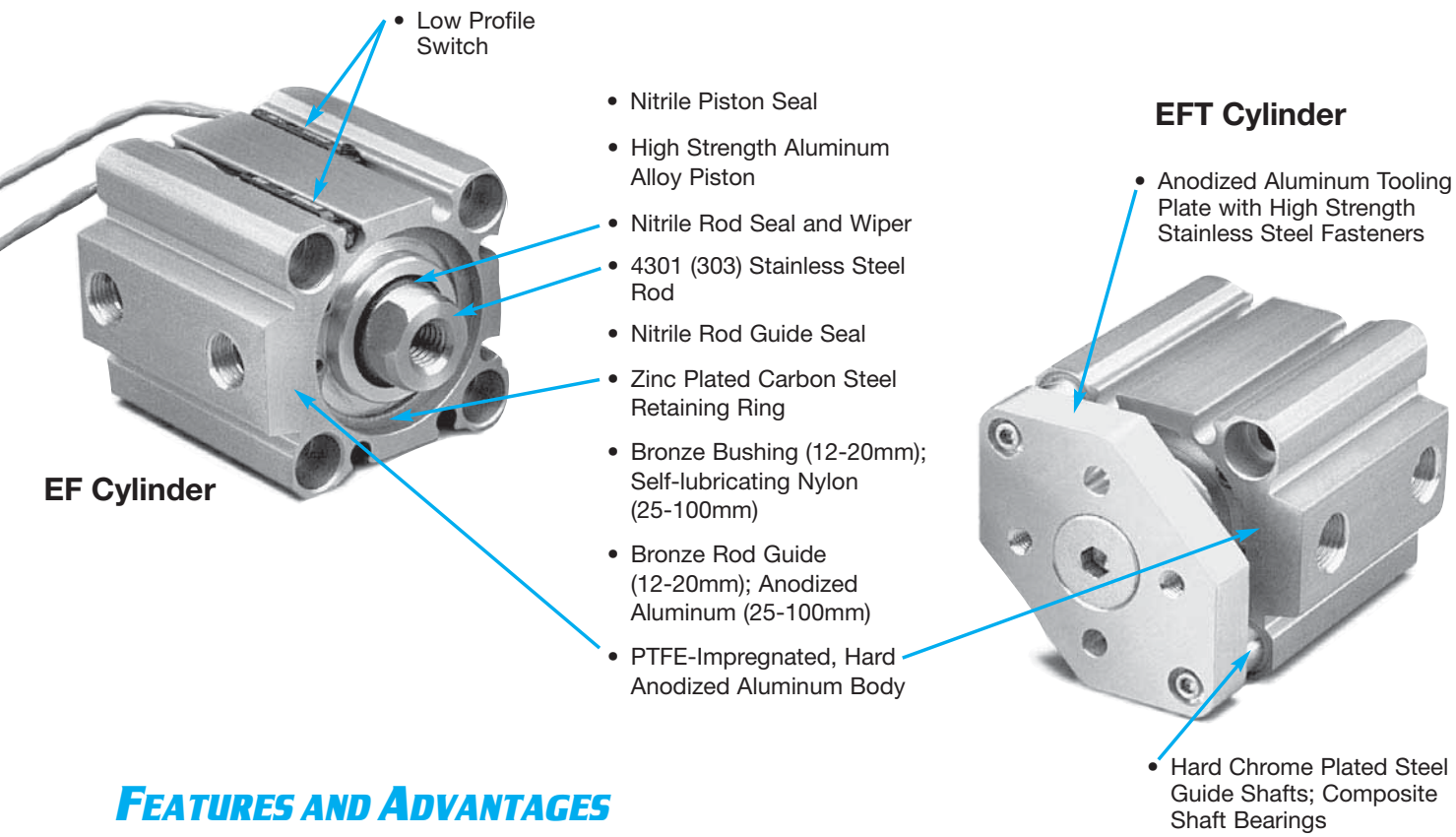
The Bimba EF Series is a compact, aluminum-extruded body air cylinder designed for international machine requirements.

The body is anodized in a special PTFE-impregnation process that provides superior wear characteristics. With its streamlined look, low cost and low-profile switch, it is an excellent choice for space-saving machine design.



Features and Advantages

- PTFE-impregnated, hard anodized aluminum body provides superior wear resistance. Expected service life is 2500 kilometers.
- Very compact; dimensionally-interchangeable with similar compact extruded aluminum body cylinders.
- Very low profile, compact switch slides into groove within cylinder geometry.
- EF1 cylinders are available in four models: double acting, single or double rod end; and single acting, spring return or extend, and EF2 cylinders are available in double acting, non-rotating.
- NEW!! EFDT cylinders are now available as a double acting, double ended, non-rotating rod cylinder to provide an additional operation feature from the cylinder rear.
- Both models are available in ten bore sizes from 12mm to 100mm.
- Wide variety of standard stroke lengths in 5mm increments; additional stroke lengths available.
- Standard cylinder is completely metric in design; with Option -E, threaded mounting options, rod threads and ports are in U.S. customary units (inch).
- Mounting options include threaded bottom mounting and threaded front/rear mounting option.
- Options include bumpers, ports and threaded mounting option and rod threads in U.S. customary units, magnetic position sensing, and high temperature seals.
- NEW!! X option for EFT and EFDT cylinders only. This option increases stability by at least two times and up to 23 times depending on bore size. In addition, the X option more than doubles the maximum cylinder side load and moment!

How to Order

The Model Number for all EF1 cylinders consists of three alphanumeric clusters. These designate type, bore size and stroke length, and options. Please refer to the charts below for an example of Model Number EF-2510-3MMTV. This is a 25mm bore, double acting, single end rod cylinder, with metric threads and ports, 10mm of stroke, threaded front/rear mounting holes, magnetic position sensing, male rod end and high temperature option.

TYPE

EF	-	Double Acting, Single End Rod
EFD	-	Double Acting, Double End Rod
EFS	-	Single Acting, Spring Retract
EFR	-	Single Acting, Spring Extend

BORE SIZE mm (inch)*

12mm	-	(1/2")	40mm	-	(1-1/2")
16mm	-	(5/8")	50mm	-	(2")
20mm	-	(3/4")	63mm	-	(2-1/2")
25mm	-	(1")	80mm	-	(3-1/4")
32mm	-	(1-1/4")	100mm	-	(4")

STROKE LENGTH**

See table - page 2.46

EF-2510-3MMTV

MOUNTING OPTIONS

(Enter in numeric order)

No Number	-	Basic model
1	-	Threaded bottom mounting option
3	-	Threaded front/rear mounting option
6	-	Rear Clevis
6N	-	Rear Clevis 90°

OPTIONS

(Enter in alphabetical order, except EE which is last)

B	-	Bumpers (see page 2.56)[1]
C	-	Stainless steel retaining ring
E	-	U.S. customary units (inch)[2]
F	-	Full-flow port orifice[5]
M	-	Magnetic position sensing (see page 2.56)[3]
MT	-	Male rod end (fine thread) (see page 2.55)[4]
NT	-	Non-threaded rod
V	-	High temperature option -10°C to 110°C (15°F to 225°F)
EE	-	Extra rod extension in 1mm increments

[1]Bumpers reduce stroke length by 3mm. When bumper is specified with option V, standard bumper material is supplied. Operating temperature remains -10° to 70°C (15° to 160°F).

[2]When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

[3]When magnetic position sensing is specified with option V, operating temperature remains -10° to 70°C (15° to 160°F). This combination is recommended when fluoroelastomer is specified for compatibility.

[4]MT option must be specified to use rod pivot.

[5]Automatically includes bumpers, so stroke is reduced by 3mm.

Please note that throughout all catalog charts, metric measurements are shown first and U.S. customary units (inches) are in parentheses.

**NOTE: Numbers in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.*

***When stroke length exceeds 30mm, a threaded mounting option should be considered. Mounting bolts that span the entire cylinder length may not be readily available.*

Bimba EF1 Cylinders

Bimba is a JIT manufacturer and we are able to provide EF model cylinders in *ANY 1mm of stroke length increment for all option styles within our standard three-day lead time*. Longer stroke lengths are also available upon request at standard lead times. Please consult Technical Assistance at 800-44-BIMBA for help.

The table below represents our standard stroke lengths. **Blue** stroke lengths are EF cylinders with -E and -3EM options in stock available for Same Day Shipping.

Stroke Length Availability

Nominal Bore Diameter	Double Acting		Single Acting	
	EF Single Rod End (mm)	EFD Double Rod End (mm)	EFS Single Acting Spring Retract (mm)	EFR Reverse Acting Spring Extend (mm)
12mm (1/2")	**5**, 10, **15**, 20, **25**, 30	5, 10, 15, 20, 25, 30	5, 10	5, 10
16mm (5/8")	5, **10**, 15, 20, 25, 30	5, 10, 15, 20, 25, 30	5, 10	5, 10
20mm (3/4")	5, **10**, 15, 20, **25**, 30, 35, **40**, 45, **50**	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5, 10	5, 10
25mm (1")	5, **10**, 15, 20, **25**, 30, 35, **40**, 45, **50**	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5, 10	5, 10
32mm (1-1/4")	5, 10, **15**, 20, **25**, 30, 35, **40**, 45, **50**, 75, 100	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5, 10	5, 10
40mm (1-1/2")	5, 10, **15**, 20, **25**, 30, 35, **40**, 45, **50**, **75**, 100	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5, 10, 15, 20	5, 10
50mm (2")	10, **15**, 20, **25**, 30, 35, **40**, 45, **50**, **75**, **100**	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20	10, 20
63mm (2-1/2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20, 25	20, 25
80mm (3-1/4")	**10**, 15, 20, **25**, 30, 35, **40**, 45, **50**, 75, 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20, 25	20, 25
100mm (4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	N/A	N/A

List Prices

Model Type	Bore Size									
	12mm	16mm	20mm	25mm	32mm	40mm	50mm	63mm	80mm	100mm
EF	$24.45	$26.90	$32.90	$38.00	$46.20	$55.00	$65.80	$78.00	$98.70	$148.55
Add per 5mm	1.20	1.20	1.20	1.30	1.30	1.30	1.65	1.85	2.15	2.55
EFS	23.40	26.35	29.55	36.55	39.40	47.65	57.55	72.40	91.70	N/A
EFR	26.25	28.70	33.60	38.80	46.95	55.70	67.95	79.60	100.80	N/A
Add per 5mm	1.30	1.30	1.45	1.55	1.65	1.75	2.45	2.70	3.15	N/A
EFD	33.60	37.05	45.25	52.05	63.55	75.45	90.65	107.40	135.85	204.60
Add per 5mm	2.05	2.05	2.05	2.15	2.15	2.25	2.85	3.15	3.55	4.40
Mounting Options										
1(threaded bottom)	$4.00	$4.20	$5.45	$5.70	$6.40	$6.55	$7.15	$7.45	$7.95	$8.35
3 (thread front/rear)	6.10	6.35	8.40	8.70	9.80	9.95	10.90	11.55	12.15	12.65
6, 6N (rear clevis)	11.70	12.25	13.15	15.20	16.65	18.70	21.55	27.85	34.05	45.30
Options										
B	$3.50	$6.20	$6.20	$6.20	$7.35	$7.35	$8.35	$10.05	$15.30	$17.60
C (EF,EFS,EFR)	2.90	3.05	4.15	4.65	5.65	8.45	14.40	17.25	85.20	138.40
C (EFD)	5.70	5.95	8.15	9.25	11.15	16.80	28.85	34.40	170.25	276.65
F (includes B)	9.60	12.35	12.35	13.90	15.10	15.10	17.60	19.45	24.85	27.80
MT (per end)	1.60	1.60	1.60	2.45	2.45	2.80	3.25	3.75	7.45	11.15
M	5.25	6.45	8.45	8.45	10.45	10.45	12.25	14.90	19.10	22.25
V (EF)	11.65	12.75	13.15	15.90	17.75	25.30	27.80	36.15	44.25	55.85
V (EFS)	9.80	10.10	10.45	10.85	11.45	15.75	17.35	21.80	30.20	N/A
V (EFR)	11.65	12.75	13.15	15.90	17.75	25.30	27.80	36.15	44.25	N/A
V (EFD)	13.55	15.50	15.80	21.05	24.15	34.90	38.45	50.30	58.15	65.60
EE (per 1mm/end)	0.35	0.35	0.35	0.40	0.40	0.40	0.45	0.45	0.50	0.50

No charge options: E (U.S. customary units), NT
Invalid option combination: NT/MT
EFD models not available with option NT

Engineering Specifications

Operating Medium:	Air
Maximum Operating Pressure:	10 bar (140 psi)
Ambient and Fluid Temperature:	-10° to 70°C (15° to 160°F)
Lubrication:	PTFE impregnated grease
Standard Rod End:	Female
Stroke Tolerance:	12-50mm bore: ± .6mm (.025 inch) 63-100mm bore: ± .8mm (.030 inch)
Cylinder Mounting (Standard):	Through hole with counterbores both ends
Cylinder Mounting (Optional):	Front and Rear threaded Side mount threaded Rear Clevis
Expected Service Life:	2500 kilometers (1500 miles)*

*For filtered, lubricated air, no-load conditions; if unlubricated, life is approximately 1/3.

Maximum Side Loads kg-Force (lb)

Bore		Stroke Length											
		5mm		10mm		15mm		20mm		25mm		30mm	
12mm	(1/2")	0.27	(0.60)	0.22	(0.49)	0.19	(0.41)	0.16	(0.35)	0.14	(0.31)	0.12	(0.27)
16mm	(5/8")	0.33	(0.73)	0.27	(0.59)	0.23	(0.50)	0.20	(0.43)	0.17	(0.38)	0.15	(0.34)
20mm	(3/4")	0.34	(0.74)	0.27	(0.60)	0.23	(0.51)	0.20	(0.44)	0.18	(0.39)	0.16	(0.35)
25mm	(1")	0.54	(1.18)	0.45	(0.99)	0.38	(0.85)	0.34	(0.74)	0.30	(0.66)	0.27	(0.59)
32mm	(1-1/4")	1.28	(2.81)	1.08	(2.38)	0.94	(2.07)	0.83	(1.83)	0.74	(1.64)	0.67	(1.48)
40mm	(1-1/2")	2.27	(4.99)	1.97	(4.34)	1.75	(3.84)	1.57	(3.44)	1.42	(3.12)	1.30	(2.85)
50mm	(2")	N/A		2.40	(5.29)	2.13	(4.69)	1.92	(4.22)	1.74	(3.83)	1.60	(3.51)
63mm	(2-1/2")	N/A		3.18	(6.99)	2.85	(6.27)	2.58	(5.69)	2.36	(5.20)	2.18	(4.80)
80mm	(3-1/4")	N/A		5.94	(13.06)	5.41	(11.91)	4.97	(10.94)	4.60	(10.12)	4.28	(9.41)
100mm	(4")	N/A		9.14	(20.10)	8.45	(18.58)	7.85	(17.28)	7.34	(16.14)	6.88	(15.15)

Bore		Stroke Length											
		35mm		40mm		45mm		50mm		75mm		100mm	
12mm	(1/2")	0.11	(0.25)	0.10	(0.23)	N/A		N/A		N/A		N/A	
16mm	(5/8")	0.14	(0.30)	0.13	(0.28)	N/A		N/A		N/A		N/A	
20mm	(3/4")	0.14	(0.32)	0.13	(0.29)	0.12	(0.27)	0.11	(0.25)	N/A		N/A	
25mm	(1")	0.24	(0.54)	0.22	(0.49)	0.21	(0.46)	0.19	(0.42)	N/A		N/A	
32mm	(1-1/4")	0.61	(1.35)	0.57	(1.25)	0.52	(1.15)	0.49	(1.07)	0.36	(0.80)	0.29	(0.64)
40mm	(1-1/2")	1.19	(2.63)	1.11	(2.44)	1.03	(2.27)	0.97	(2.12)	0.73	(1.61)	0.59	(1.30)
50mm	(2")	1.47	(3.24)	1.37	(3.01)	1.27	(2.80)	1.19	(2.63)	0.91	(2.00)	0.73	(1.61)
63mm	(2-1/2")	2.02	(4.45)	1.88	(4.15)	1.76	(3.88)	1.66	(3.65)	1.28	(2.81)	1.04	(2.29)
80mm	(3-1/4")	4.00	(8.79)	3.75	(8.25)	3.53	(7.78)	3.34	(7.35)	2.62	(5.77)	2.16	(4.75)
100mm	(4")	6.48	(14.27)	6.13	(13.48)	5.81	(12.78)	5.52	(12.15)	4.43	(9.74)	3.69	(8.13)

Theoretical Cylinder Forces

FORCE = Power Factor x Input Pressure

Bore	Direction	Power Factor* (When input pressure in bar)	Power Factor** (When input pressure in psi)
12mm (1/2")	Extend	1.1	(0.2)
	Retract	0.8	(0.1)
16mm (5/8")	Extend	2.0	(0.3)
	Retract	1.5	(0.2)
20mm (3/4")	Extend	3.1	(0.5)
	Retract	2.4	(0.4)
25mm (1")	Extend	4.9	(0.8)
	Retract	3.8	(0.6)
32mm (1-1/4")	Extend	8.0	(1.2)
	Retract	6.0	(0.9)
40mm (1-1/2")	Extend	12.6	(1.9)
	Retract	10.6	(1.6)
50mm (2")	Extend	19.6	(3.0)
	Retract	16.5	(2.6)
63mm (2-1/2")	Extend	31.2	(4.8)
	Retract	28.0	(4.3)
80mm (3-1/4")	Extend	50.3	(7.8)
	Retract	45.4	(7.0)
100mm (4")	Extend	78.5	(12.2)
	Retract	71.5	(11.1)

**Power Factor x bar = kg.*

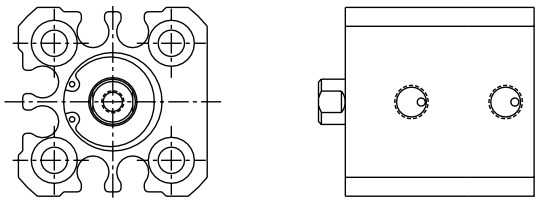
***Power Factor x psi = Pounds*

Enclosed Spring Forces

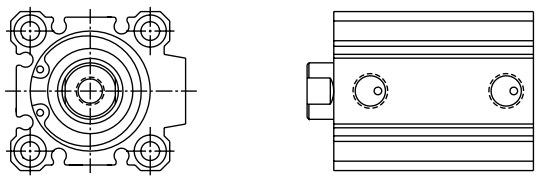
Action	Bore		Compressed Spring Force		Spring Rate	
			N	(lb)	N/mm	(lb/in)
Single Acting Spring Return	12mm	(1/2")	12.8	(2.9)	0.8	(4.8)
	16mm	(5/8")	16.0	(3.6)	1.0	(5.7)
	20mm	(3/4")	18.1	(4.1)	1.2	(6.9)
	25mm	(1")	21.4	(4.8)	1.1	(6.4)
	32mm	(1-1/4")	22.2	(5.0)	0.8	(4.3)
	40mm	(1-1/2")	33.1	(7.4)	0.9	(5.1)
	50mm	(2")	53.8	(12.1)	1.2	(6.7)
	63mm	(2-1/2")	89.0	(20.0)	2.1	(11.8)
	80mm	(3-1/4")	106.8	(24.0)	2.3	(13.2)
	100mm	(4")	N/A	(N/A)	N/A	(N/A)
Reverse Acting Spring Extend	12mm; 5mm stroke		10.9	(2.5)	1.6	(9.1)
	12mm; 10mm stroke		11.0	(2.5)	0.8	(4.6)
	16mm; 5mm stroke		20.7	(4.7)	3.4	(19.5)
	16mm; 10mm stroke		20.9	(4.7)	1.8	(10.3)
	20mm		27.3	(6.1)	2.3	(12.9)
	25mm		29.1	(6.5)	2.0	(11.2)
	32mm		26.6	(6.0)	0.9	(5.1)
	40mm		30.1	(6.8)	1.2	(7.1)
	50mm		81.9	(18.4)	2.9	(16.7)
	63mm; 20mm stroke		95.3	(21.4)	3.0	(16.7)
	63mm; 25mm stroke		95.3	(21.4)	2.4	(13.3)
	80mm; 20mm stroke		110.8	(24.9)	3.2	(17.8)
	80mm; 25mm stroke		110.9	(24.9)	2.5	(14.2)
	100mm		N/A	(N/A)	N/A	(N/A)

Body Styles

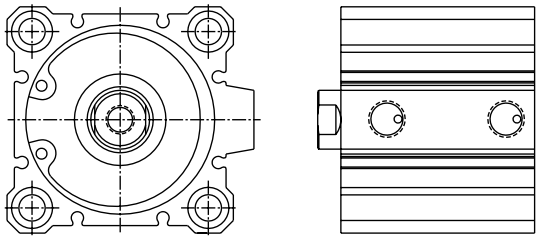
12mm Bore



16mm to 32mm Bore



40mm to 100mm Bore

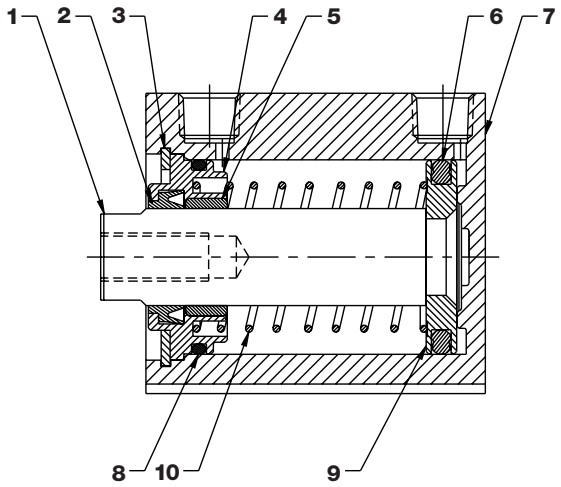


Components

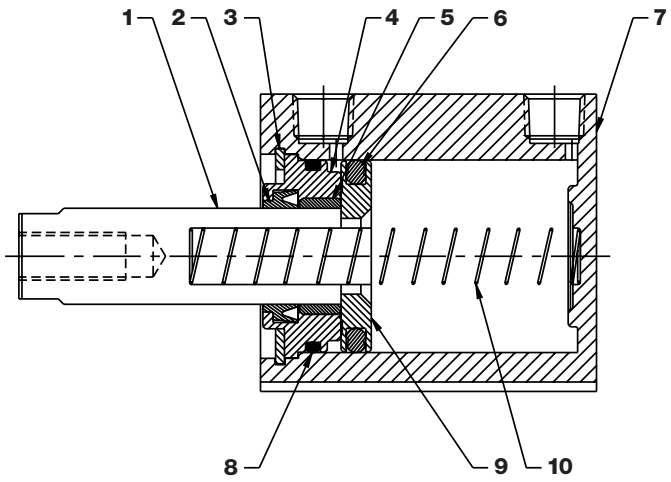
Part List

Part #	Description	Material
1	Rod	4301 (303) Stainless Steel
2	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
3	Retaining Ring	Zinc Plated Carbon Steel or Stainless Steel (optional)
4	Rod Guide	12-20mm: Bronze / 25-100mm: Anodized Aluminum
5	Bushing	12-20mm: Bronze / 25-100mm: Self Lubricating Nylon
6	Piston Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
7	Cylinder Body	Polytetrafluoroethylene (PTFE) Impregnated Hard Anodized Aluminum
8	Rod Guide Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
9	Piston	High Strength Aluminum Alloy
10	Spring	Corrosion Protected Music Wire

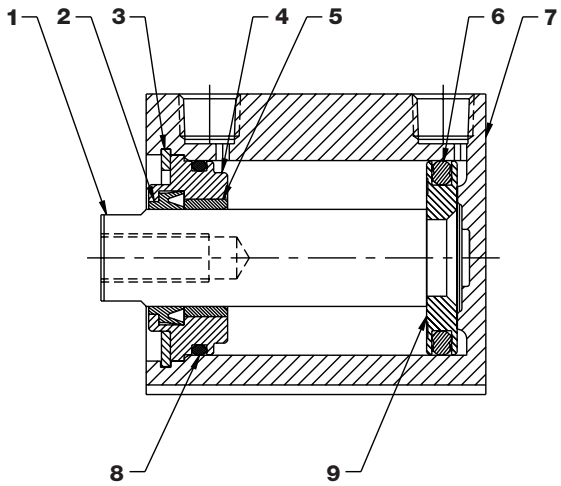
Single Acting/Spring Retract



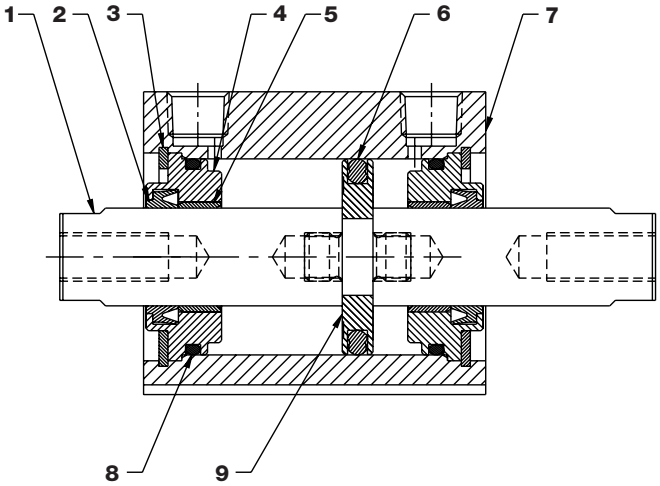
Single Acting/Spring Extend



Double Acting/Single Rod



Double Acting/Double Rod



Dimensions

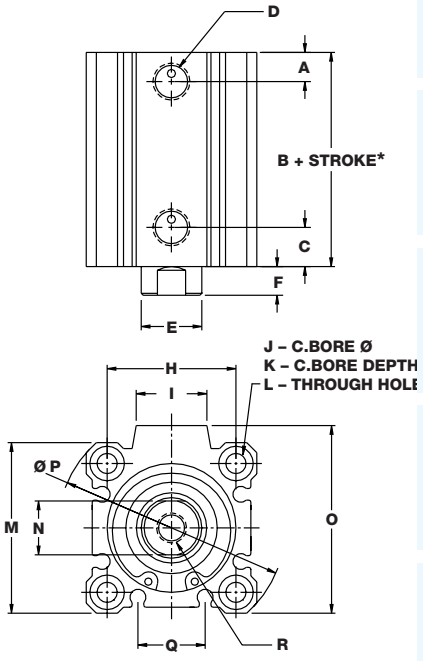
Shown in millimeters (inches)

Double Acting/Single Rod

Bore	A	B	C	D	E	F	H
12mm (1/2")	3.8 (0.15)	17.0 (0.67)	8.9 (0.35)	M5 x 0.8 (#10-32)	6.0 (0.24)	3.5 (0.14)	15.5 (0.61)
16mm (5/8")	4.6 (0.18)	18.5 (0.73)	9.4 (0.37)	M5 x 0.8 (#10-32)	8.0 (0.31)	3.5 (0.14)	20.0 (0.79)
20mm (3/4")	4.8 (0.19)	19.5 (0.77)	9.4 (0.37)	M5 x 0.8 (#10-32)	10.0 (0.39)	4.5 (0.18)	25.5 (1.00)
25mm (1")	5.1 (0.20)	22.5 (0.89)	10.9 (0.43)	M5 x 0.8 (#10-32)	12.0 (0.47)	5.0 (0.20)	28.0 (1.10)
32mm (1-1/4")	7.1 (0.28)	23.0 (0.91)	10.4 (0.41)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	34.0 (1.34)
40mm (1-1/2")	7.4 (0.29)	29.5 (1.16)	13.2 (0.52)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	40.0 (1.57)
50mm (2")	9.4 (0.37)	30.5 (1.20)	13.7 (0.54)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	50.0 (1.97)
63mm (2-1/2")	9.7 (0.38)	36.0 (1.42)	15.7 (0.62)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	60.0 (2.36)
80mm (3-1/4")	11.7 (0.46)	43.5 (1.71)	17.8 (0.70)	G - 3/8 (NPT 3/8)	25.0 (0.98)	10.0 (0.39)	77.0 (3.03)
100mm (4")	12.2 (0.48)	53.0 (2.09)	24.4 (0.96)	G - 3/8 (NPT 3/8)	30.0 (1.18)	12.0 (0.47)	94.0 (3.70)

Bore	I	J	K	L	M	N	O
12mm (1/2")	N/A	6.1 (0.24)	3.5 (0.14)	3.5 (0.14)	25.0 (0.98)	5.0 (0.19)	25.0 (0.98)
16mm (5/8")	8.7 (0.34)	6.5 (0.26)	3.5 (0.14)	3.5 (0.14)	29.0 (1.14)	6.0 (0.25)	29.0 (1.14)
20mm (3/4")	9.5 (0.37)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	36.0 (1.42)	8.0 (0.31)	36.0 (1.42)
25mm (1")	10.3 (0.41)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	40.0 (1.57)	10.0 (0.38)	40.0 (1.57)
32mm (1-1/4")	18.5 (0.73)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	45.0 (1.77)	14.0 (0.56)	49.5 (1.95)
40mm (1-1/2")	17.3 (0.68)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	52.0 (2.05)	14.0 (0.56)	57.0 (2.24)
50mm (2")	20.0 (0.79)	11.1 (0.44)	8.0 (0.31)	6.9 (0.27)	64.0 (2.52)	17.0 (0.69)	71.0 (2.80)
63mm (2-1/2")	20.0 (0.79)	14.1 (0.56)	10.5 (0.41)	8.8 (0.35)	77.0 (3.03)	17.0 (0.69)	84.0 (3.31)
80mm (3-1/4")	26.0 (1.02)	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	98.0 (3.86)	22.0 (0.88)	104.0 (4.09)
100mm (4")	26.0 (1.02)	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	117.0 (4.61)	27.0 (1.06)	123.5 (4.86)

Bore	P	Q	R
12mm (1/2")	32.0 (1.26)	5.3 (0.21)	M3 x 0.5 6H (#8-32 UNC-2B)
16mm (5/8")	38.0 (1.50)	7.8 (0.31)	M4 x 0.7 6H (#8-32 UNC-2B)
20mm (3/4")	47.0 (1.85)	10.5 (0.41)	M5 x 0.8 6H (#10-32 UNF-2B)
25mm (1")	52.0 (2.05)	11.5 (0.45)	M6 x 1.0 6H (1/4-28 UNF-2B)
32mm (1-1/4")	60.0 (2.36)	17.7 (0.70)	M8 x 1.25 6H (5/16-24 UNF-2B)
40mm (1-1/2")	69.0 (2.72)	24.5 (0.96)	M8 x 1.25 6H (3/8-24 UNF-2B)
50mm (2")	86.0 (3.39)	29.3 (1.16)	M10 x 1.5 6H (1/2-20 UNF-2B)
63mm (2-1/2")	103.0 (4.06)	29.1 (1.15)	M10 x 1.5 6H (1/2-20 UNF-2B)
80mm (3-1/4")	132.0 (5.20)	28.1 (1.11)	M16 x 2.0 6H (5/8-18 UNF-2B)
100mm (4")	156.0 (6.14)	32.3 (1.27)	M20 x 2.5 6H (3/4-16 UNF-2B)



See page 2.56 for overall body length with MRS option.

