18.0)	.188 (4.8)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CSC-30B24-E06-E06	125 (14.12)	3.27 (83.1)	2.17 (55.1)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	NA	NA	NA
CSC-30B24-E08-E08	125 (14.12)	3.27 (83.1)	2.17 (55.1)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	NA	NA	NA
CSC-30B24-E10-E10	125 (14.12)	3.27 (83.1)	2.17 (55.1)	.625 (15.9)	.709 (18.0)	.188 (4.8)	2.05 (52.1)	1.69 (42.9)	0.50 (12.7)	0.19 (4.8)	0.09 (2.3)	0.36 (9.1)	NA	NA	NA

Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CS-30	125 (14.12)	24/90	44/600	15.0	18.0	45.0	180.0 x 10^{-5}	203.0 x 10^{-5}	3.3 (1.5)	2900
CSC-30	125 (14.12)	24/90	44/600	15.0	18.0	45.0	179.5 x 10^{-5}	203.0 x 10^{-5}	3.3 (1.5)	2900

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
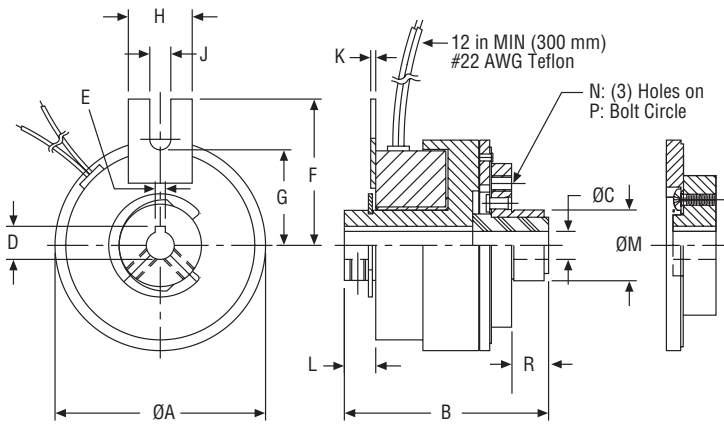(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Initial working air gap at installation shall be .008/.018.
- Static torque values above are burnished.
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Metric bores available
- Other voltages available upon request.

START

CF-11 Clutches & CFC-11 Clutch Couplings
Dimensions & Specifications

12 in MIN
(300 mm)
#22 AWG Irradiated Polyethelene

H▯

ØJ: (4) Holes on
ØL: Bolt Circle

ØF

ØC

ØA

ØM

K

N

B

Dimensions (mm)
Mounting requirements see page 144.

CF Model

CFC Model

CF Model Shown

DIMENSIONS										
Model*	Static Torque Ib-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	F: Mtg Pilot Ø in (mm)	H▯: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thickness in (mm)	L: Mtg Hole BC Ø in (mm)	M: Mtg Ø x N: Length in (mm)
CF-11B24-E04-E04	5.0 (.56)	1.25 (31.8)	1.23 (31.2)	.250 (6.4)	1.498 (38.0)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)	.507 x .33 (12.9 x 8.4)
CF-11B24-E05-E05	5.0 (.56)	1.25 (31.8)	1.23 (31.2)	.312 (7.9)	1.498 (38.0)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)	.507 x .33 (12.9 x 8.4)
CFC-11B24-E04-E04	5.0 (.56)	1.25 (31.8)	1.14 (29.0)	.250 (6.4)	1.498 (38.0)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)	NA
CFC-11B24-E05-E05	5.0 (.56)	1.25 (31.8)	1.14 (29.0)	.312 (7.9)	1.498 (38.0)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)	NA

PERFORMANCE										
Model	Static Torque Ib-in (Nm)	Coil Voltage VDC	Resistence Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CF-11	5.0 (.56)	24/90	128/1800	5.0	5.0	18.0	3.5×10^{-5}	2.5×10^{-5}	0.2 (0.1)	175
CFC-11	5.0 (.56)	24/90	128/1800	5.0	5.0	18.0	3.5×10^{-5}	2.5×10^{-5}	0.2 (0.1)	175

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
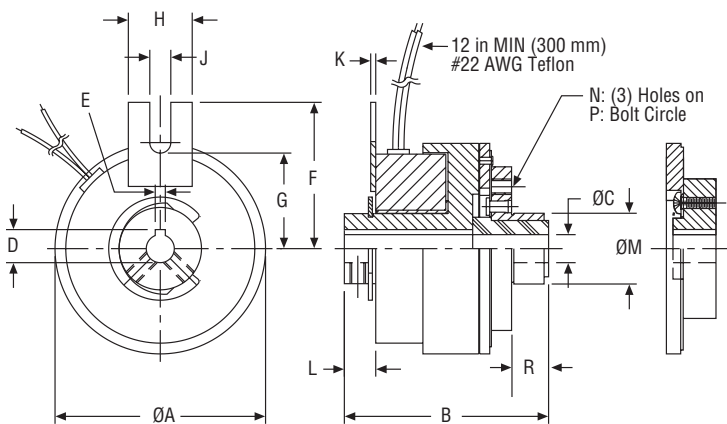(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Initial working air gap at installation shall be .004/.009.
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R

- Customer shall maintain concentricity between armature assembly and rotor shaft within .003 T.I.R.
- Customer supplied gear/pulley/sprocket is press-fit on the clutch armature assembly knurl.
- Clutch coupling armature assembly is secured to shaft by set screws and key.

- Rotor is secured to shaft by a roll pin.
- Metric bores available
- Static torque values above are burnished.
- Other voltages available upon request.

START

CF-15, 17 Clutches & CFC-15, 17 Clutch Couplings
Dimensions & Specifications

12 in MIN (300 mm)
#22 AWG Irradiated Polyethelene (CF-15 & CFC-15)
#22 AWG PVC (CF-17 & CFC-17)

ØJ: (4) Holes on
ØL: Bolt Circle

Dimensions (mm)
Mounting requirements see page 144.

CF Model   CFC Model   CFC Model Shown

	DIMENSIONS										
Model*	Static Torque in (mm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes in (mm)	K: Mtg Plt Thickness in (mm)	L: Mtg Hole BCØ	M: Mtg Ø x N: Length in (mm)
CF-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.54 (39.1)	.250 (6.4)	.286 (7.3)	0.62 (1.6)	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	.631 x .33 (16.0 x 8.4)
CF-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.54 (39.1)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	.631 x .33 (16.0 x 8.4)
CF-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.54 (39.1)	.375 (9.5)	NA	NA	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	.631 x .33 (16.0 x 8.4)
CFC-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.250 (6.4)	.286 (7.3)	0.62 (1.6)	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	NA
CFC-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	NA
CFC-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.375 (9.5)	NA	NA	1.999 (50.8)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)	NA
CF-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.65 (41.9)	.250 (6.4)	.286 (7.3)	.062 (1.6)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	.631 x .33 (16.0 x 8.4)
CF-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.65 (41.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	.631 x .33 (16.0 x 8.4)
CF-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.65 (41.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	.631 x .33 (16.0 x 8.4)
CFC-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.35 (34.3)	.250 (6.4)	.286 (7.3)	.062 (1.6)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	NA
CFC-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.35 (34.3)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	NA
CFC-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.35 (34.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.436 (61.9)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)	NA

	PERFORMANCE								
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CF-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	5.9×10^{-5}	5.0×10^{-5}	0.4 (0.2)	295
CFC-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	6.6×10^{-5}	5.0×10^{-5}	0.4 (0.2)	295
CF-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	7.3×10^{-5}	11.7×10^{-5}	0.6 (0.3)	420
CFC-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	8.1×10^{-5}	11.7×10^{-5}	0.6 (0.3)	420

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.
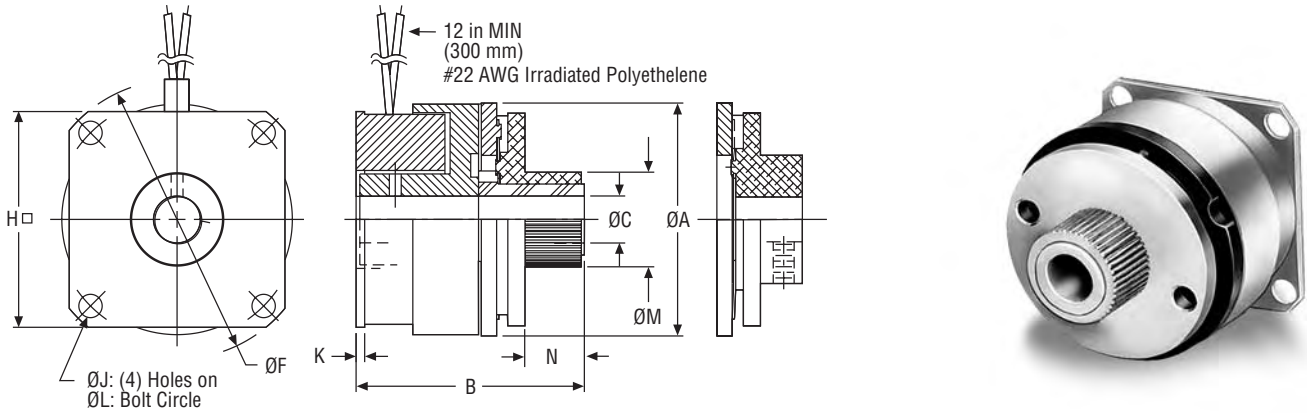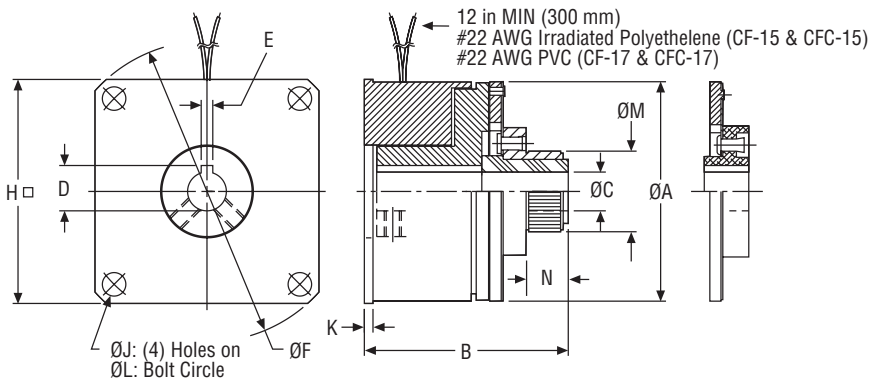
General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Other voltages available upon request.
- Metric bores available
- Initial working air gap at installation shall be .006/.013.
- Customer shall maintain concentricity between armature and rotor shaft within .003 T.I.R.

CLUTCH & CLUTCH COUPLINGS

FRICTION

CF-22, 26 Clutches & CFC-22, 26 Clutch Couplings

Dimensions & Specifications

CF Model

CFC Model

CFC Model Shown

Dimensions (mm)
Mounting requirements see page 144.

	DIMENSIONS													
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thick. in (mm)	L: Mtg Hole BC Ø in (mm)	M: Mtg Ø x R: Lgth in (mm)	N: (3) Mtg Holes	P: Mtg Hole BC Ø in (mm)
CF-22B24-E05-E05	40 (4.52)	2.26 (57.4)	1.93 (49.0)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	.756 x .37 (19.2 x 9.4)	NA	NA
CF-22B24-E06-E06	40 (4.52)	2.26 (57.4)	1.93 (49.0)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	.756 x .37 (19.2 x 9.4)	NA	NA
CF-22B24-E08-E08	40 (4.52)	2.26 (57.4)	1.93 (49.0)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	.756 x .37 (19.2 x 9.4)	NA	NA
CFC-22B24-E05-E05	40 (4.52)	2.26 (57.4)	1.78 (45.2)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	NA	NA	NA
CFC-22B24-E06-E06	40 (4.52)	2.26 (57.4)	1.78 (45.2)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	NA	NA	NA
CFC-22B24-E08-E08	40 (4.52)	2.26 (57.4)	1.78 (45.2)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.873 (73.0)	2.33 (59.2)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)	NA	NA	NA
CF-26B24-E06-E06	80 (9.04)	2.63 (66.8)	2.20 (55.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	3.499 (88.9)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)	.999 x .47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CF-26B24-E08-E08	80 (9.04)	2.63 (66.8)	2.20 (55.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	3.499 (88.9)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)	.999 x .47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CFC-26B24-E06-E06	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.375 (9.5)	.425 (10.8)	.094 (2.4)	3.499 (88.9)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)	NA	NA	NA
CFC-26B24-E08-E08	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.500 (12.7)	.564 (14.3)	.125 (3.2)	3.499 (88.9)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)	NA	NA	NA

	PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
CF-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.4 x 10^{-5}	31.7 x 10^{-5}	1.1 (0.5)	1400
CFC-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.1 x 10^{-5}	31.7 x 10^{-5}	1.1 (0.5)	1400
CF-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	80.0 x 10^{-5}	64.0 x 10^{-5}	1.4 (0.6)	2600
CFC-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	81.0 x 10^{-5}	64.0 x 10^{-5}	1.4 (0.6)	2600

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
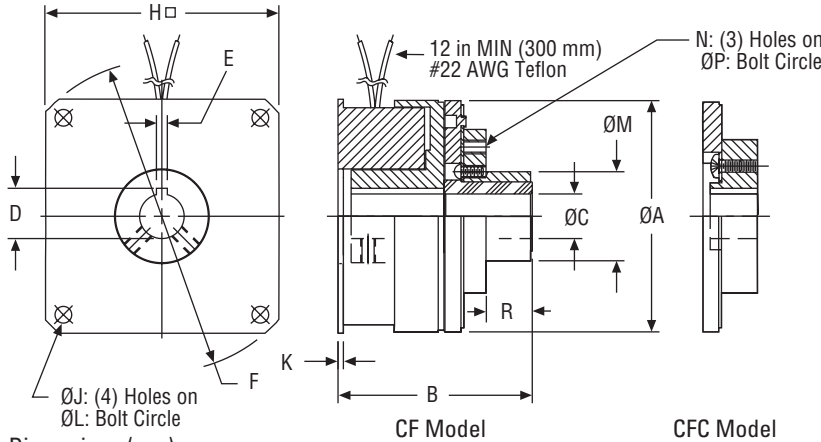(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Metric bores available
- Other voltages available upon request.

- Initial working air gap at installation shall be .006/.013.
- Customer shall maintain concentricity between armature and rotor shaft within .003 T.I.R.

START

CF-30 Clutches & CFC-30 Clutch Couplings
Dimensions & Specifications

H □

E

12 in MIN (300 mm)
#22 AWG Teflon

N: (3) Holes on
ØP: Bolt Circle

D

ØM

ØC

ØA

R

K

B

F

ØJ: (4) Holes on
ØL: Bolt Circle

CF Model   CFC Model   CFC Model Shown

Dimensions (mm)
Mounting requirements see page 144.

DIMENSIONS														
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thick. in (mm)	L: Mtg Hole BC Ø in (mm)	M: Mtg Ø x R: Lgth in (mm)	N: (3) Mtg Holes	P: Mtg Hole BC Ø in (mm)
CF-30B24-E06-E06	125 (14.12)	3.27 (83.1)	2.53 (64.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CF-30B24-E08-E08	125 (14.12)	3.27 (83.1)	2.53 (64.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CF-30B24-E10-E10	125 (14.12)	3.27 (83.1)	2.53 (64.3)	.625 (15.9)	.709 (18.0)	.188 (4.8)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	1.374 x .83 (34.9 x 21.1)	#8-32	1.75 (44.5)
CFC-30B24-E06-E06	125 (14.12)	3.27 (83.1)	1.94 (49.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	NA	NA	NA
CFC-30B24-E08-E08	125 (14.12)	3.27 (83.1)	1.94 (49.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	NA	NA	NA
CFC-30B24-E10-E10	125 (14.12)	3.27 (83.1)	1.94 (49.3)	.625 (15.9)	.709 (18.0)	.188 (4.8)	4.186 (106.3)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)	NA	NA	NA

PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec²	Rotor Inertia lb-in-sec²	Weight lb (kg)	Energy Dissipation ft-lb/min
CF-30	125 (14.12)	24/90	44/600	15.0	18.0	45.0	180.0×10^{-5}	207.2×10^{-5}	3.3 (1.5)	2900
CFC-30	125 (14.12)	24/90	44/600	15.0	18.0	45.0	179.5×10^{-5}	207.2×10^{-5}	3.3 (1.5)	2900

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Metric bores available
- Other voltages available upon request.

- Initial working air gap at installation shall be .008/.018.
- Customer shall maintain concentricity between armature and rotor shaft within .003 T.I.R.

CLUTCH & CLUTCH COUPLINGS

FRICTION

STOP   HOLD

BF Series
Power-on Brakes

Electromagnetic power-on brakes provide an efficient, switchable means of stopping and/or holding the load. While the field (electromagnet) assembly is fixed and prevented from rotating by a flange, the armature assembly is secured to the shaft. When the coil is energized, the armature engages the friction surface of the fixed field (electromagnet) assembly, thus stopping and/or holding the load.

- Torque: 5 lb-in to 125 lb-in (0.56 to 14.13 Nm)
- Diameter: 1.25 to 3.27 in. (31.8 to 83.1 mm)
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

Typical Applications

- Robotics
- Medical equipment
- Actuators
- Motor brakes
- Postal handling equipment
- Packaging

How to order

BF - 26   B   24* - E08

Series	Frame Size	U = Unburnished	Coil Voltage	Hub Bore	
BF = Power-on Brake	**11** = 1.25 (31.8)	**B** = Burnished	**12** = 12VDC	**English**	**Metric**
	15 = 1.53 (38.9)		**24** = 24VDC	**E03** = .1870	**M03** = 3mm
	17 = 1.78 (45.2)		**90** = 90VDC	**E04** = .2500	**M04** = 4mm
	22 = 2.26 (57.4)			**E05** = .3125	**M05** = 5mm
	26 = 2.63 (66.8)			**E06** = .3750	**M06** = 6mm
	30 = 3.27 (83.1)			**E08** = .5000	**M08** = 8mm
				E10 = .6250	**M10** = 10mm
				E12 = .7500	**M12** = 12mm
				E14 = .8750	**M20** = 20mm
				E16 = 1.000	**M25** = 25mm
				E24 = 1.500	**M30** = 30mm
				E32 = 2.000	**M35** = 35mm
					M40 = 40mm
					M45 = 45mm

Insulation Class:
BF: Class B (130°C)

*   Other voltages available upon request

General Notes
- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.

- Working air gap should be checked periodically to insure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.

- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

STOP HOLD

BF Series
Power-on Brakes

Efficient low power consumption coil, UL Class B insulation system

Zero backlash accurate system positioning

Fully plated components, maximum corrosion protection

BRAKES

FRICTION

BF-11 Brakes
Dimensions & Specifications

ØJ: (4) Holes on
ØL: Bolt Circle

E

ØF

D

ØG

B

12 in MIN (300 mm)
#22 AWG Irradiated Polyethelene

ØC

ØA

K

H□

BF Model Shown

Dimensions (mm)
Mounting requirements see page 144.

