

We make things MOVE®

Pneumatic Actuation (Non-NFPA) Catalog

Bimba is part of IMI Precision Engineering

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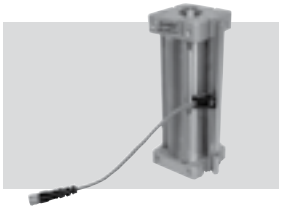
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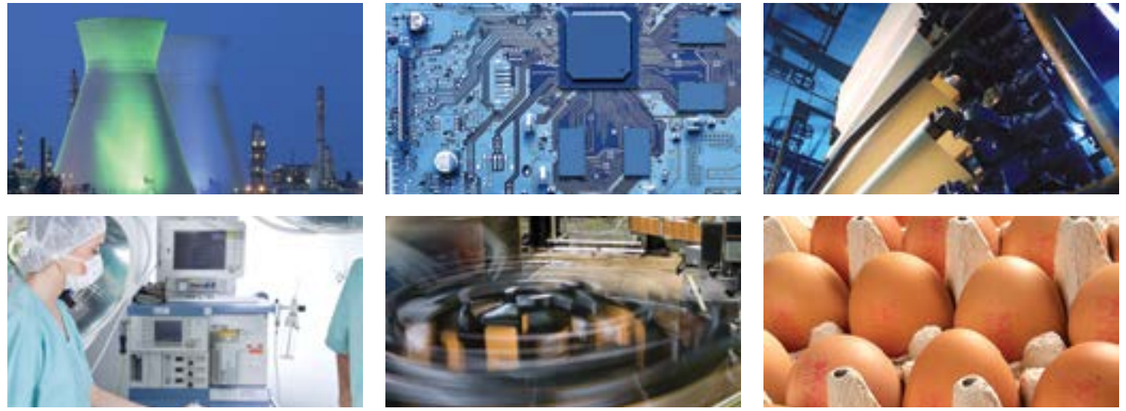
A forward-thinking innovator, Bimba provides industry-leading pneumatic, hydraulic and electric motion solutions that are easy-to-use, reliable and ready for your engineering challenges.

Doing whatever it takes to help you get the job done is what the Bimba companies do best. With an extensive line of industry-leading air cylinders, rotary actuators, linear thrusters, rodless cylinders, NFPA, hydraulics, flow controls, position-sensing cylinders, valves, switches and air preparation equipment, the people of Bimba are ready to tackle your toughest applications.

Bimba is part of IMI Precision Engineering, a world leader in motion and fluid control technologies. Wherever precision, speed and engineering reliability are essential, we deliver exceptional solutions which improve the productivity and efficiency of customers' equipment.

Our range of high-performance products, such as actuators, valves, valve islands, pressure monitoring controls and air preparation products together with trusted products brands including IMI Norgren, IMI Buschjost, IMI FAS, IMI Herion and IMI Maxseal underpin our position as a leading global supplier.

Part of IMI plc, we have a sales and service network in 50 countries, as well as manufacturing capability in the USA, Germany, China, UK, Switzerland.



Leaders In Actuation

Thousands of solutions. Thousands of configurations. Endless applications.

Solutions

- > Pneumatic
- > Hydraulic
- > Electric
- > Air Preparation
- > Valves
- > Safety
- > Production
- > Motion Control
- > Custom Designs

Industries & Applications

- > Medical
- > Food & Packaging
- > Agriculture
- > Semiconductor
- > Aerospace
- > Robotics
- > Energy
- > Window & Door

Challenges Addressed

- > Space Constraints
- > Wash-Down
- > Corrosive Environments
- > Poor Air Quality
- > Heavy Side Loads
- > Position Sensing



Notes

Original Line Cylinders

Bimba's classic "Blue and Improved" Original Line® continues to set the standard for non-repairable air cylinders. This product line features an incredible variety of standard models, including three-position, MRS, non-rotating, and PC air cylinders. Design enhancements to this line, including permanent grease lubrication, have more than doubled the anticipated service life of this industry-leading, non-repairable family of air cylinders.



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Types Of Cylinders

Bimba manufactures several different types of Original Line cylinders for your applications. These include the basic 5/16" to 3" bore cylinders described on pages 15-53. Weights published for each cylinder are approximate. Additional styles include:

Three-Position Cylinders
This multi-position Original Line stainless body cylinder provides three positive stroke positions with a single cylinder.

Cushion Cylinders
These include adjustable air cushions that slow cylinder speed at the end of stroke, reducing impact and extending cylinder life. Cushions can be ordered on rear, front or both ends, and can be ordered in combination with magnetic pistons.

MRS Cylinders
These include a magnet on the piston, designed to operate Bimba switches to actuate programmable controllers, relays, solenoids, timers or other electrically operated equipment. Dimensional differences from the basic Original Line include larger mounting threads and longer overall lengths in certain bore sizes.

Non-Rotating Cylinders
Double acting and reverse acting non-rotating cylinders have a unique square piston rod with rounded corners. They are dimensionally interchangeable with the standard Original Line.

PC Cylinders
These cylinders include acetal resin end caps. They are ideal for applications and environments that require exposure to moisture, lubricants and specific solvents. All dimensions except 1-1/2" bore nose threads are interchangeable with the Original Line.

All Stainless Steel Non-Repairable Cylinders
The new all stainless Original Line cylinders are the perfect solution for applications in the food processing/packaging, medical, chemical, or marine environments where wash down solutions or other corrosives are present in the environment. Designed to be dimensionally interchangeable with our standard Original Line, these cylinders offer a cost effective method of extending cylinder life in difficult application environments.

All Stainless Steel Repairable Cylinders
The new all stainless repairable Original Line cylinders are ideal for food processing, chemical, medical, pharmaceutical, offshore or marine equipment, and energy production or waste management applications. The bell ring design also offers the added benefit of full repairability without the need for hand tools by securing the body to the rod guide with a knurled, threaded nut.

Z-line Cylinders
For extremely tough applications, with larger diameter, two-piece piston rod, elastomer bumpers and Buna N U-cup seals for low breakaway.

Rod Lock Cylinders
This cylinder is a normally clamped unit that holds the piston rod in position when air pressure is not present. It is ideal for preventing drift at machine shut down.

Low Pressure Hydraulic Cylinders
Designed for use in low pressure hydraulic circuits with pressures not exceeding 250 psi. The design incorporates chrome plated piston rods and hydraulic seals.

Hole Punchers
These are designed to punch millions of holes in thin film or plastic materials 2-3 mils thick.

Specification Details

Accessories

Accessories have separate catalog numbers and are shown at the end of each bore size section. Most accessories are zinc-plated carbon steel. We also offer stainless steel accessories in some bore sizes.

Piston Rod Material

Standard models feature ground and polished, high strength carbon steel piston rod or ground and roller burnished type 303 stainless steel. Stainless steel can also be ordered as an option on most models (see models for pricing). Stainless steel is standard on the following models:

> All 5/16", 7/16" and 9/16" bore cylinders
> All cylinders with adjustable cushions
> All 9/16" through 3" bore cylinders ordered with Magnet (M) option
> MRS cylinders
> "Z" Line cylinders
> Block and Trunnion-mounted cylinders
> Universal mount, double-end rod cylinders
> All Fail Safe models (options JS/JR)

Temperature Range

Buna N seals with a temperature range of -20° F (-29° C) to 200° F (90° C) are standard in all BIMBA air cylinders. Fluoroelastomer seals rated for higher temperature applications (up to 400° F) are available. When specifying our magnetic piston ("M" option), maximum operating temperature is 200° F based on the material of the magnet. If cylinders are operated at temperatures below 0° F for extended time periods, our low temperature seal and lubrication option (N) is recommended. This option has a temperature range of -40° F to 200° F. If cylinders are operated below -20° F with low temperature seals for extended time periods, cylinder performance will be affected by the cold temperature.

Lubrication

Standard Original Line Cylinders are pre-lubricated at our factory with a semi-synthetic grease and do not require additional lubrication during their service life. In some instances where a specified option is not conducive to our standard grease pre-lubrication, such as our High Temperature and Hydraulic options, alternate standard pre-lubrications will be applied. See below for complete details. Additional optional pre-lubrications are available upon customer request.

> Optional oil pre-lubrication is available in most models and can be ordered by specifying option "99".
> Cylinders ordered with our High Temperature seals are pre-lubricated with an oil more suitable for high temperature applications.
> Cylinders ordered with our Low Temperature seals are pre-lubricated with a grease more suitable for low temperature applications.
> All Hydraulic Cylinders are lubricated with our proprietary oil lubrication (HT-99).
> All Stainless Steel cylinders are pre-lubricated with food grade grease.

HT-99 can be ordered through your local Bimba distributor (part number HT-99-7CC).

Specification Details

Mounting

Mounting should be by the threaded stud ends, pivot or bolt holes provided. Mount cylinders to provide alignment with the driven mechanism, avoiding side loads that restrict the free operation of the cylinder.

Special Cylinders

Do you have a complicated or unusual application? Bimba will custom-design and build the cylinder that will solve your problem. Whatever your needs—special stroke, mounting styles, rod-end configurations, seal materials, dimensional changes, etc—contact us or your local stocking BIMBA distributor.

Cylinder Life Expectancy

Bimba cylinders have been designed and tested for an expected life of 3,000 miles of travel when properly applied. Additional lubrication is not required. This life estimate applies to cylinders with our standard semi-synthetic grease pre lubricant, and may not include cylinders with design modifications, those exposed to harsh operating conditions or any unintended applications. Please note that for cylinders utilizing Fluoroelastomer seals, the life rating will be 1,400 miles of travel when properly applied.

Free Test Cylinder

Since 1975, our policy has been to provide a FREE TEST CYLINDER to any qualified original equipment manufacturer. This service is provided at no obligation, but we would appreciate a copy of your test results. Contact us or your local stocking BIMBA distributor for more information.

Delivery/Availability

Bimba cylinders are sold through local stocking distributors. Each distributor maintains an inventory of our most popular models. At the factory, Bimba classifies cylinders as shelving and non-shelving models. More than 125,000 units of various shelving models are kept in stock for immediate delivery. Standard stroke lengths shown in blue are stocked at Bimba. (Most stocked models shown in blue do not include options.) These stroke lengths are available in limited quantities for immediate shipment. Bimba also stocks a large quantity of cylinders with options such as stainless steel rods or bumpers. Non-stocked standard models are manufactured within 5 working days.

Stroke Lengths

Standard stroke lengths and recommended maximum stroke lengths are listed in each model description.

Special stroke lengths are available upon request. Stroke lengths are available in lengths longer than published, but an application review may be required. The cost per inch of stroke is listed below the base price of each cylinder. On models with 1/2" standard stroke length increments, add 1/2 of the per inch price for the 1/2" inch of stroke.

NOTE ON ROD MATERIAL: Please refer to table to determine the maximum stroke lengths for cylinders with carbon steel rods. Stroke lengths greater than those shown require a stainless steel rod.

Maximum Stroke Without SR- Option		
Bore Size	**Double Acting**	**Single Acting**
3/4" (04)	12"	11"
7/8" (06)	12"	11"
1-1/16" (09)	12"	11"
1-1/4" (12)	12"	9"
1-1/2" (17)	12"	10"
1-3/4" (24)	12"	8"
2" (31)	6"	4"
2-1/2" (50)	6"	--
3" (70)	6"	--

Specification Details

Fractional Stroke Lengths

Fractional stroke lengths for single and reverse acting cylinders, both standard and nonstandard, require special calculations to determine cylinder dimensions. The following equations apply:

Single Acting Cylinders

Calculate the length of next whole standard increment of stroke, then subtract the difference between desired stroke and next longer whole increment of stroke.

Example: 092.75

090 Base length = 1.94"

Plus 1.56 per inch of stroke = +4.68"

1.56 X 3.0 (next longer stroke increment)

093 length = 6.62

Whole stroke increment = 3.00"

Minus desired stroke = -2.75

Stroke difference = .25 -0.25"

092.75 length = 6.37"

Reverse Acting Cylinders

Calculate length of next longer standard increment of stroke, then subtract twice the difference between desired stroke and next longer standard increment of stroke.

Example: 011.625-RP

010-RP Base length = 2.38"

Plus 1.44 per each 0.5" of stroke = +5.76"

1.44 X 4 (number of standard increments required for the next longer increment)

012-RP length = 8.14

Standard stroke increment = 2.000"

Minus desired stroke = -1.625

Stroke difference = .375

Twice stroke difference = .750 -0.75"

011.625 length = 7.39"

Double Acting Cylinders

Add desired stroke length to base length of cylinder.

Example: 041.25-D

040-D Base length = 2.97”

Plus 1.25 stroke = +1.25”

041.25-D length = 4.22

NOTE: Additional charges may be added for small quantity orders of fractional, nonstandard stroke lengths. Consult your local stocking BIMBA distributor.

Spring Forces (approximate)				
Bore Size	Relaxed (lbs)	Compressed (lbs)	Heavy Spring	
			Relaxed (lbs)	Compressed (lbs)
5/16"	.5	1	—	—
7/16"	1	2	—	—
9/16"	2	4	—	—
3/4"	3	6	4	10
7/8"	3	6	—	—
1-1/16"	3	6	6	12
1-1/4"	7.5	15	—	—
1-1/2"	7	14	8.5	17
1-3/4"	11	24	—	—
2"	15	30	—	—

NOTES: Heavy spring option may increase cylinder overall length. Spring forces listed are for whole strokes.

How to Specify

ORIGINAL LINE CYLINDERS

Specification Details

Nose Mount Torque Values

Thread Size	Torque (IN*LB) FT*LB	Bore Size
1/4-28 UNF	(27.6) 2.3	5/16" (007)
3/8-24 UNF	(60) 5	5/16" (007) & 7/16" (01)
7/16-20 UNF	(84) 7	7/16" (01) & 9/16" (02)
1/2-20 UNF	(144) 12	3/4" (04)
5/8-18 UNF	(336) 28	3/4" (04), 7/8" (06) & 1-1/16" (09)
3/4-16 UNF	(480) 40	3/4" (04), 1-1/16" (09), 1-1/4" (12) & 1-1/2" (17)
7/8-16 UNF	(780) 65	1-1/16" (09), 1-1/4" (12) & 1-1/2" (17)
1-14 UNF	(1200) 100	1-1/2" (17) & 1-3/4" (24)
1 1/8-12 UNF	(1320) 110	1-1/2" (17) & 1-3/4" (24)
1 1/4-12 UNF	(1440) 120	2" (31)
1 3/8-12 UNF	(1560) 130	2-1/2" (50)
1 1/2-12 UNF	(1680) 140	3" (70)

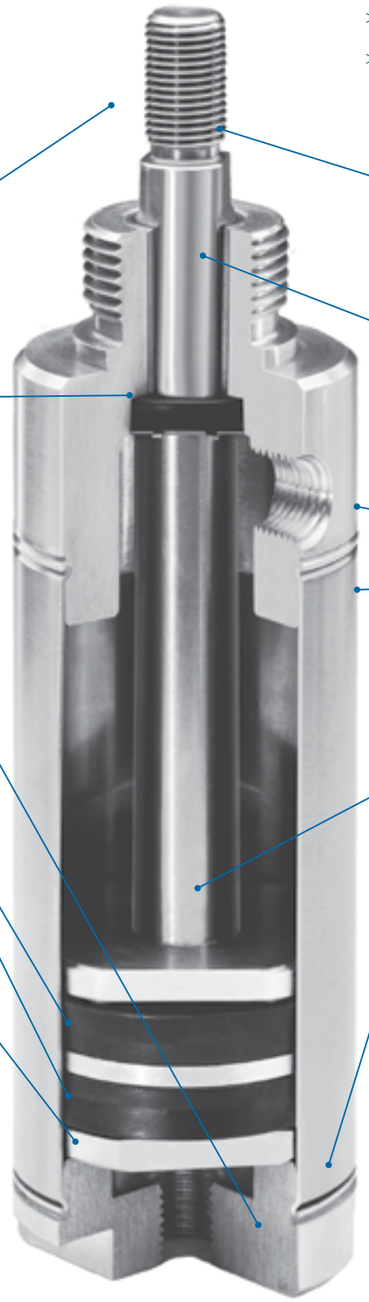
Pressure Rating

Original Line, Cushioned Original Line, NR series, Z-line, MRS and hole punchers:	250 psi
PC cylinder:	100 psi
Reservoirs:	250 psi

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Product Features

Working with bimba gives you:
> The Original stainless steel body cylinder company — with more sizes and options than any other manufacturer.
> Fast service — many models and sizes kept in stock for immediate delivery.
> Worldwide availability through local stocking distributors
> Custom-design capabilities for your specific needs.



Features and Benefits:
> 304 stainless steel body with mirror finish ID For long, reliable life.
> Pre-lubricated with semi-synthetic grease, no additional lubrication is required.
> Piston-to-rod connection is threaded, sealed and riveted securely in place.
> Low breakaway frictional characteristics: collapsible U-cup rod and piston seals; oil-impregnated, sintered bronze rod bushing on most sizes; and breakaway slots on each endcap for fast seal inflation.
> Roll-formed rod threads on both ends for high strength
> 250 psi rating
> High strength aluminum alloy porting ends, machined for minimal breakaway during initial pressurization

How to Specify

5/16" Bore Air Cylinders

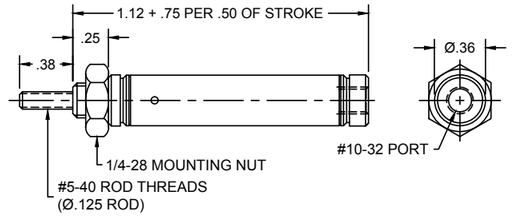
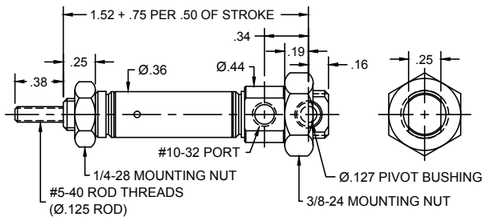
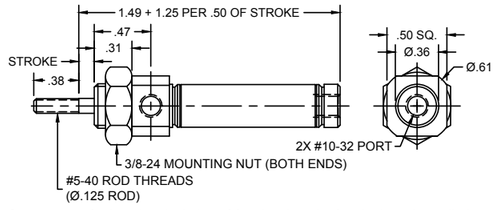
> Ground and Roller Burnished 303 Stainless Steel Piston Rod Standard
> Force Exerted Approximately 0.07 of Air Line Pressure
> Enclosed Spring Force: .5lb Relaxed — 1lb Compressed
> Cushion Quiet Bumpers Standard on All Models

Options:

See also: Option Combination Availability Chart (page 54)

> **Ports rotated (K)***
> **No thread (NT)**
» *Rod guide port rotated 90° clockwise in BF model.
> **Side Ported Rear Head (Q)**
» Add .20" to nose mount overall length
> **Extra Extension (EE)**
> **Double Acting Failsafe**
» JS = Spring Return, JR = Spring Extend
» See pages 55-56 for overall length adders
> **Low Temperature (N)**
» Temperature Range: -40° to 200° F
> **High Temperature "U" Cups (V)**
» Overall length does not change
» Temperature Range: 0° to 400° F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Magnetic Position Sensing (M)**
» Add .15" to overall length
» Must specify track(s) for use with Bimba's miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Pressure Hydraulic (HL)**
» 250 psi maximum
» Double acting models only
» Option specified as a prefix

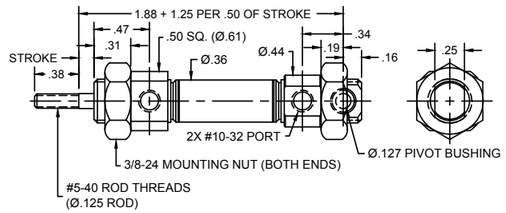
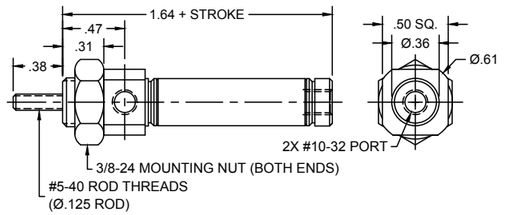
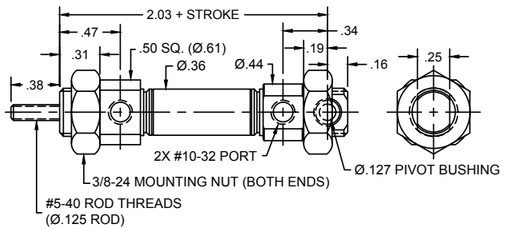
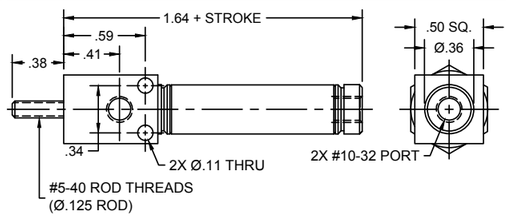
☐ Enter Stroke Length as 4th Digit

Model	Description/Weight (lbs)	Dimensions
007 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessory: D-26731 Mounting Bracket Base Weight: .03 Adder Per Inch of Stroke: .02	 See page 12 for length calculation of fractional stroke for single acting cylinders.
007 ☐ -XP 	Single Acting – Spring Return – Double End or Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessories: D-26731 Mounting Bracket D-26689 Pivot Bracket D-26690 Piston Rod Clevis Base Weight: .04 Adder Per Inch of Stroke: .02	 See page 12 for length calculation of fractional stroke for single acting cylinders.
007 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return — Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessory: D-26765 Mounting Bracket Base Weight: .05 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.

5/16” Bore Air Cylinders

> Ground and Roller Burnished 303 Stainless Steel Piston Rod Standard
> Force Exerted Approximately 0.07 of Air Line Pressure
> Enclosed Spring Force: .5 lb. Relaxed — 1 lb. Compressed
> Cushion Quiet Bumpers Standard on All Models

☐ Enter Stroke Length as 4th Digit

Model	Description/Weight (lbs)	Dimensions
007 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessories: D-26765 Mounting Bracket D-26689 Pivot Bracket D-26690 Piston Rod Clevis Base Weight: .05 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
007 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessory: D-26765 Mounting Bracket Base Weight: .05 Adder Per Inch of Stroke: .01	
007 ☐ -DXP 	Double Acting – Air Return – Double End or Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessories: D-26765 Mounting Bracket D-26689 Pivot Bracket D-26690 Piston Rod Clevis Base Weight: .06 Adder Per Inch of Stroke: .01	
BF-007 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Base Weight: .05 Adder Per Inch of Stroke: .01	

How to Specify

ORIGINAL LINE CYLINDERS

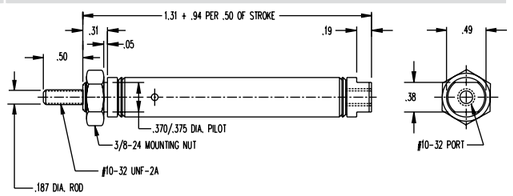
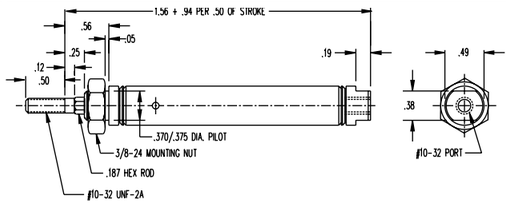
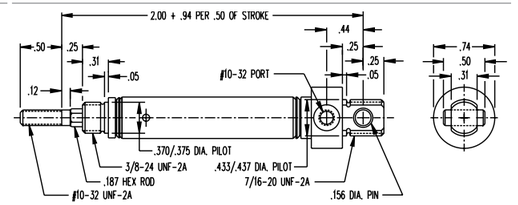
7/16” Bore Air Cylinders

> Ground and Roller Burnished 303 Stainless Steel Piston Rod Standard
> Force Exerted Approximately 0.15 of Air Line Pressure
> Enclosed Spring Force: 1lb Relaxed — 2lbs Compressed

Options:

> **Ports Rotated (K) (Not available in block mount)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .19” to nose mount overall length
> **Pivot Bushing (Y)**
» .157” ID (Use bracket D-12321-A)
> **Single And Reverse Acting Bumper (B)**
» Add .062 to overall length; Reverse acting, add .125
> **Double Acting Bumper (B)**
» Add .188 to overall length – DXDE; add .250
> **Extra Extension (EE)**
» Single, reverse and double acting
» DXDE, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature “U” Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Magnet (prefix M)**
» Add 0.25” to Double Acting overall length
» Add 0.20” to Single Acting overall length
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Rod Wiper (W)**
» Not available in standard single acting
> **Low Pressure Hydraulic (HL)**
» 250 psi maximum
» Double acting models only
» Option specified as a prefix

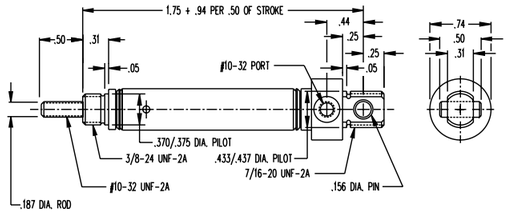
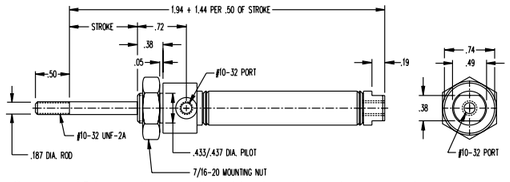
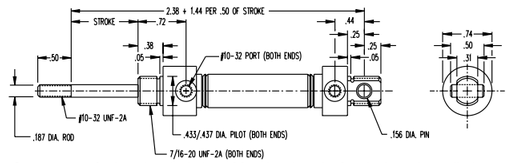
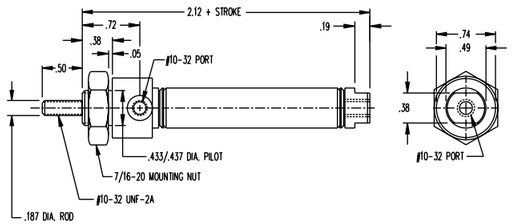
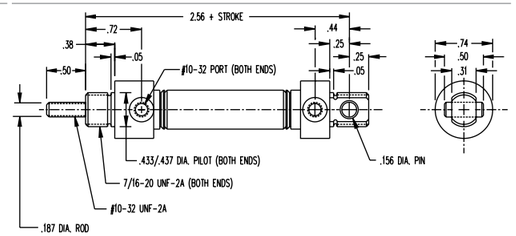
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Model	Description/Weight (lbs)	Dimensions
01 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-775 Mounting Bracket Base Weight: .04 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
01 ☐ -NR 	Single Acting – Non-rotating – Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-775 Mounting Bracket Base Weight: .04 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
01 ☐ -NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-850 Rod Clevis D-780 Pivot Brackets Base Weight: .04 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.

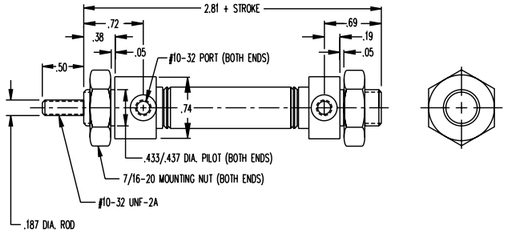
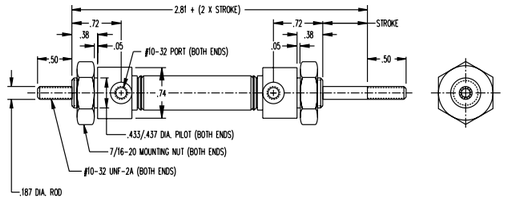
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7/16” Bore Air Cylinders

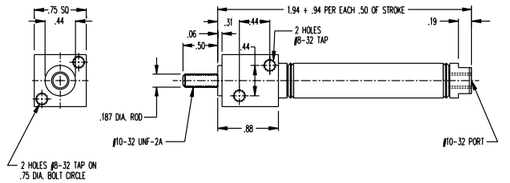
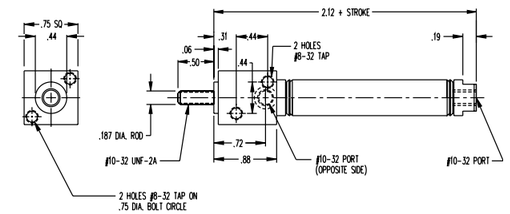
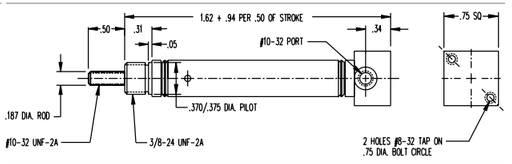
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Model	Description/Weight (lbs)	Dimensions
01 ☐ -P 	Single Acting – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-780 Pivot Brackets D-850 Piston Rod Clevis Base Weight: .04 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
01 ☐ -R 	Reverse Single Acting – Pull Type– Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .08 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
01 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-780 Pivot Brackets D-850 Piston Rod Clevis Base Weight: .08 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
01 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .07 Adder Per Inch of Stroke: .02	
01 ☐ -DP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-780 Pivot Brackets D-850 Piston Rod Clevis Base Weight: .08 Adder Per Inch of Stroke: .02	

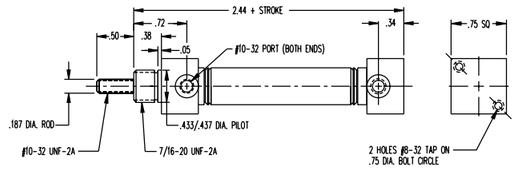
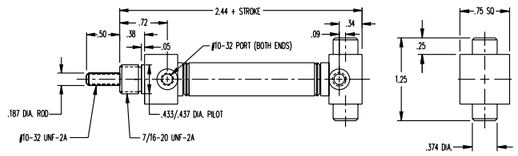
7/16” Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
01 ☐ -DX 	Double Acting – Double End Mount – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .11 Adder Per Inch of Stroke: .02	
01 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mount Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .14 Adder Per Inch of Stroke: .03	

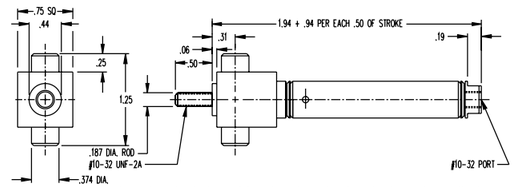
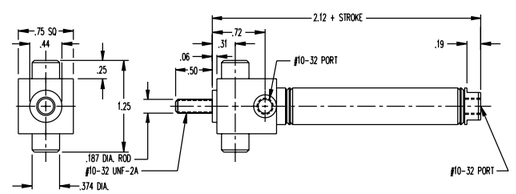
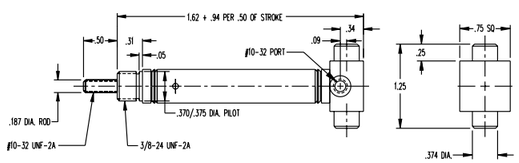
7/16" Bore Block Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BF-01 ☐ 	Single Acting – Front Block Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .07 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-01 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .07 Adder Per Inch of Stroke: .02	
BR-01 ☐ 	Single Acting – Rear Block Mounting for Vertical Positioning – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .05 Adder Per Inch of Stroke: .04	

7/16" Bore Block Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BR-01 ☐ -D 	Double Acting – Rear Block Mounting for Vertical Positioning – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .08 Adder Per Inch of Stroke: .02	
BRT-01 ☐ -D 	Double Acting – Rear Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-1 Trunnion Brackets D-850 Rod Clevis Base Weight: .10 Adder Per Inch of Stroke: .02	

7/16" Bore Trunnion Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BFT-01 ☐ 	Single Acting – Front Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-1 Trunnion Brackets D-850 Rod Clevis Base Weight: .09 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFT-01 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-1 Trunnion Brackets D-850 Rod Clevis Base Weight: .09 Adder Per Inch of Stroke: .02	
BRT-01 ☐ 	Single Acting – Rear Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-1 Trunnion Brackets D-850 Rod Clevis Base Weight: .07 Adder Per Inch of Stroke: .04	

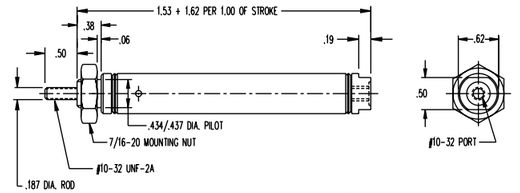
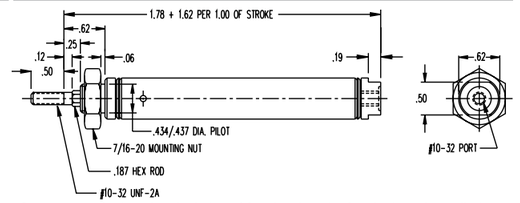
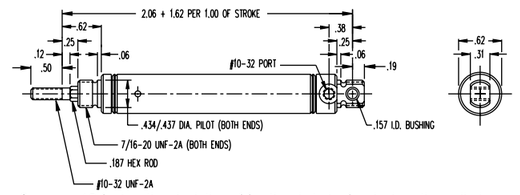
9/16" Bore Air Cylinders

> Ground and Roller Burnished 303 Stainless Steel Piston Rod Standard
> Force Exerted Approximately 0.25 of Air Line Pressure
> Enclosed Spring Force: 2lbs Relaxed — 4lbs Compressed

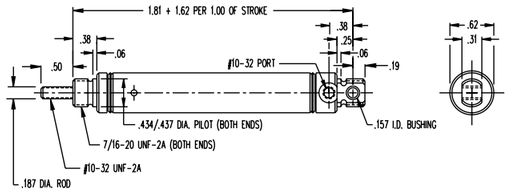
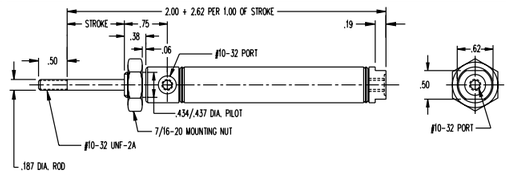
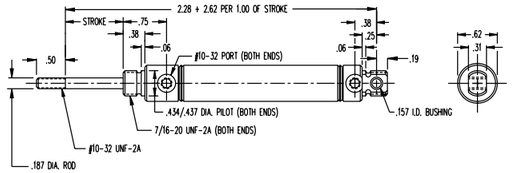
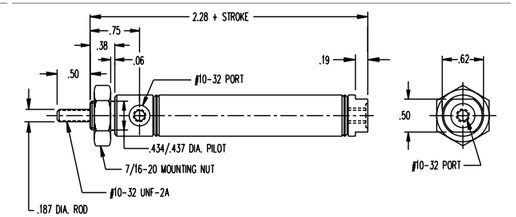
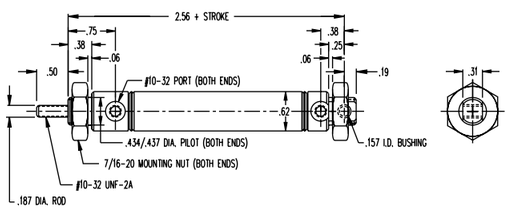
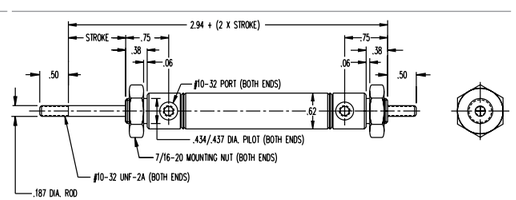
Options:

> **Ports Rotated (K) (Not available in block mount)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .03" to nose mount overall length
> **Single And Reverse Acting Bumper (B)**
» Add .062 to overall length
> **Double Acting Bumpers (B)**
» Add .125 to overall length
> **Extra Extension (EE)**
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Magnet (prefix M)**
» Single and reverse acting add .125" to overall length
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See the Switch Products chapter for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
02 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .06 Adder Per Inch of Stroke: .05	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .06 Adder Per Inch of Stroke: .05	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .06 Adder Per Inch of Stroke: .05	 See page 12 for length calculation of fractional stroke for single acting cylinders.