When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

Dimensions

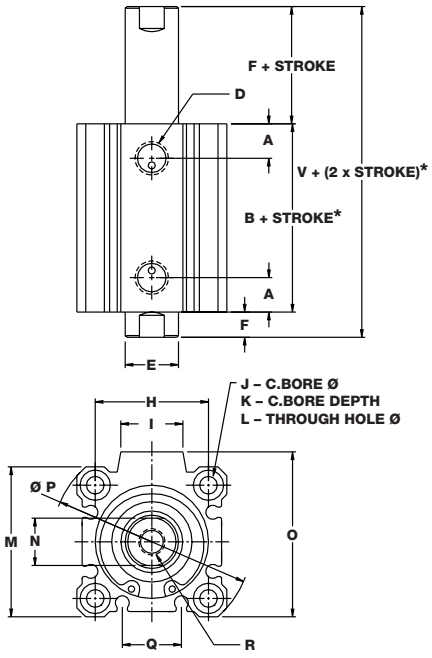
Shown in millimeters (inches)

Double Acting/Double Rod

Bore	A	B	D	E	F	H	I
12mm (1/2")	10.6 (0.42)	25.2 (0.99)	M5 x 0.8 (#10-32)	6.0 (0.24)	3.5 (0.14)	15.5 (0.61)	N/A
16mm (5/8")	10.7 (0.42)	26.0 (1.03)	M5 x 0.8 (#10-32)	8.0 (0.31)	3.5 (0.14)	20.0 (0.79)	8.7 (0.34)
20mm (3/4")	10.1 (0.40)	26.0 (1.03)	M5 x 0.8 (#10-32)	10.0 (0.39)	4.5 (0.18)	25.5 (1.00)	9.5 (0.37)
25mm (1")	11.2 (0.44)	29.0 (1.14)	M5 x 0.8 (#10-32)	12.0 (0.47)	5.0 (0.20)	28.0 (1.10)	10.3 (0.41)
32mm (1-1/4")	8.9 (0.35)	30.5 (1.20)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	34.0 (1.34)	18.5 (0.73)
40mm (1-1/2")	13.1 (0.52)	40.0 (1.58)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	40.0 (1.57)	17.3 (0.68)
50mm (2")	12.2 (0.48)	40.5 (1.60)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	50.0 (1.97)	20.0 (0.79)
63mm (2-1/2")	12.8 (0.50)	42.0 (1.66)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	60.0 (2.36)	20.0 (0.79)
80mm (3-1/4")	14.4 (0.57	51.0 (2.01)	G - 3/8 (NPT 3/8)	25.0 (0.98)	10.0 (0.39)	77.0 (3.03)	26.0 (1.02)
100mm (4")	18.3 (0.72)	60.5 (2.32)	G - 3/8 (NPT 3/8)	30.0 (1.18)	12.0 (0.47)	94.0 (3.70)	26.0 (1.02)

Bore	J	K	L	M	N	O	P
12mm (1/2")	6.1 (0.24)	3.5 (0.14)	3.5 (0.14)	25.0 (0.98)	5.0 (0.19)	25.0 (0.98)	32.0 (1.26)
16mm (5/8")	6.5 (0.26)	3.5 (0.14)	3.5 (0.14)	29.0 (1.14)	6.0 (0.25)	29.0 (1.14)	38.0 (1.50)
20mm (3/4")	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	36.0 (1.42)	8.0 (0.31)	36.0 (1.42)	47.0 (1.85)
25mm (1")	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	40.0 (1.57)	10.0 (0.38)	40.0 (1.57)	52.0 (2.05)
32mm (1-1/4")	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	45.0 (1.77)	14.0 (0.56)	49.5 (1.95)	60.0 (2.36)
40mm (1-1/2")	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	52.0 (2.05)	14.0 (0.56)	57.0 (2.24)	69.0 (2.72)
50mm (2")	11.1 (0.44)	8.0 (0.31)	6.9 (0.27)	64.0 (2.52)	17.0 (0.69)	71.0 (2.80)	86.0 (3.39)
63mm (2-1/2")	14.1 (0.56)	10.5 (0.41)	8.8 (0.35)	77.0 (3.03)	17.0 (0.69)	84.0 (3.31)	103.0 (4.06)
80mm (3-1/4")	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	98.0 (3.86)	22.0 (0.88)	104.0 (4.09)	132.0 (5.20)
100mm (4")	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	117.0 (4.61)	27.0 (1.06)	123.5 (4.86)	156.0 (6.14)

Bore	Q	R	V
12mm (1/2")	5.3 (0.21)	M3 x 0.5 6H (#8-32 UNC-2B)	32.4 (1.27)
16mm (5/8")	7.8 (0.31)	M4 x 0.7 6H (#8-32 UNC-2B)	33.2 (1.31)
20mm (3/4")	10.5 (0.41)	M5 x 0.8 6H (#10-32 UNF-2B)	35.2 (1.39)
25mm (1")	11.5 (0.45)	M6 x 1.0 6H (1/4-28 UNF-2B)	39.2 (1.54)
32mm (1-1/4")	17.7 (0.70)	M8 x 1.25 6H (5/16-24 UNF-2B)	44.7 (1.76)
40mm (1-1/2")	24.5 (0.96)	M8 x 1.25 6H (3/8-24 UNF-2B)	54.2 (2.14)
50mm (2")	29.3 (1.16)	M10 x 1.5 6H (1/2-20 UNF-2B)	56.3 (2.22)
63mm (2-1/2")	29.1 (1.15)	M10 x 1.5 6H (1/2-20 UNF-2B)	57.8 (2.28)
80mm (3-1/4")	28.1 (1.11)	M16 x 2.0 6H (5/8-18 UNF-2B)	70.8 (2.79)
100mm (4")	32.3 (1.27)	M20 x 2.5 6H (3/4-16 UNF-2B)	84.3 (3.26)



**See page 2.56 for overall body length with MRS option.*

When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

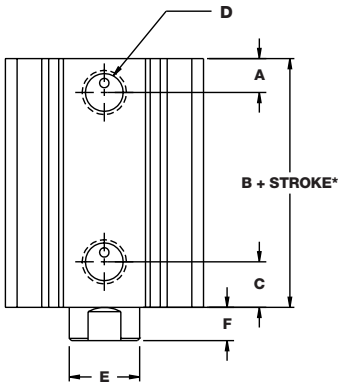
Dimensions

Shown in millimeters (inches)

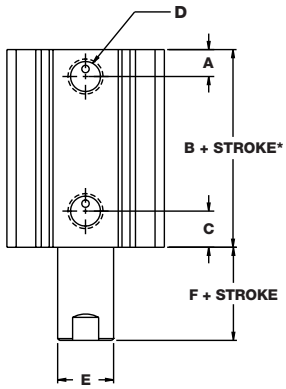
Spring Retract/Spring Extend

Bore		A		B		C		D		E		F	
12mm	(1/2")	3.8	(0.15)	17.0	(0.67)	8.9	(0.35)	M5 x 0.8	(#10-32)	6.0	(0.24)	3.5	(0.14)
16mm	(5/8")	4.6	(0.18)	18.5	(0.73)	9.4	(0.37)	M5 x 0.8	(#10-32)	8.0	(0.31)	3.5	(0.14)
20mm	(3/4")	4.8	(0.19)	19.5	(0.77)	9.4	(0.37)	M5 x 0.8	(#10-32)	10.0	(0.39)	4.5	(0.18)
25mm	(1")	5.1	(0.20)	22.5	(0.89)	10.9	(0.43)	M5 x 0.8	(#10-32)	12.0	(0.47)	5.0	(0.20)
32mm	(1-1/4")	7.1	(0.28)	23.0	(0.91)	10.4	(0.41)	G - 1/8	(NPT 1/8)	16.0	(0.63)	7.0	(0.28)
40mm	(1-1/2")	7.4	(0.29)	29.5	(1.16)	13.2	(0.52)	G - 1/8	(NPT 1/8)	16.0	(0.63)	7.0	(0.28)
50mm	(2")	9.4	(0.37)	30.5	(1.20)	13.7	(0.54)	G - 1/4	(NPT 1/4)	20.0	(0.79)	8.0	(0.31)
63mm	(2-1/2")	9.7	(0.38)	36.0	(1.42)	15.7	(0.62)	G - 1/4	(NPT 1/4)	20.0	(0.79)	8.0	(0.31)
80mm	(3-1/4")	11.7	(0.46)	43.5	(1.71)	17.8	(0.70)	G - 3/8	(NPT 3/8)	25.0	(0.98)	10.0	(0.39)

Spring Retract (Model EFS)



Spring Extend (Model EFR)



**See page 2.56 for overall body length with MRS option.*

When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

Weights

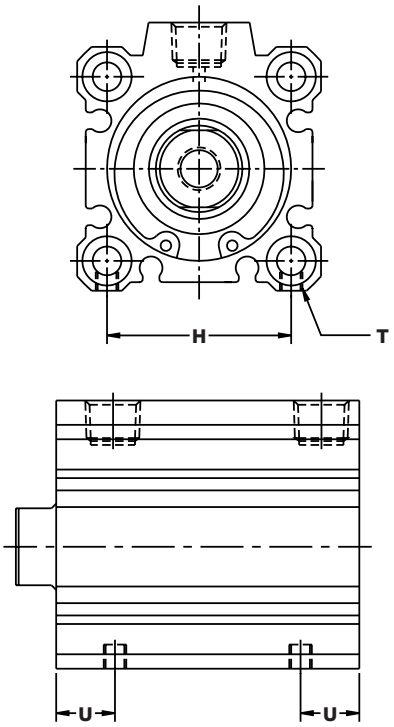
Bore		Approximate Base Weight of Cylinder gram-force (oz.)		Weight Adder per 5mm of Stroke gram-force (oz.)	
12mm	(1/2")	21.8	(0.77)	5.6	(0.20)
16mm	(5/8")	38.7	(1.36)	8.0	(0.28)
20mm	(3/4")	46.4	(1.64)	11.5	(0.41)
25mm	(1")	73.1	(2.58)	14.6	(0.52)
32mm	(1-1/4")	113.3	(4.00)	20.9	(0.74)
40mm	(1-1/2")	181.4	(6.40)	21.3	(0.75)
50mm	(2")	294.0	(10.37)	33.6	(1.19)
63mm	(2-1/2")	484.5	(17.09)	40.7	(1.44)
80mm	(3-1/4")	885.2	(31.23)	62.6	(2.21)
100mm	(4")	1885.9	(66.52)	110.1	(3.89)

Mounting Options

Threaded Bottom Mount (-1) (EF1 models only)

Bore		H		T		U	
12mm	(1/2")	15.5	(0.61)	M4 x 0.7 6H	(8-32 UNC-2B)	6.6	(0.26)
16mm	(5/8")	20.0	(0.79)	M4 x 0.7 6H	(8-32 UNC-2B)	6.6	(0.26)
20mm	(3/4")	25.5	(1.00)	M6 x 1.0 6H	(1/4-20 UNC-2B)	11.2	(0.44)
25mm	(1")	28.0	(1.10)	M6 x 1.0 6H	(1/4-20 UNC-2B)	11.2	(0.44)
32mm	(1-1/4")	34.0	(1.34)	M6 x 1.0 6H	(1/4-20 UNC-2B)	11.2	(0.44)
40mm	(1-1/2")	40.0	(1.57)	M6 x 1.0 6H	(1/4-20 UNC-2B)	11.2	(0.44)
50mm	(2")	50.0	(1.97)	M8 x 1.25 6H	(5/16-18 UNC-2B)	13.0	(0.51)
63mm	(2-1/2")	60.0	(2.36)	M10 x 1.5 6H	(7/16-14 UNC-2B)	16.8	(0.66)
80mm	(3-1/4")	77.0	(3.03)	M12 x 1.75 6H	(1/2-13 UNC-2B)	20.8	(0.82)
100mm	(4")	94.0	(3.70)	M12 x 1.75 6H	(1/2-13 UNC-2B)	20.8	(0.82)

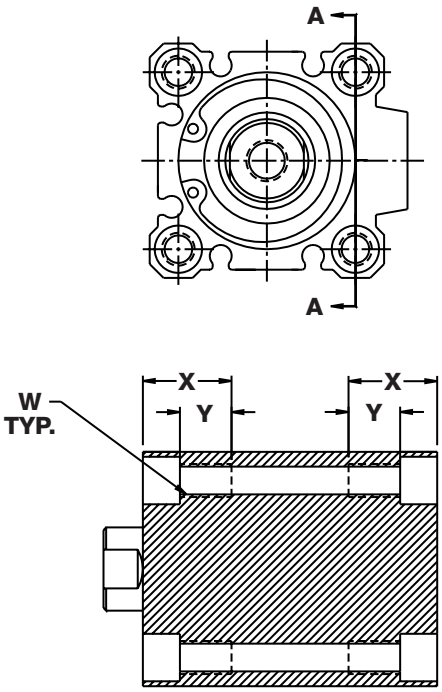
Note: On the following models, only the front set of threaded bottom mounting holes is provided; EF-205, EF-2010, EF-255, EF-325, EF-8010.



Threaded Front/Rear Mount (-3)

Bore		W		X		Y	
12mm	(1/2")	M4 X 0.7	(8-32 UNC)	10.5	(0.41)	7.0	(0.28)
16mm	(5/8")	M4 X 0.7	(8-32 UNC)	10.5	(0.41)	7.0	(0.28)
20mm	(3/4")	M6 X 1.0	(1/4-20 UNC)	17.0	(0.67)	10.0	(0.39)
25mm	(1")	M6 X 1.0	(1/4-20 UNC)	17.0	(0.67)	10.0	(0.39)
32mm	(1-1/4")	M6 X 1.0	(1/4-20 UNC)	17.0	(0.67)	10.0	(0.39)
40mm	(1-1/2")	M6 X 1.0	(1/4-20 UNC)	17.0	(0.67)	10.0	(0.39)
50mm	(2")	M8 X 1.25	(5/16-18 UNC)	22.0	(0.87)	14.0	(0.55)
63mm	(2-1/2")	M10 X 1.5	(7/16-14 UNC)	28.5	(1.12)	18.0	(0.71)
80mm	(3-1/4")	M12 X 1.75	(1/2-13 UNC)	35.6	(1.40)	22.0	(0.87)
100mm	(4")	M12 X 1.75	(1/2-13 UNC)	35.6	(1.40)	22.0	(0.87)

Note: On EFT models, there are two threaded holes per end, not four.

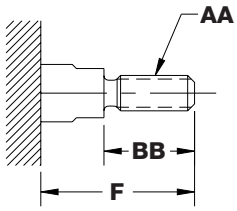


SECTION "A-A"

Options

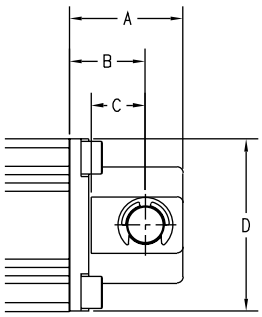
Male Rod End (MT)

Bore	Standard			With Option E		
	AA	BB	F	AA	BB	F
12mm (1/2")	M5 X 0.80	10.5 (0.41)	14.0 (0.55)	#8-32 UNC	8.0 (0.31)	11.5 (0.45)
16mm (5/8")	M6 X 1.00	12.0 (0.47)	15.5 (0.61)	#8-32 UNC	8.0 (0.31)	11.5 (0.45)
20mm (3/4")	M8 X 1.25	14.0 (0.55)	18.5 (0.73)	#10-32 UNF	8.0 (0.31)	12.5 (0.49)
25mm (1")	M10 X 1.25	17.5 (0.69)	22.5 (0.89)	1/4-28 UNF	9.5 (0.37)	14.5 (0.57)
32mm (1-1/4")	M14 X 1.5	23.5 (0.93)	28.5 (1.12)	5/16-24 UNF	12.7 (0.50)	19.7 (0.78)
40mm (1-1/2")	M14 X 1.5	23.5 (0.93)	28.5 (1.12)	3/8-24 UNF	16.0 (0.63)	23.0 (0.91)
50mm (2")	M18 X 1.5	28.5 (1.12)	33.5 (1.32)	1/2-20 UNF	19.5 (0.77)	27.5 (1.08)
63mm (2-1/2")	M18 X 1.5	28.5 (1.12)	33.5 (1.32)	1/2-20 UNF	19.5 (0.77)	27.5 (1.08)
80mm (3-1/4")	M22 X 1.5	35.5 (1.40)	43.5 (1.71)	5/8-18 UNF	25.5 (1.00)	35.5 (1.40)
100mm (4")	M26 X 1.5	35.5 (1.40)	43.5 (1.71)	3/4-16 UNF	28.5 (1.12)	40.5 (1.59)

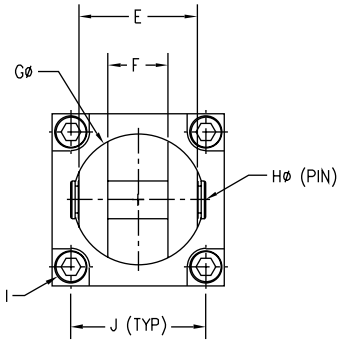


Rear Clevis Mount (6, 6N)

Stroke	A	B	C	D	E	F
12m	20 (0.79)	14 (0.55)	7 (0.28)	25 (0.98)	10 (0.39)	5 (0.21)
16m	21 (0.83)	15 (0.59)	10 (0.39)	29 (1.14)	12 (0.47)	7 (0.27)
20m	27 (1.06)	18 (0.71)	12 (0.47)	36 (1.41)	16 (0.62)	8 (0.33)
25m	30 (1.18)	20 (0.79)	14 (0.55)	40 (1.57)	20 (0.78)	10 (0.41)
32m	30 (1.18)	20 (0.79)	14 (0.55)	45 (1.77)	36 (1.41)	18 (0.72)
40m	32 (1.26)	22 (0.87)	14 (0.55)	52 (2.04)	36 (1.41)	18 (0.72)
50m	42 (1.65)	28 (1.10)	20 (0.79)	64 (2.52)	44 (1.72)	22 (0.87)
63m	44 (1.73)	30 (1.18)	20 (0.79)	77 (3.03)	44 (1.72)	22 (0.87)
80m	56 (2.21)	38 (1.50)	27 (1.06)	98 (3.85)	56 (2.20)	28 (1.11)
100m	67 (2.64)	45 (1.77)	31 (1.22)	117 (4.60)	64 (2.51)	32 (1.27)

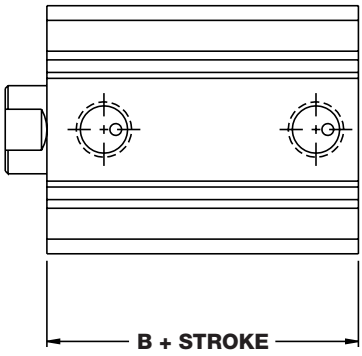


Bore	G	HØ (PIN	I	J
12mm	13 (0.51)	5 (0.197)	M4x0.7 (#8-32 UNC)	15.5 (0.61)
16mm	15 (0.58)	5 (0.197)	M4x0.7 (#8-32 UNC)	20 (0.79)
20mm	21 (0.82)	8 (0.315)	M6x1.0 (1/4-20 UNC)	25.5 (1.00)
25mm	22 (0.85)	10 (0.394)	M6x1.0 (1/4-20 UNC)	28 (1.10)
32mm	39 (1.53)	10 (0.394)	M6x1.0 (1/4-20 UNC)	34 (1.34)
40mm	39 (1.53)	10 (0.394)	M6x1.0 (1/4-20 UNC)	40 (1.58)
50mm	49 (1.91)	14 (0.551)	M8x1.25 (5/16-18 UNC)	50 (1.97)
63mm	49 (1.91)	14 (0.551)	M10x1.5 (7/16-14 UNC)	60 (2.36)
80mm	62 (2.44)	18 (0.709)	M12x1.75 (1/2-13 UNC)	77 (3.03)
100mm	72 (2.84)	22 (0.866)	M12x1.75 (1/2-13 UNC)	94 (3.70)



Magnetic Position Sensing (M)
(Body Lengths With MRS Option)

Bore		B			
		Double Acting Single Rod		Double Acting Double Rod	
12mm	(1/2")	27.0	(1.06)	32.4	(1.28)
16mm	(5/8")	28.5	(1.12)	36.0	(1.42)
20mm	(3/4")	29.5	(1.16)	36.0	(1.42)
25mm	(1")	32.5	(1.28)	39.0	(1.54)
32mm	(1-1/4")	33.0	(1.30)	40.5	(1.59)
40mm	(1-1/2")	39.5	(1.56)	50.0	(1.97)
50mm	(2")	40.5	(1.59)	50.5	(1.99)
63mm	(2-1/2")	46.0	(1.81)	52.0	(2.05)
80mm	(3-1/4")	53.5	(2.11)	61.0	(2.40)
100mm	(4")	63.0	(2.48)	70.5	(2.78)



Bumpers
(Stroke reduction by model for all bores)

Model	Stroke Reduction mm (inches)
Double Acting Single Rod End Double Acting Double Rod End	3.0 (.12)
Single Acting Spring Retract Reverse Acting Spring Extend	1.5 (.06)

Extruded Flat Repair Kits

For bore sizes of 12, 16, and 20, each Extruded Flat Basic Kit includes the appropriate rod guide, rod seal, piston seals, cylinder, body seals, and instructions. For larger bore sizes (25mm and up), a rod bushing is included instead of the rod guide. Please note that EF repair kits will work on EF2 cylinders.

To order, please provide the correct bore code in the kit part number blank. Specialty seals are designated by their suffix option.

Repair Kit
K-B-EF-__
K-B-EFD-__
K-B-EF-__-V
K-B-EFD-__-V

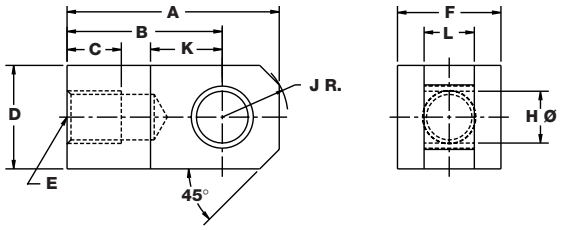
Accessories

Rod Pivot List Prices

Model Number	Bore	List Price
RP(M,E)K-12	12mm (1/2")	$26.35
RP(M,E)K-16	16mm (5/8")	27.90
RP(M,E)K-20	20mm (3/4")	31.75
RP(M,E)K-25	25mm (1")	33.65
RP(M,E)K-32	32mm (1-1/4")	35.85
RP(M,E)K-40	40mm (1/1/2")	
RP(M,E)K-50	50mm (2")	37.50
	63mm (2-1/2")	
RP(M,E)K-80	80mm (3-1/4")	38.45
RP(M,E)K-100	100mm (4")	40.05

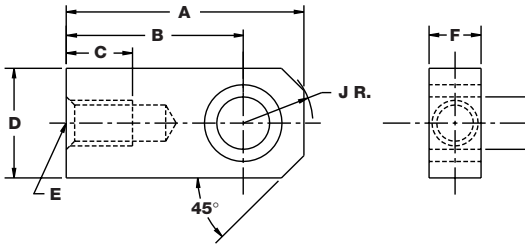
Note: To use Rod Pivot, cylinder must be specified with male thread option (MT).

For inch series Rod Pivot Kits, change the third digit from an M to an E.
For example: RPMK-32 is a metric size / RPEK-32 is a U.S. customary size.



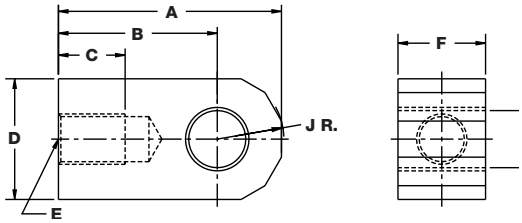
Metric Small Bore Rod Pivot (for 12mm to 63mm bore cylinders)

RPMK-12, RPMK-16, RPMK-20, RPMK-25, RPMK-32, RPMK-40, RPMK-50



U.S. Customary Small Bore Rod Pivot (for 12mm to 63mm bore cylinders)

RPEK-12, RPEK-16, RPEK-20, RPEK-25, RPEK-32, RPEK-40, RPEK-50



Metric and U.S. Customary Large Bore Rod Pivot (for 80mm and 100mm bore cylinders)

RPMK-80, RPEK-80, RPMK-100, RPEK-100

Rod Pivot Dimensions

Model Number	Bore	A	B	C	D	E
RP(M,E)K-12	12mm (1/2")	21.5 (0.85)	16.0 (0.63)	6.0 (0.24)	10.0 (0.39)	M5 x 0.8 (# 8-32 UNC)
RP(M,E)K-16	16mm (5/8")	32.0 (1.26)	25.0 (0.98)	8.0 (0.24)	12.0 (0.47)	M6 x 1.0 (# 8-32 UNC)
RP(M,E)K-20	20mm (3/4")	34.0 (1.34)	25.0 (0.98)	8.5 (0.24)	15.9 (0.63)	M8 x 1.25 (# 10-32 UNF)
RP(M,E)K-25	25mm (1")	41.0 (1.61)	30.0 (1.18)	10.5 (0.32)	20.0 (0.79)	M10 x 1.25 (1/4-28 UNF)
RP(M,E)K-32	32mm (1-1/4")	40.5 (1.59)	30.0 (1.18)	14.0 (0.35)	22.0 (0.87)	M14 x 1.5 (5/16-24 UNF)
RP(M,E)K-40	40mm (1-1/2")	40.5 (1.59)	30.0 (1.18)	14.0 (0.43)	22.0 (0.87)	M14 x 1.5 (3/8-24 UNF)
RP(M,E)K-50	50mm (2") 63mm (2-1/2")	53.8 (2.12)	40.0 (1.58)	18.0 (0.71)	28.0 (1.10)	M18 x 1.5 (1/2-20 UNF)
RP(M,E)K-80	80mm (3-1/4")	70.2 (2.77)	50.0 (1.97)	21.0 (0.83)	38.0 (1.50)	M22 x 1.5 (5/8-18 UNF)
RP(M,E)K-100	100mm (4")	77.9 (3.07)	55.0 (2.17)	21.0 (0.83)	44.0 (1.73)	M26 x 1.5 (3/4-16 UNF)

Model Number	Bore Size	F	H	J	K	L
RP(M,E)K-12	12mm (1/2")	10.0 (0.19)	7.0 (0.251)	6.2 (0.25)	6.9 N/A	4.7 N/A
RP(M,E)K-16	16mm (5/8")	12.0 (0.24)	7.0 (0.251)	7.8 (0.31)	13.9 N/A	6.2 N/A
RP(M,E)K-20	20mm (3/4")	15.9 (0.30)	10.0 (0.376)	10.2 (0.41)	11.4 N/A	7.7 N/A
RP(M,E)K-25	25mm (1")	20.0 (0.38)	12.0 (0.469)	12.6 (0.50)	13.9 N/A	9.7 N/A
RP(M,E)K-32	32mm (1-1/4")	22.0 (0.69)	12.0 (0.469)	11.9 (0.47)	13.9 N/A	17.6 N/A
RP(M,E)K-40	40mm (1-1/2")	22.0 (0.69)	12.0 (0.469)	11.9 (0.47)	13.9 N/A	17.6 N/A
RP(M,E)K-50	50mm (2") 63mm (2-1/2")	28.0 (0.85)	16.0 (0.594)	15.9 (0.63)	19.9 N/A	21.6 N/A
RP(M,E)K-80	80mm (3-1/4")	27.6 (1.09)	20.0 (0.875)	21.0 (0.83)	N/A	N/A
RP(M,E)K-100	100mm (4")	31.6 (1.24)	25.0 (1.000)	24.0 (0.94)	N/A	N/A

How to Order

The Model Number for the EF2 cylinder consists of three alphanumeric clusters. These designate type, bore size and stroke length, and options. Please refer to the charts below for an example of Model Number EFT-3225-3M. This is a 32mm bore, double acting, guided cylinder with metric threads and ports, 25mm stroke, threaded front/rear mounting holes, and magnetic position sensing.

TYPE

EFT	-	Double Acting, Non-rotating
EFDT	-	Double Acting, Double End Rod, Non-rotating

BORE SIZE mm (inch)**

12mm	-	(1/2")	40mm	-	(1-1/2")
16mm	-	(5/8")	50mm	-	(2")
20mm	-	(3/4")	63mm	-	(2-1/2")
25mm	-	(1")	80mm	-	(3-1/4")
32mm	-	(1-1/4")	100mm	-	(4")

STROKE LENGTH***

See table - page 2.59

EFT-3225-3M

MOUNTING OPTIONS

(Enter in numeric order)

No Number	-	Basic model
3	-	Threaded front/rear mounting option*
6	-	Rear clevis mount*
6N	-	Rear clevis 90°

**For dimensions, see page 2.54.*

OPTIONS

(Enter in alphabetical order, except EE which is last)

B	-	Bumpers (see page 2.67)[1]
C	-	Stainless Steel Retaining Ring
E	-	U.S. customary units (inch)[2]
F	-	Full-Flow Port Orifice[4]
M	-	Magnetic position sensing (see page 2.67)[3]
P	-	Blank tooling plate
V	-	High temperature option -10ºC to 110ºC (15°F to 225°F)
X	-	Rear guide shaft extension (see page 2.65)[5]
EE		Extra Rod Extensions in 1mm Increments[6]

[1]Bumpers reduce stroke length by 3mm. When bumper is specified with option V, standard bumper material is supplied. Operating temperature remains -10° to 70°C (15° to 160°F).

[2]When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

[3]When magnetic position sensing is specified with option V, operating temperature remains -10° to 70°C (15° to 160°F). This combination is recommended when fluoroelastomer is specified for compatibility.

[4]Automatically includes bumpers, so stroke is reduced by 3mm.

[5]Available stroke lengths starting at 10mm.

[6]In EFDT models, extra extension dimension is added to both tooling plate and rod ends.

Please note that throughout all catalog charts, metric measurements are shown first and U.S. customary units (inches) are in parentheses.

***NOTE: Numbers in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.*

****When stroke length exceeds 30mm, a threaded mounting option should be considered. Mounting bolts that span the entire cylinder length may not be readily available.*

Bimba is a JIT manufacturer and we are able to provide EFT model cylinders in *ANY 1mm of stroke length increment for all option styles within our standard three-day lead time*. Longer stroke lengths are also available upon request at standard lead times. Please consult Technical Assistance at 800-44-BIMBA for help.

The table below represents our standard stroke lengths. **Blue** stroke lengths are EF cylinders with -3EM options in stock available for Same Day Shipping.