DIMENSIONS												
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Hub ID Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	G: Case IDØ in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thickness in (mm)	L: Mtg Hole BC Ø in (mm)
BF-11B24-E04	5.0 (0.56)	1.25 (31.8)	1.14 (29.0)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.498 (38.0)	0.53 (1.35)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)
BF-11B24-E05	5.0 (0.56)	1.25 (31.8)	1.14 (29.0)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.498 (38.0)	0.53 (1.35)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
BF-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.4 x 10^{-5}	NA	0.2 (0.1)	175

*See "How to order" model numbering system on page 110 for BF power-on brakes.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .004/.009.
- Other voltages available upon request.

- Brake coupling armature assembly is secured to shaft by (1) set screw and key.
- Metric bores available

STOP   HOLD

BF-15, 17 Brakes
Dimensions & Specifications

ØJ: (4) Holes on
ØL: Bolt Circle

E

ØF

D

H□

B

12 in MIN (300 mm)
#24 AWG Teflon (BF-15)
#22 AWG PVC (BF-17)

ØG

ØC

ØA

K

BF Model Shown

Dimensions (mm)
Mounting requirements see page 144.

DIMENSIONS												
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Hub ID Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	G: Case ID Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thick. in (mm)	L: Mtg Hole BC Ø in (mm)
BF-15B24-E04	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-15B24-E05	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-15B24-E06	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.375 (9.5)	NA	NA	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-17B24-E04	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.250 (6.4)	.286 (7.3)	.062 (1.6)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)
BF-17B24-E05	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)
BF-17B24-E06	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec²	Rotor Inertia lb-in-sec²	Weight lb (kg)	Energy Dissipation ft-lb/min
BF-15	10.0 (1.13)	24/90	130/1800	5.0	8.0	22.0	6.6 x 10⁻⁵	NA	0.4 (0.2)	295
BF-17	15.0 (1.69)	24/90	108/1518	6.0	10.0	27.0	8.1 x 10⁻⁵	NA	0.5 (0.3)	420

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.
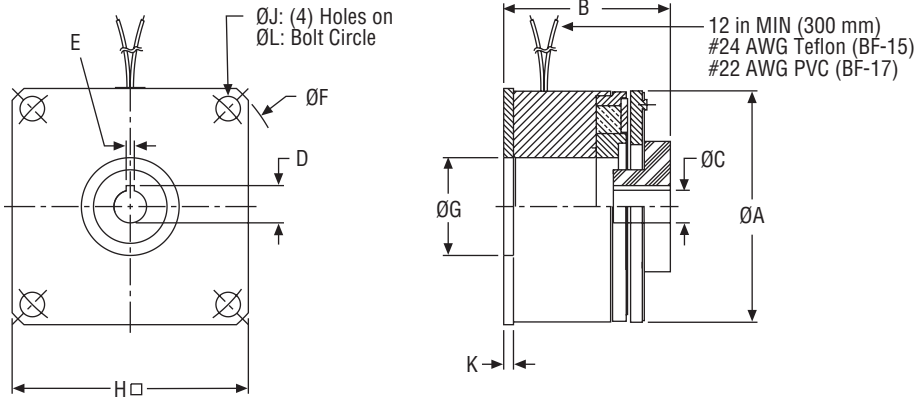
General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .006/.013.
- Other voltages available upon request.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

FRICTION

BF-22, 26 Brakes
Dimensions & Specifications

ØJ: (4) Holes on ØL: Bolt Circle

E

ØF

D

ØG

B

12 in MIN (300 mm) #22 AWG Teflon

ØC

ØA

K

H □

BF Model Shown

Dimensions (mm)
Mounting requirements see page 144.

DIMENSIONS												
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Hub ID Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	G: Case ID Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thick. in (mm)	L: Mtg Hole BC Ø in (mm)
BF-22B24-E05	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-22B24-E06	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-22B24-E08	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-26B24-E06	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.375 (9.5)	.425 (10.8)	.094 (2.4)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)
BF-26B24-E08	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.500 (12.7)	.564 (14.3)	.125 (3.2)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)
BF-26B24-E10	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.625 (15.9)	.709 (18.0)	.188 (4.8)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)

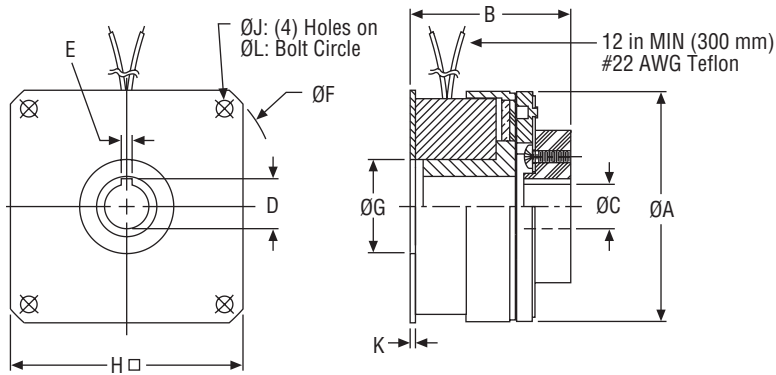|										
PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec²	Rotor Inertia lb-in-sec²	Weight lb (kg)	Energy Dissipation ft-lb/min
BF-22	40.0 (4.52)	24/90	75/1048	8.5	12.0	32.0	33.1×10^{-5}	NA	0.9 (0.4)	1400
BF-26	80.0 (9.04)	24/90	66/937	9.5	15.0	35.0	81.0×10^{-5}	NA	1.2 (0.5)	2600

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .008/.018.
- Other voltages available upon request.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

STOP HOLD

BF-30 Brakes
Dimensions & Specifications

ØJ: (4) Holes on
ØL: Bolt Circle

E

ØF

D

H □

B

12 in MIN (300 mm)
#22 AWG Teflon

ØG

ØC

ØA

K

BF Model Shown

Dimensions (mm)
Mounting requirements see page 144.

DIMENSIONS												
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B:OAL in (mm)	C: Hub ID Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Mtg Pilot Ø in (mm)	G: Case ID Ø in (mm)	H□: Mtg Width in (mm)	J: (4) Mtg Holes Ø in (mm)	K: Mtg Plt Thick. in (mm)	L: Mtg Hole BC Ø in (mm)
BF-30B24-E06	125 (14.12)	3.27 (83.1)	1.93 (49.0)	.375 (9.5)	.425 (10.8)	.094 (2.4)	4.186 (106.3)	1.75 (44.5)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)
BF-30B24-E08	125 (14.12)	3.27 (83.1)	1.93 (49.0)	.500 (12.7)	.564 (14.3)	.125 (3.2)	4.186 (106.3)	1.75 (44.5)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)
BF-30B24-E10	125 (14.12)	3.27 (83.1)	1.93 (49.0)	.625 (15.9)	.709 (18.0)	.188 (4.8)	4.186 (106.3)	1.75 (44.5)	3.25 (82.6)	.187 (4.7)	0.09 (2.3)	3.75 (95.3)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
BF-30	125.0 (14.13)	24/90	43/594	15.0	18.0	45.0	179 x 10^{-5}	NA	3.0 (1.3)	2900

*See "How to order" model numbering system on page 100 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.
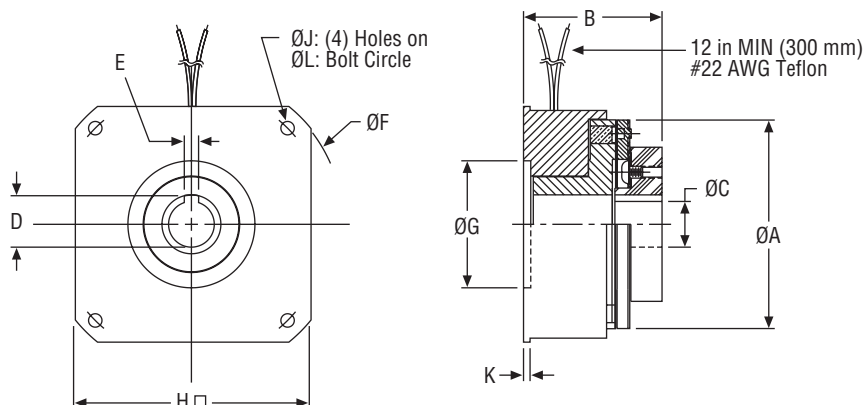
General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .008/.018.
- Other voltages available upon request.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

FRICTION

BRP / SB / FSB / AKB Series
Power-off Brakes

Spring-set electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. While the field (electromagnet) assembly is fixed and prevented from rotating, the rotor assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized, rotating components are disengaged thus allowing the shaft to freely rotate.

The AKB series is UL Recognized, and RoHS compliant.

- Torque: 1 lb-in to 1200 lb-in (0.12 to 135 Nm)
- Diameter: 1.50 to 7.25 in. (38.1 to 184.2 mm)
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

Typical Applications

- Robotics
- Medical equipment
- Actuators
- Motor brakes
- Postal handling equipment
- Packaging

How to order

SB - 26 B 24* - E08 L**

Series

BRP =	Power-off Brake
SB =	Power-off Servo Brake
FSB =	Power-off Brake
AKB =	Power-off Brake

Frame Sizes

BRP / SB
- **15** = 1.50 (38.1)
- **17** = 1.79 (45.5)
- **19** = 2.00 (50.8)
- **23** = 2.36 (60.0)
- **26** = 2.87 (72.9)
- **28** = 3.03 (77.0)
- **30** = 3.35 (85.1)
- **40** = 4.25 (108.0)
- **50** = 5.00 (127.0)
- **60** = 6.43 (163.3)
- **70** = 7.25 (184.2)

FSB
- **15** = 1.37 (34.8)
- **17** = 1.75 (44.5)

AKB
- **17** = 1.83 (46.5)
- **19** = 2.00 (50.8)
- **26** = 2.87 (72.9)
- **30** = 3.35 (85.1)
- **40** = 4.25 (108.0)
- **50** = 5.00 (127.0)

Coil Voltage

- **12** = 12VDC
- **24** = 24VDC
- **90** = 90VDC

- **B** = Burnished
- **U** = Unburnished

Hub Length**

- **L** = Long
- **S** = Short

Hub Bore

English		Metric	
E03 = .1870		**M03** = 3mm
E04 = .2500		**M04** = 4mm
E05 = .3125		**M05** = 5mm
E06 = .3750		**M06** = 6mm
E08 = .5000		**M08** = 8mm
E10 = .6250		**M10** = 10mm
E12 = .7500		**M12** = 12mm
E14 = .8750		**M20** = 20mm
E16 = 1.000		**M25** = 25mm
E24 = 1.500		**M30** = 30mm
E32 = 2.000		**M35** = 35mm
		M40 = 40mm
		M45 = 45mm

Insulation Class:
BRP: Class B (130°C)
SB: Class H (180°C)
FSB: Class B (130ºC)
AKB: Class F (155ºC)

*   Other voltages available upon request

** Long Hub Length available on BRP/SB 15, 17, 19, 23, 26, 28; FSB 15, 17; AKB 26, 30, 40 & 50. Short Hub is not available on FSB-15.

General Notes

- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.

- Working air gap should be checked periodically to insure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.

- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

SB Series
Power-off Brakes

High temperature insulated leadwires

Long-life brake lining (non-asbestos)

Low inertia rotating components, allowing higher acceleration rates

UL Class H insulation system, epoxy sealed for efficient operation in extreme environments

Spline drive construction withstands high impact stresses imparted by servo systems

Through holes for internal/external/reversible mounting flexibility

General Notes

- Actual stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.

- Working air gap should be checked periodically to insure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.

- Flying leads are provided as standard, terminal style connection available upon request.
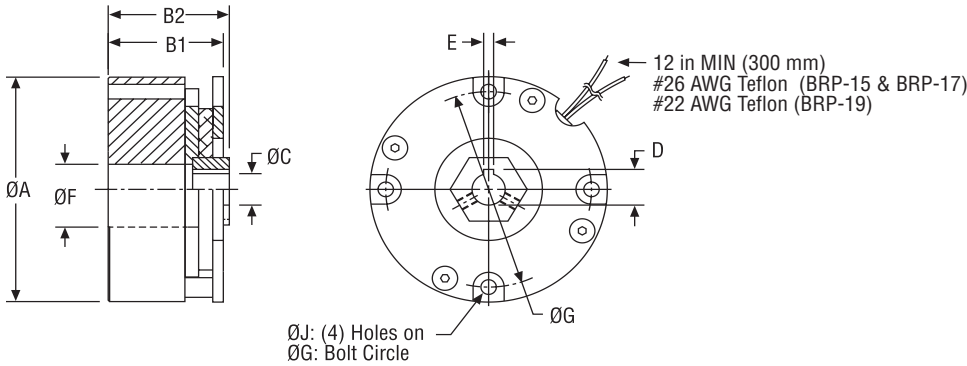- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

BRAKES

FRICTION

HOLD

BRP-15, 17, 19 Brakes
Dimensions & Specifications

B2
B1
E
12 in MIN (300 mm)
#26 AWG Teflon (BRP-15 & BRP-17)
#22 AWG Teflon (BRP-19)
D
ØC
ØA
ØF
ØJ: (4) Holes on
ØG: Bolt Circle
ØG

Dimensions (mm)
Mounting requirements see page 144.

BRP Model Shown

DIMENSIONS										
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
BRP-15U24-E04X	3 (0.34)	1.50 (38.1)	1.06 (26.9)	1.19 (30.2)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
BRP-15U24-E05X	3 (0.34)	1.50 (38.1)	1.06 (26.9)	1.19 (30.2)	.312 (7.9)	.364 (9.2)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
BRP-15U24-E06X	3 (0.34)	1.50 (38.1)	1.06 (26.9)	1.19 (30.2)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
BRP-17U24-E04X	8 (0.90)	1.79 (45.5)	1.18 (30.0)	1.32 (33.5)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
BRP-17U24-E06X	8 (0.90)	1.79 (45.5)	1.18 (30.0)	1.32 (33.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
BRP-19U24-E04X	13 (1.47)	2.00 (50.8)	1.19 (30.2)	1.37 (34.8)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)
BRP-19U24-E06X	13 (1.47)	2.00 (50.8)	1.19 (30.2)	1.37 (34.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec²	Rotor Inertia lb-in-sec²	Weight lb (kg)	Energy Dissipation ft-lb/min
BRP-15	3.0 (0.34)	24/90	96/1350	7.0	30.0	10.0	NA	2.88×10^{-6}	0.3 (0.1)	500
BRP-17	8.0 (0.90)	24/90	64/908	10.0	30.0	10.0	NA	1.87×10^{-5}	0.7 (0.3)	700
BRP-19	13 (1.47)	24/90	54/765	12.0	35.0	10.0	NA	2.36×10^{-5}	0.7 (0.3)	900

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- All BRP series brakes are shipped unburnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

HOLD

BRP-23, 26, 28 Brakes
Dimensions & Specifications

B2
B1
E
12 in MIN
(300 mm)
#22 AWG Teflon
D
ØC
ØA ØF
ØG
ØJ: (4) Holes on
ØG: Bolt Circle

BRP Model Shown

Dimensions (mm)
Mounting requirements see page 144.

	DIMENSIONS									
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
BRP-23U24-E05X	30 (3.4)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
BRP-23U24-E06X	30 (3.4)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
BRP-23U24-E08X	30 (3.4)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
BRP-23U24-E10X	30 (3.4)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.625 (15.9)	.709 (18.0)	.188 (4.8)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
BRP-26U24-E06X	35 (4.0)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
BRP-26U24-E08X	35 (4.0)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
BRP-28U24-E06X	60 (6.8)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
BRP-28U24-E08X	60 (6.8)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
BRP-28U24-E10X	60 (6.8)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)

	PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
BRP-23	30 (3.4)	24/90	46.5/700	13.0	70.0	20.0	NA	1.77×10^{-5}	1.1 (0.5)	1200
BRP-26	35 (4.0)	24/90	33/506	19.0	80.0	20.0	NA	1.14×10^{-4}	1.2 (0.5)	1400
BRP-28	60 (6.8)	24/90	36/440	20.0	50.0	40.0	NA	1.06×10^{-4}	1.8 (0.8)	1800

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
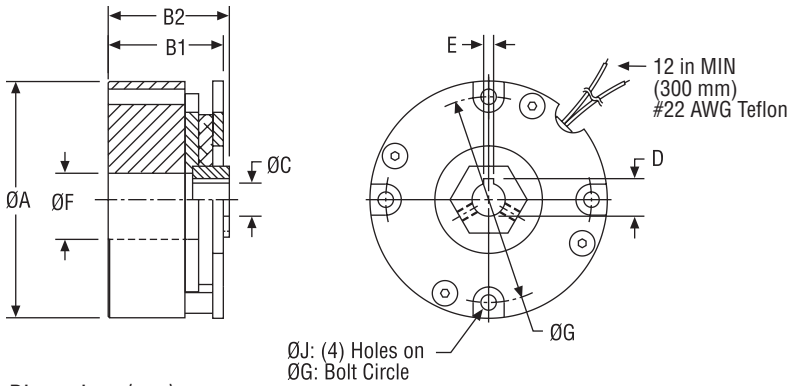(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
  - All BRP series brakes are shipped unburnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
  - Metric bores available

BRAKES

FRICTION

BRP-30, 40 Brakes
Dimensions & Specifications

B2
B1

ØA ØF ØC

E

12 in MIN (300 mm)
#22 AWG Teflon

D

ØG

ØJ: (4) Holes on
ØG: Bolt Circle

Dimensions (mm)
Mounting requirements see page 144.

BRP Model Shown

DIMENSIONS										
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
BRP-30U24-E08X	80 (9.04)	3.35 (85.1)	1.63 (41.4)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
BRP-30U24-E10X	80 (9.04)	3.35 (85.1)	1.63 (41.4)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
BRP-40U24-E06X	200 (22.6)	4.25 (108.0)	1.75 (44.5)	NA	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
BRP-40U24-E08X	200 (22.6)	4.25 (108.0)	1.75 (44.5)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
BRP-40U24-E10X	200 (22.6)	4.25 (108.0)	1.75 (44.5)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
BRP-40U24-E12X	200 (22.6)	4.25 (108.0)	1.75 (44.5)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)

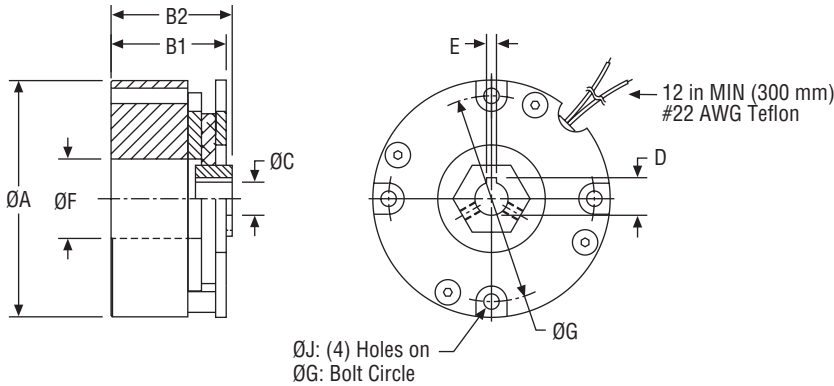| PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
BRP-30	80 (9.04)	24/90	29/374	23.0	70.0	45.0	NA	1.72×10^{-4}	2.8 (1.3)	2200
BRP-40	200 (22.6)	24/90	20/290	31.0	85.0	45.0	NA	8.34×10^{-3}	4.9 (2.2)	2500

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- All BRP series brakes are shipped unburnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

HOLD

BRP-50, 60, 70 Brakes
Dimensions & Specifications

B2
B1

E

12 in MIN (300 mm)
#22 AWG Teflon

ØC

ØA   ØF

D

ØJ: (4) Holes on
ØG: Bolt Circle

ØG

Dimensions (mm)
Mounting requirements see page 144.

