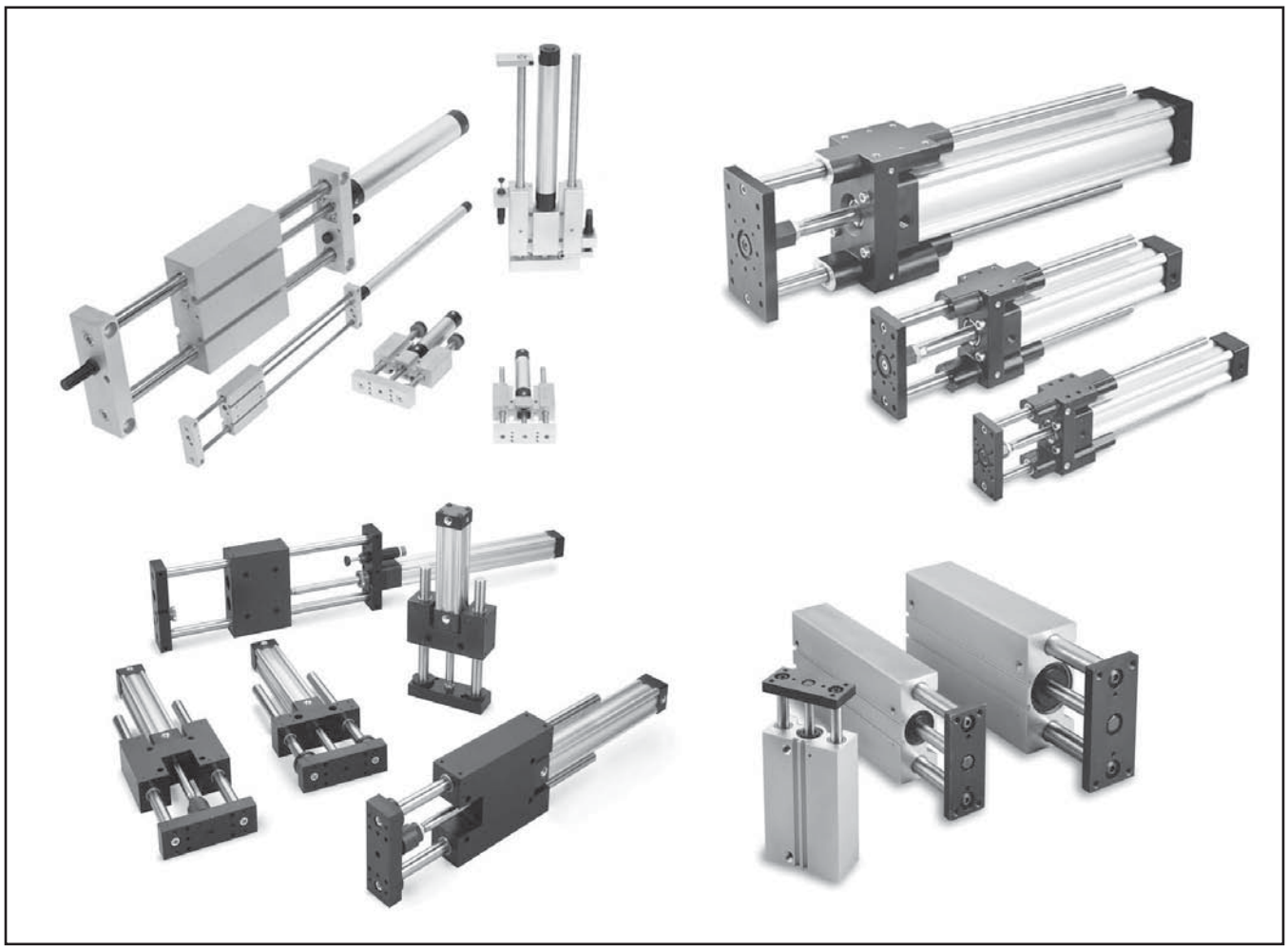
Guided Cylinders

Section F



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Section F – Guided Cylinders

P5T Series

- Heavy Duty Short Stroke Applications
- Compact Housing with Integral Cylinder
- Bore Sizes 16, 20, 25, 32, 40, 50, 63, 80 and 100mm
- Strokes 10 to 200mm Depending on Model
- Force Output at .5 Mpa (75 PSI): 23.6 to 913 lb (105 to 3927 N)
- Maximum Operating Pressure: 10 bar (145 PSI)

P5T2 Series

- Heavy Duty Short Stroke Thruster
- Bore Sizes 12, 16, 20, 25, 32, 40, 50, 63, 80 And 100mm
- Stroke Lengths from 10mm to 200mm Depending on Model
- Force Output at .5 Mpa (75 PSI): 13 to 913 lb (59 to 4063 N)
- Maximum Operating Pressure: 10 bar (145 PSI)
- Through-body Mounting on All Models

P5L Series

- 3 Body Styles (Thrust, Reach, Base)
- Bore Sizes 20, 25, 32, 40, 50, 63, 80 and 100mm
- Powered by P1L Cylinder
- Maximum Strokes 400 to 1000mm Depending on Model
- Force Output at 80 PSI (5.5 bar): 39 to 974 lb (173 to 4332 N)
- 10 bar (145 PSI) Air Service

HB Series

- Medium Duty to Extremely Heavy Duty Linear Motion
- Powered by the P1D ISO Cylinder with NFPA Options Available
- Bore Sizes 40, 50 and 63mm
- Force Output at 80 PSI: 117 to 368 lb
- 10 bar (145 PSI) Air Service with Other Options Available

P5E Series

- Low Profile Guided Assembly
- Powered by the P1D Cylinder
- Bore Sizes 32, 40, 50, 63, 80 and 100mm
- Strokes to Any Practical Length
- Rod Lock Options Available
- 10 bar (145 PSI) Air Service

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Selection Guide

Basic performance features of the product line are shown below. See catalog sections for greater detail and ordering information. Consult factory for requirements beyond the scope of these guidelines.

Cylinder Type		**NFPA/ISO**	**Round Body**	**ISO**	**Built-in**
Series		**HB**	**P5L**	**P5E**	**P5T**
Bore Size Range		1½ - 2½ in NFPA 40 to 63mm ISO	20 to 100mm	32 to 100mm	16 to 100mm
Maximum Shaft Diameter		35mm	50mm	30mm	35mm
Maximum Thrust (lbs) at 80 PSI	Extend	393	974	974	913
	Retract	368	874	913	856
Maximum Suggested Stroke		42 in.	100mm	C	200mm (8")
Maximum Pressure Rating		150 PSI	10 Bar (145 PSI)	10 Bar (145 PSI)	10 Bar (145 PSI)
Shaft Bearing Type		Composite or Linear Ball Bushings	Composite or Linear Ball Bushings	Composite or Linear Ball Bushings	Composite or Linear Ball Bushings
Non-Lube Service		●		●	●
Sensor Options	Solid State	●	●	●	●
	Reed	●	●	●	●
	Proximity	●	●		
Mounting & Porting Threads	Metric	C	●	●	●
	Inch	●	●	C	C
Stroke Adjustment		●	●	●	●
Piston Magnet Standard		●		●	●
Energy Dissipation	Cushions	●	●	●	
	Bumpers	●	●	●	●
	Shock Absorbers	●	●		
Port Relocation		●			●
3-Position		●		●	
Rod Lock Option		●		●	
Hydraulic Service Option		●		●	
Alignment Coupler		●		●	
Fluorocarbon Seals		●	●	●	●
Washdown		C		C	●
Clean Room		C		C	C

● = Available from catalog
C = Consult Factory

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Notes

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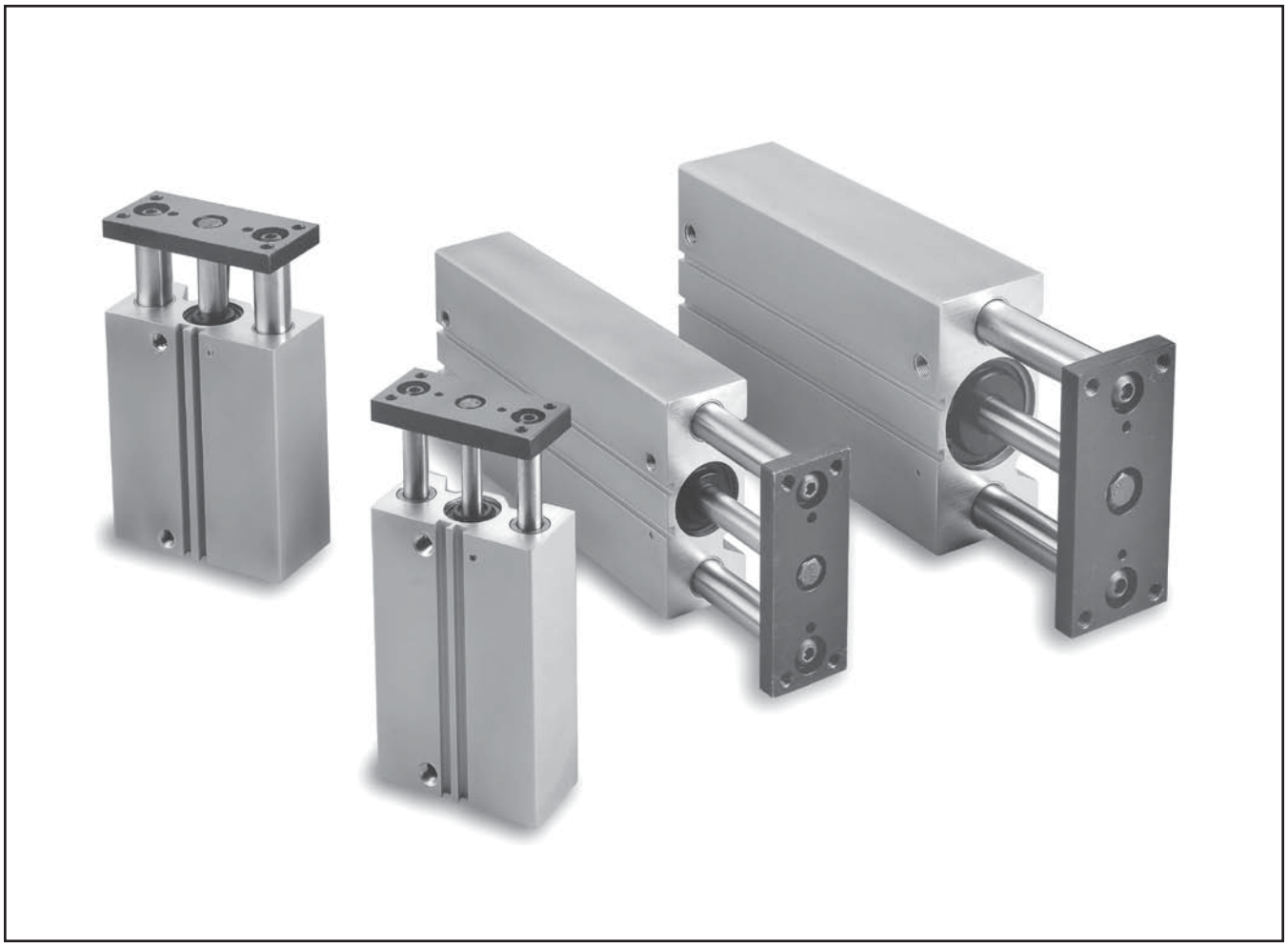
P5T Series

Short Stroke Thruster



Contents

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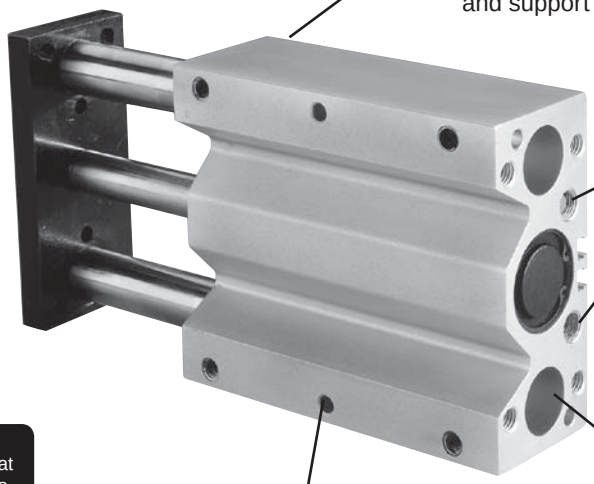
Compact, One-Piece Body
Provides economy and minimum package size by integrating a low profile cylinder and support shafts into a single body.



Rear Porting
Rear and side porting are available as options.

3D CAD FILES
available for download at parker.com/pneumatics

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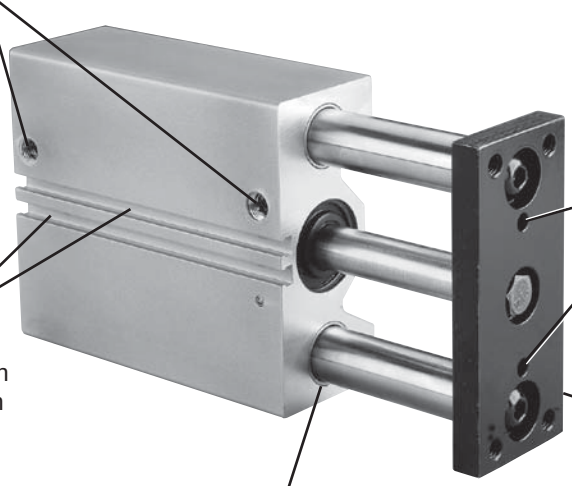
Standard Dowel Holes
Dowel holes on body provide simple, economical and precise mounting.

Internal Bumpers
Are standard on all units. These provide energy dissipation and noise reduction which result in longer operating life.

Top Porting
Top porting is standard. Optional side and rear porting is available.



Dowel Holes
Standard dowel holes provide precision mounting and alignment on the tool plate.

Sensor Grooves
Allow reed or solid state sensors to be mounted flush to the body. Magnetic piston is standard.

Tooling Plate
Precision machined from steel, the tooling plate is thick and rigid to provide a durable connection.

Composite Bushings or Linear Ball Bearings
Parker uses a PTFE impregnated **composite bushing** which serves as a lubrication reservoir. This results in higher load carrying capabilities, both dynamic and static, with excellent resistance to shock loading. The impregnated lubricant also makes the bearings more dirt tolerant. **Composite bushings with oversized shafting** are available for high impact loads. Optional **recirculating ball bearings** provide precision operation with very low friction and wear.

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Model Code and Ordering Information

Example: P5T-J032DHSN100

P5T	–	J	032	D	H	S	N	100

Shaft / Bearing Type

J	Composite Bearing, Chrome Plated Shaft (Std)
H	Ball Bearing, Stainless Steel Shaft
C	Composite Bearing, Stainless Steel Shaft

Bore Size

016	16mm
020	20mm
025	25mm
032	32mm
040	40mm
050	50mm
063	63mm
080	80mm
100	100mm

Port Location / Mounting

D	Dowel Holes, Top Ports (Std)
R	Dowel Holes, Rear Ports, Top Plugged (Std)
S	Dowel Holes, Side Ports [1] and Top Ports

Port Style

H	NPTF (Std)
G	BSPP
P	Flow Control, BSPP Port, Prestolok Tube (mm) [1]
F	Flow Control, NPTF Port, Prestolok Tube (inch) [1]
B	Flow Control, BSPP [1]
N	Flow Control, NPTF [1]

Seals

S	Nitrile (Std)
F	Fluorocarbon (High Temp)

Options

N	None (Std)
B	High Load Bearings [2]
A	Bumpers, Adjustable Stop Collars (Extend Only) and Dual Tool Plate (Side Ports Rec) [3, 4]
E	Bumpers and Adjustable Stop Collars (Extend Only) [3]
G	High Load Bearings, Bumpers and Adjustable Stop Collars (Extend Only) [2, 3]
D	Dual Tool Plate [3, 4]
X	Special

Stroke

See table below for standard stroke lengths. Consult factory for special stroke lengths.

NOTES:

1 Cannot combine flow controls, side ports and 25mm stroke.
2 Not available with rear mounting and ports.
3 Not available with rear port location (R).
4 Includes high load bearings as standard.

Bore Size (mm)	Standard Strokes (mm)*									
	10	25	40	50	75	100	125	150	175	200
16	●	●	●	●	●	●				
20		●	●	●	●	●	●			
25		●		●	●	●	●	●		
32 - 100		●		●	●	●	●	●	●	●

*Consult factory for special stroke lengths.

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Specifications

- Maximum operating pressure: 1 MPa (10 bar/145 psi)
- Operating characteristics: Double acting
- Support rod sizes: ∅8 to 35mm
- Mounting: Unrestricted
- Operating temperature range (cylinder):
  - Nitrile seals (standard) -18° to 74°C (0° to 165°F)
  - Fluorocarbon seals* -18° to 121°C (0° to 250°F)
- Filtration requirement: 40 micron, filtered dry air

* See Fluorocarbon seal option for high temperature applications.

Construction

Body ..... Aluminum
End Caps ..... Aluminum
Tool Plate ..... Steel
Piston Rod ..... Stainless Steel
Support Rods ..... Steel (Chrome Plated)
Rod Bolts ..... Steel

Mounting Bolts

Bore Size	Socket Head Cap
16	M5 x .8
20	M5 x .8
25	M6 x 1.0
32	M8 x 1.25
40	M8 x 1.25
50	M10 x 1.5
63	M10 x 1.5
80	M12 x 1.75
100	M14 x 2.0

Note: *When the P5T is used as an impact stopping system, mounting bolt thread engagement should be 1.5 times bolt diameter.*

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Quick Reference Data

Model (Bore Size)	Piston Rod (mm)	Bushings	Support Rods (mm)	Piston Bore Ares Non-Rod Side		Max Stroke (mm)	Theoretical Force			
							Extend @75 PSI (0.5 MPa)		Retract @75 PSI (0.5 MPa)	
				mm²	in²		N	lb	N	lb
16	8	Ball	8	200	0.31	100	105	23.6	77.4	17.4
		Composite	10	200	0.31	100	105	23.6	77.4	17.4
20	10	Ball	10	316	0.49	125	164	36.8	123	27.8
		Composite	12	316	0.49	125	164	36.8	123	27.8
25	10	Ball	12	490	0.76	150	254	57	213.5	48
		Composite	16	490	0.76	150	254	57	213.5	48
32	16	Ball	16	804	1.25	200	402	93	302	70
		Composite	20	804	1.25	200	402	93	302	70
40	16	Ball	16	1257	1.95	200	628	146	528	123
		Composite	20	1257	1.95	200	628	146	528	123
50	20	Ball	20	1964	3.04	200	982	228	825	192
		Composite	25	1964	3.04	200	982	228	825	192
63	20	Ball	20	3117	4.83	200	1559	362	1492	326
		Composite	25	3117	4.83	200	1559	362	1492	326
80	25	Ball	25	5027	7.79	200	2513	584	2268	527
		Composite	30	5027	7.79	200	2513	584	2268	527
100	25	Ball	30	7854	12.17	200	3927	913	3574	856
		Composite	35	7854	12.17	200	3927	913	3574	856

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Units with Composite Bushings

Weights in kg (lb)

Model	Standard Stroke (mm)									
	10	25	40	50	75	100	125	150	175	200
16	0.35 (0.77)	0.43 (0.95)	0.51 (1.13)	0.57 (1.25)	0.70 (1.54)	0.84 (1.84)	–	–	–	–
20	–	0.76 (1.66)	0.86 (1.90)	0.94 (2.06)	1.11 (2.45)	1.29 (2.85)	1.47 (3.24)	–	–	–
25	–	1.13 (2.48)	–	1.39 (3.05)	1.65 (3.63)	1.91 (4.20)	2.17 (4.77)	2.43 (5.35)	–	–
32	–	1.67 (3.68)	–	2.07 (4.55)	2.46 (5.42)	2.86 (6.29)	3.26 (7.17)	3.65 (8.04)	4.05 (8.91)	4.45 (9.78)
40	–	2.00 (4.40)	–	2.42 (5.32)	2.84 (6.25)	3.26 (7.17)	3.68 (8.10)	4.10 (9.02)	4.52 (9.94)	4.84 (10.65)
50	–	2.63 (5.78)	–	3.22 (7.08)	3.81 (8.38)	4.40 (9.69)	4.99 (10.99)	5.59 (12.29)	6.18 (13.59)	6.77 (14.89)
63	–	3.29 (7.24)	–	3.98 (8.75)	4.66 (10.25)	5.34 (11.75)	6.02 (13.25)	6.71 (14.76)	7.39 (16.26)	8.07 (17.76)
80	–	6.06 (13.33)	–	7.12 (15.66)	8.18 (18.00)	9.24 (20.33)	10.30 (22.66)	11.36 (24.99)	12.42 (27.33)	13.48 (29.66)
100	–	10.69 (23.52)	–	12.03 (26.47)	13.37 (29.42)	14.71 (32.37)	16.05 (35.32)	17.39 (38.27)	18.73 (41.22)	20.08 (44.17)

Units with Linear Ball Bushings

Weights in kg (lb)

Model	Standard Stroke (mm)									
	10	25	40	50	75	100	125	150	175	200
16	0.32 (0.70)	0.39 (0.86)	0.46 (1.02)	0.51 (1.13)	0.64 (1.40)	0.76 (1.67)	—	—	—	—
20	—	0.70 (1.53)	0.80 (1.75)	0.86 (1.90)	1.03 (2.26)	1.19 (2.62)	1.36 (2.99)	—	—	—
25	—	0.98 (2.15)	—	1.20 (2.64)	1.43 (3.14)	1.65 (3.64)	1.88 (4.14)	2.11 (4.63)	—	—
32	—	1.51 (3.31)	—	1.86 (4.09)	2.21 (4.86)	2.56 (5.63)	2.91 (6.41)	3.27 (7.18)	3.62 (7.96)	3.97 (8.73)
40	—	1.82 (4.01)	—	2.20 (4.83)	2.57 (5.66)	2.95 (6.49)	3.32 (7.31)	3.70 (8.14)	4.08 (8.97)	4.45 (9.79)
50	—	2.35 (5.17)	—	2.87 (6.32)	3.39 (7.47)	3.92 (8.62)	4.44 (9.76)	4.96 (10.91)	5.48 (12.06)	6.01 (13.21)
63	—	2.99 (6.58)	—	3.60 (7.93)	4.22 (9.28)	4.83 (10.63)	5.45 (11.98)	6.06 (13.33)	6.67 (14.68)	7.29 (16.03)
80	—	5.66 (12.45)	—	6.63 (14.59)	7.61 (16.74)	8.58 (18.88)	9.56 (21.03)	10.53 (23.18)	11.51 (25.32)	12.49 (27.47)
100	—	10.16 (22.36)	—	11.40 (25.09)	12.64 (27.82)	13.89 (30.55)	15.13 (33.28)	16.37 (36.01)	17.61 (38.74)	18.85 (41.46)

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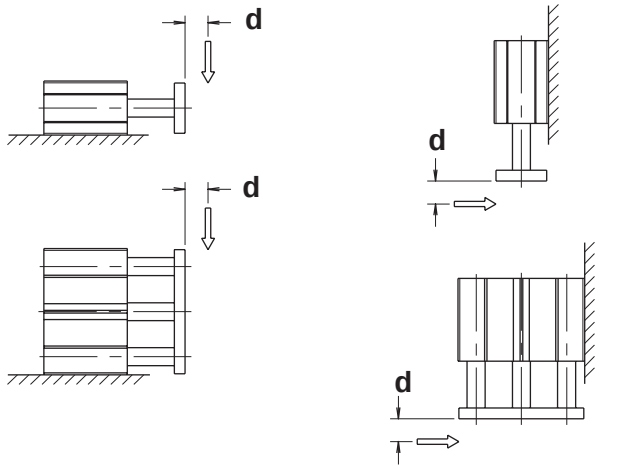
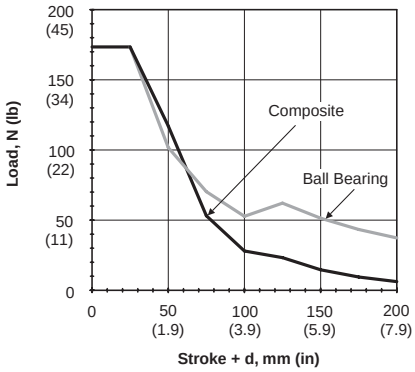
Horizontal Load Capacity
Standard Unit

P5T Series units will have the same load capacity regardless of orientation. The graphs below show maximum load capacity based on a unit life of 10 million cycles .

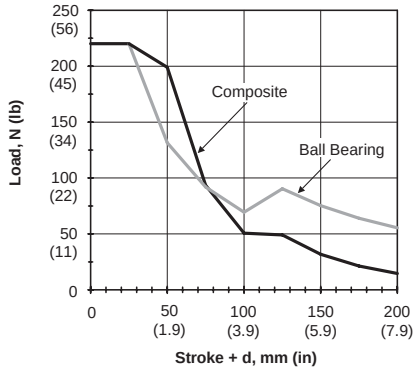
EXAMPLE: A P5T-16 with "stroke + d" of 75mm and composite bushings would have a load capacity of 50N.



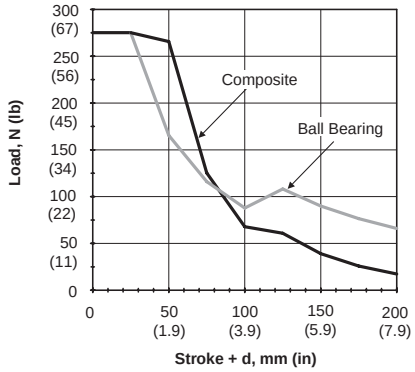
16mm Bore Size



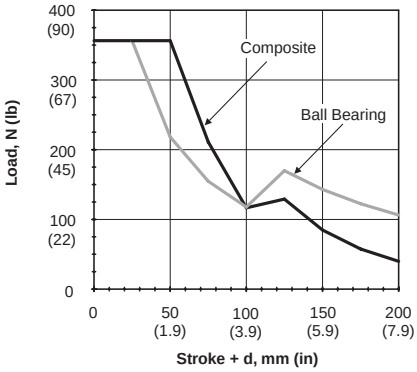
20mm Bore Size



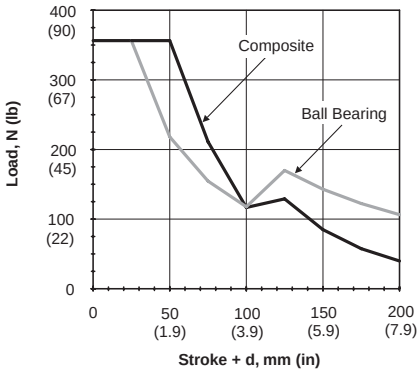
25mm Bore Size



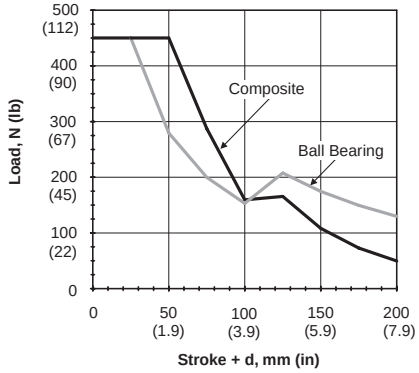
32mm Bore Size



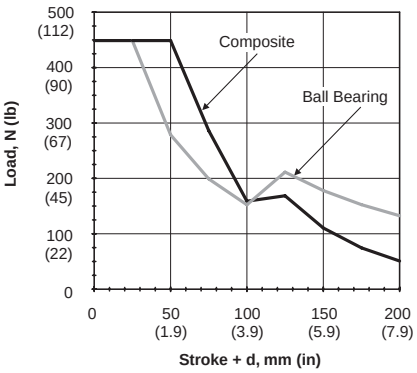
40mm Bore Size



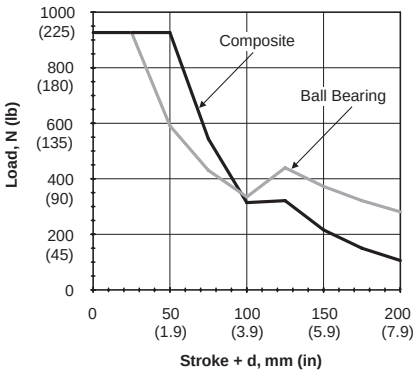
50mm Bore Size



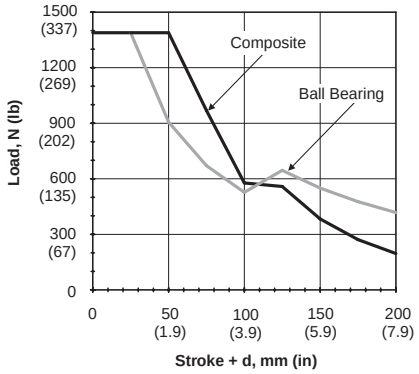
63mm Bore Size



80mm Bore Size



100mm Bore Size



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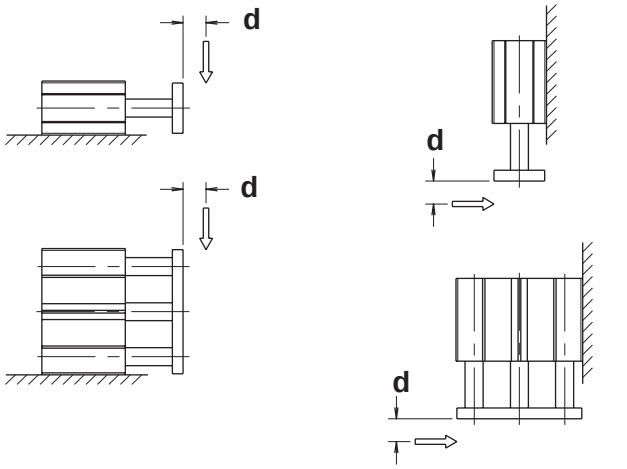
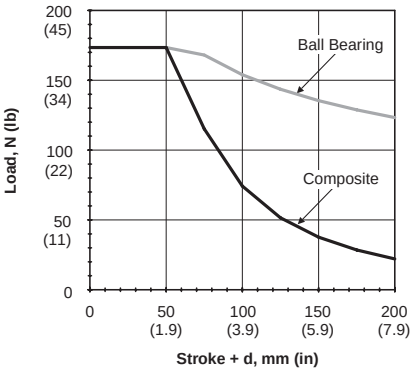
Horizontal Load Capacity with High Load Bearings and Dual Tool Plate (D, A, B)

P5T Series units will have the same load capacity regardless of orientation. The graphs below show maximum load capacity based on a unit life of 10 million cycles.

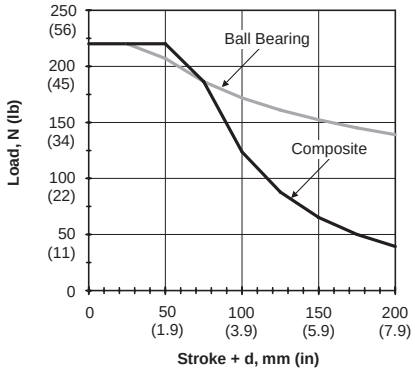
EXAMPLE: A P5T-20 with "stroke + d" of 100mm and high load composite bushings would have a load capacity of 125N.



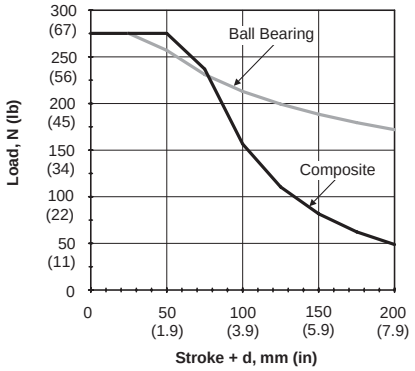
16mm Bore Size



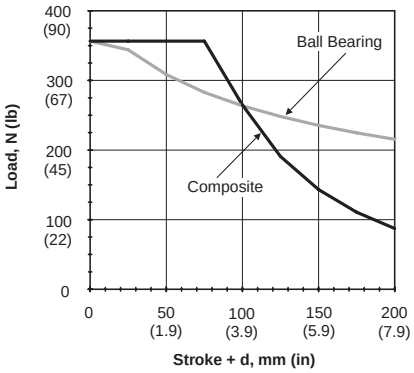
20mm Bore Size



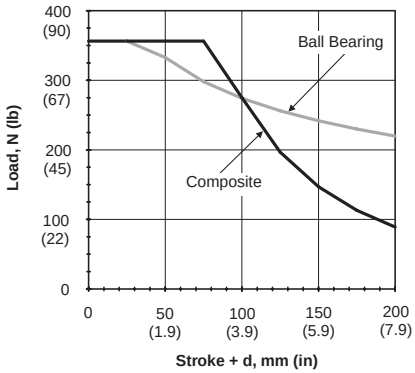
25mm Bore Size



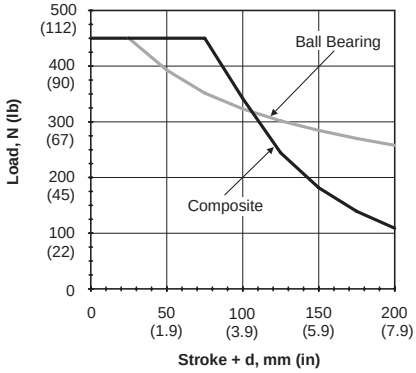
32mm Bore Size



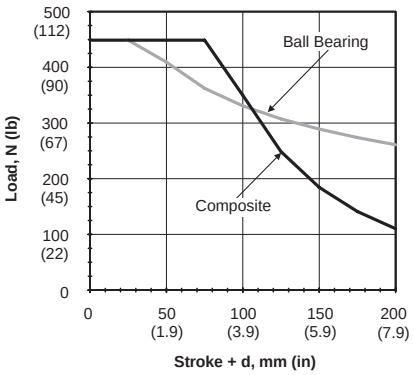
40mm Bore Size



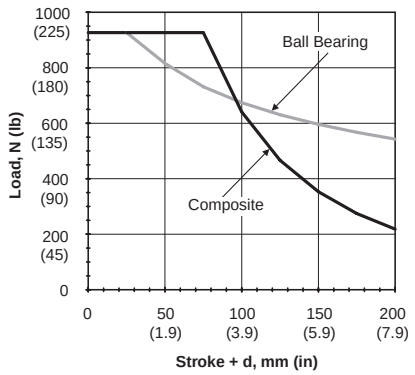
50mm Bore Size



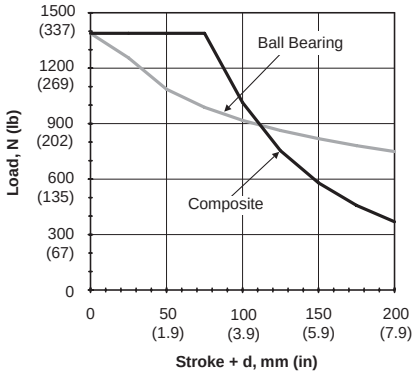
63mm Bore Size



80mm Bore Size



100mm Bore Size



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A074

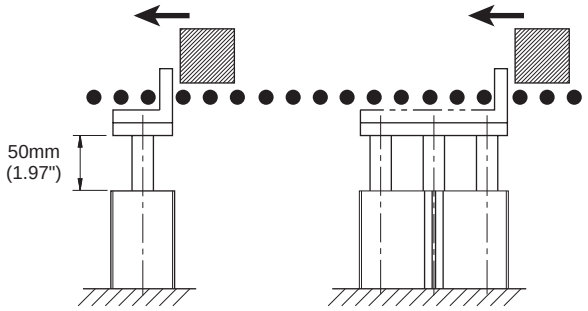
Load Stopping Capacity
Standard Unit

P5T Series actuators are ideal for conveyor stopping applications. Units can be mounted horizontally or vertically.

Composite bushings are strongly recommended for this type of application.

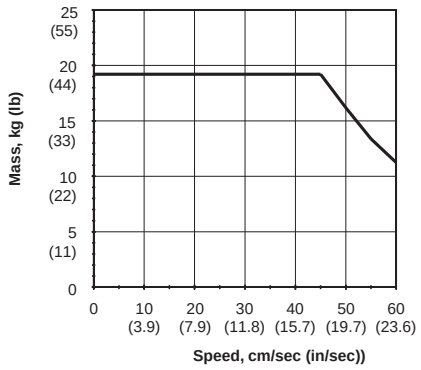
EXAMPLE: A P5T-50 unit with a stroke up to 50mm will stop an object moving at 40 cm/second (15.75 in/s) that weighs up to 50 kg (110 lb).

Note: The following graphs are based on 50mm of stroke.

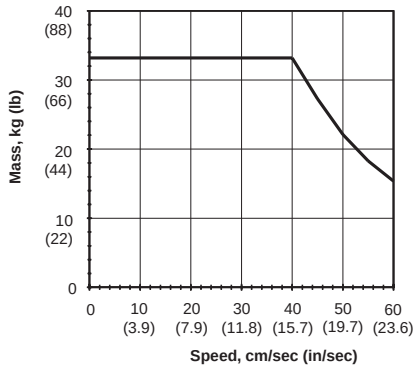


F

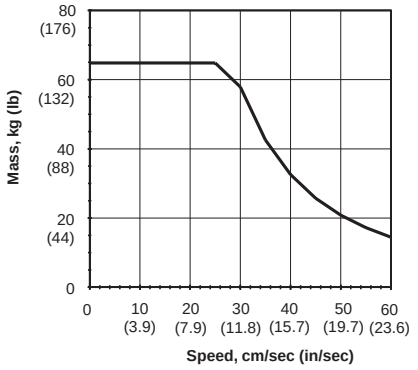
16mm Bore Size



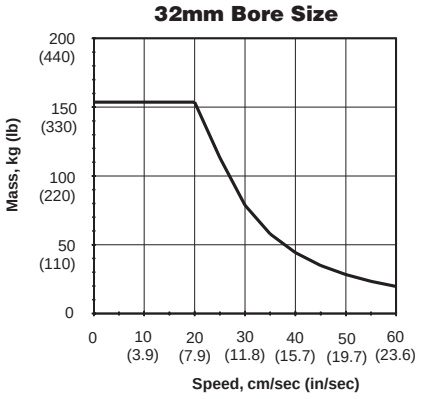
20mm Bore Size



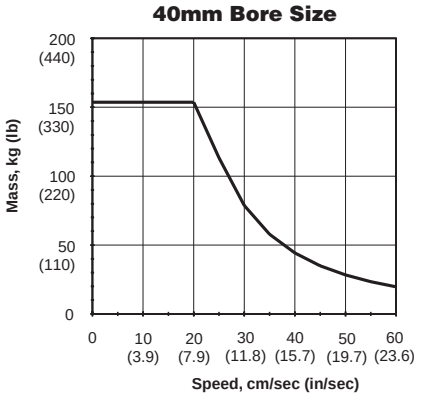
25mm Bore Size



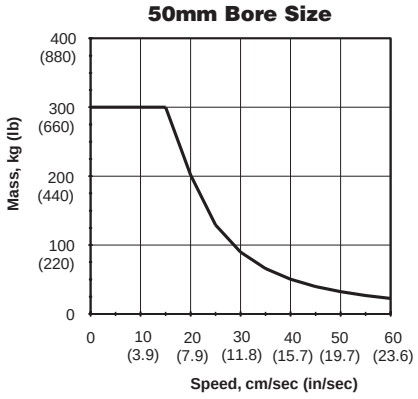
32mm Bore Size



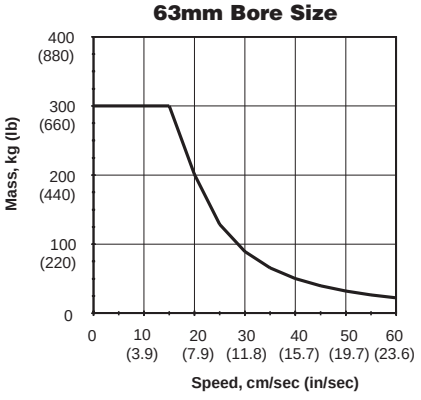
40mm Bore Size



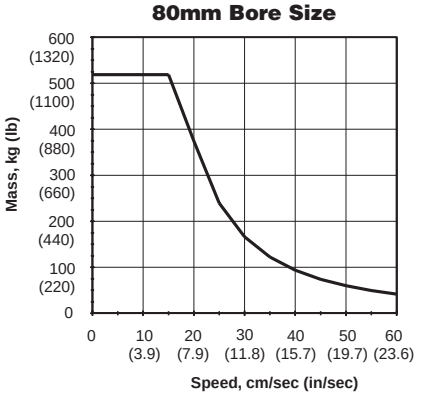
50mm Bore Size



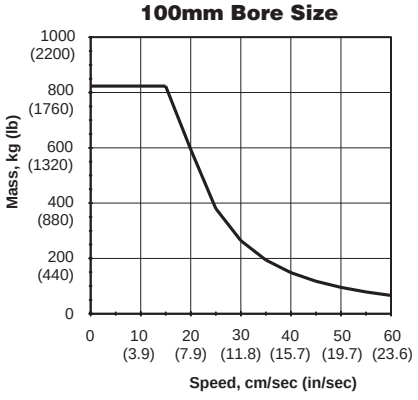
63mm Bore Size



80mm Bore Size



100mm Bore Size



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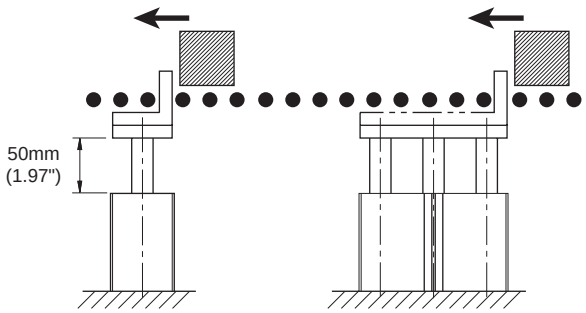
Load Stopping Capacity with High Load Bearings and Dual Tool Plate (D, A, B)

P5T Series actuators are ideal for conveyor stopping applications. Units can be mounted horizontally or vertically.

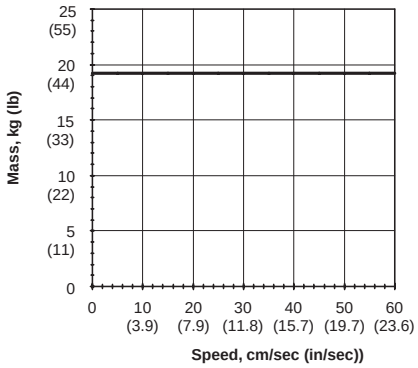
Composite bushings are strongly recommended for this type of application.

EXAMPLE: A P5T-25 unit with a stroke up to 50mm will stop an object moving at 40 cm/second (15.7 in/s) that weighs up to 46 kg (101 lb).

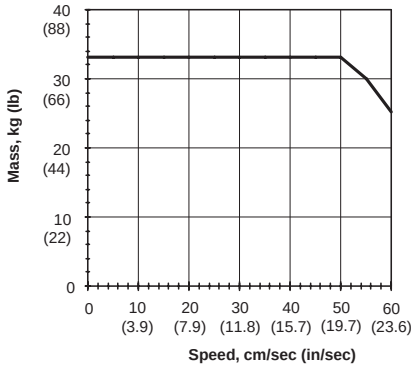
Note: The following graphs are based on 50mm of stroke.



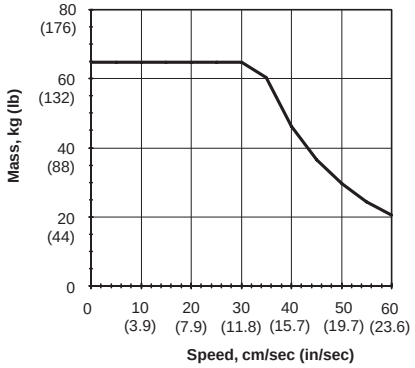
16mm Bore Size



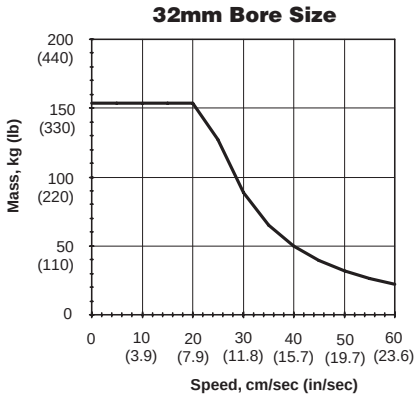
20mm Bore Size



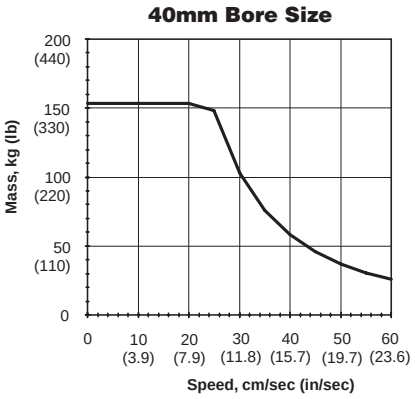
25mm Bore Size



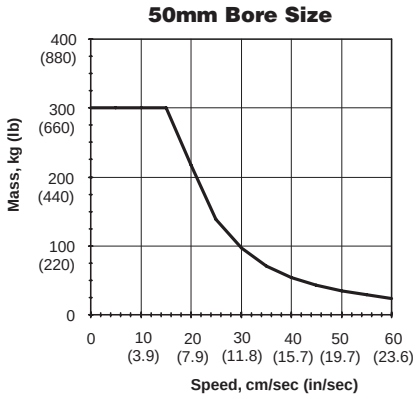
32mm Bore Size



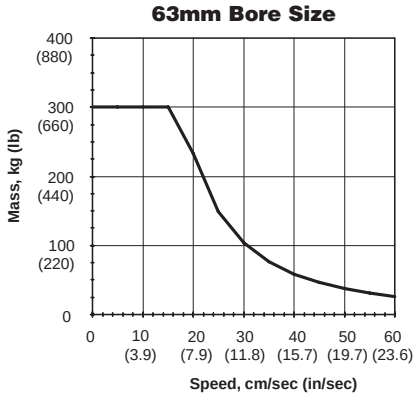
40mm Bore Size



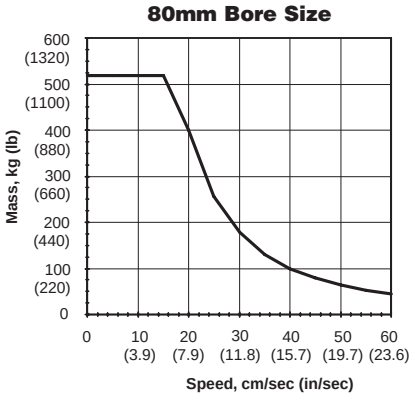
50mm Bore Size



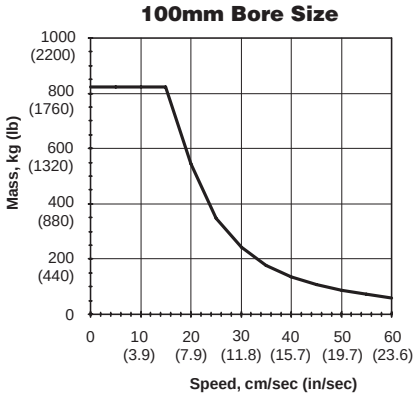
63mm Bore Size



80mm Bore Size



100mm Bore Size



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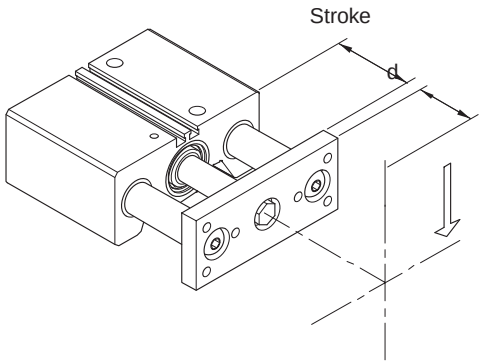
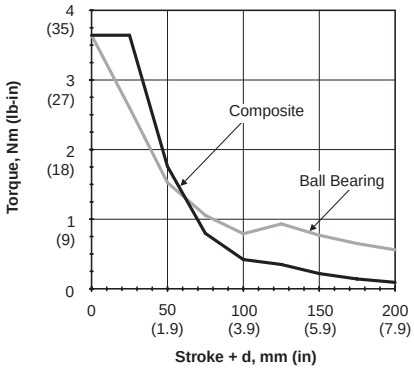
Asymmetrical Torque Capacity Standard Unit

Asymmetrical loading occurs when the load is applied to one side of the unit. P5T Series units can resist torsional loads that are asymmetrical.

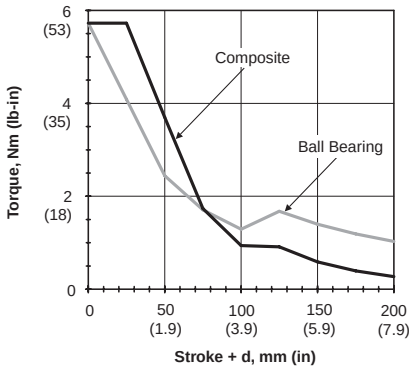
EXAMPLE: A mechanism exerts an asymmetrical load of 15Nm on a P5T-50 with 50mm "stroke+d". The P5T-50 with composite bushings will have adequate torsional capacity.



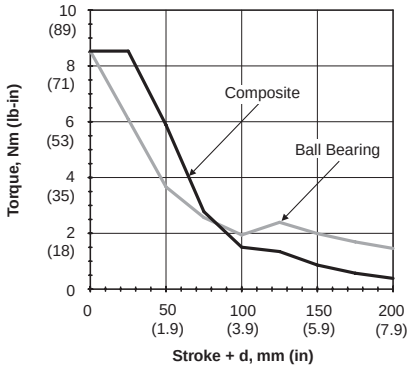
16mm Bore Size



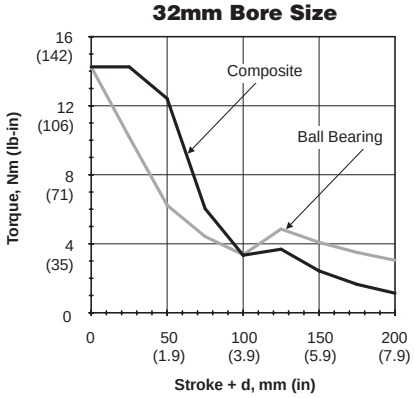
20mm Bore Size



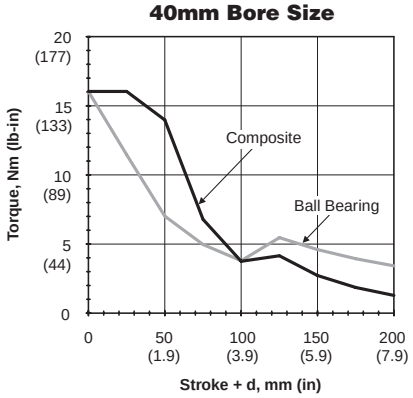
25mm Bore Size



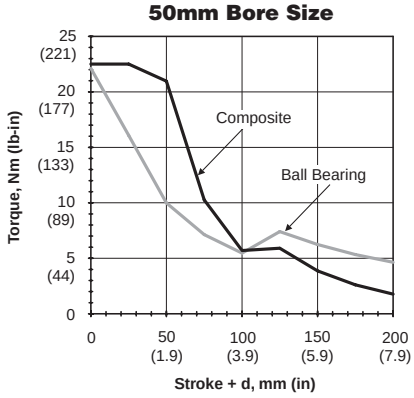
32mm Bore Size



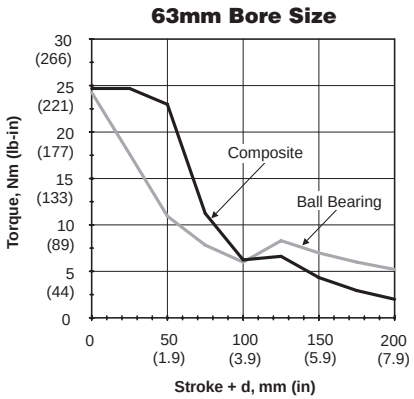
40mm Bore Size



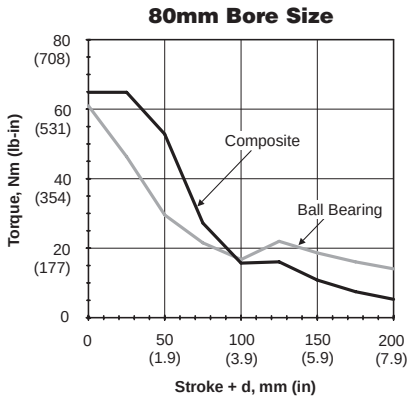
50mm Bore Size



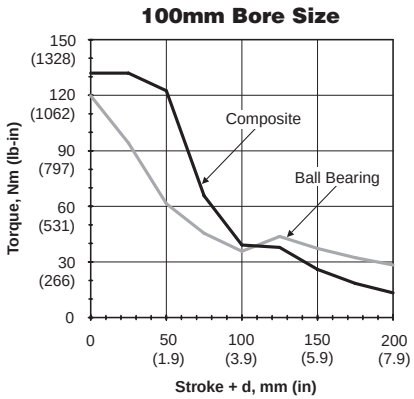
63mm Bore Size



80mm Bore Size



100mm Bore Size



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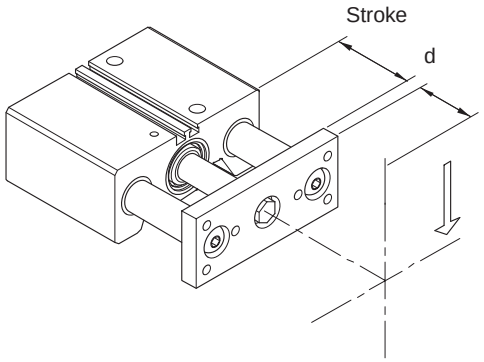
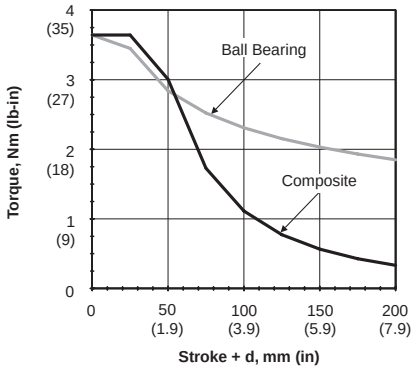
Asymmetrical Torque Capacity with High Load Bearings and Dual Tool Plate (D, A, B)

Asymmetrical loading occurs when the load is applied to one side of the unit. P5T Series units can resist torsional loads that are asymmetrical.

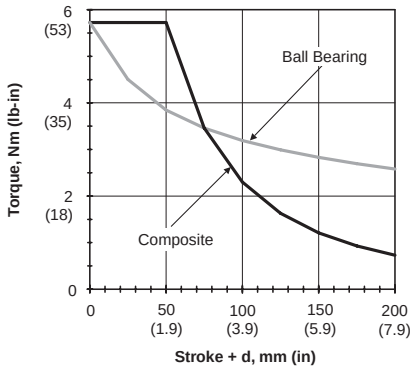
EXAMPLE: A mechanism exerts an asymmetrical load of 15Nm on a P5T-50 with 50mm "stroke+d". The P5T-50 with composite bushings will have adequate torsional capacity.



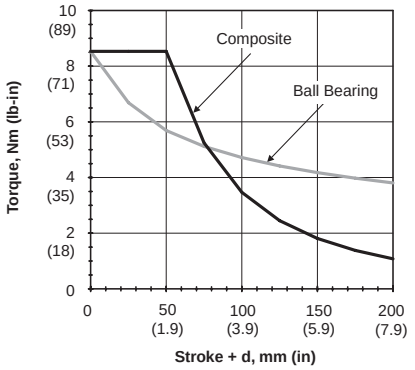
16mm Bore Size



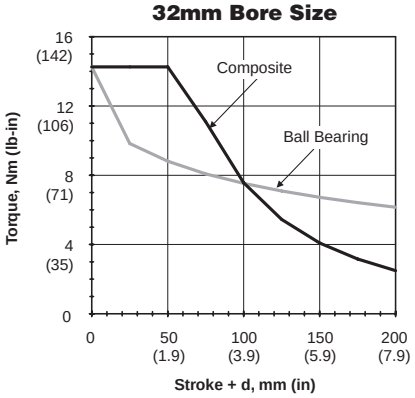
20mm Bore Size



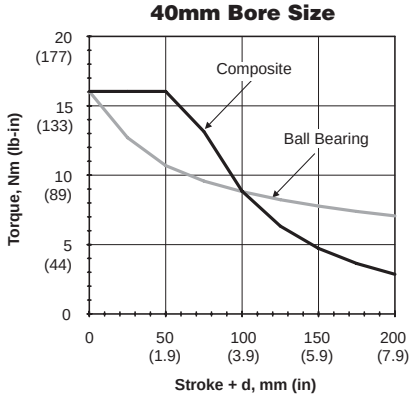
25mm Bore Size



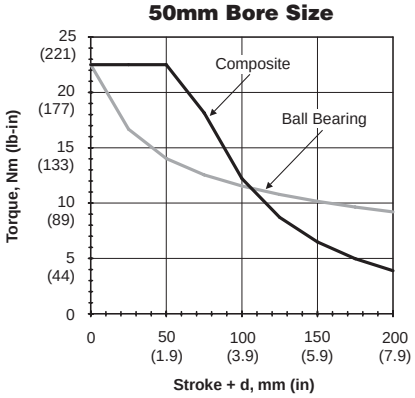
32mm Bore Size



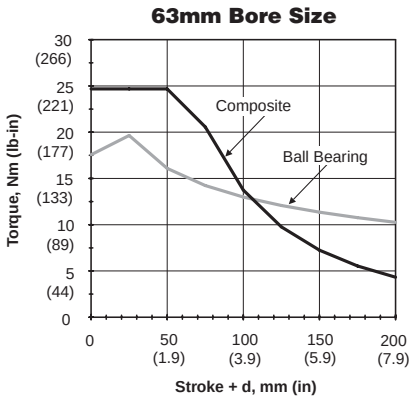
40mm Bore Size



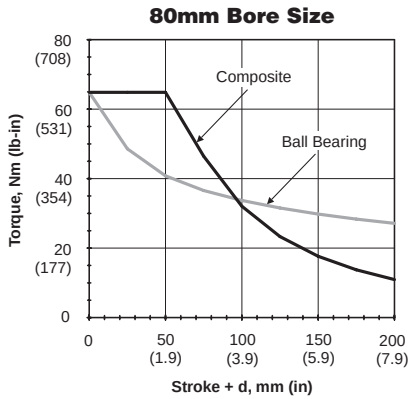
50mm Bore Size



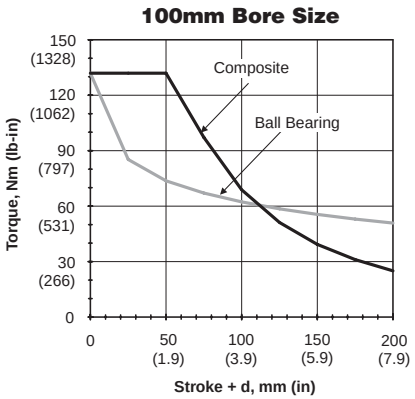
63mm Bore Size



80mm Bore Size



100mm Bore Size



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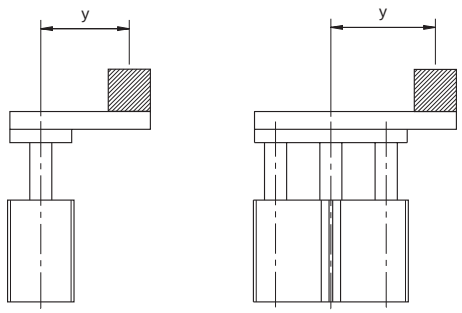
Vertical Eccentric Load Capacity
Standard Unit

P5T Series units mounted vertically will have the same eccentric load capacity regardless of orientation. The graphs provide maximum load capacity for an eccentric mounted load. The load is assumed to be mounted at the face of the tooling plate.

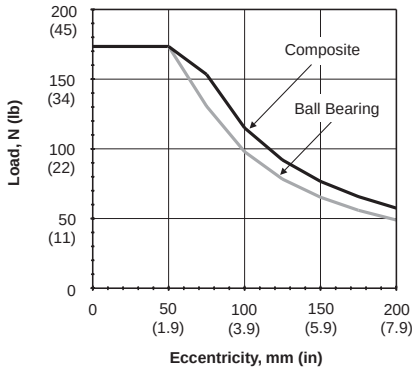
These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.



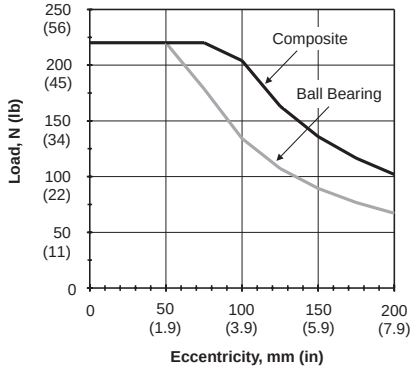
y = eccentricity distance

F

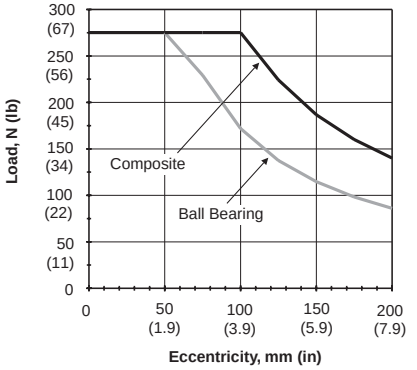
16mm Bore Size



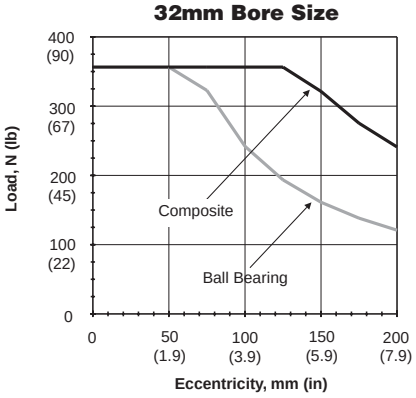
20mm Bore Size



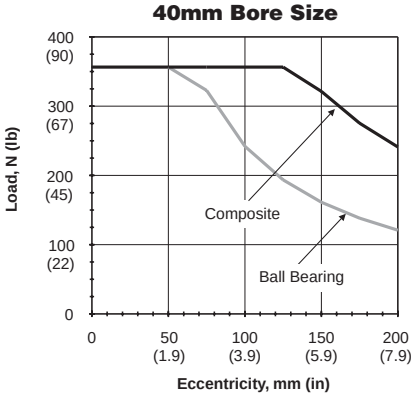
25mm Bore Size



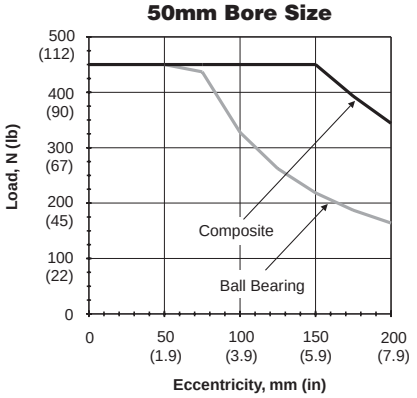
32mm Bore Size



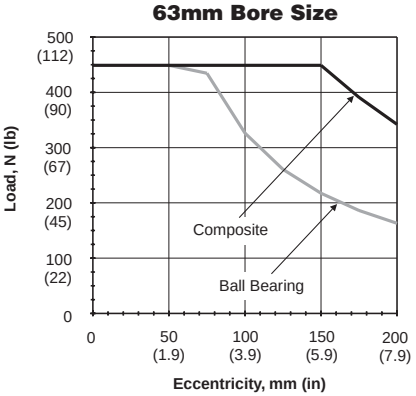
40mm Bore Size



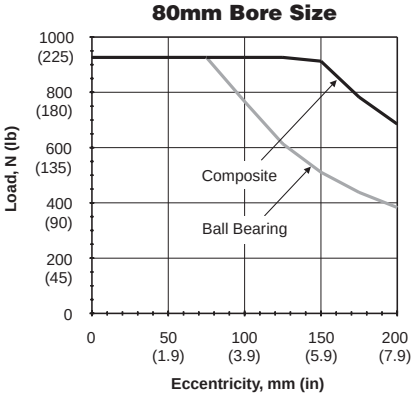
50mm Bore Size



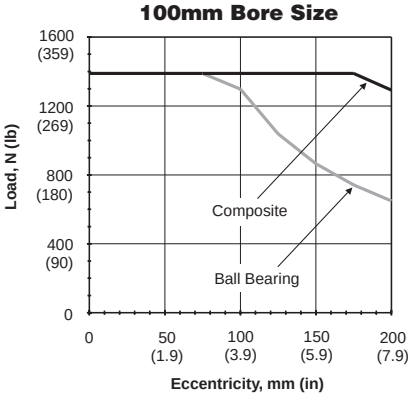
63mm Bore Size



80mm Bore Size



100mm Bore Size



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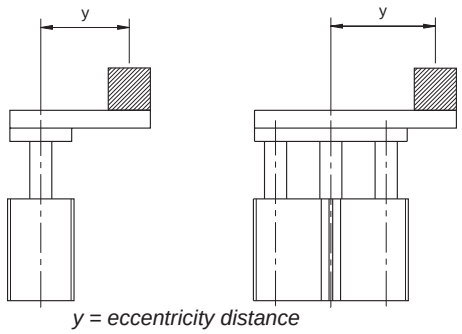
Vertical Eccentric Load Capacity with High Load Bearings and Dual Tool Plate (D, A, B)

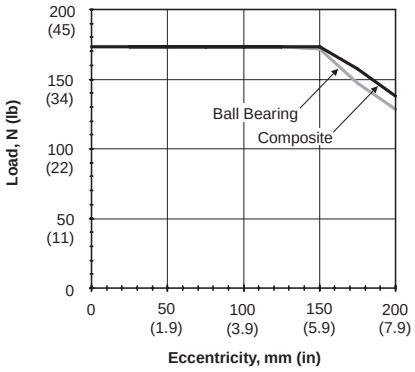
P5T Series units mounted vertically will have the same eccentric load capacity regardless of orientation. The graphs provide maximum load capacity for an eccentric mounted load. The load is assumed to be mounted at the face of the tooling plate.

These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

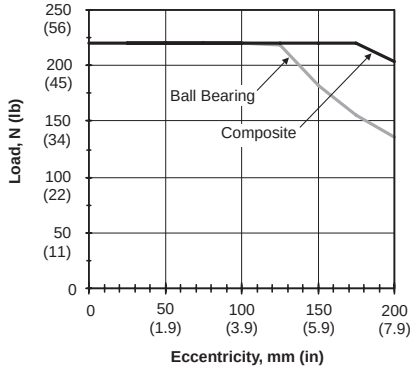


y = eccentricity distance

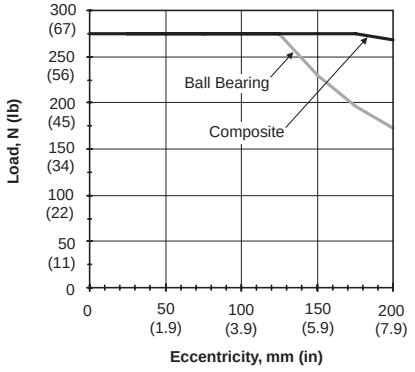
16mm Bore Size



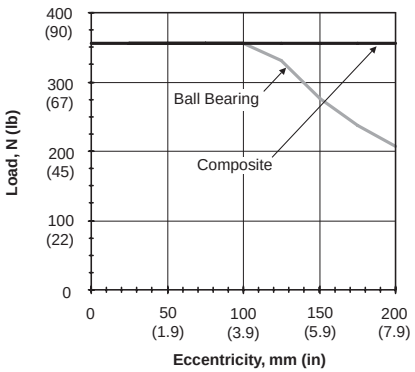
20mm Bore Size



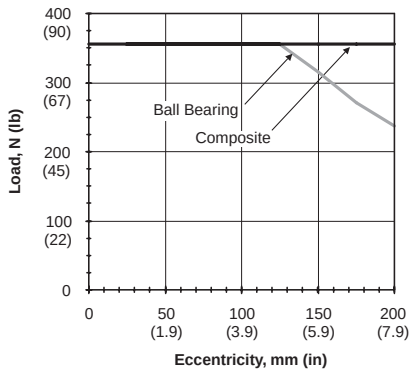
25mm Bore Size



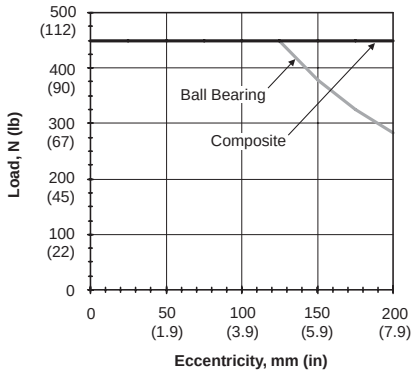
32mm Bore Size



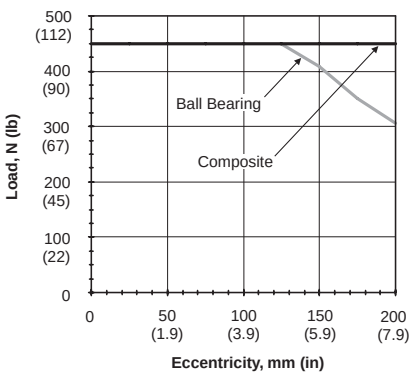
40mm Bore Size



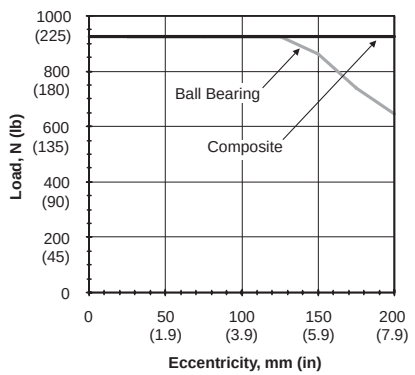
50mm Bore Size



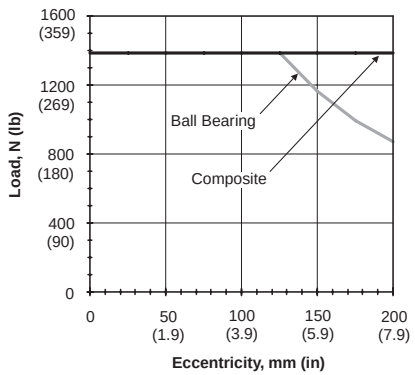
63mm Bore Size



80mm Bore Size



100mm Bore Size



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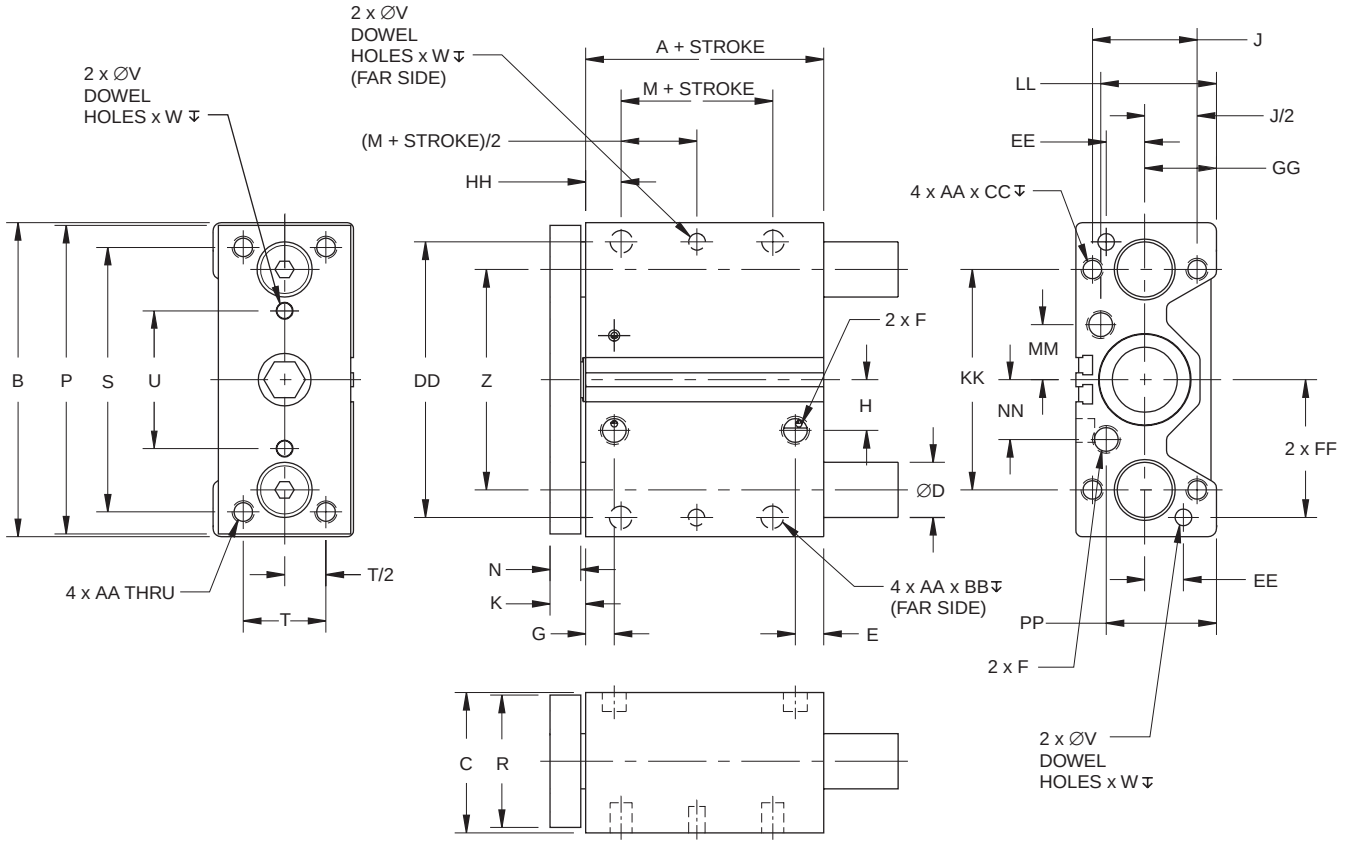
Basic Unit



3D CAD FILES
available for download at
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Note: On 16mm bore size only, one sensor groove is available. When utilizing two sensors on the 16mm bore size with 25mm stroke or less, use right angle short sensors.

F

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Basic Unit

Model	A**	B	C	D	D2	E**	F	G	H	J	K
16	37.75 (1.49)	64 (2.52)	31 (1.22)	8 (0.315)	10 (0.394)	10.1 (0.40)	M5/10-32	10.1 (0.40)	6.95 (0.27)	22 (0.866)	9.94 (0.39)
20	36 (1.42)	74 (2.91)	36 (1.42)	10 (0.394)	12 (0.472)	19 (0.75)	1/8 NPTF or BSPP	10 (0.39)	15.8 (0.62)	26 (1.024)	9.94 (0.39)
25	38 (1.50)	88 (3.46	42 (1.65)	12 (0.472)	16 (0.630)	21 (0.83)	1/8 NPTF or BSPP	11.4 (0.45)	15.5 (0.61)	32 (1.260)	9.94 (0.39)
32	36 (1.42)	114 (4.49)	51 (2.00)	16 (0.630)	20 (0.787)	10.26 (0.40)	1/8 NPTF or BSPP	10.35 (0.41)	18.42 (0.73)	38 (1.496)	13.1 (0.52)
40	44 (1.73)	124 (4.88)	52 (2.05)	16 (0.630)	20 (0.787)	12.10 (0.48)	1/8 NPTF or BSPP	14.9 (0.59)	22.53 (0.89)	38 (1.496)	13.1 (.052)
50	44.9 (1.77)	140 (5.51)	62 (2.44)	20 (0.787)	25 (0.984)	14.5 (0.57)	1/4 NPTF or BSPP	16.1 (0.63)	27 (1.06)	44 (1.732)	14.7 (0.58)
63	50.05 (1.97)	150 (5.91)	75 (2.95)	20 (0.787)	25 (0.984)	16.4 (0.65)	1/4 NPTF or BSPP	14.5 (0.57)	33 (1.30)	44 (1.732)	14.7 (0.58)
80	60.3 (2.37)	188 (7.40)	95 (3.74)	25 (0.984)	30 (1.181)	17.5 (0.610)	3/8 NPTF or BSPP	19 (0.75)	37 (1.46)	56 (2.205)	18 (0.71)
100**	67.5 (2.60)	224 (8.82)	115 (4.53)	30 (1.181)	35 (1.38)	21.9 (0.862)	3/8 NPTF or BSPP	23 (0.91)	40 (1.57)	62 (2.441)	18 (0.71)

Model	M	N	P	R	S	T	U	V	W	Z	AA	BB
16	7 (0.276)	7.94 (0.31)	62 (2.44)	25.4 (1.00)	52 (2.047)	16 (.630)	20 (0.787)	3 (0.118)	6 (0.236)	42 (1.654)	M5 X 0.8	7.5 (0.30)
20	10 (0.394)	7.94 (0.31)	72 (2.83)	31.8 (1.25)	60 (2.362)	18 (.709)	30 (1.181	4 (0.157)	6 (0.236)	52 (2.047)	M5 X 0.8	7.5 (0.30)
25	10 (0.394)	7.94 (0.31)	86 (3.39)	38 (1.50)	70 (2.756)	26 (1.024)	34 (1.339)	4 (0.157)	6 (0.236)	62 (2.441)	M6 X 1.0	9 (0.35)
32	5 (0.197)	11.1 (0.44)	112 (4.41)	44.5 (1.75)	96 (3.780)	30 (1.181)	50 (1.969)	6 (0.236)	6 (0.236)	80 (3.150)	M8 X 1.25	11 (0.43)
40	10 (0.394)	11.1 (0.44)	122 (4.80)	44.5 (1.75)	106 (4.173)	30 (1.181)	60 (2.362)	6 (0.236)	6 (0.236)	90 (3.543)	M8 X 1.25	11 0.43)
50	10 (0.394)	12.7 (0.50)	138 (5.43)	57.2 (2.25)	120 (4.724)	40 (1.575)	60 (2.362)	8 (0.315)	8 (0.315)	100 (3.937)	M10 X 1.5	12 (0.47)
63	10 (0.394)	12.7 (0.50)	148 (5.83)	69.9 (2.75)	130 (5.118)	50 (1.969)	72 (2.835)	8 (0.315)	8 (0.315)	110 (4.331)	M10 X 1.5	15 (0.59)
80	15 (0.591)	16 (0.63)	185 (7.28)	89 (3.50)	160 (6.299)	60 (2.362)	92 (3.622)	10 (0.394)	10 (0.394)	140 (5.512)	M12 X 1.75	18 (0.71)
100	15 (0.591)	16 (0.63)	221 (8.70)	108 (4.25)	190 (7.480)	80 (3.150)	114 (4.488)	10 (0.394)	10 (0.394)	170 (6.693)	M14 X 2.0	21 (0.83)

Model	CC	DD	EE	FF	GG	HH	KK	LL	MM	NN	PP	Piston Rod
16	10 (0.39)	54 (2.126)	8 (0.315)	27 (1.063)	15 (0.591)	13.06 (0.514)	42 (1.654)	22.5 (0.88)	11.25 (0.44)	9.7 (0.38)	23.0 (0.91)	8 (0.315)
20	10 (0.39)	64 (2.520)	10 (0.394)	32 (1.260)	17 (0.669)	13.06 (0.514)	52 (2.126)	26.0 (1.02)	15.4 (0.61)	15.4 (0.61)	26.0 (1.0)	10 (0.394)
25	12 (0.47)	76 (2.992)	11 (0.433)	38 (1.496)	21 (0.827)	14.06 (0.553)	62 (2.441)	33.4 (1.31)	17 (0.67)	17 (0.67)	33.4 (1.31)	10 (0.394)
32	16 (0.63)	100 (3.937)	14 (0.551)	50 (1.969)	26 (1.024)	12.9 (0.508)	80 (3.150)	42 (1.65)	20 (0.79)	21.7 (0.85)	38 (1.50)	16 (0.630)
40	16 (0.63)	110 (4.33)	14 (0.551)	55 (2.165)	26 (1.024)	13.9 (0.547)	90 (3.543)	41 (1.61)	24 (0.95)	26.4 (1.04)	37.9 (1.49)	16 (0.630)
50	20 (0.79)	124 (4.882)	16 (0.630)	62 (2.441)	30 (1.181)	14.3 (0.563)	100 (3.937)	51 (2.01)	29 (1.14)	33 (1.30)	44 (1.73)	20 (0.787)
63	20 (0.79)	132 (5.197)	18 (0.709)	66 (2.598)	36.5 (1.437)	16.3 (0.642)	110 (4.331)	62 (2.44)	36 (1.42)	37.75 (1.49)	57.75 (2.27)	20 (0.787)
80	24 (0.94)	166 (6.535)	22 (0.866)	83 (3.268)	46.5 (1.831)	21 (0.83)	140 (5.512)	78 (3.07)	45 (1.77)	48 (1.89)	75.5 (2.97)	25 (0.984)
100	28 (1.10)	200 (7.874)	24 (0.945)	100 (3.937)	56.5 (2.224)	25 (0.98)	170 (6.693)	91.5 (3.60)	53 (2.09)	51 (2.01)	95.5 (3.76)	25 (0.984)

D^1 With linear ball bearing D^2 With composite bushing

** For Model 100 with 25mm stroke, A = 100.3 (3.95") and E = 28 (1.10")

All dimensions in mm (inch)

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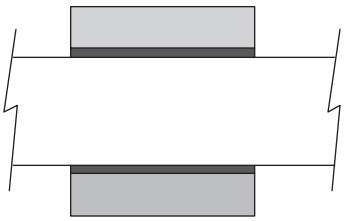
Shaft Bearings

Composite bushings are supplied as standard.
Linear ball bearings are optional.

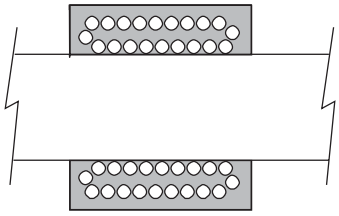
Selection should be based on the following criteria:

Application Requirement	Ball	Composite
Precision	Excellent	Good
Friction	Low	Higher
Friction coefficient	Constant	Variable
Precision over life of bearing	Constant	Variable
Static Load Capacity	Good	Excellent
Dynamic Load Capacity	Good	Good with lower efficiency
Vibration Resistance	Fair	Excellent
Contamination Resistance	Poor	Excellent
Washdown Compatibility	Poor	Excellent

For bearing load capacities, reference the Engineering Data section.



Composite Bushing (J,C)

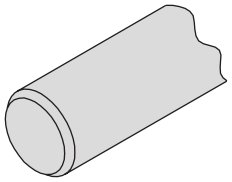


Recirculating Ball Bearing (H)

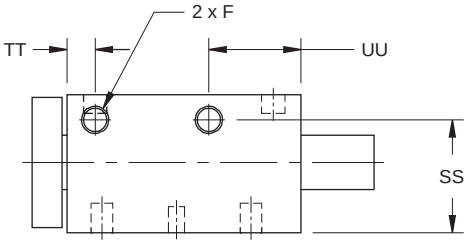
F

Corrosion Resistant Shafting (C, H)

Chrome-plated case hardened, high carbon alloy steel shafting with composite bearings is utilized for standard slides. This may corrode in some applications. Stainless steel corrosion resistant shafting is available.



Side Porting (S)



NOTES:

1 Side ports not available on 100mm bore units with 25mm of stroke.

2 Cannot use flow controls with 25mm stroke on any bore size.

Dimensions

Model	SS mm (in)	TT mm (in)	UU mm (in)	F
16	24.1 (.95)	10 (.39)	20 (.79)	10-32 or M5
20	29.00 (1.15)	10 (.39)	20 (.79)	10-32 or M5
25	35.15 (1.38)	11.4 (.45)	24 (.94)	10-32 or M5
32	43.2 (1.70)	10.35 (.41)	34 (1.34)	1/8 NTPF or BSPP
40	43.0 (1.69)	14.9 (.59)	34 (1.34)	1/8 NPTF or BSPP
50	51.25 (2.02)	16.1 (.64)	38 (1.50)	1/4 NTPF or BSPP
63	60.70 (2.39)	15.55 (.61)	41.8 (1.65)	1/4 NPTF or BSPP
80	75.5 (2.97)	19 (.75)	47 (1.85)	3/8 NTPF or BSPP
100	83.7 (3.30)	23 (.91)	53.3 (2.10)	3/8 NPTF or BSPP

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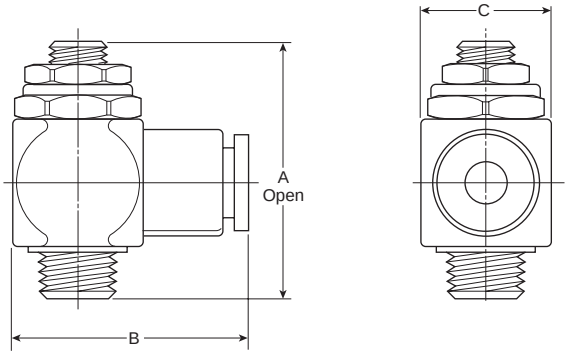
Flow Controls (B, F, N, P)

Right angle flow control valves allow precise adjustment of cylinder speed by metering exhaust air flow. Prestolok push-in or threaded ports provide 360° orientation capability.

Model	A (in)	B (in)	C (in)	Imperial	
				Prestolok (F)	NPT (N)
16, 20*, 25*	0.87	0.96	0.39	5/32"	10-32
20, 25, 32, 40	1.63	1.38	0.67	5/32"	1/8
50, 63	1.86	1.64	0.91	1/4"	1/4
80, 100	2.15	1.90	1.06	3/8"	3/8

Model	A (mm)	B (mm)	C (mm)	Metric	
				Prestolok (P)	BSPP (B)
16, 20*, 25*	22.0	24.5	10.0	4mm	M5
20, 25, 32, 40	34.5	31.6	14.4	6mm	1/8
50	41.0	34.9	18.4	6mm	1/4
63	41.0	41.3	18.4	10mm	1/4
80	51.0	46.7	21.6	10mm	3/8
100	51.0	46.7	21.6	12mm	3/8

* Side ports only.



Note: When flow controls are specified with rear ports, a 90° right angle fitting is supplied to provide ample rod clearance in the rear.

Prestolok flow controls are not available on 32-100mm bore sizes with 25mm of stroke.

Fluorocarbon Seals (F)

Standard abrasion resistant nitrile seals should be used for general purpose applications with temperatures of -18 to 74°C (0 to 165°F). Fluorocarbon seals are recommended for high temperature applications up to 121°C (250°F).

Feature	Temperature Range
Bumpers	-18 to 93°C (0 to 200°F)
Magnets	-18 to 74°C (0 to 165°F)
Sensors	-10 to 85°C (14 to 185°F)

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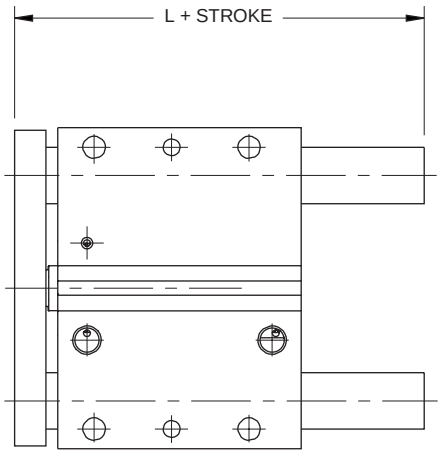
Standard Length – No Options (N)



Dimensions

Model	Stroke (mm)	L	
		mm	inch
16	10*, 25, 40, 50, 75	60.2	2.37
	100	75.2	2.96
20	25, 40, 50, 75	66.9	2.63
	100, 125	91.9	3.62
25	25, 50, 75	69.9	2.75
	100, 125, 150	91.9	3.62
32	25, 50, 75, 100	77.9	3.07
	125, 150, 175, 200	116.0	4.57
40	25, 50, 75, 100	77.9	3.07
	125, 150, 175, 200	116.0	4.57
50	25, 50, 75, 100	84.0	3.31
	125, 150, 175, 200	124.1	4.89
63	25, 50, 75, 100	84.0	3.31
	125, 150, 175, 200	124.1	4.89
80	25, 50, 75, 100	101.8	4.00
	125, 150, 175, 200	140.0	5.51
100	25**, 50, 75, 100	120.3	4.74
	125, 150, 175, 200	158.4	6.24

* For Model 16 with 10mm stroke, L = 37.7 mm (1.48").