9/16" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
02 ☐ -P 	Single Acting – Pivot Type –Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .06 Adder Per Inch of Stroke: .05	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .08 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .08 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .09 Adder Per Inch of Stroke: .02	 See page 12 for length calculation of fractional stroke for single acting cylinders.
02 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-770 Mounting Bracket D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .09 Adder Per Inch of Stroke: .02	
02 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessory: D-770 Mounting Bracket Base Weight: .16 Adder Per Inch of Stroke: .03	

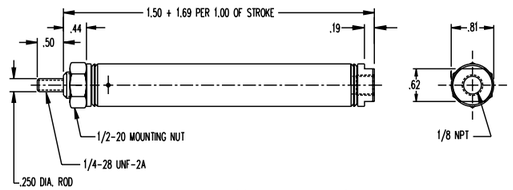
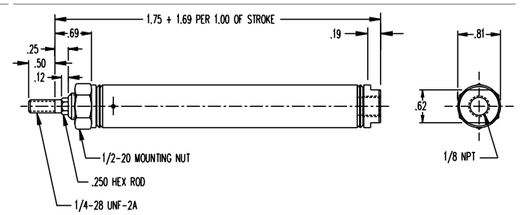
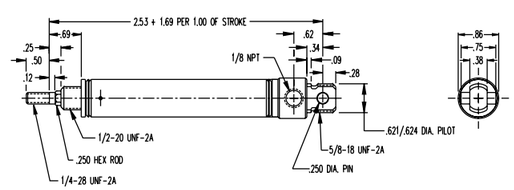
3/4" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod
> Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 0.4 of Air Line Pressure
> Enclosed Spring Force: 3lbs Relaxed — 6lbs Compressed
> Rod Wipers Available on D, DP, DXP and DXDE Models

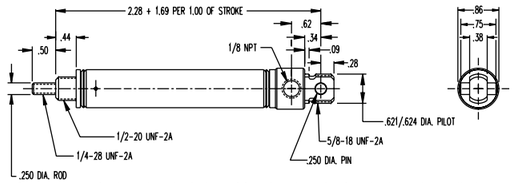
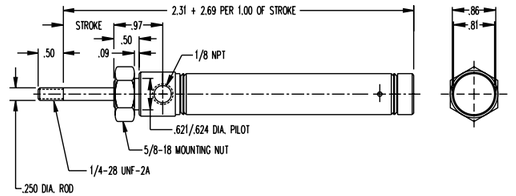
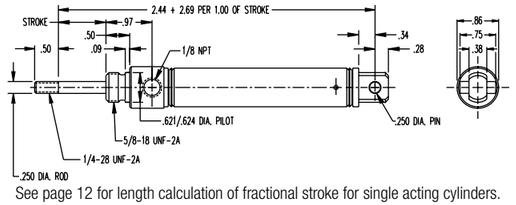
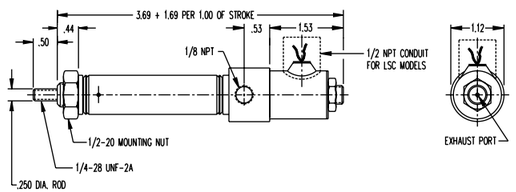
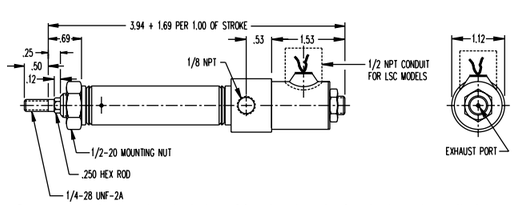
Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .44" to nose mount overall length
> **Pivot Bushing (Y)**
» .250" ID
> **Single And Reverse Acting Bumper (B)**
» Add .125 to overall length
> **Double Acting Bumpers (B)**
» No change in overall length
> **Extra Extension (EE)**
» DXDE, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Rod Wiper (W) (not available in standard single acting)**
» Now available in block mount
> **Heavy Spring (H) (available on single acting and reverse acting)**
» Spring Force: 4 lbs relaxed — 10 lbs compressed
> **Magnet (prefix M)**
» Single and reverse acting add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See the Switch Products chapter for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Stainless Steel Rod (prefix SR)**
» Standard on M option, block mount, DXP and DXDE models
> **Low Pressure Hydraulic (HL)**
» 250 psi maximum
» Double acting models only
» Option specified as a prefix

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
04 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-226 Mounting Bracket Base Weight: .10 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04 ☐ -NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-226 Mounting Bracket Base Weight: .10 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04 ☐ -NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .12 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.

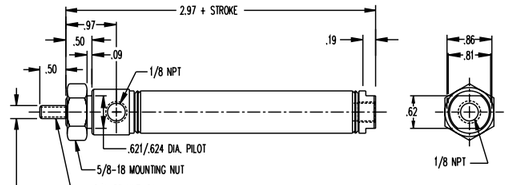
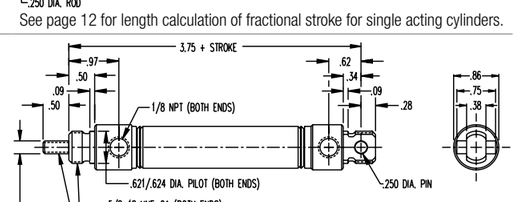
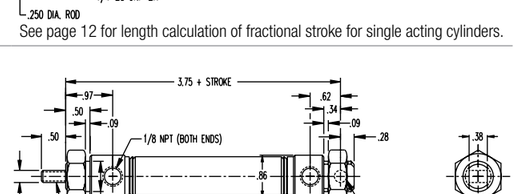
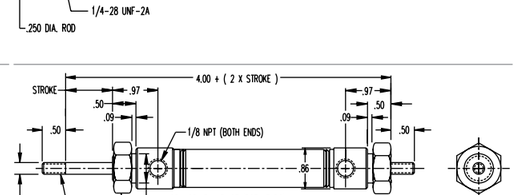
3/4" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
04☐-P 	Single Acting – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .13 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .18 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .18 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-LS or LSC (Conduit Outlet) 	Single Acting – Built-in Midget 3- Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-226 Mounting Bracket Base Weight: .38 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-NRLS or NRLSC (Conduit Outlet) 	Single Acting – Non-rotating Hexagon Piston Rod – Built-in Midget 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-226 Mounting Bracket Base Weight: .46 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.

How to Specify

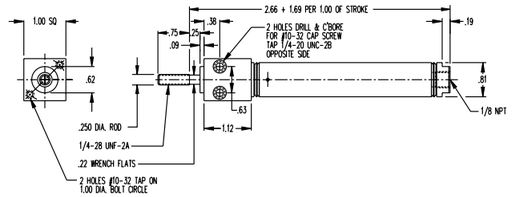
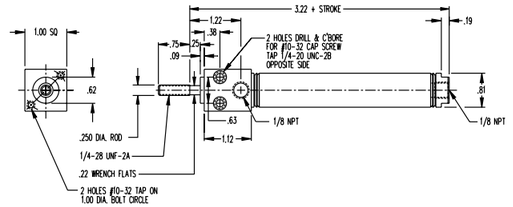
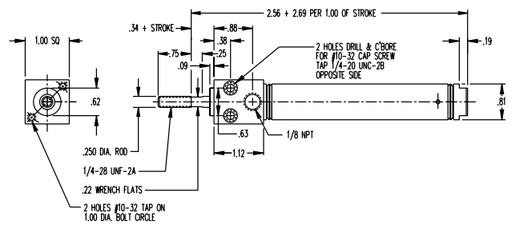
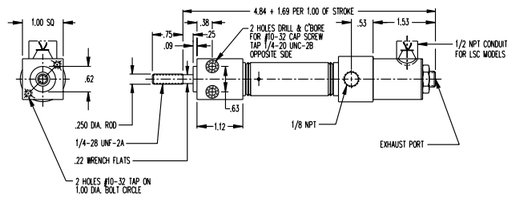
ORIGINAL LINE CYLINDERS

3/4" Bore Air Cylinders

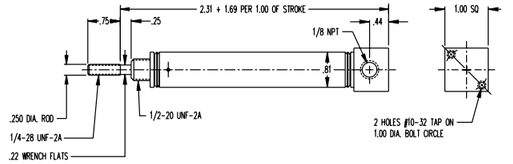
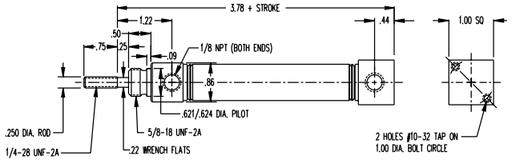
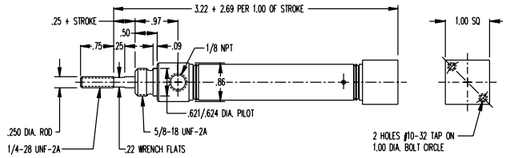
Model	Description/Weight (lbs)	Dimensions
04☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .21 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-DP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .21 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04☐-DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessories: D-129 Mounting Bracket D-13498-A Pivot Bracket D-166-3 Piston Rod Clevis Base Weight: .29 Adder Per Inch of Stroke: .03	
04☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .37 Adder Per Inch of Stroke: .04	

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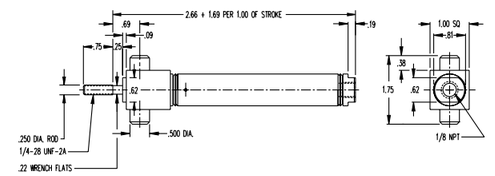
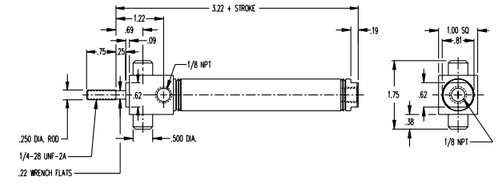
3/4" Bore Block Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BF-04 ☐ 	Single Acting – Front Block Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .18 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-04 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .22 Adder Per Inch of Stroke: .03	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-04 ☐ -R 	Pull Type – Front Block Mounting – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .19 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-04 ☐ -LS or LSC 	Built-in Midget 3-Way Solenoid Operated Valve – Single Acting – Spring Return – Front Block Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Base Weight: .38 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.

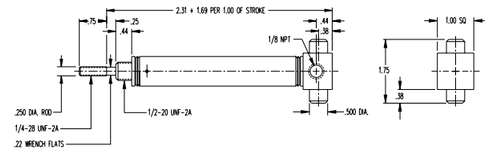
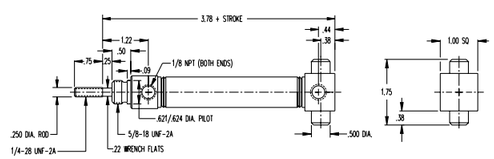
3/4" Bore Block Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BR-04 ☐ 	Single Acting – Rear Block – Mounting for Vertical Positioning – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .15 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-04 ☐ -D 	Double Acting – Rear Block – Mounting for Vertical Positioning – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .26 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-04 ☐ -R 	Pull Type – Rear Block Mounting for Vertical Positioning – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .15 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.

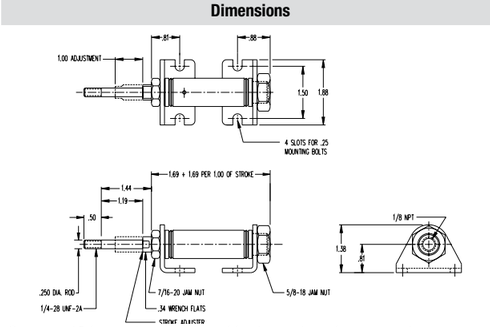
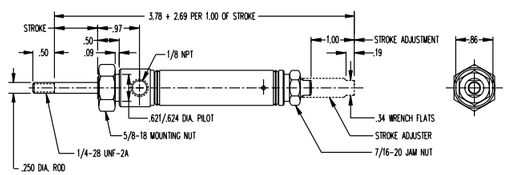
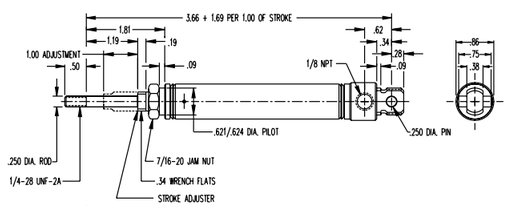
3/4" Bore Trunnion Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BFT-04 ☐ 	Single Acting – Front Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-3 Rod Clevis Base Weight: .24 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFT-04 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-3 Rod Clevis Base Weight: .29 Adder Per Inch of Stroke: .03	

3/4" Bore Trunnion Mounted Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BRT-04 ☐ 	Single Acting – Rear Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-3 Rod Clevis Base Weight: .19 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BRT-04 ☐ -D 	Double Acting – Rear Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-3 Rod Clevis Base Weight: .28 Adder Per Inch of Stroke: .03	

3/4" Bore Adjustable Stroke Air Cylinders

Model	Description/Weight (lbs)	Dimensions
04 ☐ -A 	Single Acting – Spring Return – Adjustable Stroke – Double End Mounting – Brass Piston Rod Bearing and Stroke Adjustment in 1", 2", 3". Mounting Brackets are included. 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3" Maximum Stroke – 6" Optional Stainless Steel Rod Base Weight: .40 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04 ☐ -RA 	Reverse Single Acting – Pull Type – Rod Normally Extended – Nose Mounting – Stroke Adjustment in 1", 2", 3". 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .23 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
04 ☐ -AP 	Single Acting – Pivot Type – Rear Pivot Mounting – Stroke Adjustment in 1", 2", 3". 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .23 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.

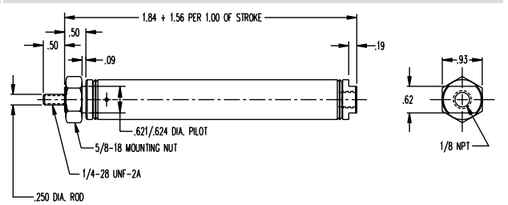
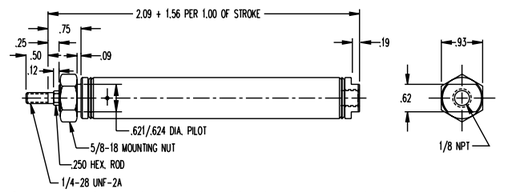
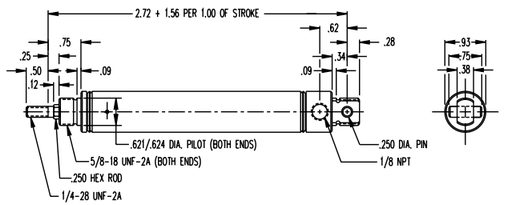
7/8" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 0.6 of Air Line Pressure
> Enclosed Spring Force: 3lbs Relaxed — 6lbs Compressed
> Cushion Quiet Bumpers Standard on All Models

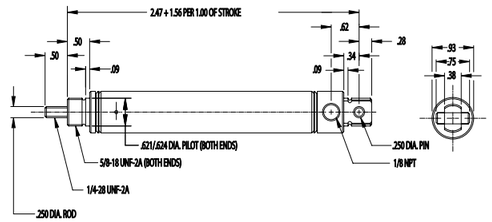
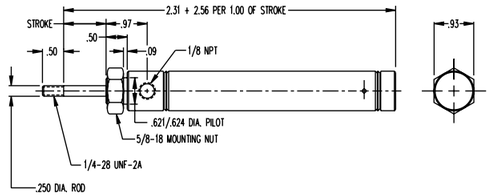
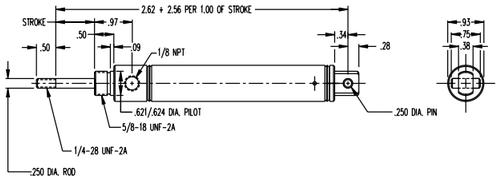
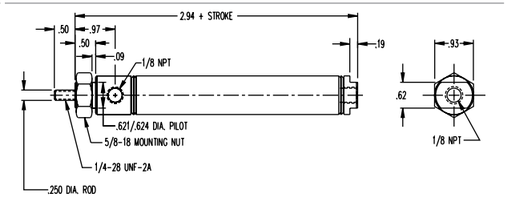
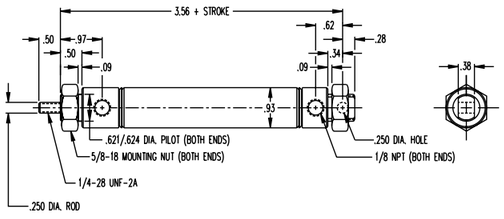
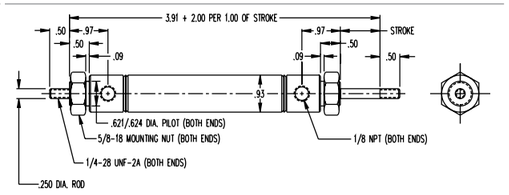
Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .28" to nose mount overall length
> **Pivot Bushing (Y)**
» .250" ID
> **Extra Extension (EE)**
» DXDE, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Magnet (prefix M)**
» All models add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Stainless Steel Rod (prefix SR)**
» Standard on DXP, DXDE, and M option

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
06 ☐	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .17 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.
06 ☐ -NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .17 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.
06 ☐ -NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .17 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.

7/8" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
06 ☐ -P 	Single Acting – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .17 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.
06 ☐ -R 	Reverse Single Acting – Pull Type –Rod Normally Extended – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .20 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.
06 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-3 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .20 Adder Per Inch of Stroke: .09	 See page 12 for length calculation of fractional stroke for single acting cylinders.
06 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .25 Adder Per Inch of Stroke: .03	
06 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-166-3 Piston Rod Clevis D-129 Mounting Bracket D-13498-A Pivot Bracket Base Weight: .32 Adder Per Inch of Stroke: .03	
06 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-129 Mounting Bracket Base Weight: .39 Adder Per Inch of Stroke: .06	

1-1/16" Bore Air Cylinders

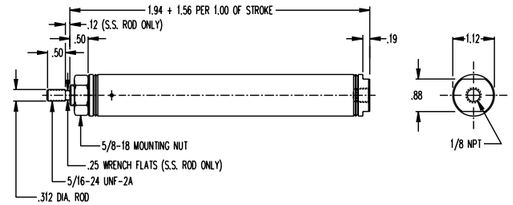
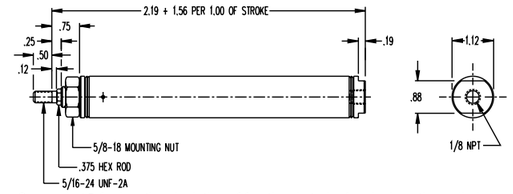
> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard

> Force Exerted Approximately 0.9 of Air Line Pressure
> Enclosed Spring Force: 3lbs Relaxed — 6lbs Compressed
> Rod Wipers Available on D, DP, DX and DXDE Models

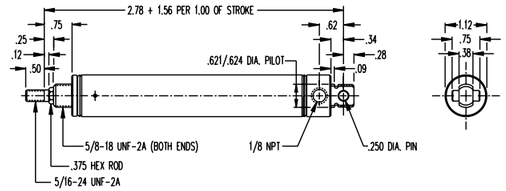
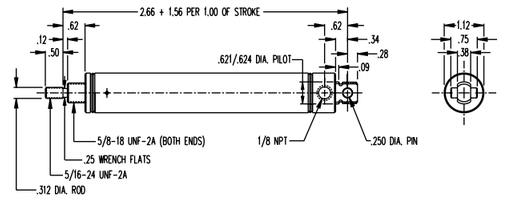
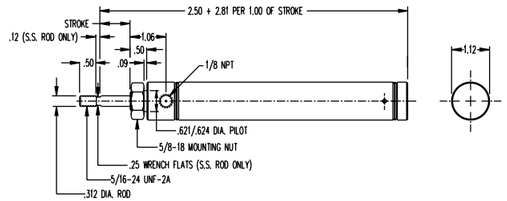
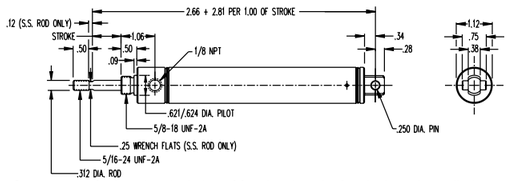
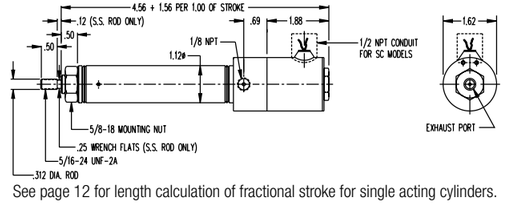
Options:

> **Ports Rotated (K)**
» *Front port rotated 90° on BF-090-D.
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .25" to nose mount overall length
> **Pivot Bushing (Y)**
» .250" ID
> **Single And Reverse Acting Bumper (B)**
» Add .125 to overall length
> **Double Acting Bumpers (B)**
» Add .125 to overall length
» Models DXDE and DXDEH add .500
> **Extra Extension (EE)**
» DXDE, extension added to each end
» DXDE hollow rod, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Heavy Springs (H) are standard on all single acting block**
» Front and block rear mount and -NRLSC models, and reverse acting except -RA type
» Spring Force: 6 lbs. relaxed —12 lbs. compressed
> **Magnet (prefix M)**
» Single acting and DXDE add .125" to overall length
» Use bumper length adder for DXDE and DXDEH when magnet and bumper are ordered together.
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products, for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
» Now available in block mount
> **Stainless Steel Rod (prefix SR)**
» Standard on DX, DXDE, DXDEH, All block mountings and M option

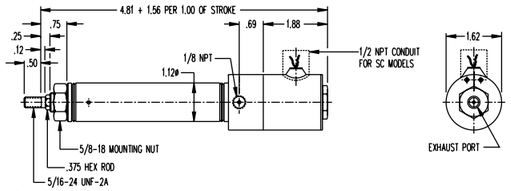
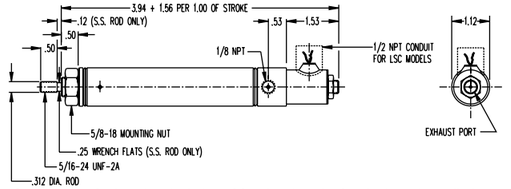
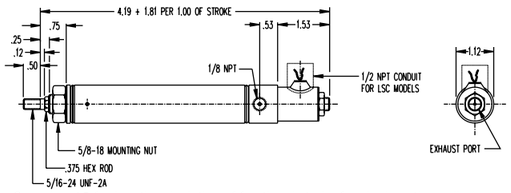
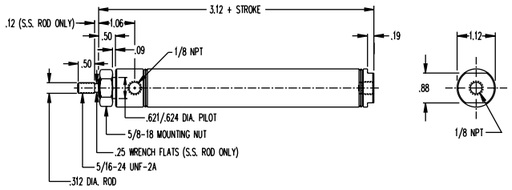
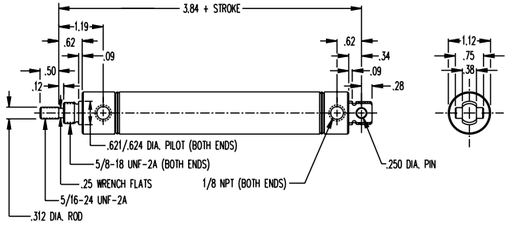
☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
09 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .23 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09 ☐ -NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .25 Adder Per Inch of Stroke: .12	 See page 12 for length calculation of fractional stroke for single acting cylinders.

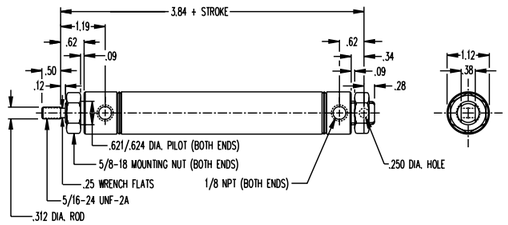
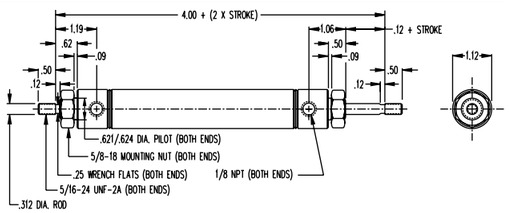
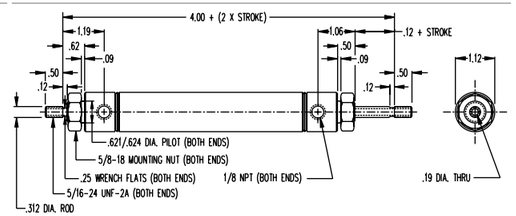
1-1/16" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
09☐-NRP 	Single Acting – Non-Rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-1 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .25 Adder Per Inch of Stroke: .12	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-P 	Single Acting – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-1 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .24 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .24 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-1 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .22 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-S or SC 	Single Acting – Built-in 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 1/16" Orifice Standard – 150 psi, 3/64" Orifice Optional Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-129 Mounting Bracket Base Weight: 1.11 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.

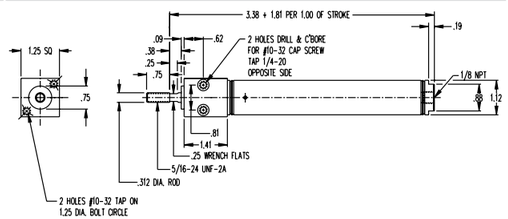
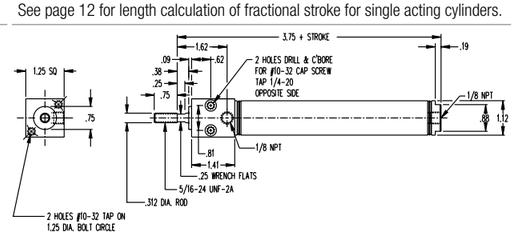
1-1/16" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
09☐-NRS or NRSC 	Single Acting – Built-in 3-Way Solenoid Operated Valve – Non-rotating Hexagon Piston Rod – Spring Return – Front Nose Mounting – 150 psi, 1/16" Orifice Standard – 150 psi, 3/64" Orifice Optional Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-129 Mounting Bracket Base Weight: 1.13 Adder Per Inch of Stroke: .12	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-LS or LSC 	Single Acting – Built-in Midget 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-129 Mounting Bracket Base Weight: 1.20 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-NRLS or NRLSC	Single Acting – Non-rotating Hexagon Piston Rod – Built-in Midget 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-129 Mounting Bracket Base Weight: 1.20 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .33 Adder Per Inch of Stroke: .05	
09☐-DP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessories: D-166-1 Piston Rod Clevis D-167 Pivot Bracket Base Weight: .33 Adder Per Inch of Stroke: .05	

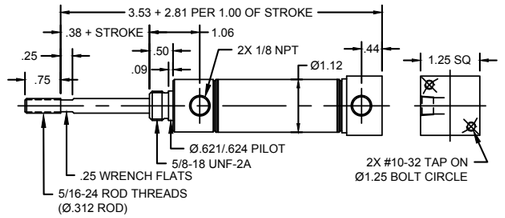
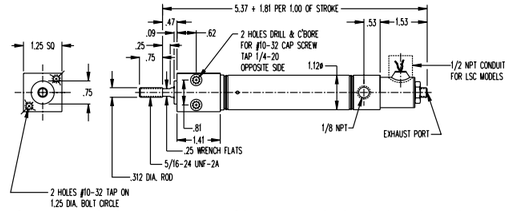
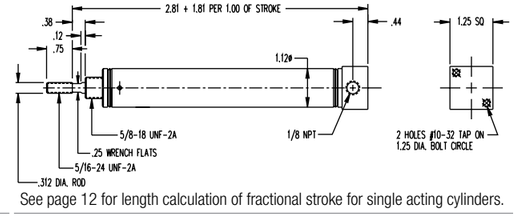
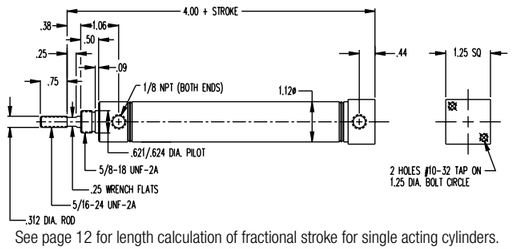
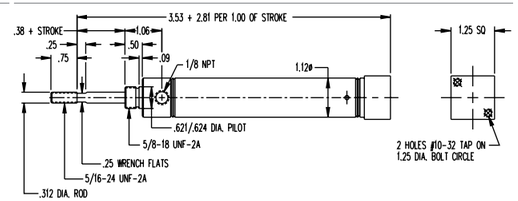
1-1/16" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
09☐-DX 	Double Acting – Universal Mounting Pivot, or Double End Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessories: D-13498-A Pivot Bracket D-129 Mounting Bracket D-166-1 Piston Rod Clevis Base Weight: .33 Adder Per Inch of Stroke: .05	
09☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .48 Adder Per Inch of Stroke: .07	
09☐-DXDEH 	Double Acting – Double End Hollow Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-129 Mounting Bracket Base Weight: .47 Adder Per Inch of Stroke: .07	

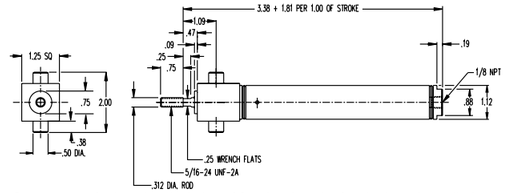
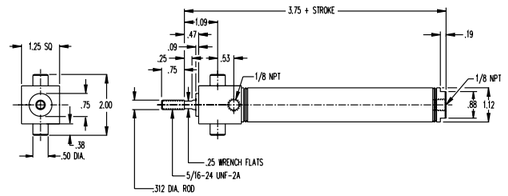
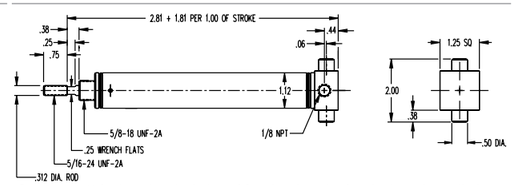
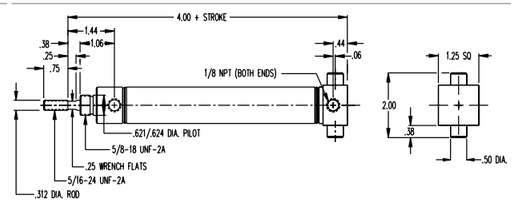
1-1/16" Bore Block Mounted (Spring Force: 6lbs Retracted, 12lbs Extended)

Model	Description/Weight (lbs)	Dimensions
BF-09☐ 	Single Acting – Front Block Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .43 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-09☐-D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .49 Adder Per Inch of Stroke: .05	

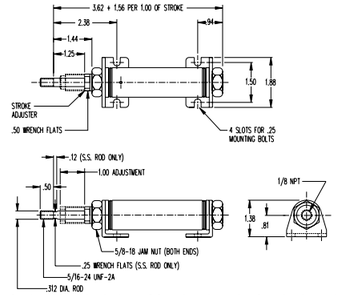
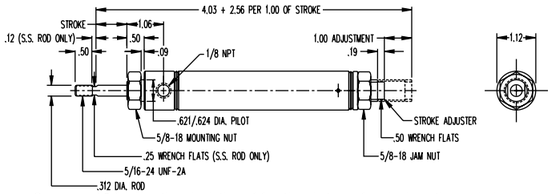
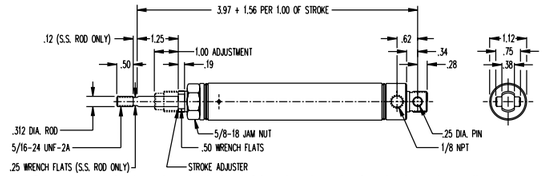
1-1/16” Bore Block Mounted (Spring Force: 6lbs Retracted, 12lbs Extended)

Model	Description/Weight (lbs)	Dimensions
BF-09☐-R 	Pull Type – Front Block Mounting – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .36 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-09☐-LS or LSC 	Built-in Midget 3-Way Solenoid Operated Valve – Single Acting – Spring Return – Front Block Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Base Weight: 1.31 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-09☐ 	Single Acting – Rear Block Mounting for Vertical Positioning – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .36 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-09☐-D 	Double Acting – Rear Block Mounting for Vertical Positioning – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .39 Adder Per Inch of Stroke: .05	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-09☐-R 	Pull Type – Rear Block Mounting for Vertical Positioning – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .32 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.

