Square Flat-II®
Non-Rotating Cylinders

- Ideal for applications where rotation cannot be tolerated
- Unique spin-riveting process securely attaches dual piston rods and rod end block to ensure rods work in tandem
- Twin rod design means the tooling plate stays aligned, eliminating need for external alignment devices
- Provisions for bottom flush or face mounting provide convenient alternative to horizontal and side mounting
- Minimized centerline distances for easier side-by-side cylinder mounting
- Precision-machined anodized aluminum heads
- Optional high temperature seals accommodate greater array of application conditions

Approximate power factors (for all models except f02, 3, 4)	
9/16" (02) = 0.25	For example, a 3/4" bore model FO-041 will exert a force of approximately 0.4 times the air line pressure.
3/4" (04) = 0.4	
1-1/16" (09) = 0.9	
1-1/2" (17) = 1.7	
2" (31) = 3.1	
2-1/2" (50) = 5.0	
3" (70) = 7.0	
4" (125) = 12.5	

How it Works

Materials of Construction

Cylinder Body: 304 Stainless Steel

Heads: Anodized Aluminum Alloy

Piston Rod: Ground and Polished 303 Stainless Steel

Piston Seals: Buna-N standard (high temperature seals optional)

Rod Bushing: Bronze

Rod Seals: Buna-N Block V (high temperature seals optional)

Tie Rods: 303 Stainless Steel

Rod End Block: Anodized Aluminum Alloy

Engineering Specifications

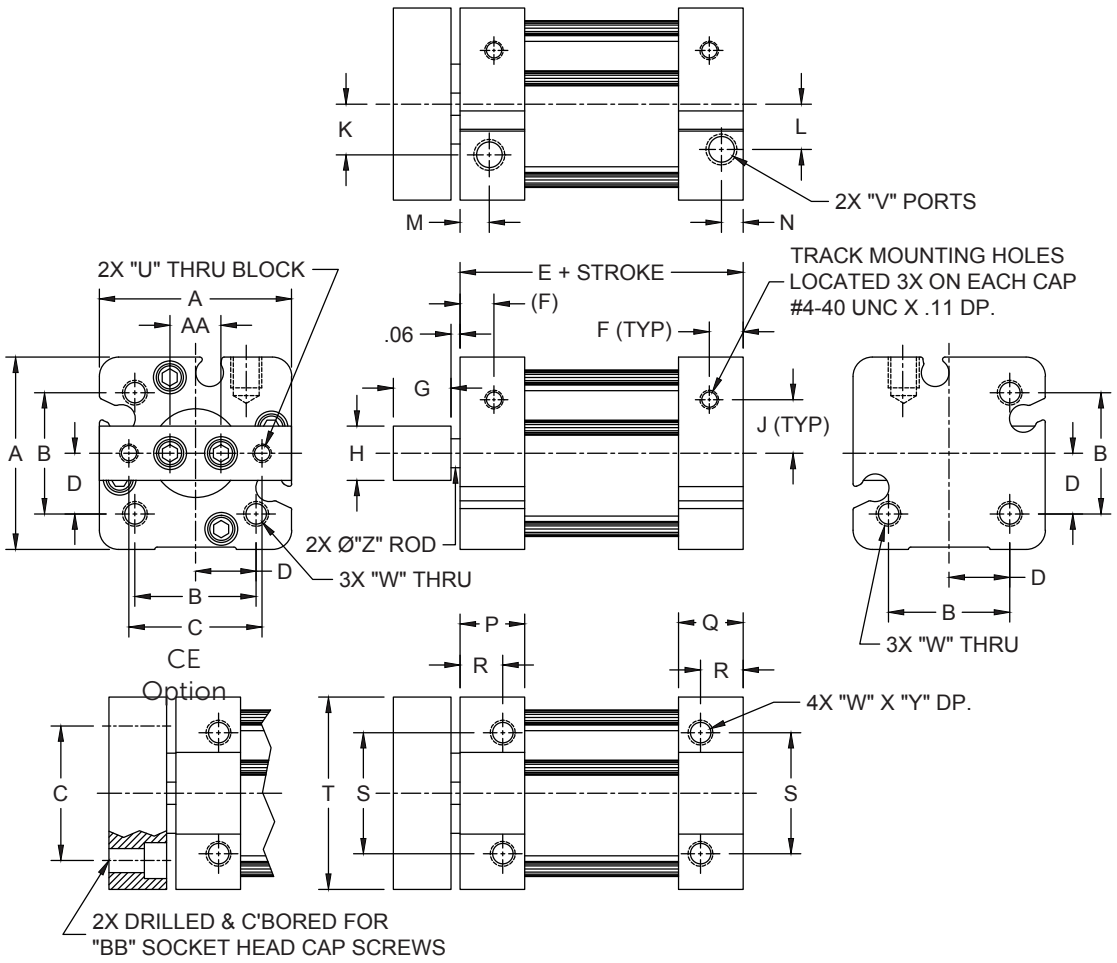
Temperature*: -20° F to 150° F (-35° C to 65° C) Standard

