Flat-II® Non-Rotating Compact Cylinders

Flat-II® non-rotating, double-acting cylinder provides the answer to applications where rotation cannot be tolerated and space is at a minimum. Non-rotation is achieved with dual piston rods and a rod end block that insures the rods work in tandem. Flat-II® eliminates the need for external alignment devices, such as guides, rods and alignment posts or pins.

- 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	

Flat-II®

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. 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:

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

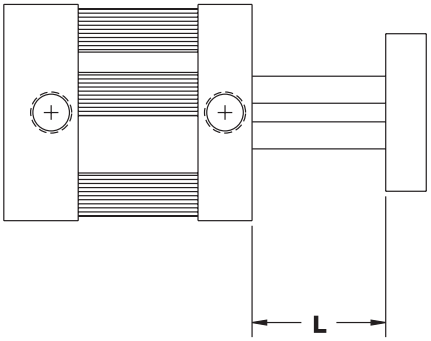
Where T = Torque (in-lb)
L = Length (see sketch below)
K = Per chart above
Ø = Angular deflection

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



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: Oil-Impregnated Bronze

Rod Seals: Buna-N O-Ring (high temperature seals optional)

Rod End Block: Anodized Aluminum Alloy

Engineering Specifications

Pressure Rating: 200 PSI max., air only (bore sizes 3/4-2")

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

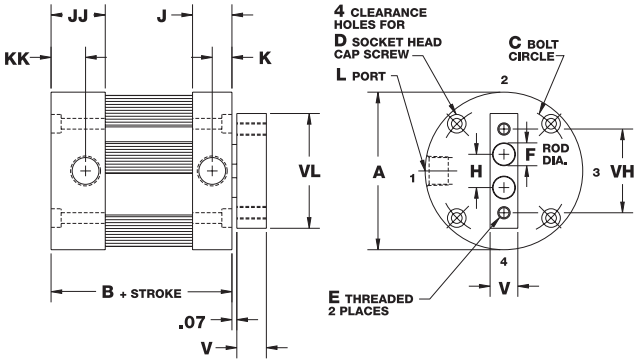
Fluoroelastomer seals rated for higher temperature applications are available. If cylinders are operated below 0° (-18° C) for extended time periods, special modifications may be required. Special seal materials are available upon request.

Flat-II® Basic Models

IMI Bimba is a JIT manufacturer and we are able to provide FT model cylinders in ANY 0.001" 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.

Model FT

(Non-rotating, double acting)



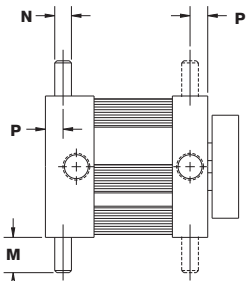
The table below represents our standard stroke lengths.

Nominal Bore Diameter	Bore Code	Standard Stroke Length Availability														
3/4"	04	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"
1-1/16"	09	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"
1-1/2"	17	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"
2"	31	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"

Mounting Options

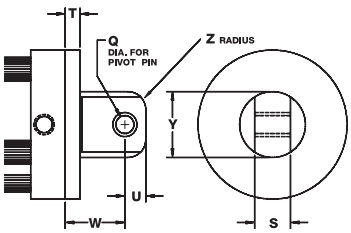
Trunnion Mount

(rear, front or both) (-2R shown)



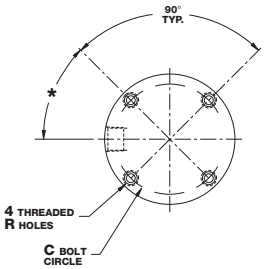
Pivot Mount

(complete with bronze bushing) (-1 shown)



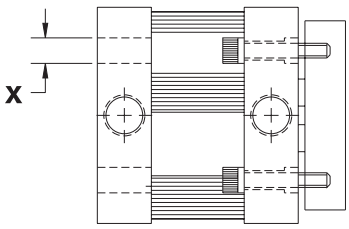
Threaded Mounting Holes

(available either or both ends) (-3R shown)



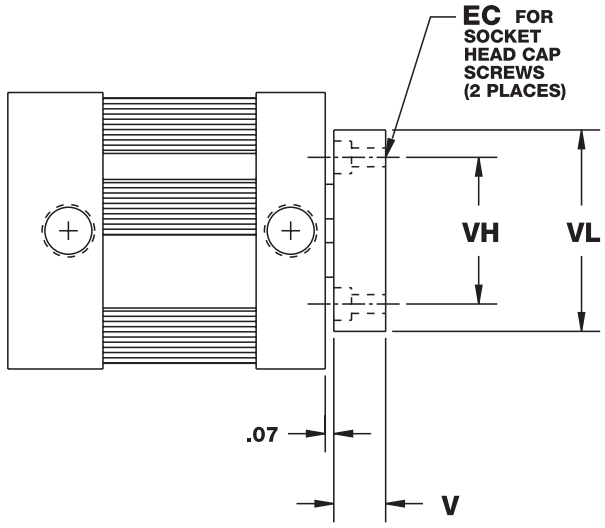
Screw Clearance Holes

(available either or both ends) (-4R shown)