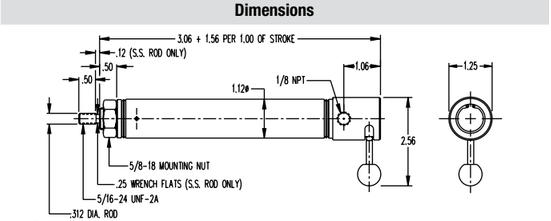
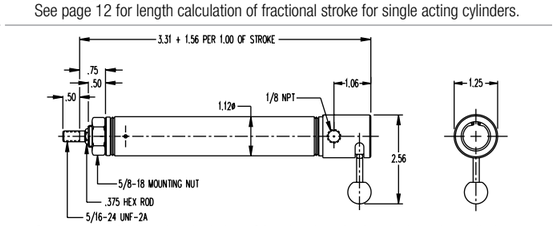
1-1/16" Bore Trunnion Mounted (Spring Force: 6lbs Retracted, 13lbs Extended)

Model	Description/weight (lbs)	Dimensions
BFT-09 ☐ 	Single Acting – Front Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-1 Rod Clevis Base Weight: .45 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFT-09 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-1 Rod Clevis Base Weight: .49 Adder Per Inch of Stroke: .05	
BRT-09 ☐ 	Single Acting – Rear Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-1 Rod Clevis Base Weight: .37 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BRT-09 ☐ -D 	Double Acting – Rear Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-166-1 Rod Clevis Base Weight: .43 Adder Per Inch of Stroke: .05	

1-1/16” Bore Block Mounted (Spring Force: 6lbs Retracted, 12lbs Extended)

Model	Description/Weight (lbs)	Dimensions
09 ☐ -A 	Single Acting – Spring Return – Adjustable Stroke – Double End Mounting – Brass Piston Rod Bearing and Stroke Adjustment in 1", 2", 3" 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3". Mounting brackets are included. Maximum Stroke – 6" Optional Stainless Steel Rod Base Weight: .58 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09 ☐ -RA 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Force: 6 lbs. Retracted, 3 lbs. Extended – Nose Mounting – Stroke Adjustment in 1", 2", 3". 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3". Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Brackets Base Weight: .41 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09 ☐ -AP 	Single Acting – Pivot Type – Rear Pivot Mounting – Stroke Adjustment in 1", 2", 3" 1" Stroke Adjusts 0" – 1", 2" Stroke 1" – 2", and 3" Stroke 2" – 3". Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-166-1 Piston Rod Clevis D-167 Pivot Brackets Base Weight: .40 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/16" Bore Built-in Manual Valve

Model	Description/Weight (lbs)	Dimensions
09 ☐ -M 	Single Acting – Built-in 3-Way Manual Valve – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .45 Adder Per Inch of Stroke: .11	 See page 12 for length calculation of fractional stroke for single acting cylinders.
09 ☐ -NRM 	Single Acting – Built-in 3-Way Manual Valve – Non-rotating Hexagon Rod – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-129 Mounting Bracket Base Weight: .47 Adder Per Inch of Stroke: .12	 See page 12 for length calculation of fractional stroke for single acting cylinders.

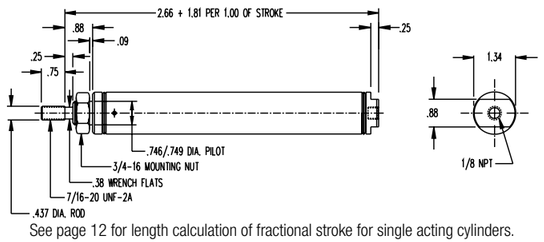
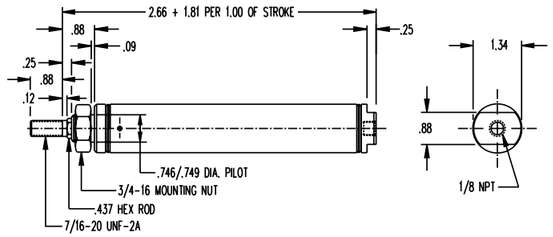
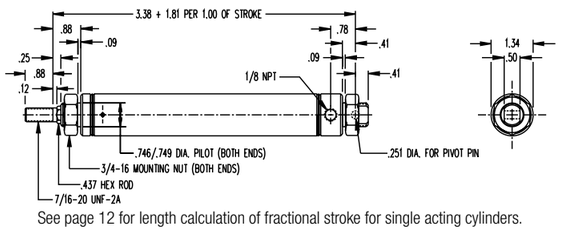
1-1/4" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 1.2 of Air Line Pressure
> Enclosed Spring Force: 7.5lbs Relaxed — 15lbs Compressed
> Cushion Quiet Bumpers Standard

Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .31" to nose mount overall length
> **Pivot Bushing (Y)**
» .250" ID
> **Extra Extension (EE)**
» DXDE, extension added to each end
» DXDE hollow rod, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Magnet (prefix M)**
» Single acting and DXDE add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Stainless Steel Rod (prefix SR)**
» Standard on DXDE, DXDEH and M option
> **Rod Wiper (W)**
» Not available in standard single acting

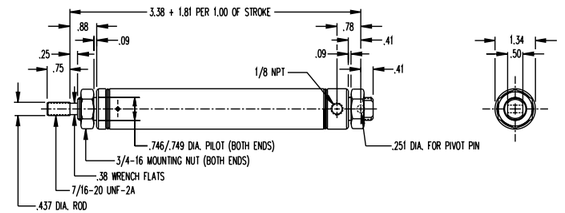
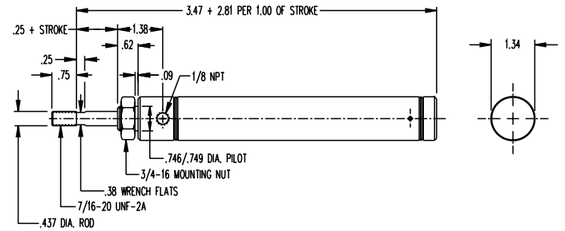
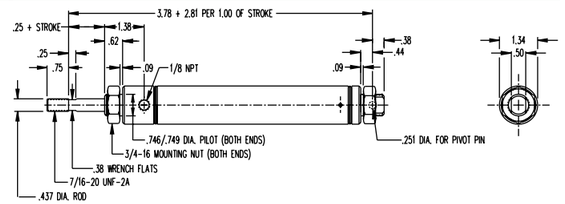
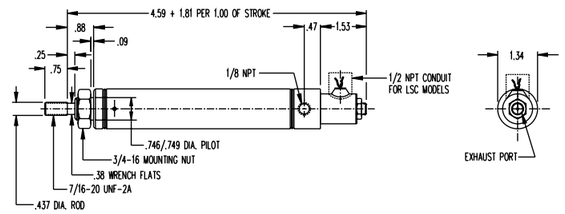
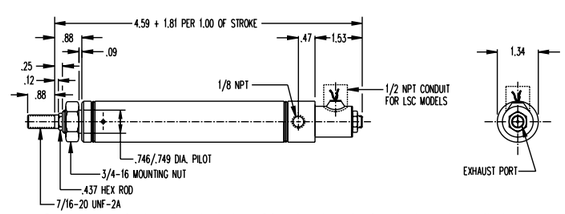
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Model	Description/Weight (lbs)	Dimensions
12☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .39 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .41 Adder Per Inch of Stroke: .20	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-1360 Pivot Brackets Base Weight: .41 Adder Per Inch of Stroke: .20	 See page 12 for length calculation of fractional stroke for single acting cylinders.

How to Specify

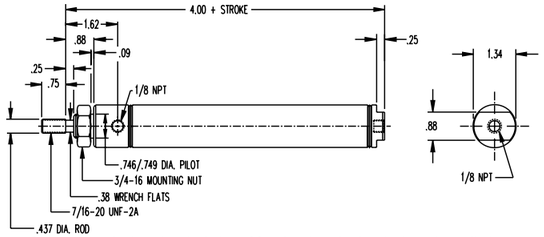
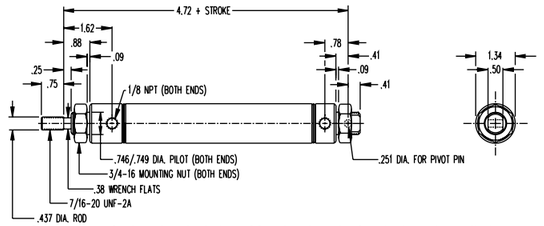
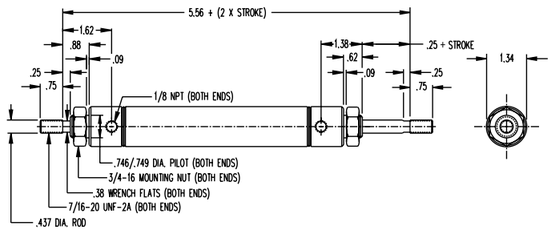
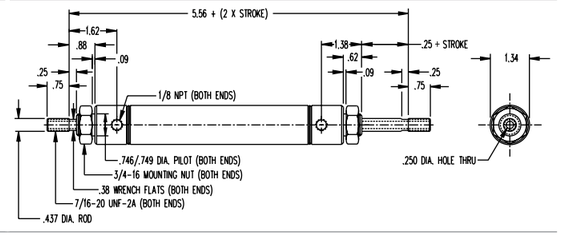
ORIGINAL LINE CYLINDERS

1-1/4" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
12☐ -P 	Single Acting – Pivot Type – Spring Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-1360 Pivot Brackets Base Weight: .53 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .50 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-1360 Pivot Bracket Base Weight: .57 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -LS or LSC 	Single Acting – Built-in Midget 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-241 Mounting Bracket Base Weight: 1.30 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐ -NRLS or NRLSC 	Single Acting – Non-rotating Hexagon Piston Rod – Built-in Midget 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 3/64" Orifice Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-241 Mounting Bracket Base Weight: 1.30 Adder Per Inch of Stroke: .21	 See page 12 for length calculation of fractional stroke for single acting cylinders.

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1-1/4" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
12☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .58 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐-DP 	Double Acting – Pivot Type – Air Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-1360 Pivot Brackets D-241 Mounting Bracket Base Weight: .71 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.
12☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-241 Mounting Bracket Base Weight: .98 Adder Per Inch of Stroke: .12	
12☐-DXDEH 	Double Acting – Double End Hollow Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-241 Mounting Bracket Base Weight: .97 Adder Per Inch of Stroke: .12	

1-1/2" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Optional — Bronze Rod Guide Bushing Standard

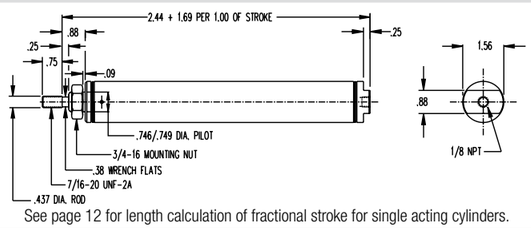
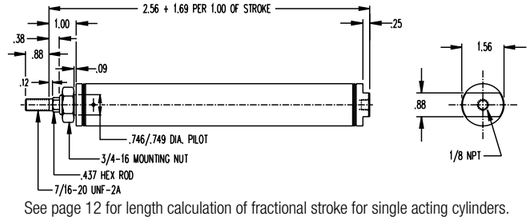
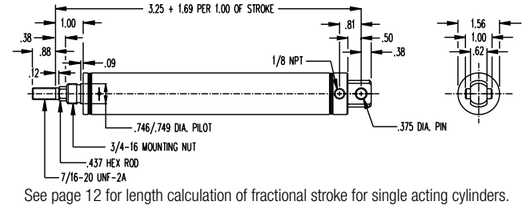
> Force Exerted Approximately 1.7 of Air Line Pressure
> Enclosed Spring Force: 7lbs Relaxed — 14lbs Compressed
> Rod Wipers Available on D, DP, DX, DXDE, and DXDEH Models

Options:

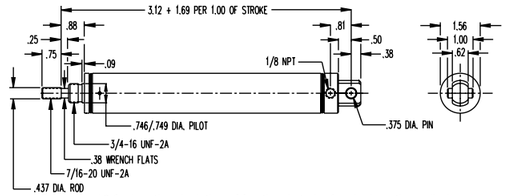
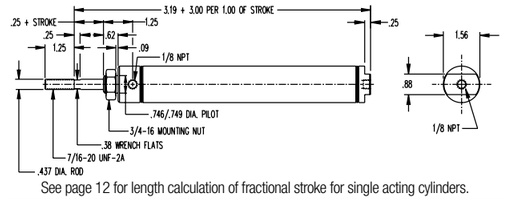
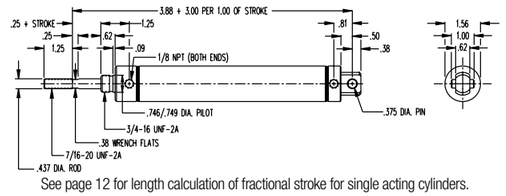
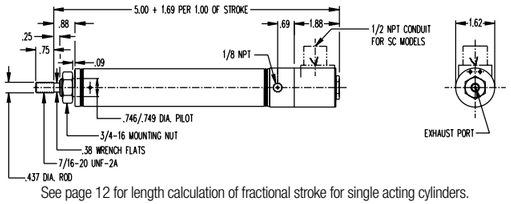
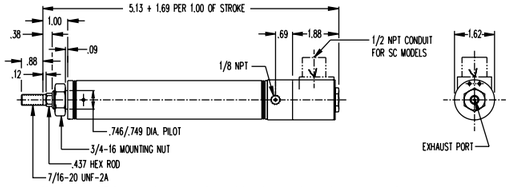
> **Ports Rotated (K)**
» *Front port rotated 90° on BF models.
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .19" to nose mount overall length and DNR; BF and BFT add .38"
> **Pivot Bushing (Y)**
» .375" ID (use D-620-1 pivot bracket)
> **Single And Reverse Acting Bumpers (B)**
» Add .125 to overall length
> **Double Acting Bumpers (B)**
» Add .125 to overall length
> **Extra Extension (EE)**
» DXDE, extension added to each end
» DXDE hollow rod, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders

> **Heavy Springs (H) are standard on all single acting block**
» Front and block rear mount, and all reverse acting and stroke adjust models.
» Spring Force: 8.5 lbs. relaxed —17 lbs. compressed
> **Magnet (prefix M)**
» Single and reverse acting add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
» Now available in block mount
> **Stainless Steel Rod (prefix SR)**
» Standard on DX, DXDE, DXDEH, DNR, DXNR, All block mounts, and M option

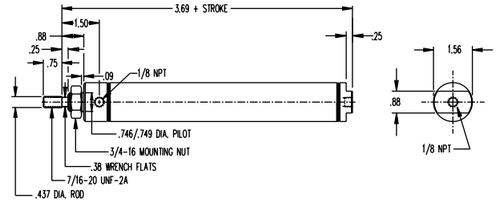
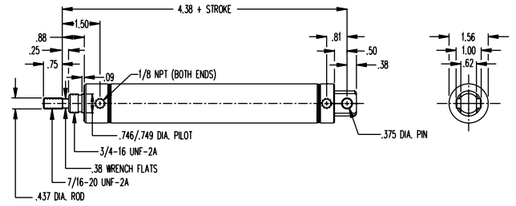
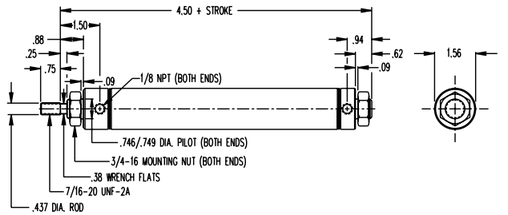
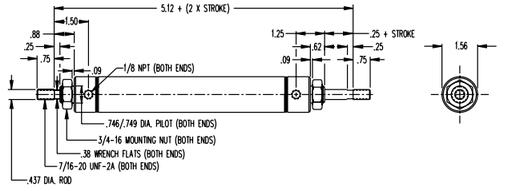
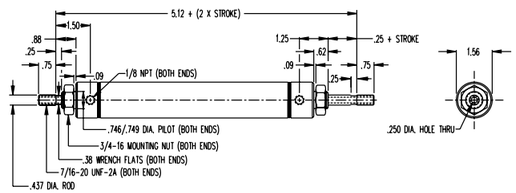
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Model	Description/Weight (lbs)	Dimensions
17☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .44 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .45 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-NRP 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-229 Pivot Brackets Base Weight: .46 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.

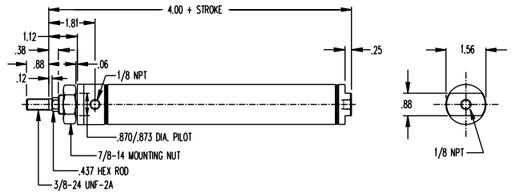
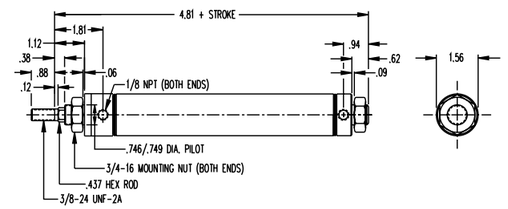
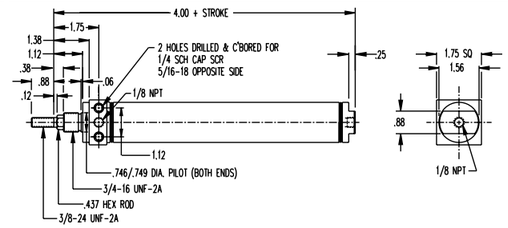
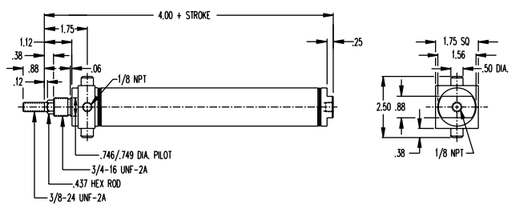
1-1/2" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
17☐-P 	Single Acting – Pivot Type – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-229 Pivot Brackets Base Weight: .45 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Spring Force 8.5 lbs. Extended, 17 lbs. Retracted – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .44 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Spring Force 8.5 lbs. Extended, 17 lbs. Retracted – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-1 Piston Rod Clevis D-229 Pivot Brackets Base Weight: .45 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-S or SC 	Single Acting – Built-in 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 1/16" Orifice Standard – 150 psi, 3/64" Orifice Optional Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-241 Mounting Bracket Base Weight: 1.38 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17☐-NRS or NRSC 	Single Acting – Non-rotating Piston Rod – Built-in 3-Way Solenoid Operated Valve – Spring Return – Front Nose Mounting – 150 psi, 1/16" Orifice Standard – 150 psi, 3/64" Orifice Optional Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Standard Voltage – 115/60 Optional Voltages: 24, 230 A.C. or 6, 12, 24 D.C. Optional Accessory: D-241 Mounting Bracket Base Weight: 1.38 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/2" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
17☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: .69 Adder Per Inch of Stroke: .08	
17☐-DP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Stainless Steel Rod Optional Rod Wiper Optional Accessories: D-231-1 Piston Rod Clevis D-229 Pivot Brackets Base Weight: .73 Adder Per Inch of Stroke: .08	
17☐-DX 	Double Acting – Double End Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: .82 Adder Per Inch of Stroke: .08	
17☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: 1.17 Adder Per Inch of Stroke: .13	
17☐-DXDEH 	Double Acting – Double End Hollow Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: 1.16 Adder Per Inch of Stroke: .13	

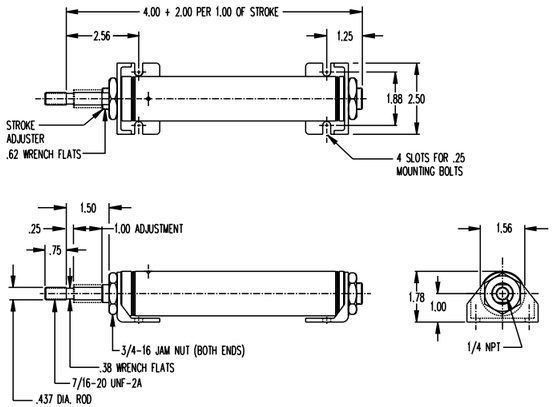
1-1/2" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
17 ☐ -DNR 	Double Acting – Non-rotating Hexagon Rod – Front Nose Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-2669 Mounting Bracket Base Weight: .77 Adder Per Inch of Stroke: .09	
17 ☐ -DXNR 	Double Acting – Non-rotating Hexagon Rod – Double End Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-241 Mounting Bracket D-8310-A Rod Clevis Base Weight: .87 Adder Per Inch of Stroke: .08	
BF-17 ☐ -DNR 	Double Acting – Non-rotating Hexagon Rod – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: D-8310-A Rod Clevis Base Weight: .71 Adder Per Inch of Stroke: .09	
BFT-17 ☐ -DNR 	Double Acting – Non-rotating Hexagon Rod – Front Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-8310-A Rod Clevis Base Weight: .78 Adder Per Inch of Stroke: .09	

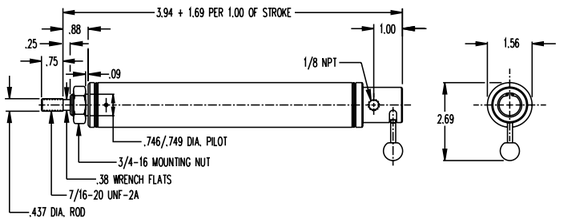
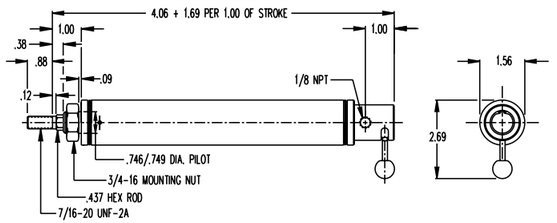
1-1/2" Bore Double Acting, Non-Rotating Rod (Repair Parts)

Part	Part Number
Rod Seal	D-2500
Rod Bearing	D-2501
DXNR Rod Guide	D-1117
DNR Rod Guide (7/8-14 mounting threads)	D-2509

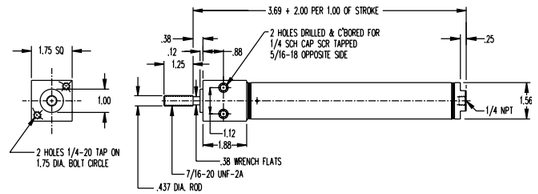
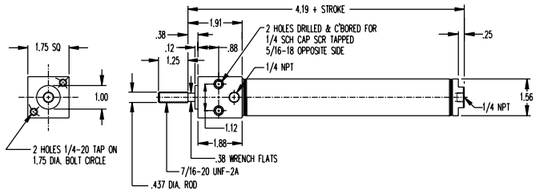
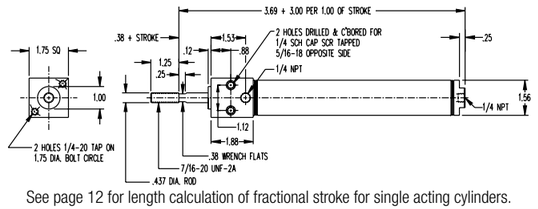
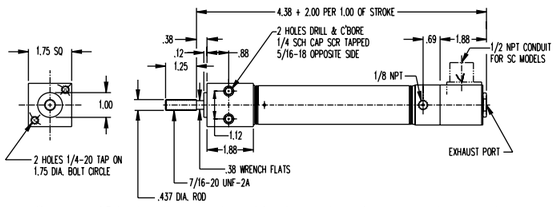
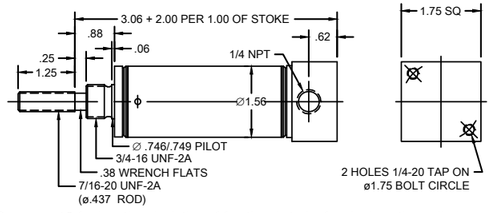
1-1/2" Bore Adjustable Stroke Air Cylinders

Model	Description/Weight (lbs)	Dimensions
17 ☐ -A 	Single Acting – Spring Return – Adjustable Stroke – Double End Mounting – Brass Piston Rod Bearing and Stroke Adjustment in 1" increments to 3". Mounting Brackets are included. 1" Stroke Adjusts 0" to 1", 2" Stroke 1" to 2", 3" Stroke 2" to 3" Maximum Stroke – 6" Optional Stainless Steel Rod Base Weight: .75 Adder Per Inch of Stroke: .25	 See page 12 for length calculation of fractional stroke for single acting cylinders.

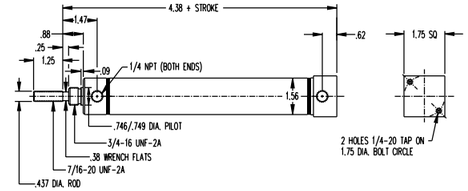
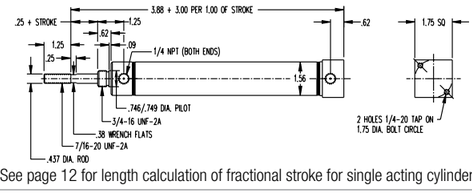
1-1/2" Bore Built-In Manual Valve Air Cylinders

Model	Description/Weight (lbs)	Dimensions
17 ☐ -M 	Single Acting – Built-in 3-Way Manual Valve – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .75 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
17 ☐ -NRM 	Single Acting – Built-in 3-Way Manual Valve – Non-rotating Hexagon Rod – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: D-241 Mounting Bracket Base Weight: .75 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.