Stroke Length Availability

Nominal Bore Diameter	EFT Single Rod End (mm)
12mm (1/2")	5, 10, **15**, 20, **25**, 30
16mm (5/8")	5, **10**, 15, 20, 25, 30
20mm (3/4")	5, **10**, 15, 20, **25**, 30, 35, **40**, 45, **50**
25mm (1")	5, **10**, 15, 20, **25**, 30, 35, **40**, 45, **50**
32mm (1-1/4")	5, **10**, 15, 20, **25**, 30, 35, **40**, 45, **50**, 75, 100
40mm (1-1/2")	5, 10, **15**, 20, **25**, 30, 35, **40**, 45, **50**, **75**, 100
50mm (2")	10, 15, 20, **25**, 30, 35, **40**, 45, **50**, **75**, **100**
63mm (2-1/2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
80mm (3-1/4")	10, 15, 20, **25**, 30, 35, **40**, 45, **50**, 75, 100
100mm (4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

List Prices

Model Type	Bore Size									
	12mm	16mm	20mm	25mm	32mm	40mm	50mm	63mm	80mm	100mm
EFT	$43.75	$49.20	$56.30	$63.45	$79.60	$92.25	$106.85	$123.45	$146.75	$196.45
Add per 5mm	2.15	2.15	2.15	2.45	2.45	2.45	3.05	3.55	3.85	4.60
EFDT	54.90	60.50	69.00	75.90	93.30	109.85	126.10	150.60	181.35	248.20
Add per 5mm	2.95	2.85	2.85	2.95	2.95	3.15	3.95	4.50	5.00	6.20
Mounting Options										
3	$6.05	$6.30	$8.35	$8.65	$9.75	$9.95	$10.90	$11.50	$12.10	$12.65
6, 6N (EFT)	11.90	12.45	13.40	15.50	16.95	19.00	21.95	28.45	34.70	46.20
Options										
B	$3.60	$6.30	$6.30	$6.30	$7.45	$7.45	$8.50	$10.20	$15.60	$18.00
C (EFT)	2.95	3.15	4.20	4.70	5.75	8.60	14.75	17.60	115.40	197.50
C (EFDT)	5.70	5.95	8.15	9.25	11.15	16.80	28.85	34.40	170.25	276.65
F (includes B)	9.75	12.55	12.55	14.15	15.40	15.40	17.95	19.80	25.35	28.40
M	5.35	6.55	8.60	8.60	10.60	10.60	12.45	15.20	19.40	22.75
V (EFT)	11.85	13.05	13.40	16.20	18.10	25.80	28.40	36.80	45.05	56.95
V (EFDT)	13.55	15.50	15.80	21.05	24.15	34.90	38.45	50.30	58.15	65.60
X (base)	5.75	6.60	8.50	9.95	13.60	15.15	16.55	16.65	17.65	18.50
Add per 5mm	1.20	1.20	1.20	1.25	1.25	1.30	1.60	1.80	1.95	2.35
EE (per 1mm)	.50	.50	.50	.65	.65	.65	.80	.80	1.00	1.00

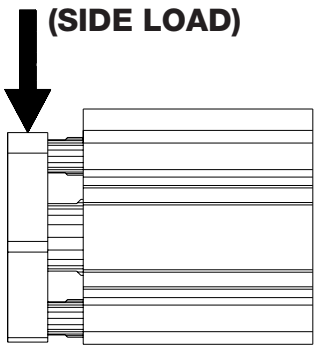
No charge options: E (U.S. Customary Units), P.

EFT Cylinders

Maximum Side Loads kg-Force (lb)

Bore	Stroke Length													
	5mm		10mm		15mm		20mm		25mm		30mm		35mm	
12mm (1/2")	1.79	(3.94)	1.47	(3.24)	1.25	(2.75)	1.08	(2.39)	0.96	(2.11)	0.86	(1.89)	N/A	
16mm (5/8")	2.60	(5.72)	2.16	(4.76)	1.85	(4.08)	1.62	(3.57)	1.44	(3.17)	1.30	(2.86)	N/A	
20mm (3/4")	5.09	(11.23)	4.36	(9.62)	3.82	(8.42)	3.39	(7.48)	3.06	(6.74)	2.78	(6.13)	2.55	(5.62)
25mm (1")	5.22	(11.50)	4.48	(9.88)	3.93	(8.66)	3.50	(7.71)	3.15	(6.94)	2.86	(6.32)	2.63	(5.80)
32mm (1-1/4")	5.54	(12.22)	4.80	(10.59)	4.24	(9.35)	3.80	(8.37)	3.44	(7.58)	3.14	(6.91)	2.89	(6.36)
40mm (1-1/2")	6.53	(14.40)	5.69	(12.55)	5.04	(11.12)	4.53	(9.98)	4.11	(9.06)	3.76	(8.28)	3.47	(7.64)
50mm (2")	N/A		8.94	(19.71)	8.03	(17.71)	7.30	(16.09)	6.68	(14.74)	6.17	(13.60)	5.73	(12.62)
63mm (2-1/2")	N/A		14.49	(31.95)	13.16	(29.01)	12.06	(26.58)	11.12	(24.51)	10.32	(22.76)	9.63	(21.23)
80mm (3-1/4")	N/A		23.59	(52.02)	21.70	(47.85)	20.09	(44.30)	18.71	(41.24)	17.50	(38.58)	16.43	(36.23)
100mm (4")	N/A		26.22	(57.80)	24.24	(53.45)	22.55	(49.71)	21.07	(46.46)	19.78	(43.61)	18.64	(41.08)

Bore	Stroke Length									
	40mm		45mm		50mm		75mm		100mm	
12mm (1/2")	N/A		N/A		N/A		N/A		N/A	
16mm (5/8")	N/A		N/A		N/A		N/A		N/A	
20mm (3/4")	2.35	(5.19)	2.19	(4.82)	2.04	(4.50)	N/A		N/A	
25mm (1")	2.43	(5.35)	2.26	(4.98)	2.11	(4.64)	N/A		N/A	
32mm (1-1/4")	2.68	(5.90)	2.49	(5.48)	2.33	(5.13)	1.76	(3.89)	1.42	(3.13)
40mm (1-1/2")	3.22	(7.09)	3.00	(6.60)	2.80	(6.18)	2.13	(4.70)	1.72	(3.79)
50mm (2")	5.34	(11.78)	5.01	(11.03)	4.71	(10.39)	3.64	(8.02)	2.96	(6.53)
63mm (2-1/2")	9.03	(19.90)	8.49	(18.72)	8.02	(17.67)	6.27	(13.82)	5.15	(11.35)
80mm (3-1/4")	15.49	(34.16)	14.66	(32.32)	13.91	(30.66)	11.07	(24.40)	9.19	(20.27)
100mm (4")	17.61	(38.83)	16.70	(36.82)	15.88	(35.00)	12.74	(28.08)	10.63	(23.44)



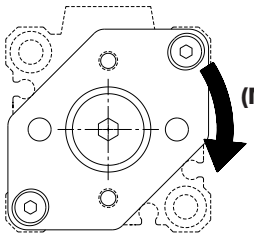
Maximum Moments N-m (in-lb)

Bore	Stroke Length													
	5mm		10mm		15mm		20mm		25mm		30mm		35mm	
12mm (1/2")	0.08	(0.72)	0.07	(0.59)	0.06	(0.50)	0.05	(0.44)	0.04	(0.39)	0.04	(0.35)	N/A	
16mm (5/8")	0.16	(1.39)	0.13	(1.16)	0.11	(1.00)	0.10	(0.87)	0.09	(0.78)	0.08	(0.70)	N/A	
20mm (3/4")	0.42	(3.72)	0.36	(3.20)	0.32	(2.81)	0.28	(2.50)	0.25	(2.25)	0.23	(2.05)	0.21	(1.88)
25mm (1")	0.45	(4.02)	0.39	(3.46)	0.34	(3.04)	0.31	(2.71)	0.28	(2.45)	0.25	(2.23)	0.23	(2.05)
32mm (1-1/4")	0.50	(4.45)	0.44	(3.88)	0.39	(3.44)	0.35	(3.09)	0.32	(2.81)	0.29	(2.57)	0.27	(2.37)
40mm (1-1/2")	0.59	(5.24)	0.52	(4.57)	0.46	(4.05)	0.41	(3.64)	0.37	(3.31)	0.34	(3.03)	0.32	(2.79)
50mm (2")	N/A		1.13	(10.04)	1.02	(9.06)	0.93	(8.26)	0.86	(7.59)	0.79	(7.02)	0.74	(6.53)
63mm (2-1/2")	N/A		2.35	(20.84)	2.15	(18.99)	1.97	(17.44)	1.82	(16.13)	1.69	(15.00)	1.58	(14.01)
80mm (3-1/4")	N/A		4.72	(41.75)	4.35	(38.51)	4.04	(35.75)	3.77	(33.35)	3.53	(31.25)	3.32	(29.41)
100mm (4")	N/A		5.57	(49.33)	5.16	(45.63)	4.79	(42.44)	4.48	(39.67)	4.21	(37.24)	3.96	(35.09)

EFT Cylinders

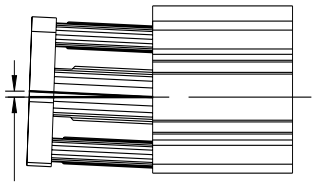
Maximum Moments N-m (in-lb)

Bore	Stroke Length				
	40mm	45mm	50mm	75mm	100mm
12mm (1/2")	N/A	N/A	N/A	N/A	N/A
16mm (5/8")	N/A	N/A	N/A	N/A	N/A
20mm (3/4")	0.20 (1.74)	0.18 (1.62)	0.17 (1.51)	N/A	N/A
25mm (1")	0.21 (1.89)	0.20 (1.76)	0.19 (1.64)	N/A	N/A
32mm (1-1/4")	0.25 (2.20)	0.23 (2.05)	0.22 (1.92)	0.16 (1.46)	0.13 (1.18)
40mm (1-1/2")	0.29 (2.59)	0.27 (2.41)	0.26 (2.26)	0.19 (1.72)	0.16 (1.39)
50mm (2")	0.69 (6.11)	0.65 (5.73)	0.61 (5.40)	0.47 (4.19)	0.39 (3.42)
63mm (2-1/2")	1.49 (13.15)	1.40 (12.39)	1.32 (11.71)	1.04 (9.19)	0.85 (7.57)
80mm (3-1/4")	3.14 (27.77)	2.97 (26.30)	2.82 (24.98)	2.26 (19.96)	1.88 (16.63)
100mm (4")	3.75 (33.17)	3.55 (31.45)	3.38 (29.90)	2.71 (24.00)	2.26 (20.04)



Tooling Plate End Play mm (in)

Bore	Stroke Length						
	5mm	10mm	15mm	20mm	25mm	30mm	35mm
12mm (1/2")	0.17 (.007)	0.21 (.008)	0.25 (.010)	0.29 (.012)	0.34 (.013)	0.38 (.015)	N/A
16mm (5/8")	0.18 (.007)	0.23 (.009)	0.27 (.011)	0.32 (.012)	0.36 (.014)	0.41 (.016)	N/A
20mm (3/4")	0.15 (.006)	0.18 (.007)	0.20 (.008)	0.23 (.009)	0.26 (.010)	0.29 (.011)	0.32 (.013)
25mm (1")	0.16 (.006)	0.19 (.007)	0.22 (.008)	0.24 (.010)	0.27 (.011)	0.30 (.012)	0.33 (.013)
32mm (1-1/4")	0.17 (.007)	0.20 (.008)	0.23 (.009)	0.26 (.010)	0.28 (.011)	0.31 (.012)	0.34 (.013)
40mm (1-1/2")	0.17 (.007)	0.20 (.008)	0.23 (.009)	0.26 (.010)	0.28 (.011)	0.31 (.012)	0.34 (.013)
50mm (2")	N/A	0.26 (.010)	0.30 (.012)	0.33 (.013)	0.36 (.014)	0.40 (.016)	0.43 (.017)
63mm (2-1/2")	N/A	0.18 (.007)	0.20 (.008)	0.22 (.009)	0.24 (.010)	0.26 (.010)	0.28 (.011)
80mm (3-1/4")	N/A	0.20 (.008)	0.23 (.009)	0.25 (.010)	0.27 (.011)	0.29 (.011)	0.31 (.012)
100mm (4")	N/A	0.21 (.008)	0.23 (.009)	0.26 (.010)	0.28 (.011)	0.30 (.012)	0.32 (.013)



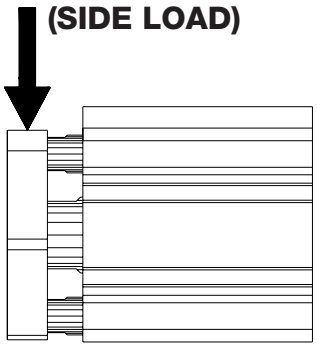
Bore	Stroke Length				
	40mm	45mm	50mm	75mm	100mm
12mm (1/2")	N/A	N/A	N/A	N/A	N/A
16mm (5/8")	N/A	N/A	N/A	N/A	N/A
20mm (3/4")	0.35 (.014)	0.38 (.015)	0.40 (.016)	N/A	N/A
25mm (1")	0.36 (.014)	0.39 (.015)	0.42 (.016)	N/A	N/A
32mm (1-1/4")	0.37 (.015)	0.40 (.016)	0.43 (.017)	0.57 (.022)	0.71 (.028)
40mm (1-1/2")	0.37 (.015)	0.40 (.016)	0.43 (.017)	0.57 (.022)	0.71 (.028)
50mm (2")	0.46 (.018)	0.50 (.020)	0.53 (.021)	0.70 (.027)	0.86 (.034)
63mm (2-1/2")	0.30 (.012)	0.32 (.013)	0.35 (.014)	0.45 (.018)	0.55 (.022)
80mm (3-1/4")	0.33 (.013)	0.36 (.014)	0.38 (.015)	0.49 (.019)	0.60 (.023)
100mm (4")	0.34 (.014)	0.36 (.014)	0.39 (.015)	0.50 (.020)	0.61 (.024)

EFT Cylinders with X Option

Maximum Side Loads kg-Force (lb)

Bore	Stroke Length						
	5mm	10mm	15mm	20mm	25mm	30mm	35mm
12mm (1/2")	N/A	2.99 (6.58)	2.85 (6.28)	2.76 (6.07)	2.69 (5.92)	2.63 (5.80)	N/A
16mm (5/8")	N/A	4.21 (9.27)	4.02 (8.84)	3.88 (8.54)	3.78 (8.32)	3.70 (8.15)	N/A
20mm (3/4")	N/A	8.13 (17.90)	7.84 (17.25)	7.63 (16.79)	7.47 (16.45)	7.35 (16.18)	7.26 (15.97)
25mm (1")	N/A	8.52 (18.76)	8.18 (18.01)	7.94 (17.47)	7.75 (17.06)	7.60 (16.74)	7.49 (16.48)
32mm (1-1/4")	N/A	8.75 (19.27)	8.42 (18.53)	8.16 (17.97)	7.96 (17.53)	7.80 (17.18)	7.68 (16.90)
40mm (1-1/2")	N/A	10.18 (22.40)	9.69 (21.34)	9.32 (20.52)	9.03 (19.87)	8.78 (19.33)	8.58 (18.89)
50mm (2")	N/A	15.11 (33.26)	14.49 (31.90)	14.01 (30.84)	13.63 (30.00)	13.31 (29.30)	13.05 (28.72)
63mm (2-1/2")	N/A	24.31 (53.50)	23.36 (51.41)	22.61 (49.76)	22.00 (48.42)	21.50 (47.32)	21.07 (46.38)
80mm (3-1/4")	N/A	38.19 (84.06)	36.78 (80.96)	35.64 (78.44)	34.68 (76.34)	33.76 (74.32)	33.19 (73.06)
100mm (4")	N/A	42.40 (93.34)	40.83 (89.88)	39.52 (86.98)	38.39 (84.51)	37.43 (82.38)	36.58 (80.53)

Bore	Stroke Length				
	40mm	45mm	50mm	75mm	100mm
12mm (1/2")	N/A	N/A	N/A	N/A	N/A
16mm (5/8")	N/A	N/A	N/A	N/A	N/A
20mm (3/4")	7.17 (15.79)	7.11 (15.65)	7.05 (15.52)	N/A	N/A
25mm (1")	7.39 (16.27)	7.31 (16.09)	7.24 (15.94)	N/A	N/A
32mm (1-1/4")	7.57 (16.66)	7.48 (16.46)	7.40 (16.29)	7.14 (15.71)	6.98 (15.36)
40mm (1-1/2")	8.41 (18.52)	8.27 (18.20)	8.14 (17.92)	7.70 (16.96)	7.44 (16.38)
50mm (2")	12.82 (28.23)	12.63 (27.81)	12.47 (27.44)	11.88 (26.16)	11.53 (25.39)
63mm (2-1/2")	20.71 (45.59)	20.40 (44.90)	20.13 (44.30)	19.16 (42.18)	18.57 (40.88)
80mm (3-1/4")	32.60 (71.75)	32.07 (70.60)	31.61 (69.59)	29.95 (65.92)	28.90 (63.61)
100mm (4")	35.84 (78.90)	35.19 (77.46)	34.61 (76.18)	32.43 (71.38)	31.01 (68.26)

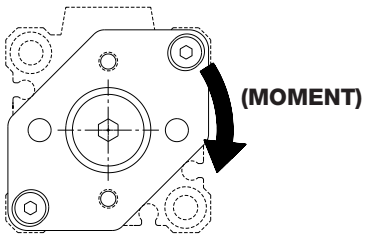


Maximum Moments N-m (in-lb)

Bore	Stroke Length						
	5mm	10mm	15mm	20mm	25mm	30mm	35mm
12mm (1/2")	N/A	0.15 (1.31)	0.14 (1.27)	0.14 (1.23)	0.13 (1.21)	0.13 (1.19)	N/A
16mm (5/8")	N/A	0.27 (2.42)	0.26 (2.32)	0.25 (2.26)	0.25 (2.21)	0.24 (2.18)	N/A
20mm (3/4")	N/A	0.68 (6.14)	0.66 (5.94)	0.64 (5.80)	0.63 (5.70)	0.62 (5.62)	0.62 (5.56)
25mm (1")	N/A	0.77 (6.93)	0.74 (6.70)	0.72 (6.53)	0.71 (6.40)	0.70 (6.30)	0.69 (6.22)
32mm (1-1/4")	N/A	0.89 (7.99)	0.86 (7.79)	0.85 (7.63)	0.83 (7.52)	0.82 (7.43)	0.82 (7.35)
40mm (1-1/2")	N/A	1.11 (10.02)	1.08 (9.71)	1.05 (9.48)	1.03 (9.29)	1.02 (9.15)	1.00 (9.03)
50mm (2")	N/A	2.16 (19.48)	2.10 (18.95)	2.06 (18.54)	2.02 (18.22)	1.99 (17.96)	1.97 (17.75)
63mm (2-1/2")	N/A	4.31 (38.84)	4.18 (37.70)	4.08 (36.80)	4.01 (36.09)	3.94 (35.51)	3.89 (35.02)
80mm (3-1/4")	N/A	8.44 (76.07)	8.21 (73.99)	8.03 (72.32)	7.88 (70.96)	7.75 (69.82)	7.64 (68.86)
100mm (4")	N/A	10.63 (95.78)	10.35 (93.25)	10.12 (91.16)	9.93 (89.42)	9.76 (87.94)	9.62 (86.67)

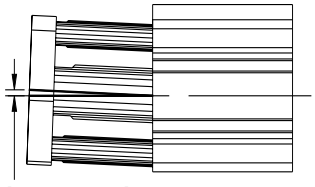
EFT Cylinders with X Option
Maximum Moments N-m (in-lb)

Bore	Stroke Length				
	40mm	45mm	50mm	75mm	100mm
12mm (1/2")	N/A	N/A	N/A	N/A	N/A
16mm (5/8")	N/A	N/A	N/A	N/A	N/A
20mm (3/4")	0.61 (5.50)	0.61 (5.46)	0.60 (5.42)	N/A	N/A
25mm (1")	0.68 (6.15)	0.68 (6.10)	0.67 (6.05)	N/A	N/A
32mm (1-1/4")	0.81 (7.29)	0.80 (7.24)	0.80 (7.20)	0.76 (6.84)	0.75 (6.77)
40mm (1-1/2")	0.99 (8.93)	0.98 (8.84)	0.97 (8.77)	0.90 (8.15)	0.89 (8.02)
50mm (2")	1.95 (17.57)	1.93 (17.42)	1.92 (17.28)	1.79 (16.16)	1.77 (15.91)
63mm (2-1/2")	3.84 (34.61)	3.80 (34.25)	3.77 (33.95)	3.47 (31.26)	3.40 (30.64)
80mm (3-1/4")	7.55 (68.03)	7.47 (67.32)	7.40 (66.69)	6.77 (60.95)	6.61 (59.55)
100mm (4")	9.50 (85.57)	9.39 (84.60)	9.30 (83.75)	8.95 (80.63)	8.73 (78.66)



Tooling Plate End Play mm (in)

Bore	Stroke Length						
	5mm	10mm	15mm	20mm	25mm	30mm	35mm
12mm (1/2")	N/A	0.10 (.004)	0.08 (.003)	0.08 (.003)	0.05 (.002)	0.05 (.002)	N/A
16mm (5/8")	N/A	0.10 (.004)	0.08 (.003)	0.08 (.003)	0.08 (.003)	0.05 (.002)	N/A
20mm (3/4")	N/A	0.10 (.004)	0.08 (.003)	0.08 (.003)	0.05 (.002)	0.05 (.002)	0.05 (.002)
25mm (1")	N/A	0.08 (.003)	0.08 (.003)	0.08 (.003)	0.05 (.002)	0.05 (.002)	0.05 (.002)
32mm (1-1/4")	N/A	0.08 (.003)	0.08 (.003)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)
40mm (1-1/2")	N/A	0.08 (.003)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)
50mm (2")	N/A	0.08 (.003)	0.08 (.003)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)
63mm (2-1/2")	N/A	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.03 (.001)
80mm (3-1/4")	N/A	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.03 (.001)	0.03 (.001)
100mm (4")	N/A	0.05 (.002)	0.05 (.002)	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.03 (.001)



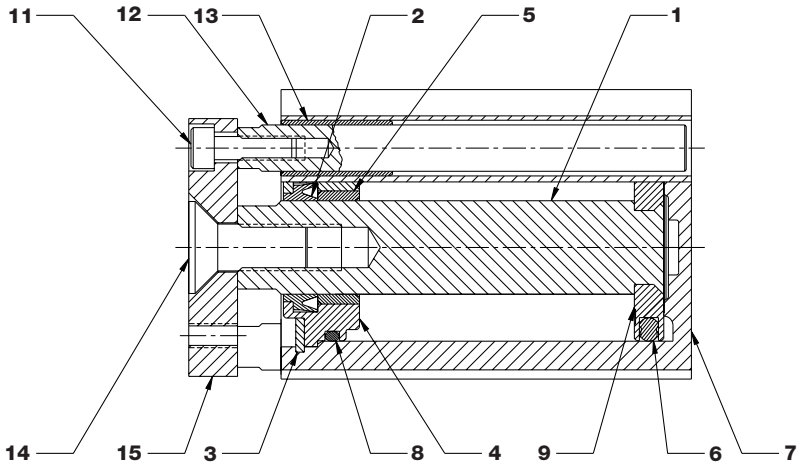
Bore	Stroke Length				
	40mm	45mm	50mm	75mm	100mm
12mm (1/2")	N/A	N/A	N/A	N/A	N/A
16mm (5/8")	N/A	N/A	N/A	N/A	N/A
20mm (3/4")	0.05 (.002)	0.05 (.002)	0.05 (.002)	N/A	N/A
25mm (1")	0.05 (.002)	0.05 (.002)	0.03 (.001)	N/A	N/A
32mm (1-1/4")	0.05 (.002)	0.05 (.002)	0.03 (.001)	0.03 (.001)	0.03 (.001)
40mm (1-1/2")	0.05 (.002)	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.13 (.005)
50mm (2")	0.05 (.002)	0.05 (.002)	0.05 (.002)	0.03 (.001)	0.13 (.005)
63mm (2-1/2")	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.13 (.005)
80mm (3-1/4")	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.13 (.005)
100mm (4")	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.03 (.001)	0.13 (.005)

Components

Shown in millimeters (inches)

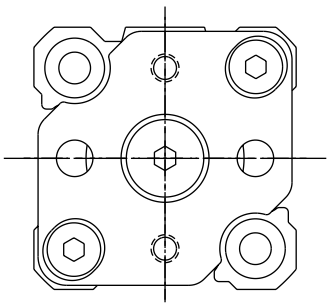
Part List

Part #	Description	Material
1	Rod	4301 (303) Stainless Steel
2	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
3	Retaining Ring	Zinc Plated Carbon Steel or Stainless Steel (Optional)
4	Rod Guide	12-20mm: Bronze / 25-100mm: Anodized Aluminum
5	Bushing	12-20mm: Bronze / 25-100mm: Self Lubricating Nylon
6	Piston Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
7	Cylinder Body	Polytetrafluoroethylene (PTFE) Impregnated Hard Anodized Aluminum
8	Rod Guide Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
9	Piston	High Strength Aluminum Alloy
11	Cap Screw	Stainless Steel
12	Guide Rod	Chrome Plated Stainless Steel
13	Guide Bushing	Delrin
14	Flat Screw	Stainless Steel
15	Plate	Clear Coat Anodized Aluminum

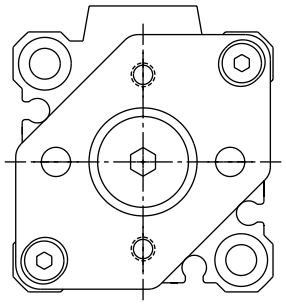


Tooling Plate Styles

12mm to 16mm Bore



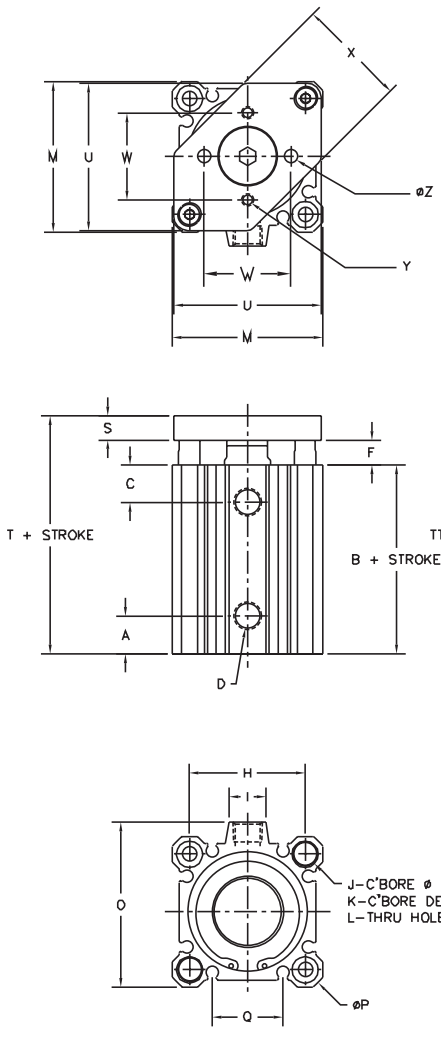
20mm to 100mm Bore



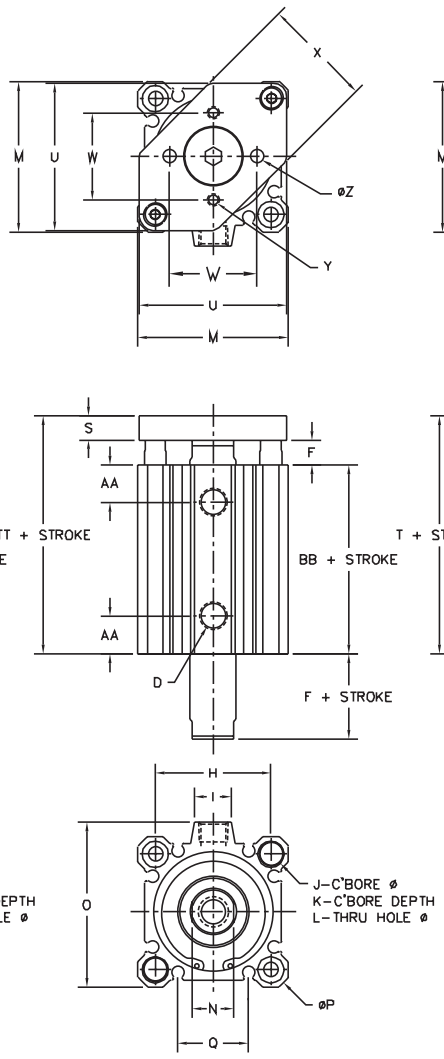
Dimensions

Shown in millimeters (inches)

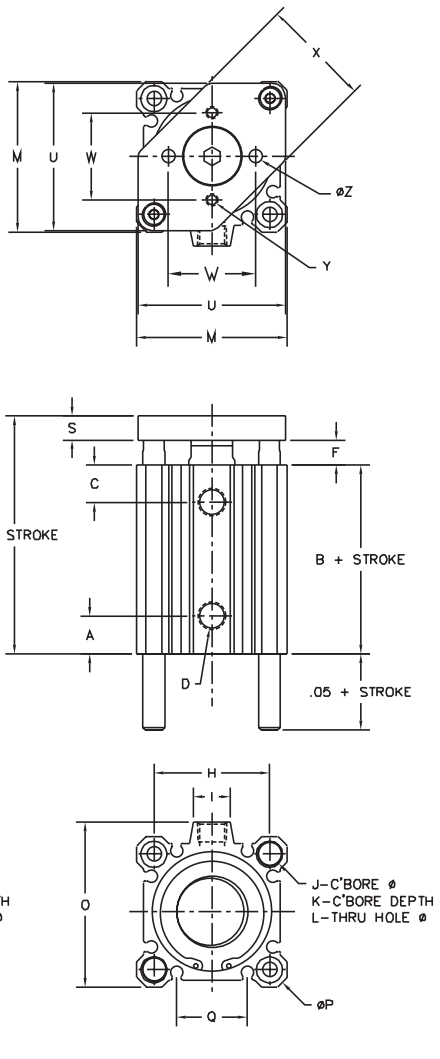
EFT Cylinder



EFDT Cylinder



X Option



Double Acting/Non-Rotating

Bore	A	AA	B	BB	C	D	F	H		
12mm (1/2")	3.8 (0.15)	10.6 (0.42)	17.0 (0.67)	25.2 (0.99)	8.9 (0.35)	M5 x 0.8 (#10-32)	3.5 (0.14)	15.5 (0.61)	N/A	6.1 (0.24)
16mm (5/8")	4.5 (0.18)	10.7 (0.42)	18.5 (0.73)	26.0 (1.03)	9.4 (0.37)	M5 x 0.8 (#10-32)	3.5 (0.14)	20.0 (0.79)	8.7 (0.34)	6.5 (0.26)
20mm (3/4")	4.8 (0.19)	10.1 (0.40)	19.5 (0.77)	26.0 (1.03)	9.4 (0.37)	M5 x 0.8 (#10-32)	4.5 (0.18)	25.5 (1.00)	9.5 (0.38)	9.0 (0.36)
25mm (1")	5.1 (0.20)	11.2 (0.44)	22.5 (0.89)	29.0 (1.14)	10.9 (0.43)	M5 x 0.8 (#10-32)	5.0 (0.20)	28.0 (1.10)	10.3 (0.41)	9.0 (0.36)
32mm (1-1/4")	7.0 (0.28)	8.9 (0.35)	23.0 (0.91)	30.5 (1.20)	10.4 (0.41)	G - 1/8 (NPT 1/8)	7.0 (0.28)	34.0 (1.34)	18.6 (0.73)	9.0 (0.36)
40mm (1-1/2")	7.4 (0.29)	13.1 (0.52)	29.5 (1.16)	40.0 (1.58)	13.2 (0.52)	G - 1/8 (NPT 1/8)	7.0 (0.28)	40.0 (1.58)	17.3 (0.68)	9.0 (0.36)
50mm (2")	9.4 (0.37)	12.2 (0.48)	30.5 (1.20)	40.5 (1.60)	13.7 (0.54)	G - 1/4 (NPT 1/4)	8.0 (0.32)	50.0 (1.97)	20.0 (0.79)	11.1 (0.44)
63mm (2-1/2")	9.7 (0.38)	12.8 (0.50)	36.0 (1.42)	42.0 (1.66)	15.7 (0.62)	G - 1/4 (NPT 1/4)	8.0 (0.32)	60.0 (2.36)	20.0 (0.79)	14.1 (0.56)
80mm (3-1/4")	11.6 (0.46)	14.4 (0.57)	43.5 (1.71)	51.0 (2.01)	17.8 (0.70)	G - 3/8 (NPT 3/8)	10.0 (0.39)	77.0 (3.03)	26.0 (1.02)	17.5 (0.69)
100mm (4")	12.2 (0.48)	18.3 (0.72)	53.0 (2.09)	60.5 (2.32)	24.4 (0.96)	G - 3/8 (NPT 3/8)	12.0 (0.47)	94.0 (3.70)	26.0 (1.02)	17.5 (0.69)

