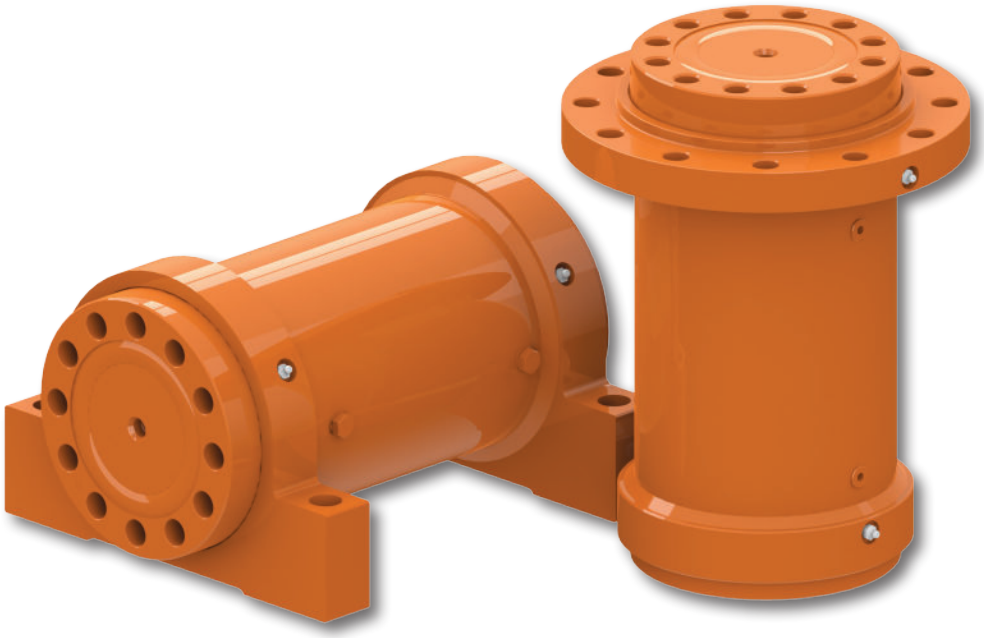










Helical Hydraulic Rotary Actuators

Series L and T



Parker

HELAC®

ENGINEERING YOUR SUCCESS.









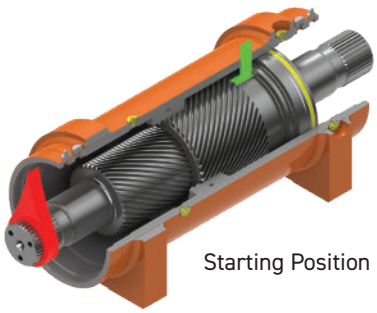
Industries Served:

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

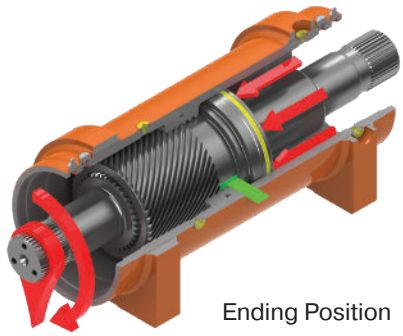
The piston is completely bottomed out. Bars indicate starting positions of piston and shaft. The housing with integral gear remains stationary.



Starting Position

Ending Position

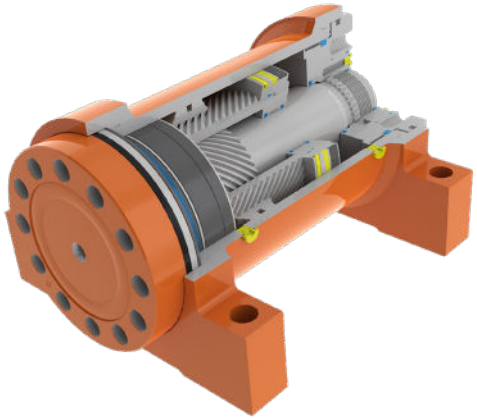
When hydraulic pressure is applied to the piston, it moves axially; while the helical gearing causes the piston and shaft to rotate simultaneously. Applying pressure to the opposite port will return the piston and shaft to their original starting positions.



Ending Position

For over 50 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 structure 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 leakage, 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 when properly equipped



Operating information L10 Series

Rotation	180° and 360°
Maximum Drive Torque:	3,000 to 25,000 in-lb
Maximum Holding Torque:	11,000 to 83,000 in-lb
Maximum Straddle Moment:	9,000 to 100,000 in-lb
Maximum Cantilever Moment:	9,000 to 100,000 in-lb
Mounting:	Flange



Operating information L30 Series

Rotation	180° and 360°
Maximum Drive Torque:	17,000 to 215,000 in-lb
Maximum Holding Torque:	43,600 to 520,000 in-lb
Maximum Straddle Moment:	119,000 to 1,505,000 in-lb
Maximum Cantilever Moment:	45,900 to 645,000 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

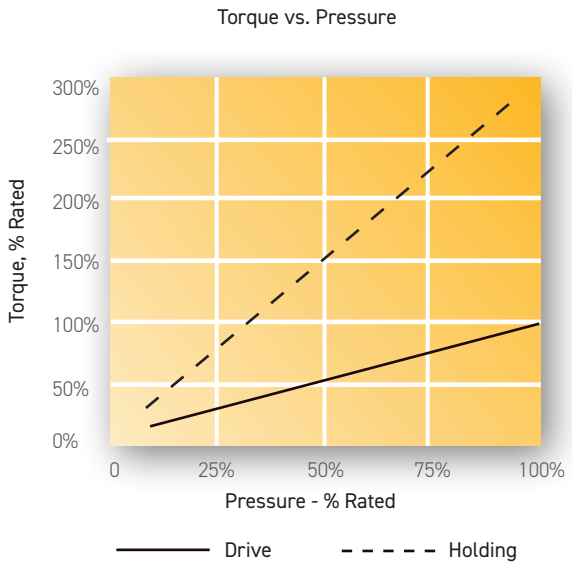


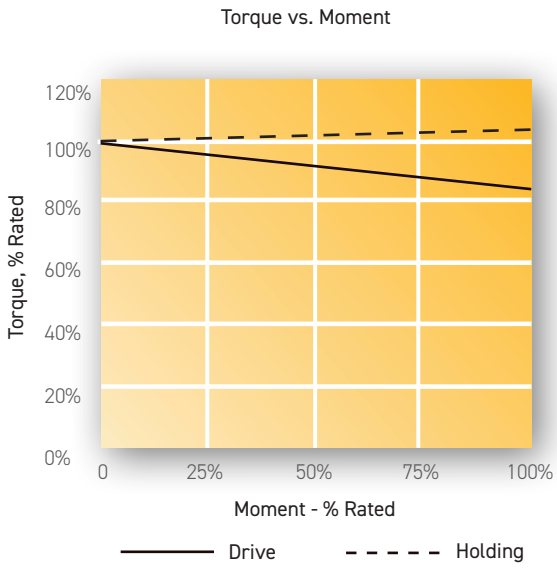
Operating information T Series

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

Torque Versus Hydraulic Pressure and Loads

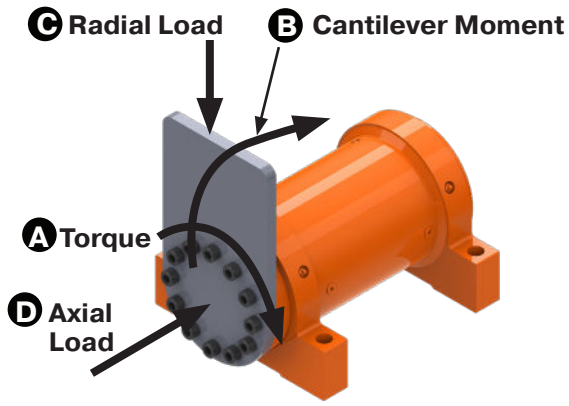
The driving torque and holding torque are approximately linear with hydraulic pressure. As moment loads increase, drive torque may be reduced by up to 15%.



