

General Purpose Clutches

FSO/HPI

Overrunning, Indexing, Backstopping Ball Bearing Supported, Sprag Clutches



All models contain PCE sprags with Formchrome® and Formsprag “Free-action” retainers except models FSO 550 & FSO 650. Standard clutches and all C/T clutches are oil lubricated. Grease lubrication is available for applications where maintenance is inadequate, or where higher inner race overrunning speeds are required. These clutches mount on a through-shaft, with the inner race driven by a key. The ground O.D. of the outer race is designed as a pilot or mounting surface for attaching parts and is concentric with the bore. Tapped holes are provided in each end of the outer race for securing these parts to the clutches. Refer to Bore Sizes/Shaft Tolerances chart for mounting data, page 124.

For vertical mounting, contact Application Engineering.

Specifications

Size	Torque Capacity lb.ft. (Nm)	Maximum RPM								Resistance after run-in lb.ft. (Nm)	Lubrication		Shipping Weight lb (kg)
		Standard Models				C/T Sprag Models					Oil or Grease	Oil only	
		Overrunning Speed				Overrunning Speed							
		Oil and Grease Lip Seals		Labyrinth Grease Seals		Overrunning Speed		Max. drive	Sprag lift-off		FSO oz (ml)	HPI oz (ml)	
		Inner Race	Outer Race	Inner Race	Outer Race	Inner Race	Outer Race						
300	275 (379)	3,000	900	3,600	900	3,000	6,000	1,100	1,300	.13 (.18)	.25 (7.0)	.50 (14.0)	3.5 (1.6)
400	300 (407)	2,800	850	3,600	850	2,800	5,000	1,100	1,300	.20 (.27)	.33 (9.9)	.67 (19.8)	6 (2.7)
500	1,175 (1621)	2,500	800	3,000	800	2,500	4,000	1,000	1,200	.23 (.31)	.75 (22.0)	1.25 (35.0)	10.5 (4.8)
550	1,885 (2598)	1,175	800	3,600	800	—	—	—	—	.35 (.47)	1.75 (52.0)	—	12 (5.4)
600	2,250 (3105)	2,200	750	2,400	750	2,200	3,600	1,000	1,200	.46 (.62)	1.75 (52.0)	3.00 (84.0)	19 (8.6)
650	2,375 (3273)	900	600	3,600	600	—	—	—	—	.80 (1.08)	6.00 (168.0)	—	24 (10.8)
700	5,000 (6900)	1,600	450	2,000	450	1,600	2,500	800	1,000	1.15 (1.56)	6.00 (168.0)	10.00 (280.0)	42 (19)

Note: Check key and shaft stress before making final clutch selection since this may determine the maximum allowable drive torque capacity.

Model FSO

General purpose, ball-bearing clutches suitable for overrunning, backstopping and light to medium-duty indexing applications. They are oil lubricated and equipped with lip type seals. Grease is available. Increased speeds are possible with steel labyrinth seals.

C/T Sprag Models (FSO Only)

C/T sprag clutches are ideal for applications with high speed outer race overrunning and low speed driving. Available with oil lubrication only.

Model HPI

Especially designed for **medium to heavy-duty** indexing applications, or applications in excess of 150 strokes/min. to provide the maximum in dependable, uniform, long life performance except models FSO 550 & FSO 650. They are oil lubricated and equipped with lip type seals. Grease is available.

Oil Lubricated Clutches

FSO-300 through 700 clutches are shipped from the factory with Mobil DTE Heavy Medium oil.

HPI-300 through 700 clutches are shipped from the factory with Mobil DTE Light oil.

Grease Lubricated Clutches

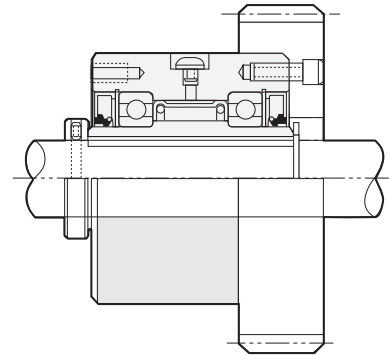
FSO-300 through 700 clutches are shipped from the factory packed with Fiske Brothers Lubriplate Low-Temp grease.

HPI-300 through 700 clutches are shipped from the factory packed with Fiske Brothers Lubriplate Low-Temp grease.

OSHA cover kits are available for Models FSO & HPI-400 through 700, see page 121 for details.

For further information, write for *Installation and Maintenance Bulletin No. 2219 for the FSO series and No. 2213 for the HPI series.*

Typical Mounting Arrangement



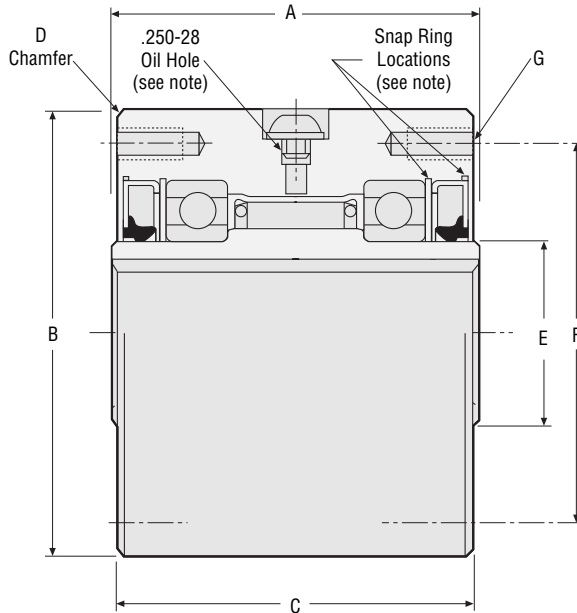
The Model FSO clutches must be secured to the shaft by customer supplied snap ring, set collar, spacer, etc.

General Purpose Clutches

FSO/HPI

FSO OSHA cover kits are designed for shaft end mounted FSO or HPI clutches and available from Formspag from size 400 through 1027. These cover kits provide not only the stationary cover enclosure required by OSHA, but provide additional protection for the clutch from abrasive environments as well.

Note: OSHA requires that a stationary guard must enclose clutches with rotating projecting parts and operating seven (7) feet or less above the floor.



Notes:

Angle — oil hole to mounting bolt hole

- Model 300, 400, 500 = 45°
- 600 = 15°
- 700 = 0° or 30° (offset from center of outer race)

Snap ring is located on the outboard side of the oil seal on Models 400, 600 and 700. On models 300 and 500, snap ring is inboard of the oil seal.

Dimensions inches (mm)

Size	A	B	C	D	E	F	G		
							Number	Thread	Depth
300	2.50 (63.50)	3.000/2.998 (76.20/76.15)	2.38 (60.45)	.06 x 45° (1.58 x 45°)	1.12 (28.58)	2.625 (66.67)	4 @ 90°	.250-28	.50 (12.70)
400	2.75 (69.85)	3.500/3.498 (88.90/88.85)	2.69 (68.26)	.06 x 45° (1.58 x 45°)	1.19 (30.15)	2.875 (73.02)	4 @ 90°	.312-24	.63 (16.00)
500	3.50 (88.90)	4.250/4.248 (107.95/107.90)	3.38 (85.72)	.06 x 45° (1.58 x 45°)	1.75 (44.45)	3.625 (92.07)	4 @ 90°	.312-24	.63 (15.87)
550	3.25 (82.55)	4.750/4.748 (120.65/120.60)	3.125 (79.38)	0.08	2.75 (69.85)	4.25 (107.95)	6 @ 60°	.312-24	.54 (13.72)
600	3.75 (95.25)	5.375/5.373 (136.53/136.47)	3.63 (92.07)	.06 x 45° (1.58 x 45°)	2.50 (63.50)	4.750 (120.65)	6 @ 60°	.312-24	.63 (15.87)
					2.72† (69.09)				
650	3.50 (88.90)	6.500/6.498 (165.1/165.05)	3.375 (85.72)	0.09	3.187 (80.94)	5.75 (146.05)	8*	.375-24	.79 (20.06)
700	5.00 (127.00)	7.125/7.123 (180.97/180.92)	4.88 (123.82)	.06 x 45° (1.58 x 45°)	3.56 (90.42)	6.250 (158.75)	8†	.375-24	.75 (19.05)
					4.00† (101.60)				

Notes:

†Six holes equally spaced at 60° plus two extra holes at 180°. Six hardened mounting screws are adequate for torque loads up to 3000 lb.ft. (4068 Nm). Use eight hardened mounting screws for torque loads above these values.

