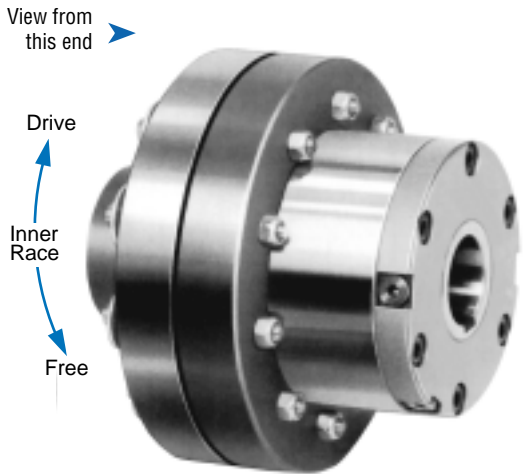


# Clutch Couplings

## AL..KEED2, ALM..KEED2

### Overrunning, Indexing, Backstopping Ball Bearing Supported, Ramp & Roller Clutch Couplings



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

Model AL..KEED2 is a ramp & roller type clutch coupling, self contained, sealed and bearing supported, using two 160 Series bearings. Unit is shipped oil lubricated.

In this design, a standard AL clutch is connected to a KEE flexible coupling for in-line mounting. The KEE model is a rugged coupling, economical and suitable for many applications.

D2 cover is used to enclose the unit. It is equipped with two screws for oil filling.

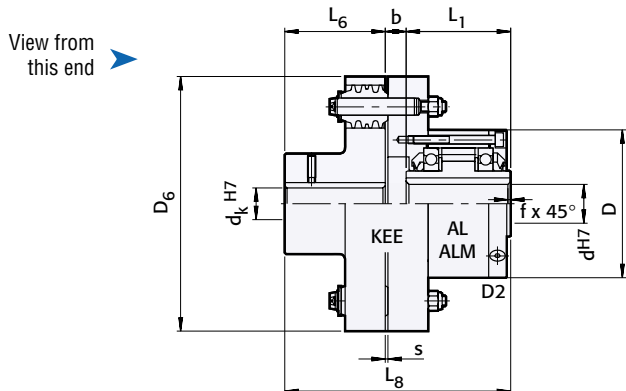
We recommend that the unit be supplied assembled.

#### Specifications

Model	Size	KEE Coupling	Torque Capacity lb.ft. (Nm)	Overrunning Speed Max. RPM		Hub Bore Range d <sub>k</sub> <sup>H7</sup>	Shipping Weight lb (kg)
				Inner Race	Outer Race		
	12	2	41 (55)	2,500	6,000	0.47 – 0.98 (12 – 25)	6.62 (3)
	15	3	90 (122)	1,900	6,000	0.63 – 1.18 (16 – 30)	9.70 (4.4)
	20	3	90 (122)	1,600	5,600	0.63 – 1.18 (16 – 30)	10.14 (4.6)
	25	4	213 (288)	1,400	4,500	0.79 – 1.57 (20 – 40)	14.11 (6.4)
	30	5	369 (500)	1,300	4,100	0.79 – 1.97 (20 – 50)	24.26 (11)
	35	6	535 (725)	1,100	3,800	0.98 – 2.56 (25 – 65)	37.48 (17)
	40	6	756 (1025)	950	3,400	0.98 – 2.56 (25 – 65)	41.90 (19)
	45	6	775 (1050)	900	3,200	0.98 – 2.56 (25 – 65)	41.90 (19)
	50	7	1,292 (1750)	850	2,800	1.18 – 2.95 (30 – 75)	68.36 (31)
<b>AL.. KEED2</b>	55	8	1,937 (2625)	720	2,650	1.38 – 3.54 (35 – 90)	103.64 (47)
	60	8	2,030 (2750)	680	2,450	1.38 – 3.54 (35 – 90)	108.05 (49)
	70	10	4,244 (5750)	580	2,150	1.77 – 4.33 (45 – 110)	198.45 (90)
	80	11	6,273 (8500)	480	1,900	2.17 – 4.92 (55 – 125)	235.94 (107)
	90	12	10,148 (13750)	380	1,700	2.56 – 5.51 (65 – 140)	374.85 (170)
	100	14	14,760 (20000)	350	1,450	2.95 – 6.30 (75 – 160)	507.15 (230)
	120	16	22,140 (30000)	250	1,250	3.35 – 7.09 (85 – 180)	727.65 (330)
	150	18	32,288 (43750)	180	980	3.74 – 7.87 (95 – 200)	1102.50 (500)
	200	22	71,955 (97500)	120	750	4.92 – 9.84 (125 – 250)	2127.83 (965)
	250	28	184,500 (250000)	100	620	6.30 – 12.60 (160 – 320)	3803.62 (1725)
	25	4	213 (288)	1,100	2,800	0.79 – 1.57 (20 – 40)	14.11 (6.4)
<b>ALM.. KEED2</b>	30	5	434 (588)	1,000	2,500	0.79 – 1.97 (20 – 50)	24.26 (11)
	35	6	618 (838)	900	2,400	0.98 – 2.56 (25 – 65)	37.48 (17)

#### Notes:

For clutch bore (d<sup>H7</sup>) and keyseat information see page 87.  
When ordering, please specify direction of rotation.



### Dimensions inches (mm)

Model	Size	D	L <sub>1</sub>	D <sub>6</sub>	L <sub>6</sub>	L <sub>8</sub>	b	s	f
	12	2.44 (62)	1.65 (42)	3.82 (97)	1.38 (35)	3.54 (90)	0.51 (13)	0.12 (3)	0.02 (0.5)
	15	2.68 (68)	2.05 (52)	4.41 (112)	1.57 (40)	4.33 (110)	0.71 (18)	0.12 (3)	0.03 (0.8)
	20	2.95 (75)	2.24 (57)	4.41 (112)	1.57 (40)	4.51 (114.5)	0.69 (17.5)	0.12 (3)	0.03 (0.8)
	25	3.54 (90)	2.36 (60)	5.12 (130)	1.97 (50)	5.02 (127.5)	0.69 (17.5)	0.12 (3)	0.04 (1)
	30	3.94 (100)	2.68 (68)	6.30 (160)	2.36 (60)	5.83 (148)	0.79 (20)	0.08 (2)	0.04 (1)
	35	4.33 (110)	2.91 (74)	7.48 (190)	2.95 (75)	6.61 (168)	0.75 (19)	0.08 (2)	0.04 (1)
	40	4.92 (125)	3.39 (86)	7.48 (190)	2.95 (75)	7.01 (178)	0.67 (17)	0.08 (2)	0.06 (1.5)
	45	5.12 (130)	3.39 (86)	7.48 (190)	2.95 (75)	7.01 (178)	0.67 (17)	0.08 (2)	0.06 (1.5)
	50	5.91 (150)	3.62 (92)	8.86 (225)	3.54 (90)	8.15 (207)	0.98 (25)	0.10 (2.5)	0.06 (1.5)
<b>AL.. KEED2</b>	55	6.30 (160)	4.09 (104)	10.63 (270)	3.94 (100)	9.19 (233.5)	1.16 (29.5)	0.12 (3)	0.08 (2)
	60	6.69 (170)	4.49 (114)	10.63 (270)	3.94 (100)	9.61 (244)	1.18 (30)	0.12 (3)	0.08 (2)
	70	7.48 (190)	5.28 (134)	13.39 (340)	5.51 (140)	12.30 (312.5)	1.52 (38.5)	0.12 (3)	0.10 (2.5)
	80	8.27 (210)	5.67 (144)	14.96 (380)	6.30 (160)	13.39 (340)	1.42 (36)	0.12 (3)	0.10 (2.5)
	90	9.06 (230)	6.22 (158)	17.32 (440)	7.09 (180)	15.28 (388)	1.97 (50)	0.14 (3.5)	0.12 (3)
	100	10.63 (270)	7.17 (182)	19.69 (500)	7.87 (200)	16.63 (422.5)	1.59 (40.5)	0.14 (3.5)	0.12 (3)
	120	12.20 (310)	7.95 (202)	22.05 (560)	8.66 (220)	18.54 (471)	1.93 (49)	0.16 (4)	0.12 (3)
	150	15.75 (400)	9.69 (246)	25.20 (640)	9.84 (250)	21.38 (543)	1.85 (47)	0.16 (4)	0.16 (4)
	200	20.47 (520)	12.83 (326)	34.65 (880)	12.60 (320)	27.58 (700.5)	2.15 (54.5)	0.18 (4.5)	0.20 (5)
	250	24.02 (610)	15.59 (396)	45.67 (1160)	15.75 (400)	34.17 (868)	2.83 (72)	0.20 (5)	0.20 (5)
	25	3.54 (90)	2.36 (60)	5.12 (130)	1.97 (50)	5.02 (127.5)	0.69 (17.5)	0.12 (3)	0.04 (1)
<b>ALM.. KEED2</b>	30	3.94 (100)	2.68 (68)	6.30 (160)	2.36 (60)	5.83 (148)	0.79 (20)	0.08 (2)	0.04 (1)
	35	4.33 (110)	2.91 (74)	7.48 (190)	2.95 (75)	6.61 (168)	0.75 (19)	0.08 (2)	0.04 (1)