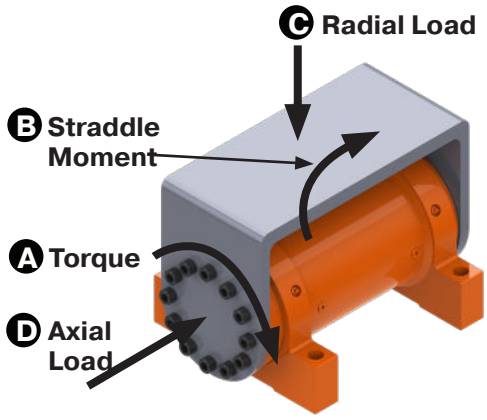


Specifications Reference Guide

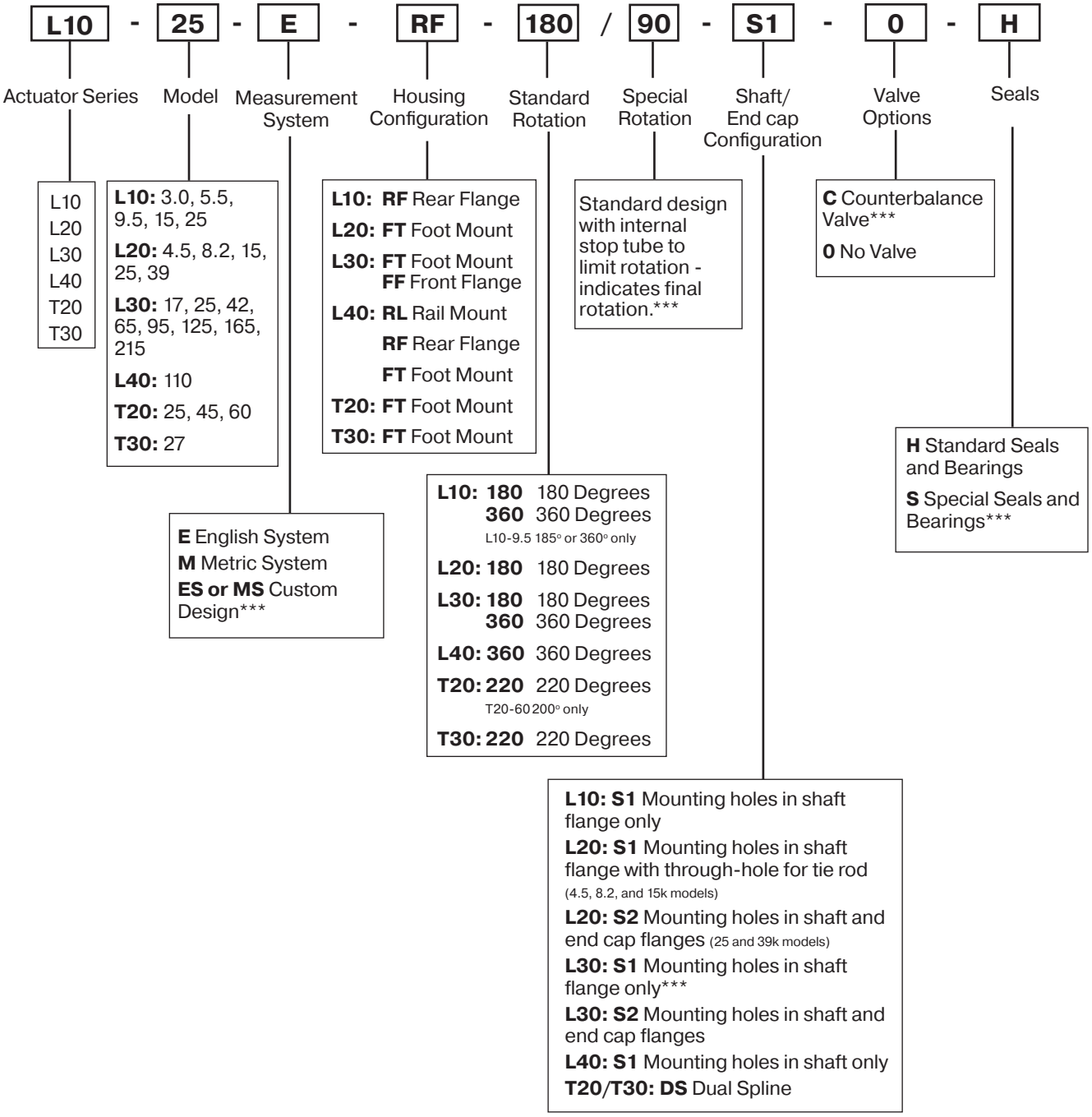
Cantilever Mount



Straddle Mount



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

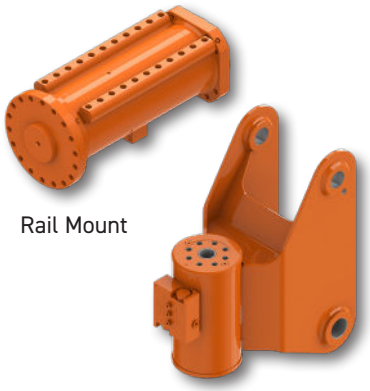


***Subject to minimum annual order quantities. Not all possible configurations available in small quantities. Consult factory.**

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

Customized Products

Parker Hannifin 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.



Rail Mount

Clevis Mount

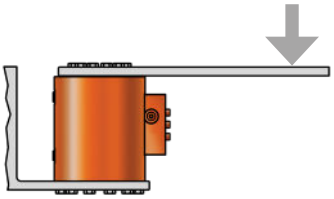
Cantilever Mount

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

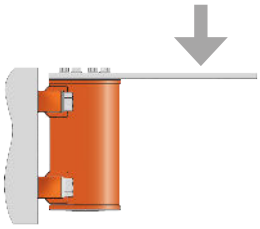
The load is supported at both ends of the shaft.