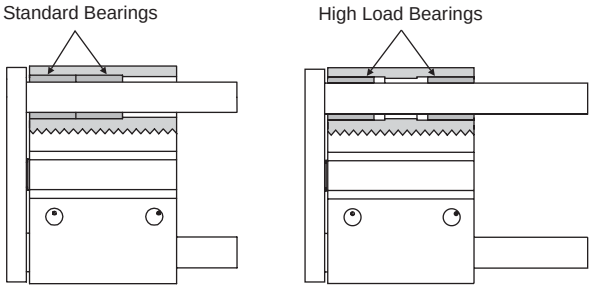
** For Model 100 with 25mm stroke, L = 122.8mm (4.8").

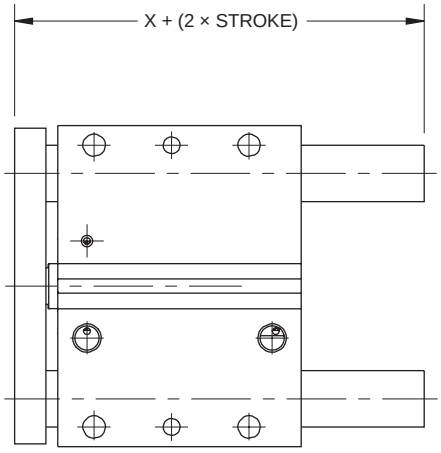
F

High Load Bearings (B)

The standard bearing configuration locates both sets of bearings at the tooling plate end of the actuator providing a compact actuator package. The high load bearings option (B) locates the bearings at the extreme ends of the housing, increasing the dynamic and static load capacity. The bearing centerlines increase as stroke length increases.

Note: Rear mounting and ports are not available with the high load bearing option.





Dimensions

Model	X	
	mm	inch
16	49.7	1.955
20	47.0	1.849
25	49.9	1.963
32	51.1	2.012
40	59.1	2.327
50	61.6	2.425
63	66.8	2.630
80	79.6	3.135
100	86.1	3.391

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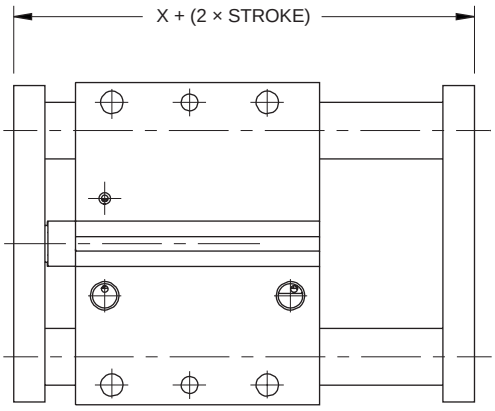
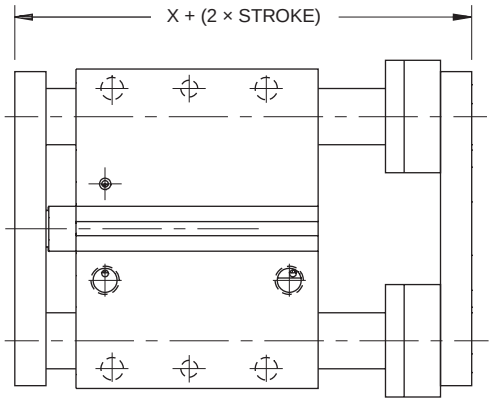
Dual Tool Plate (D)



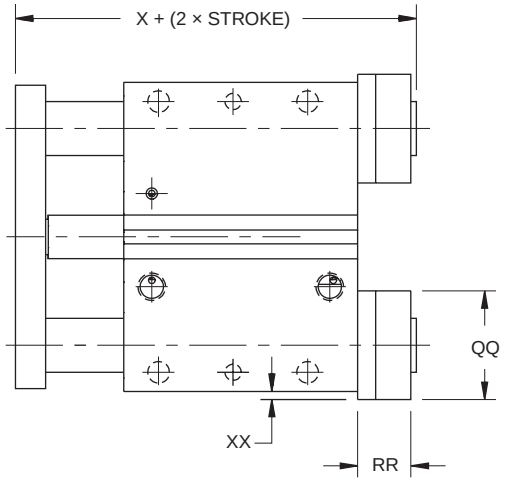
Notes:

1. Load capacities increase on dual tool plate (D & A). For load capacities, use the high load bearing graphs.
2. Rear mounting holes and rear ports are not available with Options D, A, and E.

Bumpers, Stop Collars & Dual Tool Plate (A)



Bumpers & Adjustable Stop Collars, Extend Only (E)



Dimensions

Model	Rod Dia.	X			QQ	RR	XX
		D Option	A Option	E Option			
16	8	57.7 (2.27)	70.7 (2.78)	62.7 (2.47)	18.0 (0.71)	15.7 (0.62)	0
	10	57.7 (2.27)	70.7 (2.78)	62.7 (2.47)	24.0 (0.95)	15.7 (0.62)	1 (0.04)
20	10	54.7 (2.15)	67.9 (2.67)	59.9 (2.36)	24.0 (0.95)	15.7 (0.62)	1 (0.04)
	12	54.7 (2.15)	72.6 (2.86)	64.6 (2.54)	28.0 (1.10)	17.7 (0.70)	3 (0.12)
25	12	58.8 (2.31)	76.5 (3.01)	68.1 (2.68)	28.0 (1.10)	17.7 (0.70)	1 (0.04)
	16	58.8 (2.31)	78.5 (3.09)	70.1 (2.76)	34.0 (1.34)	19.7 (0.78)	4 (0.16)
32	16	62.2 (2.45)	81.9 (3.22)	70.8 (2.79)	34.0 (1.34)	19.7 (0.78)	0
	20	62.2 (2.45)	83.9 (3.30)	72.8 (2.87)	40.0 (1.57)	21.7 (0.85)	3.7 (0.15)
40	16	70.2 (2.76)	89.9 (3.54)	78.8 (3.10)	34.0 (1.34)	19.7 (0.78)	0
	20	70.2 (2.76)	91.9 (3.62)	80.8 (3.18)	41.4 (1.63)	21.7 (0.85)	3.7 (0.15)
50	20	74.3 (2.93)	96.0 (3.78)	83.3 (3.28)	41.4 (1.63)	21.7 (0.85)	0.7 (0.03)
	25	74.3 (2.93)	96.0 (3.78)	83.3 (3.28)	45.0 (1.77)	21.7 (0.85)	5.4 (0.21)
63	20	79.5 (3.13)	101.2 (3.98)	88.5 (3.48)	41.4 (1.63)	21.7 (0.85)	0.7 (0.03)
	25	79.5 (3.13)	101.2 (3.98)	88.5 (3.48)	50.8 (2.00)	21.7 (0.85)	5.4 (0.21)
80	25	96.1 (3.78)	117.8 (4.64)	101.9 (4.01)	50.8 (2.00)	21.7 (0.85)	1.4 (0.06)
	30	96.1 (3.78)	117.8 (4.64)	101.9 (4.01)	54.0 (2.13)	21.7 (0.85)	6.3 (0.25)
100	30	103.3 (4.07)	125.8 (4.95)	109.1 (4.30)	60.5 (2.38)	21.7 (0.85)	3.3 (0.13)
	35	103.3 (4.07)	125.8 (4.95)	109.1 (4.30)	57.0 (2.24)	21.7 (0.85)	5.5 (0.22)

All dimensions in mm (inch)

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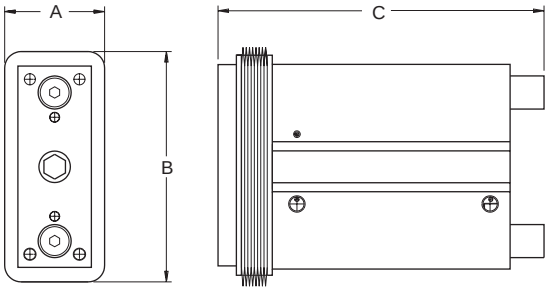
Contaminant & Weld Flash Covers

A contaminant cover protects the guide rods and bearings from particles and fluid that could cause premature failure.

A weld flash cover protects guide rods and bearings from weld spatter.

Cover option can be ordered on models having the bearings both ends option.

Consult factory to order.



Weld Flash Cover Specifications

Coating Material (exposed side)..... PVC (Black)
Base Material ..... Nomex
Coating Material (other side)..... PVC (Black)
Material Thickness Range ..... .012" - .016" (.3-.4mm)
Temperature Resistance (Nomex)
  Briefly..... 642°F (450°C)
  Continuously..... -22° to 572°F (-30° to 300°C)
Temperature Resistance (Coating)
  Briefly..... 392°F (200°C)
  Continuously..... -22° to 302°F (-30° to 150°C)
Resistant to..... Chemicals, coolants, solvents, oil
Characteristics..... self-extinguishing, abrasion resistant
Material Weight..... 400 grams/square meter

F

Dimensions

MODEL	A	B	10	25	40	50	75	100	125	150	175	200
16	42 (1.65)	86 (3.39)	61.2 (2.41)	100.2 (3.94)	135.2 (5.32)	135.2 (5.32)	160.2 (6.31)	200.2 (7.88)	–	–	–	–
20	45 (1.77)	98 (3.86)	–	106.9 (4.21)	141.9 (5.59)	141.9 (5.59)	166.9 (6.57)	216.9 (8.54)	241.9 (9.52)	–	–	–
25	49 (1.93)	112 (4.41)	–	119.9 (4.72)	–	144.9 (5.70)	169.9 (6.69)	194.9 (7.67)	241.9 (9.52)	266.9 (10.51)	–	–
32	62 (2.44)	142 (5.59)	–	127.9 (5.04)	–	152.9 (6.02)	177.9 (7.00)	202.9 (7.99)	266 (10.47)	291 (11.46)	316 (12.44)	341 (13.43)
40	62 (2.44)	152 (5.98)	–	127.9 (5.04)	–	152.9 (6.02)	177.9 (7.00)	202.9 (7.99)	266 (10.47)	291 (11.46)	316 (12.44)	341 (13.43)
50	66 (2.60)	167 (6.57)	–	134 (5.28)	–	159 (6.26)	184 (7.24)	209 (8.23)	274.1 (10.79)	299.1 (11.78)	324.1 (12.76)	349.1 (13.74)
63	77 (3.03)	187 (7.36)	–	134 (5.28)	–	159 (6.26)	184 (7.24)	209 (8.23)	274.1 (10.79)	299.1 (11.78)	324.1 (12.76)	349.1 (13.74)
80	104 (4.09)	244 (9.61)	–	151.8 (5.98)	–	176.8 (6.96)	201.8 (7.94)	226.8 (8.93)	290 (11.42)	315 (12.40)	340 (13.39)	365 (14.37)
100	109 (4.29)	279 (10.98)	–	170.3 (6.70)	–	195.3 (7.69)	220.3 (8.67)	245.3 (9.66)	308.4 (12.14)	333.4 (13.13)	358.4 (14.11)	383.4 (15.09)

All dimensions in mm (inch)

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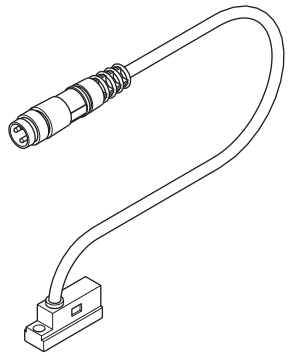
Reed and Solid State Sensors

Sensors are available in both short and standard configurations. Both styles mount in the sensor grooves on the P5T body. The standard sensors mount flush to the body. The short sensor extends out 4.5mm to the cable.
Both styles are available with quick connector or flying leads.

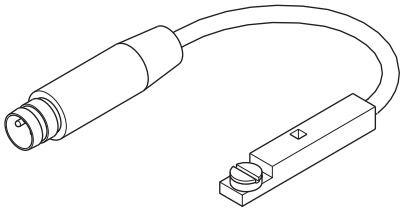
Magnetic piston is standard.

See Electronic Sensors section for part numbers and specifications.

Slide-in Short Sensor



Drop-in Sensor



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Seal Kits

Bore Size	Seal Kit Part Number	
	Nitrile Seals	Fluorocarbon Seals
16	PSK-P5T16	PSK-P5T16-F
20	PSK-P5T20	PSK-P5T20-F
25	PSK-P5T25	PSK-P5T25-F
32	PSK-P5T32	PSK-P5T32-F
40	PSK-P5T40	PSK-P5T40-F
50	PSK-P5T50	PSK-P5T50-F
63	PSK-P5T63	PSK-P5T63-F
80	PSK-P5T80	PSK-P5T80-F
100	PSK-P5T100	PSK-P5T100-F

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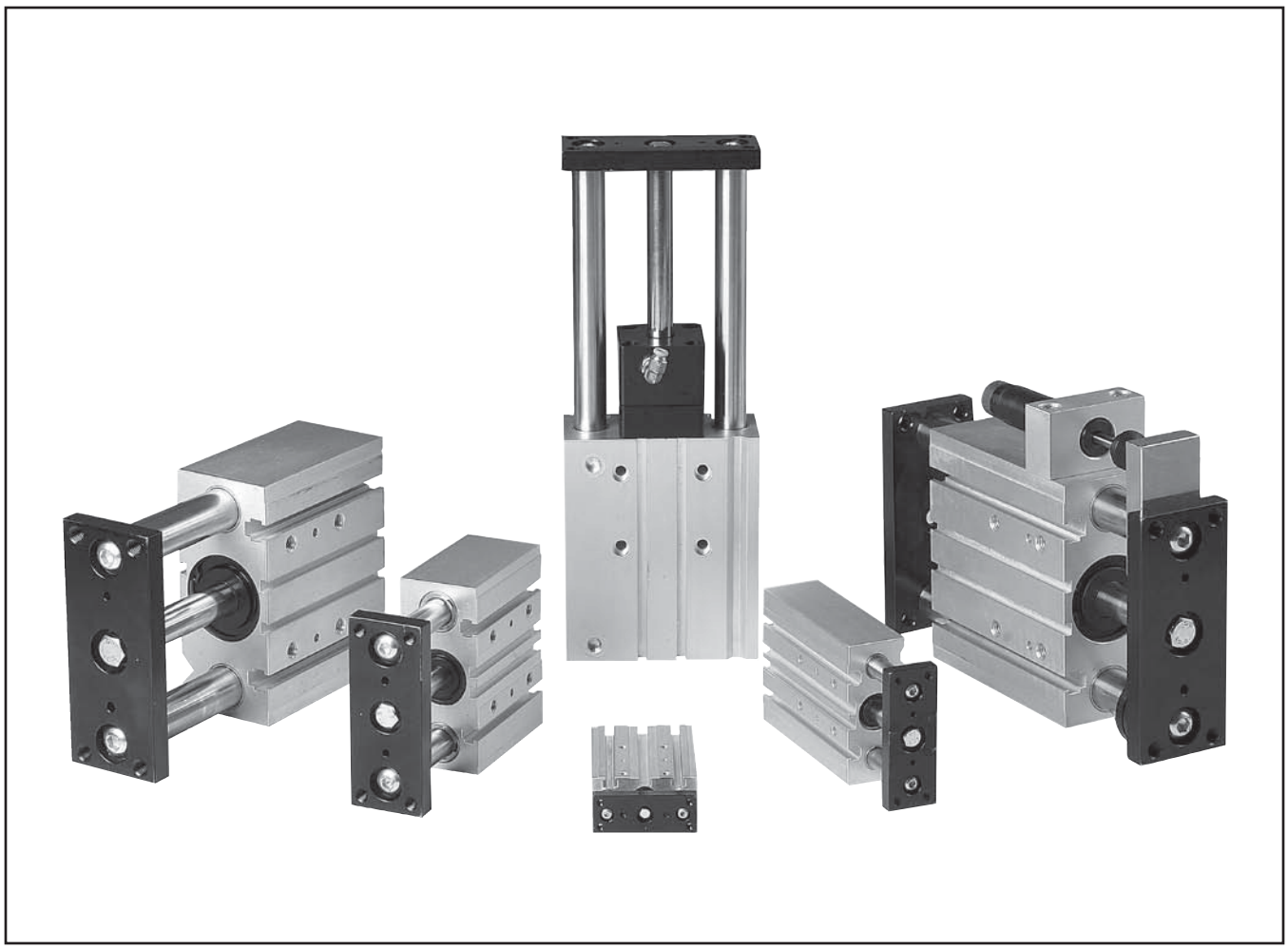
P5T2 Series

Short Stroke Thruster



Contents

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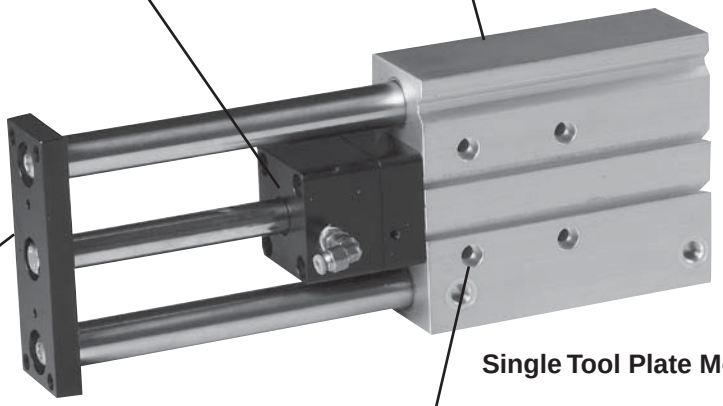
Rod Lock
True rod-lock mechanism stops unit in current position upon loss of air pressure.

Compact, One-Piece Body
The housing provides a small and economical package by integrating a low profile cylinder and support shafts into a single clear anodized body.



Porting
Top porting is standard. Rear and side porting are available.

Tool Plate
A precision machined steel tool plate provides a rigid, durable connection.

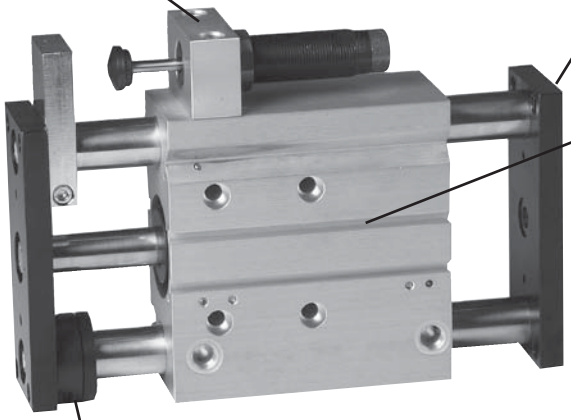
Single Tool Plate Model

Through-Hole Mounting
Standard through-hole mounting patterns ensure drop-in capabilities for a variety of installations.

Air Cushions
Fully adjustable air cushions allow for superior energy absorption compared to rubber bumpers alone.

Shock Absorbers
Adjustable external mounted shock absorbers provide excellent impact dampening in aggressive applications.

Dual Tool Plate



Sensor Grooves
The global sensors are mounted flush to the outside of the housing. Both reed and solid state are available. Magnetic piston is standard. A new low-profile proximity sensor is also available which mounts in the same groove.

Dual Tool Plate Model

Bumpers and Stop Collars
Bumpers and stop collars allow for adjustable retract and extend strokes.

Composite Bushings or Linear Ball Bearings
A PTFE impregnated **composite bushing** is standard. This bushing provides high load carrying capabilities with excellent resistance to shock loading. Optional **linear ball bearings** provide precision operation with very low friction and wear.

3D CAD FILES
available for download at
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Model Code and Ordering Information

Example: P5T2A032J1KN1BGR025A

P5T2	A	032	J1	K	N	1	B	G	J	025	A

Construction

A	Standard, Metric Mounting Threads
E	Cushions [6], Metric Mounting Threads

Bore Size

012	12mm
016	16mm
020	20mm
025	25mm
032	32mm
040	40mm
050	50mm
063	63mm
080	80mm
100	100mm

Bearings / Shaft

J1	Composite Bushings, Chrome Plated Rod
J3	Composite Bushings, Stainless Steel Rod
K1	Composite High Load Bearings, Chrome Plated Rod [7]
K3	Composite High Load Bearings, Stainless Steel Rod [7]
H3	Linear Ball Bearings, Stainless Steel Rod
L3	Linear Ball High Load Bearings, Stainless Steel Rod [7]

Extend Options

A	Shock Absorber [1, 9]
K	Bumpers and Adjustable Stop Collars [2]
L	Bumpers and Shock Absorbers [3, 9]
N	None

Retract Options

A	Shock Absorber [4, 9]
K	Bumpers and Adjustable Stop Collars [4]
L	Bumpers and Shock Absorber [4, 9]
R	Rod Lock (Sizes 32-100 only)
N	None

Port Location

1	Top
2	Side
3	Rear

Ports / Flow Controls

Ports	Flow Controls [5]		
	None	**Prestolok**	**Threaded**
NPTF	**A**	**E**	**P**
BSPP or M5	**B**	**F**	**R**

Other Options

Tool Plate	Seals	
	Buna-N	**Fluorocarbon**
Front	**G**	**L**
Front & Rear [5]	**H**	**M**

Gross Stroke

Order standard stroke from tables below using 3 digits, i.e. 025 = 25mm

Type	Connection	Sensor Option			
		Proximity Sensor [8]			None
		Extend	Retract	Extend & Retract	
PNP	Lead Type	U	A	E	N
	Plug in	V	B	F	
NPN	Lead Type	W	C	J	
	Plug in	Y	D	K	

Solid state and reed sensors can be ordered separately from pages M2-M4.

Standard Strokes, Basic Units*

Bore Size	10	20	25	30	40	50	75	100	125	150	175	200
12 - 16	●	●		●	●	●	●	●	●	●	●	●
20 - 25		●		●	●	●	●	●	●	●	●	●
32 - 100			●			●	●	●	●	●	●	●

Standard Strokes, Cushioned Units*

Bore Size	10	20	25	30	40	50	75	100	125	150	175	200
20 - 63			●			●	●	●	●	●	●	●
80 - 100						●	●	●	●	●	●	●

*Consult factory for special stroke lengths.

NOTES:

1 Not available with rear or side port; not available with Retract Option L; not available on 100mm size with 25mm stroke.
2 Not available with rear ports.
3 Not available with rear or side ports; not available with Retract Option A.
4 Not available with Rod Lock.
5 Not available with rear ports.
6 Cushions not available on Sizes 12 &16. Cushions may not be effective in combination with shocks or bumpers/stop collars.
7 High load bearings option only available with 50mm and greater strokes.
8 Consult factory for retract proximity sensors on rodlock unit.
9 Shock absorbers not available on Sizes 12 & 16.

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Specifications

- Maximum operating pressure: 1 MPa (10 bar/145 psi)
- Operating characteristics: Double acting
- Support rod sizes: ∅8 to 35mm
- Mounting: Unrestricted
- Operating temperature range (cylinder):
  - Nitrile seals (standard) -18° to 74°C (0° to 165°F)
  - Fluorocarbon seals* -18° to 121°C (0° to 250°F)
- Filtration requirement: 40 micron, filtered dry air

* See Fluorocarbon seal option for high temperature applications.

Construction

Body .....Aluminum
End Caps.....Aluminum
Tool Plate..... Steel
Piston Rod..... Stainless Steel
Support Rods ..... Steel
Rod Bolts..... Steel

F

Mounting Bolts

Bore Size	Bottom Hole Threads	Thru Hole Socket Head Cap Screw	
		Screw Size	Minimum Length (1.5 x dia. screw engagement)
12	M5 x 0.8	M4	28mm
16	M5 x 0.9	M4	32mm
20	M6 x 1.0	M5	38mm
25	M6 x 1.0	M5	44mm
32	M8 x 1.25	M6	50mm
40	M8 x 1.25	M6	56mm
50	M10 x 1.5	M8	68mm
63	M10 x 1.5	M8	82mm
80	M12 x 1.75	M10	100mm
100	M14 x 2.0	M12	96mm

Note: *When the P5T2 is used as an impact stopping system, mounting bolt thread engagement should be 1.5 times bolt diameter.*

Quick Reference Data

Model Bore	Piston Rod Diameter (mm)	Bushings	Support Rods (mm)	Force Output on Extension at 75 PSI		Force Output on Retraction at 75 PSI	
				N	lbs	N	lbs
12	6	Ball	6	59	13	44	10
		Composite	8				
16	8	Ball	8	102	23	78	18
		Composite	10				
20	10	Ball	10	165	37	120	27
		Composite	12				
25	10	Ball	12	254	57	214	48
		Composite	16				
32	12	Ball	16	414	93	356	80
		Composite	20				
40	16	Ball	16	650	146	547	123
		Composite	20				
50	20	Ball	20	1015	228	854	192
		Composite	25				
63	20	Ball	20	1611	362	1451	326
		Composite	25				
80	25	Ball	25	2599	584	2345	527
		Composite	30				
100	25	Ball	30	4063	913	3809	856
		Composite	35				

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Weights

Basic Units with Single Tool Plate

Model Bore	Support Rod Diameter	Standard Unit Weight				Cushioned Unit Weight			
		Base Weight (zero stroke)		Stroke Multiplier (per 5mm)		Base Weight (zero stroke)		Stroke Multiplier (per 5mm)	
		kg	lbs	kg	lbs	kg	lbs	kg	lbs
12	6	0.18	0.39	0.02	0.04	NA	NA	NA	NA
	8	0.18	0.39	0.02	0.04	NA	NA	NA	NA
16	8	0.27	0.59	0.02	0.05	NA	NA	NA	NA
	10	0.27	0.58	0.03	0.06	NA	NA	NA	NA
20	10	0.45	0.98	0.04	0.08	0.65	1.42	0.03	0.08
	12	0.47	1.03	0.04	0.09	0.69	1.52	0.04	0.09
25	12	0.80	1.76	0.04	0.10	0.90	1.99	0.04	0.10
	16	0.78	1.72	0.05	0.12	0.94	2.08	0.05	0.11
32	16	1.32	2.91	0.06	0.13	1.46	3.21	0.06	0.13
	20	1.33	2.93	0.07	0.15	1.53	3.38	0.07	0.15
40	16	1.45	3.21	0.07	0.16	1.75	3.85	0.08	0.17
	20	1.58	3.48	0.08	0.18	1.80	3.97	0.08	0.19
50	20	2.35	5.17	0.11	0.24	2.82	6.22	0.11	0.24
	25	2.57	5.67	0.12	0.27	3.02	6.64	0.12	0.27
63	20	3.01	6.64	0.13	0.28	3.69	8.12	0.13	0.28
	25	3.18	7.01	0.14	0.31	4.02	8.87	0.14	0.31
80	25	5.90	13.00	0.20	0.43	7.38	16.26	0.20	0.43
	30	6.11	13.47	0.21	0.47	7.72	17.02	0.21	0.47
100	30	8.79	19.37	0.20	0.44	10.71	23.60	0.21	0.45
	35	8.98	19.79	0.22	0.48	11.13	24.52	0.23	0.50

See example below

Example:

P5T2 size 40 cushioned unit, 20mm support rod with a 75mm stroke.

Base Weight = 3.97 lbs
Stroke Multiplier: 75mm ÷ 5 = 15
Stroke Weight = 15 × 0.19 lbs = 2.85 lbs

Total Weight = 3.97 lbs + 2.85 lbs = 6.82 lbs

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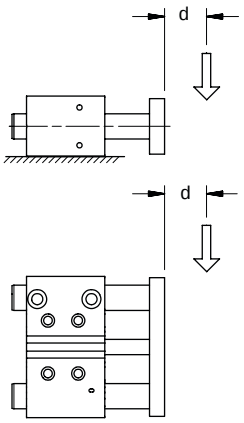
Horizontal Load Capacity with Standard Bearings (J1, J3, H3)

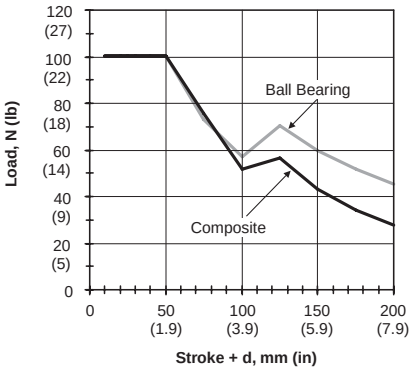
P5T2 Series units will have the same load capacity regardless of orientation. The graphs below show maximum load capacity based on a unit life of 10 million cycles.

These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

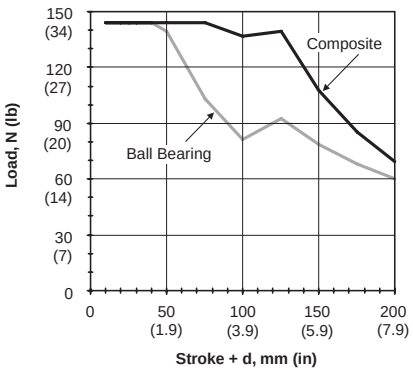
EXAMPLE: A P5T2-016 with "stroke + d" of 100mm and linear ball bearings would have a load capacity of 80 N. The capacity would be 135 N with composite bushings.



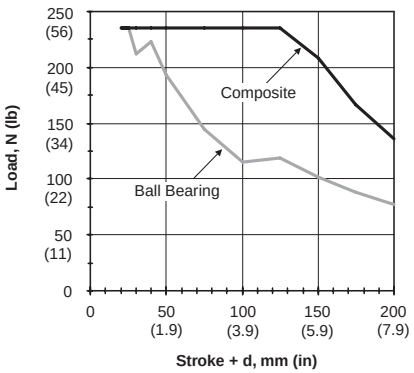
12mm Bore Size



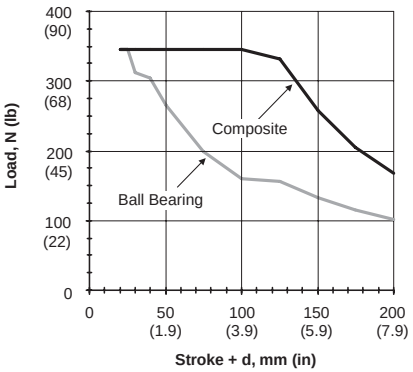
16mm Bore Size



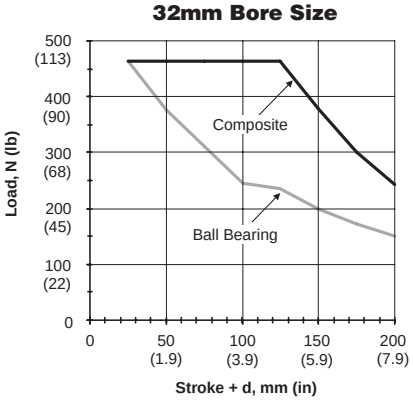
20mm Bore Size



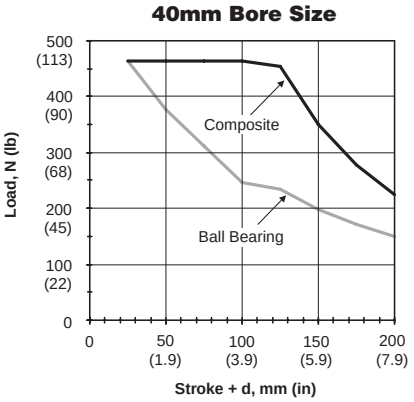
25mm Bore Size



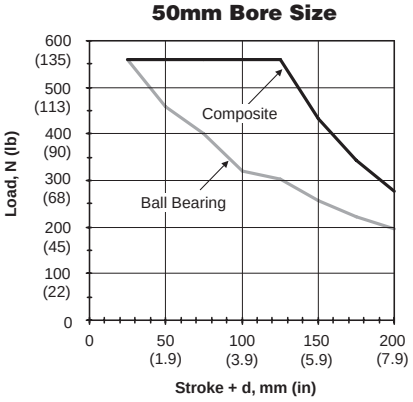
32mm Bore Size



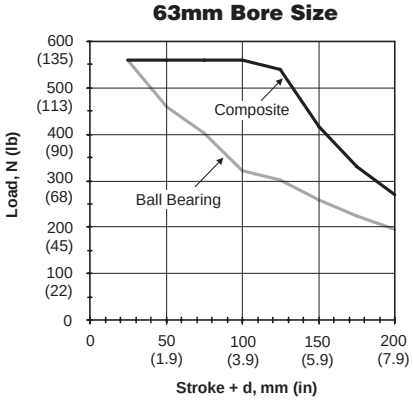
40mm Bore Size



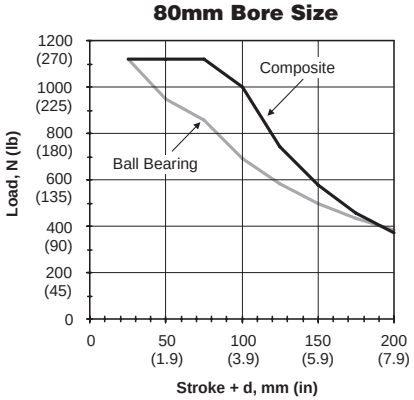
50mm Bore Size



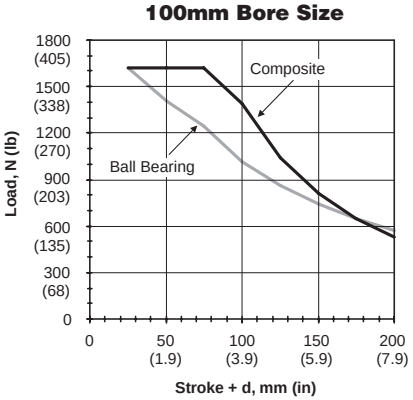
63mm Bore Size



80mm Bore Size



100mm Bore Size



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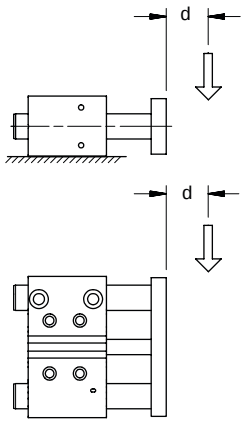
Horizontal Load Capacity with High Load Bearings (K1, K3, L3)

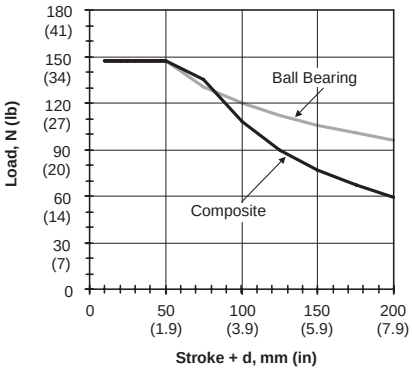
P5T2 Series units will have the same load capacity regardless of orientation. The graphs below show maximum load capacity based on a unit life of 10 million cycles.

These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

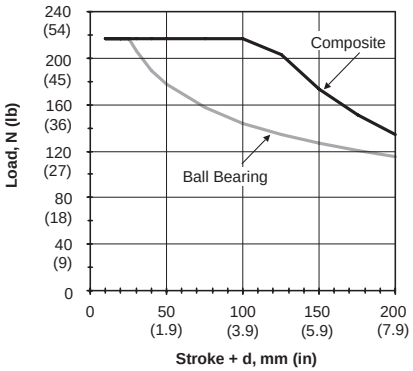
EXAMPLE: A P5T2-020 with "stroke + d" of 100mm and high load composite bushings would have a load capacity of 300 N. With linear ball bearings, the capacity would be 190 N.



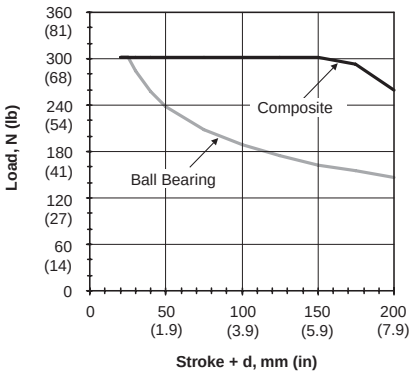
12mm Bore Size



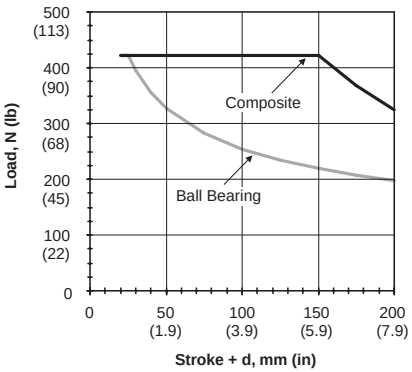
16mm Bore Size



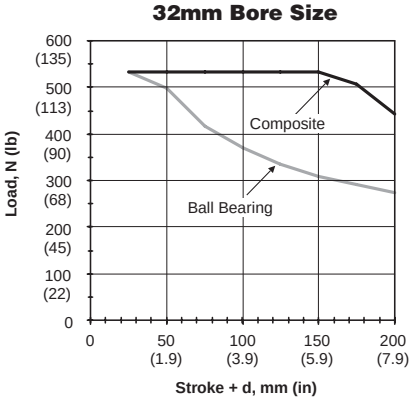
20mm Bore Size



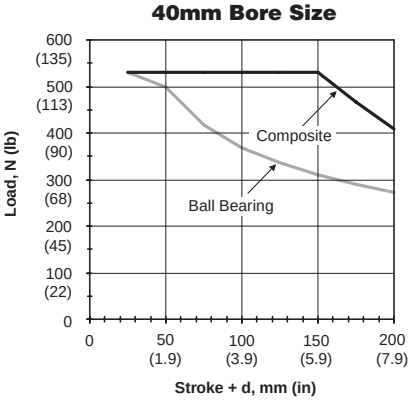
25mm Bore Size



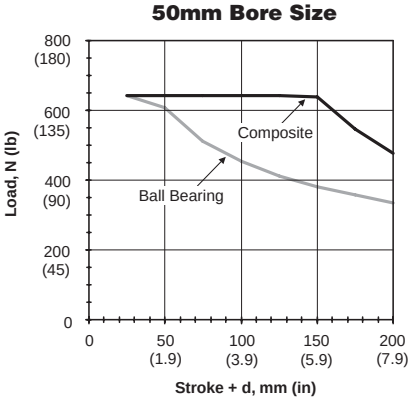
32mm Bore Size



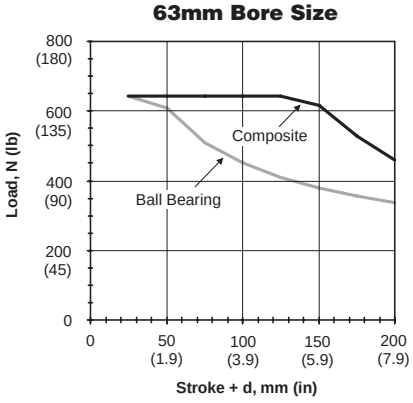
40mm Bore Size



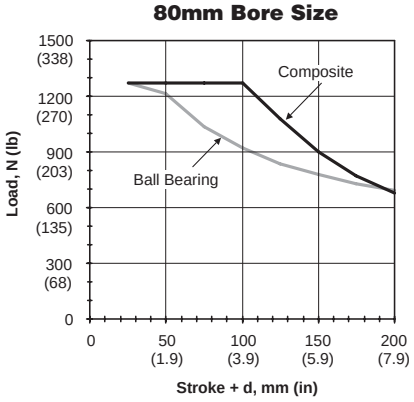
50mm Bore Size



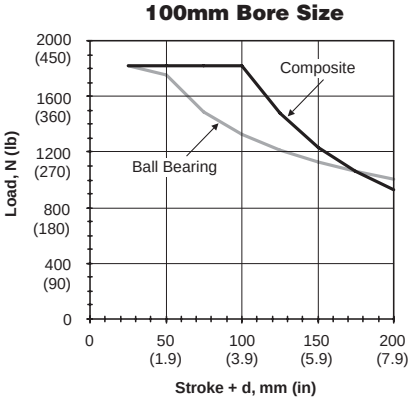
63mm Bore Size



80mm Bore Size



100mm Bore Size



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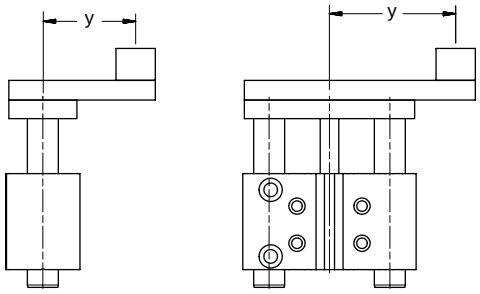
Vertical Eccentric Load Capacity

P5T2 Series units mounted vertically will have the same eccentric load capacity regardless of orientation. The graphs provide maximum load capacity for an eccentric mounted load. The load is assumed to be mounted at the face of the tool plate.

These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

EXAMPLE: A P5T2-050 unit will lift up to a 90-lb load, offset 170mm from actuator centerline.

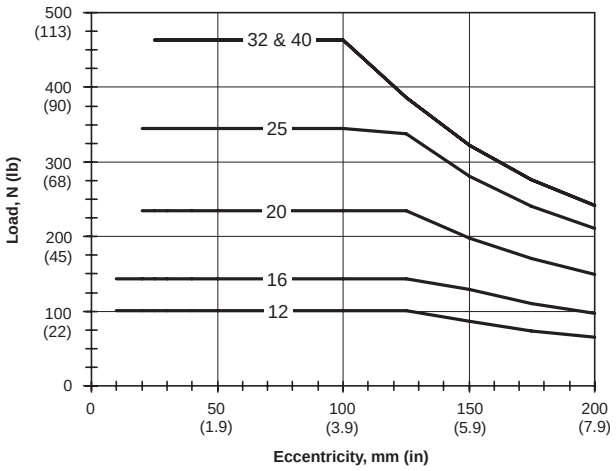


y = distance from the center of gravity of the moveable load to the center of the actuator.

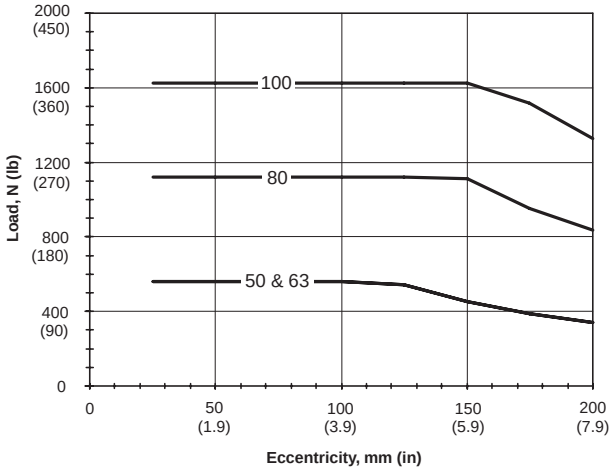
F

Standard Unit

12 - 40mm Bore Sizes

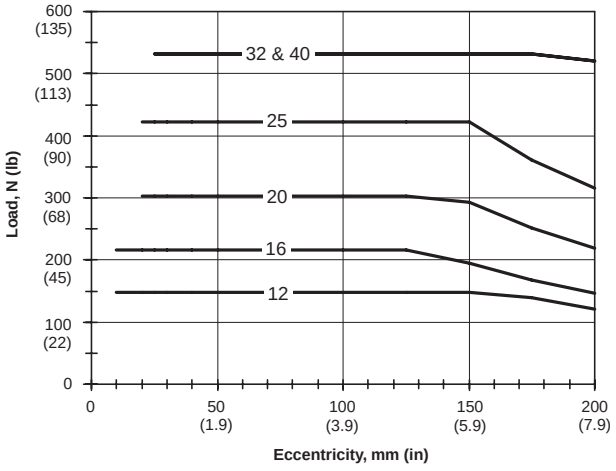


50 - 100mm Bore Sizes

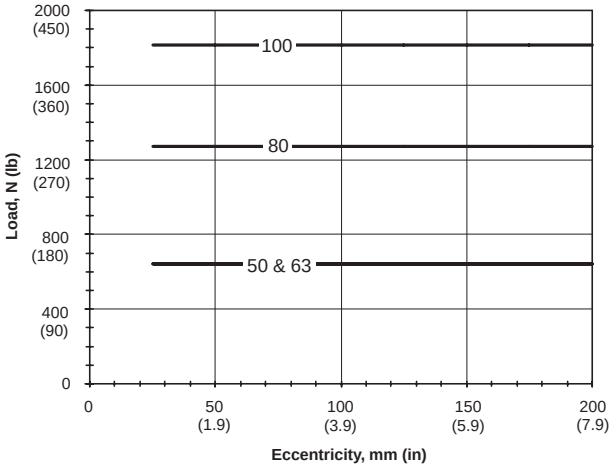


High Load Bearings

12 - 40mm Bore Sizes



50 - 100mm Bore Sizes



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Load Stopping Capacity

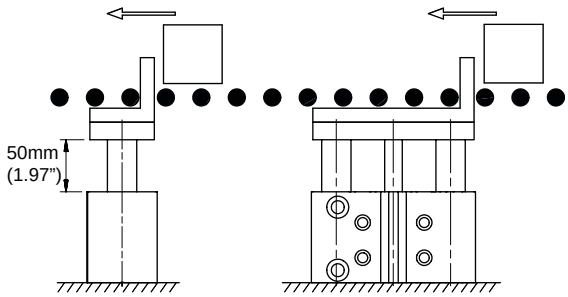
P5T2 Series actuators are ideal for conveyor stopping applications. Units can be mounted horizontally or vertically.

These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

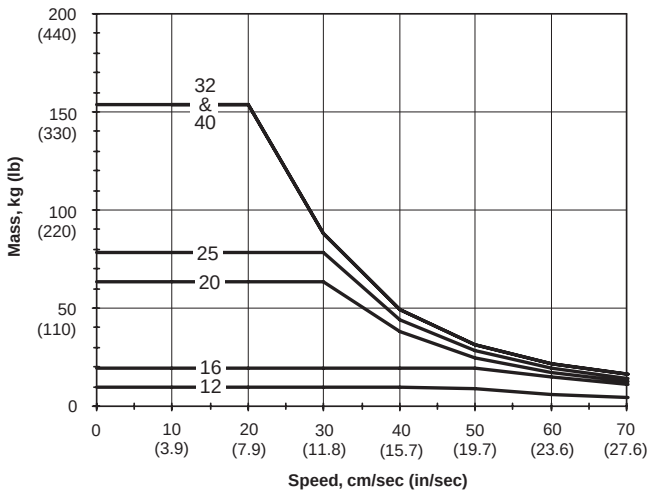
Composite bushings are strongly recommended for this type of application.

EXAMPLE: A P5T2-032 unit with a stroke up to 50mm will stop an object moving at 40 cm/second (15.7 in/s) that weighs up to 50 kg (110 lb).

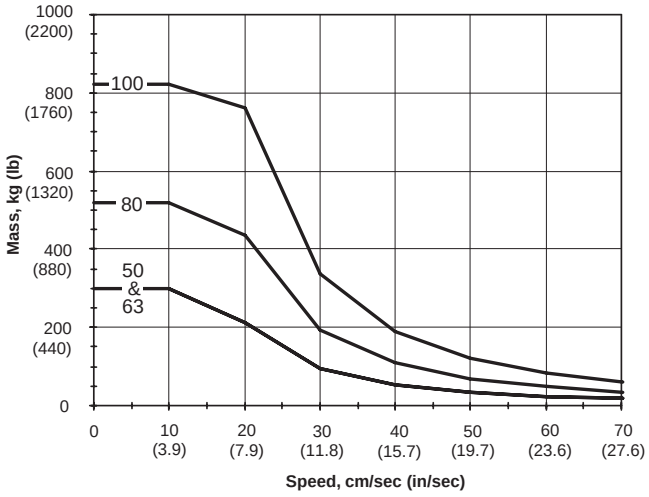
Note: The following graphs are based on 50mm of stroke.



12 - 40mm Bore Sizes



50 - 100mm Bore Sizes



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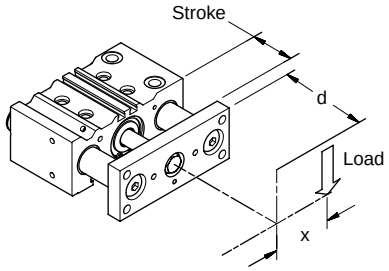
Asymmetrical Torque Capacity with Standard Bearings (J1, J3, H3)

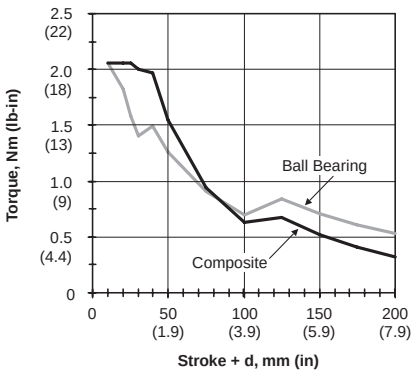
Asymmetrical loading occurs when the load is applied to one side of the unit. P5T2 Series units can resist torsional loads that are asymmetrical up to the charted lines.

EXAMPLE: A mechanism exerts an asymmetrical load of 15 Nm on a unit with 50mm "stroke+d". The P5T2-050 with composite bushings will have adequate torsional capacity.

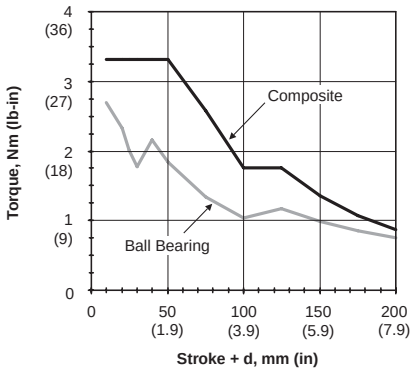


Torque is calculated by multiplying the distance 'x' by the load. The torque will be either Nm or lb-in.

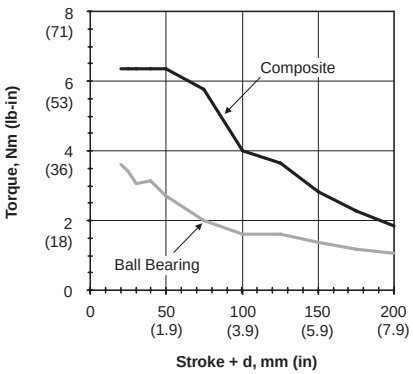
12mm Bore Size



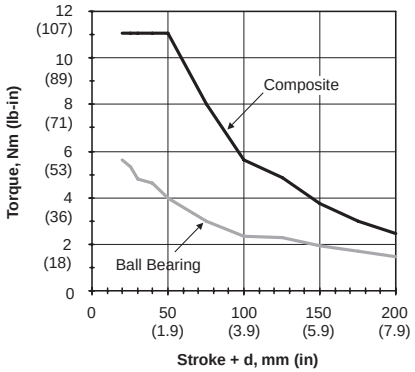
16mm Bore Size



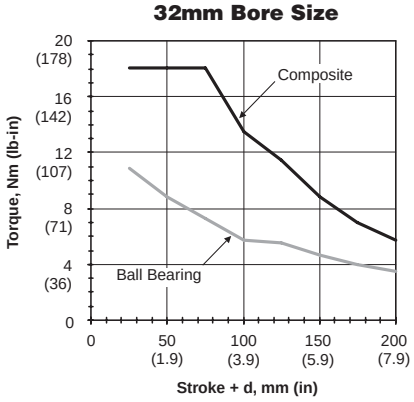
20mm Bore Size



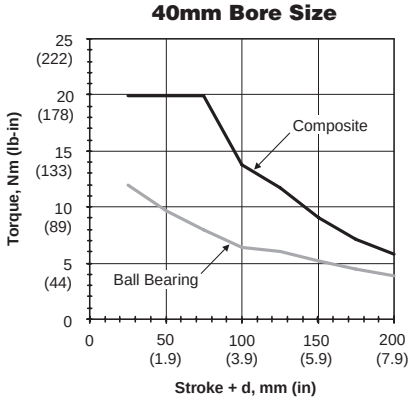
25mm Bore Size



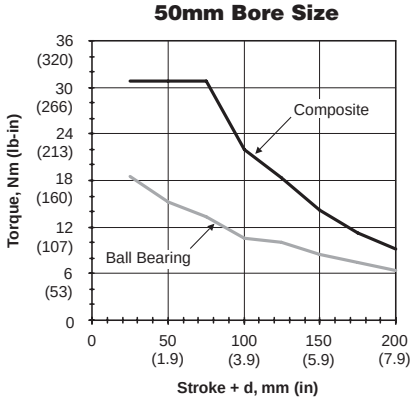
32mm Bore Size



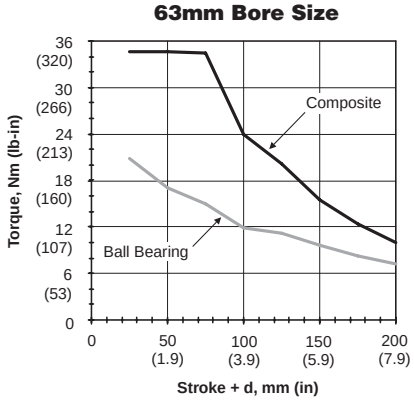
40mm Bore Size



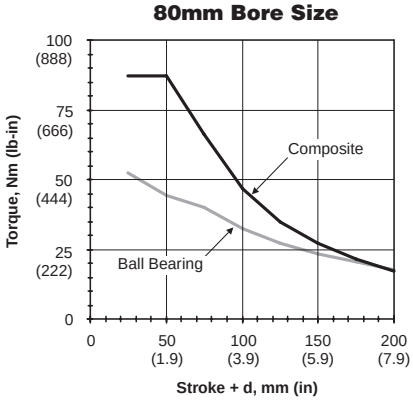
50mm Bore Size



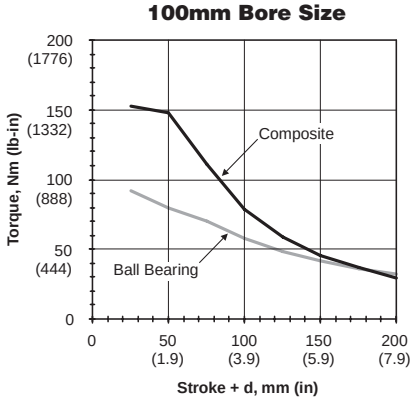
63mm Bore Size



80mm Bore Size



100mm Bore Size



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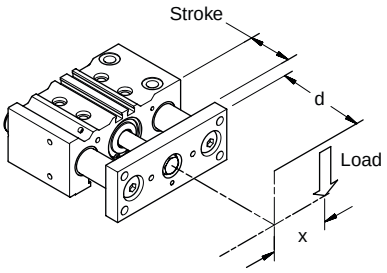
Asymmetrical Torque Capacity with High Load Bearings (K1, K3, L3)

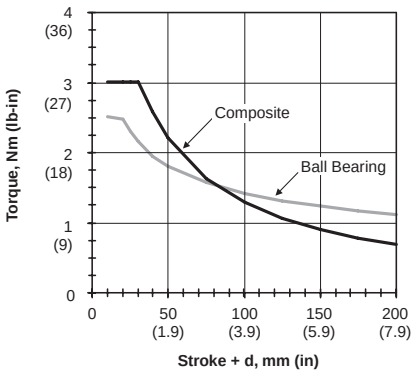
Asymmetrical loading occurs when the load is applied to one side of the unit. P5T2 Series units can resist torsional loads that are asymmetrical.

EXAMPLE: A mechanism exerts an asymmetrical load of 15 Nm on a unit with 50mm “stroke+d”. The P5T2-050 with composite bushings or ball bearings will have adequate torsional capacity.

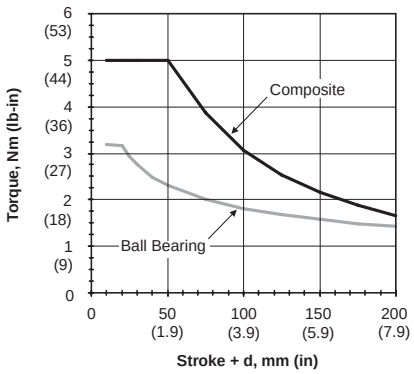


Torque is calculated by multiplying the distance 'x' by the load. The torque will be either Nm or lb-in.

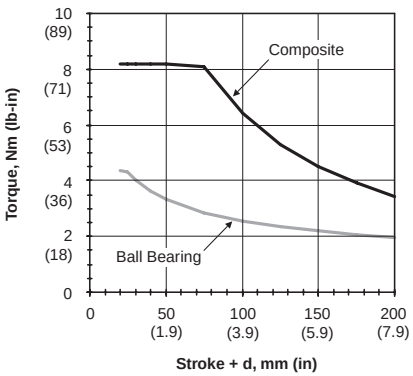
12mm Bore Size



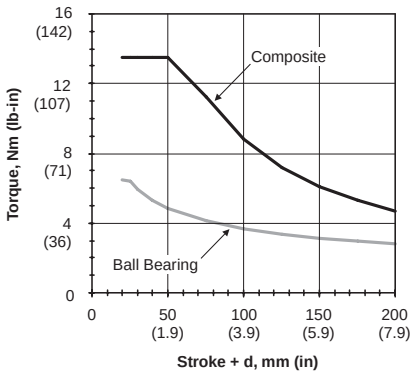
16mm Bore Size



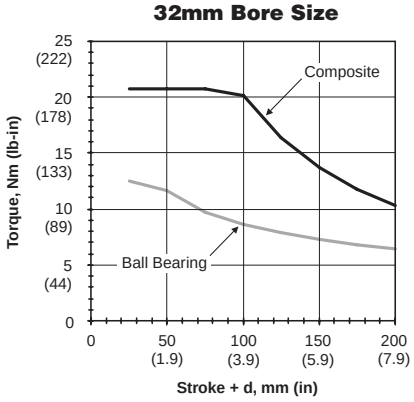
20mm Bore Size



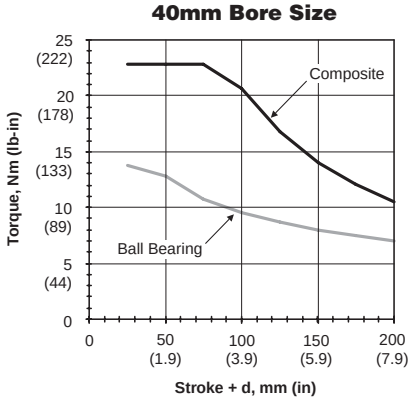
25mm Bore Size



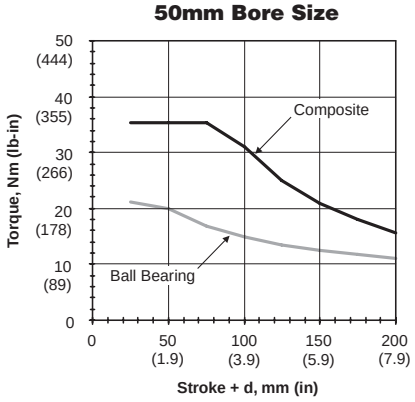
32mm Bore Size



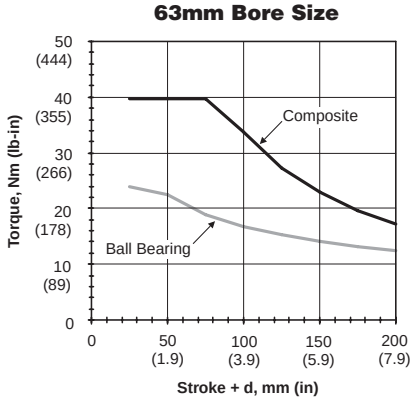
40mm Bore Size



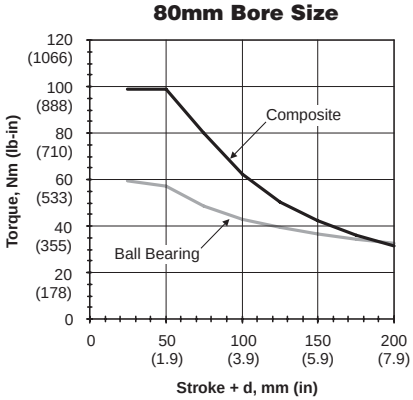
50mm Bore Size



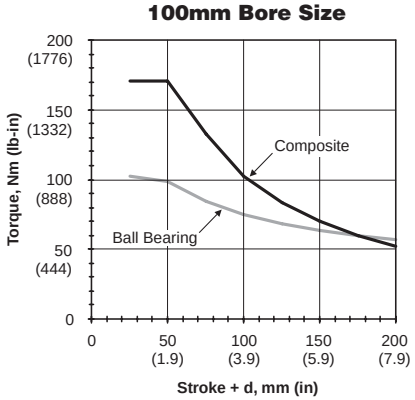
63mm Bore Size



80mm Bore Size



100mm Bore Size



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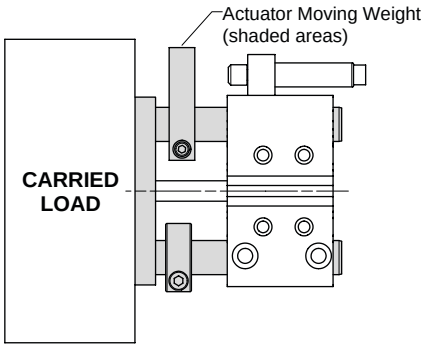
Kinetic Energy

Moving weight is defined as the weight of the carried load and the weight of any moving parts of the actuator (support rods, tool plate, etc.). The moving weight from the charts below should be considered when using the graphs on the following page.

Actuator Moving Weight =
Base Weight + [(Stroke/5) × Stroke Multiplier]

Total Moving Weight =
Actuator Moving Weight + Carried Load



Model Bore	Support Rod Diameter	Actuator Moving Weight							
		Single Tool Plate				Dual Tool Plate			
		Base @ Zero Stroke		Stroke Multiplier (per 5mm)		Base @ Zero Stroke		Stroke Multiplier (per 5mm)	
		kg	lbs	kg	lbs	kg	lbs	kg	lbs
20	10	0.16	0.35	0.009	0.020	0.211	0.47	0.015	0.03
	12	0.19	0.43	0.012	0.026	0.251	0.55	0.021	0.05
25	12	0.22	0.48	0.012	0.026	0.293	0.65	0.021	0.05
	16	0.31	0.69	0.019	0.042	0.394	0.87	0.035	0.08
32	16	0.45	0.98	0.024	0.052	0.604	1.33	0.039	0.09
	20	0.58	1.27	0.033	0.072	0.749	1.65	0.057	0.13
40	16	0.50	1.11	0.024	0.052	0.669	1.48	0.039	0.09
	20	0.65	1.43	0.033	0.072	0.827	1.82	0.057	0.13
50	20	0.87	1.92	0.037	0.082	1.210	2.67	0.062	0.14
	25	1.11	2.44	0.051	0.112	1.485	3.27	0.089	0.20
63	20	1.05	2.31	0.037	0.082	1.465	3.23	0.062	0.14
	25	1.30	2.86	0.051	0.112	1.753	3.87	0.089	0.20
80	25	2.02	4.46	0.058	0.127	2.947	6.50	0.096	0.21
	30	2.37	5.22	0.075	0.165	3.348	7.38	0.130	0.29
100	30	3.26	7.18	0.068	0.150	4.816	10.62	0.123	0.27
	35	3.73	8.23	0.088	0.194	5.390	11.88	0.163	0.36

See example below.

EXAMPLE:

P5T2-032, 20mm support rods, dual tool plate, 100mm stroke

Base Weight = 1.65 lbs
Extra Weight for Stroke Length: (100 ÷ 5) × 0.13 lbs = 2.60 lbs
Actuator Moving Weight = 1.65 lbs + 2.60 lbs = 4.25 lbs

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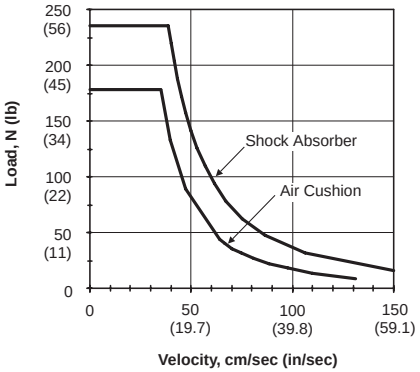
Kinetic Energy

These graphs illustrate the kinetic energy absorption of the P5T2 Series as a total moving weight versus speed chart for both air cushions and shock absorbers.

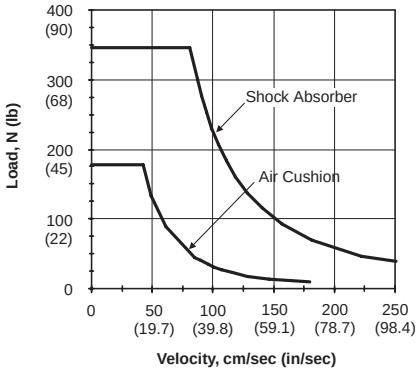
Note: These charts are to be used only to determine the energy absorption of each guided cylinder and to determine if shocks or cushions are needed.

1 kg = 9.80 Newtons (N)
1 Newton = 0.225 lbs

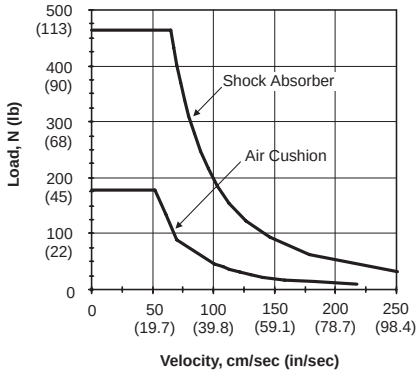
20mm Bore Size



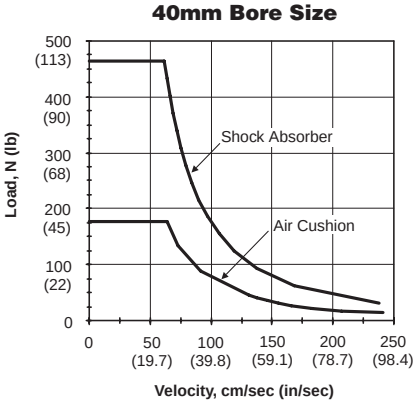
25mm Bore Size



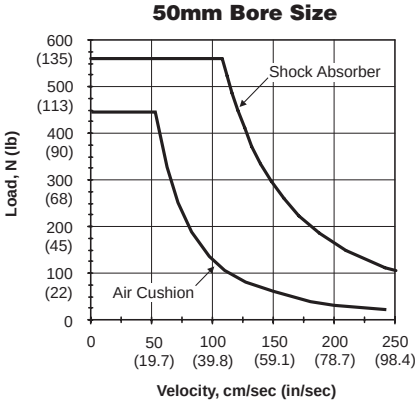
32mm Bore Size



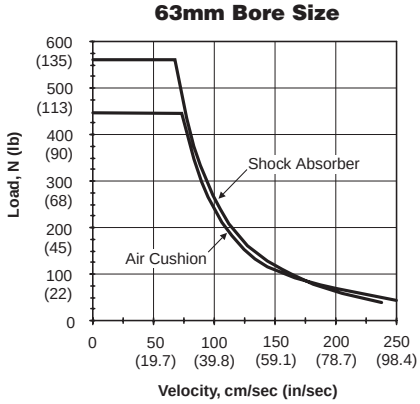
40mm Bore Size



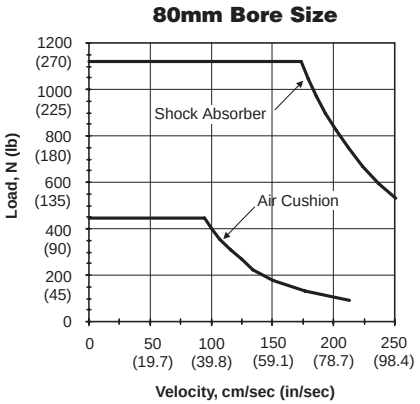
50mm Bore Size



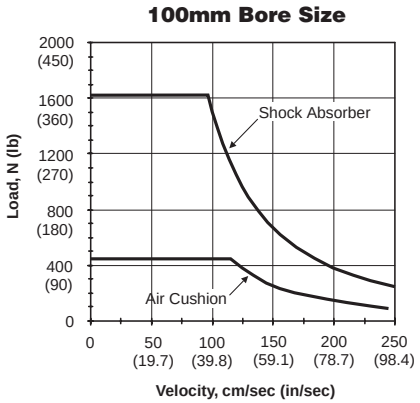
63mm Bore Size



80mm Bore Size



100mm Bore Size



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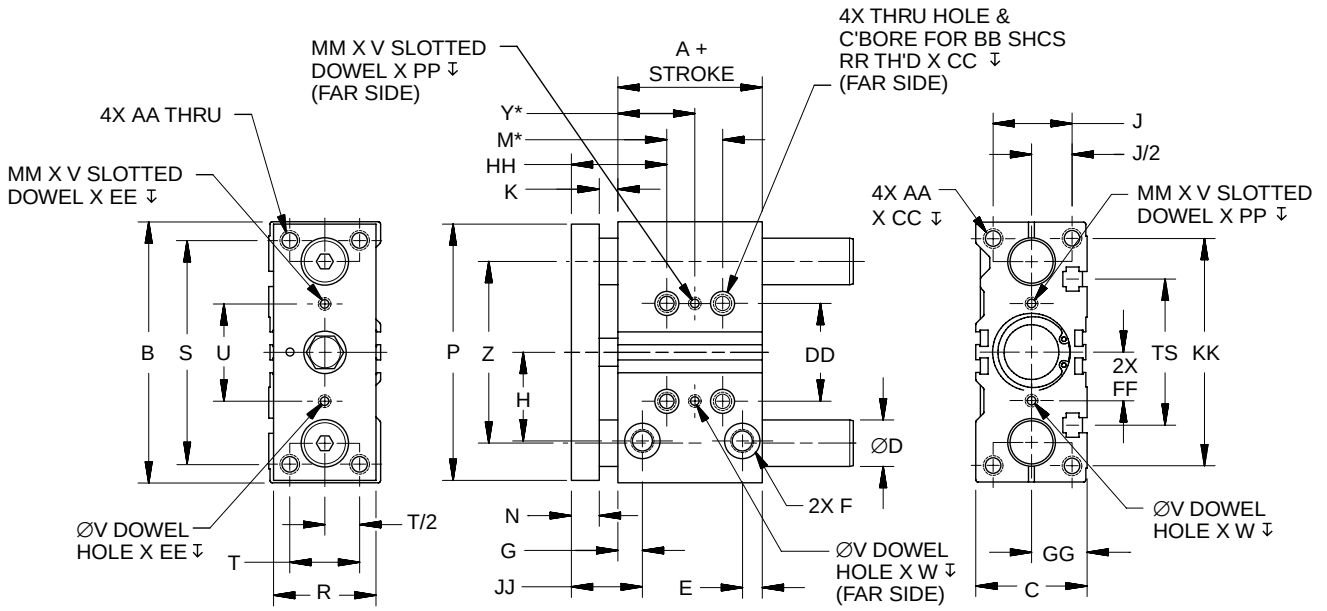
Basic Unit



F

3D CAD FILES
available for download at
parker.com/pneumatics

**** See page F42 for these stroke dependent dimensions.***

Bore	A	B	C	D_1	D_2	E	F	G	H	J	K	N	P	R	S	T	U
12	29 (1.14)	58 (2.28)	26 (1.02)	6 (0.24)	8 (0.31)	6.75 (0.27)	M5x0.8*	10.5 (0.41)	7.5 (0.30)	18 (0.71)	6 (0.24)	7 (0.28)	56 (2.20)	22 (0.87)	48 (1.89)	14 (0.55)	23 (0.91)
16	33 (1.30)	64 (2.52)	30 (1.18)	8 (0.31)	10 (0.39)	6.2 (0.24)	M5x0.8*	12 (0.47)	16.5 (0.65)	22 (0.87)	5 (0.20)	8 (0.31)	62 (2.44)	25 (0.98)	54 (2.13)	16 (0.63)	24 (0.94)
20	37 (1.46)	83 (3.27)	36 (1.42)	10 (0.39)	12 (0.47)	10 (0.39)	1/8 BSPP 1/8 NPTF	11 (0.43)	25 (0.98)	24 (0.94)	8 (0.31)	8 (0.31)	81 (3.19)	30 (1.18)	70 (2.76)	18 (0.71)	28 (1.10)
25	37.5 (1.48)	93 (3.66)	42 (1.65)	12 (0.47)	16 (0.63)	10.5 (0.41)	1/8 BSPP 1/8 NPTF	10.5 (0.41)	30 (1.18)	30 (1.18)	8 (0.31)	8 (0.31)	91 (3.58)	38 (1.50)	78 (3.07)	26 (1.02)	34 (1.34)
32	37.5 (1.48)	112 (4.41)	48 (1.89)	16 (0.63)	20 (0.79)	10.75 (0.42)	1/8 BSPP 1/8 NPTF	11.75 (0.46)	37.5 (1.48)	34 (1.34)	10 (0.39)	12 (0.47)	110 (4.33)	44 (1.73)	96 (3.78)	30 (1.18)	42 (1.65)
40	44 (1.73)	120 (4.72)	54 (2.13)	16 (0.63)	20 (0.79)	11.5 (0.45)	1/8 BSPP 1/8 NPTF	16 (0.63)	42 (1.65)	40 (1.57)	10 (0.39)	12 (0.47)	118 (4.65)	44 (1.73)	104 (4.09)	30 (1.18)	50 (1.97)
50	44 (1.73)	148 (5.83)	64 (2.52)	20 (0.79)	25 (0.98)	12.5 (0.49)	1/4 BSPP 1/4 NPTF	16 (0.63)	49 (1.93)	46 (1.81)	15 (0.59)	13 (0.51)	146 (5.75)	60 (2.36)	130 (5.12)	40 (1.57)	66 (2.60)
63	49 (1.93)	162 (6.38)	78 (3.07)	20 (0.79)	25 (0.98)	13 (0.51)	1/4 BSPP 1/4 NPTF	16 (0.63)	57 (2.24)	58 (2.28)	15 (0.59)	13 (0.51)	158 (6.22)	70 (2.76)	130 (5.12)	50 (1.97)	80 (3.15)
80	56.5 (2.22)	202 (7.95)	91.5 (3.60)	25 (0.98)	30 (1.18)	17 (0.67)	3/8 BSPP 3/8 NPTF	18 (0.71)	74 (2.91)	54 (2.13)	18 (0.71)	22 (0.87)	198 (7.80)	75 (2.95)	174 (6.85)	52 (2.05)	100 (3.94)
100	66 (2.60)	240 (9.45)	112 (4.41)	30 (1.18)	35 (1.38)	20 (0.79)	3/8 BSPP 3/8 NPTF	23 (0.91)	94 (3.70)	48 (1.89)	25 (0.98)	25 (0.98)	236 (9.29)	89 (3.50)	210 (8.27)	64 (2.52)	124 (4.88)

D_1 with linear ball bearing; D_2 with composite bushing

*10-32 fittings will fit into M5x0.8 ports.

All dimensions in mm (inch)

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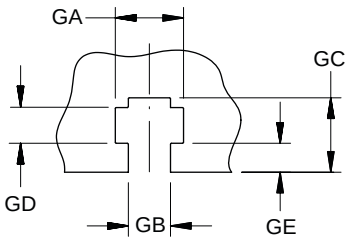
Basic Unit

Bore	V $^{+0.01}_{-0.00}$	W	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	MM**	PP	RR	TS
12	3.06 (0.12)	6 (0.24)	41 (1.61)	M4 x0.7	M4	10 (0.39)	23 (0.91)	4.5 (0.18)	11.5 (0.45)	13 (0.51)	18 (0.71)	23.5 (0.93)	50 (1.97)	3.5 (0.14)	3 (0.12)	M5 x0.8	37 (1.46)
16	3.06 (0.12)	6 (0.24)	46 (1.81)	M5 x0.8	M4	10 (0.39)	24 (0.94)	4.5 (0.18)	12 (0.47)	15 (0.59)	18 (0.71)	25 (0.98)	56 (2.20)	3.5 (0.14)	3 (0.12)	M5 x0.8	38 (1.50)
20	3.06 (0.12)	6 (0.24)	54 (2.13)	M5 x0.8	M5	12 (0.47)	28 (1.10)	4.5 (0.18)	14 (0.55)	18 (0.71)	33 (1.30)	27 (1.06)	72 (2.83)	3.5 (0.14)	3 (0.12)	M6 x1.0	44 (1.73)
25	4.06 (0.16)	6 (0.24)	64 (2.52)	M6 x1.0	M5	12 (0.47)	34 (1.34)	4.5 (0.18)	17 (0.67)	21 (0.83)	33 (1.30)	26.5 (1.04)	82 (3.23)	4.5 (0.18)	3 (0.12)	M6 x1.0	50 (1.97)
32	4.06 (0.16)	6 (0.24)	78 (3.07)	M8 x1.25	M6	16 (0.63)	42 (1.65)	5.5 (0.22)	21 (0.83)	24 (0.94)	43 (1.69)	33.75 (1.33)	98 (3.86)	4.5 (0.18)	3 (0.12)	M8 x1.25	63 (2.48)
40	4.06 (0.16)	6 (0.24)	86 (3.39)	M8 x1.25	M6	16 (0.63)	50 (1.97)	5.5 (0.22)	25 (0.98)	27 (1.06)	44 (1.73)	38 (1.50)	106 (4.17)	4.5 (0.18)	3 (0.12)	M8 x1.25	72 (2.83)
50	5.04 (0.20)	8 (0.31)	110 (4.33)	M10 x1.5	M8	20 (0.79)	66 (2.60)	5.5 (0.22)	33 (1.30)	32 (1.26)	52 (2.05)	44 (1.73)	130 (5.12)	6 (0.24)	4 (0.16)	M1 x1.5	92 (3.62)
63	5.04 (0.20)	8 (0.31)	124 (4.88)	M10 x1.5	M8	20 (0.79)	80 (3.15)	5.5 (0.22)	40 (1.57)	39 (1.54)	52 (2.05)	44 (1.73)	142 (5.59)	6 (0.24)	4 (0.16)	M10 x1.5	110 (4.33)
80	6.04 (0.24)	10 (0.39)	156 (6.14)	M12 x1.75	M10	24 (0.94)	100 (3.94)	7.0 (0.28)	50 (1.97)	46 (1.81)	68 (2.68)	58 (2.28)	180 (7.09)	7 (0.28)	5 (0.20)	M12 x1.75	140 (5.51)
100	6.04 (0.24)	10 (0.39)	188 (7.40)	M14 x2.0	M12	28 (1.10)	124 (4.88)	7.0 (0.28)	62 (2.44)	56 (2.20)	61 (2.40)	73 (2.87)	221 (8.70)	7 (0.28)	5 (0.20)	M14 x2.0	166 (6.54)

** Slot length

T-Slot Detail



Bore	GA	GB	GC	GD	GE
12	7.4 (0.29)	4.5 (0.18)	6.2 (0.24)	3.7 (0.15)	2.0 (0.08)
16	7.4 (0.29)	4.5 (0.18)	7.7 (0.30)	3.7 (0.15)	3.0 (0.12)
20	8.5 (0.33)	5.5 (0.22)	9.4 (0.37)	4.5 (0.18)	3.7 (0.15)
25	8.5 (0.33)	5.5 (0.22)	9.5 (0.37)	4.5 (0.18)	3.0 (0.12)
32	10.5 (0.41)	6.5 (0.26)	10.5 (0.41)	5.5 (0.22)	3.5 (0.14)
40	10.5 (0.41)	6.5 (0.26)	12.5 (0.49)	5.5 (0.22)	4.0 (0.16)
50	13.5 (0.53)	8.5 (0.33)	15.0 (0.59)	7.5 (0.30)	3.5 (0.14)
63	16.8 (0.66)	10.8 (0.43)	21.0 (0.83)	10.0 (0.39)	7.0 (0.28)
80	18.7 (0.74)	12.8 (0.50)	24.8 (0.98)	12.0 (0.47)	10.3 (0.41)
100	23.0 (0.91)	15.0 (0.59)	31.0 (1.22)	14.0 (0.55)	10.0 (0.39)

All dimensions in mm (inch)

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Basic Unit

Stroke Dependent Dimensions

Size	Dim	Standard Stroke Length (mm)											
		10	**20**	**25**	**30**	**40**	**50**	**75**	**100**	**125**	**150**	**175**	**200**
12	M	20 (0.79)	20 (0.79)	N/A	20 (0.79)	40 (1.57)	40 (1.57)	40 (1.57)	40 (1.57)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)
	Y	15 (0.59)	15 (0.59)	N/A	15 (0.59)	25 (0.98)	25 (0.98)	25 (0.98)	25 (0.98)	60 (2.36)	60 (2.36)	60 (2.36)	60 (2.36)
16	M	24 (0.94)	24 (0.94)	N/A	24 (0.94)	44 (1.73)	44 (1.73)	44 (1.73)	44 (1.73)	110 (4.33)	110 (4.33)	110 (4.33)	110 (4.33)
	Y	17 (0.67)	17 (0.67)	N/A	17 (0.67)	27 (1.06)	27 (1.06)	27 (1.06)	27 (1.06)	60 (2.36)	60 (2.36)	60 (2.36)	60 (2.36)
20, 25	M	N/A	24 (0.94)	N/A	24 (0.94)	44 (1.73)	44 (1.73)	44 (1.73)	44 (1.73)	120 (4.72)	120 (4.72)	120 (4.72)	120 (4.72)
	Y	N/A	29 (1.14)	N/A	29 (1.14)	39 (1.54)	39 (1.54)	39 (1.54)	39 (1.54)	77 (3.03)	77 (3.03)	77 (3.03)	77 (3.03)
32	M	N/A	N/A	24 (0.94)	N/A	N/A	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)
	Y	N/A	N/A	33 (1.30)	N/A	N/A	45 (1.77)	45 (1.77)	45 (1.77)	83 (3.27)	83 (3.27)	83 (3.27)	83 (3.27)
40	M	N/A	N/A	24 (0.94)	N/A	N/A	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)
	Y	N/A	N/A	34 (1.34)	N/A	N/A	46 (1.81)	46 (1.81)	46 (1.81)	84 (3.31)	84 (3.31)	84 (3.31)	84 (3.31)
50	M	N/A	N/A	24 (0.94)	N/A	N/A	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)
	Y	N/A	N/A	36 (1.42)	N/A	N/A	48 (1.89)	48 (1.89)	48 (1.89)	86 (3.39)	86 (3.39)	86 (3.39)	86 (3.39)
63	M	N/A	N/A	24 (0.94)	N/A	N/A	52 (2.05)	52 (2.05)	52 (2.05)	128 (5.04)	128 (5.04)	128 (5.04)	128 (5.04)
	Y	N/A	N/A	38 (1.50)	N/A	N/A	50 (1.97)	50 (1.97)	50 (1.97)	88 (3.46)	88 (3.46)	88 (3.46)	88 (3.46)
80	M	N/A	N/A	28 (1.10)	N/A	N/A	52 (2.05)	52 (2.05)	52 (2.05)	128 (5.04)	128 (5.04)	128 (5.04)	128 (5.04)
	Y	N/A	N/A	42 (1.65)	N/A	N/A	54 (2.13)	54 (2.13)	54 (2.13)	92 (3.62)	92 (3.62)	92 (3.62)	92 (3.62)
100	M	N/A	N/A	48 (1.89)	N/A	N/A	72 (2.83)	72 (2.83)	72 (2.83)	148 (5.83)	148 (5.83)	148 (5.83)	148 (5.83)
	Y	N/A	N/A	35 (1.38)	N/A	N/A	47 (1.85)	47 (1.85)	47 (1.85)	85 (3.35)	85 (3.35)	85 (3.35)	85 (3.35)

F

All dimensions in mm (inch)

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Pneumatic Division
Wadsworth, Ohio
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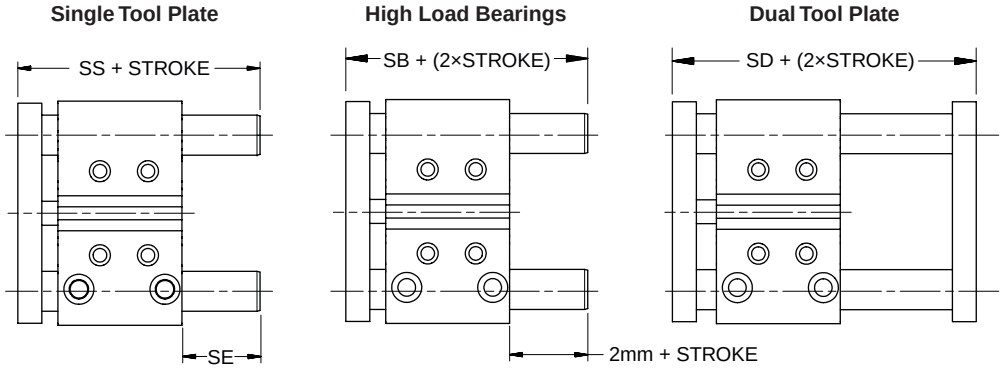
Overall Length without Extend and Retract Options

A single tool plate unit with no options has the same support rod lengths with or without cushions.



SIZE	Stroke						SB @ zero stroke		SD @ zero stroke		YY_2	PA	PB
	10, 20, 30,		40, 50, 75, 100		125, 150, 175, 200		Non-cushion	Cushion	Non-cushion	Cushion			
	SS at stroke	SE at retract	SS at stroke	SE at retract	SS at stroke	SE at retract							
12	41 (1.61)	0 0.00	55 (2.17)	13 (0.51)	85 (3.35)	43 (1.69)	44 (1.73)	N/A	50 (1.97)	N/A	15 (0.59)	10 (0.39)	25 (0.98)
16	39 (1.54)	0 0.00	65 (2.56)	19 (0.75)	95 (3.74)	49 (1.93)	48 (1.89)	N/A	55 (2.17)	N/A	15 (0.59)	11 (0.43)	26 (1.02)

SIZE	Stroke						SB @ zero stroke		SD @ zero stroke		YY_2	PA	PB
	20, 25, 30		40, 50, 75, 100		125, 150, 175, 200		Non-cushion	Cushion	Non-cushion	Cushion			
	SS at stroke	SE at retract	SS at stroke	SE at retract	SS at stroke	SE at retract							
20	44 (1.73)	0 0.00	80 (3.15)	27 (1.06)	104 (4.09)	51 (2.01)	55 (2.17)	80 (3.15)	62.0 (2.44)	87.0 (3.43)	17 (0.67)	10 (0.39)	27 (1.06)
25	70 (2.74)	16 (0.63)	86 (3.37)	32 (1.26)	105 (4.11)	51 (2.01)	56 (2.19)	81 (3.17)	62.5 (2.46)	87.5 (3.44)	19 (0.75)	12 (0.47)	31 (1.22)

SIZE	Stroke						SB @ zero stroke		SD @ zero stroke		YY_2	PA	PB
	25, 50		75, 100		125, 150, 175, 200		Non-cushion	Cushion	Non-cushion	Cushion			
	SS at stroke	SE at retract	SS at stroke	SE at retract	SS at stroke	SE at retract							
32	84 (3.31)	25 (0.96)	98 (3.86)	39 (1.52)	118 (4.65)	59 (2.30)	63 (2.46)	88 (3.44)	73 (2.85)	97.5 (3.84)	21 (0.83)	12 (0.47)	33 (1.30)
40	85 (3.35)	19 (0.75)	98 (3.86)	32 (1.26)	118 (4.65)	52 (2.05)	69 (2.72)	94 (3.70)	79 (3.11)	104.0 (4.09)	21 (0.83)	12 (0.47)	33 (1.30)
50	93 (3.66)	21 (0.83)	114 (4.49)	42 (1.65)	134 (5.28)	62 (2.44)	75 (2.95)	100 (3.94)	86 (3.39)	111.0 (4.37)	21 (0.83)	7 (0.28)	28 (1.10)
63	93 (3.66)	16 (0.63)	114 (4.49)	37 (1.46)	134 (5.28)	57 (2.24)	80 (3.15)	105 (4.13)	91 (3.58)	116.0 (4.57)	21 (0.83)	7 (0.28)	28 (1.10)
80	123 (4.84)	27 (1.04)	142 (5.59)	46 (1.79)	142 (5.59)	46 (1.79)	100 (3.92)	125 (4.90)	120 (4.70)	144.5 (5.69)	21 (0.83)	4 (0.16)	25 (0.98)
100	103 (4.06)	0 0.00	162 (6.38)	46 (1.81)	162 (6.38)	46 (1.81)	119 (4.69)	144 (5.67)	142 (5.59)	167.0 (6.57)	21 (0.83)	0 0.00	18 (0.71)

Overall Length with Extend and Retract Options

Option	Single Tool Plate	High Load Bearing	Dual Tool Plate
Retract Option	SS + STROKE + PA	SB + (2× STROKE) + PA	SD + (2× STROKE) + PA
Extend Option	SB + (2× STROKE) + YY_2	SB + (2× STROKE) + YY_2	SD + (2× STROKE) + YY_2
Extend & Retract Option	SB + (2× STROKE) + PB	SB + (2× STROKE) + PB	SD + (2× STROKE) + PB

Example: High load bearing style, 32mm bore, 175mm stroke with an extend option and a retract option.

