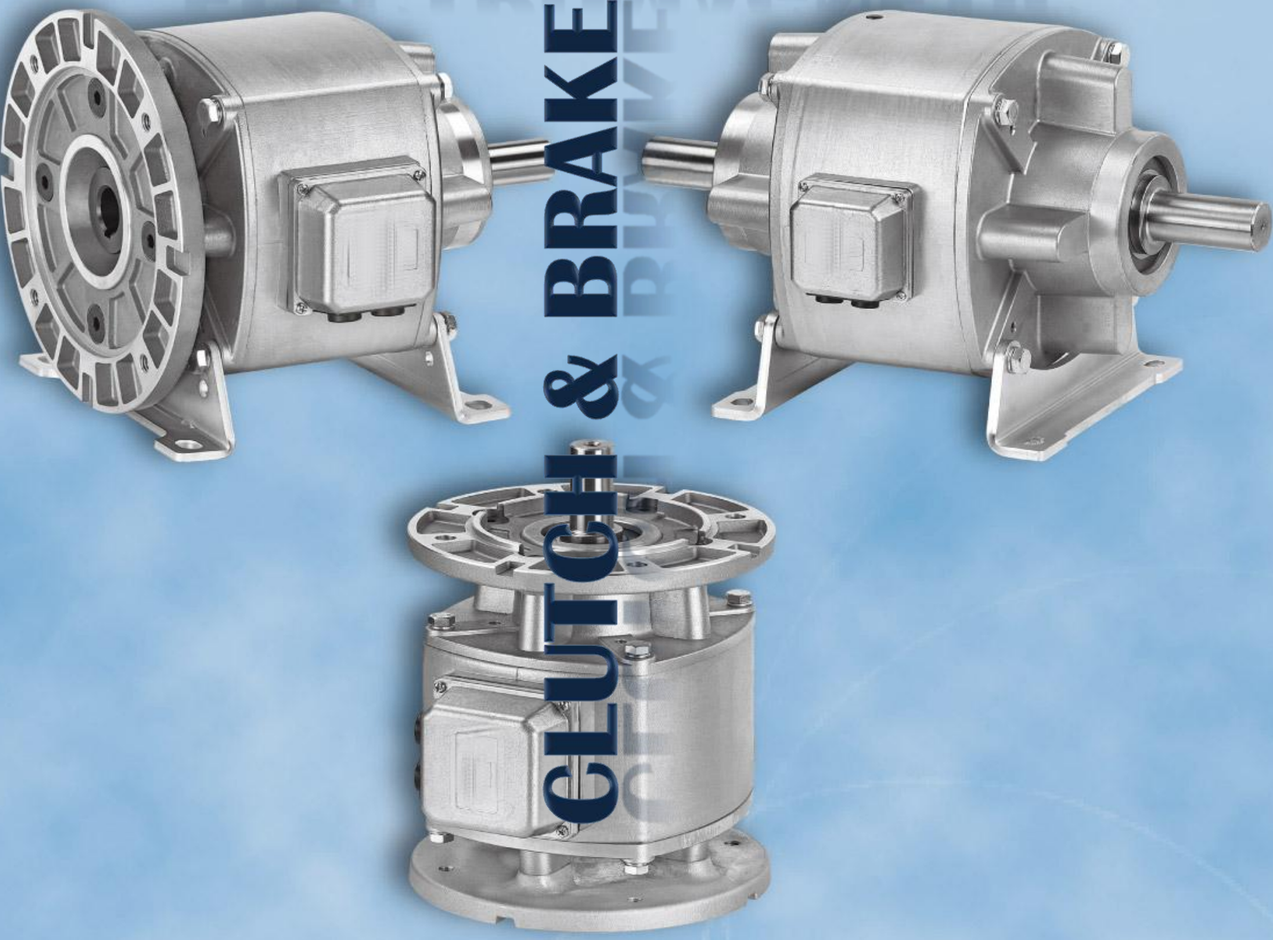
NIIKA®
Since 1989

ELECTROMAGNETIC

CLUTCH & BRAKE



NIIKA Corp.

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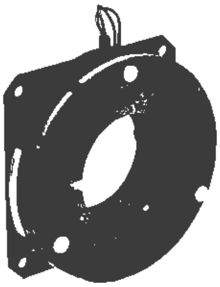
A clutch is a rotary mechanical device that is used to control the transmission of torque from one shaft to another.

A brake is a rotary mechanical device that is used to control the motion of a single shaft.

builds stationary-field electromagnetic friction clutches and brakes that are operated by applying DC voltage across a stationary coil. This type of unit offers several advantages.

- Ease of operation
- Reliability
- Wide range of models
- Fast response
- Simple, efficient control
- Versatility



Basic funtions

Coupling/Releasing
A clutch may be used to connect or disconnect a driven shaft to/from a driving shaft, as required, while under load.

Braking/Holding
A brake is used to dissipate the kinetic energy of a rotating load inertia, and/or to lock a stationary shaft firmly in place.

Speed changing
Clutches may be integrated into a transmission to allow changes in output speed and torque while the driving shaft remains under load.

Reversing
A pair of clutches may be integrated into a reversing transmission to allow changes in the direction of rotation of the output while the driving shaft remains under load.

Rapid cycling
Depending upon system inertia, cycle rates of several hundred per minute can be achieved while maintaining precise control. The response of Trantex clutches and brakes is truly exceptional.

Positioning/Indexing
Clutch/brakes may be used to provide predetermined feeding and automatic positioning.

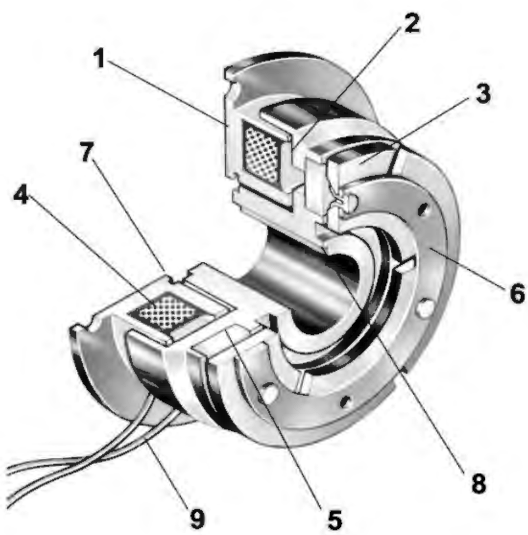
Inching
Clutch/brakes may be used for jogging or inching during machine set-up.

Soft starting
A clutch may be used as a soft-start device to reduce motor inrush current, and to reduce impact upon the load.

Overload protection
A clutch may be used as a torque fuse, to protect driven equipment during an overload condition.

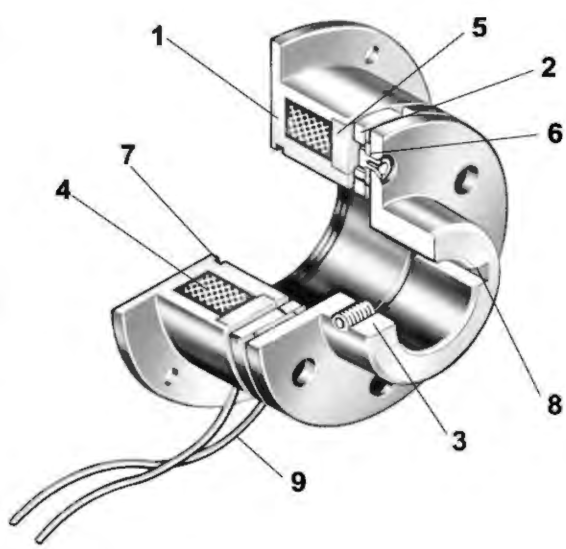
Basic construction

FCD clutch



1. **Clutch magnet** Contains a fully encapsulated coil. Mounted to a wall or bulkhead.
2. **Rotor** Keyed to a shaft. A part of the magnetic circuit, the pole faces of the rotor attract the armature.
3. **Armature plate** When the coil is energized, the armature plate is drawn up against the rotor with substantial magnetic force, allowing torque to be transmitted to/from the armature plate to the keyed rotor.
4. **Coil** Source of magnetic field when D.C. power is applied.
5. **Friction material** Carefully chosen by Trantex, the friction material greatly extends the life of the unit.
6. **Round spring** Connects/disconnects the armature to/from the load. Assures complete disengagement when current to the coil is interrupted. Transmits torque with no backlash, and enables vertical mounting.
7. **Retaining ring groove** Allows the clutch magnet field to be piloted onto a bearing.
8. **Keyway** The rotor is keyed to the shaft.
9. **Lead wires** Connected to D.C. power.

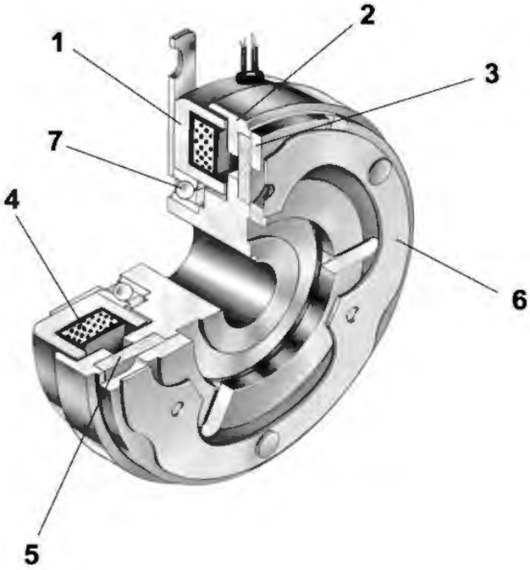
FBH brake



1. **Brake magnet** Contains coil and friction material, mounted to a bulkhead or wall.
2. **Brake armature plate** When the coil is energiz ed, the armature plate is drawn up against the magnet with considerable magnetic force, allowing torque to be transmitted to the armature hub.
3. **Armature hub** Keyed to the shaft.
4. **Coil** Fully encapsulated.
5. **Friction material** Carefully chosen by Trantex, the friction material greatly extends the life of the unit.
6. **Round spring** Connects/disconnects the armature to/from the load. Assures complete disengagement when current to the coil is interrupted. Transmits torque with no backlash, and enables vertical mounting.
7. **Retaining ring groove** Allows the clutch magnet field to be piloted onto a bearing.
8. **Keyway** Armature hub is keyed to the shaft.
9. **Lead wires** Connected to D.C. power.

Basic construction

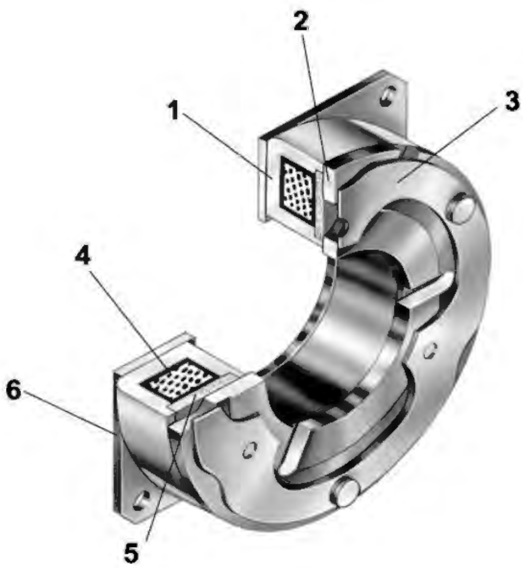
MCS clutch



1. **Clutch magnet** Bearing mounted, contains a fully encapsulated coil. The attached antirotation tab prevents rotation.
2. **Clutch rotor** Keyed to the shaft.
3. **Armature plate** When the coil is energized, the armature plate is drawn up against the rotor with substantial magnetic force, allowing torque to be transmitted to/from the armature plate to the keyed rotor.
4. **Coil** Source of magnetic field when D.C. power is applied.
5. **Friction material** Carefully chosen by Trantex, the friction material greatly extends the life of the unit.
6. **Uniformly-stressed spring** Connects/ disconnects the armature to/from the load. Assures complete disengagement when current to the coil is interrupted. Transmits torque with no backlash, and enables vertical mounting.
7. **Sealed bearing**

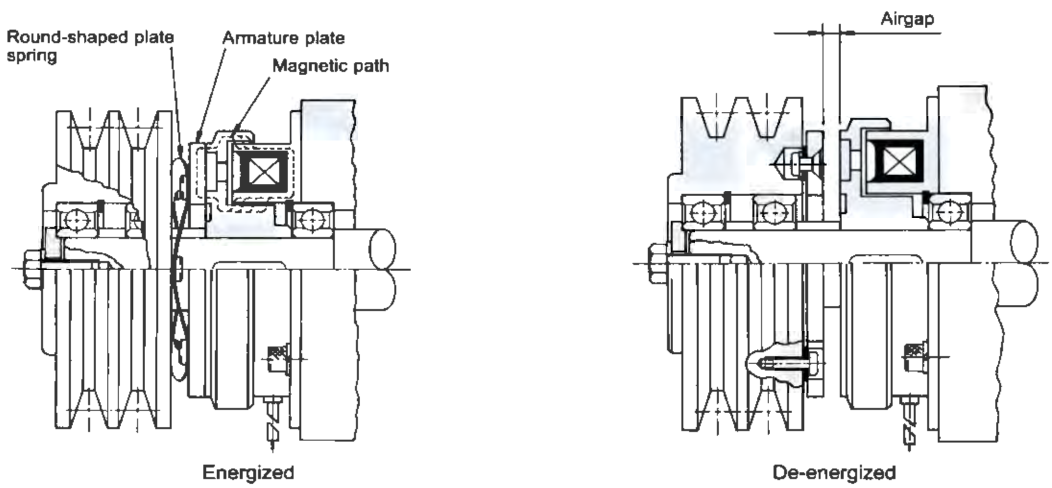
1. **Brake magnet** Contains coil and friction material, mounted to a bulkhead or wall.
2. **Brake armature plate** When the coil is energized, the armature plate is drawn up against the magnet with considerable magnetic force, allowing torque to be transmitted to the armature hub.
3. **Unifromly-stressed spring**
4. **Coil**
5. **Friction material**
6. **Mounting flange** Secured to a bulkhead or wall.

MBF brake



Clutch

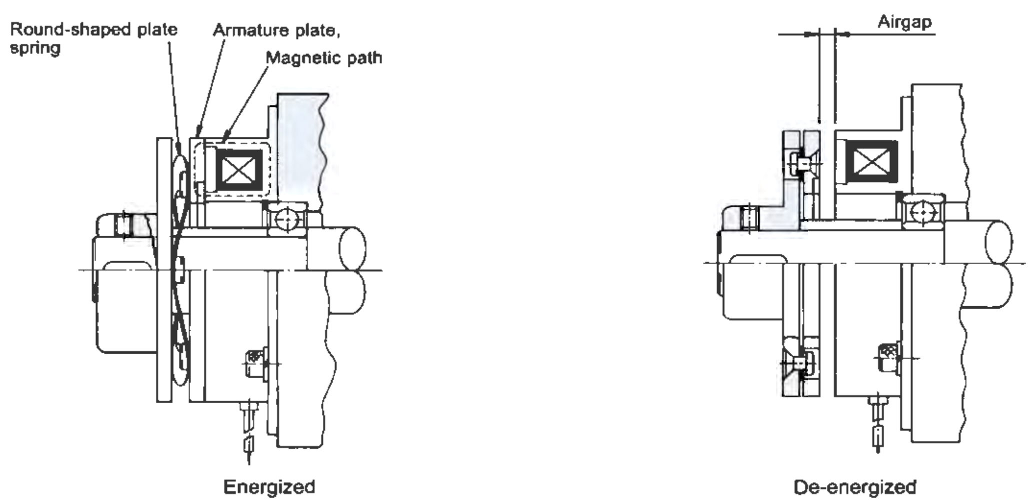
Energizing the field coil with D.C. power sets up a powerful magnetic field. The lines of magnetic force bridge the air gap between the rotor and the coil creating a powerful electromagnet that pulls in the armature with considerable force. Torque is transmitted from the pulley, through the antibacklash round spring, to the armature. After the load has been accelerated the armature is locked firmly in place against the rotor which is keyed to the shaft. In this way, torque is transmitted to/from the pulley to the shaft. Deenergizing the field coil causes the magnetic field to disappear very rapidly, which allows the armature plate to be retracted away from the rotor. This allows the clutch to disengage quickly and compleyetly.



Operation of clutch

Brake

Energizing the field coil with D.C. power sets up a powerful magnetic field. The resulting electromagnetic force pulls in the armature with considerable force. Torque is transmitted from the brake magnet, through the antibacklash, round spring to the hub which is keyed to the shaft. Friction between the armature and brake magnet dissipates the kinetic energy of the rotating load. Deenergizing the coil causes the magnetic field to disappear very rapidly, which allows the armature plate to be retracted away from the brake magnet. This allows the brake to disengage quickly and rapidly, and the shaft to rotate freely.



Operation of brake

Selecting proper sizes

Most generally, clutches and brakes are selected according to torque. Accordingly, tables 1, 2, and 3 are provided as a quick selection guide. For applications below 100 rpm, torque can be calculated by use of the torque formula given on page7. For applications involving relatively high load inertias, and/or high cycle-rates, the heat dissipation capacity of the selected unit must be taken into consideration.