L10 Series

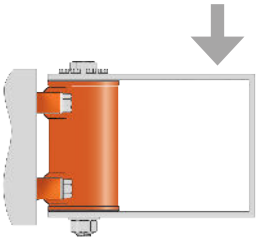


Cantilever Mount

L20 Series



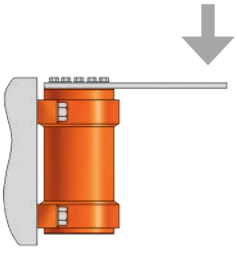
Cantilever Mount



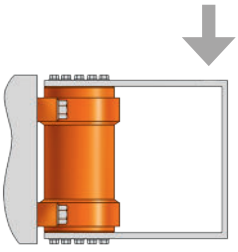
Straddle Mount

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

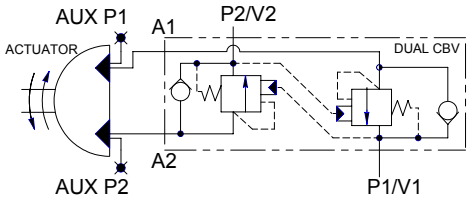
The upper portion of the bracket is bolted to the shaft flange, the lower portion is bolted to the endcap flange.

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

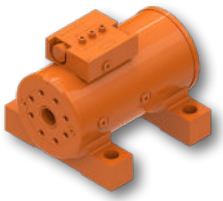
Optional factory mounted counterbalance valves prevent rotation in the event of a hydraulic line failure, control rotation when loads go over center, and protect the actuator against excessive torque loads.



L10 with counterbalance valve



Hydraulic Schematic of Optional Counterbalance Valve

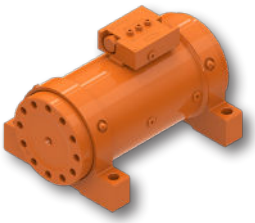


L20 with counterbalance valve

L10 and L20 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).



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

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).

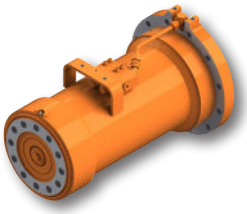


L30 with counterbalance valve, with tube (select models only)

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).

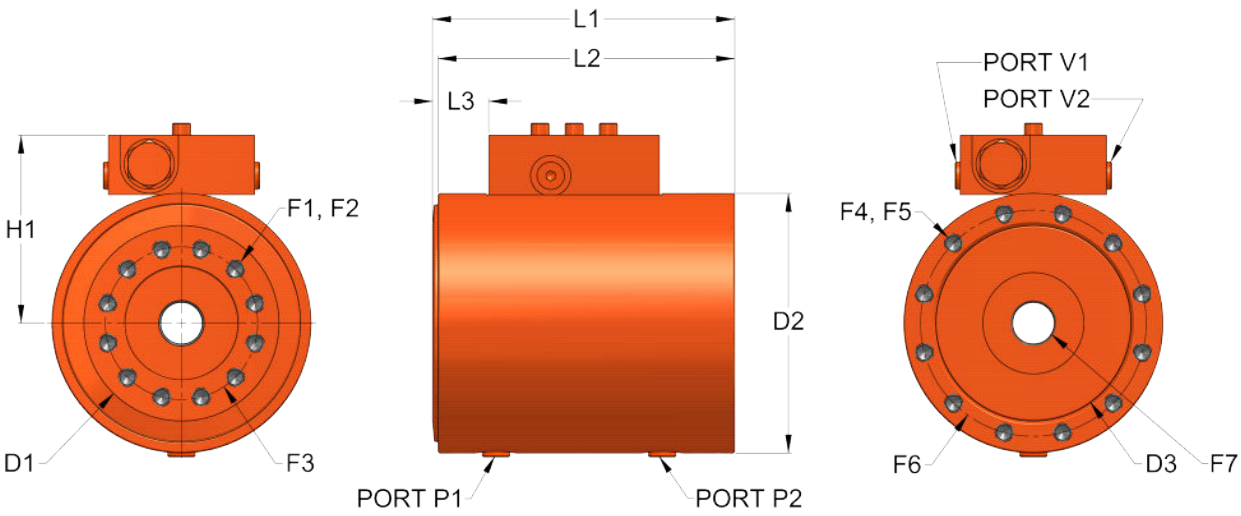


L40 with counterbalance valve, with tube (select models only)

L40 Series

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).



Shaft Flange

Housing Flange

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° in^3 (cm^3)	Displacement 360° in^3 (cm^3)	Approximate Weight 180° lb (kg)	Approximate Weight 360° lb (kg)
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.

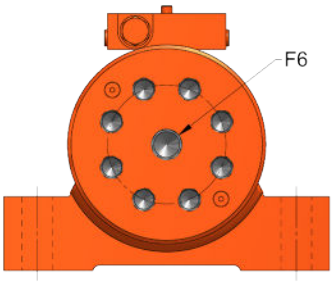
Model	D1 Shaft mounting surface diameter in (mm)	D2 Housing diameter in (mm)	D3 Mounting flange inside diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep)	F2 Quantity of mounting hole, shaft flange	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, housing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

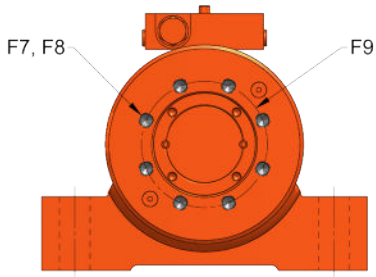
Model	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve inch (metric)
3.0	ISO-11926/SAE Series of ports. Sizes are 7/16. (ISO-1179-1/BSPP 'G' Series of ports. Sizes are 1/8.) See drawings for details.	ISO-11926/SAE Series of ports. Sizes are 7/16. (ISO-1179-1/BSPP 'G' Series of ports. Sizes are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

*L10-9.5 185°

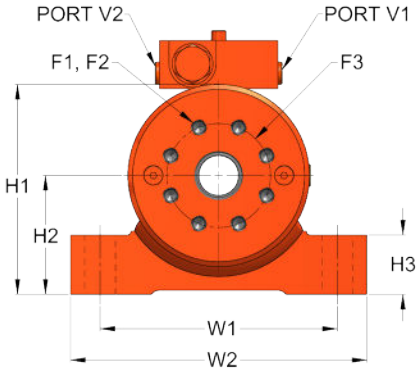
Specification charts are for general reference only. Consult drawings for actual values and tolerances.