Overall Length = SB + (2×STROKE) + PB = 63 + (2×175) + 33 = 446mm

All dimensions in mm (inch)

Parker Hannifin Corporation
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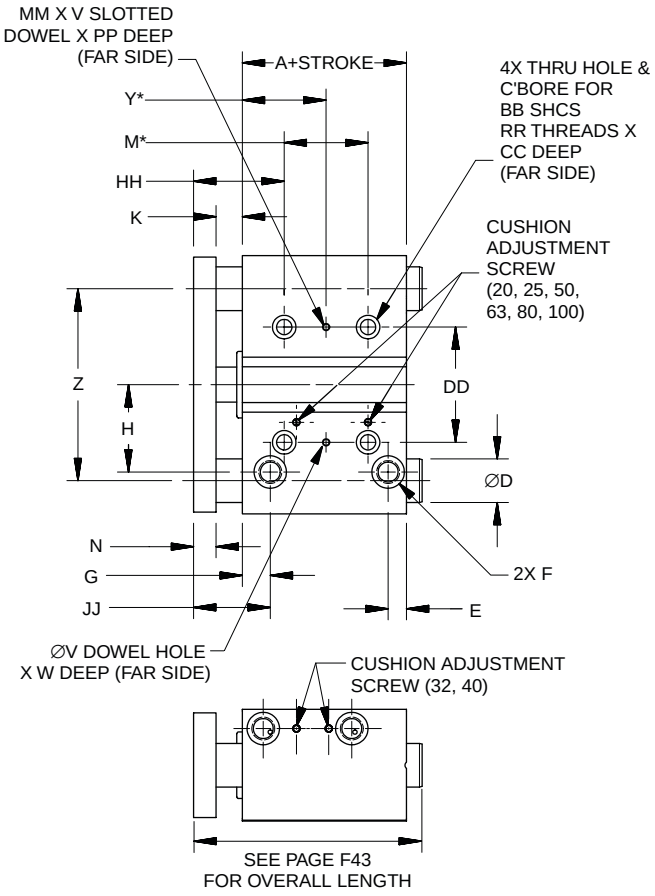
A074

Cushions (E, F)

P5T2 units in bore sizes 20mm - 100mm are available with adjustable air cushions to absorb Kinetic energy at end of stroke. Internal cushions should be used in lieu of bumpers when more energy dissipation is required. Cushions are not available in 12mm and 16mm bore sizes.

Cushions may not operate effectively when combined with shocks, adjustable stop collars and/or bumpers.

See charts on pages F38-F39 for sizing. For additional mounting dimensions not shown, please refer to basic dimensions on pages F40-F41.



Dimensions

Bore	A	D_1	D_2	E	F
20	62 (2.44)	10 (0.39)	12 (0.47)	10 (0.39)	1/8 BSPP 1/8 NPTF
25	62.5 (2.46)	12 (0.47)	16 (0.63)	10.5 (0.41)	1/8 BSPP 1/8 NPTF
32	62.5 (2.46)	16 (0.63)	20 (0.79)	10.75 (0.42)	1/8 BSPP 1/8 NPTF
40	69 (2.72)	16 (0.63)	20 (0.79)	11.5 (0.45)	1/8 BSPP 1/8 NPTF
50	69 (2.72)	20 (0.79)	25 (0.98)	12.5 (0.49)	1/4 BSPP 1/4 NPTF
63	74 (2.91)	20 (0.79)	25 (0.98)	13 (0.51)	1/4 BSPP 1/4 NPTF
80	81.5 (3.21)	25 (0.98)	30 (1.18)	17 (0.67)	3/8 BSPP 3/8 NPTF
100	91 (3.58)	30 (1.18)	35 (1.38)	19.5 (0.77)	3/8 BSPP 3/8 NPTF

D_1 with Linear Ball Bearing
D_2 with Composite Bushing

**** See next page for stroke dependent dimensions.***

Bore	G	H	K	N	V $^{+0.01}_{-0.00}$	W	Z	BB	CC	DD	HH	JJ	MM*	PP	RR
20	11 (0.43)	25 (0.98)	8 (0.31)	8 (0.31)	3.06 (0.12)	6 (0.24)	54 (2.13)	M5	12 (0.47)	28 (1.10)	33 (1.30)	27 (1.06)	3.5 (0.14)	3 (0.12)	M6x1.0
25	10.5 (0.41)	30 (1.18)	8 (0.31)	8 (0.31)	4.06 (0.16)	6 (0.24	64 (2.52)	M5	12 (0.47)	34 (1.34)	33 (1.30)	26.5 (1.04)	4.5 (0.18)	3 (0.12)	M6x1.0
32	11.75 (0.46)	37.5 (1.48)	10 (0.39)	12 (0.47)	4.06 (0.16)	6 (0.24)	78 (3.07)	M6	16 (0.63)	42 (1.65)	43 (1.69)	33.75 (1.33)	4.5 (0.18)	3 (0.12)	M8x1.25
40	16 (0.63)	42 (1.65)	10 (0.39)	12 (0.47)	4.06 (0.16)	6 (0.24)	86 (3.39)	M6	16 (0.63)	50 (1.97)	44 (1.73)	38 (1.50)	4.5 (0.18)	3 (0.12)	M8x1.25
50	16 (0.63)	49 (1.93)	15 (0.59)	13 (0.51)	5.04 (0.20)	8 (0.31)	110 (4.33)	M8	32 (1.26)	66 (2.60)	52 (2.05)	44 (1.73)	6 (0.24)	4 (0.16)	M10x1.5
63	16 (0.63)	57 (2.24)	15 (0.59)	13 (0.51)	5.04 (0.20)	8 (0.31)	124 (4.88)	M8	20 (0.79)	80 (3.15)	52 (2.05)	44 (1.73)	6 (0.24)	4 (0.16)	M10x1.5
80	18 (0.71)	74 (2.91)	18 (0.71)	22 (0.87)	6.04 (0.24)	10 (0.39)	156 (6.14)	M10	24 (0.94)	100 (3.94)	68 (2.68)	58 (2.28)	7 (0.28)	5 (0.20)	M12x1.75
100	23 (0.91)	93.5 (3.68)	25 (0.98)	25 (0.98)	6.04 (0.24)	10 (0.39)	188 (7.40)	M12	28 (1.10)	124 (4.88)	61 (2.40)	73 (2.87)	7 (0.28)	5 (0.20)	M14x2.0

*Slot length

All dimensions in mm (inch)

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Cushions

Dimensions

Size	Dim	Stroke Length (mm)							
		25	**50**	**75**	**100**	**125**	**150**	**175**	**200**
20, 25	M	44 (1.73)	44 (1.73)	44 (1.73)	120 (4.72)	120 (4.72)	120 (4.72)	120 (4.72)	200 (7.87)
	Y	39 (1.54)	39 (1.54)	39 (1.54)	77 (3.03)	77 (3.03)	77 (3.03)	77 (3.03)	117 (4.61)
32	M	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)	200 (7.87)
	Y	45 (1.77)	45 (1.77)	45 (1.77)	83 (3.27)	83 (3.27)	83 (3.27)	83 (3.27)	121 (4.76)
40	M	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)	200 (7.87)
	Y	46 (1.81)	46 (1.81)	46 (1.81)	84 (3.31)	84 (3.31)	84 (3.31)	84 (3.31)	122 (4.80)
50	M	48 (1.89)	48 (1.89)	48 (1.89)	124 (4.88)	124 (4.88)	124 (4.88)	124 (4.88)	200 (7.87)
	Y	48 (1.89)	48 (1.89)	48 (1.89)	86 (3.39)	86 (3.39)	86 (3.39)	86 (3.39)	124 (4.88)
63	M	52 (2.05)	52 (2.05)	52 (2.05)	128 (5.04)	128 (5.04)	128 (5.04)	128 (5.04)	200 (7.87)
	Y	50 (1.97)	50 (1.97)	50 (1.97)	88 (3.46)	88 (3.46)	88 (3.46)	88 (3.46)	124 (4.88)
80	M	NA	52 (2.05)	52 (2.05)	128 (5.04)	128 (5.04)	128 (5.04)	128 (5.04)	200 (7.87)
	Y	NA	54 (2.13)	54 (2.13)	92 (3.62)	92 (3.62)	92 (3.62)	92 (3.62)	128 (5.04)
100	M	NA	72 (2.83)	72 (2.83)	148 (5.83)	148 (5.83)	148 (5.83)	148 (5.83)	220 (8.66)
	Y	NA	47 (1.85)	47 (1.85)	85 (3.35)	85 (3.35)	85 (3.35)	85 (3.35)	121 (4.76)

All dimensions in mm (inch)

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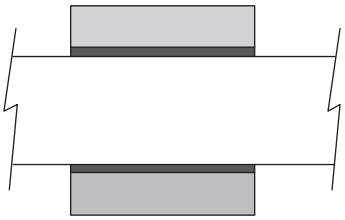
Shaft Bearings

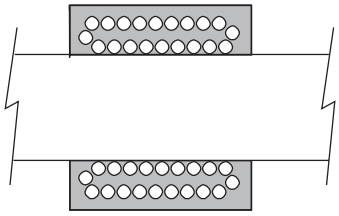
Composite bushings are supplied as standard.
Linear ball bearings are optional.

Selection should be based on the following criteria:

Application Requirement	Ball	Composite
Precision	Excellent	Good
Friction	Low	Higher
Friction coefficient	Constant	Variable
Precision over	Constant	Variable
Static Load Capacity	Good	Excellent
Dynamic Load Capacity	Good	Good with lower efficiency
Vibration Resistance	Fair	Excellent
Contamination Resistance	Poor	Excellent
Washdown Compatibility	Poor	Excellent



Composite Bushing (J, K)



Linear Ball Bearing (H, L)

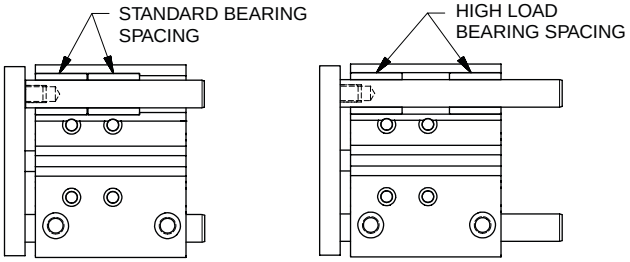
F

High Load Bearings (K1, K3, L3)

The standard bearing configuration locates both sets of bearings at the tool plate end of the actuator providing a compact actuator package.

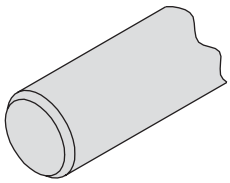
The High Load Bearings option locates the bearings at the extreme ends of the housing, increasing the dynamic and static load capacity. The bearing spacing increases as stroke length increases.

The High Load Bearing spacing is not available on strokes less than 50mm.



Corrosion Resistant Shafting

Chrome-plated steel shafting with composite bearings is utilized for standard slides. Stainless steel corrosion resistant shafting is available for extreme conditions.



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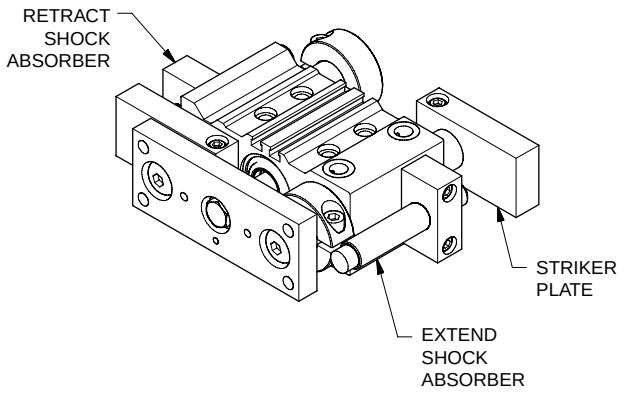
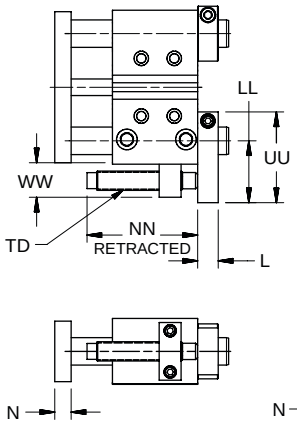
Extend and Retract Options

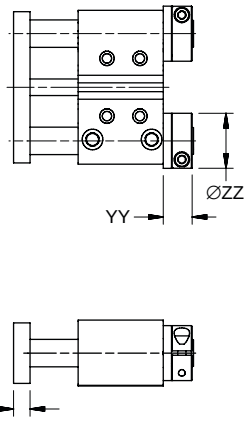
Shock Absorber (A)
Bumpers & Adj. Stop Collars (K)
Bumpers & Shock Absorber (L)



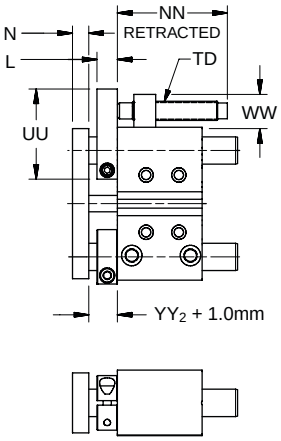
Shock Absorber Extend



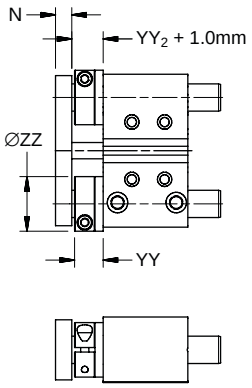
Bumpers & Adj. Stop Collars Extend



Shock Absorber Retract



Bumpers & Adj. Stop Collars Retract



Note: See page F43 for overall length.

Dimensions

Bore	L_1	L_2	N	LL	NN	TD	UU	WW	YY_1	YY_2	ZZ_1	ZZ_2
12	N/A	N/A	7 (0.28)	N/A	N/A	N/A	N/A	N/A	15 (0.59)	15 (0.59)	16 (0.63)	18 (0.71)
16	N/A	N/A	8 (0.31)	N/A	N/A	N/A	N/A	N/A	15 (0.59)	15 (0.59)	18 (0.71)	24 (0.94)
20	9 (0.35)	11 (0.43)	8 (0.31)	33.0 (1.30)	74 (2.91)	M12x1.0	48 (1.89)	19 (0.75)	15 (0.59)	17 (0.67)	24 (0.94)	28 (1.10)
25	11 (0.43)	13 (0.51)	8 (0.31)	39.0 (1.54)	80 (3.15)	M14x1.5	57 (2.24)	24 (0.94)	17 (0.67)	19 (0.75)	28 (1.10)	34 (1.34)
32	13 (0.51)	15 (0.59)	12 (0.47)	45.0 (1.77)	80 (3.15)	M14x1.5	66 (2.60)	24 (0.94)	19 (0.75)	21 (0.83)	34 (1.34)	40 (1.57)
40	15 (0.59)	15 (0.59)	12 (0.47)	45.0 (1.77)	99.5 (3.92)	M20x1.5	66 (2.60)	35 (1.38)	19 (0.75)	21 (0.83)	34 (1.34)	40 (1.57)
50	15 (0.59)	15 (0.59)	13 (0.51)	54.0 (2.13)	117 (4.61)	M25x1.5	79 (3.11)	40 (1.57)	21 (0.83)	21 (0.83)	40 (1.57)	45 (1.77)
63	15 (0.59)	15 (0.59)	13 (0.51)	54.0 (2.13)	117 (4.61)	M25x1.5	79 (3.11)	40 (1.57)	21 (0.83)	21 (0.83)	40 (1.57)	45 (1.77)
80*	15 (0.59)	15 (0.59)	22 (0.87)	71.0 (2.80)	140.5 (5.53)	M33x1.5	98 (3.86)	48 (1.89)	21 (0.83)	21 (0.83)	45 (1.77)	54 (2.13)
100*	15 (0.59)	15 (0.59)	25 (0.98)	76.0 (2.99)	140.5 (5.53)	M36x1.5	108 (4.25)	50 (1.97)	21 (0.83)	21 (0.83)	54 (2.13)	57 (2.24)

1 with Linear Ball Bearing

2 with Composite Bushing

* Shocks not available with 25mm stroke.

All dimensions in mm (inch)

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A074

Rod Lock (R)

P5T2 Series units in 32mm - 100mm bore sizes are available with an integral rod lock mechanism.

The powerful rod lock device is air/spring activated and enables the piston rod to be locked in any position. In the absence of air signal pressure, full holding force is applied to the piston rod. When an air signal pressure of 60 PSI (4 Bar) is applied, the locking device is released. Exhaust air can be piped away when a contaminant-free environment is required.

Applications: Vertical guided cylinders
In the event of pressure loss
In the event of electrical control failure

Design Tip: The piston rod should not be moving when the locking device is activated. The locking device is not intended to repeatedly brake movement. See sample pneumatic circuit.

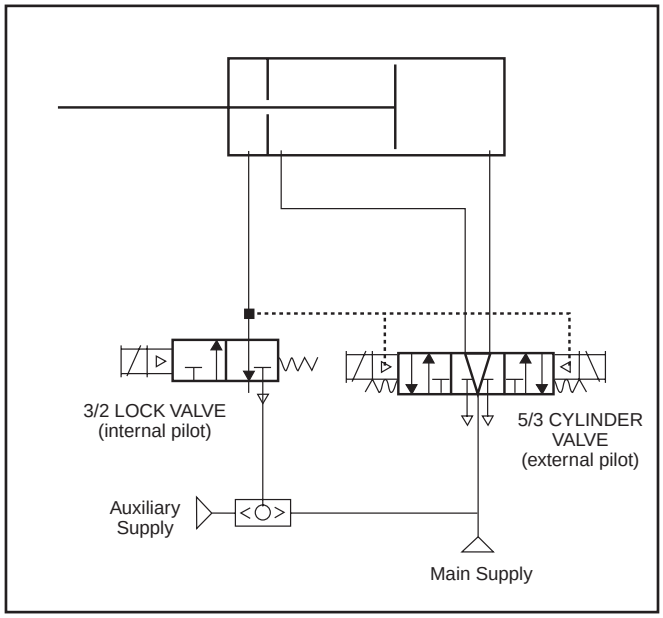
Technical Data

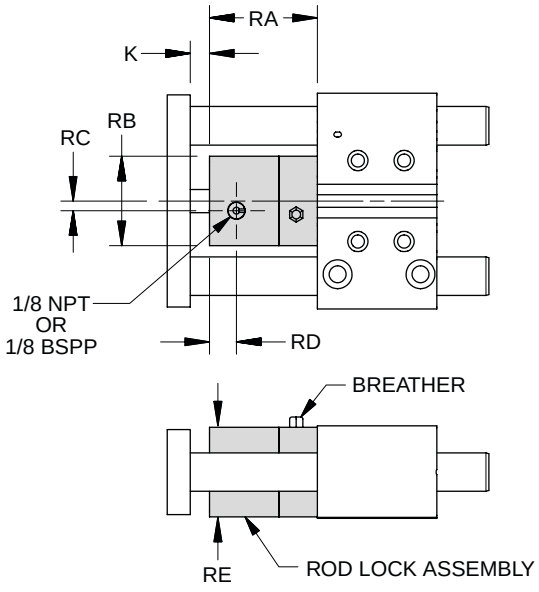
Maximum Pressure: 145 PSI (10 Bar)
Pressure Required to Unlock: 60 PSI (4 Bar)

Bore Size (mm)	Holding Force @7 Bar (102 PSI)	
	lb	N
32	123	550
40	193	860
50	303	1345
63	481	2140
80	755	3450
100	1211	5390

ROD LOCK CIRCUIT

Lock valve must be maintained energized during cylinder motion, otherwise rod lock is engaged and cylinder valve shifts to mid position. For manual override of the rod lock, insert a shuttle valve and an auxiliary air supply to disable rod lock.





Dimensions

Bore	RA	RB	RC	RD	RE	K
32	56 (2.20)	46.5 (1.83)	5 (0.20)	14 (0.55)	46.5 (1.83)	10 (0.39)
40	58 (2.28)	50.8 (2.00)	6 (0.24)	10 (0.39)	50.8 (2.00)	10 (0.39)
50	66 (2.60)	63.5 (2.50)	0 0.00	14 (0.55)	63.5 (2.50)	15 (0.59)
63	83 (3.27)	76.2 (3.00)	7.4 (0.29)	18 (0.71)	76.2 (3.00)	15 (0.59)
80	100 (3.94)	95.25 (3.75)	10 (0.39)	26 (1.02)	92.75 (3.65)	18 (0.71)
100	116 (4.57)	111 (4.37)	10 (0.39)	43 (1.69)	111 (4.37)	25 (0.98)

All dimensions in mm (inch)

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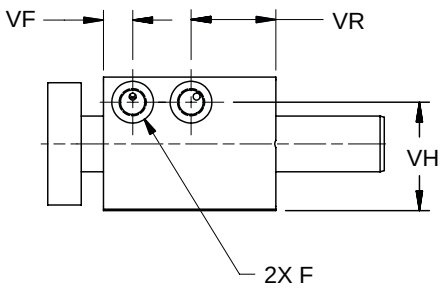
Optional Port Location (2, 3)

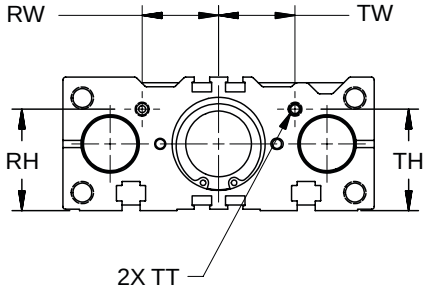
Top porting (1) is standard (see drawing on page F40). Optional side (2) and rear (3) porting is available. When ordering either optional port location, the top ports will also be present with threaded port plugs installed.

Certain configurations cannot be used with side or rear ports. Reference Model Code & Ordering Information on page F29.

Side Ports (2)



Rear Ports (3)



Dimensions

Bore	F	VH	TT	VR	VF	RW	RH	TW	TH
12	M5 x 0.8	21.5 (0.85)	M5 x 0.8	17.5 (0.69)	9.5 (0.37)	10.5 (0.41)	17.5 (0.69)	12 (0.47)	18.5 (0.73)
16	M5 x 0.8	25.5 (1.00)	M5 x 0.8	20 (0.79)	10 (0.39)	12 (0.47)	20 (0.79)	12 (0.47)	20 (0.79)
20	1/8 BSPP 1/8 NPTF	29.5 (1.16)	M5 x 0.8	25.5 (1.00)	11 (0.43)	20.5 (0.81)	28.5 (1.12)	20.5 (0.81)	28.5 (1.12)
25	1/8 BSPP 1/8 NPTF	34.5 (1.36)	M5 x 0.8	25 (0.98)	11.5 (0.45)	26.1 (1.03)	34.75 (1.37)	26.1 (1.03)	34.8 (1.37)
32	1/8 BSPP 1/8 NPTF	40 (1.57)	M5 x 0.8	30.75 (1.21)	11.75 (0.46)	29 (1.14)	37.8 (1.49)	29 (1.14)	37.8 (1.49)
40	1/8 BSPP 1/8 NPTF	46 (1.81)	1/8 BSPP 1/8 NPTF	34 (1.34)	14 (0.55)	33 (1.30)	45 (1.77)	33 (1.30)	45 (1.77)
50	1/4 BSPP 1/4 NPTF	53.75 (2.12)	1/4 BSPP 1/4 NPTF	34 (1.34)	12 (0.47)	38.5 (1.52)	48.5 (1.91)	38.5 (1.52)	48.5 (1.91)
63	1/4 BSPP 1/4 NPTF	63 (2.48)	1/4 BSPP 1/4 NPTF	36 (1.42)	16 (0.63)	45 (1.77)	63 (2.44)	45 (1.77)	62 (2.44)
80	3/8 BSPP 3/8 NPTF	74 (2.91)	3/8 BSPP 3/8 NPTF	42 (1.65)	13.5 (0.53)	61.5 (2.42)	75 (2.95)	61.5 (2.42)	75 (2.95)
100	3/8 BSPP 3/8 NPTF	83 (3.27)	3/8 BSPP 3/8 NPTF	50 (1.97)	18 (0.71)	68 (2.68)	76 (2.99)	68 (2.68)	76 (2.99)

All dimensions in mm (inch)

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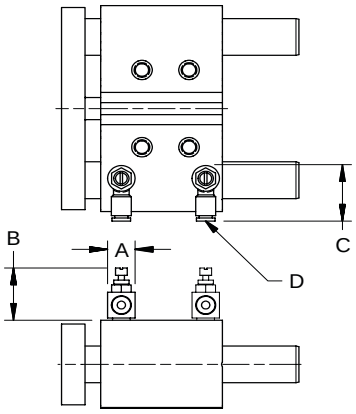
Flow Controls

Right angle flow control valves allow precise adjustment of cylinder speed by metering exhaust air flow. Prestolok push-in tube fittings or threaded fittings provide 360° orientation capability. In some rear porting instances, the flow control may not have 360° of orientation due to support rod interference.



Dimensions

Model	NPT Cylinder Ports								BSPP Cylinder Ports							
	Threaded (P, S)				Prestolok (E, K)				Threaded (R, T)				Prestolok (F, N)			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
12, 16	NA	NA	NA	NA	NA	NA	NA	NA	10.0 (0.39)	28.5 (1.12)	17.5 (0.69)	M5	10.0 (0.39)	18 (0.71)	19.5 (0.77)	4mm tube
20, 25, 32, 40	17.2 (0.68)	28.4 (1.12)	55.4 (2.18)	1/8	17.2 (0.68)	25.2 (0.99)	55.4 (2.18)	1/4"* tube	14.4 (0.57)	25.4 (1.00)	28.5 (1.12)	1/8	14.4 (0.57)	31.6 (1.24)	28.5 (1.12)	6mm tube
50, 63	17.2 (0.68)	32.4 (1.28)	65.2 (2.57)	1/4	17.2 (0.68)	38.3 (1.51)	65.2 (2.57)	3/8" tube	18.4 (0.72)	34.3 (1.35)	27.4 (1.08)	1/4	18.4 (0.72)	41.3 (1.63)	34 (1.34)	10mm tube
80, 100	25.0 (0.98)	39.0 (1.54)	80.2 (3.16)	3/8	30.0 (1.18)	47.4 (1.87)	98.0 (3.86)	3/8" tube	21.6 (0.85)	40.2 (1.58)	34 (1.34)	3/8	21.6 (0.85)	46.7 (1.84)	44 (1.73)	12mm tube

Fluorocarbon Seals (L, M)

Standard abrasion resistant Buna-N nitrile seals should be used for general purpose applications with temperatures of 18° to 74°C (0° to 165°F). Fluorocarbon seals are recommended for high temperature applications up to 121°C (250°F).

Other components in the actuator may be affected by the higher temperatures. Please see chart for temperature ratings of other commonly used components.

Feature	Temperature Range
Bumpers	-18° to 93°C (0° to 200°F)
Shock Absorbers	0° to 66°C (32° to 150°F)
Magnets	-18° to 74°C (0° to 165°F)
Switches	-10° to 85°C (14° to 185°F)

All dimensions in mm (inch)

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Proximity Sensors – 4mm

Proximity sensors are normally ordered with the unit as part of the model number. Use the part numbers below for spare parts only.

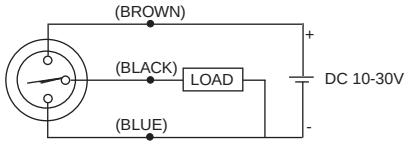
Type	Quick Connect	Flying Leads	Bracket
PNP	B8829-QC-P*	B8829-FL-P	HW-3
NPN	B8829-QC-N**	B8829-FL-N	

* Order cordset B8757-P separately.
** Order cordset B8757-N separately.

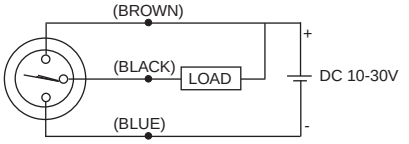
Electrical Specifications

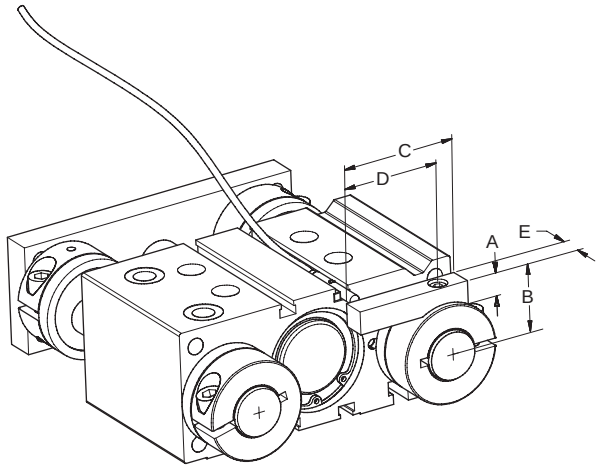
Voltage..... 10-30 VDC (3 wire) PNP or NPN
No Load Current..... 3-10 mA
Continuous Current ..... 100 mA
Switching Speed..... 8 ms
Switch Frequency ..... 1800 Hz
Switching Distance ..... Aluminum = 0.024 in (0.6mm) Brass = 0.041 in (1.05mm) Steel = 0.059 in (1.5mm)
Overload Protection..... Triggered at 170mA
Reverse Polarity Protection ..... Incorporated
Temp. Range..... -13° to 158°F (-25° to 70°C)
Enclosure Rating ..... Meets NEMA 1, 3, 4, 6, 13 and IEC IP67, fully encapsulated

PNP WIRING CONNECTION



NPN WIRING CONNECTION





Dimensions

Size	Support Rod Dia.	A	B	C	D	E
12	6mm	8.0 (0.31)	14.3 (0.56)	31.8 (1.25)	24.1 (0.95)	9.5 (0.38)
	8mm	9.5 (0.38)	16.0 (0.63)	34.9 (1.38)	26.5 (1.05)	9.5 (0.38)
16	8mm	9.5 (0.38)	16.0 (0.63)	34.9 (1.38)	26.5 (1.05)	9.5 (0.38)
	10mm	9.5 (0.38)	19.0 (0.75)	34.9 (1.38)	26.5 (1.04)	9.5 (0.38)
20	10mm	9.5 (0.38)	19.0 (0.75)	34.9 (1.38)	26.5 (1.04)	9.5 (0.38)
	12mm	9.5 (0.38)	21.5 (0.85)	37.8 (1.49)	30.8 (1.21)	9.5 (0.38)
25	12mm	9.5 (0.38)	21.5 (0.85)	37.8 (1.49)	30.8 (1.21)	9.5 (0.38)
	16mm	9.5 (0.38)	24.5 (0.96)	45.4 (1.79)	37.4 (1.47)	9.5 (0.38)
32	16mm	9.5 (0.38)	24.5 (0.96)	45.4 (1.79)	37.4 (1.47)	9.5 (0.38)
	20mm	9.5 (0.38)	26.8 (1.06)	47.5 (1.87)	37.4 (1.47)	9.5 (0.38)
40	16mm	9.5 (0.38)	24.5 (0.96)	45.4 (1.79)	37.4 (1.47)	9.5 (0.38)
	20mm	9.5 (0.38)	26.8 (1.06)	47.5 (1.87)	37.4 (1.47)	9.5 (0.38)
50	20mm	19.0 (0.75)	37.0 (1.46)	59.6 (2.35)	50.8 (2.00)	9.5 (0.38)
	25mm	19.0 (0.75)	37.2 (1.47)	64.0 (2.52)	50.8 (2.00)	12.7 (0.50)
63	20mm	19.0 (0.75)	37.0 (1.46)	59.6 (2.35)	50.8 (2.00)	9.5 (0.38)
	25mm	19.0 (0.75)	37.2 (1.47)	64.0 (2.52)	50.8 (2.00)	12.7 (0.50)
80	25mm	25.4 (1.00)	45.1 (1.78)	69.3 (2.73)	58.4 (2.30)	12.7 (0.50)
	30mm	19.0 (0.75)	44.5 (1.75)	69.1 (2.72)	58.4 (2.30)	12.7 (0.50)
100	30mm	19.0 (0.75)	44.5 (1.75)	69.1 (2.72)	58.4 (2.30)	12.7 (0.50)
	35mm	12.7 (0.50)	38.1 (1.50)	69.8 (2.75)	52.1 (2.05)	12.7 (0.50)

All dimensions in mm (inch)

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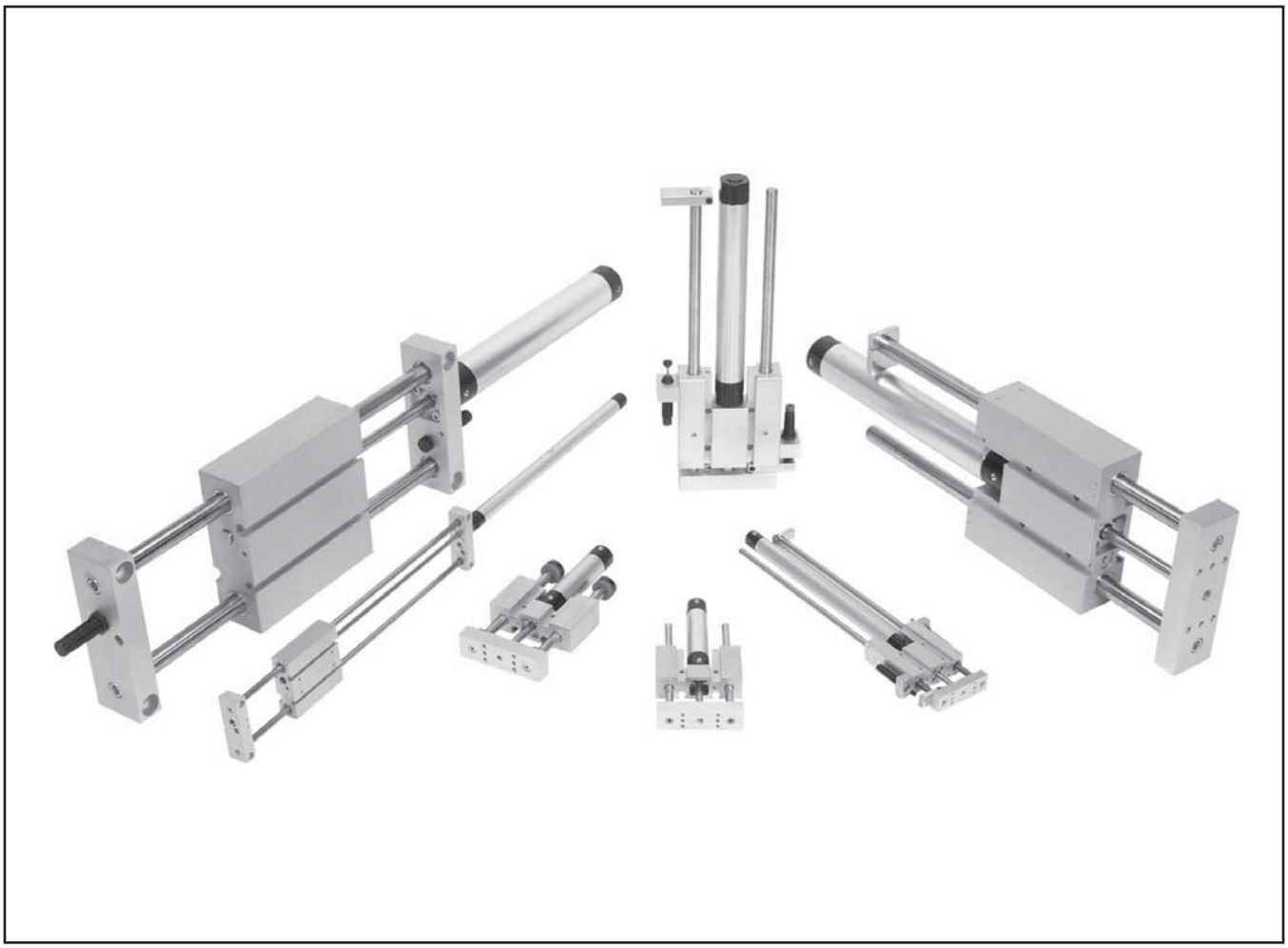
P5L Series

Guided Cylinders



Contents

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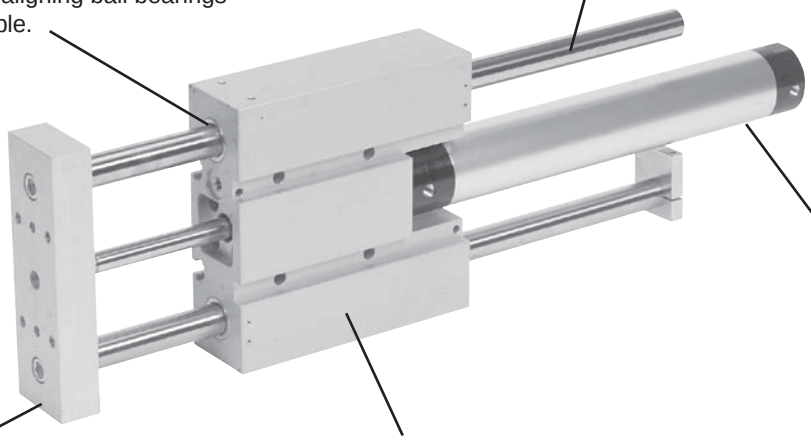
P5L-R Reach Slide Shown

Support Rods
High strength, case hardened support rods available in chrome plated, carbon or stainless steel. The chrome plated and stainless steel shafts are available in oversized versions for high load applications.

Bushings
Composite bushings with standard or oversized shafts are available. For precision applications optional recirculating ball bearings can be specified and for extremely high loads self-aligning ball bearings are available.

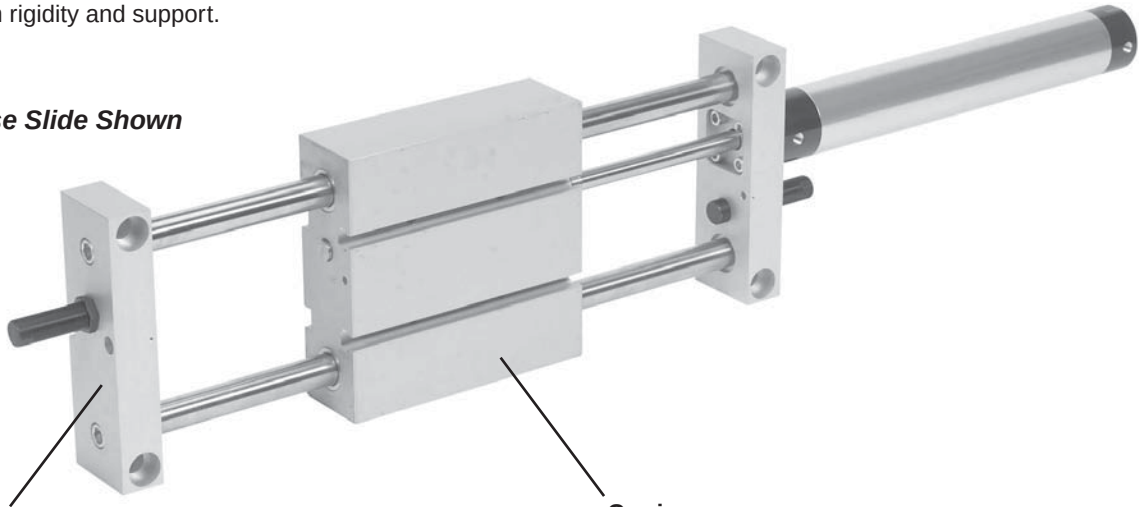


Cylinder
The all new P1L round body repairable cylinder (available in 20 to 100mm bore) is the driving force behind the P5L guided cylinder product line. Parker guided cylinders come standard with a magnetic piston for easy installation of reed or solid state sensors.

Body
Extruded aluminum and anodized body with recessed through holes. Standard dowel pin holes to provide mounting accuracy. Integrated T-slots provide mounting flexibility and quick set up. T-slots are standard on 20mm to 40mm bore models and optional on 50mm to 100mm bore models.

Tooling Plate
A precision machined, anodized aluminum tooling plate with standard tapped and counterbored mounting holes provides mounting from two faces. Dowel pin holes are also included for accurate positioning of custom tooling. The support rods are attached to the tooling plate using two socket head cap screws, providing maximum rigidity and support.

P5L-B Base Slide Shown



End Plates
Precision machined, anodized aluminum end plates have counterbored through holes for mounting. For precision, one keyway and one dowel pin are included. The support rods are attached to the tooling plate using two socket head cap screws providing maximum rigidity and support.

Carriage
Extruded aluminum and anodized carriage with recessed through holes. Standard dowel pin holes to provide mounting accuracy. Integrated t-slots provide mounting flexibility and quick set up. T-slots are standard on 20-40mm bore models and optional on 50-100mm bore models.

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Model Number Code

Example: P5L-RL100J1AANFN-0900-A

P5L	–	R	L	100	J1	A	A	N	F	N	–	0900	–	A

Series

T	Thrust Slide
R	Reach Slide
B	Base Slide

Cylinder Type

L	P1L Cylinder

Bore Size

020	20mm Bore
025	25mm Bore
032	32mm Bore
040	40mm Bore
050	50mm Bore
063	63mm Bore
080	80mm Bore
100	100mm Bore

Bushings

J1	Composite Bushing, Chrome Plated Shafts
J2	Composite Bushing, Oversized Chrome Plated Shafts
J3	Composite Bushing, Stainless Steel Shafts
J4	Composite Bushing, Oversized Stainless Steel Shafts
G1	Composite Bushing, Chrome Plated Shafts, Contaminent Tolerant Seals
G3	Composite Bushing, Stainless Steel Shafts, Contaminent Tolerant Seals
H3	Linear Ball Bearings, Stainless Steel Shafts
H5	Linear Ball Bearings, Carbon Steel Shafts
S3*	Self Aligning Linear Ball Bearings, Stainless Steel Shafts
S5*	Self Aligning Linear Ball Bearings, Carbon Steel Shafts

Extend Options

N	None
A	Shock/Stroke Adjusters
B	Bumpers (Base Slides only)
C	Cushions Both Ends
E	Micro-adjusters and Cushions (both ends only)
H	Cushions and Bumpers (includes Options C & K)
K	Bumpers and Adjustable stop collars
L	Shock absorbers and bumpers (N/A on Base Slides)

Retract Options

N	None
A	Shock/Stroke Adjusters
B	Bumpers Only
C	Cushions Both Ends
E	Micro-adjusters and Cushions (both ends only)
H	Cushions and Bumpers (includes Options C & K)
K	Bumpers and Adjustable stop collars
L	Shock absorbers and bumpers (N/A on Base Slides)

Cylinder Seals

N	Nitrile (Standard)
V	Fluorocarbon (High Temperature)

Cylinder Port Style

G	BSPT Ports
H	NPTF Ports
P	BSPT Ports w/ Presto-lok Flow Controls (mm)
F	NPTF Ports w/ Presto-lok Flow Controls (inch)
B	BSPT Ports w/ Flow Controls
N	NPTF Ports w/ Flow Controls

Proximity Sensor Options

N	No Sensor
P	PNP, Lead Type
R	NPN, Lead Type
S	PNP, Plug in Type
T	NPN, Plug in Type
W	Prox Ready, 8mm (No sensor supplied)
Z	Prox Ready, 12mm (No sensor supplied)

Note: Piston magnet is standard on all cylinders. Inductive proximity sensors are included with Options P, R, S & T.

T-Slots

–	Standard (Extruded T-slots on sizes 20-40, no T-slots on sizes 50-100)
A	Machined T-slots (Sizes 50-100)**

** N/A on sizes 20-40

Stroke

Order in 1mm increments.

Design Series

A	Current Design

** Not available on 20mm bore models*

Order P8S Series reed and solid state sensors separately from Electronic Sensors Section.

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Specifications

- Maximum operating pressure: 10 bar (145 PSI)
- Operating characteristics: double acting
- Support rod sizes from 10mm to 60mm
- Operating temperature range (cylinder):
  Standard seals -17° to 74°C (0 to 165°F)
  Fluorocarbon seals* -17° to 121°C (0 to 250°F)
- Filtration requirement: 40 micron filtered, dry air

*See fluorocarbon seal option for high temperature applications.

Quick Reference Data

Bore	Standard Support Rod Diameter		Oversized Support Rod Diameter		Output Force on Extension @5.5 Bar (80 psi)		Output Force on Retract @5.5 Bar (80 psi)		Maximum Suggested Stroke**	
	mm	(in)	mm	in	N	lbs	N	lbs	mm	in
20	10	0.39	12	0.47	173	39	147	33	400	16
25	12	0.47	16	0.63	271	61	227	51	400	16
32	16	0.63	20	0.79	445	100	383	86	450	18
40	20	0.79	25	0.98	694	156	583	131	550	22
50	25	0.98	30	1.18	1081	243	907	204	750	30
63	30	1.18	40	1.57	1717	386	1548	348	900	35
80	40	1.57	50	1.97	2771	623	2500	562	1000	39
100	50	1.97	60	2.36	4332	974	3888	874	1000	39

**Longer stroke lengths are available, but load capacities are greatly reduced. Consult factory with application parameters.

Weights

Bore	Actuator Weights (Standard Shaft)								Actuator Weights (Oversized Shaft)							
	Zero Stroke Unit Weight						Per Inch Stroke		Zero Stroke Unit Weight						Per Inch Stroke	
	Thrust		Reach		Base				Thrust		Reach		Base			
	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs
20	0.69	1.5	0.96	2.1	1.09	2.4	0.04	0.09	0.77	1.7	1.07	2.3	1.04	2.3	0.05	0.11
25	1.24	2.7	1.77	3.9	2.12	4.7	0.06	0.13	1.45	3.2	2.05	4.5	1.99	4.4	0.08	0.17
32	1.99	4.4	2.84	6.3	3.26	7.2	0.09	0.20	2.32	5.1	3.25	7.2	3.15	6.9	0.11	0.25
40	3.5	7.7	4.9	10.9	5.6	12.4	0.14	0.31	4.1	9.1	5.9	13.0	5.75	12.7	0.17	0.39
50	7.3	16.2	11.2	24.6	12.1	26.7	0.21	0.47	8.5	18.8	12.8	28.1	12.50	27.6	0.25	0.56
63	12.6	27.8	18.6	41.0	21.8	48.1	0.27	0.59	15.1	33.3	22.3	49.2	21.92	48.3	0.38	0.83
80	22.5	49.5	34.4	75.8	39.4	86.9	0.44	0.96	26.8	59.2	40.5	89.3	40.47	89.2	0.58	1.27
100	40.7	89.8	61.7	136.0	72.4	159.7	0.66	1.45	42.1	92.8	63.9	140.9	65.49	144.4	0.83	1.83

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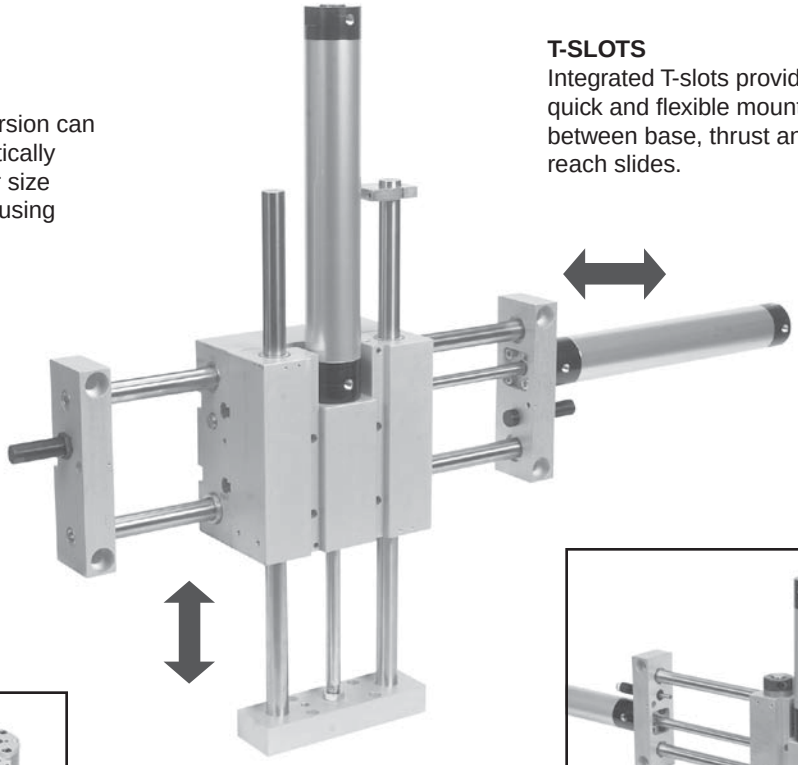
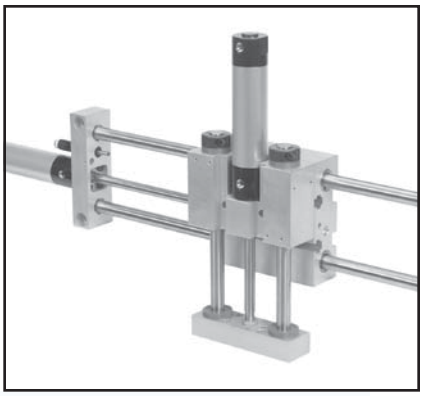
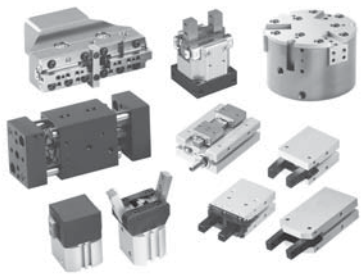
DIRECT MOUNTING
Each thrust and reach version can direct mount to the indentically sized base version. Other size combinations can mount using transition plates.

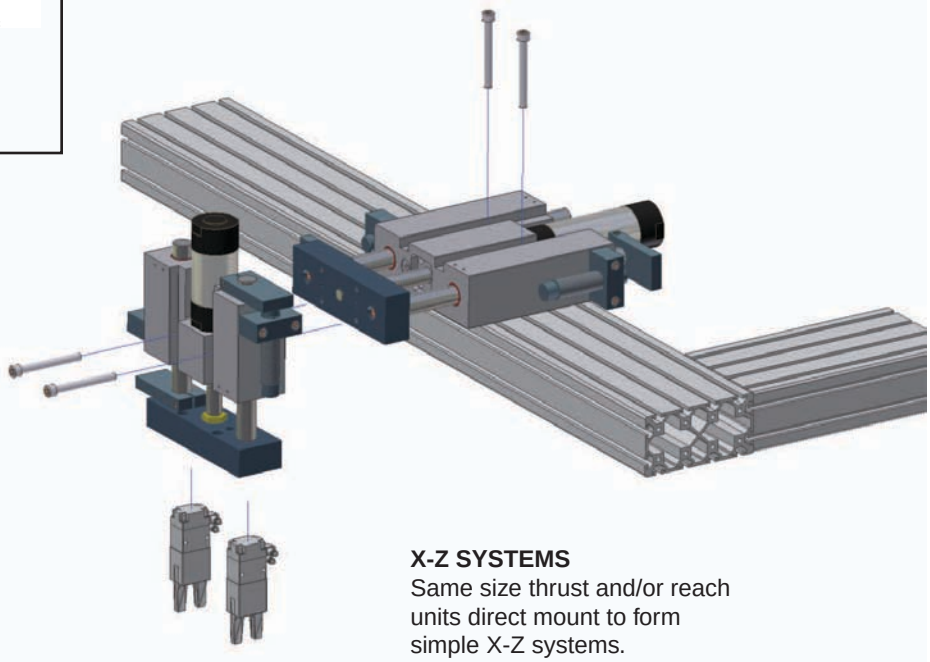


T-SLOTS
Integrated T-slots provide quick and flexible mounting between base, thrust and reach slides.





Parker has a complete line of pneumatic grippers for pick & place applications. Consult Parker Catalog 1900-2.



X-Z SYSTEMS
Same size thrust and/or reach units direct mount to form simple X-Z systems.

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Horizontal Load Capacity & Deflection with Standard Shafting

- Standard Composite w/ Chrome Plated or Stainless Steel Rods
- Recirculating Ball Bearings w/ Carbon or Stainless Steel Rods
- Self Aligning Ball Bearings w/ Carbon or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested side load at a given actuator stroke and distance (d) from the face of the tooling plate. The graphs include the weight of the support rods and tooling plate and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

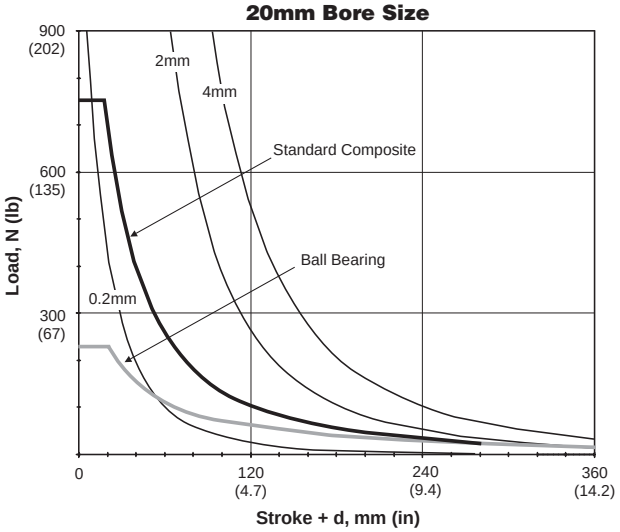
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

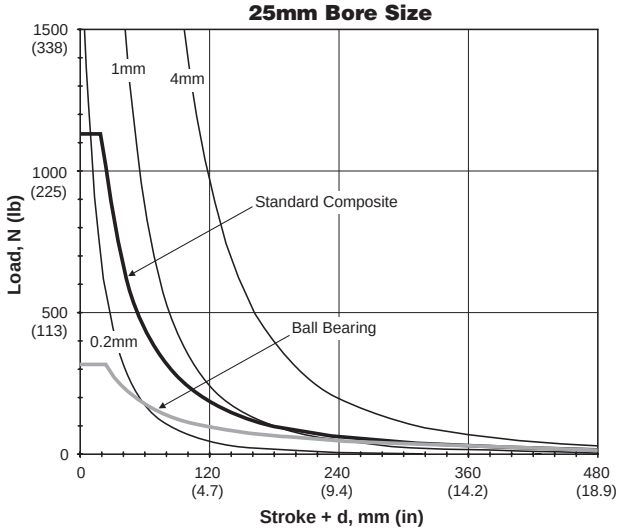
F

P5L Thrust Slides

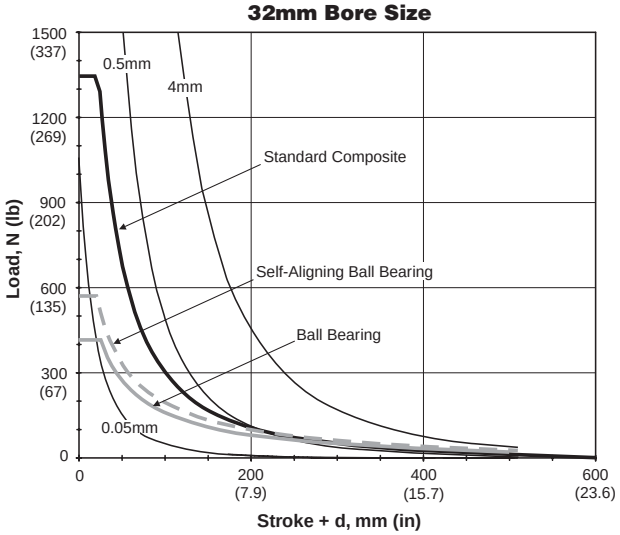
20mm Bore Size



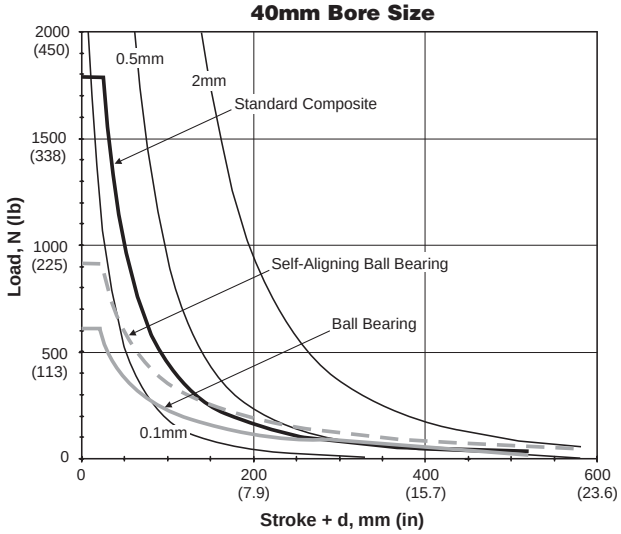
25mm Bore Size



32mm Bore Size



40mm Bore Size



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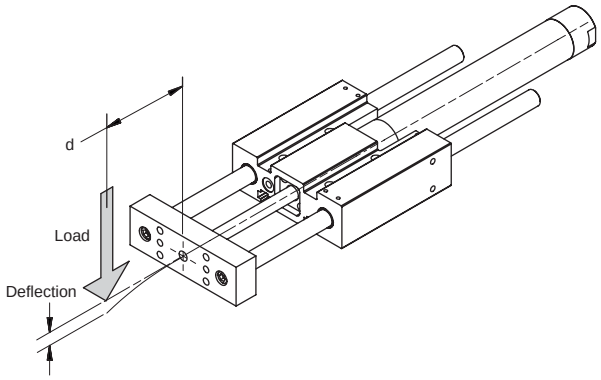
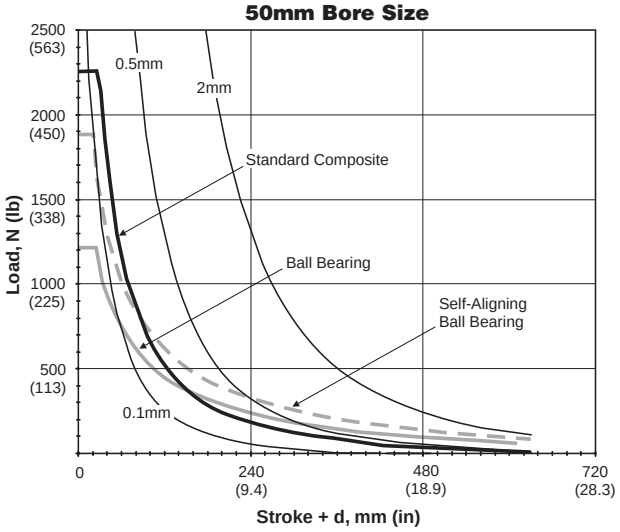
Horizontal Load Capacity & Deflection with Standard Shafting

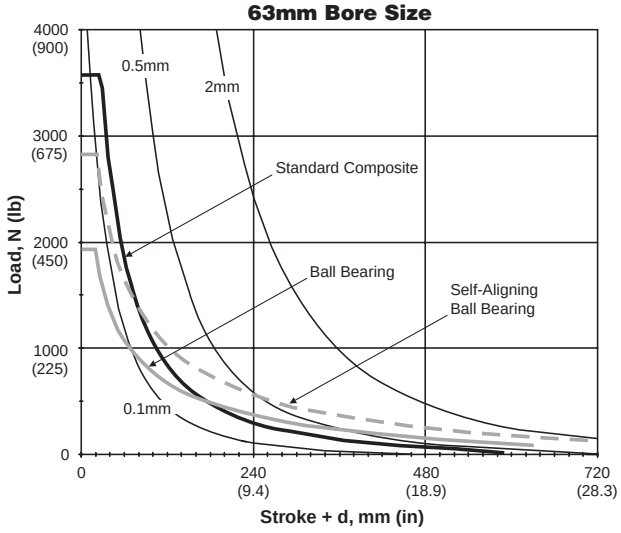


P5L Thrust Slides

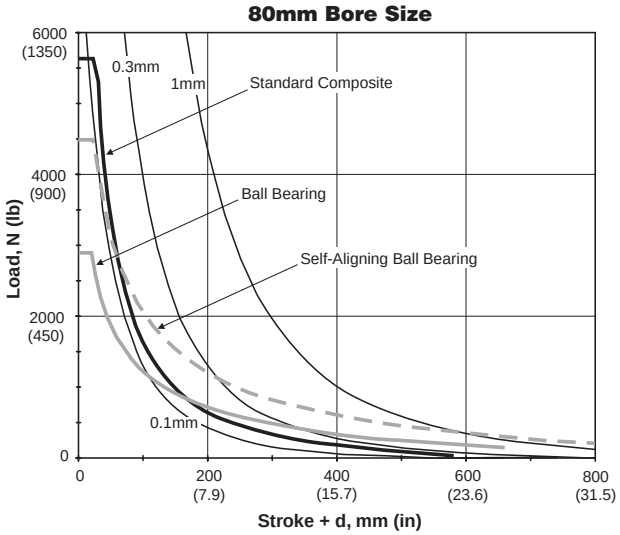
50mm Bore Size



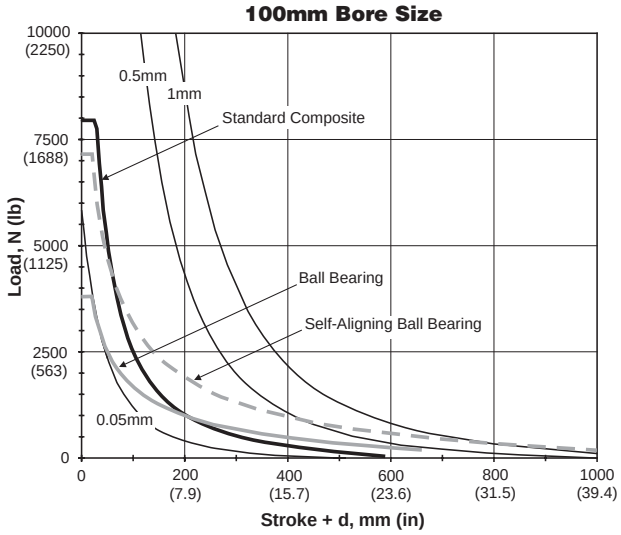
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Horizontal Load Capacity & Deflection with Oversized Shafting

- Oversized Composite w/ Chrome Plated or Stainless Steel Rods

The graphs on these two s illustrate the maximum suggested side load at a given actuator stroke and distance (d) from the face of the tooling plate. The graphs include the weight of the support rods and tooling plate and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

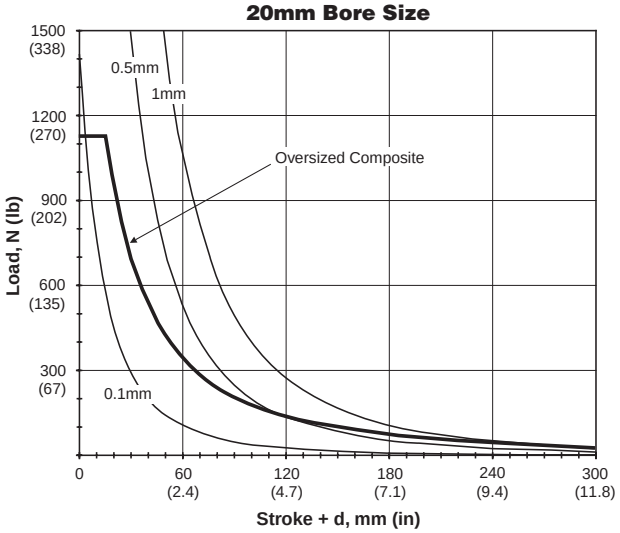
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

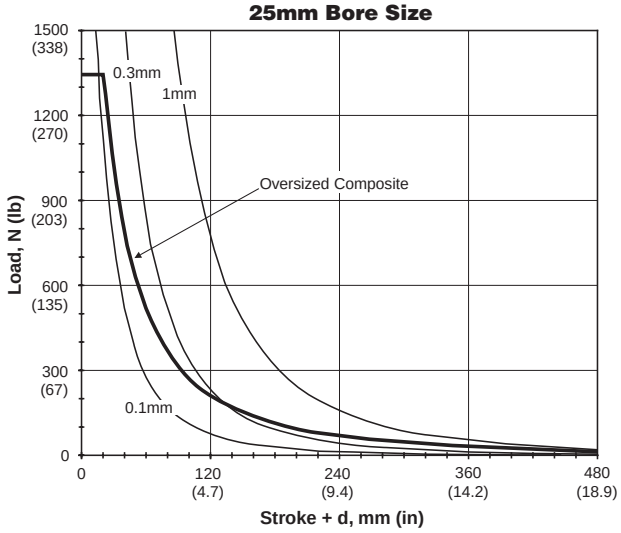
F

P5L Thrust Slides

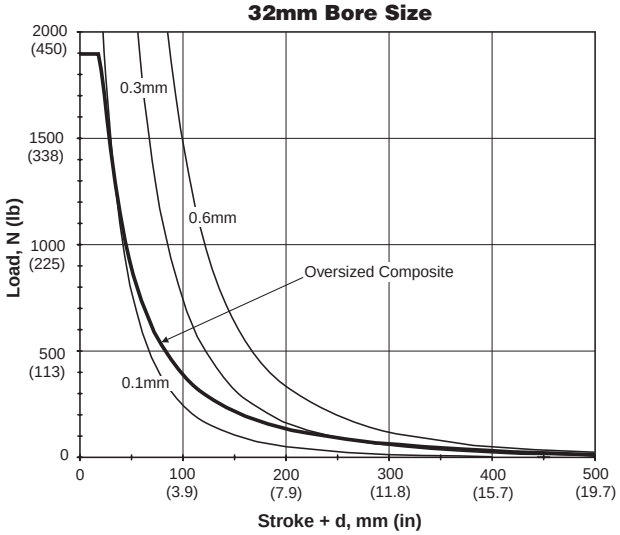
20mm Bore Size



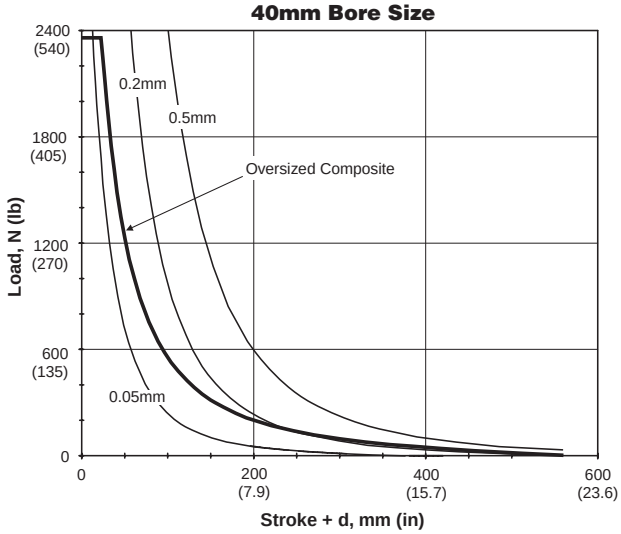
25mm Bore Size



32mm Bore Size



40mm Bore Size



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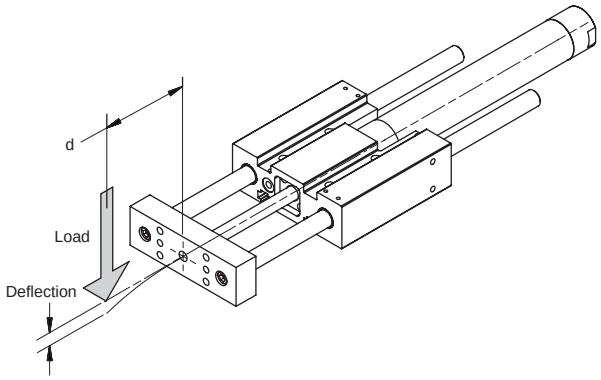
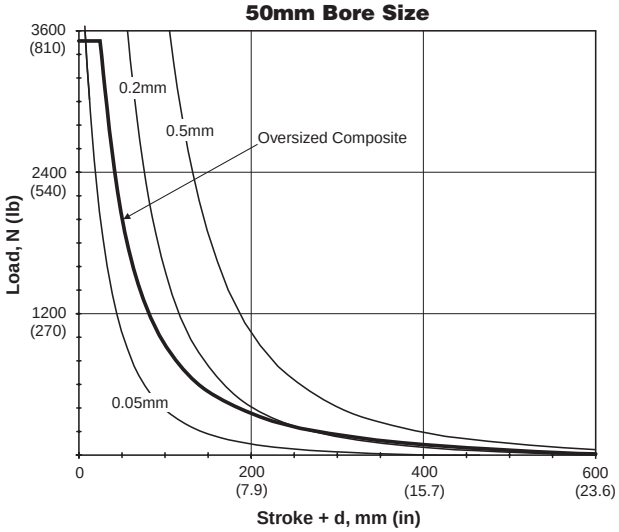
Horizontal Load Capacity & Deflection with Oversized Shafting

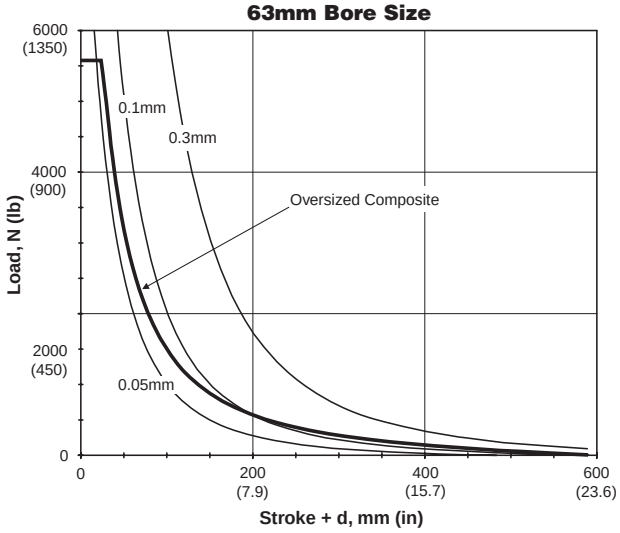


P5L Thrust Slides

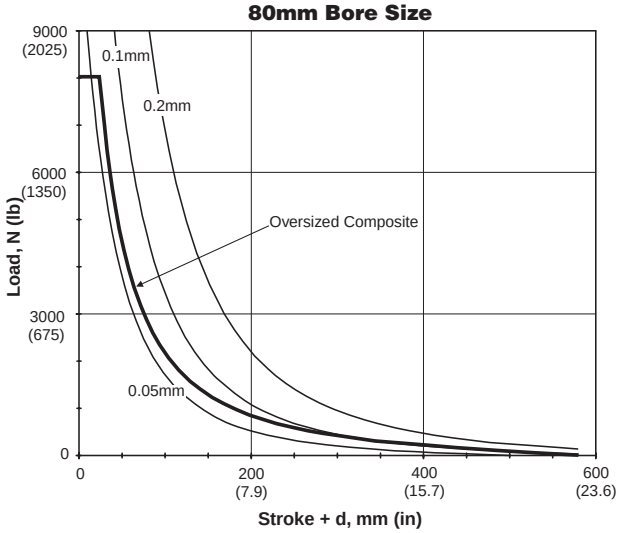
50mm Bore Size



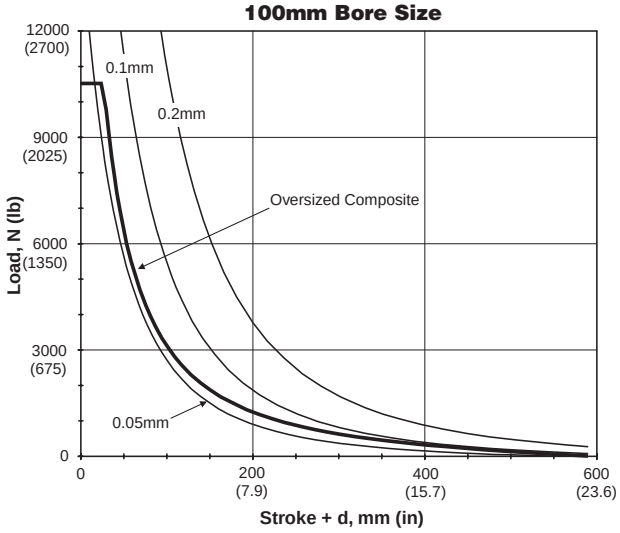
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Horizontal Load Capacity & Deflection with Standard Shafting

- Recirculating Ball Bearings w/ Carbon or Stainless Steel Rods
- Self Aligning Ball Bearings w/ Carbon or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested side load at a given actuator stroke and distance (d) from the face of the tooling plate. The graphs include the weight of the support rods and tooling plate and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

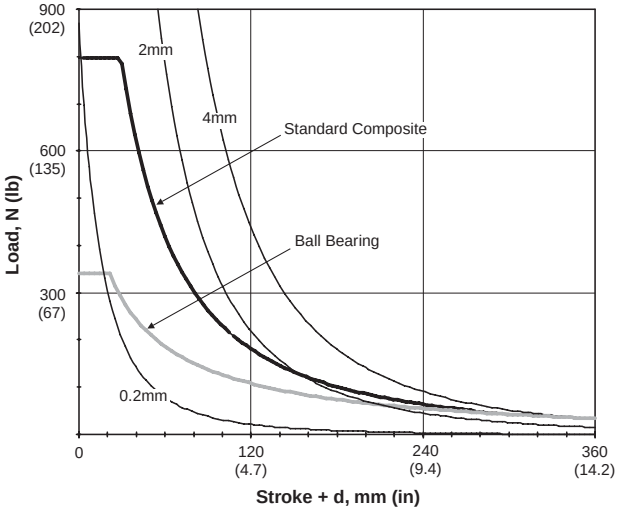
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

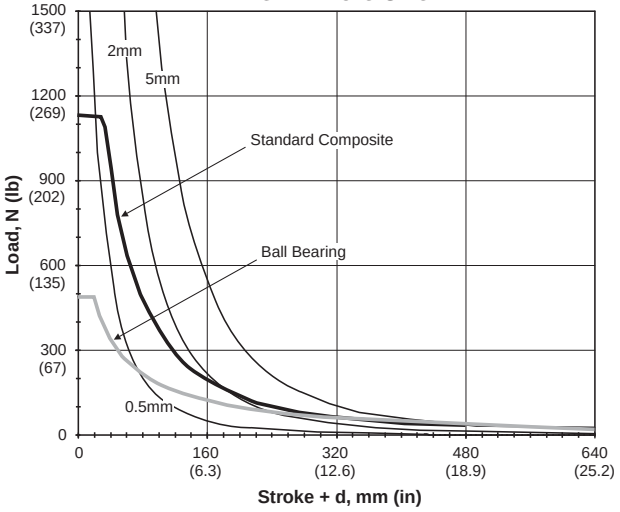
F

P5L Reach Slides

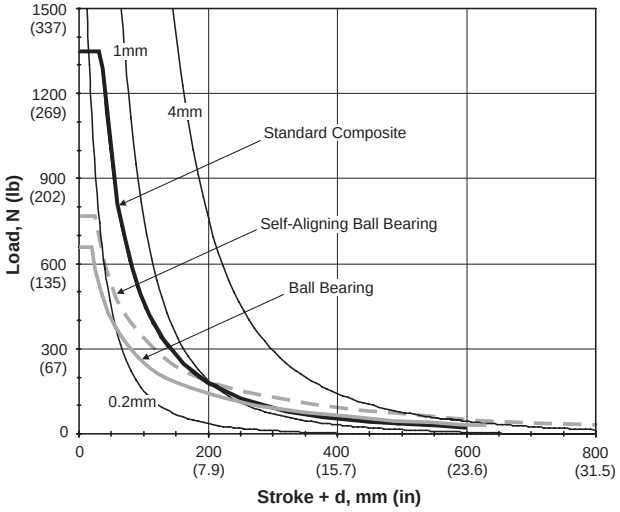
20mm Bore Size



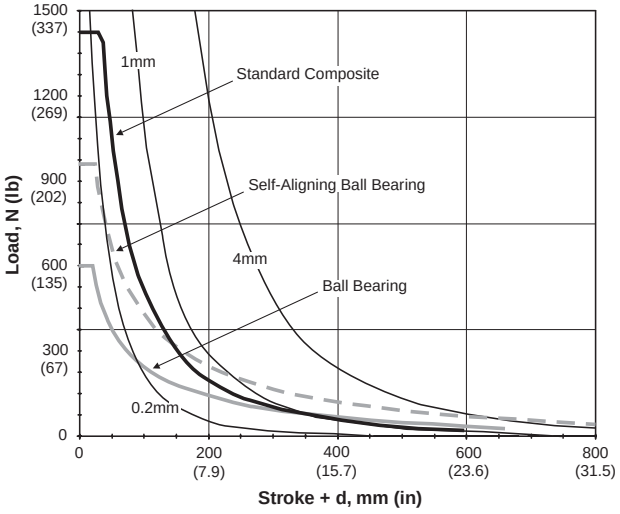
25mm Bore Size



32mm Bore Size



40mm Bore Size



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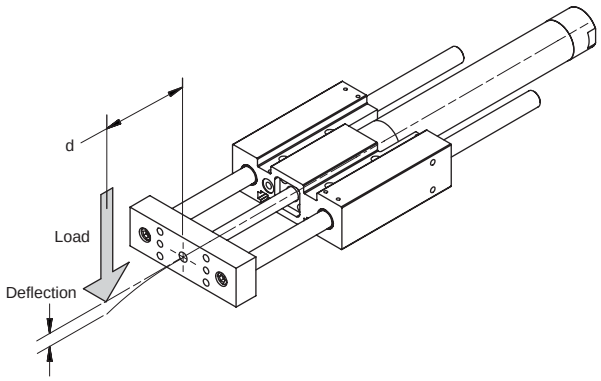
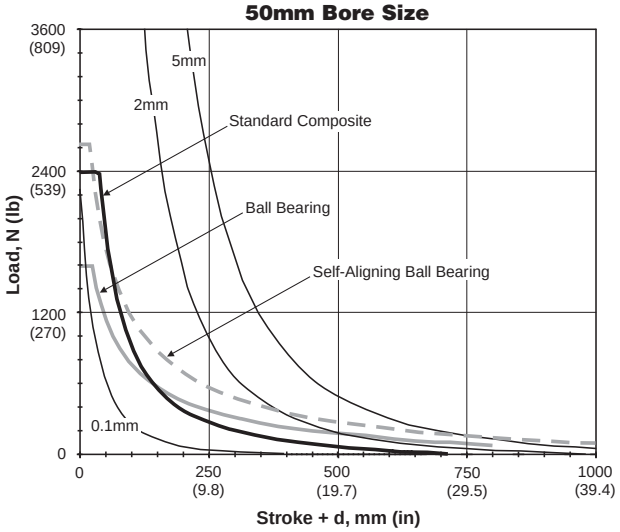
Horizontal Load Capacity & Deflection with Standard Shafting

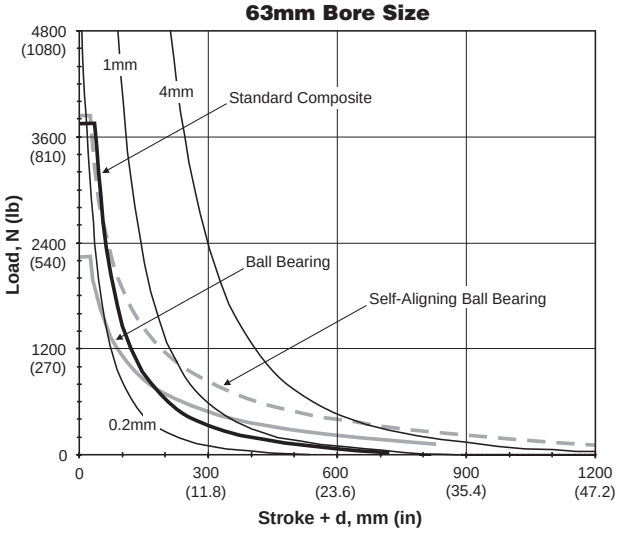


P5L Reach Slides

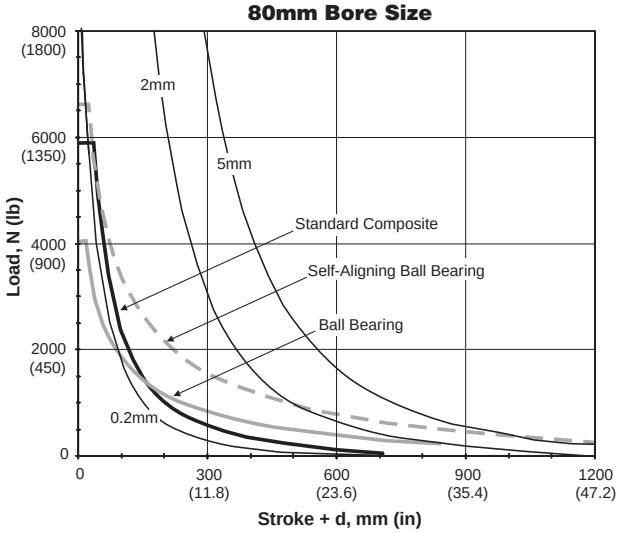
50mm Bore Size



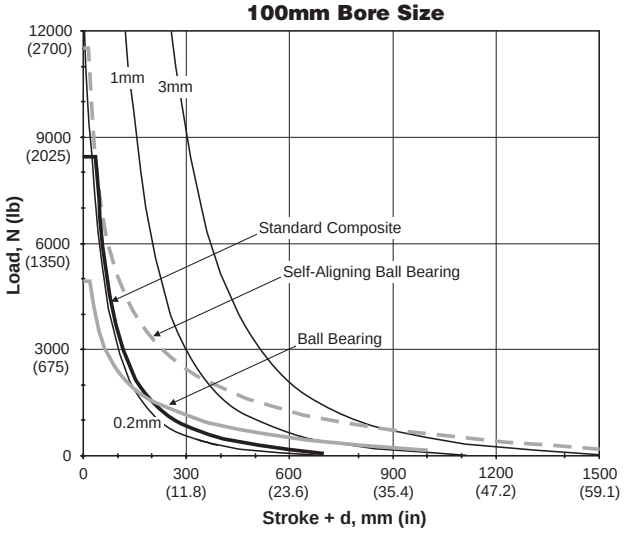
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Horizontal Load Capacity & Deflection with Oversized Shafting

- Oversized Composite w/ Chrome Plated or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested side load at a given actuator stroke and distance (d) from the face of the tooling plate. The graphs include the weight of the support rods and tooling plate and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

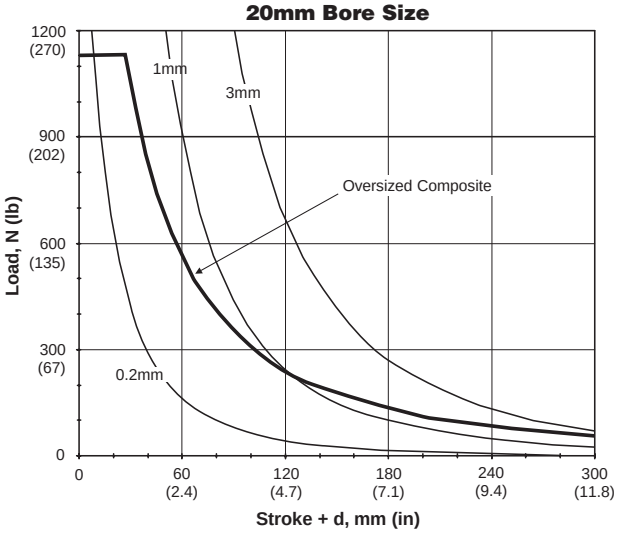
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

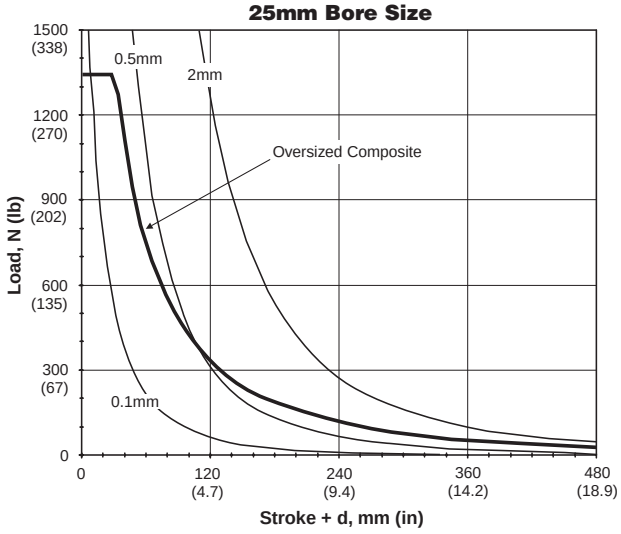
F

P5L Reach Slides

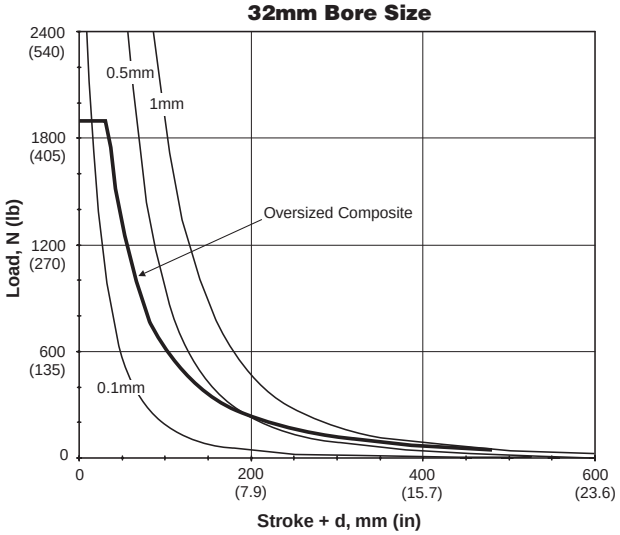
20mm Bore Size



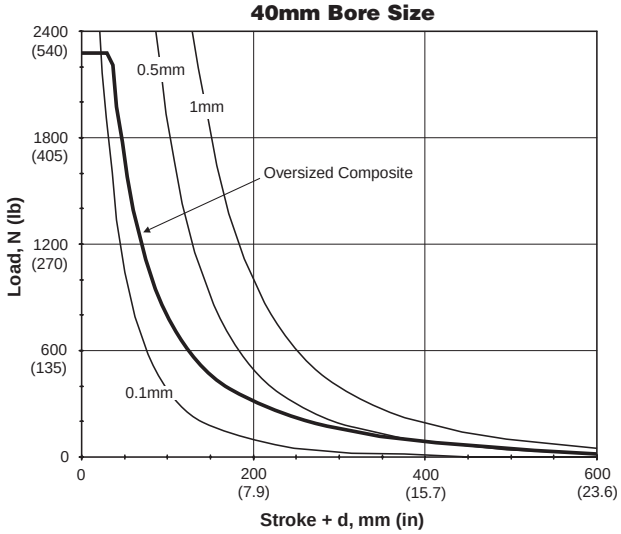
25mm Bore Size



32mm Bore Size



40mm Bore Size



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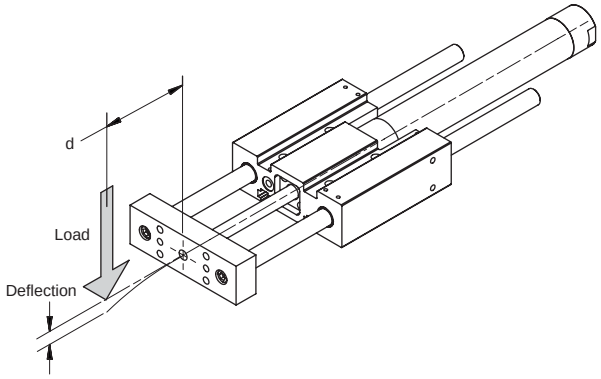
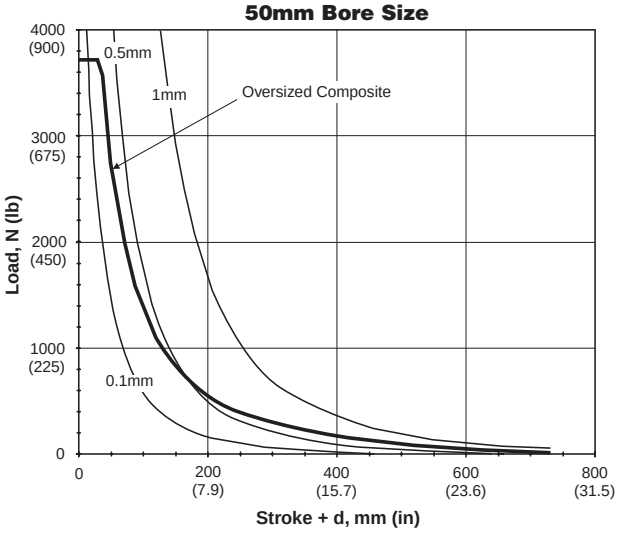
Horizontal Load Capacity & Deflection with Oversized Shafting

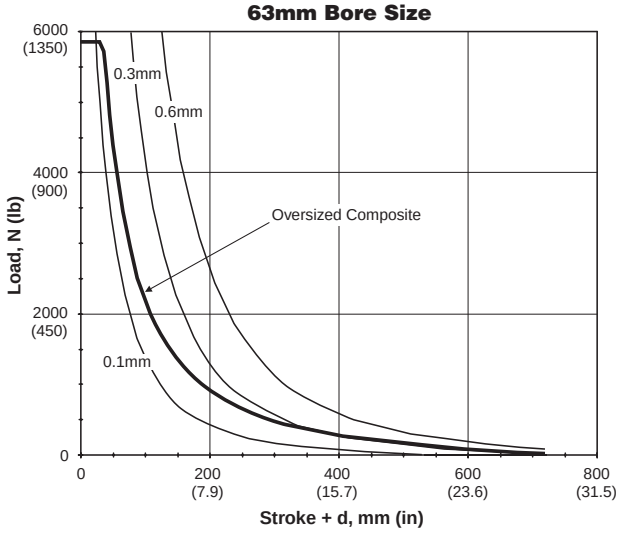


P5L Reach Slides

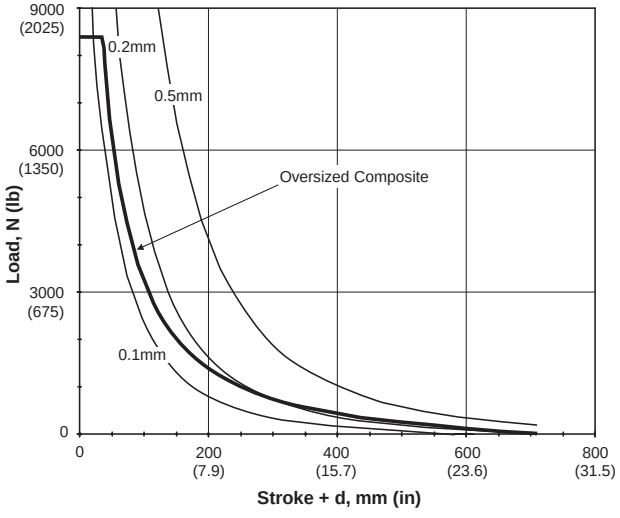
50mm Bore Size



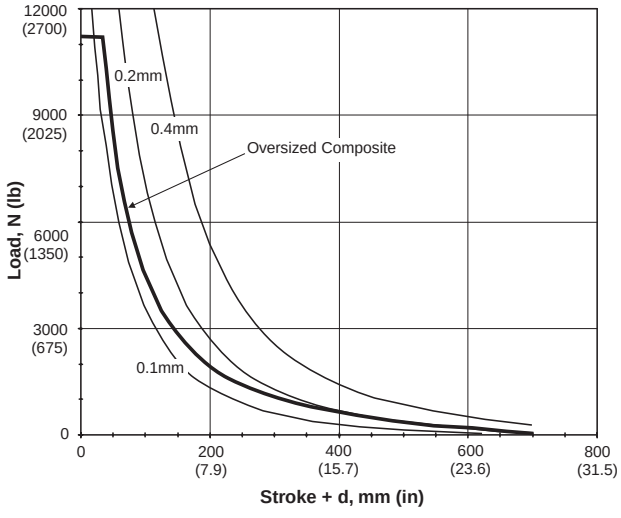
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Asymmetrical Torque Capacity

- Standard Composite w/ Chrome Plated or Stainless Steel Rods
- Oversized Composite w/ Chrome Plated or Stainless Steel Rods
- Recirculating Ball Bearings w/ Carbon or Stainless Steel Rods
- Self Aligning Ball Bearings w/ Carbon or Stainless Steel Rods

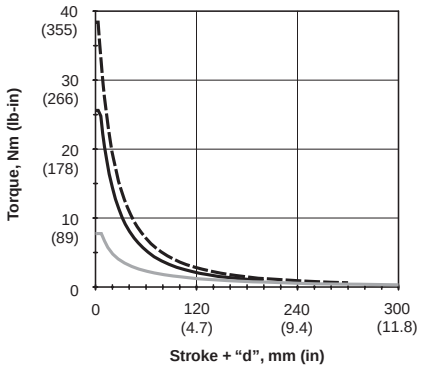
The graphs on these two pages illustrate the maximum suggested asymmetrical load at a given actuator stroke and distance (d) from the face of the tooling plate. The graphs include the weight of the support rods and tooling plate and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application. An asymmetrical load is defined as a perpendicular load applied at some horizontal distance, "m" from the center of the tooling plate.