**AL..KMSD2, ALM..KMSD2****Overrunning, Indexing, Backstopping  
Ball Bearing Supported, Ramp & Roller Clutch Couplings**

Right Hand rotation shown.  
(Left Hand opposite.)

Specify direction of rotation when ordering.

Model AL..KMSD2 is a ramp & roller type clutch coupling, self contained, sealed and bearing supported, using two 160 Series bearings. Unit is shipped oil lubricated.

In this design, a standard AL clutch is connected to a KMS flexible coupling for in-line mounting. The KMS model is a rugged coupling, economical and suitable for many applications.

D2 cover is used to enclose the unit. It is equipped with two screws for oil filling.

We recommend that the unit be supplied assembled.

**Specifications**

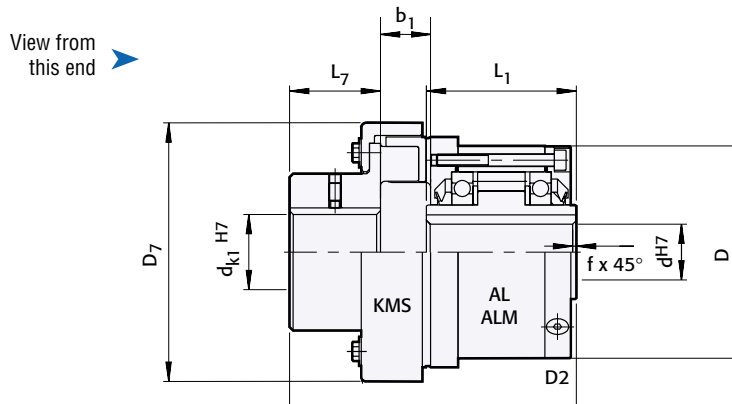
Model	Size	KMS	Torque Capacity lb.ft. (Nm)	Overrunning Speed Max. RPM		Hub Bore Range $d_{K1}^{H7}$	Shipping Weight lb (kg)	
				Inner Race	Outer Race			
	12	4	37 (50)	2,500	6,000	0.28 – 1.38 (7 – 35)	4.63 (2.1)	
	15	6.3	58 (79)	1,900	6,000	0.47 – 1.57 (12 – 40)	5.95 (2.7)	
	20	10	92 (125)	1,600	5,600	0.39 – 1.77 (10 – 45)	8.38 (3.8)	
	25	10	92 (125)	1,400	4,500	0.39 – 1.77 (10 – 45)	9.70 (4.4)	
	30	16	148 (200)	1,300	4,100	0.39 – 1.97 (10 – 50)	13.01 (5.9)	
	35	25	231 (313)	1,100	3,800	0.59 – 2.17 (15 – 55)	17.86 (8.1)	
	40	40	369 (500)	950	3,400	0.79 – 2.36 (20 – 60)	25.14 (11.4)	
	45	63	582 (788)	900	3,200	0.79 – 2.76 (20 – 70)	29.33 (13.3)	
	50	100	923 (1250)	850	2,800	0.98 – 2.95 (25 – 75)	42.12 (19.1)	
<b>AL.. KMSD2</b>	55	100	923 (1250)	720	2,650	0.98 – 2.95 (25 – 75)	44.98 (20.4)	
	60	160	1,476 (2000)	680	2,450	1.18 – 3.15 (30 – 80)	59.76 (27.1)	
	70	250	2,306 (3125)	580	2,150	1.38 – 3.54 (35 – 90)	89.08 (40.4)	
	80	400	3,690 (5000)	480	1,900	1.77 – 3.94 (45 – 100)	125.69 (57)	
	90	630	5,812 (7875)	380	1,700	2.36 – 4.72 (60 – 120)	191.84 (87)	
	100	1000	9,225 (12500)	350	1,450	2.95 – 5.51 (75 – 140)	288.86 (131)	
	120	1600	14,760 (20000)	250	1,250	3.54 – 6.30 (90 – 160)	432.18 (196)	
	150			ON REQUEST				
	200			"				
	250			"				
	25	16	148 (200)	1,100	2,800	0.79 – 1.57 (20 – 40)	9.70 (4.4)	
<b>ALM.. KMSD2</b>	30	25	231 (313)	1,000	2,500	0.79 – 1.97 (20 – 50)	13.01 (5.9)	
	35	40	369 (500)	900	2,400	0.98 – 2.56 (25 – 65)	17.86 (8.1)	

**Notes:**

For clutch bore ( $d^{H7}$ ) and keyseat information see page 87.  
When ordering, please specify direction of rotation.