Table 1

Light/medium duty applications safety factor K=2.0

KW	HP	Clutch or brake shaft speed R P M																		
		100	150	200	300	400	500	600	700	800	900	1000	1200	1500	1800	2000	2400	3000	3600	4000
0.1	⅛																			
0.125	⅙																	Micro size		
0.2	¼										Size 0.6									
0.25	⅓																			
0.4	½										Size 1.2									
0.55	¾									Size 2.5										
0.75	1																			
1.1	1½									Size 5										
1.5	2																			
2.2	3									Size 10										
3.7	5									Size 20										
5.5	7½																			
7.5	10								Size 40											
11	15			Large size																
15	20																			
19	25																			

Table 2

Heavy duty applications safety factor K=3.5

KW	HP	Clutch or brake shaft speed R P M																		
		100	150	200	300	400	500	600	700	800	900	1000	1200	1500	1800	2000	2400	3000	3600	4000
0.1	⅛																		Micro size	
0.125	⅙													Size 0.6						
0.2	¼										Size 1.2									
0.25	⅓																			
0.4	½									Size 2.5										
0.55	¾								Size 5											
0.75	1																			
1.1	1½								Size 10											
1.5	2																			
2.2	3								Size 20											
3.7	5							Size 40												
5.5	7½																			
7.5	10																			
11	15				Large size															
15	20																			
19	25																			

Equation for obtaining proper sizes

1. CALCULATION OF REQUIRED TORQUE

A. Torque requirement based upon motor power and motor speed:

$$T = \frac{974 \times KW \times K}{N} = \frac{716 \times HP \times K}{N}$$

Where T = torque of clutch or brake (kg m)
HP = power rating of motor (HP)
KW = power rating of motor (KW)
N = revolutions per minute of clutch or brake shaft (rpm)
K = service or safety factor

B. Troque required to accelerate/decelerate a given inertia in a given time.

$$T = \frac{GD^2 \times N}{375 \times ta} \pm T\ell$$

GD^2: inertia of all parts to be accelerated /decelerated (kgm^2)
N : difference in shaft speed before and after engagement (rpm)
ta : requried acceleration/deceleration time
$t\ell$: torque necessary to turn the shaft and overcome friction. Generally, this adds to the torque requirement of a clutch, but subtracts from the torque requirement of a brake. (An important exception: hoisting and lowering applicaions, where this torque adds to the brake torque requirement.)

2. CALCULATION OF ENERGY DISSIPATED PER ENGAGEMENT

The energy dissipated by a clutch or brake per engagement can be calculated from:

$$Ee = \frac{GD^2 \times N}{7160} \cdot \frac{Td}{T \pm T\ell} \text{ (kgm)}$$

Td: clutch or brake torque

Generally, $T\ell$ adds to the torque requirement of a clutch, but subtracts from the torque requirement of a brake. (An important exception is found in hoisting and lowering applicaitons, where $T\ell$ adds to the brake torque requirement.)

3. CALCULATION OF THE TIME NECESSARY TO ACCELERATE /DECELERATE A GIVEN LOAD

The time necessary to accelerate/decelerate a given load is the sum of the response time of the clutch or brake, and the time necessary to accelerate/decelerate the load after the clutch or brake has achieved full torque.

t = t1 + ta (sec)
t1: response time, or torque build-up time of clutch or brake (sec)
ta: acceleration/deceleration time

$$ta = \frac{GD^2 \times N}{375 \times (T \pm T\ell)} \text{ (sec)}$$

As above, $T\ell$ generally adds to the torque requirement of a clutch, but subtracts from the torque requirement of a brake. (Important exception: hoisting and lowering applications where $T\ell$ adds to the brake torque requirement.)

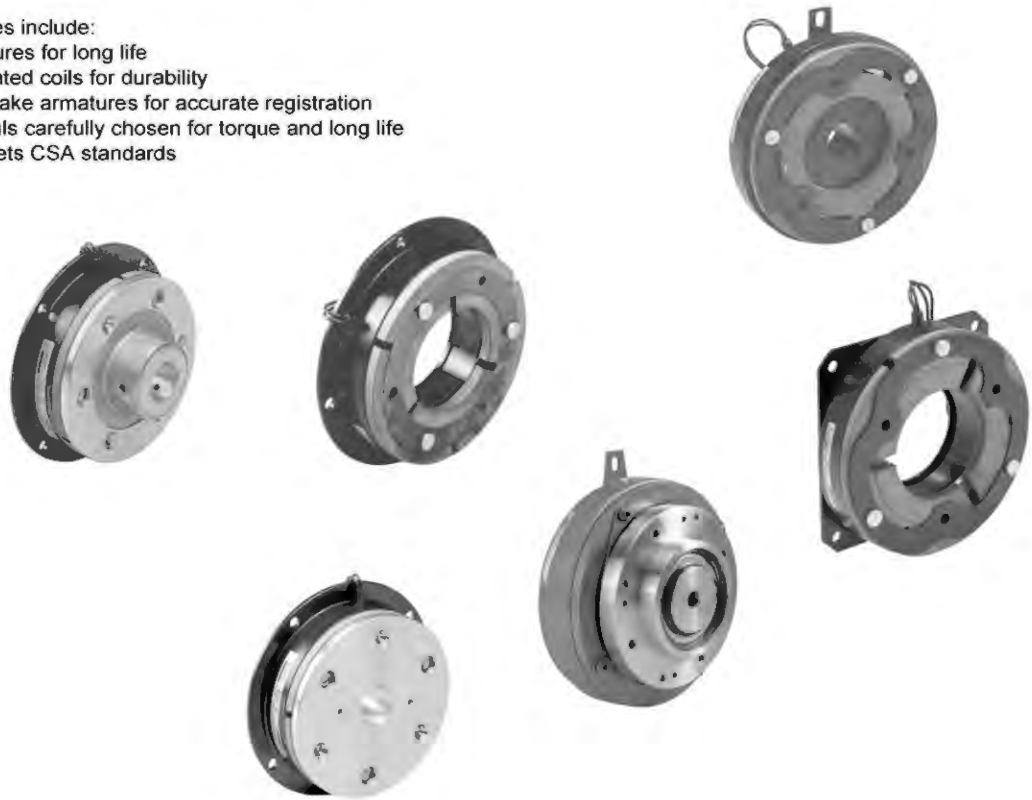
Table 3 Safety factor

Load condition	Type of machines	Factor
Low inertia, low cycle, constant load	Small-sized machine tools, office equipment	1.5
Normal inertia, normal use	Medium-sized machine tools, woodworking machines, small presses, fans	2
High inertia, high speed operation, variable load	Machine tools, medium-sized presses, weaving machines, printing machines, conveyors	2.5
High inertia, heavy load accompanied by shock	Heavy-duty presses, large-sized machine tools, rolling machines, paper making machines	3.5

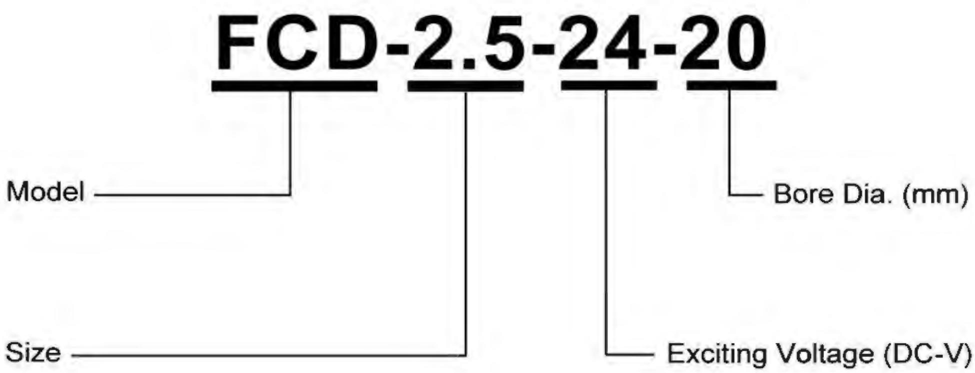
offers the very finest quality available--a truly exceptional vaulue.Many features that are standard on Trantex unit are optional or not available on competitive units.

Standard features include:

- nitrided armatures for long life
- fully encapsulated coils for durability
- fast-release brake armatures for accurate registration
- friction materials carefully chosen for torque and long life
- wiring that meets CSA standards



Ordering information



Model **FCD** Flange-mounted clutch Direct-mounted armature

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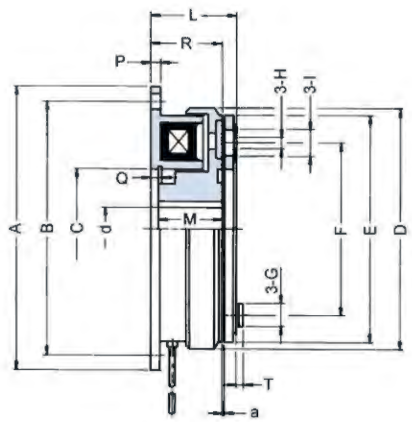
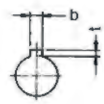
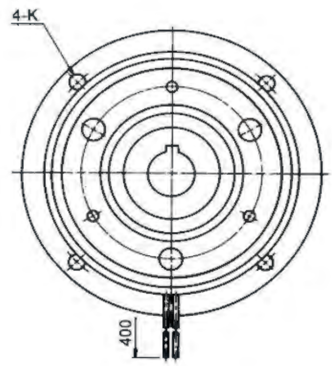




Rotor Keyway



Dimensions in mm.

SIZE			0.6	1.2	2.5	5	10	20	40
Static Torque		kgm	0.55	1.1	2.2	4.5	9	17	36
Exciting Voltage		DC-V	24	24	24	24	24	24	24
Capacity (at 20°C)		W	11	15	20	25	35	45	60
Max. Revolution		RPM	5000	5000	4500	4000	3000	2500	2000
Bore (Rotor)	Dia.	dH7	12 / 15	15 / 20	20 / 25	25 / 30	30 / 40	40 / 50	50 / 60
	keyway	bxt	4x1.5 / 5x2	5x2 / 5x2	5x2 / 7x3	7x3 / 7x3	7x3 / 10x3.5	10x3.5 / 12x3.5	12x3.5 / 15x5
Diameter	Ah8		80	100	125	150	190	230	290
	B		72	90	112	137	175	215	270
	CH7		35	42	52	62	80	100	125
	D		67	85	106	133	169	212	264
	E		63	80	100	125	160	200	250
	F		46	60	76	95	120	158	210
	G		6	8	10	12	14	16	20
	H		3.1	4.1	5.1	6.1	8.1	10.2	12.2
	I		8	10	12	15	17	19	23
	K		5	6	7	7	10	10	12
Length	L		28	31	36	40.5	46.5	55.5	64
	M		22	24	27	30	34	40	47
	P		2	2.5	3	3.5	4	5	6
	Q		3.5	4.3	5	5.5	6	7	8
	R		24	26.5	30	33.5	37.5	44	51
	T		2	2.5	3	3.5	4	4.5	5
Air Gap	a		0.2	0.2	0.2	0.2	0.3	0.4	0.5
Weight	kg		0.5	0.9	1.8	3.7	6.8	13	18.5

Model **FCB** Flange-mounted clutch Bearing-mounted armature

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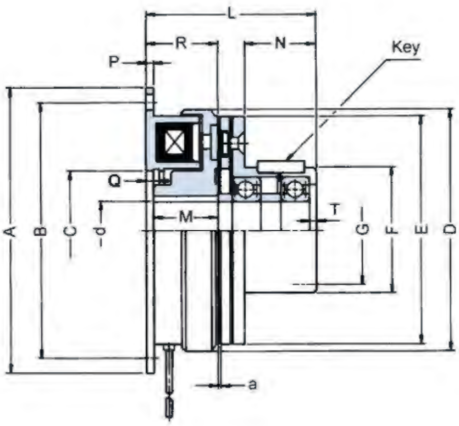
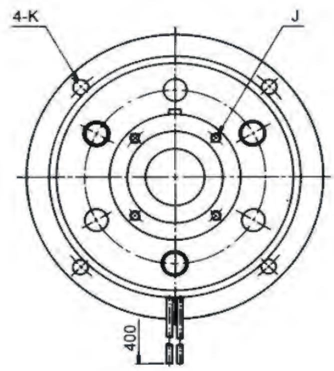


Rotor Keyway



Dimensions in mm.

SIZE			0.6	1.2	2.5	5	10	20	40
Static Torque		kgm	0.55	1.1	2 .2	4.5	9	17	36
Exciting Voltage		DC-V	24	24	24	24	24	24	24
Capacity (at 20°C)		W	11	15	20	25	35	45	60
Max. Revolution		RPM	5000	5000	4500	4000	3000	2500	2000
Bore	Dia. (Rotor, Arm Hbu)	d^{H7}	12	15	20	25	30	40	50
	keyway (Rotor)	bxt	4x1.5	5x2	5x2	7x3	7x3	10x3.5	12x3.5
Key (Arm Hub)	WidthxHeight		4x4	5x5	5x5	7x7	7x7	10x8	12x8
Diameter		A^{h8}	80	100	125	150	190	230	290
		B	72	90	112	137	175	215	270
		C^{H7}	35	42	52	62	80	100	125
		D	67	85	106	133	169	212	264
		E	63	80	100	125	160	200	250
		F_{j6}	38	45	55	64	75	90	115
		G	33	38	48	55	65	78	102
		J	3-M4	3-M4	4-M4	4-M4	4-M5	4-M6	8-M6
		K	5	6	7	7	10	10	12
Length		L	51.5	60	71	86.5	103.5	124.5	145
		M	22	24	27	30	34	40	47
		N	20	25	30	40	50	60	70
		P	2	2.5	3	3.5	4	5	6
		Q	3.5	4.3	5	5.5	6	7	8
		R	24	26.5	30	33.5	37.5	44	51
		T	2	2	3	3	4	5	6
Air Gap		a	0.2	0.2	0.2	0.3	0.3	0.4	0.5
Weight		kg	0.8	1.4	2.5	4.3	8	15	24

Model FCH Flange-mounted clutch Hub-mounted armature

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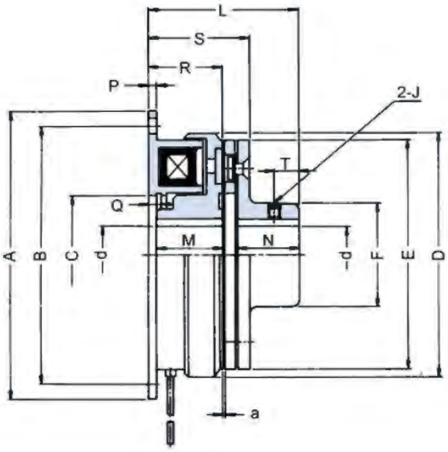
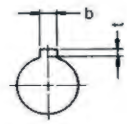
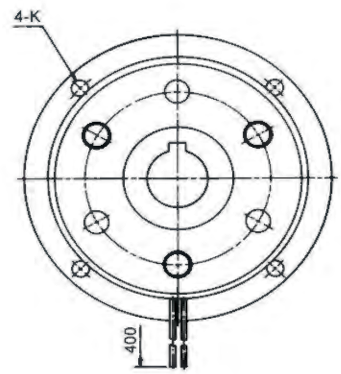




Rotor, Hub Keyway

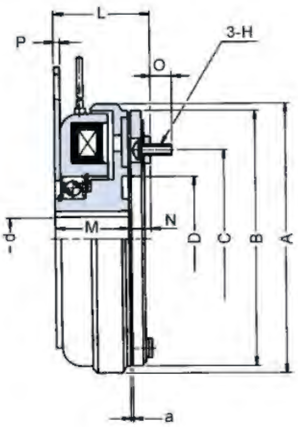


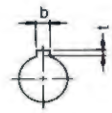
Dimensions in mm.