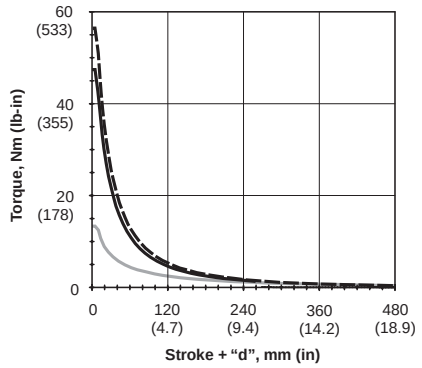
F

P5L Thrust Slides

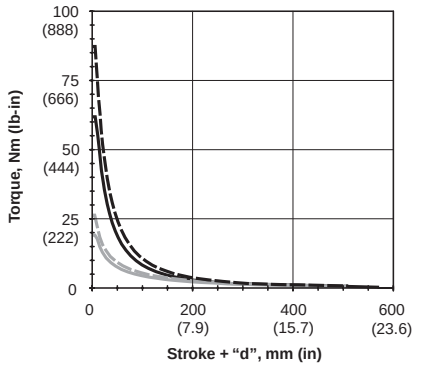
20mm Bore Size



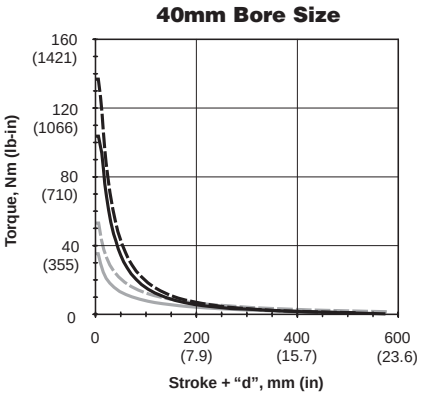
25mm Bore Size



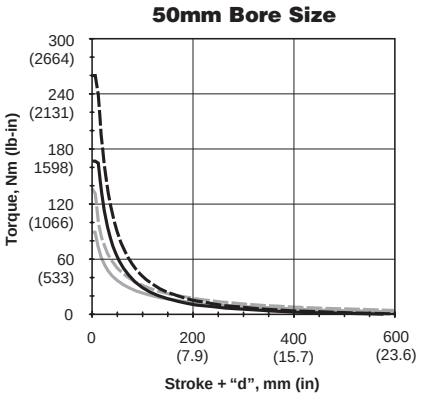
32mm Bore Size



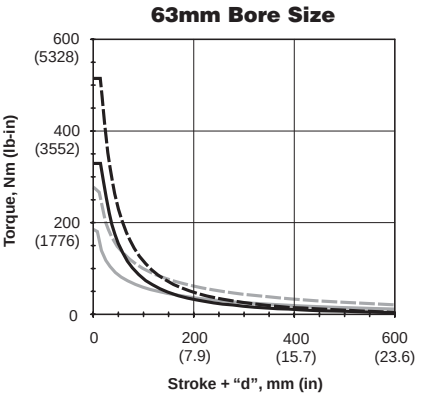
40mm Bore Size



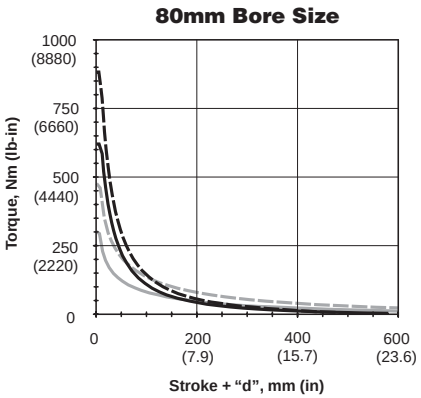
50mm Bore Size



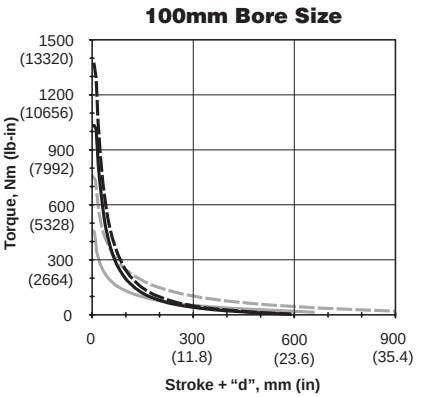
63mm Bore Size

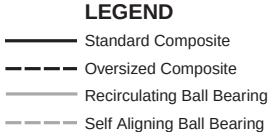


80mm Bore Size



100mm Bore Size





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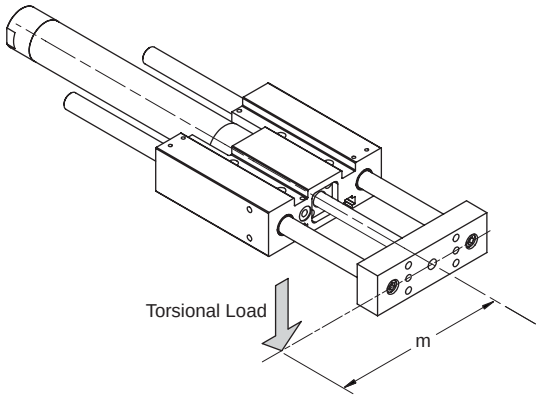
Asymmetrical Torque Capacity

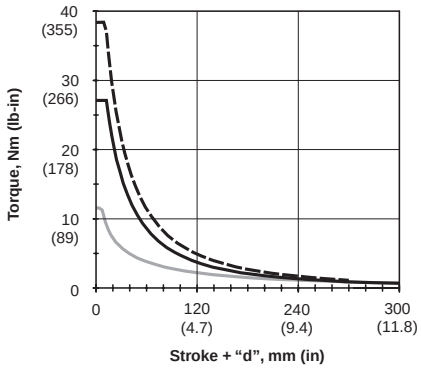
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

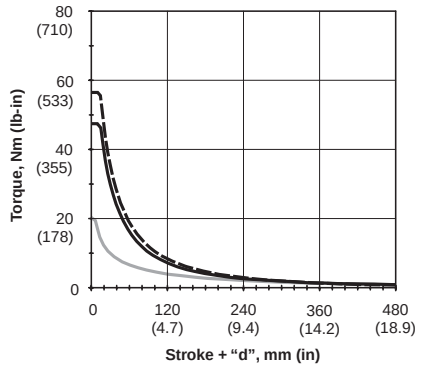


P5L Reach Slides

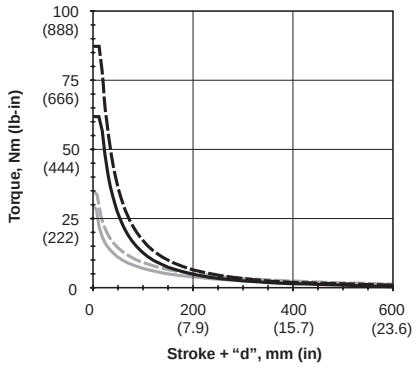
20mm Bore Size



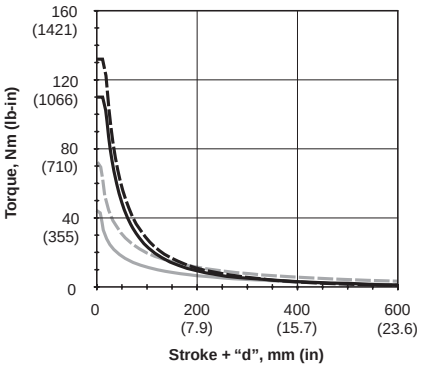
25mm Bore Size



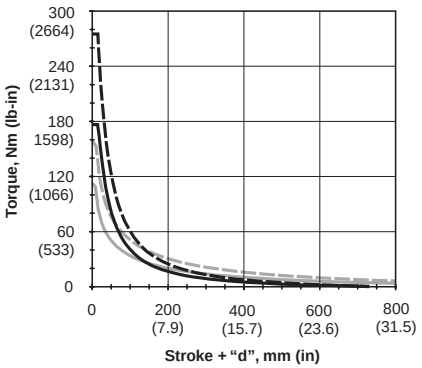
32mm Bore Size



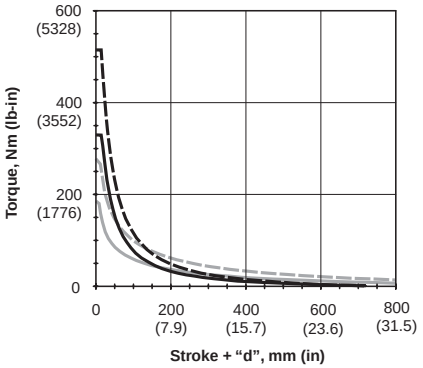
40mm Bore Size



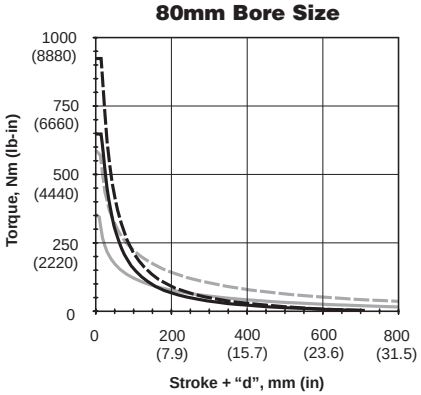
50mm Bore Size



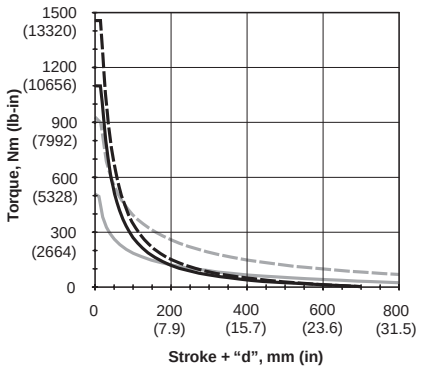
63mm Bore Size



80mm Bore Size



100mm Bore Size



LEGEND

- Standard Composite
- Oversized Composite
- Recirculating Ball Bearing
- Self Aligning Ball Bearing

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Vertical Eccentric Load Capacity

- Standard Composite w/ Chrome Plated or Stainless Steel Rods
- Oversized Composite w/ Chrome Plated or Stainless Steel Rods
- Recirculating Ball Bearings w/ Carbon or Stainless Steel Rods
- Self Aligning Ball Bearings w/ Carbon or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested eccentric load based on a stroke of 100mm (4 inches).

An eccentric load is defined as a load applied in the same direction as the motion of the cylinder however, acting at some distance (eccentricity "h") from the center of the tooling plate. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

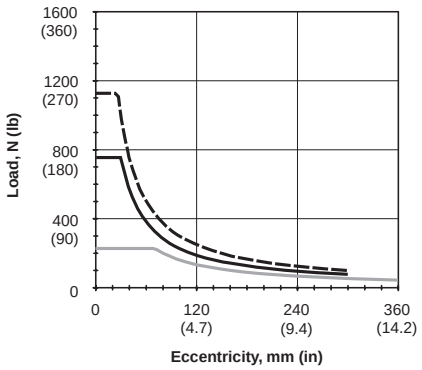
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

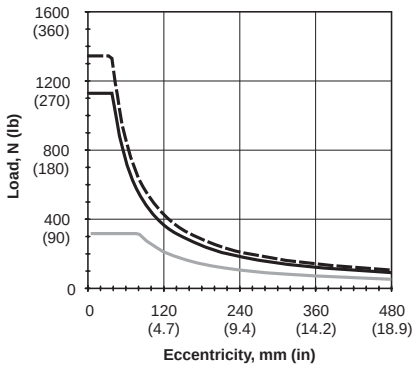
F

P5L Thrust Slides

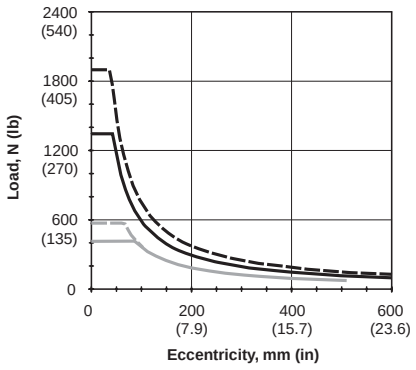
20mm Bore Size



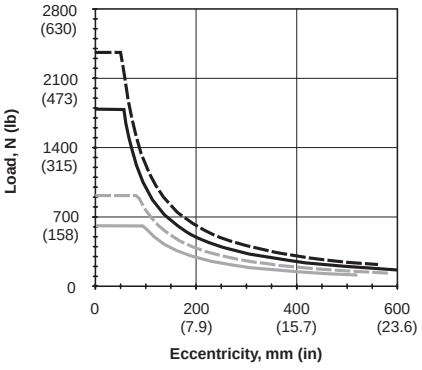
25mm Bore Size



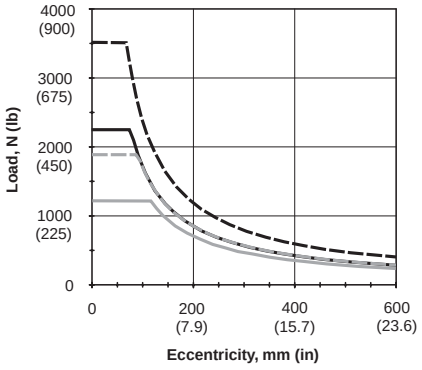
32mm Bore Size



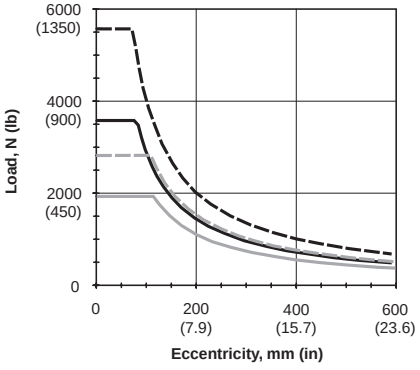
40mm Bore Size



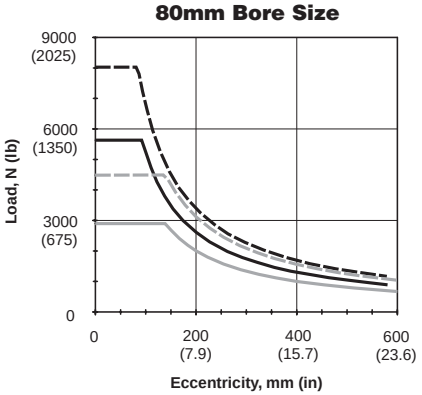
50mm Bore Size



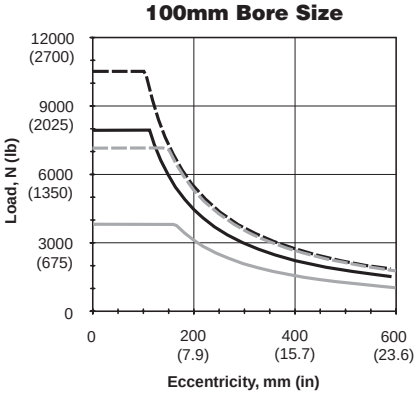
63mm Bore Size

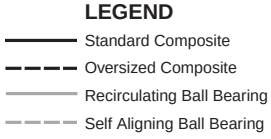


80mm Bore Size



100mm Bore Size





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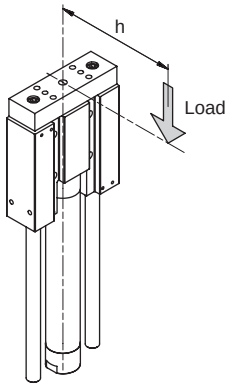
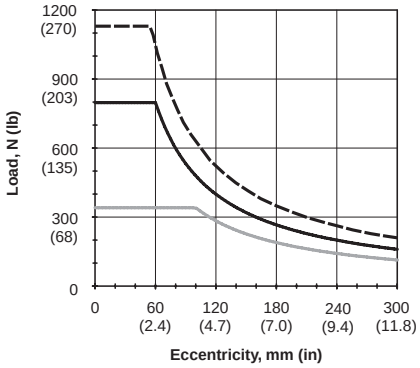
Vertical Eccentric Load Capacity

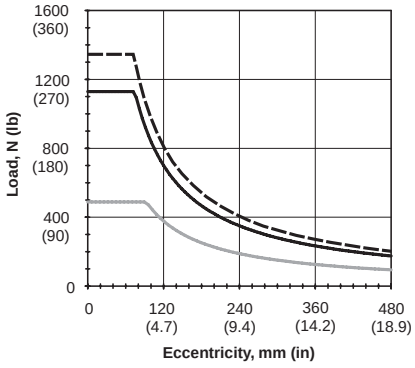


P5L Reach Slides

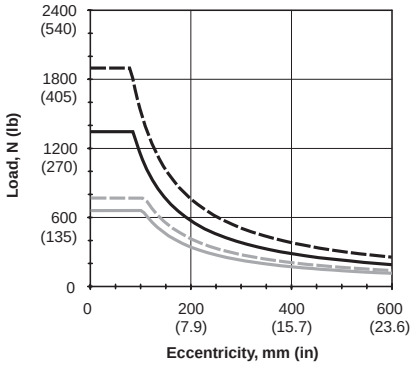
20mm Bore Size



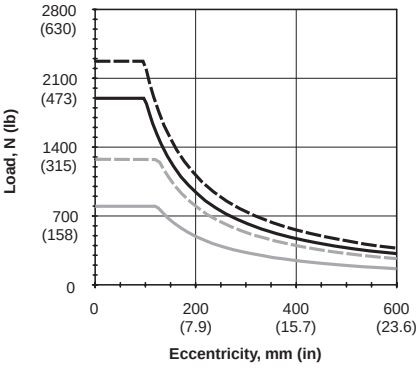
25mm Bore Size



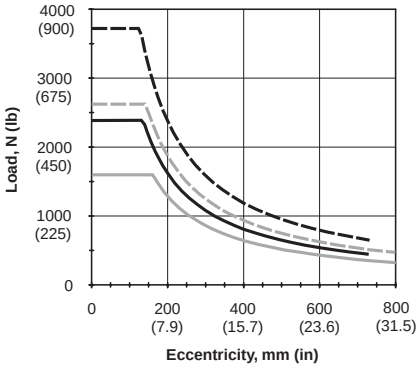
32mm Bore Size



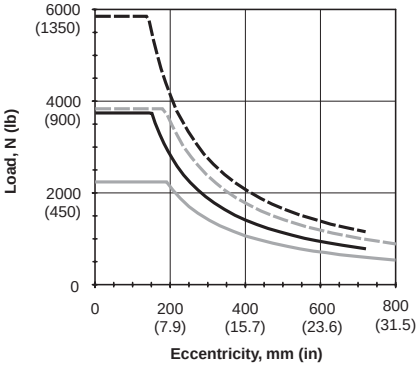
40mm Bore Size



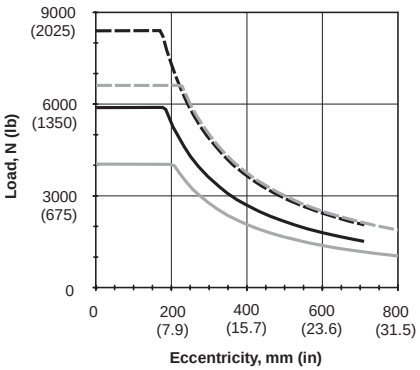
50mm Bore Size



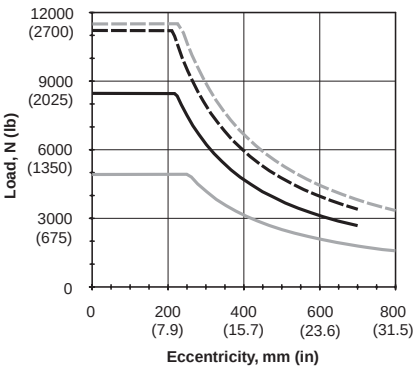
63mm Bore Size

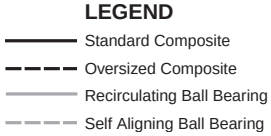


80mm Bore Size



100mm Bore Size





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Load Stopping Capacity

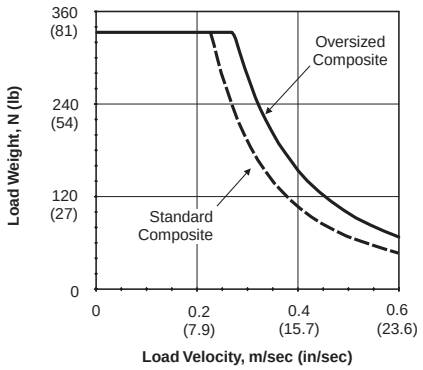
- Standard Composite w/ Chrome Plated or Stainless Steel Rods
- Oversized Composite w/ Chrome Plated or Stainless Steel Rods

The P5L series can be used in conveyor stopping applications. The graphs on these two pages illustrate the maximum stopping or impact capacity for the P5L Series. The maximum stopping capacity will vary with actuator stroke. These graphs are based on a stroke of 50mm (2 inches), assuming that the moving load is moving perpendicularly to the support rods. Care should be taken to ensure that the support rods are not damaged during this type of loading. The load should also be centered on the tooling plate.

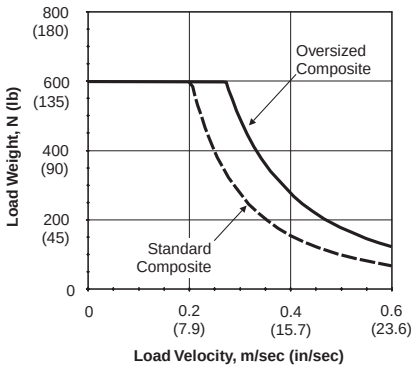
Note: Ball bearings should not be used in this type of application.

P5L Thrust Slides

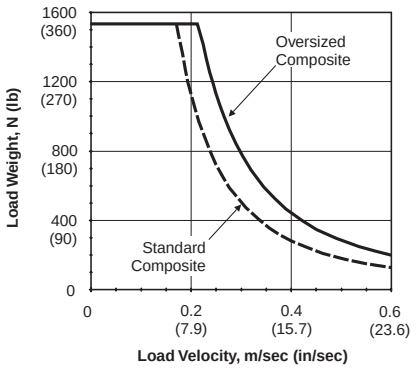
20mm Bore Size



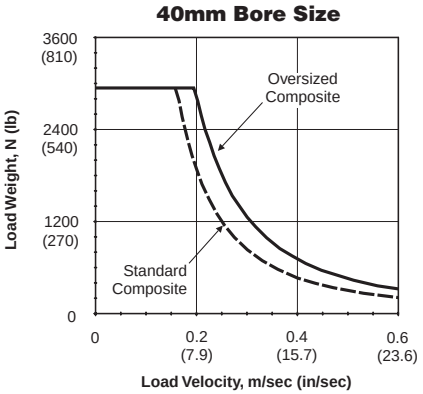
25mm Bore Size



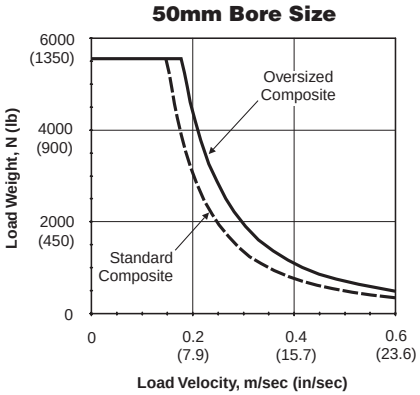
32mm Bore Size



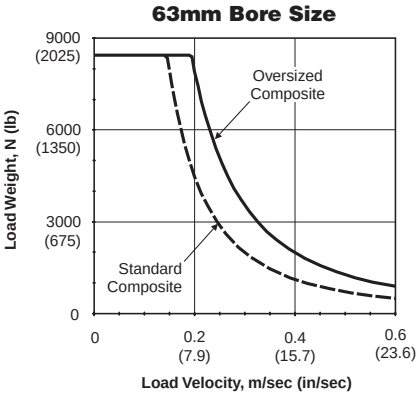
40mm Bore Size



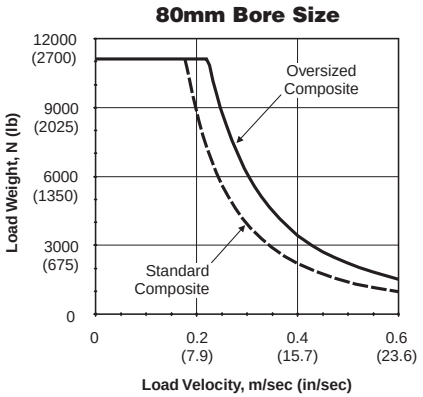
50mm Bore Size



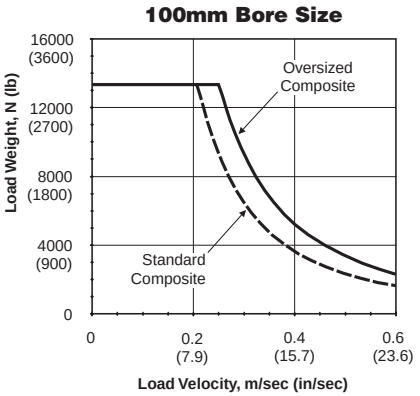
63mm Bore Size



80mm Bore Size



100mm Bore Size



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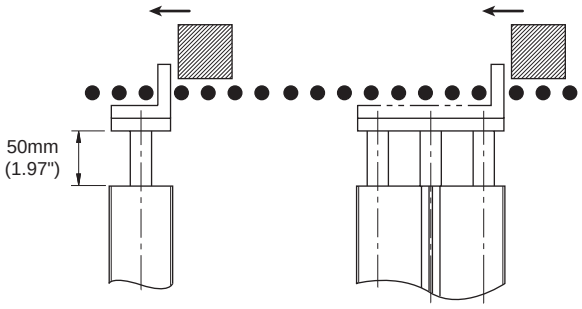
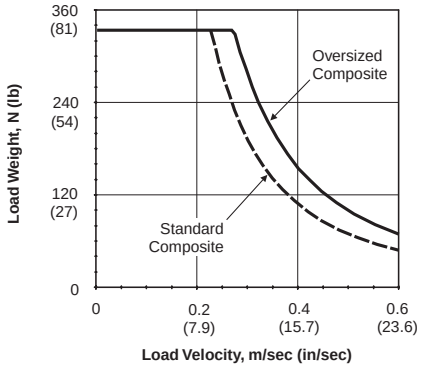
Load Stopping Capacity

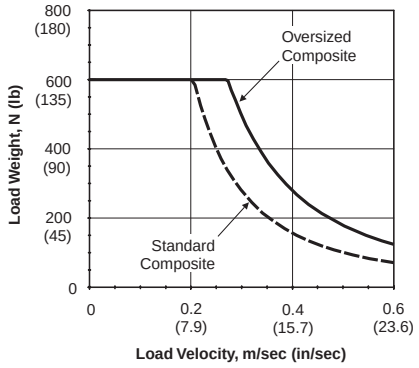


P5L Reach Slides

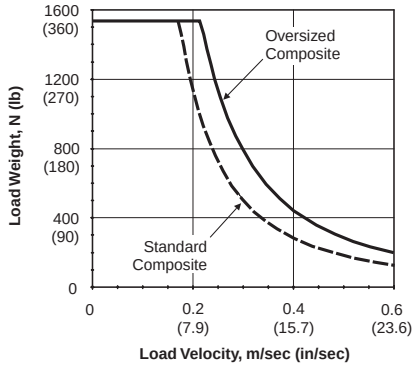
20mm Bore Size



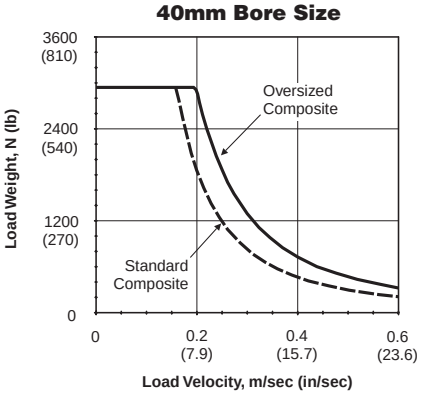
25mm Bore Size



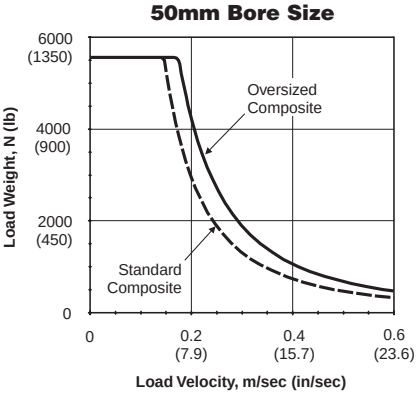
32mm Bore Size



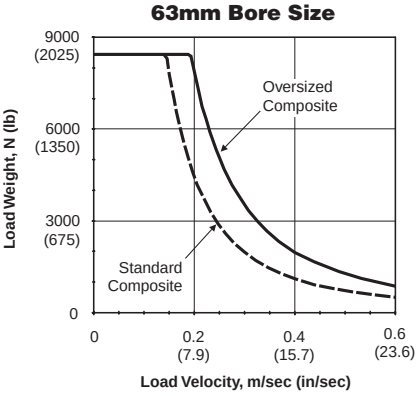
40mm Bore Size



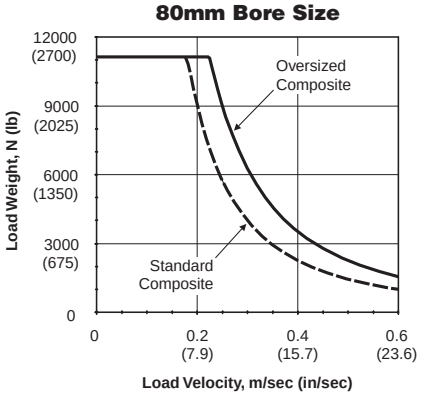
50mm Bore Size



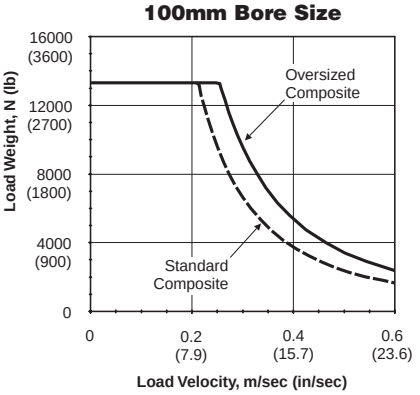
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Kinetic Energy

These graphs illustrate the kinetic energy absorption of the P5L series as a total moving weight versus speed chart for both air cushions and shock absorbers.

Moving weight is defined as the weight of the carried load and the weight of any moving parts of the actuator (support rods, tooling plate, etc.). The moving weight from the charts on page F73 should be considered.

Actuator Moving Weight =
Base Unit Weight + (Stroke × Per Inch Weight)

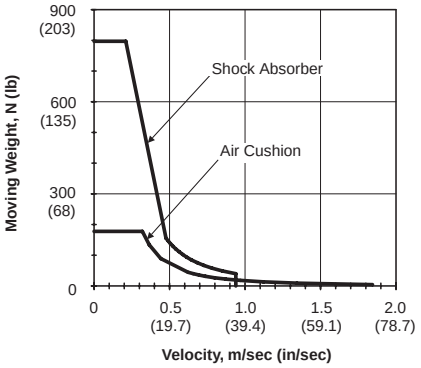
Total Moving Weight =
Actuator Moving Weight + Carried Load

Note: These charts are to be used only to determine the energy absorption of each guided cylinder and to determine if shocks or cushions are needed.

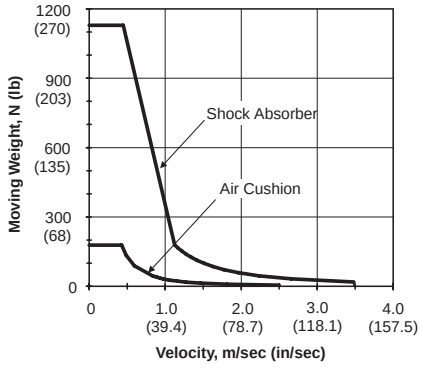
F

P5L Thrust Slides

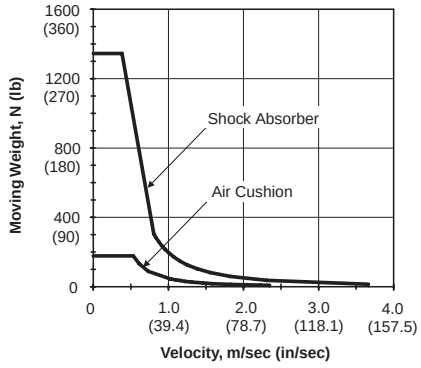
20mm Bore Size



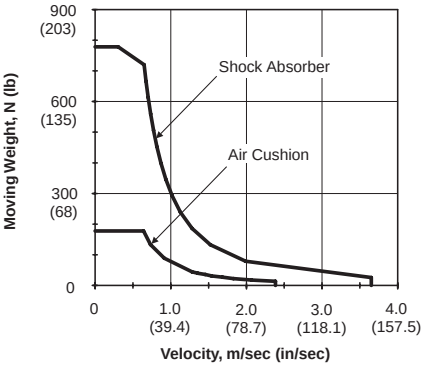
25mm Bore Size



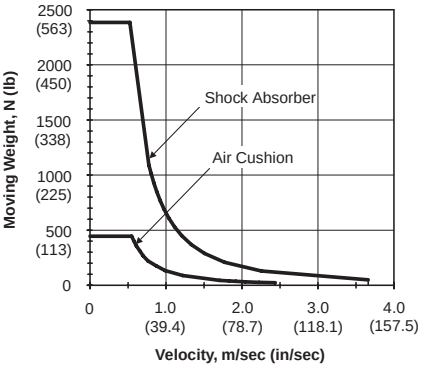
32mm Bore Size



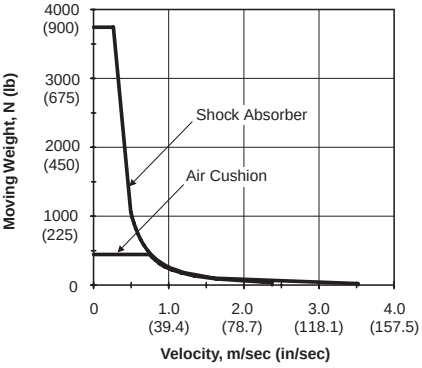
40mm Bore Size



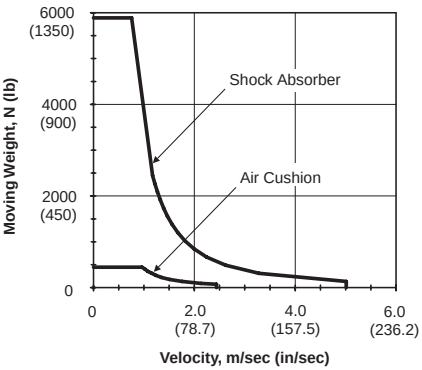
50mm Bore Size



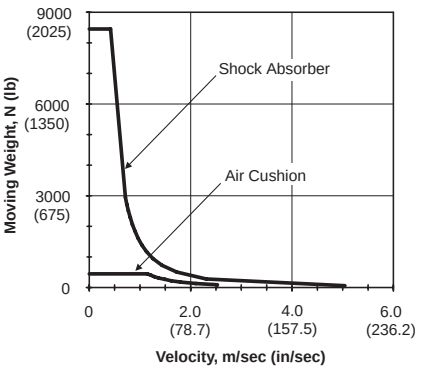
63mm Bore Size



80mm Bore Size



100mm Bore Size



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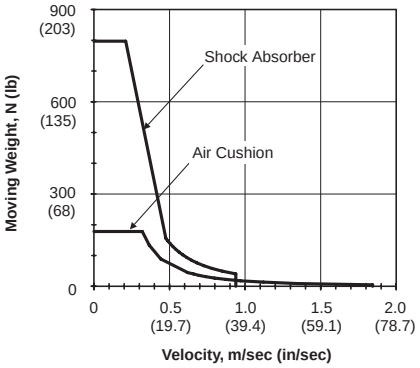
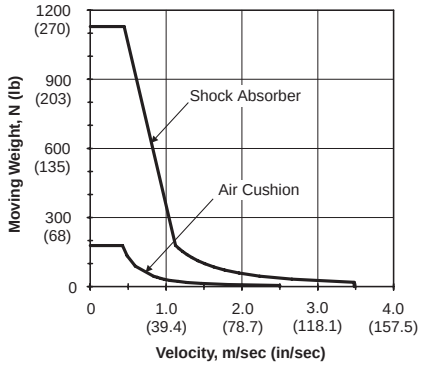
Bore	Moving Weights (Standard Shaft)						Moving Weights (Oversized Shaft)					
	Basic Thrust Unit		Basic Reach Unit		Per Inch		Basic Thrust Unit		Basic Reach Unit		Per Inch	
	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs
20	0.27	0.6	0.32	0.7	0.02	0.05	0.35	0.8	0.43	0.96	0.03	0.07
25	0.45	1.0	0.53	1.2	0.03	0.07	0.68	1.5	0.85	1.88	0.06	0.13
32	0.78	1.7	0.95	2.1	0.06	0.13	1.15	2.5	1.45	3.20	0.09	0.21
40	1.4	3.2	1.7	3.8	0.09	0.21	2.2	4.7	2.82	6.2	0.15	0.32
50	2.8	6.1	3.4	7.5	0.15	0.32	4.0	8.8	5.21	11.5	0.21	0.47
63	4.7	10.5	6.0	13.2	0.21	0.47	7.5	16.6	10.27	22.6	0.38	0.83
80	9.0	19.7	11.7	25.8	0.26	0.58	13.9	30.7	19.08	42.1	0.59	1.29
100	16.4	36.2	21.6	47.6	0.59	1.29	18.1	40.0	25.57	56.4	0.84	1.86

P5L Reach Slides

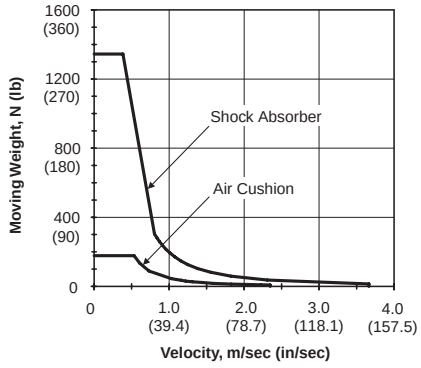
20mm Bore Size



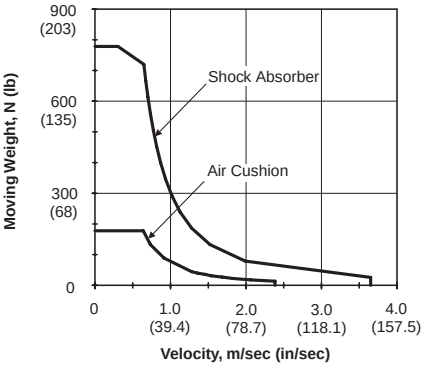
25mm Bore Size



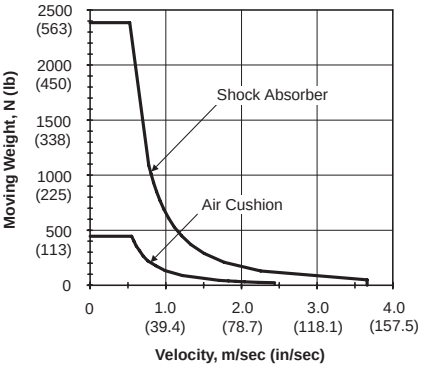
32mm Bore Size



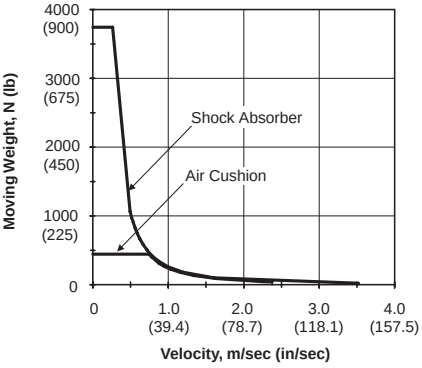
40mm Bore Size



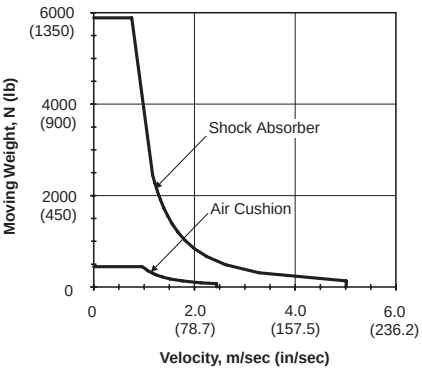
50mm Bore Size



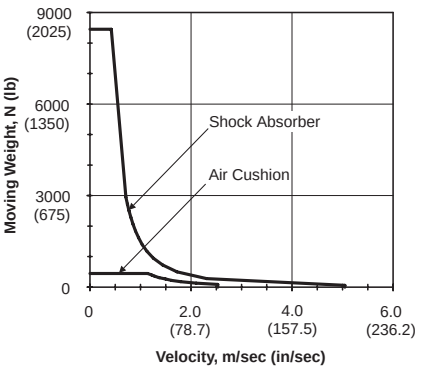
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Horizontal Load Capacity & Deflection with Standard Shafting

- Standard Composite w/ Chrome Plated or Stainless Steel Rods
- Recirculating Ball Bearings w/ Carbon or Stainless Steel Rods
- Self Aligning Ball Bearings w/ Carbon or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested side load at a given actuator stroke. The graphs include the weight of the carriage and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

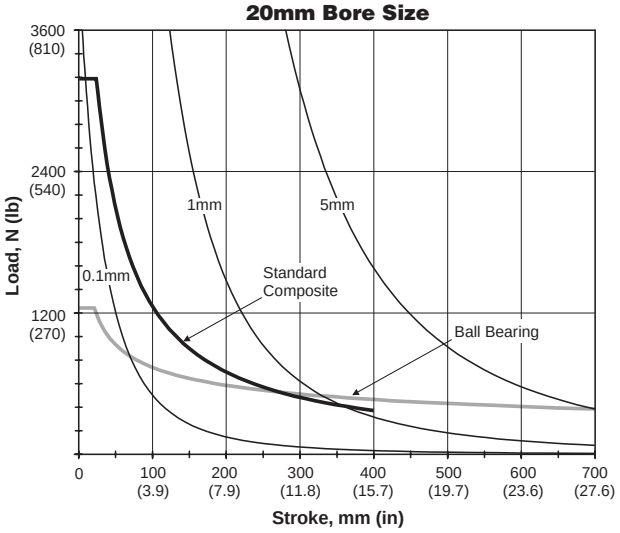
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

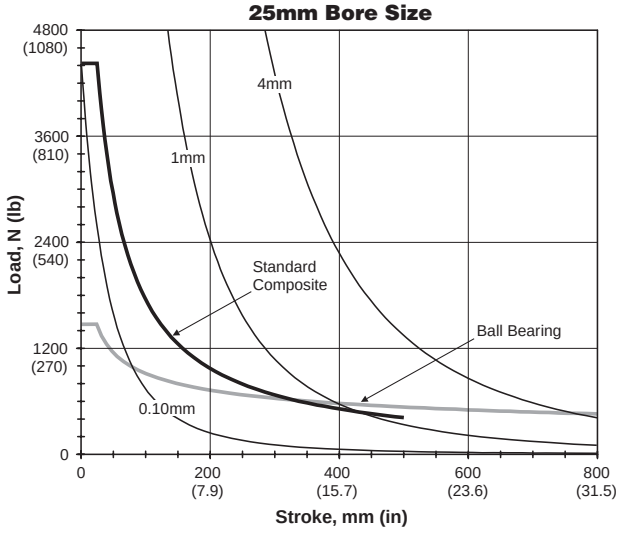
F

P5L Base Slides

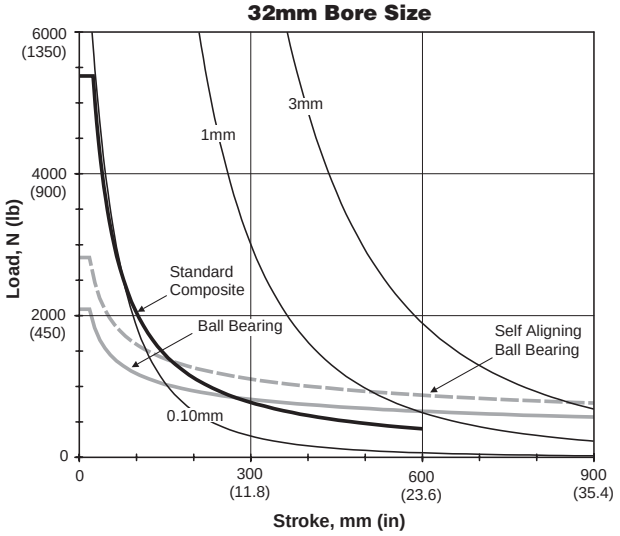
20mm Bore Size



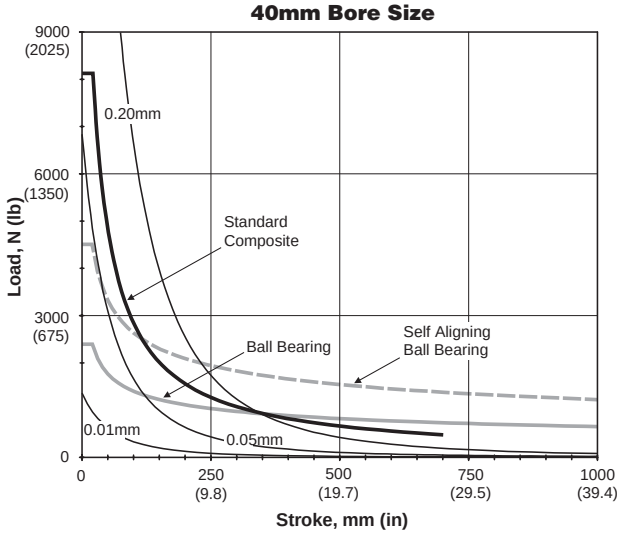
25mm Bore Size



32mm Bore Size



40mm Bore Size



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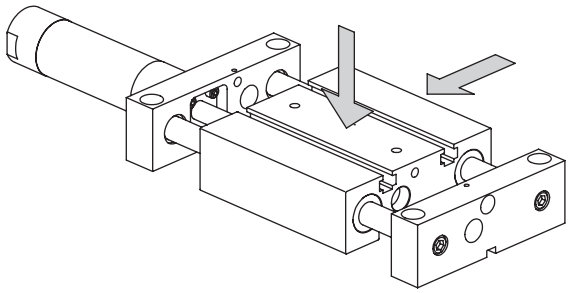
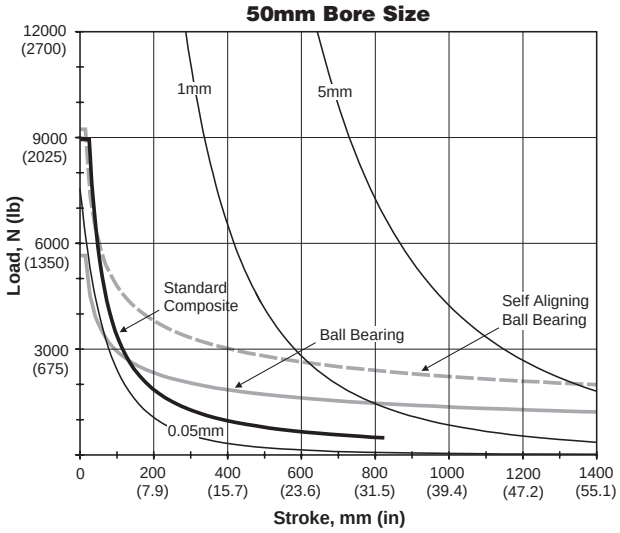
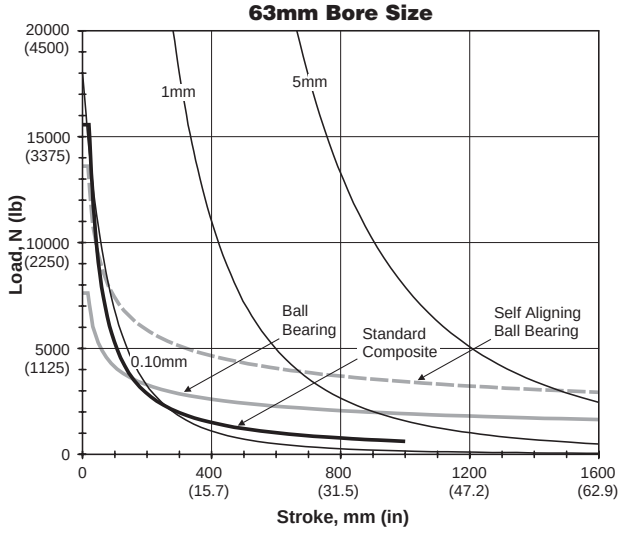
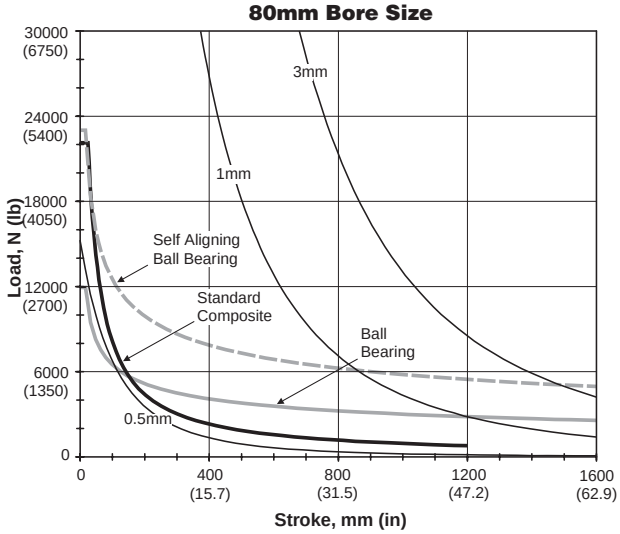
Horizontal Load Capacity & Deflection with Standard Shafting

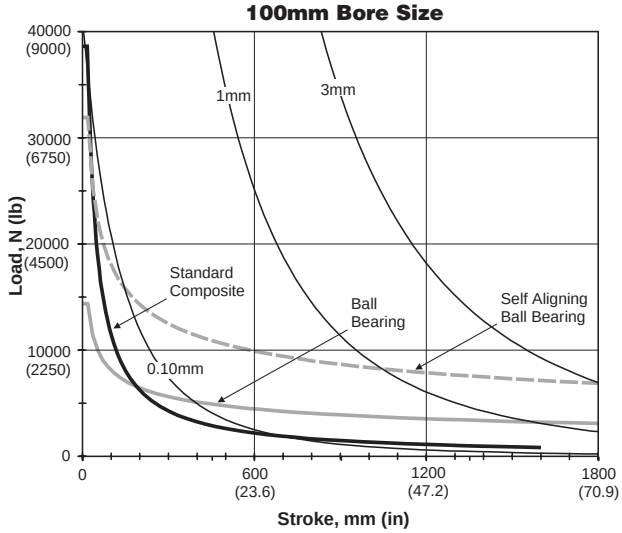


P5L Base Slides









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Horizontal Load Capacity & Deflection with Oversized Shafting

- Oversized Composite w/ Chrome Plated or Stainless Steel Rods

The graphs on these two pages illustrate the maximum suggested side load at a given actuator stroke. The graphs include the weight of the carriage and are based on a bearing life of 10 million cycles under a dynamic loading condition. For an equivalent static load capacity multiply the information in these graphs by 1.5.

See the P5L options section of this catalog for more bearing selection information.

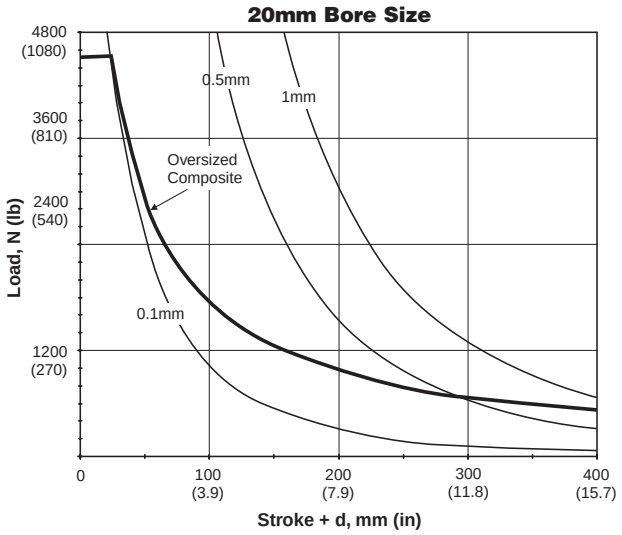
Dynamic loading is defined as a load which is affixed to the actuator tooling plate during the extend or retract motion of the actuator. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application.

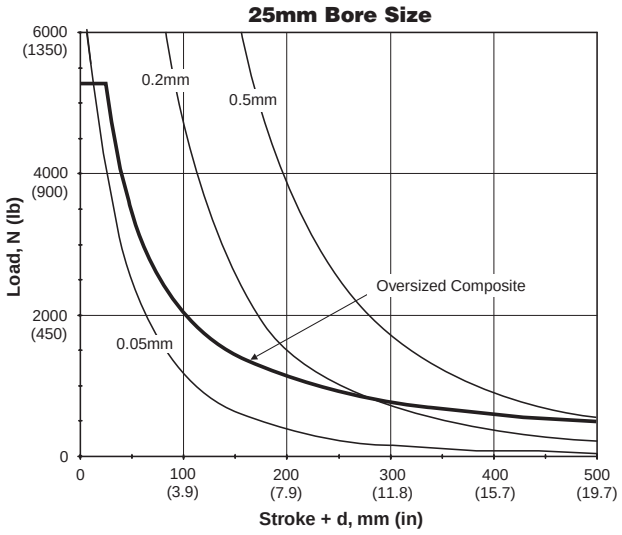
Note: The following variables commonly affect the bearing life of a guided cylinder:

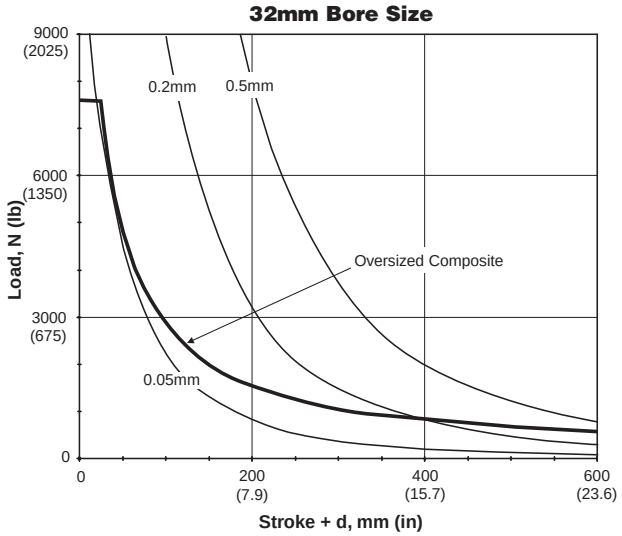
- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

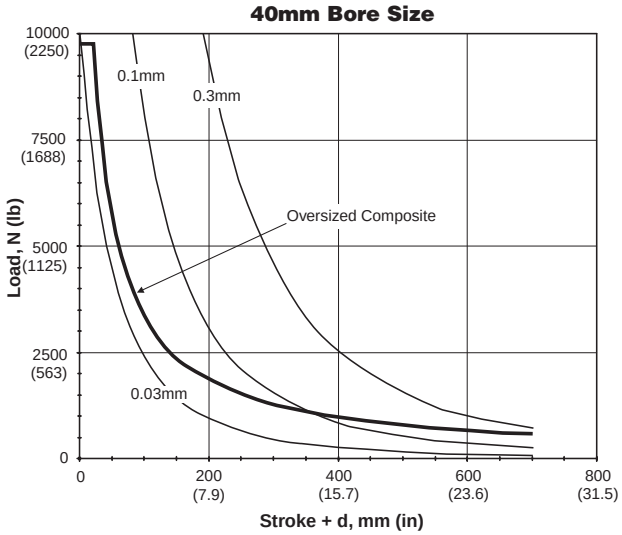
F

P5L Base Slides









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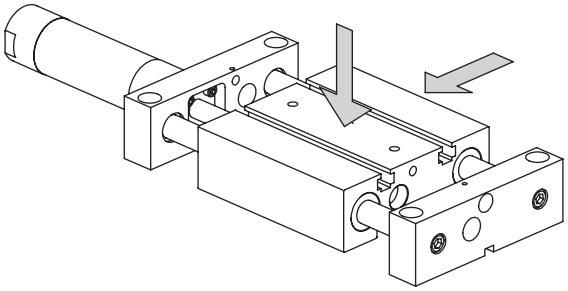
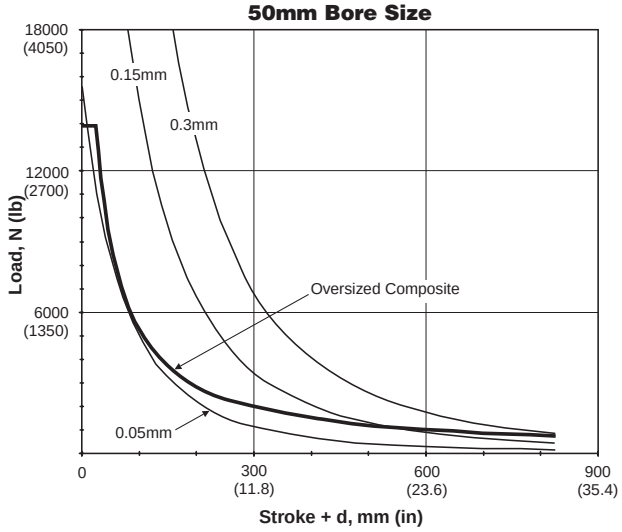
Horizontal Load Capacity & Deflection with Oversized Shafting

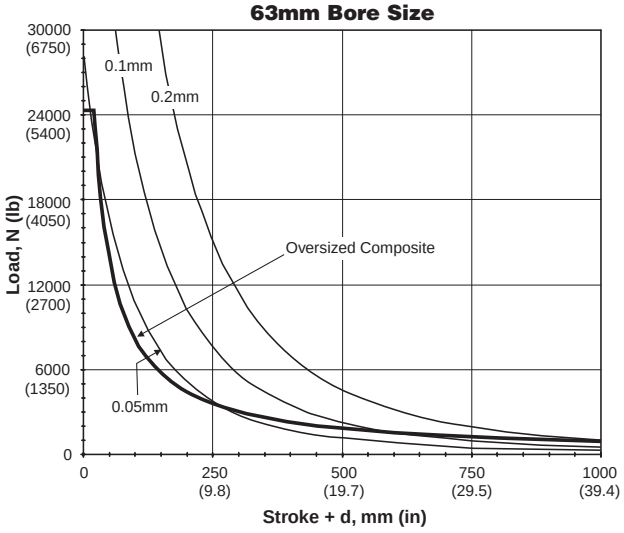


P5L Base Slides

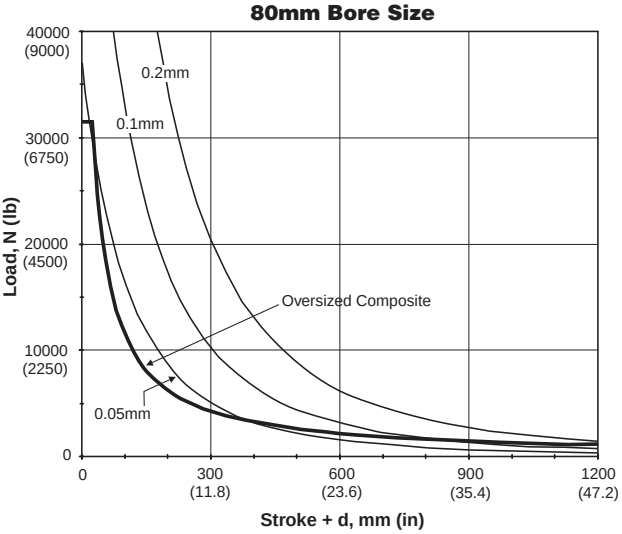
50mm Bore Size



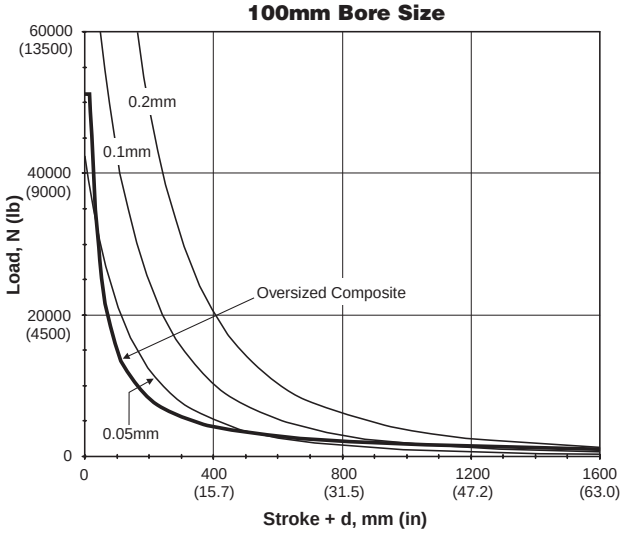
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Symmetrical Roll Torsional Loading

The graphs on these two pages illustrate the maximum suggested roll load at a given actuator stroke. It is assumed that the moment loading is acting about the centerline of the carriage. The graphs include the weight of the carriage and are based on a bearing life of 10 million cycles under a dynamic loading condition. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application. For an equivalent static load capacity multiply the information in these graphs by 1.5.

Heavy lines show loading; lighter lines show various degrees of deflection.

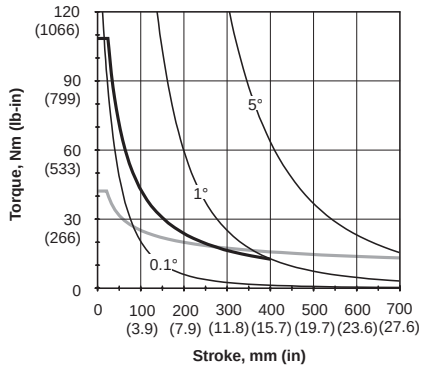
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

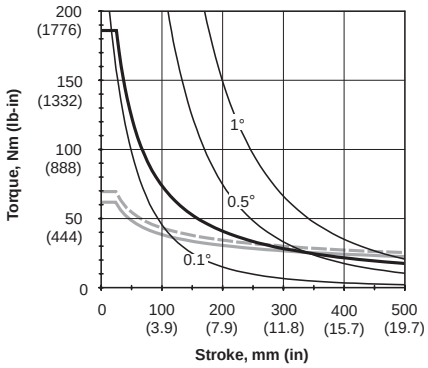
F

Standard Shafting

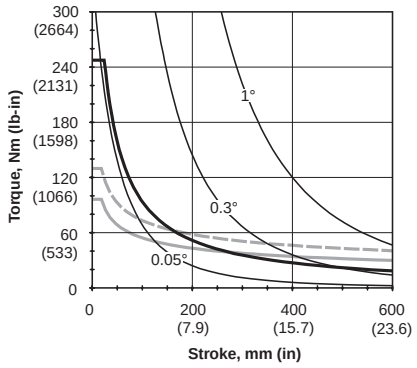
20mm Bore Size



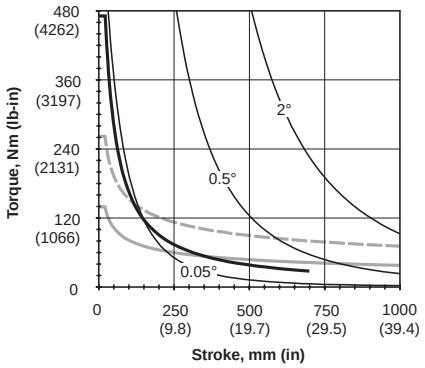
25mm Bore Size



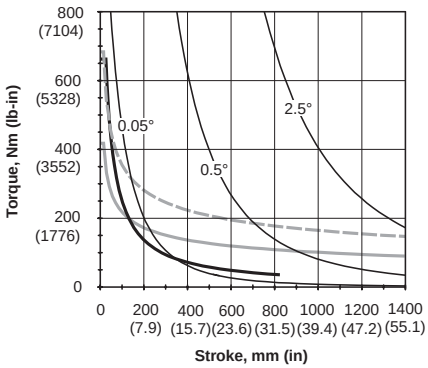
32mm Bore Size



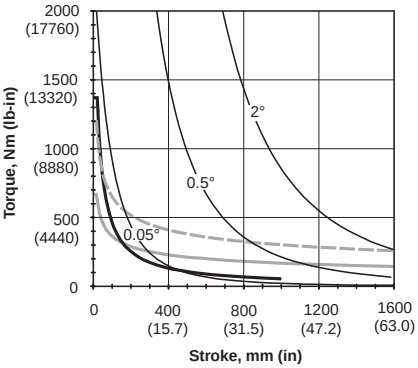
40mm Bore Size



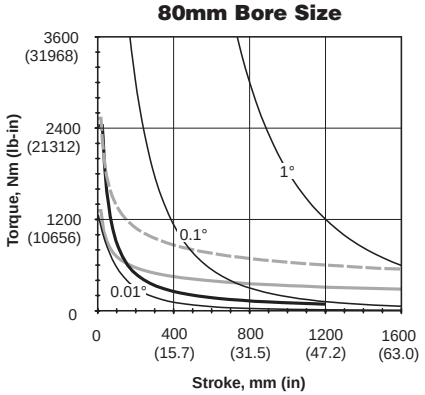
50mm Bore Size



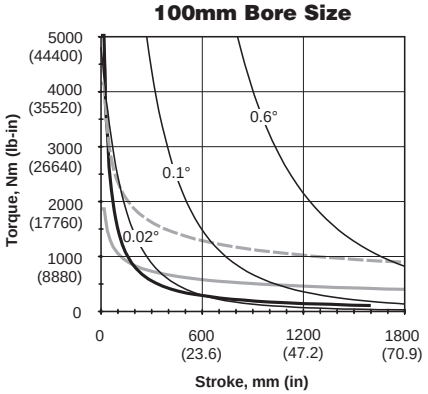
63mm Bore Size



80mm Bore Size



100mm Bore Size



LEGEND

- Standard Composite
- Recirculating Ball Bearing
- Self Aligning Ball Bearing

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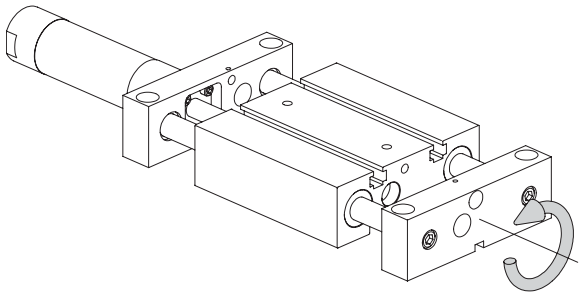
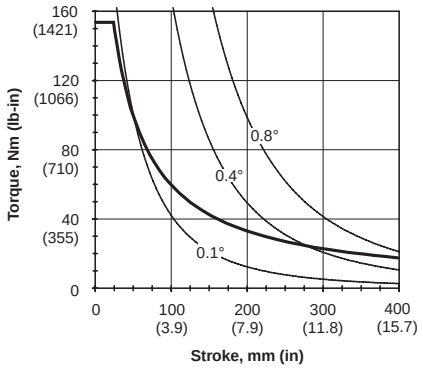
Symmetrical Roll Torsional Loading

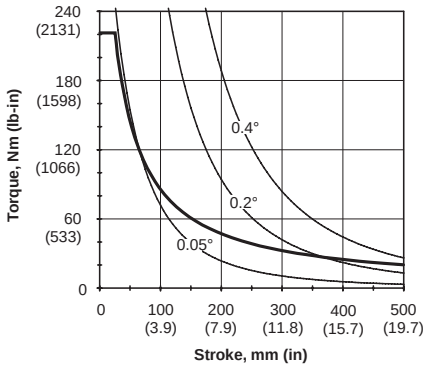


Oversized Shafting

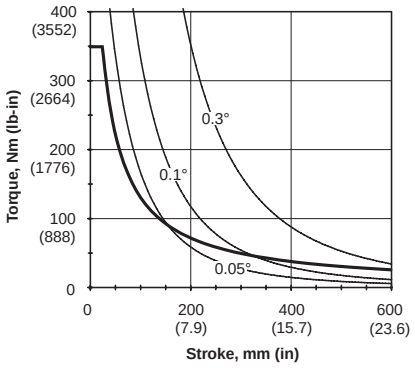
20mm Bore Size



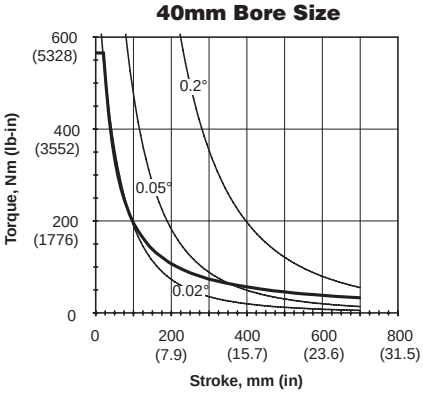
25mm Bore Size



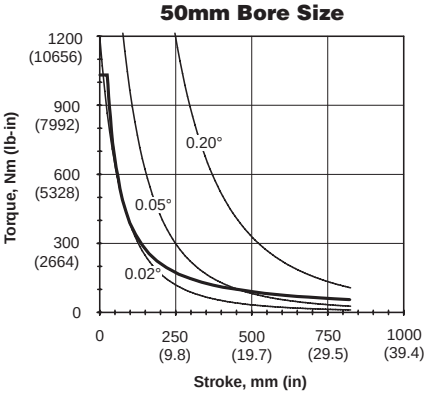
32mm Bore Size



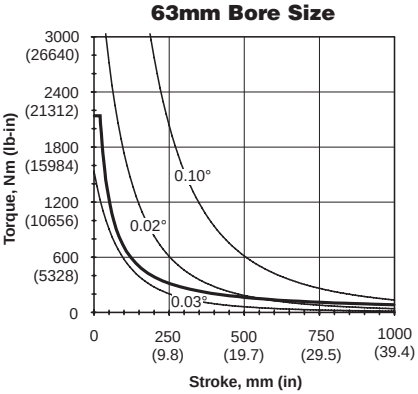
40mm Bore Size



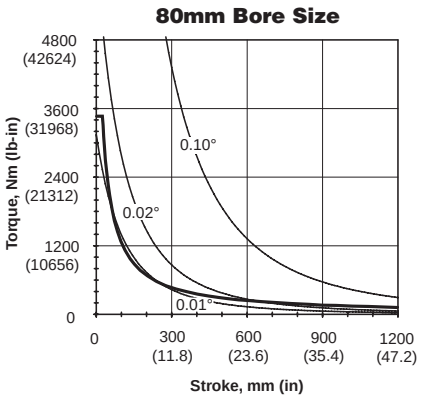
50mm Bore Size



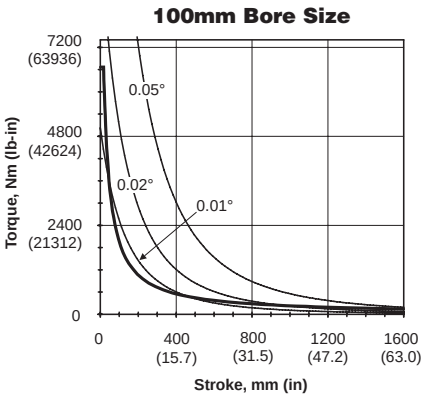
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Symmetrical Pitch Torsional Loading

The graphs on these two pages illustrate the maximum suggested pitch load at a given actuator stroke. It is assumed that the moment loading is acting about the centerline of the carriage. The graphs include the weight of the carriage and are based on a bearing life of 10 million cycles under a dynamic loading condition. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application. For an equivalent static load capacity multiply the information in these graphs by 1.5.

Heavy lines show loading; lighter lines show various degrees of deflection.

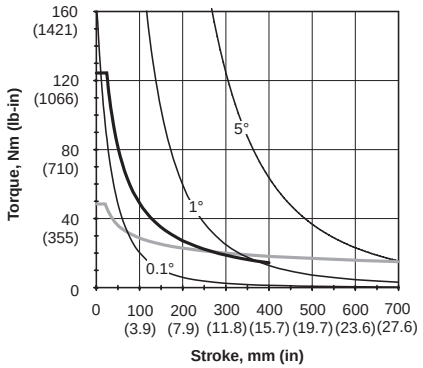
Note: The following variables commonly affect the bearing life of a guided cylinder:

- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

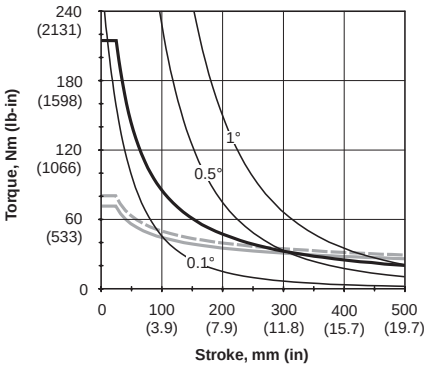
F

Standard Shafting

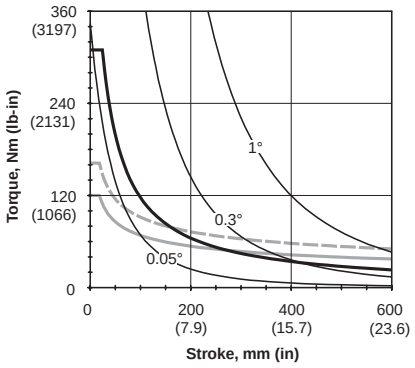
20mm Bore Size



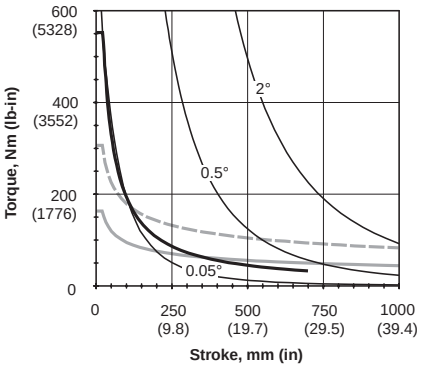
25mm Bore Size



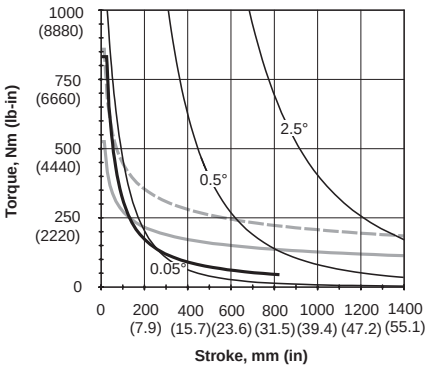
32mm Bore Size



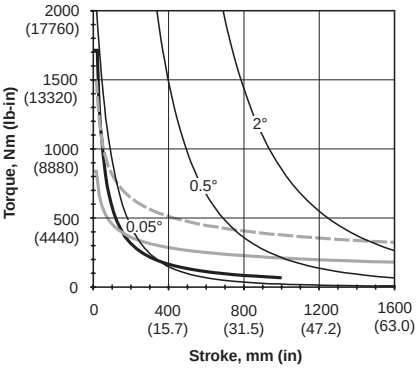
40mm Bore Size



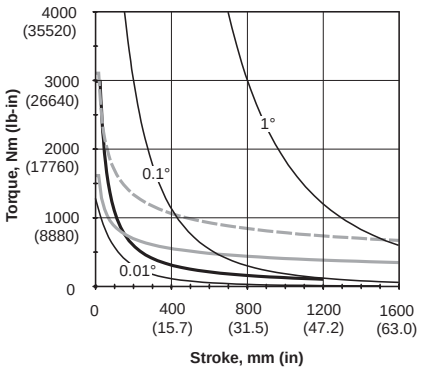
50mm Bore Size



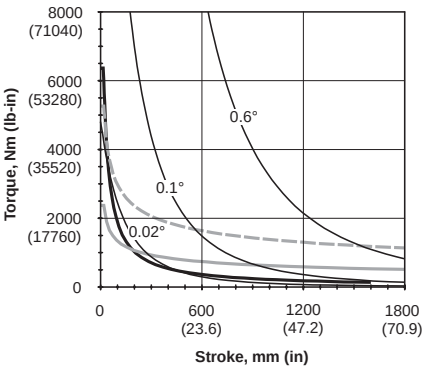
63mm Bore Size



80mm Bore Size



100mm Bore Size



LEGEND

- Standard Composite
- Recirculating Ball Bearing
- Self Aligning Ball Bearing

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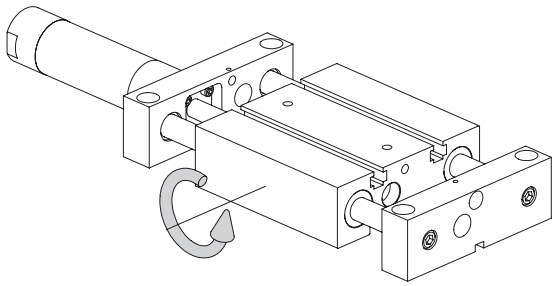
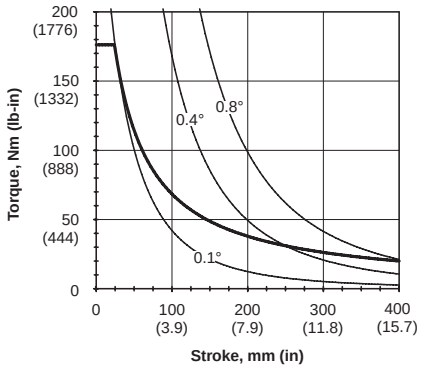
Symmetrical Pitch Torsional Loading

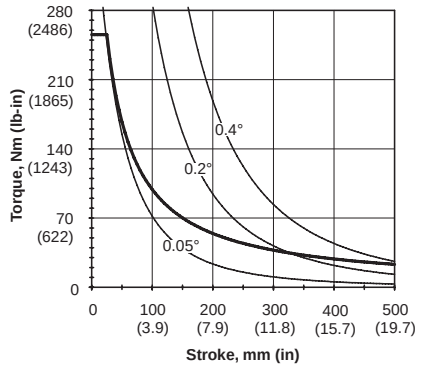


Oversized Shafting

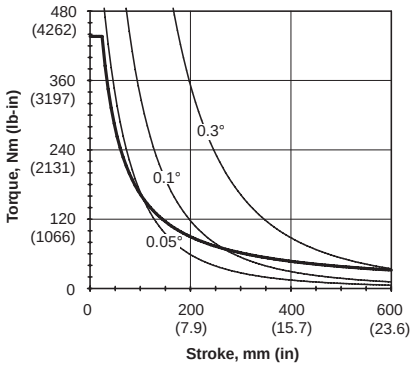
20mm Bore Size



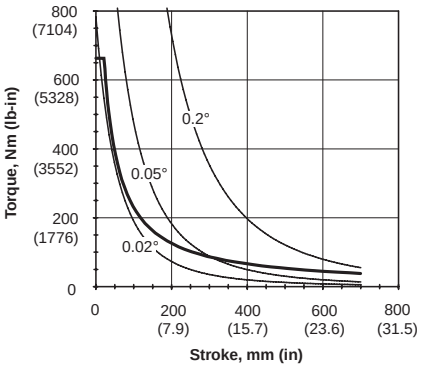
25mm Bore Size



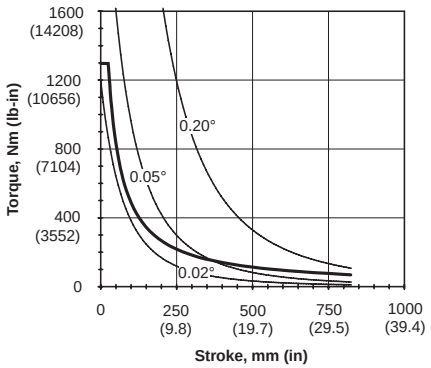
32mm Bore Size



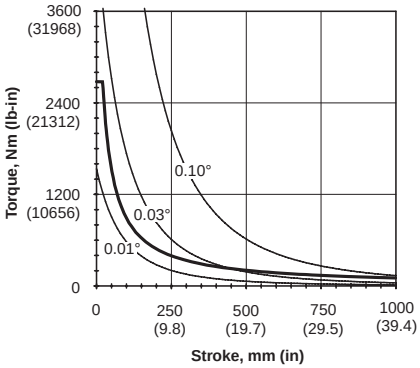
40mm Bore Size



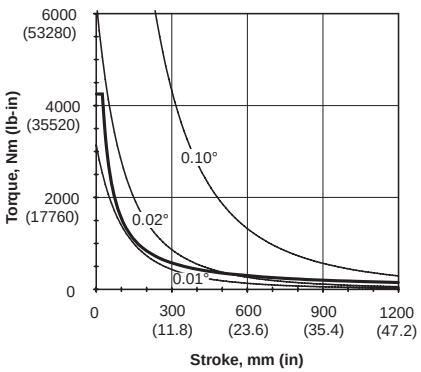
50mm Bore Size



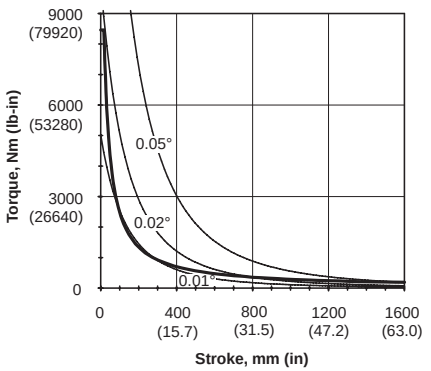
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Symmetrical Yaw Torsional Loading

The graphs on these two pages illustrate the maximum suggested yaw load at a given actuator stroke. It is assumed that the moment loading is acting about the centerline of the carriage. The graphs include the weight of the carriage and are based on a bearing life of 10 million cycles under a dynamic loading condition. Capacities are based on bearing and shafts only. Mounting bolts/hardware should be investigated per customer application. For an equivalent static load capacity multiply the information in these graphs by 1.5.

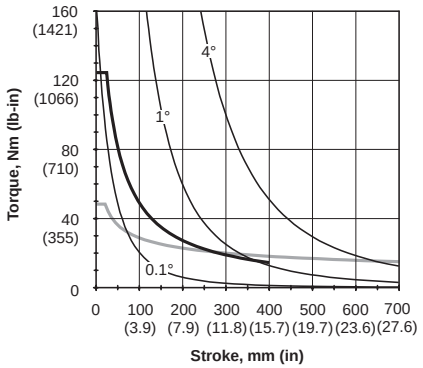
Heavy lines show loading; lighter lines show various degrees of deflection.