*The "E" dimension is larger for this bore size.

Bore sizes and keyseats inches (mm)

Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.
300	.500 (12.70)	1/8 x 1/16 (3.18 x 1.57)	.500 (12.70)	.750 (19.05)
	.625 (15.87)	3/16 x 3/32 (4.75 x 2.36)		
	15mm	5 x 2.3mm***		
	.750 (19.05)	3/16 x 3/32 (4.75 x 2.36)		
400	.500 (12.70)	1/8 x 1/16 (3.18 x 1.57)	.437 (11.10)	.875 (22.22)
	.625 (15.87)	3/16 x 3/32 (4.75 x 2.36)		
	18 mm	6 x 2.8mm***		
	.750 (19.05)	3/16 x 3/32 (4.75 x 2.36)		
	.875 (22.22)	3/16 x 1/16 (4.75 x 1.57)		
500	.875 (22.22)	3/16 x 3/32 (4.75 x 2.36)	.750 (19.05)	1.312 (33.32)
	1.000 (25.40)	1/4 x 1/8 (6.35 x 3.18)		
	1.125 (28.57)	1/4 x 1/8 (6.35 x 3.18)		
	30mm	10 x 3.3mm***		
	1.250 (31.75)	1/4 x 1/8 (6.35 x 3.18)		
	1.312 (33.32)	1/4 x 3/32 (6.35 x 2.29)		
550	1.250 (31.75)	1/4 x 1/8 (6.35 x 3.18)	1.00 (25.40)	1.625 (41.27)
	1.312 (33.32)	3/8 x 3/16 (9.52 x 4.75)		
	1.5000 (38.10)	3/8 x 3/16 (9.52 x 4.75)		
	1.625 (41.27)	3/8 x 1/8 (9.52 x 3.18)		
600	1.250 (31.75)	1/4 x 1/8 (6.35 x 3.18)	.937 (23.80)	2.250*† (57.15)
	1.375 (34.92)	3/8 x 3/16 (9.52 x 4.75)		
	1.5000 (38.10)	3/8 x 3/16 (9.52 x 4.75)		
	40mm	12 x 3.3mm***		
	1.625 (41.27)	3/8 x 3/16 (9.52 x 4.75)		
	1.750 (44.45)	3/8 x 3/16 (9.52 x 4.75)		
	45mm	14 x 3.8mm***		
	50mm	14 x 3.8mm***		
	2.000 (50.80)	3/8 x 1/8 (9.52 x 3.18)		
650	1.937 (49.20)	1/2 x 1/4 (12.70 x 6.35)	1.69 (42.85)	2.500 (63.5)
	2.000 (50.80)	1/2 x 1/4 (12.70 x 6.35)		
	2.250 (57.15)	1/2 x 1/4 (12.70 x 6.35)		
	2.437 (61.90)	5/8 x 1/8 (15.87 x 3.18)		
	2.500 (63.50)	5/8 x 1/8 (15.87 x 3.18)		
700	1.937 (49.20)	1/2 x 1/4 (12.70 x 6.35)	1.875 (47.62)	3.250*† (82.55)
	50mm	14 x 3.8mm		
	2.000 (50.80)	1/2 x 1/4 (12.70 x 6.35)		
	2.250 (57.15)	1/2 x 1/4 (12.70 x 6.35)		
	60mm	18 x 4.4mm***		
	2.437 (61.90)	5/8 x 5/16 (15.87 x 7.93)		
	2.500 (63.50)	5/8 x 5/16 (15.87 x 7.93)		
	65mm	18 x 4.4mm***		
	2.750 (69.85)	5/8 x 7/32 (15.87 x 5.53)		
	70mm	20 x 4.9mm***		
	2.937 (74.60)	5/8 x 1/8 (15.87 x 3.18)		
	75mm	20 x 4.9mm***		
	80mm	22 x 5.4mm***		

*1/2 x 1/8 keyway.

**3/4 x 1/4 keyway.

***Contact Formspag for keyseat information.

†The "E" dimension is larger for this bore size.

General Purpose Clutches

FS/FSO/HPI

Overrunning, Indexing, Backstopping Ball Bearing Supported, Sprag Clutches



All models contain Formchrome® sprags and Formsprag “Free-action” retainers. These clutches mount on a through-shaft, with the inner race driven by a key. *Standard keys are supplied by Formsprag at no additional charge.* The ground O.D. of the outer race is designed as a pilot or mounting surface for attaching parts and is concentric with the bore. Tapped holes are provided in each end of the outer race for securing these parts to the clutch. Refer to Bore Sizes/Shaft Tolerance chart for mounting data, page 124.

For vertical mounting, contact Application Engineering.

Model FSO

Allows higher inner race overrunning speeds than FS series. They are also suitable for general overrunning and light- to medium-duty indexing applications.

They are grease lubricated and equipped with grease seals.

Model HPI

Are especially designed for medium to heavy-duty indexing applications, or applications in excess of 150 strokes/ min. to provide the maximum in dependable, uniform, long life performance. They are oil lubricated and equipped with lip type seals. Grease is available.

Model FS

Suitable for general overrunning, backstopping and light- to medium-duty indexing applications. They are oil lubricated and equipped with lip-type seals.

C/T Sprag Models (FS Only)

Ideal for applications with high speed outer race overrunning and low speed driving. Available with oil lubrication only.

Oil Lubricated Clutch

FS-750 through 1027 clutches are shipped from the factory with Mobil DTE Heavy Medium oil.

HPI-750 through 1027 clutches are shipped from the factory with Mobil DTE Light oil.

Grease Lubricated Clutch

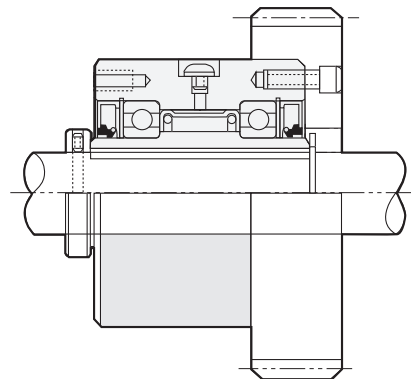
FSO-750 through 1027 clutches are shipped from the factory packed with Fiske Brothers Aero-Lubriplate grease.

HPI-750 through 1027 clutches are shipped from the factory packed with Fiske Brothers Aero-Lubriplate grease.

OSHA cover kits are available for Models FS, FSO & HPI-750 through 1027, see page 121 for details.

For further information, write for Installation and Maintenance bulletin No. 2219 for FS and FSO series, and No. 2213 bulletin for the HPI series.

Typical Mounting Arrangement



The Model FSO clutches must be secured to the shaft by customer supplied snap ring, set collar, spacer, etc.