SIZE		0.6		1.2		2.5		5		10		20		40	
Static Torque	kgm	0.55		1.1		2.2		4.5		9		17		36	
Exciting Voltage	DC-V	24		24		24		24		24		24		24	
Capacity (at 20°C)	W	11		15		20		25		35		45		60	
Max. Revolution	RPM	5000		5000		4500		4000		3000		2500		2000	
Bore (Rotor, Hub) Dia.	d^{H7}	12	15	15	20	20	25	25	30	30	40	40	50	50	60
Bore (Rotor, Hub) keyway	bxt	4x1.5	5x2	5x2	5x2	5x2	7x3	7x3	7x3	7x3	10x3.5	10x3.5	12x3.5	12x3.5	15x5
Diameter	A^{h8}	80		100		125		150		190		230		290	
	B	72		90		112		137		175		215		270	
	C^{H7}	35		42		52		62		80		100		125	
	D	67		85		106		133		169		212		264	
	E	63		80		100		125		160		200		250	
	F	26		31		42		50		65		85		105	
	J	M4		M5		M5		M6		M6		M8		M10	
	K	5		6		7		7		10		10		12	
Length	L	43		51		61		70.5		84.5		100.5		119	
	M	22		24		27		30		34		40		47	
	N	15		20		25		30		38		45		55	
	P	2		2.5		3		3.5		4		5		6	
	Q	3.5		4.3		5		5.5		6		7		8	
	R	24		26.5		30		33.5		37.5		44		51	
	S	31.5		35		41		46.5		53.5		64.5		75	
	T	6		8		10		12		15		18		22	
Air Gap	a	0.2		0.2		0.2		0.3		0.3		0.4		0.5	
Weight	kg	0.6		1.1		2		3.5		6.9		13		22	

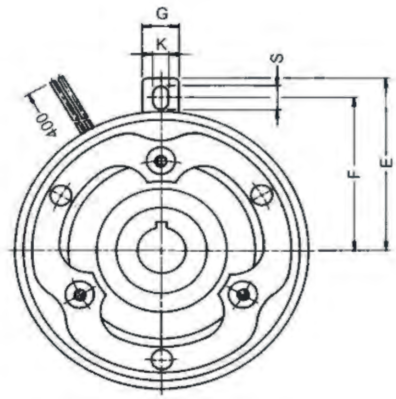
Model MCS Shaft-mounted clutch Direct-mounted armature

NIIKA





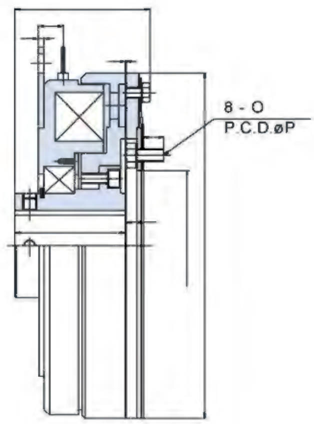
Rotor Keyway

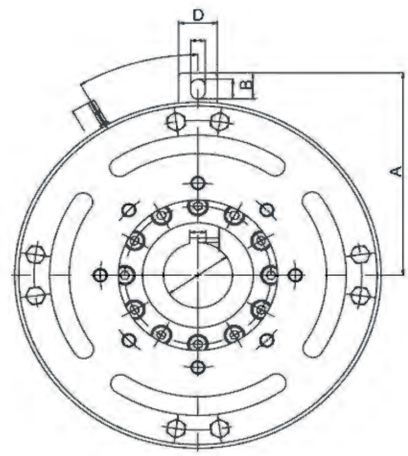


Dimensions in mm.

SIZE			0.6	1.2	2.5	5	10	20
Static Torque		kgm	0.6	1.2	2.5	5	10	20
Exciting Voltage		DC-V	24	24	24	24	24	24
Capacity (at 20°C)		W	11	15	22	30	38	50
Max. Revolution		RPM	5000	5000	4500	4000	3000	2500
Bore (Rotor)	Dia.	d^{H7}	12	15	20	25	30	40
	keyway	bxt	4x1.5	5x2	5x2	7x3	7x3	10x3.5
Diameter		A	74	93	116	144	178	225
		B	70	88	110	137	172	217
		C	50	60	76	95	120	158
		D	36	46	54	67	89	108
		E	50	65	70	85	112	132
		F	42	58	62	77	100.5	120.5
		G	12	14	16	17	24	24
		H	M3	M4	M5	M6	M8	M10
		K	4.5	5.5	6.5	6.5	9	9
Length		L	30	33.5	38.5	44	56	66.5
		M	24	26.5	30	33.5	43	50
		N	6	7	8.5	10.5	13	16
		O	5	6.5	8	11	14	17.5
		P	1.6	2	2	2.5	3	3.2
		S	8	9	10.5	10.5	13	13
Air Gap		a	0.2	0.2	0.2	0.2	0.3	0.4
Weight		kg	0.5	1.0	1.8	3.5	6.5	11.5

Model MCS Shaft-mounted clutch Direct-mounted armature

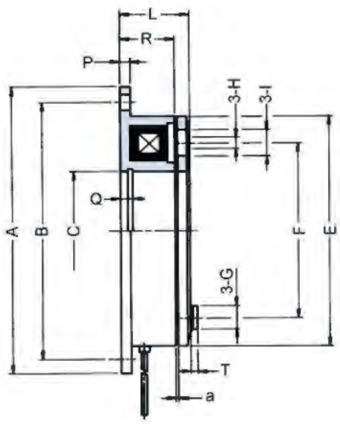


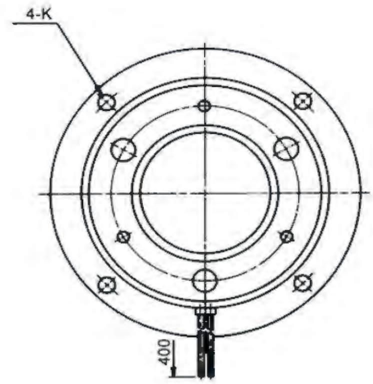


Dimensions in mm.

SIZE			40	65	100
Static Torque		kgm	40	65	100
Exciting Voltage		DC-V	24	24	24
Capacity (at 20°C)		W	75	115	150
Max. Revolution		RPM	1500	1000	1000
Bore (Rotor)	Dia.	d^{H7}	50	60	70
	keyway	bxt	12x3.5	15x5	20x4.9
Length	A		155	185	240
	B		20	23	25
	C		15	18	18
	D		28	30	40
	E		10.5	13	13
	F		97.7	111.7	120
	G		18	20	30
	H		4	4.5	7
	J		14.5	14	22
	K		80	90	92
	L		13	15	22.5
Diameter	M		115	150	185
	N		265	317	416
	O		M10x1.5Px20L	M10x1.5Px20L	M12x1.75Px30L
	P		142	180	220
Air Gap	a		0.5	0.6	0.7
Weight	kg		40	48	68

Model FBD Flange-mounted brake Direct-mounted armature

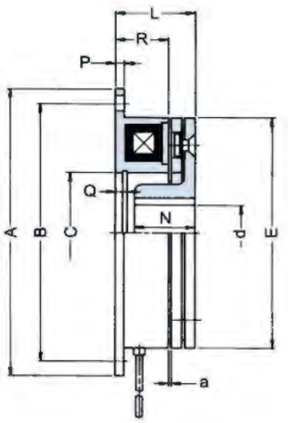




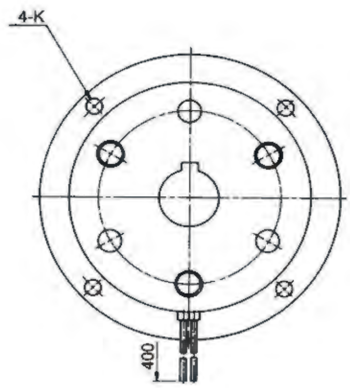
Dimensions in mm.

SIZE		0.6	1.2	2.5	5	10	20	40
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17	36
Exciting Voltage	DC-V	24	24	24	24	24	24	24
Capacity (at 20°C)	W	11	15	20	25	35	45	60
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500	2000
Diameter	A_{h8}	80	100	125	150	190	230	290
	B	72	90	112	137	175	215	270
	C_{H8}	35	42	52	62	80	100	125
	E	63	80	100	125	160	200	250
	F	46	60	76	95	120	158	210
	G	6	8	10	12	14	16	20
	H	3.1	4.1	5.1	6.1	8.1	10.2	12.2
	I	8	10	12	15	17	19	23
	K	5	6	7	7	10	10	12
Length	L	22	24.5	28	31	35	41.5	48
	P	2	2.5	3	3.5	4	5	6
	Q	2.5	4.3	5	5.5	6	7	8
	R	18	20	22	24	26	30	35
	T	2	2	2.5	3	3	4	5
Air Gap	a	0.2	0.2	0.2	0.3	0.3	0.4	0.5
Weight	kg	0.4	0.6	1.0	1.8	3.5	6.5	12.5

Model FBN Flange-mounted brake Hub-mounted armature inner boss



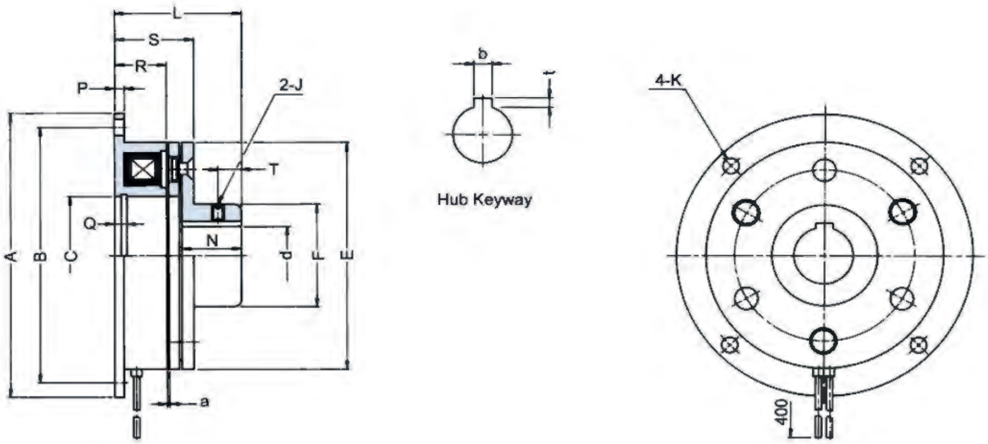
Hub Keywar



Dimensions in mm.

SIZE			0.6		1.2		2.5		5		10		20		40	
Static Torque		kgm	0.55		1.1		2.2		4.5		9		17		36	
Exciting Voltage		DC-V	24		24		24		24		24		24		24	
Capacity (at 20°C)		W	11		15		20		25		35		45		60	
Max. Revolution		RPM	5000		5000		4500		4000		3000		2500		2000	
Bore (Hub)	Dia.	d_{H7}	12	15	15	20	20	25	25	30	30	40	40	50	50	60
	keyway	bxt	4x1.5	5x2	5x2	5x2	5x2	7x3	7x3	7x3	7x3	10x3.5	10x3.5	12x3.5	12x3.5	15x5
Diameter	A_{h8}		80		100		125		150		190		230		290	
	B		72		90		112		137		175		215		270	
	C_{H7}		35		42		52		62		80		100		125	
	E		63		80		100		125		160		200		250	
	K		5		6		7		7		10		10		12	
Length	L		25.5		28.5		33		37		42		50.5		59.5	
	N		15		20		25		30		38		45		55	
	P		2		2.5		3		3.5		4		5		6	
	Q		3.5		4.3		5		5.5		6		7		8	
	R		18		20		22		24		26		30		35	
Air Gap		a	0.2		0.2		0.2		0.3		0.3		0.4		0.5	
Weight		kg	0.5		0.8		1.4		2.4		4.8		9.5		14.2	

Model FBH Flange-mounted brake Hub-mounted armature outer boss



Dimensions in mm.

SIZE		0.6	1.2	2.5	5	10	20	40
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17.5	36
Exciting Voltage	DC-V	24	24	24	24	24	24	24
Capacity (at 20°C)	W	11	15	20	25	35	45	60
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500	2000
Bore (Hub) Dia.	d^{H7}	12 / 15	15 / 20	20 / 25	25 / 30	30 / 40	40 / 50	50 / 60
Bore (Hub) keyway	bxt	4x1.5 / 5x2	5x2 / 5x2	5x2 / 7x3	7x3 / 7x3	7x3 / 10x3.5	10x3.5 / 12x3.5	12x3.5 / 15x5
Diameter	A_{h8}	80	100	125	150	190	230	290
	B	72	90	112	137	175	215	270
	C_{H7}	35	42	52	62	80	100	125
	E	63	80	100	125	160	200	250
	F	26	31	42	50	65	85	105
	J	M4	M5	M5	M6	M6	M8	M10
	K	5	6	7	7	10	10	12
Length	L	37	44.5	53	61	73	86.5	103
	N	15	20	25	30	38	45	55
	P	2	2.5	3	3.5	4	5	6
	Q	3.5	4.3	5	5.5	6	7	8
	R	18	20	22	24	26	30	35
	S	25.5	28.5	33	37	42	50.5	59
	T	6	8	10	12	15	18	22
Air Gap	a	0.2	0.2	0.2	0.3	0.3	0.4	0.5
Weight	kg	0.5	0.8	1.4	2.4	4.8	9.5	14.2

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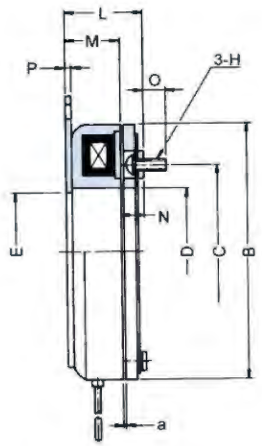
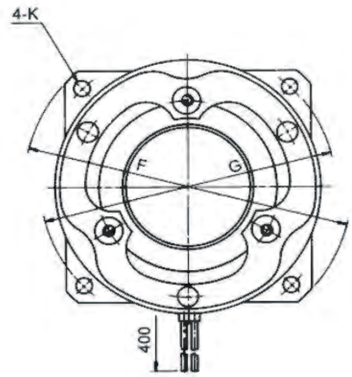
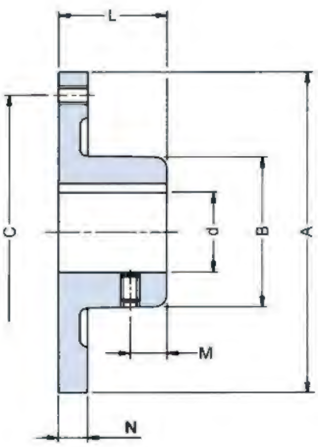
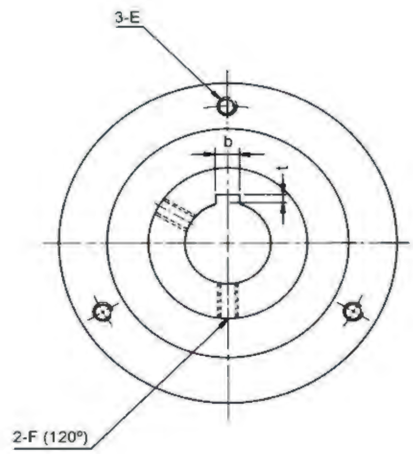




Dimensions in mm.

SIZE			0.6	1.2	2.5	5	10	20
Static Torque		kgm	0.6	1.2	2.5	5	10	20
Exciting Voltage		DC-V	24	24	24	24	24	24
Capacity (at 20°C)		W	11	15	22	30	38	50
Max. Revolution		RPM	5000	5000	4500	4000	3000	2500
Diameter	B		70	88	110	137	172	217
	C		50	60	76	95	120	158
	D		36	46	54	67	89	108
	E		35	45	52	65	80	100
	F		90	110	135	165	210	265
	G		80	98	122	150	190	240
	H		M3	M4	M5	M6	M8	M10
	K		4.5	5.5	6.5	6.5	9	11
Length	L		25	29	32.5	36.5	41	48.5
	M		19	22	24	26	28	32
	N		6	7	8.5	10.5	13	16.5
	O		5	6.5	8	11	14	17.5
	P		1.6	2	2	2.5	3	3.2
Air Gap		a	0.2	0.2	0.2	0.2	0.3	0.4
Weight		kg	0.35	0.7	1.35	2.3	4.5	8.2



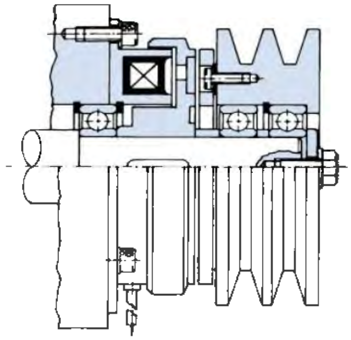


Dimensions in mm.

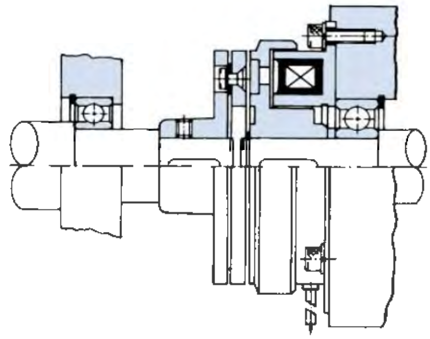
SIZE		0.6		1.2		2.5		5		10		20	
Bore Dia.	d^{H7}	12	15	15	20	20	25	25	30	30	40	40	50
keyway	bxt	4x1.5	5x2	5x2	5x2	5x2	7x3	7x3	7x3	7x3	10x3.5	10x3.5	12x3.5
Diameter	A	60		72		90		110		140		180	
	B	27		32		42		50		65		80	
	C	50		60		76		95		120		158	
	E	M3		M4		M5		M6		M8		M10	
	F	M4		M5		M5		M6		M8		M8	
Length	L	15		20		25		30		40		48	
	M	6		7		9		11		15		18	
	N	4.5		5		6.5		7.5		10		12	
Weight	g	5		74		147		260		540		1150	

Mounting Examples

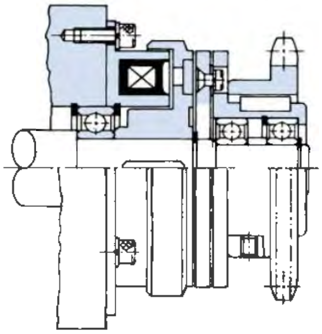
Model **FCD** clutch, wall-mounted, armature attached to V-pulley.



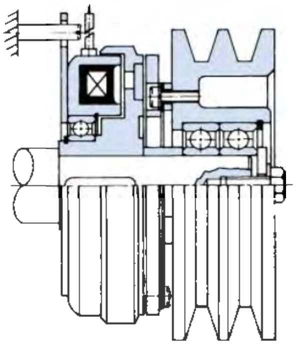
Model **FCH** clutch-coupling, wall-mounted, couples-two shafts.