# Clutch Couplings

## AL..KMSD2, ALM..KMSD2

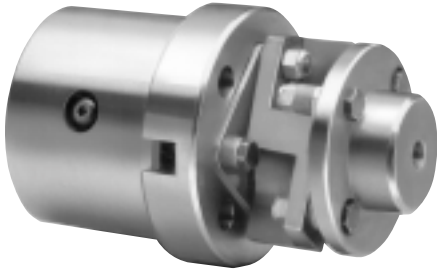


### Dimensions inches (mm)

Model	Size	d <sup>H7</sup>	D	L <sub>1</sub>	D <sub>7</sub>	d <sub>k1</sub> <sup>H7</sup>	L <sub>7</sub>	L <sub>9</sub>	b <sub>1</sub>	
	12	0.47 (12)	2.44 (62)	1.65 (42)	3.07 (78)	.28 – 1.38 (7 – 35)	1.57 (40)	3.94 (100)	0.71 (18)	
	15	0.59 (15)	2.68 (68)	2.05 (52)	3.54 (90)	.47 – 1.57 (12 – 40)	1.77 (45)	4.57 (116)	0.77 (20)	
	20	0.79 (20)	2.95 (75)	2.24 (57)	4.49 (114)	.39 – 1.77 (10 – 45)	1.89 (48)	4.86 (123.5)	0.67 (17)	
	25	0.98 (25)	3.54 (90)	2.36 (60)	4.49 (114)	.39 – 1.77 (10 – 45)	1.89 (48)	4.98 (126.5)	0.67 (17)	
	30	1.18 (30)	3.94 (100)	2.68 (68)	5.00 (127)	.39 – 1.97 (10 – 50)	2.05 (52)	5.51 (140)	0.75 (19)	
	35	1.38 (35)	4.33 (110)	2.91 (74)	5.63 (143)	.59 – 2.17 (15 – 55)	2.24 (57)	6.10 (155)	0.87 (22)	
	40	1.57 (40)	4.92 (125)	3.39 (86)	6.22 (158)	.79 – 2.36 (20 – 60)	2.40 (61)	6.81 (173)	1.02 (26)	
	45	1.77 (45)	5.12 (130)	3.39 (86)	7.13 (181)	.79 – 2.76 (20 – 70)	2.64 (67)	7.32 (186)	1.18 (30)	
	50	1.97 (50)	5.91 (150)	3.62 (92)	7.95 (202)	.98 – 2.95 (25 – 75)	2.95 (75)	8.21 (208.5)	1.38 (35)	
<b>AL.. KMSD2</b>	55	2.17 (55)	6.30 (160)	4.09 (104)	7.95 (202)	.98 – 2.95 (25 – 75)	2.95 (75)	8.52 (216.5)	1.38 (35)	
	60	2.36 (60)	6.69 (170)	4.49 (114)	9.06 (230)	1.18 – 3.15 (30 – 80)	3.23 (82)	9.57 (243)	1.61 (41)	
	70	2.76 (70)	7.48 (190)	5.28 (134)	10.12 (257)	1.38 – 3.54 (35 – 90)	3.50 (89)	10.93 (277.5)	1.85 (47)	
	80	3.15 (80)	8.27 (210)	5.67 (144)	11.57 (294)	1.77 – 3.94 (45 – 100)	3.82 (97)	12.01 (305)	2.20 (56)	
	90	3.54 (90)	9.06 (230)	6.22 (158)	13.07 (332)	2.36 – 4.72 (60 – 120)	4.57 (116)	13.64 (346.5)	2.52 (64)	
	100	3.94 (100)	10.63 (270)	7.17 (182)	15.04 (382)	2.95 – 5.51 (75 – 140)	5.51 (140)	15.20 (386)	2.95 (75)	
	120	4.72 (120)	12.20 (310)	7.95 (202)	17.01 (432)	3.54 – 6.30 (90 – 160)	6.30 (160)	18.03 (458)	2.95 (75)	
	150	5.91 (150)	ON REQUEST							
	200	7.87 (200)	"							
	250	9.84 (250)	"							
	25	0.98 (25)	3.54 (90)	2.36 (60)	4.54 (113)	.47 – 1.97 (12 – 50)	2.05 (52)	5.22 (132.5)	0.75 (19)	
<b>ALM.. KMSD2</b>	30	1.18 (30)	3.94 (100)	2.68 (68)	4.92 (125)	.59 – 2.17 (15 – 55)	2.24 (57)	5.91 (150)	0.87 (22)	
	35	1.38 (35)	4.33 (110)	2.91 (74)	5.51 (140)	.71 – 2.36 (18 – 60)	2.40 (61)	6.42 (163)	1.02 (26)	

### Overrunning Ball Bearing Supported, Sprag Clutch Couplings

#### FW Series



For in-line shaft applications

**Outer race overrunning—  
intermediate speed**

**Inner race overrunning—  
high speed**

FW clutch couplings are comprised of an FSO clutch with a Form Flex disc coupling. The Model FSO clutch can not accommodate any misalignment, so a coupling is always required for shaft to shaft in-line mounting. The FW clutch couplings are designed for high speed inner

race overrunning and intermediate speed outer race overrunning. They are usually selected for inner race overrunning. Where outer race overrunning is necessary, use the AL..KMSD2 clutch coupling.

FW clutch couplings accommodate angular and parallel misalignment, are torsionally stiff and can couple shafts of different sizes.

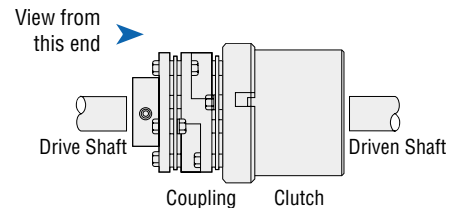
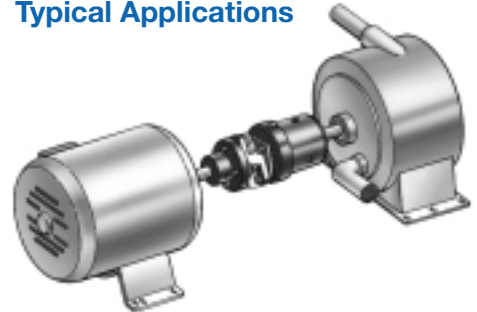
Increased clutch-coupling speeds are possible with FSO clutches having steel labyrinth grease seals.

C/T is ideal for applications with high speed outer race overrunning and slow drive speed.

Models 403 through 712 are equipped with PCE sprags and are shipped from the factory with Mobil DTE Heavy Medium Oil.

FW-752 through 1018 clutches are shipped from the factory with Fiske Bothers Lubriplate Low-Temp Grease.

#### Typical Applications



The FW Series clutch coupling is designed for **inner race overrunning**. Mount the clutch half of the unit on the driven shaft.

#### FWW Series



For in-line shaft applications  
requiring low torque

FWW clutch couplings are designed for applications where the torque requirement is low in comparison to the shaft diameters. Both bore diameters in coupling hubs are larger than clutch bores in FW and FWW series.

C/T sprags are available in FWW series.

Increased clutch-coupling speeds are possible with FSO clutches having steel labyrinth seals.

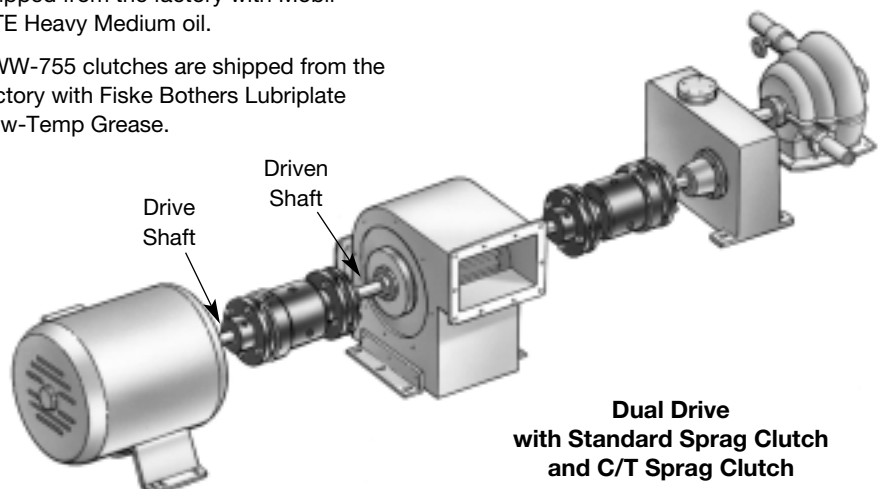
Check key and shaft stress before making final clutch or coupling selection since this may determine maximum allowable drive torque capacity.

FWW-420 through 745 clutches are shipped from the factory with Mobil DTE Heavy Medium oil.

FWW-755 clutches are shipped from the factory with Fiske Bothers Lubriplate Low-Temp Grease.

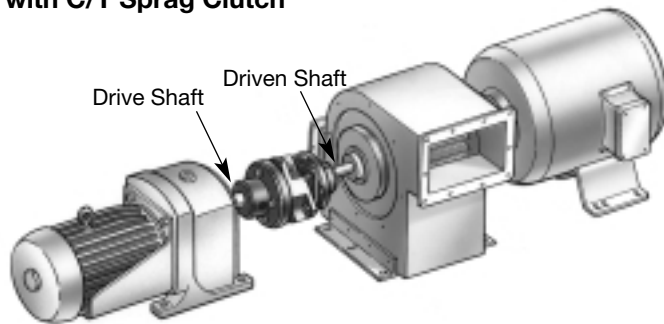
The FWW Series clutch coupling is designed for **inner race overrunning**. Mount the drive coupling on the drive shaft and the driven coupling on the driven shaft.