Specifications

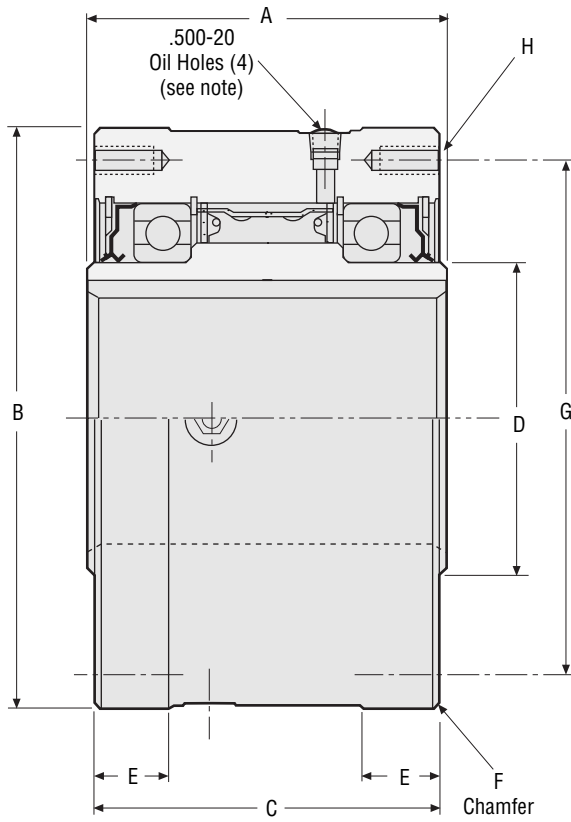
Size	Torque Capacity lb.ft. (Nm)	Maximum RPM								Resistance after run-in lb.ft. (Nm)	Lubrication			Shipping Weight lb (kg)
		Standard Models				C/T Sprag Models					Grease	Oil		
		Overrunning Speed				Overrunning Speed		FSO oz (ml)	HPI oz (ml)			FS oz (ml)		
		FS		FSO		Inner Race	Outer Race				Max. drive		Sprag lift-off	
		Inner Race	Outer Race	Inner Race	Outer Race									
750	7,000 (9660)	1,000	650	1,800	650	1,000	1,800	650	800	3.75 (5.08)	7.5 (222)	13 (384)	7 (207)	83 (38)
800	13,000 (17,940)	850	525	1,500	525	850	1,500	525	675	5.25 (7.12)	7.5 (222)	15 (444)	8.5 (251)	102 (46)
900	18,000 (24,408)	700	500	1,350	500	700	1,350	500	650	6.25 (8.47)	18 (532)	16 (473)	11.5 (340)	156 (71)
1027	27,000 (36,612)	500	375	1,100	375	500	1,100	375	475	10.00 (13.56)	22 (651)	32 (946)	16 (473)	250 (113)

Notes:

Check key and shaft stress before making final clutch selection since this may determine the maximum allowable drive torque capacity.
FSO-750 only, shipped with labyrinth seals.

General Purpose Clutches

FS/FSO/HPI



Notes:

Angle — oil hole to mounting bolt hole

Model 750 = 0° or 30°

900 = 0° or 18°

800 = 0° or 45°

1027 = 15°

Dimensions inches (mm)

Size	A	B	C	D	E	F	G	H		
								Number	Thread	Depth
750	6.00 (152.4)	8.750/8.748 (222.25/222.20)	5.88 (149.22)	4.25 (107.95)	1.25 (31.75)	.06 x 45° (1.58 x 45°)	7.00 (177.80)	8*	.500-20	1.00 (25.40)
800	6.00 (152.4)	10.000/9.998 (254.00/253.95)	5.88 (149.22)	5.50 (139.70)	1.25 (31.75)	.06 x 45° (1.58 x 45°)	8.94 (227.01)	8 @ 45°	.500-20	1.00 (25.40)
900	6.38 (161.9)	12.000/11.997 (304.80/304.72)	6.25 (158.75)	6.38 (161.92)	1.38 (34.92)	.06 x 45° (1.58 x 45°)	9.75 (247.65)	10 @ 36°	.625-18	1.25 (31.75)
1027	6.63 (168.3)	15.000/14.997 (381.00/380.92)	6.50 (165.10)	9.00 (228.60)	1.38 (34.92)	.13 x 45° (3.17 x 45°)	11.75 (298.45)	12 @ 30°	.625-18	1.00 (25.40)

*Six holes equally spaced at 60° plus two extra holes at 180°. Six hardened mounting screws are adequate for torque loads up to 5100 lb.ft. (6915 Nm). Use eight hardened mounting screws for torque loads above these values.

Bore sizes and keyseats** inches (mm)

Size	Bore Size	Keyseat	Bore Range		
			Min.	Max.	
750	2.437 (61.90)	5/8 x 5/16 (15.87 x 7.94)	2.250 (57.15)	3.437 (87.30)	
	2.500 (63.50)	5/8 x 5/16 (15.87 x 7.94)			
	65mm	18 x 4.4mm***			
	2.750 (69.85)	5/8 x 5/16 (15.87 x 7.94)			
	70mm	20 x 4.9mm***			
	2.937 (74.60)	3/4 x 3/8 (19.05 x 9.52)			
	75mm	20 x 4.9mm***			
	3.000 (76.20)	3/4 x 3/8 (19.05 x 9.52)			
	80mm	22 x 5.4mm***			
	3.250 (82.55)	3/4 x 1/4 (19.05 x 6.35)			
	3.437 (87.30)	3/4 x 3/16 (19.05 x 4.75)			
	800	3.000 (76.20)	3/4 x 3/8 (19.05 x 9.52)	2.625 (66.67)	4.437 (112.70)
		80mm	22 x 5.4mm***		
		3.250 (82.55)	3/4 x 3/8 (19.05 x 9.52)		
		85mm	22 x 5.4mm***		
3.437 (87.30)		7/8 x 7/16 (22.23 x 11.11)			
3.500 (88.90)		7/8 x 7/16 (22.23 x 11.11)			
90mm		25 x 5.4mm***			
3.750 (95.25)		7/8 x 7/16 (22.23 x 11.11)			
100mm		28 x 6.4mm***			
3.937 (100.00)		1 x 1/2 (25.40 x 12.70)			
4.000 (101.60)		1 x 1/2 (25.40 x 12.70)			
4.250 (107.95)		1 x 3/8 (25.40 x 9.52)			
110mm		28 x 6.4mm***			
4.437 (112.70)		1 x 1/4 (25.40 x 6.35)			
900		100mm	28 x 6.4mm***	3.625 (92.07)	5.437 (138.10)
	4.000 (101.60)	1 x 1/2 (25.40 x 12.70)			
	4.250 (107.95)	1 x 1/2 (25.40 x 12.70)			
	110mm	28 x 6.4mm***			
	4.437 (112.70)	1 x 1/2 (25.40 x 12.70)			
	4.500 (114.30)	1 x 1/2 (25.40 x 12.70)			
	120mm	32 x 7.4mm***			
	4.750 (120.65)	1 x 1/2 (25.40 x 12.70)			
	4.937 (125.40)	1 x 3/8 (25.40 x 9.52)			
	5.000 (127.00)	1 x 3/8 (25.40 x 9.52)			
	130mm	32 x 7.4mm***			
	5.250 (133.35)	1 x 1/4 (25.40 x 6.35)			
	5.437 (138.10)	1 x 1/4 (25.40 x 6.35)			
	1027	4.937 (125.40)	1 1/4 x 5/8 (31.75 x 15.87)	4.937 (125.40)	7.000 (177.80)
		130mm	36 x 8.4mm***		
150mm		45 x 10.4mm***			
6.000 (152.40)		1 1/4 x 5/8 (31.75 x 15.87)			
6.250 (158.75)		1 1/2 x 1/2 (38.10 x 12.70)			
6.625 (168.27)		1 1/2 x 1/2 (38.10 x 12.70)			
6.750 (171.45)		1 1/2 x 1/2 (38.10 x 12.70)			
6.875 (174.62)		1 1/2 x 1/2 (38.10 x 12.70)			
175mm		45 x 10.4mm***			
7.000 (177.80)		1 1/2 x 7/16 (38.10 x 11.10)			

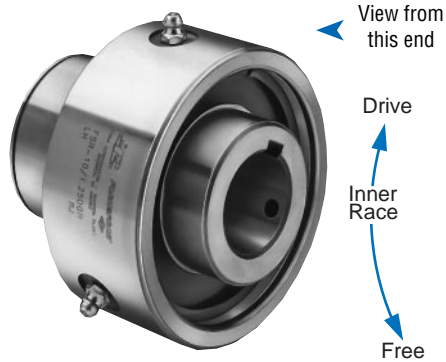
**For finished dimensions of keys supplied with the clutch, contact Formsprag.

