

Bimba FLAT-1

BIMBA FLAT-1 FITS RIGHT IN!

BIMBA Flat-1 cylinders were designed with space savings in mind. Six models offer six ways to save space.

Flat-1-

The original round cylinder.

Square Flat-1-

For additional mounting variations.

Flat-II -

The dual piston rod, nonrotating cylinder.

Square Flat-II -

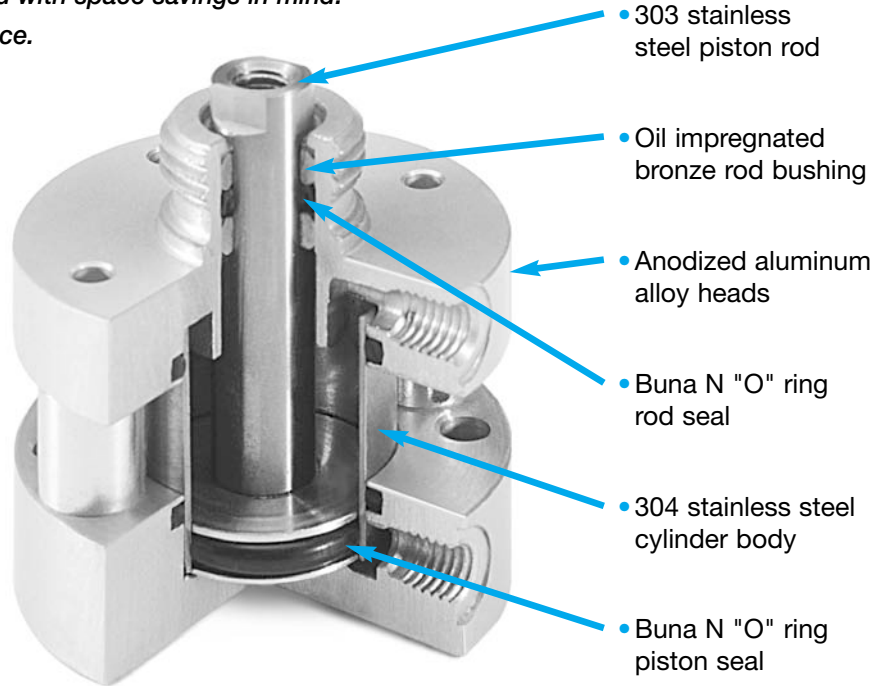
The dual piston rod, square nonrotating cylinder.

FO2, 3, 4 -

Force multiplying cylinders.

FOP -

For three positions.



Space savings without sacrificing quality means better performance and longer cylinder life. Flat-1 offers these quality features:

- 304 stainless steel cylinder body with a mirror finish I.D. Stainless steel fights corrosion and scoring from dirt particles. The result is longer piston seal life.
- Oil impregnated bronze rod bushing is standard in all models.
- Ground and polished 303 stainless steel piston rod.
- High strength piston to rod connection.
- Precision machined, anodized aluminum alloy heads.

Approximate Power Factors (For all models except FO2, 3, 4)

9/16" (02)	=	0.25
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

For example, a 3/4" bore model FO-041 will exert a force of approximately 0.4 times the air line pressure.