Dimensions

Shown in millimeters (inches)

Bore	K	L	M	N	O	P	Q	S
12mm (1/2")	3.5 (0.14)	3.5 (0.14)	25.0 (0.98)	5.0 (0.19)	25.0 (0.98)	32.0 (1.26)	5.3 (0.21)	6.0 (0.24)
16mm (5/8")	3.5 (0.14)	3.5 (0.14)	29.0 (1.14)	6.0 (0.25)	29.0 (1.14)	38.0 (1.50)	7.8 (0.31)	6.0 (0.24)
20mm (3/4")	7.0 (0.28)	5.5 (0.22)	36.0 (1.42)	8.0 (0.31)	36.0 (1.42)	47.0 (1.85)	10.5 (0.41)	6.9 (0.27)
25mm (1")	7.0 (0.28)	5.5 (0.22)	40.0 (1.58)	10.0 (0.38)	40.0 (1.58)	52.0 (2.05)	11.5 (0.45)	8.3 (0.33)
32mm (1-1/4")	7.0 (0.28)	5.5 (0.22)	45.0 (1.77)	14.0 (0.56)	49.5 (1.95)	60.0 (2.36)	17.7 (0.70)	8.3 (0.33)
40mm (1-1/2")	7.0 (0.28)	5.5 (0.22)	52.0 (2.05)	14.0 (0.56)	57.0 (2.24)	69.0 (2.72)	24.5 (0.96)	8.3 (0.33)
50mm (2")	8.0 (0.31)	6.9 (0.27)	64.0 (2.52)	17.0 (0.69)	71.0 (2.80)	86.0 (3.39)	29.3 (1.16)	12.1 (0.48)
63mm (2-1/2")	10.5 (0.41)	8.8 (0.35)	77.0 (3.03)	17.0 (0.69)	84.0 (3.31)	103.0 (4.06)	29.1 (1.15)	12.5 (0.49)
80mm (3-1/4")	13.5 (0.53)	11.0 (0.43)	98.0 (3.86)	22.0 (0.88)	104.0 (4.09)	132.0 (5.20)	28.1 (1.11)	14.0 (0.55)
100mm (4")	13.5 (0.53)	11.0 (0.43)	117.0 (4.61)	27.0 (1.06)	123.5 (4.86)	156.0 (6.14)	32.3 (1.27)	14.0 (0.55)

Bore	T	TT	U	W	X	Y		Z	
						Standard	With Option E	Standard	With Option E
12mm (1/2")	26.5 (1.04)	34.7 (1.37)	24.3 (0.96)	14.0 (0.55)	20.8 (0.82)	M3 x 0.5 6H	#4-40 UNC-2B	4.1 (0.16)	3.6 (0.14)
16mm (5/8")	28.0 (1.10)	35.5 (1.40)	28.0 (1.10)	20.0 (0.79)	25.0 (0.98)	M3 x 0.5 6H	#4-40 UNC-2B	4.1 (0.16)	3.6 (0.14)
20mm (3/4")	30.8 (1.21)	37.4 (1.47)	35.0 (1.38)	27.0 (1.06)	26.5 (1.04)	M4 x 0.7 6H	#6-32 UNC-2B	5.2 (0.20)	4.3 (0.17)
25mm (1")	35.8 (1.41)	42.3 (1.67)	39.0 (1.54)	27.0 (1.06)	30.0 (1.18)	M4 x 0.7 6H	#6-32 UNC-2B	5.2 (0.20)	4.3 (0.17)
32mm (1-1/4")	38.3 (1.52)	45.8 (1.80)	44.0 (1.73)	30.0 (1.18)	34.3 (1.35)	M4 x 0.7 6H	#8-32 UNC-2B	5.2 (0.20)	4.7 (0.18)
40mm (1-1/2")	44.8 (1.76)	55.3 (2.18)	51.0 (2.01)	30.0 (1.18)	38.0 (1.50)	M4 x 0.7 6H	#8-32 UNC-2B	5.2 (0.20)	4.7 (0.18)
50mm (2")	50.6 (1.99)	60.6 (2.39)	63.0 (2.48)	42.8 (1.69)	48.0 (1.89)	M5 x 0.8 6H	#10-32 UNF-2B	6.4 (0.25)	5.6 (0.22)
63mm (2-1/2")	56.5 (2.22)	62.5 (2.46)	75.8 (2.98)	42.8 (1.69)	53.7 (2.11)	M5 x 0.8 6H	#10-32 UNF-2B	6.4 (0.25)	5.6 (0.22)
80mm (3-1/4")	67.5 (2.66)	75.0 (2.95)	97.0 (3.82)	50.8 (2.00)	74.8 (2.94)	M6 x 1.0 6H	#1/4-20 UNC-2B	7.1 (0.28)	7.2 (0.29)
100mm (4")	79.0 (3.11)	86.5 (3.41)	115.5 (4.55)	50.8 (2.00)	93.3 (3.67)	M6 x 1.0 6H	#1/4-20 UNC-2B	7.1 (0.28)	7.2 (0.29)

*See page 2.67 for overall body length with MRS option.

When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

Weights

Bore		Approximate Base Weight of Cylinder gram-force (oz.)		Weight Adder per 5mm of Stroke gram-force (oz.)	
12mm	(1/2")	32.3	(1.14)	6.1	(0.22)
16mm	(5/8")	53.4	(1.89)	8.6	(0.30)
20mm	(3/4")	74.4	(2.62)	13.3	(0.47)
25mm	(1")	114.6	(4.04)	16.3	(0.58)
32mm	(1-1/4")	166.9	(5.89)	22.6	(0.80)
40mm	(1-1/2")	250.7	(8.84)	23.0	(0.81)
50mm	(2")	440.4	(15.53)	35.8	(1.26)
63mm	(2-1/2")	697.3	(24.60)	45.2	(1.59)
80mm	(3-1/4")	1309.6	(46.20)	70.0	(2.47)
100mm	(4")	2464.6	(86.94)	117.5	(4.15)

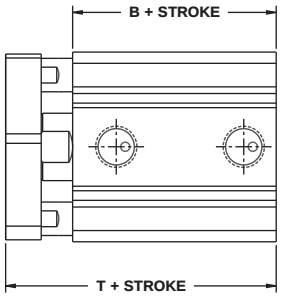
Options

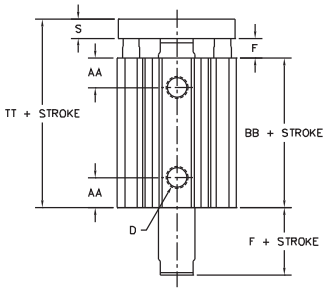
Magnetic Position Sensing (M)

(Overall Length Adders)

Model Type and Size	Body Length	Total Length
EFT	**B***	**T***
12mm – 100mm	10.0 (0.39)	10.0 (0.39)
EFDT	**BB***	**TT***
12mm	7.2 (0.28)	7.2 (0.28)
16mm – 100mm	10.0 (0.39)	10.0 (0.39)

*Add the following lengths to the overall length dimension for EFT and EFDT cylinders when specifying a magnet option.





Bumpers (B)

(Stroke reduction by model for all bores)

Model	Stroke Reduction mm (inches)
Double Acting, Non-Rotating	3.0 (.12)

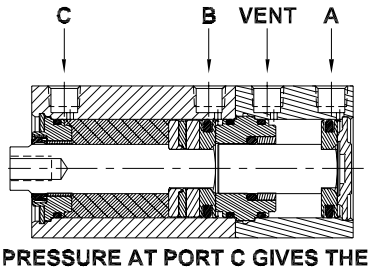
Bimba EFP MultiPosition Cylinder

New! The Bimba EFP Extruded Flat MultiPosition cylinder is a double-acting, single rod end cylinder that provides three positions in one cylinder package. This cylinder is a two piston design that saves space using the existing EF footprint and eliminates the need for an additional cylinder. This unit can help simplify machine changeovers and thereby saving costs.

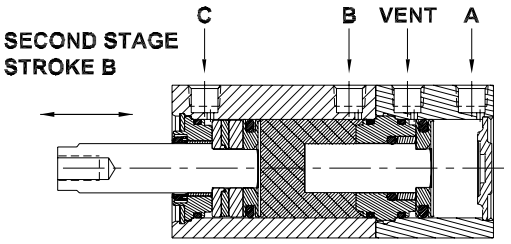
Features and Advantages

- Provides three position output on extension using the same EF bore footprint to save space
- Easily interchangeable to other compact extruded cylinders of the same bore size
- Available in 10 bore sizes from 12mm to 100mm for greater application versatility
- Versatile to easily connect and operate you application's pneumatic logic
- Shares same the popular standard features as EF product line
  - PTFE impregnated, hard anodized aluminum body for superior wear resistance
  - 4301 (303) Stainless Steel Rod
  - High Strength Aluminum Alloy Piston with Nitrile Piston Seal
  - Bronze Bushing (12-20mm); Self-Lubricating Nylon Bushing (25-100mm)
  - Bronze Rod Guide (12-20mm); Anodized Aluminum (25-100mm)
  - Nitrile Rod Seal and Wiper
  - Zinc Plated Carbon Steel Retaining Ring
  - Repairable and easy to maintain
- Standard with threaded front/rear mounting holes, English customary units, and magnetic positioning sensing (MRS) at no extra charge as compared to the competition.
- Standard options include bumpers, full flow ports, rod threads, rod extensions, and high temperature seals.
- All units are made to order and available to ship in three days!
- CAD drawings (2D and 3D) can be downloaded from our web site at: www.bimba.com/cad/

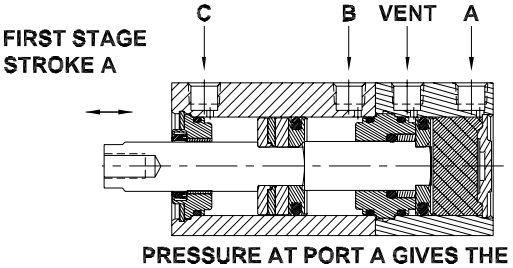
How It Works



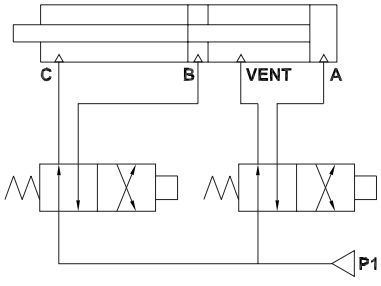
PRESSURE AT PORT C GIVES THE RETRACTED POSITION



PRESSURE AT PORT B GIVES THE SECOND STAGE STROKE B



PRESSURE AT PORT A GIVES THE FIRST STAGE STROKE A



How to Order

The model number for all EFP MultiPosition Cylinders consists of three alphanumeric clusters. These three parts designate the type of cylinder, the cylinder bore size and stroke length A/B, and cylinder options. For example, an EFP-2550/25-3EMV is a 25mm bore EF MultiPosition cylinder with 50mm for stroke plus an additional 25mm for stroke B. Additional features are threaded front/rear mounting, English ports/rod threads, magnetic position sensing, and high temperature seals. Please refer to the chart below for part number explanation and options.

Please note that all models come STANDARD with threaded front/rear mounting holes (3), English customary units for interface threads (E), and magnetic positioning sensing (M) options.

TYPE
EFP - Double Acting, Single End Rod

BORE SIZE mm (inch)*			
12mm - (1/2")		40mm - (1-1/2")	
16mm - (5/8")		50mm - (2")	
20mm - (3/4")		63mm - (2-1/2")	
25mm - (1")		80mm - (3-1/4")	
32mm - (1-1/4")		100mm - (4")	

STROKE LENGTH A
See table - page 4 for Stroke A

STROKE LENGTH B
See table - page 4 for Stroke B

EFP-2550/25-3EMV

MOUNTING OPTIONS	
3	- Threaded front/rear mounting option - **standard** (page 2.77)

OPTIONS

(Enter in alphabetical order, except EE which is last)

B	-	Bumpers (see page 2.77)[1]
C	-	Stainless steel retaining ring
E	-	U.S. customary units (inch)[2] - **standard**
F	-	Full-flow port orifice[5]
M	-	Magnetic position sensing (see page 2.56)[3] - **standard**
MT	-	Male rod end (fine thread) (see page 2.77)[4]
NT	-	Non-threaded rod
V	-	High temperature option -10ºC to 110ºC (15°F to 225°F)
EE		Extra Rod Extensions in 1mm Increments

[1]Bumpers reduce stroke length by 3mm. When bumper is specified with option V, standard bumper material is supplied. Operating temperature remains -10° to 70°C (15° to 160°F).

[2]When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

[3]When magnetic position sensing is specified with option V, operating temperature remains -10° to 70°C (15° to 160°F). This combination is recommended when fluoroelastomer is specified for compatibility.

[4]MT option must be specified to use rod pivot.

[5]Automatically includes bumpers, so stroke is reduced by 3mm.

Please note that throughout all catalog charts, metric measurements are shown first and U.S. customary units (inches) are in parentheses.
*NOTE: Number in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.

Stroke Length Availability

The table to right represents our standard stroke lengths for each stage. Please note that the total combined strokes (A + B) may not be greater than the maximum stroke as listed in the table.

Bimba is a JIT manufacturer and we are able to provide EFP cylinders in ANY stage to 1mm stroke length increment for all option styles within our standard three (3) day lead time. Longer stroke lengths other options are available upon request. Please consult Technical Assistance at 800-44-BIMBA for help.

Nominal Bore Diameter		Double Acting EF Single Rod End		
		Standard Single Stage Stroke A or B (mm)	Minimum Single Stage Stroke A or B (mm)	Maximum Total Combining Stroke A + B (mm)
12mm	(1/2")	5, 10, 15, 20, 25, 30	5	40
16mm	(5/8")	5, 10, 15, 20, 25, 30	5	70
20mm	(3/4")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5	80
25mm	(1")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5	90
32mm	(1-1/4")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5	100
40mm	(1-1/2")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5	120
50mm	(2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	120
63mm	(2-1/2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	240
80mm	(3-1/4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	230
100mm	(4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	220

List Prices

Model Type	Bore Size									
	12	16	20	25	32	40	50	63	80	100
EFP List -3EM	$72.50	$77.10	$86.95	$94.10	$114.35	$136.10	$162.90	$193.10	$244.25	$367.60
Total combined stroke per 5mm length* (2 X "A" stroke + "B" Stroke)	1.70	1.70	1.75	1.80	1.80	1.90	2.10	2.30	2.65	3.20
B	3.50	6.20	6.20	6.20	7.35	7.35	8.35	10.05	15.30	17.60
C	2.90	3.05	4.15	4.65	5.65	8.45	14.40	17.25	85.20	138.40
F (includes B option)	12.95	16.70	16.70	18.80	20.40	20.40	23.75	26.30	33.60	37.60
MT	1.60	1.60	1.60	2.45	2.45	2.80	3.25	3.75	7.45	11.15
V	11.65	12.75	13.15	15.90	17.75	25.30	27.80	36.15	44.25	55.85
EE per 1mm length	0.35	0.35	0.35	0.40	0.40	0.40	0.45	0.45	0.50	0.50

* The stroke adder for EFP cylinders is equal to 2 times the stroke length of A plus the stroke length of B. For example, an EFP-2550/25-3EMV would have a total combined stroke length of 125mm. All total combined stroke lengths are rounded to the nearest 5mm.

No additional charge for NT options
Standard options are 3, E, and M

Cylinder Weights

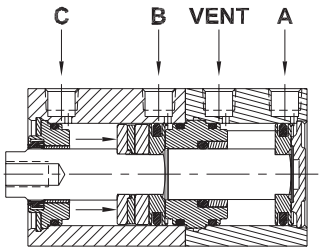
Bore Size		Approximate Base Weight of Cylinder		Approximate Weight added per 5mm of stroke	
		gf	oz	gf	oz
12mm	(1/2")	56.7	2.00	5.6	0.20
16mm	(5/8")	100.6	3.54	8.0	0.28
20mm	(3/4")	120.6	4.26	11.5	0.41
25mm	(1")	190.1	6.71	14.6	0.52
32mm	(1-1/4")	294.6	10.40	20.9	0.74
40mm	(1-1/2")	471.6	16.64	21.3	0.75
50mm	(2")	764.4	26.96	33.6	1.19
63mm	(2-1/2")	1259.7	44.43	40.7	1.44
80mm	(3-1/4")	2301.5	81.20	62.6	2.21
100mm	(4")	4903.3	172.95	110.1	3.89

New! The Bimba EFQ Extruded Flat MultiForce cylinder is a double-acting, single end rod cylinder that DOUBLES the resultant force on extension. This cylinder is a two piston design that saves space using the existing EF footprint and eliminates the need for higher pressure systems or unique configurations.Only one piston is pressurized on the return stroke to save air volume and operating costs.

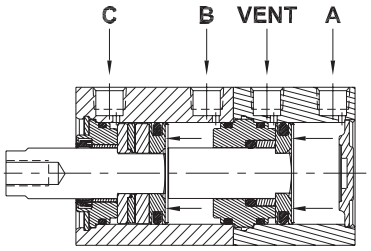
Features and Advantages

- Doubles the force output on extension using the same EF bore footprint to save space
- Easily interchangeable to other compact extruded cylinders of the same bore size
- Available in 10 bore sizes from 12mm to 100mm for greater application versatility
- Versatile to easily connect and operate your application's pneumatic logic
- Shares same the popular standard features as EF product line
  - PTFE impregnated, hard anodized aluminum body for superior wear resistance
  - 4301 (303) Stainless Steel Rod
  - High Strength Aluminum Alloy Piston with Nitrile Piston Seal
  - Bronze Bushing (12-20mm); Self-Lubricating Nylon Bushing (25-100mm)
  - Bronze Rod Guide (12-20mm); Anodized Aluminum (25-100)
  - Nitrile Rod Seal and Wiper
  - Zinc Plated Carbon Steel Retaining Ring
  - Repairable and easy to maintain
- Standard with threaded front/rear mounting holes, English customary units, and magnetic positioning sensing (MRS) at no extra charge as compared to the competition.
- Standard options include bumpers, full flow ports, rod threads, rod extensions, and high temperature seals.
- All units are made to order and available to ship in three days!
- CAD drawings (2D and 3D) can be downloaded from our web site at: www.bimba.com/cad/

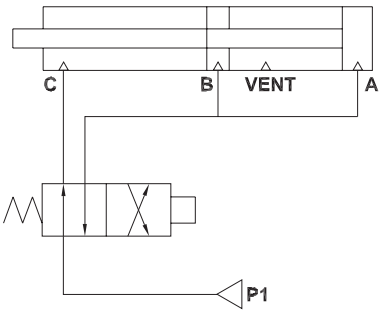
How it Works



PRESSURE AT PORT C RETRACTS THE THE PISTON RODS



PRESSURE AT PORTS A & B CREATE A MULTI-FORCE STROKE



How to Order

The model number for all EFQ MultiForce Cylinders consists of three alphanumeric clusters. These three parts designate the type of cylinder, the cylinder bore size and stroke length, and cylinder options. Please refer to the chart below for part number explanation and options.

Please note that all models come STANDARD with threaded front/rear mounting holes (3), English customary units for interface threads (E), and magnetic positioning sensing (M) options.

TYPE
EFQ - Double Acting, Single End Rod

BORE SIZE mm (inch)*			
12mm - (1/2")		40mm - (1-1/2")	
16mm - (5/8")		50mm - (2")	
20mm - (3/4")		63mm - (2-1/2")	
25mm - (1")		80mm - (3-1/4")	
32mm - (1-1/4")		100mm - (4")	

STROKE LENGTH**
See table - page 7

EFQ-2510-3EMMTV

MOUNTING OPTIONS
3 - Threaded front/rear mounting option - **standard** (page 2.77)

OPTIONS

(Enter in alphabetical order, except EE which is last)

- B - Bumpers (see page 2.77)[1]
- C - Stainless steel retaining ring
- E - U.S. customary units (inch)[2] - **standard**
- F - Full-flow port orifice[5]
- M - Magnetic position sensing (see page 2.56)[3] - **standard**
- MT - Male rod end (fine thread) (see page 2.77)[4]
- NT - Non-threaded rod
- V - High temperature option -10ºC to 110ºC (15°F to 225°F)
- EE Extra Rod Extensions in 1mm Increments

[1]Bumpers reduce stroke length by 3mm. When bumper is specified with option V, standard bumper material is supplied. Operating temperature remains -10° to 70°C (15° to 160°F).

[2]When option E is specified, user interface threads are designated U.S. customary (inch). This includes ports, rod threads and threaded mounting options (as applicable).

[3]When magnetic position sensing is specified with option V, operating temperature remains -10° to 70°C (15° to 160°F). This combination is recommended when fluoroelastomer is specified for compatibility.

[4]MT option must be specified to use rod pivot.

[5]Automatically includes bumpers, so stroke is reduced by 3mm.

Please note that throughout all catalog charts, metric measurements are shown first and U.S. customary units (inches) are in parentheses.
*NOTE: Number in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.

Stroke Length Availability

The table to right represents our standard stroke lengths. Please note that the combination of stroke and extra rod extension may not be greater than the maximum stroke length as listed in the table.

Bimba is a JIT manufacturer and we are able to provide EFQ cylinders in ANY 1mm stroke length increment for all option styles within our standard three (3) day lead time. Longer stroke lengths other options are available upon request. Please consult Technical Assistance at 800-44-BIMBA for help.

Nominal Bore Diameter		Double Acting EFQ Single Rod End		
		Standard Stroke Length (mm)	Minimum Stroke Length (mm)	Maximum Stroke Length (mm)
12mm	(1/2")	5, 10, 15, 20, 25, 30	5	40
16mm	(5/8")	5, 10, 15, 20, 25, 30	5	70
20mm	(3/4")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5	90
25mm	(1")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5	100
32mm	(1-1/4")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5	160
40mm	(1-1/2")	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	5	120
50mm	(2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	150
63mm	(2-1/2")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	110
80mm	(3-1/4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	140
100mm	(4")	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	10	160

List Prices

Model Type	Bore Size									
	12	16	20	25	32	40	50	63	80	100
EFQ List -3EM	$69.10	$73.45	$82.70	$89.55	$108.85	$129.55	$155.05	$183.85	$232.55	$350.05
Stroke Adder per 5mm	2.55	2.55	2.70	2.85	2.85	2.95	3.45	4.10	4.80	5.80
B	3.50	6.20	6.20	6.20	7.35	7.35	8.35	10.05	15.30	17.60
C	2.90	3.05	4.15	4.65	5.65	8.45	14.40	17.25	85.20	138.40
F (includes B option)	12.95	16.70	16.70	18.80	20.40	20.40	23.75	26.30	33.60	37.60
MT	1.60	1.60	1.60	2.45	2.45	2.80	3.25	3.75	7.45	11.15
V	11.65	12.75	13.15	15.90	17.75	25.30	27.80	36.15	44.25	55.85
EE per 1mm length	0.35	0.35	0.35	0.40	0.40	0.40	0.45	0.45	0.50	0.50

No additional charge for NT options
Standard options are 3, E, and M

Cylinder Weights

Bore Size		Approximate Base Weight of Cylinder		Approximate Weight added per 5mm of stroke	
		gf	oz	gf	oz
12mm	(1/2")	56.7	2.00	5.6	0.20
16mm	(5/8")	100.6	3.54	8.0	0.28
20mm	(3/4")	120.6	4.26	11.5	0.41
25mm	(1")	190.1	6.71	14.6	0.52
32mm	(1-1/4")	294.6	10.40	20.9	0.74
40mm	(1-1/2")	471.6	16.64	21.3	0.75
50mm	(2")	764.4	26.96	33.6	1.19
63mm	(2-1/2")	1259.7	44.43	40.7	1.44
80mm	(3-1/4")	2301.5	81.20	62.6	2.21
100mm	(4")	4903.3	172.95	110.1	3.89

Engineering Specifications

Operating Medium: Air

Maximum Operating Pressure: 10.0 bar (140 psi)

Ambient and Fluid Temperature: -10° to 70°C (15° to 160°F)

Lubrication: PTFE impregnated grease

Standard Rod End: Female

Stroke Tolerance: 12-50mm bore: ± .6mm (.025 inch)
63-100mm bore: ± .8mm (.030 inch)

Cylinder Mounting (Standard): Through hole with counterbores both ends
Front and Rear threaded

Maximum Sideload: Refer to page 2.47 of FL catalog for specific bore size and stroke length

Expected Service Life: 2500 kilometers (1500 miles)*

*For filtered, lubricated air, no-load conditions; if unlubricated, life is approximately 1/3.

Theoretical Cylindrical Forces

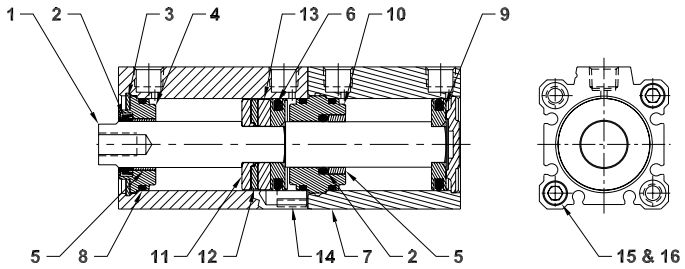
To determine the estimated force generated by the EFQ cylinder on extend or retract, use the appropriate power factor below and multiply it to the input working pressure to cylinder. Forces generated by EFP cylinders are found on page 2.48 of FL catalog.

Force (kg or lb) = Power Factor X Pressure (bar or psi)

Bore	Direction	Power Factor (kg/bar)	Power Factor (lb/psi)
12mm (1/2")	Extend	1.9	0.30
	Retract	0.8	0.10
16mm (5/8")	Extend	3.5	0.55
	Retract	1.5	0.20
20mm (3/4")	Extend	5.5	0.86
	Retract	2.4	0.40
25mm (1")	Extend	8.4	1.33
	Retract	3.8	0.60
32mm (1-1/4")	Extend	13.8	2.19
	Retract	6.0	0.90
40mm (1-1/2")	Extend	22.7	3.59
	Retract	10.6	1.60
50mm (2")	Extend	35.7	5.65
	Retract	16.5	2.60
63mm (2-1/2")	Extend	58.3	9.22
	Retract	28.0	4.30
80mm (3-1/4")	Extend	93.6	14.80
	Retract	45.4	7.0
100mm (4")	Extend	149.0	23.56
	Retract	71.5	11.1

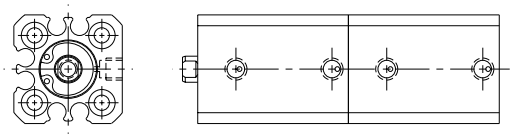
Engineering Specifications
Components

#	Description	Material
1	Rod	4301 (303) Stainless Steel
2	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature option)
3	Retaining Ring	Zinc Plated Carbon Steel (standard) or Stainless Steel (optional)
4	Rod Guide	12-20mm bore – Bronze 25-100 mm bore – Anodized Aluminum
5	Bushing	12-20mm bore – Bronze 25-100mm bore – Self Lubricating Nylon
6	Piston Seal	Nitrile (standard) or Fluoroelastomer (High Temperature option)
7	Cylinder Body	Polytetrafluoroethylene (PFTE) Impregnated Hard Anodized Aluminum
8	Rod Guide Seal	Nitrile (standard) or Fluoroelastomer (High Temperature option)
9	Piston	High Strength Aluminum Alloy
10	Center Section	12-20mm bore – Bronze 25-100mm bores – High Strength Aluminum Alloy
11	Front Magnet Plate	High Strength Aluminum Alloy
12	Magnet	Ferrite Nylon
13	Rear Magnet Plate	High Strength Aluminum Alloy
14	Threaded Insert	High Strength Steel
15	Tie Rod	High Strength Steel
16	Tie Nut	High Strength Steel

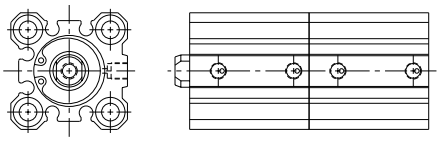


Body Styles

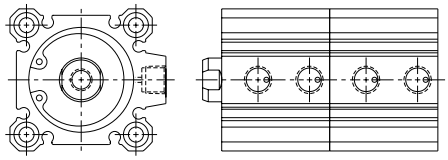
12mm Bore



16mm to 32mm Bore



40mm to 100mm Bore



Dimensions

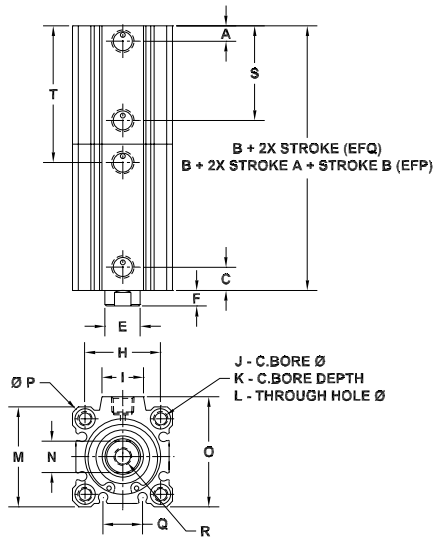
Shown in millimeters (inches)

Double Acting/Single Rod

Bore	A	B	C	D	E	F	H
12mm (1/2")	3.8 (0.15)	43.7 (1.72)	8.9 (0.35)	M5 x 0.8 (#10-32)	6.0 (0.24)	3.5 (0.14)	15.5 (0.61)
16mm (5/8")	4.6 (0.18)	47.0 (1.85)	9.4 (0.37)	M5 x 0.8 (#10-32)	8.0 (0.31)	3.5 (0.14)	20.0 (0.79)
20mm (3/4")	4.8 (0.19)	51.1 (2.01)	9.4 (0.37)	M5 x 0.8 (#10-32)	10.0 (0.39)	4.5 (0.18)	25.5 (1.00)
25mm (1")	5.1 (0.20)	56.4 (2.22)	10.9 (0.43)	M5 x 0.8 (#10.32)	12.0 (0.47)	5.0 (0.20)	28.0 (1.10)
32mm (1-1/4")	7.1 (0.28)	57.7 (2.27)	10.4 (0.41)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	34.0 (1.34)
40mm (1-1/2")	7.4 (0.29)	71.6 (2.82)	13.2 (0.52)	G - 1/8 (NPT 1/8)	16.0 (0.63)	7.0 (0.28)	40.0 (1.57)
50mm (2")	9.4 (0.37)	74.4 (2.93)	13.7 (0.54)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	50.0 (1.97)
63mm (2-1/2")	9.7 (0.38)	84.2 (3.31)	15.7 (0.62)	G - 1/4 (NPT 1/4)	20.0 (0.79)	8.0 (0.31)	60.0 (2.36)
80mm (3-1/4")	11.7 (0.46)	100.6 (3.96)	17.8 (0.70)	G - 3/8 (NPT 3/8)	25.0 (0.98)	10.0 (0.39)	77.0 (3.03)
100mm (4")	12.2 (0.48)	121.4 (4.78)	24.4 (0.96)	G - 3/8 (NPT 3/8)	30.0 (1.18)	12.0 (0.47)	94.0 (3.70)

