

# Helical Hydraulic Rotary Actuators

Series L and T



ENGINEERING YOUR SUCCESS.



**Industries Served:**

- Agriculture
- Construction
- Energy
- Marine
- Material Handling
- Military
- Mining
- Truck/Trailer
- and many others



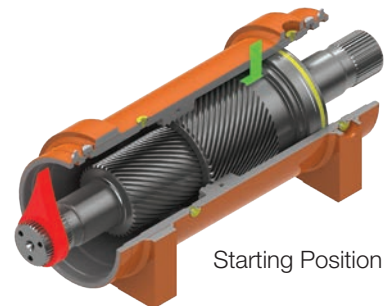
Helac's innovative sliding-spline technology converts linear piston motion into powerful shaft rotation. Each actuator is comprised of a housing and two moving parts — the central shaft and piston. Helical spline teeth on the shaft engage matching teeth on the piston's inside diameter. A second set of helical splines on the piston's outside diameter mesh with the gear in the housing.

**Starting Position**

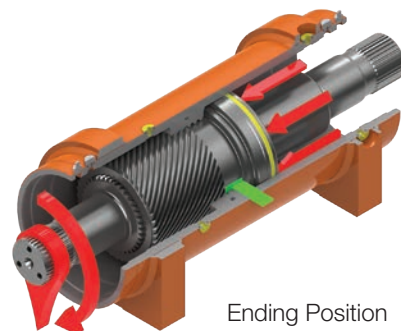
The piston is completely bottomed out. Bars indicate starting positions of piston and shaft. The housing with integral gear remains stationary.

**Ending Position**

When hydraulic pressure is applied to the piston, it moves axially; while the helical gearing causes the piston and shaft to rotate simultaneously. Applying pressure to the opposite port will return the piston and shaft to their original starting positions.



Starting Position

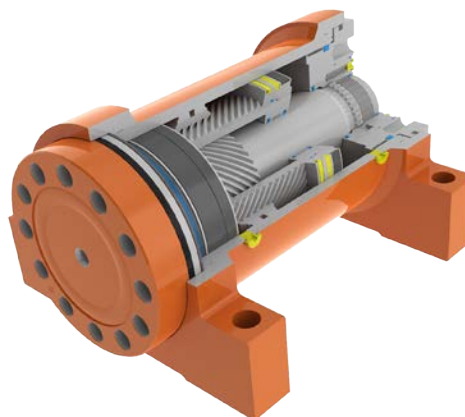


Ending Position

**Features and Benefits**

For over 45 years, Helac has lead the way in actuator technology and innovation. Our extensive line of compact and powerful rotary actuators offer simple and cost-effective solutions to move, support and position rotating loads in countless applications.

Helac actuators are designed to replace multiple components and function as a rotating device, mounting bracket and bearing, all-in-one. They feature tremendous torque output and exceptional load bearing capability in compact dimensions.



- **Powerful:** High torque, high bearing capacity
- **Durable:** Moving parts enclosed, suitable for harsh environments
- **Compact:** High power density, fits in tight spaces
- **Hold Position:** Zero internal leakages, smooth operation, no external brake required
- **Simplifies:** Eliminates bearings, linkages & brackets, reduces bill of materials, simplifies supply chain, assembly and maintenance
- **Backdrives in overload conditions:** Hydraulic fuse, prevents mechanical damage



**Operating information L10 Series**

Rotation	180° and 360°
Maximum Drive Torque:	1,700 to 25,000 in-lb
Maximum Holding Torque:	5,600 to 83,000 in-lb
Maximum Straddle Moment:	5,000 to 100,000 in-lb
Maximum Cantilever Moment:	5,000 to 100,000 in-lb
Mounting:	Flange



**Operating information L30 Series**

Rotation	180° and 360°
Maximum Drive Torque:	17,000 to 380,000 in-lb
Maximum Holding Torque:	43,600 to 936,000 in-lb
Maximum Straddle Moment:	119,000 to 1,505,000 in-lb
Maximum Cantilever Moment:	45,900 to 570,000 in-lb
Mounting:	Flange or Foot



**Operating information L20 Series**

Rotation	180°
Maximum Drive Torque:	4,500 to 39,000 in-lb
Maximum Holding Torque:	11,800 to 93,200 in-lb
Maximum Straddle Moment:	22,500 to 280,000 in-lb
Maximum Cantilever Moment:	12,000 to 140,000 in-lb
Mounting:	Foot



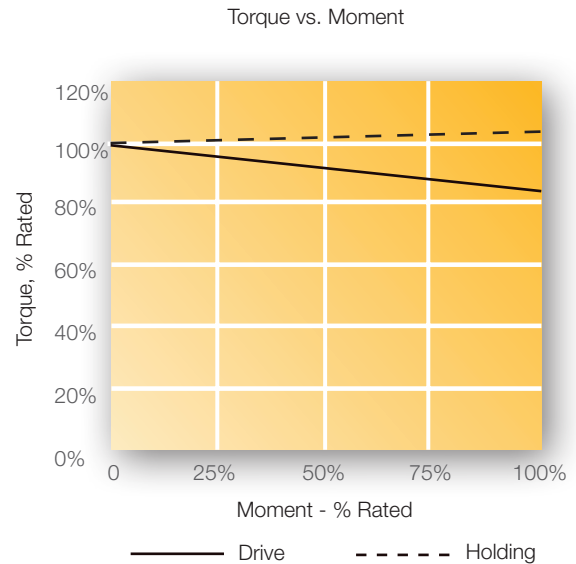
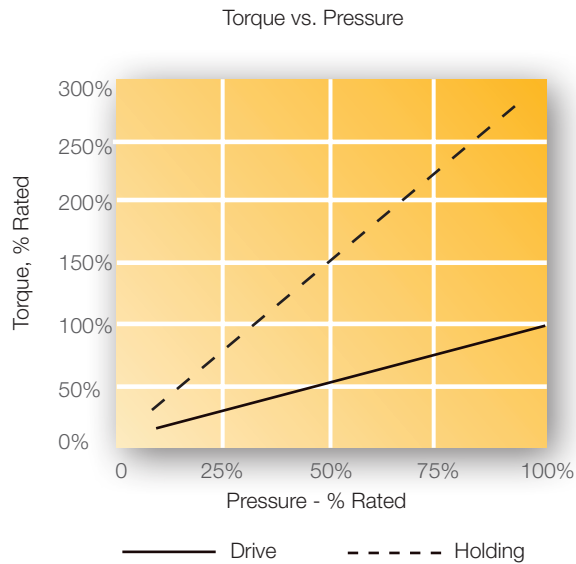
**Operating information T Series**

Rotation	200° and 220°
Maximum Drive Torque:	25,000 to 60,000 in-lb
Maximum Holding Torque:	54,200 to 127,000 in-lb
Maximum Straddle Moment:	37,500 to 90,000 in-lb
Mounting:	Foot

**Performance**

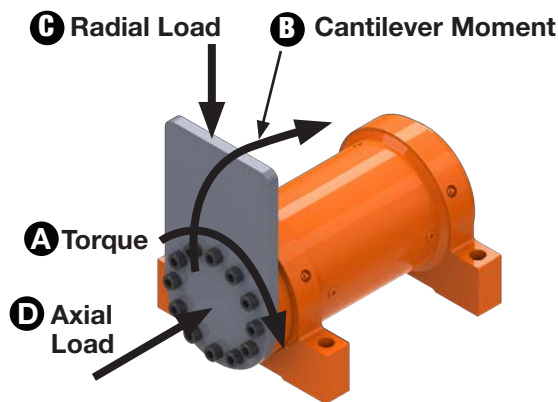
**Torque Versus Hydraulic Pressure and Loads**

The driving torque and holding torque are approximately linear with hydraulic pressure. As moment loads increase, drive torque may be reduced by up to 15%.