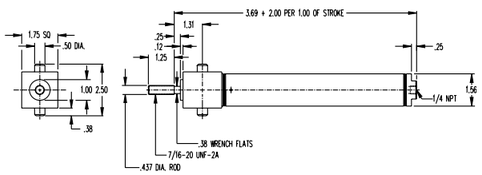
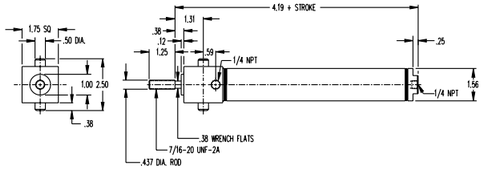
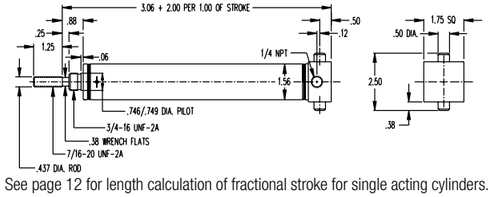
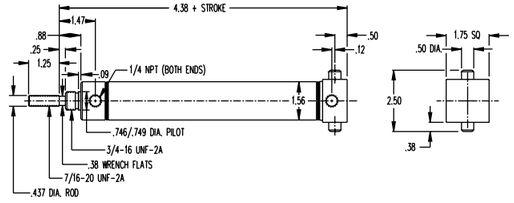
1-1/2" Bore Block Mounted (Spring Force: 8.5lbs Retracted, 17lbs Extended)

Model	Description/Weight (lbs)	Dimensions
BF-17 ☐ 	Single Acting – Front Block Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .99 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-17 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .99 Adder Per Inch of Stroke: .08	
BF-17 ☐ -R 	Pull Type – Front Block Mounting – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .96 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BF-17 ☐ -S or SC 	Built-in Midget 3-Way Solenoid Operated Valve – Single Acting – Spring Return – Front Block Mounting – 150 psi, 1/16" Orifice Mounting – 150 psi, 3/64" Orifice Optional Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Standard Voltage – 115/60 Optional Voltages: 24, 230 AC or 6, 12, 24 DC Base Weight: 1.90 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BR-17 ☐ 	Single Acting – Rear Block Mounting for Vertical Positioning – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .87 Adder Per Inch of Stroke: .08	 See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/2" Bore Block Mounted (Spring Force: 8.5lbs Retracted, 17lbs Extended)

Model	Description/Weight (lbs)	Dimensions
BR-17 ☐ -D 	Double Acting – Rear Block Mounting for Vertical Positioning – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Base Weight: .87 Adder Per Inch of Stroke: .08	
BR-17 ☐ -R 	Pull Type – Rear Block Mounting for Vertical Positioning – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Base Weight: .90 Adder Per Inch of Stroke: .10	 See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/2" Bore Trunnion Mounted (Spring Force: 8.5lbs Retracted, 17lbs Extended)

Model	Description/Weight (lbs)	Dimensions
BFT-17 ☐ 	Single Acting – Front Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-231-1 Rod Clevis Base Weight: 1.20 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFT-17 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-231-1 Rod Clevis Base Weight: 1.06 Adder Per Inch of Stroke: .08	
BRT-17 ☐ 	Single Acting – Rear Block Trunnion Mounting – Spring Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-231-1 Rod Clevis Base Weight: 1.06 Adder Per Inch of Stroke: .22	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BRT-17 ☐ -D 	Double Acting – Rear Block Trunnion Mounting – Air Return Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: TRB-2 Trunnion Brackets D-231-1 Rod Clevis Base Weight: .91 Adder Per Inch of Stroke: .08	

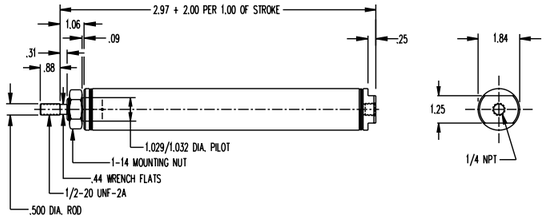
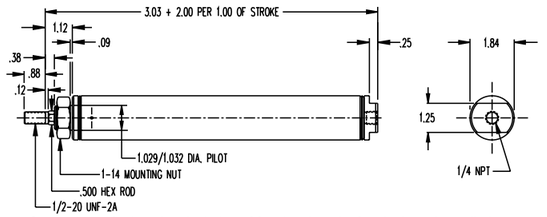
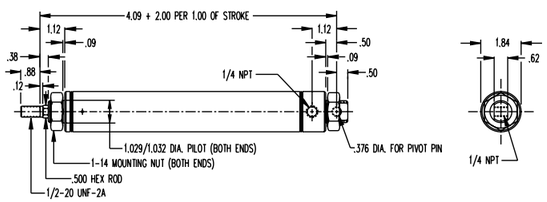
1-3/4" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 2.4 of Air Line Pressure
> Enclosed Spring Force: 11lbs Relaxed — 24lbs Compressed
> Cushion Quiet Bumpers Standard

Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .56" to nose mount overall length
> **Pivot Bushing (Y)**
» .375" ID
> **Extra Extension (EE)**
» DXDE, extension added to each end
» DXDE hollow rod, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Magnet (prefix M)**
» Single and reverse acting add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Stainless Steel Rod (prefix SR)**
» Standard on DXDE, DXDEH

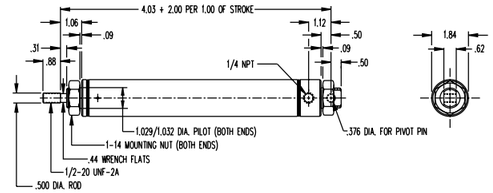
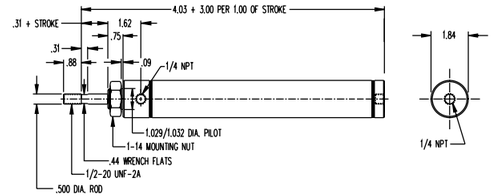
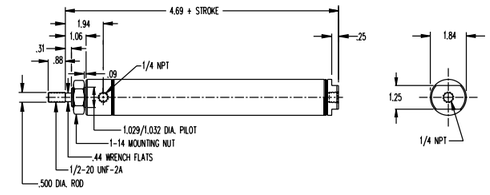
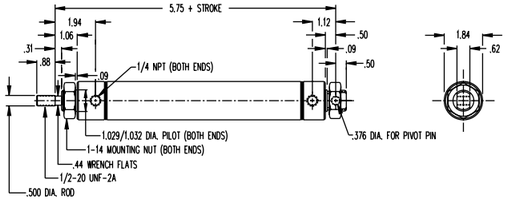
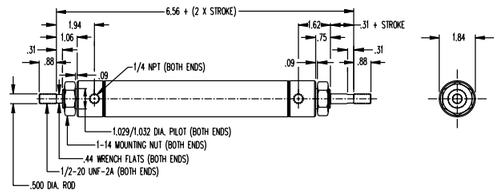
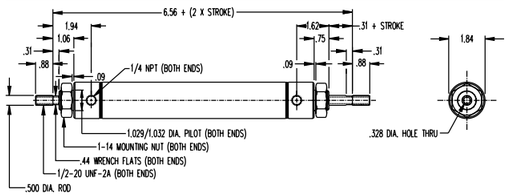
☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
24☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: C-1337 Mounting Bracket Base Weight: .85 Adder Per Inch of Stroke: .36	 See page 12 for length calculation of fractional stroke for single acting cylinders.
24☐-NR 	Single Acting – Non-rotating Hexagon Rod – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: C-1337 Mounting Bracket Base Weight: .86 Adder Per Inch of Stroke: .36	 See page 12 for length calculation of fractional stroke for single acting cylinders.
24☐-NRP 	Single Acting – Non-rotating Hexagon Rod – Pivot Type – Spring Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-3 Piston Rod Clevis D-620-1 Pivot Brackets C-1337 Mounting Bracket Base Weight: .86 Adder Per Inch of Stroke: .36	 See page 12 for length calculation of fractional stroke for single acting cylinders.

How to Specify

ORIGINAL LINE CYLINDERS

1-3/4" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
24☐-P 	Single Acting – Pivot Type – Spring Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessories: D-231-3 Piston Rod Clevis D-620-1 Pivot Brackets C-1337 Mounting Bracket Base Weight: .86 Adder Per Inch of Stroke: .36	 See page 12 for length calculation of fractional stroke for single acting cylinders.
24☐-R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 6" Optional Stainless Steel Rod Optional Accessory: C-1337 Mounting Bracket Base Weight: 1.17 Adder Per Inch of Stroke: .31	 See page 12 for length calculation of fractional stroke for single acting cylinders.
24☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Accessory: C-1337 Mounting Bracket Base Weight: 1.29 Adder Per Inch of Stroke: .11	
24☐-DP 	Double Acting – Pivot Type – Air Return – Rear Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Stainless Steel Rod Optional Accessories: D-231-3 Piston Rod Clevis D-620-1 Pivot Brackets C-1337 Mounting Bracket Base Weight: 1.64 Adder Per Inch of Stroke: .11	
24☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: C-1337 Mounting Bracket Base Weight: 1.87 Adder Per Inch of Stroke: .18	
24☐-DXDEH 	Double Acting – Double End Hollow Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessory: C-1337 Mounting Bracket Base Weight: 1.80 Adder Per Inch of Stroke: .16	

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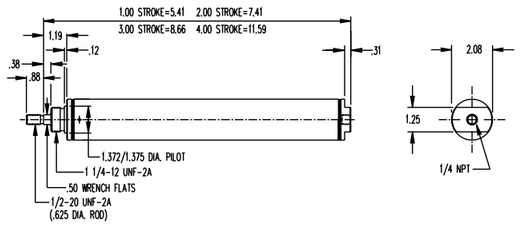
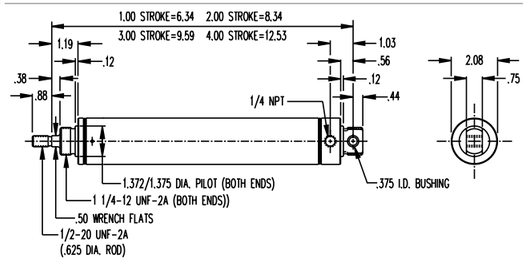
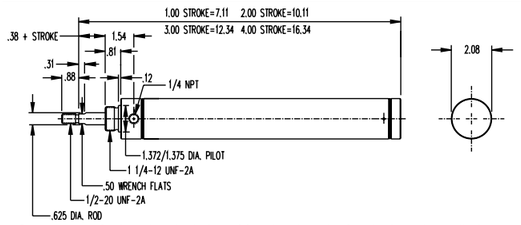
2" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 3.1 of Air Line Pressure
> Enclosed Spring Force: 15lbs Relaxed — 30lbs Compressed
> Mounting Nuts Not Included

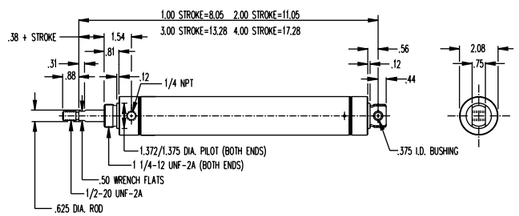
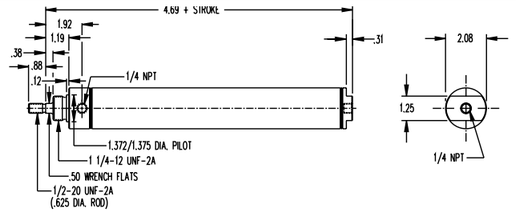
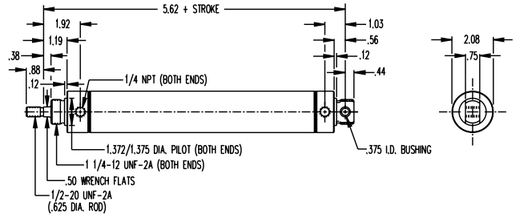
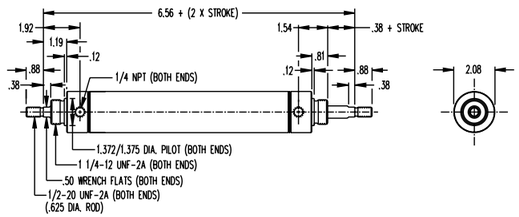
Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .38" to nose mount overall length
> **Single And Reverse Acting Bumpers (B)**
» Add .125 to overall length
> **Double Acting Bumpers (B)**
» Add .250 to overall length
> **Extra Extension (EE)**
» DXDE, extension added to each end
> **Double Acting Failsafe**
» (JS = Spring Return, JR = Spring Extend)
» See pages 55-56 for overall length adders
> **Magnet (prefix M)**
» Single and reverse acting add .125" to overall length
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Stainless Steel Rod (prefix SR)**
» Standard on DXP, DXDE, XP, M option

☐ Enter Stroke Length as 3rd Digit

Model	Description/weight (lbs)	Dimensions
31 ☐ 	Single Acting – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Optional Stainless Steel Rod Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.04 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.
31 ☐ -XP 	Single Acting – Universal Mounting Type – Nose, Pivot or Double End – Spring Return – Bronze Rod Bushing and Bronze Pivot Bushing Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Stainless Steel Rod Standard Optional Accessories: D-231-3 Piston Rod Clevis D-615 Mounting Bracket D-620 Pivot Brackets D-508 Mounting Nut Base Weight: 1.26 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.
31 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Optional Stainless Steel Rod Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.24 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.

2" Bore Air Cylinders

Model	Description/Weight (lbs)	Dimensions
31 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4" Maximum Stroke – 4" Optional Stainless Steel Rod Optional Accessories: D-231-3 Piston Rod Clevis D-620 Pivot Bracket D-508 Mounting Nut D-615 Mounting Bracket Base Weight: 1.46 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.
31 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Accessories: D-508 Mounting Nut D-615 Mounting Bracket Base Weight: 1.40 Adder Per Inch of Stroke: .15	 See page 12 for length calculation of fractional stroke for single acting cylinders.
31 ☐ -DXP 	Double Acting – Universal Mounting Type – Pivot or Double End – Air Return – Bronze Pivot Bushing Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16", 17", 18", 19", 20", 21", 22", 23", 24" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-231-3 Piston Rod Clevis D-615 Mounting Bracket D-620 Pivot Brackets D-508 Mounting Nut Base Weight: 1.62 Adder Per Inch of Stroke: .15	 See page 12 for length calculation of fractional stroke for single acting cylinders.
31 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.97 Adder Per Inch of Stroke: .24	 See page 12 for length calculation of fractional stroke for single acting cylinders.

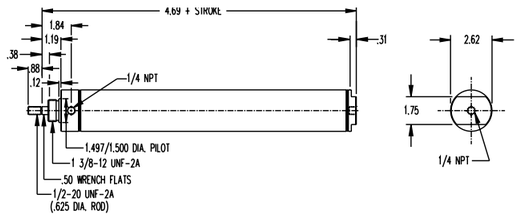
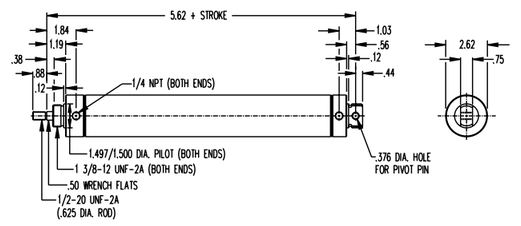
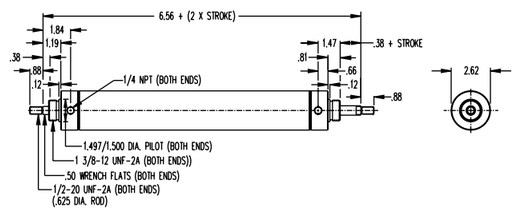
2-1/2" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 5.0 of Air Line Pressure
> Double Acting Only
> Mounting Nuts Not Included

Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .38" to nose mount overall length
> **Double Acting Bumpers (B)**
» Add .250 to overall length
> **Extra Extension (EE)**
» DXDE, extension added to each end
> **Magnet (prefix M)**
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Stainless Steel Rod (prefix SR)**
» Standard on M option, DXP, DXDE

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
50☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Stainless Steel Rod Optional Accessories: D-615-1 Mounting Bracket D-2540 Mounting Nut Base Weight: 1.98 Adder Per Inch of Stroke: .17	
50☐-DXP 	Double Acting – Universal Mounting Type – Pivot or Double End – Air Return – Bronze Rod Bushing and Bronze Pivot Bushing Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16", 17", 18", 19", 20", 21", 22", 23", 24" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-231-3 Piston Rod Clevis D-615-1 Mounting Bracket D-620 Pivot Brackets D-2540 Mounting Nut Base Weight: 2.27 Adder Per Inch of Stroke: .17	
50☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615-1 Mounting Bracket D-2540 Mounting Nut Base Weight: 2.32 Adder Per Inch of Stroke: .34	

How to Specify

ORIGINAL LINE CYLINDERS

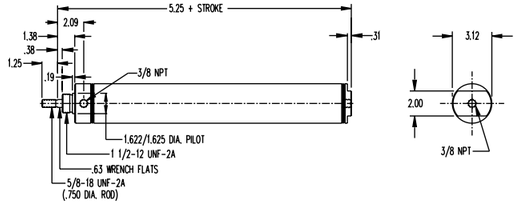
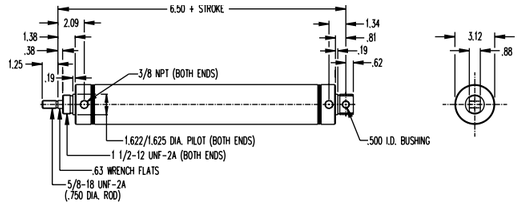
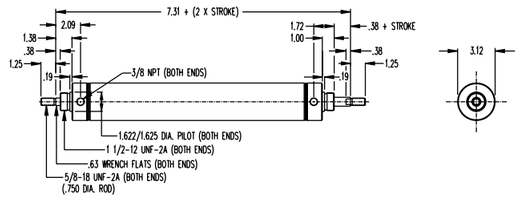
3" Bore Air Cylinders

> Ground and Polished, High Strength Carbon Steel Piston Rod Standard — 303 Stainless Steel Rod Available as an Option — Bronze Rod Guide Bushing Standard
> Force Exerted Approximately 7.0 of Air Line Pressure
> Double Acting Only
> Mounting Nuts Not Included

Options:

> **Ports Rotated (K)**
> **No Thread (NT)**
> **Side Ported Rear Head (Q)**
» Add .44" to nose mount overall length
> **Double Acting Bumpers (B)**
» Add .250 to overall length
> **Extra Extension (EE)**
» DXDE, extension added to each end
> **Magnet (prefix M)**
» Stainless steel rod becomes standard with this option
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40° to 200°F
> **High Temperature "U" Cups (V)**
» Temperature Range: 0° to 400°F (-18° to 205°C)
> **Rod Wiper (W)**
» Not available in standard single acting
> **Stainless Steel Rod (prefix SR)**
» Standard on DXP, DXDE, and M option

☐ Enter Stroke Length as 3rd Digit

Model	Description/weight (lbs)	Dimensions
70☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Carbon Steel Piston Rod Standard Optional Stainless Steel Rod Optional Accessories: D-19127 Mounting Bracket D-5379 Mounting Nut Base Weight: 3.34 Adder Per Inch of Stroke: .26	
70☐-DXP 	Double Acting – Universal Mount Pivot or Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16", 17", 18", 19", 20", 21", 22", 23", 24" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-13512-A Pivot Bracket D-19127 Mounting Bracket D-8314-A Rod Clevis D-5379 Mounting Nut Base Weight: 3.87 Adder Per Inch of Stroke: .26	
70☐-DXDE 	Double Acting – Double End Rod – Double End Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-19127 Mounting Bracket D-5379 Mounting Nut Base Weight: 4.05 Adder Per Inch of Stroke: .52	

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Original Line Stainless Steel Body Options

Many options can be added to our standard cylinders. Options vary by bore size. See individual bore sizes for valid options, pricing and length adders for that size. Consult specific cylinder types in this catalog for options available for those cylinder types.

Option Combination Availability Chart

Due to design or compatibility restrictions, the following options may NOT be ordered in combination. For example, option K (ports rotated) and option Q (side ported rear head) are not a valid combination.

Options NT and EE are available independently, with each other or with all other options or viable option combinations.

	Options								
Size	**W[3,4] (Wiper)**	**B[2] (Bumper)**	**V[2,4] (High Temperature)**	**H (Heavy Spring)**	**K (Ports Rotated 90°)**	**Y (Pivot Bushing)**	**N[2] (Low Temperature)**	**Q (Side Ported Rear Head)**	**HL[5] (Low Pressure Hydraulic)**
007	HL	STD	N	N/A	Q	STD	V, HL	K	N, H, W
01	HL	N, HL	N	N/A	Q	Q	B, V, HL	K, Y	B, N, H, W
02	HL	N, HL	N	N/A	Q	STD	B, V, HL	K	B, N, H, W
04, 09, 17	H, N	N, HL	N	W, HL	Q	Q	B, V, HL	K, Y	B, N, H
06, 12, 24	N/A	STD, HL	N	N/A	Q	Q	V, HL	K, Y	B, N, H
31, 50	N/A	N, HL	N	N/A	Q	STD	B, V, HL	K	B, N, H
70	N/A	N, HL	N	N/A	Q	STD	V, HL	K	B, N, H

NOTES:
[1] Option M is designated as a prefix, (ie M-041-DXP). When M is specified, the piston rod will be made of 303 stainless steel. Certain bore sizes and mounting styles offer the stainless rod standard.
[2] When bumpers are standard and high or low temperature option is specified, the bumpers are omitted and the overall length of the cylinder may decrease. When bumpers and high temperature are ordered as options on the same cylinder, the bumper material will be standard Buna N.
[3] Wipers are available in double acting and reverse single acting models only. Wipers may not be available with certain mounting configurations. Consult the specific bore size in this catalog for detail.
[4] When high temperature and the magnetic options are combined, operating temperature remains at 200°F. This combination is recommended when Fluoroelastomer seals are specified for compatibility. When specifying the high temperature and wiper options together, a standard Buna N or Urethane wiper will be provided.
[5] Option HL applies only to Double Acting Original Line cylinders and is not available with the following series: Cushion, PC, MRS, NR, Z-Line, DNR, 500 Hydraulic and Multiple Position.

Overall Length Reductions for Options N & V

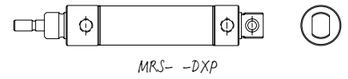
Double Acting	
0070-DV	N/A
0070-DXPN	.08"
BF-0070-DN	.08"
060-D (V or N)	.22"
060-DXP (V or N)	.22"
060-DXDE (V or N)	.25"
120-D (V or N)	.19"
120-DP (V or N)	.19"
120-DXDE (V or N)	.25"
120-DXDEH (V or N)	.25"
240-D (V or N)	.25"
240-DP (V or N)	.25"
240-DXDE (V or N)	.25"

* 0070 bumpers are high temperature option material and not removed when high temperature option is specified.

Single Acting	
0070-N	.04"
0070-XPN	.04"
0070-RN	.04"
0070-RPN	.04"
060- (V or N)	.09"
060-NR (V or N)	.09"
060-RP (V or N)	.125"
060-R (V or N)	.125"
120- (V or N)	.125"
120-NR (V or N)	.125"
120-NRP (V or N)	.125"
120-P (V or N)	.125"
120-R (V or N)	.125"
120-RP (V or N)	.125"
240- (V or N)	.125"
240-NR (V or N)	.125"
240-P (V or N)	.125"
240-R (V or N)	.125"

Switch Track and Port Orientation

The switch track and port orientation when ordering the “Z” (Switch Track) and “K” (Ports Rotated) options on an Original Line MRS cylinder is shown below. Double track option Z and K cannot be ordered in combination.





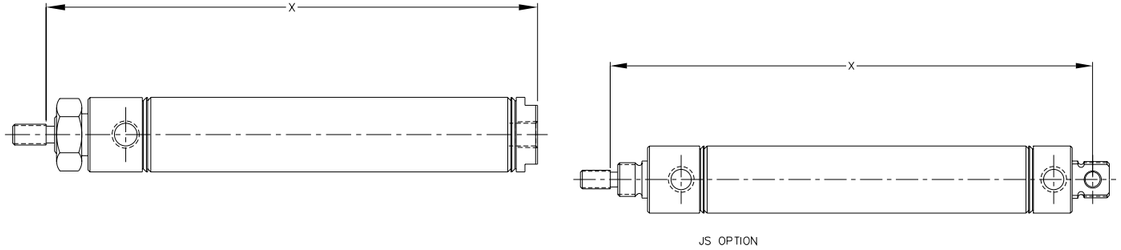
Fail Safe Length Adders (Option JS)

Spring Return Length Adder		
Bore	**Type**	**Overall Length Adder for -JS Option**
5/16"	0070-D	1.65 + 0.75 per 0.50" of stroke
	0070-DXP	2.04 + 0.75 per 0.50" of stroke
	BF-0070-D	1.71 + 0.75 per 0.50" of stroke
7/16"	010-D, BF-010-D, BF-010-D & BFT-010-D	2.17 + 0.94 per 0.50" of stroke
	010-DP & 0010-DX	2.61 + 0.94 per 0.50" of stroke
	BR-010-D & BRT-010-D	2.49 + 0.94 per 0.50" of stroke
	010-DXDE	2.86 + 1.44 per 0.50" of stroke
9/16"	020-D	2.34 + 1.63 per 1" of stroke
	020-DXP	2.61 + 1.63 per 1" of stroke
	020-DXDE	3.00 + 2.63 per 1" of stroke
3/4"	040-D	3.03 + 1.69 per 1" of stroke
	040-DP, 040-DXP, BR-040-D & BRT-040-D	3.81 + 1.69 per 1" of stroke
	BF-040-D & BFT-040-D	3.28 + 1.69 per 1" of stroke
	040-DXDE	4.06 + 2.69 per 1" of stroke
7/8"	060-D	3.19 (3.10 High Temp.) + 1.56 per 1" of stroke
	060-DXP	3.82 (3.72 High Temp.) + 1.56 per 1" of stroke
	060-DXDE	4.16 (4.03 High Temp.) + 2.56 per 1" of stroke
1-1/16"	090-D	3.38 (3.50 SR) + 1.56 per 1" of stroke
	090-DP, 090-DX	4.10 + 1.56 per 1" of stroke
	BF-090-D, BFT-090-D	4.00 + 1.56 per 1" of stroke
	BR-090-D, BRT-090-D	4.25 + 1.56 per 1" of stroke
	090-DXDE	4.25 + 2.56 per 1" of stroke
1-1/4"	120-D	4.38 (4.25 High Temp.) + 1.81 per 1" of stroke
	120-DP	5.09 (5.03 High Temp.) + 1.81 per 1" of stroke
	120-DXDE	5.94 (5.81 High Temp.) + 2.81 per 1" of stroke
1-1/2"	170-D	3.75 + 1.69 per 1" of stroke
	170-DP	4.44 + 1.69 per 1" of stroke
	170-DX	4.56 + 1.69 per 1" of stroke
	BF-170-D, BFT-170-D	4.25 + 1.69 per 1" of stroke
	BR-170-D, BRT-170-D	4.44 + 1.69 per 1" of stroke
	170-DXDE	5.19 + 2.69 per 1" of stroke
1-3/4"	240-D	5.13 (5.00 High Temp.) + 2" per 1" of stroke
	240-DP	6.43 (6.07 High Temp.) + 3" per 1" of stroke
	240-DXDE	7.00 (6.87 High Temp.) + 3" per 1" of stroke

Spring Return Length Adder for 2" Bore					
Bore	**Type**	**Stroke**			
		Up to 1"	**1" to 2"**	**2" to 3"**	**3" to 4"**
2"	310-D	5.95 + stroke	6.95 + stroke	7.20 + stroke	9.14 + stroke
	310-DXP	6.88 + stroke	7.88 + stroke	8.13 + stroke	10.07 + stroke
	310-DXDE	7.82 + 2 x stroke	8.82 + 2 x stroke	9.07 + 2 x stroke	11.02 + 2 x stroke

Please use the drawings below as examples of the reference points for the overall length dimensions shown in the tables above. Length is always referenced to the base of the rod thread.

For models not shown in the drawings below (ex., BF, BR, DXDE, etc.), please refer to the applicable catalog drawing of the base model (double acting) without the failsafe option to determine your reference points for determining overall length.



JS OPTION

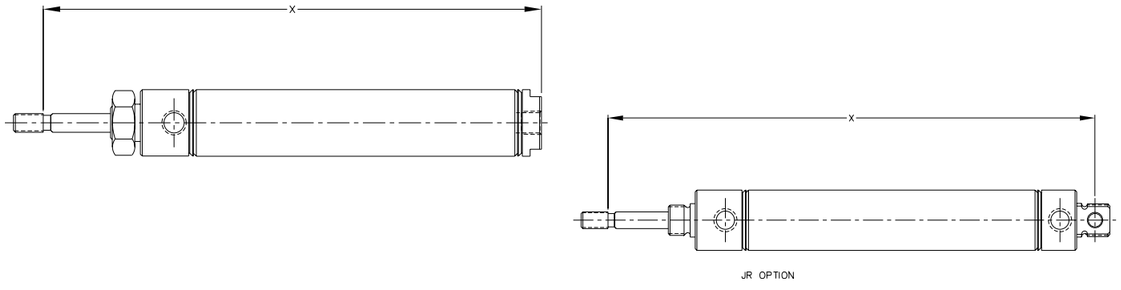
Fail Safe Length Adders (Option JR)

Spring Extend Length Adder		
Bore	**Type**	**Overall Length Adder for -JR Option**
5/16"	0070-D	1.65 + 1.25 per 0.50" of stroke
	0070-DXP	2.04 + 1.25 per 0.50" of stroke
	BF-0070-D	1.71 + 1.25 per 0.50" of stroke
7/16"	010-D, BF-010-D & BFT-010-D	2.17 + 1.44 per 0.50" of stroke
	010-DP & 0010-DX	2.61 + 1.44 per 0.50" of stroke
	BR-010-D & BRT-010-D	2.49 + 1.44 per 0.50" of stroke
9/16"	020-D	2.34 + 2.63 per 1" of stroke
	020-DXP	2.61 + 2.63 per 1" of stroke
3/4"	040-D	3.03 + 2.69 per 1" of stroke
	040-DP, 040-DXP, BR-040-D & BRT-040-D	3.81 + 2.69 per 1" of stroke
	BF-040-D & BFT-040-D	3.28 + 2.69 per 1" of stroke
7/8"	060-D	3.19 (3.10 High Temp.) + 2.56 per 1" of stroke
	060-DXP	3.82 (3.72 High Temp.) + 2.56 per 1" of stroke
1-1/16"	090-D	3.38 (3.50 SR) + 2.56 per 1" of stroke
	090-DP, 090-DX	4.10 + 2.56 per 1" of stroke
	BF-090-D, BFT-090-D	4.00 + 2.56 per 1" of stroke
	BR-090-D, BRT-090-D	4.25 + 2.56 per 1" of stroke
1-1/4"	120-D	4.38 (4.25 High Temp) + 2.81 per 1" of stroke
	120-DP	5.09 (5.05 High Temp) + 2.81 per 1" of stroke
1-1/2"	170-D	3.75 + 2.69 per 1" of stroke
	170-DP	4.44 + 2.69 per 1" of stroke
	170-DX	4.56 + 2.69 per 1" of stroke
	BF-170-D, BFT-170-D	4.25 + 2.69 per 1" of stroke
	BR-170-D, BRT-170-D	4.44 + 2.69 per 1" of stroke
1-3/4"	240-D	5.13 (5.00 High Temp.) + 3" per 1" of stroke
	240-DP	6.43 (6.07 High Temp.) + 3" per 1" of stroke

Spring Extend Length Adder for 2" Bore					
Bore	**Type**	**Stroke**			
		Up to 1"	**1" to 2"**	**2" to 3"**	**3" to 4"**
2"	310-D	5.95 + 2 x stroke	6.95 + 2 x stroke	7.20 + 2 x stroke	9.14 + 2 x stroke
	310-DXP	6.88 + 2 x stroke	7.88 + 2 x stroke	8.13 + 2 x stroke	10.07 + 2 x stroke

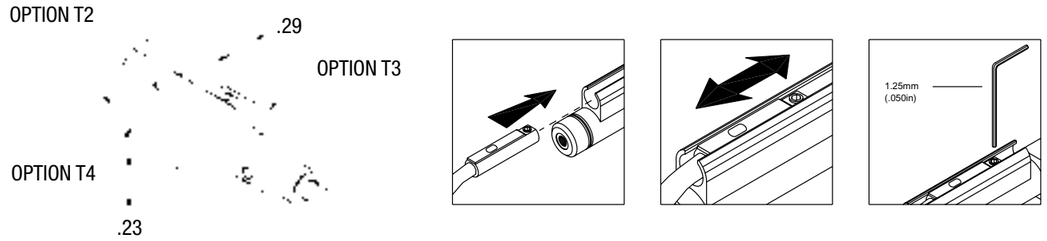
Please use the drawings below as examples of the reference points for the overall length dimensions shown in the tables above. Length is always referenced to the base of the rod thread.

For models not shown in the drawings below (ex., BF, BR, DXDE, etc.), please refer to the applicable catalog drawing of the base model (double acting) without the failsafe option to determine your reference points for determining overall length.



Switch Track Kit Options

For Original Line cylinders, including MRS cylinders, with -T2, T3, and T4 options



Switch Track for use with Bimba MR, MS, MSC, and MSK Switches

Miniature Position Sensing track lengths can now be purchased separately for field mounting of custom track locations. Simply specify the length of track desired after the part number.

Mounting recommendations:

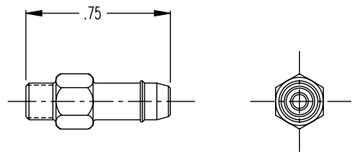
> Clean body with acetone. Remove all oil from body surface.
> Avoid mounting track over rolled construction. Locate edge of track 0.175" from rolled construction.
> Use a solid continuous bead of glue for the entire length of track used. Bead should fill center channel of track.
> Adhere to recommended cure times as specified by the glue manufacturer.

Bores	Part Number
007 - 04	D-74168-A-length
06 - 31	D-78527-A-length
50 - 70	D-78528-A-length

Loctite U-05FL or similar adhesive is recommended (not included).

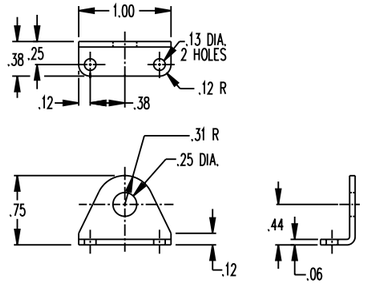
5/16" Bore Accessories

D-3229-A



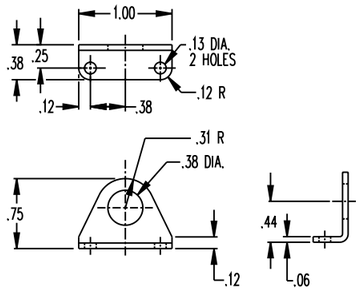
Aluminum Alloy Barbed Fitting
1/4" Hose (O.D.) Barbed Fitting Supplied with Gasket, No. 10-32 to 1/4" O.D. Tubing.