***Contact Formsprag for keyseat information.

General Purpose Clutches

FSR

Overrunning, Indexing, Backstopping Sleeve Bearing Supported, Sprag Clutches



Right Hand rotation shown.
(Left Hand opposite.)
Specify direction of rotation when ordering.

secure attached parts to the hub, which is ground as a mounting surface. Oil lubricated models have a Buna-N oil seal at each end of the clutch which provides positive lubricant sealing. They can be removed for free lubricant flow if clutch is operated in an oil bath.

The shaft must extend through the full length of the clutch and must be held to recommended limits because the sleeve-bearing in the outer race rides on the shaft.

The keyseat in the shaft must not extend into the sleeve-bearing area of the clutch. Refer to Bore Sizes/Shaft Tolerances chart on page 124.

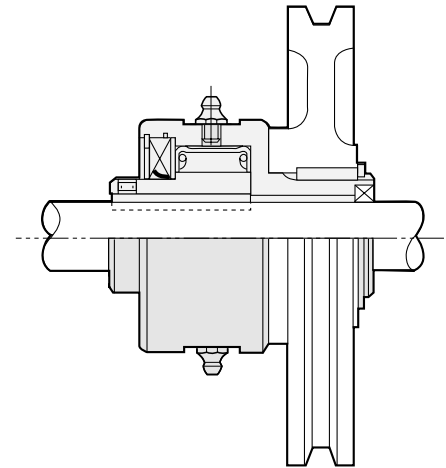
For vertical mounting, contact Application Engineering.

FSR-3 through 16 clutches are shipped from the factory packed with Fiske Brothers Lubriplate Low-Temp grease.*

Oil lubricated clutches are shipped without lubrication and require filling before use.

For further information write for Installation and Maintenance Bulletin No. 2217.

Typical Mounting Arrangement



The Model FSR-3 is secured to the shaft by a .187 roll pin (furnished). Models FSR-5 and up are secured to the shaft by two set screws also furnished.

There are eight sleeve-bearing clutch models suitable for general purpose applications—overrunning, indexing and backstopping. To provide maximum life and resistance to wear, all FSR model clutches incorporate Formchrome® sprags; models FSR-5 thru FSR-16 have the Formsprag “Free-action” sprag retainer. A keyseat and snap-ring groove are provided to

Specifications

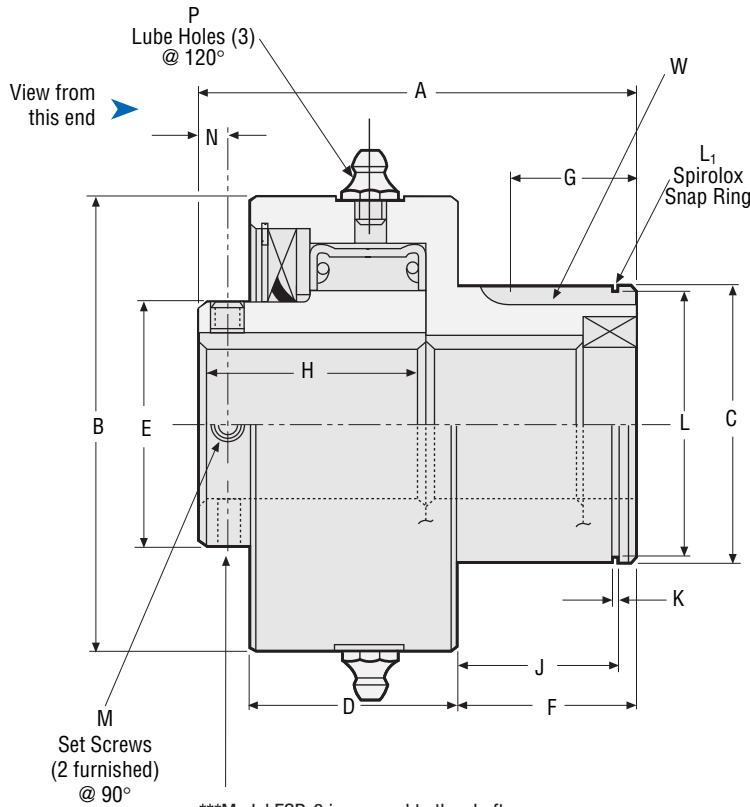
Size	Torque Capacity lb.ft. (Nm)	Overrunning Speed Max. RPM		Resistance after run-in lb.ft. (Nm)	Keyseat in Hub (W) (output) in (mm)	Max. Bore Keyseat in (mm)	Lubrication (Grease) Required* oz (ml)	Shipping Weight lb (kg)
		Inner Race	Outer Race					
3	40 (55)	1,950	900	.20 (.27)	1/8 x 1/16 (3.18 x 1.58)	—	Grease	1 (0.5)
5	110 (152)	1,950	900	.50 (.68)	3/16 x 3/32 (4.76 x 2.38)	3/16 x 3/32 (4.76 x 2.38)	.25 (7.4)	2 (0.9)
6	300 (414)	1,950	750	1.68 (2.28)	3/16 x 3/32 (4.76 x 2.38)	3/16 x 1/16 (4.76 x 1.58)	.375 (11.1)	3 (1.4)
8	450 (621)	1,650	600	2.80 (3.80)	1/4 x 1/8 (6.35 x 3.17)	1/4 x 3/32 (6.35 x 2.38)	.5 (14.8)	5 (2.3)
10	675 (931)	1,250	350	3.50 (4.75)	5/16 x 5/32 (7.93 x 3.96)	5/16 x 1/8 (7.93 x 3.17)	.5 (14.8)	6 (2.7)
12	1,350 (1863)	1,150	350	5.84 (7.90)	3/8 x 3/16 (9.52 x 4.76)	3/8 x 1/8 (9.52 x 3.17)	.75 (22.2)	9 (4.0)
14	1,600 (2208)	950	250	6.87 (9.30)	7/16 x 7/32 (11.11 x 5.54)	1/2 x 1/4 (12.70 x 6.35)	1 (29.6)	15 (6.8)
16	1,800 (2484)	950	250	6.87 (9.30)	1/2 x 1/4 (12.70 x 6.35)	1/2 x 1/8 (12.70 x 3.17)	1 (29.6)	15 (6.8)

Notes:

Check key and shaft stress before making final clutch selection since this may determine the maximum allowable drive torque capacity.

Specify direction of rotation when ordering.

*Oil lubricated designs are also available. Oil lubricated clutches are shipped without lubrication and require filling before use.



***Model FSR-3 is secured to the shaft by a .187 (4.75) roll pin (furnished)

Bore sizes and keyseats inches (mm)

(Metric bore also available)

Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.
3	.375/.500 (9.52/12.70)	***	.375 (9.52)	.500 (12.70)
5	.500 (12.70)	1/8 x 1/16 (3.18 x 1.59)	.500 (12.70)	.687 (17.45)
	.625 (15.88)	3/16 x 3/32 (4.76 x 2.38)		
6	.750 (19.05)	3/16 x 3/32 (4.75 x 2.38)	.750 (19.05)	.875 (22.22)
	20mm	6 x 2.8mm [†]		
8	.875 (22.22)	1/4 x 1/8 (6.35 x 3.18)	.688 (17.46)	1.125 (28.57)
	25mm	8 x 3.8mm [†]		
	1.000 (25.40)	1/4 x 1/8 (6.35 x 3.18)		
10	1.125 (28.58)	5/16 x 5/32 ^{**} (7.93 x 3.96)	.875 (22.22)	1.375 (34.92)
	30mm	8 x 3.8mm [†]		
	1.250 (31.75)	5/16 x 5/32 (7.93 x 3.96)		
12	1.375 (34.93)	5/16 x 5/32 (7.93 x 3.96)	1.125 (28.57)	1.625 (41.27)
	1.500 (38.10)	3/8 x 3/16 (9.52 x 4.76)		
	40mm	12 x 3.3mm [†]		
14	1.625 (41.27)	7/16 x 7/32 (11.11 x 5.54)	1.375 (34.92)	1.875 (47.62)
	1.750 (44.45)			
	45mm	12 x 3.3mm [†]		
16	1.875 (47.62)	1/2 x 1/4 (12.70 x 6.35)	1.500 (38.10)	2.187 (55.55)
	50mm	14 x 3.8mm [†]		
	2.000 (50.80)	1/2 x 1/4 (12.70 x 6.35)		