Bimba FLAT-11

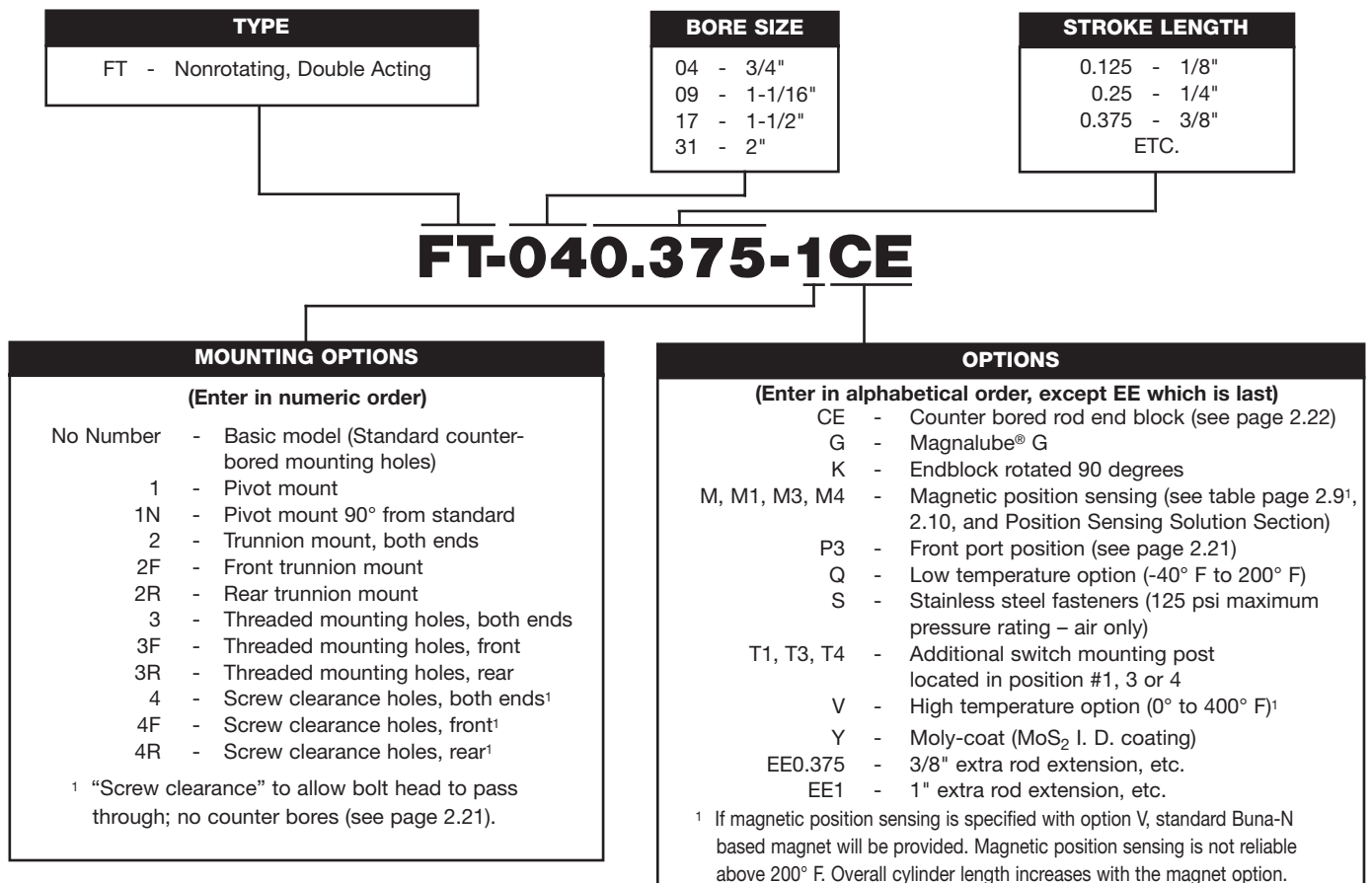


Flat-II nonrotating, double-acting cylinder provides the answer to applications where rotation cannot be tolerated and space is at a minimum. Nonrotation is achieved with dual piston rods and a rod end block that insures the rods work in tandem. Flat-II eliminates the need for external alignment devices,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

- Body — 304 Stainless Steel
 - Heads — Anodized Aluminum Alloy
 - Piston Rod — Ground and Polished 303 Stainless Steel
 - Piston Seals — Buna N (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
 - Pressure Rating — 200 PSI Maximum (Air only)
 - Temperature Rating — From -20°F to +150°F (-25°C to +65°C)
- Buna N seals with a temperature range of -20°F to +150°F (-25°C to +65°C) are standard in all Bimba air cylinders. Fluoroelastomer seals rated for higher temperature applications are available. If cylinders are operated below -0°F (18°C) for extended time periods, special modifications may be required. Special seal materials are available upon request.

How to Order

The model number for Flat-II consists of three alphanumeric clusters. These designate type, bore size and stroke length, and mounting and special options. Please refer to the charts below for an example of Model Number FT-040.375-1CE. This is a nonrotating, double-acting, 3/4" bore, 3/8" stroke, pivot mount cylinder with counter-bored mounting holes in the rod end block.



Flat-I / Square Flat-I
Flat-II / Square Flat-II
F02, F03, F04 (multiple power)
F0P (multiple position)
Flat Accessories
EF1 / EF2
EFP / EFQ
Stopper / Twist Clamp
Extruded Flat Lift Table
Twin Bore
NPA / LPA
Diaphragm / Miniature Cube

Bimba FLAT-11

Price List

Basic Model	Base Price by Bore Size			
	3/4"	1-1/16"	1-1/2"	2"
Base Model	\$63.05	\$82.65	\$97.90	\$113.15
Adder per 1/8" of stroke	0.45	0.55	0.85	1.10