Note: The following variables commonly affect the bearing life of a guided cylinder:

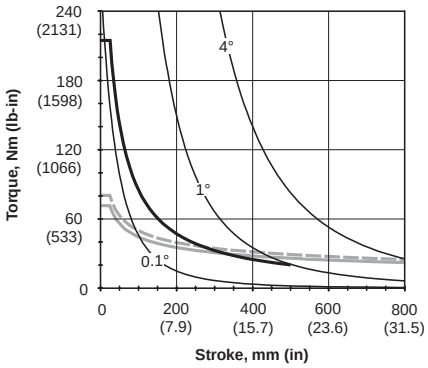
- Velocity
- Vibration
- Orientation
- Environment (Dust, moisture, etc.)

Standard Shafting

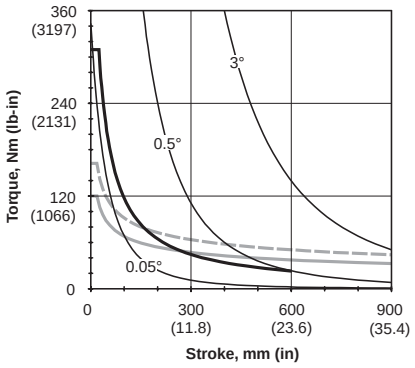
20mm Bore Size



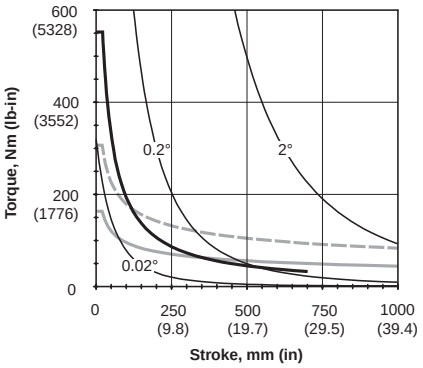
25mm Bore Size



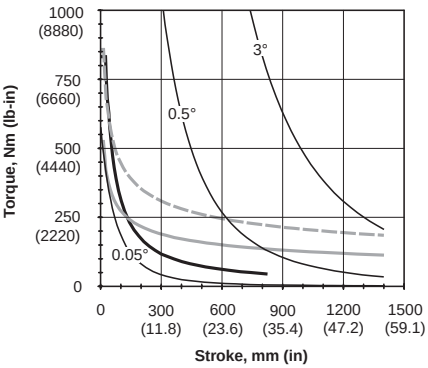
32mm Bore Size



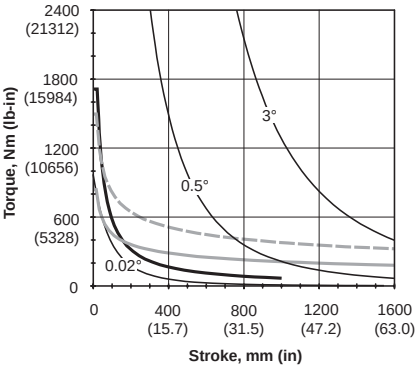
40mm Bore Size



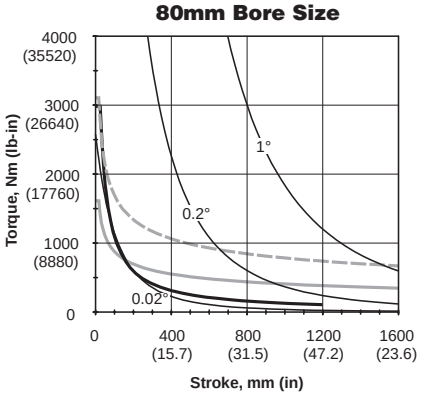
50mm Bore Size



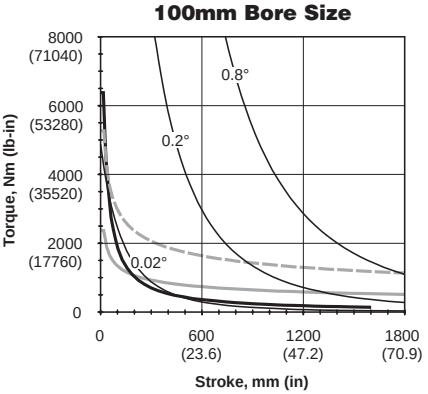
63mm Bore Size

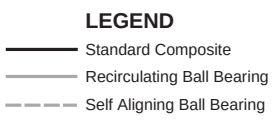


80mm Bore Size



100mm Bore Size





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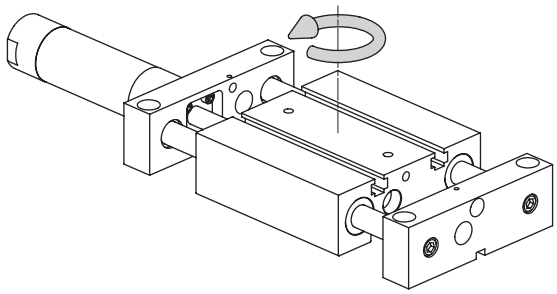
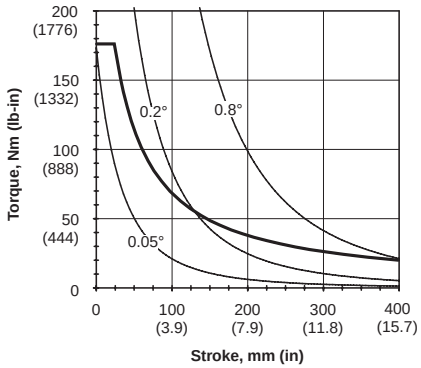
Symmetrical Yaw Torsional Loading

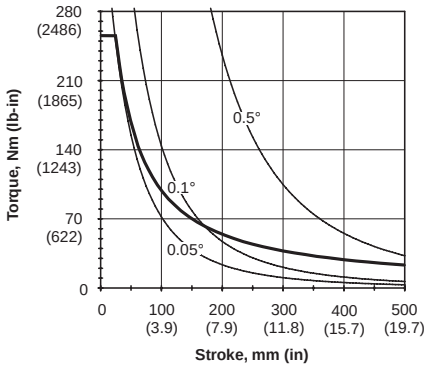


Oversized Shafting

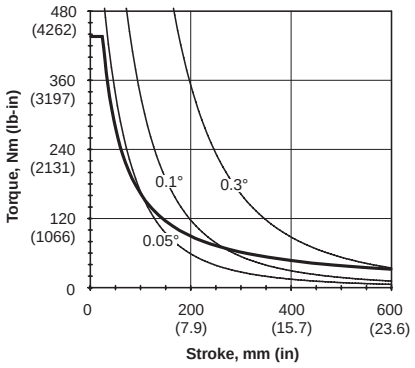
20mm Bore Size



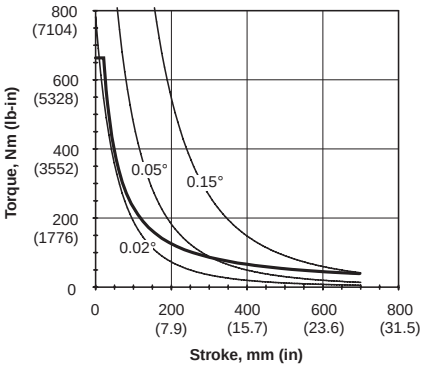
25mm Bore Size



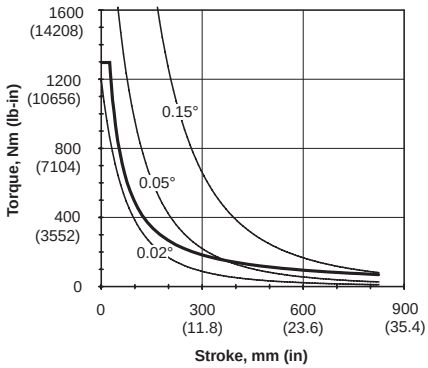
32mm Bore Size



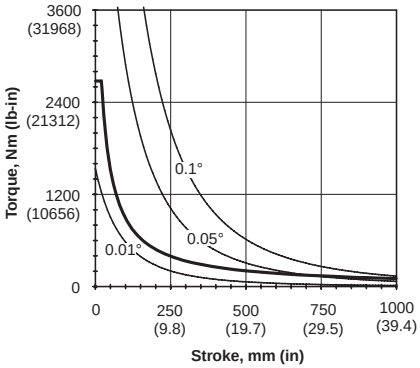
40mm Bore Size



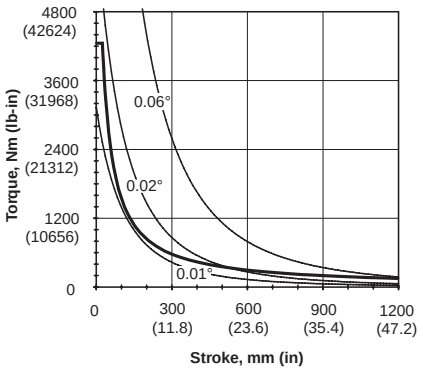
50mm Bore Size



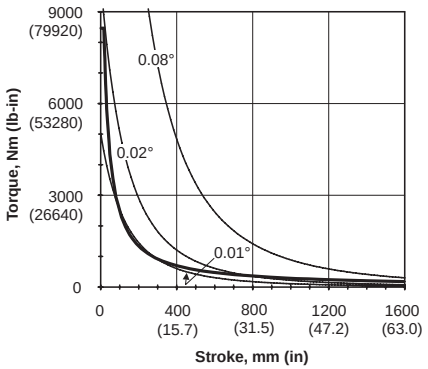
63mm Bore Size



80mm Bore Size



100mm Bore Size



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Kinetic Energy

These graphs illustrate the kinetic energy absorption of the P5L series as a weight versus speed chart for both air cushions and shock absorbers.

Moving weight is defined as the weight of the carried load and the weight of any moving parts of the actuator (support rods, tooling plate, etc.). The moving weight from the chart to the right should be considered.

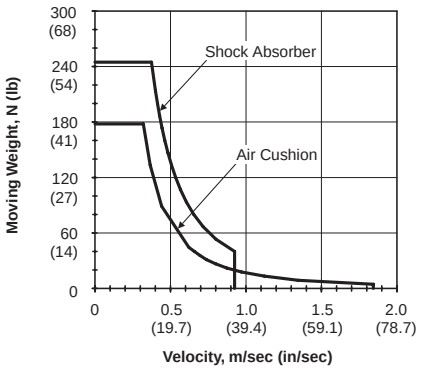
Note: These charts are to be used only to determine the energy absorption of each guided cylinder and to determine if shocks or cushions are needed.

Bore	Moving Weights (Standard Shaft)		Moving Weights (Oversized Shaft)	
	kg	lbs	kg	lbs
20	0.60	1.3	0.51	1.1
25	1.17	2.6	1.01	2.2
32	1.77	3.9	1.51	3.3
40	3.10	6.8	2.70	5.9
50	7.10	15.7	6.70	14.8
63	13.4	29.5	10.9	24.0
80	22.5	49.6	19.3	42.6
100	41.9	92.4	33.9	746.5

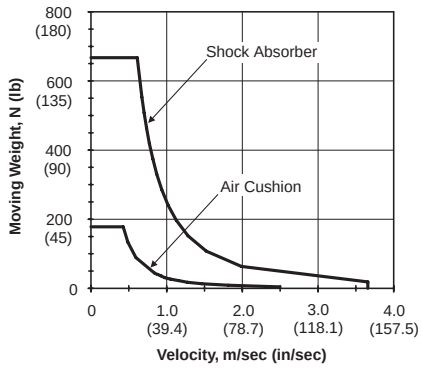
Note: Cylinder moving parts considered negligible.

P5L Base Slides

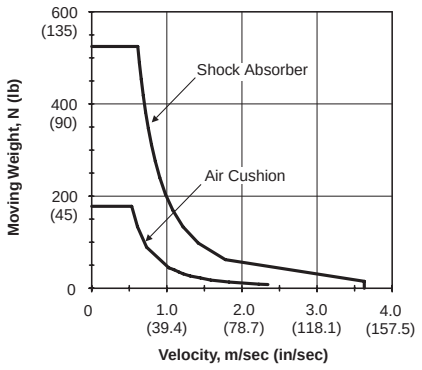
20mm Bore Size



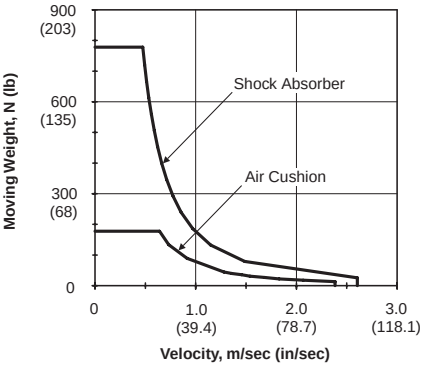
25mm Bore Size



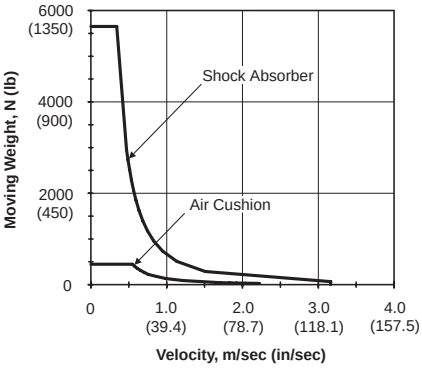
32mm Bore Size



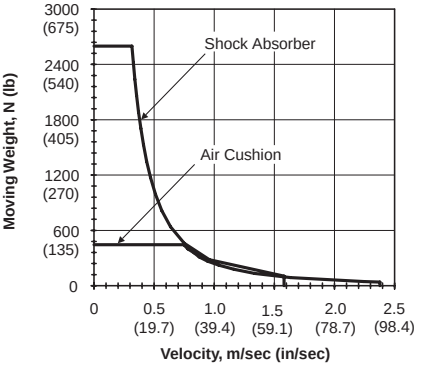
40mm Bore Size



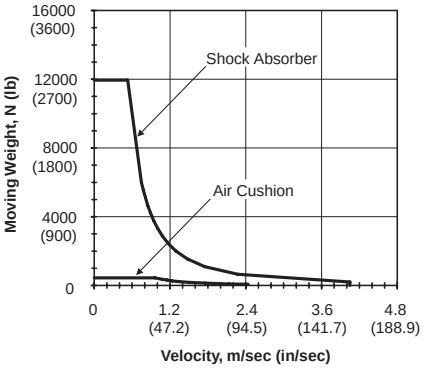
50mm Bore Size



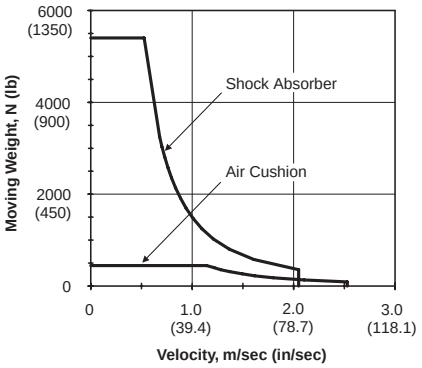
63mm Bore Size



80mm Bore Size



100mm Bore Size



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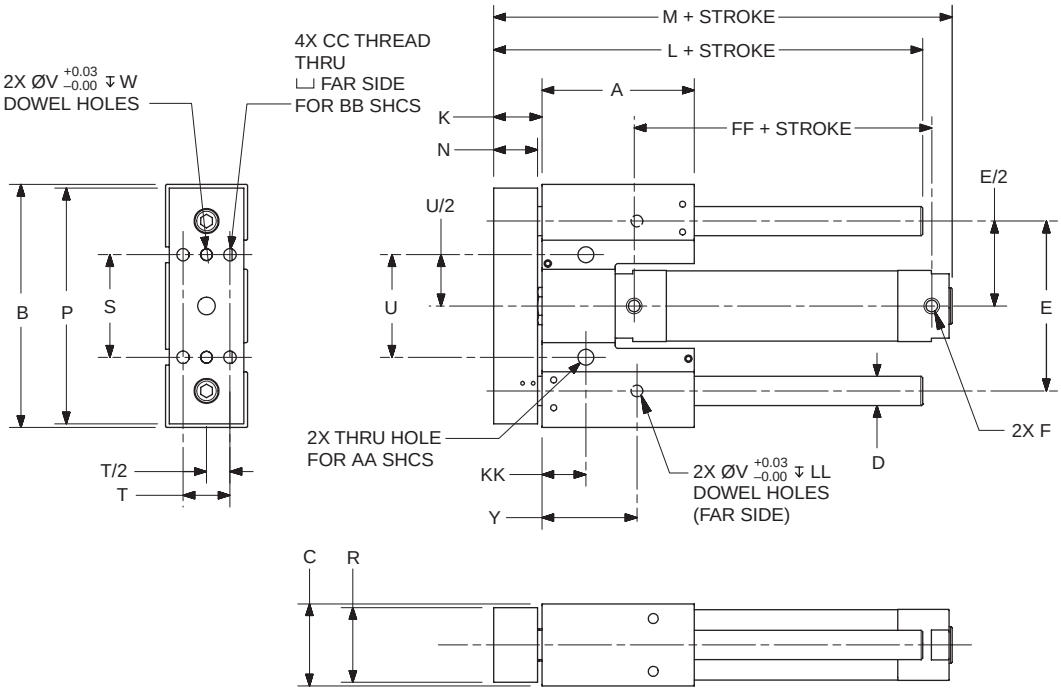
Thrust Slides



Bore	A	B	C	Ds*	Do*	E	F**	K	L	M	N	P	R
20	60 (2.4)	98 (3.9)	30 (1.2)	10 (0.4)	12 (0.5)	68 (2.7)	1/8†	20 (0.8)	86 (3.4)	114 (4.5)	17 (0.7)	96 (3.8)	26 (1.0)
25	76 (3.0)	122 (4.8)	38 (1.5)	12 (0.5)	16 (0.6)	84 (3.3)	1/8†	25 (1.0)	107 (4.2)	126 (5.0)	22 (0.9)	119 (4.7)	33 (1.3)
32	84 (3.3)	140 (5.5)	44 (1.7)	16 (0.6)	20 (0.8)	92 (3.6)	1/8	27 (1.1)	117 (4.6)	140 (5.5)	24 (0.9)	137 (5.4)	39 (1.5)
40	104 (4.1)	166 (6.5)	56 (2.2)	20 (0.8)	25 (1.0)	116 (4.6)	1/8	33 (1.3)	143 (5.6)	163 (6.4)	30 (1.2)	161 (6.3)	51 (2.0)
50	130 (5.1)	216 (8.5)	70 (2.8)	25 (1.0)	30 (1.2)	148 (5.8)	1/4	39 (1.5)	175 (6.9)	195 (7.7)	36 (1.4)	211 (8.3)	63 (2.5)
63	152 (6.0)	260 (10.2)	84 (3.3)	30 (1.2)	40 (1.6)	176 (6.9)	1/4	43 (1.7)	203 (8.0)	219 (8.6)	40 (1.6)	255 (10.0)	77 (3.0)
80	180 (7.1)	320 (12.6)	102 (4.0)	40 (1.6)	50 (2.0)	220 (8.7)	3/8	49 (1.9)	237 (9.3)	249 (9.8)	46 (1.8)	315 (12.4)	95 (3.7)
100	222 (8.7)	390 (15.4)	120 (4.7)	50 (2.0)	60 (2.4)	260 (10.2)	1/2	59 (2.3)	289 (11.4)	306 (12.0)	56 (2.2)	383 (15.1)	111 (4.4)

Bore	S	T	U	V	W	Y	AA	BB	CC	FF	KK	LL
20	40 (1.6)	16 (0.6)	40 (1.6)	4.03 (0.2)	4 (0.2)	36 (1.4)	M5	M4	M5x0.8	45 (1.8)	16 (0.6)	4 (0.2)
25	48 (1.9)	20 (0.8)	48 (1.9)	5.03 (0.2)	5 (0.2)	46 (1.8)	M6	M5	M6x1.0	46 (1.8)	22 (0.9)	5 (0.2)
32	50 (2.0)	24 (0.9)	50 (2.0)	6.03 (0.2)	6 (0.2)	53 (2.1)	M8	M6	M8x1.25	43 (1.7)	28 (1.1)	6 (0.2)
40	70 (2.8)	32 (1.3)	70 (2.8)	8.03 (0.3)	8 (0.3)	65 (2.6)	M10	M8	M10x1.5	49 (1.9)	30 (1.2)	8 (0.3)
50	80 (3.1)	42 (1.7)	80 (3.1)	8.03 (0.3)	8 (0.3)	83 (3.3)	M10	M8	M10x1.5	53 (2.1)	43 (1.7)	8 (0.3)
63	100 (3.9)	52 (2.0)	100 (3.9)	10.03 (0.4)	10 (0.4)	101 (4.0)	M12	M10	M12x1.75	52 (2.0)	51 (2.0)	10 (0.4)
80	124 (4.9)	62 (2.4)	124 (4.9)	12.03 (0.5)	12 (0.5)	127 (5.0)	M16	M14	M16x1.5	64 (2.5)	65 (2.6)	12 (0.5)
100	148 (5.8)	72 (2.8)	148 (5.8)	12.03 (0.5)	12 (0.5)	154 (6.1)	M20	M16	M20x2.5	66 (2.6)	80 (3.1)	12 (0.5)

Dimensions in mm (in) ** s = standard, o = oversized* *** NPTF or BSPT* *† w/cushions M5/10-32*

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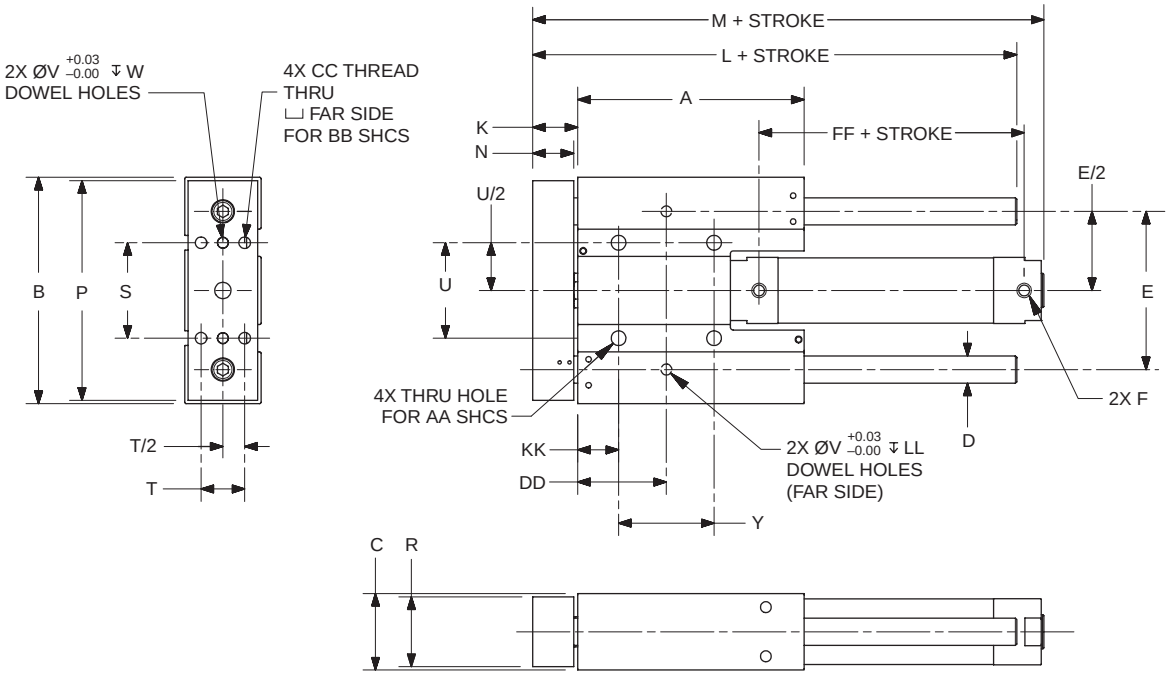
Reach Slides



Bore	A	B	C	Ds*	Do*	E	F**	K	L	M	N	P	R
20	98 (3.9)	98 (3.9)	30 (1.2)	10 (0.4)	12 (0.5)	68 (2.7)	1/8†	20 (0.8)	124 (4.9)	152 (6.0)	17 (0.7)	96 (3.8)	26 (1.0)
25	122 (4.8)	122 (4.8)	38 (1.5)	12 (0.5)	16 (0.6)	84 (3.3)	1/8†	25 (1.0)	153 (6.0)	172 (6.8)	22 (0.9)	119 (4.7)	33 (1.3)
32	140 (5.5)	140 (5.5)	44 (1.7)	16 (0.6)	20 (0.8)	92 (3.6)	1/8	27 (1.1)	173 (6.8)	196 (7.7)	24 (0.9)	137 (5.4)	39 (1.5)
40	166 (6.5)	166 (6.5)	56 (2.2)	20 (0.8)	25 (1.0)	116 (4.6)	1/8	33 (1.3)	205 (8.1)	225 (8.9)	30 (1.2)	161 (6.3)	51 (2.0)
50	216 (8.5)	216 (8.5)	70 (2.8)	25 (1.0)	30 (1.2)	148 (5.8)	1/4	39 (1.5)	261 (10.3)	281 (11.1)	36 (1.4)	211 (8.3)	63 (2.5)
63	260 (10.2)	260 (10.2)	84 (3.3)	30 (1.2)	40 (1.6)	176 (6.9)	1/4	43 (1.7)	311 (12.2)	327 (12.9)	40 (1.6)	255 (10.0)	77 (3.0)
80	320 (12.6)	320 (12.6)	102 (4.0)	40 (1.6)	50 (2.0)	220 (8.7)	3/8	49 (1.9)	377 (14.8)	389 (15.3)	46 (1.8)	315 (12.4)	9 (3.7)
100	390 (15.4)	390 (15.4)	120 (4.7)	50 (2.0)	60 (2.4)	260 (10.2)	1/2	59 (2.3)	457 (18.0)	474 (18.7)	56 (2.2)	383 (15.1)	111 (4.4)

Bore	S	T	U	V	W	Y	AA	BB	CC	DD	FF	KK	LL
20	40 (1.6)	16 (0.6)	40 (1.6)	4.03 (0.2)	4 (0.2)	40 (1.6)	M5	M4	M5X0.8	36 (1.4)	45 (1.8)	16 (0.6)	4 (0.2)
25	48 (1.9)	20 (0.8)	48 (1.9)	5.03 (0.2)	5 (0.2)	48 (1.9)	M6	M5	M6X1.0	46 (1.8)	46 (1.8)	22 (0.9)	5 (0.2)
32	50 (2.0)	24 (0.9)	50 (2.0)	6.03 (0.2)	6 (0.2)	50 (2.0)	M8	M6	M8X1.25	53 (2.1)	43 (1.7)	28 (1.1)	6 (0.2)
40	70 (2.8)	32 (1.3)	70 (2.8)	8.03 (0.3)	8 (0.3)	70 (2.8)	M10	M8	M10X1.5	65 (2.6)	49 (1.9)	30 (1.2)	8 (0.3)
50	80 (3.1)	42 (1.7)	80 (3.1)	8.03 (0.3)	8 (0.3)	80 (3.1)	M10	M8	M10X1.5	83 (3.3)	53 (2.1)	43 (1.7)	8 (0.3)
63	100 (3.9)	52 (2.0)	100 (3.9)	10.03 (0.4)	10 (0.4)	100 (3.9)	M12	M10	M12X1.75	101 (4.0)	52 (2.0)	51 (2.0)	10 (0.4)
80	124 (4.9)	62 (2.4)	124 (4.9)	12.03 (0.5)	12 (0.5)	124 (4.9)	M16	M14	M16X1.5	127 (5.0)	64 (2.5)	65 (2.6)	12 (0.5)
100	148 (5.8)	72 (2.8)	148 (5.8)	12.03 (0.5)	12 (0.5)	148 (5.8)	M20	M16	M20X2.5	154 (6.1)	66 (2.6)	80 (3.1)	12 (0.5)

Dimensions in mm (in) ** s = standard, o = oversized* *** NPTF or BSPT* *† w/cushions M5/10-32*

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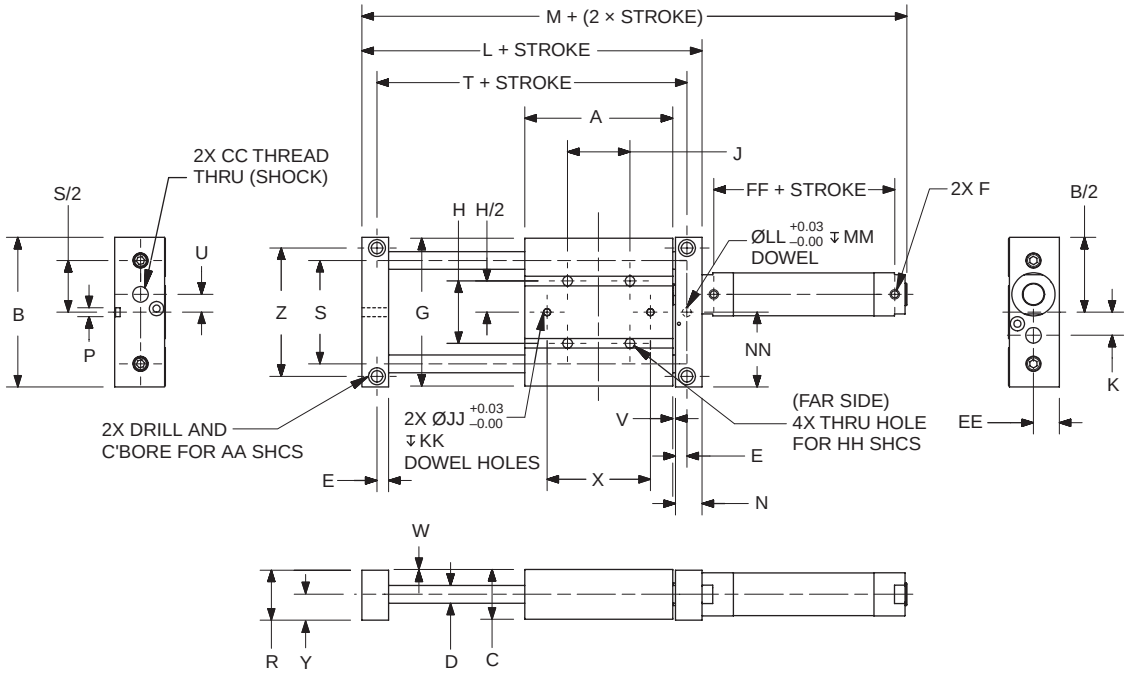
Base Slides



Bore	A	B	C	Ds*	Do*	E	F**	G	H	J	K	L	M	N	P+.03	R	S
20	98 (3.9)	100 (3.9)	30 (1.2)	10 (0.4)	12 (0.5)	8 (0.3)	1/8†	98 (3.9)	40 (1.6)	40 (1.6)	18 (0.7)	140 (5.5)	211 (8.3)	18 (0.7)	5.03 (0.2)	30 (1.2)	68 (2.7)
25	122 (4.8)	124 (4.9)	38 (1.5)	12 (0.5)	16 (0.6)	14 (0.6)	1/8†	122 (4.8)	48 (1.9)	48 (1.9)	22 (0.9)	176 (6.9)	247 (9.7)	24 (0.9)	6.03 (0.2)	38 (1.5)	84 (3.3)
32	140 (5.5)	142 (5.6)	44 (1.7)	16 (0.6)	20 (0.8)	12 (0.5)	1/8	140 (5.5)	50 (2.0)	50 (2.0)	22 (0.9)	198 (7.8)	271 (10.7)	26 (1.0)	6.03 (0.2)	44 (1.7)	92 (3.6)
40	166 (6.5)	168 (6.6)	56 (2.2)	20 (0.8)	25 (1.0)	13 (0.5)	1/8	166 (6.5)	70 (2.8)	70 (2.8)	26 (1.0)	232 (9.1)	312 (12.3)	30 (1.2)	10.03 (0.4)	56 (2.2)	116 (4.6)
50	216 (8.5)	218 (8.6)	70 (2.8)	25 (1.0)	30 (1.2)	16 (0.6)	1/4	216 (8.5)	80 (3.1)	80 (3.1)	28 (1.1)	292 (11.5)	384 (15.1)	35 (1.4)	10.03 (0.4)	70 (2.8)	148 (5.8)
63	260 (10.2)	262 (10.3)	84 (3.3)	30 (1.2)	40 (1.6)	19 (0.7)	1/4	260 (10.2)	100 (3.9)	100 (3.9)	42 (1.7)	350 (13.8)	442 (17.4)	42 (1.7)	12.03 (0.5)	84 (3.3)	176 (6.9)
80	320 (12.6)	322 (12.7)	102 (4.0)	40 (1.6)	50 (2.0)	24 (0.9)	3/8	320 (12.6)	124 (4.9)	124 (4.9)	42 (1.7)	434 (17.1)	545 (21.5)	54 (2.1)	16.03 (0.6)	102 (4.0)	220 (8.7)
100	390 (15.4)	392 (15.4)	120 (4.7)	50 (2.0)	60 (2.4)	28 (1.1)	1/2	390 (15.4)	148 (5.8)	148 (5.8)	62 (2.4)	528 (20.8)	639 (25.2)	66 (2.6)	16.03 (0.6)	120 (4.7)	260 (10.2)

Bore	T	U	V***	W	X	Y	Z	AA	CC	EE	FF	HH	JJ	KK	LL	MM	NN
20	120 (4.7)	11 (0.4)	3 (0.1)	1 (0.0)	68 (2.7)	14 (0.6)	86 (3.4)	M6	M12	16 (0.6)	45 (1.8)	M5	4.03 (0.2)	4 (0.2)	5.03 (0.2)	5 (0.2)	50 (2.0)
25	156 (6.1)	12 (0.5)	3 (0.1)	1 (0.0)	84 (3.3)	18 (0.7)	104 (4.1)	M8	M14	20 (0.8)	46 (1.8)	M6	5.03 (0.2)	5 (0.2)	6.03 (0.2)	6 (0.2)	62 (2.4)
32	170 (6.7)	11 (0.4)	3 (0.1)	1 (0.0)	92 (3.6)	21 (0.8)	120 (4.7)	M10	M14	23 (0.9)	43 (1.7)	M8	6.03 (0.2)	6 (0.2)	6.03 (0.2)	6 (0.2)	71 (2.8)
40	198 (7.8)	20 (0.8)	3 (0.1)	1 (0.0)	116 (4.6)	27 (1.1)	144 (5.7)	M12	M20	29 (1.1)	49 (1.9)	M10	8.03 (0.3)	8 (0.3)	10.03 (0.4)	10 (0.4)	84 (3.3)
50	254 (10.0)	22 (0.9)	3 (0.1)	1 (0.0)	148 (5.8)	34 (1.3)	188 (7.4)	M16	M25	36 (1.4)	53 (2.1)	M10	8.03 (0.3)	8 (0.3)	10.03 (0.4)	10 (0.4)	109 (4.3)
63	304 (12.0)	30 (1.2)	3 (0.1)	1 (0.0)	176 (6.9)	41 (1.6)	224 (8.8)	M20	M25	43 (1.7)	52 (2.0)	M12	10.03 (0.4)	10 (0.4)	12.03 (0.5)	12 (0.5)	131 (5.2)
80	374 (4.7)	36 (1.4)	3 (0.1)	1 (0.0)	220 (8.7)	50 (2.0)	276 (10.9)	M24	M33	52 (2.0)	64 (2.5)	M16	12.03 (0.5)	12 (0.5)	16.03 (0.6)	16 (0.6)	161 (6.3)
100	452 (17.8)	36 (1.4)	3 (0.1)	1 (0.0)	260 (10.2)	59 (2.3)	336 (13.2)	M30	M36	61 (2.4)	66 (2.6)	M20	12.03 (0.5)	12 (0.5)	16.03 (0.6)	16 (0.6)	196 (7.7)

** s = standard; o = oversized* *** NPTF or BSPT* *† w/cushions M5/10-32*

**** Space between housing and end plate in both extend and retract positions.*

Dimensions in mm (in)

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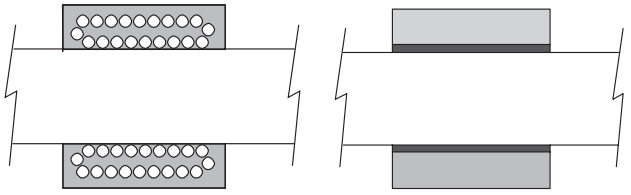
Bushings (J*, G*, H*, S*)

Several bushing, bearing and shaft options are available. To assure maximum life from the P5L guidance system, it is critical to match the bearing and shaft type to the application and environment it will be used in.

For bushing load capacities, reference the Engineering Data pages of this section.



Recirculating Ball Bearing | Composite Bushing

Bearing Type	Load Capacity		Stroke Lengths	Wet Environment	Wear Characteristics
	Short Stroke	Long Strokes			
Composite	Very Good	Average	Short	Excellent	Good
Recirculating Ball Bearings	Good*	Very Good	Long	Poor	Excellent
Self-Aligning Recirculating Ball Bearings	Good*	Excellent	Longest	Poor	Excellent

*It is not recommended to use ball bearings in extremely short strokes subject to rapid cycling

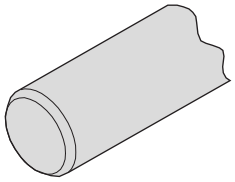
Note: Stainless steel shafts should be used in damp or wet environments

F

Stainless Steel Shafts

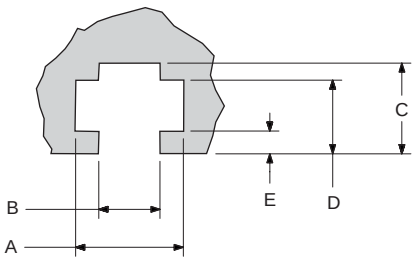
Case hardened, high carbon alloy steel shafting is utilized for standard slides. Stainless steel shafting can be specified for corrosive applications.

Note: Carbon steel rods should not be used in any application subject to any amount of moisture.



T-Slots (-, A)

Mounting T-slots provide quick and flexible mounting between base, thrust and reach slides. Extruded T-slots are standard on models with bore sizes 20-40mm. Machined T-slots are optional on models with bore sizes from 50-100mm.



Dimensions in mm (in)

Bore	A	B	C	D	E
20	10.0 (0.39)	5.8 (0.23)	9.0 (0.35)	7.0 (0.28)	2.0 (0.08)
25	12.0 (0.47)	6.8 (0.27)	12.0 (0.47)	9.0 (0.35)	3.0 (0.12)
32	15.0 (0.59)	8.8 (0.35)	14.0 (0.55)	11.0 (0.43)	3.5 (0.14)
40	19.0 (0.75)	10.8 (0.43)	15.0 (0.59)	12.0 (0.47)	3.0 (0.12)
50	19.0 (0.75)	10.8 (0.43)	16 (0.63)	13 (0.51)	4.0 (0.16)
63	21 (0.83)	12.8 (0.50)	21.5 (0.85)	18.5 (0.73)	7.5 (0.30)
80	27 (1.06)	16.8 (0.66)	29.5 (1.16)	24.5 (0.96)	9.5 (0.37)
100	33 (1.30)	21 (0.83)	35 (1.38)	30 (1.18)	12.5 (0.49)

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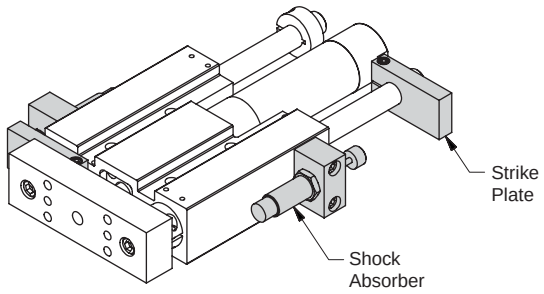
Shock Absorbers

Optional adjustable shock absorbers are available on the P5L series. When specifying this option verify the kinetic energy on pages F72-F73.

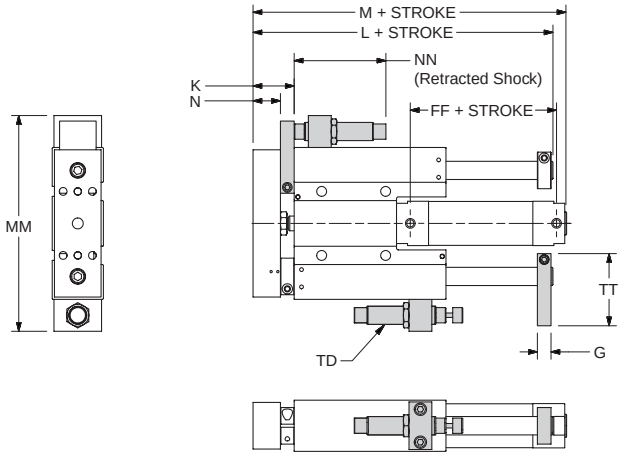
To achieve proper operation it is important to adjust the shock absorber per the application. To properly adjust the shock absorber, cycle the guided cylinder to impact the shock absorber. Rotate the shock adjustment knob, located on the front or the rear of the shock, to achieve a smooth deceleration. Reducing the setting (achieved by rotating the adjustment knob in the counterclockwise direction or towards 9) decreases the resistance. Increasing the setting (achieved by rotating the adjustment in the clockwise direction of towards 0) increases the resistance. A properly adjusted shock absorber will provide smooth deceleration through the stroke of the shock.

The shock absorber option can also be used as a stroke adjuster. To adjust the stroke of the actuator, loosen the socket head cap screw on the striker plate.

Note: Using the shock absorber option as a stroke adjuster will only reduce the actuator stroke from a maximum value given in the actuator part number and cannot add additional stroke.



Shock Absorbers Extend and Retract (AA)



Bore	Gs*	Ks*	Go*	Ko*	Thrust			Reach			N	FF	MM	NN	TD	TT
					Ls*	Lo*	M	Ls*	Lo*	M						
20	9 (0.4)	26 (1.0)	11 (0.4)	28 (1.1)	100 (3.9)	102 (4.0)	126 (5.0)	138 (5.4)	140 (5.5)	164 (6.5)	17 (0.7)	51 (2.0)	136 (5.4)	74 (2.9)	M12X1.0	48 (1.9)
25	11 (0.4)	33 (1.3)	13 (0.5)	35 (1.4)	123 (4.8)	127 (5.0)	140 (5.5)	169 (6.7)	173 (6.8)	186 (7.3)	22 (0.9)	52 (2.0)	170 (6.7)	80.1 (3.2)	M14X1.5	57 (2.2)
32	13 (0.5)	37 (1.5)	15 (0.6)	39 (1.5)	136 (5.4)	140 (5.5)	156 (6.1)	192 (7.6)	196 (7.7)	212 (8.3)	24 (0.9)	49 (1.9)	188 (7.4)	80.1 (3.2)	M14X1.5	66 (2.6)
40	15 (0.6)	45 (1.8)	15 (0.6)	45 (1.8)	166 (6.5)	166 (6.5)	181 (7.1)	228 (9.0)	228 (9.0)	243 (9.6)	30 (1.2)	55 (2.2)	236 (9.3)	99.5 (3.9)	M20X1.5	79 (3.1)
50	15 (0.6)	51 (2.0)	15 (0.6)	51 (2.0)	198 (7.8)	198 (7.8)	213 (8.4)	284 (11.2)	284 (11.2)	299 (11.8)	36 (1.4)	59 (2.3)	296 (11.7)	117.3 (4.6)	M25X1.5	98 (3.9)
63	15 (0.6)	55 (2.2)	15 (0.6)	55 (2.2)	224 (8.8)	224 (8.8)	237 (9.3)	332 (13.1)	332 (13.1)	345 (13.6)	40 (1.6)	58 (2.3)	340 (13.4)	117.3 (4.6)	M25X1.5	108 (4.3)
80	15 (0.6)	61 (2.4)	19 (0.7)	65 (2.6)	258 (10.2)	266 (10.5)	267 (10.5)	398 (15.7)	406 (15.6)	407 (16.0)	46 (1.8)	70 (2.8)	416 (16.4)	140.5 (5.5)	M33X1.5	126 (5.0)
100	19 (0.7)	75 (3.0)	19 (0.7)	75 (3.0)	318 (12.5)	318 (12.5)	328 (12.9)	486 (19.1)	486 (19.1)	496 (19.5)	56 (2.2)	72 (2.8)	498 (19.6)	140.5 (5.5)	M36X1.5	157 (6.2)

Dimensions in mm (in) ** s = standard, o = oversized*

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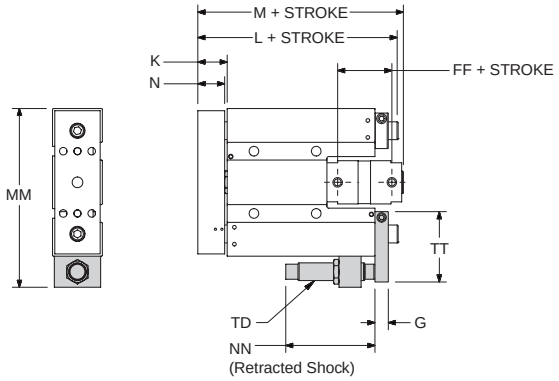
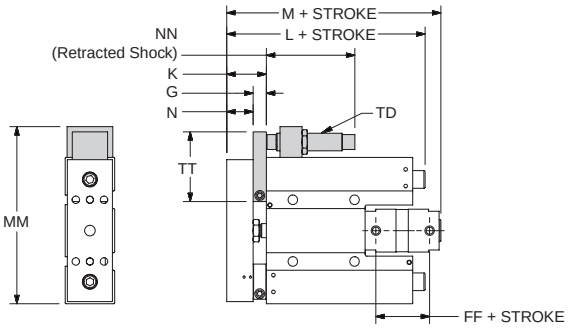
Shock Absorbers
Extend Only (AN)



Bore	Gs*	Go*	K	Thrust			Reach			N	FF	MM	NN	TD	TT
				Ls*	Lo*	M	Ls*	Lo*	M						
20	9 (0.4)	11 (0.4)	20 (0.8)	100 (3.9)	102 (4.0)	117 (4.6)	138 (5.4)	140 (5.5)	153 (6.0)	17 (0.7)	48 (1.9)	117 (4.6)	74 (2.9)	M12x1.0	48 (1.9)
25	11 (0.4)	13 (0.5)	25 (1.0)	123 (4.8)	127 (5.0)	129 (5.1)	169 (6.7)	173 (6.8)	185 (7.3)	22 (0.9)	49 (1.9)	146 (5.7)	80.1 (3.2)	M14x1.5	57 (2.2)
32	13 (0.5)	15 (0.6)	27 (1.1)	136 (5.4)	140 (5.5)	143 (5.6)	192 (7.6)	196 (7.7)	197 (7.8)	24 (0.9)	46 (1.8)	164 (6.5)	80.1 (3.2)	M14x1.5	66 (2.6)
40	15 (0.6)	15 (0.6)	33 (1.3)	166 (6.5)	166 (6.5)	166 (6.5)	228 (9.0)	228 (9.0)	228 (9.0)	30 (1.2)	52 (2.0)	201 (7.9)	99.5 (3.9)	M20x1.5	79 (3.1)
50	15 (0.6)	15 (0.6)	39 (1.5)	198 (7.8)	198 (7.8)	198 (7.8)	284 (11.2)	284 (11.2)	284 (11.2)	36 (1.4)	56 (2.2)	256 (10.1)	117.3 (4.6)	M25x1.5	98 (3.9)
63	15 (0.6)	15 (0.6)	43 (1.7)	224 (8.8)	224 (8.8)	222 (8.7)	332 (13.1)	332 (13.1)	330 (13.0)	40 (1.6)	55 (2.2)	300 (11.8)	117.3 (4.6)	M25x1.5	108 (4.3)
80	15 (0.6)	19 (0.7)	49 (1.9)	258 (10.2)	266 (10.5)	252 (9.9)	398 (15.7)	406 (15.6)	388 (15.3)	46 (1.8)	67 (2.6)	368 (14.5)	140.5 (5.5)	M33x1.5	126 (5.0)
100	19 (0.7)	19 (0.7)	59 (2.3)	318 (12.5)	318 (12.5)	309 (12.2)	486 (19.1)	486 (19.1	477 (18.8)	56 (2.2)	69 (2.7)	444 (17.5)	140.5 (5.5)	M36x1.5	157 (6.2)

Shock Absorbers
Retract Only (NA)



Bore	Gs*	Ks*	Go*	Ko*	Thrust			Reach			N	FF	MM	NN	TD	TT
					Ls*	Lo*	M	Ls*	Lo*	M						
20	9 (0.4)	26 (1.0)	11 (0.4)	28 (1.1)	100 (3.9)	102 (4.0)	123 (4.8)	138 (5.4)	140 (5.5)	161 (6.3)	17 (0.7)	48 (1.9)	117 (4.6)	74 (2.9)	M12x1.0	48 (1.9)
25	11 (0.4)	33 (1.3)	13 (0.5)	35 (1.4)	123 (4.8)	127 (5.0)	137 (5.4)	169 (6.7)	173 (6.8)	183 (7.2)	22 (0.9)	49 (1.9)	146 (5.7)	80.1 (3.2)	M14x1.5	57 (2.2)
32	13 (0.5)	37 (1.5)	15 (0.6)	39 (1.5)	136 (5.4)	140 (5.5)	153 (6.0)	192 (7.6)	196 (7.7)	209 (8.2)	24 (0.9)	46 (1.8)	164 (6.5)	80.1 (3.2)	M14x1.5	66 (2.6)
40	15 (0.6)	45 (1.8)	15 (0.6)	45 (1.8)	166 (6.5)	166 (6.8)	178 (7.0)	228 (9.0)	228 (9.0)	240 (9.4)	30 (1.2)	52 (2.0)	201 (7.9)	99.5 (3.9)	M20x1.5	79 (3.1)
50	15 (0.6)	51 (2.0)	15 (0.6)	51 (2.0)	198 (7.8)	198 (7.8)	210 (8.3)	284 (11.2)	284 (11.2)	296 (11.7)	36 (1.4)	56 (2.2)	256 (10.1)	117.3 (4.6)	M25x1.5	98 (3.9)
63	15 (0.6)	55 (2.2)	15 (0.6)	55 (2.2)	224 (8.8)	224 (8.8)	234 (9.2)	332 (13.1)	332 (13.1)	342 (13.5)	40 (1.6)	55 (2.2)	300 (11.8)	117.3 (4.6)	M25x1.5	108 (4.3)
80	15 (0.6)	61 (2.4)	19 (0.7)	65 (2.6)	258 (10.2)	266 (10.5)	264 (10.4)	398 (15.7)	406 (15.6)	404 (15.9)	46 (1.8)	67 (2.6)	368 (14.5)	140.5 (5.5)	M33x1.5	126 (5.0)
100	19 (0.7)	75 (3.0)	19 (0.7)	75 (3.0)	318 (12.5)	318 (12.5)	325 (12.8)	486 (19.1)	486 (19.1)	493 (19.4)	56 (2.2)	69 (2.7)	444 (17.5)	140.5 (5.5)	M36x1.5	157 (6.2)

Dimensions in mm (in) ** s = standard, o = oversized*

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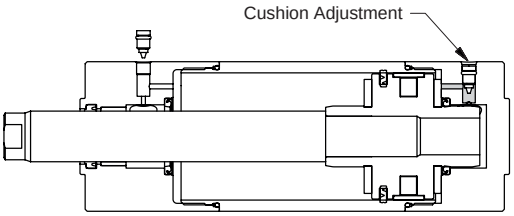
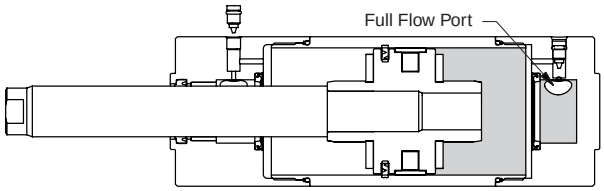
Cylinder Cushions

Fully adjustable cylinder cushions can be provided to reduce speed and energy at the end of cylinder stroke.

Note: If stroke adjustment is used in conjunction with cylinder cushions, the cushion effectiveness may be affected.



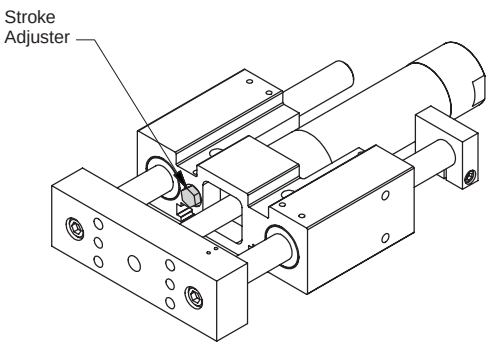


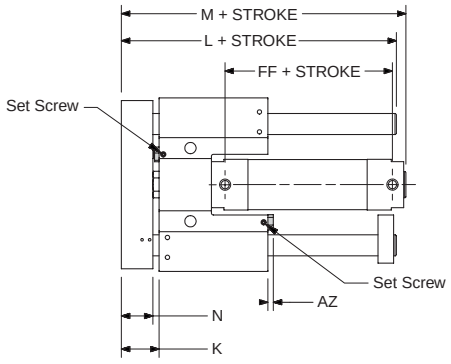
Micro Adjust (EE)

Micro adjusters can be used as an accurate and fine adjustment of end of stroke position. Actual per end stroke adjustment depends on model size. See chart below.

Micro adjusters must be ordered as both ends only. Caution should be used as cushion effectiveness may be affected.

Note: Using micro adjusters will only reduce the actuator stroke from a maximum value given in the actuator part number and cannot add additional stroke.





Bore	Kmin	Kmax	Thrust			Reach			N	AZmin	AZmax	FF
			Ls*	Lo*	M	Ls*	Lo*	M				
20	23 (0.9)	28 (1.1)	100 (3.9)	102 (4.0)	123 (4.8)	138 (5.4)	140 (5.5)	161 (6.3)	17 (0.7)	3.5 (0.1)	8.5 (0.3)	51 (2.0)
25	28 (1.1)	37 (1.5)	123 (4.8)	127 (5.0)	135 (5.3)	169 (6.7)	173 (6.8)	181 (7.1)	22 (0.9)	3.5 (0.1)	12.5 (0.5)	52 (2.0)
32	30 (1.2)	38 (1.5)	136 (5.4)	140 (5.5)	149 (5.9)	192 (7.6)	196 (7.7)	205 (8.1)	24 (0.9)	4 (0.2)	12 (0.5)	49 (1.9)
40	36 (1.4)	48 (1.9)	166 (6.5)	166 (6.5)	172 (6.8)	228 (9.0)	228 (9.0)	234 (9.2)	30 (1.2)	5.3 (0.2)	17.3 (0.7)	55 (2.2)
50	42 (1.7)	57 (2.2)	198 (7.8)	198 (7.8)	204 (8.0)	284 (11.2)	284 (11.2)	290 (11.4)	36 (1.4)	6.4 (0.3)	21.4 (0.8)	59 (2.3)
63	46 (1.8)	63 (2.5)	224 (8.8)	224 (8.8)	228 (9.0)	332 (13.1)	332 (13.1)	336 (13.2)	40 (1.6)	7.5 (0.3)	24.5 (1.0)	58 (2.3)
80	52 (2.0)	69 (2.7)	258 (10.2)	266 (10.5)	258 (10.2)	398 (15.7)	406 (15.6)	398 (15.7)	46 (1.8)	7.5 (0.3)	24.5 (1.0)	70 (2.8)
100	62 (2.4)	76 (3.0)	318 (12.5)	318 (12.5)	315 (12.4)	486 (19.1)	486 (19.1)	483 (19.0)	56 (2.2)	10 (0.4)	24 (0.9)	72 (2.8)

Dimensions in mm (in) ** s = standard, o = oversized*

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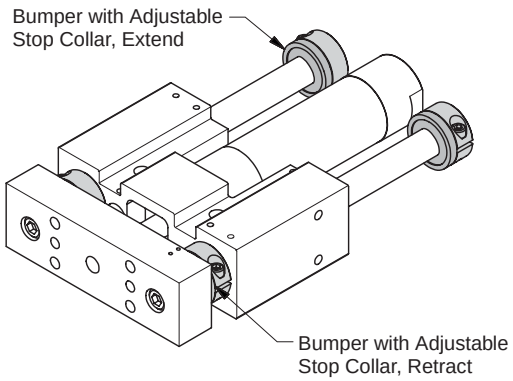
Bumpers and Adjustable Stop Collars

Bumpers provide end of stroke noise reduction. Bumpers can be used in conjunction with adjustable stop collars to provide adjustment. When a bumper is specified in the extend stroke a stop collar is provided.

Bumpers provide minimal energy absorption. If high speeds are present consult the kinetic energy section of this catalog to determine if cylinder cushions or shock absorbers are recommended.

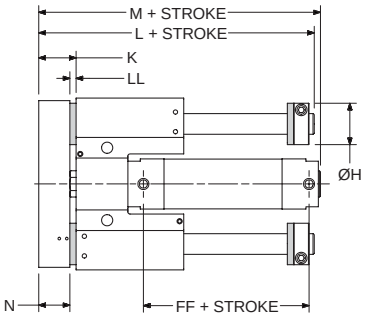
A properly adjusted bumper and stop collar will prevent the cylinder from bottoming on the cylinder end cap thus increasing cylinder life.



P5L-T thrust slide shown

F

Bumpers Both Ends (KB)



Bore	Hs*	Ho*	K	Thrust			Reach			N	FF	LL
				Ls*	Lo*	M	Ls*	Lo*	M			
20	24 (0.9)	28 (1.1)	23 (0.9)	100 (3.9)	102 (4.0)	123 (4.8)	138 (5.4)	140 (5.5)	161 (6.3)	17 (0.7)	51 (2.0)	6 (0.2)
25	28 (1.1)	34 (1.3)	28 (1.1)	123 (4.8)	127 (5.0)	135 (5.3)	169 (6.6)	173 (6.8)	181 (7.1)	22 (0.9)	52 (2.0)	6 (0.2)
32	34 (1.3)	40 (1.6)	30 (1.2)	136 (5.4)	140 (5.5)	149 (5.9)	192 (7.6)	248 (9.8)	205 (8.1)	24 (0.9)	49 (1.9)	6 (0.2)
40	40 (1.6)	45 (1.8)	36 (1.4)	166 (6.5)	166 (6.5)	172 (6.8)	228 (9.0)	290 (11.4)	234 (9.2)	30 (1.2)	55 (2.2)	6 (0.2)
50	45 (1.8)	54 (2.1)	42 (1.7)	198 (7.8)	198 (7.8)	204 (8.0)	284 (11.2)	370 (14.6)	290 (11.4)	36 (1.4)	59 (2.3)	6 (0.2)
63	54 (2.1)	60 (2.4)	46 (1.8)	224 (8.8)	224 (8.8)	228 (9.0)	332 (13.1)	440 (17.3)	336 (13.2)	40 (1.6)	58 (2.3)	6 (0.2)
80	60 (2.4)	78 (3.1)	52 (2.0)	258 (10.1)	266 (10.5)	258 (10.2)	398 (15.7)	538 (21.2)	398 (15.7)	46 (1.8)	70 (2.8)	6 (0.2)
100	78 (3.1)	88 (3.5)	62 (2.4)	318 (12.5)	318 (12.5)	315 (12.4)	486 (19.1)	654 (25.7)	483 (19.0)	56 (2.2)	72 (2.8)	6 (0.2)

Dimensions in mm (in) ** s = standard, o = oversized*

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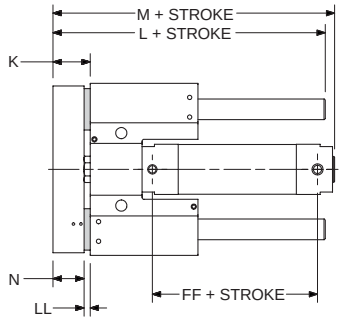
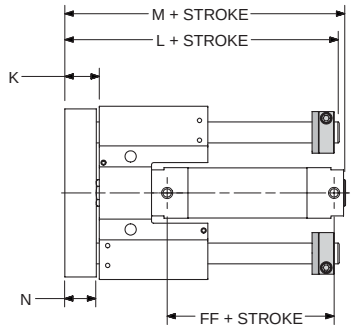
Bumpers on Retract Only (NB)

Bore	K	Thrust			Reach			N	FF	LL
		Ls*	Lo*	M	Ls*	Lo*	M			
20	23 (0.9)	100 (3.9)	102 (4.0)	120 (4.7)	138 (5.4)	140 (5.5)	158 (6.2)	17 (0.7)	48 (1.9)	6 (0.2)
25	28 (1.1)	123 (4.8)	127 (5.0)	132 (5.2)	169 (6.7)	173 (6.8)	178 (7.0)	22 (0.9)	49 (1.9)	6 (0.2)
32	30 (1.2)	136 (5.4)	140 (5.5)	146 (5.7)	192 (7.6)	196 (7.7)	202 (8.0)	24 (0.9)	46 (1.8)	6 (0.2)
40	36 (1.4)	166 (6.5)	166 (6.5)	169 (6.7)	228 (9.0)	228 (9.0)	231 (9.1)	30 (1.2)	52 (2.0)	6 (0.2)
50	42 (1.7)	198 (7.8)	198 (7.8)	201 (7.9)	284 (11.2)	284 (11.2)	287 (11.3)	36 (1.4)	56 (2.2)	6 (0.2)
63	46 (1.8)	224 (8.8)	224 (8.8)	225 (8.9)	332 (13.1)	332 (13.1)	333 (13.1)	40 (1.6)	55 (2.2)	6 (0.2)
80	52 (2.0)	258 (10.2)	266 (10.5)	255 (10.0)	398 (15.7)	406 (16.0)	395 (15.6)	46 (1.8)	67 (2.6)	6 (0.2)
100	62 (2.4)	318 (12.5)	318 (12.5)	312 (12.3)	486 (19.1)	486 (19.1)	480 (18.9)	56 (2.2)	69 (2.7)	6 (0.2)



Bumpers and Adjustable Stop Collars, Extend Only (KN)

Bore	K	Thrust			Reach			N	FF
		Ls*	Lo*	M	Lo*	Ls*	M		
20	20 (0.8)	109 (4.3)	111 (4.4)	117 (4.6)	147 (5.8)	149 (5.9)	155 (6.1)	17 (0.7)	48 (1.9)
25	25 (1.0)	134 (5.3)	138 (5.4)	129 (5.1)	180 (7.1)	184 (7.2)	175 (6.9)	22 (0.9)	49 (1.9)
32	27 (1.1)	148 (5.8)	152 (6.0)	143 (5.6)	204 (8.0)	208 (8.2)	199 (7.8)	24 (0.9)	46 (1.8)
40	33 (1.3)	178 (7.0)	178 (7.0)	166 (6.5)	240 (9.4)	240 (9.4)	228 (9.0)	30 (1.2)	52 (2.0)
50	39 (1.5)	210 (8.3)	210 (8.3)	198 (7.8)	296 (11.7)	296 (11.7)	284 (11.2)	36 (1.4)	56 (2.2)
63	43 (1.7)	236 (9.3)	236 (9.3)	222 (8.7)	344 (13.5)	344 (13.5)	330 (13.0)	40 (1.6)	55 (2.2)
80	49 (1.9)	271 (10.7)	279 (11.0)	252 (9.9)	411 (16.2)	419 (16.5)	392 (15.4)	46 (1.8)	67 (2.6)
100	59 (2.3)	330 (13.0)	330 (13.0)	309 (12.2)	498 (19.6)	498 (19.6)	478 (18.8)	56 (2.2)	69 (2.7)



Dimensions in mm (in) ** s = standard, o = oversized*

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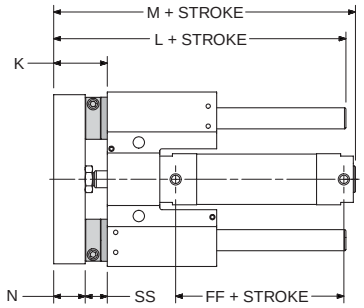
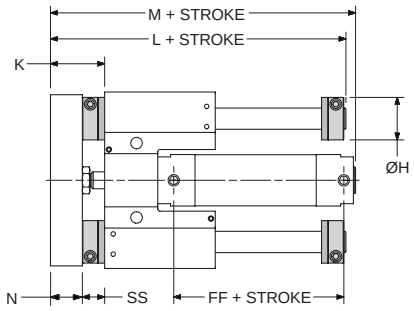
Bumpers and Adjustable Stop Collars, Retract Only (NK)



Bore	Ks	Ko	Thrust				Reach				N	FF	SSs*	SSo*
			Ls*	Lo*	Ms*	Mo*	Ls*	Lo*	Ms*	Mo*				
20	32 (1.3)	34 (1.3)	109 (4.3)	111 (4.4)	129 (5.1)	131 (5.2)	147 (5.8)	149 (5.9)	167 (6.6)	169 (6.7)	17 (0.7)	48 (1.9)	15 (0.6)	17 (0.7)
25	39 (1.5)	41 (1.6)	134 (5.3)	138 (5.4)	143 (5.6)	145 (5.7)	180 (7.1)	184 (7.2)	189 (7.4)	191 (7.5)	22 (0.9)	49 (1.9)	17 (0.7)	19 (0.7)
32	43 (1.7)	45 (1.8)	148 (5.8)	152 (6.0)	159 (6.3)	161 (6.3)	204 (8.0)	208 (8.2)	215 (8.5)	217 (8.5)	24 (0.9)	46 (1.8)	19 (0.7)	21 (0.8)
40	51 (2.0)	51 (2.0)	178 (7.0)	178 (7.0)	184 (7.2)	184 (7.2)	240 (9.4)	240 (9.4)	246 (9.7)	246 (9.7)	30 (1.2)	52 (2.0)	21 (0.8)	21 (0.8)
50	57 (2.2)	57 (2.2)	210 (8.3)	210 (8.3)	216 (8.5)	216 (8.5)	296 (11.7)	296 (11.7)	302 (11.9)	302 (11.9)	36 (1.4)	56 (2.2)	21 (0.8)	21 (0.8)
63	61 (2.4)	61 (2.4)	236 (9.3)	236 (9.3)	240 (9.4)	240 (9.4)	344 (13.5)	344 (13.5)	348 (13.7)	348 (13.7)	40 (1.6)	55 (2.2)	21 (0.8)	21 (0.8)
80	67 (2.6)	71 (2.8)	271 (10.7)	279 (11.0)	270 (10.6)	274 (10.8)	411 (16.2)	419 (16.5)	410 (16.1)	414 (16.3)	46 (1.8)	67 (2.6)	21 (0.8)	25 (1.0)
100	81 (3.2)	81 (3.2)	330 (13.0)	330 (13.0)	331 (13.0)	331 (13.0)	492 (19.4)	492 (19.4)	499 (19.6)	499 (19.6)	56 (2.2)	69 (2.7)	25 (1.0)	25 (1.0)

Bumpers and Adjustable Stop Collars, Both Ends (KK)



Bore	Hs*	Ho*	Ks*	Ko*	Thrust				Reach				N	FF	SSs*	SSo*
					Ls*	Lo*	Ms*	Mo*	Ls*	Lo*	Ms*	Mo*				
20	24 (0.9)	28 (1.1)	32 (1.3)	34 (1.3)	109 (4.3)	111 (4.4)	132 (5.2)	134 (5.3)	147 (5.8)	149 (5.9)	170 (6.7)	172 (6.8)	17 (0.7)	51 (2.0)	15 (0.6)	17 (0.7)
25	28 (1.1)	34 (1.3)	39 (1.5)	41 (1.6)	134 (5.3)	138 (5.4)	146 (5.7)	148 (5.8)	180 (7.1)	184 (7.2)	192 (7.6)	194 (7.6)	22 (0.9)	52 (2.0)	17 (0.7)	19 (0.7)
32	34 (1.3)	40 (1.6)	43 (1.7)	45 (1.8)	148 (5.8)	152 (6.0)	162 (6.4)	164 (6.5)	204 (8.0)	208 (8.2)	218 (8.6)	220 (8.7)	24 (0.9)	49 (1.9)	19 (0.7)	21 (0.8)
40	40 (1.6)	45 (1.8)	51 (2.0)	51 (2.0)	178 (7.0)	178 (7.0)	187 (7.4)	187 (7.4)	240 (9.4)	240 (9.4)	249 (9.8)	249 (9.8)	30 (1.2)	55 (2.2)	21 (0.8)	21 (0.8)
50	45 (1.8)	54 (2.1)	57 (2.2)	57 (2.2)	210 (8.3)	210 (8.3)	219 (8.6)	219 (8.6)	296 (11.7)	296 (11.7)	305 (12.0)	305 (12.0)	36 (1.4)	59 (2.3)	21 (0.8)	21 (0.8)
63	54 (2.1)	60 (2.4)	61 (2.4)	61 (2.4)	236 (9.3)	236 (9.3)	243 (9.6)	243 (9.6)	344 (13.5)	344 (13.5)	351 (13.8)	351 (13.8)	40 (1.6)	55 (2.2)	21 (0.8)	21 (0.8)
80	60 (2.4)	78 (3.1)	67 (2.6)	71 (2.8)	271 (10.7)	279 (11.0)	273 (10.7)	277 (10.9)	411 (16.2)	419 (16.5)	413 (16.3)	417 (16.4)	46 (1.8)	69 (2.7)	21 (0.8)	25 (1.0)
100	78 (3.1)	88 (3.5)	81 (3.2)	71 (2.8)	330 (13.0)	330 (13.0)	334 (13.1)	334 (13.1)	498 (19.6)	498 (19.6)	502 (19.8)	502 (19.8)	56 (2.2)	71 (2.8)	25 (1.0)	25 (1.0)

Dimensions in mm (in) ** s = standard, o = oversized*

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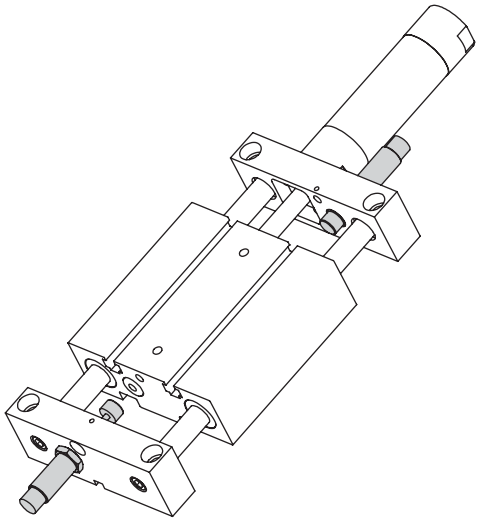
Shock Absorbers

Optional adjustable shock absorbers are available on the P5L series. When specifying this option verify the kinetic energy on page F84.

To achieve proper operation it is important to adjust the shock absorber per the application. To properly adjust the shock absorber, cycle the guided cylinder to impact the shock absorber. Rotate the shock adjustment knob, located on the front or the rear of the shock, to achieve a smooth deceleration. Reducing the setting (achieved by rotating the adjustment knob in the counterclockwise direction or towards 9) decreases the resistance. Increasing the setting (achieved by rotating the adjustment in the clockwise direction of towards 0) increases the resistance. A properly adjusted shock absorber will provide smooth deceleration through the stroke of the shock.

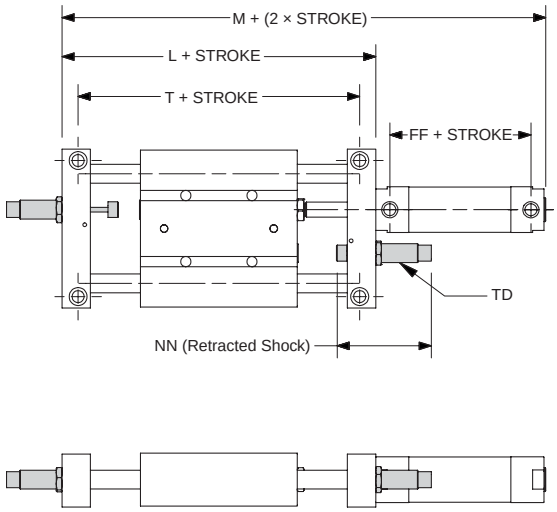
The shock absorber option can also be used as a stroke adjuster. To adjust the stroke of the actuator, loosen the jam nut and thread shock in/out.

Note: Using the shock absorber option as a stroke adjuster will only reduce the actuator stroke from a maximum value given in the actuator part number and cannot add additional stroke.



Shock Absorbers Both Ends (AA)

Bore	L	M	T	FF	NN	TD
20	140 (5.5)	217 (8.5)	120 (4.7)	51 (2.0)	74 (2.9)	M12X1.0
25	176 (6.9)	253 (10.0)	156 (6.1)	52 (2.0)	80.1 (3.2)	M14X1.5
32	198 (7.8)	277 (10.9)	170 (6.7)	49 (1.9)	80.1 (3.2)	M14X1.5
40	232 (9.1)	318 (12.5)	198 (7.8)	55 (2.2)	99.5 (3.9)	M20X1.5
50	292 (11.5)	390 (15.4)	254 (10.0)	59 (2.3)	117.3 (4.6)	M25X1.5
63	350 (13.8)	448 (17.6)	304 (12.0)	58 (2.3)	117.3 (4.6)	M25X1.5
80	434 (17.1)	551 (21.7)	374 (14.7)	70 (2.8)	140.5 (5.5)	M33X1.5
100	528 (20.8)	645 (25.4)	452 (17.8)	72 (2.8)	140.5 (5.5)	M36X1.5



Dimensions in mm (in)

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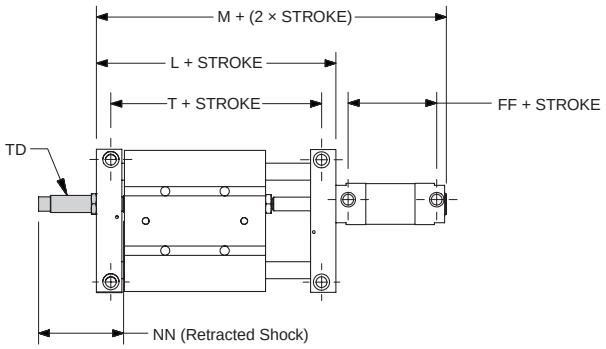
Shock Absorber Extend Only (AN)

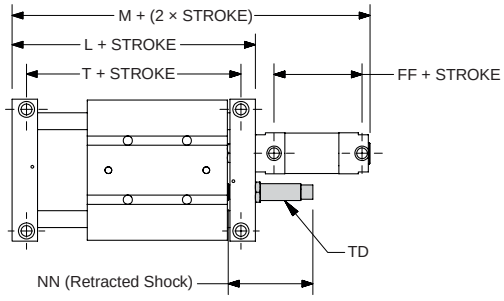
Bore	L	M	T	FF	NN	TD
20	140 (5.5)	214 (8.4)	120 (4.7)	48 (1.9)	74 (2.9)	M12x1.0
25	176 (6.9)	250 (9.8)	156 (6.1)	49 (1.9)	80.1 (3.2)	M14x1.5
32	198 (7.8)	274 (10.8)	170 (6.7)	46 (1.8)	80.1 (3.2)	M14x1.5
40	232 (9.1)	315 (12.4)	198 (7.8)	52 (2.0)	99.5 (3.9)	M20x1.5
50	292 (11.5)	387 (15.2)	254 (10.0)	56 (2.2)	117.3 (4.6)	M25x1.5
63	350 (13.8)	445 (17.5)	304 (12.0)	55 (2.2)	117.3 (4.6)	M25x1.5
80	434 (17.1)	548 (21.6)	374 (14.7)	67 (2.6)	140.5 (5.5)	M33x1.5
100	528 (20.8)	642 (25.3)	452 (17.8)	69 (2.7)	140.5 (5.5)	M36x1.5



F

Shock Absorber Retract Only (NA)

Bore	L	M	T	FF	NN	TD
20	140 (5.5)	214 (8.4)	120 (4.7)	48 (1.9)	74 (2.9)	M12x1.0
25	176 (6.9)	250 (9.8)	156 (6.1)	49 (1.9)	80.1 (3.2)	M14x1.5
32	198 (7.8)	274 (10.8)	170 (6.7)	46 (1.8)	80.1 (3.2)	M14x1.5
40	232 (9.1)	315 (12.4)	198 (7.8)	52 (2.0)	99.5 (3.9)	M20x1.5
50	292 (11.5)	387 (15.2)	254 (10.0)	56 (2.2)	117.3 (4.6)	M25x1.5
63	350 (13.8)	445 (17.5)	304 (12.0)	55 (2.2)	117.3 (4.6)	M25x1.5
80	434 (17.1)	548 (21.6)	374 (14.7)	67 (2.6)	140.5 (5.5)	M33x1.5
100	528 (20.8)	642 (25.3)	452 (17.8)	69 (2.7)	140.5 (5.5)	M36x1.5



Dimensions in mm (in)

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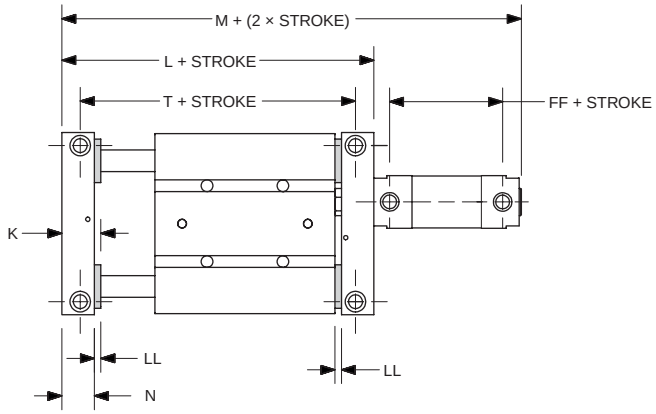
Bumpers (B)

Bumpers absorb shock, reduce noise and permit faster cycle times, thereby increasing production rates. They can be placed on the extend, retract or both positions.

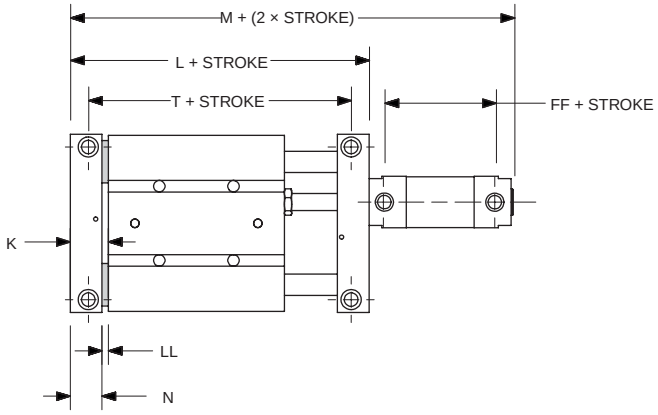
Bumpers Both Ends (BB)

Bore	K	L	M	N	T	FF	LL
20	24 (0.9)	146 (5.7)	223 (8.8)	18 (0.7)	126 (5.0)	51 (2.0)	6 (0.2)
25	30 (1.2)	182 (7.2)	259 (10.2)	24 (0.9)	163 (6.4)	52 (2.0)	6 (0.2)
32	32 (1.3)	204 (8.0)	283 (11.1)	26 (1.0)	176 (6.9)	49 (1.9)	6 (0.2)
40	36 (1.4)	238 (9.4)	324 (12.8)	30 (1.2)	204 (8.0)	55 (2.2)	6 (0.2)
50	41 (1.6)	298 (11.7)	396 (15.6)	35 (1.4)	260 (10.2)	59 (2.3)	6 (0.2)
63	48 (1.9)	356 (14.0)	454 (17.9)	42 (1.7)	310 (12.2)	58 (2.3)	6 (0.2)
80	60 (2.4)	440 (17.3)	557 (21.9)	54 (2.1)	380 (15.0)	70 (2.8)	6 (0.2)
100	72 (2.8)	534 (21.0)	651 (25.6)	66 (2.6)	458 (18.0)	72 (2.8)	6 (0.2)



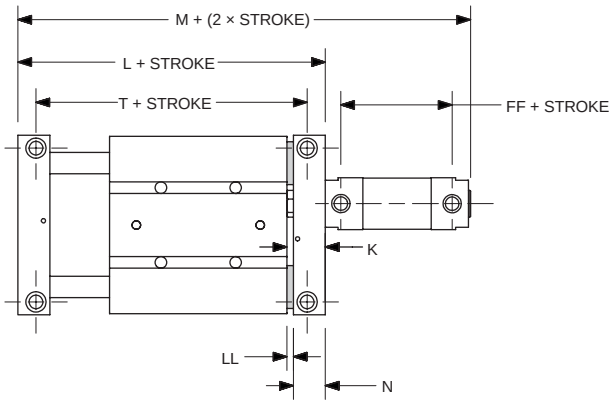
Bumpers, Extend Only (BN)

Bore	K	L	M	N	T	FF	LL
20	24 (0.9)	143 (5.6)	217 (8.5)	18 (0.7)	123 (4.8)	48 (1.9)	6 (0.2)
25	30 (1.2)	179 (7.0)	253 (10.0)	24 (0.9)	159 (6.3)	49 (1.9)	6 (0.2)
32	32 (1.3)	201 (7.9)	277 (10.9)	26 (1.0)	173 (6.8)	46 (1.8)	6 (0.2)
40	36 (1.4)	235 (9.3)	318 (12.5)	30 (1.2)	201 (7.9)	52 (2.0)	6 (0.2)
50	41 (1.6)	295 (11.6)	390 (15.4)	35 (1.4)	257 (10.1)	56 (2.2)	6 (0.2)
63	48 (1.9)	353 (13.9)	448 (17.6)	42 (1.7)	307 (12.1)	55 (2.2)	6 (0.2)
80	60 (2.4)	437 (17.2)	551 (21.7)	54 (2.1)	377 (14.8)	67 (2.6)	6 (0.2)
100	72 (2.8)	531 (20.9)	645 (25.4)	66 (2.6)	455 (17.9)	69 (2.7)	6 (0.2)



Bumpers on Retract Only (NB)

Bore	K	L	M	N	T	FF	LL
20	24 (0.9)	143 (5.6)	217 (8.5)	18 (0.7)	123 (4.8)	48 (1.9)	6 (0.2)
25	30 (1.2)	179 (7.0)	253 (10.0)	24 (0.9)	159 (6.3)	49 (1.9)	6 (0.2)
32	32 (1.3)	201 (7.9)	277 (10.9)	26 (1.0)	173 (6.8)	46 (1.8)	6 (0.2)
40	36 (1.4)	235 (9.3)	318 (12.5)	30 (1.2)	201 (7.9)	52 (2.0)	6 (0.2)
50	41 (1.6)	295 (11.6)	390 (15.4)	35 (1.4)	257 (10.1)	56 (2.2)	6 (0.2)
63	48 (1.9)	353 (13.9)	448 (17.6)	42 (1.7)	307 (12.1)	55 (2.2)	6 (0.2)
80	60 (2.4)	437 (17.2)	551 (21.7)	54 (2.1)	377 (14.8)	67 (2.6)	6 (0.2)
100	72 (2.8)	531 (20.9)	645 (25.4)	66 (2.6)	455 (17.9)	69 (2.7)	6 (0.2)



Dimensions in mm (in)

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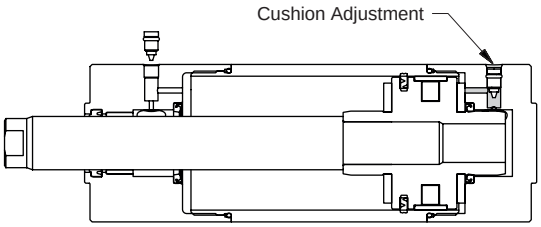
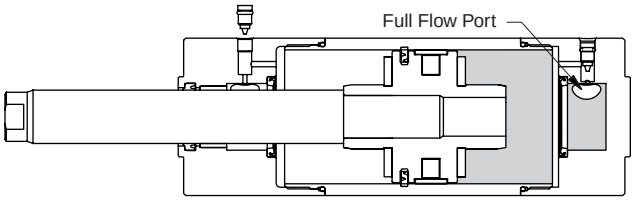
Cylinder Cushions (CC)

Fully adjustable cylinder cushions can be provided to reduce speed and energy at the end of cylinder stroke.

Cushions must be ordered as both ends only.

Note: If stroke adjustment is used in conjunction with cylinder cushions, the cushion effectiveness may be affected.



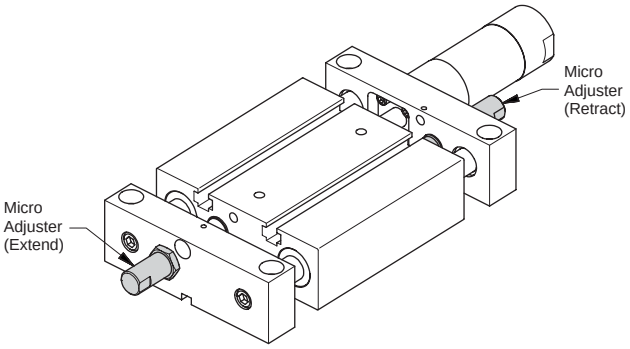


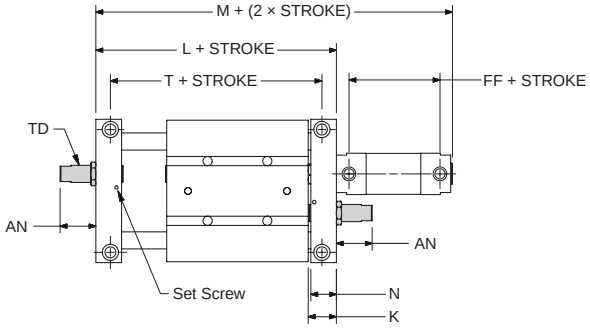
Micro Adjusters (EE)

Micro adjusters can be used as an accurate and fine adjustment of end of stroke position. Actual per end stroke adjustment depends on model size. See chart below.

Micro adjusters must be ordered as both ends only. Caution should be used as cushion effectiveness may be affected.

Note: Using micro adjusters will only reduce the actuator stroke from a maximum value given in the actuator part number and cannot additional stroke.





Bore	Kmin	Kmax	L	M	N	T	TD	FF	AN
20	21 (0.8)	48 (1.9)	140 (5.5)	217 (8.5)	18 (0.7)	120 (4.7)	M12x1.5	51 (2.0)	42 (1.7)
25	27 (1.1)	45 (1.8)	176 (6.9)	253 (10.0)	24 (0.9)	156 (6.1)	M14x1.5	52 (2.0)	36 (1.4)
32	29 (1.1)	45 (1.8)	198 (7.8)	277 (10.9)	26 (1.0)	170 (6.7)	M14x1.5	49 (1.9)	34 (1.3)
40	33 (1.3)	56 (2.2)	232 (9.1)	318 (12.5)	30 (1.2)	198 (7.8)	M20x1.5	55 (2.2)	42 (1.7)
50	38 (1.5)	71 (2.8)	292 (11.5)	390 (15.4)	35 (1.4)	254 (10.0)	M25x1.5	59 (2.3)	53 (2.1)
63	45 (1.8)	104 (4.1)	350 (13.8)	448 (17.6)	42 (1.7)	304 (12.0)	M25x1.5	55 (2.2)	77 (3.0)
80	57 (2.2)	87 (3.4)	434 (17.1)	551 (21.7)	54 (2.1)	374 (14.7)	M33x1.5	69 (2.7)	52 (2.0)
100	69 (2.7)	87 (3.4)	528 (20.8)	645 (25.4)	66 (2.6)	452 (17.8)	M36x1.5	71 (2.8)	40 (1.6)

Dimensions in mm (in)

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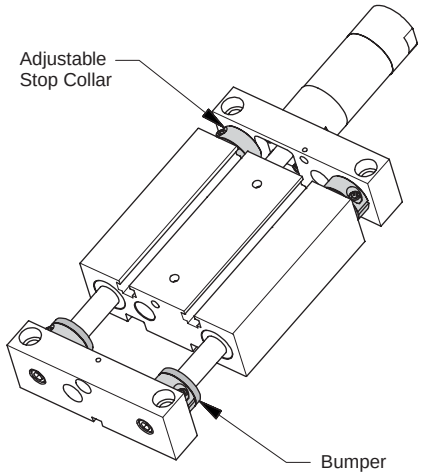
Bumpers and Adjustable Stop Collars

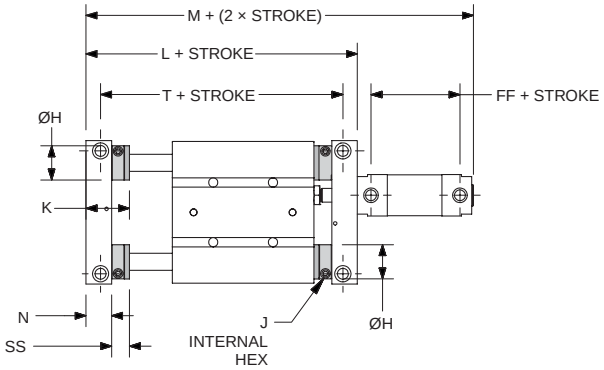
Bumpers provide end of stroke noise reduction. Bumpers can be used in conjunction with adjustable stop collars to provide adjustment. When a bumper is specified in the extend stroke a stop collar is provided.