BRP Model Shown

DIMENSIONS										
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
BRP-50U24-E10X	300 (33.9)	5.00 (127.0)	1.90 (48.3)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
BRP-50U24-E12X	300 (33.9)	5.00 (127.0)	1.90 (48.3)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
BRP-50U24-E16X	300 (33.9)	5.00 (127.0)	1.90 (48.3)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
BRP-60B24-E10X	510 (57.6)	6.431 (163.3)	2.364 (60.0)	NA	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)	1.655 (42.0)	6.00 (152.4)	0.226 (5.7)
BRP-60B24-E12X	510 (57.6)	6.431 (163.3)	2.364 (60.0)	NA	0.750 (19.1)	0.837 (21.3)	0.188 (4.8)	1.655 (42.0)	6.00 (152.4)	0.226 (5.7)
BRP-60B24-E16X	510 (57.6)	6.431 (163.3)	2.364 (60.0)	NA	1.000 (25.4)	1.114 (28.3)	0.250 (6.4)	1.655 (42.0)	6.00 (152.4)	0.226 (5.7)
BRP-70U24-E16X	1000 (113.0)	7.25 (184.2)	2.77 (70.4)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
BRP-70U24-E24X	1000 (113.0)	7.25 (184.2)	2.77 (70.4)	NA	1.500 (38.1)	1.669 (42.4)	.375 (9.5)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
BRP-70U24-E32X	1000 (113.0)	7.25 (184.2)	2.77 (70.4)	NA	2.000 (50.8)	2.223 (56.5)	.500 (12.7)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)

PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
BRP-50	300 (33.9)	24/90	19/291	32.0	160.0	110.0	NA	2.07×10^{-3}	6.5 (3.0)	2650
BRP-60	510 (57.6)	24/90	15/255	51.0/43.0	150.0	200.0	NA	3.08×10^{-3}	14.5 (6.6)	
BRP-70	1000 (113.0)	24/90	12/180	52.0	140.0	250.0	NA	16.34×10^{-3}	20.2 (9.2)	3900

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
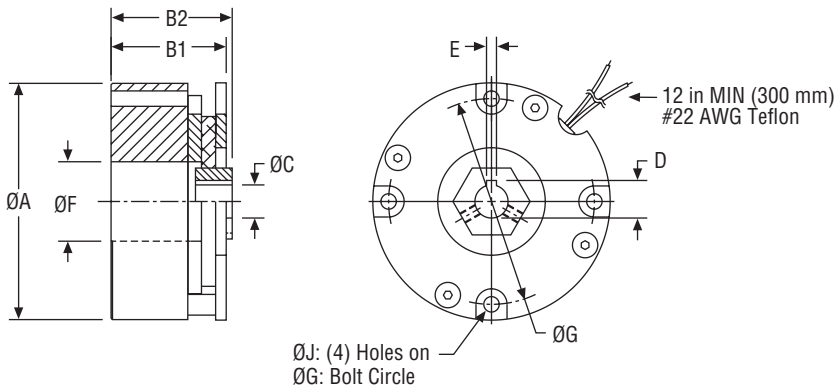(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

• Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.

• Other voltages available upon request.
• Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.

• All BRP series brakes are shipped unburnished.
• Brake coupling armature assembly is secured to shaft by (2) set screws and key.
• Metric bores available

BRAKES

FRICTION

SB-15, 17, 19 Brakes
Dimensions & Specifications

E →| |←

12 in MIN (300 mm)
#26 AWG Teflon (SB-15 & SB-17)
#22 AWG Teflon (SB-19)

B2
B1

ØA ØF ØC

D

ØJ: (4) Holes on
ØG: Bolt Circle
ØG

Dimensions (mm)
Mounting requirements see page 144.

SB Model Shown

	DIMENSIONS									
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
SB-15B24-E04X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-15B24-E05X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.312 (7.9)	.364 (9.2)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-15B24-E06X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-17B24-E04X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.32 (33.5)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-17B24-E06X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.32 (33.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-17B24-E08X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.32 (33.5)	.500 (12.7)	.564 (14.3)	.125 (3.2)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-19B24-E04X	18 (2.03)	2.00 (50.8)	1.19 (30.2)	1.38 (35)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)
SB-19B24-E06X	18 (2.03)	2.00 (50.8)	1.19 (30.2)	1.38 (35)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)

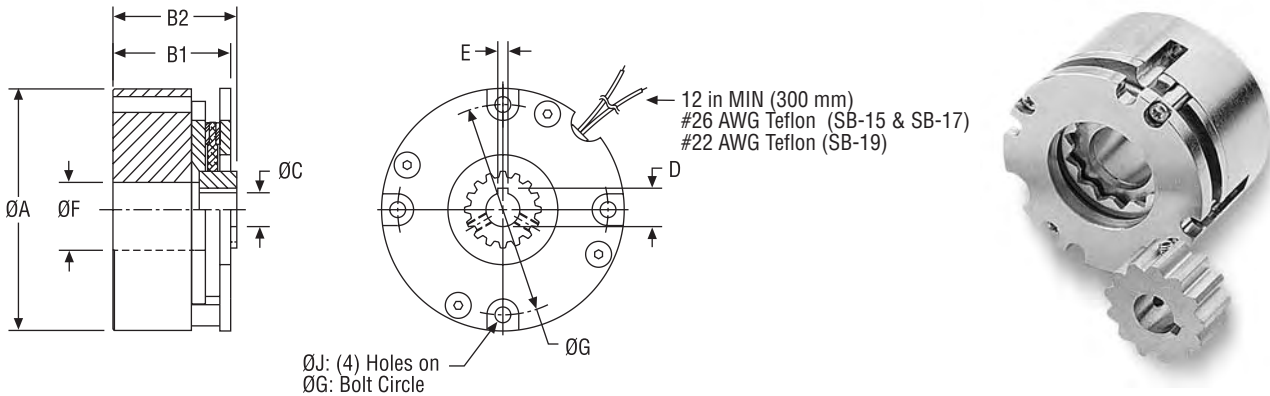|	PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
SB-15	5.0 (0.56)	24/90	96/1350	7.0	20.0	10.0	NA	4.38×10^{-6}	0.3 (0.1)	500
SB-17	10 (1.13)	24/90	64/908	10.0	20.0	10.0	NA	1.87×10^{-5}	0.7 (0.3)	700
SB-19	18 (2.03)	24/90	54/765	12.0	35.0	10.0	NA	2.36×10^{-5}	0.7 (0.3)	900

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

HOLD

SB-23, 26, 28 Brakes
Dimensions & Specifications

ØJ: (4) Holes on
ØG: Bolt Circle

12 in MIN
(300 mm)
#22 AWG Teflon

SB Model Shown

Dimensions (mm)
Mounting requirements see page 144.

	DIMENSIONS									
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
SB-23B24-E05X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E06X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E08X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E10X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.625 (15.9)	.709 (14.3)	.188 (4.8)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-26B24-E06X	40 (4.5)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
SB-26B24-E08X	40 (4.5)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
SB-28B24-E06X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
SB-28B24-E08X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
SB-28B24-E10X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)

	PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
SB-23	35 (4.0)	24/90	46.5/700	13.0	70.0	20.0	NA	1.77×10^{-5}	1.1 (0.5)	1200
SB-26	40 (4.5)	24/90	33/506	19.0	80.0	20.0	NA	1.14×10^{-4}	1.2 (0.5)	1400
SB-28	80 (9.0)	24/90	36/440	20.0	50.0	40.0	NA	1.06×10^{-4}	1.8 (0.8)	1800

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.
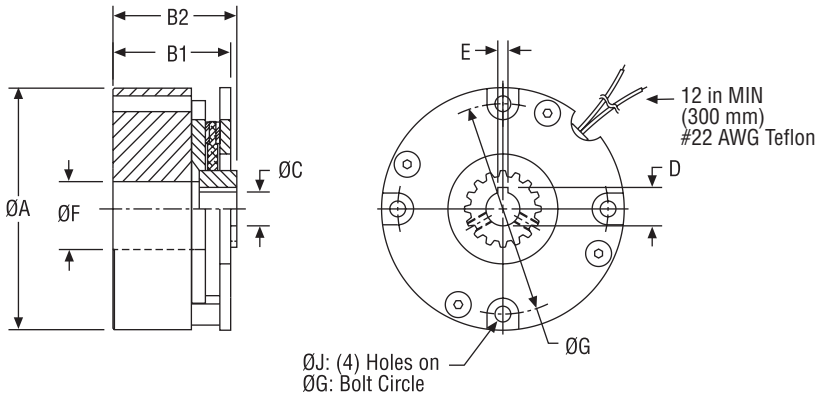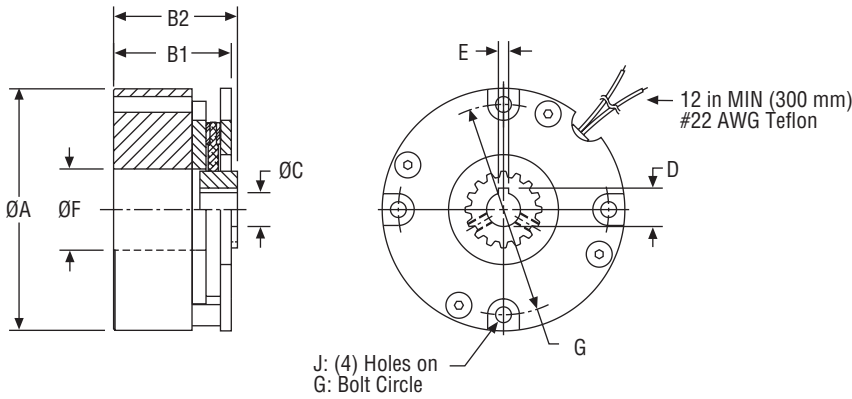
General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

FRICTION

HOLD

SB-30, 40 Brakes
Dimensions & Specifications

B2
B1
E
12 in MIN (300 mm)
#22 AWG Teflon
ØC
ØA ØF
D
J: (4) Holes on
G: Bolt Circle
G

Dimensions (mm)
Mounting requirements see page 144.

SB Model Shown

DIMENSIONS										
Model*	**Static Torque** lb-in (Nm)	**A: OD** in (mm)	**B1: OAL Short Hub** in (mm)	**B2: OAL Long Hub** in (mm)	**C: Hub ID Ø** in (mm)	**D: Keyway Height** in (mm)	**E. Keyway Width** in (mm)	**F: Case ID Ø** in (mm)	**G: Mtg Hole BC Ø** in (mm)	**J: (4) Mtg Holes** in (mm)
SB-30B24-E06X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-30B24-E08X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-30B24-E10X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-40B24-E06X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E08X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E10X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E12X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)

PERFORMANCE										
Model	**Static Torque** lb-in (Nm)	**Coil Voltage** VDC	**Resistance Ohms** nom.	**Power Watts** max	**Armature Engagement** msec	**Armature Disengagement** msec	**Armature Inertia** lb-in-sec^2	**Rotor Inertia** lb-in-sec^2	**Weight** lb (kg)	**Energy Dissipation** ft-lb/min
SB-30	140 (15.8)	24/90	29/374	24.0	70.0	45.0	NA	1.72×10^{-4}	2.8 (1.3)	2200
SB-40	265 (29.9)	24/90	20/290	31.0	85.0	45.0	NA	0.834×10^{-3}	4.9 (2.2)	2500

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.
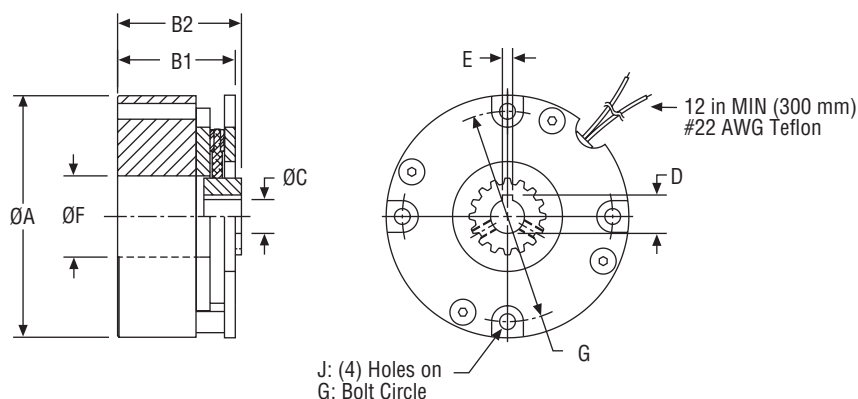
General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

HOLD

SB-50, 60, 70 Brakes
Dimensions & Specifications

12 in MIN (300 mm)
#22 AWG Teflon

J: (4) Holes on
G: Bolt Circle

Dimensions (mm)
Mounting requirements see page 144.

SB Model Shown

DIMENSIONS										
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
SB-50B24-E10X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-50B24-E12X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-50B24-E16X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-60B24-E10X	600 (67.8)	6.431 (163.3)	2.364 (60.0)	NA	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)	1.655 (42.0)	6.00 (152.4)	.226 (5.7)
SB-60B24-E12X	600 (67.8)	6.431 (163.3)	2.364 (60.0)	NA	0.750 (19.1)	0.837 (21.3)	0.188 (4.8)	1.655 (42.0)	6.00 (152.4)	.226 (5.7)
SB-60B24-E16X	600 (67.8)	6.431 (163.3)	2.364 (60.0)	NA	1.000 (25.4)	1.114 (28.3)	0.188 (4.8)	1.655 (42.0)	6.00 (152.4)	.226 (5.7)
SB-70B24-E16X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
SB-70B24-E24X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	1.500 (38.1)	1.669 (42.4)	.375 (9.5)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
SB-70B24-E32X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	2.000 (50.8)	2.223 (56.5)	.500 (12.7)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
SB-50	350 (39.5)	24/90	19/291	32.0	160.0	110.0	NA	2.07×10^{-3}	6.5 (3.0)	2650
SB-60	600 (67.8)	24/90	15/255	51.0/43.0	150.0	200.0	NA	3.08×10^{-3}	14.5 (6.6)	
SB-70	1200 (135.6)	24/90	12/180	53.0	140.0	250.0	NA	16.34×10^{-3}	20.2 (9.2)	3900

*See "How to order" model numbering system on page 116 for power-off brakes.
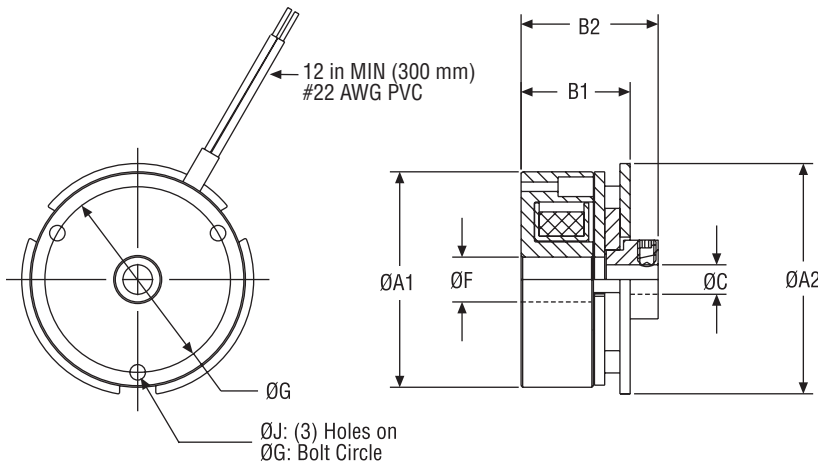X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

FRICTION

HOLD

FSB-15, 17 Brakes
Dimensions & Specifications

12 in MIN (300 mm)
#22 AWG PVC

B2

B1

ØA1   ØF   ØC   ØA2

ØG

ØJ: (3) Holes on
ØG: Bolt Circle

Dimensions (mm)
Mounting requirements see page 144.

FSB Model Shown

DIMENSIONS									
Model*	Static Torque lb-in (Nm)	A1: OD Body in (mm)	A2: OD Flange in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (3) Mtg Holes in (mm)
FSB-15U24-E03L	1 (.12)	1.37 (34.8)	1.475 (17.5)	0.69** (17.5)	0.9 (22.9)	.187 (4.8)	0.285 (7.2)	1.18 (30.0)	3 x .125 (3.2)
FSB-15U24-E04L	1 (.12)	1.37 (34.8)	1.475 (17.5)	0.69** (17.5)	0.9 (22.9)	.250 (6.4)	0.285 (7.2)	1.18 (30.0)	3 x .125 (3.2)
FSB-17U24-E04X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.250 (6.4)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)
FSB-17U24-E05X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.312 (7.9)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)
FSB-17U24-E06X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.375 (9.5)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)

PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohma nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
FSB-15	1 (.12)	24/90	118/1750	6.0	25.0	15.0	NA	1.05×10^{-5}	0.2 (.09)	250
FSB-17	3 (.34)	24/90	92/1300	7.0	35.0	30.0	NA	1.45×10^{-5}	0.6 (.27)	350

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.

(-) denotes metric equivalents. Specifications subject to change without notice.
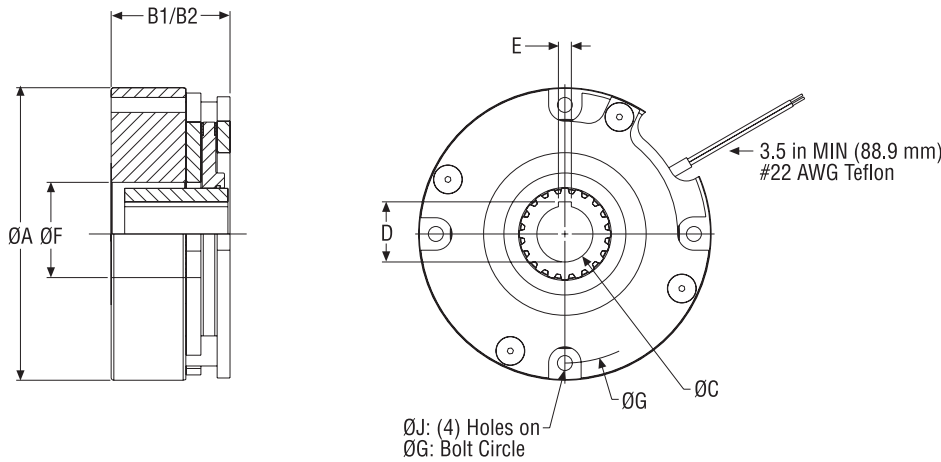**Short Hub not available for size 15.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- Brake coupling armature assembly is secured to shaft by (2) set screws.
- Metric bores available

HOLD

AKB-17, 19, 26, 30 Brakes
Dimensions & Specifications

→ 3.5 in MIN (88.9 mm)
#22 AWG Teflon

ØJ: (4) Holes on
ØG: Bolt Circle

ØG

ØC

Dimensions (mm)
Mounting requirements see page 144.