Mounting Options	Price Adders by Bore Size			
	3/4"	1-1/16"	1-1/2"	2"
Pivot Mount (Options 1, 1N)	\$11.85	\$13.80	\$18.65	\$21.65
Trunnion Mount (Options 2, 2F, 2R)	9.90 per end	9.90 per end	9.90 per end	9.90 per end
Threaded Mounting Holes (Options 3, 3F, 3R)	3.20 per end	3.40 per end	4.20 per end	4.20 per end
Screw Clearance Holes (Options 4, 4F, 4R)	2.60 per end	2.60 per end	2.60 per end	2.60 per end

Options	Price Adders by Bore Size			
	3/4"	1-1/16"	1-1/2"	2"
EE (each 1/2" each end)	\$0.85	\$0.95	\$1.10	\$1.40
Magnetic Position Sensing (Options M, M1, M3, M4)	6.35	6.35	9.40	15.60
S	2.20	2.20	2.55	2.55
Switch Mounting Post (Options T1, T3, T4)	2.40	3.15	3.15	3.15
High Temperature Seals (Option V)	12.70	20.00	24.85	38.60
Y (Adder per 1/8" of stroke)	0.50	0.50	0.50	0.50
Q (low temp seals)	11.60	14.45	18.20	22.75

No charge options – CE, G, K, P3.

Repair Kits

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 BIMBA Distributor for pricing on kits and other repair parts.

Weights

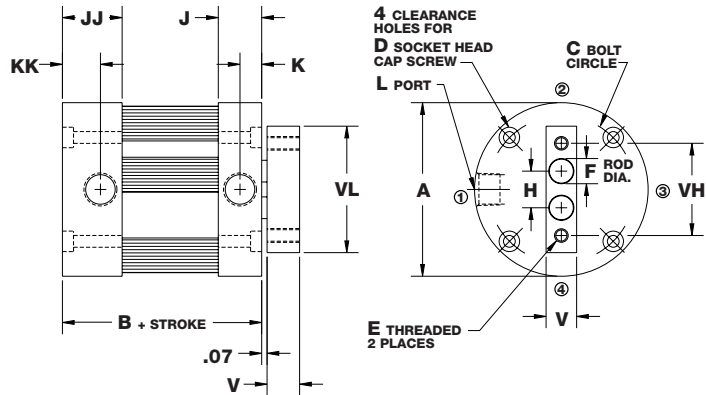
Bore	Approximate Cylinder Weights (oz.)	
	Base	Adder per 1/8" of stroke
3/4" (04)	2.7	0.1
1-1/16" (09)	6.4	0.5
1-1/2" (17)	12.2	0.7
2" (31)	18.4	0.9

Bimba FLAT-11

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.

Basic Model

Model FT
(Nonrotating, double acting)



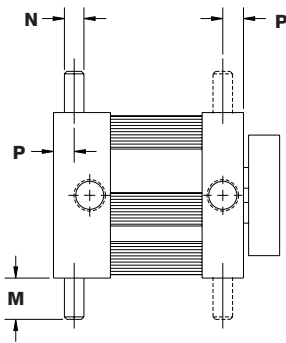
The table below represents our standard stroke lengths. **Blue** stroke lengths are BASIC FT cylinders in stock available for Same Day Shipping.

Nominal Bore Diameter	Bore Code	Standard Stroke Length Availability															
		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"
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

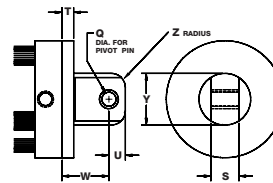
Trunnion Mount

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



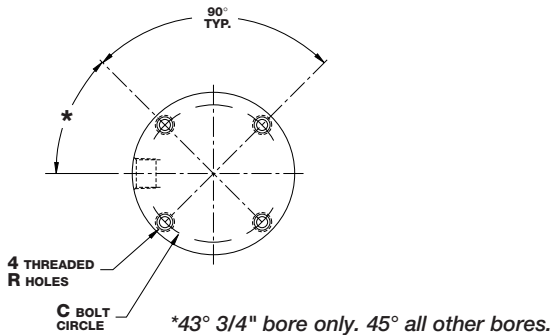
Pivot Mount

(complete with bronze bushing) (-1 shown)



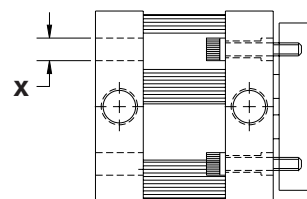
Threaded Mounting Holes

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



Screw Clearance Holes

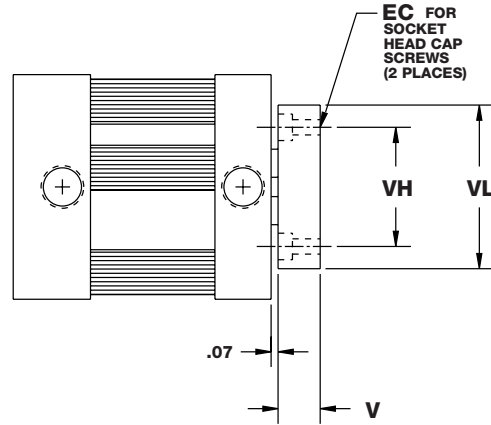
(available either or both ends) (-4R shown)



Bimba FLAT-11

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.