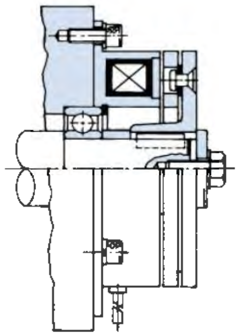
Model **FCB** clutch, wall-mounted, sprocket mounted on armature hub.



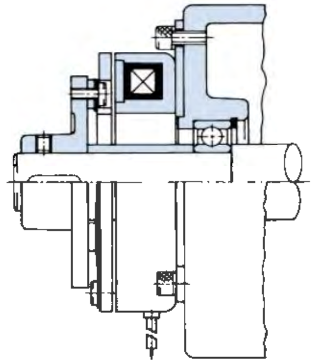
Model **MCS** clutch, shaft-mounted, armature attached to V-pulley.



Model **FBN** brake, wall-mounted, hub to the inside.



Model **MBF** brake, wall-mounted, hub to the outside.



Electromagnetic clutch-brake enclosed combinations

Product information

The new models **FMP, TMP, MMP** type 7~250 are the combinations of brake and clutch. Due to they totally enclosed construction, they are environmentally resistant. There is no interference of torque between the clutch and brake. Also, the air gap adjustment can be easily completed. There are many other features in unit.

◎ High resistance to environment
Due to its totally enclosed construction, it responds to an hostile environment such as water, oil or dust.

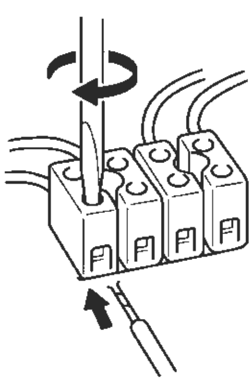
◎ High torque
Compact design, with high torque capacity.

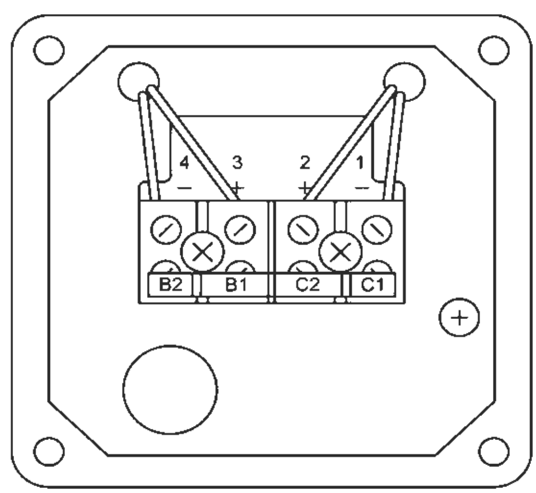
◎ Reliable operation
The clutch and braking armature are combined into two common pieces.

◎ Simple adjustment
The air gap adjustment can be easily completed by loosening the bolt and turning the ring. The conventional adjustment by disassembling is not necessary.

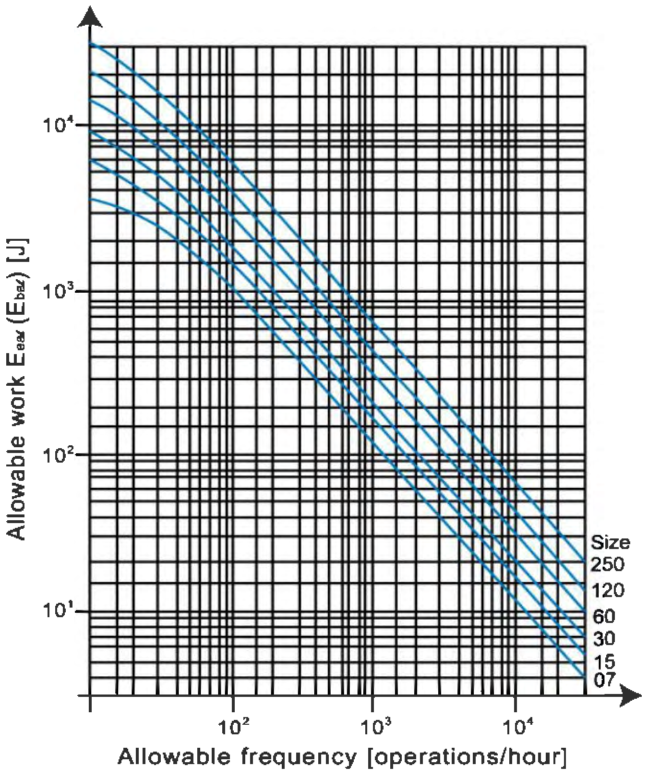
◎ Free choice of mounting
By changing the mounting foot position, the terminal block can be moved from right to left or up and down. The center height can be selected from two high-low levels.

Wiring · Connection
Since this unit has a polarity, follow the face plate of the terminal block to connect. Alead wire to connect to the terminal block must be below (2.5mm^2).



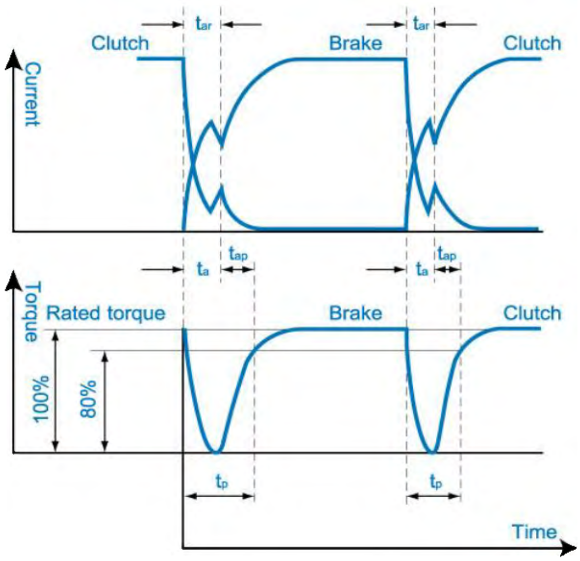


Allowable work characteristics



Operating characteristics

The two armatures are common to both clutch and brake. They are moved from one side to another by the magnetic pull of respective stators.
For this reason, there is no interference of torque between the clutch and brake.
Therefore, reliable and economical operation can be performed.



Operating time

Unit [s]

Model	Clutch			Brake		
	t_a=t_{ar}	t_{ap}	t_p	t_a=t_{ar}	t_{ap}	t_p
07	0.018	0.033	0.053	0.018	0.023	0.043
15	0.023	0.068	0.093	0.023	0.028	0.053
30	0.033	0.083	0.118	0.033	0.048	0.083
60	0.048	0.118	0.168	0.048	0.073	0.123
120	0.063	0.143	0.208	0.063	0.083	0.148
250	0.085	0.165	0.230	0.085	0.105	0.170

- The above value indicates the value obtained when the operation is performed on the direct-current side. In the case of alternating current, it is more than 3 times slower.

t_a — Armature suction time: Time from when the current is applied till when the armature is suctioned and torque is generated.

t_{ap} — Torque increment time: Time from when torque is generated till when it becomes 80% of the rated torque.

t_p — Torque rise time: Time from when it becomes 80% of the rated torque.

t_{ar} — Armature release time: Time from when the current is shut off till when the armature returns to the position before suction.

Air gap adjustment

Clutches and brakes transmit torque by friction force. The air gap is enlarged by long term use and wear of the friction surfaces. When it exceeds its limit, it disrupts the performance such as torque or operating characteristics, and therefore the air gap adjustment is necessary. Proper operation can be obtained after air gap adjustment.

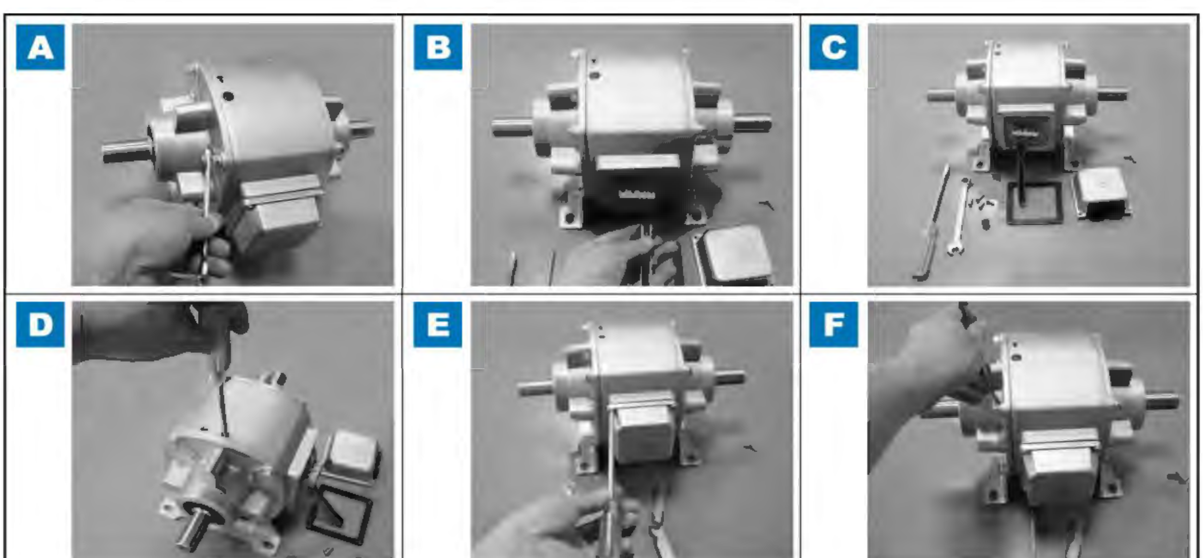
Time before it needs to be adjusted

Size	Estimated air gap [mm]	Limit air gap [mm]	Total amount of work before air gap readjustment E_T [J]	Thickness gauge [mm]
07	0.2	0.5	$24X10^6$	0.2
15	0.2	0.5	$40X10^6$	0.2
30	0.2	0.5	$62X10^6$	0.2
60	0.3	0.75	$154X10^6$	0.3
120	0.3	0.75	$250X10^6$	0.3
250	0.3	0.9	$400X10^6$	0.3

Air gap readjustment procedure

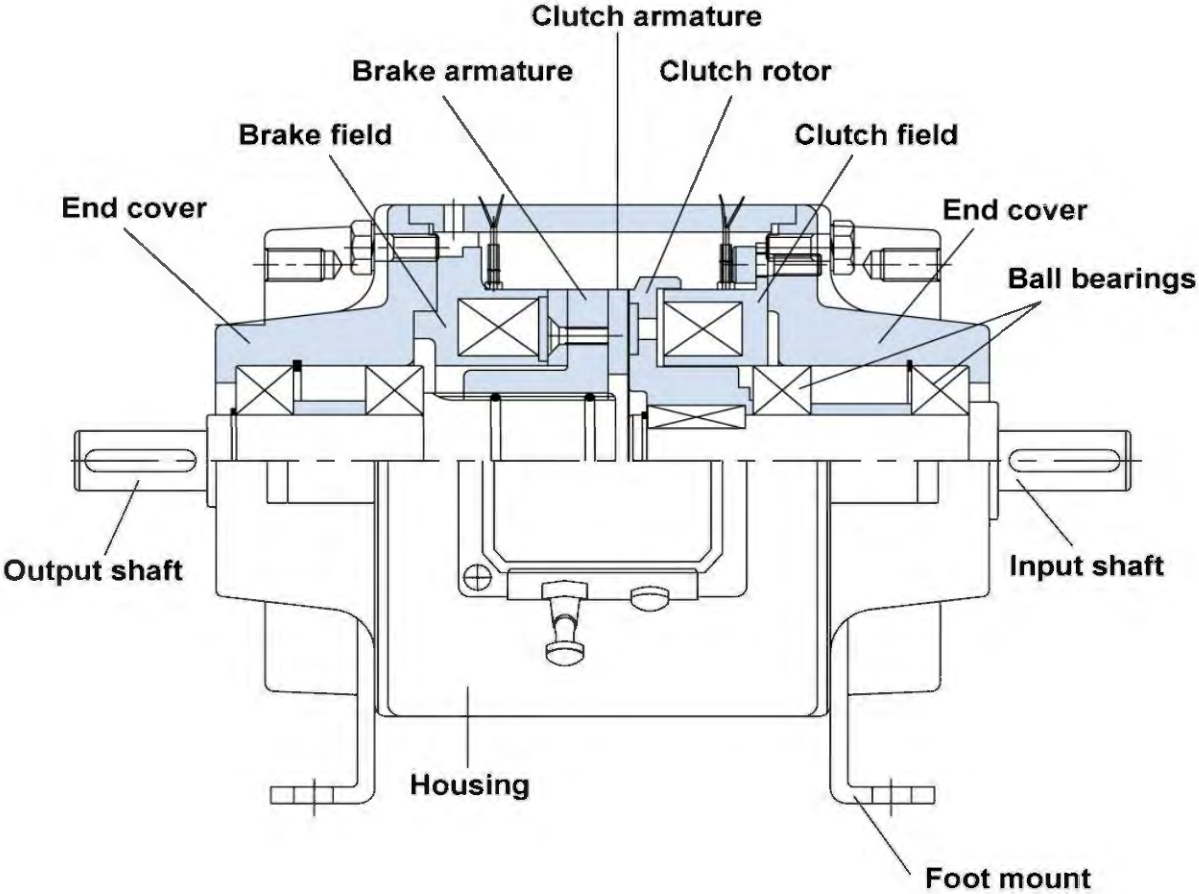
Please follow the procedure below for the air gap adjustment.

1. Loosen the four screws in the housing cover at the output end. Do not remove them. (A)
2. Remove terminal box cover and then insert the thickness gauge to bore hole. (B)
3. Remove the rubber cover. Insert the flat-head screwdriver into the hole and turn to the direction of an arrow until you can feel a resistance. The appropriate air gap is set. (C) (D)
4. Remove the thickness gauge, fit terminal box cover, and tighten screws on the terminal box cover. (E)
5. Tighten the four screws in the housing cover at the output end, and place the rubber cover.
   The air adjustment is completes. (F)



The **FMP** clutch/brake module comes preassembled and preadjusted and combines clutch and brake with an in-line split shaft. The housing of this foot-mounted, drip-proof module is made from aluminum. Because both input and output shafts are supported by a pair of sealed ball bearings, this module is suitable for parallel-shaft drives where overhung loads are present, as well as in-line shaft drives that ues flexible couplings. The FMP clutch/brake module excels in high-cycle-rate applications, is easy to install, and requires little maintenance.

Construction



Model FMP Clutch/brake module enclosed, foot-mounted, split-shaft

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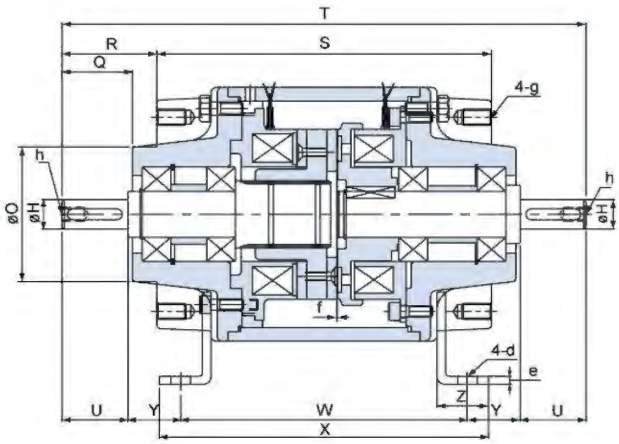
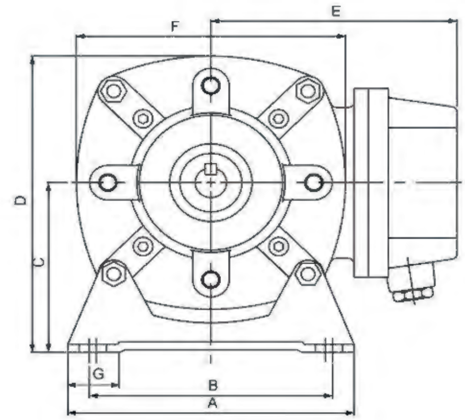


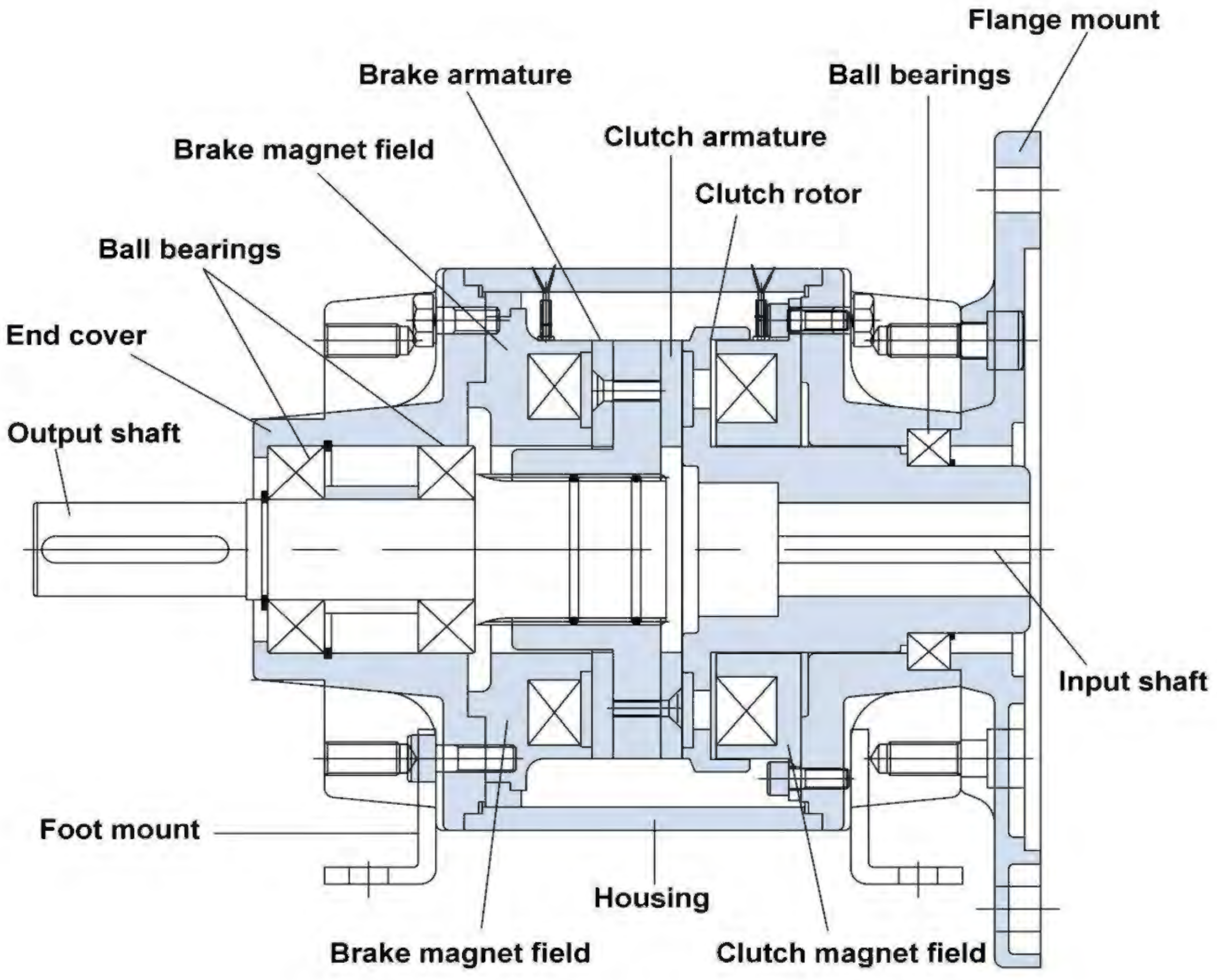


Dimensions in mm.