Bumpers provide little energy absorption. If high speeds are present consult the kinetic energy section of this catalog to determine if cylinder cushions or shock absorbers are recommended.

A properly adjusted bumper and stop collar will prevent the cylinder from bottoming on the cylinder end cap thus increasing cylinder life.



Bumpers and Adjustable Stop Collars, Both Ends (KK)



Bore	Hs*	Ho*	Js*	Jo*	Ks*	Ko*	Ls*	Lo*	Ms*	Mo*	N	Ts*	To*	FF	SSs*	SSo*
20	24 (0.9)	28 (1.1)	2.5 (0.1)	3 (0.1)	33 (1.3)	35 (1.4)	164 (6.5)	170 (6.7)	241 (9.5)	245 (9.6)	18 (0.7)	144 (5.7)	148 (5.8)	51 (2.0)	15 (0.6)	17 (0.7)
25	28 (1.1)	34 (1.3)	3 (0.1)	4 (0.2)	41 (1.6)	43 (1.7)	204 (8.0)	208 (8.2)	281 (11.1)	285 (11.2)	24 (0.9)	184 (7.2)	188 (7.4)	52 (2.0)	17 (0.7)	19 (0.7)
32	34 (1.3)	40 (1.6)	4 (0.2)	5 (0.2)	45 (1.8)	47 (1.9)	230 (9.1)	234 (9.2)	309 (12.2)	313 (12.3)	26 (1.0)	202 (8.0)	206 (8.1)	49 (1.9)	19 (0.7)	21 (0.8)
40	40 (1.6)	45 (1.8)	5 (0.2)	5 (0.2)	51 (2.0)	51 (2.0)	268 (10.6)	268 (10.6)	354 (13.9)	354 (13.9)	30 (1.2)	234 (9.2)	234 (9.2)	55 (2.2)	21 (0.8)	21 (0.8)
50	45 (1.8)	54 (2.1)	5 (0.2)	5 (0.2)	56 (2.2)	56 (2.2)	328 (12.9)	328 (12.9)	426 (16.8)	426 (16.8)	35 (1.4)	290 (11.4)	290 (11.4)	59 (2.3)	21 (0.8)	21 (0.8)
63	54 (2.1)	60 (2.4)	5 (0.2)	5 (0.2)	63 (2.5)	63 (2.5)	396 (15.6)	396 (15.6)	484 (19.1)	484 (19.1)	42 (1.7)	340 (13.4)	340 (13.4)	58 (2.3)	21 (0.8)	21 (0.8)
80	60 (2.4)	78 (3.1)	5 (0.2)	6 (0.2)	75 (3.0)	79 (3.1)	470 (18.5)	478 (18.8)	587 (23.1)	595 (23.4)	54 (2.1)	410 (16.1)	418 (16.5)	70 (2.8)	21 (0.8)	25 (1.0)
100	78 (3.1)	88 (3.5)	6 (0.2)	6 (0.2)	91 (3.6)	91 (3.6)	572 (22.5)	572 (22.5)	689 (27.1)	689 (27.1)	66 (2.6)	496 (19.5)	496 (19.5)	72 (2.8)	25 (1.0)	25 (1.0)

Dimensions in mm (in)

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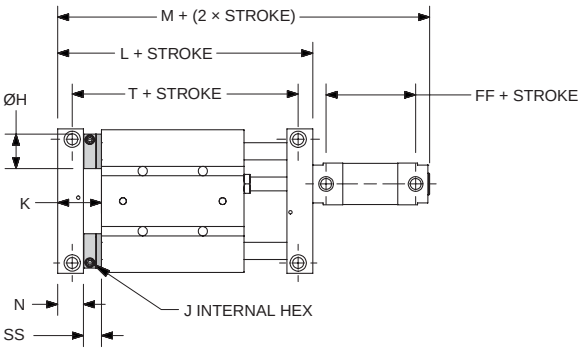
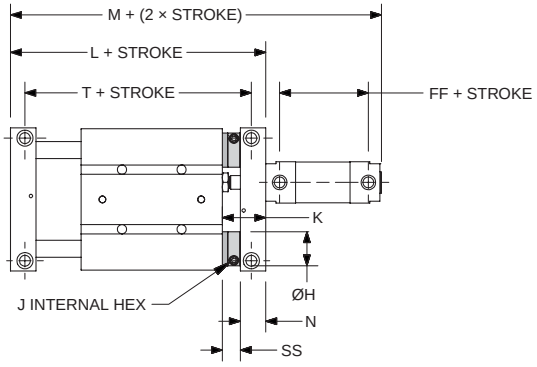
Bumpers and Adjustable Stop Collars, Extend Only (KN)



Bore	Hs*	Ho*	Js*	Jo*	Ks*	Ko*	Ls*	Lo*	Ms*	Mo*	N	Ts*	To*	FF	SSs*	SSo*
20	24 (0.9)	28 (1.1)	2.5 (0.1)	3 (0.1)	33 (1.3)	35 (1.4)	152 (6.0)	156 (6.1)	226 (8.9)	230 (9.1)	18 (0.7)	132 (5.2)	136 (5.4)	48 (1.9)	15 (0.6)	17 (0.7)
25	28 (1.1)	34 (1.3)	3 (0.1)	4 (0.2)	41 (1.6)	43 (1.7)	190 (7.5)	194 (7.6)	264 (10.4)	268 (10.6)	24 (0.9)	170 (6.7)	174 (6.9)	49 (1.9)	17 (0.7)	19 (0.7)
32	34 (1.3)	40 (1.6)	4 (0.2)	5 (0.2)	45 (1.8)	47 (1.9)	214 (8.4)	218 (8.6)	290 (11.4)	294 (11.6)	26 (1.0)	186 (7.3)	190 (7.5)	46 (1.8)	19 (0.7)	21 (0.8)
40	40 (1.6)	45 (1.8)	5 (0.2)	5 (0.2)	51 (2.0)	51 (2.0)	250 (9.8)	250 (9.8)	333 (13.1)	333 (13.1)	30 (1.2)	216 (8.5)	216 (8.5)	52 (2.0)	21 (0.8)	21 (0.8)
50	45 (1.8)	54 (2.1)	5 (0.2)	5 (0.2)	56 (2.2)	56 (2.2)	310 (12.2)	310 (12.2)	405 (15.9)	405 (15.9)	35 (1.4)	272 (10.7)	272 (10.7)	56 (2.2)	21 (0.8)	21 (0.8)
63	54 (2.1)	60 (2.4)	5 (0.2)	5 (0.2)	63 (2.5)	63 (2.5)	368 (14.5)	368 (14.5)	463 (18.2)	463 (18.2)	42 (1.7)	322 (12.7)	322 (12.7)	55 (2.2)	21 (0.8)	21 (0.8)
80	60 (2.4)	78 (3.1)	5 (0.2)	6 (0.2)	75 (3.0)	79 (3.1)	452 (17.8)	460 (18.1)	566 (22.3)	574 (22.6)	54 (2.1)	392 (15.4)	400 (15.7)	67 (2.6)	21 (0.8)	25 (1.0)
100	78 (3.1)	88 (3.5)	6 (0.2)	6 (0.2)	91 (3.6)	91 (3.6)	550 (21.7)	550 (21.7)	664 (26.1)	664 (26.1)	66 (2.6)	474 (18.7)	474 (18.7)	69 (2.7)	25 (1.0)	25 (1.0)

Bumpers and Adjustable Stop Collars, Retract Only (NK)



Bore	Hs*	Ho*	Js*	Jo*	Ks*	Ko*	Ls*	Lo*	Ms*	Mo*	N	Ts*	To*	FF	SSs*	SSo*
20	24 (0.9)	28 (1.1)	2.5 (0.1)	3 (0.1)	33 (1.3)	35 (1.4)	152 (6.0)	156 (6.1)	226 (8.9)	230 (9.1)	18 (0.7)	132 (5.2)	136 (5.4)	48 (1.9)	15 (0.6)	17 (0.7)
25	28 (1.1)	34 (1.3)	3 (0.1)	4 (0.2)	41 (1.6)	43 (1.7)	190 (7.5)	194 (7.6)	264 (10.4)	268 (10.6)	24 (0.9)	170 (6.7)	174 (6.9)	49 (1.9)	17 (0.7)	19 (0.7)
32	34 (1.3)	40 (1.6)	4 (0.2)	5 (0.2)	45 (1.8)	47 (1.9)	214 (8.4)	218 (8.6)	290 (11.4)	294 (11.6)	26 (1.0)	186 (7.3)	190 (7.5)	46 (1.8)	19 (0.7)	21 (0.8)
40	40 (1.6)	45 (1.8)	5 (0.2)	5 (0.2)	51 (2.0)	51 (2.0)	250 (9.8)	250 (9.8)	333 (13.1)	333 (13.1)	30 (1.2)	216 (8.5)	216 (8.5)	52 (2.0)	21 (0.8)	21 (0.8)
50	45 (1.8)	54 (2.1)	5 (0.2)	5 (0.2)	56 (2.2)	56 (2.2)	310 (12.2)	310 (12.2)	405 (15.9)	405 (15.9)	35 (1.4)	272 (10.7)	272 (10.7)	56 (2.2)	21 (0.8)	21 (0.8)
63	54 (2.1)	60 (2.4)	5 (0.2)	5 (0.2)	63 (2.5)	63 (2.5)	368 (14.5)	368 (14.5)	463 (18.2)	463 (18.2)	42 (1.7)	322 (12.7)	322 (12.7)	55 (2.2)	21 (0.8)	21 (0.8)
80	60 (2.4)	78 (3.1)	5 (0.2)	6 (0.2)	75 (3.0)	79 (3.1)	452 (17.8)	460 (18.1)	566 (22.3)	574 (22.6)	54 (2.1)	392 (15.4)	400 (15.7)	67 (2.6)	21 (0.8)	25 (1.0)
100	78 (3.1)	88 (3.5)	6 (0.2)	6 (0.2)	91 (3.6)	91 (3.6)	550 (21.7)	555 (21.9)	664 (26.1)	664 (26.1)	66 (2.6)	474 (18.7)	474 (18.7)	69 (2.7)	25 (1.0)	25 (1.0)

Dimensions in mm (in) ** s = standard; o = oversized*

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Fluorocarbon Seals (V)

Standard nitrile seals are used for applications within the temperatures of -18° to 74°C (0° to 165°F). For high temperature applications, up to 121°C (250° F), fluorocarbon seals are available.

When temperatures exceed 60°C (140°F) other components may not be applicable. See chart for temperature ratings of other commonly used components.

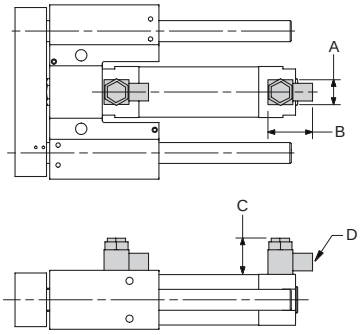
Option	Temperature Range	
Shock Absorbers	0° to 66°C	32° - 150°F
Bumpers	-18° to 93°C	0° - 200°F
Piston Magnets	-18° to 74°C	0° - 165°F
Sensors	-10° to 60°C	14° - 140°F

Flow Controls (P, F, B, N)

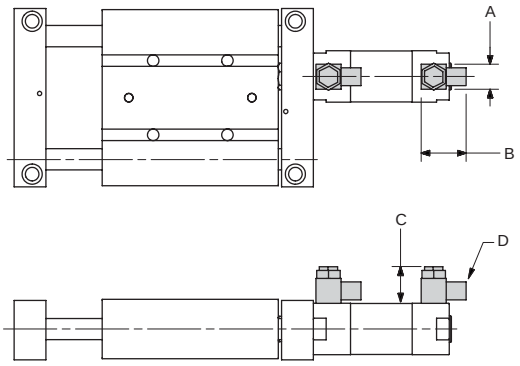
Right angle flow controls provide speed control. It is recommended that applications involving heavy loads use flow controls to provide maximum cylinder life.

Parker flow controls are available in Prestolok (push-in) and threaded style connections with the ability to rotate the head 360°.

Thrust Reach



Base

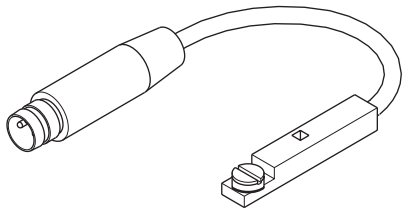


Bore	NPT Cylinder Port								BSPT Cylinder Port							
	Threaded (N)				Presto-lok (F)				Threaded (B)				Presto-lok (P)			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
20, 25, 32, 40	17.2 (0.68)	28.4 (1.12)	55.4 (2.18)	1/8	17.2 (0.68)	25.2 (0.99)	55.4 (2.18)	1/4"* tube	14.4 (0.57)	25.4 (1.00)	28.5 (1.12)	1/8	14.4 (0.57)	31.6 (1.24)	28.5 (1.12)	6mm tube
50, 63	17.2 (0.68)	32.4 (1.27)	65.2 (2.57)	1/4	17.2 (0.68)	38.3 (1.51)	65.2 (2.57)	3/8" tube	18.4 (0.72)	34.3 (1.35)	27.4 (1.08)	1/4	18.4 (0.72)	41.3 (1.63)	34 (1.34)	10mm tube
80	25.0 (0.98)	39.0 (1.54)	80.2 (3.16)	3/8	30.0 (1.18)	47.4 (1.87)	98.0 (3.86)	3/8" tube	21.6 (0.85)	40.2 (1.58)	34.0 (1.34)	3/8	21.6 (0.85)	46.7 (1.84)	44 (1.73)	12mm tube
100	30.0 (1.18)	45.5 (1.79)	98.0 (3.86)	1/2	30.0 (1.18)	51.4 (2.02)	98.0 (3.86)	1/2" tube	26.5 (1.04)	49.1 (1.93)	42.0 (1.65)	1/2	26.5 (1.04)	52.1 (2.05)	52 (2.05)	12mm tube

*1/8" on 20 and 25mm bore

Reed and Solid State Sensors

The P5L series guided cylinder includes a standard magnetic piston to allow for field installation of reed or solid state sensors. The sensor, bracket and cable must be ordered separately from the Electronic Sensors section of this catalog.



Dimensions in mm (in)

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Pneumatic Division
Wadsworth, Ohio
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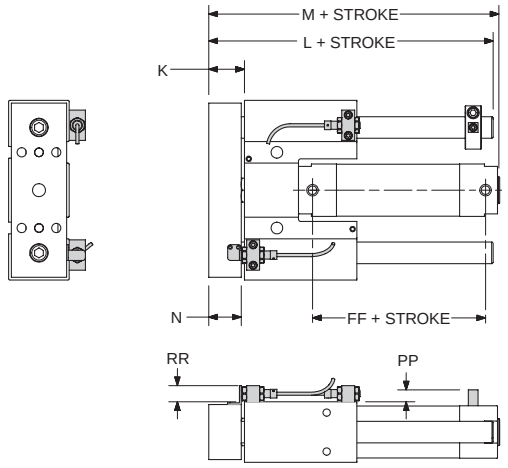
Proximity Sensors

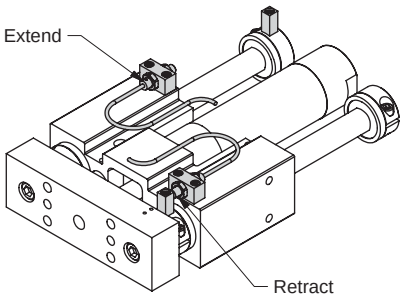
8mm proximity sensors may be ordered as part of the P5L ordering code.

A P5L can also be ordered prepared for proximity sensors which would include all the brackets necessary to mount either 8mm or 12mm proximity sensors. See Electronic Sensors section for specifications and part numbers.

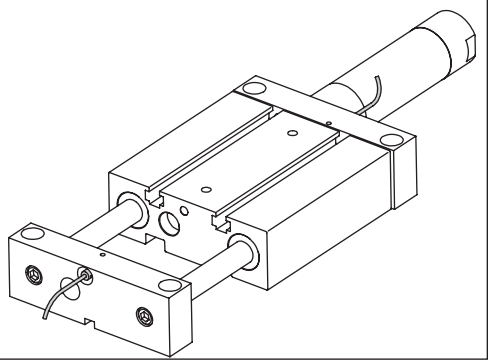


Thrust/Reach

Drawing illustrates proximity sensor and bumper options.

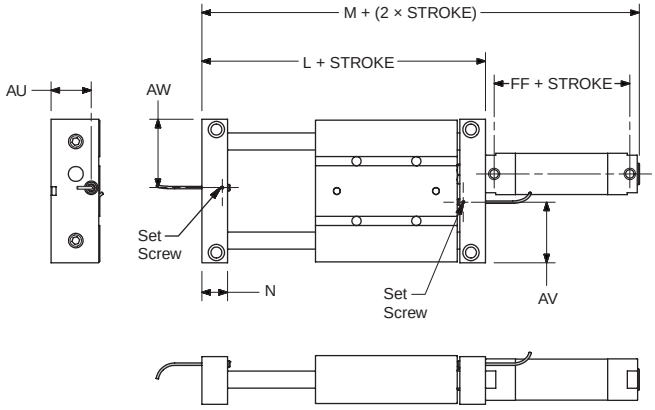


Base Slide



Dimensions – Thrust / Reach

Bore	K	Thrust			Reach			N	FF	PP	RR	
		Ls*	Lo*	M	Ls*	Lo*	M				8mm	12mm
20	20 (0.8)	100 (3.9)	102 (4.0)	120 (4.7)	138 (5.4)	140 (5.5)	158 (6.2)	17 (0.7)	45 (1.8)	13 (0.5)	17 (0.7)	NA
25	25 (1.0)	123 (4.8)	127 (5.0)	132 (5.2)	169 (6.7)	173 (6.8)	178 (7.0)	22 (0.9)	46 (1.8)	13 (0.5)	15 (0.6)	22 (0.9)
32	27 (1.1)	136 (5.4)	140 (5.5)	146 (5.7)	192 (7.6)	196 (7.7)	202 (8.0)	24 (0.9)	43 (1.7)	12.5 (0.5)	15 (0.6)	22 (0.9)
40	33 (1.3)	166 (6.5)	166 (6.5)	169 (6.7)	228 (9.0)	228 (9.0)	231 (9.1)	30 (1.2)	49 (1.9)	13 (0.5)	15 (0.6)	22 (0.9)
50	39 (1.5)	198 (7.8)	198 (7.8)	201 (7.9)	284 (11.2)	284 (11.2)	287 (11.3)	36 (1.4)	53 (2.1)	13.5 (0.5)	15 (0.6)	22 (0.9)
63	43 (1.7)	224 (8.8)	224 (8.8)	225 (8.9)	332 (13.1)	332 (13.1)	333 (13.1)	40 (1.6)	52 (2.0)	13 (0.5)	15 (0.6)	22 (0.9)
80	49 (1.9)	258 (10.2)	266 (10.5)	255 (10.0)	398 (15.7)	406 (16.0)	395 (15.6)	46 (1.8)	64 (2.5)	13.5 (0.5)	15 (0.6)	22 (0.9)
100	59 (2.3)	318 (12.5)	318 (12.5)	312 (12.3)	486 (19.1)	486 (19.1)	480 (18.9)	56 (2.2)	66 (2.6)	13 (0.5)	15 (0.6)	22 (0.9)



Dimensions – Base Slides

Bore	L	M	N	AU	AV	AW	FF
20	140 (5.5)	211 (8.3)	18 (0.7)	22 (0.9)	43 (1.7)	51 (2.0)	45 (1.8)
25	176 (6.9)	247 (9.7)	24 (0.9)	29 (1.1)	51 (2.0)	62 (2.4)	46 (1.8)
32	198 (7.8)	271 (10.7)	26 (1.0)	35 (1.4)	58 (2.3)	69 (2.7)	43 (1.7)
40	232 (9.1)	312 (12.3)	30 (1.2)	47 (1.9)	71 (2.8)	80 (3.1)	49 (1.9)
50	292 (11.5)	384 (15.1)	35 (1.4)	60 (2.4)	95 (3.7)	101 (4.0)	53 (2.1)
63	350 (13.8)	442 (17.4)	42 (1.7)	73 (2.9)	114 (4.5)	121 (4.8)	52 (2.0)
80	434 (17.1)	545 (21.5)	54 (2.1)	92 (3.6)	144 (5.7)	145 (5.7)	64 (2.5)
100	528 (20.8)	639 (25.2)	66 (2.6)	109 (4.3)	169 (6.7)	180 (7.1)	66 (2.6)

Dimensions in mm (in)

** s = standard, o = oversized*

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Seal Kits for Cylinder Only*

Bore	Nitrile	Fluorocarbon
20mm	P1L020D001	P1L020D005
25mm	P1L025D001	P1L025D005
32mm	P1L032D001	P1L032D005
40mm	P1L040D001	P1L040D005
50mm	P1L050D001	P1L050D005
63mm	P1L063D001	P1L063D005
80mm	P1L080D001	P1L080D005
100mm	P1L0100D001	P1L0100D005

* Additional Information on page D90 of P1L Series Section.

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F

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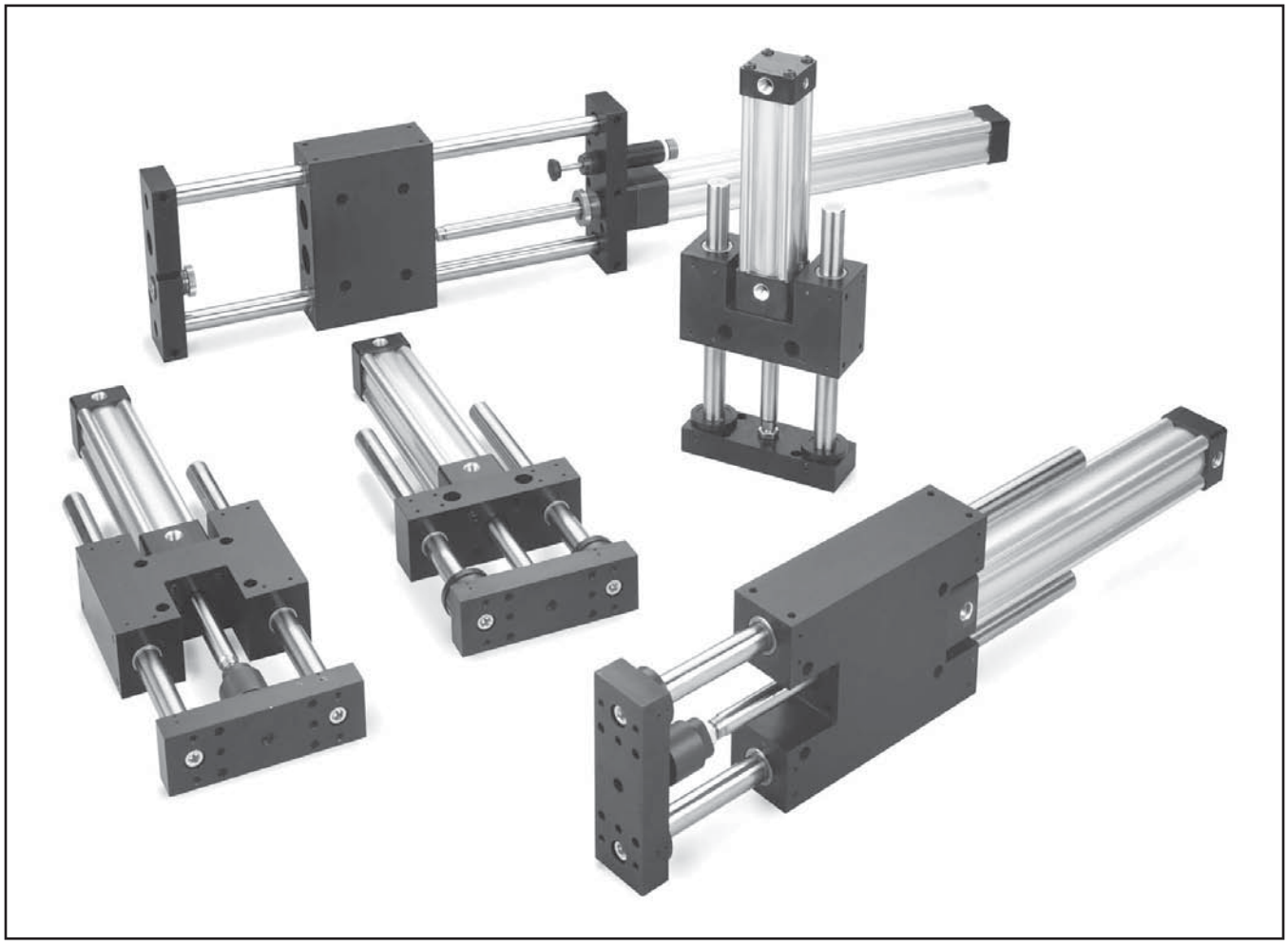
HB Series

Guided Cylinders



Contents

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Pneumatic Division
Wadsworth, Ohio
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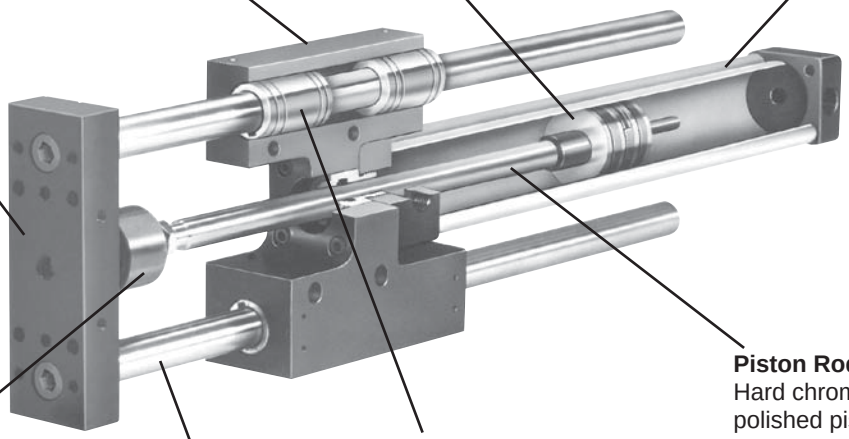
Model HBT Shown

Tooling Plate
Precision machined from aluminum and then anodized, the tooling plate allows mounting on two sides. Standard dowel pin holes provide accurate mounting.

Body
A machined aluminum one-piece anodized body with tapped and counterbored through holes on three faces for mounting flexibility. Standard dowel pin holes provide accurate mounting.

Cylinder Piston
Aluminum piston with nylon wearband eliminates metal-to-metal contact. This increases cylinder life especially when the support shafts deflect under load. Magnetic piston is standard on all HB slides.

Cylinder Body
Extruded aluminum profile cylinder body offers integrated sensor grooves to minimize sensor installation time, maximize sensor protection and eliminate the need for brackets. Grooves readily accept both Global and Mini-Global Sensors. Single corner lobe of extrusion will accept legacy 2MA sensor brackets. Anodized and bright-dipped for corrosion resistance, maximum seal life and lower friction.



3D CAD FILES
available for download at
parker.com/pneumatics

F

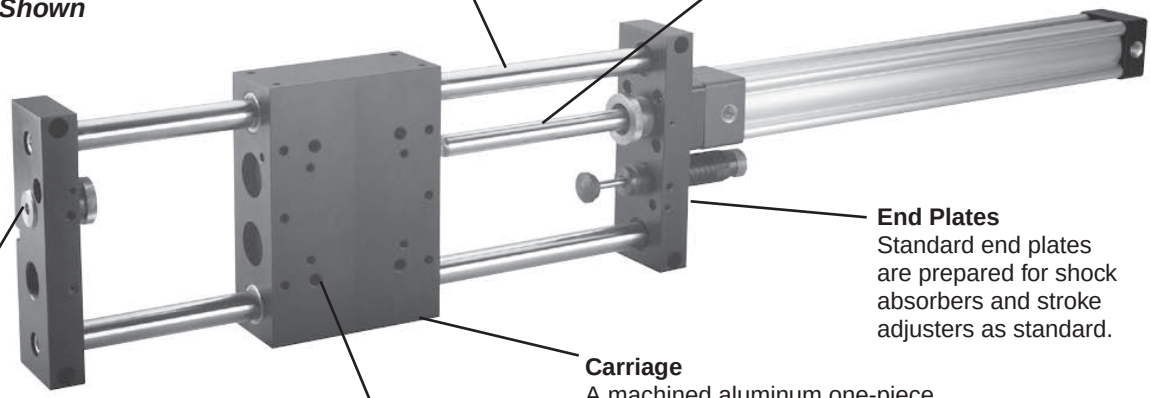
Alignment Coupler
For long stroke or heavy load applications, the alignment coupler allows the piston rod to self-center, thus increasing cylinder life. Not available for HBC Series due to shorter strokes.

Support Shafts
Case hardened to Rc 60 - 65, support shafts are machined from high carbon alloy steel and chrome plated. Stainless steel and oversized shafting are available.

Bushings
Composite bushings with oversized shafting are available for higher loads and lower cost. Sealed recirculating ball bearings provide precise alignment with very low friction and wear.

Piston Rod
Hard chrome plated and polished piston rod of 100,000 PSI yield, high tensile strength steel, case hardened to Rc 50-54 for reliable performance, reduced friction and long rod seal life.

Model HBB Shown



End Plates
Standard end plates are prepared for shock absorbers and stroke adjusters as standard.

Carriage
A machined aluminum one-piece anodized body with tapped and counterbored through holes on three faces for mounting flexibility. Standard dowel pin holes provide accurate mounting.

Threaded Stroke Adjusters
Used to achieve precise end of stroke adjustment. Available with shock absorbers and optional shock pads to reduce noise.

Direct Mounting
Tapped holes provide direct mounting capabilities to HBC Series.

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Model Number Code for HBC, HBT and HBR

Example: HBT25-08AP1T1FEV-B

HBT	25	–	08	A	P1	T1	F	E	V	–	B	

Series

HBC	Compact Slide
HBT	Thrust Slide
HBR	Reach Slide

Model

15	1-1/2" Bore, 20mm Shaft
20	2" Bore, 25mm Shaft
25	2-1/2" Bore, 30mm Shaft

Stroke

Order in 1" increments. [4]

For 3-position units, specify intermediate and total stroke separated by a "/", i.e. 02/06.

Consult factory for strokes over 36".

Slide Configuration Options

Blank	None
A	Shock Absorber, Both Ends
A1	Shock Absorber, Extend only
A2	Shock Absorber, Retract only
A3	Shock Ready, Both Ends
A4	Shock Ready, Extend
A5	Shock Ready, Retract
B	Bumpers Both Ends [1]
B1	Bumper & Adjustable Stop Collar, Extend only
B2	Bumper Retract only
B3	Bumper & Adjustable Stop Collar, Retract only
B4	Bumper & Adjustable Stop Collar, Both Ends
C	Cushions on Cylinder, Both Ends [2]
C1	Cushion on Cylinder, Extend only [2]
C2	Cushion on Cylinder, Retract only [2]
X	Special Slide Configuration (Please specify)

Proximity Sensor Options

Blank	None
P	PNP, Flying Lead Type
N	NPN, Flying Lead Type
P1	PNP, Plug-in Connector
N1	NPN, Plug-in Connector
J	8mm Sensor Mounting Bracket, no sensor supplied
J1	12mm Sensor Mounting Bracket, no sensor supplied

Note: 8mm inductive proximity sensors are included with Options P, N, P1, N1. Magnetic piston is standard for 3MA, 4MA, 4MAJ, 4ML and P1D cylinders. Order reed and solid state sensors separately for these cylinders from the Electronic Sensors section.

Bushings

T	Composite (Standard)
D	Linear Ball Bearing
T1	Composite with Oversized Support Shafts
TC	Composite with Contaminant-tolerant Seals

Other Options
(More than one selection is possible)

Blank	None
F	Flow Controls (Presto-Lok)
G	Flow Controls (NPT)
K	Stainless Steel Support Shafting

Cylinder Type

3A	3MA NFPA Air Cylinder, NPTF Ports [2]
4A	4MA NFPA Air Cylinder, NPTF Ports
4J	4MAJ NFPA Air Cylinder with Manual Override Rodlock, NPTF Ports, 100 PSIG max.
D	P1D ISO Cylinder w/Removable Gland, BSPP Ports
D1	P1D ISO Cylinder w/Removable Gland, Standard Rodlock, BSPP Ports
D2	P1D ISO Cylinder w/Removable Gland, Manual Override Rodlock, BSPP Ports
E	P1D ISO Cylinder w/Removable Gland, NPTF Ports
E1	P1D ISO Cylinder w/Removable Gland, Standard Rodlock, NPTF Ports
E2	P1D ISO Cylinder w/Removable Gland, Manual Override Rodlock, NPTF Ports
4L	4ML NFPA Hydraulic Cylinder, NPTF Ports, 400 PSIG max. [2]
S	2A NFPA Steel Air Cylinder, 250 PSIG max.
S1	3L NFPA Steel Hydraulic Cylinder, 750 PSIG max.
Q	No Cylinder, NFPA Cylinder Mounting
Q1	No Cylinder, ISO Cylinder Mounting
X	Special Cylinder Type (Please specify)

Cylinder Options
(More than one selection is possible)

Blank	None
V	Fluorocarbon cylinder seals [3]
L1	Left hand assembly
L3	Cylinder ports at position 3

Design Series

B	Current Design Level

Special Options

Blank (STD)

(Two digit code assigned by factory and applies when any "X" appears in the model number or when special options or features are required.)

NOTES

1 Option B includes Options B1 and B2.

2 Cushions are not available with 4ML cylinders or 3MA cylinders on HB products.

3 Fluorocarbon seals not available with 3MA or rodlock cylinders.

4 P1D cylinders have strokes only in whole mm. The HB inch stroke will be changed (rounded up) to reflect this.

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Model Number Code for HBB

Example: HBB25-08AP1T1FLV-B

HBB	25	–	08	A	P1	T1	F	3A	V	–	B	

Series

HBB	Base Slide

Model

15	1½" Bore, 20mm Shaft
20	2" Bore, 25mm Shaft
25	2½" Bore, 30mm Shaft

Stroke

Order in 1" increments. [4]

For 3-position units, specify intermediate and total stroke separated by a "/", i.e. 02/06.

Consult factory for strokes over 36".

Slide Configuration Options

Blank	None
A	Shock Absorber, Both Ends
A1	Shock Absorber, Extend only
A2	Shock Absorber, Retract only
A3	Shock Ready, Both Ends
B	Bumpers Both Ends
B1	Bumper & Adjustable Stop Collar, Extend only
B2	Bumper Retract only
B3	Bumper & Adjustable Stop Collar, Retract only
B4	Bumpers & Adjustable Stop Collar, Extend only
B5	Bumper & Adjustable Stop Collar, Both Ends
C	Cushions on Cylinder, Both Ends [2]
C1	Cushion on Cylinder, Extend only [2]
C2	Cushion on Cylinder, Retract only [2]
E	Threaded Stroke Adjusters, Both Ends
E1	Stroke Adjusters with Shock Pads, Both Ends
E2	Stroke Adjusters with Shock Pads, Extend only
E3	Stroke Adjusters with Shock Pads, Retract only
X	Special Slide Configuration (Please specify)

Proximity Sensor Options

Blank	None
P	PNP, Flying Lead Type
N	NPN, Flying Lead Type
P1	PNP, Plug-in Connector
N1	NPN, Plug-in Connector
J	8mm Sensor Mounting Bracket, no sensor supplied
J1	12mm Sensor Mounting Bracket, no sensor supplied

Note: 8mm inductive proximity sensors are included with Options P, N, P1, N1. Magnetic piston is standard for 3MA, 4MA, 4MAJ, 4ML and P1D cylinders. Order reed and solid state sensors separately for these cylinders from the Electronic Sensors section.

Bushings

T	Composite (Standard)
D	Linear Ball Bearings
T1	Composite with Oversized Support Shafts
TC	Composite with Contaminant-tolerant Seals

Other Options
(More than one selection is possible)

Blank	None
F	Flow Controls (Presto-Lok)
G	Flow Controls (NPT)
K	Stainless Steel Guide Shafting

Cylinder Type

3A	3MA NFPA Air Cylinder, NPTF Ports [2]
4A	4MA NFPA Air Cylinder, NPTF Ports
4J	4MAJ NFPA Air Cylinder with Manual Override Rodlock, NPTF Ports, 100 PSIG max.
D	P1D ISO Cylinder w/Removable Gland, BSPP Ports
D1	P1D ISO Cylinder w/Removable Gland, Standard Rodlock, BSPP Ports
D2	P1D ISO Cylinder w/Removable Gland, Manual Override Rodlock, BSPP Ports
E	P1D ISO Cylinder w/Removable Gland, NPTF Ports
E1	P1D ISO Cylinder w/Removable Gland, Standard Rodlock, NPTF Ports
E2	P1D ISO Cylinder w/Removable Gland, Manual Override Rodlock, NPTF Ports
4L	4ML NFPA Hydraulic Cylinder, NPTF Ports, 400 PSIG max. [2]
S	2A NFPA Steel Air Cylinder, 250 PSIG max.
S1	3L NFPA Steel Hydraulic Cylinder, 750 PSIG max.
Q	No Cylinder, NFPA Cylinder Mounting
Q1	No Cylinder, ISO Cylinder Mounting
X	Special Cylinder Type (Please specify)

Cylinder Options
(More than one selection is possible)

Blank	None
V	Fluorocarbon Cylinder Seals [3]
L3	Cylinder Ports at Position 3

Design Series

B	Current Design Level

Special Options

Blank (STD)

(Two digit code assigned by factory applies when any "X" appears in the model number or when special options or features are required.)

NOTES

1 Option B includes Options B1 and B2.

2 Cushions are not available with 4ML cylinders or 3MA cylinders on HB products.

3 Fluorocarbon seals not available with 3MA or rodlock cylinders.

4 P1D cylinders have strokes only in whole mm. The HB inch stroke will be changed (rounded up) to reflect this.

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Specifications

- Maximum operating pressure: 100 psi (air) – 4MAJ cylinder
  150 psi (air) – P1D cylinder
  250 psi (air) – 3MA, 4MA and 2A cylinders
  400 psi (oil) – 4ML cylinder only
  750 psi (oil) – 3L cylinder only
- Operating characteristics: double acting
- Four support shaft sizes: 20, 25, 30 and 35 mm
- Stroke tolerance: +.030, -.000
- Mounting: unrestricted
- Operating temperature range (cylinder):
  Standard seals 0 to 165°F
  Fluorocarbon seals* 0 to 250°F
- Filtration requirement:
  40 micron filtered, dry air or
  filtered hydraulic oil (4ML or 3L)

* See fluorocarbon seal option for high temperature applications. Not available for 3MA or rod lock cylinders.

Quick Reference Data

Model	Support Shaft Diameter mm (in)	Oversized Shaft Diameter mm (in)	3MA, 4MA, 4MAJ, 4ML NFPA Cylinder Bore Size (in)	P1D ISO Cylinder Bore Size (mm)	Force Output on Extend at 80 PSI (lb)	Force Output on Retract at 80 PSI (lb)
15	20 (0.79)	25 (0.98)	1½	40	142	117
20	25 (0.98)	30 (1.18)	2	50	251	226
25	30 (1.18)	35 (1.38)	2½	63	393	368

Model	Maximum Suggested Stroke, inches*				Weights, Standard Shaft (lb)					Weights, Oversized Shaft (lb)				
					Base Unit				Per Inch Stroke	Base Unit				Per Inch Stroke
	HBC	HBT	HBR	HBB	HBC	HBT	HBR	HBB		HBC	HBT	HBR	HBB	
15	8	24	30	30	6.54	8.86	12.76	11.05	0.48	7.24	9.83	14.20	11.92	0.63
20	10	30	36	36	11.57	14.35	24.02	18.65	0.64	12.60	15.67	26.19	19.81	0.83
25	12	36	42	42	20.57	24.45	42.03	31.78	0.85	22.03	25.69	44.50	33.32	1.08

*Consult factory for longer strokes.

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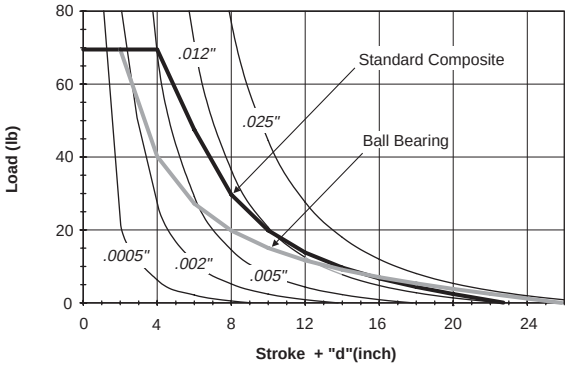
Horizontal Load Capacity & Deflection with Standard Shafting

The plots on these two pages illustrate the side load vs. actuator stroke for the three HB slide sizes. Applied loads will cause a slight deflection of the support rods. Deflection distance is also shown except for HBN, which should be used on non-rotating applications. The graphs include the weight of the support rods and tooling plate and are based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic loads will reduce cycle life. For static loads, multiply the information in the graph by 1.5. The vertical load for HBN does not include the weight of the tool plate and support rods.

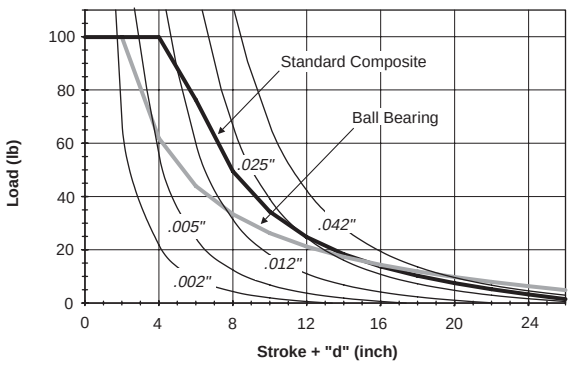
Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration
- Orientation

HBC15



HBT15



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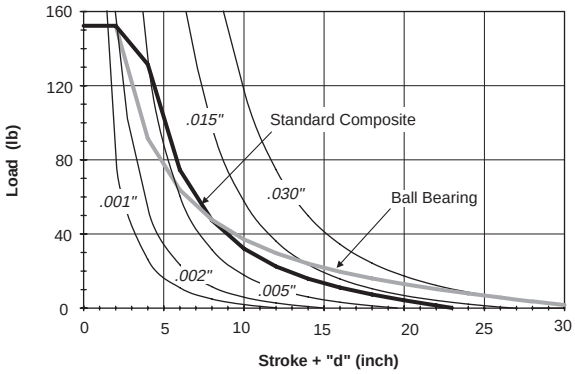

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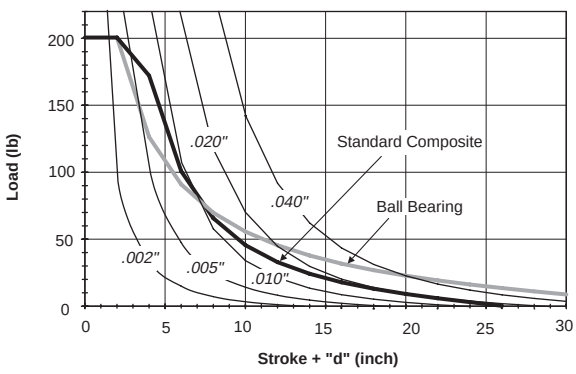

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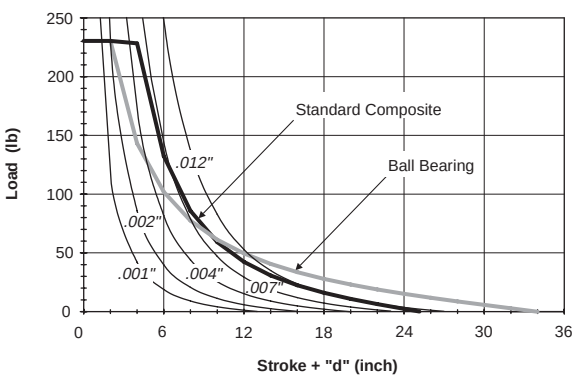

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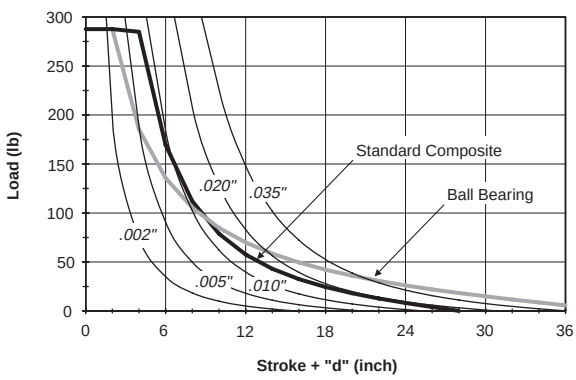

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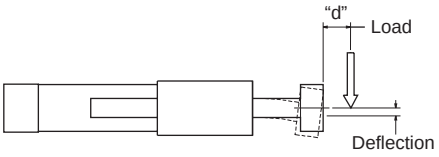
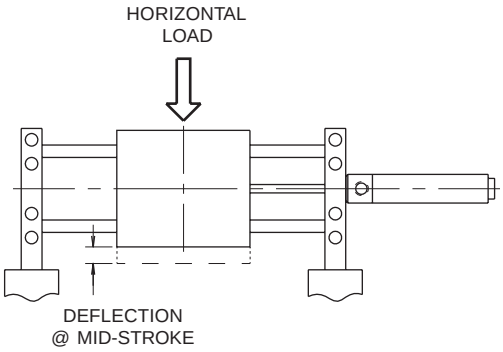


EXAMPLE:

An HBT15 with ball bearings and a "stroke+d" of 12" would have a load capacity of 20 lbs.



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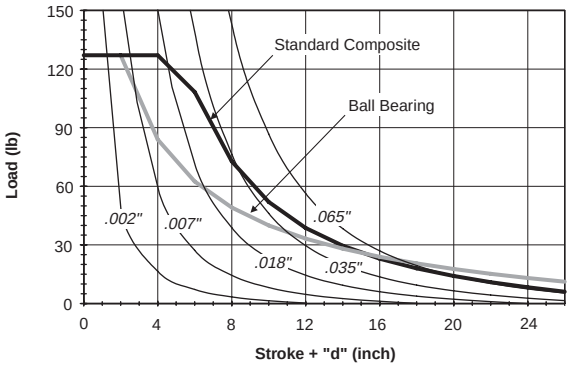

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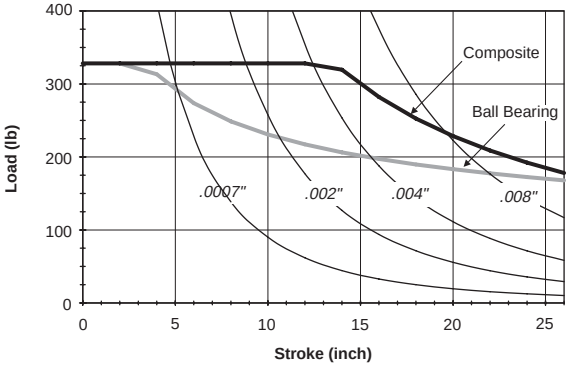

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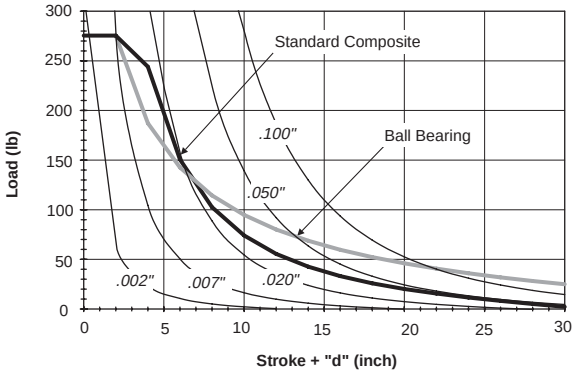

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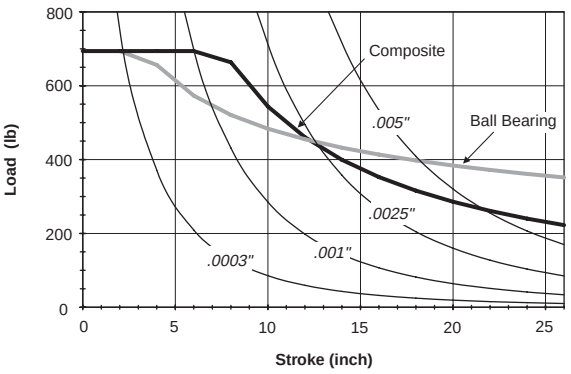

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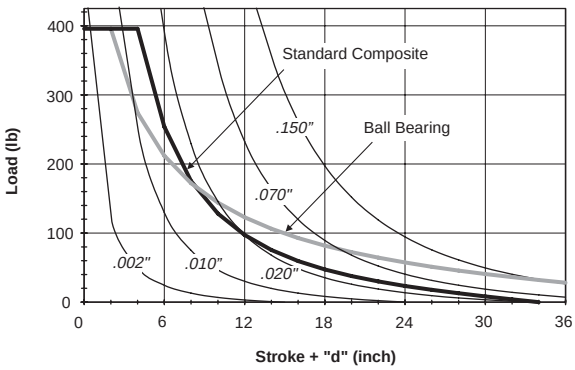

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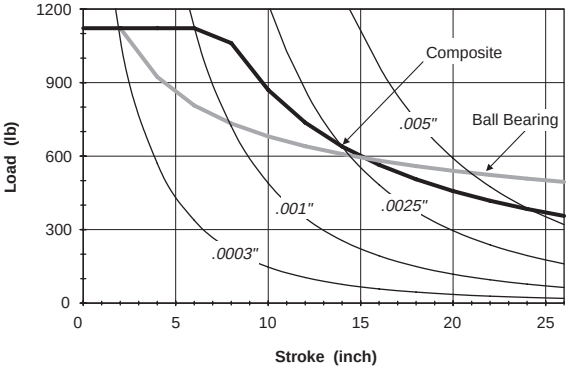

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Horizontal Load Capacity & Deflection with Oversized Shafting

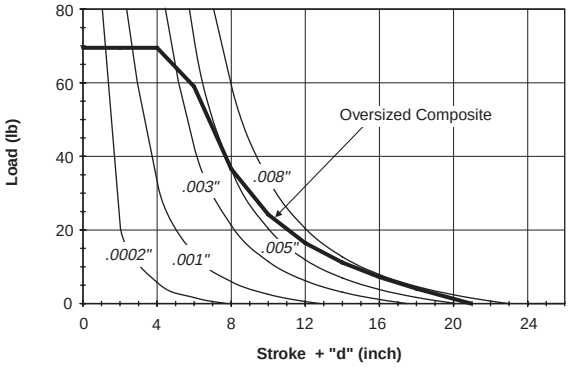
The plots on these two pages illustrate the side load vs. actuator stroke for the three HB slide sizes. Applied loads will cause a slight deflection of the support rods. Deflection distance is also shown. The graphs include the weight of the support rods and tooling plate and are based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic loads will reduce cycle life. For static loads, multiply the information in the graph by 1.5.

Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration
- Orientation

F

HBC15



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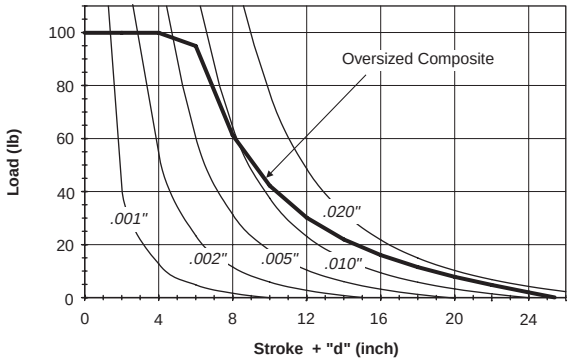

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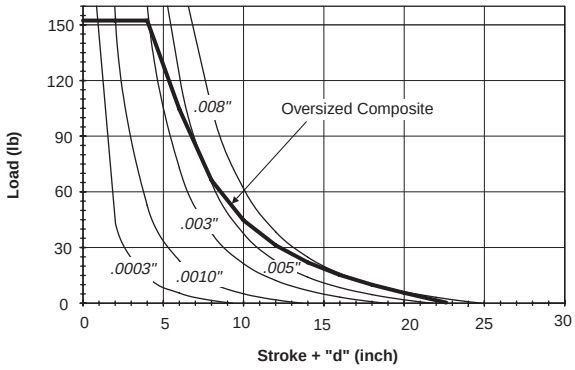

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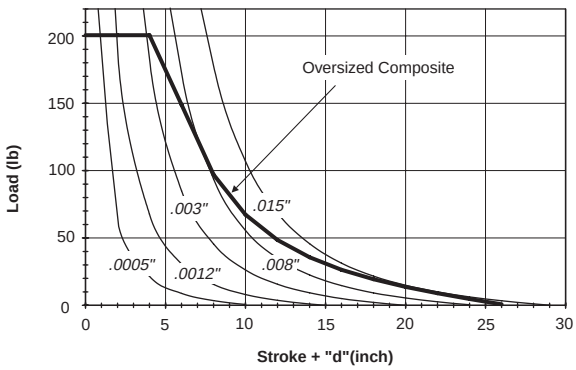

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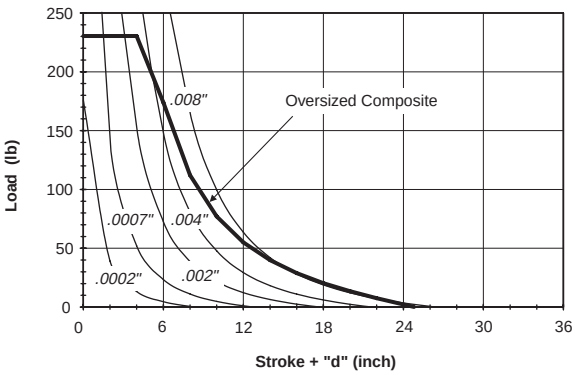

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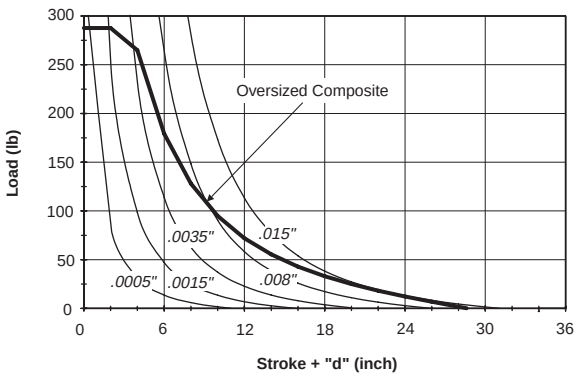

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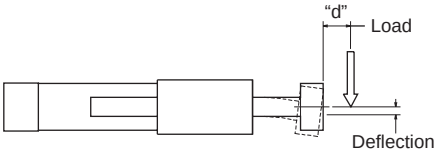
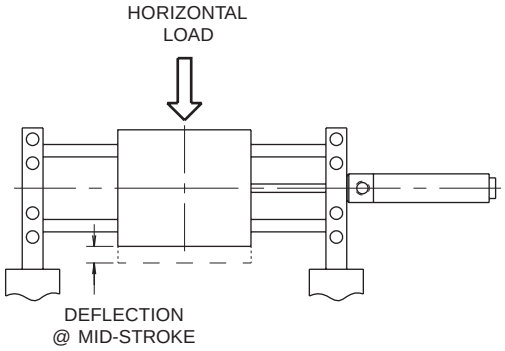


EXAMPLE:

An HBT15 with oversized composite bushings and a "stroke+d" of 8" would have a load capacity of 60 lbs.



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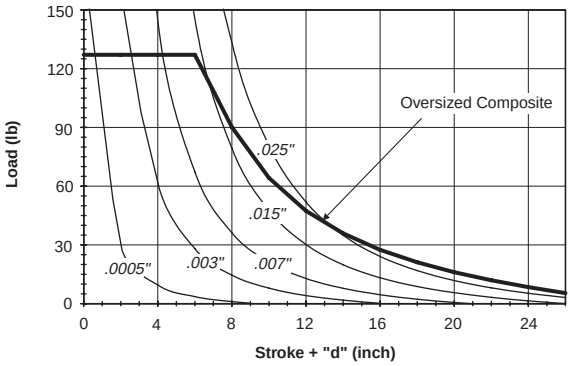
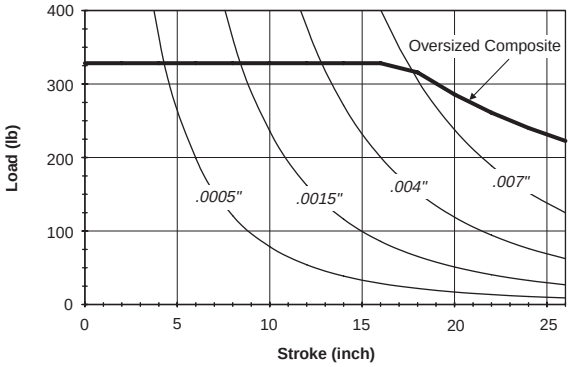


HBB15



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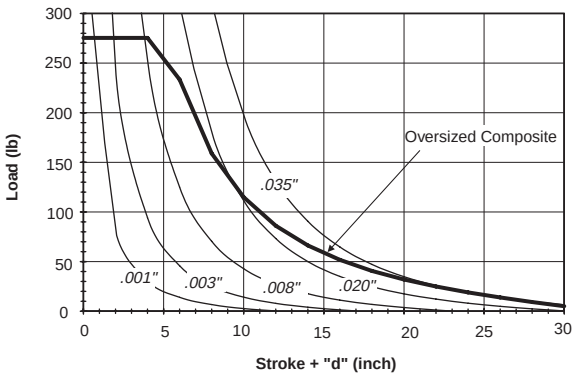
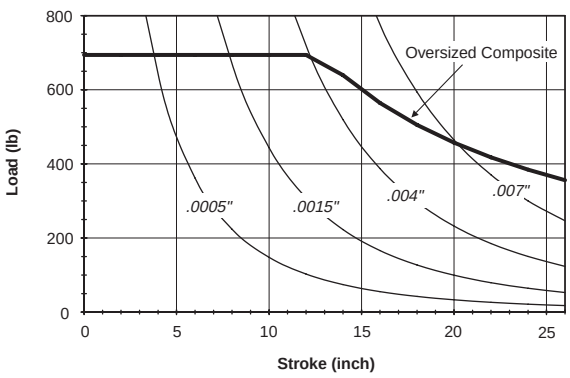
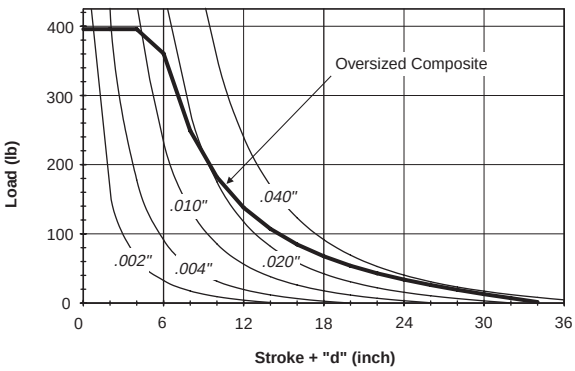


HBB20



HBR25



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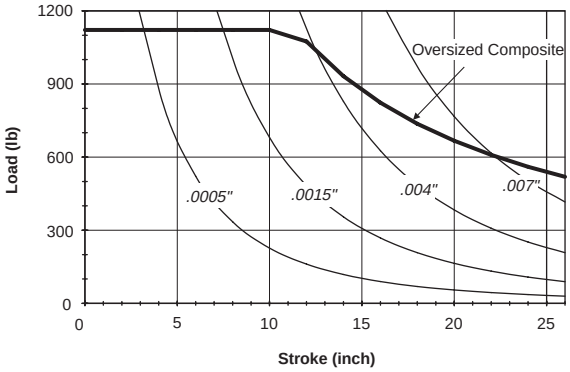

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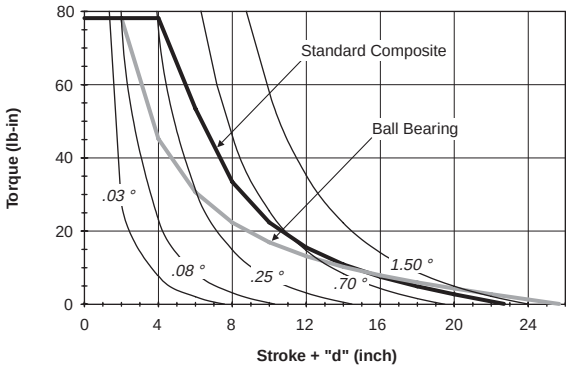
Symmetrical Torque Capacity with Standard Shafting

The plots on these two pages provide the torsional load vs. actuator stroke for various slide sizes. Torsional loads will cause a slight amount of angular deflection of the tooling plate. Angular deflection is also shown except for HBN, which should be used in non-rotating applications. The data presented is based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic torques will reduce cycle life. For static torque, multiply the information in the graph by 1.5. The vertical load for HBN does not include the weight of the tool plate and support rods.

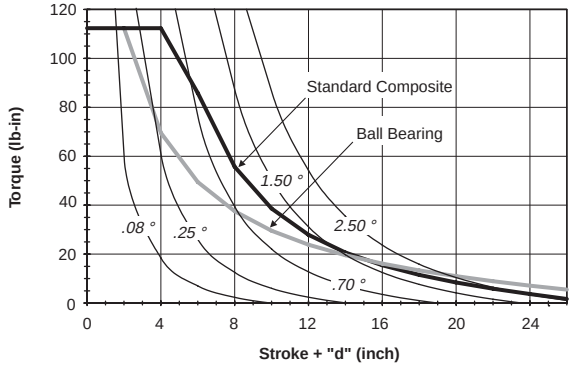
Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration
- Orientation

HBC15



HBT15



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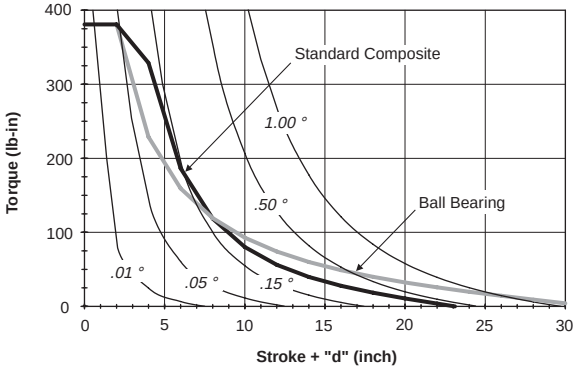

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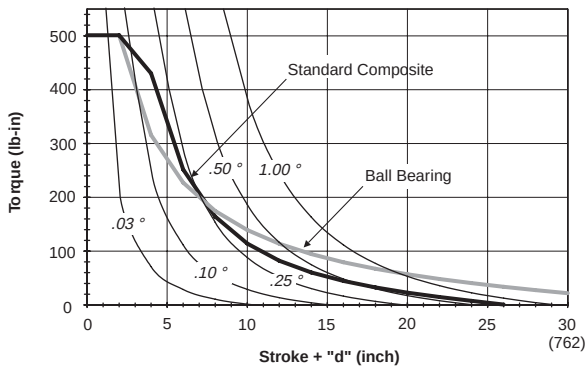

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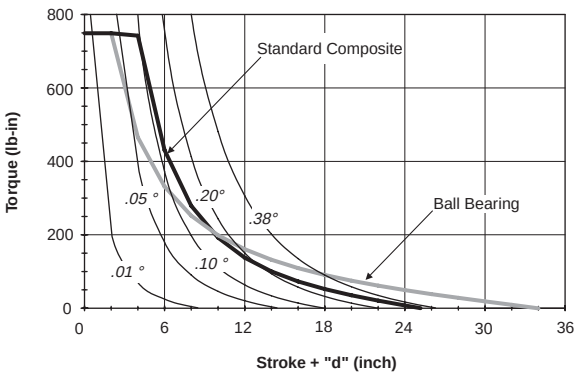

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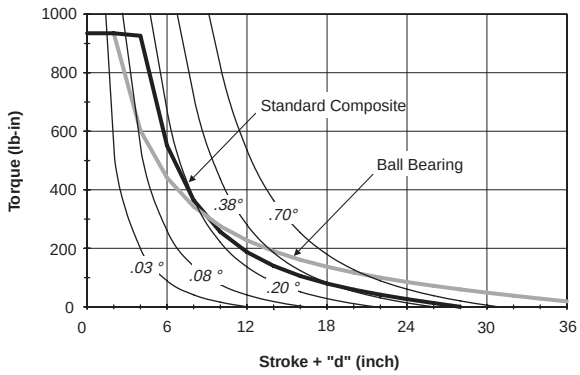

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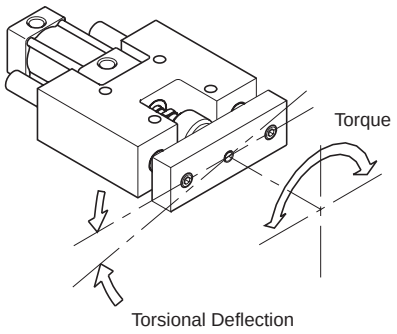
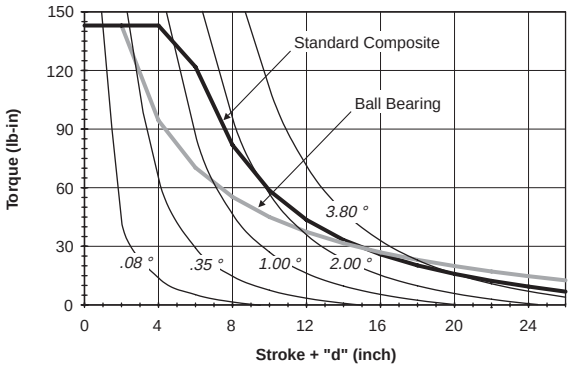


EXAMPLE:

An HBT25 with composite bushings and a “stroke+d” of 12" would have a torque capacity of 200 lb-in.

HBR15



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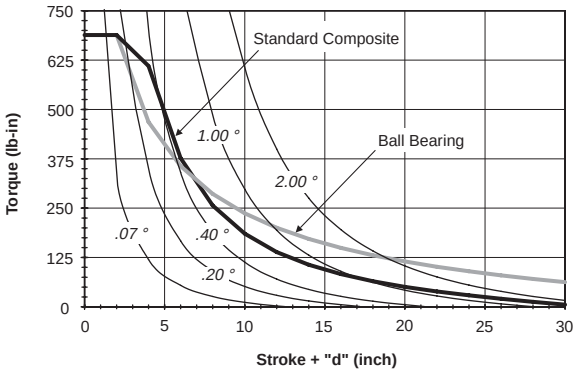

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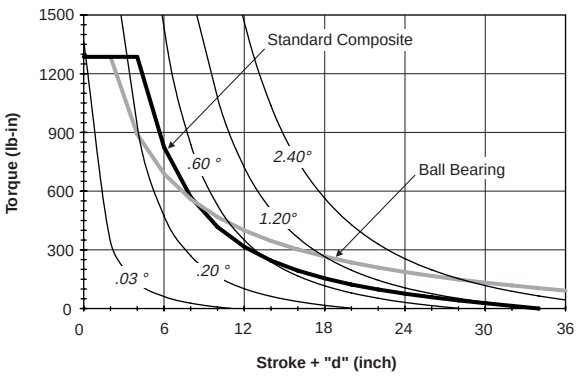

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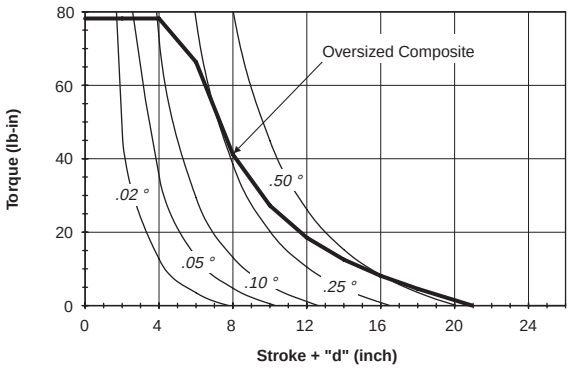
Symmetrical Torque Capacity with Oversized Shafting

The plots on these two pages provide the torsional load vs. actuator stroke for various slide sizes. Torsional loads will cause a slight amount of angular deflection of the tooling plate. Angular deflection is also shown. The data presented is based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic torques will reduce cycle life. For static torque, multiply the information in the graph by 1.5.

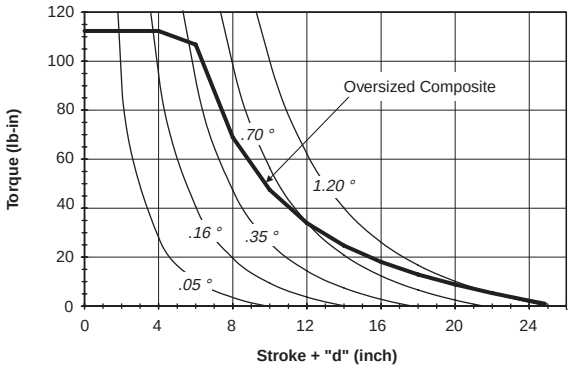
Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration
- Orientation

HBC15



HBT15



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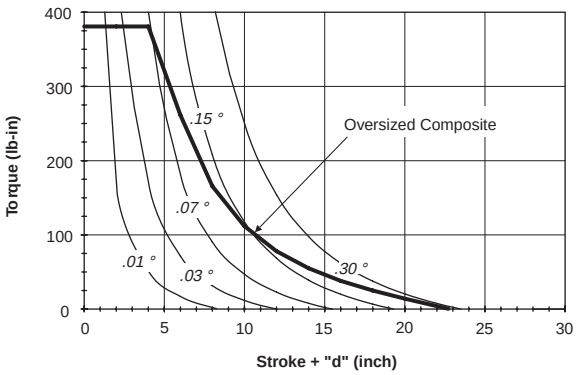

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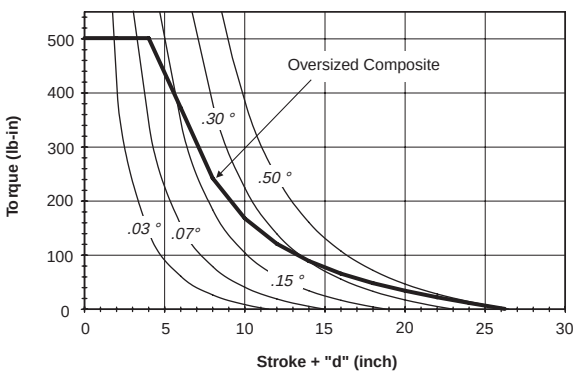

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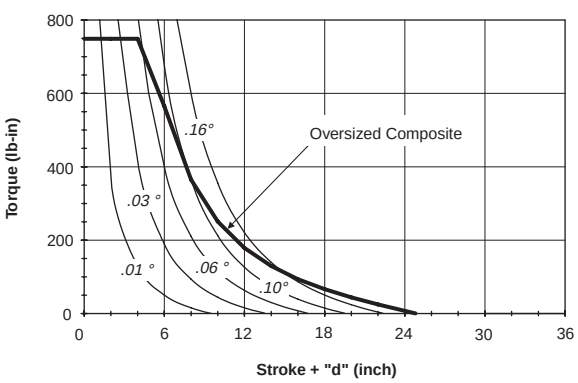

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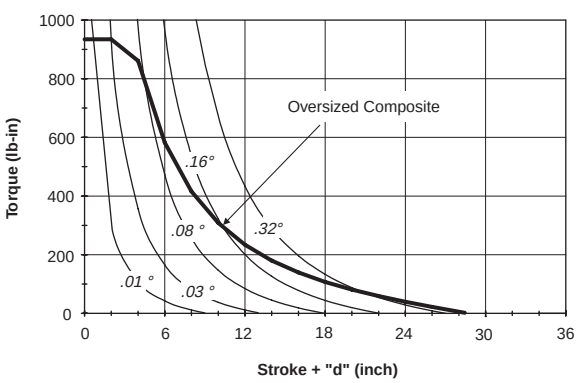

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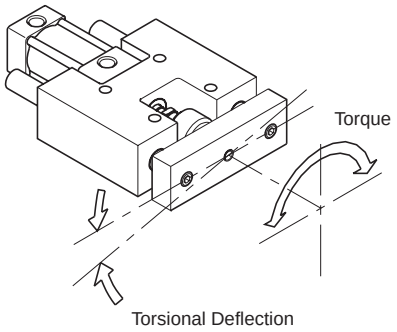
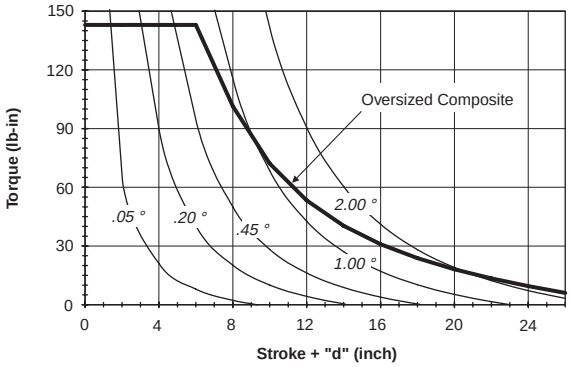


EXAMPLE:

An HBT25 with oversized composite bushings and a “stroke+d” of 6" would have a torque capacity of 600 lb-in.

HBR15



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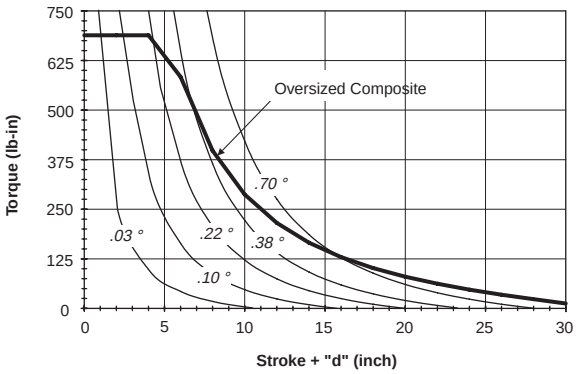

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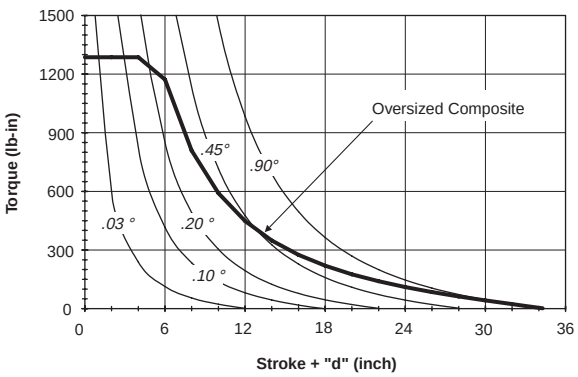

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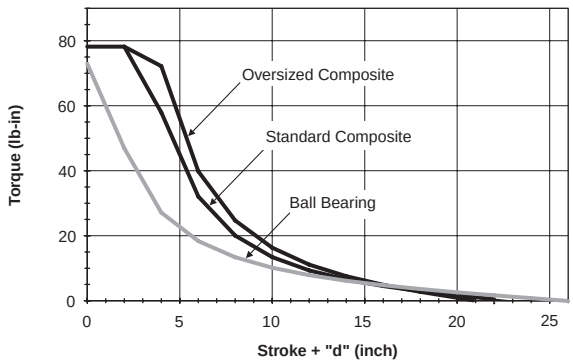
Asymmetrical Torque Capacity

Asymmetrical loading occurs when the load is applied to one side of the unit. HB Series units can resist torsional loads that are asymmetrical. The graphs on these two pages show torsional load capacity for both standard and oversized shafting under dynamic conditions For static applications, multiply the information in the graphs by 1.5. The vertical load for HBN does not include the weight of the tool plate and support rods.

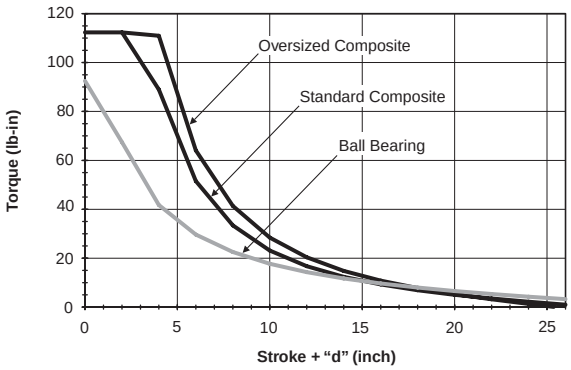
Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration
- Orientation

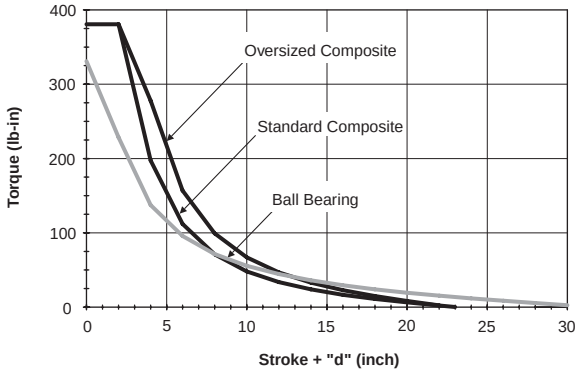
HBC15



HBT15



HBC20



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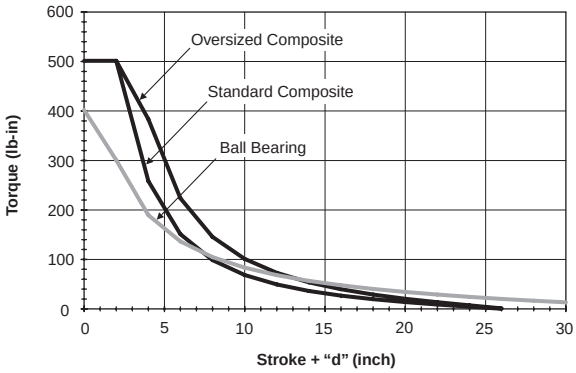

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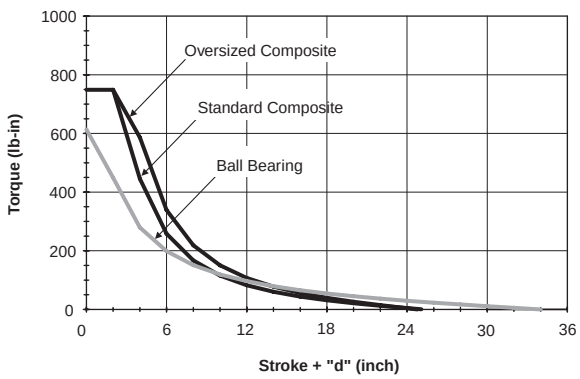

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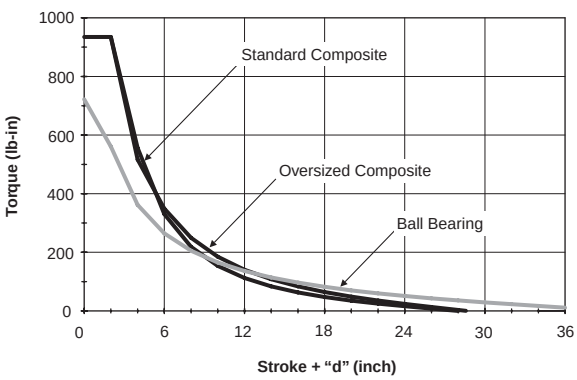

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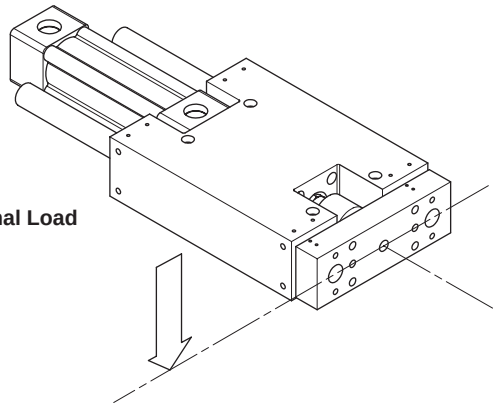
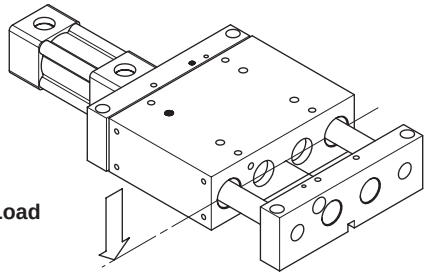


Torsional Load

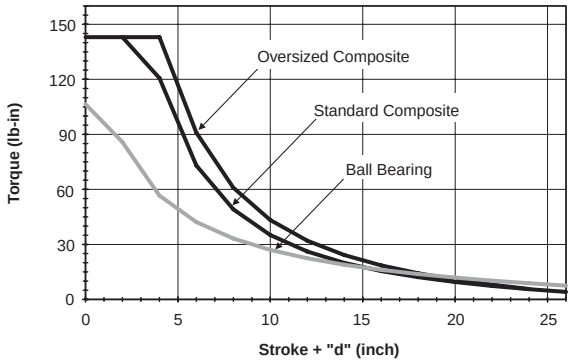


Torsional Load

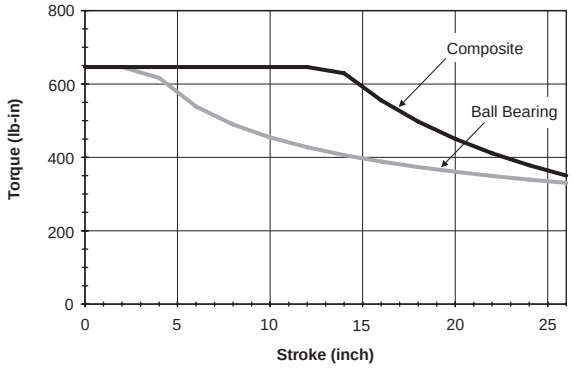
EXAMPLE:

An HBT-20 with standard composite bushings and a stroke + d of 10 inches would have an asymmetrical torque capacity of 80 lb-in.

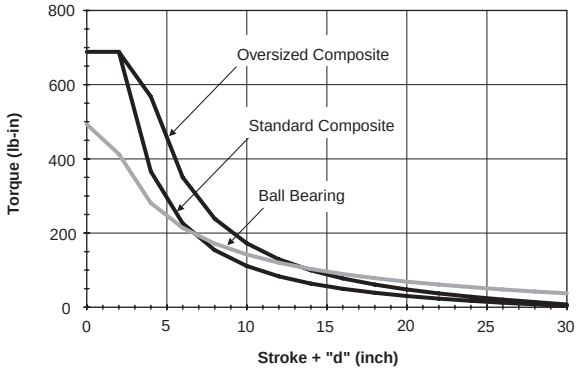
HBR15



HBB15



HBR20



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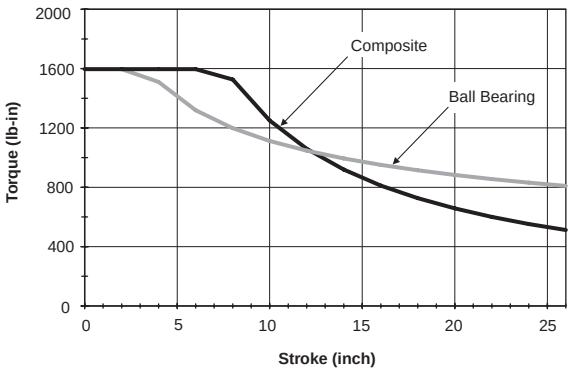

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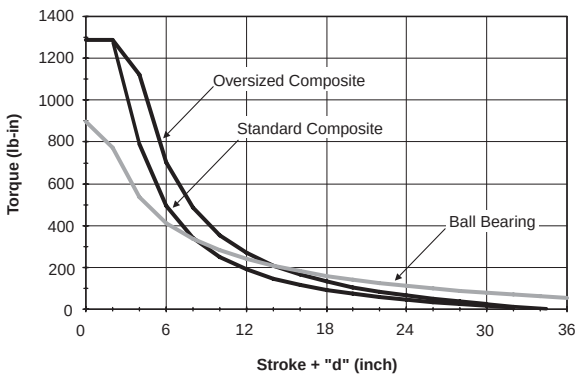

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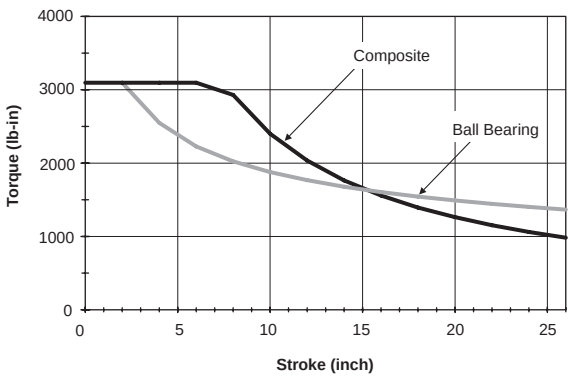

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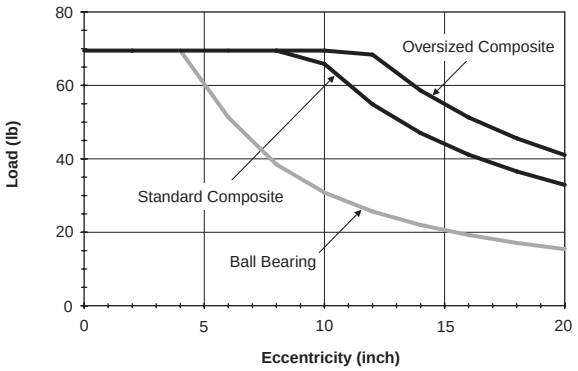
Vertical Eccentric Load Capacity

HB Series units mounted vertically will have the same eccentric load capacity regardless of orientation. The graphs provide maximum load capacity for an eccentric mounted load on a 4" stroke cylinder. The load is assumed to be mounted at the face of the tooling plate.