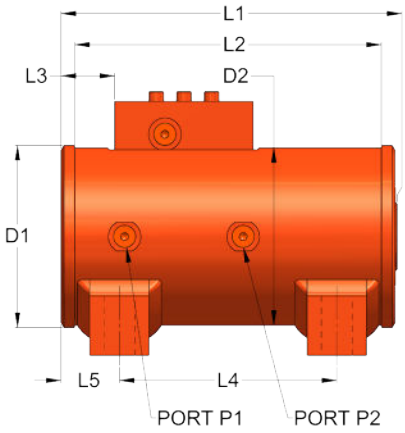
L20-25, 39 Shaft Flange

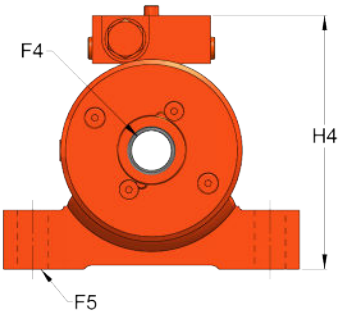


L20-25, 39 Endcap



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° in^3 (cm^3)	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)

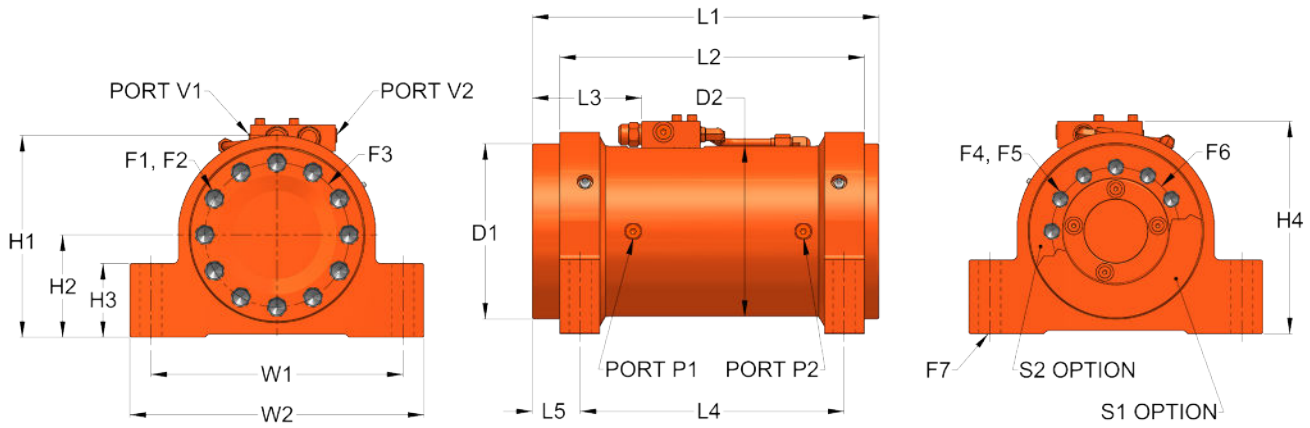
Specification charts are for general reference only. Consult drawings for actual values and tolerances.

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 ↧0.54 (M10 x 1.5 ↧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 ↧0.54 (M10 x 1.5 ↧15.2)	8	2.625 (65)	1 through (M24 through)	3/4 (M20)	- -	- -	-
15	5.60 (142)	5.50 (139)	1/2-13 ↧0.75 (M12 x 1.75 ↧19.1)	8	3.375 (85)	1 through (M24 through)	1 (M24)	- -	- -	-
25	6.70 (170)	6.50 (165)	3/4-10 ↧1.13 (M20 x 2.5 ↧30)	8	4.000 (102)	- -	1 (M24)	1-8 ↧2.00 (M24 x 3 ↧25)	1/2-13 ↧0.75 (M12 x ↧1.75 18)	8
39	7.70 (196)	7.75 (191)	3/4-10 ↧1.25 (M20 x 2.5 ↧28)	10	4.750 (121)	- -	1 1/4 (M30)	1- 1/4-7 ↧2.00 (1- 1/4-7 X ↧2.00)	5/8-11 ↓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)	H4 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)	W2 Overall width in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve inch (metric)
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.



Shaft Flange **Endcap Flange**

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)

Model	Displacement 180° in^3 (cm^3)	Displacement 360° in^3 (cm^3)	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)

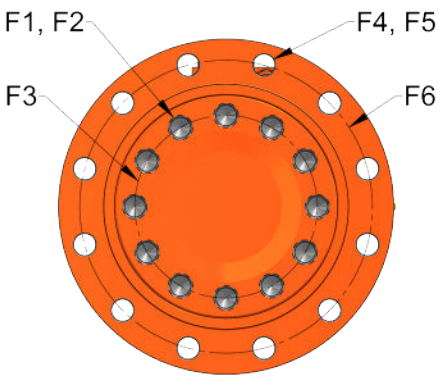
Specification charts are for general reference only. Consult drawings for actual values and tolerances.

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 ↧0.75 (M12 x 1.75 ↧18)	4.50 (115)	3/8-16 ↧0.56 (M10 x 1.5 ↧15)	4.25 (108)	5/8 (M16)
25	6.09 (155)	6.00 (152)	5/8-11 ↧0.94 (M16 x 2 ↧23.9)	5.00 (125)	1/2-13 ↧0.75 (M12 x 1.75 ↧18)	4.75 (120)	3/4 (M20)
42	7.22 (183)	7.00 (178)	3/4-10 ↧1.13 (M20 x 2.5 ↧30)	5.88 (150)	5/8-11 ↧0.94 (M16 x 2 ↧23.9)	5.25 (133)	7/8 (M22)
65	8.22 (209)	8.00 (203)	7/8-9 ↧1.31 (M22 x 2.5 ↧33)	6.75 (170)	3/4-10 ↧1.13 (M20 x 2.5 ↧30)	6.00 (150)	1 (M24)
95	9.22 (234)	9.00 (229)	1-8 ↧1.38 (M24 x 3 ↧36.1)	7.75 (195)	7/8-9 ↧1.31 (M22 x 2.5 ↧33)	6.75 (170)	1 1/8 (M27)
125	10.34 (263)	10.0 (254)	1 1/8-7 ↧1.69 (M27 x 3 ↧40.6)	8.50 (215)	1-8 ↧1.50 (M24 x 3 ↧36.1)	7.50 (190)	1 1/4 (M30)
165	11.35 (288)	11.0 (279)	1 1/8-7 ↧1.69 (M27 x 3 ↧40.6)	9.50 (240)	1-8 ↧1.50 (M24 x 3 ↧36.1)	8.25 (210)	1 3/8 (M36)
215	12.22 (310)	12.0 (305)	1 1/4-7 ↧1.88 (M30 x 3.5 ↧44.9)	10.00 (255)	1 1/8-7 ↧1.69 (M27 x 3 ↧40.1)	9.00 (230)	1 1/2 (M36)

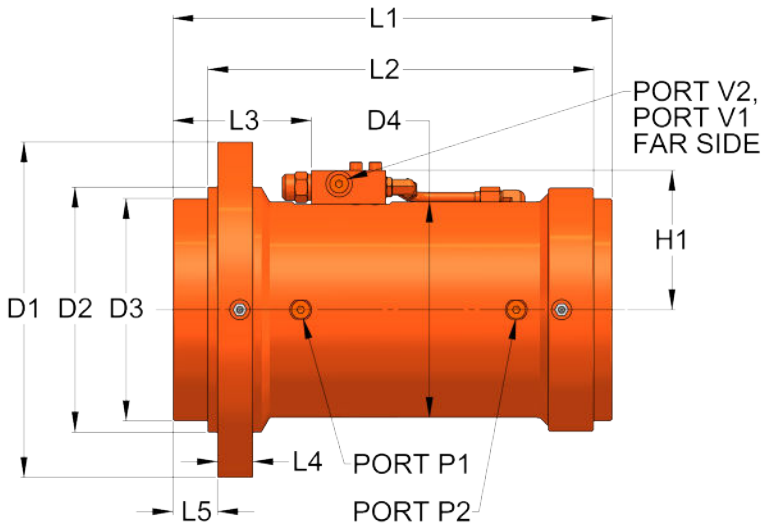
Model	H1 Overall height (excluding valve) in (mm)	H2 Height to centerline in (mm)	H3 Foot height in (mm)	H4 Overall height (with valve) in (mm)	L1 Overall Length 180° in (mm)	L1 Overall Length 360° in (mm)	L2 Overall Length, non-rotating 180° in (mm)	L2 Overall Length, non-rotating 360° in (mm)	L3 Shaft 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)