**Note:** Mounting is reversed for C/T Series.

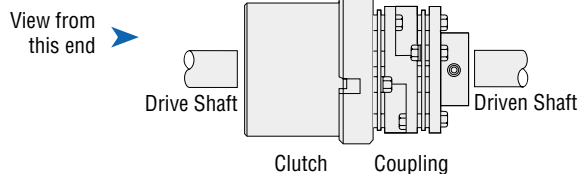


**Dual Drive  
with Standard Sprag Clutch  
and C/T Sprag Clutch**

### Turning Gear Drive with C/T Sprag Clutch

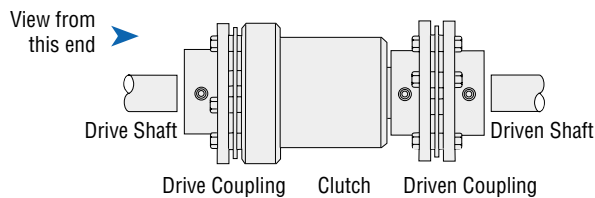


### With C/T Sprags



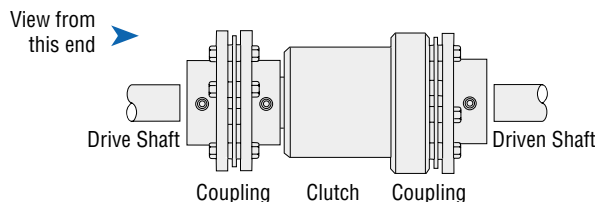
The model FW (C/T) clutch coupling is designed for outer race overrunning. Mount the clutch half of the unit on the drive shaft.

### FWW



The model FWW clutch coupling is designed for inner race overrunning. Mount the drive coupling on the drive shaft and the driven coupling on the driven shaft.

### With C/T Sprags



**Note:** Mounting is reversed for C/T Series.

### Bore and keyseat tolerances for couplings

Couplings will be bored to AGMA Standard 511.02 for Flexible Couplings. Bore fit normally supplied is listed to the right.

*For tolerances not listed, please consult Formsprag.*

### Standard bore tolerances inches (mm)

Nominal Shaft Dia.	Clearance Fit Class 1 Nominal	Interference* Fit Nominal
1/2" through 1 1/2" (12.7 through 38.1)	+ .001 / - .000 (+ .025 / - .000)	Less .001 + .0005 / - .000 (Less .025 + .013 / - .000)
Over 1 1/2" through 2" (Over 38.1 through 50.8)	+ .001 / - .000 (+ .025 / - .000)	Less .002 + .001 / - .000 (Less .051 + .025 / - .000)
Over 2" through 3" (Over 50.8 through 76.2)	+ .0015 / - .000 (+ .038 / - .000)	Less .003 + .0015 / - .000" (Less .076 + .038 / - .000)
Over 3" through 4" (Over 76.2 through 101.6)	+ .0015 / - .000 (+ .038 / - .000)	Less .003 + .0015 / - .000" (Less .076 + .038 / - .000)
Over 4" through 7" (Over 101.6 through 177.8)	+ .002 / - .000 (+ .051 / - .000)	Less .003 + .0015 / - .000" (Less .076 + .038 / .000)

\*Available at extra charge. Sizes are standard unless otherwise specified.

### Standard keyseats inches (mm)

Nominal Shaft Diameter		Keyseat	
Over	Through	Width	Length
		+ .002 / - .000 (+ .051 / - .00)	+ .010 / - .000 (+ .254 / - .000)
3/8 (9.525)	7/16 (11.100)	3/32 (2.362)	1/16 (1.168)
7/16 (11.100)	9/16 (14.275)	1/8 (3.175)	1/16 (1.575)
9/16 (14.275)	7/8 (22.225)	3/16 (4.750)	3/32 (2.362)
7/8 (22.225)	1 1/4 (31.750)	1/4 (6.350)	1/8 (3.175)
1 1/4 (31.750)	1 3/8 (34.925)	5/16 (7.925)	5/32 (3.962)
1 3/8 (34.925)	1 3/4 (44.450)	3/8 (9.525)	3/16 (4.750)
1 3/4 (44.450)	2 1/4 (57.150)	1/2 (12.700)	1/4 (6.350)
2 1/4 (57.150)	2 3/4 (69.850)	5/8 (15.875)	5/16 (7.925)
2 3/4 (69.850)	3 1/4 (82.550)	3/4 (19.050)	3/8 (9.525)
3 1/4 (82.550)	3 3/4 (95.250)	7/8 (22.225)	7/16 (11.100)
3 3/4 (95.250)	4 1/2 (114.300)	1 (25.400)	1/2 (12.700)
4 1/2 (114.300)	5 1/2 (139.700)	1 1/4 (31.750)	5/8 (15.875)
5 1/2 (139.700)	7 (177.800)	1 1/2 (38.100)	3/4 (19.050)

# Clutch Couplings

## FW/FWW

### FW

#### Specifications

FW Size	Torque Capacity lb.ft. (Nm)	HP Rating/ 100 RPM hp (kw)	Maximum Overrunning Speed (RPM)								Clutch Size*	Coupling Size	Shipping Weight lb (kg)
			Standard Sprag			C/T Sprag							
			Outer Race	Inner <sup>†</sup> Race	Drive Speed	Outer Race	Inner Race	Sprag Lift-off	Drive Speed				
403	65 (88)	1.2 (.90)	850	2,800	6,000	5,000	2,800	1,300	1,100	FSO-400	AP10W	11 (5)	
406	180 (244)	3.5 (2.6)	850	2,800	6,000	5,000	2,800	1,300	1,100	FSO-400	AP20W	13 (6)	
504	180 (244)	3.5 (2.6)	800	2,500	6,000	4,000	2,500	1,200	1,000	FSO-500	AP20W	19 (9)	
508	575 (782)	11.0 (8.2)	800	2,500	5,000	4,000	2,500	1,200	1,000	FSO-500	AP30W	29 (13)	
607	325 (442)	6.2 (4.6)	750	2,200	5,000	3,600	2,200	1,200	1,000	FSO-600	AP25W	31 (14)	
610	1,500 (2040)	29.0 (21.6)	750	2,200	3,750	3,600	2,200	1,200	1,000	FSO-600	AP40W	54 (25)	
708	945 (1285)	18.0 (13.4)	450	1,600	3,000	2,500	1,600	1,000	800	FSO-700	AP35W	68 (31)	
712	2,520 (3427)	48.0 (35.8)	450	1,600	3,000	2,500	1,600	1,000	800	FSO-700	AP45W	86 (30)	
752	2,520 (3427)	48.0 (35.8)	650	1,000	3,000	1,800	1,000	800	650	FSO-750	AP45W	127 (58)	
754	4,725 (6426)	90.0 (67.1)	650	1,000	2,800	1,800	1,000	800	650	FSO-750	AP55W	162 (74)	
812	2,520 (3427)	48.0 (35.8)	525	850	3,000	1,500	850	675	525	FSO-800	AP45W	146 (66)	
814	4,725 (6426)	90.0 (67.1)	525	850	2,800	1,500	850	675	525	FSO-800	AP55W	181 (82)	
916	18,000 (24480)	250 (186)	500	700	2,000	1,350	700	650	500	FSO-900	AE25	512 (233)	
1018	19,425 (26418)	370 (276)	375	500	2,000	1,100	500	475	375	FSO-1027	AE25	619 (281)	

\*For clutch dimensions and bore/keyseat sizes, see pages 15 and 17.

†Labyrinth grease seals permit higher inner race overrunning speed; see pages 14 and 16.

### FWW

#### Specifications

FWW Size	Torque Capacity lb.ft. (Nm)	HP Rating/ 100 RPM hp (kw)	Maximum RPM Overrunning Speed								Clutch Size*	Coupling Size	Shipping Weight lb (kg)
			Standard Sprag			C/T Sprag							
			Outer Race	Inner <sup>†</sup> Race	Drive Speed	Outer Race	Inner Race	Sprag Lift-off	Drive Speed				
420	183 (248)	3.5 (2.6)	850	2,800	6,200	5,000	2,800	1,300	1,100	FSO-400	AJ20	20 (9)	
530	575 (782)	11.0 (8.2)	800	2,500	5,000	4,000	2,500	1,200	1,000	FSO-500	AJ30	42 (19)	
640	1,500 (2040)	29.0 (21.6)	750	2,200	3,750	3,600	2,200	1,200	1,000	FSO-600	AJ40	91 (41)	
745	2,520 (3427)	48.0 (35.8)	450	1,600	3,000	2,500	1,600	1,000	800	FSO-700	AJ45	150 (68)	
755	4,725 (6426)	90.0 (67.1)	650	1,000	2,800	1,800	1,000	800	650	FSO-750	AJ55	323 (147)	

\*For clutch dimensions and bore/keyseat sizes, see pages 15 and 17.