Bore	I	J	K	L	M	N	O	P
12mm (1/2")	N/A	6.1 (0.24)	3.5 (0.14)	3.5 (0.14)	25.0 (0.98)	5.0 (0.19)	25.0 (0.98)	32.0 (1.26)
16mm (5/8")	8.7 (0.34)	6.5 (0.26)	3.5 (0.14)	3.5 (0.14)	29.0 (1.14)	6.0 (0.25)	29.0 (1.14)	38.0 (1.50)
20mm (3/4")	9.5 (0.37)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	36.0 (1.42)	8.0 (0.31)	36.0 (1.42)	47.0 (1.85)
25mm (1")	10.3 (0.41)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	40.0 (1.57)	10.0 (0.38)	40.0 (1.57)	52.0 (2.05)
32mm (1-1/4")	18.5 (0.73)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	45.0 (1.77)	14.0 (0.56)	49.5 (1.95)	60.0 (2.36)
40mm (1-1/2")	17.3 (0.68)	9.0 (0.35)	7.0 (0.28)	5.5 (0.22)	52.0 (2.05)	14.0 (0.56)	57.0 (2.24)	69.0 (2.72)
50mm (2")	20.0 (0.79)	11.1 (0.44)	8.0 (0.31)	6.9 (0.27)	64.0 (2.52)	17.0 (0.69)	71.0 (2.80)	86.0 (3.39)
63mm (2-1/2")	20.0 (0.79)	14.1 (0.56)	10.5 (0.41)	8.8 (0.35)	77.0 (3.03)	17.0 (0.69)	84.0 (3.31)	103.0 (4.06)
80mm (3-1/4")	26.0 (1.02)	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	98.0 (3.86)	22.0 (0.88)	104.0 (4.09)	132.0 (5.20)
100mm (4")	26.0 (1.02)	17.5 (0.69)	13.5 (0.53)	11.0 (0.43)	117.0 (4.61)	27.0 (1.06)	123.5 (4.86)	156.0 (6.14)

Bore	Q	R		S	T
12mm (1/2")	5.3 (0.21)	M3 x 0.5 6H	(#8-32 UNC-2B)	8.1 (0.32)	20.8 (0.82)
16mm (5/8")	7.8 (0.31)	M4 x 0.7 6H	(#8-32 UNC-2B)	9.1 (0.36)	23.1 (0.91)
20mm (3/4")	10.5 (0.41)	M5 x 0.8 6H	(#10-32 UNF-2B)	10.2 (0.40)	26.4 (1.04)
25mm (1")	11.5 (0.45)	M6 x 1.0 6H	(1/4-28 UNF-2B)	11.7 (0.46)	29.2 (1.15)
32mm (1-1/4")	17.7 (0.70)	M8 x 1.25 6H	(5/16-24 UNF-2B)	12.7 (0.50)	31.5 (1.24)
40mm (1-1/2")	24.5 (0.96)	M8 x 1.25 6H	(3/8-24 UNF-2B)	16.3 (0.64)	40.3 (1.59)
50mm (2")	29.3 (1.16)	M10 x 1.5 6H	(1/2-20 UNF-2B)	16.8 (0.66)	41.9 (1.65)
63mm (2-1/2")	29.1 (1.15)	M10 x 1.5 6H	(1/2-20 UNF-2B)	20.3 (0.80)	47.2 (1.86)
80mm (3-1/4")	28.1 (1.11)	M16 x 2.0 6H	(5/8-18 UNF-2B)	25.7 (1.01)	57.5 (2.26)
100mm (4")	32.3 (1.27)	M20 x 2.5 6H	(3/4-16 UNF-2B)	28.7 (1.13)	69.7 (2.74)

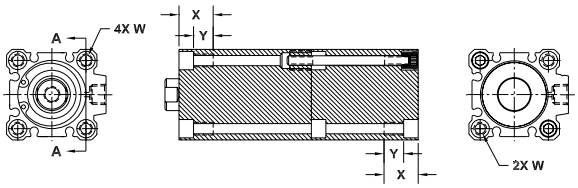


Options

Threaded Front/Rear Mount (-3) (Standard)

Bore	W*	X	Y
12mm (1/2")	8-32 UNC	10.5 (0.41)	7.0 (0.28)
16mm (5/8")	8-32 UNC	10.5 (0.41)	7.0 (0.28)
20mm (3/4")	1/4-20 UNC	17.0 (0.67)	10.0 (0.39)
25mm (1")	1/4-20 UNC	17.0 (0.67)	10.0 (0.39)
32mm (1-1/4")	1/4-20 UNC	17.0 (0.67)	10.0 (0.39)
40mm (1-1/2")	1/4-20 UNC	17.0 (0.67)	10.0 (0.39)
50mm (2")	5/16-18 UNC	22.0 (0.87)	14.0 (0.55)
63mm (2-1/2")	7/16-14 UNC	28.5 (1.12)	18.0 (0.71)
80mm (3-1/4")	1/2-13 UNC	35.8 (1.40)	22.0 (0.87)
100mm (4")	1/2-13 UNC	35.8 (1.40)	22.0 (0.87)

*All four bolt holes are recommended to be used for front mounting.

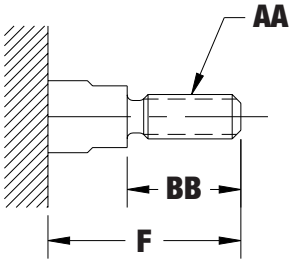


Bumpers (-B)
Stroke Reduction for all EFP/EFQ Bore Sizes

Model	Stroke Reduction mm (in)
Double Acting Single Rod End	3.0 (1.2)

Male Rod End (-MT)

Bore	AA	BB	F
12mm (1/2")	8-32 UNC	8.0 (0.31)	11.5 (0.45)
16mm (5/8")	8-32 UNC	8.0 (0.31)	11.5 (0.45)
20mm (3/4")	10-32 UNC	8.0 (0.31)	12.5 (0.49)
25mm (1")	1/4-28 UNC	9.5 (0.37)	14.5 (0.57)
32mm (1-1/4")	5/16-24 UNC	12.7 (0.50)	19.7 (0.78)
40mm (1-1/2")	3/8-24 UNC	16.0 (0.63)	23.0 (0.91)
50mm (2")	1/2-20 UNC	19.5 (0.77)	27.5 (1.08)
63mm (2-1/2")	1/2-20 UNC	19.5 (0.77)	27.5 (1.08)
80mm (3-1/4")	5/8-18 UNC	25.5 (1.00)	35.5 (1.40)
100mm (4")	5/8-18 UNC	28.5 (1.12)	40.5 (1.59)



Bimba Extruded Flat Lift Table

The Lift Table is an EF1-based, guided cylinder with four shafts for maximum rigidity. It is designed for lifting applications where other non-rotating cylinders cannot handle an overhung load and space is at a premium.

- Four-shaft support withstands offset loads and moments.
- Simple, efficient design provides economical alternative to other costly guided actuators.
- Joins the EF family of products and shares all the same benefits--long service life, low friction operation, fast delivery.
- Convenient wide tooling mounting surface.
- Intended for vertical lifting applications and should not be mounted horizontally or with tooling plates facing down.

How to Order

Type	Bore Size	Stroke Length	Options
EFF - Double-Acting Non-Rotating Lift Table	50 - 50mm 80 - 80mm 125 - 125mm	5mm increments to 100mm max	B - Internal Bumpers[1] E - U.S. Customary (inch)[2] M - Magnetic Position Sensing V - High Temperature (15°F to 225°F)

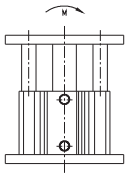
EFF - 80 50 - EM

[1]Bumper on rod end only and stroke is reduced by 0.06"
[2]Inch-series only; include "E" option in all model numbers

List Prices

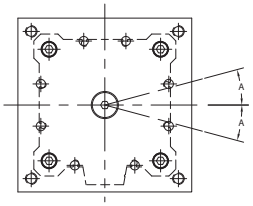
	50mm	80mm	125mm
Base	$189.90	$284.50	$474.00
Add per 5mm	4.80	5.35	6.55
B	9.25	16.65	24.40
M	12.95	20.40	31.85
V	30.15	47.95	79.15

Engineering Specifications



Maximum Moment
Due to Side or Overhung Load

Bore	Max Moment
50mm	45 in-lb
80mm	125 in-lb
125mm	175 in-lb

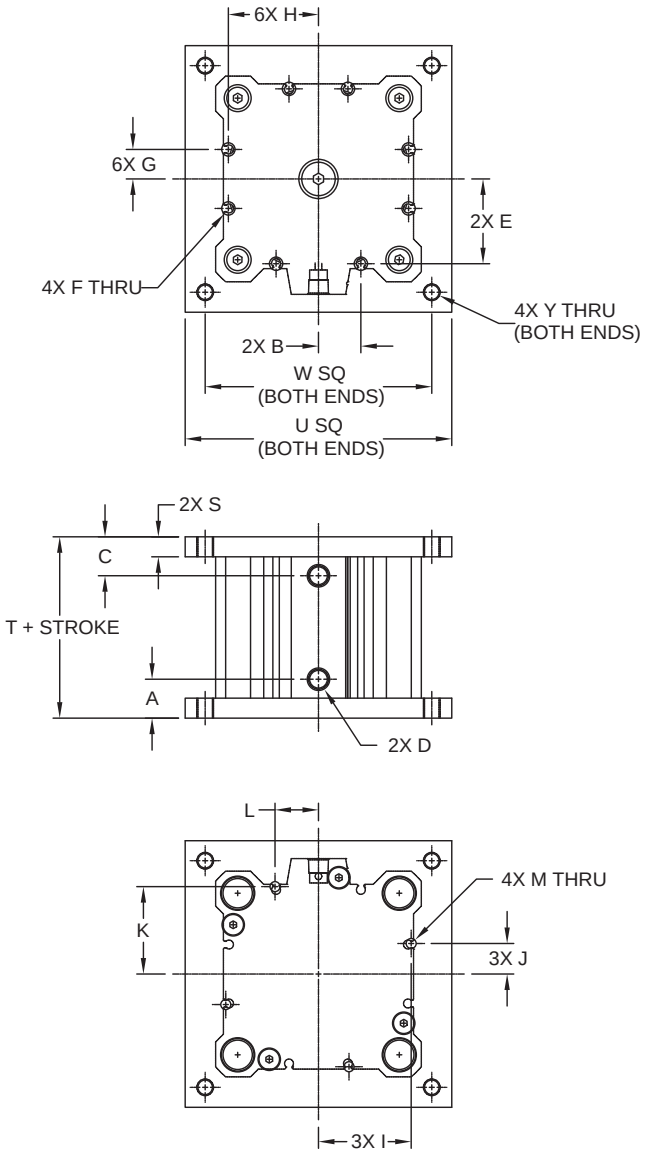


Non-Rotational Accuracy

Bore	Accuracy (A)
50mm	+/- .17°
80mm	+/- .14°
125mm	+/- .11°

Materials of Construction

Component	Material
Cylinder Body	PTFE-impregnated hard anodized aluminum
Rear Mounting Plate	Anodized Aluminum
Guide Shafts	Hard Chrome Plated Stainless Steel
Guide Shaft Bearings	Composite Plastic
Tooling Plate	Anodized Aluminum
Piston Rod	Stainless Steel
Rod Guide	Aluminum Alloy
Seals	Nitrile (Fluoroelastomer optional)
Piston	Aluminum Alloy



Dimensions (inches)

Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	S	T	U	W	Y
50mm	0.58	0.56	0.58	1/8 NPT	1.06	0.25	0.58	1.05	1.09	0.60	1.11	0.58	0.25	0.25	See Table Below	3.00	2.50	#10-32 UNF
80mm	0.73	0.80	0.73	1/8 NPT	1.59	0.25	0.55	1.68	1.74	0.57	1.64	0.82	0.19	0.38		5.00	4.25	5/16-24 UNF
125mm	1.00	1.07	1.00	3/8 NPT	2.43	0.25	0.85	2.52	2.57	0.87	2.48	1.09	0.19	0.50		7.00	5.88	1/2-20 UNF

Overall Length, Dimension "T"

Bore	Without M Option	With M Option
50mm	Strokes: 0-24mm	Strokes: 0-21mm
	1.86	2.42
	Strokes: 25-100mm	Strokes: 22-100mm
	0.88 + Stroke	1.59 + Stroke
80mm	Strokes: 0-22mm	Strokes: 0-18mm
	2.14	2.30
	Strokes: 23-100mm	Strokes: 19-100mm
	1.28 + Stroke	1.59 + Stroke
125mm	Strokes: 0-37mm	Strokes: 0-30mm
	3.03	3.25
	Strokes: 38-100mm	Strokes: 31-100mm
	1.58 + Stroke	2.17 + Stroke

Bimba Metric Twin Bore Series Cylinders

The Bimba Twin Bore Cylinder is a small cross-section, double-bore cylinder that provides highly accurate linear motion. The cylinder incorporates extra long piston rod bearings, resulting in high radial load capacity. Single and double end rod units are available in both Delrin® and ball bushing styles. The highly precise Air Table incorporates a rigid linear rail with recirculating ball bearings.

Basic Twin Bore (TB)

- Dual bores exert twice the force of a traditional cylinder while providing smooth, non-rotating actuation. The cylinder is symmetric and can be mounted from either side to allow convenient port access.

Double End Twin Bore (TBD)

- Double rod end provides a saddle-mount unit with improved loading and resistance to deflection.

Twin Bore Air Table (TBA)

- Smooth, precise movement is achieved via integration of a highly accurate recirculating ball bushing rail.

Delrin® is a trademark of Dupont.

How to Order

The model number for all Twin Bore cylinders consists of three alphanumeric clusters. These designate product type, bore size and stroke length, and options. Please refer to the charts below for an example of model number TB-1610-EX. This is a double-acting 16mm bore, Twin Bore Cylinder, with 10mm stroke, ball bushings, and U.S. customary threads.

PRODUCT TYPE

TB - Twin Bore Actuator
TBD - Twin Bore; Double End
TBA - Twin Bore Air Table

BORE SIZE

6mm
8mm
12mm
16mm
20mm
25mm
32mm

STANDARD STROKE LENGTHS (mm)	BORE SIZE													
	TB & TBD							TBA						
	6	8	12	16	20	25	32	6	8	12	16	20	25	32
10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
35	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
45	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	X	X	X	X	X	X	X	X	X	X	X	X	X	X
60	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
70	N/A	N/A	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
75	N/A	X	X	X	X	X	X	N/A	X	X	X	X	X	X
80	N/A	N/A	N/A	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
90	N/A	N/A	N/A	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100	N/A	N/A	N/A	X	X	X	X	N/A	N/A	X	X	X	X	X
125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X
150	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X

TB-1610-EX

OPTIONS

(Enter in alphabetical order)

A1 - Stroke adjustment, both ends[1]
A2 - Stroke adjustment, extend only[1]
A3 - Stroke adjustment, retract only[1]
E - U.S. customary units (inch)
F - Full-Flow Port Orifice
K _ _ - Shock absorbers[1 2]
First _ will be: 1-Shock both ends
2-Shock extend only
3-Shock retract only
Second _ will be: 1-Light shock
2-Standard shock
3-Heavy shock
M - Magnetic position sensing
S - Side mounting holes[3]
V - High temperature; -15° to 135°C (0° to 275°F)[4]
X - Ball bushings[3 4]

Combination Availability

Options	All Bore Sizes
A1	E; M; V
A2	E; K31, 2,or 3; M; V
A3	E; K21, 2,or 3, M; V
E	A1, 2,or 3; K11, 2,or 3; K21, 2,or 3; K31, 2,or 3; M; S; V; X
K11, 2 or 3	E; M; V
K21, 2 or 3	A3; E; M; V
K31, 2 or 3	A2; E; M; V
M	A1, 2,or 3; K11, 2,or 3; E; K21, 2,or 3; K31, 2,or 3; S; V; X
S	E; M; V; X
V	A1, 2,or 3; E; K11, 2,or 3; K21, 2,or 3; K31, 2,or 3; M; S; X
X	E; M; S; V

Bumpers standard on all models
[1]*TBA Models Only*
[2]*N/A on 6mm bore*
[3]*TB and TBD Models Only*
NOTE: TB and TBD stroke lengths are available in any 0.1mm increment up to 225mm maximum (12 – 32 bores only). Consult your distributor for pricing of any stroke length not listed as standard above. TBA models available only in those stroke lengths listed as standard above.
[4]*Not available on 6mm and 8mm*

List Prices

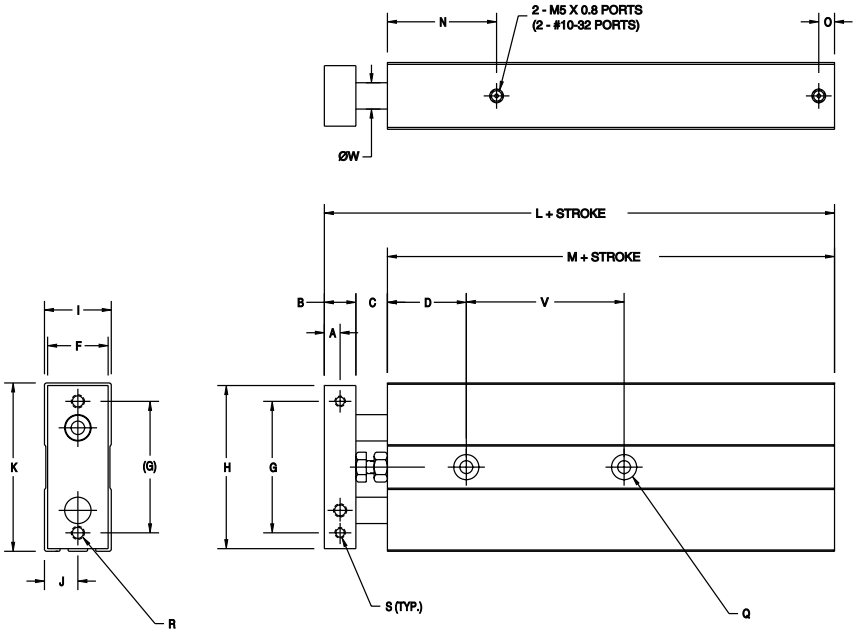
Model Type	Bore Size						
	6mm	8mm	12mm	16mm	20mm	25mm	32mm
TB	$87.25	$85.70	$85.25	$83.15	$89.15	$95.95	$103.65
add per 5mm	1.85	1.85	2.25	3.75	3.75	3.75	4.35
TBD	177.60	181.05	142.55	145.55	155.95	166.85	181.30
add per 5mm	4.45	4.45	5.40	7.35	7.35	7.35	8.60
TBA; Prices by Stroke							
10mm	252.65	275.25	344.00	354.10	422.85	489.40	547.80
20mm	281.20	288.15	344.00	354.10	422.85	489.40	547.80
30mm	306.45	318.50	344.00	354.10	422.85	489.40	547.80
40mm	396.45	403.10	375.05	386.55	461.30	534.70	598.90
50mm	428.00	441.25	405.65	416.00	499.40	580.25	649.90
75mm	N/A	460.15	467.35	493.40	555.55	648.50	726.10
100mm	N/A	N/A	557.30	570.50	647.60	739.00	827.90
125mm	N/A	N/A	N/A	660.15	737.60	839.05	939.70
150mm	N/A	N/A	N/A	N/A	827.35	938.85	1051.75

Options	Bore Size						
	6mm	8mm	12mm	16mm	20mm	25mm	32mm
A- Stroke Adjustment (TBA; per end)	$29.10	$30.20	$32.45	$32.45	$37.40	$37.40	$43.40
F- Full-flow Port Orifice	N/A	N/A	6.40	6.40	6.40	8.10	8.10
K- Shock Absorbers (TBA; per end)	N/A	71.80	77.45	77.45	93.00	102.15	111.65
M - MRS Position Sensing	4.95	5.25	5.85	6.40	6.95	7.60	8.10
S - Side Mount Holes	3.85	4.05	4.65	4.65	5.50	5.50	6.40
V - High Temperature	N/A	N/A	12.75	15.00	15.00	17.30	19.90
X - Ball Bushings (TB)	N/A	N/A	38.80	39.70	49.05	50.25	68.05
X - Ball Bushings (TBD)	N/A	N/A	77.45	79.20	97.90	100.40	136.00

No Charge Options: E

TB Cylinder

Dimensions mm (inch)



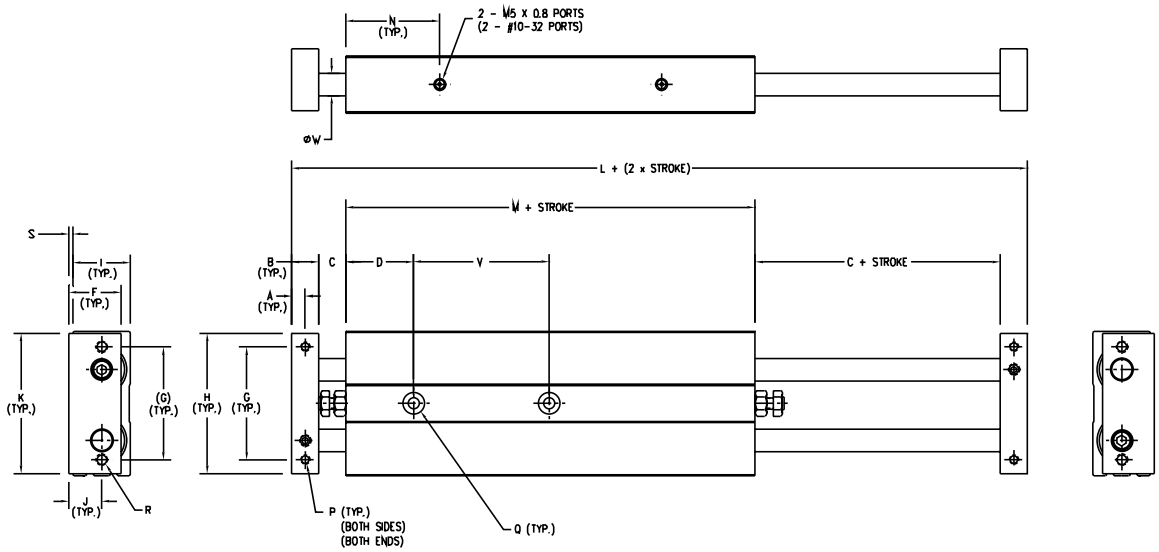
Bore	A	B	C	D	F	G	H	I	J	K	L	M
6	2.8 (0.11)	5.5 (0.22)	8 (0.32)	13 (0.51)	12 (0.47)	25 (0.98)	31 (1.22)	13.2 (0.52)	6.4 (0.25)	32 (1.26)	58.5 (2.30)	45 (1.77)
8	3 (0.12)	6 (0.24)	8 (0.32)	13 (0.51)	13 (0.51)	28 (1.10)	36 (1.42)	14.7 (0.58)	7.3 (0.29)	37.8 (1.49)	64 (2.52)	50 (1.97)
12	4 (0.16)	8 (0.32)	9 (0.35)	20 (0.79)	15 (0.59)	35 (1.38)	44 (1.73)	17.3 (0.68)	8.7 (0.34)	46 (1.81)	72 (2.83)	55 (2.17)
16	5 (0.20)	10 (0.39)	9 (0.35)	30 (1.18)	18 (0.71)	45 (1.77)	55 (2.17)	20.4 (0.80)	10.2 (0.40)	57 (2.24)	80 (3.16)	61 (2.41)
20	6 (0.24)	12 (0.47)	12 (0.47)	30 (1.18)	23 (0.91)	50 (1.97)	62 (2.44)	25.4 (1.00)	12.7 (0.50)	64 (2.52)	94 (3.70)	70 (2.76)
25	6 (0.24)	12 (0.47)	12 (0.47)	30 (1.18)	28 (1.10)	66 (2.60)	78 (3.07)	30.4 (1.20)	15.2 (0.60)	80 (3.15)	96 (3.78)	72 (2.84)
32	8 (0.32)	16 (0.63)	14 (0.55)	30 (1.18)	36 (1.42)	80 (3.15)	96 (3.78)	38.4 (1.51)	19.2 (0.76)	98 (3.86)	115 (4.51)	85 (3.33)

Bore	N	O	Q (Body Mounting Holes)	R	S	T (Ports)
6	16 (0.63)	6.7 (0.27)	M4x0.7 6H (#8-32 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)
8	16.1 (0.64)	6.7 (0.27)	M4x0.7 6H (#8-32 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)
12	30.6 (1.20)	5 (0.20)	M4x0.7 6H (#8-32 UNC-2B)	M4x0.7 6H (#8-32 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)
16	36.2 (1.42)	4.5 (0.18)	M5x0.8 6H (#10-32 UNF-2B)	M5x0.8 6H (#10-32 UNF-2B)	M4x0.7 6H (#8-32 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)
20	41.5 (1.63)	6 (0.24)	M6x1 6H (1/4-20 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)	M4x0.7 6H (#8-32 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)
25	45 (1.77)	5 (0.20)	M8x1.25 6H (5/16-18 UNC-2B)	M6x1 6H (1/4-20 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)	M5x0.8 6H (#10-32 UNF-2B)
32	53 (2.09)	7.2 (0.28)	M8x1.25 6H (5/16-18 UNC-2B)	M6x1 6H (1/4-20 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)	G 1/8 (NPT 1/8)

Bore	V Based on Stroke										W
	0-10mm	11-20mm	0-20mm	21-25mm	21-30mm	26-50mm	31-40mm	41-50mm	51-75mm	51-80mm	81-100mm	
6	15 (0.59)	20 (0.79)	N/A N/A	N/A N/A	25 (0.98)	N/A N/A	30 (1.18)	35 (1.38)	N/A N/A	N/A N/A	N/A N/A	3 (.12)
8	15 (0.59)	20 (0.79)	N/A N/A	N/A N/A	25 (0.98)	N/A N/A	30 (1.18)	35 (1.38)	47.5 (1.87)	N/A N/A	N/A N/A	4 (.16)
12	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	50 (1.97)	N/A N/A	6 (.24)
16	N/A N/A	N/A N/A	25 (0.98)	35 (1.38)	N/A N/A	35 (1.38)	N/A N/A	N/A N/A	N/A N/A	45 (1.77)	55 (2.17)	8 (.32)
20	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	60 (2.36)	60 (2.36)	10 (.39)
25	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	60 (2.36)	60 (2.36)	12 (.47)
32	N/A N/A	N/A N/A	40 (1.58)	40 (1.58)	N/A N/A	50 (1.97)	N/A N/A	N/A N/A	N/A N/A	70 (2.76)	70 (2.76)	16 (.63)

TBD Cylinder

Dimensions mm (inch)



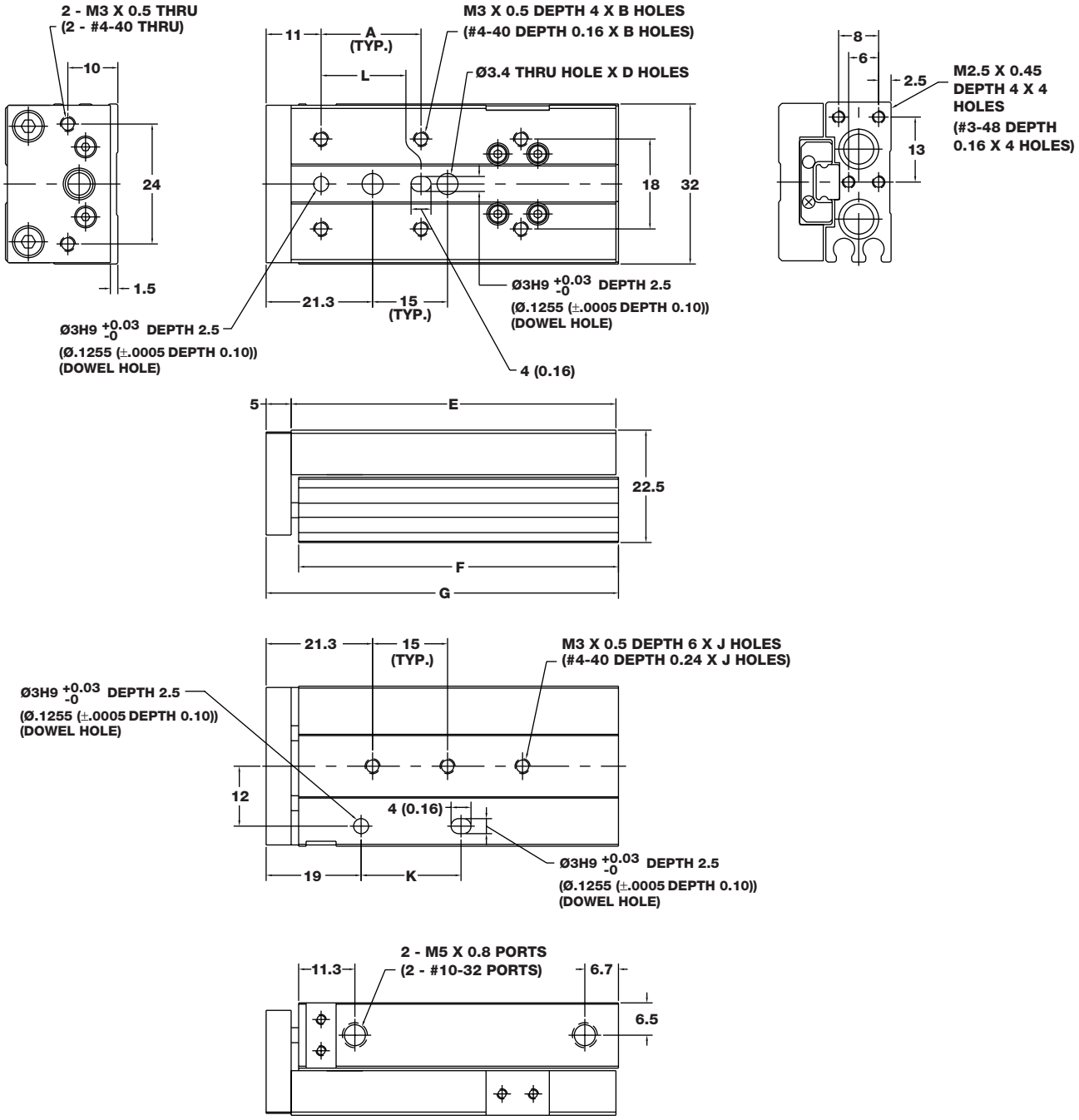
Bore	A	B	C	D	F	G	H	I	J	K	L	M	N
6	2.8 (0.11)	5.5 (0.22)	8 (0.32)	13 (0.51)	12 (0.47)	25 (0.98)	31 (1.22)	13.2 (0.52)	7.8 (0.31)	32 (1.26)	92.9 (3.66)	66 (2.60)	16 (0.63)
8	3 (0.12)	6 (0.24)	8 (0.32)	13 (0.51)	13 (0.51)	28 (1.10)	36 (1.42)	14.7 (0.58)	8.6 (0.34)	37.8 (1.49)	92.9 (3.66)	66 (2.60)	16.1 (0.64)
12	4 (0.16)	8 (0.32)	9 (0.35)	20 (0.79)	15 (0.59)	35 (1.38)	44 (1.73)	17.3 (0.68)	10.4 (0.41)	46 (1.81)	116.3 (4.58)	82.3 (3.24)	30.6 (1.20)
16	5 (0.20)	10 (0.39)	9 (0.35)	30 (1.18)	18 (0.71)	45 (1.77)	55 (2.17)	20.4 (0.80)	12.0 (0.47)	57 (2.24)	131.5 (5.18)	93.5 (3.68)	36.2 (1.42)
20	6 (0.24)	12 (0.47)	12 (0.47)	30 (1.18)	23 (0.91)	50 (1.97)	62 (2.44)	25.4 (1.00)	14.5 (0.57)	64 (2.52)	154.2 (6.07)	106.2 (4.18)	41.5 (1.63)
25	6 (0.24)	12 (0.47)	12 (0.47)	30 (1.18)	28 (1.10)	66 (2.60)	78 (3.07)	30.4 (1.20)	17.0 (0.67)	80 (3.15)	160.9 (6.33)	112.9 (4.45)	45 (1.77)
32	8 (0.32)	16 (0.63)	14 (0.55)	30 (1.18)	36 (1.42)	80 (3.15)	96 (3.78)	38.4 (1.51)	21.0 (0.83)	98 (3.86)	192.6 (7.58)	132.6 (5.22)	53 (2.09)