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)	W2 Overall width in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve inch (metric)
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. (ISO-1179-1/ BSPP 'G' Series of ports. Sizes vary from 1/4 thru 1/2.) See drawings for details.	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 3/4. (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)		

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



Shaft and Mounting Flange



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)

Model	Displacement 180° in^3 (cm^3)	Displacement 360° in^3 (cm^3)	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)

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

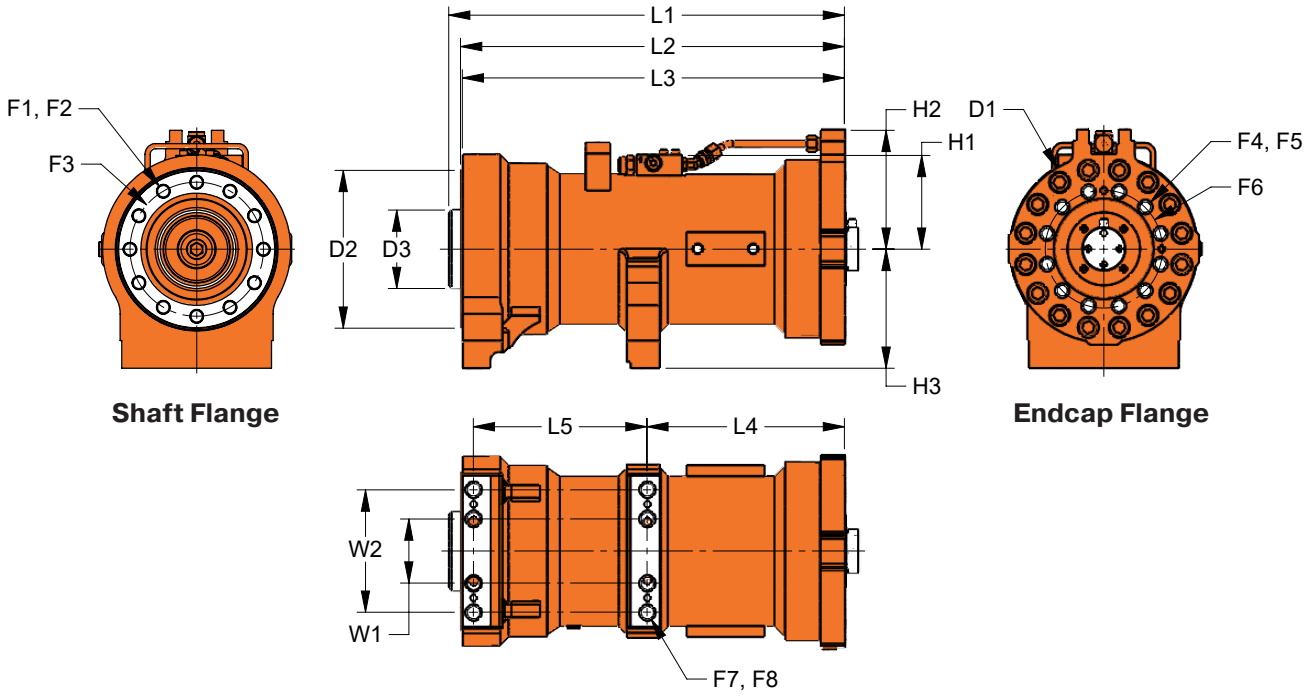
Model	D1 Overall flange diameter in (mm)	D2 Pilot diameter in (mm)	D3 Shaft and endcap flange diameter in (mm)	D4 Housing diameter in (mm)	F1 Threaded mounting hole, shaft flange in, deep (metric, deep) (F2 Quantity of mounting holes: 12)	F3 Bolt circle diameter, shaft flange in (mm)	F4 Housing flange 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 ↧0.75 (M12 x 1.75 ↧18)	4.50 (115)	3/8 (M10)
25	9.25 (235)	6.89 (175)	6.09 (155)	6.00 (152)	5/8-11 ↧0.94 (M16 x 2 ↧23.9)	5.00 (125)	1/2 (M12)
42	11.02 (280)	8.07 (205)	7.22 (183)	7.00 (178)	3/4-10 ↧1.13 (M20 x 2.5 ↧30)	5.88 (150)	5/8 (M16)
65	12.40 (315)	9.05 (230)	8.22 (209)	8.00 (203)	7/8-9 ↧1.31 (M22 x 2.5 ↧33)	6.75 (170)	3/4 (M20)
95	13.98 (355)	10.23 (260)	9.22 (234)	9.00 (229)	1-8 ↧1.38 (M24 x 3 ↧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 ↧1.69 (M27 x 3 ↧40.6)	8.50 (215)	1 (M24)
165	17.40 (442)	12.40 (315)	11.34 (288)	11.0 (279)	1 1/8-7 ↧1.69 (M27 x 3 ↧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 ↧1.88 (M30 x 3.5 ↧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)

Model	L5 Shaft flange to mounting flange face in (mm)	P1, P2 Ports, housing inch (metric)	V1, V2 Ports, valve inch (metric)
17	1.06 (26.9)	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 3/4. (ISO-1179-1/BSPP 'G' Series of ports. Sizes vary from 1/4 thru 1/2.) See drawings for details.	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 3/4 (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)		