†Labyrinth grease seals permit higher inner race overrunning speeds, see pages 14 and 16.



## Selection Procedure

1. Calculate the drive torque to be transmitted by the clutch coupling:  

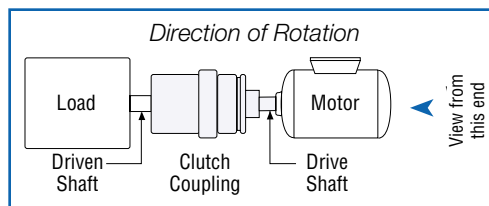
$$\text{Drive Torque (lbs.-ft.)} = \frac{5250 \times \text{HP}}{\text{RPM}}$$
2. Select proper Service Factor from the table below.
3. Determine Design Torque:  

$$\text{Design Torque (lbs.-ft.)} = \text{Service Factor} \times \text{Drive Torque.}$$
4. Determine shaft size and bore requirements of clutch and coupling. Check key and shaft stress before making final selection since this may determine maximum allowable drive torque capacity. Metric bore and keyseats available on request.
5. Determine overrunning speed and the type of clutch coupling required (FW or FWW). Standard FW and FWW Clutch Couplings (Form-Flex

coupling combined with a FSO clutch) are designed for high speed inner race overrunning and intermediate speed outer race overrunning.

- a) FW C/T or FWW C/T models may be used in applications where the drive RPM is lower than the listed C/T maximum drive RPM and the outer race overrunning RPM is higher than the listed lift off RPM.
- b) FW C/T or FWW C/T models may not be used in applications where the drive RPM is higher than the listed maximum drive RPM.

6. Determine the direction of rotation required. These units are not symmetrical, rotational direction must be specified.
7. Select a clutch coupling from the catalog based on Design Torque, Bore Size and overrunning speed to meet the application requirements.
8. Check the maximum drive speed rating of the clutch coupling selected. If the application speed requirement is greater than the maximum drive speed rating consult Formsprag.
9. Check space limitations to allow axial space for assembly and disassembly of clutch coupling.
10. Do not exceed angular or parallel alignment shown on page 114.
11. Check lubrication requirements (refer to page 130). Grease is not recommended where ambient temperatures are below +20°F.



## Service Factors

### Formsprag Overrunning Clutch

Couplings are suitable for many different power transmission applications. Please refer to this table for proper service factor for your application.

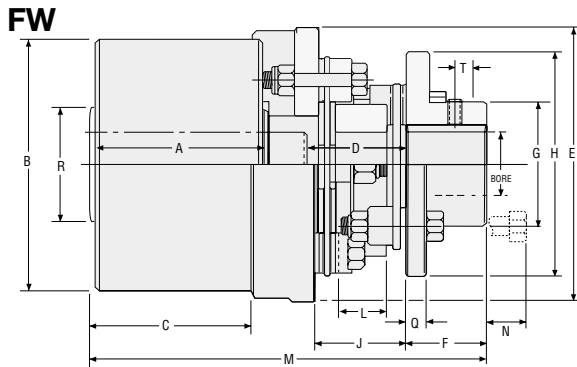
Typical Prime movers are listed below, types of loads across the top, and your service factor opposite the typical prime movers.

		Driven Equipment Load Classifications			
		Light Steady Loads Starting torque is equal to or slightly greater than running torque.	Moderate Loads High starting torque or above average running torque.	Medium Loads Starting torque is approximately double running torque.	Heavy-Duty Loads High starting torque, shock loading, light torque reversals during drive.
		—			
		Centrifugal pumps, uniformly loaded conveyors, light-duty fans and blowers, liquid mixers and agitators, centrifugal compressors, lobe and vane type blowers, gear pumps, textile machinery, wood-working machinery.	Hot oil pumps, heavy-duty centrifugal pumps, cooling towers, slurry agitators, boiler feed pumps, hoists, conveyors.	Dredge pumps, dynamometer drives, light-duty hammermills, lineshafts, paper-converting machinery, rotary kilns, rotary or screw-type pumps for high viscosity fluids.	Mine ventilating fans, reciprocating pumps or compressors, papermaking machinery, heavy-duty hammermills, ore crushers, pulverizing mills.
Prime Mover	Steam, gas or air turbine	1.00	1.50	1.50	2.50
	AC electric motor	1.25	1.50	1.50	2.50
	DC electric motor or DOL start AC electric motor	1.25	1.50	1.75	3.00
	Gasoline, natural gas, propane or other spark ignition engine	1.75	1.75	Consult Formsprag	Consult Formsprag
	Diesel	Consult Formsprag	Consult Formsprag	Consult Formsprag	Consult Formsprag



# Clutch Couplings

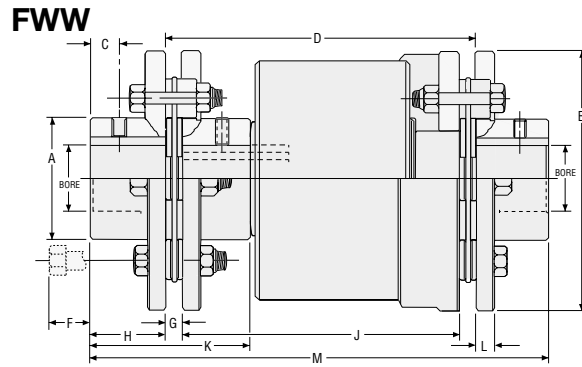
## FW/FWW



Coupling sizes 403 through 712 have PCE sprags. C/T sprags are available for all sizes.

### Coupling standard bore sizes and keyseats inches (mm)

Coupling Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.
AP10W	.500	1/8 x 1/16 (3.18 x 1.59)	.625 (15.87)	1.625 (41.28)
	.750	3/16 x 3/32 (4.76 x 2.36)		
	1.000 1.250	1/4 x 1/8 (6.35 x 3.18)		
AP20W	1.000 1.125 1.250	1/4 x 1/8 (6.35 x 3.18)	.843 (21.41)	2.125 (53.98)
	1.375	5/16 x 5/32 (7.93 x 3.96)		
	1.500 1.625	3/8 x 3/16 (9.52 x 4.75)		
AP25W	1.375	5/16 x 5/32 (7.93 x 3.96)	.937 (23.80)	2.375 (60.33)
	1.625	3/8 x 3/16 (9.52 x 4.75)		
	1.875 2.000	1/2 x 1/4 (12.70 x 6.35)		
AP30W	1.875 2.000 2.125	1/2 x 1/4 (12.70 x 6.35)	1.125 (28.58)	2.875 (73.03)
	2.375	5/8 x 5/16 (15.87 x 7.93)		
AP35W	2.125	1/2 x 1/4 (12.70 x 6.35)	1.50 (38.10)	3.750 (95.25)
	2.375 2.625	5/8 x 5/16 (15.87 x 7.93)		
	2.875	3/4 x 3/8 (19.05 x 9.52)		
AP40W	2.375	5/8 x 5/16 (15.87 x 7.93)	1.50 (38.10)	3.75 (95.25)
	2.875	3/4 x 3/8 (19.05 x 9.52)		
AP45W	Any Coupling Bore is Standard Between Minimum and Maximum Shown with Standard Tolerances		1.813 (46.05)	4.625 (117.48)
AP55W	Any Coupling Bore is Standard Between Minimum and Maximum Shown with Standard Tolerances		2.188 (55.57)	5.750 (146.05)
AE25	Any Coupling Bore is Standard Between Minimum and Maximum Shown with Standard Tolerances		2.500 (63.50)	6.500 (165.10)



Coupling sizes 420 through 745 have PCE sprags. C/T sprags are available for all sizes.