Flat-II® Dimensions (in)

Counterbored Rod End Block



Bore	A	B*	C	D	E	EC	F	H
3/4" (04)	1.50	0.94	1.22	#6	#6-32 UNC	#6	0.19	0.332
1-1/16" (09)	2.00	1.31	1.69	#6	#8-32 UNC	#8	0.25	0.422
1-1/2" (17)	2.63	1.31	2.19	#10	1/4-20 UNC	1/4	0.38	0.562
2" (31)	3.13	1.38	2.69	#10	5/16-18 UNC	5/16	0.50	0.750

Bore	J	JJ	K	KK	L	M	N	P	Q	R
3/4" (04)	0.34	0.47	0.14	0.27	#10-32	0.31	0.13	0.17	0.19	#6-32 UNC
1-1/16" (09)	0.50	0.69	0.25	0.44	1/8 NPT	0.50	0.25	0.25	0.19	#6-32 UNC
1-1/2" (17)	0.50	0.69	0.25	0.44	1/8 NPT	0.50	0.25	0.25	0.38	#10-24 UNC
2" (31)	0.53	0.72	0.25	0.44	1/8 NPT	0.50	0.25	0.25	0.38	#10-24 UNC

Bore	S	T	U	V	VL	VH	W	X	Y	Z
3/4" (04)	0.38	0.19	0.25	0.38	1.25	0.88	0.75	0.23	0.75	0.19
1-1/16" (09)	0.38	0.25	0.25	0.38	1.44	1.06	0.81	0.25	0.75	0.19
1-1/2" (17)	0.75	0.25	0.44	0.50	2.00	1.50	1.19	0.34	1.38	0.38
2" (31)	0.75	0.31	0.44	0.63	2.50	1.88	1.25	0.34	1.38	0.38

*Magnetic Position Sensing Length Adder: 0.63. A minimum stroke of 0.38" is required to sense extending end-of-stroke position.

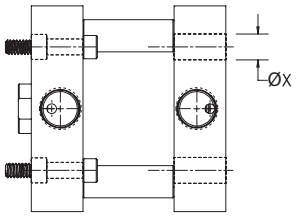
Flat-II® Accessory Options and Dimensions (in)

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

Screw Clearance Holes

(Option 4R or 4F)
Available in front or rear end cap
Option 4R shown



NOTE: Use caution when using a long screw that spans the length of the cylinder.
If the endcap experiences flexing, we recommend the -4F or -4R mounting style.

Flat-II® Repair Kits

IMI Bimba 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-FT-__)*		
Part No.	Description	Quantity
PF-29	Rod Seal	2
PF-30	Piston Seal	2
PF-3	Tube Seal	2
PF-31	Bushing	4

*Must specify bore size when ordered. Contact your local IMI BIMBA Distributor for pricing on kits and other repair parts.

The Model Number for all 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 Model Number FT-040.375-1CE. This is a non-rotating, double acting, 3/4" bore, 3/8" stroke, pivot mount cylinder with counterbored mounting holes in the rod end block.

Type	
FT	Non-Rotating, Double Acting

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

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

FT - 04 0.375 - 1 CE

Mounting Options (Enter in numeric order)	
No number	Basic model (standard counterbored mounting holes)
1	Pivot mount
1N	Pivot mount 90° from standard
2	Trunnion mount, both ends
2F	Front trunnion mount
2R	Rear trunnion mount
3	Threaded mounting holes, both ends
3F	Threaded mounting holes, front
3R	Threaded mounting holes, rear
4	Screw clearance holes, both ends[1]
4F	Screw clearance holes, front[1]
4R	Screw clearance holes, rear[1]
7R	F series interchange; threaded holes, rear[4 5]

[1] "Screw clearance" to allow bolt head to pass through; no counter bores (see page 146).

Options (Enter in alphabetical order, except for EE which is last)	
CE	Counterbored rod end block (see page 158)
G	Magnalube® G
K	End block rotated 90°
M, M1, M3, M4	Magnetic position sensing. Switch post designed for HC and HK style Hall Effect switches (see table pages 143 and 147 for length adders and envelope dimensions)[1]
P3	Front port position (see page 162)
Q	Low temperature operation (-40° F to 200° F)
S	Stainless steel fasteners (125 PSI maximum pressure rating - air only)
T1, T3, T4	Additional switch mounting post located in position #1, #3, or #4
V	High temperature option (0° F to 400° F)[2]
Y	Moly-coat (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.