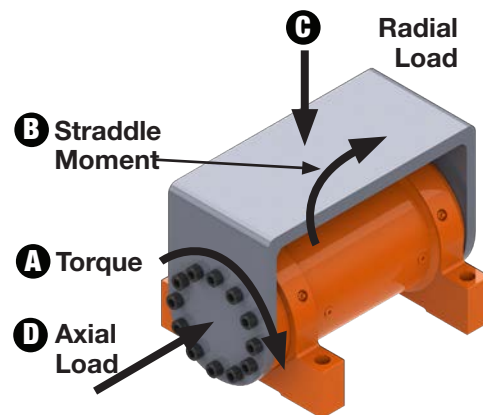


**Specifications Reference Guide**

**Cantilever Mount**

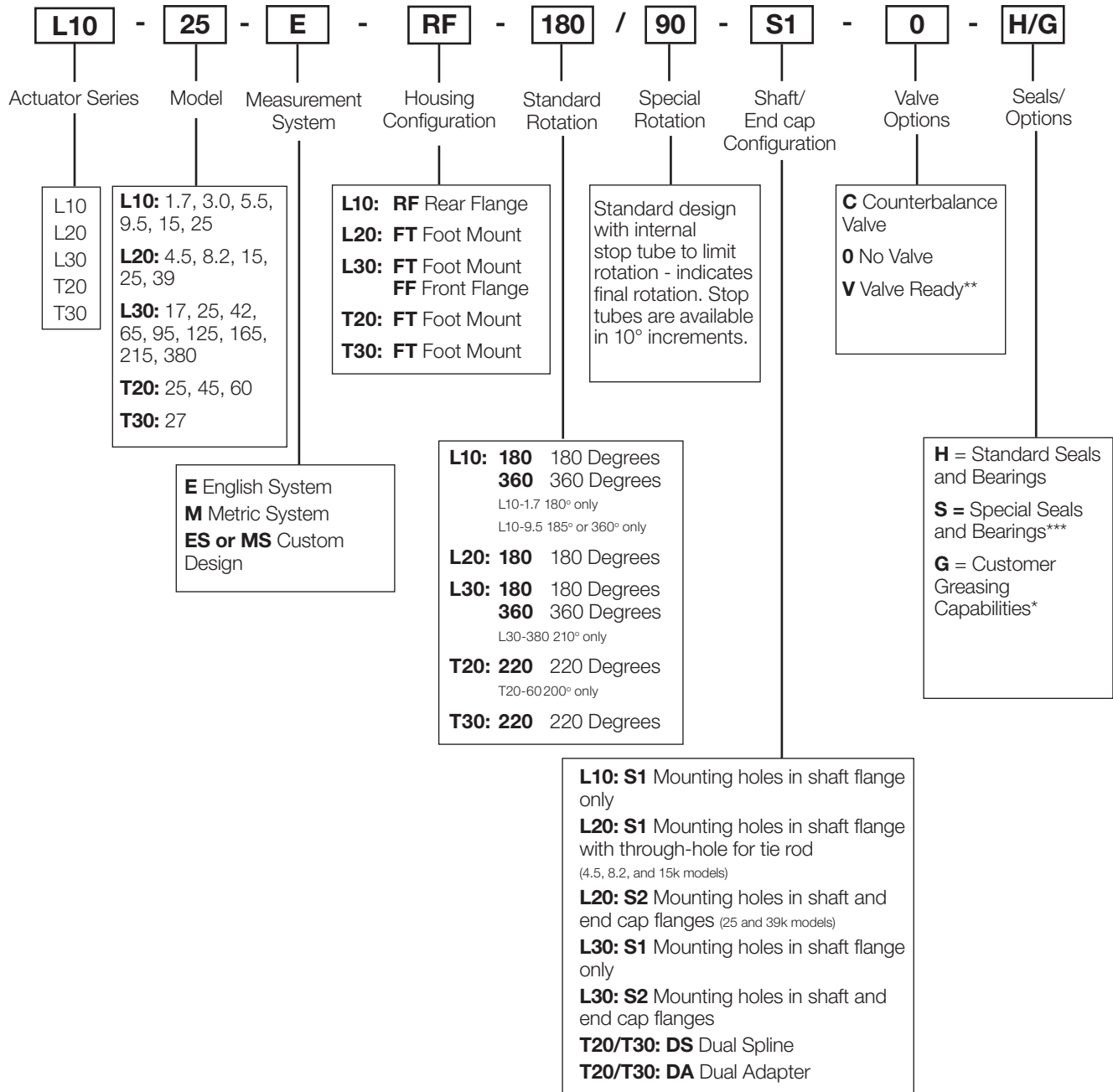


**Straddle Mount**



Digital Drawings can be provided in the following formats: .pdf, .stp, .dwg and .dxf. Email request to [actuators@helac.com](mailto:actuators@helac.com), or call +1 800 327 2589 (US and Canada), or +1 360 825 1601 (Worldwide).

Model Code / Ordering Information



\*Greasing is standard on L30, T20-60, T30-27 models. Option applies to L10 models only.

\*\*\* High volume only. \*\*Available only on L10 and L20 models.

The Model Code defines standard configurations of our actuators. Please contact Parker-Helac Corporation for special requirements.

### Customized Products

Helac Corporation can customize our rotary actuators to meet unique application requirements. Custom engineering can range from slight to complete, and is offered to those customers whose actuator needs match our program requirements.

### Cantilever Mount

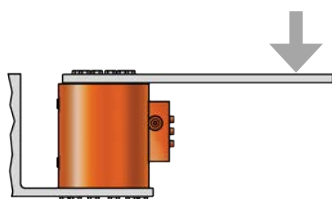
The load is mounted to the shaft flange and is supported at only one end of the shaft. Cantilever mounting is not recommended for aerial work platforms or other critical and safety-related applications.

### Straddle Mount

The load is supported at both ends of the shaft.

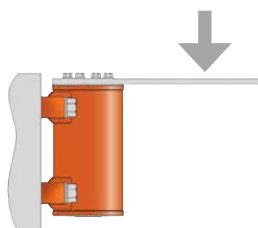


### L10 Series

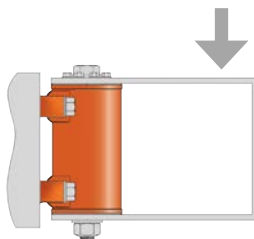


Cantilever Mount

### L20 Series



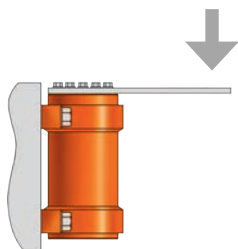
Cantilever Mount



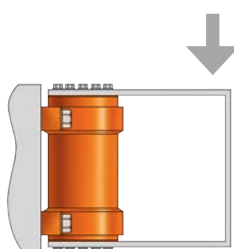
Straddle Mount

The upper portion of the bracket is bolted to the shaft flange. The lower portion is secured either by a tie rod passed through the shaft bore or is bolted to the endcap flange.

### L30 Series



Cantilever Mount



Straddle Mount

The upper portion of the bracket is bolted to the shaft flange, the lower portion is bolted to the endcap flange.

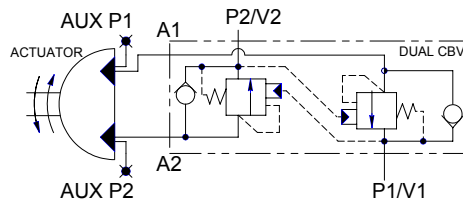
**⚠** WARNING: Improper selection, installation, or use of Helac products or systems may result in failure and cause death, personal injury or property damage.

**Valve Configurations**

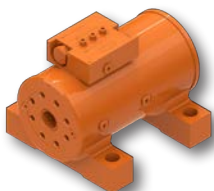
Optional factory mounted counterbalance valves prevent rotation in the event of a hydraulic line failure, control rotation when loads go over center, and protect the actuator against excessive torque loads.