### Coupling standard bore sizes and keyseats inches (mm)

Coupling Size	Bore Size	Keyseat	Bore Range	
			Min.	Max.*
AJ20	1.000 1.125	1/4 x 1/8 (6.35 x 3.18)	.8125 (20.64)	2.125 (53.90)
	1.250 1.375	5/16 x 5/32 (7.93 x 3.96)		
	1.500 1.625	3/8 x 3/16 (9.52 x 4.75)		
	1.875 2.000	1/2 x 1/4 (12.70 x 6.35)		
AJ30	2.125 2.375	5/8 x 5/16 (15.88 x 7.93)	1.156 (29.36)	2.875 (73.03)
	2.375	5/8 x 5/16 (15.88 x 7.93)		
AJ40	2.375	5/8 x 5/16 (15.88 x 7.93)	1.25 (31.75)	3.75 (95.25)
	2.875	3/4 x 3/8 (19.05 x 9.52)		
AJ45	Bore to Order		1.813 (46.05)	4.625 (117.48)
AJ55	Bore to Order		2.187 (55.55)	5.75 (146.05)

\*Does not apply to C/T Series

An AZ coupling (large bore version of the AJ hub) is required to obtain maximum coupling bores shown in this chart.

For clutch dimensions and bore/keyseat sizes, see pages 15 and 17.

## FW

### Dimensions inches (mm)

Size	A	B	C	D	E	F	G	H	J	L	M	N	Q	R	T
403	2.75 (69.85)	3.500/3.498 (88.90/88.85)	2.53 (64.26)	2.39/1.72 (60.71/43.69)	4.00 (101.60)	1.00 (25.40)	1.80 (45.72)	3.19 (81.03)	1.72 (43.69)	1.18 (29.97)	6.167 (156.64)	0.62 (15.75)	0.30 (7.62)	1.187 (30.15)	.375 (9.53)
406	2.75 (69.85)	3.500/3.498 (88.90/88.85)	2.53 (64.26)	2.67/1.74 (67.82/44.20)	4.08 (103.63)	1.32 (33.53)	2.40 (60.96)	4.08 (103.63)	1.74 (44.20)	1.06 (26.92)	6.740 (171.20)	0.87 (22.10)	0.35 (8.89)	1.187 (30.15)	.500 (12.70)
504	3.50 (88.90)	4.250/4.248 (107.95/107.90)	3.25 (82.55)	2.64/1.74 (67.06/44.20)	4.75 (120.65)	1.32 (33.53)	2.40 (60.96)	4.08 (103.63)	1.74 (44.20)	1.06 (26.92)	7.460 (189.48)	0.87 (22.10)	0.35 (8.89)	1.750 (44.45)	.500 (12.70)
508	3.50 (88.90)	4.250/4.248 (107.95/107.90)	3.25 (82.55)	3.70/2.48 (93.98/62.99)	5.63 (143.00)	1.88 (47.75)	3.30 (83.82)	5.63 (143.00)	2.48 (62.99)	1.54 (39.12)	9.085 (230.76)	1.25 (31.75)	0.55 (13.97)	1.750 (44.45)	.687 (17.45)
607	3.75 (95.25)	5.375/5.373 (136.53/136.47)	3.50 (88.90)	3.09/2.03 (78.49/51.56)	5.86 (148.84)	1.62 (41.15)	2.80 (71.12)	4.95 (125.73)	2.03 (51.56)	1.13 (28.70)	8.465 (215.01)	1.00 (25.40)	0.45 (11.43)	2.750 (69.85)	.625 (15.88)
610	3.75 (95.25)	5.375/5.373 (136.53/136.47)	3.50 (88.90)	4.23/2.70 (107.44/68.58)	7.64 (194.06)	2.50 (63.50)	4.65 (118.11)	7.64 (194.06)	2.70 (68.58)	1.50 (38.10)	10.480 (266.19)	1.30 (33.02)	0.65 (16.51)	2.750 (69.85)	.937 (23.80)
708	5.00 (127.00)	7.125/7.123 (180.98/180.92)	4.94 (125.48)	3.70/2.41 (93.98/61.21)	7.12 (180.85)	2.25 (57.15)	4.15 (105.41)	6.63 (168.40)	2.41 (61.21)	1.31 (33.27)	10.955 (278.26)	1.00 (25.40)	0.55 (13.97)	4.000 (101.60)	.875 (22.23)
712	5.00 (127.00)	7.125/7.123 (180.98/180.92)	4.94 (125.48)	4.69/3.26 (119.13/82.80)	8.43 (214.12)	3.00 (76.20)	5.40 (137.16)	8.43 (214.12)	3.26 (82.80)	1.56 (39.62)	12.700 (322.58)	1.00 (25.40)	0.65 (16.51)	4.000 (101.60)	1.203 (30.56)
752	6.00 (152.40)	8.750/8.748 (222.25/222.20)	5.94 (150.88)	4.69/3.26 (119.13/82.80)	8.75 (222.25)	3.00 (76.20)	5.40 (137.16)	8.43 (214.12)	3.26 (82.80)	1.56 (39.62)	13.700 (347.98)	1.00 (25.40)	0.65 (16.51)	4.250 (107.95)	1.203 (30.56)
754	6.00 (152.40)	8.750/8.748 (222.25/222.20)	5.94 (150.88)	6.58/4.45 (167.13/113.03)	10.85 (275.59)	4.00 (101.60)	6.65 (168.91)	10.85 (275.59)	4.45 (113.03)	2.31 (58.67)	16.585 (421.26)	1.75 (44.45)	1.00 (25.40)	4.250 (107.95)	1.562 (39.67)
812	6.00 (152.40)	10.000/9.998 (254.00/253.95)	5.94 (150.88)	4.69/3.26 (119.13/82.80)	10.00 (254.00)	3.00 (76.20)	5.40 (137.16)	8.43 (214.12)	3.26 (82.80)	1.56 (39.62)	13.700 (347.98)	1.00 (25.40)	0.65 (16.51)	5.500 (139.70)	1.203 (30.56)
814	6.00 (152.40)	10.000/9.998 (254.00/253.95)	5.94 (150.88)	6.58/4.45 (167.13/113.03)	10.85 (275.59)	4.00 (101.60)	6.65 (168.91)	10.85 (275.59)	4.45 (113.03)	2.31 (58.67)	16.585 (421.26)	1.75 (44.45)	1.00 (25.40)	5.500 (139.70)	1.562 (39.67)
916	6.38 (162.05)	12.000/11.997 (304.80/304.72)	6.06 (153.92)	9.05/6.78 (229.87/172.21)	14.76 (374.90)	6.00 (152.40)	9.40 (238.76)	14.76 (374.90)	7.13 (181.10)	5.25 (133.35)	21.430 (544.32)	0.25 (6.35)	1.15 (29.21)	6.380 (162.05)	2.500 (63.50)
1018	6.63 (168.40)	15.000/14.997 (381.00/380.92)	6.56 (166.62)	9.05/6.78 (229.87/172.21)	14.76 (374.90)	6.00 (152.40)	9.40 (238.76)	14.76 (374.90)	7.13 (181.10)	5.25 (133.35)	22.692 (576.38)	0.25 (6.35)	1.15 (29.21)	9.000 (228.60)	2.500 (63.50)

## FWW

### Dimensions inches (mm)

Size	A	B	C	D	F	G	H	J	K	L	M
420	2.40 (60.96)	4.08 (103.63)	0.50 (12.70)	5.68 (144.27)	0.87 (22.10)	0.34 (8.64)	1.32 (33.53)	5.00 (127.00)	2.98 (75.69)	0.35 (8.89)	8.32 (211.33)
530	3.30 (83.82)	5.63 (143.00)	0.69 (17.53)	7.55 (191.77)	1.25 (31.75)	0.47 (11.94)	1.88 (47.75)	6.61 (167.89)	4.23 (107.44)	0.55 (13.97)	11.31 (287.27)
640	4.65 (118.11)	7.64 (194.06)	0.94 (23.88)	8.98 (228.09)	1.30 (33.02)	0.60 (15.24)	2.50 (63.50)	7.78 (197.61)	5.60 (142.24)	0.65 (16.51)	13.98 (355.09)
745	5.40 (137.16)	8.43 (214.12)	1.20 (30.48)	11.15 (283.21)	0.62 (15.75)	0.85 (21.59)	3.00 (76.20)	9.45 (240.03)	6.85 (173.99)	0.65 (16.51)	17.15 (435.61)
755	6.65 (168.91)	10.85 (275.59)	1.56 (39.62)	14.28 (362.71)	1.75 (44.45)	1.07 (27.18)	4.00 (101.60)	12.14 (308.36)	9.07 (230.38)	1.00 (25.40)	22.28 (565.91)

### Installation and Alignment Procedure

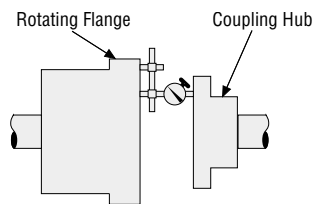
#### Mounting and Preliminary Alignment

Reasonable care in initial assembly and aligning will permit clutch-coupling to operate to full capacity, compensate for misalignment, and provide long service life.