Bimba FLAT-11

Nonrotation 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:

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

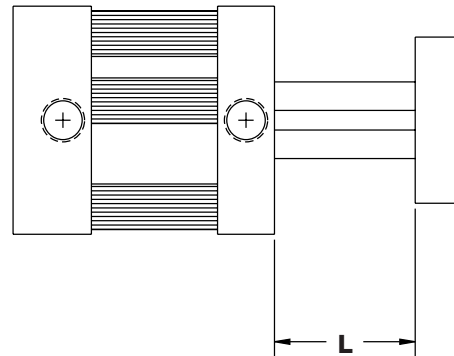
Where T = Torque (in.-lb.)
 L = Length (see sketch below)
 K = Per chart above
 \emptyset = Angular deflection

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

Rotational Tolerance

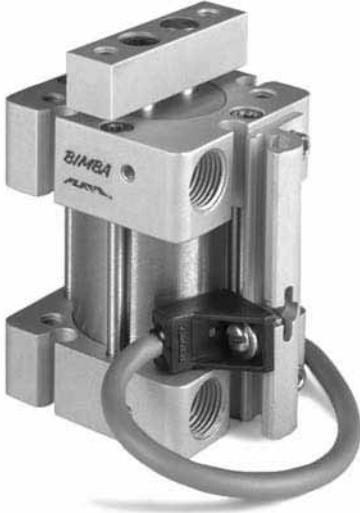
Bore	Maximum Rotation
3/4" (04)	±1°
1-1/16" (09)	±3/4°
1-1/2" (17)	±1/2°
2" (31)	±1/2°

Deflection L Value



Bimba Square FLAT- II

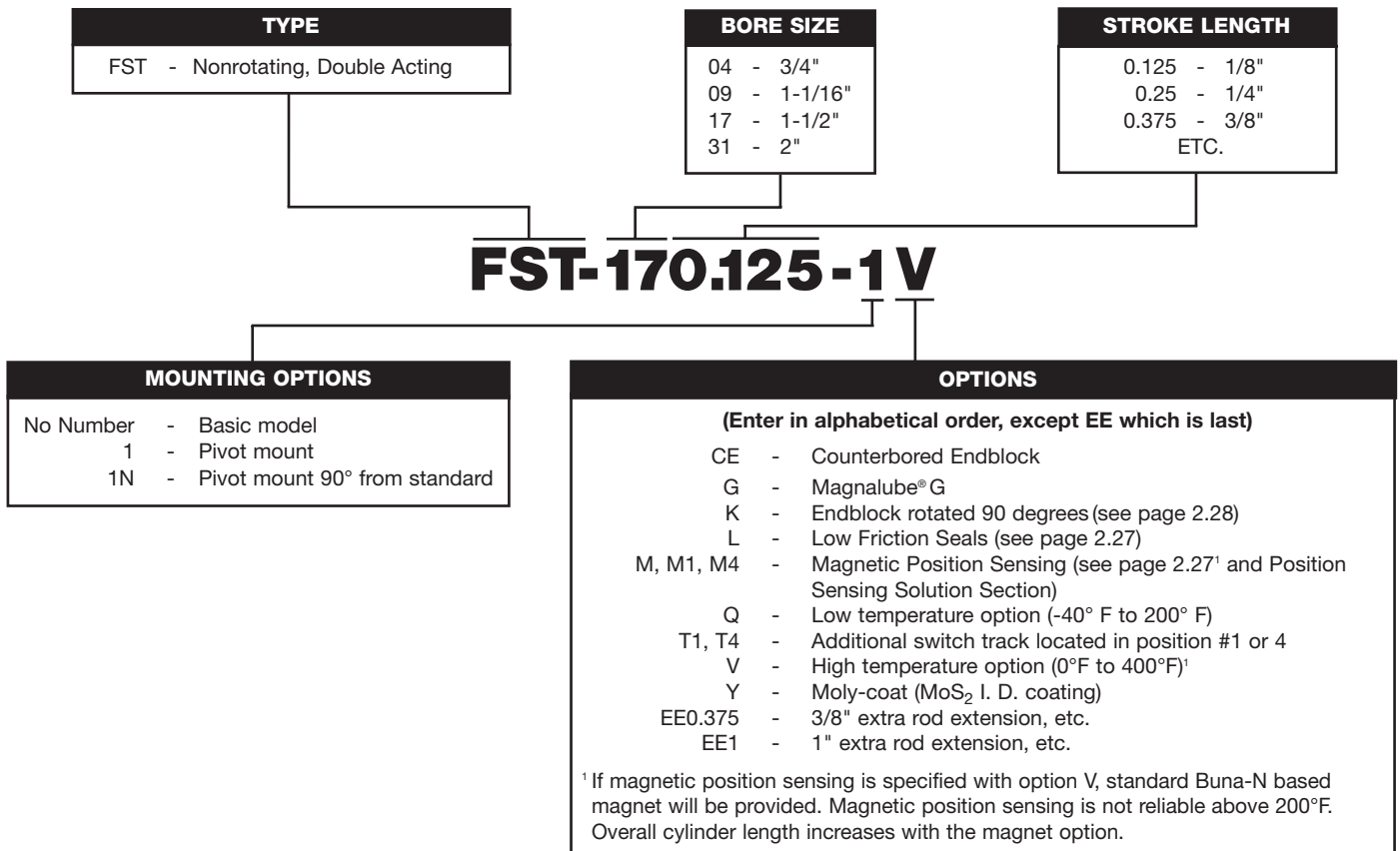
Square Flat-II nonrotating, double acting cylinder provides the answer to applications where rotation cannot be tolerated. Nonrotation is achieved with dual piston rods and a rod end block that insures the rods work in tandem. Square Flat-II eliminates the need for external alignment devices. It also provides a convenient alternative for horizontal and side mounting, with provisions for both bottom flush or face mounting. Centerline distances are minimized, facilitating side-by-side cylinder mounting.