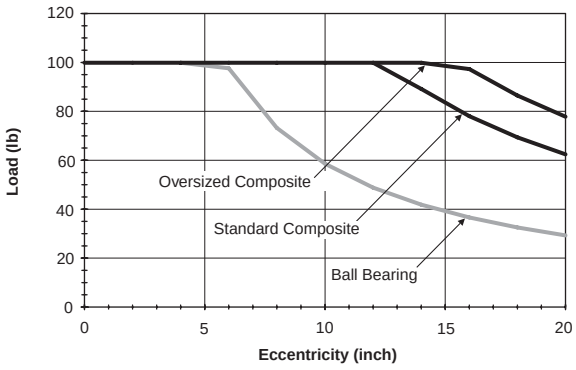
Note: Actuator life may vary depending on the severity of the following variables:

- Acceleration
- Velocity
- Vibration

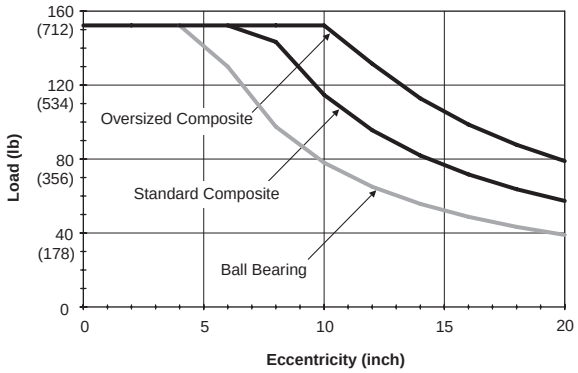
HBC15



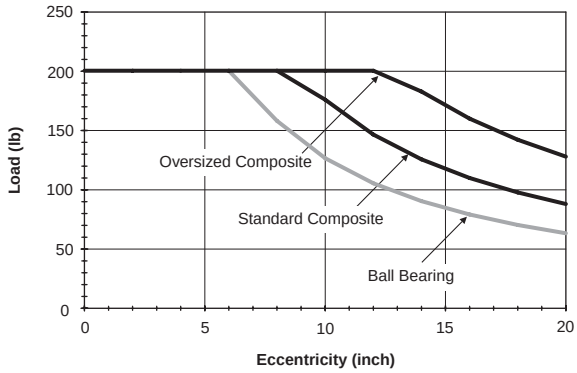
HBT15



HBC20



HBT20



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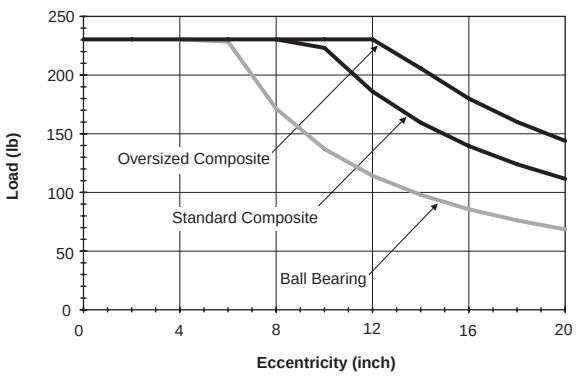
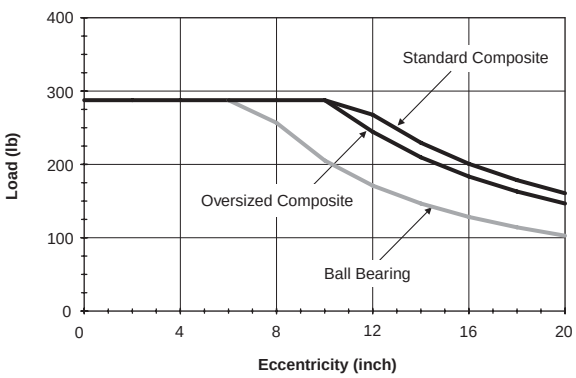


HBT25



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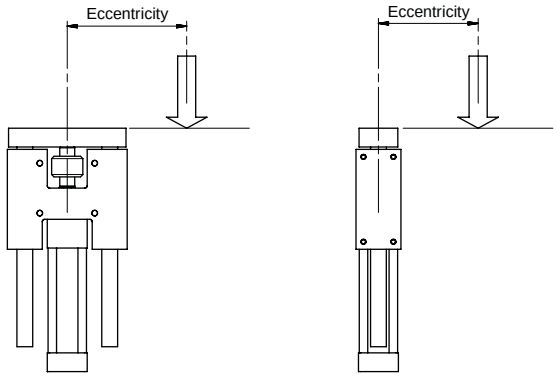
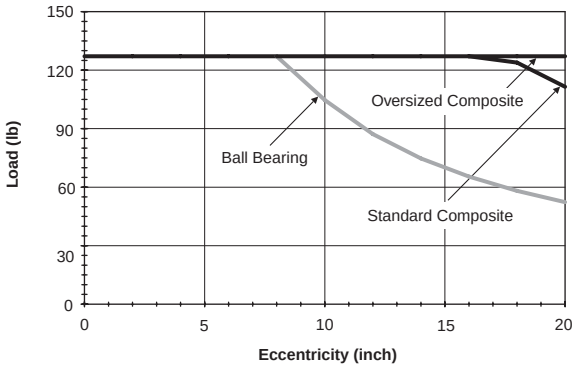


EXAMPLE:

An HBT15 with ball bearings carrying an eccentric load with an eccentricity distance of 15" would have a load capacity of 40 lbs.

HBR15



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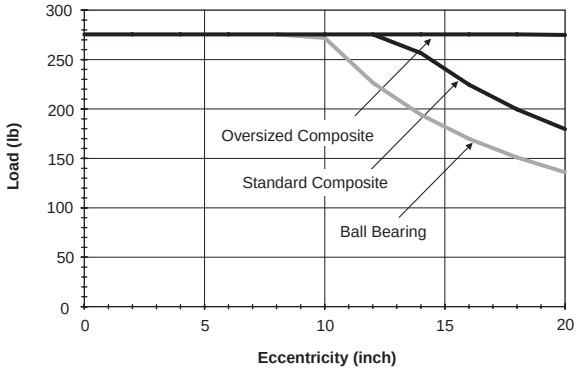
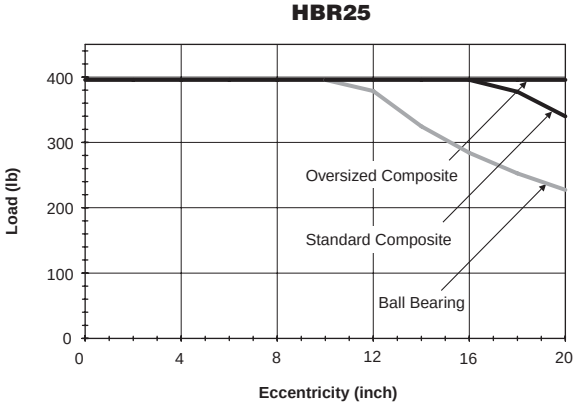


HBR25



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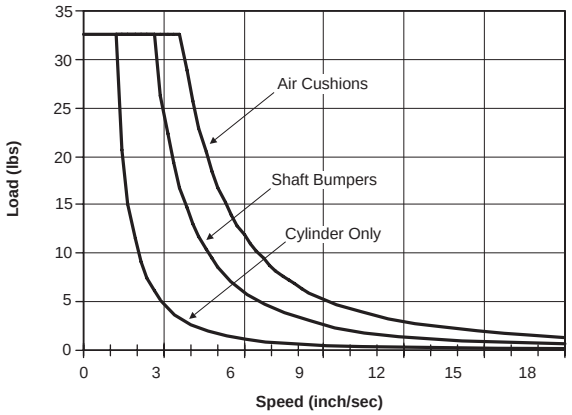
Kinetic Energy

These plots illustrate the stopping capacity of the HB Series with bumpers, cushions or cylinder only. This type of sizing is based on the weight of the load and the speed at which the load is moving. The bumper plots are based on a 0.020 deflection.

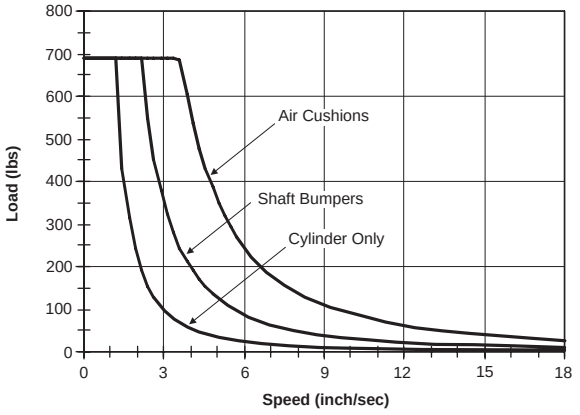
For values above the cushion line, shock absorbers must be specified. Follow the shock absorber sizing steps on the following page to ensure proper stopping capacity.

Note: These charts are to be used only to determine the stopping capacity of each guided cylinder.

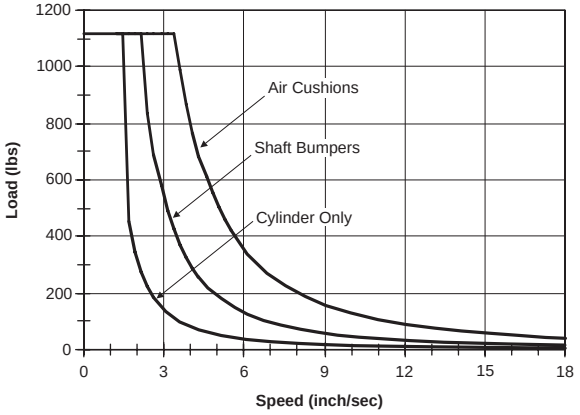
HB*15



HB*20



HB*25



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Kinetic Energy

Steps to sizing a guided cylinder with shocks:

1) Determine the "Moving Weight", W.

   Use Table 1 to determine the "Kinetic Energy Weight" of a given slide. This value should be added to the weight of the load the slide will be carrying.

   Moving Weight (lbs) =
   Kinetic Energy Weight (lbs) + Weight of Load (lbs)

2) Determine the velocity of the load, V (ft/second)

3) Determine the cylinder force output at the operating pressure, $F_{cylinder}$ (lbs)

4) Determine the Kinetic Energy of the load:

   $KE = 0.2 \times W \times V^2$ (lb-in)

5) Determine the Energy per Cycle, E_{cycle} (lb-in):

   E_{cycle} = KE + $F_{cylinder}$ × Shock Stroke
   (unless stroke adjusters are used, 1 inch is standard)

   This value should be less than the value listed in table 2

6) Determine the Energy per Hour: E_{hour} (in-lbs)

   E_{hour} = 2 × E_{cycle} × # of cycles in one hour
   (a cycle is defined as the extension and retraction of the slide)

   This value should be less than the value listed in table 2

7) Determine the Effective Weight of the load

$$W_{effective} = \frac{E_{cycle}}{0.2 \times V^2}$$

   This value should be between the values listed in table 2

Example:

An HBT20-10D-B with standard support rods and shock absorbers will be carrying a load of 40 lbs at a velocity of 17 in/second (cycling 15 times per hour) while operating at 80psi. Is this unit properly sized?

1) Moving Weight = [8.35 + (10 × 0.65)] + 40 lbs = 54.85 lbs
2) V = 17 in/second = 1.4 ft/second
3) $F_{cylinder}$ = 251 lbs
4) $KE = 0.2 \times 54.85 \times 1.4^2 = 21.5$ lb-in
5) E_{cycle} = 21.5 + 251 = 272.5 lb-in
6) E_{hour} = 2 × 272.5 × 15 = 8175 lb-in

7) $$W_{effective} = \frac{272.5}{0.2 \times (1.4)^2} = 695 \text{ lbs}$$

The shock will dissipate the energy of the load.

Table 1

Model	Base Weight (lb)	Stroke Adder (lb/inch)	Base Weight, Oversized (lb)	Stroke Adder (lb/inch)
HBC15	3.66	0.36	4.36	0.52
HBC20	7.15	0.65	8.19	0.84
HBC25	12.73	1.04	14.19	1.27
HBT15	4.70	0.36	5.67	0.52
HBT20	8.35	0.65	9.67	0.84
HBT25	14.22	1.04	16.01	1.27
HBR15	5.52	0.36	6.96	0.52
HBR20	10.29	0.65	12.46	0.84
HBR25	17.63	1.04	20.66	1.27
HBB15*	7.93	0.09	7.93	0.09
HBB20*	13.94	0.22	13.94	0.22
HBB25*	25.03	0.42	25.03	0.42

*Support rods do not move with the carriage, so kinetic energy is the same for standard and oversized rods.

Table 2

Size	Total Energy per Cycle (lb-in)	Total Energy per Hour (lb-in)	Effective Weight (lb)	Velocity Range (in/sec)
15	600	600,000	20 - 3000	6 - 144
20	900	800,000	30 - 4500	6 - 144
25	1500	670,000	28 - 3800	6 - 120

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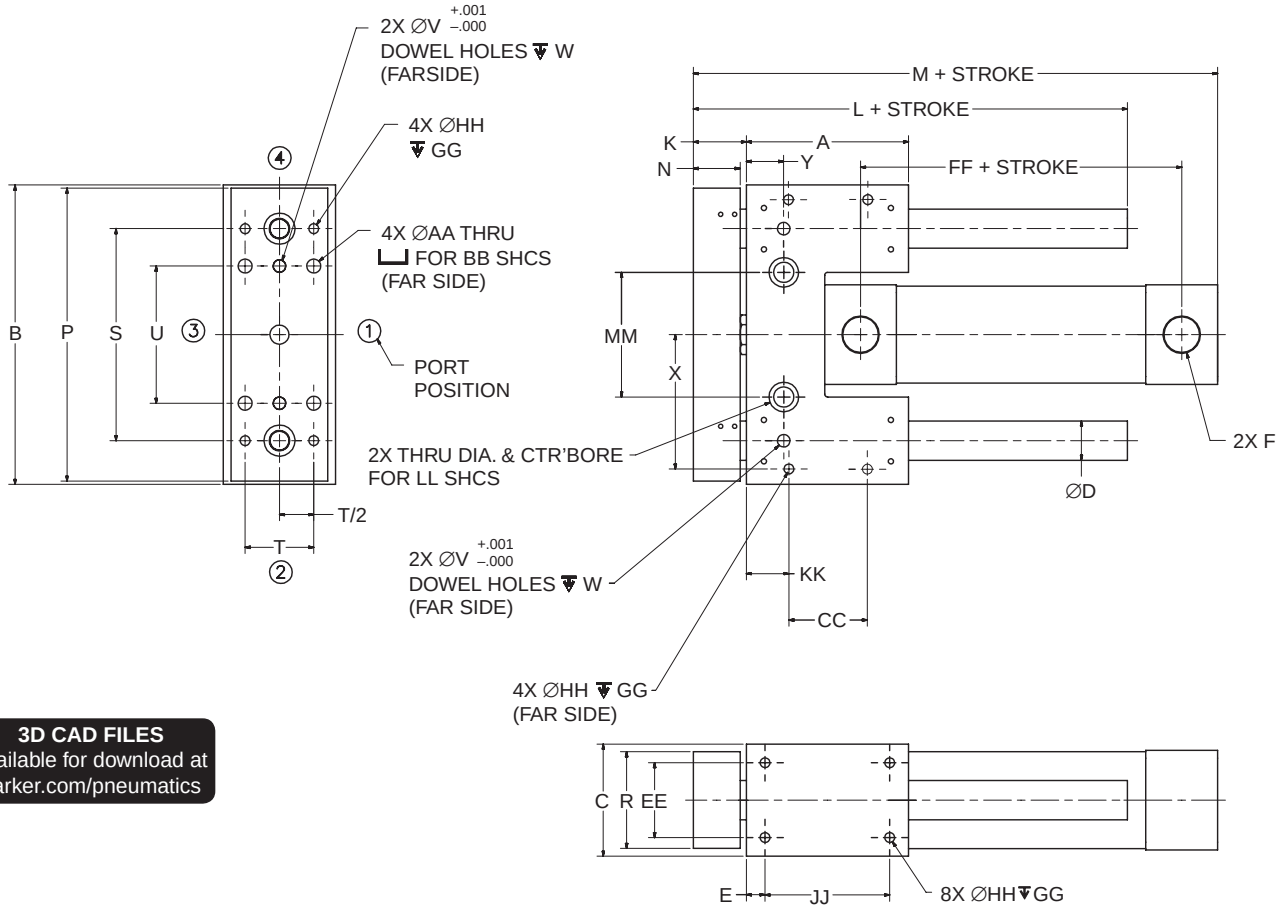
HBC Series



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Model	A	B	C	Ds*	Do**	E	F NPTF	F BSPP	K	L	M	N	P	R	S	T	U
15	3.25	6.00	2.25	20mm (0.79)	25mm (0.98)	0.375	1/4 [1]	1/4	1.06	5.19	6.26	0.94	5.88	1.94	4.250	1.375	2.750
20	4.00	7.25	2.75	25mm (0.98)	30mm (1.18)	0.500	3/8	1/4	1.31	6.39	7.00	1.19	7.13	2.44	5.000	1.750	3.250
25	5.00	9.00	3.25	30mm (1.18)	35mm (1.38)	0.500	3/8	3/8	1.56	7.82	8.38	1.44	8.88	2.88	6.500	2.000	3.750

Model	V	W	X	Y	AA	BB	CC	EE	FF	GG	HH	JJ	KK	LL	MM
15	0.251	0.27	2.750	0.750	0.28	1/4	1.750	1.500	2.31	0.50	1/4-20	2.50	0.75	3/8	2.500
20	0.313	0.33	3.250	0.750	0.34	5/16	2.250	1.750	2.31	0.63	5/16-18	3.00	0.88	3/8	3.000
25	0.376	0.39	4.000	1.532	0.41	3/8	3.000	2.250	2.38	0.75	3/8-16	4.00	1.00	1/2	4.000

* Standard shafting
** Oversized shafting

1 Model 15 with Cylinder Type 3A (3MA cylinder) has 3/8" NPTF ports.

All dimensions in inches unless otherwise noted.

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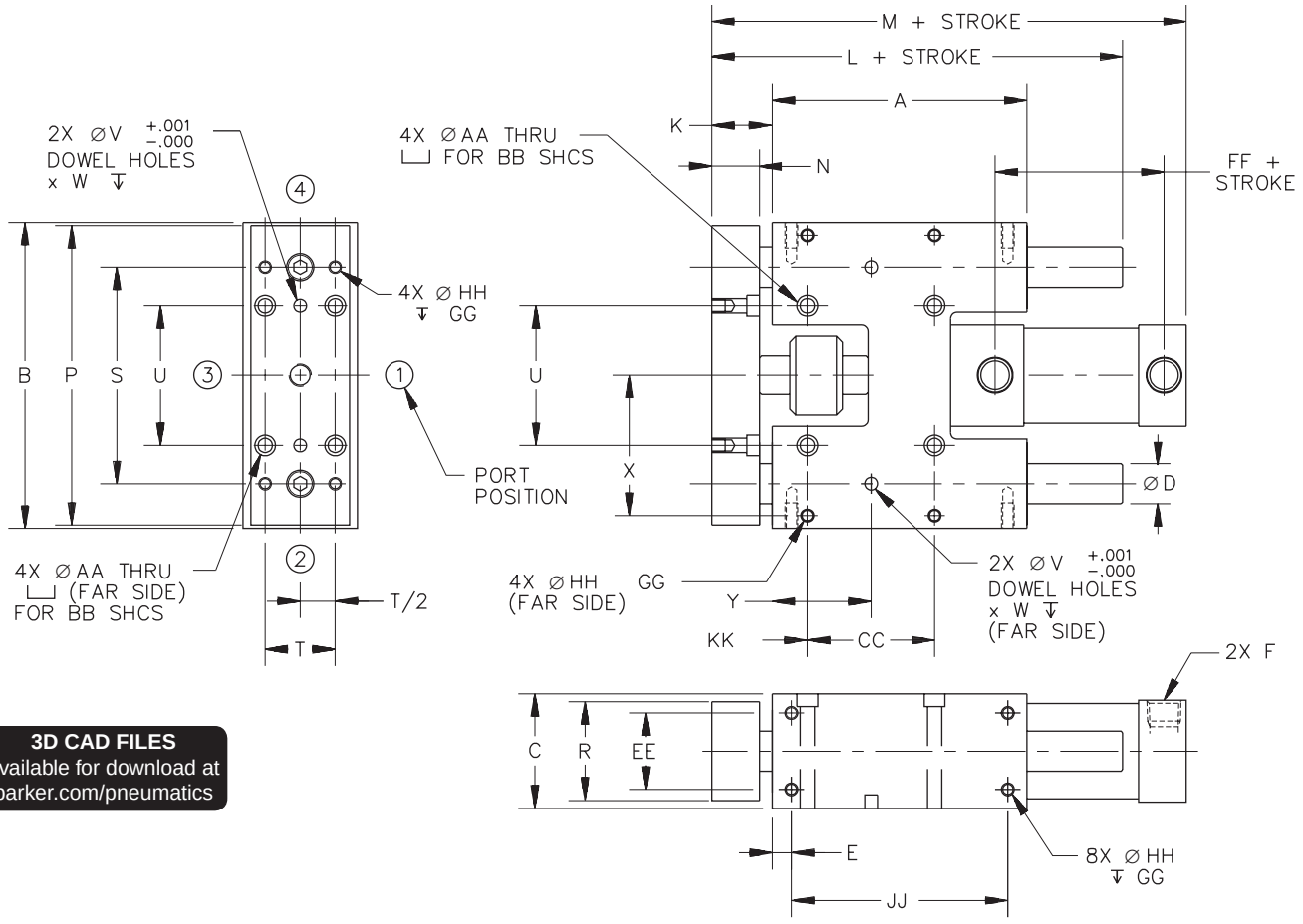
HBT Series



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Model	A	B	C	Ds*	Do**	E	F NPTF	F BSPP	K	L	M	N	P	R	S	T
15	5.0	6.00	2.25	20mm (0.79)	25mm (0.98)	0.375	1/4 [1]	1/4	1.06	6.94	8.19	0.94	5.88	1.94	4.250	1.375
20	5.5	7.25	2.75	25mm (0.98)	30mm (1.18)	0.500	3/8	1/4	1.31	7.88	8.94	1.19	7.13	2.44	5.000	1.750
25	6.5	9.00	3.25	30mm (1.18)	35mm (1.38)	0.500	3/8	3/8	1.56	9.31	10.31	1.44	8.88	2.88	6.500	2.000

Model	U	V	W	X	Y	AA	BB	CC	EE	FF	GG	HH	JJ	KK
15	2.750	0.251	0.27	2.750	1.938	0.28	1/4	2.500	1.500	2.31	0.50	1/4-20	4.25	0.69
20	3.250	0.313	0.33	3.250	2.250	0.34	5/16	2.750	1.750	2.31	0.63	5/16-18	4.50	0.88
25	3.750	0.376	0.39	4.000	2.750	0.41	3/8	3.500	2.250	2.38	0.75	3/8-16	5.50	1.00

* Standard shafting
** Oversized shafting

1 Model 15 with Cylinder Type 3A (3MA cylinder) has 3/8" NPTF ports.

All dimensions in inches unless otherwise noted.

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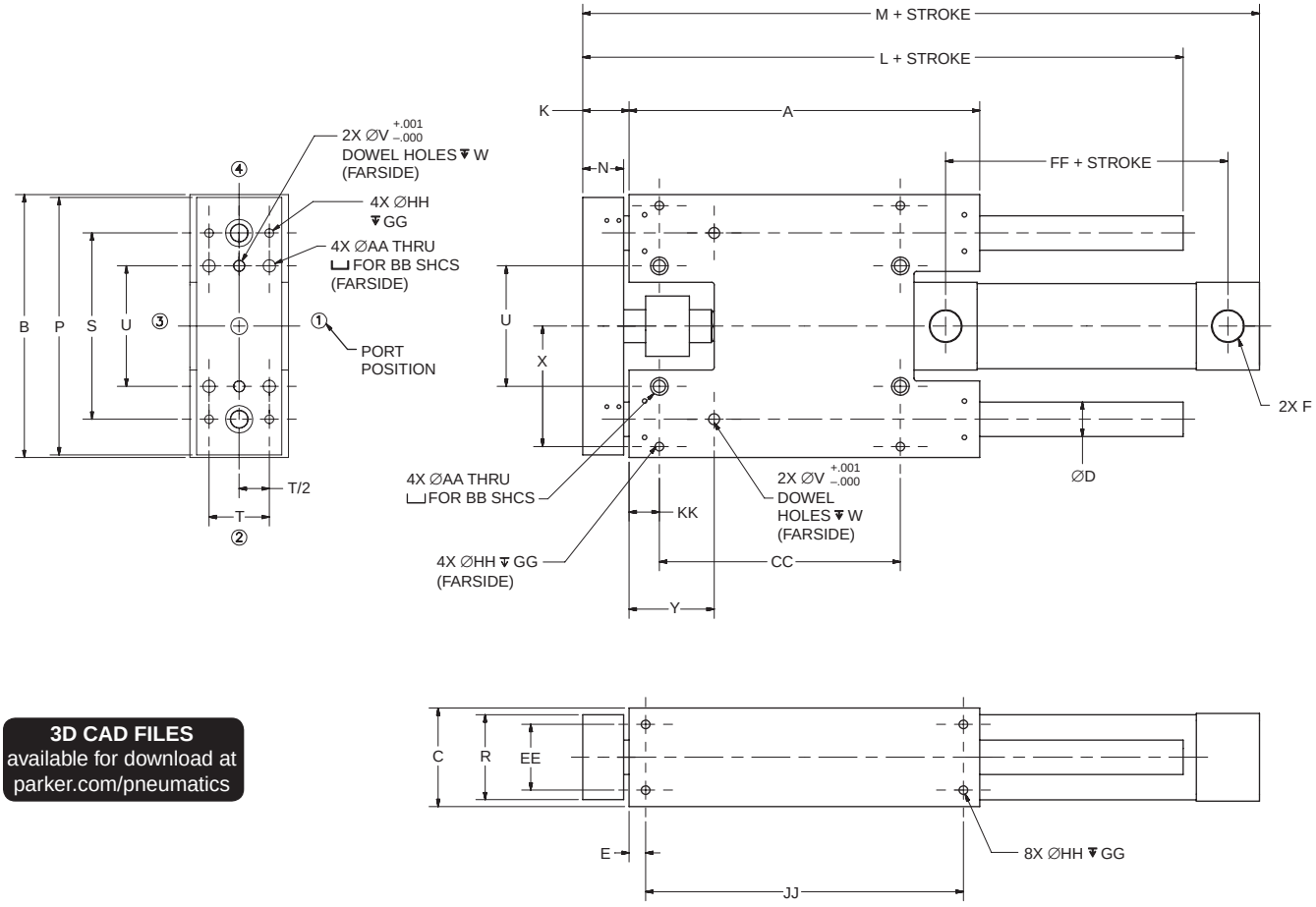
HBR Series



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Model	A	B	C	Ds*	Do**	E	F NPTF	F BSPP	K	L	M	N	P	R	S	T
15	8.00	6.00	2.25	20mm (0.79)	25mm (0.98)	0.375	1/4 [1]	1/4	1.06	9.94	11.19	0.94	5.88	1.94	4.250	1.375
20	10.00	7.25	2.75	25mm (0.98)	30mm (1.18)	0.500	3/8	1/4	1.31	12.39	13.44	1.19	7.13	2.44	5.000	1.750
25	12.00	9.00	3.25	30mm (1.18)	35mm (1.38)	0.500	3/8	3/8	1.56	14.82	15.82	1.44	8.88	2.88	6.500	2.000

Model	U	V	W	X	Y	AA	BB	CC	EE	FF	GG	HH	JJ	KK
15	2.750	0.251	0.27	2.750	1.938	0.28	1/4	5.500	1.500	2.31	0.50	1/4-20	7.25	0.69
20	3.250	0.313	0.33	3.250	2.250	0.34	5/16	7.250	1.750	2.31	0.63	5/16-18	9.00	0.88
25	3.750	0.376	0.39	4.000	2.760	0.41	3/8	9.000	2.250	2.38	0.75	3/8-16	11.00	1.00

* Standard shafting
** Oversized shafting

1 Model 15 with Cylinder Type 3A (3MA cylinder) has 3/8" NPTF ports.

All dimensions in inches unless otherwise noted.

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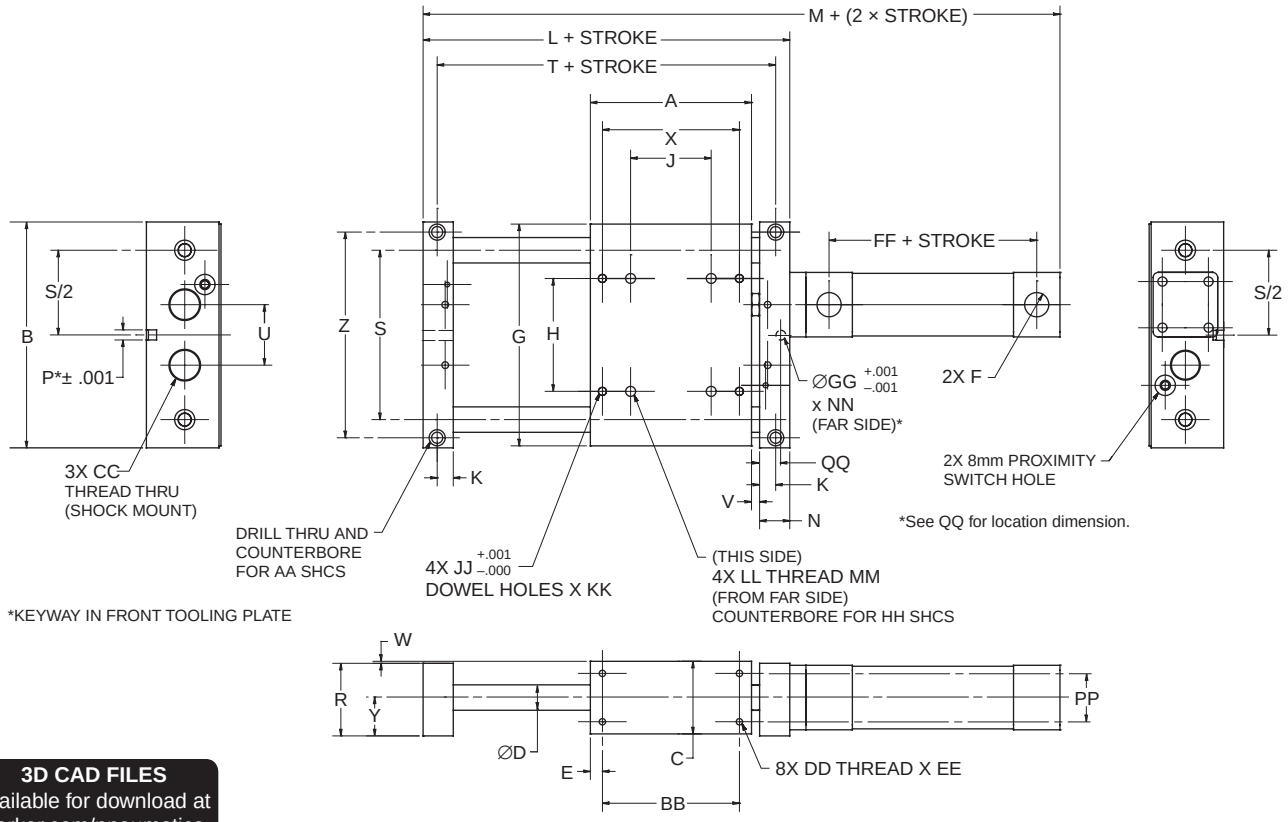
HBB Series



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Model	A	B	C	Ds*	Do**	E	F NPTF	F BSPP	G	H	J	K	L	M
15	5.00	7.00	2.25	20mm (0.79)	25mm (0.98)	0.375	1/4 [1]	1/4	6.875	3.50	2.50	0.50	7.00	11.13
20	5.50	8.75	2.75	25mm (0.98)	30mm (1.18)	0.500	3/8	1/4	8.625	4.50	2.50	0.50	8.00	12.13
25	6.50	11.00	3.25	30mm (1.18)	35mm (1.38)	0.500	3/8	3/8	10.875	6.00	3.00	0.50	9.50	13.75

Model	N	P	R	S	T	U	V	W	X	Y	Z	AA	BB
15	0.94	0.313	2.25	5.25	6.13	1.88	0.13	0.06	4.25	1.188	6.375	5/16-18	4.25
20	1.19	0.313	2.75	6.50	6.63	2.25	0.13	0.06	4.25	1.438	8.000	3/8-16	4.50
25	1.44	0.313	3.25	8.50	7.63	3.50	0.13	0.06	5.00	1.688	10.000	1/2-13	5.50

Model	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ
15	25mm	1/4-20	0.50	2.31	0.313	5/16-18	0.251	0.27	3/8-16	0.75	0.25	1.50	0.500
20	25mm	5/16-18	0.63	2.31	0.313	5/16-18	0.251	0.27	3/8-16	0.75	0.25	1.75	0.594
25	1¼-12	3/8-16	0.75	2.38	0.313	5/16-18	0.313	0.33	3/8-16	0.75	0.25	2.75	0.719

* Standard shafting
** Oversized shafting

1 Model 15 with Cylinder Type 3A (3MA cylinder) has 3/8" NPTF ports.

All dimensions in inches unless otherwise noted.

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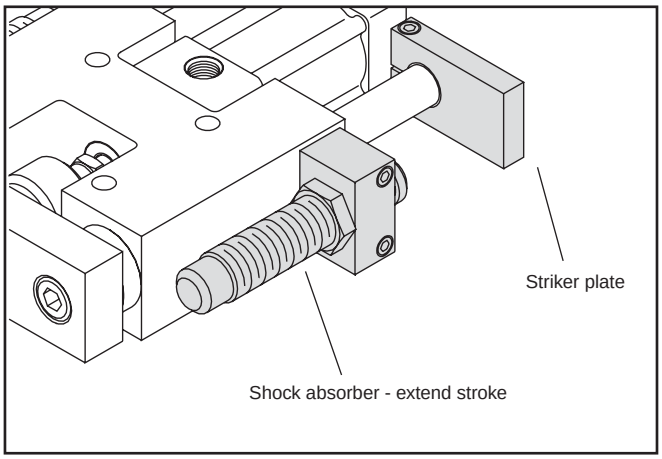
Shock Absorbers/Stroke Adjusters (A, A1, A2)

Adjustable shock absorbers are provided when this option is specified. These dissipate kinetic energy over a wide range of velocities and weights. Cylinder stroke is adjusted by moving the shock striker plate.

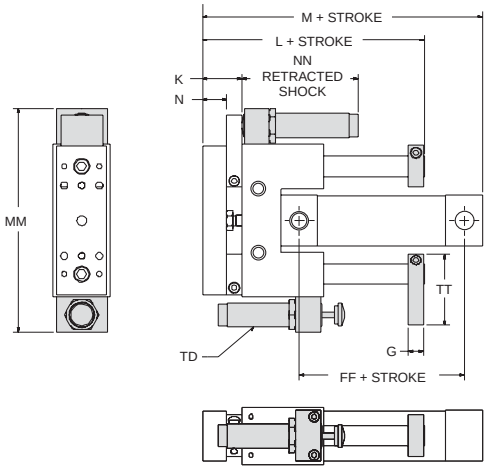
Shock Absorber Adjustment Procedure: Proper adjustment is important to maximize a shock absorber's performance. With a range of zero to ten, shocks are factory preset at five. Cycle the slide to impact the shock absorber. Rotate the shock's adjustment knob to achieve smooth deceleration. Adjusting towards zero increases resistance. If the initial impact is too hard, rotate the knob towards ten to lessen the resistance. If the final setting is less than one, a larger shock and/or slide should be considered. Tighten the adjusting knob set screw to maintain resistance



Shock Absorbers/Stroke Adjusters Extend and Retract (A)

F

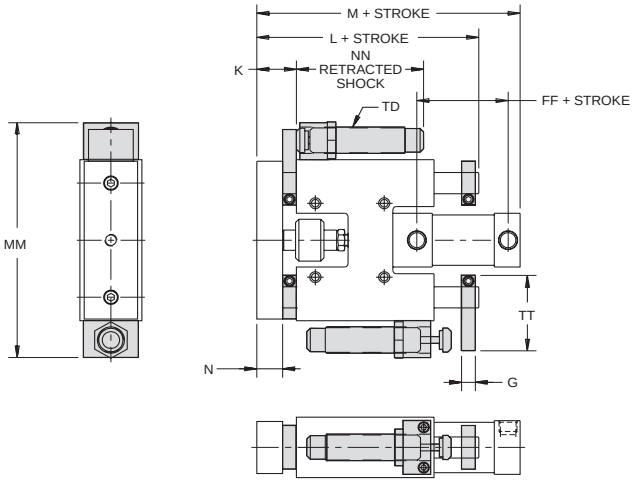
HBC



Model	G	K	L	M	N
HBC15	0.50	1.53	5.66	6.97	0.94
HBC20	0.63	1.88	6.95	7.82	1.19
HBC25	0.75	2.31	8.57	9.38	1.44

Model	FF	MM	NN	TD	TT
HBC15	2.56	8.75	4.62	M25 x 1.5	2.81
HBC20	2.56	10.00	5.86	M25 x 1.5	3.25
HBC25	2.63	12.50	4.45	1 1/4 - 12	4.13

HBT / HBR



Model	G	K	L	M	N
HBT15	0.50	1.53	7.31	8.81	0.94
HBT20	0.63	1.88	8.44	9.75	1.19
HBT25	0.75	2.31	10.06	11.31	1.44
Model	**FF**	**MM**	**NN**	**TD**	**TT**
HBT15	2.56	8.75	4.62	M25 x 1.5	2.81
HBT20	2.56	10.00	5.86	M25 x 1.5	3.25
HBT25	2.63	12.50	4.45	1 1/4 - 12	4.13

Model	G	K	L	M	N
HBR15	0.50	1.53	10.41	11.90	0.94
HBR20	0.63	1.88	12.95	14.26	1.19
HBR25	0.75	2.31	15.57	16.82	1.44
Model	**FF**	**MM**	**NN**	**TD**	**TT**
HBR15	2.56	8.75	4.62	M25 x 1.5	2.81
HBR20	2.56	10.00	5.86	M25 x 1.5	3.25
HBR25	2.63	12.50	4.45	1 1/4 - 12	4.13

All dimensions shown in inches.

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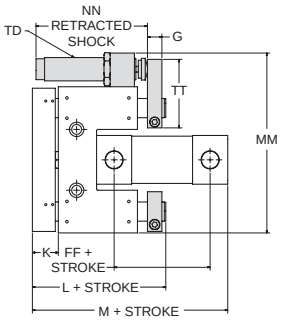
Shock Absorbers Extend Only (A1)

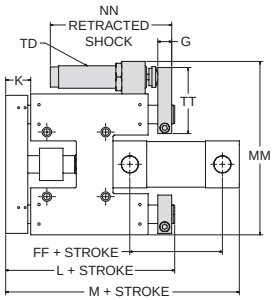
HBC



Model	G	K	L	M	N
HBC15	0.50	1.06	5.19	6.38	0.94
HBC20	0.63	1.31	6.39	7.13	1.19
HBC25	0.75	1.56	7.82	8.50	1.44

Model	FF	MM	NN	TD	TT
HBC15	2.44	7.38	4.62	M25 x 1.5	2.81
HBC20	2.44	8.63	5.86	M25 x 1.5	3.25
HBC25	2.50	10.75	4.45	1 1/4 - 12	4.13

HBT / HBR



Model	G	K	L	M	N
HBT15	0.50	1.06	6.94	8.32	0.94
HBT20	0.63	1.31	7.88	9.07	1.19
HBT25	0.75	1.56	9.31	10.44	1.44

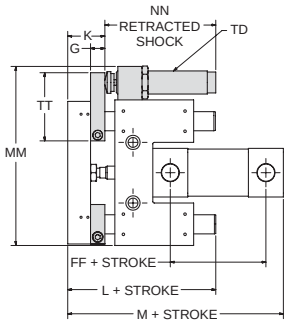
Model	FF	MM	NN	TD	TT
HBT15	2.44	7.38	4.62	M25 x 1.5	2.81
HBT20	2.44	8.63	5.86	M25 x 1.5	3.25
HBT25	2.50	10.75	4.45	1 1/4 - 12	4.13

Model	G	K	L	M	N
HBR15	0.50	1.06	9.94	11.31	0.94
HBR20	0.63	1.31	12.39	13.57	1.19
HBR25	0.75	1.56	14.82	15.94	1.44

Model	FF	MM	NN	TD	TT
HBR15	2.44	7.38	4.62	M25 x 1.5	2.81
HBR20	2.44	8.63	5.86	M25 x 1.5	3.25
HBR25	2.50	10.75	4.45	1 1/4 - 12	4.13

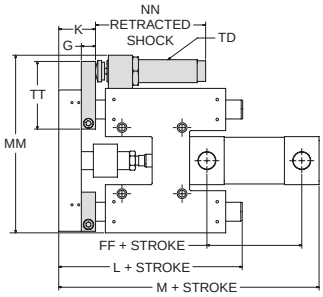
Shock Absorbers Retract Only (A2)

HBC



Model	K	L	M	FF	G	MM	NN	TD	TT
HBC15	1.53	5.66	6.85	2.44	0.50	7.38	4.62	M25 x 1.5	2.81
HBC20	1.88	6.95	7.69	2.44	0.63	8.63	5.86	M25 x 1.5	3.25
HBC25	2.32	8.57	9.26	2.50	0.75	10.75	4.45	1 1/4-12	4.13

HBT / HBR



Model	K	L	M	FF	G	MM	NN	TD	TT
HBT15	1.53	7.41	8.78	2.44	0.50	7.38	4.62	M25 x 1.5	2.81
HBT20	1.88	8.45	9.63	2.44	0.63	8.63	5.86	M25 x 1.5	3.25
HBT25	2.32	10.07	11.20	2.50	0.75	10.75	4.45	1 1/4-12	4.13

Model	K	L	M	FF	G	MM	NN	TD	TT
HBR15	1.53	10.40	11.78	2.44	0.50	7.38	4.62	M25 x 1.5	2.81
HBR20	1.88	12.95	14.13	2.44	0.63	8.63	5.86	M25 x 1.5	3.25
HBR25	2.32	15.57	16.70	2.50	0.75	10.75	4.45	1 1/4-12	4.13

All dimensions shown in inches.

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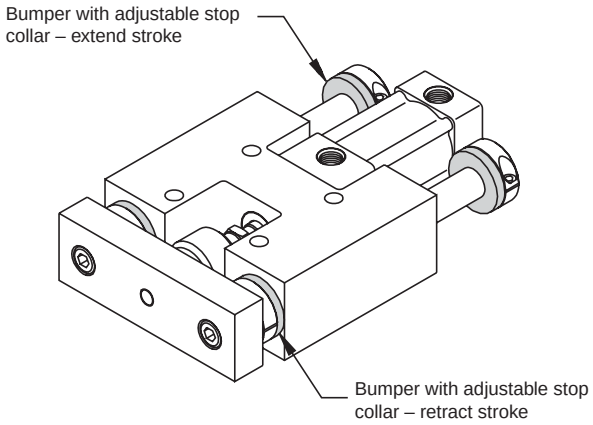
Bumpers/Adjustable Stop Collars (B, B1, B2, B3, B4)

Bumpers absorb shock, reduce noise and permit faster cycle times thereby increasing production rates. They can be placed on the extend, retract or both positions.

When bumpers are specified, an adjustable stop collar is supplied on the extend stroke as standard. An extend stop collar provides travel adjustment. A stop collar can also be specified for the retract stroke. This stop collar is optional and is only provided if requested.

Note: Stop collars must be adjusted evenly to avoid creating a moment between the guide rods.

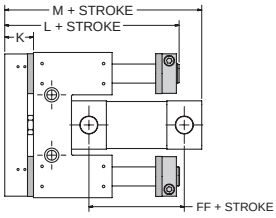


HBT shown with B4 option

Bumpers Both Ends (B)

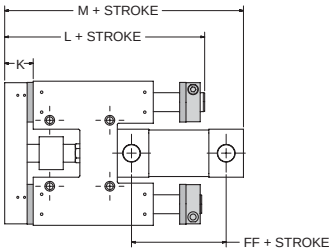
F

HBC



Model	K	L	M	FF
HBC15	1.19	5.32	6.62	2.56
HBC20	1.44	6.51	7.38	2.56
HBC25	1.69	7.94	8.75	2.63

HBT / HBR



Model	K	L	M	FF
HBT15	1.19	7.07	8.56	2.56
HBT20	1.44	8.01	9.32	2.56
HBT25	1.69	9.44	10.69	2.63

Model	K	L	M	FF
HBR15	1.19	10.07	11.56	2.56
HBR20	1.44	12.51	13.82	2.56
HBR25	1.69	14.94	16.19	2.63

All dimensions shown in inches.

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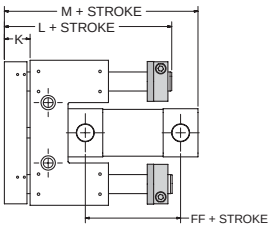
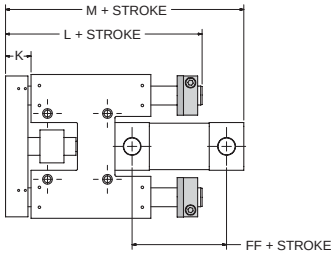
Bumpers and Adjustable Stop Collars, Extend Only (B1)

HBC



Model	K	L	M	FF
HBC15	1.06	5.19	6.37	2.44
HBC20	1.31	6.39	7.13	2.44
HBC25	1.56	7.82	8.50	2.50

HBT / HBR

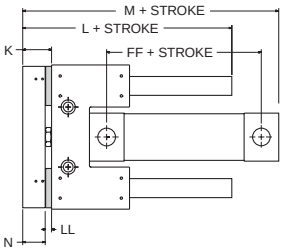


Model	K	L	M	FF
HBT15	1.06	6.94	8.31	2.44
HBT20	1.31	7.89	9.07	2.44
HBT25	1.56	9.32	10.44	2.50

Model	K	L	M	FF
HBR15	1.06	9.94	11.31	2.44
HBR20	1.31	12.39	13.57	2.44
HBR25	1.56	14.82	15.94	2.50

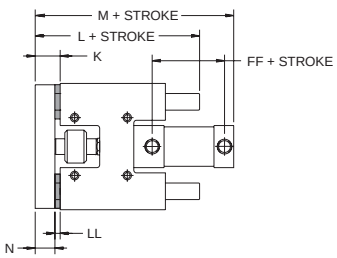
Bumpers on Retract Only (B2)

HBC



Model	K	L	M	N	FF	LL
HBC15	1.19	5.32	6.51	0.94	2.44	0.25
HBC20	1.44	6.51	7.26	1.19	2.44	0.25
HBC25	1.69	7.94	8.63	1.44	2.50	0.25

HBT / HBR



Model	K	L	M	N	FF	LL
HBT15	1.19	7.07	8.44	0.94	2.44	0.25
HBT20	1.44	8.01	9.19	1.19	2.44	0.25
HBT25	1.69	9.44	10.57	1.44	2.50	0.25

Model	K	L	M	N	FF	LL
HBR15	1.19	10.07	11.44	0.94	2.44	0.25
HBR20	1.44	12.51	13.70	1.19	2.44	0.25
HBR25	1.69	14.94	16.07	1.44	2.50	0.25

All dimensions shown in inches.

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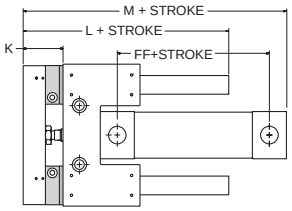
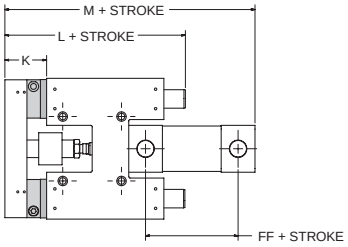
Bumpers and Adjustable Stop Collars, Retract Only (B3)

HBC



Model	K	L	M	FF
HBC15	1.78	5.91	7.10	2.44
HBC20	2.03	7.10	7.84	2.44
HBC25	2.28	8.53	9.22	2.50

HBT / HBR



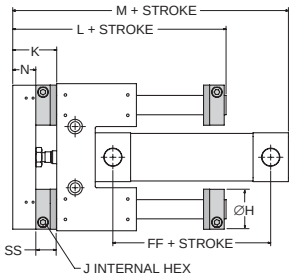
Model	K	L	M	FF
HBT15	1.78	7.66	9.03	2.44
HBT20	2.03	8.60	9.78	2.44
HBT25	2.28	10.03	11.16	2.50

Model	K	L	M	FF
HBR15	1.78	10.66	12.03	2.44
HBR20	2.03	13.10	14.28	2.44
HBR25	2.28	15.53	16.66	2.50

F

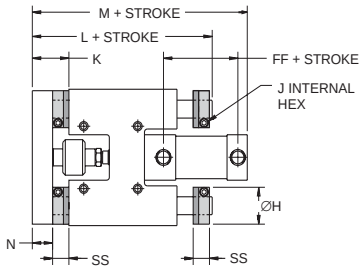
Bumpers and Adjustable Stop Collars, Both Ends (B4)

HBC



Model	H(s)*	H(o)**	J	K	L	M	N	FF	SS
HBC15	1.57	1.77	3/16	1.78	5.91	7.22	0.94	2.56	0.84
HBC20	1.77	2.12	3/16	2.03	7.10	7.97	1.19	2.56	0.84
HBC25	2.12	2.23	3/16	2.28	8.53	9.34	1.44	2.63	0.84

HBT / HBR



Model	H(s)*	H(o)**	J	K	L	M	N	FF	SS
HBT15	1.57	1.77	3/16	1.78	7.56	9.06	0.94	2.56	0.84
HBT20	1.77	2.12	3/16	2.03	8.69	10.00	1.19	2.56	0.84
HBT25	2.12	2.23	3/16	2.28	10.31	11.56	1.44	2.63	0.84

Model	H(s)*	H(o)**	J	K	L	M	N	FF	SS
HBR15	1.57	1.77	3/16	1.78	10.66	12.15	0.94	2.56	0.84
HBR20	1.77	2.12	3/16	2.03	13.10	14.41	1.19	2.56	0.84
HBR25	2.12	2.23	3/16	2.28	15.53	16.78	1.44	2.63	0.84

All dimensions shown in inches.

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Shock Absorbers

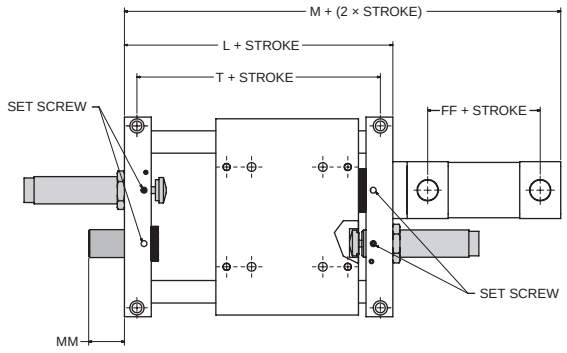
Adjustable shock absorbers are provided when this option is specified. These dissipate kinetic energy over a wide range of velocities and weights. Cylinder stroke is adjusted by moving the threaded stroke adjuster. It is important to adjust the threaded stroke adjuster to prevent the shock from "bottoming". **Maximum adjustment is 1/2".**

Shock Absorber Adjustment Procedure: Proper adjustment is important to maximize a shock absorber's performance. With a range of zero to ten, shocks are factory pre-set at five. Cycle the slide to impact the shock absorber. Rotate the shock's adjustment knob to achieve smooth deceleration. Adjusting towards zero increases resistance. If the initial impact is too hard, rotate the knob towards ten to lessen the resistance. If the final setting is less than one, a larger shock and/or slide should be considered. Tighten the adjusting knob set screw to maintain resistance.

Note: A standard HBB unit includes mounting holes in the end plates to allow field installation of the shock absorbers.

Shock Absorbers (A, A1, A2)

HBB



Model	L	T	M	FF	MM
HBB15	7.38	6.50	11.75	2.56	1.25
HBB20	8.38	7.00	12.75	2.56	1.00
HBB25	9.88	8.00	14.38	2.63	1.00

All dimensions shown in inches.

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Bumpers/Adjustable Stop Collars

(B, B1, B2, B3, B4, B5)

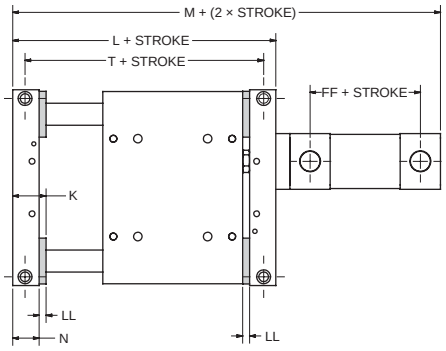
Bumpers absorb shock, reduce noise and permit faster cycle times thereby increasing production rates. They can be placed on the extend, retract or both positions.

A stop collar can be provided for travel adjustment. This stop collar is optional and is only provided if requested.

Note: Stop collars must be adjusted evenly to avoid creating a moment between the guide rods.

Bumpers Both Ends (B)

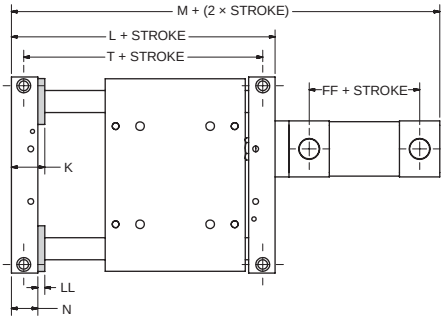
HBB



Model	L	T	M	K	N	FF	LL
HBB15	7.375	6.50	11.75	1.19	0.94	2.56	0.25
HBB20	8.375	7.00	12.75	1.44	1.19	2.56	0.25
HBB25	9.875	8.00	14.38	1.69	1.44	2.63	0.25

Bumpers, Extend Only (B1)

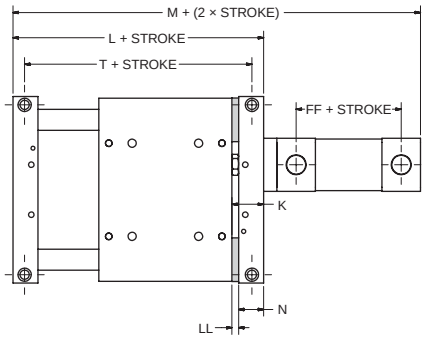
HBB



Model	L	T	M	K	N	FF	LL
HBB15	7.25	6.38	11.50	1.19	0.94	2.44	0.25
HBB20	8.25	6.88	12.50	1.44	1.19	2.44	0.25
HBB25	9.75	7.88	14.13	1.69	1.44	2.51	0.25

Bumpers on Retract Only (B2)

HBB



Model	L	T	M	K	N	FF	LL
HBB15	7.13	6.25	11.38	1.19	0.94	2.44	0.25
HBB20	8.13	6.75	12.38	1.44	1.19	2.44	0.25
HBB25	9.63	7.75	14.00	1.69	1.44	2.51	0.25

All dimensions shown in inches.

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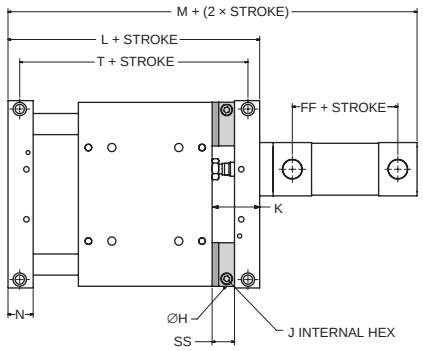
Bumpers and Adjustable Stop Collars, Retract Only (B3)

HBB

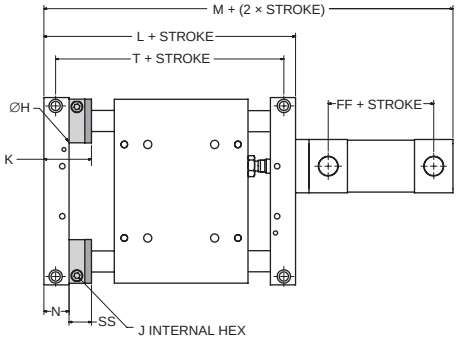


Model	L	T	M	K	N
HBB15	7.72	6.84	11.98	1.78	0.94
HBB20	8.72	7.34	12.98	2.03	1.19
HBB25	10.22	8.34	14.60	2.28	1.44

Model	H(s)*	H(o)**	J	FF	SS
HBB15	1.57	1.77	3/16	2.44	0.84
HBB20	1.77	2.12	3/16	2.44	0.84
HBB25	2.12	2.23	3/16	2.50	0.84

Bumpers and Adjustable Stop Collars, Extend Only (B4)

HBB

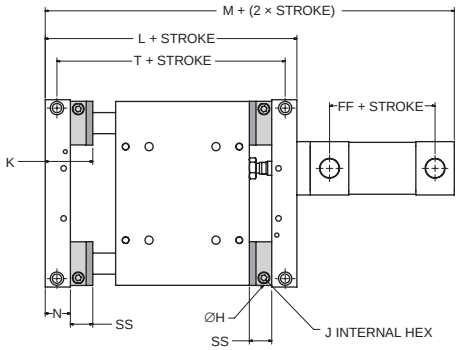


Model	L	T	M	K	N
HBB15	7.85	6.97	12.10	1.78	0.94
HBB20	8.85	7.47	13.10	2.03	1.19
HBB25	10.35	8.47	14.73	2.28	1.44

Model	H(s)*	H(o)**	J	FF	SS
HBB15	1.57	1.77	3/16	2.44	0.84
HBB20	1.77	2.12	3/16	2.44	0.84
HBB25	2.12	2.23	3/16	2.50	0.84

Bumpers and Adjustable Stop Collars, Both Ends (B5)

HBB



Model	L	T	M	K	N
HBB15	8.56	7.68	12.93	1.78	0.94
HBB20	9.56	8.18	13.93	2.03	1.19
HBB25	11.06	9.18	15.56	2.28	1.44

Model	H(s)*	H(o)**	J	FF	SS
HBB15	1.57	1.77	3/16	2.56	0.84
HBB20	1.77	2.12	3/16	2.56	0.84
HBB25	2.12	2.23	3/16	2.63	0.84

* Standard support rods
** Oversized support rods

All dimensions shown in inches.

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Threaded Stroke Adjusters (E, E1, E2, E3)

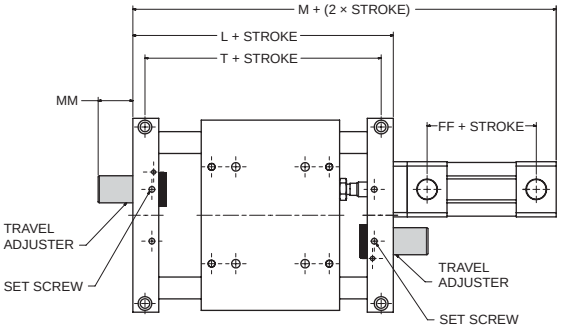
The threaded stroke adjust option allows for precise end of stroke positioning. The maximum stroke adjustment is one inch (1"). Threaded stroke adjusters are standard with shock absorbers.

Note:

Not available with Bumper Options B, B1, B2, B3, B4.

Threaded Stroke Adjusters, Both Ends (E)

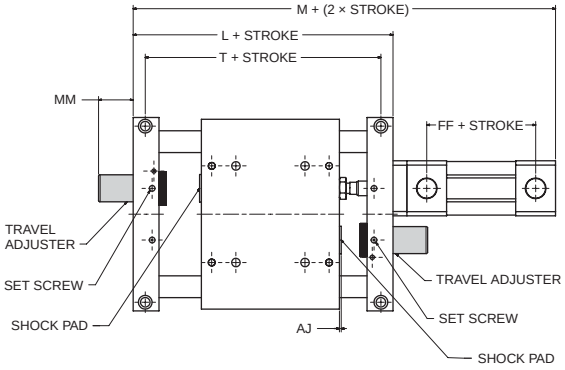
HBB



Model	L	T	M	FF	MM
HBB15	7.38	6.50	11.75	2.56	1.25
HBB20	8.38	7.00	12.75	2.56	1.00
HBB25	9.88	8.00	14.38	2.63	1.00

Stroke Adjusters and Shock Pads (E1, E2, E3)

HBB



Both Ends (E1)

Model	L	T	M	FF	MM	AJ
HBB15	7.63	6.75	12.00	2.56	1.25	0.13
HBB20	8.63	7.25	13.00	2.56	1.00	0.13
HBB25	10.13	8.25	14.63	2.63	1.00	0.13

Extend Only (E2)

Model	L	T	M	FF	MM	AJ
HBB15	7.38	6.50	11.75	2.56	1.25	0.13
HBB20	8.38	7.00	12.75	2.56	1.00	0.13
HBB25	9.88	8.00	14.38	2.63	1.00	0.13

Retract Only (E3)

Model	L	T	M	FF	MM	AJ
HBB15	7.25	6.38	11.63	2.56	1.25	0.13
HBB20	8.25	6.88	12.63	2.56	1.00	0.13
HBB25	9.75	7.88	14.25	2.63	1.00	0.13

All dimensions shown in inches.

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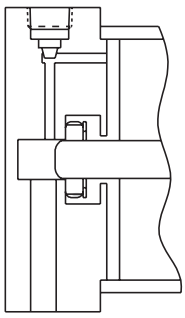
Cushions on Cylinder (C, C1, C2)

Optional cylinder cushions are available at either or both ends. The check seal cushions float radially to compensate for problems with misalignment. Flow paths molded on the circumference of the seal allow exceptionally rapid return stroke without the use of ball checks. A captive cushion screw provides safe cushion adjustment while the cylinder is pressurized. The brass adjustment screw provides maximum corrosion resistance.

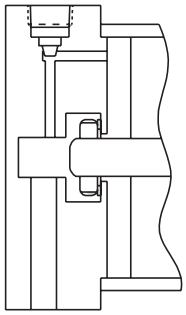
Cushion Location*: The cushion adjustment screws are located on the same face as the port unless specified otherwise. The port is machined off-center to allow space for the cushion screw.

Note: Cushions not available with Cylinder Type 3A (3MA cylinder).

* For steel cylinders, the cushion adjustment screw is located on the face opposite the port. Consult factory for other locations.



Spear entering cushion cavity

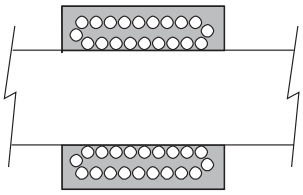


Spear exiting cushion cavity

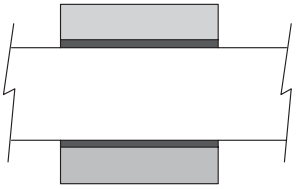
Bushings (D, T, T1, TC)

Selection should be based on the following criteria:

Application Requirement	Ball Bearing	Composite
Precision	Excellent	Good
Friction	Low	Higher
Friction Coefficient	Constant	Variable
Precision over Life of Bearing	Constant	Variable
Static Load Capacity	Good	Excellent
Dynamic Load Capacity	Good	Good with Lower Efficiency
Lubrication	Required	Not Required
Vibration Resistance	Fair	Excellent
Contamination Resistance	Fair	Excellent
Washdown Compatibility	Poor	Excellent



Recirculating Ball Bearing

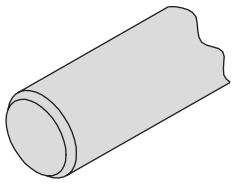


Composite Bushing

For bushing load capacities, reference the Engineering Data pages of this section.

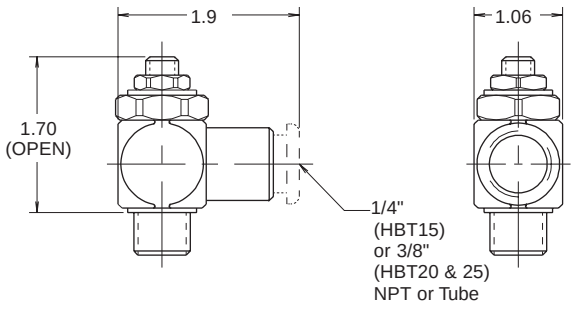
Stainless Steel Shafts (K)

Chrome plated, case-hardened carbon steel shafting is standard for slides. Stainless steel shafting can be specified for corrosive applications.



Flow Controls (F, G)

Right angle flow control valves allow precise adjustment of cylinder speed by metering exhaust air flow. Presto-Lok push-in or NPT ports provide 360° orientation capability.



All dimensions shown in inches.

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Pneumatic Division
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www.parker.com/pneumatics

NFPA Steel Air Cylinder (S)*

Parker's 2A Series NFPA steel air cylinder is available for extremely rugged applications. Magnetic pistons are not available with this option. Consult factory for other switching or sensing options.

250 PSI NFPA Air Cylinder (3A, 4A)

Parker's 3MA and 4MA Series aluminum NFPA air cylinders are available for general purpose use.

400 PSI NFPA Hydraulic Cylinder (4L)

Parker's 4ML Series aluminum NFPA cylinder is available for 400 PSI hydraulic service. Cushions are not available.

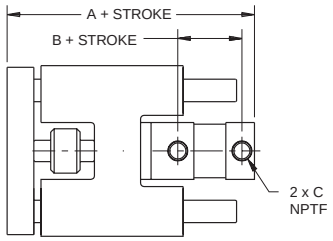
750 PSI NFPA Hydraulic Cylinder (S1)*

Parker's 3L Series NFPA steel cylinder is available for hydraulic service requiring higher force and precise control.

Magnetic pistons are not available with this option. Consult factory for other switching or sensing options.

**If cushions are specified with this option, the adjustment screw is located on the face opposite the port. Consult factory for other locations.*

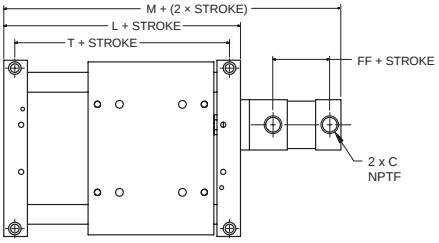
HBC
HBT
HBR



Model	A			B	C	Cylinder Bore (in)
	HBC	HBT	HBR			
15	C/F	8.56	11.56	2.25	3/8	1-1/2
20	C/F	9.31	13.81	2.25	3/8	2
25	C/F	10.69	16.2	2.38	3/8	2-1/2

C/F = Consult Factory

HBB

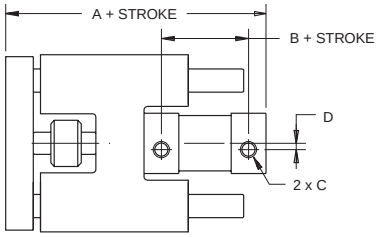


Model	L	T	M	C (NPTF)	FF	Cylinder Bore (in)
15	7.00	6.13	C/F	3/8	2.25	1-1/2
20	8.00	6.63	C/F	3/8	2.25	2
25	9.50	7.63	C/F	3/8	2.38	2-1/2

ISO Air Cylinder (D, E)

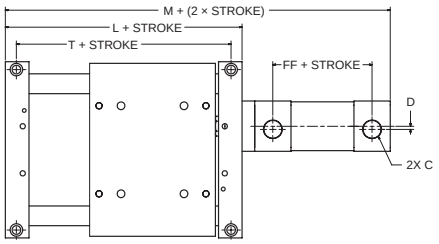
An ISO cylinder (Parker's P1D Series) is available for ISO or metric requirements. Magnetic pistons are standard.
If sensors are required, they must be ordered from the Electronic Sensors section of this catalog.

HBC
HBT
HBR



Model	A			B	C		Bore (mm)
	HBC	HBT	HBR		BSPP	NPTF	
15	6.77	8.69	11.70	2.95	1/4	3/8	40
20	7.55	9.48	13.99	2.83	1/4	3/8	50
25	9.39	11.32	16.83	3.50	3/8	3/8	63

HBB



Model	L	T	M	C		D	FF	Bore (mm)
				BSPP	NPTF			
15	7.0	6.1 3	11.63	1/4	1/4	0.22	2.95	40
20	8.0	6.63	12.67	1/4	3/8	0.34	2.83	50
25	9.5	7.63	14.76	3/8	3/8	0.24	3.50	63

All dimensions shown in inches.

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Pneumatic Division
Wadsworth, Ohio
www.parker.com/pneumatics

Rod Lock Cylinder (D1, D2, E1, E2)

The P1D Series Rod Lock Cylinder incorporates a powerful piston rod locking device, which clamps the piston rod and locks it in position. The locking device is a spring lock with an air pressure release and is integrated into the front (head) cover of the cylinder. This increases the cylinder length as shown below.

In the absence of air signal pressure, full holding force is applied to the piston rod. When air is present at 4 Bar (58 PSI), the locking device is released. A manual override rod lock version is also available.

Applications: Vertical guided cylinders
In the event of pressure loss
In the event of electrical control failure

Design Tip: The piston rod should not be moving when the locking device is activated. The locking device is not intended to repeatedly brake movement. See sample pneumatic circuit.

Note: Rod locking cylinders automatically include cushions, but include cushions ("C") in model code. If sensors are required, they must be ordered from the Electronic Sensors section of this catalog.

TECHNICAL DATA

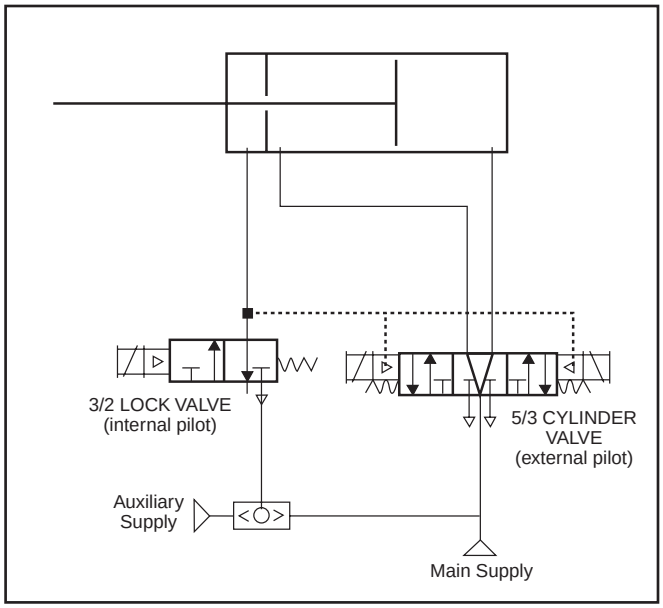
Maximum Pressure: 145 PSI (10 Bar)
Pressure Required to Unlock: 58 PSI (4 Bar) [1]

[1]Signal pressure to port on locking device. Operation at pressures lower than 4 Bar (58 PSI) may lead to inadvertent engagement of the rod lock device.

Model	Bore (mm)	Holding Force, lb (N)
15	40	193 (860)
20	50	303 (1345)
25	63	481 (2140)

ROD LOCK CIRCUIT

Lock valve must be maintained energized during cylinder motion, otherwise rod lock is engaged and cylinder valve shifts to mid position. For manual override of the rod lock, insert a shuttle valve and an auxiliary air supply to disable rod lock.

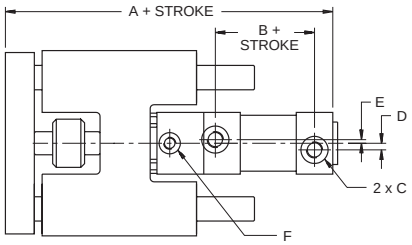


NOTES:

Cushion adjust (head only) located at position #4 for bore sizes 32-63mm. Head end port and cushion cannot be repositioned.

All P1D Rod Lock Versions are not intended for use in water service applications, or in environments that have high humidity levels and/or splashing fluids present.

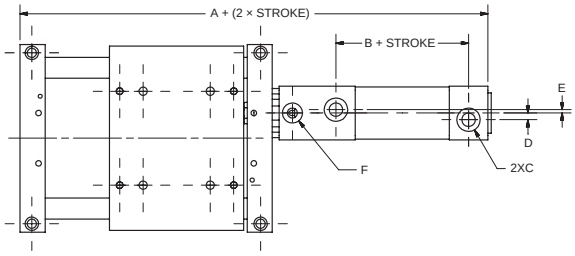
HBC
HBT
HBR



Model	A			B	C*	D	E	F*	Cylinder Bore (mm)
	HBC	HBT	HBR						
15	8.50	10.43	13.43	3.11	1/4	0.22	0.08	1/8	40
20	9.39	11.33	15.93	3.01	1/4	0.30	0.16	1/8	50
25	11.63	13.57	19.07	3.45	3/8	0.43	0.08	1/8	63

*BSPP or NPTF

HBB



HBB Model	A	B	C*	D	E	F*	Cylinder Bore (mm)
15	13.37	3.11	1/4	0.22	0.08	1/8	40
20	14.52	3.01	1/4	0.30	0.16	1/8	50
25	17.00	3.45	3/8	0.43	0.08	1/8	63

*BSPP or NPTF

All dimensions shown in inches.

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NFPA Rod Lock Cylinder (4J)

The 4MAJ Series Rod Lock Cylinder incorporates a powerful piston rod locking device, which clamps the piston rod and locks it in position. The locking device is a spring lock with an air pressure release and is attached to the front (head) cover of the cylinder. This increases the cylinder length as shown below.

In the absence of air signal pressure, full holding force is applied to the piston rod. When air is present at 60 PSIG or greater, the locking device is released. The manual override version is standard.

Applications: Vertical guided cylinders
In the event of pressure loss
In the event of electrical control failure

Design Tip: The piston rod should not be moving when the locking device is activated. The locking device is not intended to repeatedly brake movement. See sample pneumatic circuit.

Note: Rod locking cylinders automatically include cushions, but include cushions ("C") in model code. If sensors are required, they must be ordered from the Electronic Sensors section of this catalog.

F

TECHNICAL DATA

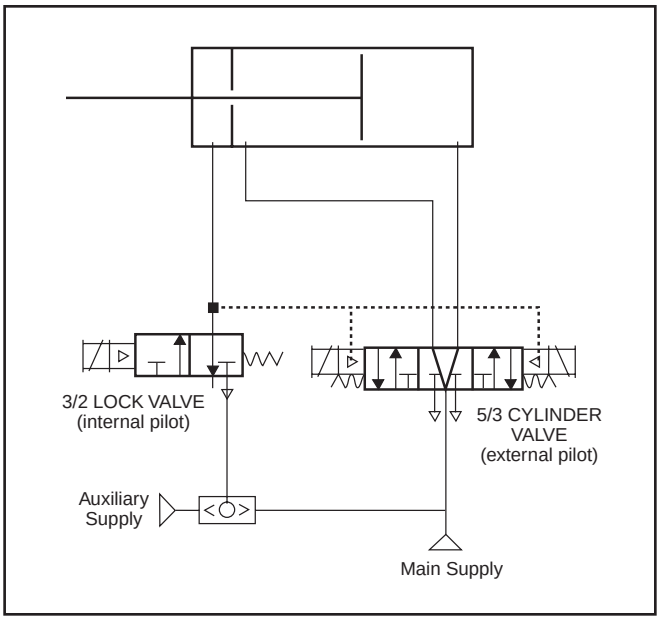
Maximum Pressure: 100 PSIG
Pressure Required to Unlock: 60 PSIG [1]

[1] Signal pressure to port on locking device. Operation at pressures lower than 60 PSIG may lead to inadvertent engagement of the rod lock device.

Model	Bore (inch)	Holding Force, lb
15	1½	180
20	2	314
25	2½	491

ROD LOCK CIRCUIT

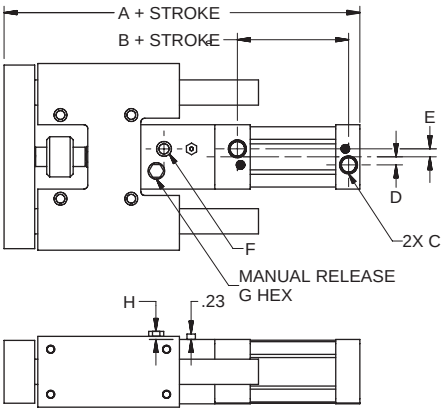
Lock valve must be maintained energized during cylinder motion, otherwise rod lock is engaged and cylinder valve shifts to mid position. For manual override of the rod lock, insert a shuttle valve and an auxiliary air supply to disable rod lock.



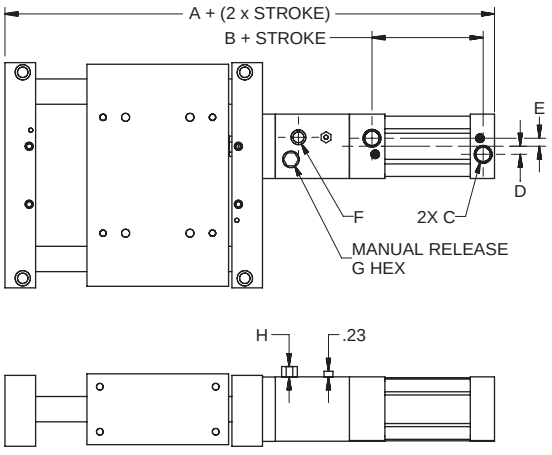
Note:

All 4MAJ rod lock cylinders are not intended for use in water service applications, or in environments that have high humidity levels and/or splashing fluids present.

HBC
HBT
HBR



HBB



Model	A				B	C NPTF	D	E	F NPTF	G HEX	H	Cylinder Bore (inch)
	HBC	HBT	HBR	HBB								
15	8.89	10.82	13.82	14.26	2.31	3/8	0.31	0.31	1/8	5/16	0.19	1-1/2
20	9.88	11.82	16.32	15.51	2.31	3/8	0.31	0.31	1/8	1/2	0.27	2
25	11.26	13.19	18.70	17.13	2.38	3/8	0.31	0.31	1/8	1/2	0.27	2-1/2

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Special (X)

Other common modifications are available. Consult factory for specifications. Examples include:

- NC9 Series NFPA Pneumatic Cylinder
- 2AN Series NFPA Pneumatic Cylinder
- Cylinders with Continuous Position Feedback
- Bumpers on cylinder only

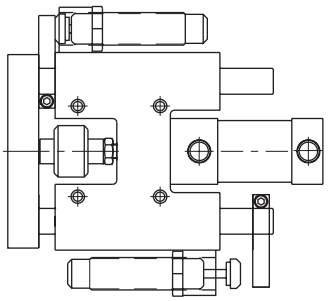
No Cylinder (Q, Q1)

The unit is supplied with cylinder mounting but no cylinder so that one may be field-added. Consult factory for required cylinder piston rod length.

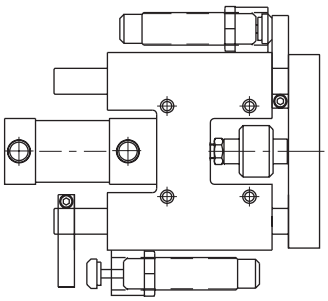
Left Hand Assembly (L1)

Units with shock absorbers can be assembled with shocks on the opposite sides.

Standard Orientation



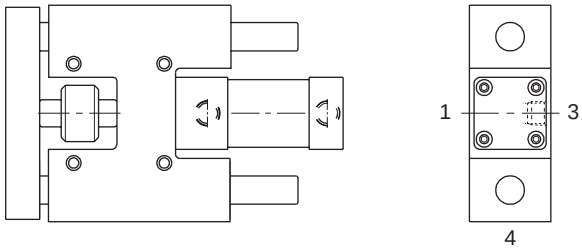
Left Hand Orientation



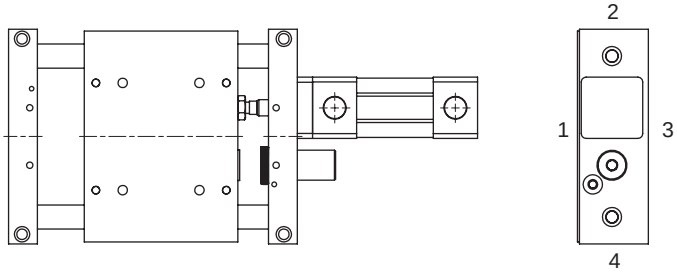
Port Location (L3)

Cylinder ports are located in position 3, opposite the standard position when L3 is specified. Port positions 2 and 4 are not possible.

HBC
HBT
HBR



HBB



Fluorocarbon Seals (V)

Standard abrasion-resistant nitrile seals should be used for general purpose applications with temperatures of 0 - 165°F. **Fluorocarbon** seals are recommended for high temperature applications up to 250°F.

Note: Fluorocarbon seals are not available for the 3MA Series cylinder.

Option	Temperature Range (°F)
Shock Absorbers	32 - 150
Bumpers	0 - 200
Piston Magnets	0 - 165
Sensors	14 - 140

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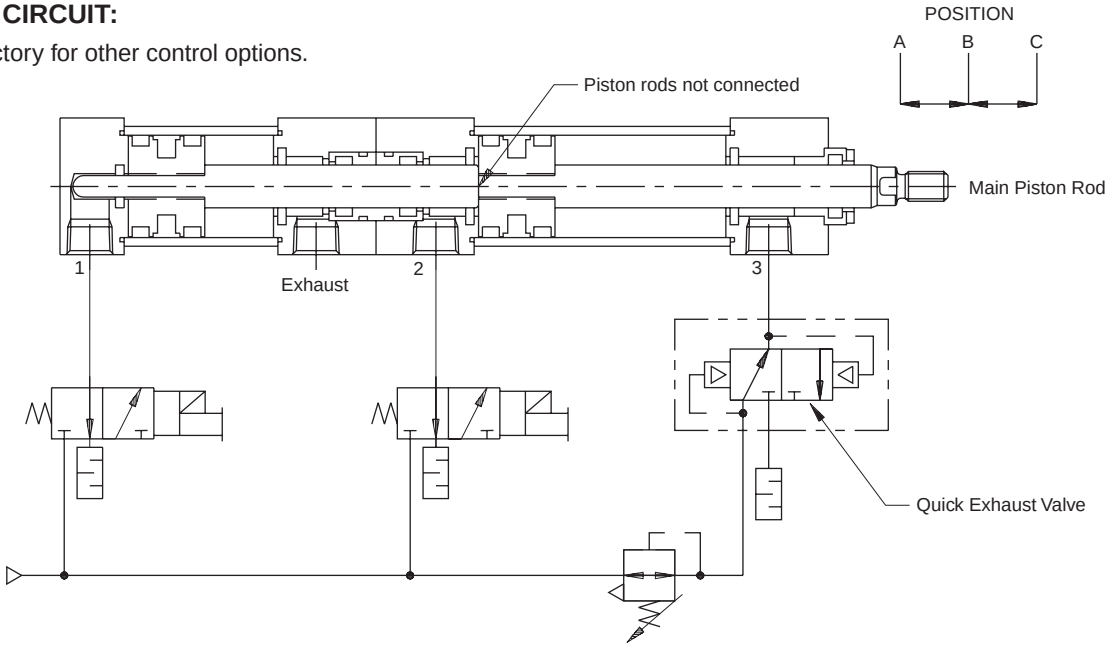
Three Position Cylinder

The three position unit utilizes a duplex air cylinder to provide the center position. This option can be specified with all other options. However, bumpers and body mounted inductive proximity sensors operate on the fully extended and retracted positions only. Cylinder mounted reed and solid state sensors can be used to detect the center position of the slide.

Note: The Three Position Cylinder is not available for the 3MA Series cylinder.

SAMPLE CIRCUIT:

Consult factory for other control options.



OPERATION:

Position A (fully retracted) is obtained by applying pressure to Port 3 with Ports 2 and 1 vented to atmosphere.

Position B (mid-position) is obtained by applying pressure to Port 1 while maintaining a lower pressure to Port 3. The pressure at Port 3 prevents the main piston rod from over-travelling. A quick exhaust valve can be used to maintain pressure while allowing full exhaust capability.

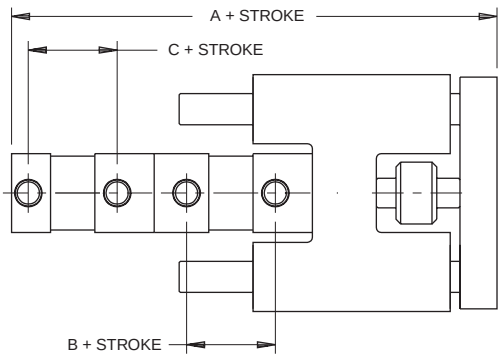
Position C (fully extended) is obtained by applying pressure to Port 2.

DIMENSIONAL DATA:

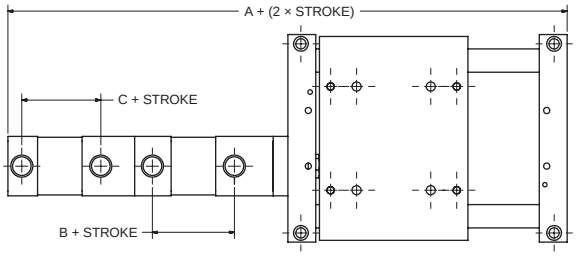
Three position units utilize a longer cylinder.
All other dimensions remain the same.

Model	A				B	C
	HBC	HBT	HBR	HBB		
15	10.38	12.31	15.31	15.25	2.38	2.31
20	11.12	13.06	17.56	16.25	2.38	2.31
25	12.57	14.50	20.01	17.94	2.38	2.38

HBC
HBT
HBR



HBB



All dimensions shown in inches.

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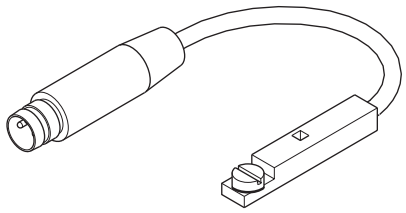
Solid State and Reed Sensors

Sensors must be ordered separately.

Magnetic piston is standard.

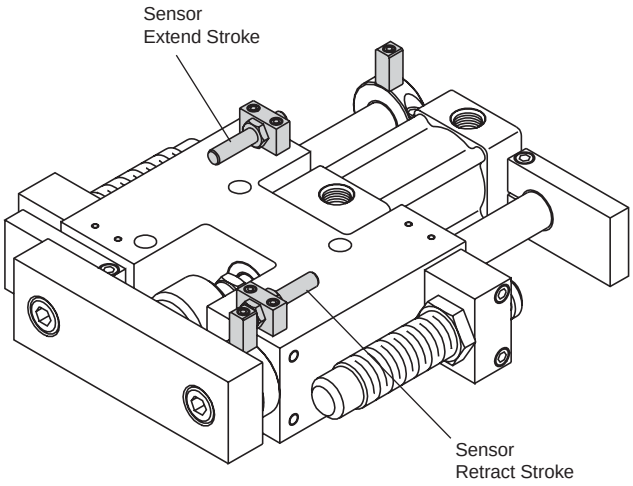
See Electronic Sensors section for part numbers and sensor specifications.



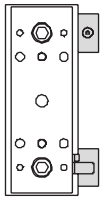
Inductive Proximity Sensors

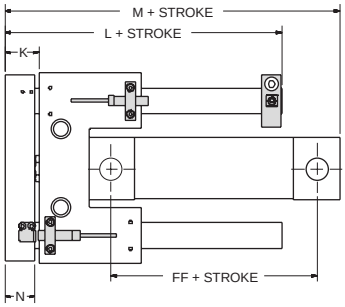
8mm barrel type proximity sensors may be ordered with the HB Series slides (options P, N, P1, N1). The slides can also be ordered “prox ready” (J, J1). A magnetic piston is standard.

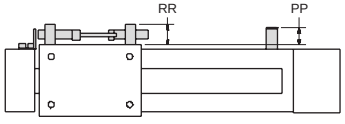
See Electronic Sensors section for sensor specifications.



HBC







Model	K	L	M	N
HBC15	1.06	5.19	6.26	0.94
HBC20	1.31	6.39	7.00	1.19
HBC25	1.56	7.82	8.38	1.44

Model	FF	PP	RR	
			8mm	12mm
HBC15	2.31	0.50	0.63	0.88
HBC20	2.31	0.50	0.63	0.88
HBC25	2.38	0.50	0.63	0.88

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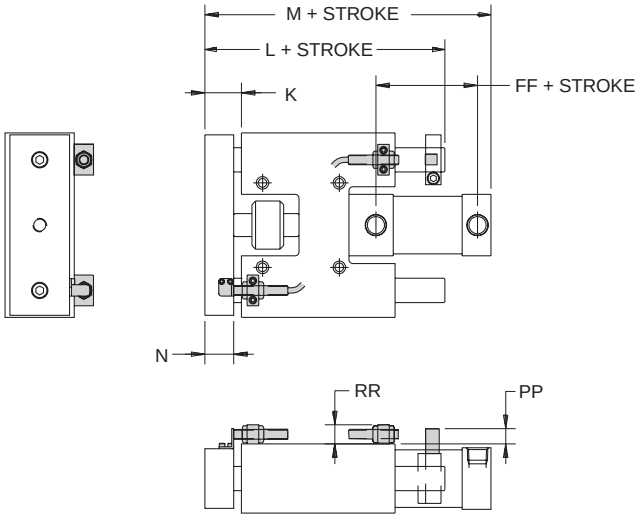
Proximity Sensor Dimensions

HBT
HBR



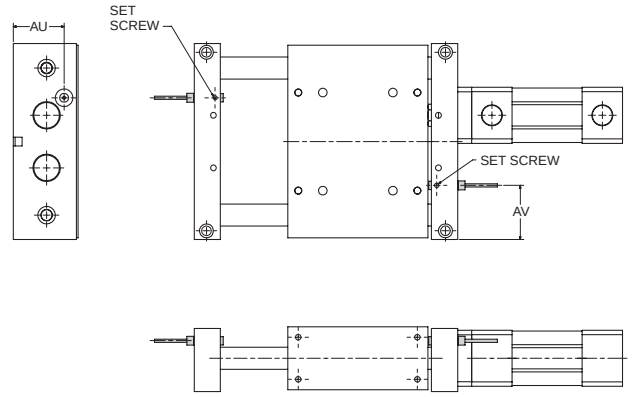
Model	K	L	M	N
HBT15	1.06	6.94	8.19	0.94
HBT20	1.31	7.88	8.94	1.19
HBT25	1.56	9.31	10.31	1.44

Model	FF	PP	RR	
			8mm	12mm
HBT15	2.31	0.50	0.63	0.88
HBT20	2.31	0.50	0.63	0.88
HBT25	2.38	0.50	0.63	0.88

Model	K	L	M	N
HBR15	1.06	9.94	11.19	0.94
HBR20	1.31	12.39	13.44	1.19
HBR25	1.56	14.82	15.82	1.44

Model	FF	PP	RR	
			8mm	12mm
HBR15	2.31	0.50	0.63	0.88
HBR20	2.31	0.50	0.63	0.88
HBR25	2.38	0.50	0.63	0.88

HBB



Model	AU	AV
HBB15	1.81	1.94
HBB20	2.19	2.63
HBB25	2.31	2.75

All dimensions shown in inches.