L10 with counterbalance valve



Hydraulic Schematic of Optional Counterbalance Valve

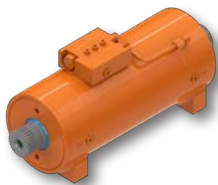


L20 with counterbalance valve

**L10, L20 and T20 Series**

Manufactured from aluminum, the valve blocks are bolted to a flat mounting pad on the actuator housing. Three bolts secure the valve block to the actuator. See specification pages for valve location.

The pilot ratio is 3:1. The valves are set to relieve at 3300 psi ±300 psi (228 bar ±21 bar).



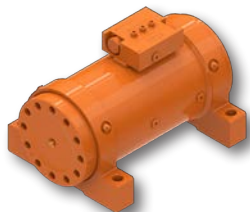
T20 with counterbalance valve

**L30 Series**

**Standard Valve for L30-17 and L30-25 180 Degree Models**

Manufactured from aluminum, the valve blocks are bolted to a flat mounting pad on the actuator housing. Three bolts secure the valve block to the actuator. See specification pages for valve location.

The pilot ratio is 3:1. The valves are set to relieve at 3300 psi ±300 psi (228 bar ±21 bar).



L30 with counterbalance valve, no tube (select models only)

**Standard Valve for all other L30 Series Actuators**

Manufactured from ductile iron, the valve blocks are bolted to a flat mounting pad on the actuator housing, usually over port P1. Factory installed steel tubing connects the valve to port P2. Valve locations and plumbing routing differ among sizes. See specification pages for details.

The pilot ratio is 2.5:1. The valves are set to relieve at 3,625 psi ±360 psi (250 bar ±25 bar).

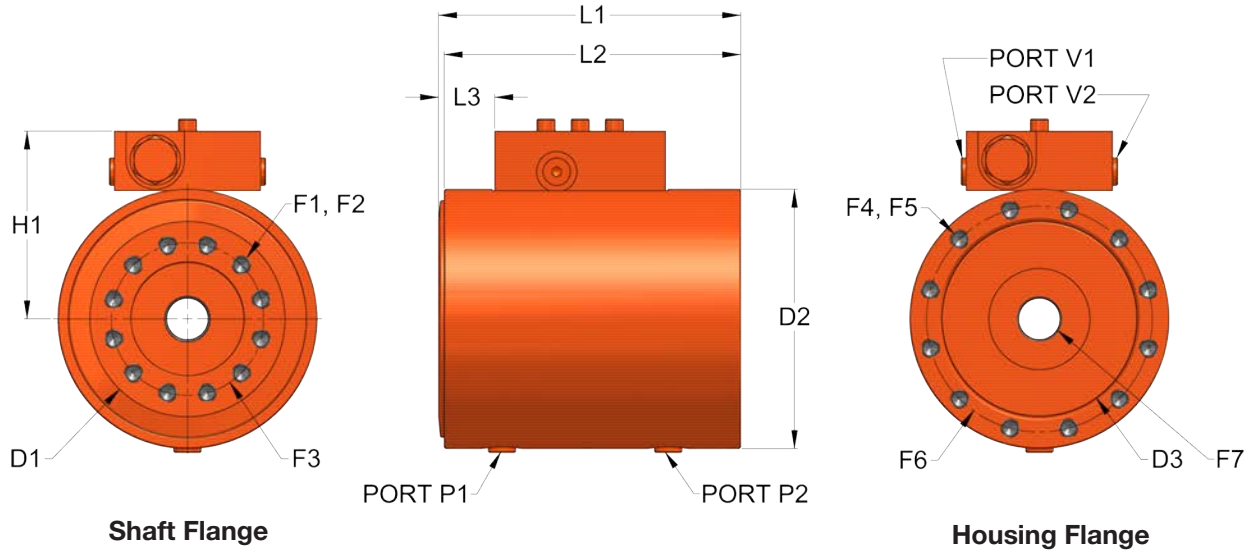


L30 with counterbalance valve, with tube (select models only)

**Valve Ready Option**

Available on select models only, the actuator has a flat mounting pad machined on the housing with threaded holes to accept the valve mounting bolts. The actuator-to-valve ports have threaded plugs which allow the actuator to be used with or without a valve.

**L10 Dimensional Data**



Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Moment Capacity Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement 180° in³ (cm³)	Displacement 360° in³ (cm³)	Approximate Weight 180° lb (kg)	Approximate Weight 360° lb (kg)
1.7	1,700 (192)	5,600 (633)	5,000 (565)	2,000 (907)	2,000 (907)	3.90 (63.9)	-	14.0 (6.4)	-
3.0	3,000 (339)	11,000 (1 243)	9,000 (1 017)	3,000 (1 361)	3,000 (1 361)	7.40 (121.3)	14.80 (242.5)	22.0 (10.0)	28.0 (12.7)
5.5	5,500 (622)	17,000 (1 921)	20,000 (2 260)	4,000 (1 814)	4,000 (1 814)	11.7(191.7)	23.40 (383.5)	31.0 (14.1)	42.0 (19.1)
9.5*	9,500 (1 074)	34,000 (3 842)	50,000 (5 650)	8,000 (3 629)	8,000 (3 629)	22.3 (365.4)	44.70 (732.5)	57.0 (25.9)	77.0 (34.9)
15	15,000 (1 695)	50,000 (5 650)	80,000 (9 040)	11,000 (4 990)	11,000 (4 990)	33.7 (552.2)	67.40 (1 104.5)	95.0 (43.1)	120 (54.4)
25	25,000 (2 825)	83,000 (9 379)	100,000 (11 300)	15,000 (6 804)	15,000 (6 804)	55.8 (914.4)	111.60 (1 828.8)	125 (56.7)	183 (83.0)

\*L10-9.5 185°

Specification charts are for general reference only. Consult drawings for actual values and tolerances.



**L10 Dimensional Data**

Model	D1 Shaft mounting surface diameter in (mm)	D2 Housing diameter in (mm)	D3 Mounting flange inside diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep)	F2 Quantity of mounting hole, shaft flange	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, housing flange in, deep (metric, deep)	F5 Quantity of mounting holes, housing flange	F6 Bolt circle diameter, housing flange in (mm)	F7 Shaft through-hole diameter in (mm)
1.7	3.04 (77.2)	3.90 (100)	3.02 (76.7)	5/16-18 $\nabla$ 0.50 (M8 x 1.25 $\nabla$ 11.9)	8	2.125 (54.0)	5/16-18 $\nabla$ 0.50 (M8 x 1.25 $\nabla$ 11.9)	8	3.375 (86)	0.56 (14.3)
3.0	3.50 (89)	4.70 (119)	3.66 (93)	5/16-18 $\nabla$ 0.50 (M8 x 1.25 $\nabla$ 12)	8	2.875 (73.0)	5/16-18 $\nabla$ 0.50 (M8 x 1.25 $\nabla$ 12)	8	4.063 (103)	0.66 (17)
5.5	4.00 (102)	5.30 (135)	4.12 (105)	3/8-16 $\nabla$ 0.63 (M10 x 1.5 $\nabla$ 15.2)	12	3.125 (80.0)	3/8-16 $\nabla$ 0.63 (M10 x 1.5 $\nabla$ 18)	12	4.625 (117)	.84 (21.4)
9.5*	5.00 (127)	6.70 (170)	5.28 (134)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	12	4.000 (102)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	12	5.938 (151)	1.41 (35.7)
15	5.81 (148)	7.80 (198)	6.16 (157)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	12	5.000 (127)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	12	6.875 (175)	1.80 (45.7)
25	7.27 (185)	8.90 (226)	7.32 (186)	5/8-11 $\nabla$ 1.00 (M16 x 2 $\nabla$ 25.4)	12	5.500 (140)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	12	8.000 (203)	2.63 (66.7)