SIZE		7		15		30		60		120		250		400	
Static Torque	kgm	0.7		1.5		3		6		12		24		40	
Exciting Voltage	DC-V	24		24		24		24		24		24		24	
Capacity (at 20°C)W	C/B	15	11	20	16	28	21	35	28	50	38	60	50	85	60
Max. Revolution	RPM	5000		5000	4500	4500	4000	4000	3000	3000		2500		2500	
Shaft Dia.	D_{j6}	11	14	14	19	19	24	24	28	28	38	38	42	42	
Key (Shaft)	WidthxHeight	4x4	5x5	5x5	6x6	6x6	8x7	8x7		8x7	10x8	10x8	12x8	12x8	
Length	A	100		130		160		180		223		250		300	
	B	85		110		140		160		195		215		267	
	C	63	71	71	80	80	90	90	100	112	132	160		195	
	D	110	118	130	139	150	160	174	184	218	238	292		356	
	E	86		95		109		130		154		176		202	
	F	94		118		140		168		212		264		322	
	G	18		22		28		30		33		47		50	
Diameter	H	11	14	14	19	19	24	24	28	28	38	38	42	42	
	O	49		55		67		77		97		124		155	
Length	Q	24.5	31.5	32	42	43	53	52	62	62	82	82	112	112	
	R	33	40	42	52	62	72	72	82	82	102	105	135	135	
	S	117		136		151		180		216		276		370	
	T	183	197	220	240	275	295	324	344	380	420	486	546	640	
	U	23	30	30	40	40	50	50	60	60	80	80	110	110	
	W	100		110		135		155		185		230		270	
	X	115		130		160		180		215		262		312	
	Y	18.5		25		30		34.5		37.5		48		75	
	Z	18		25		30		31.5		38		45		60	
	d	7		9		9		11		13		14		17	
	e	3		3.2		4		5		6		8		8	
	f	0.2		0.2		0.2		0.2		0.3		0.4		0.4	
Diameter	g	M6		M8		M8		M10		M12		M16		M16	
	h	M4	M5	M5	M6	M6	M8	M8	M10	M10	M12	M12	M16	M16	
Weight	kg	2.6		4.5		8		13		23.5		46			

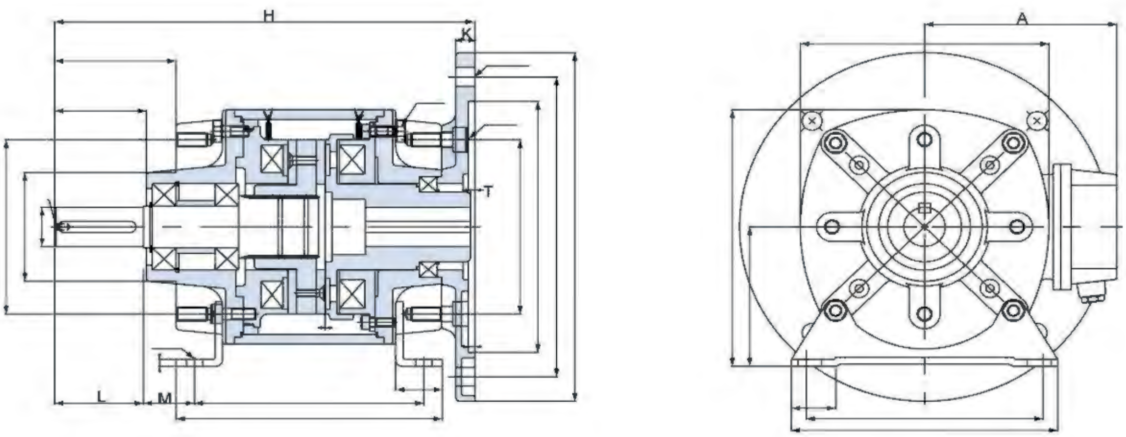
The **MMP** clutch/brake module comes preassembled and preadjusted, and combines a clutch and a brake on a split shaft. This foot-mounted module has a female input flange that make it possible to mount an I.E.C. standard motor directly to the input of the clutch/brake. The double-bearing-supported output shaft is suitable for parallel-shaft drives or for mounting a flexible coupling. The drip-proof housing is made of aluminum; all bearings are sealed. These units are suitable for high-cycle-rate applications.

Construction



Model **MMP** **Clutch/brake module enclosed, single-flange-mounted, split-shaft**

NIKA

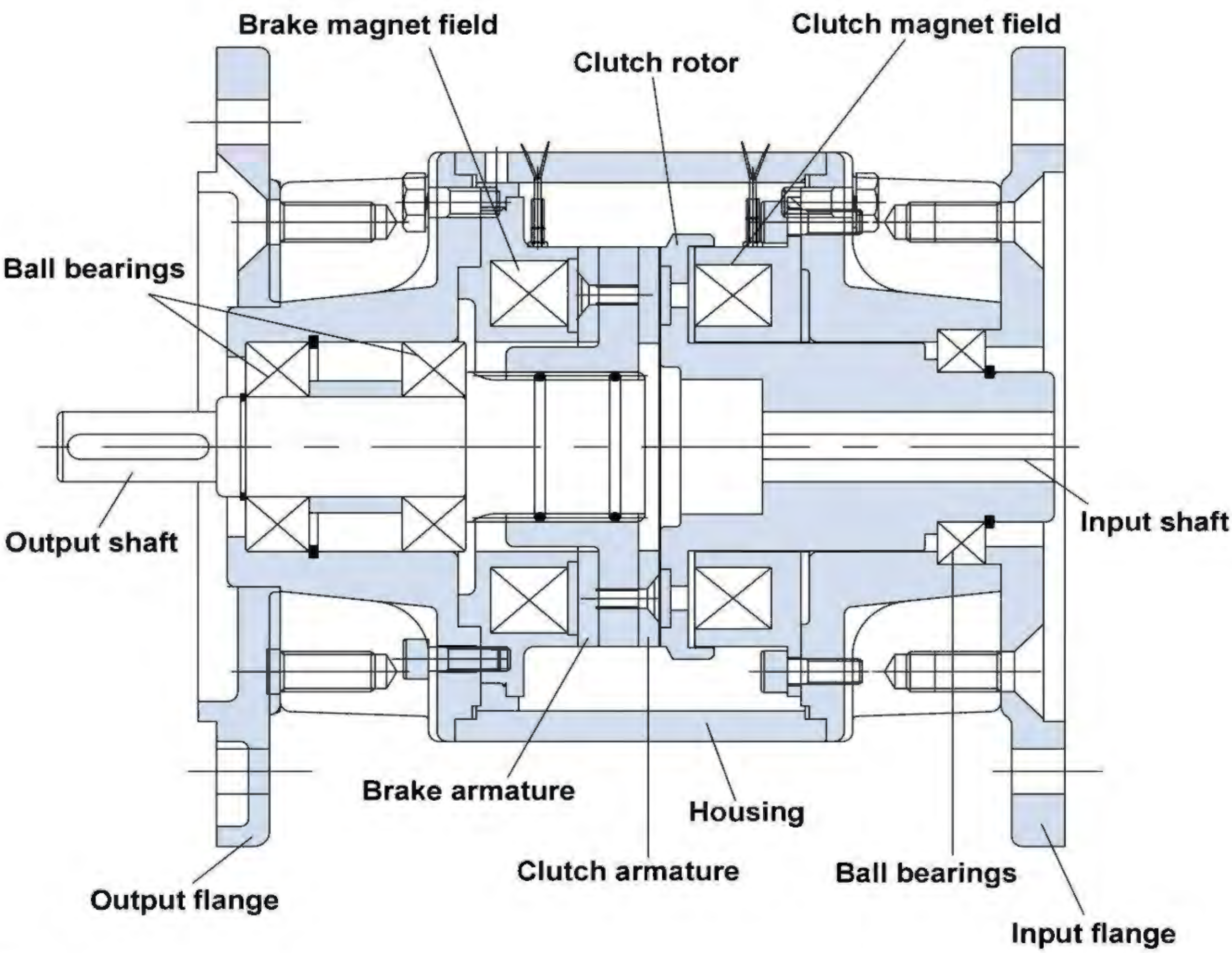


Dimensions in mm.

SIZE			7		15		30		60		120		250		400	
Static Torque		kgm	0.7		1.5		3		6		12		24		24	
Exciting Voltage		DC-V	24		24		24		24		24		24		24	
Capacity (at 20°C)W		C/B	15	11	20	16	28	21	35	28	50	38	60	50	85	60
Input Bore	Dia	d^{G7}	11	14	14	19	19	24	24	28	28	38	38	42	42	42
	keyway	bxt	4x4	5x5	5x5	6x6	6x6	8x7	8x7		8x7	10x8	10x8	12x8	12x8	12x8
Output Shaft	Dia	D^{1j6}	11	14	14	19	19	24	24	28	28	38	38	42	42	42
	keyway	$b^{1}xt^{1}$	4x4	5x5	5x5	6x6	6x6	8x7	8x7		8x7	10x8	10x8	12x8	12x8	12x8
Length	A		86		95		109		130		154		176		202	
	B		94		118		140		168		212		264		322	
	C		110	118	130	139	150	160	174	184	218	238	292		356	
	D		63	71	71	80	80	90	90	100	112	132	160		195	
	E		18		22		28		30		33		47		50	
	F		85		110		140		160		195		215		267	
	G		100		130		160		180		223		250		300	
	H		156	163	190	200	236	246	274	284	320	340	395	425	530	
	I		33	40	42	52	60	70	72	82	82	102	105	135	135	
	J		24.5	31.5	32	42	43	53	52	62	62	82	82	112	112	
	K		10		10		13		13		13		23		23	
	L		23	30	30	40	40	50	50	60	60	80	80	110	110	
	M		18.5		25		30		34.5		37.5		48		75	
	N		100		110		135		155		185		230		270	
	O		115		130		160		180		215		262		312	
	P		3		3.2		4		5		6		8		8	
	Q		18		25		30		31.5		38		45		60	
	R		4		4		5		4		5		6		6	
	S		0.2		0.2		0.2		0.2		0.3		0.4		0.5	
	T		2		2		3		3		4		5		5	
Diameter	a		M8		M8	M10	M10	M12	M10	M12	M12		M12	M16	M16	
	b		M6		M8		M8		M10		M12		M16		M16	
	d		M5		M6		M6	M8	M8		M10		M12		M16	
	e		7		9		9		11		13		14		17	
	f		140	160	160	200	200	250	200	250	250	300	300	350	350	
	g		115	130	130	165	165	215	165	215	215	265	265	300	300	
	i		95	110	110	130	130	180	130	180	180	230	230	250	250	
	j		67		85		112		112		145		195		250	
	m		11	14	14	19	19	24	24	28	28	38	38	42	42	
	n		49		55		77		78		97		124		155	
	q		M4	M5	M5	M6	M6	M8	M8	M10	M10	M12	M12	M16	M16	
Weight	kg		3		5		9		14		25		54			

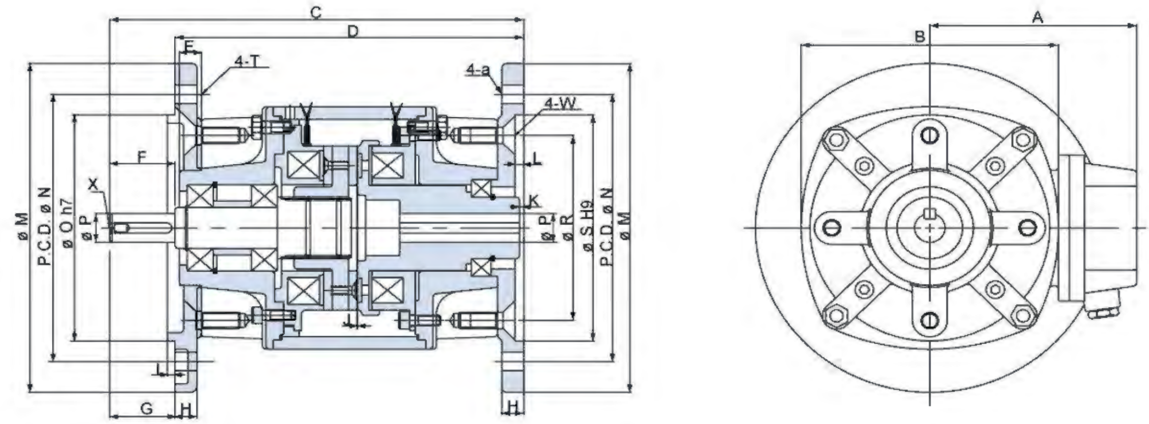
The **TMP** clutch/brake module comes preassembled and preadjusted, and combines a clutch and a brake on a split shaft. This module has a female input that mounts an I.E.C. standard motor, and a male output that mounts directly to a reduceer or other power transmission component. The drip-proof housing is made of aluminum; all bearings are sealed. These units are suitable for high-cycle-rate applications.

Construction



Model **TMP** Clutch/brake module enclosed, double-flange-mounted,split-shaft

NIIKA



Dimensions in mm.

SIZE			7		15		30		60		120		250		400
Static Torque		kgm	0.7		1.5		3		6		12		24		40
Exciting Voltage		DC-V	24		24		24		24		24		24		24
Capacity (at 20°C)W		C/B	15	11	20	16	28	21	35	28	50	38	60	50	85 | 60
Intput Bore	Dia.	d^{G7}	11	14	14	19	19	24	24	28	28	38	38	42	42
	Keyway	bxt	4x4	5x5	5x5	6x6	6x6	8x7	8x7		8x7	10x8	10x8	12x8	12x8
Output Shaft	Dia.	D^{1j6}	11	14	14	19	19	24	24	28	28	38	38	42	42
	Keyway	b^1xt^1	4x4	5x5	5x5	6x6	6x6	8x7	8x7		8x7	10x8	10x8	12x8	12x8
Length	A		86		95		109		130		154		176		202
	B		94		118		140		168		212		264		322
	C		156	163	190	200	236	236	274	284	320	340	395	425	530
	D		133		160		185		224		260		315		418
	E		8.5		10		19.5		20		20		23		23
	F		23	30	30	40	40	50	50	60	60	80	80	110	110
	G		23	30	30	40	40	50	50	60	60	80	80	112	112
	H		10		10		13		13		16		23		23
	I		3		3.5		3.5		3.5		3.5		5		5
	J		0.2		0.2		0.2		0.2		0.3		0.4		0.5
	K		2		2		3		3		4		5		5
	L		4		4		5		5		5		6		6
Diameter	M		140	160	160	200	200	200	200	250	250	300	300	350	350
	N		115	130	130	165	165	215	165	215	215	265	265	300	300
	O		95	110	110	130	130	180	130	180	180	230	230	250	250
	P		11	14	14	19	19	24	24	28	28	38	38	42	42
	R		67		85		112		112		145		195		250
	S		95	110	110	130	130	180	130	180	180	230	230	250	250
	T		9		9	11	13		11	13	13		13	18	18
	W		M6		M8		M8		M10		M12		M16		M16
	X		M4	M5	M5	M6	M6	M8	M8	M10	M10	M12	M12	M16	M16
Weight	kg		3.4		5.5		9.7		14.7		26.3		62		
	a		M8		M8	M10	M10	M12	M10	M12	M12		M12	M16	M16

clutch/brake modules are ideally suited for high-cycle-rate applications. Each unit is completely preassembled and preadjusted. Service life is enhanced by open frame construction which facilitates air cooling, and by the standard high-quality features shared by all Trantex clutches and brakes such as fully encapsulated coils, nitrided armatures, fast release brake armatures, etc. Trantex clutch/brake modules are available in a wide variety of designs, and are compatible with most motors, reducers, and power transmission components.