HB Series Service Kits

Cylinder Type	Info Location
3MA	pages B112-B114
4MA	pages B115-B118
4ML	pages B119-B122
4MAJ	page B123
2A	see Catalog 0106-6
P1D	page C33
3L	see Catalog 0106-6

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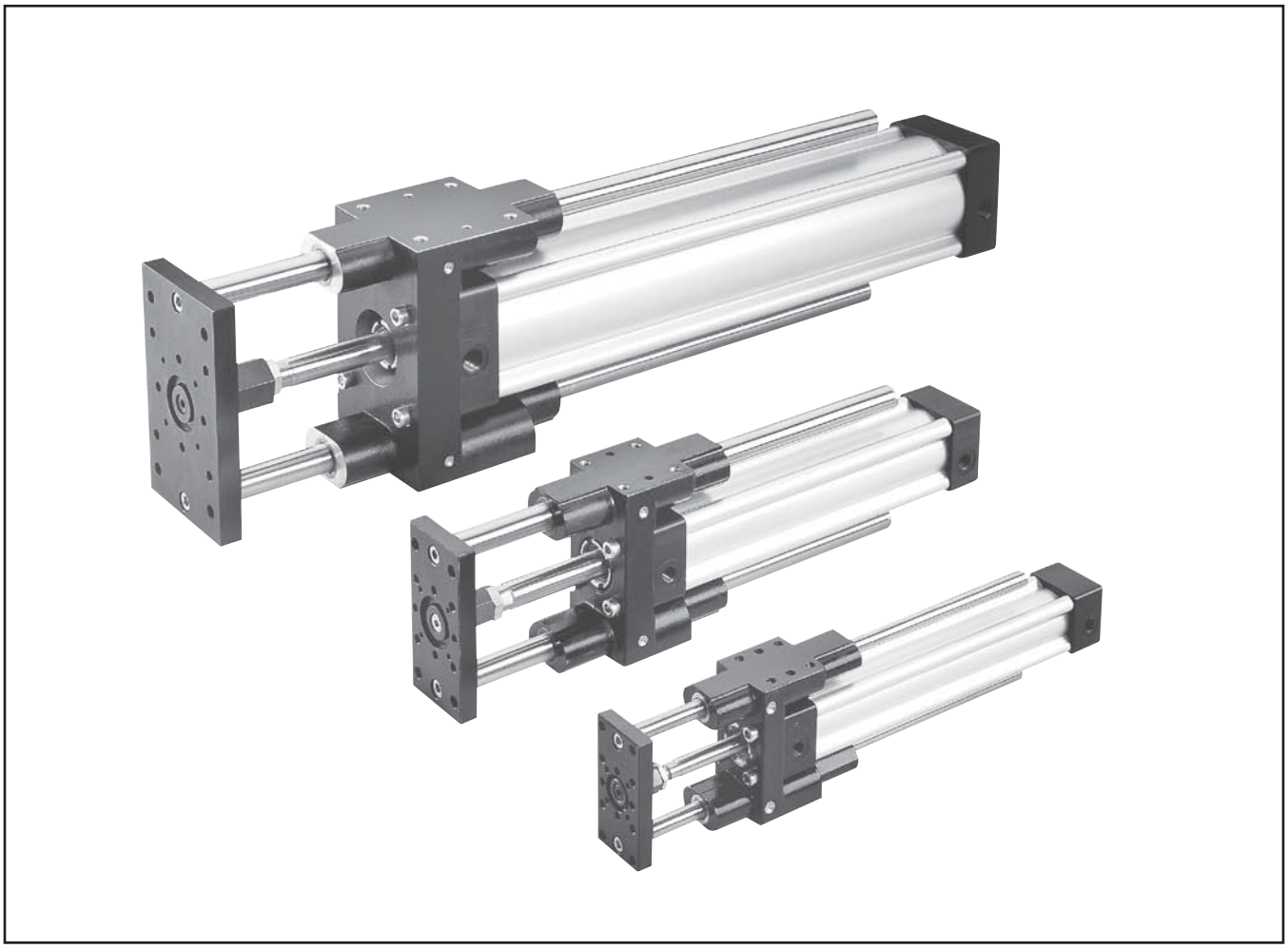
P5E Series

P1D ISO Guided Cylinders



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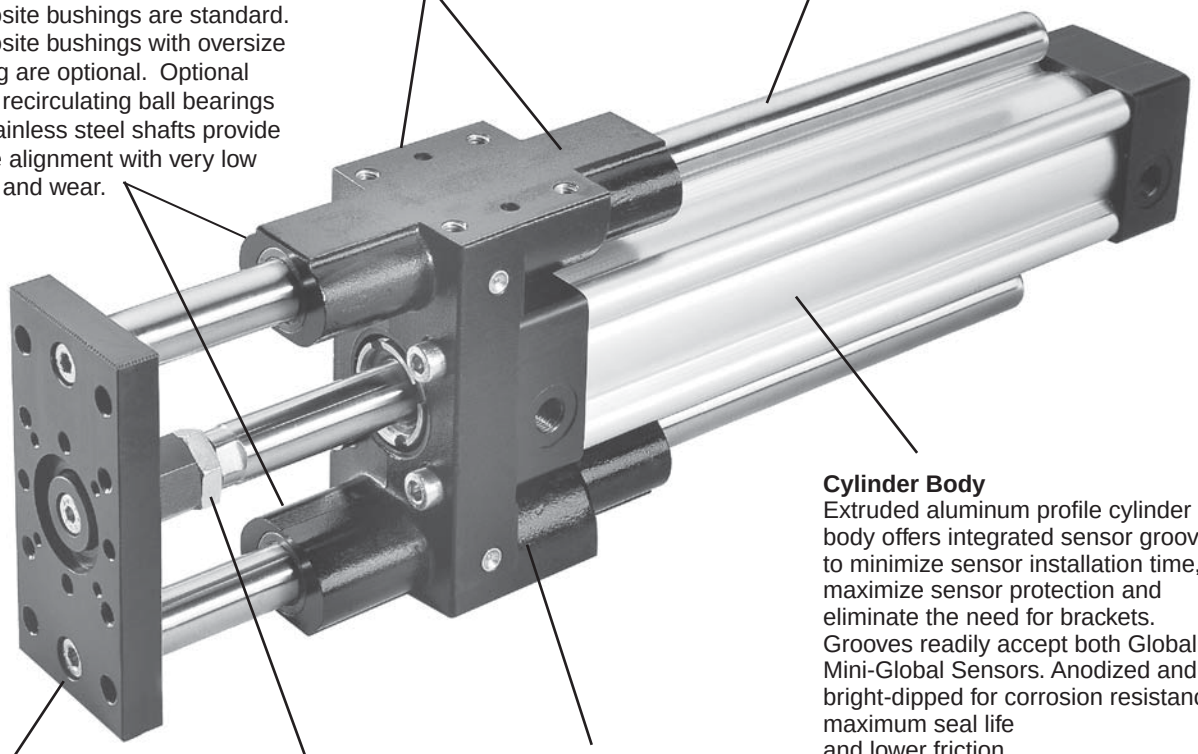

Support Shafts
Chrome plated, case hardened support shafts are machined from high carbon alloy steel. Stainless steel and oversized shafting are available.

Cast Aluminum Body
Lightweight, unitized design provides strength and 3 mounting faces.

Bushings
Composite bushings are standard. Composite bushings with oversize shafting are optional. Optional sealed recirculating ball bearings with stainless steel shafts provide precise alignment with very low friction and wear.

Cylinder Body
Extruded aluminum profile cylinder body offers integrated sensor grooves to minimize sensor installation time, maximize sensor protection and eliminate the need for brackets. Grooves readily accept both Global and Mini-Global Sensors. Anodized and bright-dipped for corrosion resistance, maximum seal life and lower friction.

Cylinder Mounting
Conforms to ISO 6431, ISO/DIS 15552, VDMA 24562 and AFNOR standards

Tooling Plate
Precision machined and anodized, the aluminum tooling plate allows mounting on two sides. Dowel pin holes provide accurate mounting.

Alignment Coupler
Allows piston rod to self-center, thus increasing cylinder life, especially when the support shafts deflect under load.

F

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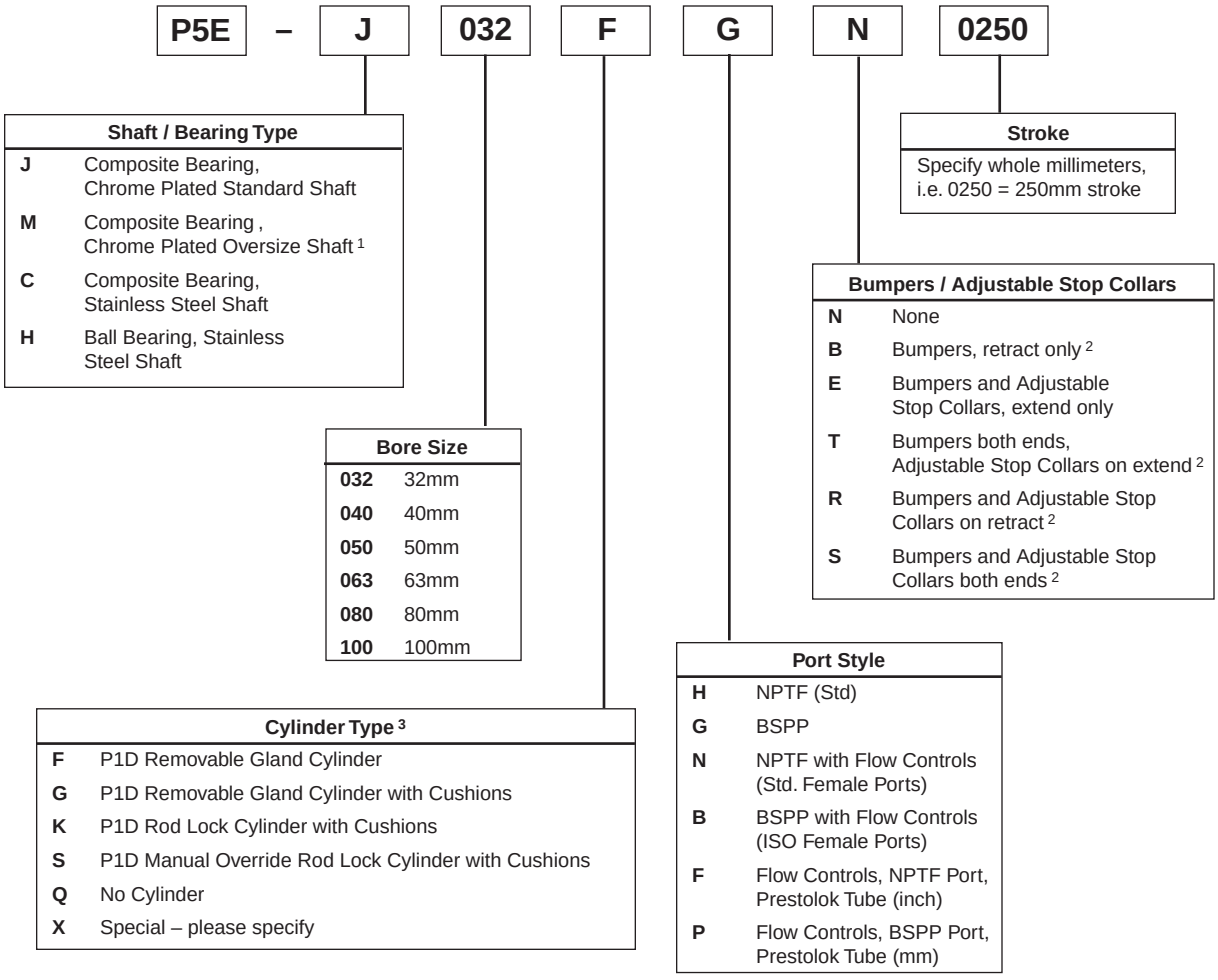
Model Number Code
Example: P5E-J032FGN0250



1 Bumpers and adjustable stop collars are not available with oversize shaft option.

2 These options will increase the cylinder length. To achieve a specific usable stroke length with these options, add the corresponding value(s) in the Adder table on page F156 to the desired stroke length. See Bumper Options for explanation.

Adders are not used when P1D Rod Lock (K) or P1D Manual Override Rod Lock (S) are specified with bumpers.

3 Tie Rod Version or composite piston option must be specified as Special (X).

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Specifications

- Maximum Operating Pressure: 145 PSI (10 Bar)
- Support Shaft Sizes: ∅12 to 30mm
- Cylinder Mounting: ISO 6431, ISO/DIS 15552, VDMA 24 562 and AFNOR standards
- Mounting: Unrestricted
- Operating Temperature Range: -10°C to +74°C (14°F to 165°F)
- Filtration Requirement: 40 micron, dry filtered air

Quick Reference Data

Model (Bore Size)	Piston Rod (mm)	Bushings	Support Shafts (mm)	Piston Bore Area Non-Rod Side		Max.* Stroke (mm)	Theoretical Force		Weights	
				(mm^2)	(in^2)		Extend @80 PSI (5.5 Bar), N (lb)	Retract @80 PSI (5.5 Bar), N (lb)	Base Weight, kg (lb)	Per 100 mm Stroke, kg (lb)
32	16	Standard	12	804	1.25	500	444 (100)	334 (75)	0.97 (2.14)	0.175 (0.39)
		Oversized	16							
40	16	Standard	16	1257	1.95	625	694 (156)	583 (131)	1.55 (3.41)	0.315 (0.69)
		Oversized	20							
50	20	Standard	20	1964	3.04	775	1081 (243)	907 (204)	2.56 (5.64)	0.495 (1.09)
		Oversized	25							
63	20	Standard	20	3117	4.83	950	1717 (386)	1544 (347)	3.57 (7.84)	0.495 (1.09)
		Oversized	25							
80	25	Standard	25	5027	7.79	1150	2771 (623)	2500 (562)	6.53 (14.4)	0.770 (1.70)
		Oversized	30							
100	25	Standard	25	7854	12.17	1350	4333 (974)	4061 (913)	8.76 (19.32)	0.770 (1.70)
		Oversized	30							

* Ball bearings suggested on long-stroke applications. Consult factory for longer strokes.

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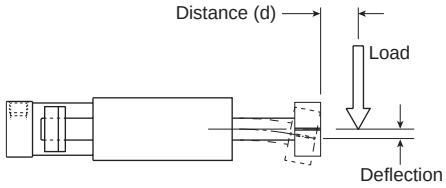
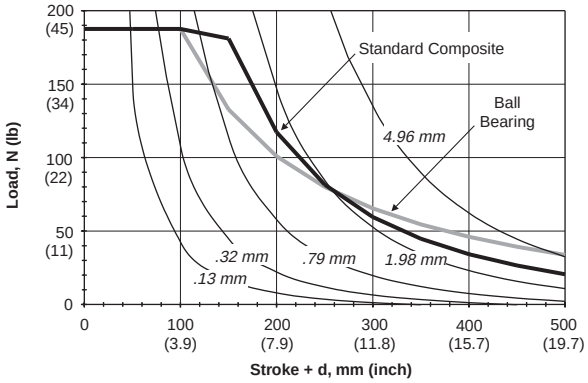
Maximum Load Capacity with Standard Shaft

The following curves are based on 10 million cycles at a speed of 0.20 m/s (40 fpm). Higher dynamic loads will reduce cycle life. For static conditions, multiply the information in the graphs by 1.5.

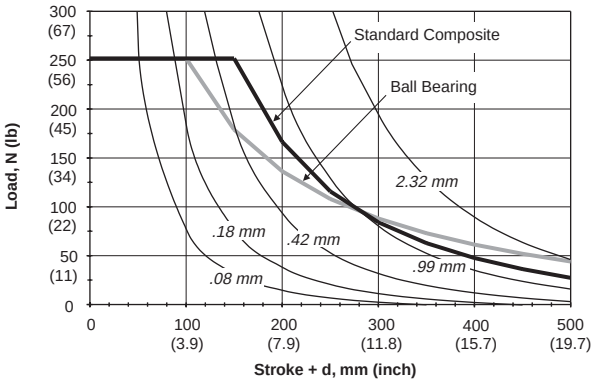
EXAMPLE: A P5E with 40mm bore, composite bushings and a "stroke+d" of 400mm will have a load capacity of 48N.



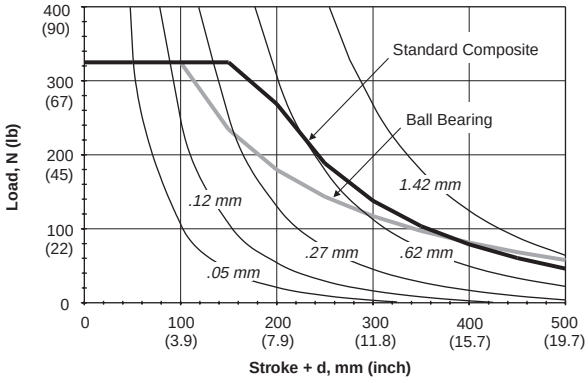
32mm Bore Size



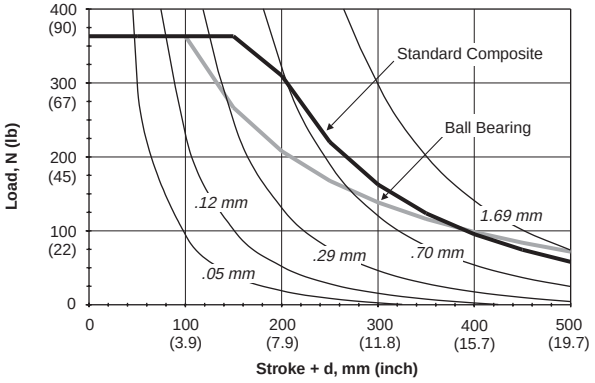
40mm Bore Size



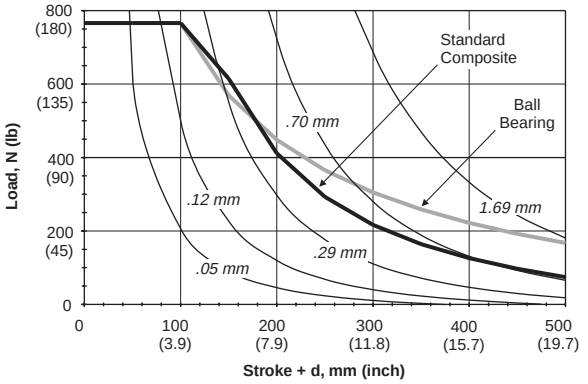
50mm Bore Size



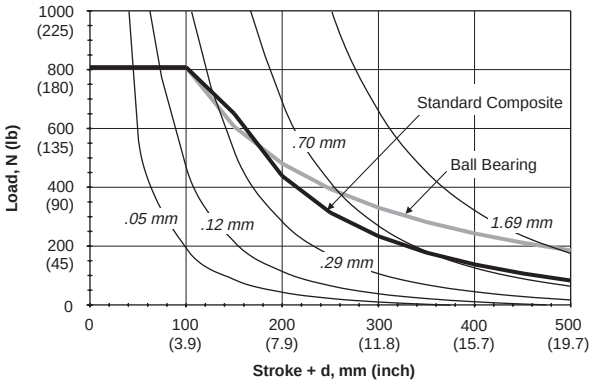
63mm Bore Size



80mm Bore Size



100mm Bore Size



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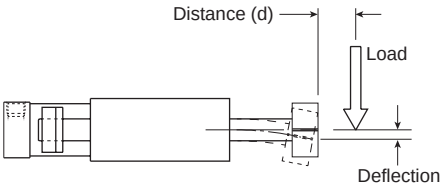
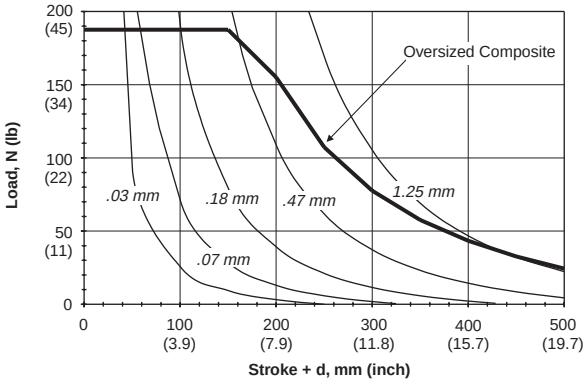
Maximum Load Capacity with Oversized Shaft

The following curves are based on 10 million cycles at a speed of 0.20 m/s (40 fpm). Higher dynamic loads will reduce cycle life. For static conditions, multiply the information in the graphs by 1.5.

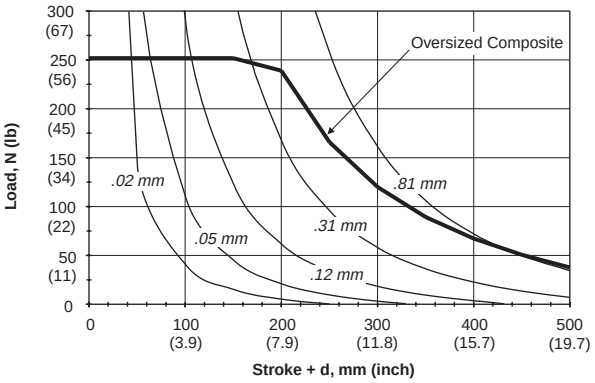
EXAMPLE: A P5E with 63mm bore, oversized support shafts and a "stroke+d" of 300mm would have a load capacity of 200N.



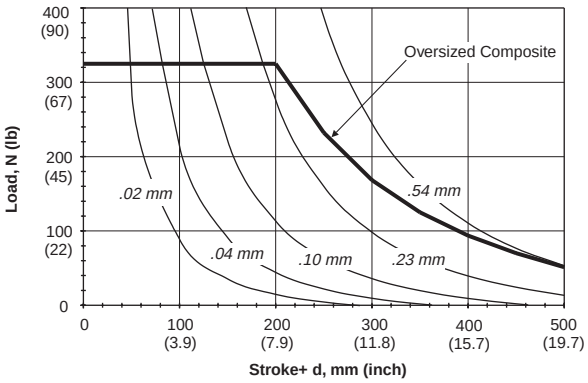
32mm Bore Size



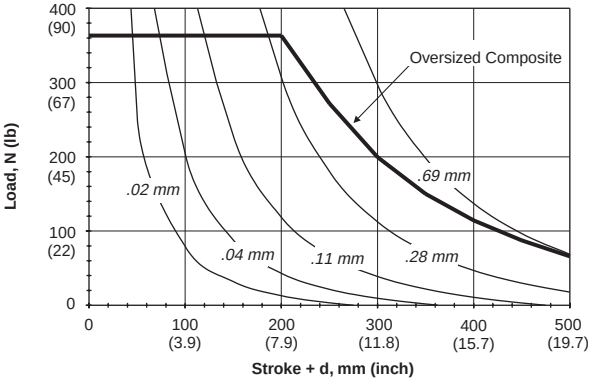
40mm Bore Size



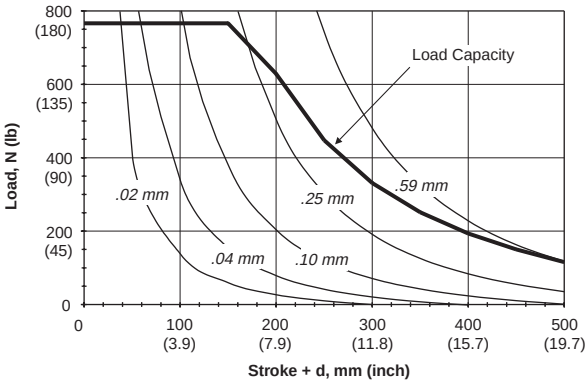
50mm Bore Size



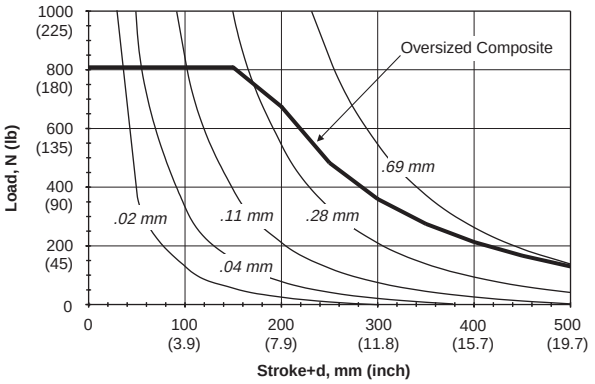
63mm Bore Size



80mm Bore Size



100mm Bore Size



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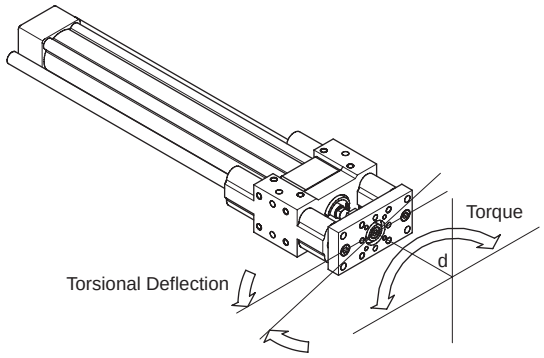
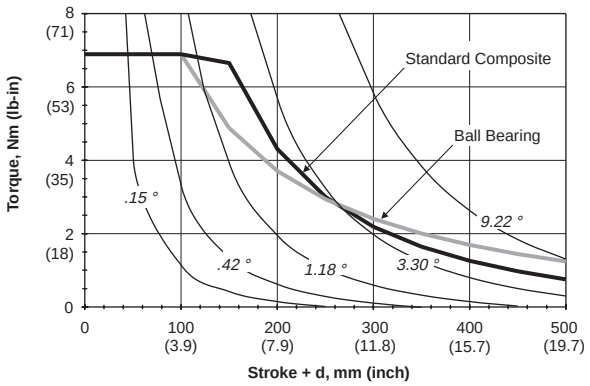
Symmetrical Torque Capacity with Standard Shaft

These curves provide the maximum permissible torsional load vs. stroke for various slide sizes. The data presented is based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic torques will reduce cycle life. For static conditions, multiply the information in the graphs by 1.5.

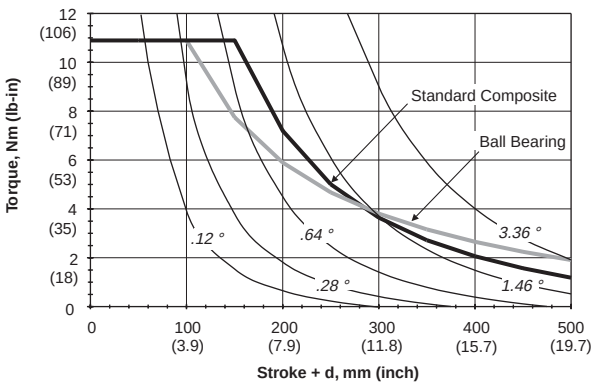
EXAMPLE: A P5E with 100mm bore, composite bushings and a "stroke + d" of 300mm would have a torque capacity of 20 Nm.



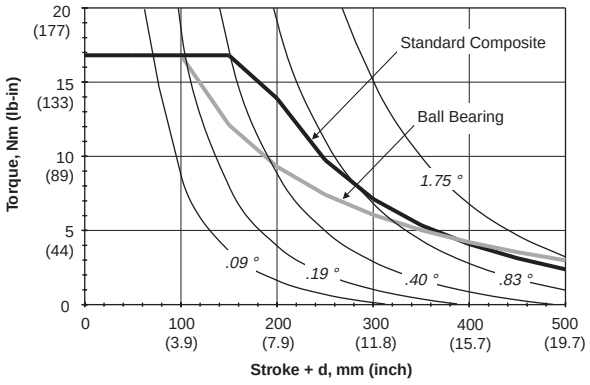
32mm Bore Size



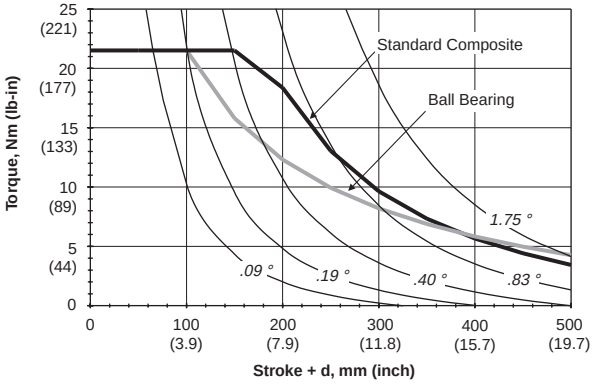
40mm Bore Size



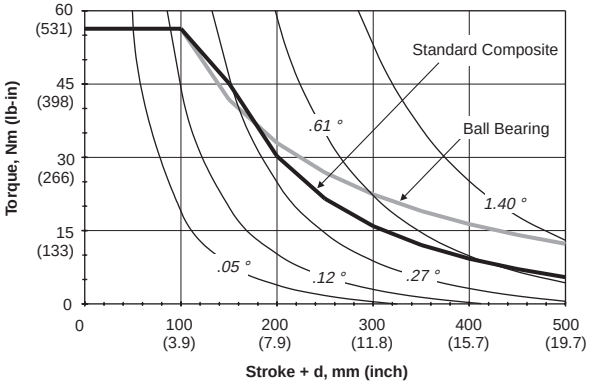
50mm Bore Size



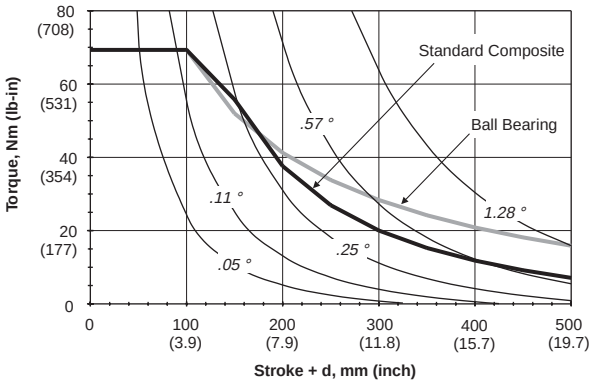
63mm Bore Size



80mm Bore Size



100mm Bore Size



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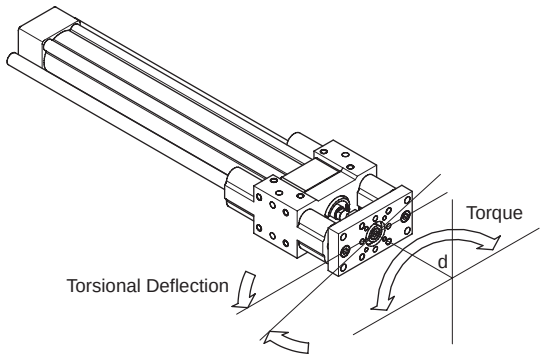
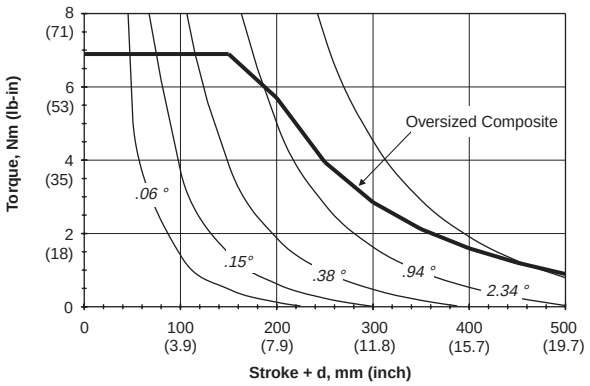
Symmetrical Torque Capacity with Oversized Shaft

These curves provide the maximum permissible torsional load vs. stroke for various slide sizes. The data presented is based on a bearing life equivalent to 10 million cycles for dynamic conditions. Higher dynamic torques will reduce cycle life. For static conditions, multiply the information in the graphs by 1.5.

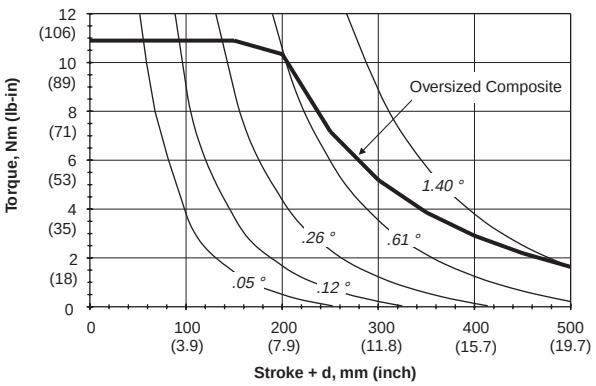
EXAMPLE: A P5E with 50mm bore, oversized support shafts and a "stroke + d" of 400mm would have a torque capacity of 5 Nm.



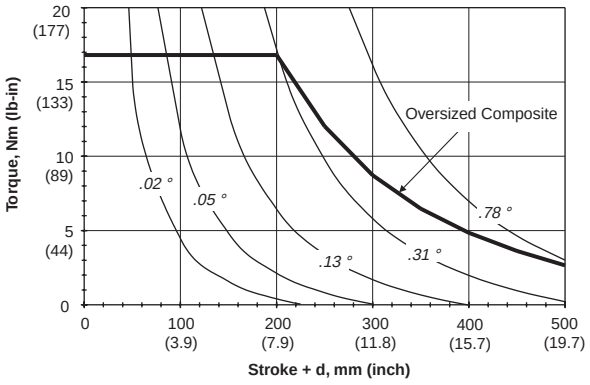
32mm Bore Size



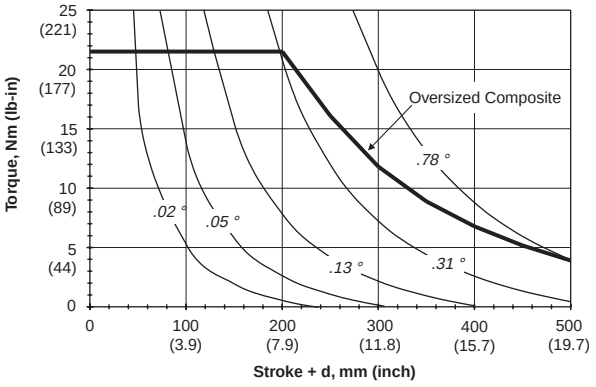
40mm Bore Size



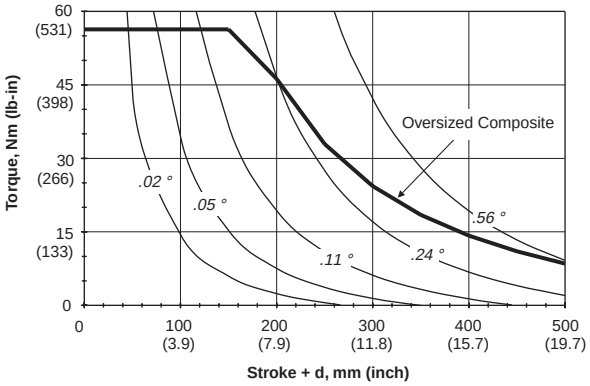
50mm Bore Size



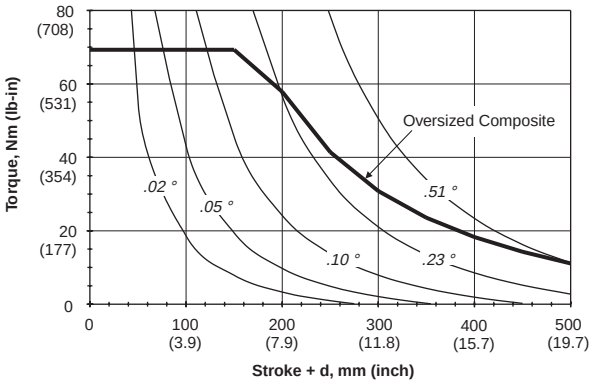
63mm Bore Size



80mm Bore Size



100mm Bore Size



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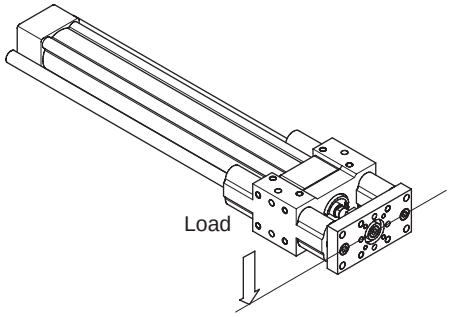
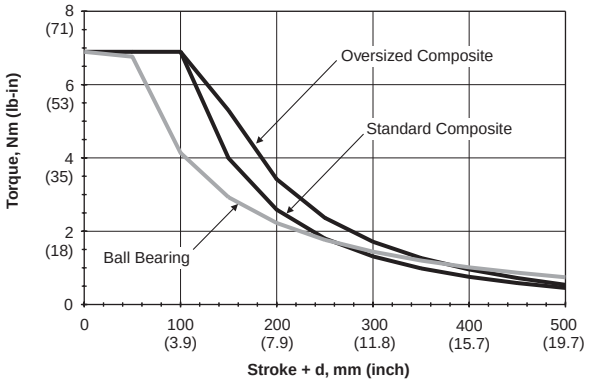
Asymmetrical Torque Capacity

Asymmetrical loading occurs when an off-center load is applied to the unit. P5E Series units can resist torsional loads that are asymmetrical.

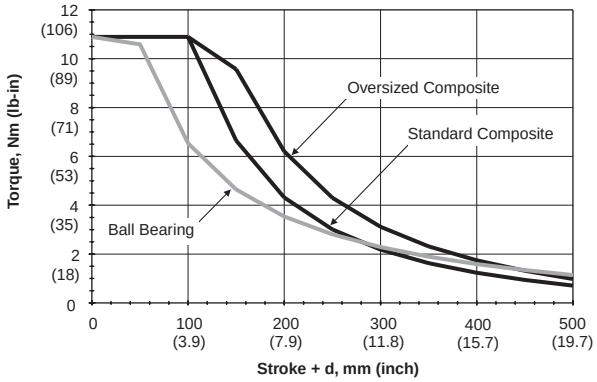
EXAMPLE: A P5E with 63mm bore, ball bearings and a "stroke + d" of 300mm would have an asymmetrical torque capacity of 5 Nm.



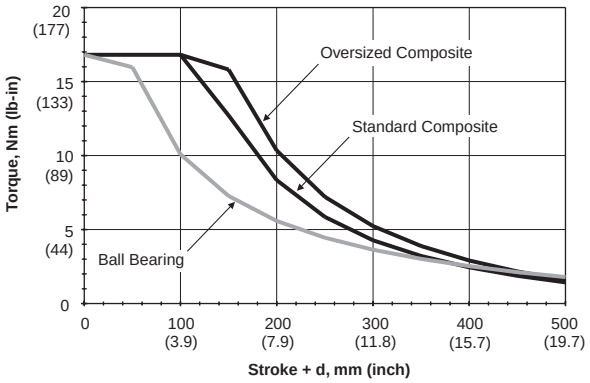
32mm Bore Size



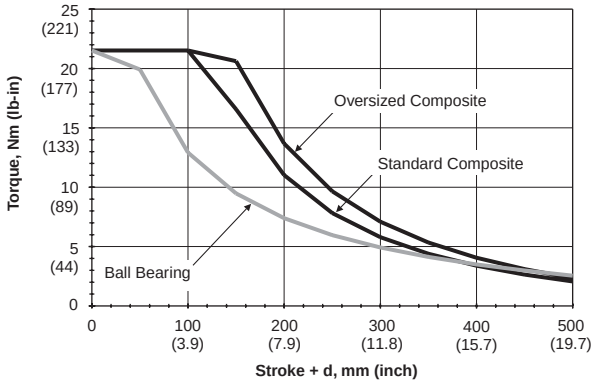
40mm Bore Size



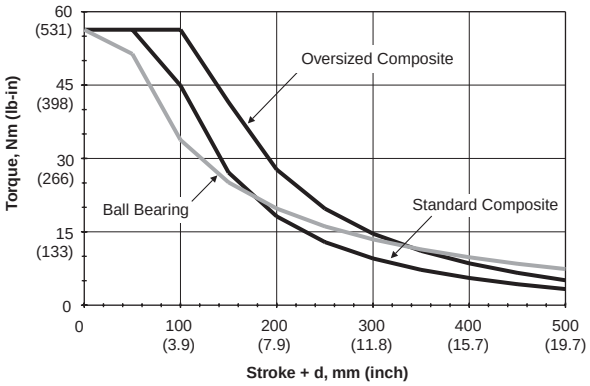
50mm Bore Size



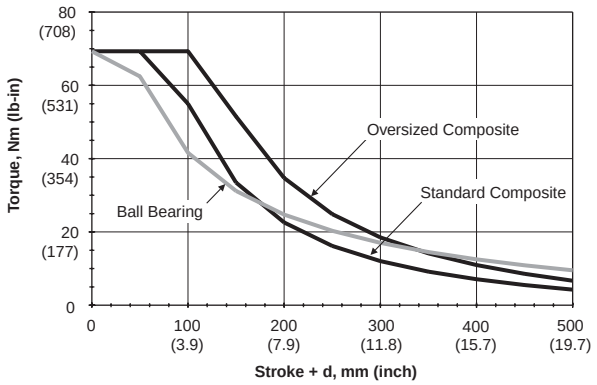
63mm Bore Size



80mm Bore Size



100mm Bore Size



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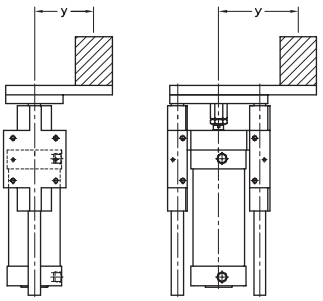
Vertical Eccentric Load Capacity

P5E Series units mounted vertically will have the same eccentric load capacity regardless of orientation. The graphs provide maximum load capacity for an eccentric mounted load. The load is assumed to be mounted at the face of the tooling plate.

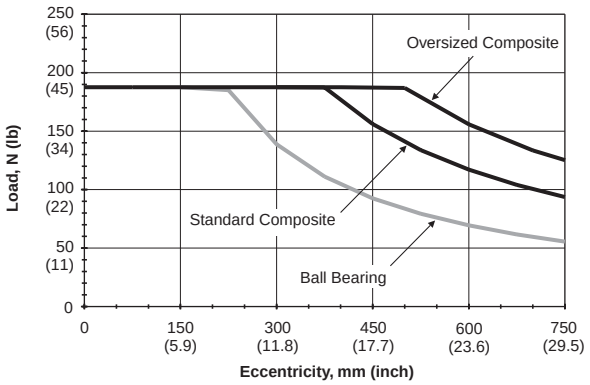
These load curves illustrate load ratings based on the bearing system of the product. Load rating is a key selection criterion but is not the only one to consider in the selection of a product.

Note: Charts are based on 100mm of stroke.

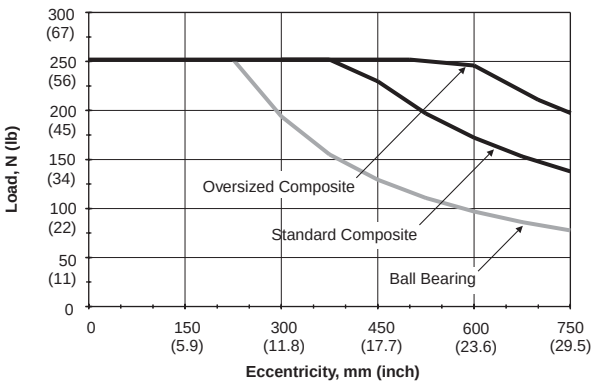


EXAMPLE: A P5E with a 40mm bore carrying an eccentric load located 300mm from the centerline has a capacity of approximately 200N (45 lbs).

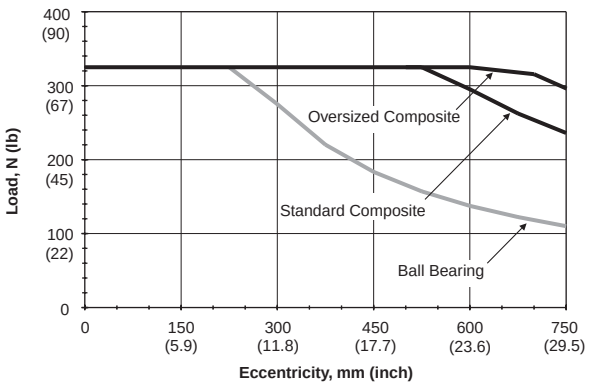
32mm Bore Size



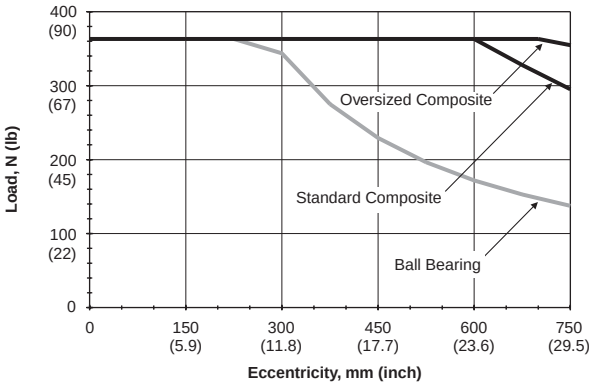
40mm Bore Size



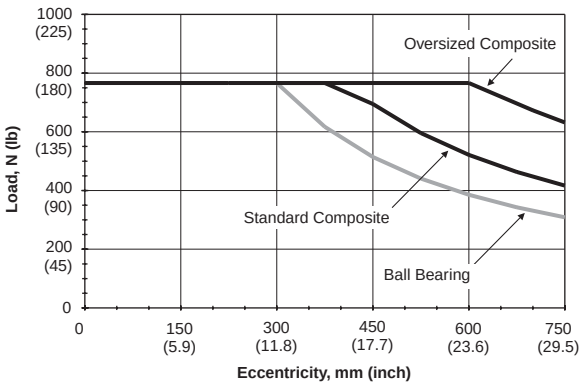
50mm Bore Size



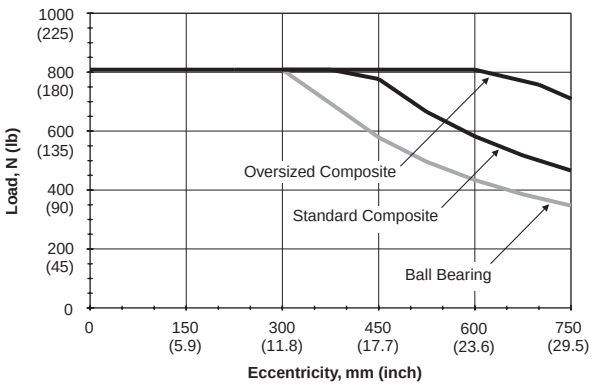
63mm Bore Size



80mm Bore Size



100mm Bore Size



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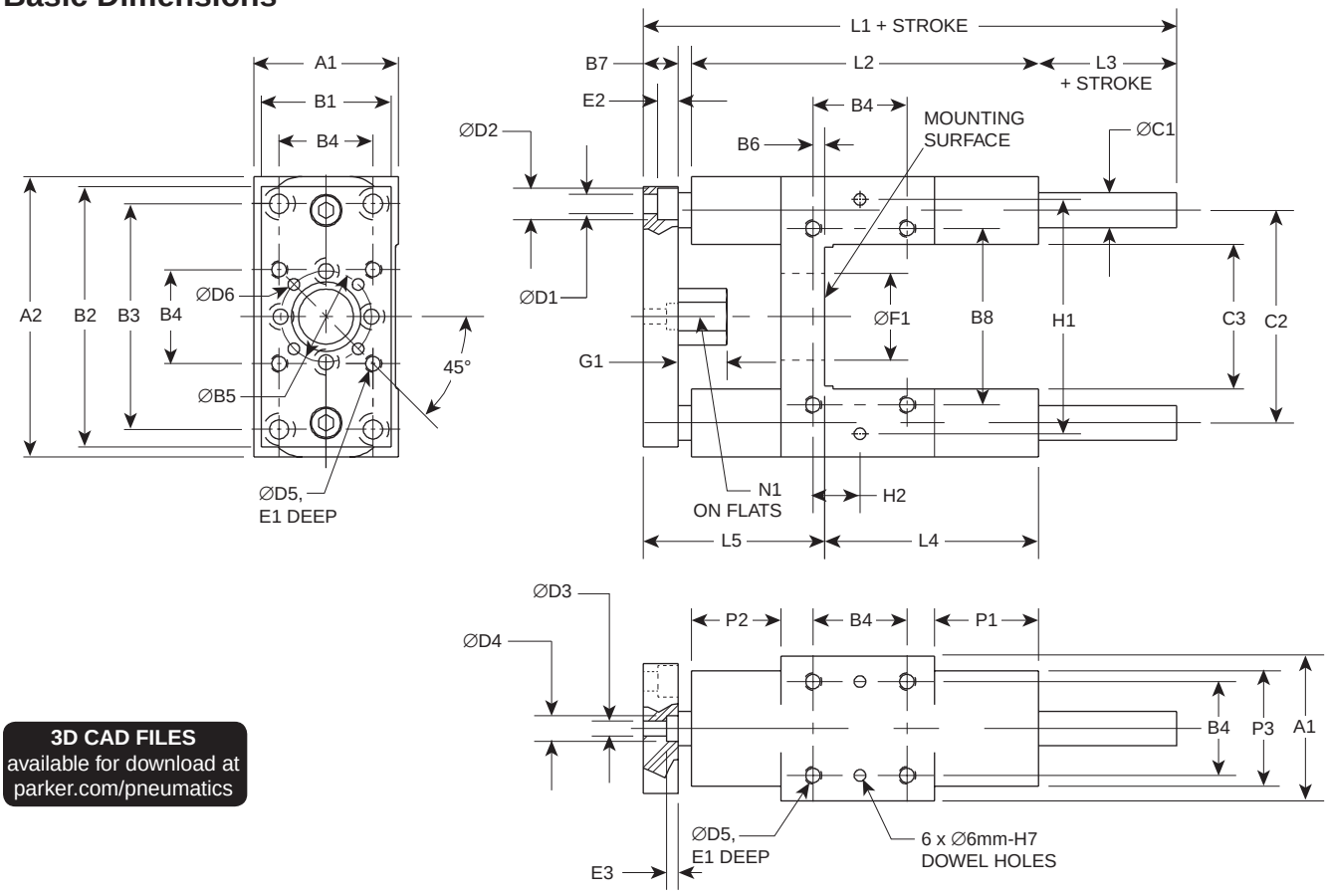
Basic Dimensions



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Dimensions, mm (inch)

Bore	A1	A2	B1	B2	B3	B4	ØB5	B6	B7	B8	ØC1 Std.	ØC1 O.S.	C2	C3	ØD1	ØD2	ØD3	ØD4	ØD5	ØD6
32	50 (1.97)	97 (3.82)	45 (1.77)	92 (3.62)	78 (3.07)	32.5 (1.28)	31.5 (1.24)	4 (0.16)	12.7 (0.50)	61 (2.40)	12 (0.47)	16 (0.63)	73.5 (2.89)	50 (1.97)	6.6 (0.26)	11 (0.43)	5.2 (0.20)	9 (0.35)	M6 x 1.00	4 (0.16)
40	58 (2.28)	115 (4.53)	50.8 (2.00)	110 (4.33)	84 (3.31)	38 (1.50)	31.5 (1.24)	11 (0.43)	12.7 (0.50)	69 (2.72)	16 (0.63)	20 (0.79)	86.5 (3.41)	58 (2.28)	6.6 (0.27)	11 (0.43)	5.2 (0.20)	9 (0.35)	M6 x 1.00	4 (0.16)
50	70 (2.76)	137 (5.39)	63 (2.48)	132 (5.20)	100 (3.94)	46.5 (1.83)	50 (1.97)	19 (0.75)	16 (0.63)	85 (3.35)	20 (0.79)	25 (0.98)	103.5 (4.07)	70 (2.76)	9 (0.35)	14 (0.55)	6.4 (0.25)	11 (0.43)	M8 x 1.25	4 (0.16)
63	85 (3.35)	152 (5.98)	82.5 (3.25)	145 (5.71)	105 (4.13)	56.5 (2.24)	50 (1.97)	15 (0.59)	16 (0.63)	100 (3.94)	20 (0.79)	25 (0.98)	118.5 (4.67)	85 (3.35)	9 (0.35)	14 (0.55)	6.4 (0.25)	11 (0.43)	M8 x 1.25	4 (0.16)
80	105 (4.13)	189 (7.44)	100 (3.94)	180 (7.09)	130 (5.12)	72 (2.83)	76 (2.99)	21 (0.83)	19 (0.75)	130 (5.12)	25 (0.98)	30 (1.18)	147 (5.79)	105 (4.13)	11 (0.43)	17 (0.67)	8.4 (0.33)	14 (0.55)	M10 x 1.50	6 (0.24)
100	130 (5.12)	213 (8.39)	120 (4.72)	200 (7.87)	150 (5.91)	89 (3.50)	76 (2.99)	24.5 (0.97)	19 (0.75)	150 (5.91)	25 (0.98)	30 (1.18)	171.5 (6.75)	130 (5.12)	11 (0.43)	17 (0.67)	8.4 (0.33)	14 (0.55)	M10 x 1.50	6 (0.24)

Bore	E1	E2	E3	ØF1	G1	H1	H2	L1	L2	L3	L4	L5	N1	P1	P2	P3	Port Size NPT/ BSPP	Piston Rod Thread
32	12 (0.47)	7 (0.28)	4 (0.16)	30 (1.18)	17 (0.67)	81 (3.19)	16 (0.63)	153 (6.02)	120 (4.72)	17 (0.67)	71 (2.80)	64.7 (2.55)	17 (0.67)	36 (1.42)	31 (1.22)	40 (1.57)	1/8	M10 x 1.25
40	12 (0.47)	7 (0.28)	4 (0.16)	35 (1.38)	24 (0.94)	99 (3.90)	19 (0.75)	166 (6.54)	130 (5.12)	20 (0.79)	71 (2.80)	74.7 (2.94)	17 (0.67)	36 (1.42)	36 (1.42)	44 (1.73)	1/4	M12 x 1.25
50	16 (0.63)	9 (0.35)	9 (0.35)	40 (1.57)	27 (1.06)	119 (4.69)	23 (0.91)	194 (7.64)	150 (5.90)	25 (0.98)	79 (3.11)	90 (3.54)	24 (0.94)	42 (1.65)	44 (1.73)	50 (1.97)	1/4	M16 x 1.5
63	16 (0.63)	9 (0.35)	9 (0.35)	45 (1.77)	27 (1.06)	132 (5.20)	28 (1.10)	224 (8.82)	180 (7.09)	25 (0.98)	109 (4.29)	90 (3.54)	24 (0.94)	58 (2.28)	44 (1.73)	60 (2.36)	3/8	M16 x 1.5
80	20 (0.79)	11 (0.43)	5 (0.19)	45 (1.77)	32 (1.26)	166 (6.54)	36 (1.42)	252 (9.92)	200 (7.87)	30 (1.18)	113 (4.45)	109 (4.29)	30 (1.18)	50 (1.97)	52 (2.05)	70 (2.76)	3/8	M20 x 1.5
100	20 (0.79)	11 (0.43)	5 (0.20)	55 (2.17)	32 (1.26)	190 (7.48)	45 (1.77)	272 (10.71)	220 (8.66)	30 (1.18)	128 (5.04)	114 (4.49)	30 (1.18)	49 (1.93)	51 (2.01)	70 (2.76)	1/2	M20 x 1.5

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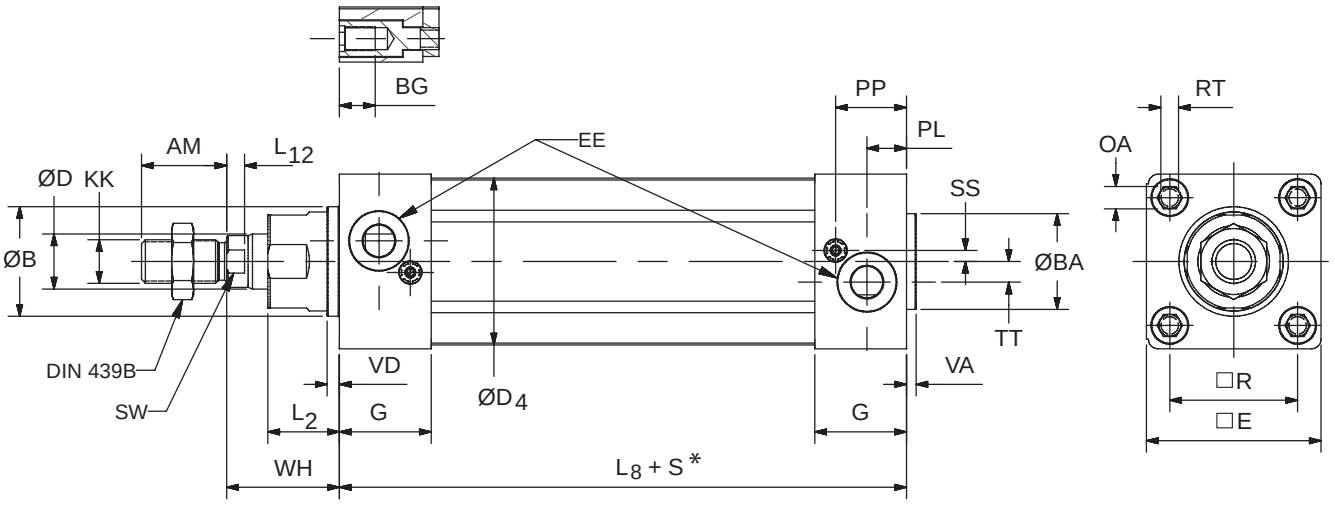
P1D Removable Gland Version



F

Dimensions

								EE						
Cylinder Bore	**AM mm**	**B mm**	**BA mm**	**BG mm**	**D mm**	**D4 mm**	**E mm**	**BSPP**	**NPTF/ BSPT**	**G mm**	**KK**	**L_2 mm**	**L_8 mm**	**L_{12} mm**
32	22	30	30	16	12	45.0	46.5	G1/8	1/8	28.5	M10x1.25	18	94	6.0
40	24	35	35	16	16	52.0	52.0	G1/4	1/4	33.0	M12x1.25	20	105	6.5
50	32	40	40	16	20	60.7	63.5	G1/4	1/4	33.5	M16x1.5	26	106	6.5
63	32	45	45	16	20	71.5	76.0	G3/8	3/8	39.5	M16x1.5	26	121	6.5
80	40	45	45	17	25	86.7	95.5	G3/8	3/8	39.5	M20x1.5	33	128	10.0
100	40	55	55	17	25	106.7	114.5	G1/2	1/2	44.5	M20x1.5	33	138	10.0

Cylinder Bore	**OA mm**	**PL mm**	**PP mm**	**R mm**	**RT**	**SS mm**	**SW mm**	**TT mm**	**VA mm**	**VD mm**	**WH mm**
32	6	13	21.8	32.5	M6	6.5	10	4.5	3.5	4.5	26
40	6	14	21.9	38.0	M6	8.0	13	5.5	3.5	4.5	30
50	8	14	25.9	46.5	M8	4.0	17	7.5	3.5	4.5	37
63	8	16	27.4	56.5	M8	6.5	17	11.0	3.5	4.5	37
80	6	16	30.5	72.0	M10	0	22	15.0	3.5	4.5	46
100	6	18	35.8	89.0	M10	0	22	20.0	3.5	4.5	51

S=Stroke

Tolerances

Cylinder Bore	**B**	**BA mm**	**L_8 mm**	**L_9 mm**	**R mm**	**Stroke Tolerance**
32	d11	d11	±0.4	±2	±0.5	+1/-0
40	d11	d11	±0.7	±2	±0.5	+1/-0
50	d11	d11	±0.7	±2	±0.6	+1/-0
63	d11	d11	±0.8	±2	±0.7	+1/-0
80	d11	d11	±0.8	±3	±0.7	+1/-0
100	d11	d11	±1.0	±3	±0.7	+1/-0

*Stroke Adder for Cylinder Bumper Options

Cylinder Bore	**Option**				
	B	**T**	**R**	**S**	E
32, 40, 50 63, 80	5 (0.20)	25 (0.98)	25 (0.98)	25 (0.98)	25 (0.98)
100	5 (0.20)	5 (0.20)	25 (0.98)	25 (0.98)	0

Adder dimensions in mm (inch)

Note: Adders not used when P1D Rod Lock (K) and P1D Manual Override Rod Lock (S) are specified with bumpers.

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P1D Rod Lock (K, S)

The P1D Series Rod Lock Cylinder incorporates a powerful piston rod locking device, which clamps the piston rod and locks it in position. The locking device is a spring lock with an air pressure release and is integrated into the front (head) cover of the cylinder. In the absence of air signal pressure, full holding force is applied to the piston rod. When air is present at 4 Bar (58 psi), the locking device is released.

The design provides several valuable characteristics, such as:

- A holding force corresponding to a pressure of 7 Bar (102 psi)
- A clean design, with the front (head) end cover and locking device built into a common block for compact installation.
- Easy to clean, well-sealed construction.
- Exhaust air from the locking device can be piped away when there are high demands for contaminant free environment.

Note: The P1D with rod lock product line is not intended for use in water service applications, or in environments that have high humidity levels and/or splashing fluids present.

Specifications

- Fluid Medium: Dry, filtered, compressed air
- Maximum Cylinder Operating Pressure: 10 Bar (145 PSI)
- Required Pressure to Unlock[1]: 4 Bar (58 PSI)
- Minimum Torque Required for Override:

  32mm Bore = 0.9 N-m / 8 in-lbs
  40mm Bore = 0.9 N-m / 8 in-lbs
  50mm Bore = 2.7 N-m / 24 in-lbs
  63mm Bore = 2.7 N-m / 24 in-lbs
  80mm Bore = 27.1 N-m / 240 in-lbs
  100mm Bore = 36.6 N-m / 324 in-lbs

- Maximum Operating Temperature: -10°C to +75°C, +14°F to +167°F
- Maximum Cylinder Operating Speed: 5 feet per second

[1]Signal pressure to port on locking device. Operation at pressures lower than 4 Bar (58 psi) may lead to inadvertent engagement of the rod lock device.

Connection

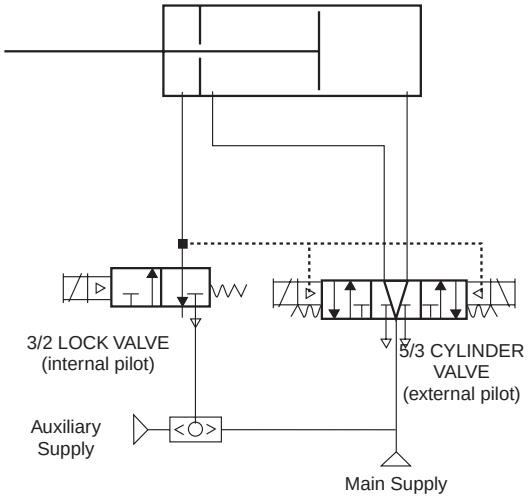
The signal air for the locking device can be obtained directly from a main air supply, or from the air supply serving the valve that controls the cylinder itself. For controlled ON/OFF operation of the locking device, a separate quick-venting valve is used.

The piston rod should not be moving when the locking device is activated. The locking device is not intended to brake a movement in repeated sequences.

Holding Forces

Bore Size	Holding Forces	
	(N)	(lbs)
32mm	550	123
40mm	860	193
50mm	1345	303
63mm	2140	481
80mm	3450	755
100mm	5390	1211

Note: All P1D Rod Lock Versions are not intended for use in water service applications, or in environments that have high humidity levels and/or splashing fluids present.



1. Lock valve must be maintained energized during cylinder motion, otherwise rod lock is engaged and cylinder valve shifts to mid position.
2. Cylinder valve must be maintained energized during extend or retract. Also keep energized at end of stroke until change of direction is desired.
3. Mid position of 5/3 Cylinder valve may be pressurized outlets if the combination of pressure load on the cylinder and inertia effects of the attached load do not exceed the holding force rating of the rod lock device, including allowance for wear.
4. Do not use cylinder lines for any logic functions — pressure levels vary too much.

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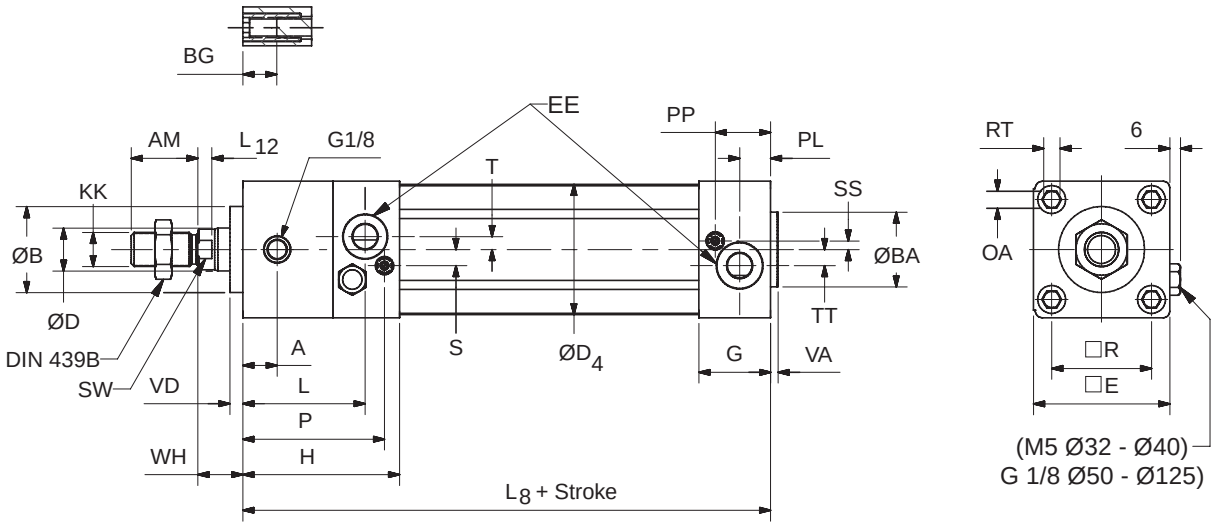
P1D Rod Lock Version (K)



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Dimensions

Cylinder Bore	A mm	AM mm	B mm	BA mm	BG mm	D mm	D_4 mm	E mm	EE	G mm	H mm	KK	L mm	L_8 mm	L_{12} mm
32	16	22	30	30	16	12	45.0	46.5	G1/8	28.5	71.5	M10x1.25	56.0	137	6.0
40	16	24	35	35	16	16	52.0	52.0	G1/4	33.0	77.0	M12x1.25	56.0	149	6.5
50	18	32	40	40	16	20	60.7	63.5	G1/4	33.5	80.5	M16x1.5	62.5	153	6.5
63	26	32	45	45	16	20	71.5	76.0	G3/8	39.5	96.5	M16x1.5	74.5	178	6.5
80	35	40	45	45	17	25	86.7	95.5	G3/8	39.5	110.5	M20x1.5	87.0	199	10.0
100	50	40	55	55	17	25	106.7	114.5	G1/2	44.5	132.5	M20x1.5	106.0	226	10.0

Cylinder Bore	OA mm	P mm	PL mm	PP mm	R mm	RT mm	S mm	SS mm	SW mm	T mm	TT mm	VA mm	VD mm	WH mm
32	6	64.8	13	21.8	32.5	M6	7	6.5	10	2.5	4.5	3.5	4.5	15
40	6	68.0	14	21.9	38.0	M6	9	8.0	13	2.0	5.5	3.5	4.5	16
50	8	73.5	14	25.9	46.5	M8	8	4.0	17	4.0	7.5	3.5	5.0	17
63	8	89.5	16	27.4	56.5	M8	8	6.5	17	2.0	11.0	3.5	5.0	17
80	6	101.5	16	30.5	72.0	M10	9	0	22	5.0	15.0	3.5	4.0	20
100	6	123.5	18	35.8	89.0	M10	12	0	22	6.0	20.0	3.5	4.0	20

Tolerances

Cylinder Bore	B mm	R mm	L_8 mm	BA mm	Stroke-length Tolerance mm
32	d11	±0.5	±0.4	d11	+1/-0
40	d11	±0.5	±0.7	d11	+1/-0
50	d11	±0.6	±0.7	d11	+1/-0
63	d11	±0.7	±0.8	d11	+1/-0
80	d11	±0.7	±0.8	d11	+1/-0
100	d11	±0.7	±1.0	d11	+1/-0

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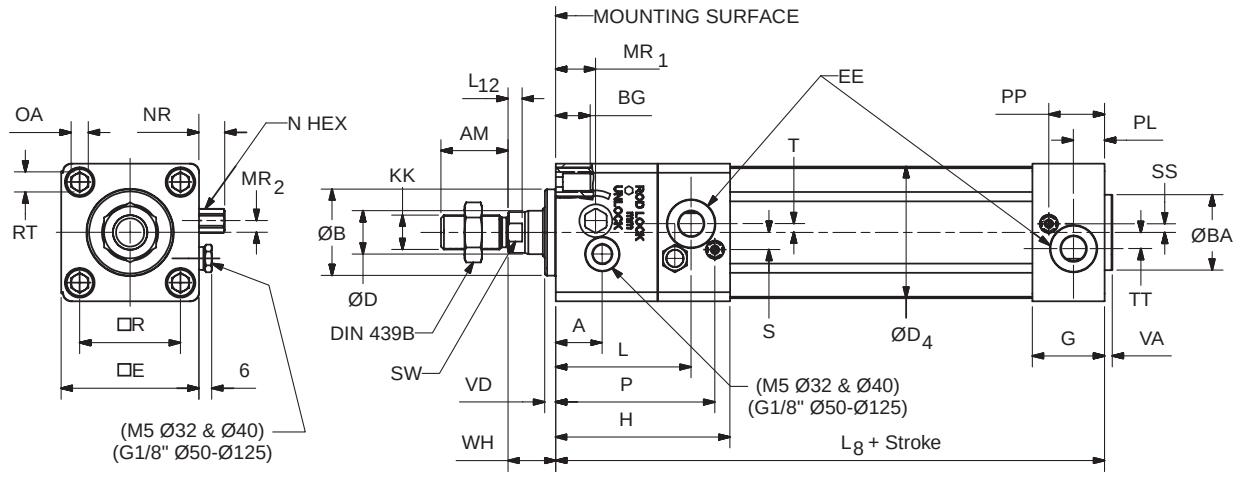
P1D Rod Lock Version with Manual Override (S)



Dimensions

Cylinder Bore	A mm	AM mm	B mm	BA mm	BG mm	D mm	D_4 mm	E mm	EE	G mm	H mm	KK	L mm	L_8 mm	L_{12} mm	MR_1 mm	MR_2 mm
32	27.0	22	30	30	16	12	45.0	46.5	G1/8	28.5	71.5	M10X1.25	56.0	137	6.0	16.0	3.0
40	27.0	24	35	35	16	16	52.0	52.0	G1/4	33.0	77.0	M12X1.25	56.0	149	6.5	16.0	3.0
50	21.5	32	40	40	16	20	60.7	63.5	G1/4	33.5	80.5	M16X1.5	62.5	153	6.5	18.5	5.5
63	39.0	32	45	45	16	20	71.5	76.0	G3/8	39.5	96.5	M16X1.5	74.5	178	6.5	22.0	4.0
80	38.5	40	45	45	17	25	86.7	95.5	G3/8	39.5	110.5	M20X1.5	87.0	199	10.0	15.0	19.8
100	55.0	40	55	55	17	25	106.7	114.5	G1/2	44.5	132.5	M20X1.5	106.0	226	10.0	15.0	20.8

Cylinder Bore	N mm	NR mm	OA mm	P mm	PL mm	PP mm	R mm	RT	S mm	SS mm	SW mm	T mm	TT mm	VA mm	VD mm	WH mm
32	8	10.0	6	64.8	13	21.8	32.5	M6	7	6.5	10	2.5	4.5	3.5	4.5	15
40	8	10.0	6	68.0	14	21.9	38.0	M6	9	8.0	13	2.0	5.5	3.5	4.5	16
50	10	12.0	8	73.5	14	25.9	46.5	M8	8	4.0	17	4.0	7.5	3.5	5.0	17
63	10	12.0	8	89.5	16	27.4	56.5	M8	8	6.5	17	2.0	11.0	3.5	5.0	17
80	11	12.5	6	101.5	16	30.5	72.0	M10	9	0	22	5.0	15.0	3.5	14.0	30
100	11	12.5	6	123.5	18	35.8	89.0	M10	12	0	22	6.0	20.0	3.5	14.0	30

Tolerances

Cylinder Bore	B mm	R mm	L_8 mm	BA mm	Stroke-length Tolerance mm
32	d11	±0.5	±0.4	d11	+1/-0
40	d11	±0.5	±0.7	d11	+1/-0
50	d11	±0.6	±0.7	d11	+1/-0
63	d11	±0.7	±0.8	d11	+1/-0
80	d11	±0.7	±0.8	d11	+1/-0
100	d11	±0.7	±1.0	d11	+1/-0

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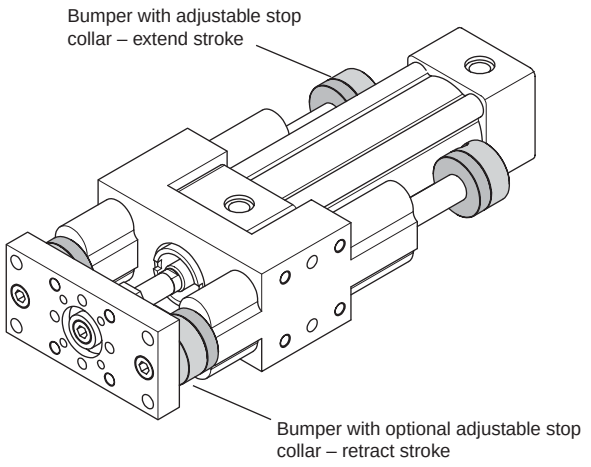
Bumpers / Adjustable Stop Collars

Bumpers absorb shock, reduce noise and permit faster cycle times, thereby increasing production rates. They can be placed on the extend, retract or both positions.

When bumpers are specified on the extend stroke, an adjustable stop collar is required and provides travel adjustment. An optional stop collar can also be specified for the retract stroke.

OPTIONS:

B – Bumpers (retract only)
E – Bumpers, adjustable stop collars (extend only)
R – Bumpers, adjustable stop collars (retract only)
S – Bumpers, adjustable stop collars (both ends)
T – Bumpers both ends, adjustable stop collars on extend



Bumpers and adjustable stop collars, both ends (S)

NOTES:

1. Bumpers and adjustable stop collars are not available with oversize shaft options.
2. To achieve the desired useable stroke length with options B, E, T, R or S, the cylinder length will increase. See Stroke Adder table for cylinder dimensions adders.
3. Bumpers and adjustable stop collars on the extend stroke require additional cylinder stroke lengths on some bore sizes in order for the collars to clear the cylinder end cap. *Therefore, cushions on extend stroke are not available with this option.* See Stroke Adder table for cylinder dimension adders with options E, T or S.

Stroke Adder for Cylinder Bumper Options

Cylinder Bore	Option				
	B	**T**	**R**	**S**	E
32, 40, 50 63, 80	5 (0.20)	25 (0.98)	25 (0.98)	25 (0.98)	25 (0.98)
100	5 (0.20)	5 (0.20)	25 (0.98)	25 (0.98)	0

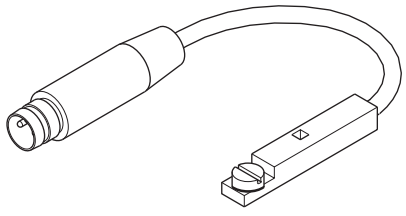
Adder dimensions in mm (inch)

Note: Adders not used when P1D Rod Lock (K) and P1D Manual Override Rod Lock (S) are specified with bumpers.

Sensors

Optional solid state and reed sensors sense the position of the magnetic ring on the cylinder piston. Drop-in Global Sensors are installed into the integral sensor grooves on the cylinder body and are easily positioned. Magnetic piston is standard.

Order sensors separately. See Electronic Sensors section for part numbers and specifications.



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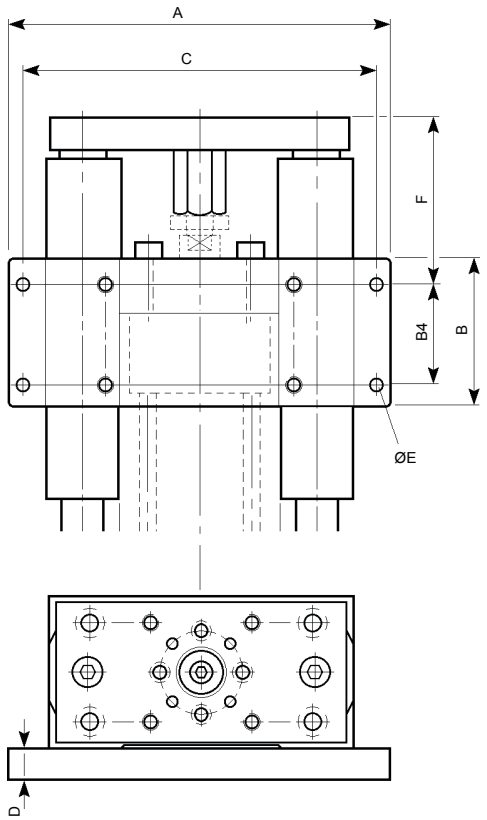
Mounting Kits

Mounting kits conform to ISO 6431, ISO/DIS 15552, VDMA 24 562 and AFNOR standards.

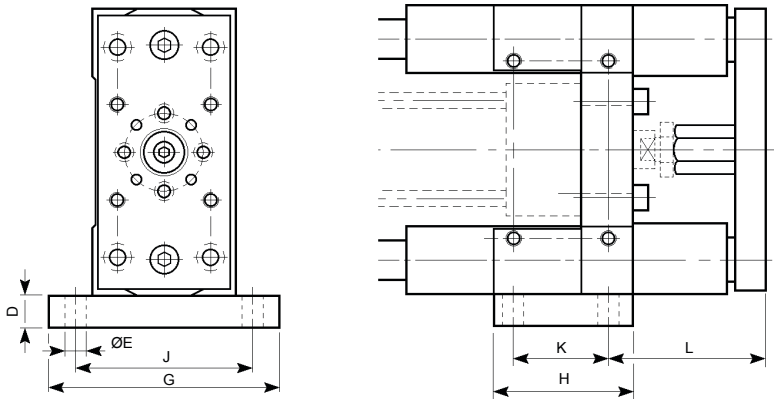
Kits include 4 mounting screws.

Raw Material: Galvanized steel

Horizontal Mounting Kit (1)



Vertical Mounting Kit (2)



Dimensions & Weights

Bore Size	Mounting (1) Horizontal	Mounting (2) Vertical	A	B	B4	C	D	E	F	G	H	J	K	L	Weight, g (lb) (1)	(2)
32	**32-2801R**	**PIC-4KMB**	128 (5.04)	50 (1.97)	32.5 (1.28)	116 (4.57)	10 (0.39)	6.6 (0.26)	60 (2.37)	80 (3.15)	47 (1.85)	64 (2.52)	32 (1.26)	60 (2.37)	500 (1.10)	230 (0.51)
40	**40-2801R**	**PIC-4LMB**	155 (6.10)	55 (2.16)	38 (1.50)	140 (5.51)	10 (0.39)	9 (0.35)	63 (2.48)	92 (3.62)	53 (2.09)	72 (2.83)	36 (1.42)	64 (2.52)	700 (1.54)	280 (0.62)
50	**50-2801R**	**PIC-4MMB**	175 (6.89)	70 (2.76)	46.5 (1.83)	160 (6.30)	12 (0.47)	9 (0.35)	70 (2.76)	113 (4.45)	65 (2.56)	90 (3.54)	45 (1.77)	71 (2.79)	1180 (2.60)	530 (1.17)
63	**63-2801R**	**PIC-4NMB**	190 (7.48)	80 (3.15)	56.5 (2.22)	175 (6.89)	12 (0.47)	9 (0.35)	74 (2.91)	129 (5.08)	74 (2.91)	100 (3.94)	50 (1.97)	77 (3.03)	1450 (3.20)	710 (1.57)
80	**80-2801R**	**PIC-4PMB**	240 (9.45)	100 (3.94)	72 (2.83)	218 (8.58)	16 (0.63)	11 (0.43)	89 (3.50)	153 (6.02)	97 (3.82)	126 (4.96)	63 (2.48)	93.5 (3.68)	3000 (6.61)	1590 (3.51)
100	**100-2801R**	**PIC-4QMB**	270 (10.63)	120 (4.72)	89 (3.50)	245 (9.65)	16 (0.63)	13 (0.51)	90.5 (3.56)	186 (6.93)	111 (4.37)	150 (5.91)	75 (2.95)	97.5 (3.84)	4100 (9.04)	2190 (4.83)

Note: All dimensions in mm or (inch) unless otherwise noted.

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Safety Guide for Selecting and Using Hydraulic, Pneumatic Cylinders and Their Accessories

WARNING: ⚠ FAILURE OF THE CYLINDER, ITS PARTS, ITS MOUNTING, ITS CONNECTIONS TO OTHER OBJECTS, OR ITS CONTROLS CAN RESULT IN:

- **Unanticipated or uncontrolled movement of the cylinder or objects connected to it.**
- **Falling of the cylinder or objects held up by it.**
- **Fluid escaping from the cylinder, potentially at high velocity.**

THESE EVENTS COULD CAUSE DEATH OR PERSONAL INJURY BY, FOR EXAMPLE, PERSONS FALLING FROM HIGH LOCATIONS, BEING CRUSHED OR STRUCK BY HEAVY OR FAST MOVING OBJECTS, BEING PUSHED INTO DANGEROUS EQUIPMENT OR SITUATIONS, OR SLIPPING ON ESCAPED FLUID.

Before selecting or using Parker (The Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using The Company's products.

1.0 General Instructions

1.1 Scope – This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

1.2 Fail Safe – Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

1.3 Distribution – Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use The Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

1.4 User Responsibility – Due to very wide variety of cylinder applications and cylinder operating conditions, The Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to The Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own
analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

1.5 Additional Questions – Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2.0 Cylinder and Accessories Selection

2.1 Seals – Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

2.2 Piston Rods – Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Follow the recommendations of the "Piston Rod Selection Chart and Data" in the publication for the series of cylinders of interest. The suggested piston rod diameter in these charts must be followed in order to avoid piston rod buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

On occasion cylinders are ordered with double rods (a piston rod extended from both ends of the cylinder). In some cases a stop is threaded on to one of the piston rods and used as an external stroke adjuster. On occasions spacers are attached to the machine member connected to the piston rod and also used as a stroke adjuster. In both cases the stops will create a pinch point and the user should consider appropriate use of guards. If these external stops are not perpendicular to the mating contact surface, or if debris is trapped between the contact surfaces, a bending moment will be placed on the piston rod, which can lead to piston rod failure. An external stop will also negate the effect of cushioning and will subject the piston rod to impact loading. Those two (2) conditions can cause piston rod failure. Internal stroke adjusters are available with and without cushions. The use of external stroke adjusters should be reviewed with our engineering department.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston to rod joint.

2.3 Cushions – Cushions should be considered for cylinder applications when the piston velocity is expected to be over 4 inches/second.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be review by our engineering department.

2.4 Cylinder Mountings – Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

2.5 Port Fittings – Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end.

The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure x effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

3.0 Cylinder and Accessories Installation and Mounting

3.1 Installation

3.1.1 – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

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3.1.2 – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

3.1.3 – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

3.1.4 – Sometimes it may be necessary to rotate the piston rod in order to thread the piston rod into the machine member. This operation must always be done with zero pressure being applied to either side of the piston. Failure to follow this procedure may result in loosening the piston to rod-threaded connection. In some rare cases the turning of the piston rod may rotate a threaded piston rod gland and loosen it from the
cylinder head. Confirm that this condition is not occurring. If it does, re-tighten the piston rod gland firmly against the cylinder head.

For double rod cylinders it is also important that when attaching or detaching the piston rod from the machine member that the torque be applied to the piston rod end of the cylinder that is directly attaching to the machine member with the opposite end unrestrained. If the design of the machine is such that only the rod end of the cylinder opposite to where the rod attaches to the machine member can be rotated, consult the factory for further instructions.

3.2 Mounting Recommendations

3.2.1 – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

3.2.2 – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

3.2.3 – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. The standard tie rod extension is shown as BB in dimension tables. Longer or shorter extensions can be supplied. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

3.2.4 – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

3.2.5 – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

3.2.6 – Clevis Mountings – Cylinders should be pivoted at both ends with centerline of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

4.1 Storage – At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

4.1.1 – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

4.1.2 – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

4.1.3 – Port protector plugs should be left in the cylinder until the time of installation.

4.1.4 – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

4.1.5 – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

4.2 Cylinder Trouble Shooting

4.2.1 – **External Leakage**

4.2.1.1 – Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to gland wear. If clearance is excessive, replace rod bushing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F. (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F. (+177°C.) and replace with fluorocarbon seals.

4.2.1.2 – Cylinder body seal leak can generally be traced to loose tie rods. Torque the tie rods to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque tie rods as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the tie rods replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

4.2.2 – **Internal Leakage**

4.2.2.1 – Piston seal leak (by-pass) 1 to 3 cubic inches per minute leakage is considered normal for piston ring construction. Virtually no static leak with lipseal type seals on piston should be expected. Piston seal wear is a usual cause of piston seal leakage. Replace seals as required.

4.2.2.2 – With lipseal type piston seals excessive back pressure due to over-adjustment of speed control valves could be a direct cause of rapid seal wear. Contamination in a hydraulic system can result in a scored cylinder bore, resulting in rapid seal wear. In either case, replace piston seals as required.

4.2.2.3 – What appears to be piston seal leak, evidenced by the fact that the cylinder drifts, is not always traceable to the piston. To make sure, it is suggested that one side of the cylinder piston be pressurized and the fluid line at the opposite port be disconnected. Observe leakage. If none is evident, seek the cause of cylinder drift in other component parts in the circuit.

4.2.3 – **Cylinder Fails to Move the Load**

4.2.3.1 – Pneumatic or hydraulic pressure is too low. Check the pressure at the cylinder to make sure it is to circuit requirements.

4.2.3.2 – Piston Seal Leak – Operate the valve to cycle the cylinder and observe fluid flow at valve exhaust ports at end of cylinder stroke. Replace piston seals if flow is excessive.

4.2.3.3 – Cylinder is undersized for the load – Replace cylinder with one of a larger bore size.

4.3 Erratic or Chatter Operation

4.3.1 – Excessive friction at rod gland or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

4.3.2 – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

4.3.3 – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

4.4 Cylinder Modifications, Repairs, or Failed Component – Cylinders as shipped from the factory are not to be disassembled and or modified. If cylinders require modifications, these modifications must be done at company locations or by The Company's certified facilities. The Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, tie rod, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, Ohio
www.parker.com/pneumatics

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9. 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, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are 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.

10. 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.

11. 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. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. 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.

13. 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.

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

15. 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 the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. 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.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (b) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (c) an assignment for the benefit of creditors, or (d) the dissolution or liquidation of the Buyer.

18. 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. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. 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.

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Pneumatic Division
Wadsworth, Ohio
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