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

Foot Mount



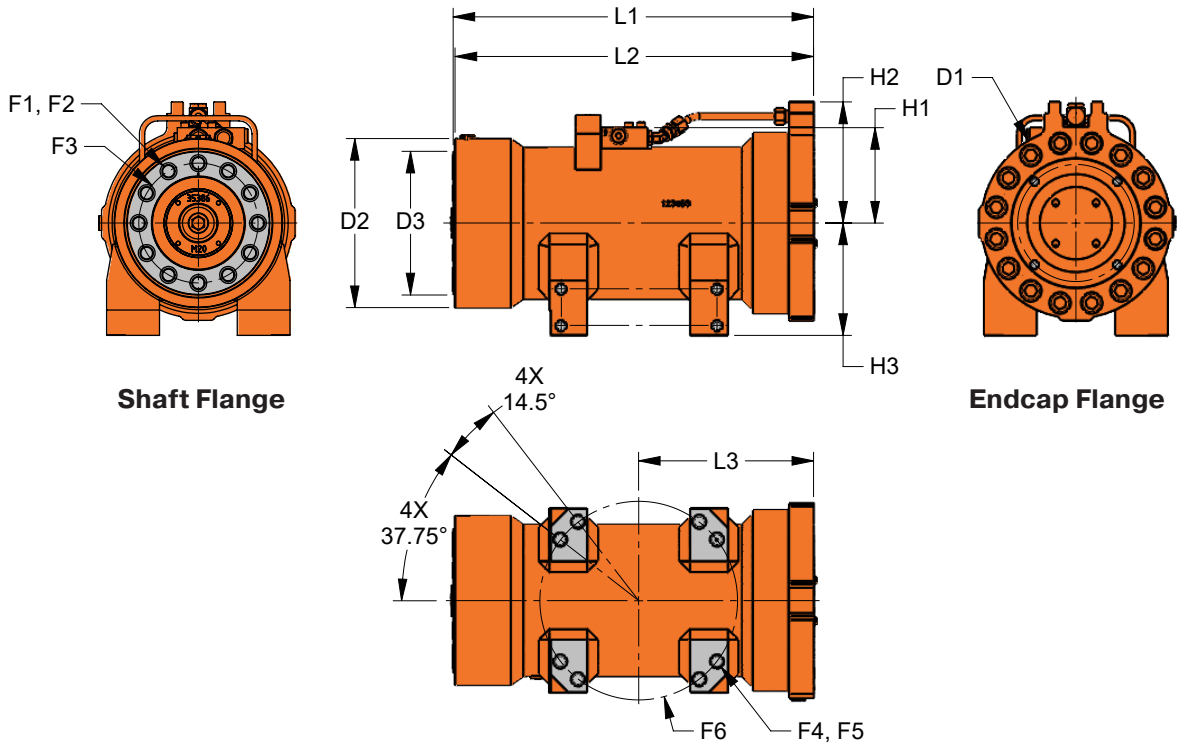
Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Standard Rotation	Moment Capacity Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	265,000 (29940)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	382 (173)

Model	D1 Overall flange diameter in (mm)	D2 Shaft flange diameter in (mm)	D3 Shaft pilot diameter in (mm)	F1 Threaded mounting hole, shaft flange in, depth (mm, depth)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, endcap flange in (mm)	F5 Quantity of mounting holes	F6 Bolt circle diameter, endcap flange in (mm)
L40-110	11.25 (285.8)	9.50 (241.3)	4.723 (119.96)	M20 x 2.5 - 6H ↧ 1.40 (35.6)	12	8.071 (205)	M20 x 2.5 - 6H ↧ 1.02 (25.9)	12	7.087 (180)

Model	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	H3 Centerline to foot mount in (mm)	L1 Overall length in (mm)	L2 Length to shaft flange in (mm)	L3 Overall length, non-rotating in (mm)	F7 Threaded mounting hole, housing foot in (mm)	F8 Threaded mounting hole, housing foot
L40-110	5.7 (143.5)	7.2 (182)	7.16 (182)	23.9 (607)	23.2 (589.3)	23.1 (586.7)	M20 x 2.5 - 6H ↧ 1.65 (41.9)	8

Model	L4 Foot mounting hole location in (mm)	L5 Foot mounting hole spacing in (mm)	W1 Foot mounting hole spacing in (mm)	W1 Foot mounting hole spacing in (mm)
L40-110	11.94 (303.3)	10.50 (266.7)	3.858 (98)	7.362 (187)

Foot Mount



Shaft Flange

Endcap Flange

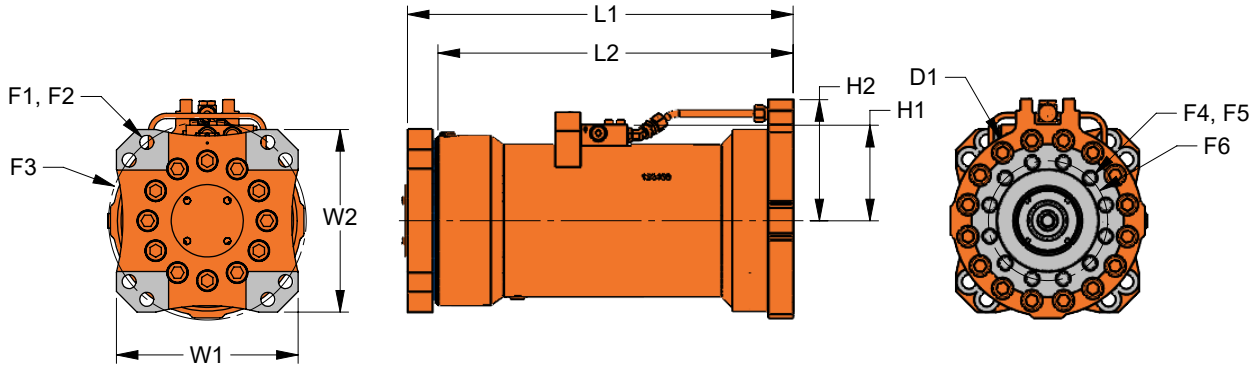
Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Standard Rotation	Moment Capacity Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	276,143 (31 200)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	320 (146)

Model	D1 Overall flange diameter in (mm)	D2 Housing diameter in (mm)	D3 Shaft flange diameter in (mm)	F1 Threaded mounting hole, shaft flange in, depth (mm, depth)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, housing foot in (mm)	F5 Quantity of mounting holes
L40-110	11.25 (285.8)	10.0 (254)	8.50 (215.9)	M20 x 2.5 - 6H ↧1.85 (47)	12	7.087 (180)	M20 x 2.5 - 6H↧ 2.56 (65)	2.88 (73.2)

Model	F6 Bolt circle diameter, housing feet in (mm)	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	H3 Centerline to foot mount in (mm)	L1 Overall length in (mm)	L2 Overall length, non-rotating in (mm)	L3 Foot mounting location in (mm)
L40-110	11.750 (298.45)	5.7 (143.5)	7.2 (182)	6.65 (168.9)	21.4 (544.1)	21.3 (541.2)	10.40 (364.2)

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

Rear Flange Mount



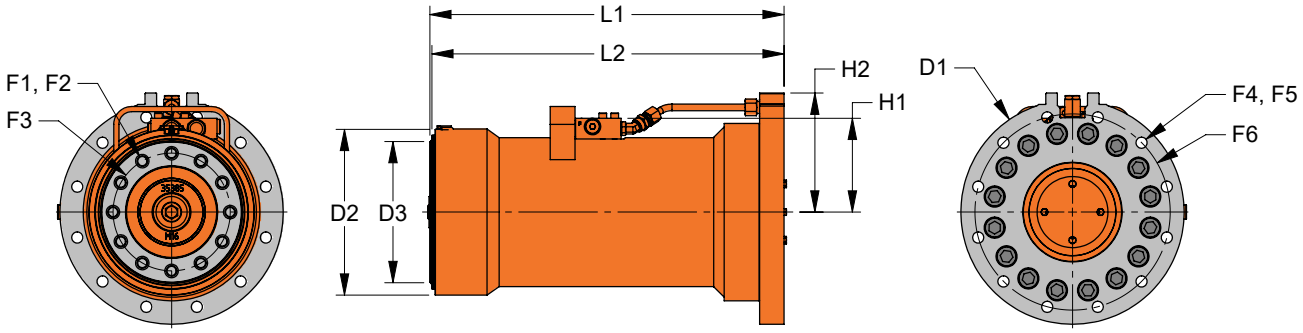
Shaft Flange **Endcap Flange**

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 Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	276,143 (31 200)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	310 (141)