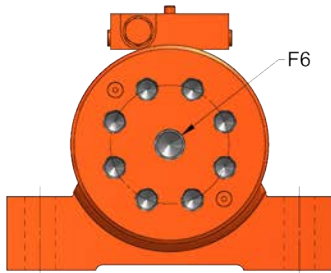
Model	H1 Centerline to valve top in (mm)	L1 Overall Length 180° in (mm)	L1 Overall Length 360° in (mm)	L2 Overall Length, non-rotating 180° in (mm)	L2 Overall Length, non-rotating 360° in (mm)	L3 Shaft flange to counterbalance valve 180° in (mm)	L3 Shaft flange to counterbalance valve 360° in (mm)
1.7	3.15 (80)	5.50 (140)	- (-)	5.45 (138)	- (-)	1.00 (25.4)	- (-)
3.0	3.53 (89.7)	5.63 (143)	7.45 (189)	5.58 (142)	7.40 (188)	1.06 (26.9)	0.89 (22.6)
5.5	3.85 (97.8)	6.13 (156)	8.35 (212)	6.08 (154)	8.30 (211)	1.09 (27.7)	0.97 (24.6)
9.5	4.53 (115)	7.25 (184)*	10.15 (258)	7.17 (182)*	10.07 (256)	1.10 (27.9)*	1.68 (42.7)
15	5.07 (129)	8.83 (224)	12.25 (311)	8.72 (221)	12.14 (308)	1.52 (38.6)	2.37 (60.2)
25	5.63 (143)	9.50 (241)	13.64 (346)	9.40 (239)	13.54 (344)	1.73 (43.9)	2.77 (70.4)

Model	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve
1.7	ISO-11926/SAE Series of ports. Sizes are 7/16. (ISO-1179-1/BSPP 'G' Series of ports. Sizes are 1/8. See drawings for details.)	ISO-11926/SAE Series of ports. Sizes are 7/16. See drawings for details
3.0		
5.5		
9.5*		
15		
25		

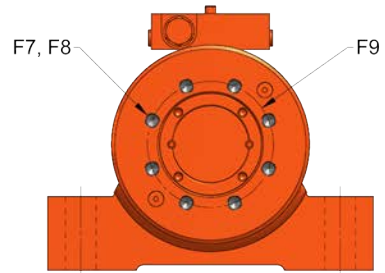
\*L10-9.5 185°

Specification charts are for general reference only. Consult drawings for actual values and tolerances.

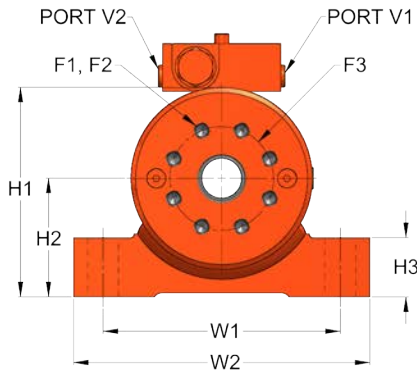
**L20 Dimensional Data**



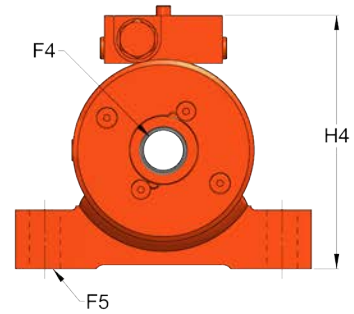
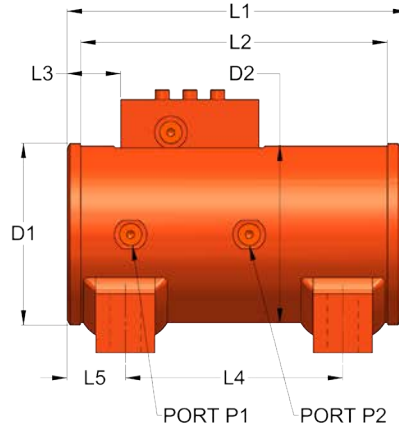
**L20-25, 39 Shaft Flange**



**L20-25, 39 Endcap**



**L20-4.5, 8.2, 15 Shaft Flange**



**L20-4.5, 8.2, 15 Endcap**

Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Moment Capacity Straddle in-lb (Nm)	Moment Capacity Cantilever in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement 180° in³ (cm³)	Approximate Weight lb (kg)
4.5	4,500 (509)	11,800 (1 333)	22,500 (2 543)	12,000 (1 356)	3,050 (1 383)	1,100 (499)	8.05 (131.9)	27.0 (12.2)
8.2	8,200 (927)	21,000 (2 373)	40,000 (4 520)	22,000 (2 486)	4,700 (2 132)	1,500 (680)	14.3 (234.3)	37.0 (16.8)
15	15,000 (1 695)	38,720 (4 375)	90,000 (10 170)	48,000 (5 424)	9,230 (4 187)	2,200 (998)	26.6 (435.9)	66.0 (29.9)
25	25,000 (2 825)	62,900 (7 108)	200,000 (22 597)	100,000 (11 300)	12,300 (5 579)	3,100 (1 406)	44.3 (725.9)	113 (51.3)
39	39,000 (4 407)	93,200 (10 532)	280,000 (31 640)	140,000 (15 820)	21,000 (9 526)	3,900 (1 769)	65.7 (1 076.6)	169 (76.7)

Specification charts are for general reference only. Consult drawings for actual values and tolerances.

**L20 Dimensional Data**

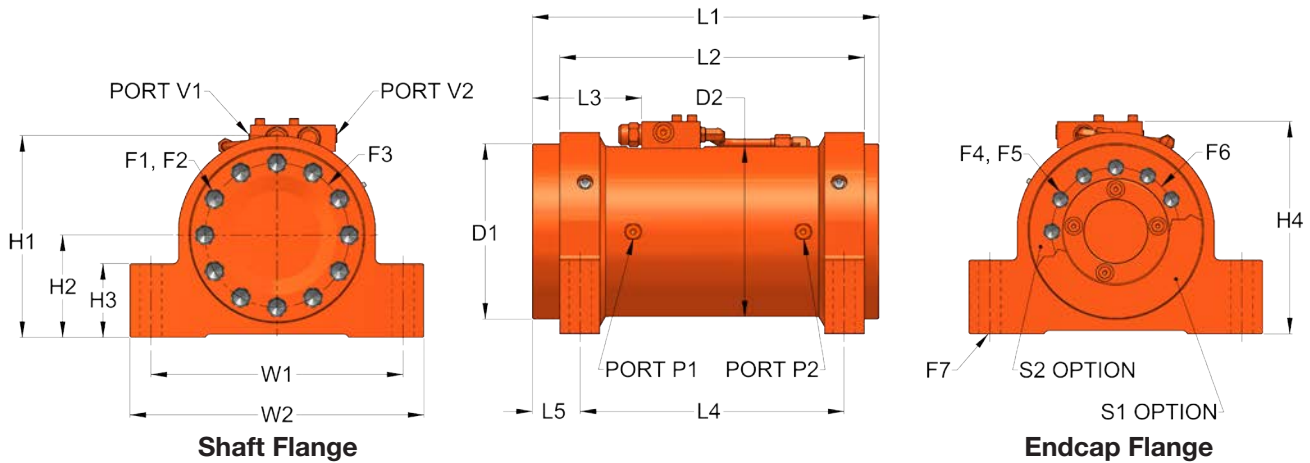
Model	D1 Shaft and endcap flange diameter in (mm)	D2 Housing diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep)	F2 Quantity of mounting hole, shaft flange	F3 Bolt circle diameter, shaft flange in (mm)	F4 Clearance hole for shaft through-bolt (S1) in (metric)	F5 Housing foot clearance hole, required bolt size in (mm)	F6 Shaft center threaded hole in, deep (metric, deep)	F7 Threaded mounting hole, endcap flange (S2) in deep (metric deep)	F8 Quantity of mounting holes, endcap flange (S2)
4.5	4.10 (104)	4.00 (101)	3/8-16 $\nabla$ 0.54 (M10 x 1.5 $\nabla$ 12.7)	6	2.125 (53.9)	3/4 through (M20 through)	5/8 (M16)	- -	- -	-
8.2	4.60 (117)	4.50 (114)	3/8-16 $\nabla$ 0.54 (M10 x 1.5 $\nabla$ 15.2)	8	2.625 (65)	1 through (M24 through)	3/4 (M20)	- -	- -	-
15	5.60 (142)	5.50 (139)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 19.1)	8	3.375 (85)	1 through (M24 through)	1 (M24)	- -	- -	-
25	6.70 (170)	6.50 (165)	3/4-10 $\nabla$ 1.13 (M20 x 2.5 $\nabla$ 30)	8	4.000 (102)	- -	1 (M24)	1-8 $\nabla$ 2.00 (M24 x 3 $\nabla$ 25)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 18)	8
39	7.70 (196)	7.75 (191)	3/4-10 $\nabla$ 1.25 (M20 x 2.5 $\nabla$ 28)	10	4.750 (121)	- -	1 1/4 (M30)	1- 1/4-7 $\nabla$ 2.00 (1- 1/4-7 X $\nabla$ 2.00)	5/8-11 $\nabla$ 0.94 (M16 X 2 23)	10