- Body — 304 Stainless Steel
 - Heads — Anodized Aluminum Alloy
 - Piston Rod — Ground and Polished 303 Stainless Steel
 - Piston Seals — Buna N (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
 - Pressure Rating — 200 PSI Maximum (Air only)
 - Temperature Rating — From -20°F to +150°F (-25°C to +65°C)
- Buna N seals with a temperature range of -20°F to +150°F (-25°C to +65°C) are standard in all Bimba air cylinders. Fluoroelastomer seals rated for higher temperature applications are available. If cylinders are operated below 0°F (-18°C) for extended time periods, special modifications may be required. Special seal materials are available upon request.

How to Order

The Model Number for all Square Flat-II cylinders consists of three alphanumeric clusters. These designate type, bore size and stroke length, mounting and special options. Please refer to the charts below for an example of Model Number FST-170.125-1V. This is a nonrotating, double acting, 1-1/2" bore, 1/8" stroke, pivot mount cylinder with high temperature seals.



Bimba Square FLAT-11

Price List

Basic Model	Base Price by Bore Size			
	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
Base Model	\$72.80	\$93.40	\$110.95	\$127.95
Adder per 1/8" of Stroke	0.45	0.60	0.85	1.10
Mounting Options	Price Adders by Bore Size			
	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
Pivot Mount (Options 1,1N)	\$15.60	\$17.05	\$21.55	\$24.15
Options	Price Adders by Bore Size			
	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
EE (each 1/2" each end)	\$0.85	\$0.95	\$1.10	\$1.40
V Option (Standard Seals)	5.00	7.35	11.20	14.40
V Option (Low Friction Seals)	12.70	20.00	24.85	38.60
L (Low Friction Seals)	3.50	4.30	4.80	5.70
Magnetic Position Sensing (Options M, M1, M3, M4)	6.35	6.35	9.40	15.60
Switch Mounting Post (Options T1, T4) (Per post)	3.65	3.65	3.65	3.65
Q Option (Standard Seals)	5.45	6.80	8.50	10.60
Q Option (Low Friction Seals)	11.60	14.45	18.20	22.75
Y (Adder per 1/8" of stroke)	0.50	0.50	0.50	0.50

No Charge Options - CE, G, K

Flat-1/
Square Flat-1

Flat-11/
Square Flat-11

F02, F03, F04
(multiple power)

F0P
(multiple position)