Fluoroelastomer seals rated for higher temperature applications are available. If cylinders are operated below 0° (-18° C) for extended time periods, special modifications may be required. Special seal materials are available upon request.

Square Flat-II® Basic Models

Model FST
(Non-rotating, double acting)

Standard Strokes: 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/2", 3", 3-1/2", 4"



*Some options affect cylinder length; see page 156

Dimensions (in)

Bore	A	B	C	D	E	F	G	H	I	K	L	M	N
3/4" (04)	1.25	0.750	0.875	0.375	0.75	0.22	0.38	0.38	0.35	0.33	0.30	0.19	0.14
1-1/16" (09)	1.50	1.000	1.062	0.500	1.25	0.22	0.38	0.38	0.34	0.45	0.45	0.25	0.24
1-1/2" (17)	2.00	1.375	1.500	0.688	1.25	0.22	0.50	0.50	0.20	0.61	0.61	0.25	0.24
2" (31)	2.50	1.750	1.875	0.875	1.31	0.22	0.63	0.63	0.19	0.76	0.76	0.25	0.25

Bore	P	Q	R	S	T	U	V	W	Y	Z	AA	BB
3/4" (04)	0.42	0.42	0.281	0.750	1.25	#6-32 UNC-2B	#10-32	#6-32 UNC-2B	0.22	0.188	0.33	#6
1-1/16" (09)	0.58	0.50	0.368	1.000	1.44	#8-32 UNC-2B	1/8 NPT	#8-32 UNC-2B	0.25	0.250	0.42	#8
1-1/2" (17)	0.58	0.50	0.310	1.375	2.00	1/4-20 UNC-2B	1/8 NPT	#10-24 UNC-2B	0.30	0.375	0.56	1/4
2" (31)	0.62	0.62	0.380	1.750	2.50	5/16-18 UNC-2B	1/8 NPT	1/4-20 UNC-2B	0.38	0.500	0.75	5/16

Square Flat-II® Accessory Options and Dimensions (in)

Weights

Bore	Approximate Cylinder Weights (oz)	
	Base	Adder per 1/8" of stroke
3/4" (04)	2.7	0.1
1-1/16" (09)	6.4	0.5
1-1/2" (17)	12.2	0.7
2" (31)	18.4	0.9

Length Adder Dimensions for Options

Bore	Length Adder		
	Low Friction Seals (L)	Magnetic Position Sensing* (M)	Low Friction Seals and Magnetic Position Sensing
3/4" (04)	0.25	0.75	0.75
1-1/16" (09)	0.25	0.50	0.50
1-1/2" (17)	0.25	0.63	0.63
2" (31)	0.25	0.63	0.63

Non-rotation is achieved through the use of dual piston rods incorporated into the body of the Flat-II® cylinder. The rods are securely attached to the piston by our unique spin-riveting process. A rod end block is used to insure the rods work in tandem—as a team. This end block also acts as a useful surface to easily accommodate any mounting attachments required to get the job done. For mounting convenience, the rod end block is provided with threaded mounting holes or optional counterbored holes.