**250 x .13 also available

Dimensions inches (mm)

Size	A	B	C	D	E	F	G	H	J	K	L	L ₁ *	M	N	P
3	1.88 (47.62)	1.63 (41.27)	.875/.874 (22.23/22.20)	.69 (17.46)	.80 (20.24)	.81 (20.64)	.500 (12.70)	.94 (33.32)	.715/.720 (18.16/18.29)	.036/.056 (.91/1.42)	.841/.835 (21.36/21.21)	RS 87	—	.22 (5.54)	—
5	2.75 (69.85)	2.00 (50.80)	1.250/1.249 (31.75/31.72)	1.25 (31.75)	1.00 (25.40)	1.00 (25.40)	.562 (14.27)	1.63 (41.27)	.900/.905 (22.86/22.99)	.048/.068 (1.22/1.73)	1.206/1.198 (30.63/30.43)	RS 125	#8-36	.25 (6.35)	#10-32
6	3.19 (80.95)	2.88 (73.00)	1.375/1.374 (34.93/34.90)	1.56 (39.67)	1.38 (34.92)	1.31 (33.32)	.937 (23.80)	1.69 (42.85)	1.215/1.220 (30.86/30.99)	.048/.068 (1.22/1.73)	1.327/1.319 (33.70/33.50)	RS 137	#10-32	.18 (4.75)	.250-28
8	3.56 (90.50)	3.25 (82.55)	1.750/1.749 (44.45/44.42)	1.75 (44.45)	1.62 (41.27)	1.44 (36.50)	1.00 (25.40)	1.88 (47.62)	1.315/1.320 (33.40/33.53)	.056/.076 (1.42/1.93)	1.696/1.686 (43.08/42.82)	RS 175	.250-28	.25 (6.35)	.250-28
10	3.50 (88.90)	3.75 (95.25)	2.250/2.249 (57.15/57.12)	1.75 (44.45)	2.03 (51.59)	1.44 (36.50)	.94 (23.80)	1.81 (46.02)	1.340/1.345 (34.04/34.16)	.056/.076 (1.42/1.93)	2.182/2.170 (55.42/55.12)	RS 225	.250-28	.25 (6.35)	.250-28
12	3.88 (98.42)	4.44 (112.70)	2.500/2.499 (63.50/63.47)	1.94 (49.20)	2.38 (60.32)	1.44 (36.50)	1.19 (30.22)	2.13 (53.97)	1.311/1.321 (33.30/33.55)	.120/.130 (3.05/3.30)	2.391/2.379 (60.73/60.43)	RST-250	.312-24	.31 (7.92)	.250-28
14	4.38 (111.12)	5.50 (139.70)	2.875/2.874 (73.03/73.00)	2.19 (55.56)	3.00 (76.20)	1.75 (44.45)	1.34 (34.04)	2.25 (57.15)	1.625/1.630 (41.27/41.40)	.056/.076 (1.42/1.93)	2.787/2.775 (70.79/70.48)	RS 287	.312-24	.31 (7.92)	.250-28
16	4.38 (111.12)	5.50 (139.70)	3.250/3.249 (82.55/82.52)	2.19 (55.56)	3.00 (76.20)	1.75 (44.45)	1.44 (36.58)	2.25 (57.15)	1.650/1.655 (41.91/42.04)	.068/.088 (1.72/2.23)	3.156/3.144 (80.16/79.86)	RS 325	.312-24	.31 (7.92)	.250-28

*Spirolox snap ring not included.

†Contact Formsprag for keyseat information.

Special Purpose Clutches

RL (Reverse-Locking)

Backstopping, Bi-directional / Reverse-locking Ball Bearing Supported, Sprag Clutches



Available in six sizes, the Formsprag RL Clutch is a sprag type no-back which permits transmission of driving torque from input to output shaft in both directions of rotation, but restrains any feedback torque of the driven load from rotating the output shaft in either direction.

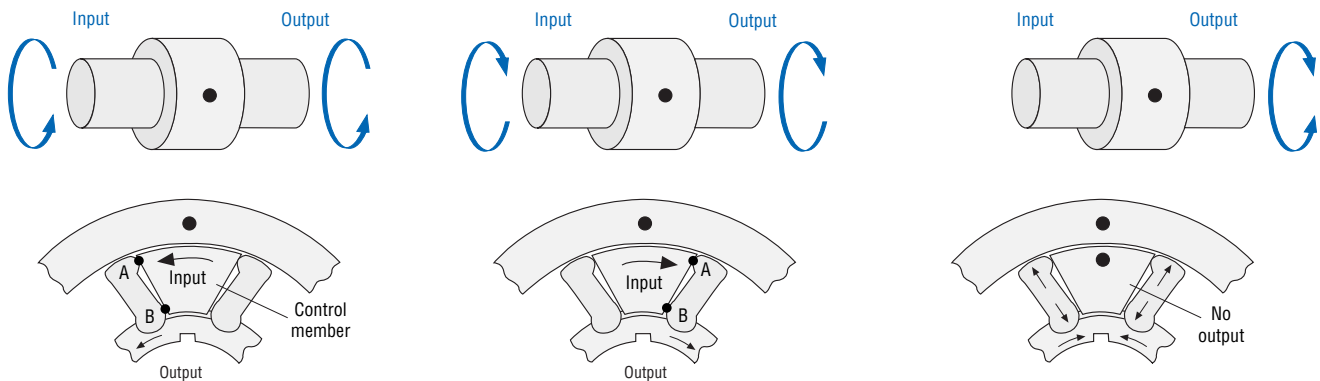
The RL Clutch is extremely simple in design and has a minimum number of moving parts. The outer race diameter is the same size as standard bearing dimensions, thus simplifying mounting and providing maximum strength in the assembly.

Model RL-47A through RL-160A

Models RL-47A through RL-160A are larger units applicable in an extensive torque capacity range. These models require lubrication.

Operating Principle

With the outer race held in a stationary or fixed position, torque is transmitted as follows:

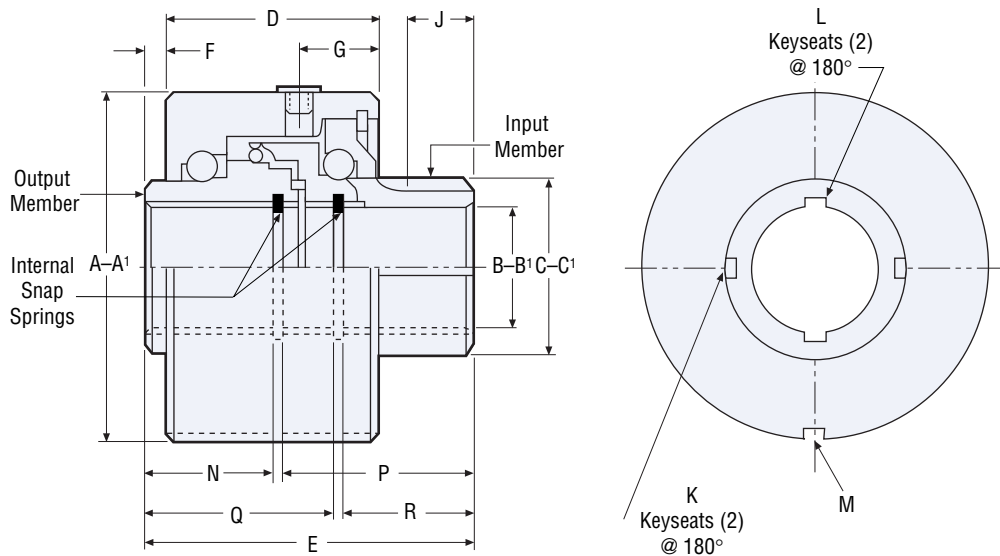


The control member projects between each pair of opposing sprags and when driving torque is applied to it, each projection first contacts a sprag at point "A" to disengage the sprag from the outer race. Then, the control member drives against the sprag at point "B" to transmit driving torque directly to the output member.