1. Inspect shafts and bores and make sure they are free from burrs. Check for the proper fit of the keys to the shafts and bores.
2. Position the coupling hub so that the shaft end is flush with the machined face of the flange. Coupling hub shrink fits are not necessary with Form-Flex couplings. If the hub is bored for an interference fit, the hubs should be heated in oil at 200–250°F and then quickly positioned on the shaft. Do not spot heat as it may cause distortion.
3. Check clutch for proper rotation by overrunning (freewheeling) clutch by hand. Mount clutch and key on shaft. Mount so that clutch will stay in place in service. Use shoulders, snap rings, set collars, or locking keys. Fit the clutch/adaptor assembly so that A) the machined face of the adapter is flush with the proper shaft end or B) the dimension as specified on the installation drawing between the shaft end and the machined face of the adapter is maintained.
4. Move the equipment to be connected into position. Set the gap between hub and adapter flanges to the “Adapter to Coupling Flange Dimension” within  $\pm .010$ ". For special clutch couplings, refer to the installation drawing for the proper dimension.

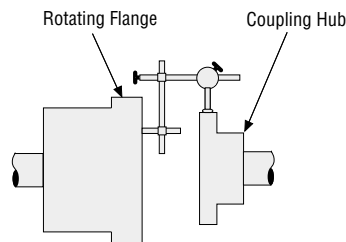
#### Angular Alignment

5. After preliminary alignment, secure a dial indicator to the adapter flange and indicate face of the coupling hub as shown in figures 1 and 2.
6. Rotate the adapter flange to which the indicator is attached to find minimum indicator reading. Set the indicator for zero reading.
7. Again, rotate the coupling half (with indicator attached) 360° to check misalignment.



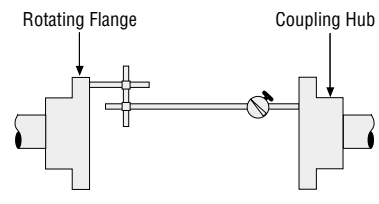
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Figure 1. Angular alignment.



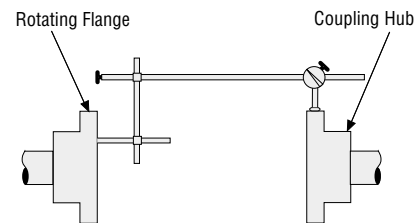
FW

Figure 3. Parallel alignment.



FWW

Figure 2. Angular alignment.



FWW

Figure 4. Parallel alignment.

Coupling Model No.	T.I.R.	
	Angular	Parallel
403	.024	.003
406	.032	.004
420	.032	.012
504	.032	.004
508	.044	.005
530	.004	.015
607	.038	.003
610	.060	.005
640	.060	.018
708	.052	.004
712	.066	.005
728	.052	.004
732	.066	.005
745	.070	.029
752	.066	.005
754	.086	.008
755	.086	.025
812	.066	.005
814	.086	.008
916	.050	.010
1018	.050	.010

\*Bolts should be lubricated with grease before assembling.

8. Adjust position of connected equipment until indicator reading is within the allowable variation shown in the table at right.

#### Parallel Alignment

9. Reposition the indicator as shown in figure 3 and/or figure 4 and check for parallel alignment. Adjust the height of connected equipment to attain minimum misalignment. The allowable parallel misalignment is indicated in the table above.
10. Recheck angular alignment to make certain the values in the table have not been exceeded.

#### Coupling Assembly

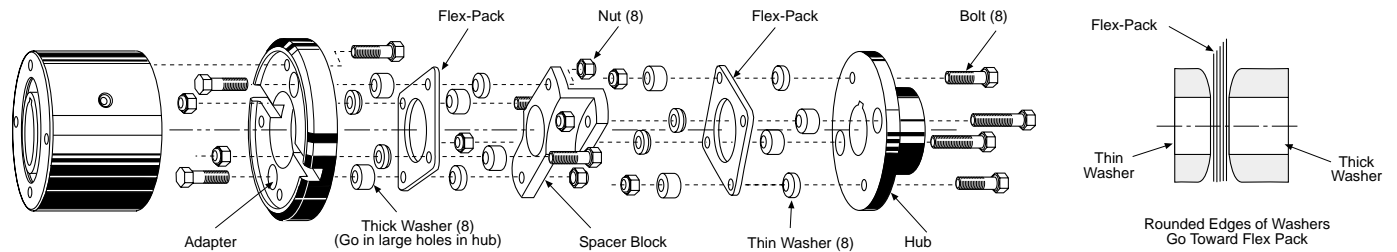
11. Assemble the clutch coupling.

**Note:** The curved face of the washers must be placed adjacent to the flexible element pack. Do not drive or force bolts into position. The thick washers nest in the large clearance holes in the flanges.

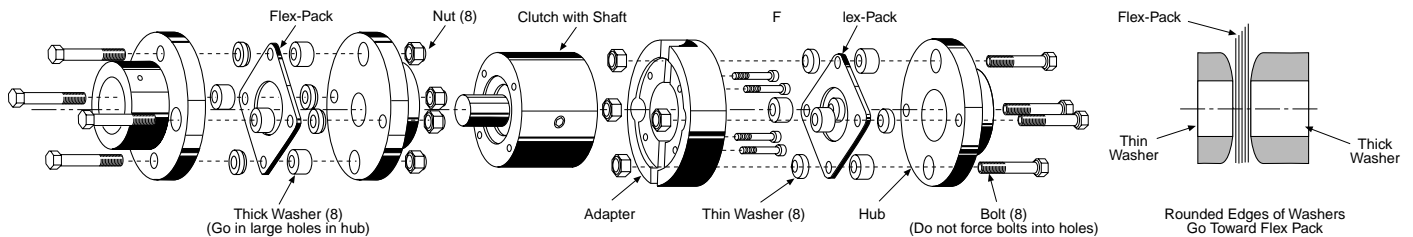
12. Torque tighten all nuts to the value shown below. Check torque on nuts after several hours of actual running. Use “Loctite” on bolts which fasten into tapped holes.

For further information write for installation and Maintenance Bulletin WRN 2332.

## FW



## FWW



### Torque Values (mm)

Coupling Model No.	Tightening Torque lb.ft. (Nm.)
403	8 (10.846)
406	17 (23.049)
420	17 (23.049)
504	17 (23.049)
508	58 (78.636)
530	58 (78.636)
607	40 (54.232)
610	115 (155.917)
640	115 (155.917)
708	58 (78.636)
712	115 (155.917)
728	58 (78.636)
732	115 (155.917)
745	115 (155.917)
752	115 (155.917)
754	400 (542.32)
755	400 (542.32)
812	115 (155.917)
814	400 (542.32)
916	375* (508.425)
1018	375* (508.425)

\*Bolts should be lubricated with grease before assembling.

## How to Order

### Available Modifications

Special designs are available. Contact Formsprag Engineering.