As with any cylinder application, side loading should be avoided (see option K below). The two smaller rods will have more deflection due to side load than the one standard rod in a comparable Flat-1® model.

The Flat-II® is intended to work satisfactorily against pure torsional loads. The maximum torsional load per bore size is shown in the following table:

Bore	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
Torque (in-lb)	0.3	1	5	10
K	5.21	26.61	238.85	1344.63

The amount of angular deflection, in degrees, can be approximated by the following formula:

$$\varnothing = \frac{TL^3}{K}$$

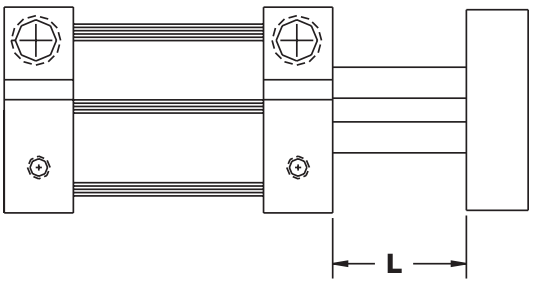
Where
T = Torque (in.-lb.)
L = Length (see sketch below)
K = Per chart above
Ø = Angular deflection

Note: To prevent rod distortion, the rod end block must be fastened securely.

Rotational Tolerance

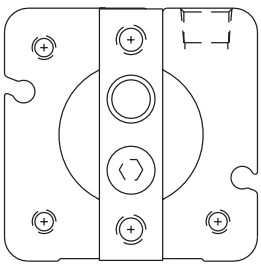
Bore	Maximum Rotation
3/4" (04)	±1°
1-1/16" (09)	±3/4°
1-1/2" (17)	±1/2°
2" (31)	±1/2°

Deflection L Value



L = .062 + STROKE

Option K - Endblock Rotated 90°



The Model Number for all Square Flat-II® cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, mounting, and special options. Please refer to the charts below for an example of a standard Square Flat-II® model. This is a non-rotating, double acting, 1-1/2" bore, 1/8" stroke, pivot mount cylinder with high temperature seals.

Type	
FST	Non-Rotating, Double Acting

Bore Size	
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"

Mounting Options	
No number	Basic model
1	Pivot mount
1N	Pivot mount 90° from standard

FST - 17 0.125 - 1 V

Stroke Length	
0.125	1/8"
0.25	1/4"
0.375	3/8"
ETC.	

Options (Enter in alphabetical order, except for EE which is last)	
CE	Counterbored end block
G	Magnalube® G
K	End block rotated 90° (see page 169)
L	Low friction seals (see table page 156)
M, M1, M4	Magnetic position sensing (see table page 156)
Q	Low temperature operation (-40° F to 200° F)
T1, T4	Additional switch mounting post located in position #1 or #4
V	High temperature option (0° F to 400° F)[1]
Y	Molycoat (MoS_2 I.D. coating)
EE0.375	3/8" extra rod extension, etc.
EE1	1" extra rod extension, etc.

[1] If magnetic position sensing is specified with option V, standard Buna-N based magnet will be provided. Magnetic position sensing is not reliable above 200° F. Overall cylinder length increases with the magnet option.

Square Flat-II® Repair Kits

IMI Bimba Square Flat-II® cylinders are repairable. To order repair kits, please provide the correct bore code in the kit part number blank for the desired size repair kit. Optional seals are designated by the suffix option. Repair kits include the standard bronze rod bushing, piston, rod, and body seals. For cylinders with optional composite bushings, please order those bushing as a separate repair part with part number (PF4-__). For cylinders where FKM seals, wipers, or scrapers are required, complete end caps assemblies are provided to allow for easier repair.

Basic Repair Kit (K-B-FST-__)*		
Part No.	**Description**	**Quantity**
PF-29-FST	Rod Seal	2
PF-30-FST	Piston Seal	1
PF-3-FST	Tube Seal	2

*Must specify bore size to order.