When input torque is reversed, the control member rotates a maximum of 6° to release the opposing set of sprags and then again drives the output member through point "B" on these sprags.

Any feedback torque from the output member is instantly stopped by the wedging of sprags between the fixed outer race and the output member—feedback torque never reaches the control member.

RL-47A through RL-160A



Dimensions inches (mm)

Size	A	B	C	D*	E*	F**	G*	H	J*
RL-47A	1.8504/1.8499 (47.000/46.987)	.500/.501 (12.700/12.725)	.783/.782 (19.89/19.86)	1.563 (39.70)	2.125 (53.98)	.031 (.787)	.688 (17.48)		.438 (11.13)
RL-72A	2.8346/2.8341 (71.999/71.986)	1.000/1.001 (25.400/25.425)	1.376/1.375 (34.95/34.93)	1.719 (43.66)	2.625 (66.68)	.156 (3.96)	.750 (19.05)		.625 (15.88)
RL-115A	4.5276/4.5271 (115.001/114.988)	1.500/1.501 (38.100/38.125)	2.001/2.000 (50.83/50.80)	2.281 (57.94)	3.141 (79.78)	.031 (.787)	.875 (22.23)		.688 (17.48)
RL-130A	5.1181/5.1173 (129.999/129.979)	2.000/2.001 (50.800/50.825)	2.845/2.844 (72.26/72.24)	2.828 (71.83)	4.172 (105.97)	.031 (.787)	1.00 (25.40)		1.031 (26.19)
RL-160A	6.2992/6.2982 (159.999/159.974)	2.500/2.501 (63.500/63.525)	3.876/3.875 (98.45/98.43)	3.094 (78.59)	4.719 (119.86)	.031 (.787)	1.00 (25.40)		.937 (23.80)

*± .010 (.254) except RL-35A

**± .020 (.508) except RL-35A

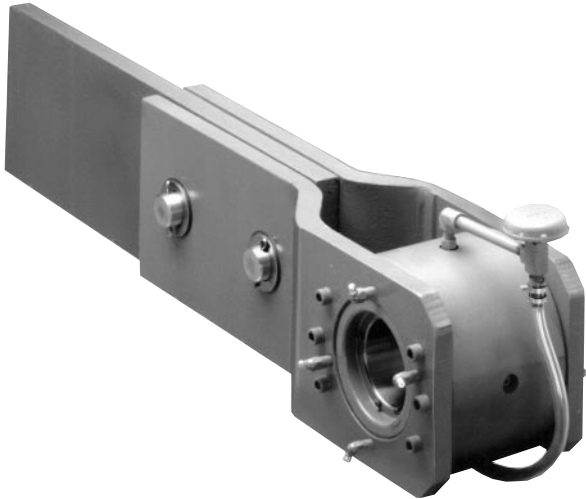
Bore sizes and keyseats inches (mm)

Size	A ¹ Housing Bore	B ¹ Shaft Dia.	C ¹ Bore Dia.	Keyseats			Key Engagement Lengths		Shaft Engagement Lengths	
				K	L	M	N	R	Q	P
RL-47A	1.8514/1.8520 (47.025/47.041)	.499/.498 (12.67/12.65)	.7833/.7838 (19.896/19.908)	3/32 x 1/16 (2.39 x 1.27)	3/32 x 1/16 (2.39 x 1.27)	1/8 x 1/16 (3.18 x 1.59)	.781 (19.84)	.813 (20.65)	1.156 (29.36)	1.188 (30.18)
RL-72A	2.8356/2.8362 (72.024/72.039)	.999/.988 (25.38/25.35)	1.3763/1.3768 (34.958/34.971)	5/32 x 1/16 (3.96 x 1.78)	5/32 x 1/16 (3.96 x 1.78)	1/8 x 1/16 (3.18 x 1.59)	1.000 (25.40)	1.000 (25.40)	1.469 (37.31)	1.469 (37.31)
RL-115A	4.5286/4.5294 (115.026/115.047)	1.499/1.498 (38.07/38.05)	2.0013/2.0020 (50.833/50.851)	1/4 x 1/8 (6.35 x 3.18)	1/4 x 1/8 (6.35 x 3.18)	1/4 x 1/8 (6.35 x 3.18)	1.188 (41.27)	1.188 (41.28)	1.781 (45.24)	1.781 (45.24)
RL-130A	5.1191/5.1201 (130.025/130.051)	1.999/1.998 (50.77/50.75)	2.8453/2.8463 (72.271/72.296)	5/16 x 5/32 (7.93 x 3.96)	5/16 x 5/32 (7.93 x 3.96)	1/4 x 1/8 (6.35 x 3.18)	1.635 (41.27)	1.635 (41.27)	2.375 (60.33)	2.375 (60.33)
RL-160A	6.3002/6.3012 (160.025/160.050)	2.499/2.498 (63.48/63.45)	3.8763/3.8775 (98.458/98.489)	1/2 x 1/4 (12.70 x 6.35)	1/2 x 1/4 (12.70 x 6.35)	1/4 x 1/8 (6.35 x 3.18)	1.875 (47.62)	1.875 (47.62)	2.688 (68.28)	2.688 (68.28)

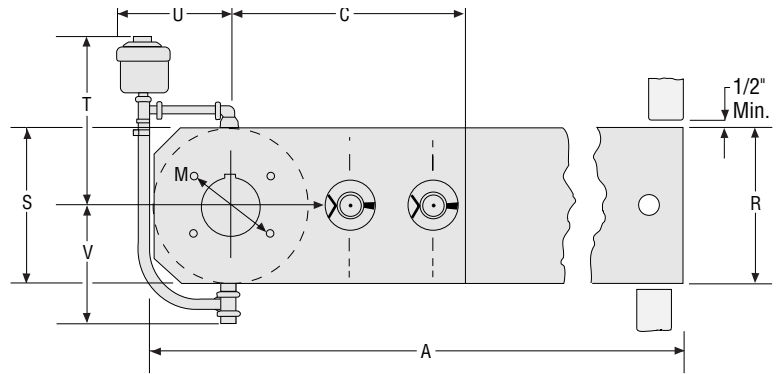
Holdback Clutches

LLH

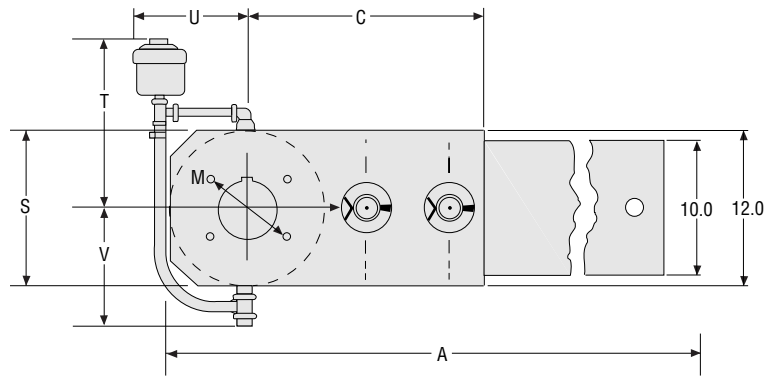
Model sizes 700 through 900



Horizontal Mounting



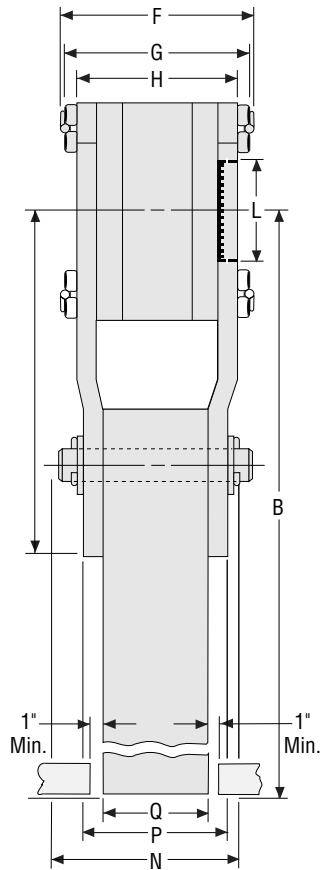
Sizes 700 through 800



Size 900

Dimensions inches (mm)