D-26731



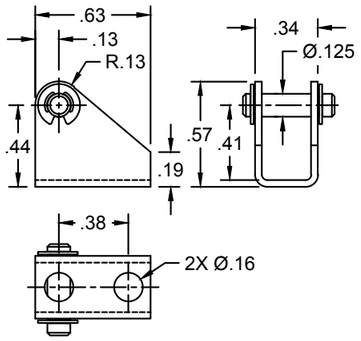
Mounting Bracket (for Single Acting Models)

D-26765



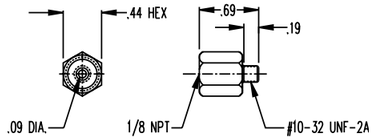
Mounting Bracket (for Double Acting Models)

D-26689



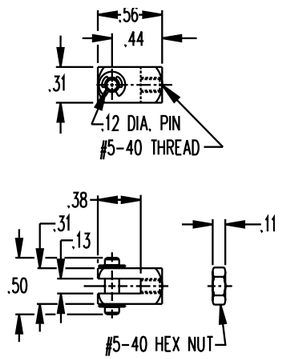
Pivot Bracket with Pin

D-855-A



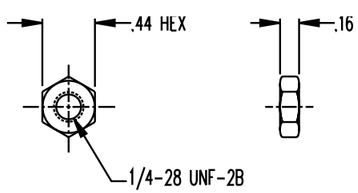
Adaptors (10-32 to 1/8 NPT Female)
Supplied with Gasket

D-26690



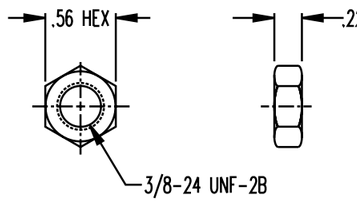
Piston Rod Clevis (with Pin)

D-344



Mounting Nut

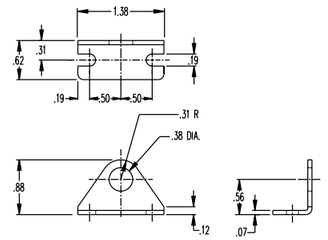
D-801



Mounting Nut

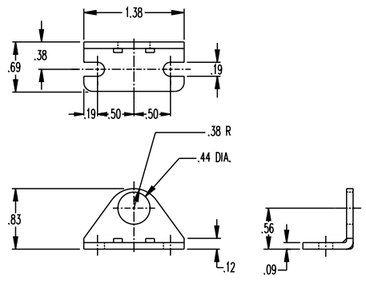
7/16" Bore Accessories

D-775



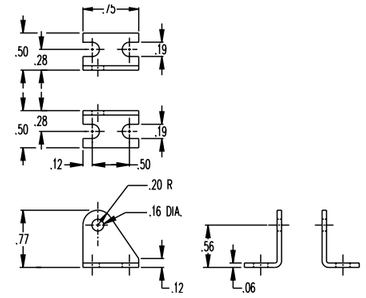
Mounting Bracket (for Single Acting Models)

D-770



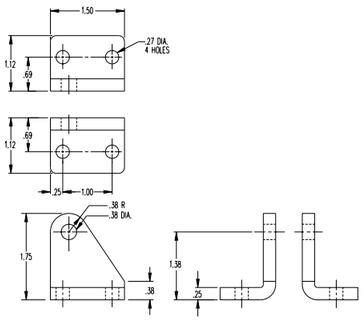
Mounting Bracket (for Double Acting Models)

D-780



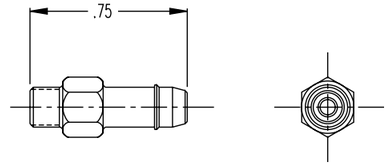
Pivot Brackets

TRB-1



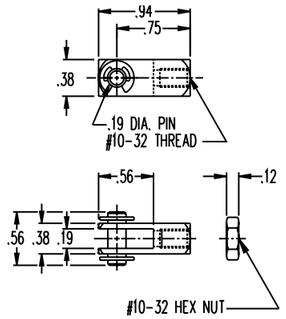
Trunnion Brackets

D-3229-A



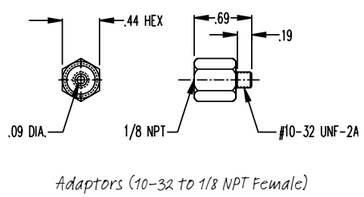
Aluminum Alloy Barbed Fitting. 1/4" Hose (O.D.) Barbed Fitting Supplied with Gasket, No. 10-32 to 1/4" O.D. Tubing

D-850



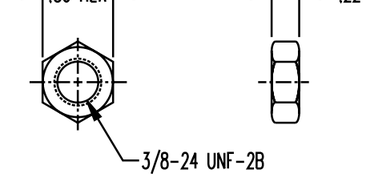
Piston Rod Clevis

D-855-A



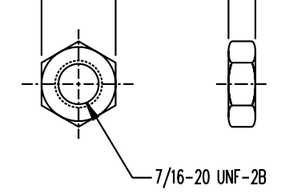
Adaptors (10-32 to 1/8 NPT Female)
Supplied with Gasket

D-801



Mounting Nut

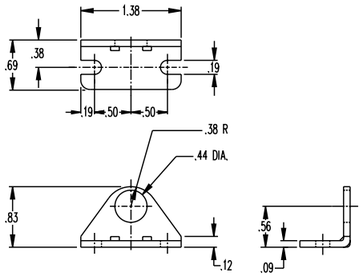
D-154



Mounting Nut

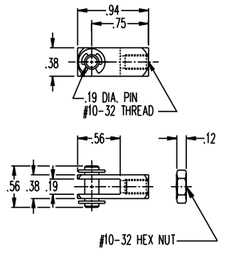
9/16" Bore Accessories

D-770



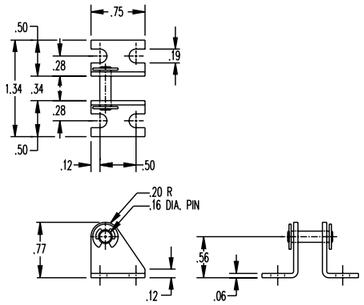
Mounting Bracket

D-850



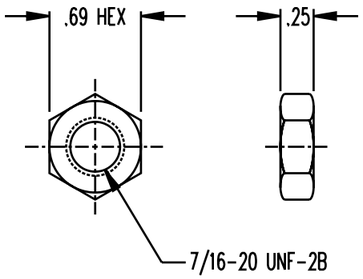
Piston Rod Clevis

D-12321-A



Pivot Bracket with Pin

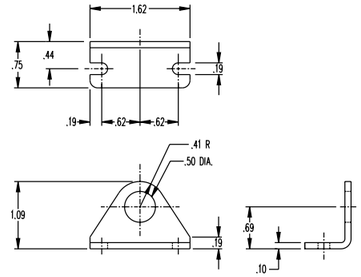
D-154



Mounting Nut

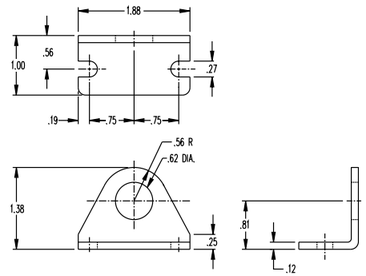
3/4" Bore Accessories

D-226



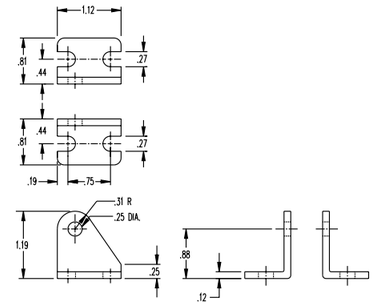
Mounting Bracket (for Single Acting Models)

D-129



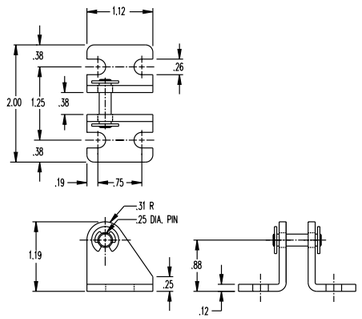
Mounting Bracket (for Double Acting Models)

D-167



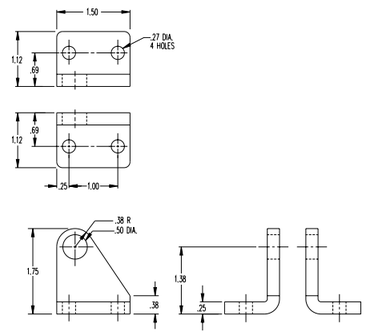
Pivot Brackets

D-13498-A



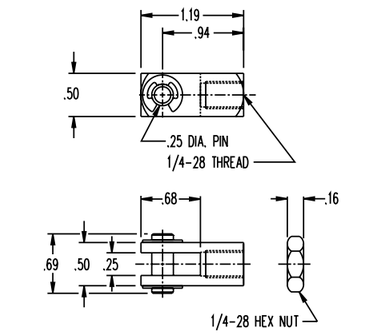
Pivot Bracket

TRB-2



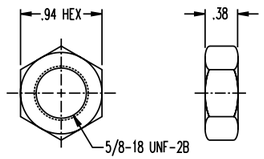
Trunnion Brackets

D-166-3



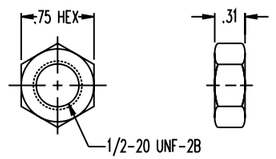
Piston Rod Clevis

D-9



Mounting Nut

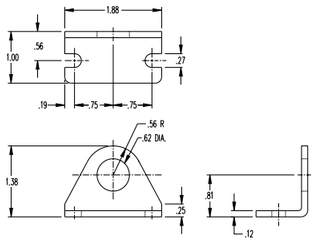
D-98



Mounting Nut

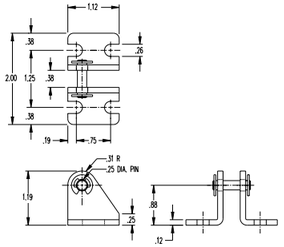
7/8" Bore Accessories

D-129



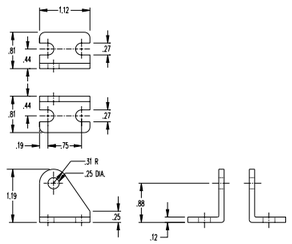
Mounting Bracket

D-13498-A



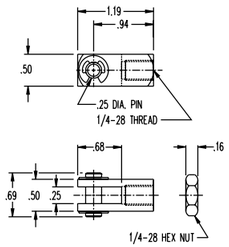
Pivot Bracket

D-167



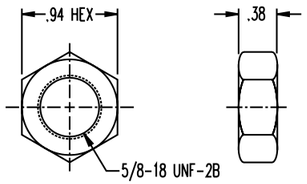
Pivot Brackets

D-166-3



Rod Clevis

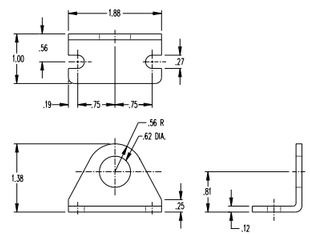
D-9



Mounting Nut

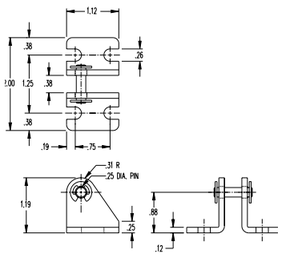
1-1/16" Bore Accessories

D-129



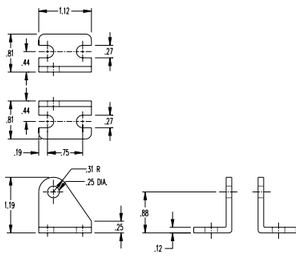
Mounting Bracket (for Single & Double Acting Models)

D-13498-A



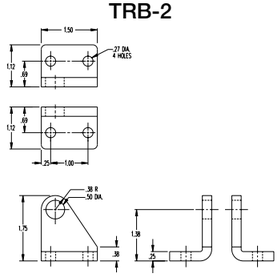
Pivot Bracket

D-167



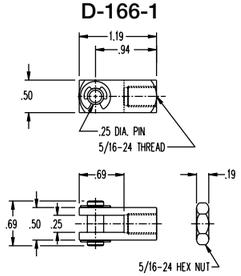
Pivot Brackets

TRB-2



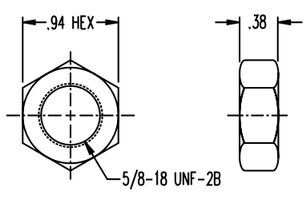
Trunnion Brackets

D-166-1



Piston Rod Clevis

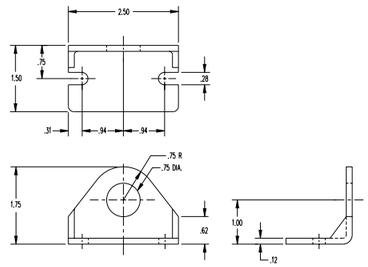
D-9



Mounting Nut

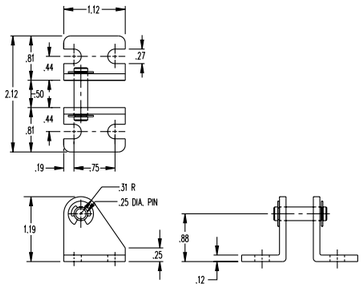
1-1/4" Bore Accessories

D-241



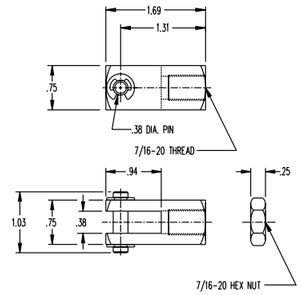
Mounting Bracket (for Single & Double Acting Models)

D-1360



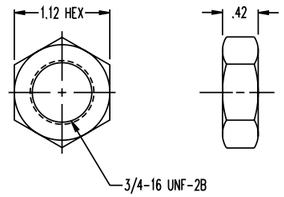
Pivot Brackets

D-231-1



Piston Rod Clevis

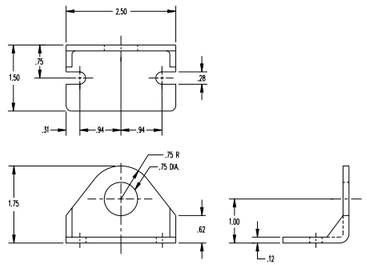
D-3556



Mounting Nut

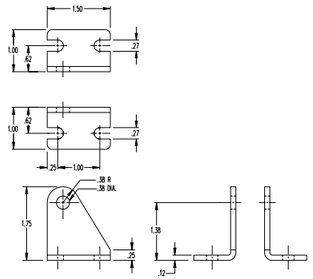
1-1/2" Bore Accessories

D-241



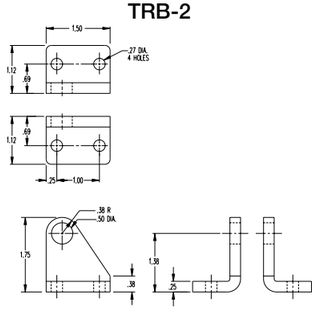
Mounting Bracket

D-229



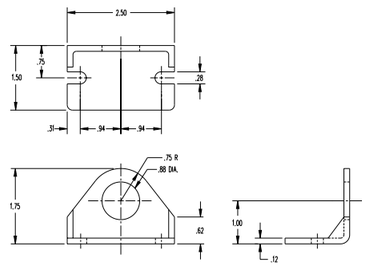
Pivot Bracket

TRB-2



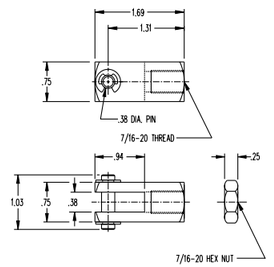
Trunnion Brackets

D-2669



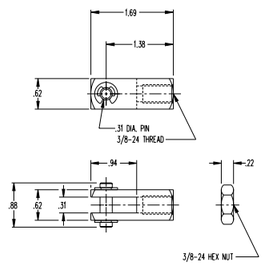
Mounting Bracket

D-231-1



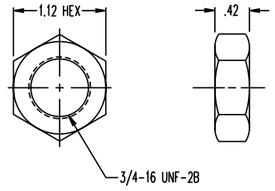
Piston Rod Clevis

D-8310-A



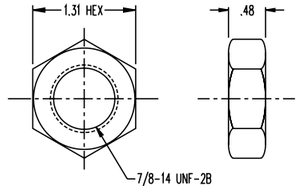
Rod Clevis

D-3556



Mounting Nut

D-2545



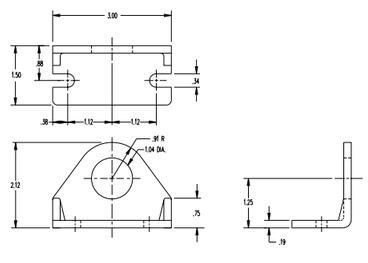
Mounting Nut

How to Accessorize

ORIGINAL LINE CYLINDERS

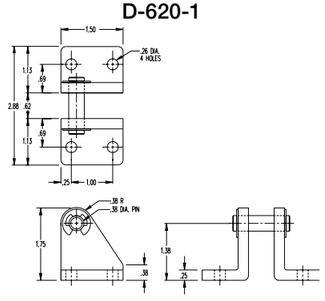
1-3/4" Bore Accessories

C-1337



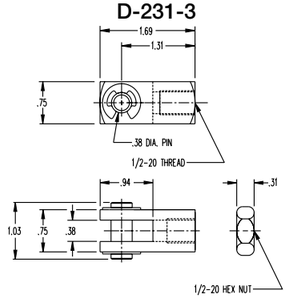
Mounting Bracket

D-620-1



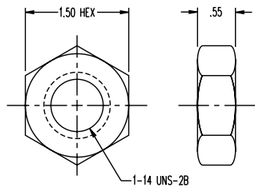
Pivot Brackets

D-231-3



Piston Rod Clevis

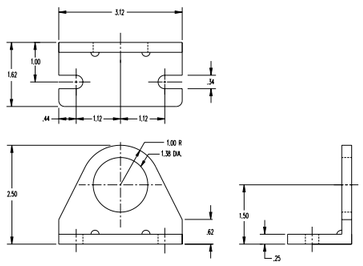
D-1331



Mounting Nut

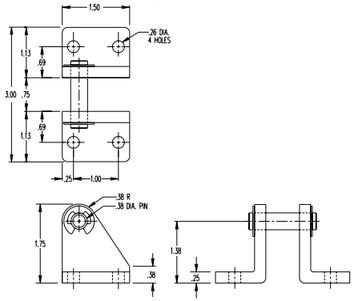
2" Bore Accessories

D-615



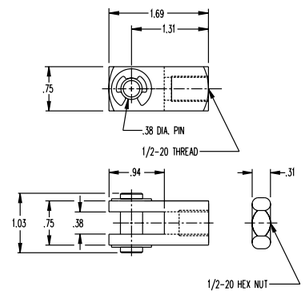
Mounting Bracket

D-620



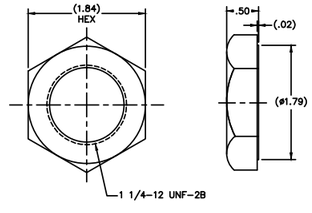
Pivot Brackets

D-231-3



Piston Rod Clevis

D-508



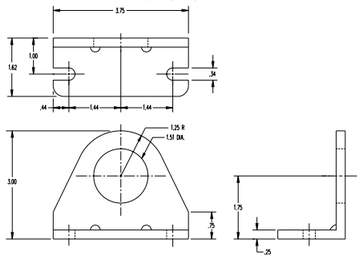
Mounting Nut

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How to Accessorize

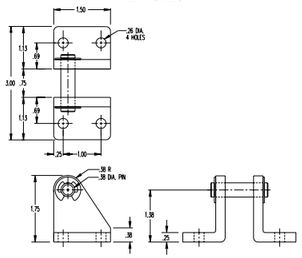
2-1/2" Bore Accessories

D-615-1



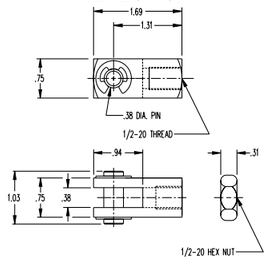
Mounting Bracket

D-620



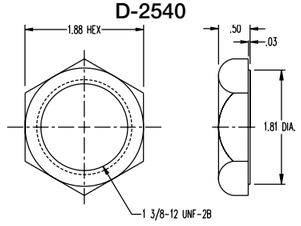
Pivot Brackets

D-231-3



Piston Rod Clevis

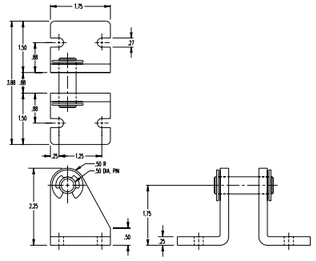
D-2540



Mounting Nut

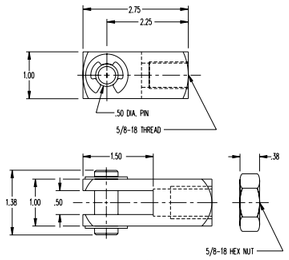
3" Bore Accessories

D-13512-A



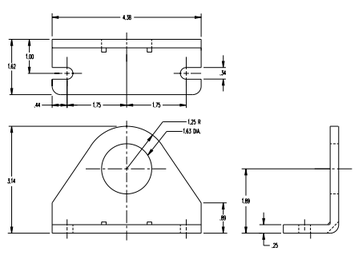
Pivot Bracket

D-8314-A



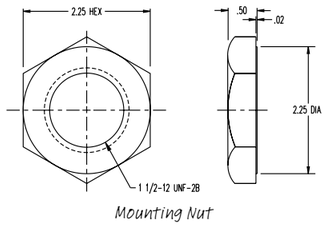
Rod Clevis

D-19127



Mounting Bracket

D-5379



Mounting Nut

How to Order

The model number of all Original Line pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, mounting styles, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic double-acting Original Line unit with a rear block, 7/16” bore, 3” stroke, and additional options is shown below.

Stroke Length
XX (in)

Acting	
blank	Single acting
D	Double acting
R	Reverse single acting

BR - 01 3 - D BEE0.5

Model	
blank	Standard Original Line
BF/BR/BFT/ BRT/BFM/BRM/ BFTM/BRTM	Block or trunnion-mounted
M	Magnet option for standard cylinders
SR	Stainless rod, if nonstandard

Bore Size/Power Factor	
007	5/16”
01	7/16”
02	9/16”
04	3/4”
06	7/8”
09	1-1/16”
12	1-1/4”
17	1-1/2”
24	1-3/4”
31	2”
50	2-1/2”
70	3”

Options*	
99	HT-99 oil pre-lube
B	Bumpers
H	Heavy spring (H designated before mounting style)
JR	Double-acting spring extend (stainless steel rod standard)
JS	Double-acting spring return (stainless steel rod standard)
K	Ports rotated 90°
N	Low temperature seals and lubrication
NT	No thread
Q	Side ported rear head
V	High temperature seals and lubrication
W	Rod wiper
Y	Pivot bushing replaces pivot pin
EEX.XX	Extra rod extension of X.XX

Approximate Power Factors		
5/16”	=	0.07
7/16”	=	0.15
9/16"	=	0.25
3/4"	=	0.40
7/8”	=	0.60
1-1/16"	=	0.90
1-1/4”	=	1.20
1-1/2"	=	1.7
1-3/4”	=	2.40
2"	=	3.10
2-1/2"	=	5.00
3"	=	7.00

Bimba has made sizing a cylinder as easy as knowing the model number. Each base model number is developed by calculating the area of the cylinder bore. This area, or Power Factor, will provide the force the cylinder will exert when multiplied by the airline pressure.

FORCE = Airline Pressure x Piston Area

PISTON AREA = Bimba Power Factor

FORCE = Airline Pressure x Bimba Power Factor

Common Customization Options

Bimba provides a wide variety of common customization options for Original Line cylinders, including:

- Custom labeling
- Pre-assembled flow controls in cylinder ports
- New end cap mounting geometries
- Special component materials
- Unique testing requirements
- Manifold-based consolidated circuits
- Rate controls

Beyond the common customization options, Bimba offers our full support in developing a custom solution that's perfectly tailored to the needs of your application. We bring over 60 years of experience to the customization process, backing your group up with our expert team of engineers, machinists, and salespeople from concept to creation.

Contact your local Bimba distributor or the factory directly to learn more.



Adjustable Cushion Air Cylinders

- Readily accessible cushion needle for easy adjustment
- Double acting models
- Rated 250 psi
- 304 Stainless steel body - mirror finish I.D.
- High strength aluminum alloy porting ends
- Ground and roller burnished 303 stainless steel piston rod standard
- Buna N “U” cup seals
- Low breakaway friction - less than 5 psi
- Special stroke lengths available on request

Cylinders are supplied with adjustable cushions on both ends. To order cushion on one end only, specify CF (front head cushion only), or CR (rear head cushion only), or CS (one end only) and deduct from base price as shown.

(ex: 3/4" bore, cushion on front head only - CF-04 ☐ -D;
3/4" bore, cushion on rear head only - CR-04 ☐ -D;
3/4" DXDE model, cushion on one side only - CS-04 ☐ -DXDE)

Options:

- **No Thread (NT)**
  - Available on 3/4”, 1-1/16” and 1-1/2” bores
- **Pivot Bushing (Y)**
  - .250” ID
- **Extra Extension (EE)**
- **Ports Rotated (K)**
  - Rotates ports and cushion screw location 90° clockwise
- **Magnetic Piston (prefix M)**
- **Mini Switch Tracks on all bore sizes**
  - Must specify track(s) for use with Bimba's miniature position sensing (T2, T3, T4. See page 57 for track location details. See Switch Products for switch selection information.
- **High Temperature Seals (V)**
- **Rod Wiper (W) (Available on 3/4", 1-1/16" and 1-1/2" bores)**

Cushion Energy Absorption

Cylinders with air cushions provide a possible solution to destructive energies. The air cushion traps a small amount of exhaust air at the end of stroke, providing an air pocket that decelerates the load. This reduces the potentially destructive energy being transmitted to the cylinder and other components. The following is a brief explanation on how to determine the energy level of your application and decide if an air cushion can provide adequate energy absorption. For a more detailed description, consult the factory at 1-800-44-BIMBA.

1. Determine the load to be stopped by the cylinder.
2. Determine the velocity at which the load impacts the cylinder endcap.
3. Calculate the energy the cylinder generates. Use the following equation:

energy (e) = ([w/64] x v^2) + (p x k)
w = weight of the load (lbs)
V = velocity of the cylinder as the piston impacts the endcap (feet per second)
p = driving pressure (psi)
k = bore constant

Example: C-316-D at 80 psi with total load of 8lbs

driving pressure (p) = 80 psi
total load (w) = 8lbs
bore constant (k) = .24
maximum velocity (v) = 6 fps

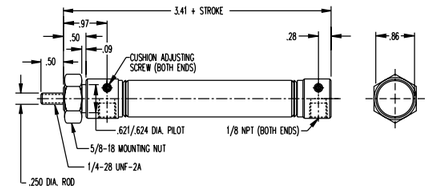
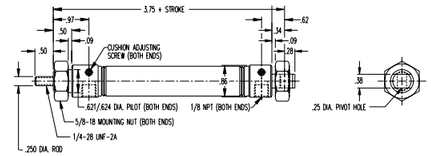
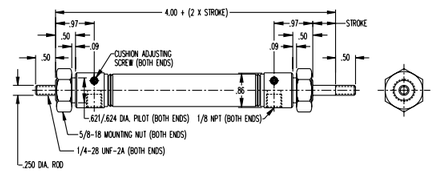
= (8/64) x (6^2) + (80 x .24) = 23.7 ft-lbs

Maximum Energy Calculation Data		
Bore	**Max Energy (ft-lbs)**	**k**
04	4.47	0.03
09	10.40	0.05
17	18.80	0.11
31	27.60	0.24
50	40.11	0.37
70	77.72	0.58

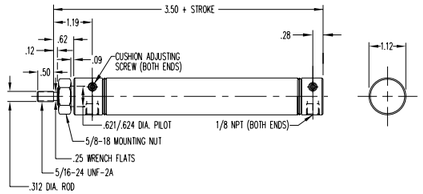
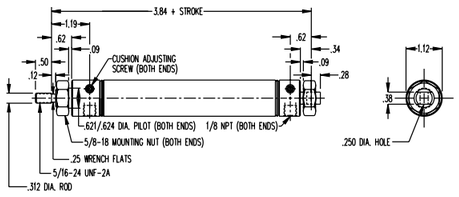
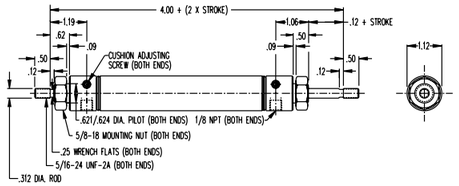
Cushion Lengths
0.75“
0.75”
0.75”
0.90”
0.90”
0.99”

3/4" Bore Air Cylinders with Adjustable Cushions

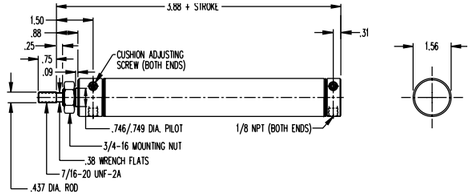
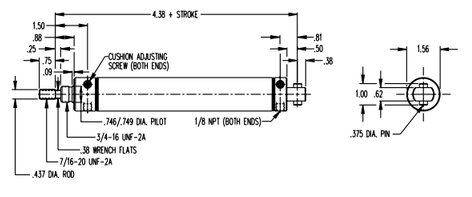
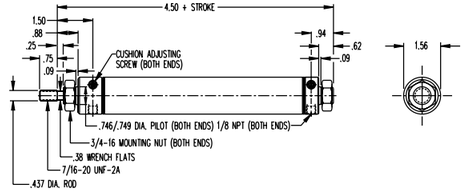
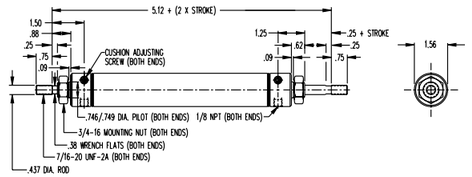
☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
C-04☐-D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .24 Adder Per Inch of Stroke: .03	 *U.S. Patent nos. 4,794,681 and 4,862,786
C-04☐-DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessories: D-129 Mounting Bracket D-13498-A Pivot Bracket D-166-3 Piston Rod Clevis Base Weight: .29 Adder Per Inch of Stroke: .03	
C-04☐-DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .30 Adder Per Inch of Stroke: .06	

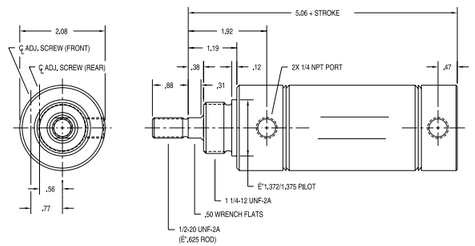
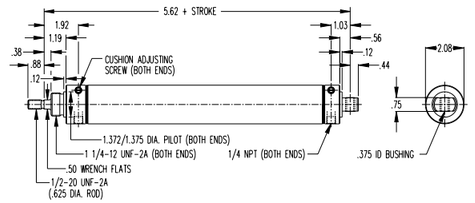
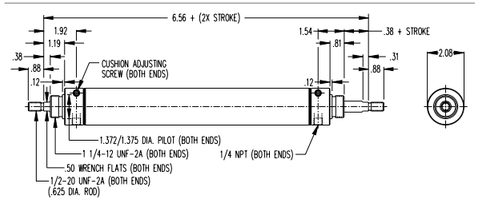
1-1/16" Bore Air Cylinders with Adjustable Cushions

Model	Description/Weight (lbs)	Dimensions
C-09 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .38 Adder Per Inch of Stroke: .04	
C-09 ☐ -DXP 	Double Acting – Universal Mounting Pivot, or Double End Mounting – Air Return Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessories: D-13498-A Pivot Bracket D-129 Mounting Bracket D-166-1 Piston Rod Clevis Base Weight: .44 Adder Per Inch of Stroke: .04	
C-09 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-129 Mounting Bracket Base Weight: .46 Adder Per Inch of Stroke: .08	

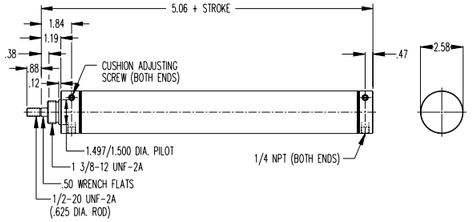
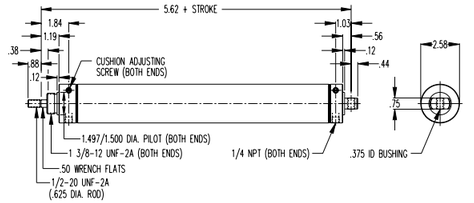
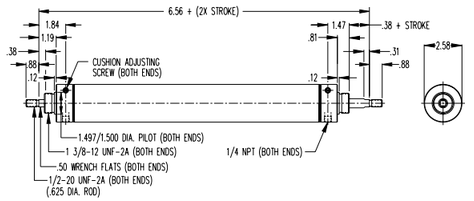
1-1/2" Bore Air Cylinders with Adjustable Cushions

Model	Description/Weight (lbs)	Dimensions
C-17 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: .76 Adder Per Inch of Stroke: .09	
C-17 ☐ -DP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessories: D-231-1 Piston Rod Clevis D-229 Pivot Brackets Base Weight: .77 Adder Per Inch of Stroke: .09	
C-17 ☐ -DX 	Double Acting – Double End Mounting – Air Return Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: .84 Adder Per Inch of Stroke: .09	
C-17 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Rod Wiper Optional Accessory: D-241 Mounting Bracket Base Weight: .90 Adder Per Inch of Stroke: .18	

2" Bore Air Cylinders with Adjustable Cushions

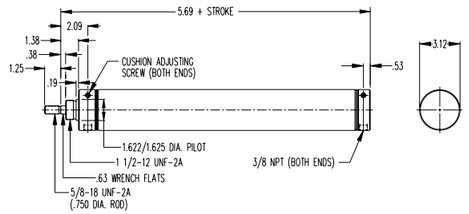
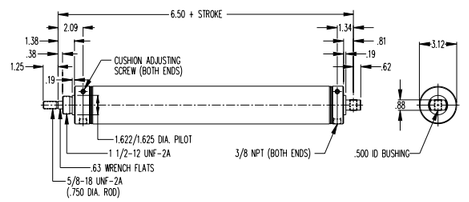
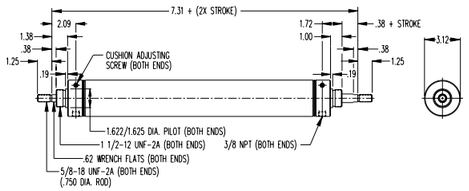
Model	Description/Weight (lbs)	Dimensions
C-31 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.64 Adder Per Inch of Stroke: .15	
C-31 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-615 Mounting Bracket D-620 Pivot Bracket D-231-3 Piston Rod Clevis D-508 Mounting Nut Base Weight: 1.68 Adder Per Inch of Stroke: .15	
C-31 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.99 Adder Per Inch of Stroke: .24	

2-1/2" Bore Air Cylinders with Adjustable Cushions

Model	Description/Weight (lbs)	Dimensions
C-50 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615-1 Mounting Bracket D-2540 Mounting Nut Base Weight: 2.21 Adder Per Inch of Stroke: .17	
C-50 ☐ -DXP 	Double Acting – Universal Mounting Pivot, or Double End Mounting – Air Return Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-615-1 Mounting Bracket D-620 Pivot Bracket D-231-3 Piston Rod Clevis D-2540 Mounting Nut Base Weight: 2.33 Adder Per Inch of Stroke: .17	
C-50 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-615-1 Mounting Bracket D-2540 Mounting Nut Base Weight: 2.38 Adder Per Inch of Stroke: .34	

How to Specify

3" Bore Air Cylinders with Adjustable Cushions

Model	Description/Weight (lbs)	Dimensions
C-70 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-19127 Mounting Bracket D-5379 Mounting Nut Base Weight: 3.81 Adder Per Inch of Stroke: .26	
C-70 ☐ -DXP 	Double Acting – Pivot Type – Air Return – Rear Pivot Mounting Standard Stroke Lengths: 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9, 10", 11", 12" Maximum Stroke – 32" Stainless Steel Rod Standard Optional Accessories: D-8314-A Piston Rod Clevis D-13512-A Pivot Brackets D-5379 Mounting Nut Base Weight: 3.97 Adder Per Inch of Stroke: .26	
C-70 ☐ -DXDE 	Double Acting – Double End Rod – Air Return – Double End Mounting Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Stainless Steel Rod Standard Optional Accessories: D-19127 Mounting Bracket D-5379 Mounting Nut Base Weight: 4.15 Adder Per Inch of Stroke: .52	

Accessories

For accessories, see the standard air cylinder accessories section, pages 58-66.