Flat
Accessories

EF1 / EF2

EFP / EFPQ

Stopper/
Twist Clamp

Extruded
Flat Lift Table

Twin Bore

NPA/LPA

Diaphragm/
Miniature Cube

Bimba Square FLAT-11

Basic Model

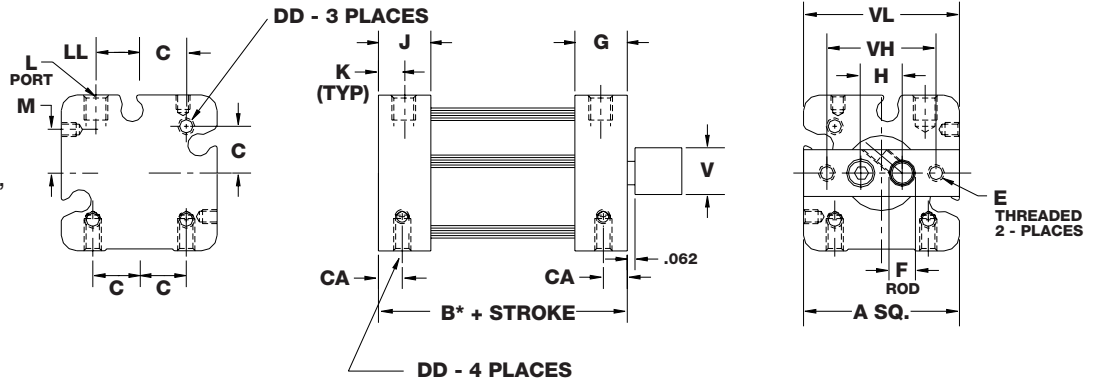
Model FST

(Nonrotating, double acting)

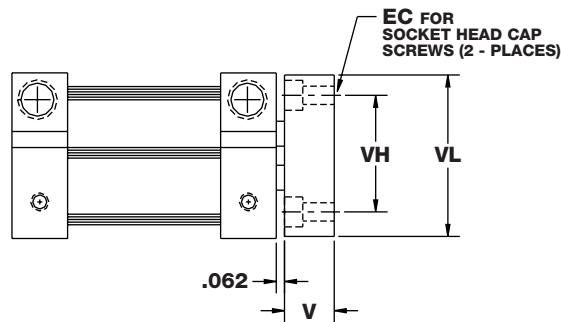
Standard strokes

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 2.27.



Counterbored Rod End Block



Dimensions (in)

Bore	A	B	C	CA	DD	E	EC	F	G	H
3/4" (04)	1.25	0.75	0.38	0.28	#6-32 UNC	#6-32 UNC	#6	0.19	0.42	0.332
1-1/16" (09)	1.50	1.25	0.50	0.38	#8-32 UNC	#8-32 UNC	#8	0.25	0.58	0.422
1-1/2" (17)	2.00	1.25	0.69	0.31	#10-24 UNC	1/4-20 UNC	1/4	0.38	0.58	0.562
2" (31)	2.50	1.31	0.88	0.38	#1/4-20 UNC	5/16-18 UNC	5/16	0.50	0.62	0.750

Bore	J	K	L	LL	M	V	VH	VL
3/4" (04)	0.42	0.19	#10-32	0.35	0.349	0.38	0.88	1.25
1-1/16" (09)	0.50	0.25	1/8 NPT	0.45	0.321	0.38	1.06	1.44
1-1/2" (17)	0.50	0.25	1/8 NPT	0.60	0.200	0.50	1.50	2.00
2" (31)	0.62	0.25	1/8 NPT	0.76	0.186	0.63	1.88	2.50

A minimum stroke of .38" is required to sense extending end-of-stroke position.
See page 2.27 for length adders for magnet option.

Bimba Square FLAT-11

Repair Kits

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.

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

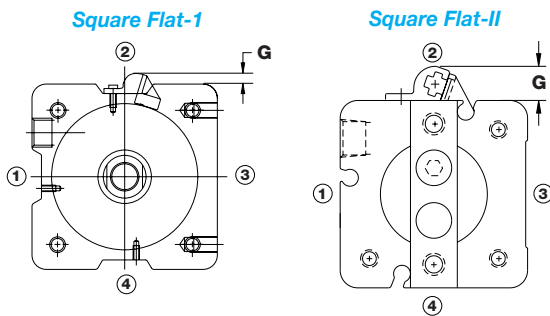
Length Adder Dimensions for Options

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

*A minimum stroke of 0.38" is required to sense extending end-of-stroke position.

MRS Switch Option Dimensions

For all SQUARE Flat-1 Series Cylinder -M option, the default switch mounting post location is Position 2. To locate the post to other positions, please specify options M1 or M4. For additional tracks, please specify options T1 or T4 for the appropriate location.