Bore	P	Q (Body Mounting Holes)	R	S	T (Ports)
6	M3x0.5 6H (#4-40 UNC-2B)	M4x0.7 6H (#8-32 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	1.3 (.05)	M5x0.8 6H (#10-32 UNF-2B)
8	M3x0.5 6H (#4-40 UNC-2B)	M4x0.7 6H (#8-32 UNC-2B)	M3x0.5 6H (#4-40 UNC-2B)	1.3 (.05)	M5x0.8 6H (#10-32 UNF-2B)
12	M3x0.5 6H (#4-40 UNC-2B)	M4x0.7 6H (#8-32 UNC-2B)	M4x0.7 6H (#8-32 UNC-2B)	1.8 (.07)	M5x0.8 6H (#10-32 UNF-2B)
16	M4x0.7 6H (#8-32 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)	M5x0.8 6H (#10-32 UNF-2B)	1.8 (.07)	M5x0.8 6H (#10-32 UNF-2B)
20	M4x0.7 6H (#8-32 UNC-2B)	M6x1 6H (1/4-20 UNC-2B)	M5x0.8 6H (#10-32 UNF-2B)	1.8 (.07)	M5x0.8 6H (#10-32 UNF-2B)
25	M5x0.8 6H (#10-32 UNF-2B)	M8x1.25 6H (5/16-18 UNC-2B)	M6x1 6H (1/4-20 UNC-2B)	1.8 (.07)	M5x0.8 6H (#10-32 UNF-2B)
32	M5x0.8 6H (#10-32 UNF-2B)	M8x1.25 6H (5/16-18 UNC-2B)	M6x1 6H (1/4-20 UNC-2B)	1.8 (.07)	G 1/8 (NPT 1/8)

Bore	V Based on Stroke										W
	0-10mm	11-20mm	0-20mm	21-25mm	21-30mm	26-50mm	31-40mm	41-50mm	51-75mm	51-80mm	81-100mm	
6	15 (0.59)	20 (0.79)	N/A N/A	N/A N/A	25 (0.98)	N/A N/A	30 (1.18)	35 (1.38)	N/A N/A	N/A N/A	NA (NA)	3 (.12)
8	15 (0.59)	20 (0.79)	N/A N/A	N/A N/A	25 (0.98)	N/A N/A	30 (1.18)	35 (1.38)	47.5 (1.87)	N/A N/A	NA (NA)	4 (.16)
12	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	50 (1.97)	NA (NA)	6 (.24)
16	N/A N/A	N/A N/A	25 (0.98)	35 (1.38)	N/A N/A	35 (1.38)	N/A N/A	N/A N/A	N/A N/A	45 (1.77)	55 (2.17)	8 (.32)
20	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	60 (2.36)	60 (2.36)	10 (.39)
25	N/A N/A	N/A N/A	30 (1.18)	30 (1.18)	N/A N/A	40 (1.58)	N/A N/A	N/A N/A	N/A N/A	60 (2.36)	60 (2.36)	12 (.47)
32	N/A N/A	N/A N/A	40 (1.58)	40 (1.58)	N/A N/A	50 (1.97)	N/A N/A	N/A N/A	N/A N/A	70 (2.76)	70 (2.76)	16 (.63)

TBA Cylinder: 6mm Bore

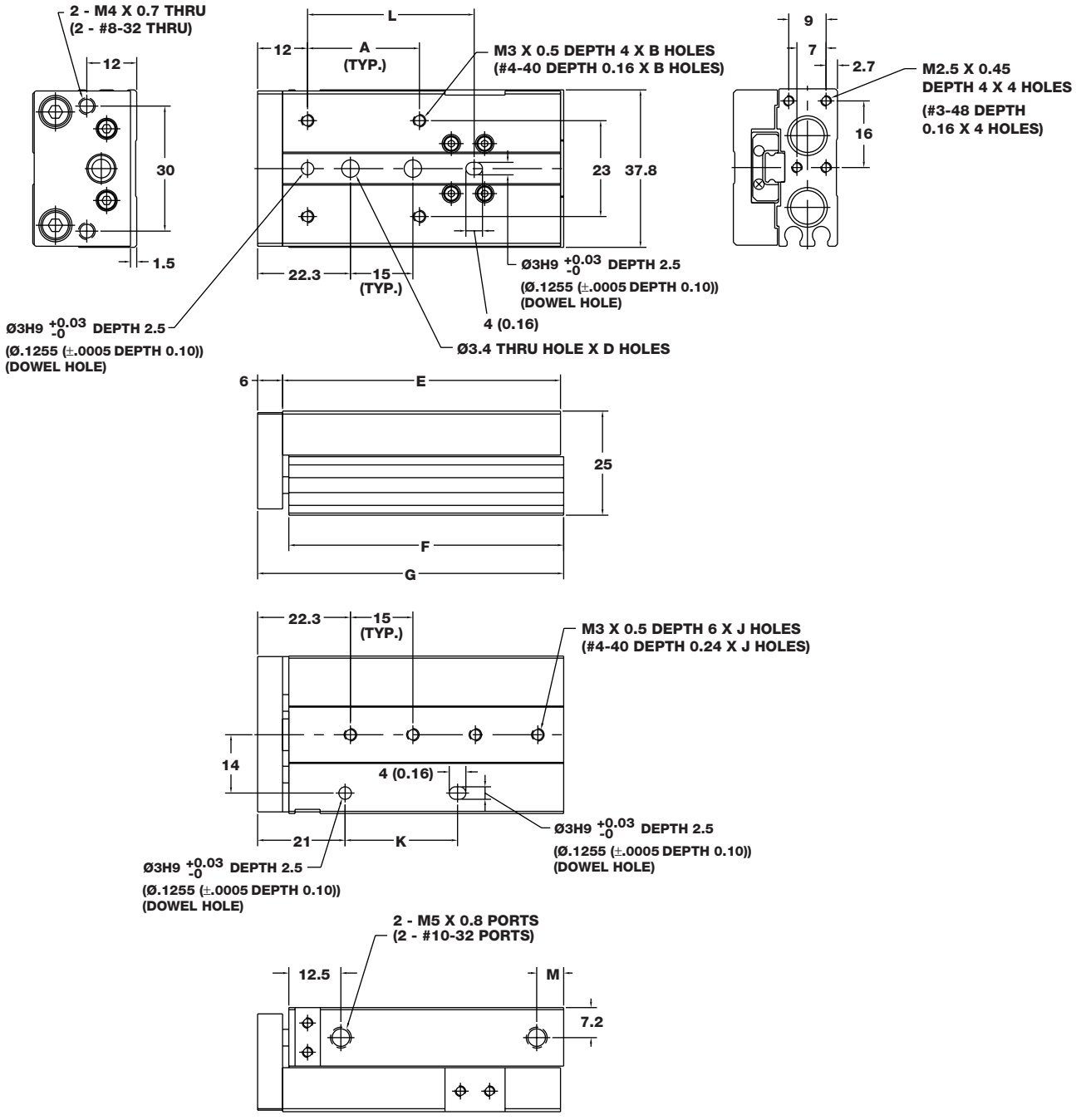
Dimensions mm (inch)



Stroke	A		B	D	E		F		G		J	K		L	
10	20	(0.79)	4	2	45	(1.77)	44	(1.73)	50.5	(1.99)	2	16	(0.63)	20	(0.79)
20	30	(1.18)	4	2	55	(2.17)	54	(2.13)	60.5	(2.38)	3	18	(0.71)	20	(0.79)
30	20	(0.79)	6	2	65	(2.56)	64	(2.52)	70.5	(2.78)	3	20	(0.79)	20	(0.79)
40	28	(1.10)	6	3	95	(3.74)	94	(3.70)	100.5	(3.96)	5	28	(1.10)	35	(1.38)
50	38	(1.50)	6	3	104.5	(4.11)	104.5	(4.11)	111	(4.37)	6	28	(1.10)	35	(1.38)

TBA Cylinder: 8mm Bore

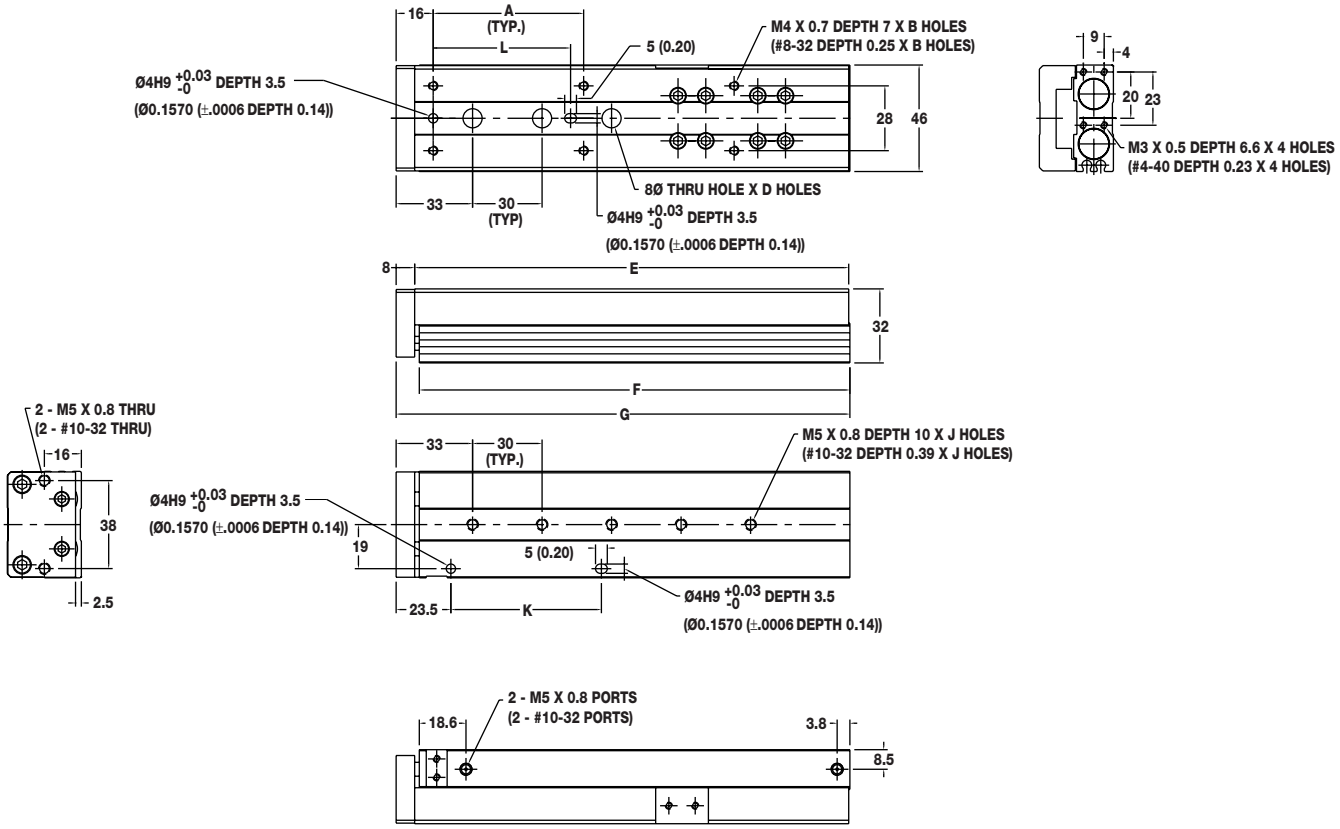
Dimensions mm (inch)



Stroke	A		B	D	E		F		G		J	K		L		M	
10	25	(0.98)	4	3	49.7	(1.96)	49	(1.93)	55.5	(2.19)	3	19	(0.75)	18	(0.71)	6.5	(0.26)
20	25	(0.98)	4	3	56.7	(2.23)	56	(2.21)	62.5	(2.46)	3	28	(1.10)	18	(0.71)	6.5	(0.26)
30	40	(1.58)	4	2	66.7	(2.63)	66	(2.60)	72.5	(2.85)	3	28	(1.10)	40	(1.58)	6.5	(0.26)
40	50	(1.97)	4	3	91.2	(3.59)	90.4	(3.56)	97	(3.82)	5	31	(1.22)	50	(1.97)	11	(0.43)
50	38	(1.50)	6	3	102.3	(4.03)	101.5	(4.0)	108	(4.25)	6	58	(2.28)	50	(1.97)	6.5	(0.26)
75	50	(1.97)	6	5	133.7	(5.27)	133	(5.24)	139.5	(5.49)	8	60	(2.36)	50	(1.97)	6.5	(0.26)

TBA Cylinder: 12mm Bore

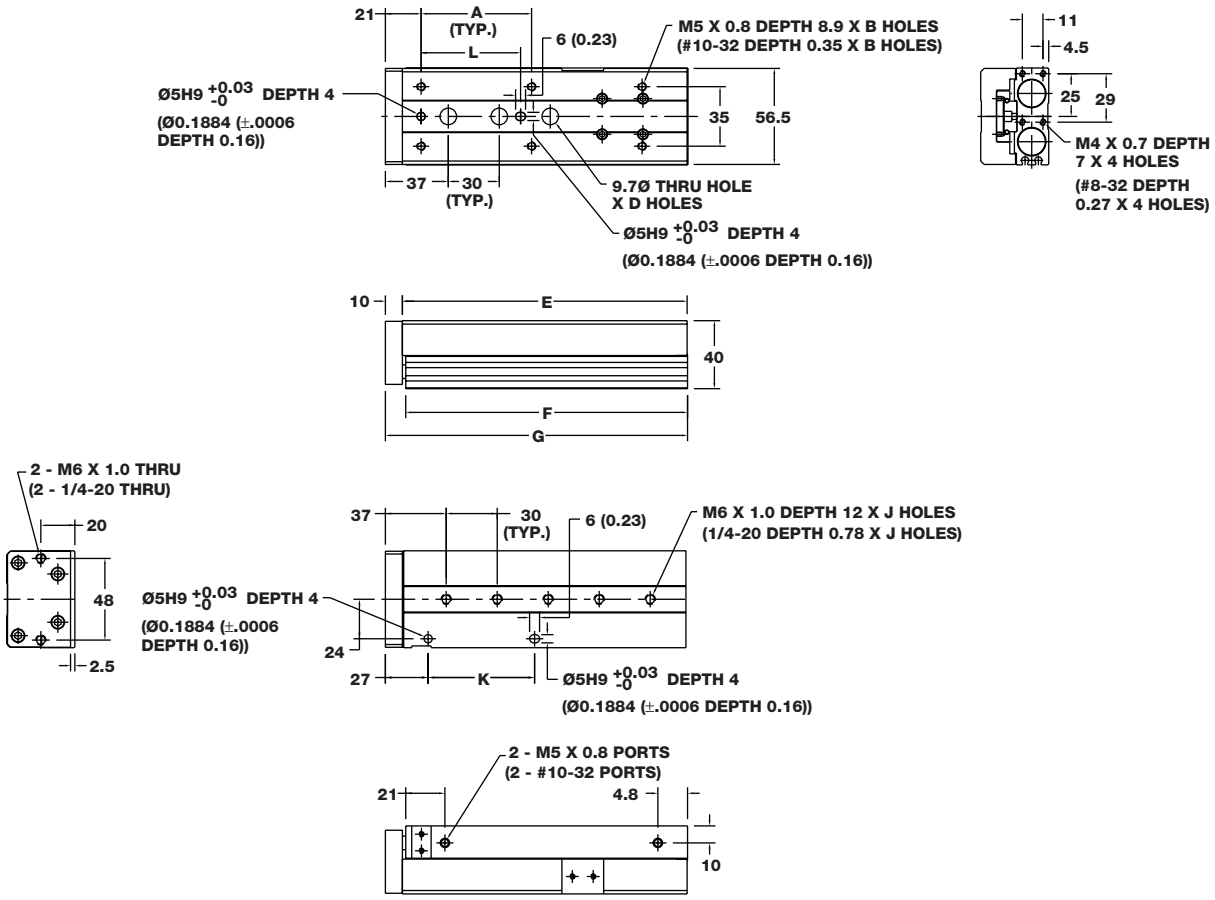
Dimensions mm (inch)



Stroke	A		B	D	E		F		G		J	K		L	
10	35	(1.38)	4	1	73	(2.86)	71	(2.80)	81	(3.20)	2	35	(1.38)	35	(1.38)
20	35	(1.38)	4	1	73	(2.86)	71	(2.80)	81	(3.20)	2	35	(1.38)	35	(1.38)
30	35	(1.38)	4	1	73	(2.86)	71	(2.80)	81	(3.20)	2	35	(1.38)	35	(1.38)
40	50	(1.97)	4	1	85	(3.36)	83	(3.28)	93	(3.67)	2	50	(1.97)	50	(1.97)
50	35	(1.38)	6	1	105	(4.12)	103	(4.06)	113	(4.46)	3	35	(1.38)	35	(1.38)
75	55	(2.17)	6	2	151	(5.93)	149	(5.88)	159	(6.27)	4	55	(2.17)	55	(2.17)
100	65	(2.56)	6	3	189	(7.43)	187	(7.37)	197	(7.76)	5	65	(2.56)	65	(2.56)

TBA Cylinder: 16mm Bore

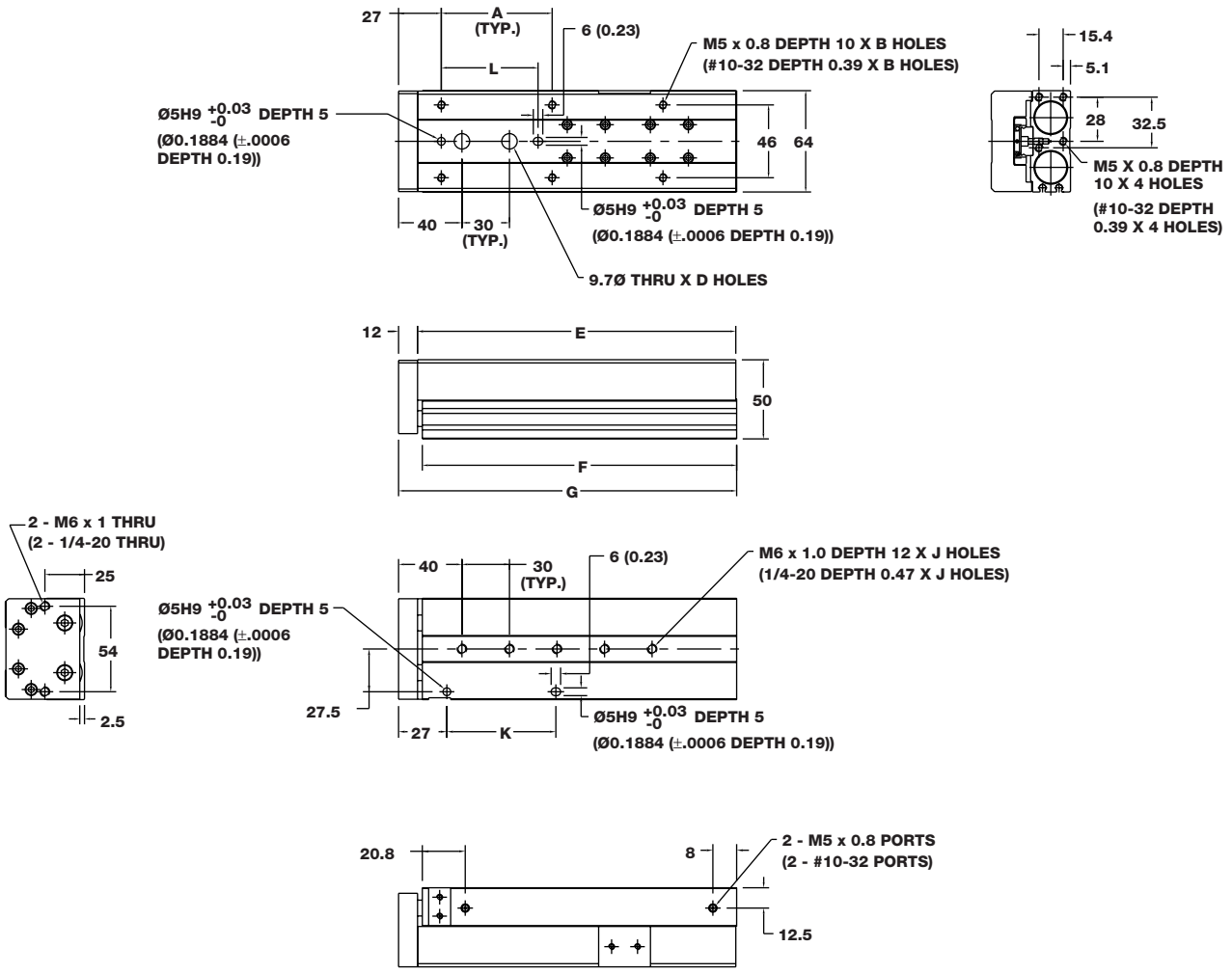
Dimensions mm (inch)



Stroke	A	B	D	E	F	G	J	K	L
10	35 (1.38)	4	1	79 (3.11)	77 (3.05)	89 (3.52)	2	35 (1.38)	35 (1.38)
20	35 (1.38)	4	1	79 (3.11)	77 (3.05)	89 (3.52)	2	35 (1.38)	35 (1.38)
30	35 (1.38)	4	1	79 (3.11)	77 (3.05)	89 (3.52)	2	35 (1.38)	35 (1.38)
40	40 (1.58)	6	1	89 (3.50)	87 (3.44)	99 (3.91)	3	40 (1.57)	40 (1.57)
50	30 (1.18)	6	1	116 (4.56)	114 (4.51)	126 (4.98)	3	30 (1.18)	30 (1.18)
75	55 (2.17)	6	2	145 (5.71)	143 (5.65)	155 (6.12)	4	55 (2.17)	55 (2.17)
100	65 (2.56)	6	3	170 (6.69)	168 (6.63)	180 (7.10)	5	65 (2.56)	65 (2.56)
125	70 (2.70)	8	4	205 (8.07)	203 (8.01)	215 (8.48)	6	70 (2.76)	64 (2.52)

TBA Cylinder: 20mm Bore

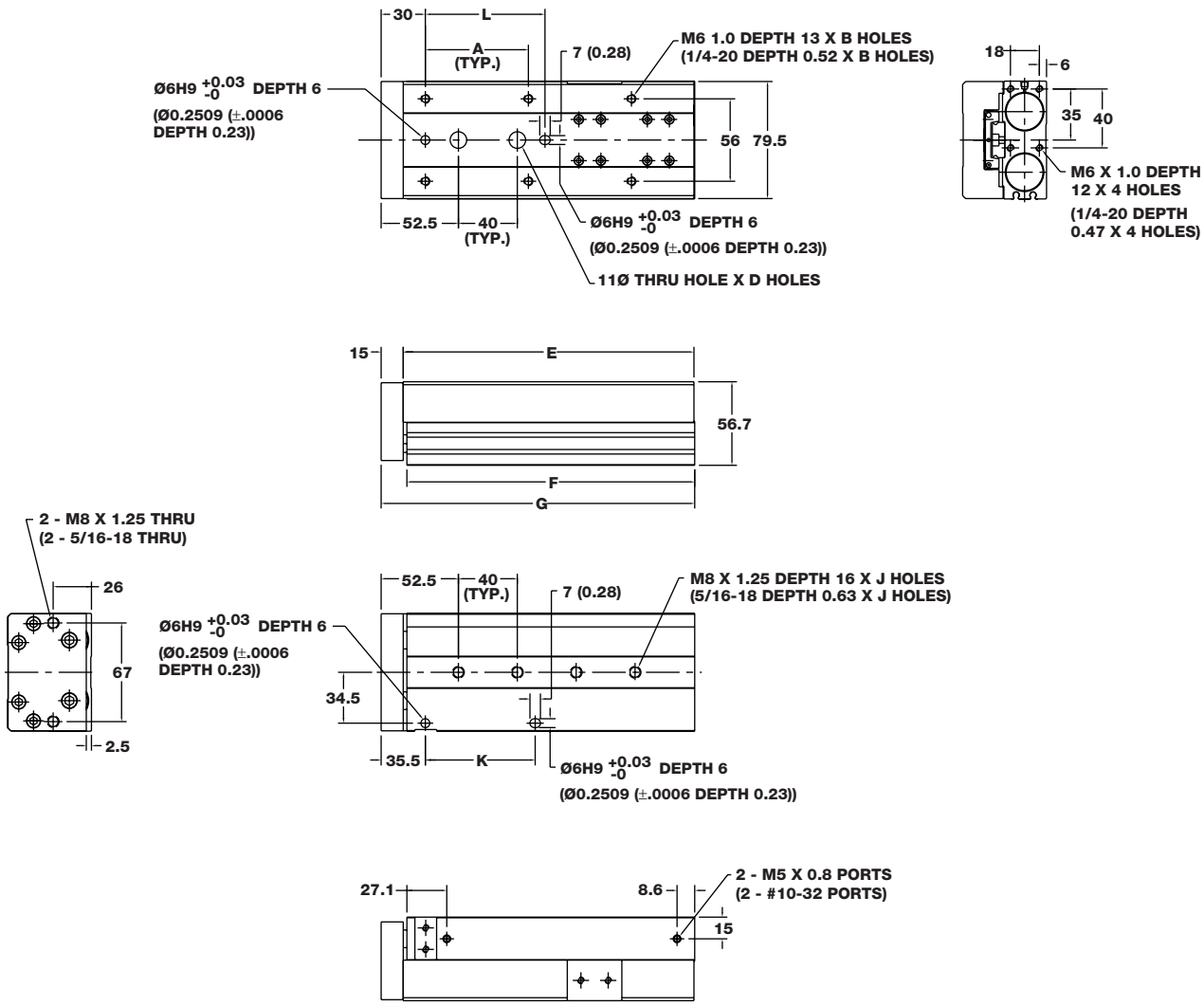
Dimensions mm (inch)



Stroke	A	B	D	E	F	G	J	K	L
10	50 (1.97)	4	1	84 (3.30)	81.5 (3.21)	96 (3.78)	2	50 (1.97)	50 (1.97)
20	50 (1.97)	4	1	84 (3.30)	81.5 (3.21)	96 (3.78)	2	50 (1.97)	50 (1.97)
30	50 (1.97)	4	1	84 (3.30)	81.5 (3.21)	96 (3.78)	2	50 (1.97)	50 (1.97)
40	60 (2.36)	4	1	94 (3.69)	91.5 (3.60)	106 (4.17)	2	60 (2.36)	60 (2.36)
50	35 (1.38)	6	1	108.5 (4.27)	106.5 (4.19)	121 (4.76)	3	35 (1.38)	35 (1.38)
75	60 (2.36)	6	2	140 (5.51)	138 (5.44)	152.5 (6.01)	4	60 (2.36)	60 (2.36)
100	70 (2.76)	6	3	200.5 (7.89)	198.5 (7.82)	213 (8.39)	5	70 (2.76)	64 (2.52)
125	70 (2.76)	8	4	230 (9.06)	228 (8.98)	242.5 (9.55)	6	70 (2.76)	64 (2.52)
150	80 (3.15)	8	5	263 (10.36)	261 (10.28)	275.5 (10.85)	7	80 (3.15)	80 (3.15)

TBA Cylinder: 25mm Bore

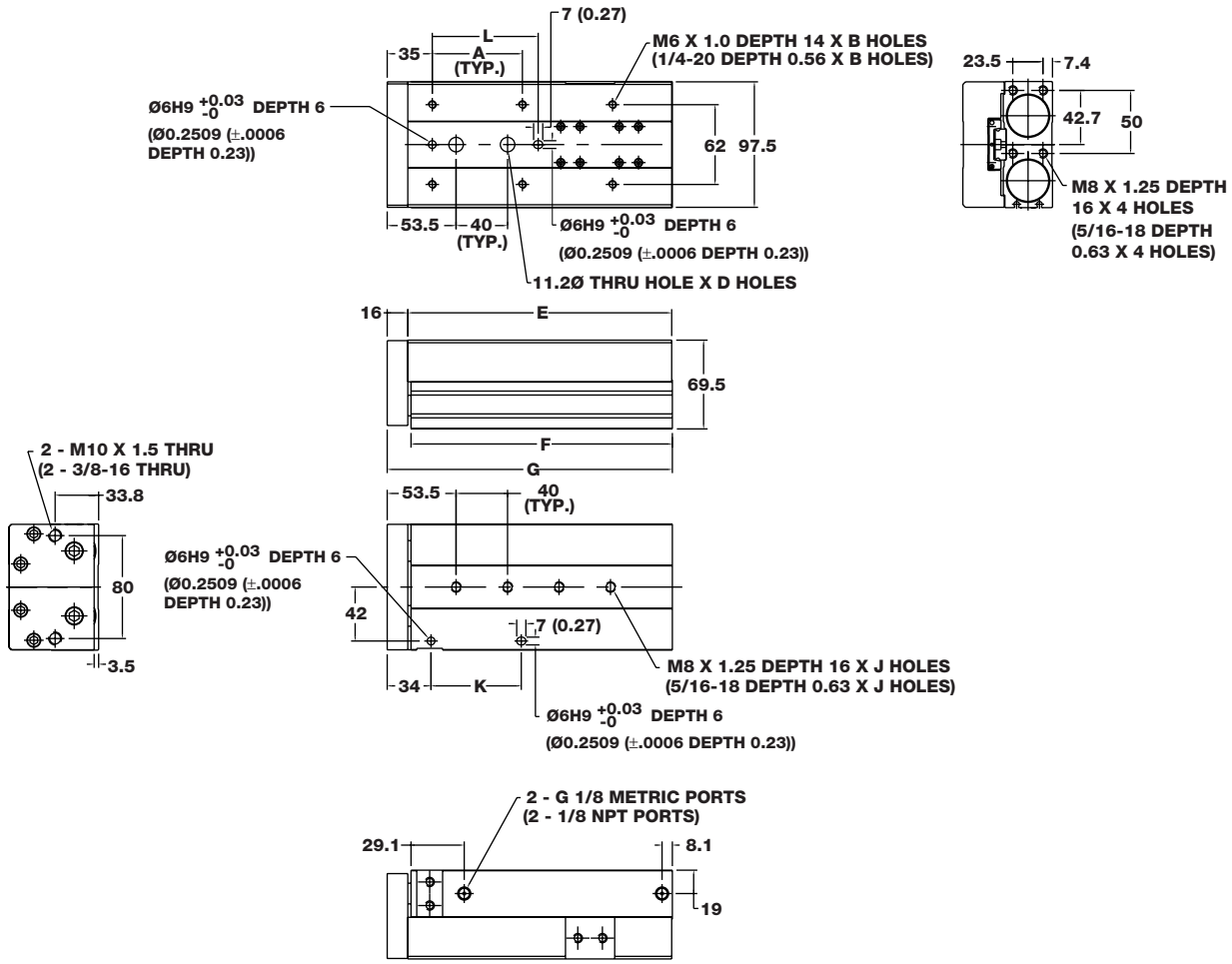
Dimensions mm (inch)