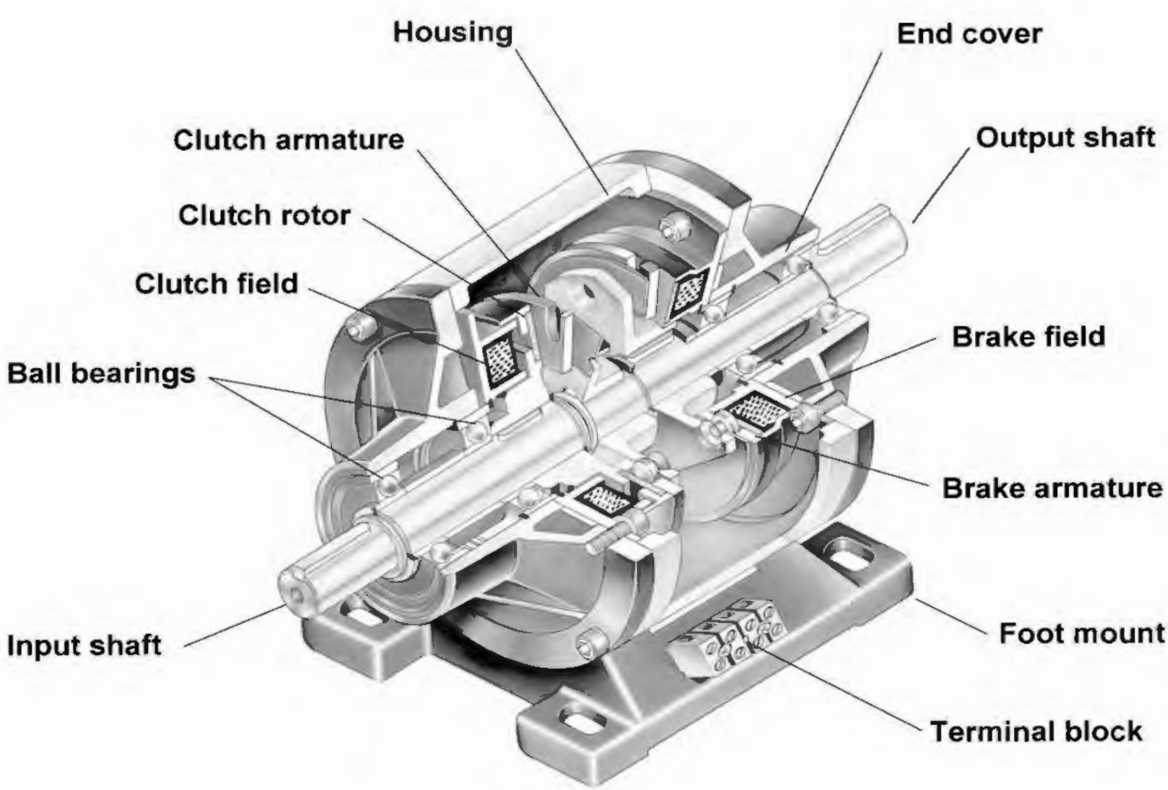
Ordering information

FMP-2.5-24-19

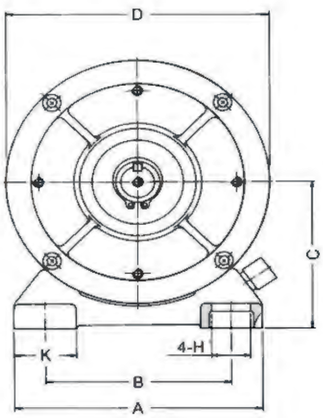
- Model — FMP
- Size — 2.5
- Exciting Voltage (DC-V) — 24
- Shaft Dia. (mm) — 19

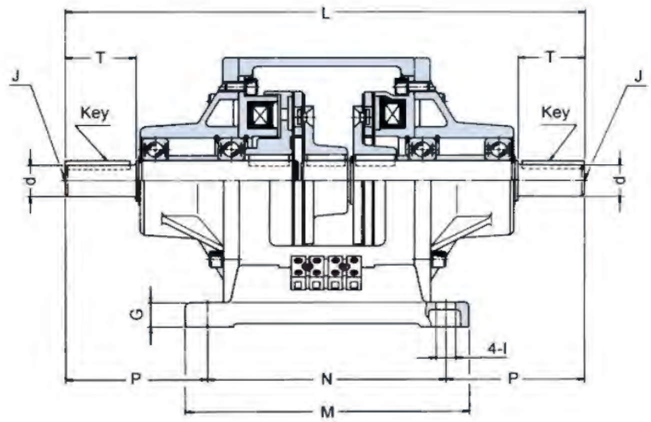
The **FMP** clutch/brake module comes preassembled and preadjusted and combines clutch and brake with an in-line split shaft. The housing of this foot-mounted, drip-proof module is made from a light alloy. Because both input and output shafts are supported by a pair of sealed ball bearings, this module is suitable for parallel-shaft drives where overhung loads are present, as well as in-line shaft drives that use flexible couplings. The FMP clutch/brake module excels in high-cycle-rate applications, is easy to install, andrequires little maintenance.

Construction



Model FMP Clutch/brake module, foot-mounted, split-shaft



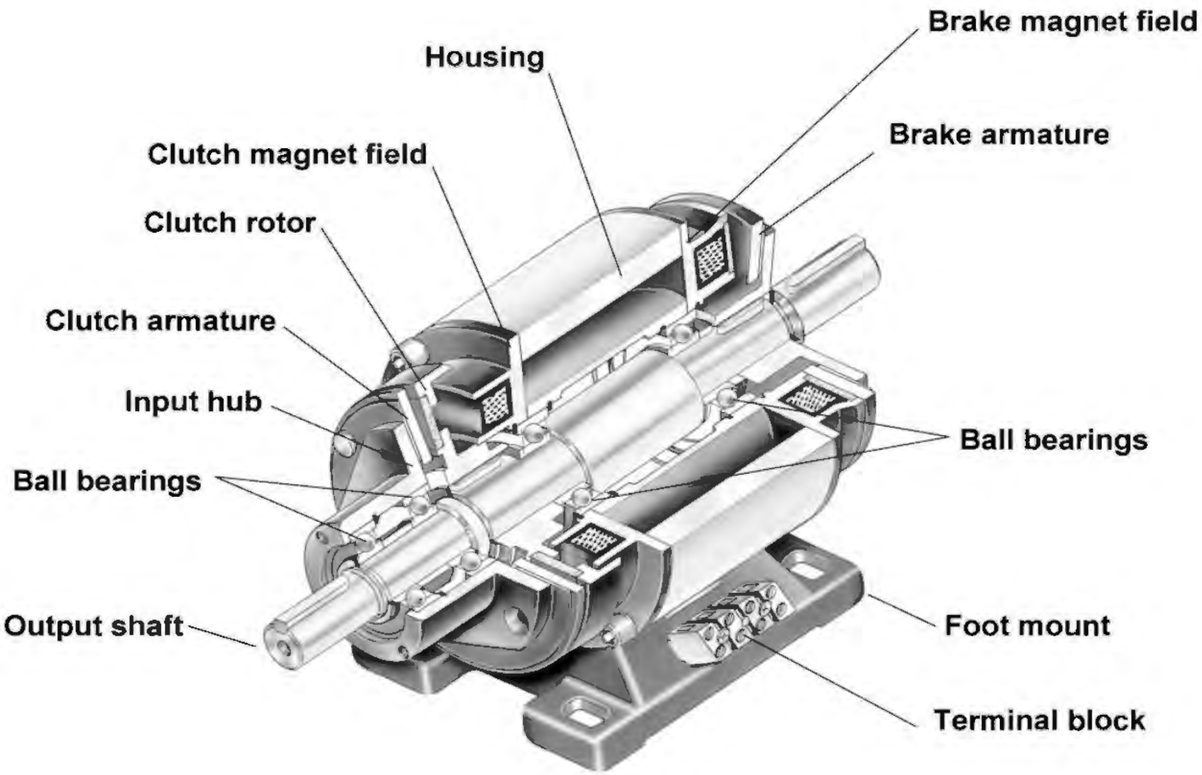


Dimensions in mm.

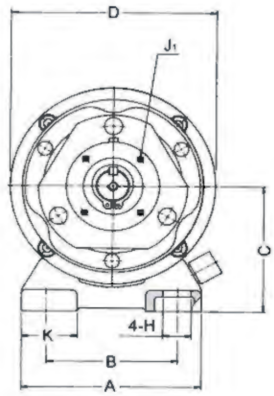
SIZE		0.6	1.2	2.5	5	10	20
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17
Exciting Voltage	DC-V	24	24	24	24	24	24
Capacity (at 20°C)	W	11	15	20	25	35	45
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500
Shaft Dia.	d_{j6}	11	14	19	24	28	38
Key (Shaft)	WidthxHeight	4x4	5x5	5x5	7x7	7x7	10x8
Diameter	A	90	110	140	175	200	240
	B	65	80	105	135	155	195
	$C^{+0}_{-0.5}$	65	80	90	112	132	160
	D	100	125	150	190	230	290
	G	10	12	15	15	18	20
	H	13.5	15	20	24	28	28
	I	6.5	9	11	11	14	14
	J	M4	M4	M6	M6	M6	M10
	K	27.5	32	35	42	45	47
Length	L	195	236	295	376	490	616
	M	105	130	160	185	230	270
	N	90	110	135	160	200	240
	P	52.5	63	80	108	145	188
	T	25	30	40	50	60	80
Weight	kg	2.3	4.7	7.6	14.6	25.5	48

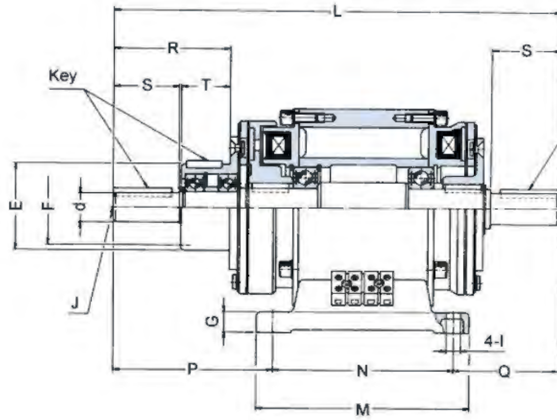
The **FMR** clutch/brake module features a matched clutch and brake mounted on a bearing-supported through shaft. The housing of this foot-mounted unit is made from a light alloy. Simpler than the FMP module, the FMR module is an open design that allows for optimum heat dissipation. This unit has a bearing-supported input hub that allows both ends of the shaft to be used independently as sources of output power. The unit is fully assembled and preadjusted. All bearings are sealed. Critical alignment is not necessary during installation. The FMP module is suitabe for parallel-shaft drive applications, and is easy to install.

Construction



Model FMR Clutch/brake module, Foot-mounted through-shaft



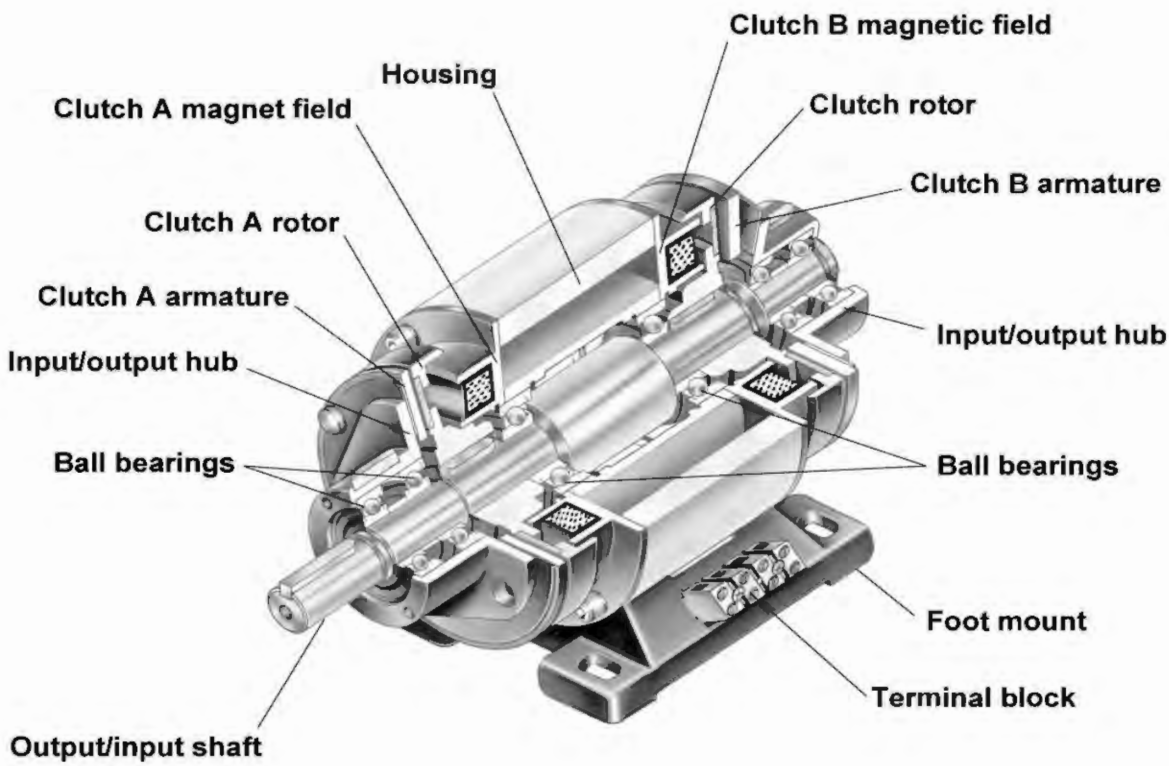


Dimensions in mm.

SIZE		0.6	1.2	2.5	5	10	20	40
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17	36
Exciting Voltage	DC-V	24	24	24	24	24	24	24
Capacity (at 20°C)	W	11	15	20	25	35	45	60
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500	2000
Shaft Dia.	d_{j6}	11	14	19	24	28	38	42
Key (Shaft, Hub)	WidthxHeight	4x4	5x5	5x5	7x7	7x7	10x8	12x8
Diameter	A	80	90	110	140	175	200	240
	B	52.5	65	80	105	135	155	195
	$C^{+0}_{-0.5}$	55	65	80	90	112	132	160
	D	80	100	125	150	190	230	290
	E_{j6}	38	45	55	64	75	90	115
	F	33	37	47	52	62	74.5	102
	G	10	10	12	15	15	18	20
	H	13.5	13.5	15	20	24	28	28
	I	6.5	6.5	9	11	11	14	14
	J	M4	M4	M6	M6	M6	M10	M10
	J_1	3-M4	3-M4	4-M4	4-M4	6-M5	4-M6	8-M6
	K	27.5	27.5	32	35	42	45	45
Length	L	181	217	270	330	399	504	632
	M	90	105	130	160	185	230	270
	N	75	90	110	135	160	200	240
	P	65.5	78.5	98	121	149	187	238
	Q	40.5	48.5	62	74	90	117	154
	R	46.5	57	72	92	113	142	183
	S	25	30	40	50	60	80	110
	T	20	25	30	40	50	60	70
Weight	kg	1.7	3	6.3	10.6	20	37	66.6

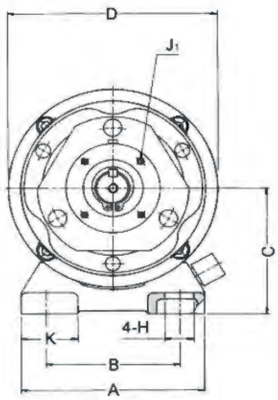
The **FMT** clutch/clutch module features a pair of matched clutches mounted on a bearing-supported through shaft. The housing of the FMT module is made from a light alloy, and the open design allows for optimum heat dissipation. All parts are preadjusted and preassembled. It is possible to select either clutch hub as an input, and the shaft as an output, or the shaft as an input, and the clutch hubs as outputs. All bearings are sealed. The FMT module is ideal for buidling a transmission or a reversing drive, and can achieve high cycle rates.