UL Recognized Component
RoHS Compliant

AKB Model Shown

DIMENSIONS										
Model*	Static Torque lb-in (Nm)	A: OD in (mm)	B1: OAL Short Hub in (mm)	B2: OAL Long Hub in (mm)	C: Hub ID Ø in (mm)	D: Keyway Height in (mm)	E. Keyway Width in (mm)	F: Case ID Ø in (mm)	G: Mtg Hole BC Ø in (mm)	J: (4) Mtg Holes in (mm)
AKB-17B24-E04X	12.5 (1.4)	1.83 (46.5)	1.32 (33.5)	NA	.250 (6.35)	.286 (7.3)	.062 (1.6)	0.512 (13)	1.640 (42)	.094 (2.4)
AKB-19B24-E04X	22 (2.5)	2.00 (51)	1.33 (33.8)	NA	.250 (6.35)	.286 (7.3)	.062 (1.6)	0.472 (12)	1.770 (45)	.134 (3.4)
AKB-26B24-E05X	47 (5.3)	2.87 (73)	1.26 (32)	1.26 (32)	.312 (7.92)	.364 (9.25)	.094 (2.4)	0.75 (19)	2.500 (64)	.177 (4.5)
AKB-26B24-E06X	47 (5.3)	2.87 (73)	1.26 (32)	1.26 (32)	.375 (9.52)	.425 (10.8)	.094 (2.4)	0.75 (19)	2.500 (64)	.177 (4.5)
AKB-30B24-E06X	128 (14.5)	3.35 (85)	1.62 (41.1)	1.62 (41.1)	.375 (9.52)	.425 (10.8)	.094 (2.4)	1.125 (29)	2.913 (74)	.177 (4.5)
AKB-30B24-E08X	128 (14.5)	3.35 (85)	1.62 (41.1)	1.62 (41.1)	.500 (12.7)	.564 (14.33)	.125 (3.18)	1.125 (29)	2.913 (74)	.177 (4.5)

PERFORMANCE										
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lb-in-sec^2	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
AKB-17	12.5 (1.4)	24	68.5	10.94	(20.0)	(20.0)	NA	3.9×10^{-3}	0.57 (0.26)	700
AKB-19	22 (2.5)	24	56.6	13.24	(35.0)	(15.0)	NA	4.9×10^{-3}	0.76 (0.35)	900
AKB-26	47 (5.3)	24	45.2	16.58	(80.0)	(20.0)	NA	2.27×10^{-2}	1.43 (0.64)	1400
AKB-30	128 (14.5)	24	29.6	25.3	(80.0)	(45.0)	NA	5.6×10^{-2}	2.49 (1.12)	2200

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- All AKB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

FRICTION

HOLD

AKB-40, 50 Brakes
Dimensions & Specifications
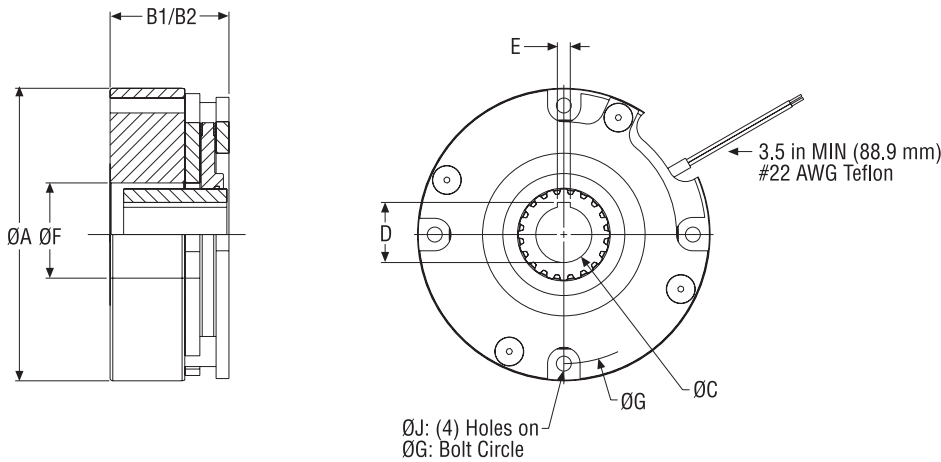
B1/B2

ØA ØF

E

D

3.5 in MIN (88.9 mm)
#22 AWG Teflon

ØJ: (4) Holes on
ØG: Bolt Circle

ØG   ØC

AKB Model Shown

Dimensions (mm)
Mounting requirements see page 144.

UL Recognized Component
RoHS Compliant

DIMENSIONS										
Model*	**Static Torque** lb-in (Nm)	**A: OD** in (mm)	**B1: OAL Short Hub** in (mm)	**B2: OAL Long Hub** in (mm)	**C: Hub ID Ø** in (mm)	**D: Keyway Height** in (mm)	**E: Keyway Width** in (mm)	**F: Case ID Ø** in (mm)	**G: Mtg Hole BC Ø** in (mm)	**J: (4) Mtg Holes** in (mm)
AKB-40B24-E06X	220 (25)	4.25 (108)	1.81 (46.0)	1.81 (46.0)	.375 (9.52)	.425 (10.8)	.094 (2.4)	1.50 (38)	3.750 (95)	.217 (5.5)
AKB-40B24-E08X	220 (25)	4.25 (108)	1.81 (46.0)	1.81 (46.0)	.500 (12.7)	.564 (14.33)	.125 (3.18)	1.50 (38)	3.750 (95)	.217 (5.5)
AKB-40B24-E10X	220 (25)	4.25 (108)	1.81 (46.0)	1.81 (46.0)	.625 (15.9)	.709 (18.0)	.188 (4.78)	1.50 (38)	3.750 (95)	.217 (5.5)
AKB-40B24-E12X	220 (25)	4.25 (108)	1.81 (46.0)	1.81 (46.0)	.750 (19.05)	.837 (21.26)	.188 (4.78)	1.50 (38)	3.750 (95)	.217 (5.5)
AKB-50B24-E10X	470 (53)	5.00 (127)	1.85 (47)	1.85 (47)	.625 (15.9)	.709 (18.0)	.188 (4.78)	1.75 (44)	4.500 (114)	.217 (5.5)
AKB-50B24-E12X	470 (53)	5.00 (127)	1.85 (47)	1.85 (47)	.750 (19.05)	.837 (21.26)	.188 (4.78)	1.75 (44)	4.500 (114)	.217 (5.5)
AKB-50B24-E16X	470 (53)	5.00 (127)	1.85 (47)	1.85 (47)	1.000 (25.4)	1.114 (28.30)	.250 (6.35)	1.75 (44)	4.500 (114)	.217 (5.5)

PERFORMANCE										
Model	**Static Torque** lb-in (Nm)	**Coil Voltage** VDC	**Resistance Ohms** nom.	**Power Watts** max	**Armature Engagement** msec	**Armature Disengagement** msec	**Armature Inertia** lb-in-sec^2	**Rotor Inertia** lb-in-sec^2	**Weight** lb (kg)	**Energy Dissipation** ft-lb/min
AKB-40	220 (25)	24	22.4	33.5	(105.0)	(45.0)	NA	2.24×10^{-1}	4.47 (2.02)	2200
AKB-50	470 (53)	24	16.0	46.8	(160.0)	(110.0)	NA	5.53×10^{-1}	6.4 (2.89)	2650

*See "How to order" model numbering system on page 116 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.

- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- All AKB series brakes are shipped burnished.

- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

⊖ **HOLD**

PMB Series
Power-off Brakes

The PMB Series are a power-off, DC, spring set brake that provides a low-cost, multi-functional brake alternative for many application. The series offers nine frame sizes: 30, 40, 50, 60, 65, 75, 85, 100, 120 and a superior torque to size ratio.

Many extra features are offered with this versatile product series.

- Torque adjustment collar allows the torque to be varied depending on application.
- Engineered friction material on rotor assembly boosts maximum brake performance and extends life.
- Brake easily mounts to motor or frame. Mounting hardware included with brake. Simple splined hub attaches to shaft with set screw and keyway provided.
- Brake case design offers excellent heat dissipation.
- Fully potted coils meet minimum requirements for class "F" insulation.
- UL Recognized Component
- Splined hub with anti-rattle feature promotes quiet operation

- Brake leads can be customized (connectors, sleeving) to meet special requirements.
- Dust cover (option) keeps foreign materials from interfering with brake actuation.
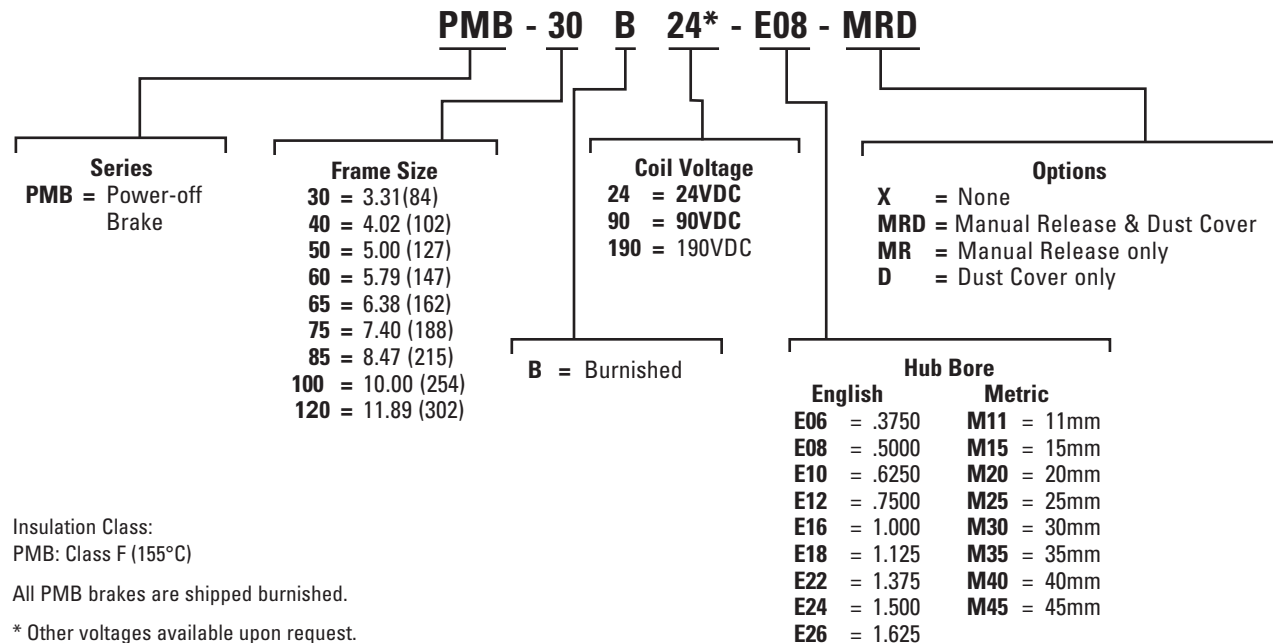- Manual release lever (option) provides override to release brakes in the absence of power.

Typical Applications
- Factory automation
- Semiconductor
- Military/aerospace
- Medical equipment
- Elevators
- Lift trucks
- Pallet trucks
- Electric vehicles
- Electric hoists
- Construction equipment
- Winches & Cranes
- Electric motor brakes
- Conveyors

- Robotics
- Floor sweepers
- Scissor lifts
- Automated material handling equipment

How to order

PMB - 30 B 24* - E08 - MRD

Series	**Frame Size**	**Coil Voltage**	**Options**
PMB = Power-off Brake	**30 =** 3.31(84) **40 =** 4.02 (102) **50 =** 5.00 (127) **60 =** 5.79 (147) **65 =** 6.38 (162) **75 =** 7.40 (188) **85 =** 8.47 (215) **100 =** 10.00 (254) **120 =** 11.89 (302)	**24 =** 24VDC **90 =** 90VDC **190 =** 190VDC	**X =** None **MRD =** Manual Release & Dust Cover **MR =** Manual Release only **D =** Dust Cover only

B = Burnished

Hub Bore

English		**Metric**	
E06 = .3750		**M11** = 11mm	
E08 = .5000		**M15** = 15mm	
E10 = .6250		**M20** = 20mm	
E12 = .7500		**M25** = 25mm	
E16 = 1.000		**M30** = 30mm	
E18 = 1.125		**M35** = 35mm	
E22 = 1.375		**M40** = 40mm	
E24 = 1.500		**M45** = 45mm	
E26 = 1.625			

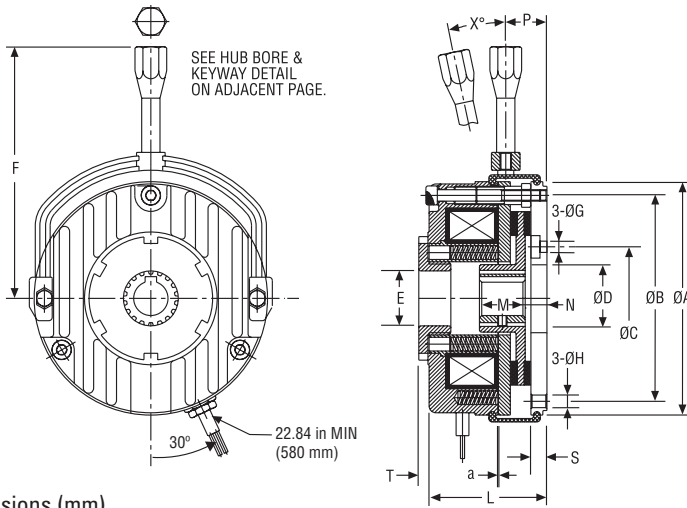Insulation Class:
PMB: Class F (155°C)

All PMB brakes are shipped burnished.

* Other voltages available upon request.

BRAKES

FRICTION

PMB-30, 40, 50, 60, 65, 75, 85, 100, 120 Brakes

Dimensions & Specifications

SEE HUB BORE & KEYWAY DETAIL ON ADJACENT PAGE.

30° 22.84 in MIN (580 mm)

3-ØG

3-ØH

Dimensions (mm)
Mounting requirements see page 144.

UL Recognized Component

PMB model shown with optional manual release & dust cover.

DIMENSIONS															
Model	Static Torque lb-in (Nm)	A: OD in (mm)	B: Mtg Hole in (mm)	C in (mm)	D in (mm)	E in (mm)	F in (mm)	G, H in (mm)	L in (mm)	M in (mm)	N in (mm)	P in (mm)	S in (mm)	T in (mm)	X deg.	a: Air Gap in (mm)
PMB-30	45 (5)	3.307 (84)	2.835 (72)	NA	1.220 (31)	0.748 (19)	3.86 (98)	0.197 (5)	1.614 (41)	0.701 (17.8)	0.157 (4)	0.697 (17.7)	0.236 (6)	0.118 (3)	10	0.006 (0.15)
PMB-40	70 (8)	4.016 (102)	3.543 (90)	1.772 (45)	1.181 (30)	0.945 (24)	4.29 (109)	0.217 (5.5)	2.048 (52)	0.787 (20)	0.374 (9.5)	1.004 (25.5)	0.276 (7)	0.394 (10)	8	0.008 (0.2)
PMB-50	142 (16)	5.000 (127)	4.409 (112)	2.205 (56)	1.575 (40.5)	1.378 (35)	5.47 (139)	0.256 (6.5)	2.244 (57)	0.787 (20)	0.492 (11.5)	1.280 (32.5)	0.346 (8.8)	0.157 (4)	7	0.008 (0.25)
PMB-60	283 (32)	5.787 (147)	5.197 (132)	2.441 (62)	1.772 (45)	1.575 (40)	6.02 (153)	0.256 (6.5)	2.598 (66)	0.984 (25)	0.472 (12)	1.280 (32.5)	0.354 (9)	0.197 (5)	8	0.012 (0.3)
PMB-65	530 (60)	6.378 (162)	5.709 (145)	2.913 (74)	2.165 (55)	1.890 (48)	7.28 (185)	0.354 (9)	2.992 (76)	1.181 (30)	0.551 (14)	1.417 (36)	0.433 (11)	0.197 (5)	8	0.012 (0.3)
PMB-75	708 (80)	7.402 (188)	6.693 (170)	3.307 (84)	2.559 (65)	2.047 (52)	7.88 (200)	0.354 (9)	3.367 (85.5)	1.181 (30)	0.551 (14)	1.634 (41.5)	0.433 (11)	0.236 (6)	8	0.012 (0.3)
PMB-85	1505 (170)	8.465 (215)	7.717 (196)	3.937 (100)	2.953 (75)	2.441 (62)	10.24 (260)	0.354 (9)	3.780 (96)	1.378 (35)	0.591 (15)	1.772 (45)	0.433 (11)	0.374 (9.5)	12	0.016 (0.4)
PMB-100	2655 (300)	10.000 (254)	9.055 (230)	4.331 (110)	3.543 (90)	3.346 (85)	16.46 (418)	0.433 (11)	4.252 (108)	1.575 (40)	0.689 (17.5)	1.850 (47)	0.433 (11)	N/A	12	0.016 (0.4)
PMB-120	4250 (480)	11.890 (302)	10.945 (278)	5.512 (140)	4.724 (120)	4.528 (115)	19.84 (504)	0.433 (11)	4.685 (119)	1.969 (50)	0.689 (17.5)	2.756 (70)	0.492 (12.5)	N/A	12	0.020 (0.5)

| PERFORMANCE									
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms@ 20°C nom.	Power Watts max	Speed RPM	Armature Engagement msec	Armature Disengagement msec	Rotor Inertia lb-in-sec^2	Weight lb (kg)	Energy Dissipation ft-lb/min
PMB-30	45 (5)	24/90/190	30.4/405/1805	20	3000	15	55	1.15×10^{-4}	3 (1.36)	1840
PMB-40	70 (8)	24/90/190	24.5/324/1444	25	3000	20	60	3.98×10^{-4}	4 (1.8)	2240
PMB-50	142 (16)	24/90/190	19.8/270/1203	30	3000	20	90	2.30×10^{-3}	7.5 (3.4)	2790
PMB-60	283 (32)	24/90/190	15.2/202.3/903	40	3000	20	120	4.96×10^{-3}	11 (4.8)	3225
PMB-65	530 (60)	24/90/190	14.7/162/722	50	3000	20	210	6.75×10^{-3}	16 (7.3)	3550
PMB-75	708 (80)	24/90/190	10.6/124.6/555	65	3000	190	230	1.68×10^{-2}	27 (12)	4120
PMB-85	1505 (170)	24/90/190	7.84/95.3/425	85	1500	300	260	3.28×10^{-2}	40 (18)	4720
PMB-100	2655 (300)	24/90/190	5.2/73.6/328	110	1500	350	550	6.69×10^{-2}	55 (25)	5575
PMB-120	4250 (480)	24/90/190	5.2/73.6/328	110	1500	500	650	1.95×10^{-1}	90 (41)	6625