Bore Designator	Bore	G inch (mm)
04	3/4" (19mm)	0.365 (9.3)
09	1-1/16" (27mm)	0.365 (9.3)
17	1-1/2" (38mm)	0.365 (9.3)
31	2" (50mm)	0.365 (9.3)
50	2-1/2" (63mm)	0.270 (6.9)
70	3" (76mm)	0.300 (7.6)
125	4" (101mm)	0.160 (4.1)

Flat-1 / Square Flat-1
 Flat-II / Square Flat-II
 F02, F03, F04 (multiple power)
 F0P (multiple position)
 Flat Accessories
 EF1 / EF2
 EFP / EFO
 Stopper / Twist Clamp
 Extruded Flat Lift Table
 Twin Bore
 NPA / LPA
 Diaphragm / Miniature Cube

Bimba Square FLAT-11

Nonrotation 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:

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

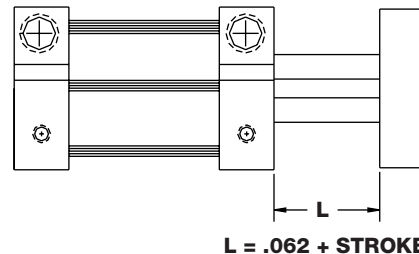
Where T = Torque (in.-lb.)
 L = Length (see sketch below)
 K = Per chart above
 \emptyset = Angular deflection

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

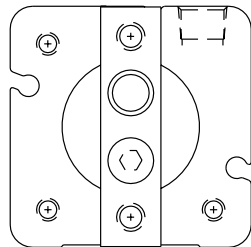
Rotational Tolerance

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



Option K - Endblock Rotated 90°



Bimba FLAT-1 Accessories

Selection Guide

(All Models)

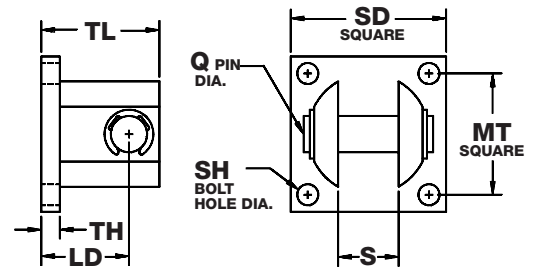
Accessory	Flat-1	Square Flat-1	Square Flat-II	Flat-II	FO2	FOP
Clevis Bracket	X	X	X	X	N/A	X
Trunnion Bracket	X	N/A	N/A	X	N/A	N/A
Rod Pivot	X	X	N/A	N/A	X	X
Pivot Attachment	N/A	X	X	N/A	N/A	N/A

Clevis Bracket

Anodized aluminum alloy, complete with stainless steel pin

Model	Bore	LD	MT	Q	S	SH	SD	TH	TL
BC-1	9/16" (02), 3/4" (04), 1-1/16" (09)	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
BC-2	1-1/2" (17), 2" (31), 2-1/2" (50)	0.94	1.38	0.38	0.75	#10	1.75	0.22	1.34
BC-3	3" (70), 4" (125)	1.25	2.00	0.63	1.00	0.25	2.50	0.25	1.81

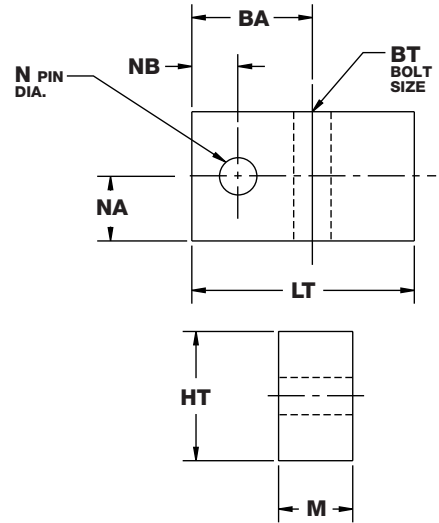
Bracket intended to mount with either rod pivot or pivot mount, not directly to the cylinder rear head.