Model	D1 Overall flange diameter in (mm)	F1 Shaft flange clearance hole, required bolt size in (mm)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, housing foot in (mm)	F5 Quantity of mounting holes
L40-110	11.25 (285.8)	M20	12	11.75 (298.5)	M20 x 2.5 - 6H ↧ 1.02 (26)	12

Model	F6 Bolt circle diameter, housing feet in (mm)	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	H3 Centerline to foot mount in (mm)	L1 Overall length in (mm)	L2 Overall length, non-rotating in (mm)	W1 Shaft flange width in (mm)	W2 Shaft flange width in (mm)
L40-110	7.087 (180)	5.7 (143.5)	7.2 (182)	5.06 (128.5)	22.9 (581.6)	21.1 (536)	10.8 (274.3)	10.8 (274.3)

Rear Mount Flange



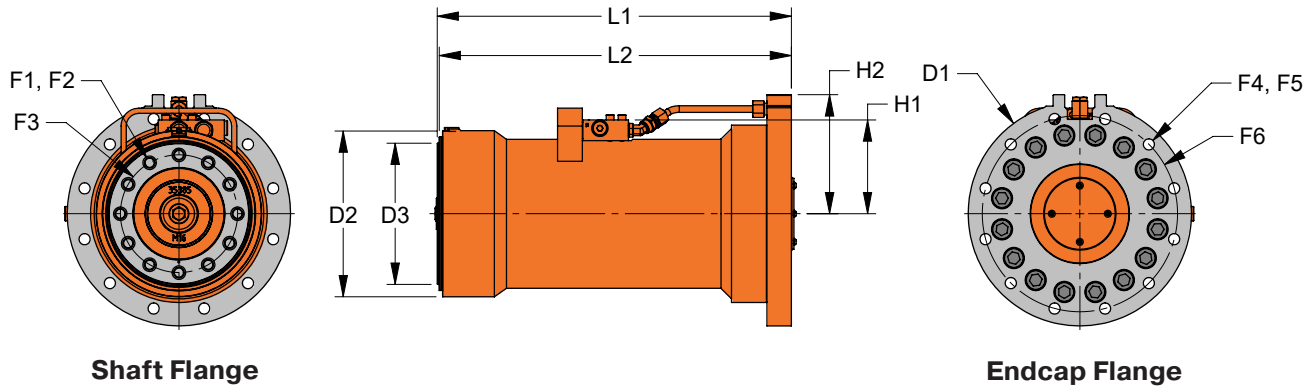
Shaft Flange **Endcap Flange**

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 Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	276,143 (31200)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	304 (138)

Model	D1 Overall flange diameter in (mm)	D2 Housing diameter in (mm)	D3 Shaft flange diameter in (mm)	F1 Threaded mounting hole, shaft flange in, depth (mm, depth)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Endcap flange clearance hole, required bolt size in (mm)	F5 Quantity of mounting holes
L40-110	13.50 (342.9)	10.0 (254)	8.50 (215.9)	M20 x 2.5 - 6H ↧ 1.41 (35.7)	12	7.087 (180)	M16	12

Model	F6 Bolt circle diameter, housing feet in (mm)	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	L1 Overall length in (mm)	L2 Overall length, non-rotating in (mm)
L40-110	11.811 (300)	5.7 (143.5)	7.2 (182)	21.4 (544.1)	21.3 (541.2)

Rear Flange Mount



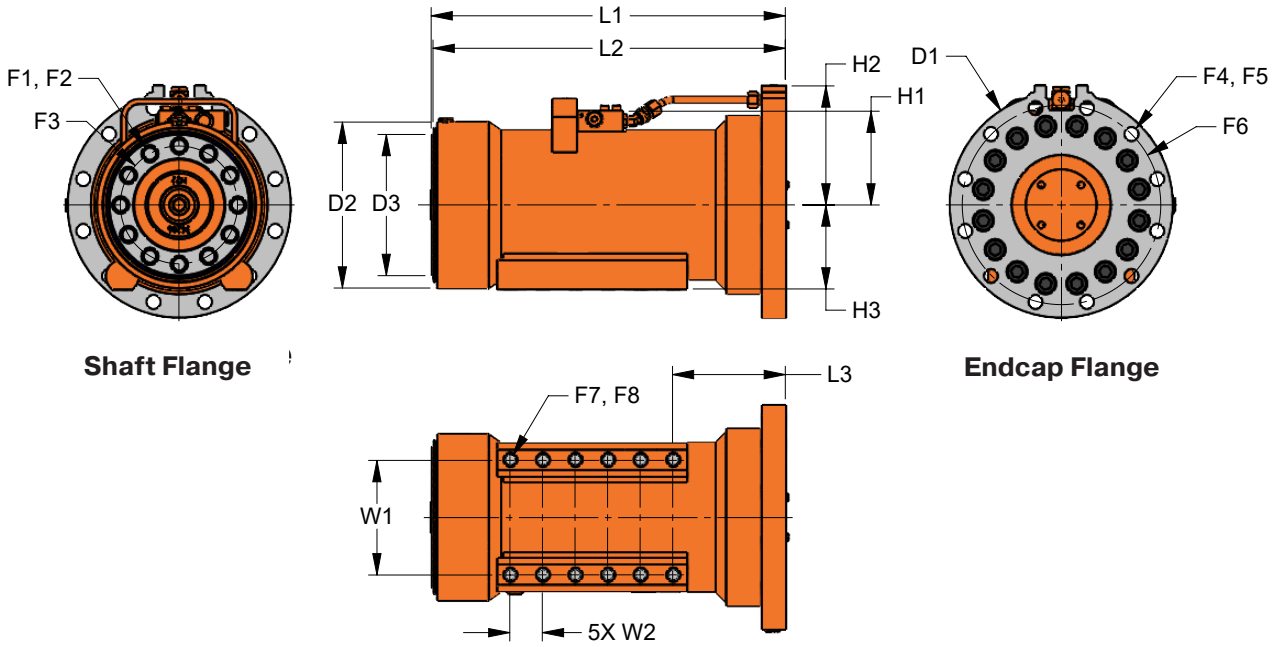
Shaft Flange **Endcap Flange**

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 Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	276,143 (31 200)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	310 (141)

Model	D1 Overall flange diameter in (mm)	D2 Housing diameter in (mm)	D3 Shaft flange diameter in (mm)	F1 Threaded mounting hole, shaft flange in, depth (mm, depth)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, endcap flange in (mm)
L40-110	13.50 (342.9)	10.0 (254)	8.50 (215.9)	M16 x 2 - 6H ↧ 1.41 (35.7)	12	7.087 (180)	M16

Model	F6 Bolt circle diameter, housing flange in (mm)	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	L1 Overall length in (mm)	L2 Overall length, non-rotating in (mm)
L40-110	11.811 (300)	5.7 (143.5)	7.2 (182)	21.4 (544.1)	21.3 (541.2)