Model	F9 Bolt circle diameter, endcap flange (S2) in (mm)	H1 Overall height (excluding valve) in (mm)	H2 Height to centerline in (mm)	H3 Foot height in (mm)	H3 Overall height (with valve) in (mm)	L1 Overall Length in (mm)	L2 Overall Length, non-rotating in (mm)	L3 Shaft flange to counterbalance valve in (mm)	L4 Mounting length in (mm)	L5 Shaft flange to mounting hole in (mm)
4.5	-	4.67 (119)	2.60 (66.0)	1.35 (34.3)	5.76 (146)	7.40 (188)	6.80 (173)	1.26 (32)	4.38 (111)	1.49 (37.9)
8.2	-	5.32 (135)	3.00 (76.2)	1.5 (38.1)	6.41 (163)	8.50 (216)	7.76 (197)	1.36 (34.5)	5.50 (140)	1.48 (37.6)
15	-	6.21 (158)	3.38 (85.9)	1.75 (44.5)	7.28 (185)	9.75 (248)	9.01 (229)	1.76 (44.7)	6.00 (152)	1.85 (47)
25	4.25 (108)	7.60 (1.93)	4.25 (108)	2.50 (63.5)	8.66 (220)	11.75 (298)	10.87 (276)	1.92 (48.8)	7.25 (184)	2.25 (57.2)
39	4.75 (121)	8.60 (218)	4.75 (121)	2.75 (70)	9.65 (245)	13.25 (337)	12.37 (314)	1.93 (49)	8.50 (216)	2.38 (60.5)

Model	W1 Mounting width in (mm)	W1 Overall width in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve
4.5	5.50 (145)	7.00 (178)	ISO-11926/SAE Series of ports. Sizes are 7/16. See drawings for details	ISO-11926/SAE Series of ports. Sizes are 7/16. See drawings for details
8.2	6.00 (152)	7.50 (191)		
15	7.75 (197)	9.75 (248)		
25	8.75 (222)	11.00 (279)		
39	10.50 (267)	13.00 (330)		

Specification charts are for general reference only. Consult drawings for actual values and tolerances.

**L30 Dimensional Data**



**L30 Foot Mount Specifications**

Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Moment Capacity Cantilever Mount in-lb (Nm)	Moment Capacity Straddle Mount 180° in-lb (Nm)	Moment Capacity Straddle Mount 360° in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)
17	17,000 (1 921)	43,600 (4 927)	45,900 (5 187)	119,000 (13 447)	170,000 (19 210)	4,000 (1 814)	3,000 (1 361)
25	25,000 (2 825)	60,400 (6 825)	62,500 (7 063)	150,000 (16 950)	218,000 (24 634)	5,000 (2 268)	4,000 (1 814)
42	42,000 (4 746)	103,000 (11 639)	105,000 (11 865)	273,000 (30 849)	402,000 (45 426)	8,000 (3 629)	6,000 (2 722)
65	65,000 (7 345)	162,000 (18 306)	162,500 (18 363)	423,000 (47 799)	630,000 (71 190)	11,000 (4 990)	8,000 (3 629)
95	95,000 (10 735)	232,000 (26 216)	261,250 (29 521)	665,000 (75 145)	987,000 (111 531)	15,000 (6 804)	10,000 (4 536)
125	125,000 (14 125)	306,000 (34 578)	343,750 (38 844)	875,000 (98 875)	1,295,000 (146 335)	18,000 (8 165)	13,000 (5 897)
165	165,000 (18 645)	404,000 (45 652)	495,000 (55 935)	1,155,000 (130 515)	1,750,000 (197 750)	22,000 (9 979)	15,000 (6 804)
215	215,000 (24 295)	520,000 (58 760)	645,000 (72 885)	1,505,000 (170 065)	2,270,000 (256 510)	26,000 (11 794)	18,000 (8 165)
380*	380,000 (42 940)	936,000 (105 768)	570,000 (64 410)	1,505,000 (170 065)	1,505,000 (170 065)	26,000 (11 794)	18,000 (8 165)

Model	Displacement 180° in³ (cm³)	Displacement 360° in³ (cm³)	Approximate Weight 180° lb (kg)	Approximate Weight 360° lb (kg)
17	29.8 (488.3)	60.0 (983.2)	76.0 (34.5)	100 (45.4)
25	42.5 (696.5)	85.0 (1,392.9)	110 (49.9)	140 (63.5)
42	72.2 (1,183.1)	144 (2,359.7)	160 (72.6)	220 (99.8)
65	114 (1,868.1)	228 (3,736.3)	240 (108.9)	310 (140.6)
95	164 (2,687.5)	327 (5,358.6)	360 (163.3)	450 (204.1)
125	216 (3,539.6)	432 (7,079.2)	490 (222.3)	630 (285.8)
165	284 (4,653.9)	569 (9,324.3)	610 (276.7)	810 (367.4)
215	366 (5,997.7)	732 (11,995.4)	790 (358.3)	1,000 (453.6)
380*	622 (10,192.8)	-	1,100 (499.0)	-

\* L30-380 Standard rotation is 210°. 180° rotation is achieved by incorporating an internal stop tube in the 210° actuator. Contact Parker-Helac for more information. Specification charts are for general reference only. Consult drawings for actual values and tolerances.