How to Order

The model number of all Adjustable Cushion Original Line pneumatic actuators consists of an alphanumeric cluster designating model, bore size, stroke length, mounting styles, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Adjustable Cushion Original Line unit with front head cushions, 3/4" bore, 1" stroke, front nose mounting, and additional options is shown below.

Stroke Length
XX (in)

Mounting Style	
D	Front nose
DXP	Universal double end or rear pivot
DXDE	Double end with double end rod

CF - 04 1 - D NT

Model	
C	Cushion, both ends
CF	Cushion, front head only
CR	Cushion, rear head only
CM	Cushion, both ends, with magnetic piston
CRM	Cushion, rear head only, with magnetic piston
CFM	Cushion, fron head only, with magnetic piston
CS	DXDE mounting - cushions one end only
CSM	DXDE mounting - cushions one end only with magnetic piston

Bore Size	
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Options*	
99	HT-99 oil pre-lube
NT	Solid/non-threaded
V	High temperature seals and lubrication
W	Rod wiper
EEX.XX	Extra rod extension of X.XX

*When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.

Approximate Power Factors		
5/16"	=	0.07
7/16"	=	0.15
9/16"	=	0.25
3/4"	=	0.40
7/8"	=	0.60
1-1/16"	=	0.90
1-1/4"	=	1.20
1-1/2"	=	1.7
1-3/4"	=	2.40
2"	=	3.10
2-1/2"	=	5.00
3"	=	7.00

Bimba has made sizing a cylinder as easy as knowing the model number. Each base model number is developed by calculating the area of the cylinder bore. This area, or Power Factor, will provide the force the cylinder will exert when multiplied by the airline pressure.

FORCE = Airline Pressure x Piston Area

PISTON AREA = Bimba Power Factor

FORCE = Airline Pressure x Bimba Power Factor



MRS® Magnetic Reed Switch Air Cylinders

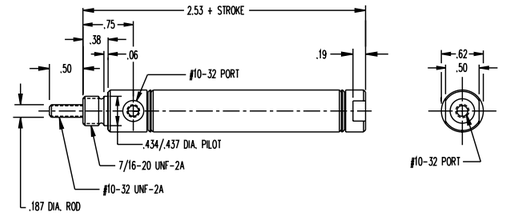
Specifically designed to operate Bimba position sensing switches to actuate programmable controllers, relays, solenoids, timers, or any other electrically operated equipment. MRS cylinders have an additional groove in the piston to accommodate a magnet. They differ from the M option because they combine features of the "Z" line with Original Line construction; check dimensional drawings for each size for more specific information. Type 303 stainless steel rods are standard.

Options:

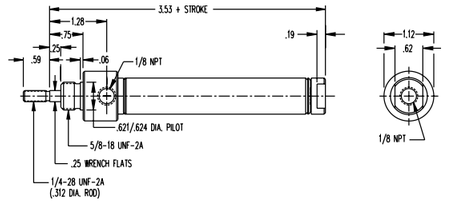
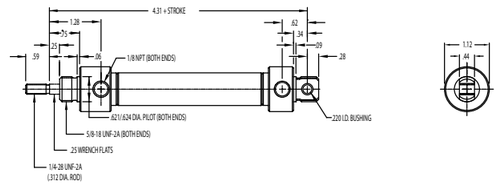
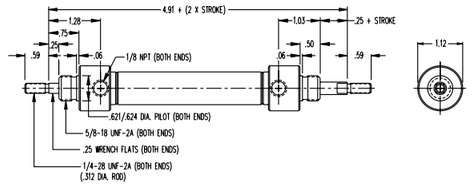
- **No Thread (NT)**
- **Switch Track for Miniature Switches (T2, T3, T4)**
  - Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
- **Switch Track for Heavy Duty Track Mounted Switches**
  - Must specify Z for one track, ZTT for 2 tracks. See Switch Products for switch selection information.
- **Double Acting Bumpers (B)**
  - 9/16", add .125" to length
  - 3/4" and 11/16" add .250" to length
  - 1-1/4" and 1-1/2" add .250" to length
  - 1-3/4", 2" and 2-1/2" add .250" to length
- **Extra Extension (EE)**
- **Fluoroelastomer/High Temperature Seal (V)**
- **Ports Rotated 90 (K)**
- **Side Ported Rear Head (Q)**

9/16" Bore MRS® Magnetic Reed Switch Air Cylinders

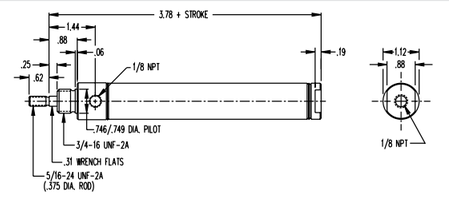
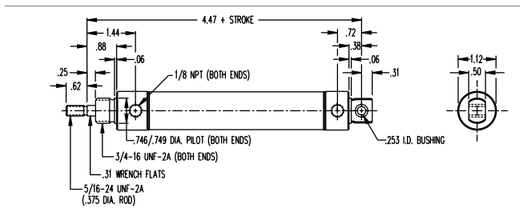
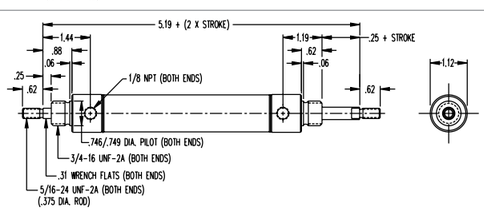
☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
MRS-02 ☐ -D	Nose Mount Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-770 Mounting Bracket Base Weight: .10 Adder Per Inch of Stroke: .01	
MRS-02 ☐ -DXP	Double End or Rear Pivot Mounting Standard Stroke Lengths: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 12" Optional Accessories: D-12321-A Pivot Bracket D-770 Mounting Bracket D-850 Rod Clevis Base Weight: .10 Adder Per Inch of Stroke: .01	
MRS-02 ☐ -DXDE	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-770 Mounting Bracket Base Weight: .14 Adder Per Inch of Stroke: .02	

3/4” Bore MRS® Magnetic Reed Switch Air Cylinders

Model	Description/Weight (lbs)	Dimensions
MRS-04 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-129 Mounting Bracket Base Weight: .24 Adder Per Inch of Stroke: .04	
MRS-04 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-10131-A Pivot Bracket D-129 Mounting Bracket D-10139-A Rod Clevis Base Weight: .30 Adder Per Inch of Stroke: .06	
MRS-04 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-129 Mounting Bracket Base Weight: .41 Adder Per Inch of Stroke: .06	

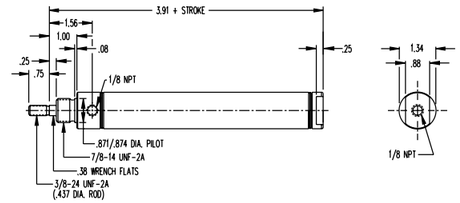
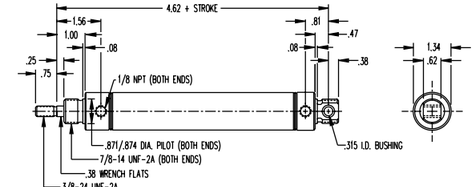
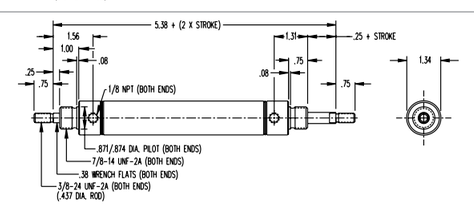
1-1/16” Bore MRS® Magnetic Reed Switch Air Cylinders

Model	Description/Weight (lbs)	Dimensions
MRS-09 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8315 Mounting Bracket Base Weight: .37 Adder Per Inch of Stroke: .05	
MRS-09 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8321-A Pivot Bracket D-8315 Mounting Bracket D-8309-A Rod Clevis Base Weight: .42 Adder Per Inch of Stroke: .05	
MRS-09 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8315 Mounting Bracket Base Weight: .60 Adder Per Inch of Stroke: .08	

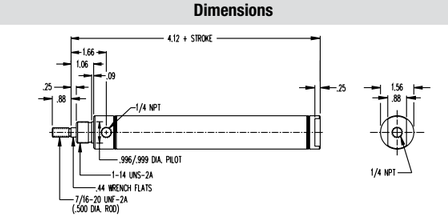
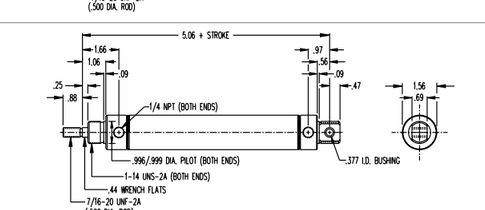
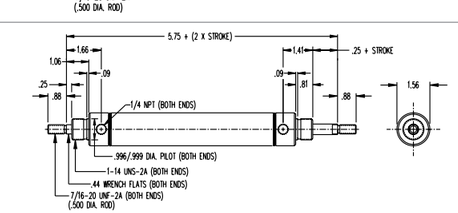
How to Specify

ORIGINAL LINE CYLINDERS

1-1/4” Bore MRS® Magnetic Reed Switch Air Cylinders

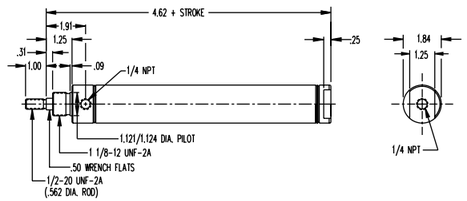
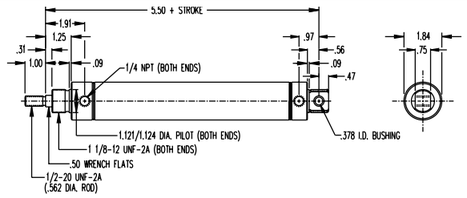
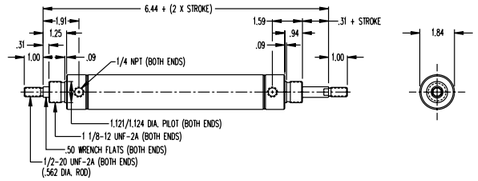
Model	Description/Weight (lbs)	Dimensions
MRS-12 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8316 Mounting Bracket Base Weight: .51 Adder Per Inch of Stroke: .07	
MRS-12 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8322-A Pivot Bracket D-8316 Mounting Bracket D-8310-A Rod Clevis Base Weight: .61 Adder Per Inch of Stroke: .05	
MRS-12 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8316 Mounting Bracket Base Weight: .70 Adder Per Inch of Stroke: .14	

1-1/2” Bore MRS® Magnetic Reed Switch Air Cylinders

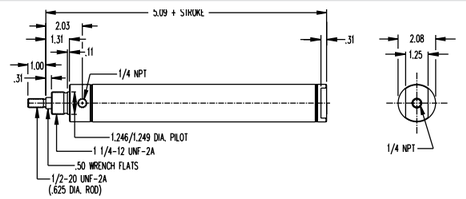
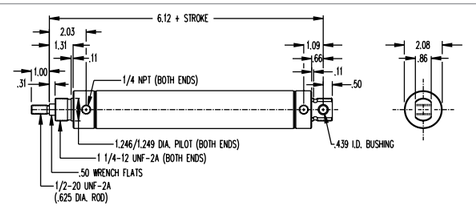
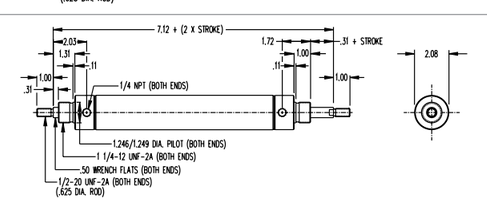
Model	Description/Weight (lbs)	Dimensions
MRS-17 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8317 Mounting Bracket Base Weight: .74 Adder Per Inch of Stroke: .10	
MRS-17 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8323-A Pivot Bracket D-8317 Mounting Bracket D-8311-A Rod Clevis Base Weight: .87 Adder Per Inch of Stroke: .10	
MRS-17 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8317 Mounting Bracket Base Weight: .94 Adder Per Inch of Stroke: .20	

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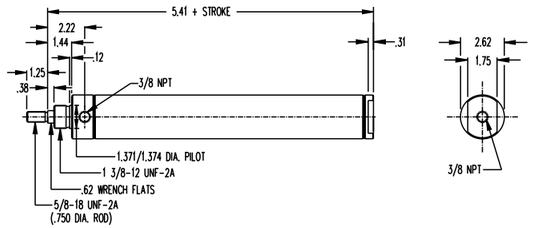
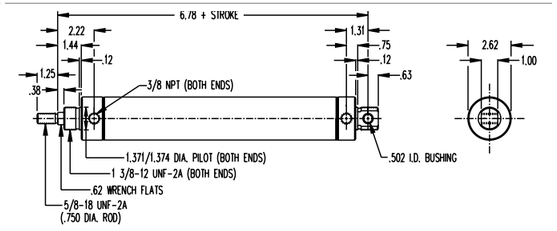
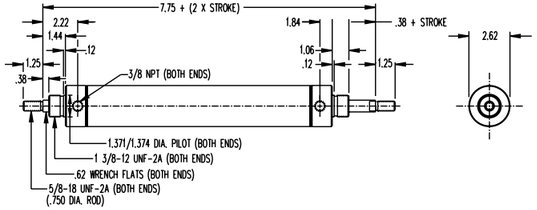
1-3/4” Bore MRS® Magnetic Reed Switch Air Cylinders

Model	Description/Weight (lbs)	Dimensions
MRS-24 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8318 Mounting Bracket Base Weight: 1.14 Adder Per Inch of Stroke: .13	
MRS-24 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8324-A Pivot Bracket D-8318 Mounting Bracket D-8312-A Rod Clevis Base Weight: 1.30 Adder Per Inch of Stroke: .13	
MRS-24 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8318 Mounting Bracket Base Weight: 1.40 Adder Per Inch of Stroke: .26	

2” Bore MRS® Magnetic Reed Switch Air Cylinders

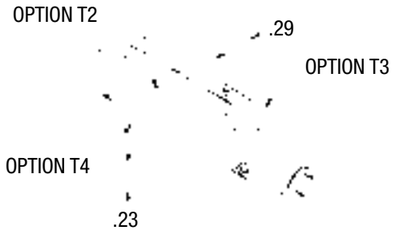
Model	Description/Weight (lbs)	Dimensions
MRS-31 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8319 Mounting Bracket Base Weight: 1.55 Adder Per Inch of Stroke: .15	
MRS-31 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8325-A Pivot Bracket D-8319 Mounting Bracket D-8313-A Rod Clevis Base Weight: 1.80 Adder Per Inch of Stroke: .15	
MRS-31 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8319 Mounting Bracket Base Weight: 1.90 Adder Per Inch of Stroke: .30	

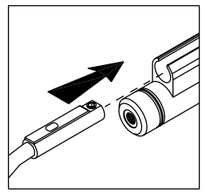
2-1/2” Bore MRS® Magnetic Reed Switch Air Cylinders

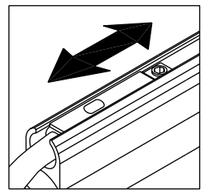
Model	Description/Weight (lbs)	Dimensions
MRS-50 ☐ -D 	Nose Mount Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8320 Mounting Bracket Base Weight: 2.48 Adder Per Inch of Stroke: .20	
MRS-50 ☐ -DXP 	Double End or Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Optional Accessories: D-8326-A Pivot Bracket D-8320 Mounting Bracket D-8314-A Rod Clevis Base Weight: 2.90 Adder Per Inch of Stroke: .20	
MRS-50 ☐ -DXDE 	Double End Rod – Double End Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-8320 Mounting Bracket Base Weight: 3.15 Adder Per Inch of Stroke: .40	

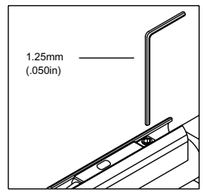
Switch Track Options

For Original Line cylinders, including MRS cylinders, with –T2, T3, and T4 options









Switch Track for use with Bimba MR, MS, MSC, and MSK Switches

Miniature Position Sensing track lengths can now be purchased separately for field mounting of custom track locations. Simply specify the length of track desired after the part number.

Mounting recommendations:

- Clean body with acetone. Remove all oil from body surface.
- Avoid mounting track over rolled construction. Locate edge of track 0.175" from rolled construction.
- Use a solid continuous bead of glue for the entire length of track used. Bead should fill center channel of track.
- Adhere to recommended cure times as specified by the glue manufacturer.

Bores	Part Number
007 - 04	D-74168-A-length
06 - 31	D-78527-A-length
50 - 70	D-78528-A-length

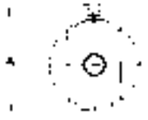
Loctite U-05FL or similar adhesive is recommended (not included).

For MRS cylinders with –Z or –ZTT options

For 3/16" and 3/4" Bore



For 1-1/16" and 2-1/2" Bore

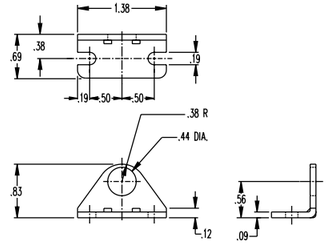


Bore Designator	Bore	A
02	9/16"	1.00
04	3/4"	1.38
09	1-1/16"	1.50
12	1-1/4"	1.68
17	1-1/2"	1.91
24	1-3/4"	2.20
31	2"	2.43
50	2-1/2"	2.98

MRS® Accessories

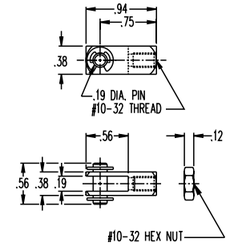
9/16" Bore Accessories

D-770



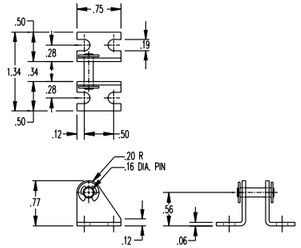
Mounting Bracket

D-850



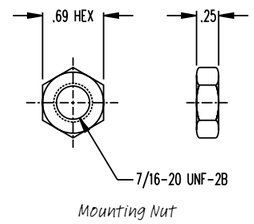
Rod Clevis

D-12321-A



Pivot Bracket

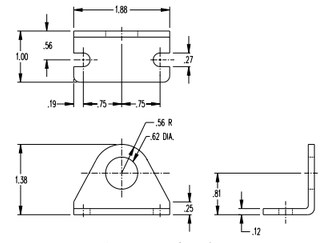
D-154



Mounting Nut

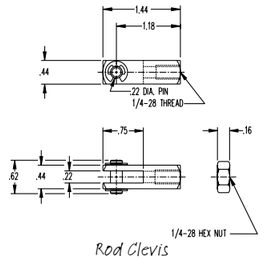
3/4" Bore Accessories

D-129



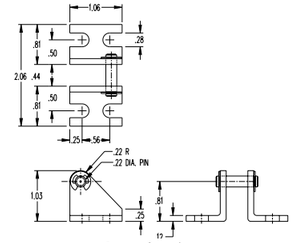
Mounting Bracket

D-10139-A



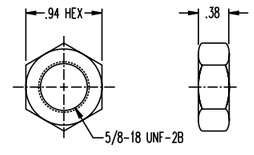
Rod Clevis

D-10131-A



Pivot Bracket

D-9

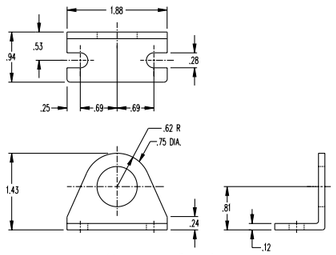


Mounting Nut

MRS® Accessories

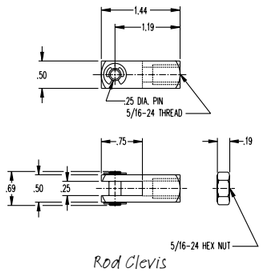
1-1/16" Bore Accessories

D-8315



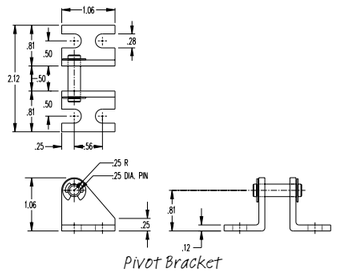
Mounting Bracket

D-8309-A



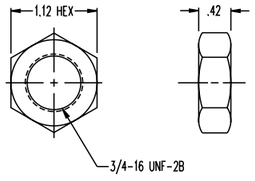
Rod Clevis

D-8321-A



Pivot Bracket

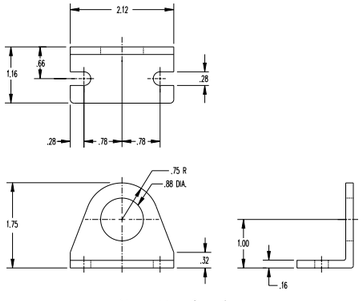
D-3556



Mounting Nut

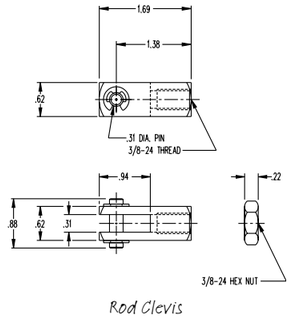
1-1/4" Bore Accessories

D-8316



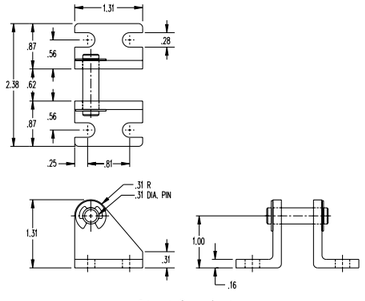
Mounting Bracket

D-8310-A



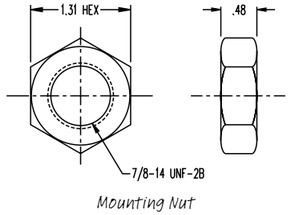
Rod Clevis

D-8322-A



Pivot Bracket

D-2545



Mounting Nut

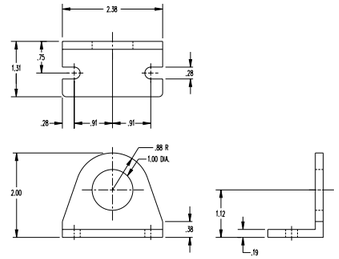
How to Accessorize

ORIGINAL LINE CYLINDERS

MRS® Accessories

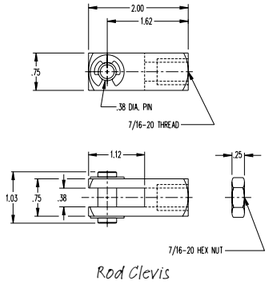
1-1/2" Bore Accessories

D-8317



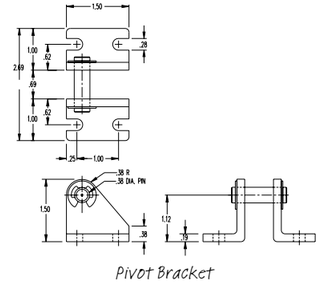
Mounting Bracket

D-8311-A



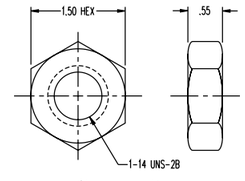
Rod Clevis

D-8323-A



Pivot Bracket

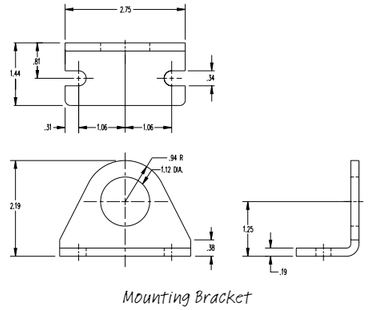
D-1331



Mounting Nut

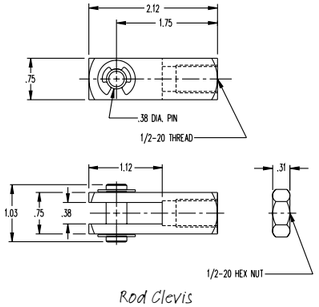
1-3/4" Bore Accessories

D-8318



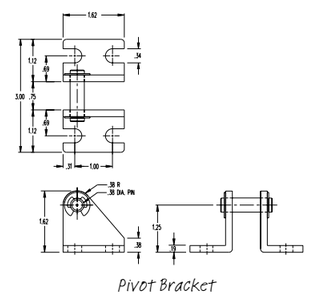
Mounting Bracket

D-8312-A



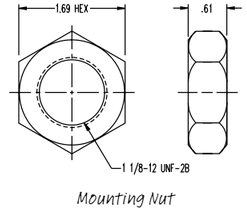
Rod Clevis

D-8324-A



Pivot Bracket

D-8484



Mounting Nut

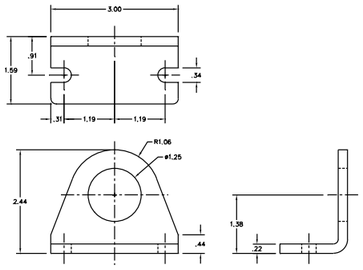
BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

How to Accessorize

MRS® Accessories

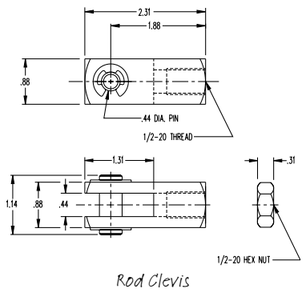
2" Bore Accessories

D-8319



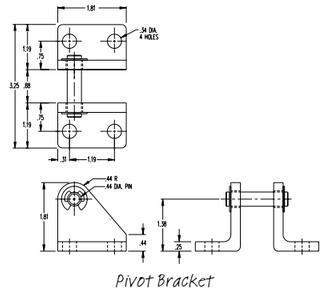
Mounting Bracket

D-8313-A



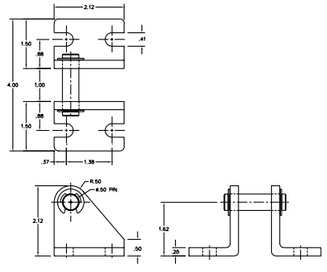
Rod Clevis

D-8325-A



Pivot Bracket

D-8326-A



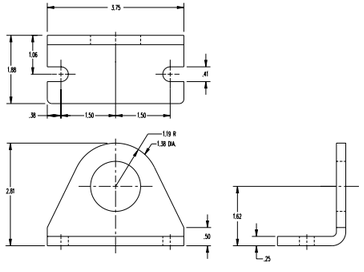
Pivot Bracket

D-508

Mounting Nut

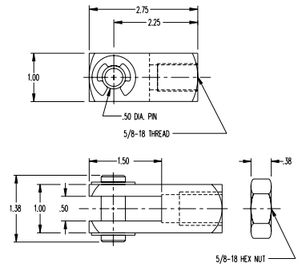
2-1/2" Bore Accessories

D-8320



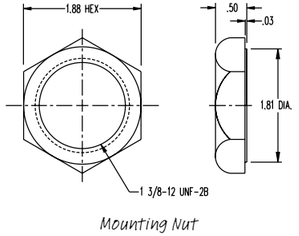
Mounting Bracket

D-8314-A



Rod Clevis

D-2540



Mounting Nut

How to Order

The model number of all Magnetic Reed Switch Original Line pneumatic actuators consists of an alphanumeric cluster designating model, bore size, stroke length, mounting styles, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Magnetic Reed Switch Original Line unit with 2-1/2" bore, 3" stroke, front nose mounting, and additional options is shown below.

Stroke Length
XX (in)

Mounting Style	
D	Front nose
XP	Universal double end or rear pivot
DXDE	Double end with double end rod

MRS - 50 3 - D NT

Model	
MRS	Magnetic Reed Switch cylinder

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
12	1-1/4"
17	1-1/2"
24	1-3/4"
31	2"
50	2-1/2"

Options*	
99	HT-99 oil pre-lube
B	Bumpers
NT	No thread
Q	Side ported rear head
T	Switch track (T1, T2, T3, or T4) (see Switch Products for switch selection information)
V	High temperature seals and lubrication
Z	Heavy duty switch track
EEX.XX	Extra rod extension of X.XX

Approximate Power Factors		
5/16"	=	0.07
7/16"	=	0.15
9/16"	=	0.25
3/4"	=	0.40
7/8"	=	0.60
1-1/16"	=	0.90
1-1/4"	=	1.20
1-1/2"	=	1.7
1-3/4"	=	2.40
2"	=	3.10
2-1/2"	=	5.00
3"	=	7.00

Bimba has made sizing a cylinder as easy as knowing the model number. Each base model number is developed by calculating the area of the cylinder bore. This area, or Power Factor, will provide the force the cylinder will exert when multiplied by the airline pressure.