Stroke	A	B	D	E	F	G	J	K	L
10	50 (1.97)	4	1	92.5 (3.64)	90.5 (3.56)	108 (4.25)	2	50 (1.97)	50 (1.97)
20	50 (1.97)	4	1	92.5 (3.64)	90.5 (3.56)	108 (4.25)	2	50 (1.97)	50 (1.97)
30	50 (1.97)	4	1	92.5 (3.64)	90.5 (3.56)	108 (4.25)	2	50 (1.97)	50 (1.97)
40	60 (2.36)	4	1	102.5 (4.04)	100.5 (3.96)	118 (4.65)	2	60 (2.36)	60 (2.36)
50	35 (1.38)	6	1	115.5 (4.55)	113.5 (4.47)	131 (5.16)	2	35 (1.38)	35 (1.38)
75	60 (2.36)	6	1	156.5 (6.16)	154.5 (6.08)	172 (6.77)	3	60 (2.36)	60 (2.36)
100	70 (2.76)	6	2	197.5 (7.78)	195.5 (7.70)	213 (8.39)	4	70 (2.76)	76 (2.99)
125	75 (2.95)	8	3	253.5 (9.98)	251.5 (9.90)	269 (10.59)	5	75 (2.95)	75 (2.95)
150	80 (3.15)	8	3	270.5 (10.65)	268.5 (10.57)	286 (11.26)	6	80 (3.15)	80 (3.15)

TBA Cylinder: 32mm Bore

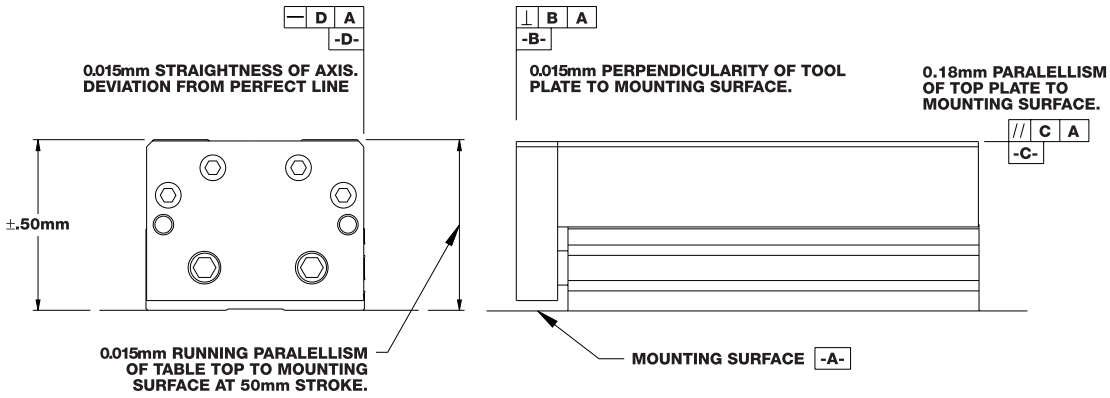
Dimensions mm (inch)



Stroke	A	B	D	E	F	G	J	K	L
10	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.97)	50 (1.97)
20	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.97)	50 (1.97)
30	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.97)	50 (1.97)
40	60 (2.36)	4	1	112 (4.41)	110 (4.34)	129 (5.06)	2	60 (2.36)	60 (2.36)
50	35 (1.38)	6	1	125 (4.93)	123 (4.85)	142 (5.58)	2	35 (1.38)	35 (1.38)
75	60 (2.36)	6	1	171 (6.73)	169 (6.66)	188 (7.39)	3	60 (2.36)	60 (2.36)
100	70 (2.76)	6	2	207 (8.15)	205 (8.08)	224 (8.80)	4	70 (2.76)	76 (2.99)
125	75 (2.95)	8	3	265 (10.44)	263 (10.36)	282 (11.09)	5	75 (2.95)	75 (2.95)
150	80 (3.15)	8	3	298 (11.74)	296 (11.66)	315 (12.39)	6	80 (3.15)	80 (3.15)

Engineering Specifications

Twin Bore Air Table (Model TBA)



Engineering Specifications

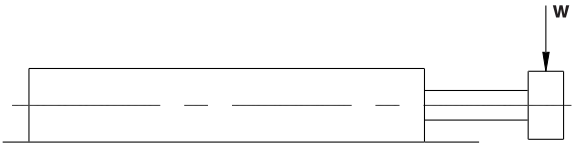
Operating Medium:	Air
Maximum Operating Pressure:	10 bar (140 psi)
Temperature Range:	-10° to 70°C (15° to 160°F)
Lubrication:	PTFE Grease
Expected Service Life:	2500 kilometers (1500 miles)*

*For filtered, lubricated air, no-load conditions; if unlubricated, life is approximately 1/3.

Twin Bore Style

(Model TB; Standard Bearings and Option X)

Maximum Radial Load kg-Force (lb)



Maximum allowable load for horizontally mounted cylinder with rods aligned in horizontal direction.

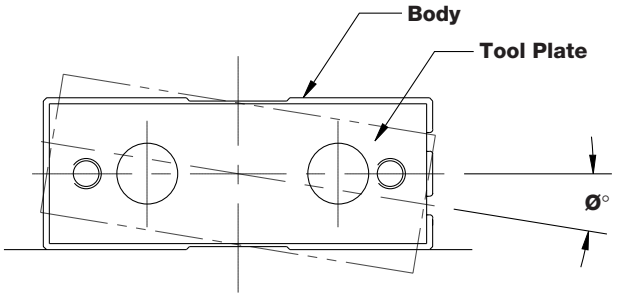
TB Standard Maximum Radial Loads Kgf (lb)														
Model No.	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TB-6	0.15	(0.33)	0.12	(0.26)	0.10	(0.21)	0.08	(0.18)	0.07	(0.16)	N/A	N/A	N/A	N/A
TB-8	0.14	(0.31)	0.11	(0.24)	0.09	(0.20)	0.08	(0.17)	0.07	(0.15)	0.05	(0.11)	N/A	N/A
TB-12	1.0	(2.14)	0.8	(1.77)	0.7	(1.51)	0.6	(1.31)	0.5	(1.16)	0.4	(0.90)	N/A	N/A
TB-16	1.5	(3.31)	1.3	(2.80)	1.1	(2.42)	1.0	(2.14)	0.9	(1.91)	0.7	(1.51)	0.6	(1.25)
TB-20	2.3	(5.07)	2.0	(4.36)	1.7	(3.83)	1.6	(3.41)	1.4	(3.07)	1.1	(2.47)	0.9	(2.06)
TB-25	3.1	(6.76)	2.7	(5.85)	2.3	(5.15)	2.1	(4.60)	1.9	(4.16)	1.5	(3.35)	1.3	(2.81)
TB-32	5.8	(12.82)	5.1	(11.30)	4.6	(10.10)	4.2	(9.13)	3.8	(8.33)	3.1	(6.84)	2.6	(5.80)

TB-X Maximum Radial Loads Kgf (lb)														
Model No.	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TB-12-X	0.7	(1.50)	0.6	(1.28)	0.5	(1.11)	0.4	(0.98)	0.4	(0.88)	0.3	(0.70)	N/A	N/A
TB-16-X	0.9	(2.08)	0.8	(1.80)	0.7	(1.58)	0.6	(1.42)	0.6	(1.28)	0.5	(1.03)	0.4	(0.86)
TB-20-X	1.4	(3.06)	1.2	(2.69)	1.1	(2.41)	1.0	(2.17)	0.9	(1.98)	0.7	(1.63)	0.6	(1.38)
TB-25-X	1.5	(3.36)	1.4	(2.97)	1.2	(2.67)	1.1	(2.42)	1.0	(2.21)	0.8	(1.82)	0.7	(1.55)
TB-32-X	2.7	(5.97)	2.4	(5.35)	2.2	(4.85)	2.0	(4.43)	1.9	(4.08)	1.6	(3.41)	1.3	(2.93)

Engineering Specifications

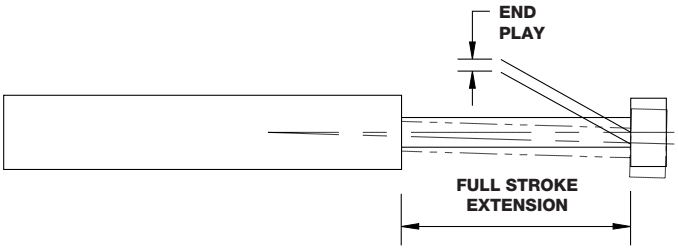
(Model TB; Standard Bearings and Option X) Maximum Radial Load kg-Force (lb) Non-Rotational Accuracy (degrees)

Maximum allowable value for Ø° in a free unloaded condition.



TB Model (Standard Bushings)	
Model No.	**Degrees (±)**
TB-6	0.15
TB-8	0.12
TB-12	0.10
TB-16	0.08
TB-20	0.08
TB-25	0.06
TB-32	0.05
TB Model - X Option (Ball Bushing)	
Model No.	**Degrees (±)**
TB-12	0.02
TB-16	0.02
TB-20	0.02
TB-25	0.01
TB-32	0.01

(Model TB; Standard Bearings and Option X) Maximum End Play mm (inch)

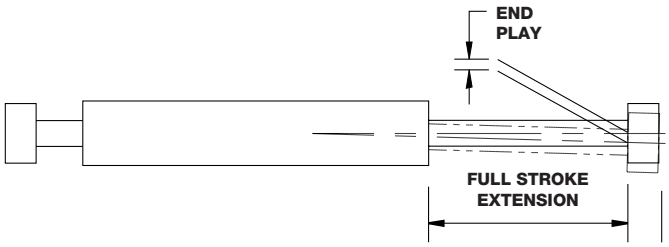


Maximum allowable movement of the tooling plate in the vertical direction with rods aligned in horizontal direction

TB Model													
Model No.	**Stroke Length mm**												
(Standard Bushings)	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TB-6	0.243	(0.010)	0.327	(0.013)	0.410	(0.016)	0.494	(0.019)	0.577	(0.023)	N/A	N/A	N/A	N/A
TB-8	0.255	(0.010)	0.343	(0.013)	0.431	(0.017)	0.519	(0.020)	0.607	(0.024)	0.828	(0.033)	N/A	N/A
TB-12	0.224	(0.009)	0.283	(0.011)	0.341	(0.013)	0.400	(0.016)	0.458	(0.018)	0.604	(0.024)	0.750	(0.030)
TB-16	0.229	(0.009)	0.283	(0.011)	0.337	(0.013)	0.391	(0.015)	0.445	(0.018)	0.581	(0.023)	0.716	(0.028)
TB-20	0.252	(0.010)	0.305	(0.012)	0.359	(0.014)	0.412	(0.016)	0.466	(0.018)	0.600	(0.024)	0.734	(0.029)
TB-25	0.231	(0.009)	0.278	(0.011)	0.325	(0.013)	0.372	(0.015)	0.420	(0.017)	0.537	(0.021)	0.655	(0.026)
TB-32	0.224	(0.009)	0.260	(0.010)	0.297	(0.012)	0.334	(0.013)	0.370	(0.015)	0.462	(0.018)	0.553	(0.022)
(Option X - Ball Bushing)	**Stroke Length mm**												
	10		**20**		**30**		**40**		**50**		**75**		**100**	
TB-12-X	0.143	(0.006)	0.185	(0.007)	0.228	(0.009)	0.271	(0.011)	0.313	(0.012)	0.420	(0.017)	0.526	(0.021)
TB-16-X	0.140	(0.006)	0.178	(0.007)	0.216	(0.008)	0.254	(0.010)	0.291	(0.011)	0.386	(0.015)	0.480	(0.019)
TB-20-X	0.133	(0.005)	0.165	(0.006)	0.197	(0.008)	0.229	(0.009)	0.260	(0.010)	0.340	(0.013)	0.419	(0.017)
TB-25-X	0.154	(0.006)	0.190	(0.007)	0.225	(0.009)	0.261	(0.010)	0.296	(0.012)	0.385	(0.015)	0.474	(0.019)
TB-32-X	0.156	(0.006)	0.185	(0.007)	0.214	(0.008)	0.243	(0.010)	0.273	(0.011)	0.346	(0.014)	0.419	(0.016)

Engineering Specifications

(Model TBD; Standard Bearings and Option X) Maximum End Play mm (inch)



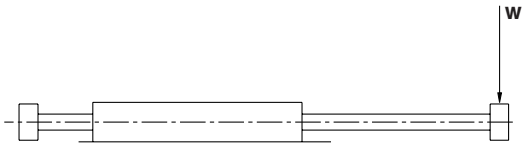
Maximum allowable movement of the tooling plate in the vertical direction with rods aligned in horizontal direction

TBD Model													
Model No.	**Stroke Length mm**												
(Standard Bushings)	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TBD-6	0.076	(0.003)	0.089	(0.003)	0.098	(0.004)	0.106	(0.004)	0.112	(0.004)	N/A	N/A	N/A	N/A
TBD-8	0.068	(0.003)	0.080	(0.003)	0.088	(0.003)	0.095	(0.004)	0.101	(0.004)	0.111	(0.004)	N/A	N/A
TBD-12	0.063	(0.002)	0.071	(0.003)	0.077	(0.003)	0.082	(0.003)	0.086	(0.003)	0.094	(0.004)	0.100	(0.004)
TBD-16	0.068	(0.003)	0.075	(0.003)	0.081	(0.003)	0.086	(0.003)	0.091	(0.004)	0.099	(0.004)	0.105	(0.004)
TBD-20	0.074	(0.003)	0.082	(0.003)	0.088	(0.003)	0.094	(0.004)	0.099	(0.004)	0.108	(0.004)	0.115	(0.005)
TBD-25	0.069	(0.003)	0.076	(0.003)	0.082	(0.003)	0.087	(0.003)	0.092	(0.004)	0.101	(0.004)	0.107	(0.004)
TBD-32	0.078	(0.003)	0.084	(0.003)	0.089	(0.003)	0.093	(0.004)	0.097	(0.004)	0.104	(0.004)	0.110	(0.004)
(Option X - Ball Bushing)	**Stroke Length mm**													
	10		**20**		**30**		**40**		**50**		**75**		**100**	
TBD-12-X	0.007	(0.0003)	0.008	(0.0003)	0.009	(0.0003)	0.009	(0.0004)	0.010	(0.0004)	0.011	(0.0004)	0.012	(0.0005)
TBD-16-X	0.006	(0.0002)	0.006	(0.0002)	0.007	(0.0003)	0.007	(0.0003)	0.008	(0.0003)	0.009	(0.0003)	0.009	(0.0004)
TBD-20-X	0.008	(0.0003)	0.009	(0.0004)	0.010	(0.0004)	0.011	(0.0004)	0.012	(0.0005)	0.013	(0.0005)	0.014	(0.0005)
TBD-25-X	0.009	(0.0004)	0.010	(0.0004)	0.011	(0.0004)	0.012	(0.0005)	0.013	(0.0005)	0.014	(0.0006)	0.015	(0.0006)
TBD-32-X	0.010	(0.0004)	0.010	(0.0004)	0.011	(0.0004)	0.012	(0.0005)	0.013	(0.0005)	0.014	(0.0005)	0.015	(0.0006)

Engineering Specifications

Twin Bore, Double-End Style (Model TBD; Standard Bearings and Option X)

Maximum Radial Load kg-Force (lb)



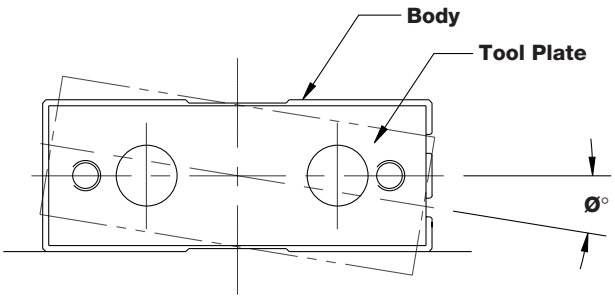
Maximum allowable load for horizontally mounted Double Rod End cylinder with rods aligned in horizontal direction.

TBD Standard Maximum Radial Loads Kgf (lb)														
Model No.	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TBD-6	0.83	(1.83)	0.79	(1.75)	0.77	(1.69)	0.75	(1.65)	0.73	(1.62)	N/A	N/A	N/A	N/A
TBD-8	0.90	(1.98)	0.86	(1.90)	0.84	(1.84)	0.82	(1.80)	0.81	(1.77)	0.78	(1.72)	N/A	N/A
TBD-12	1.5	(3.35)	1.5	(3.27)	1.5	(3.22)	1.4	(3.18)	1.4	(3.15)	1.4	(3.09)	N/A	N/A
TBD-16	2.3	(4.97)	2.2	(4.89)	2.2	(4.83)	2.2	(4.79)	2.2	(4.76)	2.1	(4.70)	2.1	(4.66)
TBD-20	3.3	(7.29)	3.3	(7.19)	3.2	(7.11)	3.2	(7.05)	3.2	(7.01)	3.1	(6.92)	3.1	(6.86)
TBD-25	4.3	(9.46)	4.2	(9.33)	4.2	(9.22)	4.2	(9.14)	4.1	(9.07)	4.1	(8.95)	4.0	(8.87)
TBD-32	7.5	(16.44)	7.4	(16.21)	7.3	(16.02)	7.2	(15.88)	7.2	(15.76)	7.1	(15.53)	7.0	(15.37)

TBD-X Maximum Radial Loads Kgf (lb)														
Model No.	**10**		**20**		**30**		**40**		**50**		**75**		**100**	
TBD-12-X	12.1	(26.70)	11.9	(26.09)	11.7	(25.65)	11.5	(25.33)	11.4	(25.08)	11.2	(24.64)	N/A	N/A
TBD-16-X	15.0	(33.04)	14.8	(32.51)	14.6	(32.13)	14.5	(31.84)	14.4	(31.61)	14.2	(31.20)	14.1	(30.94)
TBD-20-X	21.1	(46.37)	20.8	(45.71)	20.6	(45.22)	20.4	(44.84)	20.2	(44.54)	20.0	(43.99)	19.8	(43.62)
TBD-25-X	23.5	(51.64)	23.1	(50.89)	22.9	(50.32)	22.7	(49.87)	22.5	(49.51)	22.2	(48.86)	22.0	(48.42)
TBD-32-X	44.7	(98.38)	44.1	(96.98)	43.6	(95.89)	43.2	(95.01)	42.9	(94.29)	42.2	(92.94)	41.8	(92.01)

Non-Rotational Accuracy (degrees)

Maximum allowable value for Ø° in a free unloaded condition.



TBD Model (Standard Bushings)	
Model No.	**Degrees (±)**
TBD-6	0.15
TBD-8	0.12
TBD-12	0.10
TBD-16	0.08
TBD-20	0.08
TBD-25	0.06
TBD-32	0.05
TBD Model - X Option (Ball Bushing)	
Model No.	**Degrees (±)**
TBD-12	0.02
TBD-16	0.02
TBD-20	0.02
TBD-25	0.01
TBD-32	0.01

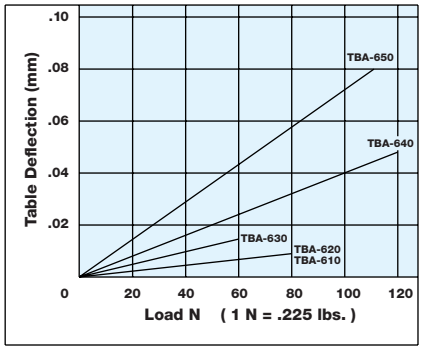
Engineering Specifications

Twin Bore Air Table (Model TBA)

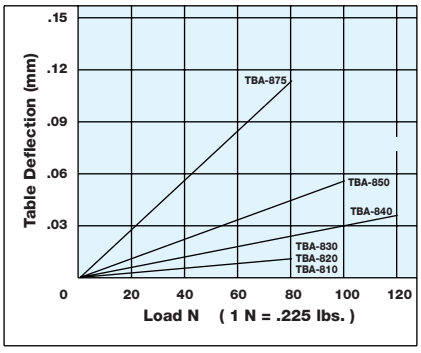
Table deflection by pitch moment

Table pitch deflection due to static pitch moment applied at arrow for fully extended stroke of slide table.

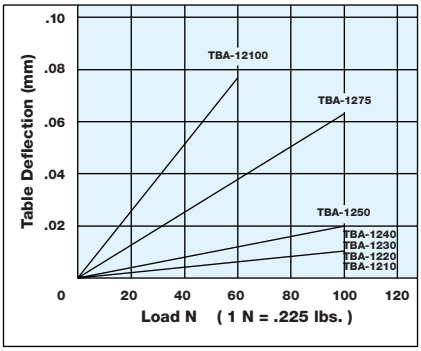
TBA-6



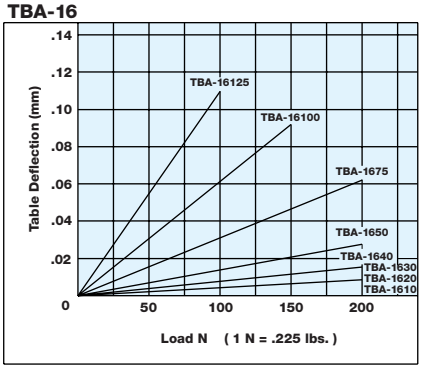
TBA-8



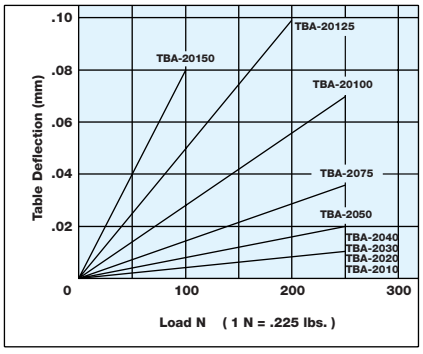
TBA-12



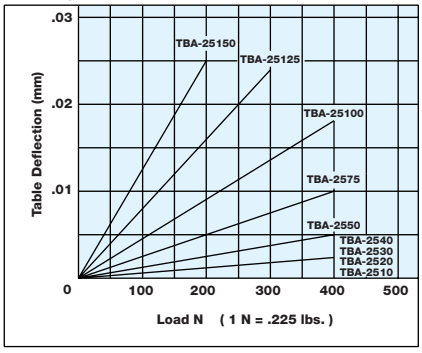
TBA-16



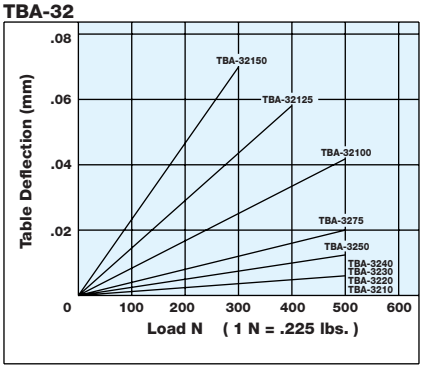
TBA-20



TBA-25



TBA-32



Engineering Specifications

Twin Bore Air Table (Model TBA)

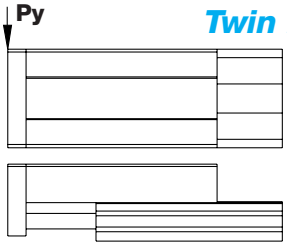
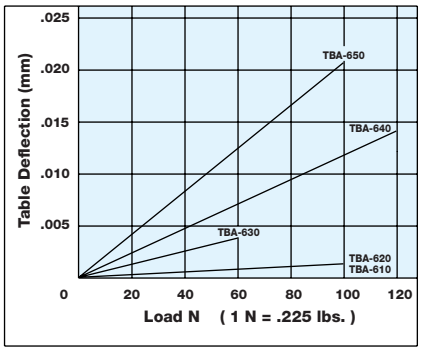


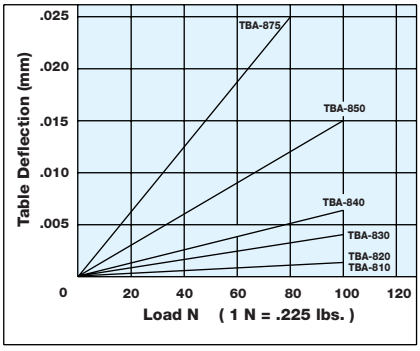
Table deflection by yaw moment

Table yaw deflection due to static yaw moment applied at arrow for fully extended stroke of slide table.

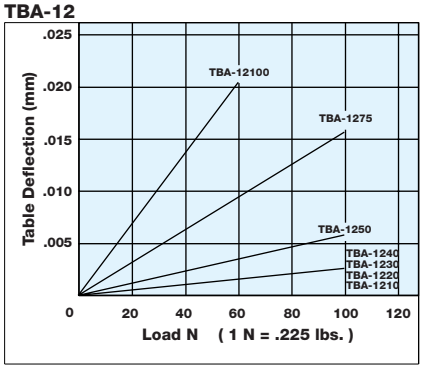
TBA-6



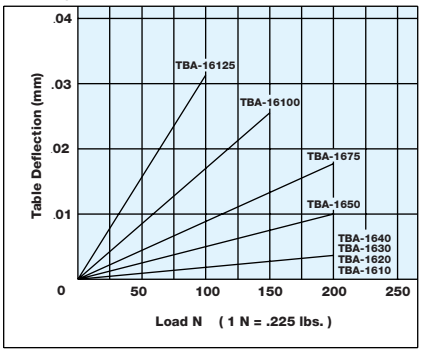
TBA-8



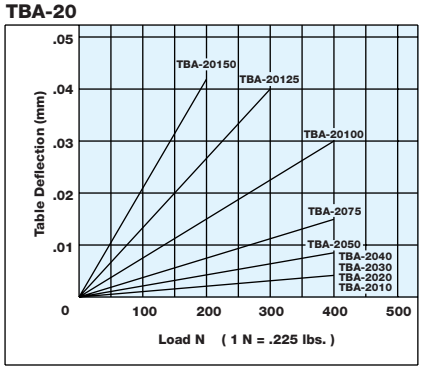
TBA-12



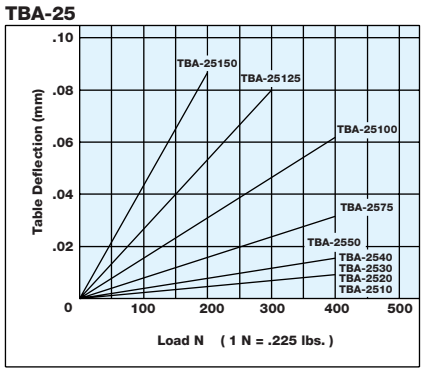
TBA-16



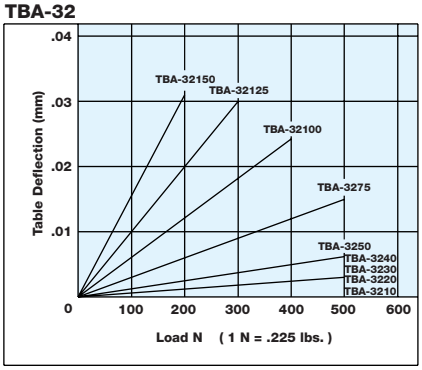
TBA-20



TBA-25



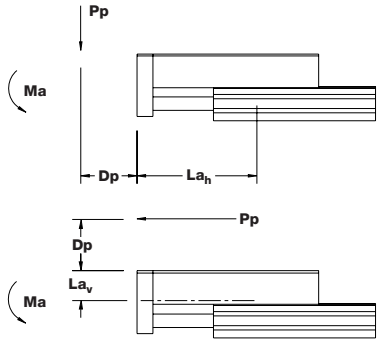
TBA-32



Engineering Specifications

Twin Bore Air Table (Model TBA)

Formula for calculation of allowable static load Pp, Py and Pr



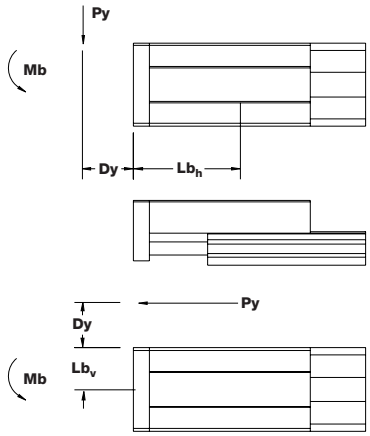
$$Pp = \frac{Ma \times 1000}{Dp + La} \text{ (Newtons)}$$

Dp = Distance from load point to body (mm).

La = Moment arm (mm) see chart.

Ma (Pitching Moment)

Model \ Stroke (mm)	Maximum Allowable Moment (Nm)								
	10	20	30	40	50	75	100	125	150
TBA-6	2.55	2.55	2.55	8.65	8.65	N/A	N/A	N/A	N/A
TBA-8	2.55	2.55	2.55	8.65	8.65	8.65	N/A	N/A	N/A
TBA-12	5.39	5.39	5.39	5.39	5.39	14.1	14.1	N/A	N/A
TBA-16	8.72	8.72	8.72	8.72	31.5	31.5	31.5	31.5	N/A
TBA-20	31.5	31.5	31.5	31.5	31.5	31.5	42.1	42.1	42.1
TBA-25	44.9	44.9	44.9	44.9	44.9	44.9	72.2	72.2	72.2
TBA-32	44.9	44.9	44.9	44.9	44.9	120	120	120	120



$$Py = \frac{Mb \times 1000}{Dy + Lb} \text{ (Newtons)}$$

Dy = Distance from load point to body (mm).

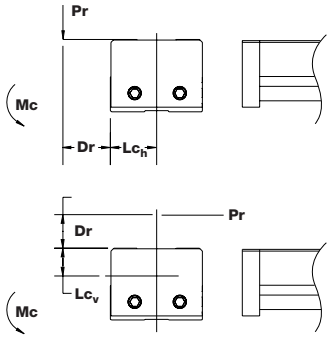
Lb = Moment arm (mm) see chart.