Trunnion Bracket (pair)

Anodized aluminum alloy, complete with bronze pivot bushings

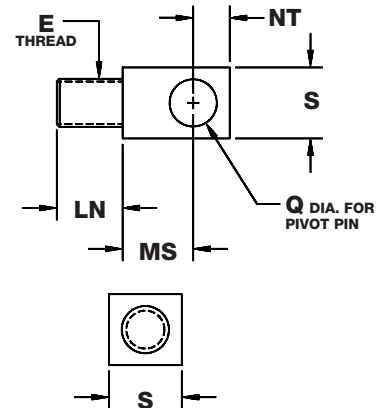
Model	Bore	BA	BT	HT	LT	M	N	NA	NB
BT-1	3/4" (04)	0.56	#10	0.63	1.12	0.31	0.13	0.30	0.22
BT-2	1-1/16" (09), 1-1/2" (17), 2" (31)	0.81	0.25	0.88	1.50	0.50	0.25	0.38	0.31
BT-3	2-1/2" (50), 3" (70)	0.94	0.31	1.00	1.63	0.63	0.31	0.45	0.38
BT-4	4" (125)	1.06	0.38	1.25	1.88	0.75	0.38	0.55	0.44



Rod Pivot

Zinc plated, high strength, heat treated alloy steel, complete with a bronze pivot bushing and nut

Model	Bore	E	LN	MS	NT	Q	S
RP-1/2	9/16" (02)	#8-32 UNC	0.38	0.47	0.25	0.19	0.38
RP-1	3/4" (04)	#10-32 UNF	0.38	0.47	0.25	0.19	0.38
RP-2	1-1/16" (09)	5/16-24 UNF	0.63	0.47	0.25	0.19	0.38
RP-3	1-1/2" (17)	3/8-24 UNF	0.63	0.72	0.44	0.38	0.75
RP-4	2" (31), 2-1/2" (50)	1/2-20 UNF	0.75	0.72	0.44	0.38	0.75
RP-5	3" (70)	5/8-18 UNF	0.88	1.00	0.63	0.63	1.00
RP-6	4" (125)	3/4-16 UNF	0.88	1.00	0.63	0.63	1.00

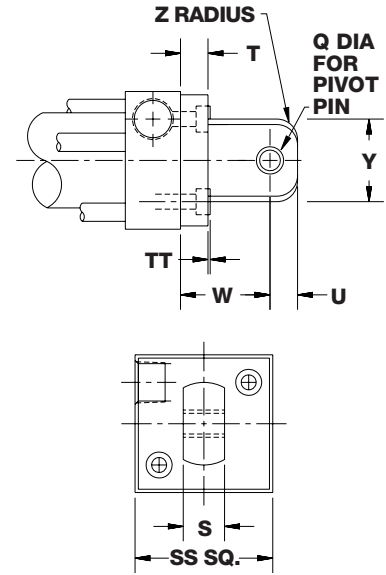


Bimba FLAT-1 Accessories

Pivot Attachment

Anodized aluminum alloy. Complete with two mounting screws. Not necessary if ordered as part of complete Square Flat-1 cylinder (1 or 1N option).

Model	Bore	Q	S	SS	T	TT	U	W	Y	Z
PM-1	3/4" (04)	0.19	0.38	1.13	0.19	0.020	0.25	0.75	0.75	-
PM-2	1-1/16" (09)	0.19	0.38	1.25	0.25	0.020	0.25	0.81	0.75	-
PM-3	1-1/2" (17)	0.38	0.75	1.75	0.25	0.025	0.44	1.19	1.38	-
PM-4	2" (31)	0.38	0.75	2.25	0.31	0.080	0.44	1.38	1.38	-
PM-5	2-1/2" (50)	0.38	0.75	3.00	0.38	0.05	0.44	1.31	1.38	0.38
PM-6	3" (70)	0.63	1.00	3.50	0.38	0.05	0.56	1.69	1.88	0.38
PM-7	4" (125)	0.63	1.00	4.50	0.44	0.12	0.56	1.75	1.88	0.38



Price List

Description	Model	List Price
Rod Pivot	RP-1/2	\$11.60
	RP-1	12.45
	RP-2	12.45
	RP-3	13.00
	RP-4	13.00
	RP-5	15.25
	RP-6	15.85
Trunnion Bracket	BT-1	12.05
	BT-2	13.15
	BT-3	15.40
	BT-4	17.10
Clevis Bracket	BC-1	17.60
	BC-2	25.05
	BC-3	34.35
Pivot Attachment	PM-1	15.70
	PM-2	17.35
	PM-3	22.50
	PM-4	26.65
	PM-5	38.45
	PM-6	56.80
	PM-7	70.90
Wrench Kit (Fits wrench flats on all piston rods)	FWK	17.95

Flat-1 / Square Flat-1
 Flat-II / Square Flat-II
 F02, F03, F04 (multiple power)
 F0P (multiple position)
 Flat Accessories
 EF1 / EF2
 EFP / EPQ
 Stopper / Twist Clamp
 Extruded Flat Lift Table
 Twin Bore
 NPA / LPA
 Diaphragm / Miniature Cube