Size	A	B	C	F	G	H	J	L	M	N	P
700	33.63 (854.07)	30.00 (762.00)	18.00 (457.20)	8.25 (209.55)	7.13 (180.97)	6.38 (161.92)	5.00 (127.00)	3.63 (92.07)	5.31 (134.92)	3.88 (98.42)	2.50 (63.50)
750	36.38 (923.92)	32.00 (812.80)	20.38 (517.52)	9.25 (234.95)	8.38 (212.72)	7.38 (187.32)	6.00 (152.40)	4.63 (117.47)	5.81 (147.62)	3.88 (98.42)	2.50 (63.50)
800	37.00 (939.80)	32.00 (812.80)	22.13 (561.97)	9.50 (241.30)	8.63 (219.07)	7.63 (193.67)	6.00 (152.40)	5.44 (138.10)	7.31 (185.72)	4.19 (106.35)	2.75 (69.85)
900	50.00 (1270.00)	44.00 (1117.60)	22.75 (577.85)	9.75 (247.65)	9.25 (234.95)	8.00 (203.20)	6.38 (161.92)	6.44 (163.50)	8.56 (217.47)	4.69 (119.05)	3.25 (82.55)



Sizes 700 through 900

Dimensions inches (mm)

Size	Q	R	S	T	U	V
700	1.00 (25.40)	7.00 (177.80)	7.13 (180.97)	6.00 (152.40)	6.00 (152.40)	5.00 (127.00)
750	1.00 (25.40)	8.00 (203.20)	8.00 (203.20)	11.50 (292.10)	7.25 (184.15)	7.25 (184.15)
800	1.00 (25.40)	10.00 (254.00)	10.00 (254.00)	12.50 (317.50)	8.00 (203.20)	7.75 (196.85)
900	1.50 (38.10)	10.00 (254.00)	10.00 (254.00)	13.50 (342.90)	9.25 (234.95)	8.75 (222.25)

Bore sizes and keyseats*

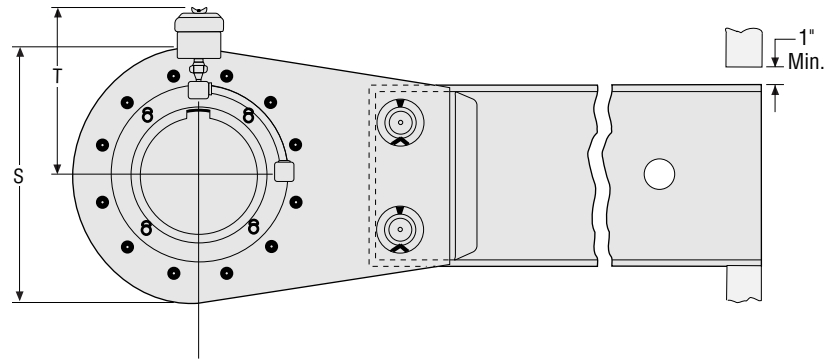
Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.
700	1.937 (49.20)	1/2 x 1/4 (12.70 x 6.35)	1.875 (47.62)	3.250 (74.60)
	2.000 (50.80)			
	2.250 (57.15)			
	2.437 (61.90)	5/8 x 5/16 (15.87 x 7.93)		
	2.500 (63.50)			
	2.750 (69.85)	5/8 x 7/32 (15.87 x 5.56)		
2.937 (74.60)	5/8 x 1/8 (15.87 x 3.18)			
750	2.437 (61.90)	5/8 x 5/16 (15.87 x 7.93)	2.250 (57.15)	3.437 (87.30)
	2.500 (63.50)			
	2.750 (69.85)			
	2.937 (74.60)	3/4 x 3/8 (19.05 x 9.52)		
	3.000 (76.20)			
	3.250 (82.55)	3/4 x 1/4 (19.05 x 6.35)		
	3.437 (87.30)	3/4 x 3/16 (19.05 x 4.75)		
800	2.937 (74.60)	3/4 x 3/8 (19.05 x 9.52)	2.625 (66.67)	4.437 (112.70)
	3.000 (76.20)			
	3.250 (82.55)			
	3.437 (87.30)	7/8 x 7/16 (22.22 x 11.10)		
	3.500 (88.90)			
	3.750 (95.25)			
	3.937 (100.00)	1 x 1/2 (25.40 x 12.70)		
4.000 (101.60)	1 x 3/8 (25.40 x 9.52)			
4.250 (107.95)				
4.437 (112.70)	1 x 1/4 (25.40 x 6.35)			
900	3.937 (100.00)	1 x 1/2 (25.40 x 12.70)	3.625 (92.07)	5.437 (138.10)
	4.000 (101.60)			
	4.250 (107.95)			
	4.437 (112.70)	1 x 3/8 (25.40 x 9.52)		
	4.500 (114.30)			
	4.750 (120.65)			
	4.937 (125.40)	1 x 1/4 (25.40 x 6.35)		
	5.000 (127.00)			
	5.250 (133.35)			
5.437 (138.10)				

*For finished dimensions of keys supplied with the clutch, contact Formsprag.

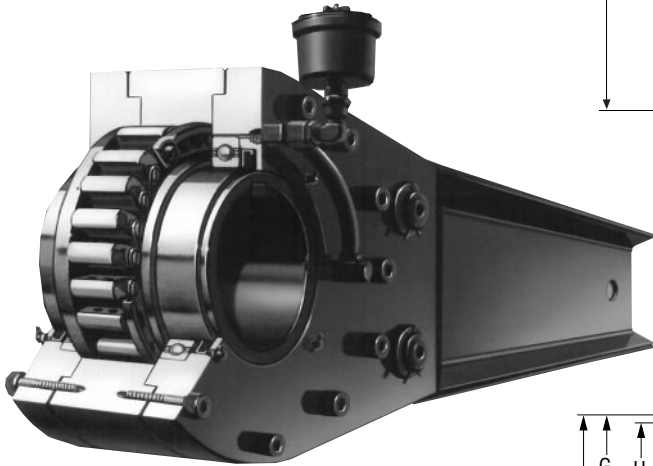
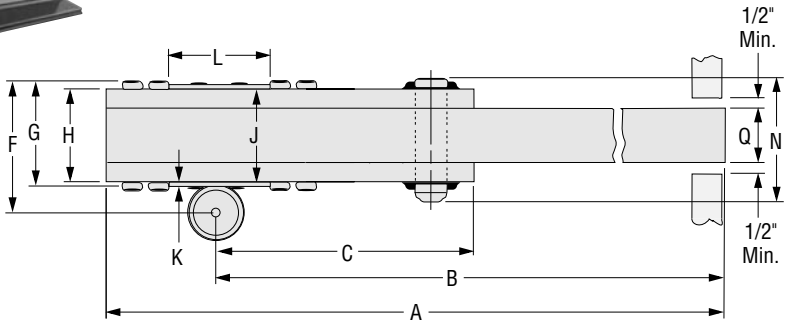
Holdback Clutches