## L30 Dimensional Data

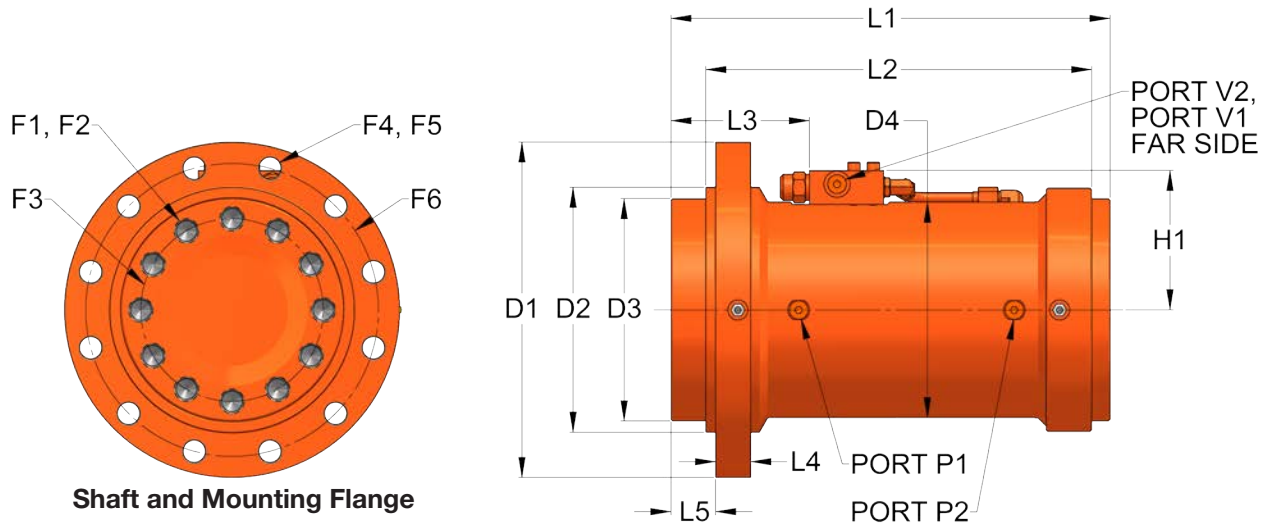
Model	D1 Shaft and endcap flange diameter in (mm)	D2 Housing diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep) (F2 Quantity of mounting holes: 12)	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, endcap flange, S2 in, deep (metric, deep) (F5 Quantity of mounting holes: 12)	F6 Bolt circle diameter, endcap flange in (mm)	F7 Housing foot clearance hole, required bolt size in (mm)
17	5.47 (139)	5.50 (140)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 18)	4.50 (115)	3/8-16 $\nabla$ 0.56 (M10 x 1.5 $\nabla$ 15)	4.25 (108)	5/8 (M16)
25	6.09 (155)	6.00 (152)	5/8-11 $\nabla$ 0.94 (M16 x 2 $\nabla$ 23.9)	5.00 (125)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 18)	4.75 (120)	3/4 (M20)
42	7.22 (183)	7.00 (178)	3/4-10 $\nabla$ 1.13 (M20 x 2.5 $\nabla$ 30)	5.88 (150)	5/8-11 $\nabla$ 0.94 (M16 x 2 $\nabla$ 23.9)	5.25 (133)	7/8 (M22)
65	8.22 (209)	8.00 (203)	7/8-9 $\nabla$ 1.31 (M22 x 2.5 $\nabla$ 33)	6.75 (170)	3/4-10 $\nabla$ 1.13 (M20 x 2.5 $\nabla$ 30)	6.00 (150)	1 (M24)
95	9.22 (234)	9.00 (229)	1-8 $\nabla$ 1.38 (M24 x 3 $\nabla$ 36.1)	7.75 (195)	7/8-9 $\nabla$ 1.31 (M22 x 2.5 $\nabla$ 33)	6.75 (170)	1 1/8 (M27)
125	10.34 (263)	10.0 (254)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.6)	8.50 (215)	1-8 $\nabla$ 1.50 (M24 x 3 $\nabla$ 36.1)	7.50 (190)	1 1/4 (M30)
165	11.35 (288)	11.0 (279)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.6)	9.50 (240)	1-8 $\nabla$ 1.50 (M24 x 3 $\nabla$ 36.1)	8.25 (210)	1 3/8 (M36)
215	12.22 (310)	12.0 (305)	1 1/4-7 $\nabla$ 1.88 (M30 x 3.5 $\nabla$ 44.9)	10.00 (255)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.1)	9.00 (230)	1 1/2 (M36)
380*	12.22 (310)	12.0 (305)	1 1/4-7 $\nabla$ 1.88 (M30 x 3.5 $\nabla$ 44.9)	10.00 (255)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.1)	9.00 (230)	1 1/2 (M36)

Model	H1 Overall height (excluding valve) in (mm)	H2 Height to centerline in (mm)	H3 Foot height in (mm)	H3 Overall height (with valve) in (mm)	L1 Overall Length 180° in (mm)	L1 Overall Length 360° in (mm)	L2 Overall Length, non-rotating 180° in (mm)	L2 Overall Length, non-rotating 360° in (mm)	L3 Shaft flange to counterbalance valve 180° in (mm)	L3 Shaft flange to counterbalance valve 360° in (mm)
17	6.15 (156)	3.15 (80.0)	1.89 (48)	7.05 (179)	11.73 (298)	16.81 (427)	10.26 (261)	15.44 (392)	2.96 (75.2)	5.85 (149)
25	7.34 (186)	3.74 (94.9)	2.75 (69.9)	7.91 (201)	12.72 (323)	18.51 (470)	11.27 (286)	17.05 (433)	5.27 (134)	6.19 (157)
42	8.35 (212)	4.25 (108)	3.07 (77.9)	8.90 (226)	14.37 (365)	21.18 (538)	12.73 (323)	19.54 (496)	5.61 (143)	7.75 (197)
65	9.45 (240)	4.80 (122)	3.47 (88.1)	10.68 (271)	16.24 (413)	24.20 (615)	14.27 (363)	22.23 (565)	5.12 (130)	9.15 (232)
95	10.86 (276)	5.51 (140)	4.13 (105)	11.16 (283)	18.70 (475)	27.76 (705)	16.95 (431)	26.01 (661)	6.00 (152)	10.50 (267)
125	11.99 (305)	6.06 (154)	4.33 (110)	12.21 (310)	20.63 (524)	30.55 (776)	18.21 (463)	28.13 (715)	7.27 (185)	12.13 (308)
165	12.88 (327)	6.50 (165)	4.73 (120)	13.15 (334)	21.81 (554)	32.92 (836)	19.39 (493)	30.49 (775)	7.73 (196)	13.32 (338)
215	14.25 (362)	7.25 (184)	5.32 (135)	14.40 (366)	23.62 (600)	35.67 (906)	21.02 (534)	33.19 (843)	8.69 (221)	14.71 (374)
380*	14.25 (362)	7.25 (184)	5.32 (135)	14.40 (366)	35.67 (906)	- (-)	33.37 (848)	- (-)	14.71 (374)	- (-)

Model	L4 Mounting Length 180° in (mm)	L4 Mounting Length 360° in (mm)	L5 Shaft flange to mounting hole in (mm)	W1 Mounting width in (mm)	W1 Overall width in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve
17	9.02 (229)	14.09 (358)	1.50 (38.1)	7.48 (190)	8.74 (222)	ISO-11926/ SAE Series of ports. Sizes vary from 7/16 to 3/4. See drawings for details.	ISO-1179-1/ BSPP 'G' Series of ports. Sizes vary from 1/4 thru 1/2. See drawings for details.
25	9.76 (248)	15.55 (395)	1.73 (43.9)	9.06 (230)	10.55 (268)		
42	11.06 (281)	17.87 (454)	1.97 (50)	10.24 (260)	12.21 (310)		
65	12.36 (314)	20.32 (516)	2.24 (56.9)	11.81 (300)	13.78 (350)		
95	14.73 (374)	23.78 (604)	2.36 (59.9)	13.39 (340)	15.75 (400)		
125	15.75 (400)	25.67 (652)	2.92 (74.2)	14.96 (380)	17.60 (447)		
165	16.77 (426)	27.88 (708)	2.99 (75.9)	16.14 (410)	19.06 (484)		
215	18.11 (460)	30.16 (766)	3.09 (78.5)	17.72 (450)	20.87 (530)		
380*	30.16 (766)	- (-)	3.15 (80)	17.72 (450)	20.87 (530)		

Specification charts are for general reference only. Consult drawings for actual values and tolerances.