- **Custom length spacers** to accommodate greater distance between shafts.
- **Dynamic balancing** for high speed applications
- **Splined bore** for splined shafts.
- **Taperlock and Q.D. bushings** for the coupling hub.
- **Tapered bore coupling hubs** for mill motors.
- **Holding brake** to provide overrunning drag when required for turbine or motor dual drive systems.

### Example

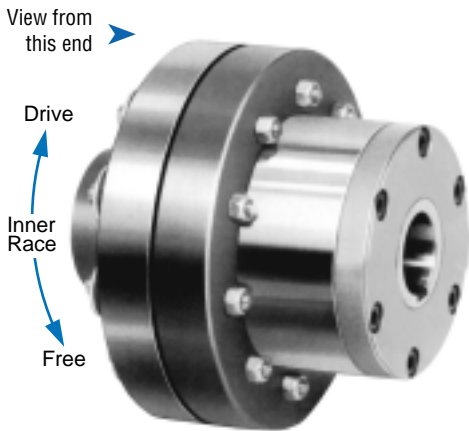
When the assembly number is known, please specify:

Series FW Model No. 504 Assembly No. 36 Direction of Rotation (see page 111) RH

When the assembly number is not known, please specify:

Item	Example
Series and Model No.	FW-752
Clutch Bore (Driven or Driving)	Clutch 2.50" Driven Shaft
Keyseat Size (If other than listed on page 15)	
Coupling Bore (Driven or Driving)	Coupling 2.75" Driving Shaft
Keyseat Size (If other than listed on page 112)	
Direction of Rotation (see page 111)	Rotation RH
Lubricant, Oil/GR (Grease)	GR
Labyrinth seal optional	L

### Overrunning Ball Bearing Supported, Centrifugal Throwout (C/T) Sprag Clutch Couplings



Model RIZ..ELG2 is a centrifugal throwout sprag clutch with a coupling for in-line shaft mounting applications. In this design only the inner race can overrun.

They are self-contained units designed for overrunning clutch applications. Typically used in creep drives, where the overrunning speed is high, but the drive speed low, and does not exceed the maximum driving speed specified in the table.

When ordered complete, the unit is shipped grease lubricated, ready for either horizontal or vertical installation.

*Right Hand rotation shown.  
(Left Hand opposite.)*

*Specify direction of rotation when ordering.*


#### Specifications

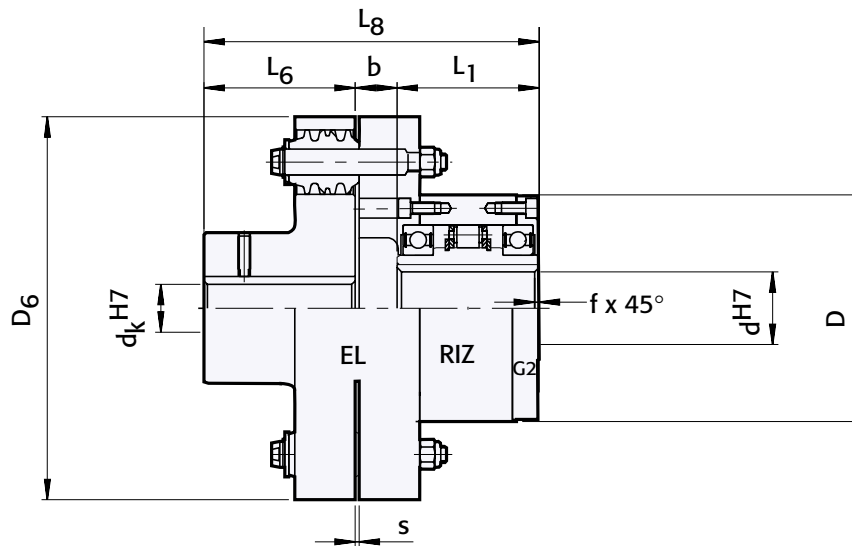
Size	EL	Torque Capacity lb.ft. (Nm)	Overrunning Speed Max. RPM			Lubrication	Shipping Weight lb (kg)
			Drive	Sprag Lift-off	Overrunning		
30	5	231 (313)	350	780	9,000	Grease	24.26 (11)
35	6	277 (375)	320	740	8,500	Grease	37.48 (17)
40	6	576 (781)	315	720	7,500	Grease	41.90 (19)
45	6	660 (894)	285	665	6,600	Grease	41.90 (19)
50	7	1,033 (1400)	265	610	6,000	Grease	68.36 (31)
60	8	1,384 (1875)	200	490	5,300	Grease	108.05 (49)
70	10	2,077 (2815)	210	480	4,100	Grease	198.45 (90)
80	11	3,321 (4500)	190	450	3,600	Grease	235.94 (107)
90	12	4,244 (5750)	180	420	2,700	Grease	374.85 (170)
100	14	7,011 (9500)	200	455	2,700	Grease	507.15 (230)
130	16	12,454 (16875)	180	415	2,400	Grease	727.65 (330)

#### Notes:

When ordering, please specify direction of rotation.

### RIZ..ELG2

View from  
this end 



#### Dimensions inches (mm)

Size	d <sup>H7</sup>	d <sub>k</sub> <sup>H7</sup> Bore Range	D	L <sub>1</sub>	D <sub>6</sub>	L <sub>6</sub>	L <sub>8</sub>	b	s	f
30	1.18 (30)	0.79 – 2.17 (20 – 55)	3.94 (100)	2.68 (68)	6.30 (160)	2.36 (60)	5.81 (147.5)	0.77 (19.5)	0.08 (2)	0.04 (1)
35	1.38 (35)	0.98 – 2.95 (25 – 75)	4.33 (110)	2.91 (74)	7.48 (190)	2.95 (75)	6.56 (166.5)	0.69 (17.5)	0.08 (2)	0.04 (1)
40	1.57 (40)	0.98 – 2.95 (25 – 75)	4.92 (125)	3.39 (86)	7.48 (190)	2.95 (75)	6.95 (176.5)	0.61 (15.5)	0.08 (2)	0.06 (1.5)
45	1.77 (45)	0.98 – 2.95 (25 – 75)	5.12 (130)	3.39 (86)	7.48 (190)	2.95 (75)	6.95 (176.5)	0.61 (15.5)	0.08 (2)	0.06 (1.5)
50	1.97 (50)	1.18 – 3.35 (30 – 85)	5.91 (150)	3.70 (94)	8.86 (225)	3.54 (90)	8.21 (208.5)	0.96 (24.5)	0.10 (2.5)	0.06 (1.5)
60	2.36 (60)	1.38 – 3.94 (35 – 100)	6.69 (170)	4.49 (114)	10.63 (270)	3.94 (100)	9.61 (244)	1.18 (30)	0.12 (3)	0.08 (2)
70	2.76 (70)	1.77 – 4.72 (45 – 120)	7.48 (190)	5.28 (134)	13.39 (340)	5.51 (140)	12.30 (312.5)	1.52 (38.5)	0.12 (3)	0.12 (2.5)
80	3.15 (80)	2.17 – 5.71 (55 – 145)	8.27 (210)	5.67 (144)	14.96 (380)	6.30 (160)	13.39 (340)	1.42 (36)	0.12 (3)	0.10 (2.5)
90	3.54 (90)	2.56 – 6.50 (65 – 165)	9.06 (230)	6.22 (158)	17.32 (440)	7.09 (180)	15.28 (388)	1.97 (50)	0.14 (3.5)	0.12 (3)
100	3.94 (100)	2.95 – 6.69 (75 – 170)	10.63 (270)	7.17 (182)	19.69 (500)	7.87 (200)	16.63 (422.5)	1.59 (40.5)	0.14 (3.5)	0.12 (3)
130	5.12 (130)	3.35 – 7.09 (85 – 180)	12.20 (310)	8.35 (212)	22.05 (560)	8.66 (220)	18.98 (482)	1.97 (50)	0.16 (4)	0.12 (3)

**Note:** For clutch bore and keyseat information see page 99.