LLH

Model Sizes 1027 Through 5000

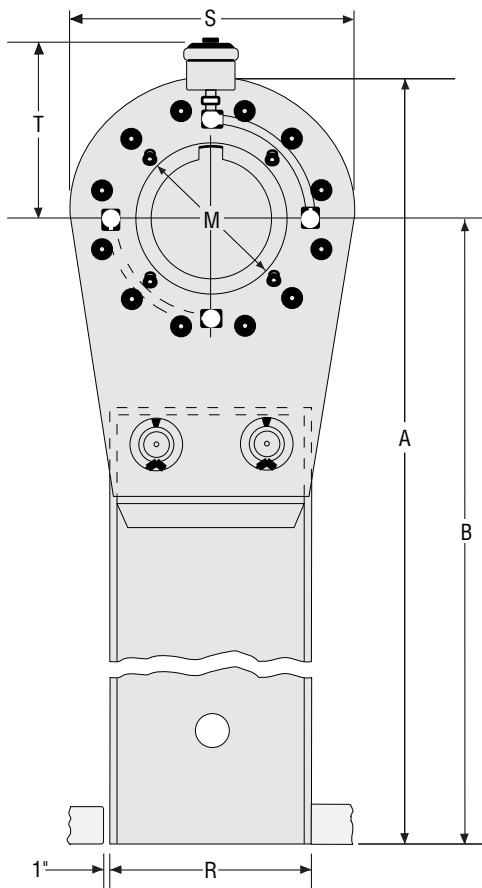


Horizontal Mounting



Dimensions inches (mm)

Size	A	B	C	F	G	H	J	K	L	M	N
1027	68.63 (1743.55)	61.88 (1571.62)	18.00 (457.20)	9.63 (244.47)	9.50 (241.30)	8.25 (209.55)	6.63 (168.27)	—	8.88 (225.42)	10.75 (273.05)	10.00 (254.00)
1051	68.63 (1743.07)	61.13 (1552.57)	18.00 (457.20)	14.25 (361.95)	10.75 (273.05)	9.50 (241.30)	9.63 (244.47)	0.06 (1.57)	8.63 (219.07)	9.63 (244.47)	11.88 (301.62)
1250	76.00 (1930.40)	66.00 (1676.40)	20.25 (514.36)	14.97 (380.24)	11.57 (293.88)	9.80 (248.92)	10.25 (260.35)	.23 (5.84)	10.56 (268.22)	12.00 (304.80)	12.00 (304.80)
1300	77.75 (1974.85)	67.00 (1701.80)	21.81 (553.97)	15.10 (383.54)	11.87 (300.23)	9.80 (248.92)	10.25 (260.35)	.23 (5.84)	11.72 (297.69)	13.00 (330.20)	12.00 (304.80)
1375	82.25 (2089.15)	70.00 (1778.00)	24.50 (622.30)	15.22 (386.59)	12.07 (306.58)	9.80 (248.92)	11.00 (279.40)	.61 (15.494)	13.56 (344.42)	15.00 (381.00)	12.00 (304.80)
2000	97.00 (2463.80)	82.00 (2082.80)	29.44 (747.70)	15.38 (390.52)	12.38 (314.32)	10.38 (263.52)	10.62 (269.8)	0.13 (3.17)	17.56 (446.07)	19.25 (488.95)	13.00 (330.20)
2400	100.50 (2552.70)	82.50 (2095.50)	34.19 (868.35)	15.38 (390.52)	12.38 (314.32)	10.63 (269.87)	10.88 (276.22)	0.13 (3.17)	19.56 (496.87)	21.25 (539.75)	13.25 (336.55)
3500	101.50 (2578.10)	82.50 (2095.50)	34.12 (866.65)	20.16 (512.06)	17.00 (431.80)	14.75 (374.65)	18.00 (457.20)	1.03 (26.16)	22.46 (570.48)	26.00 (660.40)	16.75 (425.45)
5000	101.50 (2578.10)	82.50 (2095.50)	34.12 (866.65)	24.66 (626.36)	21.50 (546.10)	19.25 (488.95)	22.81 (579.37)	1.03 (26.16)	22.46 (570.48)	26.00 (660.40)	21.25 (539.75)



Vertical Mounting

(Must be mounted at least 10° off of vertical)

Dimensions inches (mm)

Size	P*	Q	R	S	T
1027	8.25 (209.55)	5.25 (133.35)	12.00 (304.80)	15.00 (381.00)	14.50 (368.30)
1051	9.50 (241.30)	5.25 (133.35)	12.00 (304.80)	15.00 (381.00)	12.00 (304.80)
1250	—	5.50 (139.70)	15.00 (381.00)	20.00 (508.00)	13.17 (334.52)
1300	—	6.25 (158.75)	18.00 (457.20)	21.50 (546.10)	13.42 (340.87)
1375	—	6.25 (158.75)	18.00 (457.20)	24.50 (622.30)	14.55 (369.57)
2000	—	7.13 (180.97)	24.00 (609.60)	30.00 (762.00)	17.25 (438.15)
2400	—	7.88 (200.02)	24.00 (609.60)	36.00 (914.40)	18.75 (476.25)
3500	—	8.00 (203.20)	24.00 (609.60)	38.00 (965.20)	20.17 (512.32)
5000	—	8.00 (203.20)	24.00 (609.60)	38.00 (965.20)	20.17 (512.32)

* Width over torque cap, see page 71.

Bore sizes and keyseats**

Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.
1027	4.937 (125.40) to 6.000 (152.40)	1 1/4 x 5/8 (31.75 x 15.87)	4.937 (125.40)	7.000 (177.80)
	6.250 (158.75) to 6.500 (165.10)	1 1/2 x 1/2 (38.10 x 12.70)		
	6.750 (171.45) to 7.000 (177.80)	1 1/2 x 7/16 (38.10 x 11.10)		
1051	5.000 (127.00) to 6.000 (152.40)	1 1/4 x 5/8 (31.75 x 15.88)	4.937 (125.40)	7.000 (177.80)
	6.250 (158.75) to 6.625 (162.28)	1 1/2 x 5/8 (38.10 x 15.88)		
	6.750 (171.45) to 6.875 (174.63)	1 1/2 x 1/2 (38.10 x 12.70)		
	7.000 (177.80)	1 1/2 x 7/16 (38.10 x 11.11)		
1250	7.50 (190.50) to 7.937 (201.60)	1 3/4 x 7/8 (44.45 x 22.35)	6.750 (171.45)	9.000 (228.60)
	8.000 (203.20) to 8.250 (209.55)	1 3/4 x 5/8 (44.45 x 16.00)		
	8.312 (211.12) to 9.000 (228.60)	1 1/2 x 1/2 (38.10 x 12.70)		
	8.000 (203.20) to 9.000 (228.60)	1 3/4 x 7/8 (44.45 x 22.35)		
1300	9.000 (228.60) to 10.250 (260.35)	1 3/4 x 7/8 (44.45 x 22.35)	7.937 (201.60)	10.000 (254.00)
	10.312 (261.93) to 11.00 (279.40)	2 x 3/4 (50.80 x 19.05)		
	10.937 (277.80) to 12.000 (304.80)	2 1/2 x 1 1/4 (63.50 x 31.75)		
2000	12.063 (306.40) to 13.250 (336.55)	2 1/2 x 1 (63.50 x 25.40)	10.937 (277.80)	13.250 (336.55)
	13.000 (330.20) to 15.000 (381.00)	2 1/2 x 1 1/4 (63.50 x 31.75)		
	15.063 (382.60) to 15.500 (393.70)	2 1/2 x 1 (63.50 x 25.40)		
2400	13.437 (341.30) to 13.750 (349.25)	2 1/2 x 1 1/4 (63.50 x 31.75)	13.437 (341.30)	20.00 (508.00)
	14.000 (355.60) to 18.000 (457.20)	3 x 1 1/2 (76.20 x 38.10)		
	20.000 (508.00)	3 x 1 1/4 (76.20 x 31.75)		
5000	13.437 (341.30) to 13.750 (349.25)	2 1/2 x 1 1/4 (63.50 x 31.75)	13.437 (341.30)	20.00 (508.00)
	14.000 (355.60) to 18.000 (457.20)	3 x 1 1/2 (76.20 x 38.10)		
	20.000 (508.00)	3 x 1 1/4 (76.20 x 31.75)		
	20.000 (508.00)	3 x 1 1/4 (76.20 x 31.75)		

**For finished dimensions of keys supplied with the clutch, contact Formsprag.