(-) denotes metric equivalents. Specifications subject to change without notice.
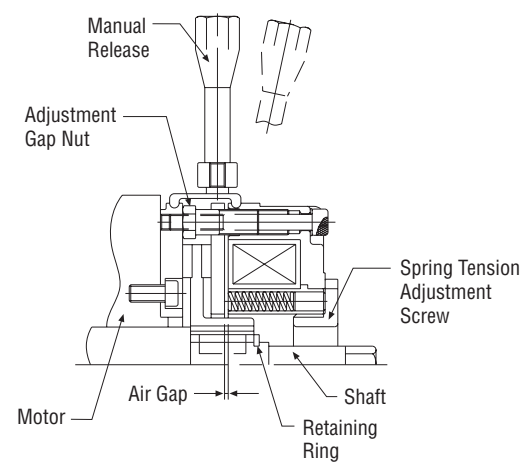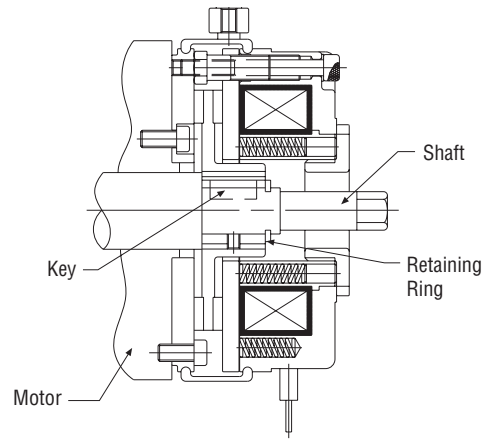
⊖ **HOLD**

PMB Series Brakes
Dimensions & Specifications

HUB BORE &
KEYWAY DETAIL
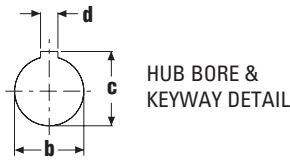
Model*	b: Bore** in (mm)	c: Keyway Height in (mm)	d: Keyway Width in (mm)
BORE & KEYWAY DATA			
PMB-30BXX-E06-MRD	0.375 (9.5)	0.425 (10.8)	0.094 (2.4)
PMB-30BXX-E08-MRD	0.500 (12.7)	0.564 (14.3)	0.125 (3.2)
PMB-30BXX-M11-MRD	0.433 (11.0)	0.512 (13.0)	0.157 (4)
PMB-40BXX-E08-MRD	0.500 (12.7)	0.564 (14.3)	0.125 (3.2)
PMB-40BXX-E10-MRD	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)
PMB-40BXX-M15-MRD	0.591 (15.0)	0.669 (17.0)	0.197 (5)
PMB-50BXX-E10-MRD	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)
PMB-50BXX-E12-MRD	0.750 (19.0)	0.837 (21.3)	0.188 (4.8)
PMB-50BXX-M15-MRD	0.591 (15.0)	0.669 (17.0)	0.197 (5)
PMB-50BXX-M20-MRD	0.787 (20.0)	0.866 (22.0)	0.197 (5)
PMB-60BXX-E12-MRD	0.750 (19.0)	0.837 (21.3)	0.188 (4.8)
PMB-60BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-60BXX-M20-MRD	0.787 (20.0)	0.866 (22.0)	0.197 (5)
PMB-60BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-65BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-65BXX-E18-MRD	1.125 (28.6)	1.251 (31.8)	0.250 (6.3)
PMB-65BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-65BXX-M30-MRD	1.181 (30.0)	1.299 (33.0)	0.276 (7)
PMB-75BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-75BXX-E18-MRD	1.125 (28.6)	1.251 (31.8)	0.250 (6.3)
PMB-75BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-75BXX-M30-MRD	1.181 (30.0)	1.299 (33.0)	0.276 (7)
PMB-85BXX-E22-MRD	1.375 (34.9)	1.517 (38.5)	0.313 (7.9)
PMB-85BXX-E24-MRD	1.500 (38.1)	1.669 (42.4)	0.375 (9.5)
PMB-85BXX-M35-MRD	1.378 (35.0)	1.516 (38.5)	0.394 (10)
PMB-85BXX-M40-MRD	1.575 (40.0)	1.713 (43.5)	0.394 (10)
PMB-100BXX-E22-MRD	1.375 (34.9)	1.517 (38.5)	0.313 (7.9)
PMB-100BXX-E24-MRD	1.500 (38.1)	1.669 (42.4)	0.375 (9.5)
PMB-100BXX-M35-MRD	1.378 (35.0)	1.516 (38.5)	0.394 (10)
PMB-100BXX-M40-MRD	1.575 (40.0)	1.713 (43.5)	0.394 (10)
PMB-120BXX-E24-MRD	1.500 (38.1)	1.669 (42.4)	0.375 (9.5)
PMB-120BXX-E26-MRD	1.625 (41.3)	1.795 (45.6)	0.375 (9.5)
PMB-120BXX-M40-MRD	1.575 (40.0)	1.713 (43.5)	0.394 (10)
PMB-120BXX-M45-MRD	1.77 (45.0)	1.929 (49.0)	0.551 (14)

*See "How to order" model numbering system on page 129 for PMB brakes.
XX = Upon ordering, choose voltage, see page 129 for options.
(-) denotes metric equivalents. Specifications subject to change without notice.
**Other bore sizes available upon request.

Installation Diagram

Manual Release

Adjustment Gap Nut

Spring Tension Adjustment Screw

Motor   Air Gap   Shaft

Retaining Ring

Gap Adjustment

Model shown at left is complete with all accessories.
Model on right is shown with accessories removed.
Accessories include: (A) manual release; (B) spline hub,
(C) anti-rattle feature (o-ring) and (D) dust cover.

BRAKES
FRICTION

SLIP

TFD Series
Torque Feedback Devices

The new Torque Feedback Device (TFD) provides a variable torque output, in proportion to a DC input, for steering and other by-wire applications. This innovative design offers a cost effective, high quality user interface by applying state-of-the-art friction materials and a patent pending electromagnetic actuation system.

Incorporated into the TFD are two redundant sensors for fail-safe shaft feedback. Several standard product configurations are offered with torques ranging from 2.5 to 20Nm, and the TFD's modular design makes it easily adaptable to specific application requirements.

• Integrated design combines both tactile and position/velocity feedback with a steering wheel interface in one mechanical package.

• Compact design offers high torque densities and energy efficient operation.

• Continuously variable torque output for high quality operator interface or "feel".

• Redundant sensors for safety and field serviceability.

• Modular design allows the product to be easily scaled to specific application requirements.

• Repeatable operation over a wide range of operating conditions and product life.

• Assembly and all components meet EU Directive 2002/95/EC (RoHS)

Typical Steer-By-Wire Applications

• Electric vehicles including:
   Lift trucks
   Golf carts
   Pallet trucks
   Floor sweepers
   Cleaning equipment
• Turf & garden equipment (professional lawnmowers)
• Military/aerospace
• Construction equipment
• Industrial & recreational marine/boats

TFD Model Shown

How to order

TFD - 30 - 025 - 12 - 01 - 001

	Series		Frame Size*		Coil Voltage		Custom Mechanical
TFD	**=** Torque Feedback Device	**30 =** 3.25 (83) **40 =** 4.20 (106.7)		**12** = **12VDC** **24** = 24VDC **36** = 36VDC **48** = 48VDC		**001** = **Standard** **XXX** = Custom

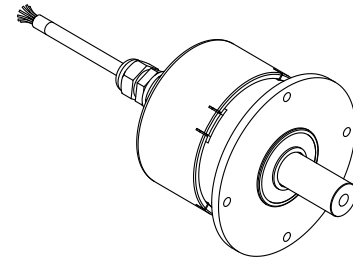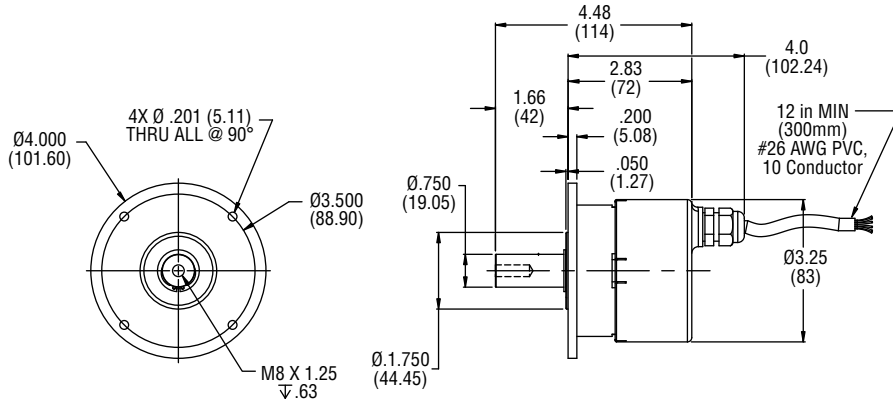| Rated Torque**	Encoder
025 = 2.5 (Nm) **050 =** 5.0 (Nm) **090 =** 9.0 (Nm) **120 =** 12.0 (Nm)	**01** = **Magnetic Encoder** **02** = Optical Encoder **03** = Custom Encoder
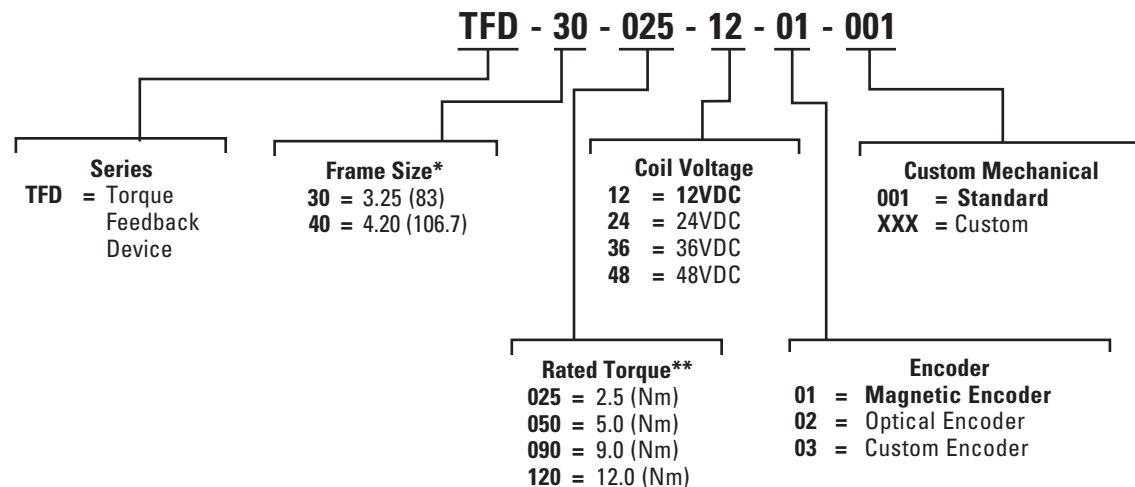
*Case diameter

** Rated Torque availability
2.5 (Nm) - TFD30 only
5.0 (Nm) - TFD30 & TFD40
9.0 (Nm) - TFD40 only
12.0 (Nm) - TFD40 only
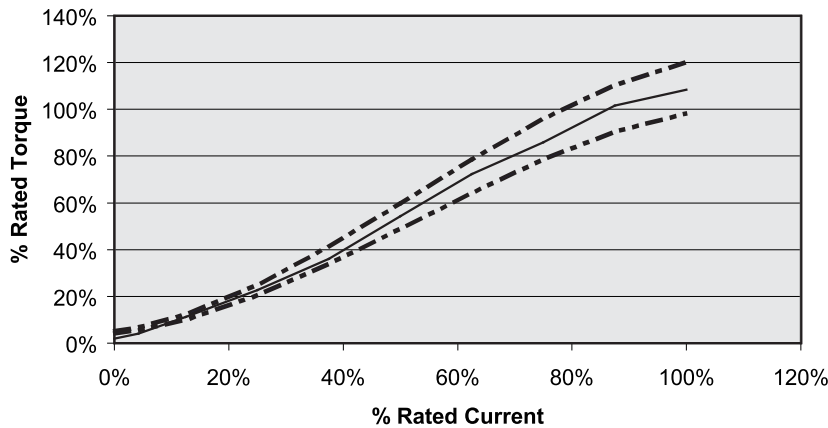
SLIP

TFD-30
Dimensions & Specifications

4.48
(114)

4.0
(102.24)

2.83
(72)

1.66
(42)

.200
(5.08)

.050
(1.27)

12 in MIN
(300mm)
#26 AWG PVC,
10 Conductor

4X Ø .201 (5.11)
THRU ALL @ 90°

Ø4.000
(101.60)

Ø3.500
(88.90)

Ø.750
(19.05)

Ø3.25
(83)

M8 X 1.25
▽.63

Ø.1.750
(44.45)

TFD30 Model Shown

Dimensions (mm)

PERFORMANCE							
Model	Static Torque lb-in (Nm)	Coil Voltage* VDC	Resistance Ohms @ 20°C nom	Power Watts max	Speed* RPM	Rotor Inertia lb-in-sec^2	Weight lb (kg)
TFD-30 025	22 (2.5)	12	3.6	40	300/120	35 X 10^{-3}	3.5 (1.59)
		24	12.5	46	300/120	35 X 10^{-3}	3.5 (1.59)
		36	32.6	40	300/120	35 X 10^{-3}	3.5 (1.59)
		48	55.0	42	300/120	35 X 10^{-3}	3.5 (1.59)
TFD-30 050	44 (5.0)	12	3.6	40	300/120	62 X 10^{-3}	3.5 (1.59)
		24	12.5	46	300/120	62 X 10^{-3}	3.5 (1.59)
		36	32.6	40	300/120	62 X 10^{-3}	3.5 (1.59)
		48	55.0	42	300/120	62 X 10^{-3}	3.5 (1.59)

(-) denotes metric equivalents. Specifications subject to change without notice.
*Intermittent/Continuous

Typical Torque Performance

% Rated Torque	% Rated Current
2%	0%
25%	28%
50%	47%
75%	65%
100%	88%

ENGINEERED PRODUCTS

FRICTION

SLIP

TFD-40
Dimensions & Specifications

4X Ø.327 (8.30) $^{+.004}_{-.001}$ THRU ALL

Ø5.000
(127)

Ø4.454
(113.13)

Ø.750
(19.05)

M8X 1.25

5.8
(148)

2.70
(68.6)

.200
(5.08)

.050
(1.27)

12 in MIN
(300mm)
#26 AWG PVC,
10 Conductor

Ø4.20
(106.7)

Ø1.750
(44.45)

1.96
(49.9)
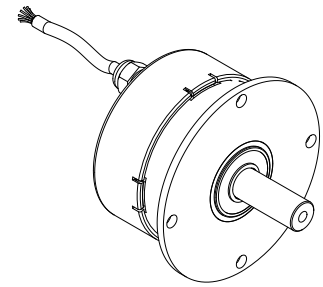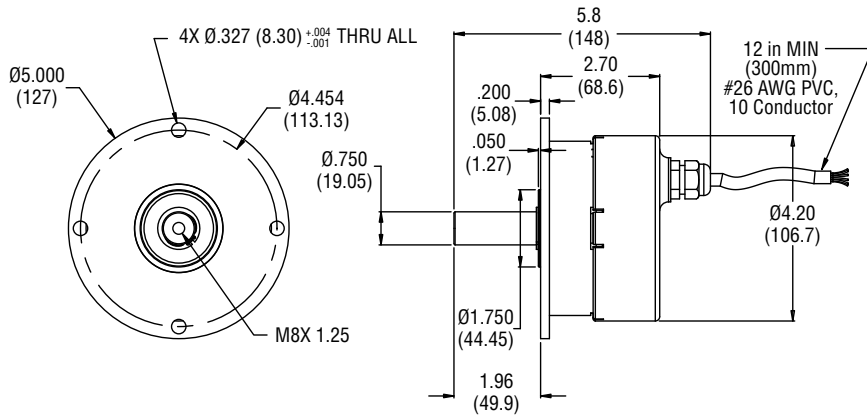
TFD40 Model Shown

Dimensions (mm)

PERFORMANCE							
Model	Static Torque lb-in (Nm)	Coil Voltage* VDC	Resistance Ohms @ 20°C nom	Power Watts max	Speed* RPM	Rotor Inertia lb-in-sec^2	Weight lb (kg)
TFD-40 050	44 (5.0)	12	3.5	42	300/120	76 X 10^3	6.2 (2.8)
		24	11.0	51	300/120	76 X 10^3	6.2 (2.8)
		36	22.7	57	300/120	76 X 10^3	6.2 (2.8)
		48	35.5	65	300/120	76 X 10^3	6.2 (2.8)
TFD-40 090	80 (9.0)	12	3.5	42	300/120	10 X 10^2	6.2 (2.8)
		24	11.0	51	300/120	10 X 10^2	6.2 (2.8)
		36	22.7	57	300/120	10 X 10^2	6.2 (2.8)
		48	35.5	65	300/120	10 X 10^2	6.2 (2.8)
TFD-40 120	106 (12.0)	12	3.5	42	300/120	13 X 10^2	6.2 (2.8)
		24	11.0	51	300/120	13 X 10^2	6.2 (2.8)
		36	22.7	57	300/120	13 X 10^2	6.2 (2.8)
		48	35.5	65	300/120	13 X 10^2	6.2 (2.8)

(-) denotes metric equivalents. Specifications subject to change without notice.
*Intermittent/Continuous

Typical Torque Performance

% Rated Torque vs % Rated Current

% Rated Torque	% Rated Current
2%	0%
25%	28%
50%	47%
75%	65%
100%	88%

START
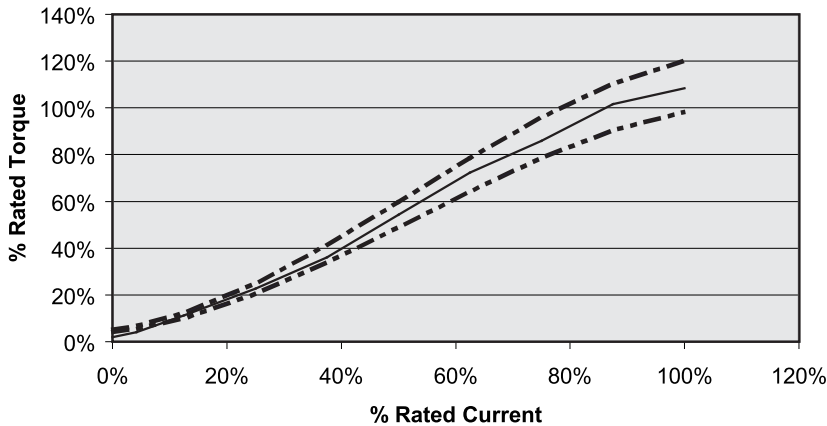
TC / TCR / TCP Series
Power-on and Power-off Tooth Clutches

When used in either static or low speed engagement applications, tooth clutches and clutch couplings provide an efficient, positive, switchable link between a motor and load on in-line or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by a fixed flange, the rotor is generally attached to the input shaft. The armature assembly is securely mounted to either an in-line load shaft or a parallel shaft by means of pulleys or gears. When the coil is energized, the tooth profile of the armature positively engages the tooth profile of the rotor, coupling the two in-line or parallel shafts, thus driving the load.