**L30 Dimensional Data**



**L30 Flange Mount Specifications**

Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Moment Capacity S1 Option, Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)
17	17,000 (1 921)	43,600 (4 927)	45,900 (5 187)	4,000 (1 814)	3,000 (1 361)
25	25,000 (2 825)	60,400 (6 825)	62,500 (7 063)	5,000 (2 268)	4,000 (1 814)
42	42,000 (4 746)	103,000 (11 639)	105,000 (11 865)	8,000 (3 629)	6,000 (2 722)
65	65,000 (7 345)	162,000 (18 306)	162,500 (18 363)	11,000 (4 990)	8,000 (3 629)
95	95,000 (10 735)	232,000 (26 216)	261,250 (29 521)	15,000 (6 804)	10,000 (4 536)
125	125,000 (14 125)	306,000 (34 578)	343,750 (38 844)	18,000 (8 165)	13,000 (5 897)
165	165,000 (18 645)	404,000 (45 652)	495,000 (55 935)	22,000 (9 979)	15,000 (6 804)
215	215,000 (24 295)	520,000 (58 760)	645,000 (72 885)	26,000 (11 794)	18,000 (8 165)
380*	380,000 (42 940)	936,000 (105 768)	570,000 (64 410)	26,000 (11 794)	18,000 (8 165)

Model	Displacement 180° in³ (cm³)	Displacement 360° in³ (cm³)	Approximate Weight 180° lb (kg)	Approximate Weight 360° lb (kg)
17	29.8 (488.3)	60.0 (983.2)	76.0 (34.5)	100 (45.4)
25	42.5 (696.5)	85.0 (1 392.9)	110 (49.9)	140 (63.5)
42	72.2 (1 183.1)	144 (2 359.7)	160 (72.6)	220 (99.8)
65	114 (1 868.1)	228 (3 736.3)	240 (108.9)	310 (140.6)
95	164 (2 687.5)	327 (5 358.6)	360 (163.3)	450 (204.1)
125	216 (3 539.6)	432 (7 079.2)	490 (222.3)	630 (285.8)
165	284 (4 653.9)	569 (9 324.3)	610 (276.7)	810 (367.4)
215	366 (5 997.7)	732 (11 995.4)	790 (358.3)	1,000 (453.6)
380*	622 (10 192.8)	-	1,100 (499.0)	-

\* L30-380 Standard rotation is 210°. 180° rotation is achieved by incorporating an internal stop tube in the 210° actuator. Contact Parker-Helac for more information. Specification charts are for general reference only. Consult drawings for actual values and tolerances.

**L30 Dimensional Data**

Model	D1 Overall flange diameter in (mm)	D2 Pilot diameter in (mm)	D3 Shaft and endcap flange diameter in (mm)	D4 Housing diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep) (F2 Quantity of mounting holes: 12)	F3 Bolt circle diameter, shaft flange in (mm)	F4 Housing flange clearance hole, required bolt size in (mm) (F5 Quantity of mounting holes: 12)
17	7.87 (200)	5.91 (150)	5.47 (139)	5.50 (140)	1/2-13 $\nabla$ 0.75 (M12 x 1.75 $\nabla$ 18)	4.50 (115)	3/8 (M10)
25	9.25 (235)	6.89 (175)	6.09 (155)	6.00 (152)	5/8-11 $\nabla$ 0.94 (M16 x 2 $\nabla$ 23.9)	5.00 (125)	1/2 (M12)
42	11.02 (280)	8.07 (205)	7.22 (183)	7.00 (178)	3/4-10 $\nabla$ 1.13 (M20 x 2.5 $\nabla$ 30)	5.88 (150)	5/8 (M16)
65	12.40 (315)	9.05 (230)	8.22 (209)	8.00 (203)	7/8-9 $\nabla$ 1.31 (M22 x 2.5 $\nabla$ 33)	6.75 (170)	3/4 (M20)
95	13.98 (355)	10.23 (260)	9.22 (234)	9.00 (229)	1-8 $\nabla$ 1.38 (M24 x 3 $\nabla$ 36.1)	7.75 (195)	7/8 (M22)
125	15.60 (396)	11.42 (290)	10.34 (263)	10.0 (254)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.6)	8.50 (215)	1 (M24)
165	17.40 (442)	12.40 (315)	11.34 (288)	11.0 (279)	1 1/8-7 $\nabla$ 1.69 (M27 x 3 $\nabla$ 40.6)	9.50 (240)	1 1/8 (M27)
215	18.70 (475)	13.38 (340)	12.22 (310)	12.0 (305)	1 1/4-7 $\nabla$ 1.88 (M30 x 3.5 $\nabla$ 44.9)	10.00 (255)	1 1/4 (M30)
380*	18.70 (475)	13.38 (340)	12.22 (310)	12.0 (305)	1 1/4-7 $\nabla$ 1.88 (M30 x 3.5 $\nabla$ 44.9)	10.00 (255)	1 1/4 (M30)

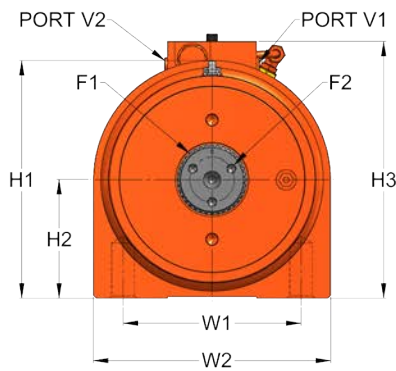
Model	F6 Bolt circle diameter, housing flange in (mm)	H1 Centerline to valve top in (mm)	L1 Overall Length 180° in (mm)	L1 Overall Length 360° in (mm)	L2 Overall Length, non-rotating 180° in (mm)	L2 Overall Length, non-rotating 360° in (mm)	L3 Shaft flange to counterbalance valve 180° in (mm)	L3 Shaft flange to counterbalance valve 360° in (mm)	L4 Mounting flange thickness in (mm)
17	6.89 (175)	3.90 (99.1)	11.73 (298)	16.81 (427)	10.26 (261)	15.34 (390)	2.96 (75.2)	7.95 (202)	0.99 (25.2)
25	8.07 (205)	4.17 (106)	12.72 (323)	18.51 (470)	11.14 (283)	16.93 (430)	5.27 (134)	6.19 (157)	1.02 (25.9)
42	9.65 (245)	4.65 (118)	14.37 (365)	21.18 (538)	12.73 (323)	19.54 (496)	5.61 (142)	7.75 (197)	1.22 (30.9)
65	10.83 (275)	5.15 (131)	16.24 (413)	24.20 (615)	14.27 (363)	22.23 (565)	5.12 (130)	9.15 (232)	1.30 (33)
95	12.21 (310)	5.65 (144)	18.70 (475)	27.76 (705)	16.95 (431)	26.01 (661)	6.00 (152)	10.50 (267)	1.58 (40.1)
125	13.58 (345)	6.15 (156)	20.63 (524)	30.55 (776)	18.21 (462)	28.13 (715)	7.25 (184)	12.14 (308)	1.65 (41.9)
165	14.96 (380)	6.66 (169)	21.71 (551)	32.92 (836)	19.39 (493)	30.49 (775)	7.83 (199)	13.39 (340)	1.81 (45.9)
215	16.14 (410)	7.16 (182)	23.62 (600)	35.67 (906)	21.02 (534)	33.03 (839)	8.69 (221)	14.71 (374)	2.05 (52)
380*	16.14 (410)	7.16 (182)	35.67 (906)	- (-)	33.06 (840)	- (-)	14.71 (374)	- (-)	2.05 (52)

Model	L5 Shaft flange to mounting flange face in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve
17	1.06 (26.9)	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 3/4. See drawings for details.	ISO-1179-1/BSPP 'G' Series of ports. Sizes vary from 1/4 thru 1/2. See drawings for details.
25	1.26 (32)		
42	1.38 (35.1)		
65	1.65 (41.9)		
95	1.58 (40.1)		
125	2.09 (53.1)		
165	2.13 (54.1)		
215	2.20 (55.9)		
380*	2.20 (55.9)		

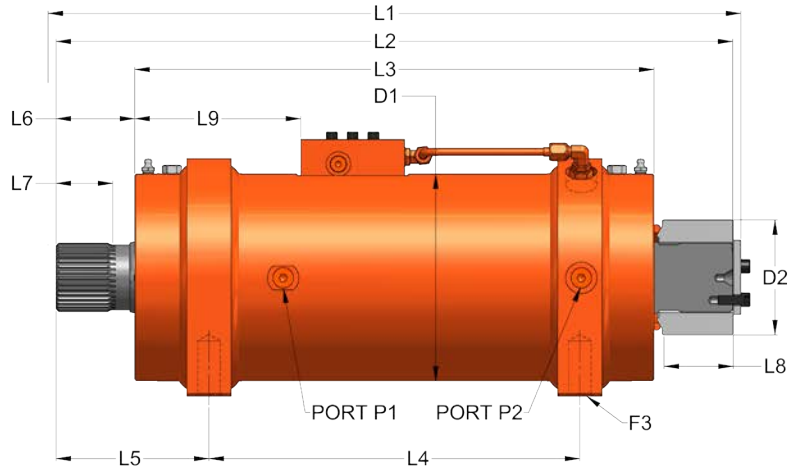
Specification charts are for general reference only. Consult drawings for actual values and tolerances.