FORCE = Airline Pressure x Piston Area

PISTON AREA = Bimba Power Factor

FORCE = Airline Pressure x Bimba Power Factor



Non-Rotating Original Line Air Cylinders

Bimba's Non-Rotating Original Line stainless steel body air cylinder design consists of a unique square piston rod with rounded corners. The square rod prevents rotation better than other rod configurations, and the rounded corners provide longer seal life than conventional hexagonal rods. The unusual geometry of the square rod also provides superior rotation control. All bore sizes have a rotational control of less than or equal to ±3 degrees. The special high strength aluminum alloy rod guide provides high load carrying capability and abrasion resistance. The urethane-based rod seal provides excellent seal life and leak-free service. The Non-Rotating Original Line cylinder is dimensionally interchangeable with the standard Original Line stainless steel cylinder.

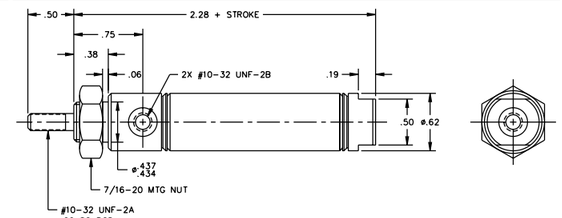
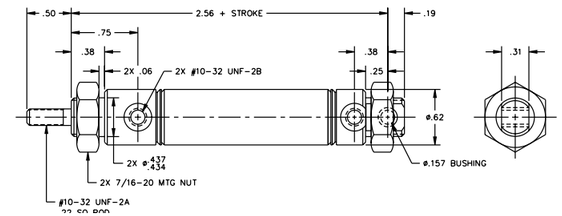
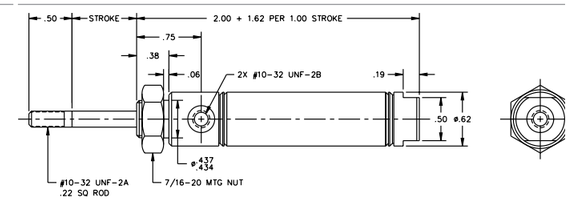
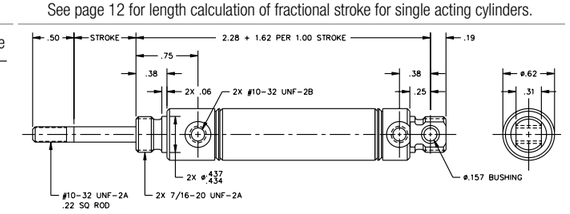
9/16" Bore Non-Rotating Air Cylinders

- Stainless steel piston rod standard
- Unique square piston rod with rounded corners
- High strength aluminum alloy rod guide
- Urethane-based rod seal
- Buna N "U" cup piston seal
- Pressure rating – 250 psi maximum (air only)
- Available in double acting and reverse acting models
- Enclosed spring force: 2lbs relaxed - 4lbs compressed
- Standard Buna N seals temperature range: -20˚ F (-25˚ C) to 200˚ F (95˚ C)

Options:

- **Side Ported Rear Head (Q)**
- **Ports Rotated (K)**
- **Reverse Acting Bumpers (B)**
  - » Add .062 to overall length
- **Double Acting Bumpers (B)**
  - » Add .125 to overall length
- **Extra Extension (EE)**
- **Magnet (prefix M)**
  - » Reverse acting add .125" to overall length
  - » Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See the Switch Products chapter for switch selection information.
- **Low Temperature (N)**
  - » Temperature Range : -40˚ to 200˚F
- **High Temperature Seals (V)**
  - » Temperature Range : 0˚ to 400˚F (-18˚ to 205˚C)

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-02 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 10" Optional Accessory: D-770 Mounting Bracket Base Weight: .09 Adder Per Inch of Stroke: .02	
NR-02 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 10" Optional Accessories: D-770 Mounting Nut D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .09 Adder Per Inch of Stroke: .02	
NR-02 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3" Maximum Stroke – 4" Optional Accessory: D-770 Mounting Bracket Base Weight: .08 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.
NR-02 ☐ -RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3" Maximum Stroke – 4" Optional Accessories: D-850 Rod Clevis D-12321-A Pivot Bracket Base Weight: .08 Adder Per Inch of Stroke: .04	 See page 12 for length calculation of fractional stroke for single acting cylinders.

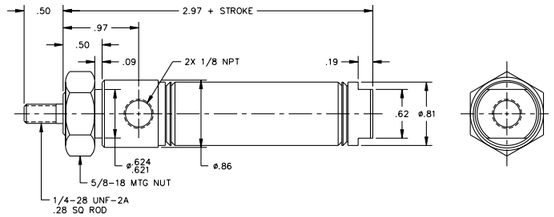
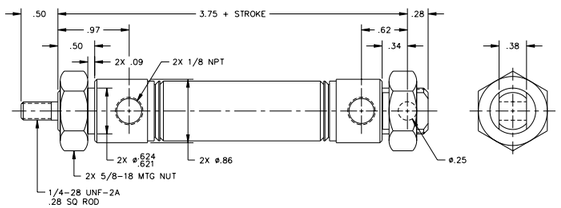
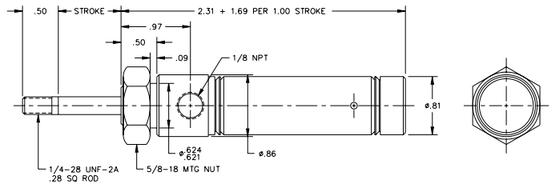
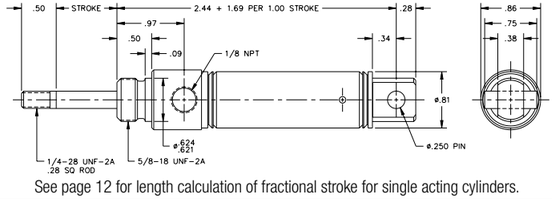
3/4" Bore Non-Rotating Air Cylinders

- Stainless steel piston rod standard
- Unique square piston rod with rounded corners
- High strength aluminum alloy rod guide
- Urethane-based rod seal
- Buna N “U” cup piston seal
- Pressure rating – 250 psi maximum (air only)
- Available in double acting and reverse acting models
- Enclosed spring force: 3lbs relaxed - 6lbs compressed
- Standard Buna N seals temperature range: 20˚ F (-25˚ C) to 200˚ F (95˚ C)

Options:

- **Ports Rotated (K)**
- **Side Ported Rear Head (Q)**
- **Pivot Bushing (Y)**
- **Reverse Acting Bumpers (B)**
  - » Add .062 to overall length
- **Double Acting Bumpers (B)**
  - » Add .125 to overall length
- **Extra Extension (EE)**
- **Magnet (prefix M)**
  - » Reverse acting add .125” to overall length
  - » Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See the Switch Products chapter for switch selection information.
- **Low Temperature (N)**
  - » Temperature Range : -40˚ to 200˚F
- **High Temperature Seals (V)**
  - » Temperature Range : 0˚ to 400˚F (-18˚ to 205˚C)

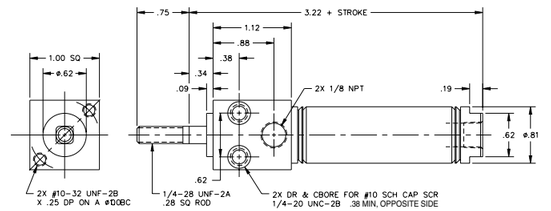
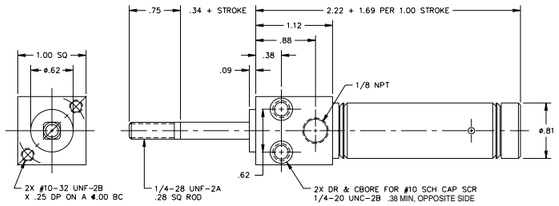
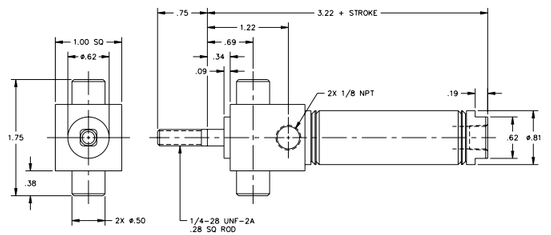
☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-04 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-129 Mounting Bracket Base Weight: .21 Adder Per Inch of Stroke: .03	
NR-04 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 24" Optional Accessories: D-129 Mounting Bracket D-166-3 Rod Clevis D-13498-A Pivot Bracket Base Weight: .29 Adder Per Inch of Stroke: .03	
NR-04 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessory: D-129 Mounting Bracket Base Weight: .18 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
NR-04 ☐ -RP 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return — Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessories: D-167 Mounting Brackets D-166-3 Piston Rod Clevis Base Weight: .18 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.

How to Specify

ORIGINAL LINE CYLINDERS

3/4" Bore Non-Rotating Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BFNR-04 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .22 Adder Per Inch of Stroke: .03	
BFNR-04 ☐ -R 	Pull Type – Front Block Mounting Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Base Weight: .19 Adder Per Inch of Stroke: .07	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFTNR-04 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 12" Optional Accessories: TRB-2 Trunnion Brackets D-166-3 Rod Clevis Base Weight: .29 Adder Per Inch of Stroke: .03	

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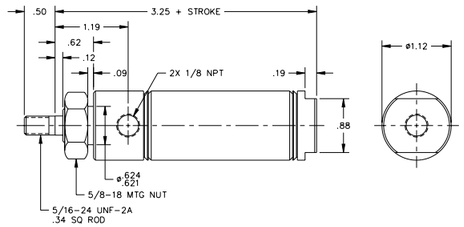
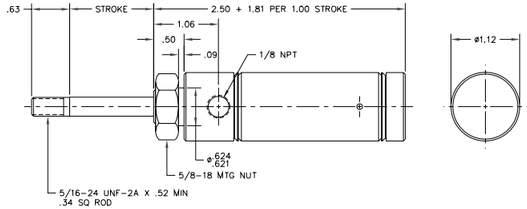
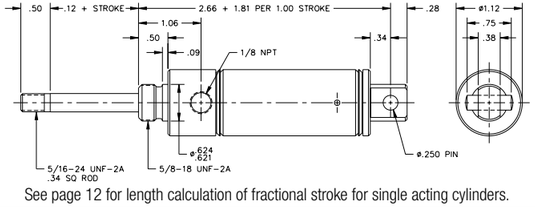
1-1/16" Bore Non-Rotating Air Cylinders

- Stainless steel piston rod standard
- Unique square piston rod with rounded corners
- High strength aluminum alloy rod guide
- Urethane-based rod seal
- Buna N "U" cup piston seal
- Pressure rating – 250 psi maximum (air only)
- Available in double acting and reverse acting models
- Enclosed spring force: 6lbs relaxed - 12lbs compressed.
- Standard Buna N seals temperature range:-20˚ F (-25˚ C) to 200˚ F (95˚ C)

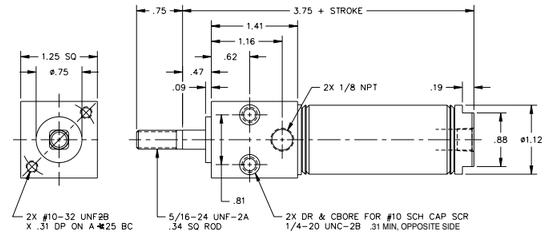
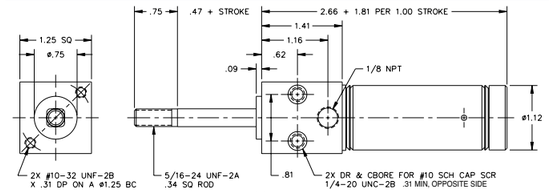
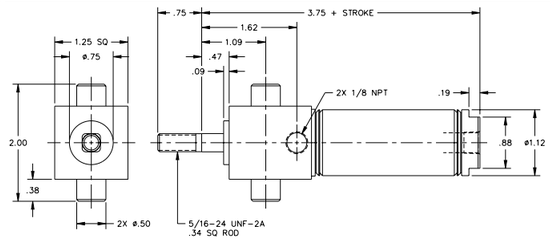
Options:

- **Ports Rotated (K)**
- **Side Ported Rear Head (Q)**
- **Pivot Bushing (Y)**
- **Reverse Acting Bumpers (B)**
  - » Add .062 to overall length
- **Double Acting Bumpers (B)**
  - » Add .125 to overall length
- **Extra Extension (EE)**
- **Magnet (prefix M)**
  - » Reverse acting add .125" to overall length
  - » Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
- **Low Temperature (N)**
  - » Temperature Range : -40˚ to 200˚ F
- **High Temperature Seals (V)**
  - » Temperature Range : 0˚ to 400˚ F (-18˚ to 205˚ C)

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-09 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-129 Mounting Bracket Base Weight: .33 Adder Per Inch of Stroke: .05	
NR-09 ☐ -DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 24" Optional Accessories: D-129 Mounting Bracket D-166-1 Rod Clevis D-13498-A Pivot Bracket Base Weight: .33 Adder Per Inch of Stroke: .05	
NR-09 ☐ -R 	Reverse Single Acting – Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessory: D-129 Mounting Bracket Base Weight: .24 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
NR-09 ☐ -RP 	Reverse Single Acting – Pivot or Pull Type – Rod Normally Extended Spring Return – Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessories: D-166-1 Piston Rod Clevis D-167 Mounting Bracket Base Weight: .22 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/16" Bore Non-Rotating Air Cylinders

Model	Description/Weight (lbs)	Dimensions
BFNR-09 ☐ -D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .49 Adder Per Inch of Stroke: .05	
BFNR-09 ☐ -R 	Reverse Single Acting – Front Block Mounting – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Base Weight: .36 Adder Per Inch of Stroke: .16	 See page 12 for length calculation of fractional stroke for single acting cylinders.
BFTNR-09 ☐ -D 	Double Acting – Front Block Trunnion Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 12" Optional Accessories: TRB-2 Trunnion Brackets D-166-1 Rod Clevis Base Weight: .49 Adder Per Inch of Stroke: .05	

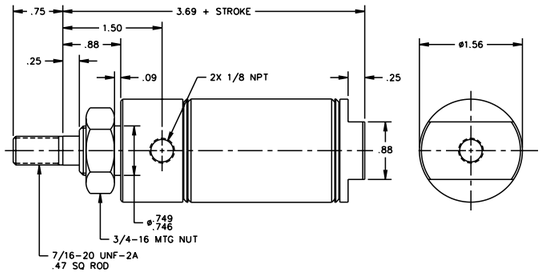
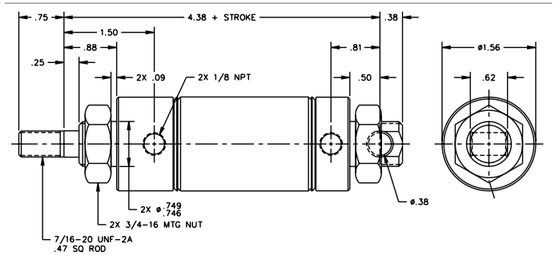
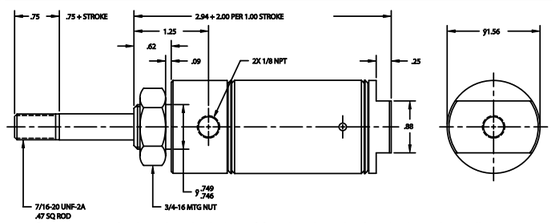
1-1/2" Bore Non-Rotating Air Cylinders

- Stainless steel piston rod standard
- Unique square piston rod with rounded corners
- High strength aluminum alloy rod guide
- Urethane-based rod seal
- Buna N “U” cup piston seal
- Pressure rating – 250 psi maximum (air only)
- Available in double acting and reverse acting models
- Enclosed spring force: 8.5lbs relaxed - 17lbs compressed
- Standard Buna N seals temperature range: -20˚ F (-25˚ C) to 200˚ F (95˚ C)

Options:

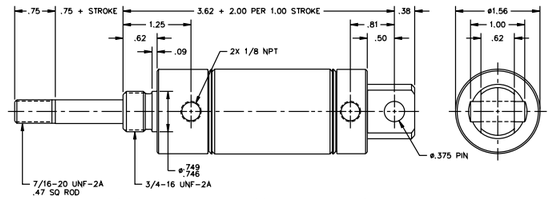
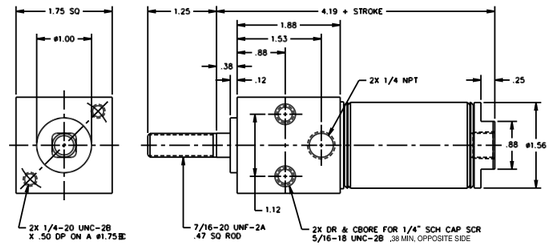
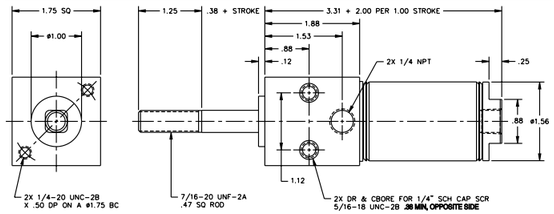
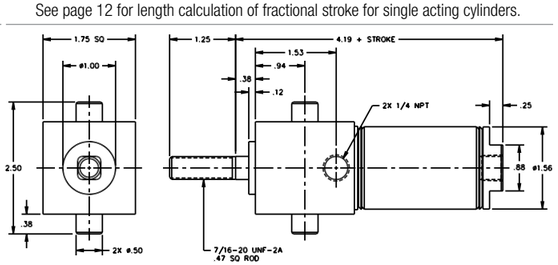
- **Ports Rotated (K)**
- **Side Ported Rear Head (Q)**
- **Pivot Bushing (Y)**
- **Reverse Acting Bumpers (B)**
  - » Add .062 to overall length
- **Double Acting Bumpers (B)**
  - » Add .125 to overall length
- **Extra Extension (EE)**
- **Magnet (prefix M)**
  - » Reverse acting add .125” to overall length
  - » Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
- **Low Temperature (N)**
  - » Temperature Range : -40˚ to 200˚ F
- **High Temperature Seals (V)**
  - » Temperature Range : 0˚ to 400˚ F (-18˚ to 205˚ C)

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-17☐-D	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessory: D-241 Mounting Bracket Base Weight: .69 Adder Per Inch of Stroke: .08	
NR-17☐-DXP 	Double Acting – Double End or Rear Pivot Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 24" Optional Accessories: D-241 Mounting Bracket D-231-1 Rod Clevis D-8323-A Pivot Bracket Base Weight: .82 Adder Per Inch of Stroke: .08	
NR-17☐-R 	Reverse Single Acting – Pull Type – Rod Normally Extended Spring Return – Spring force 8.5lbs relaxed, 17lbs compressed – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessory: D-241 Mounting Bracket Base Weight: .44 Adder Per Inch of Stroke: .22	

See page 12 for length calculation of fractional stroke for single acting cylinders.

1-1/2” Bore Non-Rotating Air Cylinders

Model	Description/Weight (lbs)	Dimensions
NR-17☐-RP 	Reverse Single Acting – Pivot and Pull Type – Rod Normally Extended – Spring Return – Spring Force 8.5lbs relaxed, 17lbs compressed – Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Optional Accessories: D-231-1 Piston Rod Clevis D-229 Mounting Bracket Base Weight: .45 Adder Per Inch of Stroke: .22	
BFNR-17☐-D 	Double Acting – Front Block Mounting – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .99 Adder Per Inch of Stroke: .08	
BFNR-17☐-R 	Pull Type – Front Block Mounting – Rod Normally Extended – Reverse Single Acting – Spring Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 6" Base Weight: .96 Adder Per Inch of Stroke: .22	
BFTNR-17☐-D 	Double Acting – Front Block Trunnion Mounting – Spring Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 12" Optional Accessories: TRB-2 Trunnion Brackets D-231-1 Rod Clevis Base Weight: 1.06 Adder Per Inch of Stroke: .08	

See page 12 for length calculation of fractional stroke for single acting cylinders.

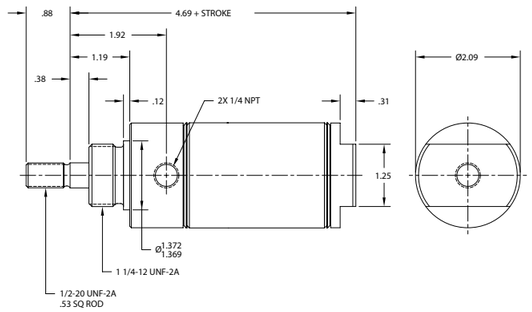
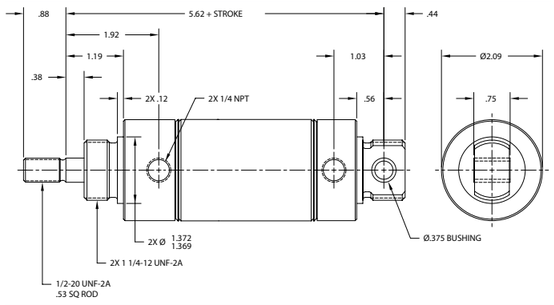
2" Bore Non-Rotating Air Cylinders

- Stainless steel piston rod standard
- Unique square piston rod with rounded corners
- High strength aluminum alloy rod guide
- Urethane-based rod seal
- Buna N "U" cup piston seal
- Pressure rating – 250 psi maximum (air only)
- Available in double acting and reverse acting models.
- Enclosed spring force: 15lbs relaxed - 30lbs compressed.
- Standard Buna N seals temperature range: -20˚ F (-25˚ C) to 200˚ F (95˚ C)

Options:

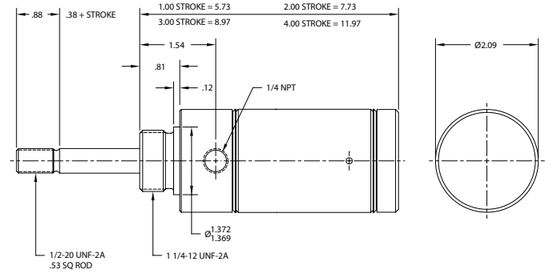
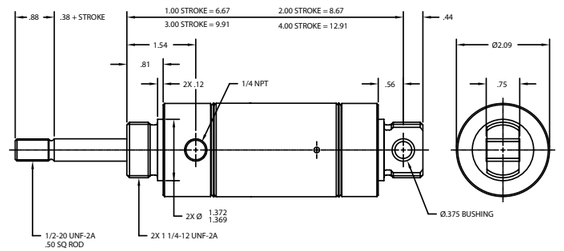
- **Ports Rotated (K)**
- **Side Ported Rear Head (Q)**
- **Reverse Acting Bumpers (B)**
  - » Add .062 to overall length
- **Double Acting Bumpers (B)**
  - » Add .125 to overall length
- **Extra Extension (EE)**
- **Magnet (prefix M)**
  - » Reverse acting add .125" to overall length
  - » Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
- **Low Temperature (N)**
  - » Temperature Range : -40˚ to 200˚ F
- **High Temperature Seals (V)**
  - » Temperature Range : 0˚ to 400˚ F (-18˚ to 205˚ C)

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-31 ☐ -D 	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessories: D-615 Mounting Bracket D-508 Mounting Nut Base Weight: 1.40 Adder Per Inch of Stroke: .15	
NR-31 ☐ -DXP 	Double Acting – Universal Mounting Type – Pivot or Double End — Air Return Standard Stroke Lengths: ½", 1" , 1½", 2", 2½", 3" , 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 24" Optional Accessories: D-615 Mounting Bracket D-231-3 Rod Clevis D-620 Pivot Bracket D-508 Mounting Nut Base Weight: 1.62 Adder Per Inch of Stroke: .15	

2" Bore Non-Rotating Air Cylinders

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-31 ☐ -R 	Reverse Single Acting — Pull Type – Rod Normally Extended – Spring Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 4" Optional Accessories: D-129 Mounting Bracket D-508 Mounting Nut Base Weight: 1.24 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.
NR-31 ☐ -RP 	Reverse Single Acting — Pivot or Pull Type – Rod Normally Extended Spring Return – Rear Pivot Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4" Maximum Stroke – 4" Optional Accessories: D-231-3 Piston Rod Clevis D-620 Pivot Bracket D-508 Mounting Nut D-615 Mounting Bracket Base Weight: 1.46 Adder Per Inch of Stroke: .43	 See page 12 for length calculation of fractional stroke for single acting cylinders.

How to Specify

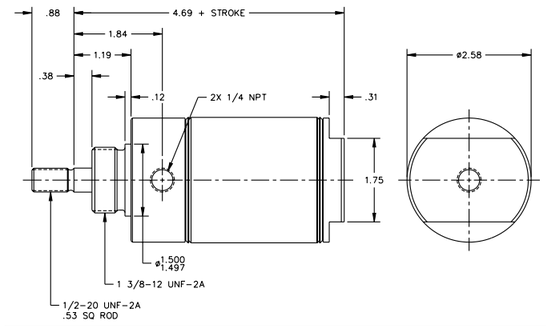
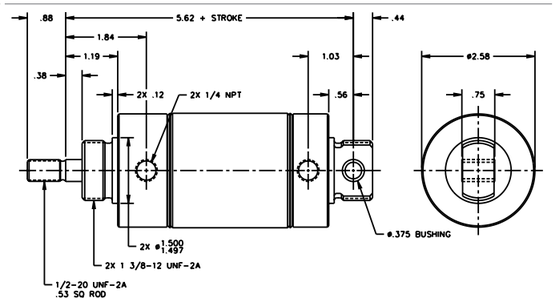
2-1/2" Bore Non-Rotating Air Cylinders

> Stainless steel piston rod standard
> Unique square piston rod with rounded corners
> High strength aluminum alloy rod guide
> Urethane-based rod seal
> Buna N “U” cup piston seal
> Pressure rating – 250 psi maximum (air only)
> Available in double acting
> Standard Buna N seals temperature range: -20˚ F (-25˚ C) to 200˚ F (95˚ C)

Options:

> **Ports Rotated (K)**
> **Side Ported Rear Head (Q)**
> **Double Acting Bumpers (B)**
» Add .125 to overall length
> **Extra Extension (EE)**
> **Magnet (prefix M)**
» Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.
> **Low Temperature (N)**
» Temperature Range: -40˚ to 200˚ F
> **High Temperature Seals (V)**
» Temperature Range: 0˚ to 400˚ F (-18˚ to 205˚ C)

☐ Enter Stroke Length as 3rd Digit

Model	Description/Weight (lbs)	Dimensions
NR-50 ☐ -D	Double Acting – Air Return – Front Nose Mounting Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6" Maximum Stroke – 12" Optional Accessories: D-615-1 Mounting Bracket D-2540 Mounting Nut Base Weight: 1.98 Adder Per Inch of Stroke: .17	
NR-50 ☐ -DXP	Double Acting – Universal Mounting Type – Pivot or Double End – Air Return Standard Stroke Lengths: ½", 1", 1½", 2", 2½", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 24" Optional Accessories: D-615-1 Mounting Bracket D-231-3 Rod Clevis D-620 Pivot Bracket D-2540 Mounting Nut Base Weight: 2.27 Adder Per Inch of Stroke: .17	

Accessories

Non-Rotating Original Line cylinders utilize the same accessories as standard Original Line cylinders. For more information on accessories, please refer to the Original Line accessories section, pages 58-66.

How to Order

The model number of all Original Line pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, mounting styles, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic double-acting Original Line unit with a rear block, 7/16” bore, 3” stroke, and additional options is shown below.

Stroke Length
XX (in)

Acting	
D	Double acting
R	Reverse acting
DXDE	Double end with double end rod

NR - 04 5 - R P BEE0.5

Model	
NR	Non-rotating
BFNR	Non-rotating, front block mounting
BFTNR	Non-rotating, front block trunnion

Bore Size	
02	9/16”
04	3/4”
09	1-1/16”
17	1-1/2”
31	2”
50	2-1/2”

Mounting Style	
D	Front nose
P	Rear pivot
DXP	Universal double end or rear pivot

Options*	
99	HT-99 oil pre-lube
B	Bumpers
K	Ports rotated 90°
N	Low temperature seals and lubrication
NT	No thread
Q	Side ported rear head
V	High temperature seals and lubrication
Y	Pivot bushing replaces pivot pin
EEX.XX	Extra rod extension of X.XX

Approximate Power Factors		
5/16”	=	0.07
7/16”	=	0.15
9/16"	=	0.25
3/4"	=	0.40
7/8”	=	0.60
1-1/16"	=	0.90
1-1/4”	=	1.20
1-1/2"	=	1.7
1-3/4”	=	2.40
2"	=	3.10
2-1/2"	=	5.00
3"	=	7.00

Bimba has made sizing a cylinder as easy as knowing the model number. Each base model number is developed by calculating the area of the cylinder bore. This area, or Power Factor, will provide the force the cylinder will exert when multiplied by the airline pressure.

FORCE = Airline Pressure x Piston Area

PISTON AREA = Bimba Power Factor

FORCE = Airline Pressure x Bimba Power Factor



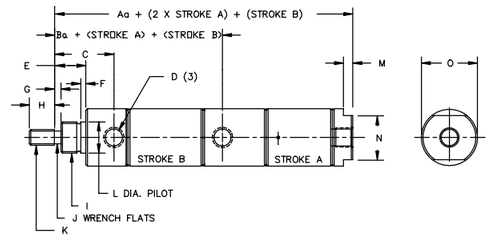
Three Position Original Line Cylinders

The "Blue and Improved" 3-Position Original Line® cylinder features permanent grease lubrication. Design enhancements have more than doubled the anticipated service life of this non-repairable stainless steel body cylinder offering three distinct stopping points in its travel. This double acting cylinder is an example of our industry leading product breadth in non-repairable cylinders.

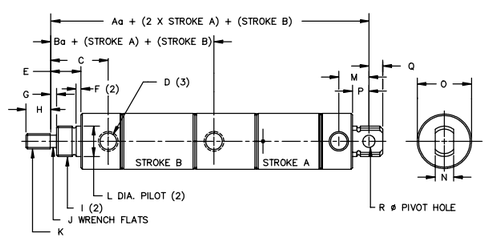
- Bore sizes: 9/16", 3/4", 1-1/16", 1-1/2", 2"
- Three model options: standard, magnetic piston for end of stroke sensing, and non-rotating rod
- Standard options: bumpers, alternate port location, rod wiper, switch track, and more
- Low and high temperature lubrication and seals
- Blue and /improved design doubles previous cylinder life
- Permanent grease lubricant requires no additional lubrication during service

Dimensions (Three Position Original Line Cylinders)

D Mounting Style (in)



DXP Mounting Style (in)



	D Model															Bumper Option	
Bore	Aa	Ba	C	D	E	F	G	H	I	J	K	L	M	N	O	Aa	Ba
9/16" (02)	4.12	2.25	0.75	#10-32	0.38	0.06	N/A	0.50	7/16-20	N/A	#10-32	.434/.437	0.19	0.50	0.62	4.31	2.31
3/4" (04)	5.47	3.12	0.97	1/8 NPT	0.50	0.09	N/A	0.50	5/8-18	N/A	1/4-28	.621/.624	0.19	0.62	0.81	5.47	3.12
1-1/16" (09)	5.97	3.25	1.19	1/8 NPT	0.62	0.09	0.12	0.50	5/8-18	0.25	5/16-24	.621/.624	0.19	0.88	1.12	6.09	3.25
1-1/2" (17)	6.5	3.69	1.50	1/8 NPT	0.88	0.09	0.25	0.75	3/4-16	0.38	7/16-20	.746/.749	0.25	0.88	1.56	6.62	3.69
2" (31)	8.25	4.78	1.92	1/4 NPT	1.19	0.12	0.38	0.88	1-1/4-12	0.50	1/2-20	1.375/1.372	0.31	1.25	2.09	8.62	4.91

	DXP Model									
Bore	Aa	Ba	C	D	E	F	G	H	I	J
9/16" (02)	4.41	2.25	0.75	#10-32	0.38	0.06	N/A	0.50	7/16-20	N/A
3/4" (04)	6.25	3.12	0.97	1/8 NPT	0.50	0.09	N/A	0.50	5/8-18	N/A
1-1/16" (09)	6.56	3.25	1.19	1/8 NPT	0.62	0.09	0.12	0.50	5/8-18	0.25
1-1/2" (17)	7.18	3.69	1.50	1/8 NPT	0.88	0.09	0.25	0.75	3/4-16	0.38
2" (31)	9.19	4.78	1.92	1/4 NPT	1.19	0.12	0.38	0.88	1-1/4-12	0.50

	DXP Model								Bumper Option	
Bore	K	L	M	N	O	P	Q	R	Aa	Ba
9/16" (02)	#10-32	.434/.437	0.38	0.31	0.62	0.25	0.19	0.157	4.59	2.31
3/4" (04)	1/4-28	.621/.624	0.62	0.38	0.86	0.34	0.28	0.250	6.25	3.12
1-1/16" (09)	5/16-24	.621/.624	0.62	0.38	1.12	0.34	0.28	0.250	6.68	3.25
1-1/2" (17)	7/16-20	.746/.749	0.81	0.62	1.56	0.50	0.38	0.375	7.31	3.69
2" (31)	1/2-20	1.375/1.372	1.03	0.75	2.08	0.56	0.44	0.500	9.56	4.91

How to Order

The model number of all Three-Position Original Line pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic double-acting Three-Position Original Line unit with a 3/4” bore; strokes at positions 0", 3", and 7.5"; double acting nose mounts; and additional options is shown below.