Tooth brakes (not shown) provide an efficient, positive, switchable means of either holding a load or decelerating a load from a slow speed, generally 20 RPM or less. Utilizing the same principle as the tooth clutch, these brakes can be used to effectively hold a load in position. Available in power-on or power-off models, tooth brakes are ideal for applications requiring very high torque in tight places.

- Torque: up to 250 lb-in (28.2 Nm)
- Diameter: 2.13 in. (54.1 mm)
- Positive engagement, indexing capability
- Highest torque density
- Power-on and power-off
- Zero wear at speed when not engaged
- Standard and custom designs
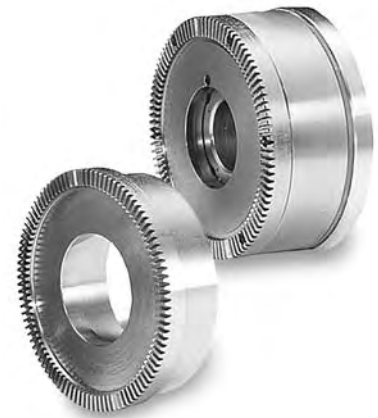
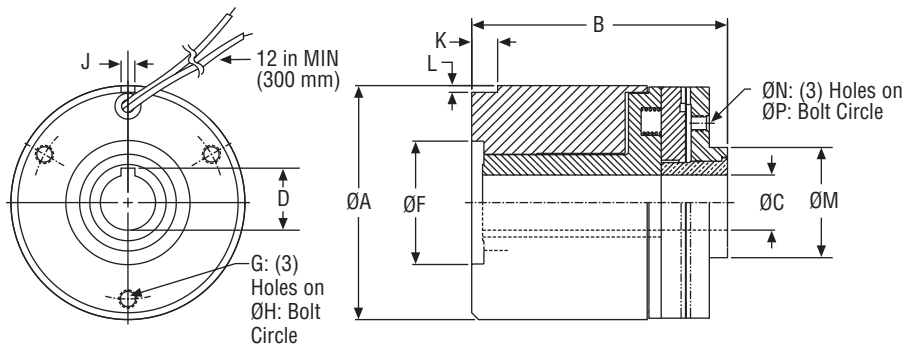TCR Model Shown

Typical Applications

- Military aerospace actuators
- Avionics and flight control
- Medical equipment
- Postal handling equipment
- Machine tools
- Robotics

How to order

TC - 19 - 24 - E08

Series
TC = Power-on Tooth Clutch
TCR = Power-off Reverse-Acting
TCP = Pin Drive Tooth Clutch

Frame Size
19 = 2.13 (54.1)

Bore
E06= .376 (9.6)
E08= .501 (12.7)

Coil Voltage
12 = 12VDC
24 = 24VDC
90 = 90VDC

ENGINEERED PRODUCTS

FRICTION

START
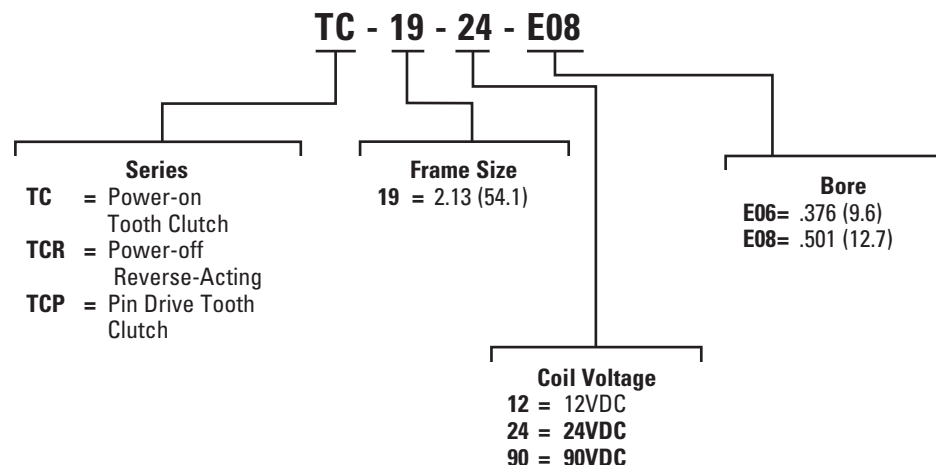
TC-19, TCR-19, TCP-19 Tooth Clutches
Dimensions & Specifications

J ← → 12 in MIN (300 mm)

K
L

B

ØN: (3) Holes on ØP: Bolt Circle

ØA ØF ØC ØM

D

G: (3) Holes on ØH: Bolt Circle

TCR Model Shown

DIMENSIONS															
Model	Static Torque lb-in (Nm)	A: OD in (mm)	B: OAL in (mm)	C: Bore Ø in (mm)	D: K'way Height in (mm)	E: K'way Width in (mm)	F: Case Pilot Ø in (mm)	G: (3) Case Mtg Holes in (mm)	H: Case Mtg Holes Ø in (mm)	J: Mtg Slot Width in (mm)	K: Mtg Slot Length in (mm)	L: Mtg Slot Depth in (mm)	M: Mtg Pilot Ø in (mm)	N: (3) Mtg Holes	P: Mtg Hole BC Ø in (mm)
TC-19-24-E06	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .19 DP	1.44 (36.6)
TC-19-24-E08	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.500 (12.7)	.564 (14.3)	.126 (3.2)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .19 DP	1.44 (36.6)
TCR-19-24-E06	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .16 DP	1.44 (36.6)
TCR-19-24-E08	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.500 (12.7)	.564 (14.3)	.126 (3.2)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .16 DP	1.44 (36.6)
TCP-19-24-E06	50 (5.6)	2.13 (54.1)	157 (39.9)	.375 (9.5)	NA	NA	NA	NA	NA	.13 (3.3)	.24 (6.1)	.06 (1.5)	1,000 (25.4)	NA	NA

PERFORMANCE							
Model	Static Torque lb-in (Nm)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Engagement Speed RPM (max)	RPM max	Weight lb (kg)
TC-19	250 (28.2)	24/90	47/653	16.7	20	3600	1.7 (0.7)
TCR-19	250 (28.2)	24/90	47/653	16.7	20	3600	1.8 (0.8)
TCP-19	50 (5.6)	24/90	34/476	17.0	20	1750	0.8 (0.3)

(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Torque may decrease at higher RPM due to misalignment and vibration associated with the application.
- Engagement speed can be significantly increased and is directly related to system inertia. Consult factory for more information.

- Most tooth clutch applications require a high degree of attention with respect to shaft concentricity and mounting perpendicularity. Consult factory for details.
- Other voltages available upon request.

- Additional sizes and configurations are available upon request. Torque values can be greatly enhanced as well. Consult factory for additional information.

START HOLD STOP

MCS/MBF Series
Metric Clutches and Brakes

Our new metric line of clutches and brakes are designed to be used in true metric applications (dimensional). The MCS and MBF Series offer a wide selection of metric bores and metric standard keyways. The Form Fit and Function matches popular metric lines globally available and are drop-in replacements in most cases.

The MCS and MBF Series have superior performance at a fraction of the cost of our competition. These units are available for low, medium and high volumes.

- Torque: 5.5 to 350 Nm (49 to 3,097 lb-in)
- Diameters: 63 to 264 mm (2.48 to 10.39 in)
- Zero Backlash design
- Static or Dynamic engagement
- Simple installation
- Energy efficient
- Economic cost
- Available "as is" or custom
- **RoHS compliant**

Typical Applications

- Factory automation
- Robotics
- Material handling
- Automotive
- Office automation
- Aviation
- Mail sorters
- Servo systems
- Medical

MCS

MBF-S (Short Hub)

MBF-L (Long Hub)

How to order

MBF - 26 - U - 24 - M12 - L**

Series	Frame Size		Coil Voltage
MCS = Metric Clutches	**26** = 67.5 (2.657)		**24** = 24VDC
MBF = Metric Brakes	**30** = 85 (3.346)		
	40 = 106 (4.173)		
	50 = 133 (5.236)		
	60 = 169 (6.654)		
	80 = 212.5 (8.366)		
	100 = 264 (10.394)		

B = Burnished
U = Unburnished

Armature Bore (MBF Series)	Rotor Bore (MCS Series)
M12 = 12mm	**M12** = 12mm
M15 = 15mm	**M15** = 15mm
M20 = 20mm	**M20** = 20mm
M25 = 25mm	**M25** = 25mm
M30 = 30mm	**M30** = 30mm
M40 = 40mm	**M40** = 40mm
M50 = 50mm	**M50** = 50mm
M60 = 60mm	

Hub Length**
L = Long Hub
S = Short Hub

** Long or Short Hub Length available only on MBF Series Brakes

General Notes
- The air gap should be checked periodically to insure proper operation.
- All friction faces must be kept free of grease and oil for proper operation.
- Consult factory for additional options.

- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Flying leads are provided as standard, terminal style connection available upon request.

- Armature and rotor bore dimensions are minimums, with tolerance generally .001/.002 larger to accommodate varying environmental conditions.
- Coil of 24 volts are provided as standard, other coil voltages are available upon request.

ENGINEERED PRODUCTS

FRICTION

MCS-26, 30, 40, 50, 60, 80, 100 Metric Clutches
Dimensions & Specifications

MCS Model Shown

Dimensions mm (inches)

DIMENSIONS													
											Mounting Holes		
Model	**Static Torque Nm (lb-in)**	**A: OD mm (in)**	**B: OAL mm (in)**	**C: Bore mm (in)**	**D: K'way Height mm (in)**	**E: K'way Width mm (in)**	**F: Tab Height mm (in)**	**G: Slot mm (in)**	**H: Tab Width mm (in)**	**J: Slot Width mm (in)**	**K: Tab Thickness mm (in)**	**N: Dia Holes (3) mm (in)**	**P: BC mm (in)**	**R: Dia mm (in)**
MCS-26U24-M12	5.5 (48.68)	67.5 (2.657)	31 (1.22)	12 (0.472)	1.5 (0.059)	4 (0.157)	50 (1.969)	42.5 (1.673)	14 (0.551)	4.5 (0.177)	2 (0.079)	3.1 (0.122)	46 (1.811)	34.5 (1.358)
MCS-26U24-M15	5.5 (48.68)	67.5 (2.657)	31 (1.22)	15 (0.591)	2 (0.079)	5 (0.197)	50 (1.969)	42.5 (1.673)	14 (0.551)	4.5 (0.177)	2 (0.079)	3.1 (0.122)	46 (1.811)	34.5 (1.358)
MCS-30U24-M15	11 (97.35)	85 (3.346)	34.5 (1.358)	15 (0.591)	2 (0.079)	5 (0.197)	65 (2.559)	57.5 (2.264)	16 (0.630)	6.5 (0.256)	2 (0.079)	4.1 (0.161)	60 (2.362)	41.5 (1.634)
MCS-40U24-M20	22 (194.70)	106 (4.173)	39.5 (1.555)	20 (0.787)	3.5 (0.138)	5 (0.197)	70 (2.756)	62.5 (2.461)	16 (0.630)	6.5 (0.256)	2 (0.079)	5.1 (0.201)	76 (2.992)	51.5 (2.028)
MCS-50U24-M25	45 (398.25)	133 (5.236)	44.5 (1.752)	25 (0.984)	3.5 (0.138)	7 (0.276)	85 (3.346)	77.5 (3.051)	16 (0.630)	6.5 (0.256)	2 (0.079)	6.1 (0.240)	95 (3.740)	61.5 (2.421)
MCS-60U24-M30	90 (796.50)	169 (6.654)	50.5 (1.988)	30 (1.181)	3 (0.118)	7 (0.276)	112 (4.409)	100 (3.937)	25 (0.984)	8.5 (0.335)	3.2 (0.126)	8.1 (0.319)	120 (4.724)	79.5 (3.130)
MCS-80U24-M40	175 (1548.75)	212.5 (8.366)	60.5 (2.382)	40 (1.575)	3 (0.118)	10 (0.394)	138 (5.433)	125 (4.921)	25 (0.984)	8.5 (0.335)	3 (0.118)	10.2 (0.402)	158 (6.220)	99.5 (3.917)
MCS-100U24-M50	350 (3097.50)	264 (10.394)	69 (2.717)	50 (1.969)	3.5 (0.138)	12 (0.472)	173 (6.811)	155 (6.102)	30 (1.181)	12 (0.472)	6 (0.236)	12.2 (0.480)	210 (8.268)	124.5 (4.902)

PERFORMANCE										
Model	**Static Torque* Nm (lb-in)**	**Coil Voltage VDC**	**Resistance Ohms nom**	**Power Watts max**	**Armature Engagement msec**	**Armature Disengage msec**	**Armature Inertia kgcm² (lb-in-sec²)**	**Rotor Inertia kgcm² (lb-in-sec²)**	**Weight kg (lb)**	**Energy Dissipation ft-lb/min**	**Recomm. Air Gap at Install mm (in)**
MCS-26U24-M15	5.5 (48.68)	24	52	11	20	20	0.423 (3.74 x 10⁻⁴)	0.735 (6.51 x 10⁻⁴)	0.5 (1.102)	2600	0.2 (0.008)
MCS-30U24-M15	11 (97.35)	24	38	15	23	30	1.18 (1.04 x 10⁻³)	2.24 (1.98 x 10⁻³)	0.87 (1.918)	2900	0.2 (0.008)
MCS-40U24-M20	22 (194.70)	24	29	20	25	50	4.78 (4.23 x 10⁻³)	6.78 (6.00 x 10⁻³)	1.57 (3.461)	5800	0.2 (0.008)
MCS-50U24-M25	45 (398.25)	24	23	25	40	65	13.1 (1.16 x 10⁻²)	21.4 (1.89 x 10⁻²)	2.89 (6.371)	9000	0.3 (0.012)
MCS-60U24-M30	90 (796.50)	24	16	35	50	85	48 (4.25 x 10⁻²)	63 (5.58 x 10⁻²)	5.3 (11.684)	10000	0.3 (0.012)
MCS-80U24-M40	175 (1548.75)	24	13	45	90	130	137 (1.21 x 10⁻¹)	193 (1.71 x 10⁻¹)	9.8 (21.605)	50000	0.5 (0.020)
MCS-100U24-M50	350 (3097.50)	24	8	72	115	210	358 (3.17 x 10⁻¹)	448 (3.97 x 10⁻¹)	17.5 (38.581)	70000	0.5 (0.020)

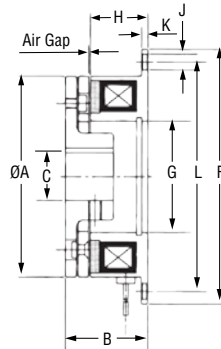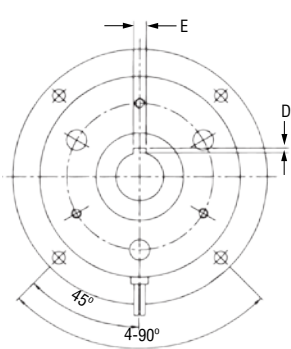(-) denotes English equivalents. Specifications subject to change without notice.
*Unburnished
**Consult factory

STOP   HOLD

MBF-26, 30, 40, 50, 60, 80, 100-S (Short) Metric Brakes
Dimensions & Specifications

MBF-S Model Shown

Dimensions mm (inches)

	DIMENSIONS										
Model	Static Torque Nm (lb-in)	A: OD mm (in)	B: OAL mm (in)	C: Bore mm (in)	D: K'way Height mm (in)	E: K'way Width mm (in)	F: Flange OD mm (in)	G: Case ID mm (in)	H: Case Height mm (in)	J: Mtg Holes (4) mm (in)	K: Mtg Pla Thickness mm (in)	L: Mtg Hole BC mm (in)
MBF-26U24-M12-S	5.5 (48.68)	63 (2.48)	25.5 (1.00)	12 (0.47)	1.5 (0.06)	4 (0.16)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2.1 (0.08)	72 (2.83)
MBF-26U24-M15-S	5.5 (48.68)	63 (2.48)	25.5 (1.00)	15 (0.59)	2 (0.08)	5 (0.20)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2.1 (0.08)	72 (2.83)
MBF-30U24-M15-S	11 (97.35)	80 (3.15)	28.5 (1.12)	15 (0.59)	2 (0.08)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.6 (0.10)	90 (3.54)
MBF-30U24-M20-S	11 (97.35)	80 (3.15)	28.5 (1.12)	20 (0.79)	2.5 (0.10)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.6 (0.10)	90 (3.54)
MBF-40U24-M20-S	22 (194.70)	100 (3.94)	33 (1.30)	20 (0.79)	2.5 (0.10)	5 (0.20)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3.1 (0.12)	112 (4.41)
MBF-40U24-M25-S	22 (194.70)	100 (3.94)	33 (1.30)	25 (0.98)	3 (0.12)	7 (0.28)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3.1 (0.12)	112 (4.41)
MBF-50U24-M25-S	45 (398.25)	125 (4.92)	37 (1.46)	25 (0.98)	3 (0.12)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.6 (0.14)	137 (5.39)
MBF-50U24-M30-S	45 (398.25)	125 (4.92)	37 (1.46)	30 (1.18)	3 (0.12)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.6 (0.14)	137 (5.39)
MBF-60U24-M30-S	90 (796.50)	160 (6.30)	42 (1.65)	30 (1.18)	3 (0.12)	7 (0.28)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4.1 (0.16)	175 (6.89)
MBF-60U24-M40-S	90 (796.50)	160 (6.30)	42 (1.65)	40 (1.57)	3 (0.12)	10 (0.39)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4.1 (0.16)	175 (6.89)
MBF-80U24-M40-S	175 (1548.75)	200 (7.87)	50.5 (1.99)	40 (1.57)	3 (0.12)	10 (0.39)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5.1 (0.20)	215 (8.46)
MBF-80U24-M50-S	175 (1548.75)	200 (7.87)	50.5 (1.99)	50 (1.97)	3.5 (0.14)	12 (0.47)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5.1 (0.20)	215 (8.46)
MBF-100U24-M50-S	350 (3097.50)	250 (9.84)	59 (2.32)	50 (1.97)	3.5 (0.14)	12 (0.47)	290 (11.42)	125 (4.92)	35 (1.38)	11.5 (0.45)	6.1 (0.24)	270 (10.63)
MBF-100U24-M60-S	350 (3097.50)	250 (9.84)	59 (2.32)	60 (2.36)	4 (0.16)	15 (0.59)	290 (11.42)	125 (4.92)	35 (1.38)	11.5 (0.45)	6.1 (0.24)	270 (10.63)