Mb (Yawing Moment)

Model \ Stroke (mm)	Maximum Allowable Moment (Nm)								
	10	20	30	40	50	75	100	125	150
TBA-6	2.55	2.55	2.55	8.65	8.65	N/A	N/A	N/A	N/A
TBA-8	2.55	2.55	2.55	8.65	8.65	8.65	N/A	N/A	N/A
TBA-12	5.39	5.39	5.39	5.39	5.39	14.1	14.1	N/A	N/A
TBA-16	8.72	8.72	8.72	8.72	31.5	31.5	31.5	31.5	N/A
TBA-20	31.5	31.5	31.5	31.5	31.5	31.5	42.1	42.1	42.1
TBA-25	44.9	44.9	44.9	44.9	44.9	44.9	72.2	72.2	72.2
TBA-32	44.9	44.9	44.9	44.9	44.9	120	120	120	120

Engineering Specifications

Twin Bore Air Table (Model TBA)



$$Pr = \frac{Mc \times 1000}{Dr + Lc} \quad \textit{(Newtons)}$$

Dr = Distance from load point to body (mm).

Lc = Moment arm (mm) see chart.

Mc (Rolling Moment)

Model \ Stroke (mm)	Maximum Allowable Moment (Nm)								
	10	20	30	40	50	75	100	125	150
TBA-6	5.1	5.1	5.1	13.1	13.1	N/A	N/A	N/A	N/A
TBA-8	5.1	5.1	5.1	13.1	13.1	13.1	N/A	N/A	N/A
TBA-12	15.2	15.2	15.2	15.2	15.2	22.8	22.8	N/A	N/A
TBA-16	22.8	22.8	22.8	22.8	38.1	38.1	38.1	38.1	N/A
TBA-20	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2
TBA-25	66.5	66.5	66.5	66.5	66.5	66.5	77.7	77.7	77.7
TBA-32	75.7	75.7	75.7	75.7	75.7	91.2	91.2	91.2	91.2

Bore/Stroke Constants

Model \ Stroke (mm)	Lah and Lbh Moment Lever Arm (mm)								
	10	20	30	40	50	75	100	125	150
TBA-6	30.5	40.5	50.4	71.6	81.6	N/A	N/A	N/A	N/A
TBA-8	30.5	41	51	72.8	83.1	108.1	N/A	N/A	N/A
TBA-12	58	58	58	68	78	120	145	N/A	N/A
TBA-16	63.5	63.5	63.5	73.5	89.5	114.5	139.5	164.5	N/A
TBA-20	70.5	70.5	70.5	80.5	92.5	117.5	157	182	207
TBA-25	77	77	77	87.5	98.5	124.5	165	190	215
TBA-32	79	79	79	89	99	139.5	165.5	190.5	215

Model	Moment Lever Arm Distances (mm)			
	La_v	Lb_v	Lc_h	Lc_v
TBA-6	9.1	15.7	15.7	9.1
TBA-8	9.1	18.6	18.6	9.1
TBA-12	12.5	23	23	12.5
TBA-16	15.5	28.5	28.5	15.5
TBA-20	20.5	32	32	20.5
TBA-25	22.5	40	40	22.5
TBA-32	27	49	49	27

Note: 1 N-m = 8.851 in-lb
1N-m = .7376 ft-lb

Theoretical Cylinder Forces

Force = Power Factor x Input Pressure

Bore	Direction	Power Factor (When Input pressure in bar)	Power Factor (When input pressure in psi)
6mm	Extend*	0.57	0.09
	Retract	0.42	0.07
8mm	Extend*	1.00	0.16
	Retract	0.75	0.12
12mm	Extend*	2.2	0.4
	Retract	1.6	0.2
16mm	Extend*	4.0	0.6
	Retract	3.0	0.4
20mm	Extend*	6.2	1.0
	Retract	4.8	0.8
25mm	Extend*	9.8	1.6
	Retract	7.6	1.2
32mm	Extend*	16.0	2.4
	Retract	12.0	1.8

**For TBD models use Retract Power Factors only; Extend is not applicable.*
BAR x Power Factor = kg
PSI x Power Factor = Pounds

Weights

TB Cylinder

Bore	Approx. Base Wt. of Cylinder gf (oz.)		Wt. Added Per 5mm of Stk gf (oz.)	
6	52.3	(1.85)	4.9	(0.17)
8	75.5	(2.66)	6.5	(0.23)
12	127.4	(4.5)	9.4	(0.3)
16	212.6	(7.5)	13.6	(0.4)
20	345.6	(12.1)	19.1	(0.6)
25	551.8	(19.4)	28.0	(0.9)
32	1046.5	(36.9)	44.4	(1.5)

TBD Cylinder

Bore	Approx. Base Wt. of Cylinder gf (oz.)		Wt. Added Per 5mm of Stk gf (oz.)	
6	81.8	(2.89)	5.5	(0.19)
8	109.7	(3.87)	7.4	(0.26)
12	208.7	(7.3)	11.6	(0.4)
16	361.3	(12.7)	17.6	(0.6)
20	580.9	(20.4)	25.3	(0.8)
25	943.1	(33.2)	36.9	(1.3)
32	1835.6	(64.7)	60.1	(2.1)

TBA Cylinder

Bore	Weight of Cylinder Based on Stroke Length gf (oz.)									
	10mm		20mm		30mm		40mm		50mm	
6	119.6	(4.22)	139.4	(4.92)	158.6	(5.60)	219.8	(7.75)	240.5	(8.48)
8	159.8	(5.64)	178.5	(6.30)	202.9	(7.16)	267.2	(9.42)	295.0	(10.41)
12	236.0	(8.3)	240.4	(8.4)	244.9	(8.6)	283.0	(9.9)	342.0	(12.0)
16	378.7	(13.3)	386.5	(13.6)	394.4	(13.9)	433.1	(15.2)	561.4	(19.8)
20	631.4	(22.2)	643.7	(22.7)	656.0	(23.1)	728.0	(25.6)	827.9	(29.2)
25	992.5	(35.0)	1010.2	(35.6)	1027.9	(36.2)	1128.3	(39.8)	1253.4	(44.2)
32	1660.0	(58.5)	1691.6	(59.6)	1723.1	(60.7)	1882.1	(66.3)	2078.8	(73.3)

TBA Cylinder

Bore	Weight of Cylinder Based on Stroke Length gf (oz.)							
	75mm		100mm		125mm		150mm	
6	N/A		N/A		N/A		N/A	
8	391.0	(13.79)	N/A		N/A		N/A	
12	479.9	(16.9)	616.9	(21.7)	N/A		N/A	
16	699.8	(24.6)	821.7	(28.9)	984.5	(34.7)	N/A	
20	1047.4	(36.9)	1438.4	(50.7)	1645.0	(58.0)	1872.4	(66.0)
25	1636.0	(57.7)	2019.1	(71.2)	2525.8	(89.1)	2710.5	(95.6)
32	2741.4	(96.7)	3277.9	(115.6)	4093.6	(144.4)	4591.6	(161.9)

Twin Bore Repair Kits

Each TB and TBD repair kit includes the appropriate number cup seals, rod wiper seals, rod seals, and rod guides. The TBA kits include the bumper in addition to the seals.

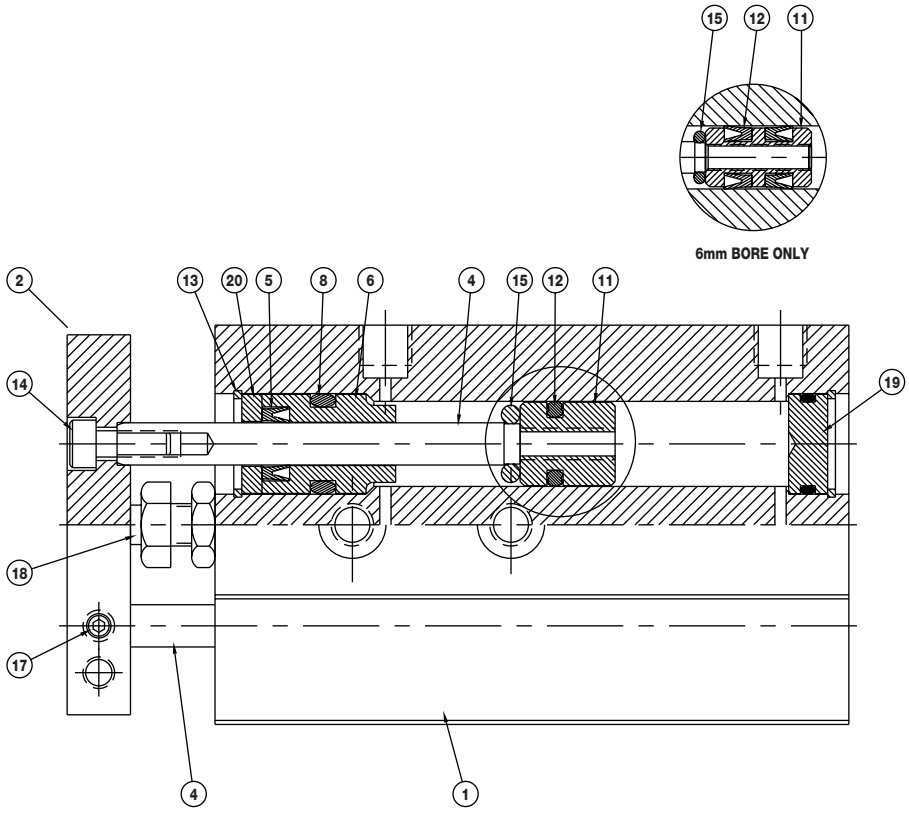
To order, please insert the bore code after the model designation for the desired repair kit. Suffix after bore code indicates seal and ball bushing options.

For Twin Bore cylinders prior to May, 2003, use the same part number except the prefix is designated as K (e.g., K-B-TB-12).

Repair Kit
K2-B-TB-__
K2-B-TB-__-V
K2-B-TBD-__
K2-B-TBD-__-V
K2-B-TB-__-X
K2-B-TB-__-VX
K2-B-TBD-__-X
K2-B-TBD-__-VX
K2-B-TBA-__
K2-B-TBA-__-V

Twin Bore

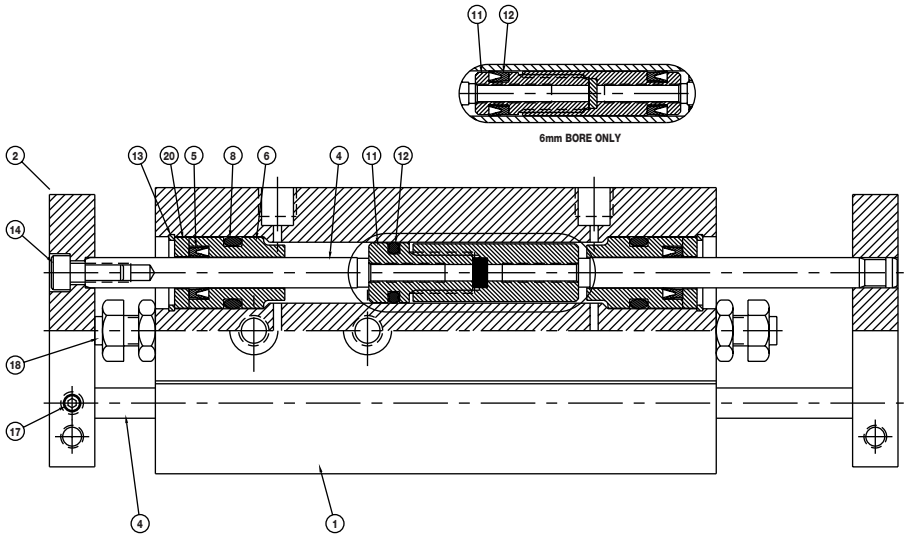
Standard Model 6mm – 8mm Bore



Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal	Nitrile
6	Rod Guide	White Delrin®
8	Rod Guide Seal	Nitrile
11	Piston	Aluminum
12	Piston Seal	Nitrile
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
15	Bumper	Urethane
17	Socket Head Set Screw	Zinc Plated Carbon Steel
18	Stroke Adjuster/Bumper	Stainless Bolt with Urethane Bumper
19	Rear Head	Anodized Aluminum
20	Rod Seal Retainer	Stainless Steel

Twin Bore

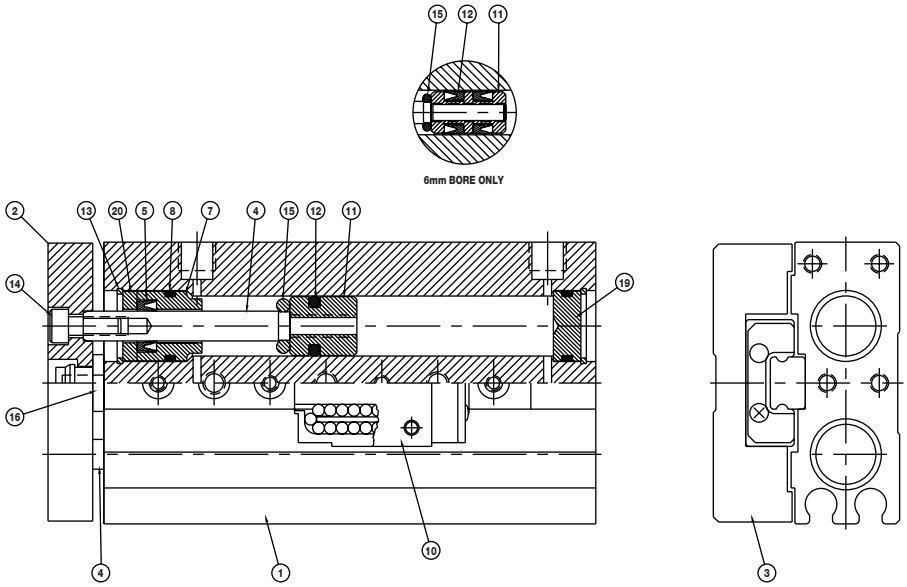
TBD (Double Rod End) 6mm – 8mm Bore



Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal	Nitrile
6	Rod Guide	White Delrin
8	Rod Guide Seal	Nitrile
11	Piston	Aluminum
12	Piston Seal	Nitrile
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
17	Socket Head Set Screw	Zinc Plated Carbon Steel
18	Stroke Adjuster/Bumper	Stainless Bolt with Urethane Bumper
20	Rod Seal Retainer	Stainless Steel

Twin Bore

TBA (Air Table Model) 6mm – 8mm Bore

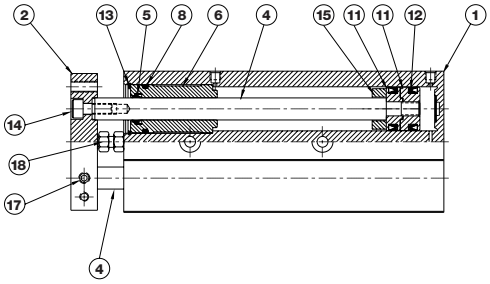


Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
3	Table Plate	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal	Nitrile
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	Nitrile
10	Table Bearing	Stainless Steel Rail + Stainless Steel Bearings
11	Piston	Aluminum
12	Piston Seal	Nitrile
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
15	Bumper	Urethane
19	Rear Head	Anodized Aluminum
20	Rod Seal Retainer	Stainless Steel

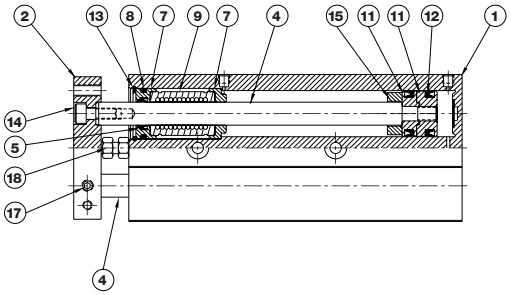
Twin Bore

12mm – 32mm Bore

Standard Model



Ball Bearing Model (Option X)

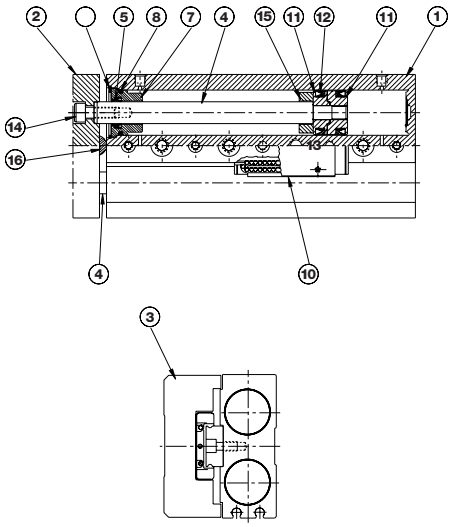


Part List

Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
6	Rod Guide	White Delrin
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
9	Ball Bushing	Stainless Steel
11	Piston	Aluminum
12	Piston Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
15	Bumper	Urethane
17	Socket Head Set Screw	Zinc Plated Carbon Steel
18	Stroke Adjuster/Bumper	Stainless Bolt w/Urethane Bumper

Twin Bore

Air Table Model (TBA) 12mm – 32mm Bore



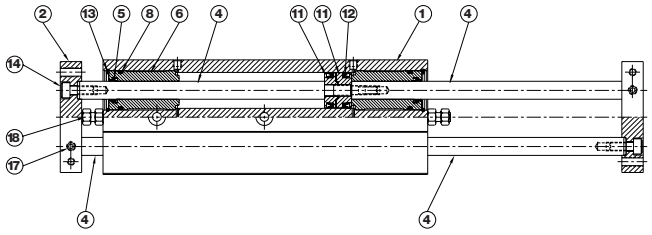
Part List

Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
3	Table Plate	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
10	Table Bearing	Stainless Steel Rail + Stainless Steel Bearings
11	Piston	Aluminum
12	Piston Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
15	Bumper	Urethane
16	Bumper	Urethane

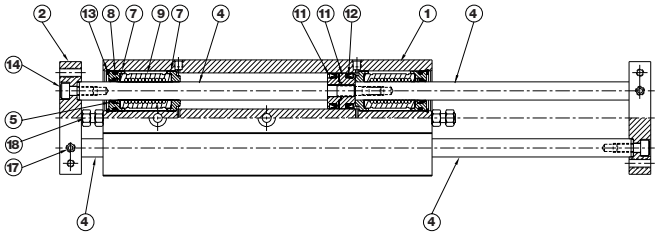
Twin Bore

TBD (Double Rod End) 12mm – 32mm Bore

Standard Model



Ball Bearing Model (Option X)



Part List

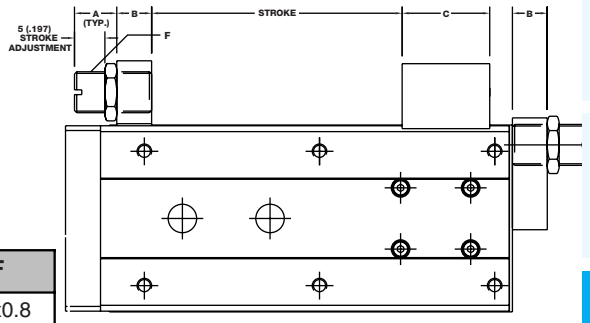
Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
6	Rod Guide	White Delrin
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
9	Ball Bushing	Stainless Steel
11	Piston	Aluminum
12	Piston Seal	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket Head Cap Screw	Zinc Plated Carbon Steel
17	Socket Head Set Screw	Zinc Plated Carbon Steel
18	Stroke Adjuster/Bumper	Stainless Bolt w/Urethane Bumper

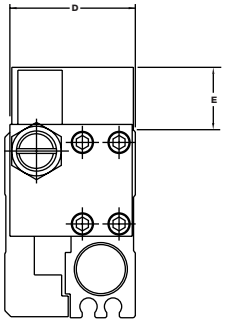
Options

Stroke Adjuster (Options A1, A2, A3)

Provides 5mm (.197) of stroke adjustment at the end of stroke.

(Option A1 shown)



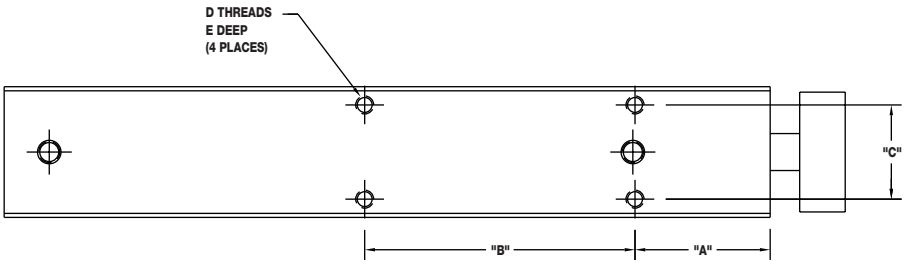


Bore	A		B		C		D		E		F
6	7.7	(0.30)	6	(0.24)	12.5	(0.49)	21.7	(0.85)	9	(0.35)	M5x0.8
8	8	(0.31)	6	(0.24)	14.3	(0.56)	24.6	(0.97)	12.2	(0.48)	M8x1
12	10	(.39)	8	(.31)	18.1	(.71)	30	(1.18)	17	(.67)	M10x1
16	10	(.39)	10	(.39)	21.1	(.83)	37.5	(1.48)	18	(.71)	M12x1
20	10	(.39)	12	(.47)	30	(1.18)	47.5	(1.87)	22	(.87)	M14x1
25	10	(.39)	16	(.63)	30	(1.18)	54.5	(2.15)	24.5	(.96)	M20x1.5
32	10	(.39)	16	(.63)	32	(1.26)	67.3	(2.65)	32.3	(1.27)	M25x1.5

Options

Side Mounting Holes (Option S)

Use for Models TB and TBD cylinders.

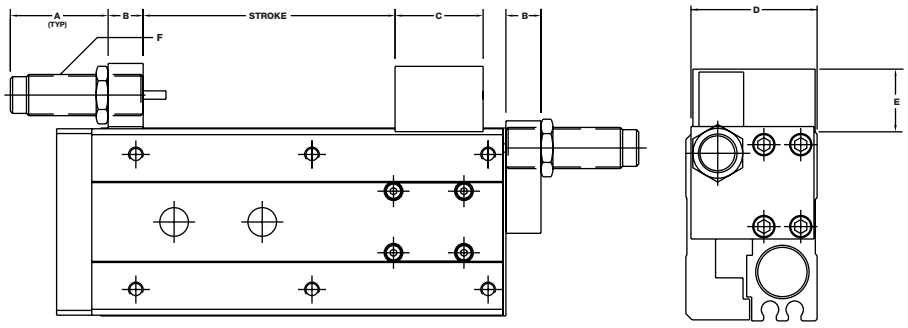


Bore	A	B	Stroke Length	C	D		E
					Standard	Option E	
6mm	10 (0.394)	23 (0.906)	0-10mm	6 (0.236)	M2x0.4	#2-56 UNC	3 (0.118)
		33 (1.299)	11-20mm				
		43 (1.693)	21-30mm				
		53 (2.087)	31-40mm				
		63 (2.480)	41-50mm				
8mm	10 (0.394)	23 (0.906)	0-10mm	7 (0.276)	M2.5x0.45	#3-48 UNC	3 (0.118)
		33 (1.299)	11-20mm				
		43 (1.693)	21-30mm				
		53 (2.087)	31-40mm				
		63 (2.480)	41-50mm				
		88 (3.465)	51-75mm				
12mm	20 (.787)	30 (1.181)	0-25mm	10 (.394)	M3x.5	#4-40 UNC	4.5 (.177)
		40 (1.575)	26-50mm				
		50 (1.969)	51-75mm				
16mm	30 (1.181)	25 (.984)	0-20mm	12 (.472)	M4x0.7	#8-32 UNC	4.5 (.177)
		35 (1.378)	21-50mm				
		45 (1.772)	51-80mm				
		55 (2.165)	81-100mm				
20mm	30 (1.181)	30 (1.181)	0-25mm	16 (.630)	M4x0.7	#8-32 UNC	4.5 (.177)
		40 (1.575)	26-50mm				
		60 (2.362)	51-100mm				
25mm	30 (1.181)	30 (1.181)	0-20mm	22 (.866)	M5x0.8	#10-32 UNF	7.4 (.290)
		40 (1.575)	21-50mm				
		60 (2.362)	51-80mm				
32mm	30 (1.181)	40 (1.575)	0-25mm	25 (.984)	M5x0.8	#10-32 UNF	7.5 (.295)
		50 (1.969)	26-50mm				
		70 (2.756)	51-100mm				

Options

Shock Absorbers (Option K)

Provides shock absorbtion at the ends of stroke. The shock absorbers are available in three dampening levels: light duty, standard duty, and heavy duty, so the shock can be selected based on the energies of the application. Shock absorbers can also be provided at either end of stroke or at both ends.



Bore	A		B		C		D		E		F
8	22.5	(0.89)	6	(0.24)	14.3	(0.56)	24.6	(0.97)	12.2	(0.48)	M8x1
12	20.7	(.81)	8	(.31)	18.1	(.71)	30	(1.18)	17	(.67)	M10x1
16	39.8	(1.57)	10	(.39)	21.1	(.83)	37.5	(1.48)	18	(.71)	M12x1
20	70.2	(2.76)	12	(.47)	30	(1.18)	47.5	(1.87)	22	(.87)	M14x1
25	82.7	(3.26)	16	(.63)	30	(1.18)	54.5	(2.15)	24.5	(.96)	M20x1.5
32	90.4	(3.56)	16	(.63)	32	(1.26)	67.3	(2.65)	32.3	(1.27)	M25x1.5

See the following section on how to size the shock absorber to a specific application. Shock absorbers within a given bore size have the same dimensions regardless of dampening strength.

How to Size The Shock Absorber

"The shock absorber is pre selected for size by the bore diameter of the cylinder. However, the "dampening strength must be selected to choose the proper shock absorber. To calculate the necessary shock, the following values must be known.

Cylinber Bore Diameter	d(mm)
Operating Pressure	p(bar)
Load on the Actuator	W(kg)
Impact Velocity	v(m / sec)
(impact velocity may be estimated	
at 2 times average velocity.)	
Weight Constant	k1
Cylinder Constant	k2
Shock Constant	k3
Cycles per Hour	c
Mounting Orientation (horizontal or vertical)	

Et (Total Energy) equals the sum of Ek (Kinetic Energy) and Ew (Work Energy). Note the "Work Energy calculation varies with mounting orientation, Ewh for horizontal and Ewv for"vertical applications.

Ek = ((W/2) + k1) x v2 [Nm]

Ewh = k2 x p x k3 [Nm]

Ewv = ((k2 x p) + W + k1) x k3 [Nm]

Et = Ek + Ew [Nm]

EtC = Et x c [Nm / hr]

Et and EtC must not exceed maximum values listed below. Dampening must be chosen from graphs on page 2.114.

Options

Shock Specifications

Model Bore	Shock Bore (mm)	K_3 Shock Constant	Thread Size	E_t Max Nm per Cycle	$E_t C$ Max Nm per Hour	Max Shock Force (N)	Max Propelling Force (N)	Shock Weight (g)
8	5.6	0.0051	M8x1	0.45	3954	N/A	N/A	9
12	7.1	0.006	M10x1.0	2.2	4100	700	89	12
16	6	0.010	M12x1.0	5.0	14125	1000	220	42
20	7	0.016	M14x1.0	21.5	34000	2225	530	71
25	11	0.022	M20x1.5	45.0	53700	3110	890	200
32	13	0.025	M25x1.5	73.5	70000	4440	1550	285

Weight Constant (k_1)

Stroke	Bore					
	8	12	16	20	25	32
10	0.08	0.17	0.29	0.51	0.82	1.34
20	0.10	0.17	0.29	0.52	0.84	1.38
30	0.12	0.17	0.30	0.53	0.86	1.41
40	0.15	0.20	0.33	0.58	0.92	1.51
50	0.20	0.23	0.42	0.64	0.99	1.63
75	0.22	0.32	0.50	0.78	1.22	2.05
100	N/A	0.40	0.57	1.02	1.46	2.38
125	N/A	N/A	0.67	1.15	1.76	2.86
150	N/A	N/A	N/A	1.29	1.88	3.17

Shock Graph Legend

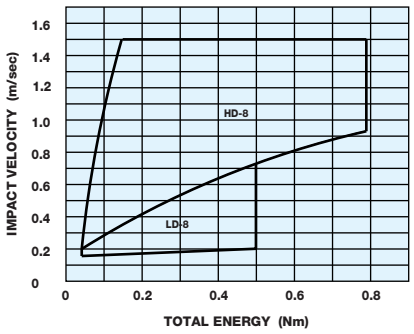
Bore	Dampening		
	Light Duty	Std. Duty	Heavy Duty
8	LD-8	N/A	HD-8
12	LD-12	SD-12	HD-12
16	LD-16	SD-16	HD-16
20	LD-20	SD-20	HD-20
25	LD-25	SD-25	HD-25
32	LD-32	SD-32	HD-32
Order Code	1	2	3

Cylinder Constant (k_2)

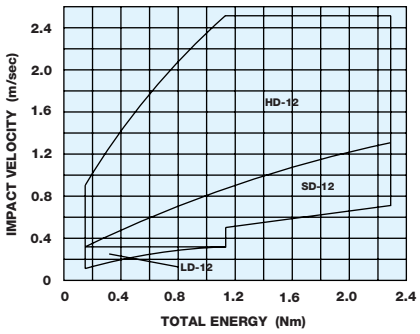
Bore	k
8	10.06
12	22.62
16	40.22
20	62.84
25	98.19
32	160.87

Based on bore diameter, impact velocity (v), and calculated Total Energy (E_t), choose the LD, SD, or HD shock from the appropriate graph.

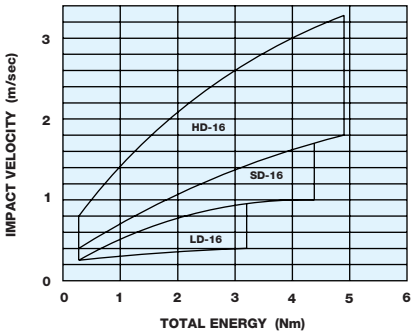
8mm Bore



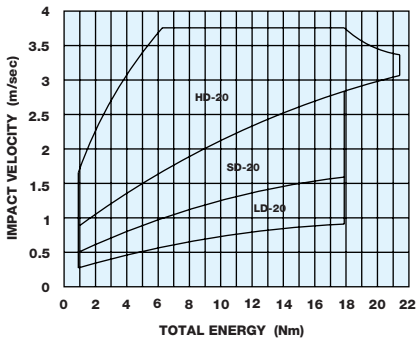
12mm Bore



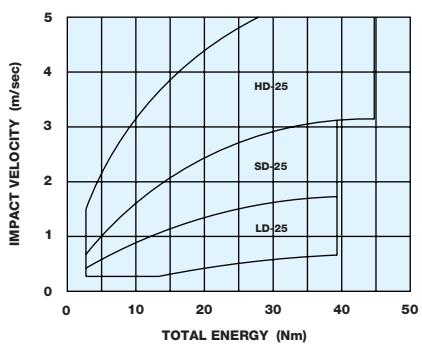
16mm Bore



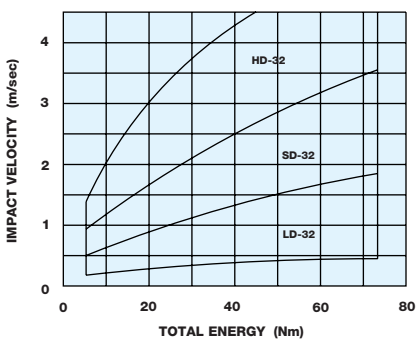
20mm Bore



25mm Bore



32mm Bore



Note: A minimum impact velocity of .25 m/sec. is necessary before shock will be effective.