Rear Flange and Rail Mount

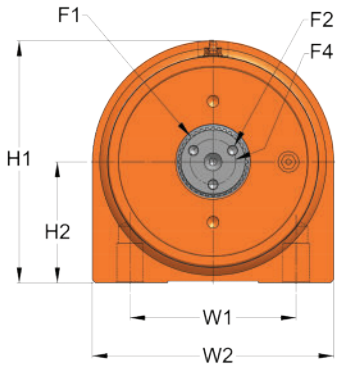


Model	Drive Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Holding Torque in-lb @ 3,000 psi (Nm @ 207 bar)	Standard Rotation	Moment Capacity Cantilever Mount in-lb (Nm)	Radial Capacity lb (kg)	Axial Capacity lb (kg)	Displacement in^3 (cm^3)	Approximate Weight lb (kg)
L40-110	106,210 (12 000)	248,000 (28 000)	360°	276,143 (31200)	10,000 (4 536)	10,000 (4 536)	358 (5 867)	310 (141)

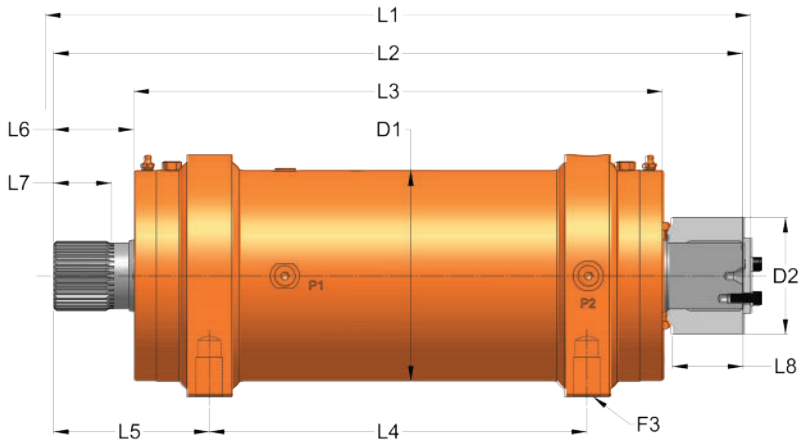
Model	D1 Overall flange diameter in (mm)	D2 Housing diameter in (mm)	D3 Shaft flange diameter in (mm)	F1 Threaded mounting hole, shaft flange in, depth (mm, depth)	F2 Quantity of mounting holes	F3 Bolt circle diameter, shaft flange in (mm)	F4 Threaded mounting hole, endcap flange in (mm)	F5 Quantity of mounting holes
L40-110	13.50 (342.9)	10.0 (254)	8.50 (215.9)	M22 x 2.5 - 6H ↧ 2.04 (51.8)	12	7.087 (180)	M20	12

Model	F6 Bolt circle diameter, housing flange in (mm)	H1 Centerline to valve top in (mm)	H2 Centerline to guard mount in (mm)	F7 Threaded mounting hole, rail mount in, depth (mm, depth)	F8 Quantity of mounting holes	W1 Rail mounting width in (mm)	W2 Rail mounting spacing in (mm)
L40-110	12.008 (305)	5.7 (143.5)	7.2 (182)	M20 x 2.5 - 6H ↧ 1.30 (33)	12	6.89 (175)	1.969 (50)

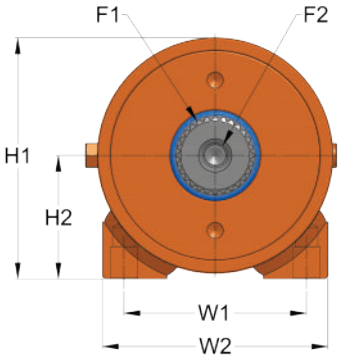
Model	L1 Overall length in (mm)	L2 Overall length, non-rotating in (mm)	L3 Rail mounting location in (mm)
L40-110	21.4 (544.1)	21.3 (541.2)	6.82 (173.3)



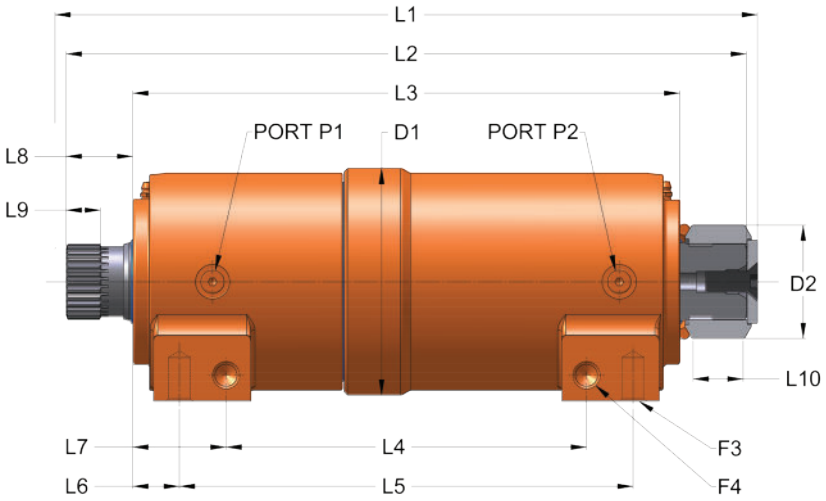
T20-60, Endview



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^3 (cm^3)	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.

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 feet (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. (Metric models comply with DIN5480.) See drawings for specific details.	1/2-13 ↧ 1.21 (M12 x 1.75 ↧35.1)	5/8-11 ↧1.00 (M16 x 2 ↧19)	5.9 (150)	2.88 (73.2)	6.79 (173)
T30-27	5.46 (139)	2.73 (80)		1/2-13 ↧1.21 (M12 x 1.75 x35.1)	5/8-11 ↧0.78 (M16 x 2 ↧19.8)	5.61 (142)	2.88 (73.2)	- (-)
T20-45	6.50 (165)	3.54 (89.9)		1/2-13 ↧1.21 (M12 x 1.75 ↧35.1)	3/4-10 ↧1.00 (M20 x 2.5 ↧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) ↧.50 on 1.50" Bolt circle (M12 x 1.75 Quantity 1 ↧35.1)	7/8-9 ↧1.31 (M22 x 2.5 ↧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)	W1 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)	- (-)	- (-)	6.00 (150)	8.00 (203)

Model	P1, P2 Ports, housing inch (metric)
T20-25	ISO-11926/SAE Series of ports. Sizes vary from 7/16 to 9/16. (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.

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5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCTS, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

7. Confidential Information. Buyer acknowledges and agrees that Confidential Information has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller and shall return all such Confidential Information to Seller within thirty (30) days upon request.

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12. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of Buyer's Property; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms, including any legal or administrative proceedings, collection efforts, or other actions arising from or relating to such failure to comply. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

13. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order 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 and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

14. Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in the Seller's sole discretion. An event of force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or sub–contractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

16. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

17. Duration. Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms.

18. Termination. Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property,(d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

19. Ownership of Rights. Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open source software, the applicable open source license.

20. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. 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 a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

21. Governing Law. These Terms, the terms of any Quote, and the sale and delivery of all Products are 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 the sale and delivery of the Products.

22. Entire Agreement. These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, 'clickwrap' or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

23. No 'Wrap' Agreements/No Authority to Bind. Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and Conditions. NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.

24. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law. (9/22)

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