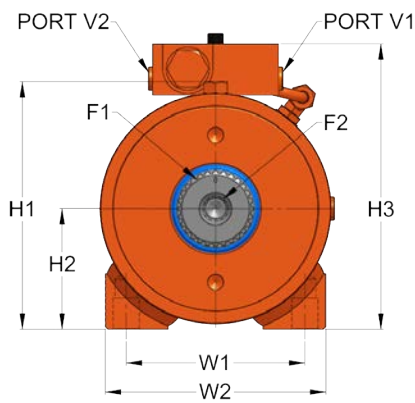
**T20 Dimensional Data**



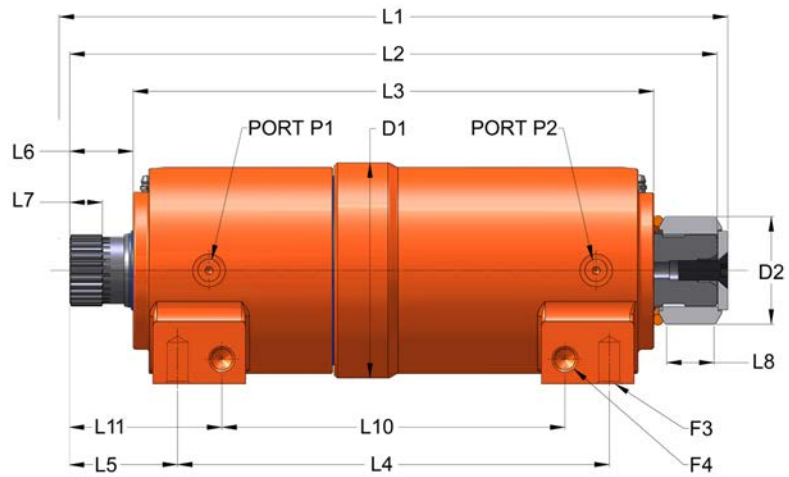
**T20-60, Endview**



**T20-60**



**T20-25, 45, Endview**



**T30-27**

Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Standard Rotation	Moment Capacity Straddle Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in <sup>3</sup> (cm <sup>3</sup> )	Approximate Weight lb (kg)
T20-25	25,000 (2 825)	54,200 (6 125)	220°	37,500 (4 238)	4,500 (2 041)	4,500 (2 041)	47.3 (775.1)	74.0 (33.6)
T30-27	27,000 (3 051)	54,200 (6 125)	220°	40,500 (4 577)	4,500 (2 041)	4,500 (2 041)	48.8 (799.7)	72.0 (32.7)
T20-45	45,000 (5 085)	94,000 (10 622)	220°	67,500 (7 628)	6,900 (3 130)	6,900 (3 130)	82.8 (1 356.9)	128 (58.1)
T20-60	60,000 (6 780)	127,000 (14 351)	200°	90,000 (10 170)	8,600 (3 901)	8,600 (3 901)	101 (1 655.1)	166 (75.3)

Specification charts are for general reference only. Consult drawings for actual values and tolerances.



**T20 Dimensional Data**

Model	D1 Housing diameter in (mm)	D2 Optional spline adapter diameter in (mm)	F1 Shaft spline, both ends inch (metric)	F2 Shaft threaded mounting hole, both ends in, deep (metric, deep)	F3 Threaded mounting hole, housing feel (F4 T30-27 only) in, deep (metric, deep)	H1 Overall height (excluding valve) in (mm)	H2 Height to centerline in (mm)	H3 Overall height (including valve) in (mm)
T20-25	5.50 (140)	3.15 (80)	Inch models comply with ANSI B92.1. See drawings for specific details. (Metric models comply with DIN5480. See drawings for specific details.)	1/2-13 $\nabla$ 1.21 (M12 x 1.75 $\nabla$ 35.1)	5/8-11 $\nabla$ 1.00 (M16 x 2 $\nabla$ 19)	5.9 (150)	2.88 (73.2)	6.79 (173)
T30-27	5.46 (139)	2.73 (80)		1/2-13 $\nabla$ 1.21 (M12 x 1.75 $\nabla$ 35.1)	5/8-11 $\nabla$ 0.78 (M16 x 2 $\nabla$ 19.8)	5.61 (142)	2.88 (73.2)	- (-)
T20-45	6.50 (165)	3.54 (89.9)		1/2-13 $\nabla$ 1.21 (M12 x 1.75 $\nabla$ 35.1)	3/4-10 $\nabla$ 1.00 (M20 x 2.5 $\nabla$ 25)	6.85 (176)	3.30 (83.9)	7.72 (196)
T20-60	7.00 (178)	3.87 (98.3)		5/16-18 (Quantity 3) $\nabla$ .50 on 1.50" Bolt circle (M12 x 1.75 <i>Quantity 1</i> $\nabla$ 35.1)	7/8-9 $\nabla$ 1.31 (M22 x 2.5 $\nabla$ 30)	8.00 (203)	4.00 (102)	8.64 (220)

Model	L1 Overall length, rotating, with optional adapter in (mm)	L2 Overall length, rotating, without optional adapter in (mm)	L3 Overall length, non-rotating in (mm)	L4 Mounting length in (mm)	L5 Mounting hole to end of shaft in (mm)	L6 Shaft extension in (mm)	L7 Spline length in (mm)
T20-25	16.95 (431)	16.41 (417)	13.20 (335)	10.50 (265)	2.96 (75.1)	1.61 (40.9)	0.88 (21.6)
T30-27	16.65 (423)	16.41 (417)	13.20 (335)	10.95 (278.1)	2.72 (69.1)	1.59 (40.5)	0.83 (21)
T20-45	22.08 (561)	21.50 (546)	16.62 (422)	12.50 (320)	4.50 (113)	2.44 (61.9)	1.58 (40)
T20-60	23.94 (608)	22.81 (579)	17.50 (445)	12.50 (320)	5.16 (130)	2.66 (67.6)	1.92 (49)

Model	L8 Optional spline adapter length in (mm)	L9 Housing end to valve in (mm)	L10 Mounting length in (mm)	L11 Mounting hole to end of shaft in (mm)	W11 Mounting width in (mm)	W2 Overall foot width in (mm)
T20-25	1.28 (32.5)	3.44 (87)	- (-)	- (-)	4.25 (104)	5.25 (133)
T30-27	1.20 (30.6)	- (-)	8.70 (220.9)	3.84 (97.6)	4.25 (104)	5.25 (133)
T20-45	2.07 (52.6)	4.97 (126)	- (-)	- (-)	5.25 (140)	6.70 (170)
T20-60	2.42 (60.5)	5.59 (142)	- (-)	- (-)	5.50 (150)	8.00 (203)

Model	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve
T20-25	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 9/16. See drawings for details. (ISO-1179-1BSPP 'G' Series of ports. Sizes vary from 1/8 to 1/4. See drawings for details.)	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 9/16. See drawings for details. (ISO-1179-1BSPP 'G' Series of ports. Sizes vary from 1/8 to 1/4. See drawings for details.)
T30-27		
T20-45		
T20-60		

Specification charts are for general reference only. Consult drawings for actual values and tolerances.

## Offer of Sale

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**1. Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at [www.parker.com/saleterms/](http://www.parker.com/saleterms/). Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

**2. Price Adjustments; Payments.** Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

**3. Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

**4. Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

**5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

**6. LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

**7. User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

**8. Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**10. Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

**11. Improper use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any

other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

**12. Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

**13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

**14. Force Majeure.** Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

**15. Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

**16. Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

**17. Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

**18. Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

**19. Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

**20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

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**Offer of Sale**

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by provisions stated on a separate page of the document entitled 'Offer of Sale'.

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