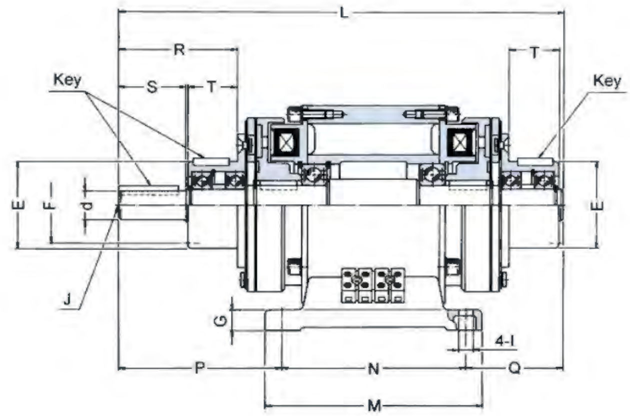
Construction



Model FMT Double clutch module, foot-mounted, through-shaft

NIIKA



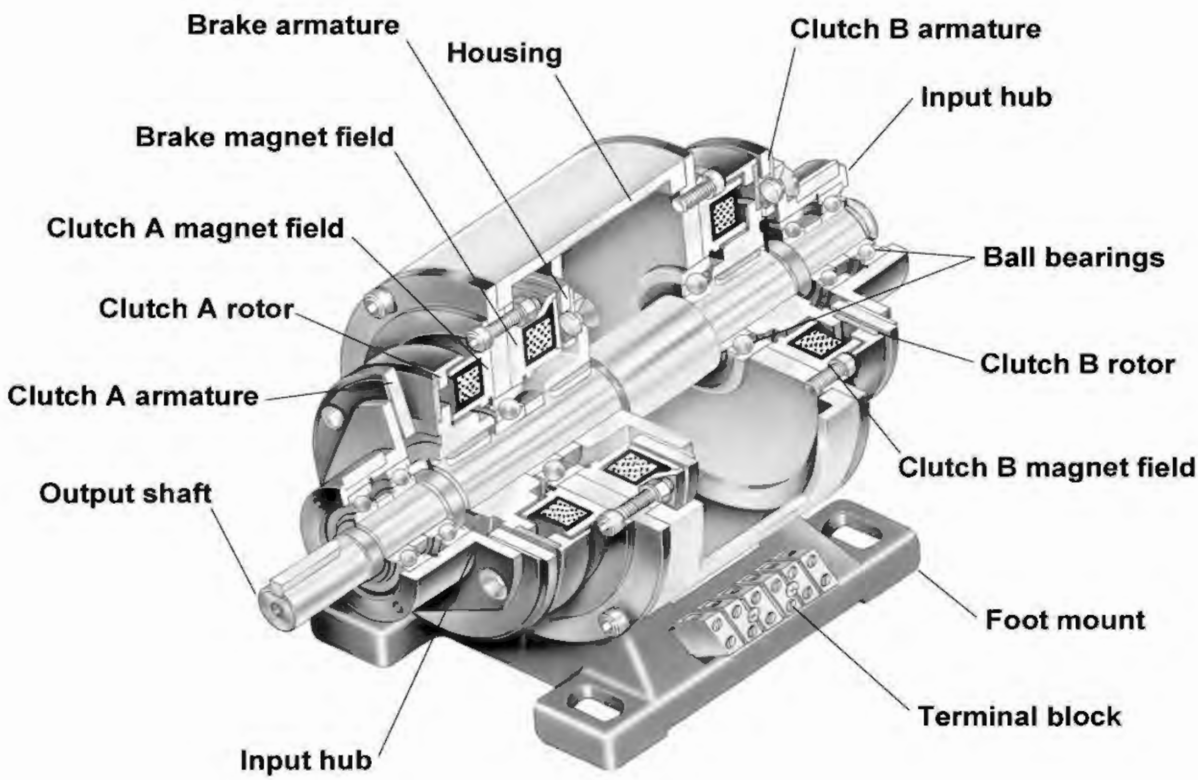


Dimensions in mm.

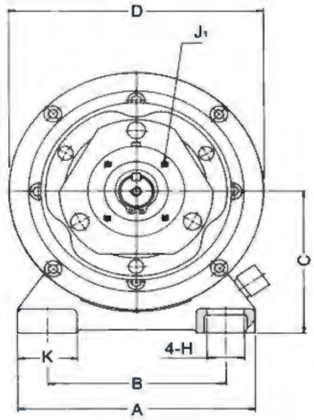
SIZE		0.6	1.2	2.5	5	10	20	40
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17	36
Exciting Voltage	DC-V	24	24	24	24	24	24	24
Capacity (at 20 °C)	W	11	15	20	25	35	45	60
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500	2000
Shaft Dia.	d_{j6}	11	14	19	24	28	38	42
Key (Shaft, Hub)	WidthxHeight	4x4	5x5	5x5	7x7	7x7	10x8	12x8
Diameter	A	80	90	110	140	175	200	240
	B	55	65	80	105	135	155	195
	$C^{+0}_{-0.5}$	55	65	80	90	112	132	160
	D	80	100	125	150	190	230	290
	E_{j6}	38	45	55	64	75	90	115
	F	33	37	47	52	62	74.5	101.5
	G	10	10	12	15	15	18	20
	H	13.5	15	20	24	28	28	28
	I	6.5	6.5	9	11	11	14	14
	J	M4	M4	M6	M6	M6	M10	M10
	J^1	3-M4	3-M4	4-M4	4-M4	6-M5	4-M6	8-M6
	K	27.5	27.5	32	35	42	45	45
Length	L	181	217	266	327	397	492	603
	M	90	105	130	160	185	230	270
	N	75	90	110	135	160	200	240
	P	65.5	78.5	98	121	149	187	238
	Q	40.5	48.5	58	71	88	105	125
	R	47	57	72	93	113	143	183
	S	25	30	40	50	60	80	110
	T	20	25	30	40	50	60	70
Weight	kg	1.9	3.6	7.2	12.5	22.5	40.5	72.6

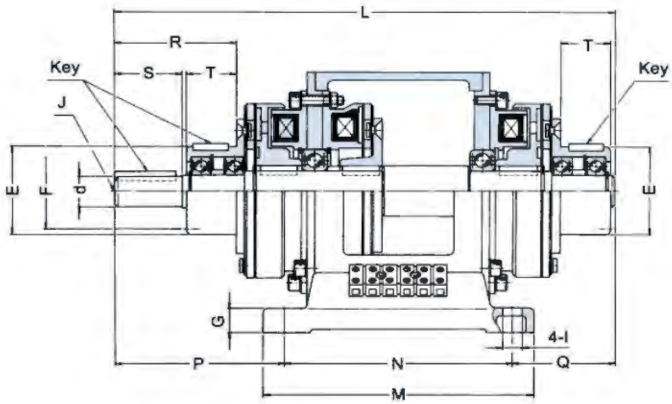
The **FMX** clutch/clutch/brake module features a pair of matched clutches and a matched brake mounted on a bearing-supported through shaft. The housing of the FMX moudle is made from a light alloy, and the open design allows for optimum heat dissipation. All parts are preadjusted and preassembled, and all bearings are sealed. The clutch hubs are driven at different speeds and/or directions in order to build a transmission or reversing drive. The brake is used to stop and hold the output. The FMX module can be used to achieve high cycle rates.

Construction



Model FMX Double clutch/brake module, foot-mounted, through-shaft



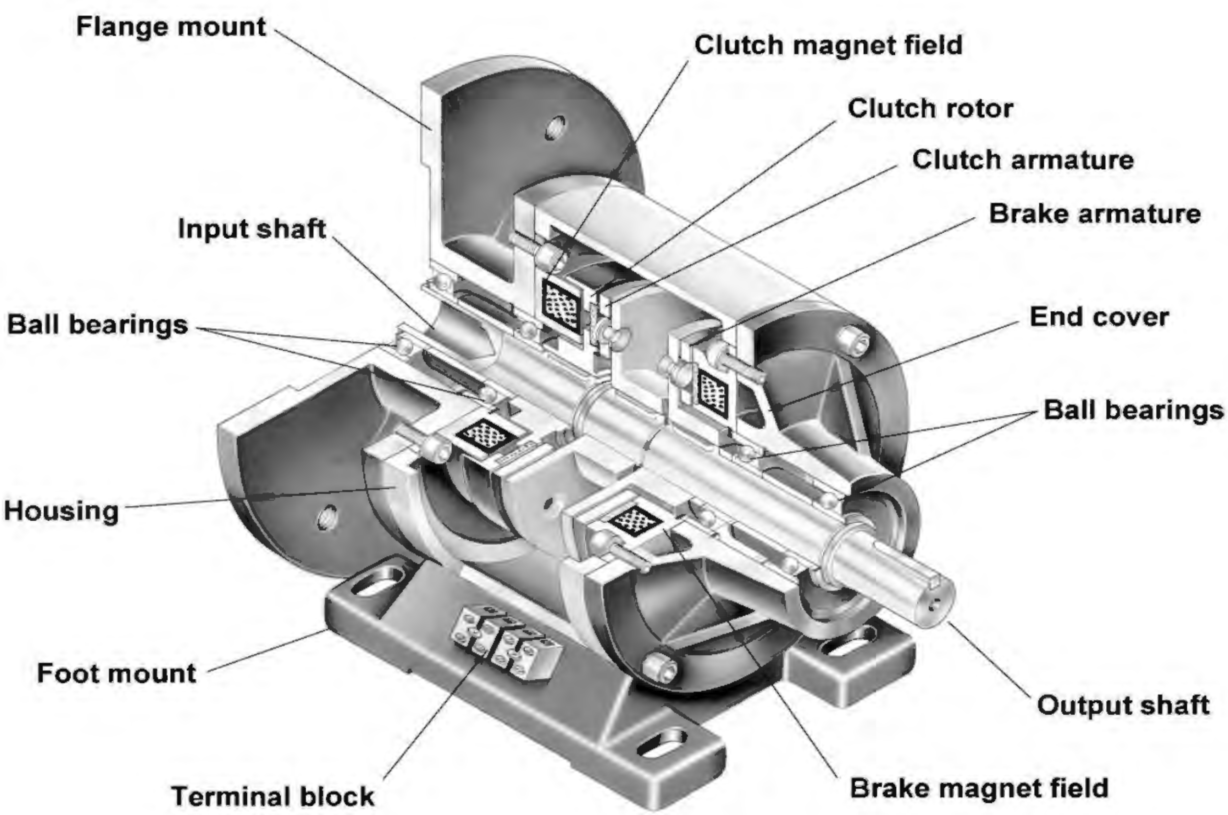


Dimensions in mm.

SIZE		0.6	1.2	2.5	5	10	20
Static Torque	kgm	0.55	1.1	2.2	4.5	9	17
Exciting Voltage	DC-V	24	24	24	24	24	24
Capacity (at 20℃)	W	11	15	20	25	35	45
Max. Revolution	RPM	5000	5000	4500	4000	3000	2500
Shaft Dia.	d^{j6}	11	14	19	24	28	38
Key (Shaft, Hub)	WidthxHeight	4x4	5x5	5x5	7x7	7x7	10x8
Diameter	A	90	110	140	175	200	240
	B	60	80	105	135	155	195
	$C^{+0}_{-0.5}$	65	80	90	112	132	160
	D	100	125	150	190	230	290
	E^{j6}	38	45	55	64	75	90
	F	33	37	47	52	62	74.5
	G	10	12	15	15	18	20
	H	13.5	15	20	24	28	28
	I	6.5	9	11	11	14	14
	J	M4	M4	M6	M6	M6	M10
	J^1	3-M4	3-M4	4-M4	4-M4	6-M5	4-M6
	K	27.5	32	35	42	45	47
Length	L	211	246	294	358	440	551
	M	105	130	160	185	230	270
	N	90	110	135	160	200	240
	P	73	83	99.5	124	150	197
	Q	48	53	59.5	74	90	114
	R	47	57	72	93	114	143
	S	25	30	40	50	60	80
	T	20	25	30	40	50	60
Weight	kg	4.2	6.5	9.8	18	30.5	60

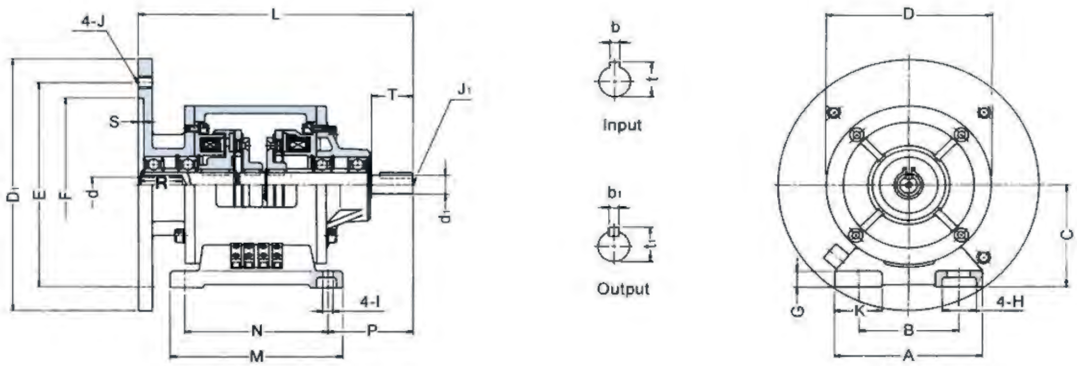
The **MMP** clutch/brake module comes preassembled and preadjusted, and combines a clutch and a brake on a split shaft. This foot-mounted module has a female input flange that make it possible to mount an I.E.C. standard motor directly to the input of the clutch/brake. The double-bearing-supported output shaft is suitable for parallel-shaft drives or for mounting a flexible coupling. The drip-proof housing is made of a light alloy; all bearings are sealed. These units are suitable for high-cycle-rate applications.

Construction



NIIKA

Model MMP Clutch/brake module, single-flange-mounted, split-shaft

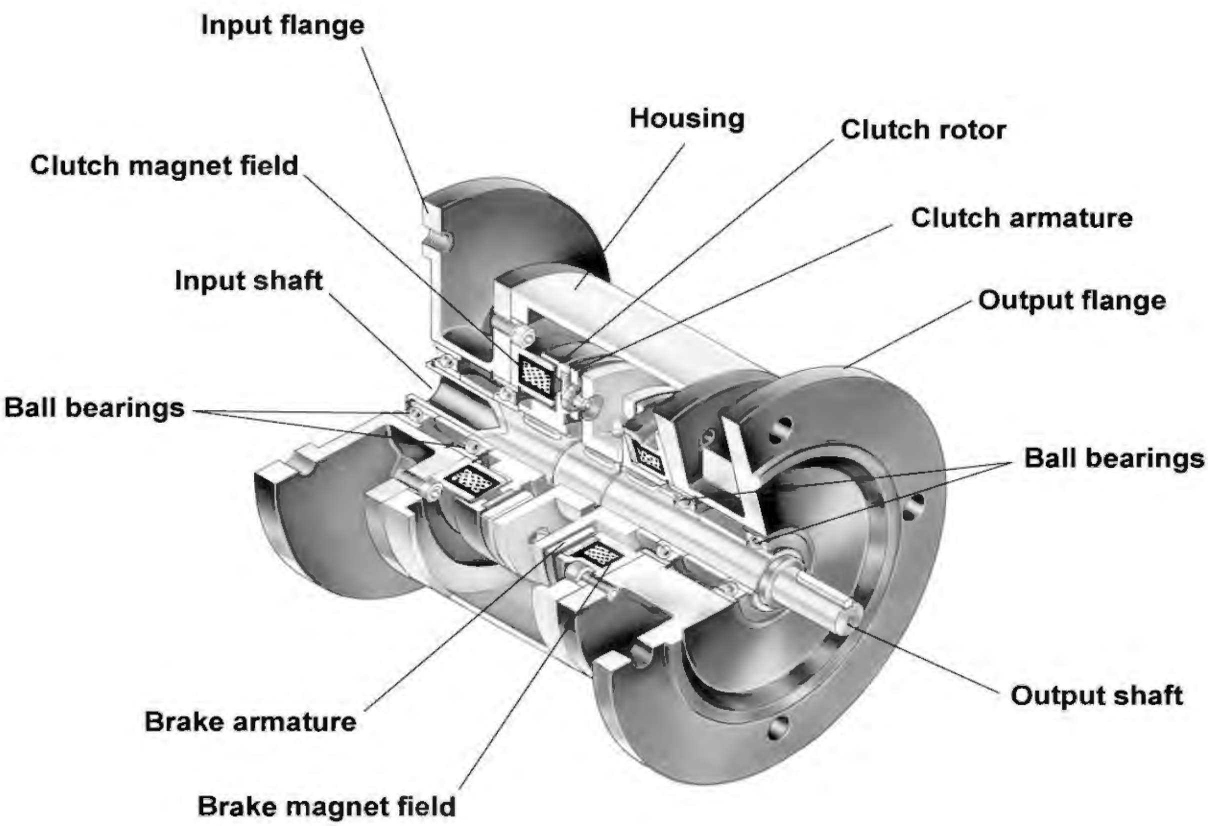


Dimensions in mm.