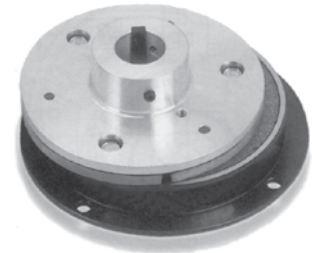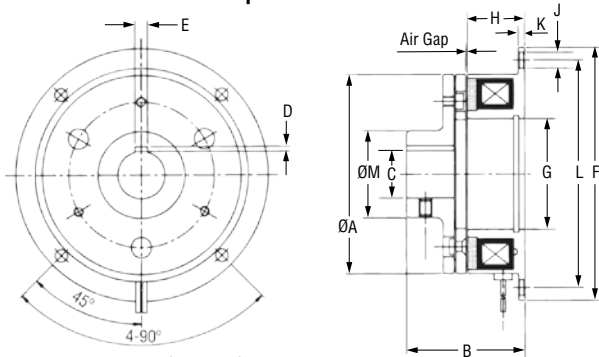|	PERFORMANCE									
Model	Static Torque* Nm (lb-in)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Armature Engagement msec	Armature Disengage msec	Armature Inertia kgcm^2 (lb-in-sec^2)	Weight kg (lb)	Energy Dissipation ft-lb/min	Recomm. Air Gap at Install mm (in)
MBF-26U24-xxx-S	5.5 (48.68)	24	52	11	15	15	0.603 (5.34 x 10^{-4})	0.32 (0.705)	2600	0.2 (0.008)
MBF-30U24-xxx-S	11 (97.35)	24	38	15	16	25	1.71 (1.51 x 10^{-3})	0.58 (1.279)	2900	0.2 (0.008)
MBF-40U24-xxx-S	22 (194.7)	24	29	20	18	30	6.63 (5.87 x 10^{-3})	1.07 (2.359)	5800	0.2 (0.008)
MBF-50U24-xxx-S	45 (398.25)	24	23	25	27	50	18.1 (1.60 x 10^{-2})	1.97 (4.343)	9000	0.3 (0.012)
MBF-60U24-xxx-S	90 (796.5)	24	16	35	35	55	63.5 (5.62 x 10^{-2})	3.45 (7.606)	10000	0.3 (0.012)
MBF-80U24-xxx-S	175 (1548.75)	24	13	45	65	70	190 (1.68 x 10^{-1})	7.1 (15.653)	50000	0.5 (0.020)
MBF-100U24-xxx-S	350 (3097.50)	24	9.6	60	85	125	483 (4.27 x 10^{-1})	12.2 (26.896)	70000	0.5 (0.020)

(-) denotes English equivalents. Specifications subject to change without notice.   *Unburnished   **Consult factory

STOP | HOLD

MBF-26, 30, 40, 50, 60, 80, 100-L (Long) Metric Brakes
Dimensions & Specifications

MBF-L Model Shown

Dimensions mm (inches)

	DIMENSIONS											
Model	**Static Torque** Nm (lb-in)	**A: OD** mm (in)	**B: OAL** mm (in)	**C: Bore** mm (in)	**D: K'way Height** mm (in)	**E: K'way Width** mm (in)	**F: Flange OD** mm (in)	**G: Case ID** mm (in)	**H: Case Height** mm (in)	**J: Mtg Holes (4)** mm (in)	**K: Mtg Pla Thickness** mm (in)	**L: Mtg Hole BC** mm (in)	**M: Hub Dia** mm (in)
MBF-26U24-M12-L	5.5 (48.68)	63 (2.48)	37 (1.46)	12 (0.47)	1.5 (0.06)	4 (0.16)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2.10 (0.08)	72 (2.83)	26 (1.02)
MBF-26U24-M15-L	5.5 (48.68)	63 (2.48)	37 (1.46)	15 (0.59)	2 (0.08)	5 (0.20)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2.10 (0.08)	72 (2.83)	26 (1.02)
MBF-30U24-M15-L	11 (97.35)	80 (3.15)	44.8 (1.76)	15 (0.59)	2 (0.08)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.6 (0.10)	90 (3.54)	31 (1.22)
MBF-30U24-M20-L	11 (97.35)	80 (3.15)	44.8 (1.76)	20 (0.79)	2.5 (0.10)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.6 (0.10)	90 (3.54)	31 (1.22)
MBF-40U24-M20-L	22 (194.70)	100 (3.94)	53 (2.09)	20 (0.79)	2.5 (0.10)	5 (0.20)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3.10 (0.12)	112 (4.41)	41 (1.61)
MBF-40U24-M25-L	22 (194.70)	100 (3.94)	53 (2.09)	25 (0.98)	3 (0.12)	7 (0.28)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3.10 (0.12)	112 (4.41)	41 (1.61)
MBF-50U24-M25-L	45 (398.25)	125 (4.92)	61.3 (2.41)	25 (0.98)	3 (0.12)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.6 (0.14)	137 (5.39)	49 (1.93)
MBF-50U24-M30-L	45 (398.25)	125 (4.92)	61.3 (2.41)	30 (1.18)	3 (0.12)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.6 (0.14)	137 (5.39)	49 (1.93)
MBF-60U24-M30-L	90 (796.50)	160 (6.30)	73.5 (2.89)	30 (1.18)	3 (0.12)	7 (0.28)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4.10 (0.16)	175 (6.89)	65 (2.56)
MBF-60U24-M40-L	90 (796.50)	160 (6.30)	73.5 (2.89)	40 (1.57)	3 (0.12)	10 (0.39)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4.10 (0.16)	175 (6.89)	65 (2.56)
MBF-80U24-M40-L	175 (1548.75)	200 (7.87)	87.2 (3.43)	40 (1.57)	3 (0.12)	10 (0.39)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5.10 (0.20)	215 (8.46)	83 (3.27)
MBF-80U24-M50-L	175 (1548.75)	200 (7.87)	87.2 (3.43)	50 (1.97)	3.5 (0.14)	12 (0.47)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5.10 (0.20)	215 (8.46)	83 (3.27)
MBF-100U24-M50-L	350 (3097.50)	250 (9.84)	102.6 (4.04)	50 (1.97)	3.5 (0.14)	12 (0.47)	290 (11.42)	125 (4.92)	35 (1.38)	11.5 (0.45)	6.10 (0.24)	270 (10.63)	105 (4.13)
MBF-100U24-M60-L	350 (3097.50)	250 (9.84)	102.6 (4.04)	60 (2.36)	4 (0.16)	15 (0.59)	290 (11.42)	125 (4.92)	35 (1.38)	11.5 (0.45)	6.10 (0.24)	270 (10.63)	105 (4.13)

	PERFORMANCE									
Model	**Static Torque*** Nm (lb-in)	**Coil Voltage** VDC	**Resistance Ohms** nom	**Power Watts** max	**Armature Engagement** msec	**Armature Disengage** msec	**Armature Inertia** kgcm^2 (lb-in-sec^2)	**Weight** kg (lb)	**Energy Dissipation** ft-lb/min	**Recomm. Air Gap at Install** mm (in)
MBF-26U24-xxx-L	5.5 (48.68)	24	52	11	15	15	0.603 (5.34 x 10^{-4})	0.32 (0.705)	2600	0.2 (0.008)
MBF-30U24-xxx-L	11 (97.35)	24	38	15	16	25	1.71 (1.51 x 10^{-3})	0.58 (1.279)	2900	0.2 (0.008)
MBF-40U24-xxx-L	22 (194.7)	24	29	20	18	30	6.63 (5.87 x 10^{-3})	1.07 (2.359)	5800	0.2 (0.008)
MBF-50U24-xxx-L	45 (398.25)	24	23	25	27	50	18.1 (1.60 x 10^{-2})	1.97 (4.343)	9000	0.3 (0.012)
MBF-60U24-xxx-L	90 (796.5)	24	16	35	35	55	63.5 (5.62 x 10^{-2})	3.45 (7.606)	10000	0.3 (0.012)
MBF-80U24-xxx-L	175 (1548.75)	24	13	45	65	70	190 (1.68 x 10^{-1})	7.1 (15.653)	50000	0.5 (0.020)
MBF-100U24-xxx-L	350 (3097.50)	24	9.6	60	85	125	483 (4.27 x 10^{-1})	12.2 (26.896)	70000	0.5 (0.020)

(-) denotes English equivalents. Specifications subject to change without notice.   *Unburnished   **Consult factory

Engineered Products

Power-off Spring Set (Safety) - LBRP Series

Spring Set electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. Custom manufactured for wheelchair and the handicap scooter industry, our LBRP series brakes have optional manual release handles and some models are available with micro switches. (To indicate whether the brake is released or engaged.) Our LBRP series power-off spring set brakes can be used as a stopping (emergency stopping) or holding brake (parking). These brakes are manufactured in low cost regions allowing the lowest prices available in the market.

- Static Torque: 1 to 13 Nm (8.85 to 115 lb-in)
- Diameter: 42 to 100 mm (1.65 to 3.938 in)

- Bore size (Shaft Dia.): 6 to 12 mm (0.236 to 0.472 in)
- Assembly and all components meet EU Directive 2002/95/EC (RoHS)
- Plated steel surfaces to withstand corrosion
- Tough, durable long-wearing friction materials
- Anti-Rattle feature
- Operating speeds up to 3600 RPM

Other Applications Include

- Patient Lifts
- Handicap Van/RV/Truck actuators
- Electric Vehicles

LBRP Series
Contact our Applications Team for more information.

Multi Disc Brakes and Clutches - MDB/MDC Series

Multiple Disc Clutches provide a smooth efficient, switchable link between a motor and a load on in-line or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor is securely mounted on the drive shaft. The armature assembly is then mounted either directly on an opposing in-line shaft, or indirectly on a parallel shaft by means of gears or pulleys. When the coil is energized, the armature engages the friction surface of the rotor, further engaging the multiple discs within the assembly until full torque is achieved, thereby coupling the two in-line or parallel shafts, thus driving the load. A brake operates similarly by eliminating the rotor.

- Torque: 25 lb-in to 300 lb-ft (2.8 to 407 Nm)
- Diameter: 2.0 to 10 in. (50.8 to 254.0 mm)
- Dynamic engagement capabilities
- Wet or dry operation
- Custom designs only

Typical Applications

- Flight control actuators
- Postal equipment
- Packaging
- Machine tools
- Agricultural equipment

MDC Model Shown

Complete Custom Assemblies and Subassemblies

Custom Brake and Clutch Value-Added Assemblies are a major strength of Danaher Motion. Variations of any device shown in this catalog can be adapted specifically to meet the most demanding needs of your application.

Custom gears, pulleys, sprockets, integrally mounted to the clutch can be combined with special shaft sizes, coil voltages, connector assemblies or any other type of design imaginable.

We manufacture complete assemblies and subassemblies for many customers. Allow us to help cost-reduce your product and provide a more economical solution to your most complex clutch or brake application.

- Torque: 6.0 oz-in to 1200 lb-in (0.04 to 135 Nm)
- Diameters: 0.6 to 7.25 in (15.2 to 184.2 mm)
- Efficient means of cycling load
- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

See inside back cover of this catalog for more information.

ENGINEERED PRODUCTS

FRICTION

Design Considerations

Factors To Consider

Brake and Clutch design considerations are based on a number of factors. Depending upon the particular application these factors can become either more or less important. The discussion of Application Definitions differentiates between heavy, medium and light duty, as well as static versus dynamic applications. In a simple light duty, static use application, clutch or brake selection can be made based on an estimate of torque required considering the motor torque capacity and the load driven (or held). However when precise control and life expectancy are of concern, one must consider inertia, heat dissipation and speed as key factors.

Inertia Calculations

Total system inertia, typically expressed in lb-in-sec^2 units, equals the sum of reflected inertia (I_R) and clutch inertia (I_C).

Clutch inertia values can be found in our catalog, reflected inertia is calculated beginning with **load inertia**.

Load inertia (I_L) for cylindrical rotational bodies, expressed in units of lb-in-sec^2, is equal to WR^2/772, where W = weight in lbs. and R = radius in inches. The following chart may be used as reference (based on steel, per inch of length) to help simplify this calculation. To determine the inertia of a given shaft, multiply the WR^2/L shown below by the length of the shaft or the thickness of the disc in inches. For hollow shafts, subtract the WR^2/L of the ID from the WR^2/L of the OD and multiply by the length.

Diameter in	WR^2/L lb-in^2/in	Diameter in	WR^2/L lb-in^2/in	Diameter in	WR^2/L lb-in^2/in	Diameter in	WR^2/L lb-in^2/in
0.250	0.00011	2.00	0.445	6.00	36.00	10.00	277.92
0.312	0.00027	2.25	0.712	6.25	42.39	10.25	306.72
0.375	0.00055	2.50	1.085	6.50	49.60	10.50	337.71
0.437	0.00102	2.75	1.584	6.75	57.68	10.75	371.04
0.500	0.00173	3.00	2.250	7.00	66.71	11.00	406.78
0.562	0.00279	3.25	3.100	7.25	76.76	11.25	444.96
0.625	0.00425	3.50	4.176	7.50	87.91	11.50	485.93
0.687	0.00623	3.75	5.494	7.75	100.23	11.75	529.59
0.750	0.00879	4.00	7.113	8.00	113.90	12.00	576.00
0.812	0.01215	4.25	9.072	8.25	128.71	12.25	626.10
0.875	0.01634	4.50	11.393	8.50	145.00	12.50	678.31
0.937	0.02142	4.75	14.144	8.75	162.86	12.75	734.22
1.000	0.02778	5.00	17.365	9.00	182.29	13.00	793.52
1.250	0.06783	5.25	21.107	9.25	203.40	13.25	856.35
1.500	0.14065	5.50	25.488	9.50	226.30	13.50	922.83
1.750	0.26058	5.75	30.371	9.75	252.00	13.75	993.11

To obtain this information for materials other than steel, multiply the inertia of the proper steel diameter from the above chart using the correct multiplier in the chart at right.

Reflected inertia can now be calculated as $I_R = I_L(\omega_L/\omega_C)^2$, where ω_L = load RPM and ω_C = clutch input RPM.

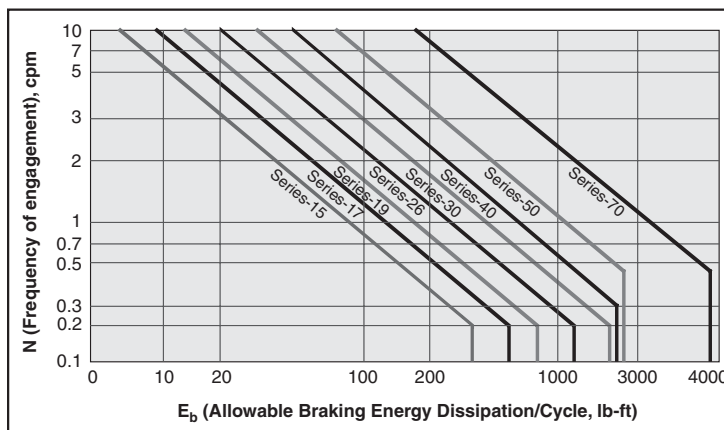| Material	Multiplier
Bronze	1.05
Steel	1.00
Iron	0.92
Powder Metal Bronze	0.79
Powder Metal Iron	0.88
Aluminum	0.35
Nylon	0.17

Design Considerations

Energy Dissipation Calculations

Total energy dissipation (E_c), typically expressed in units of ft-lb, is defined as the sum of kinetic (E_k) and slip (E_s) energy dissipated each clutch or brake cycle.

Kinetic energy dissipation (E_k) is equal to $4.6 \times 10^{-4} \times I \times \omega^2$, where I = total system inertia in lb-in-sec^2 units, and ω = differential slip speed in RPM.

Slip energy dissipation (E_s) is equal to $43.6 \times 10^{-4} \times \omega \times D \times t_s$, where D = load drag reflected to the clutch shaft in lb-in units, and t_s = total slip time in seconds.

Brake Energy Dissipation Chart

N (Frequency of engagement), cpm

E_b (Allowable Braking Energy Dissipation/Cycle, lb-ft)

Series-15, Series-17, Series-19, Series-26, Series-30, Series-40, Series-50, Series-70

Use to evaluate size of a power-off brake after determining the energy dissipation.

Optimum Torque and Response

Burnishing: Burnishing is a process of running-in the mating friction surfaces of a clutch or brake to ensure the highest possible output torque. By forcing the unit to slip rotationally when energized, the mating frictional surfaces establish an optimal wear pattern within a relatively short time. This can be accomplished at the factory or during the initial stages of installed application. However, whenever possible it is more desirable to perform the burnishing process at the actual installation to insure a consistent alignment of the friction faces.

Engagement: Coil overexcitation is a technique which makes a clutch or brake engage faster and have greatly improved starting and stopping accuracy. It is accomplished by applying over-voltage to the clutch or brake coil to reduce current build-up time, thereby reducing the magnetizing time. However, this overexcitation does not increase the torque of the unit. It simply reduces the start/stop times and friction face wear normally associated with slippage that can occur during a slower engagement time. In many applications, the reduction in start-time can be reduced significantly when using an over-excitation circuit. However, adequate coil suppression must be employed to prevent damage to the system. Please contact the factory for more detailed information.

Disengagement: When a clutch or brake is disengaged, a reverse voltage is generated in the coil. This voltage can be extremely high and could cause potential damage to the unit and the switch in the circuit. Therefore, an arc suppression circuit should be used to protect the coil and switch. When properly applied, such a circuit will not adversely affect the clutch or brake engagement time.

In most applications, a simple resistor connected in parallel with the clutch or brake coil is sufficient (Fig. I). The resistor should be rated at six times the coil resistance and approximately 25% of the coil wattage. To eliminate any added current draw, a diode may be added to the circuit as shown

(Fig. II). If faster release times are desired, a zener diode with two times the coil voltage should be incorporated into the circuit (Fig. III). However, the fastest disengagement time is achieved with the use of an MOV (metal oxide varistor) (Fig. IV). Conversely, if slower disengagement times are required, the use of a diode connected in parallel with the coil (Fig. V), or simply switching the A/C side of the circuit, will achieve this result.