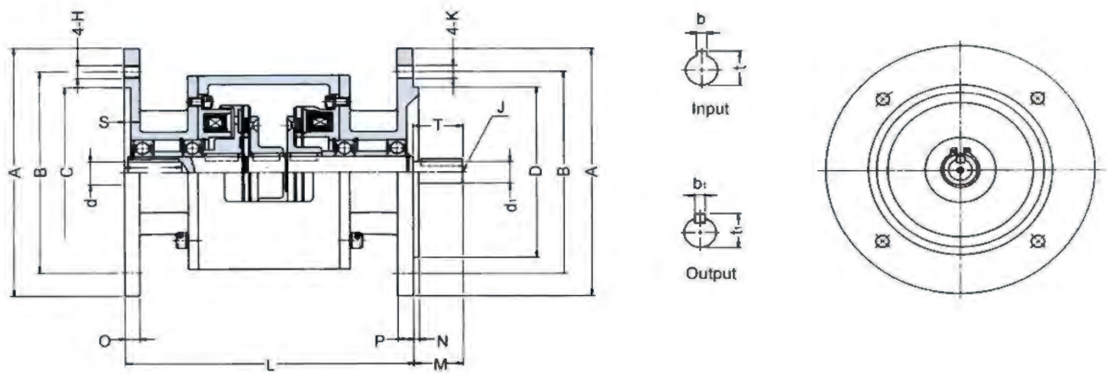
SIZE			0.6	1.2	2.5	5	10	20
Static Torque		kgm	0.55	1.1	2.2	4.5	9	17
Exciting Voltage		DC-V	24	24	24	24	24	24
Capacity (at 20℃)		W	11	15	20	25	35	45
Input Bore	Dia.	d^{H7}	11	14	19	24	28	38
	keyway	bxt	4x12.5	5x16	6x21.5	8x27	8x31	10x41.5
Output Shaft	Dia.	d^{1j6}	11	14	19	24	28	38
	keyway	b^1xt^1	4x12.5	5x16	5x21	7x27	7x31	10x41.5
Diameter	A		90	110	140	175	200	240
	B		60	80	105	135	155	195
	$C^{+0}_{-0.5}$		65	80	90	112	132	160
	D		100	125	150	190	230	290
	D^1		140	160	200	200	250	300
	E		115	130	165	165	215	265
	F^{H7}		95	110	130	130	180	230
	G		10	12	15	15	18	20
	H		13.5	15	20	24	28	28
	I		6.5	9	11	11	14	14
	J		M8	M8	M10	M10	M12	M12
	J^1		M4	M4	M6	M6	M6	M10
	K		27.5	32	35	42	45	47
Length	L		162	195	244	287	380	536
	M		105	130	160	185	230	270
	N		90	110	135	160	200	240
	P		52.5	63	80	108	145	188
	R		27	32	42	52	62	82
	S		5	5	5	5	6	6
	T		25	30	40	50	60	80
Weight		kg	2.8	5.5	9.4	16	28	52

The **TMP** clutch/brake module comes preassembled and preadjusted, and combines a clutch and a brake on a split shaft. This module has a female input that mounts an I.E.C. standard motor, and a male output that mounts directly to a reduceer or other power transmission component. The drip-proof housing is made of a light alloy; all bearings are sealed. These units are suitable for high-cycle-rate applications.

Construction



Model TMP Clutch/brake module, double-flange-mounted, split-shaft

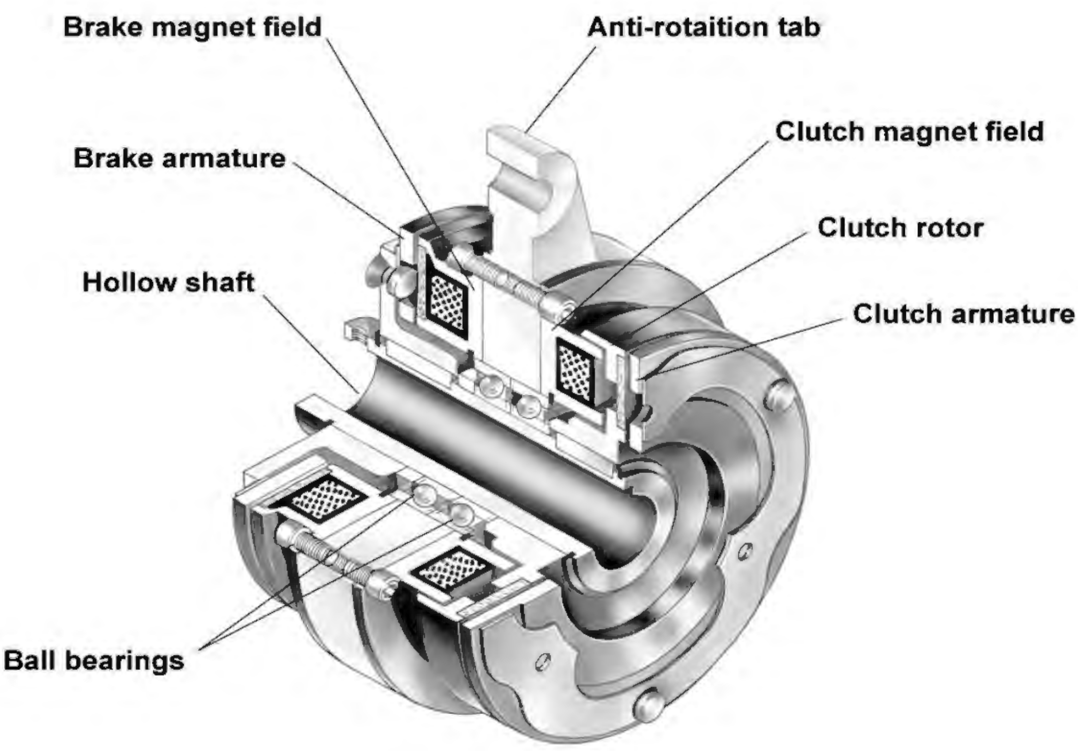


Dimensions in mm.

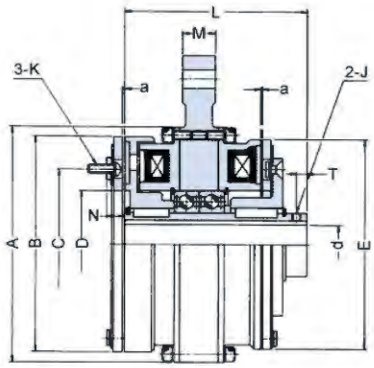
SIZE			0.6	1.2	2.5	5	10	20
Static Torque		kgm	0.55	1.1	2.2	4.5	9	17
Exciting Voltage		DC-V	24	24	24	24	24	24
Capacity (at 20°C)		W	11	15	20	25	35	45
Input Bore	Dia.	d^{G7}	11	14	19	24	28	38
	keyway	bxt	4x12.5	5x16	6x21.5	8x27	8x31	10x41.5
Output Shaft	Dia.	d_1^{j6}	11	14	19	24	28	38
	keyway	b_1xt_1	4x12.5	5x16	6x21.5	8x27	8x31	10x41.5
Diameter	A		140	160	200	200	250	300
	B		115	130	165	165	215	265
	C^{H7}		95	110	130	130	180	230
	D^{h7}		95	110	130	130	180	230
	H		M8	M8	M10	M10	M12	M12
	J		M4	M4	M6	M6	M6	M10
	K		10	10	12	12	14	14
Length	L		137	165	203	246	270	456
	M		25	30	40	50	60	80
	N		3.5	3.5	3.5	3.5	4	4
	O		10	10	12	12	16	16
	P		8	8	10	10	12	12
	R		27	32	42	52	62	82
	S		5	5	5	5	6	6
	T		25	30	40	50	60	80
Weight	kg		2.8	5.6	9.5	16.8	29.5	53.5

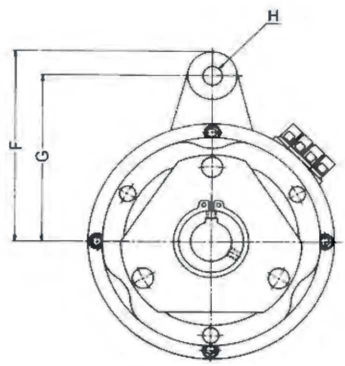
The **SMP** clutch/brake combines a matched clutch and brake on a hollow shaft. The open design allows for maximum cooling. The light alloy frame has an antirotation tab, and the armature can be mounted directly to sheaves, sprockets, or gears. Although the design of this unit is space saving and low cost, the SMP is easy to install, and is suitable for high-cycle-rate applications.

Construction



Model SMP Clutch/brake, shaft-mounted





Dimensions in mm.

SIZE			2.5	5	10	20	40
Static Torque		kgm	2.2	4.5	9	17	36
Exciting Voltage		DC-V	24	24	24	24	24
Capacity (at 20°C)		W	20	25	35	45	60
Max. Revolution		RPM	5000	4000	3000	3000	2000
Bore Shaft	Dia.	d^{H7}	20	25	35	40	48
	keyway	bxt	5X2	7x3	10x3.5	10x3.5	12x3.5
Diameter	A		125	150	190	230	290
	B		106	133	169	212	250
	C		76	95	120	158	210
	D		54	67	89	108	125
	E		108	133	168	208	250
	F		105	120	153	180	225
	G		90	105	135	160	200
	H		10	12	15	18	21
	J		M5	M6	M8	M8	M10
	K		M5	M6	M8	M10	M12
Length	L		97	110	125	145	180
	M		17	20	22	24	30
	N		8.5	10.5	13	16.5	12
	T		6	6	9	10	12
Air Gap	a		0.2	0.3	0.3	0.4	0.5
Weight	kg		3.8	4.7	10.2	18.5	40

Control Circuits

Electromagnetic clutches and brakes require DC power. Unless battery power is available, a diode or bridge rectifier is used to convert AC power to DC power. Listed here are a few of the many control circuits that have been used.

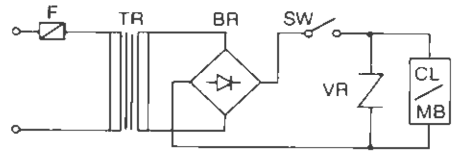


Figure 1.

Basic control circuits

The most basic control circuits consist of a DC power supply, an arc suppression circuit, and a switch.

- The coil may be controlled by a simple on/off switch (figure 1.)

- Push buttons may be used to operate a control relay. The capacity of the contacts should be at least 10 times the steady-state load current (figure 2.)

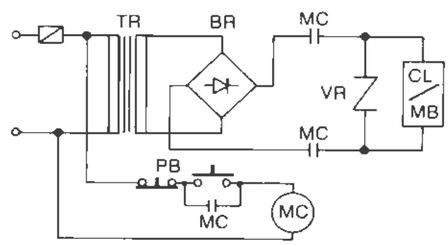


Figure 2.

Quick response control circuits

For applications that demand high cycle rates and/or accurate registration, the following control circuits can be used to reduce significantly the response time of a clutch or brake.

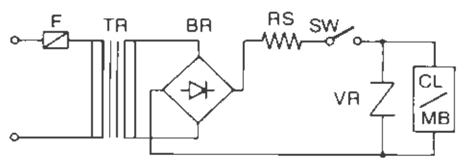


Figure 3.

● Simple overenergization circuit

A simple means of providing a voltage spike to a clutch or brake coil is to place a resistor in series with the coil (figure 3). At the instant after the switch is closed, the current through the closed loop is zero. At the instant, the IR drop (voltage drop) across the resistor is zero, and the entire voltage drop occurs across the coil and the variator. The resistor should be chosen so that the initial voltage across the coil is about 4 times the steady-state coil voltage.

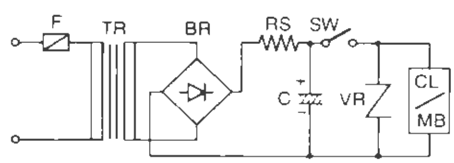


Figure 4.

● Capacitor overenergization circuit

A capacitor may be used in order to reduce coil rise and decay times, which greatly reduces the time that is takes to energize or to deenergize a clutch or brake (figure 4). This is especially apparent with large coils, i.e. large inductances. Cycle rates that can be achieved using this circuit are limited by the time that it takes to charge the capacitor.

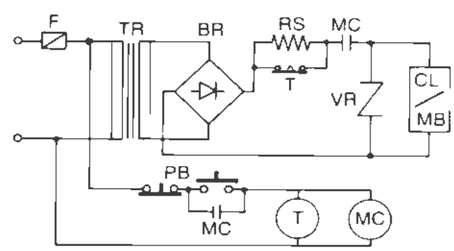


Figure 5.

● Timer-controlled overenergization circuit

It is possible to reduce the coil rise time by placing a timer circuit in parallel with a resistor. At the instant when the coil is to be turned on, the timer circuit provides a shunt around the resistor. At some later time the contacts open, which allows current to flow through the resistor, and reduces the voltage across the coil. Coil decay time is increased by using this circuit.

TR: Transformer	VR: Varistor	RS: Resistor
BR: Rectifier (Bridge)	MC: Relay	F: Fuse
SW: Switch	C: Capacitor	CL: Clutch
PB: Push Button	T: Timer	MB: Brake

When D.C. power is switched off, a momentary reverse voltage (- L dI/dt) is induced by the coil. This voltage is considerably higher than the steady-state voltage that is present across the contacts, and could damage both the contacts and the coil unless arc supression is added to the circuit.

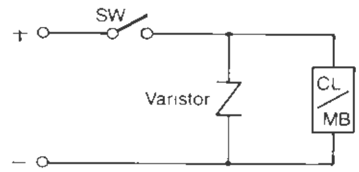


Figure 6.

Basic discharging circuit

The device that is used most often is the metal oxide variator (figure 6). During steady state, the variator has a fixed resistance. When the switch is opened, the variator sees the relatively large reverse inductive voltage from the coil (- L dI/dt), which changes the resistance of the variator to a much lower value. This allows a momentary path for current to flow in the loop. The variator allows for fast release times.

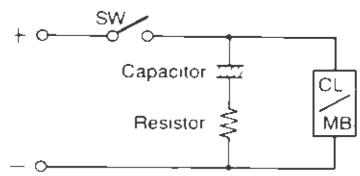


Figure 7.

Capacitor/resistor arc suppression

A capacitor and a resistor may be used to absorb the surge of voltage that occurs when the switch is opened. Selection of the proper values of resistance and capacitance may shorten release times (figure 7).

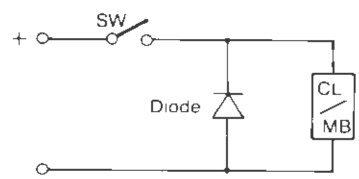


Figure 8.

Diode arc suppression

A diode may be used to completely absorb the surge of voltage that occurs when the switch is opened (figure 8). Notice however, that the decay time of this circuit, and hence, the armature release time, will be relatively long.

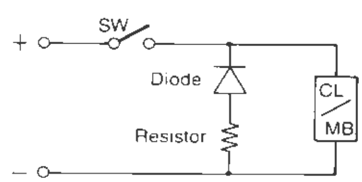


Figure 9.

Resistor arc suppression

When a diode and resistor are placed in series, as shown (figure 9), no power is absorbed by the resistor when the switch is closed. When the switch is opened, the resistor reduces the reverse voltage across the diode.

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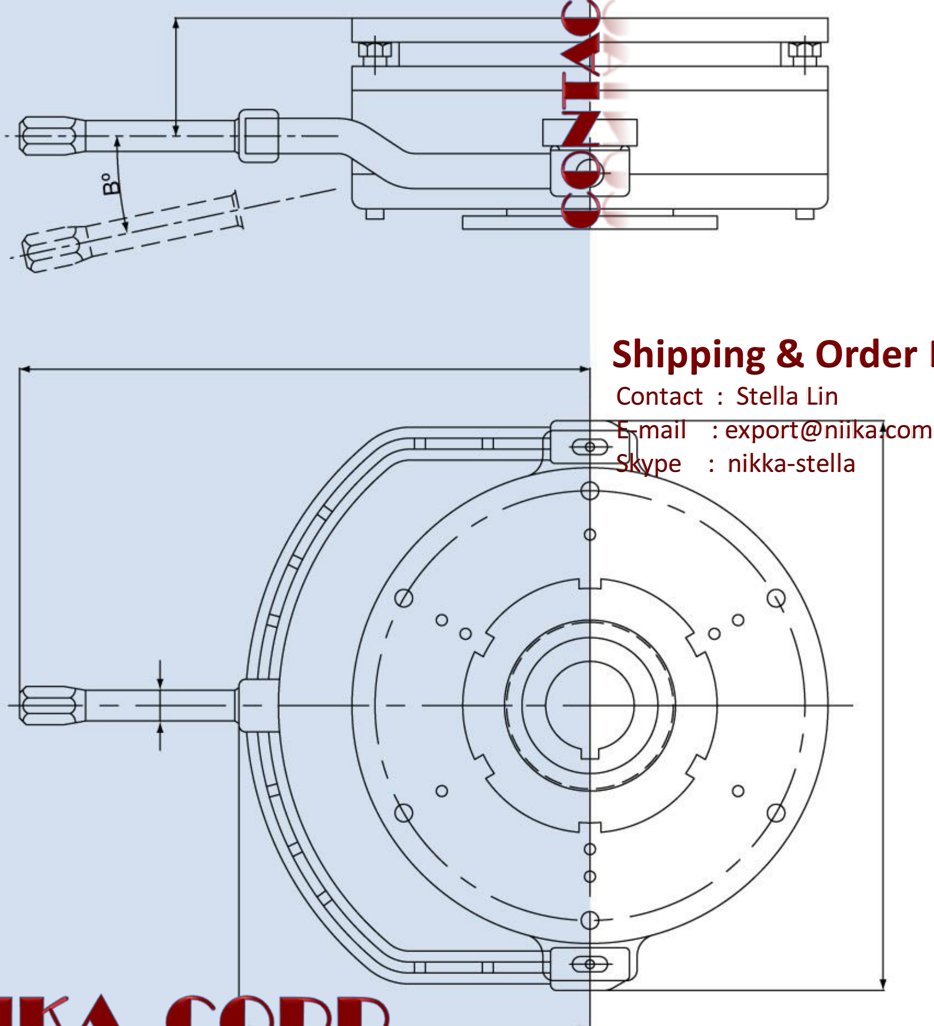

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