V_{in} — Clutch or Brake Coil — Resistor — **Fig I**

V_{in} — Clutch or Brake Coil — Resistor, Diode — **Fig II**

V_{in} — Clutch or Brake Coil — Zener, Diode — **Fig III**

V_{in} — Clutch or Brake Coil — MOV — **Fig IV**

V_{in} — Clutch or Brake Coil — Diode — **Fig V**

FRICTION

ENGINEERING GUIDELINES
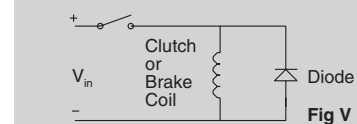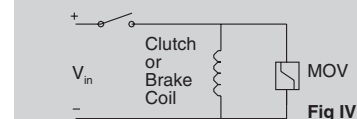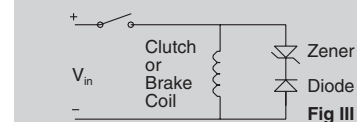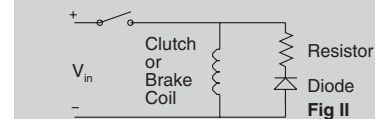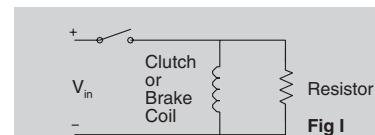
Mounting Requirements
CS, CSC, CF, CFC, BF, BRP, SB, FSB, AKB and PMB units

(Bearing and flange mounted clutches, couplings and brakes)

Figure 1

Figure 2

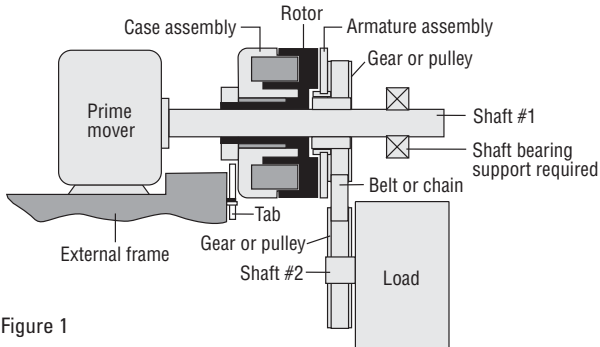**Bearing Mounted Clutches - CS models**
Figure 1 - Used to couple two parallel shafts. The rotor and armature are mounted on the same shaft. The armature is bearing mounted on the shaft and is free to rotate independent of the shaft. The knurled hub can press fit a gear or pulley onto the armature assembly which in turn drives the parallel shaft. The case assembly is bearing mounted and is provided with anti-rotation tab.

Bearing Mounted Clutch Couplings - CSC models
Figure 2 - Used to couple two in-line shafts. The rotor is attached to one shaft and the armature to the other shaft. The case assembly is bearing mounted and is provided with an anti-rotation tab.
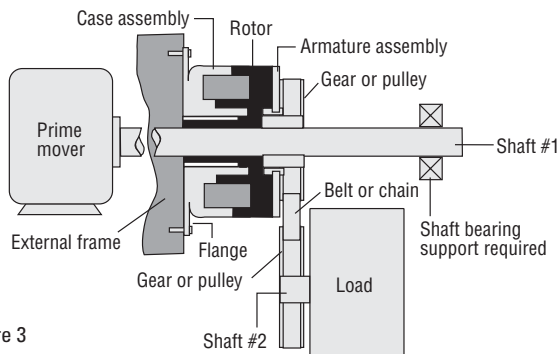
Figure 3

Figure 4

Flange Mounted Clutches - CF models
Figure 3 - Used to couple two parallel shafts. The case assembly is flange mounted for fastening to a bulkhead.

Flange Mounted Clutch Couplings - CFC models
Figure 4 - Used to couple two in-line shafts. The rotor is attached to one shaft and the armature to the other shaft. The case assembly is flange mounted for fastening to a bulkhead.
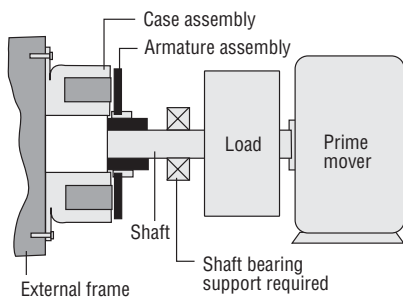
Figure 5

Figure 6

Flange Mounted Brakes - BF models
Figure 5 - Used to stop or hold the armature and load to which it is attached. Units are furnished with coupling type armature hubs. The case assembly is flange mounted for fastening to a bulkhead.
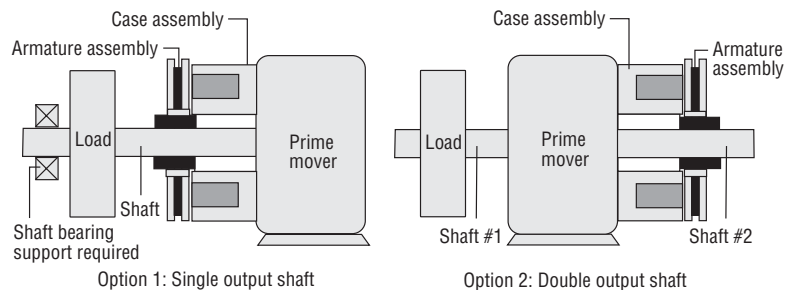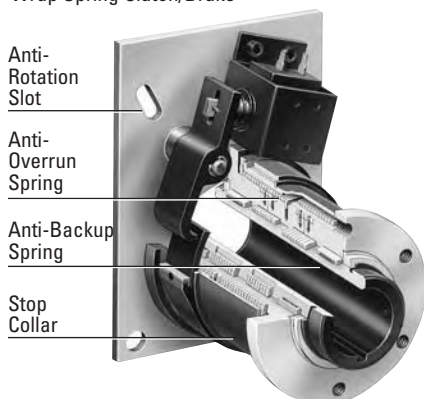
Power-Off Brakes - BRP, SB, FSB, AKB & PMB models
Figure 6 - Used to stop or hold a load in the absence of power. The case assembly is mounted or fastened to a bulkhead. The armature assembly is attached to the rotating load.

Glossary of Terms

Wrap Spring Clutch/Brake

Anti-
Rotation
Slot

Anti-
Overrun
Spring

Anti-Backup
Spring

Stop
Collar

Acceleration Time - The time required to change the speed of a system from the moment the clutch engages until it is statically engaged and the system is moving at a constant speed.

Actuator Limit Stop - The actuator limit stop is a restraining pin or plate on a wrap spring clutch that limits the motion of the actuator on solenoid actuated models.

Air Gap - The physical axial space between rotor and armature that is overcome when the magnet body is energized, engaging the clutch, or brake.

Anti-Backup (AB) - The anti-backup spring prevents oscillation between the clutch and brake springs on a wrap spring device and prevents the output load from reversing. Anti-backup is a standard feature on CB Series clutch/brake combinations.

Anti-Overrun (AO) - The anti-overrun spring prevents overhauling loads from overrunning the input on a wrap spring. For example, anti-overrun is being applied when an eccentric output load is held at the same speed as the constant speed input. Anti-overrun is a standard feature on all CB series products.

Anti-Rattle Feature - PMB and AKB brakeare available with an anti-rattle feature. This feature minimizes noise that occurs when the brake is released (Power On) and is running at speed. On the PMB Series, a rubber "O" ring is embedded in the "splined hub" that applies a slight pressure on the mating spline teeth eliminating most of the rattling noise. On the AKB Series, an "O" ring is embedded in the ID on the rotor assembly.

Anti-Rotation Slot - A slot used in a clutch models to prevent rotation during operation.

Armature (assembly) - The component in a friction clutch or brake that is attracted to the rotor or case assembly by the magnetic field created by the case assembly, effecting the coupling of input and output.

Armature Disengagement Time (ADT) - The time required from the instant electrical power is removed from the actuation system until the clutch is disengaged. Armature Disengagement Time is also often referred to as Drop-Out Time.

Burnishing - A process of running in a clutch or a brake to reach full potential torque. All standard catalog values of torque are indicated as burnished. Generally, any unit will become burnished during the first few cycles of normal operation at the customer's site. Pre-burnishing at the factory is normally an additional operation required only by those customers needing immediate out-of-box torque prior to the normal application run-in period.

Case Assembly - The fixed component in a clutch or brake that is energized, creating a magnetic field, effecting the engagement of rotor and armature.

Control Collar - A combination of protective cover and controlling device in a wrap spring product. The control tang of the spring fits in this collar; thus by allowing or preventing rotation of this collar, the spring is allowed or not allowed to wrap tight on the hubs. Stops are molded or machined on this plastic collar and can be engaged by an external arm to control engagement. A single stop is standard and most any number up to 24 can be machined for special applications.

Control Tang - A control tang at the end(s) of the wrap spring is/are used to engage and disengage the input and output hubs on on-off, start-stop, and indexing units.

Drag Torque - The torque necessary to overcome static friction in a clutch or brake.

Dust Cover - PMB brakes are available with a dust cover. The dust cover protects the braking surfaces against, dust, dirt, and dripping water. This feature is made from flexible rubber and is fitted between the case and the mounting plate.

Dynamic Torque - The torque developed where there is a relative motion between mating surfaces in a friction clutch or brake. The torque varies with the speed of rotation and amount of slip. Please contact our engineers for specific data.

Friction Clutch

Rotor

Case
Assembly
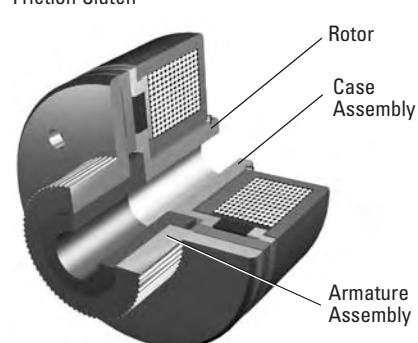
Armature
Assembly

Engagement Time - The time required, from the moment the clutch receives the appropriate electrical signal, for the magnet to attract the armature and the clutch faces are engaged. At this point the load begins to accelerate.

Frictional Torque - The torque created by friction reflected at the output of the clutch or brake.

Inertia - That property of a body to continue in the state of motion or rest in which it may be placed until acted on by some force.

Inertial Torque - The torque developed by accelerating or decelerating a given load.

Inner & Outer Pole (face) - Areas of the rotor that form the magnetic flux path and torque carrying friction within a clutch. In a brake the case assembly forms these poles.

Manual Release - Spring set brakes such as our PMB Series are available with a manual release. The manual release allows the brake to be released mechanically in place of the electric coil operation. When power is removed, the brake is "holding", if there is no electrical power available, simply push or pull the lever (handle) and the brake will release (not hold the load, shaft - hub will be allowed to rotate freely). Once pressure is removed from the handle (let go), the manual release handle will go back to its original position automatically. The brake will then "hold" (shaft - hub will be locked once again).

OTS/AB - If the load inertia is greater than the wrap spring tang can absorb without damage, an overtravel stop can be added to absorb a portion of the stopping torque. The anti-backup feature will prevent the output from reversing.

Overrunning - The most basic control func-

Glossary of Terms

tion performed by PSI Series wrap spring clutches in which the clutch transmits torque in one direction and allows the load to free wheel or overrun when the input drive is stopped or reversed.

Positive Engagement - An engagement that will not slip.

Radial Bearing Load - The maximum permissible load that can be applied to a clutch or brake unit at maximum velocity without incurring damage.

Residual Magnetism - The condition in electromagnets where low level magnetism remains after the electrical current is removed.

Rotor (assembly) - The rotating component in a clutch that is generally attached (keyed or pinned) to the input (motor) shaft.

Split Cam - A new sleeve design incorporated in all standard and super CB-5, CB-6, CB-7, CB-8, and SAC-5 & SAC-6 units. This new design makes setting the spring differential (overtravel) simple. With the one piece construction (older style) the relative position of the brake and drive springs are set together. The new split cam design allows the user to set the position of the brake spring by just wrapping the spring in the direction opposite of the clutch input rotation.

Spring Differential - Spring differential is the positional relationship of the drive spring to the brake spring. Correctly adjusted spring differential is imperative for proper clutch/brake performance. The spring differential is factory set.

Start-Stop Clutch - This control function is a basic engage-disengage operation resulting in random load stopping positions. Both SP Series and PSI Series (mechanically actuated) clutches can be used as start-stop clutches, as can the SAC, BIMAC, MAC, BBC and DL.

Start-Stop Clutches and Brakes - Most wrap spring clutches and brakes can be configured to perform the start-stop control function in which loads are started and stopped accurately.

Static Torque - In wrap springs this is defined as the maximum torque that can be applied statically with the spring completely wrapped down before damage occurs. In friction devices this is the torque level beyond which the clutch or brake will slip or overrun.

Stop Collar - A combination cover and control device on a wrap spring device that has detent positions to enable the clutch or brake to be engaged or disengaged. Standard stop collars have one stop per revolution. Specials are available with as many as twenty-four stops per revolution.

Time To Engagement (TTE) - The time required from the instant the actuation system is signaled until the clutch is engaged. At this point the system begins to accelerate. Time to Engagement is also often referred to as Pull-In Time.

Time To Speed (TTS) - The time required from the instant the actuation system is signaled until the output reaches the input RPM. Time to Speed is the equivalent of the sum of engagement time and acceleration time.

Time to Zero - The time required to fully disengage the motor from its load, thus allowing the load to drop to zero speed. Note: Factors such as system friction and inertia naturally play an important role in both of these critical measurements.

Torque - The product of the force and the perpendicular distance from its line of action to the instantaneous center of rotation, generally expressed in lb-in or Nm. Static torque occurs when there is no relative movement or slippage between mating friction surfaces. Fully engaged clutches, or a brake holding a load, are examples of static torque. Dynamic torque is developed when there is relative motion between mating friction surfaces.

Torque Adjustment Feature - Our PMB series brakes are available with a Torque Adjustment Feature. This feature allows the torque to be adjusted down from maximum holding force (Static Torque). This feature is in the form of a threaded "spanner type nut", to turn the nut, a simple spanner wrench may be used. This feature relieves the "tension" on the springs, therefore reducing the holding torque. This feature allows for a "softer" stop or less holding force (torque).

Total Cycle Time - Sum of the device time-on and time-off as measured in seconds. Duty cycle is the percentage of total cycle time that a clutch or brake is engaged. For example, 5 seconds on/5 seconds off corresponds to a 50% duty cycle and a 10 second cycle time. Cycle rate is expressed in CPM (cycles per minute), as the number of times the clutch or brake is engaged and disengaged during a one minute period.

Undercut - A process of cutting back one of the pole surfaces in relation to the other. Generally done to reduce any residual magnetism or to derate a device. Also a term used to describe the recessing of friction material so as to affect a more efficient burnished condition.

Wrap Angle - The number of degrees a spring tang must rotate in order to engage or disengage a load in a wrap spring device.

Wrap Spring - High tensile strength coiled wire, which transmits a substantial amount of torque when wrapped tightly around two hubs.

Application Definitions

Heavy Duty is defined as one where the clutch is engaged in concert with the movement of the load. Example: a paper feed clutch that is engaged each time that a sheet of paper is introduced into the print path.

Light to Medium Duty is defined as one where running speed is achieved in the absence of loading (or the clutch is engaged at zero speed). Example: a machine tool head that is engaged and at speed before the cutting of metal begins.

A **Dynamic Clutch** application is another way of defining "Heavy Duty". Factors such as inertia, energy dissipation and life become critical.

A **Static Clutch** application is defined as one where the clutch is engaged at zero speed. Example: a tooth clutch that is used to couple and position an X-ray machine head.

A **Dynamic Brake** application is defined as one where the brake is engaged to actually stop the load. Again, inertia, energy dissipation and life must be well defined. Example: an emergency stop of a motor that is running at speed, particularly if under load.

A **Static Brake** application is defined as one where the brake is engaged after the system has come to rest. Example: a holding brake on a Z-axis to hold the load in place in the event of a power failure.

Conversion Chart

Listed Alphabetically

To Convert From	To	Multiply By	To Convert From	To	Multiply By	To Convert From	To	Multiply By
cm	feet	3.281×10^{-2}	(lb-ft)(RPM)	Watts	.142	Nm	oz-in	141.69
cm	inches	.3937	lb-ft^2	gm-cm^2	4.214×10^{5}	Nm^2	lb-in^2	348.47
degrees/sec	RPM	.1667	lb-ft^2	lb-in^2	144	Nm-sec^2	lb-in^2	3417
degrees/sec	rad/sec	1.745×10^{-2}	lb-ft^2	lb-in-sec^2	.37272	Newtons	pounds	.225
feet	cm	30.48	lb-ft^2	oz-in^2	2304	oz-in	lb-ft	5.208×10^{-3}
ft-lb/min	Watts	2.259×10^{-2}	lb-ft^2	oz-in-sec^2	5.969	oz-in	lb-in	6.25×10^{-2}
g-cm	lb-ft	7.233×10^{-5}	lb-in	g-cm	165960	(oz-in)(RPM)	HP	9.917×10^{-7}
g-cm	oz-in	1.389×10^{-2}	lb-in	kg-cm	165.96	(oz-in)(RPM)	Watts	7.395×10^{-4}
g-cm^2	lb-in^2	3.417×10^{-4}	lb-in	kg-m	1.6596	oz-in^2	gm-cm^2	182.9
g-cm^2	lb-ft^2	2.373×10^{-6}	lb-in	lb-ft	.083	oz-in^2	lb-ft^2	4.340×10^{-4}
gm-cm^2	oz-in^2	5.467×10^{-3}	lb-in	Nm	.113	oz-in^2	lb-in^2	6.25×10^{-2}
horsepower	ft-lb/min	33,000	lb-in	oz-in	16	oz-in^2	oz-in-sec^2	2.590×10^{-3}
horsepower	watts	7.457×10^{-2}	(lb-in)(RPM)	HP	1.587×10^{-5}	oz-in-sec^2	oz-in^2	3.8609×10^{-2}
inches	cm	2.540	(lb-in)(RPM)	Watts	.0118	oz-in-sec^2	lb-in^2	24.125
kg-m	lb-ft	7.233	lb-in^2	kg-cm^2	2.926	RPM	rad/sec	.1047
kg-m	lb-in	.6026	lb-in^2	Nm^2	2.870×10^{-3}	radians	degrees	57.3
kg-cm^2	lb-in^2	3.417×10^{-1}	lb-in^2	kg-m^2	2.9265×10^{-4}	rad/sec	RPM	9.549
kg-cm-sec^2	lb-in^2	335.1	lb-in^2	lb-in-sec^2	2.590×10^{-3}	revolutions	radians	6.283
kg-m^2	lb-ft^2	23.73	lb-in^2	lb-ft^2	6.944×10^{-2}	revolutions/min.	degrees/sec	6
kg-m^2	lb-in^2	3417	lb-in^2	oz-in^2	16	square-inches	square-mm	645.2
kilograms	pounds	2.205	meters	millimeters	1000	temp. (°C) +17.78	temp. (°F)	1.8
lb-ft	lb-in	12	millimeters	inches	3.937×10^{-2}	temp. (°F) -32	temp. (°C)	.555
lb-ft	oz-in	192	Nm	lb-ft	.738	Watts	ft-lb/min	44.2
(lb-ft)(RPM)	HP	1.904×10^{-4}	Nm	lb-in	8.85	Watts	HP	1.341×10^{-3}

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