Stroke A	Stroke B
XX (in)	XX (in)

M - 04 3 / 4.5 - D W

Model	
Blank	Three-Position Original Line
M	Magnet option for cylinders
NR	Non-rotating rod option

Bore Size	
02	9/16”
04	3/4”
09	1-1/16”
17	1-1/2”
31	2”

Mounting Options	
D	Double acting, nose mount
DXP	Double acting, universal mount

Options*	
99	HT-99 oil pre-lube
B	Bumpers
K	Ports rotated 90°
N	Low temperature seals and lubrication
NT	Non-threaded rod
Q	Side ported rear head (see Original Line information for applicable length adders by bore size)
T	Switch track (T1, T2, T3, or T4) (see Switch Products for switch selection information)
V	High temperature seals and lubrication
W	Rod wiper
EEX.XX	Extra rod extension of X.XX

NOTE: Consult page 54 for option combination compatibility.
*When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.

Specifications

Description	Specification
Expected life:	3,000 miles without additional lubrication when properly applied
Total stroke tolerance:	
9/16” - 1-1/2”	+.075/-.040
2”	+.095/-.060
Operating medium:	Air only
Maximum operating pressure:	250 psi
Temperature range:	-20°F to 200°F
Standard lubrication:	Semi-synthetic grease
Endcaps, center section, and piston material:	Aluminum
Cylinder body:	304 stainless steel
Piston and rod seals:	Buna N “U” cups
Rod and pivot bushings:	Sintered bronze
Piston rod:	303 stainless steel

Weights (lbs)

Model	Base Weight	Adder per inch of Combined Stroke*
020/0-D	.13	Total combined stroke x .02
020/0-DXP	.13	Total combined stroke x .02
040/0-D	.24	Total combined stroke x .03
040/0-DXP	.32	Total combined stroke x .03
090/0-D	.36	Total combined stroke x .05
090/0-DXP	.45	Total combined stroke x .05
170/0-D	.96	Total combined stroke x .08
170/0-DXP	1.09	Total combined stroke x .08
310/0-D	2.25	Total combined stroke x .15
310/0-DXP	2.47	Total combined stroke x .15

*Total combined stroke = (2 x Stroke A) + Stroke B

For accessories, see the standard air cylinder accessories section, pages 58-66.

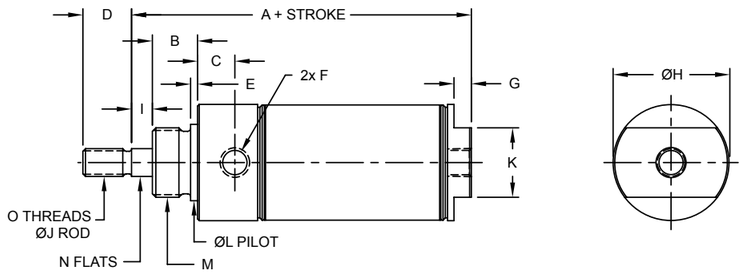


Original Line Cylinders with Plastic End Caps

The "Blue and Improved" Original Line® cylinder features permanent grease lubrication. Design enhancements have more than doubled the anticipated service life. This cylinder features acetal resin end caps, stainless steel rods and stainless steel bodies. They're ideal for applications in environments requiring exposure to moisture, lubricants and specific solvents.

Dimensions (PC Cylinders)

D Mounting Style



Bore	A	A (cushion or Q option)	B	C	D	E	F	G	H
9/16" (02)	2.28	--	0.38	0.38	0.50	0.06	#10-32	0.19	0.61
3/4" (04)	2.97	3.44	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.81
1-1/16" (09)	3.25	3.50	0.50	0.56	0.50	0.09	1/8 NPT	0.19	1.13
1-1/2" (17)	3.69	3.88	0.63	0.63	0.75	0.09	1/8 NPT	0.25	1.56
2" (31)	4.69	5.27	0.81	0.72	0.88	0.13	1/4 NPT	0.31	2.08

Bore	H (cushion option)	I	J	K	L	M	N	O
9/16" (02)	--	--	0.19	0.50	.434 / .437	7/16-20	--	#10-32
3/4" (04)	0.96	--	0.25	0.63	.621 / .624	5/8-18	--	1/4-28
1-1/16" (09)	1.13	0.13	0.31	0.88	.621 / .624	5/8-18	0.25	5/16-24
1-1/2" (17)	1.56	0.25	0.44	0.88	.996 / .999	1-14	0.38	7/16-20
2" (31)	2.08	0.38	0.63	1.25	1.372 / 1.375	1-1/4-12	0.50	1/2-20

Magnetic Piston Length Adder: 0.125" for 1-1/16" and 1-1/2", all other sizes 0.250"

Bumper Length Adder

9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
0.125	0	0.125*	0.125	0.250

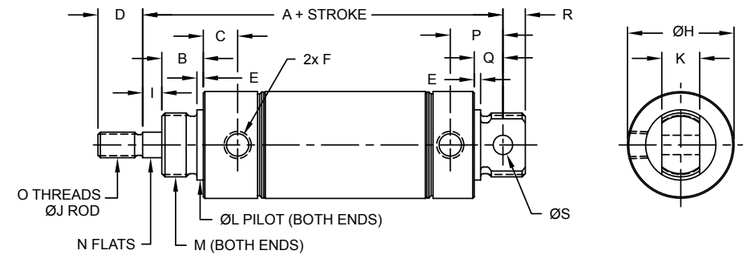
*For DXDE model, add 0.500"

How to Specify

ORIGINAL LINE CYLINDERS

Dimensions (PC Cylinders)

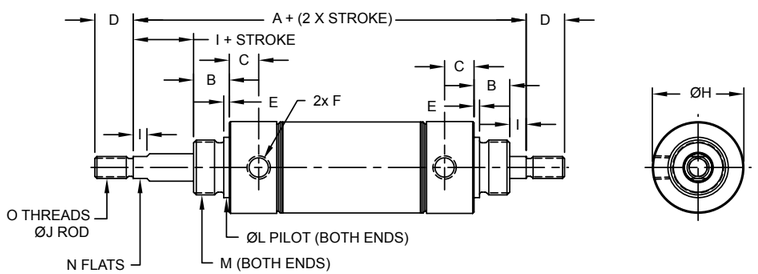
DXP Mounting Style



Bore	A	B	C	D	E	F	H	H (cushion option)	I	J
9/16" (02)	2.56	0.38	0.38	0.50	0.06	#10-32	0.61	--	--	0.19
3/4" (04)	3.75	0.50	0.47	0.50	0.09	1/8 NPT	0.86	0.96	--	0.25
1-1/16" (09)	3.84	0.50	0.56	0.50	0.09	1/8 NPT	1.13	1.13	0.13	0.31
1-1/2" (17)	4.38	0.63	0.63	0.75	0.09	1/8 NPT	1.56	1.56	0.25	0.44
2" (31)	5.63	0.81	0.73	0.88	0.13	1/4 NPT	2.08	2.08	0.38	0.63

Bore	K	L	M	N	O	P	Q	R	S
9/16" (02)	0.31	.434 / .437	7/16-20	--	#10-32	0.38	0.25	0.19	0.16
3/4" (04)	0.38	.621 / .624	5/8-18	--	1/4-28	0.63	0.34	0.28	0.25
1-1/16" (09)	0.38	.621 / .624	5/8-18	0.25	5/16-24	0.63	0.34	0.28	0.25
1-1/2" (17)	0.63	.996 / .999	1-14	0.38	7/16-20	0.81	0.50	0.38	0.38
2" (31)	0.74	1.372 / 1.375	1-1/4-12	0.50	1/2-20	1.03	0.56	0.44	0.38

DXDE Mounting



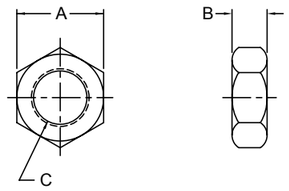
Bore	A	B	C	D	E	F	H	H (cushion option)	I	J	L	M	N	O
9/16" (02)	2.94	0.38	0.38	0.50	0.06	#10-32	0.61	--	--	0.19	.434 / .437	7/16-20	--	#10-32
3/4" (04)	4.00	0.50	0.47	0.50	0.09	1/8 NPT	0.86	0.96	--	0.25	.621 / .624	5/8-18	--	1/4-28
1-1/16" (09)	4.00	0.50	0.56	0.50	0.09	1/8 NPT	1.13	1.13	0.13	0.31	.621 / .624	5/8-18	0.25	5/16-24
1-1/2" (17)	5.13	0.63	0.63	0.75	0.09	1/8 NPT	1.56	1.56	0.25	0.44	.996 / .999	1-14	0.38	7/16-20
2" (31)	6.56	0.81	0.73	0.88	0.13	1/4 NPT	2.08	2.08	0.38	0.63	1.372 / 1.375	1-1/4-12	0.50	1/2-20

Magnetic Piston Length Adder: 0.250"

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Dimensions (PC Cylinders)

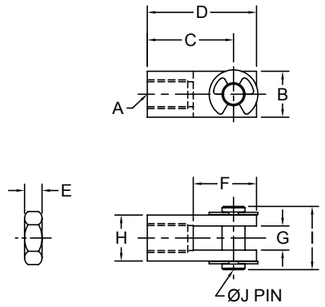
Stainless Steel Mounting Nut*



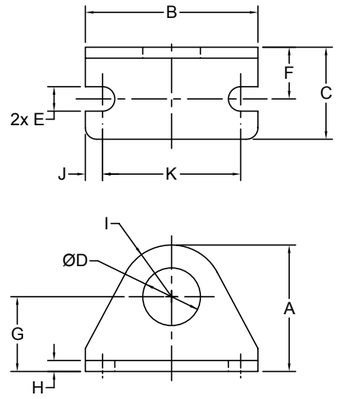
Bore*	Model	A	B	C
9/16" (02)	D-154-SS	0.69	0.25	7/16-20
3/4" (04)	D-9-SS	0.94	0.38	5/8-18
1-1/16" (09)	D-9-SS	0.94	0.38	5/8-18
1-1/2" (17)	D-1331-SS	1.50	0.55	1-14
2" (31)	D-508-SS	1.88	0.50	1-1/4-12

*See page 13 for torque specifications

Stainless Steel Rod End Clevis (includes nut)



Stainless Steel Foot Bracket



Stainless Steel Rod End Clevis (includes nut)

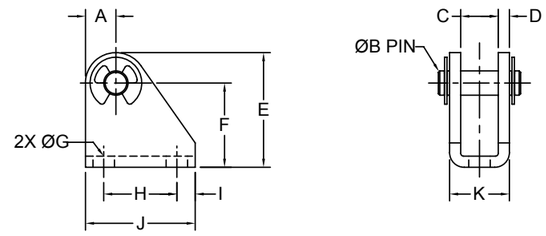
Bore	Model	A	B	C	D	E	F	G	H	I	J
9/16" (02)	D-850-SS	#10-32	0.38	0.75	0.94	0.13	0.56	0.19	0.38	0.56	0.19
3/4" (04)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.25	0.50	0.69	0.25
1-1/16" (09)	D-54564-SS	5/16-24	0.50	0.94	1.19	0.19	0.69	0.25	0.50	0.69	0.25
1-1/2" (17)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.38	0.75	1.03	0.38
2" (31)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.38	0.75	1.03	0.38

Stainless Steel Foot Bracket

Bore	Model	A	B	C	D	E	F	G	H	I	J	K
9/16" (02)	D-770-SS	0.84	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
3/4" (04)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/16" (09)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/2" (17)	D-61288-SS	1.75	2.50	1.50	1.03	0.28	0.75	1.00	0.12	0.75	0.31	1.88
2" (31)	D-615-SS	2.50	3.13	1.63	1.38	0.34	1.00	1.50	0.25	1.00	0.44	2.25

Dimensions (PC Cylinders)

Stainless Steel Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
9/16" (02)	D-55202-SS	0.20	0.16	0.31	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
3/4" (04)	D-55203-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.22	0.75	0.19	1.13	0.63
1-1/16" (09)	D-55203-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.22	0.75	0.19	1.13	0.63
1-1/2" (17)	D-55204-SS	0.38	0.38	0.63	0.13	1.75	1.38	0.28	1.00	0.25	1.50	0.91
2" (31)	D-55205-SS	0.38	0.38	0.75	0.25	1.75	1.38	0.28	1.00	0.25	1.50	1.25

Specifications

Pressure Rating:	100 psi (Air)
Temperature Range:	32° F to 160° F (0° C to 72° C)
	Delrin End Caps
	304 Stainless Steel Body
	303 Stainless Steel Rod
	Anodized Aluminum Alloy Piston
Options:	Buna N Bumpers
	Polyurethane Wiper
	Fluoroelastomer Seals (for compatibility only, not high temperature)

CYLINDER WEIGHT (lbs)					
Bore	Base Weight			Adder per 1"	
	D	DXP	DXDE	D & DXP	DXDE
9/16" (02)	0.05	0.06	0.07	0.02	0.03
3/4" (04)	0.13	0.15	0.18	0.03	0.05
1-1/16" (09)	0.21	0.25	0.3	0.05	0.07
1-1/2" (17)	0.46	0.48	0.6	0.08	0.13
2" (31)	1.08	1.17	1.48	0.15	0.24

MOUNTING NUT Torque Specifications		
Bore Size	Thread Size	Max Torque (in-lbs)
9/16" (02)	7/16-20	4.0
3/4" (04) 1-1/16" (09)	5/8-18	12.0
1-1/2" (17)	1-14	30.0
2" (31)	1 1/4-12	45.0

How to Order

The model number of all PC pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic PC unit with 1-1/16” bore, 6” stroke, and additional options is shown below.

Standard stroke lengths*	
All models	1/2”, 1”, 1-1/2”, 2”, 2-1/2”, 3”, 4”, 5”, 6”
DXP / DXDE models	7”, 8”, 9”, 10”, 11”, 12”

Delrin End Cap Cylinder

PC - 09 6 - DXP W

Bore Size	
02	9/16”
04	3/4”
09	1-1/16”
17	1-1/2”
31	2”

Mounting	
D	Nose mount
DXP	Universal mount
DXDE	Double-ended rod

* Consult your local distributor for price and availability of non-standard strokes.

Options*	
99	HT-99 oil pre-lube
B	Bumpers
C	Air cushion, both ends
C1	Air cushion, front head only
C2	Air cushion, rear head only
K	Pivot 90° (DXP models only)
M	Magnetic piston
NT	No thread
Q	Side ported rear head
T	Switch track (T1, T2, T3, or T4) (see Switch Products for switch selection information)
V	Fluoroelastomer seals (for compatibility only)
W	Rod wiper (not available for 9/16” bore)
EEX.XX	Extra rod extension of X.XX

*When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.

Approximate Power Factors		
9/16"	=	0.25
3/4"	=	0.40
1-1/16"	=	0.90
1-1/2"	=	1.7
2"	=	3.10

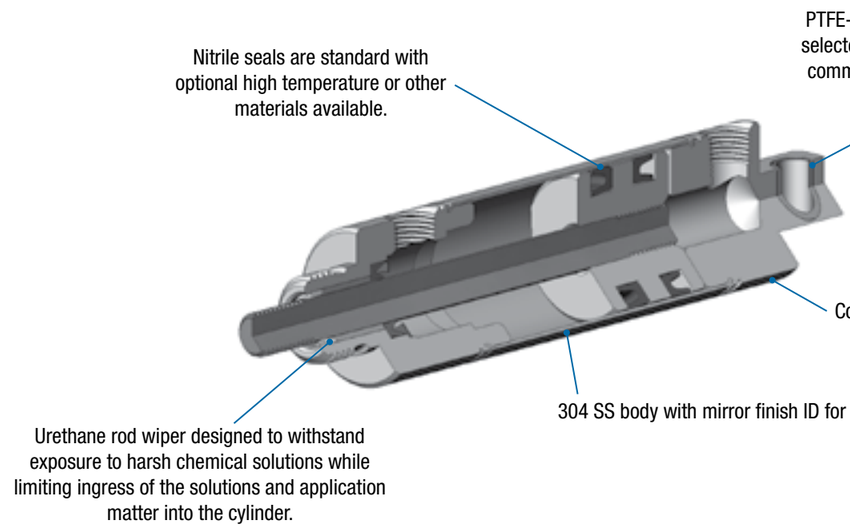
Bimba has made sizing a cylinder as easy as knowing the model number. Each base model number is developed by calculating the area of the cylinder bore. This area, or Power Factor, will provide the force the cylinder will exert when multiplied by the airline pressure.

FORCE = Airline Pressure x Piston Area

PISTON AREA = Bimba Power Factor

FORCE = Airline Pressure x Bimba Power Factor

Product Features



The "Blue and Improved" all stainless steel Original Line® cylinder utilizes permanent FDA approved grease lubrication. Design enhancements have more than doubled the anticipated service life of these cylinders, which are perfect solutions for applications in food processing, packaging, medical, pharmaceutical, or marine industries where wash down solutions and corrosives are present.

All Stainless Steel Non-Repairable Original Line Cylinders

- Bore sizes: 5/16", 7/16", 9/16", 3/4", 7/8", 1-1/16", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/2", 3"
- Corrosion resistant stainless steel end caps
- Urethane rod wiper limits ingress of application matter/chemical solutions into cylinder
- PTFE based rod and pivot bushings
- Blue and Improved design doubles previous cylinder life
- Permanent grease lubricant requires no additional lubrication during service

Technical Data

Operating Specifications

Pressure Rating
250 psi air maximum

Temperature Rating
-20º F to 200º F

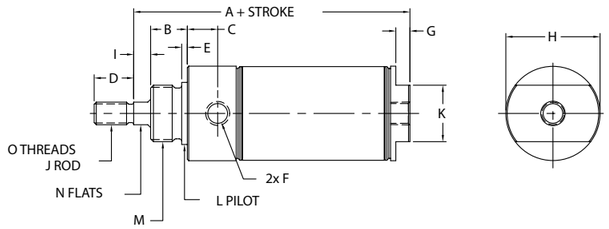
Note that if the magnetic piston is used, maximum temperature is derated to 185º F. Fluoroelastomer seals rated for higher temperatures (up to 400º F) are available. Fluoroelastomer seals (option “V”) should be ordered for chemical compatibility only. The temperature rating of the standard Urethane rod wiper is 200° F. If a cylinder temperature rating of higher than 200° F is required please contact your local distributor to request a quote for a custom design to meet your application requirements.

If cylinders are operated at temperatures below 0º F for extended time periods, our low temperature option (N) is recommended. This option has a temperature range of -40º F to 200º F. If cylinders are operated below -20º F with low temperature seals for extended time periods, cylinder performance will be affected by the cold temperature.

Lubrication
Food grade synthetic grease

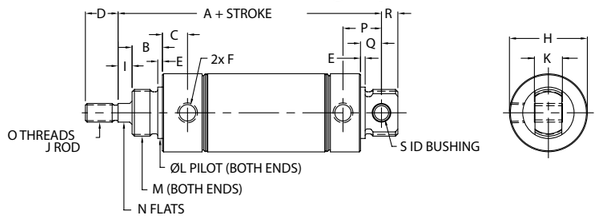
Dimensions (All Stainless Steel Non-Repairable Original Line Cylinders)

D Mounting Style



Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5/16" (007)	1.55	0.31	0.16	0.38	N/A	#10-32	N/A	0.61	N/A	0.125	N/A	N/A	3/8-24	N/A	#5-40
7/16" (01)	2.13	0.38	0.35	0.50	0.05	#10-32	0.19	0.74	N/A	0.188	0.38	0.433 / 0.437	7/16-20	N/A	#10.32
9/16" (02)	2.28	0.38	0.38	0.50	0.06	#10-32	0.19	0.62	N/A	0.188	0.50	0.434 / 0.437	7/16-20	N/A	#10-32
3/4" (04)	2.97	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.86	N/A	0.250	0.62	0.621 / 0.624	5/8-18	N/A	1/4-28
7/8" (06)	2.71	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.93	N/A	0.250	0.62	0.621 / 0.624	5/8-18	N/A	1/4-28
1-1/16" (09)	3.25	0.50	0.57	0.50	0.09	1/8 NPT	0.19	1.11	0.12	0.312	0.88	0.621 / 0.624	5/8-18	0.25	5/16-24
1-1/4" (12)	3.81	0.63	0.75	0.75	0.09	1/8 NPT	0.25	1.33	0.25	0.438	0.88	0.746 / 0.749	3/4-16	0.38	7/16-20
1-1/2" (17)	3.69	0.66	0.63	0.75	0.09	1/8 NPT	0.25	1.56	0.25	0.438	0.88	0.746 / 0.749	3/4-16	0.38	7/16-20
1-3/4" (24)	4.44	0.75	0.88	0.88	0.09	1/4 NPT	0.25	1.85	0.31	0.500	1.25	1.029 / 1.032	1-14	0.44	1/2-20
2" (31)	4.69	0.81	0.75	0.88	0.13	1/4 NPT	0.31	2.09	0.38	0.625	1.25	1.372 / 1.375	1-1/4-12	0.50	1/2-20
2-1/2" (50)	4.69	0.81	0.66	0.88	0.13	1/4 NPT	0.31	2.58	0.38	0.625	1.75	1.497 / 1.500	1-3/8-12	0.50	1/2-20
3" (70)	5.25	1.00	0.72	1.25	0.19	3/8 NPT	0.31	3.13	0.38	0.750	2.00	1.622 / 1.625	1-1/2-12	0.63	5/8-18

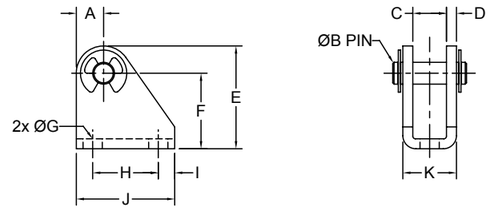
DXP Mounting Style



Bore	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	Q	R	S
5/16" (007)	1.94	0.31	0.16	0.38	N/A	#10-32	0.50 SQ	N/A	0.125	0.25	N/A	3/8-24	N/A	#5-40	0.34	0.19	0.16	0.13
7/16" (01)	2.56	0.38	0.35	0.50	0.05	#10-32	Ø.74	N/A	0.188	0.31	0.433 / 0.437	7/16-20	N/A	#10-32	0.44	0.25	0.25	0.16
9/16" (02)	2.56	0.38	0.38	0.50	0.06	#10-32	Ø.62	N/A	0.188	0.31	0.434 / 0.437	7/16-20	N/A	#10-32	0.38	0.25	0.19	0.16
3/4" (04)	3.75	0.50	0.47	0.50	0.09	1/8 NPT	Ø.86	N/A	0.250	0.38	0.621 / 0.624	5/8-18	N/A	1/4-28	0.63	0.34	0.28	0.25
7/8" (06)	3.34	0.50	0.47	0.50	0.09	1/8 NPT	Ø.93	N/A	0.250	0.38	0.621 / 0.624	5/8-18	N/A	1/4-28	0.63	0.34	0.28	0.25
1-1/16" (09)	3.84	0.50	0.57	0.50	0.09	1/8 NPT	Ø1.11	0.12	0.312	0.38	0.621 / 0.624	5/8-18	0.25	5/16-24	0.63	0.34	0.28	0.25
1-1/4" (12)	4.53	0.63	0.75	0.75	0.09	1/8 NPT	Ø1.33	0.25	0.438	0.50	0.746 / 0.749	3/4-16	0.38	7/16-20	0.78	0.40	0.41	0.25
1-1/2" (17)	4.38	0.66	0.63	0.75	0.09	1/8 NPT	Ø1.56	0.25	0.438	0.63	0.746 / 0.749	3/4-16	0.38	7/16-20	0.81	0.50	0.38	0.38
1-3/4" (24)	5.50	0.75	0.88	0.88	0.09	1/4 NPT	Ø1.85	0.31	0.500	0.63	1.029 / 1.032	1-14	0.44	1/2-20	1.13	0.50	0.50	0.38
2" (31)	5.63	0.81	0.75	0.88	0.13	1/4 NPT	Ø2.09	0.38	0.625	0.75	1.372 / 1.375	1-1/4-12	0.50	1/2-20	1.03	0.56	0.44	0.38
2-1/2" (50)	5.63	0.81	0.66	0.88	0.13	1/4 NPT	Ø2.58	0.38	0.625	0.75	1.497 / 1.500	1-3/8-12	0.50	1/2-20	1.03	0.56	0.44	0.38
3" (70)	6.50	1.00	0.72	1.25	0.19	3/8 NPT	Ø3.13	0.38	0.750	0.88	1.622 / 1.625	1-1/2-12	0.63	5/8-18	1.34	0.81	0.63	0.50

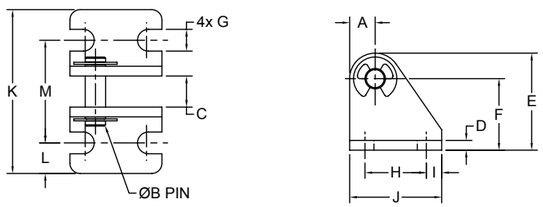
Dimensions (All Stainless Steel Non-Repairable Original Line Cylinders)

Stainless Steel One Piece Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
5/16" (007)	D-26689-SS	0.13	0.13	0.27	0.04	0.57	0.44	0.16	0.38	0.13	0.63	0.34
7/16" (01)	D-55202-SS	0.20	0.16	0.32	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
9/16" (02)	D-55202-SS	0.20	0.16	0.32	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
3/4" (04)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
7/8" (06)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
1-1/16" (09)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
1-1/4" (12)	D-111614-SS	0.31	0.25	0.52	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.74
1-1/2" (17)	D-55204-SS	0.38	0.37	0.64	0.14	1.77	1.39	0.28	1.00	0.25	1.50	0.92
1-3/4" (24)	D-55204-SS	0.38	0.37	0.64	0.14	1.77	1.39	0.28	1.00	0.25	1.50	0.92
2" (31)	D-55205-SS	0.38	0.37	0.76	0.25	1.77	1.38	0.28	1.00	0.25	1.50	1.26
2-1/2" (50)	D-55205-SS	0.38	0.37	0.76	0.25	1.75	1.38	0.28	1.00	0.25	1.50	1.26
3" (70)	D-111613-SS	0.50	0.50	0.89	0.25	2.25	1.75	0.42	1.38	0.38	2.13	1.39

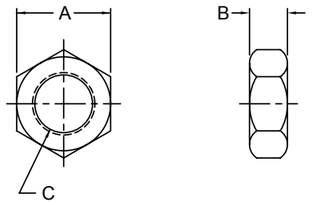
Stainless Steel Two Piece Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K	L	M
5/16" (007)	D-113373-SS	0.13	0.13	0.28	0.04	0.54	0.40	0.13	0.38	0.12	0.63	1.03	0.13	0.78
7/16" (01)	D-12321-SS	0.20	0.16	0.34	0.06	0.77	0.57	0.19	0.50	0.13	0.75	1.36	0.23	0.91
9/16" (02)	D-12321-SS	0.20	0.16	0.34	0.06	0.77	0.57	0.19	0.50	0.13	0.75	1.36	0.23	0.91
3/4" (04)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
7/8" (06)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
1-1/16" (09)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
1-1/4"(12)	D-1360-SS	0.31	0.25	0.50	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.13	0.38	1.39
1-1/2" (17)	D-229-SS	0.38	0.38	0.63	0.13	1.75	1.38	0.27	1.00	0.25	1.50	2.63	0.38	1.88
1-3/4" (24)	D-620-1-SS	0.38	0.38	0.63	0.25	1.75	1.38	0.27	1.00	0.25	1.50	2.87	0.43	2.00
2" (31)	D-620-SS	0.38	0.38	0.76	0.25	1.75	1.38	0.27	1.00	0.25	1.50	3.01	0.44	2.14
2-1/2" (50)	D-620-SS	0.38	0.38	0.76	0.25	1.75	1.38	0.27	1.00	0.25	1.50	3.01	0.44	2.14
3" (70)	D-13512-SS	0.50	0.50	0.88	0.25	2.25	1.75	0.27	1.25	0.25	1.75	3.88	0.63	2.63

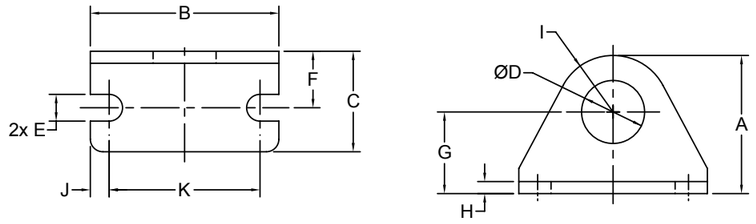
Dimensions (All Stainless Steel Non-Repairable Original Line Cylinders)

Stainless Steel Mounting Nut



Bore	Model	A	B	C
5/16" (007)	D-801-SS	0.56	0.22	3/8-24
7/16" (01)	D-154-SS	0.69	0.25	7/16-20
9/16"(02)	D-154-SS	0.69	0.25	7/16-20
3/4" (04)	D-9-SS	0.94	0.38	5/8-18
7/8" (06)	D-9-SS	0.94	0.38	5/8-18
1-1/16" (09)	D-9-SS	0.94	0.38	5/8-18
1-1/4" (12)	D-3556-SS	1.12	0.42	3/4-16
1-1/2" (17)	D-3556-SS	1.12	0.42	3/4-16
1-3/4" (24)	D-1331-SS	1.50	0.55	1-14
2" (31)	D-508-SS	1.88	0.50	1-1/4-12
2-1/2" (50)	D-2540-SS	1.85	0.50	1-3/8-12
3" (70)	D-5379-SS	2.25	0.50	1-1/2-12

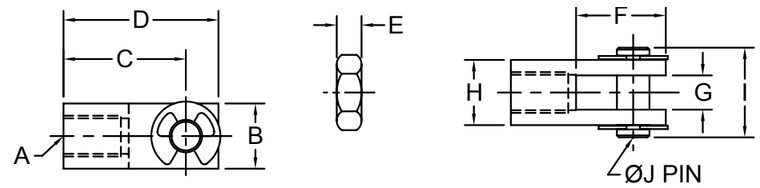
Stainless Steel Foot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
5/16" (007)	D-26765-SS	0.75	1.00	0.38	0.38	0.13	0.25	0.44	0.06	0.31	0.13	0.75
7/16" (01)	D-770-SS	0.83	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
9/16" (02)	D-770-SS	0.83	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
3/4" (04)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
7/8" (06)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/16" (09)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/4" (12)	D-241-SS	1.75	2.50	1.50	0.76	0.28	0.75	1.00	0.12	0.75	0.31	1.88
1-1/2" (17)	D-241-SS	1.75	2.50	1.50	0.76	0.28	0.75	1.00	0.12	0.75	0.31	1.88
1-3/4" (24)	D-1337-SS	2.12	3.00	1.50	1.04	0.34	0.88	1.25	0.18	0.91	0.38	2.25
2" (31)	D-615-SS	2.50	3.13	1.63	1.39	0.34	1.00	1.50	0.27	1.00	0.44	2.25
2-1/2" (50)	D-615-1-SS	3.00	3.75	1.63	1.50	0.34	1.00	1.75	0.26	1.25	0.44	2.88
3" (70)	D-19127-SS	3.14	4.38	1.63	1.63	0.34	1.00	1.89	0.25	1.25	0.44	3.50

Dimensions (All Stainless Steel Non-Repairable Original Line Cylinders)

Stainless Steel Rod End Clevis (includes nut)



Bore	Model	A	B	C	D	E	F	G	H	I	J
5/16" (007)	D-26690-SS	#5-40	0.31	0.44	0.56	0.11	0.37	0.14	0.31	0.50	0.13
7/16" (01)	D-850-SS	#10-32	0.38	0.75	0.94	0.12	0.56	0.20	0.38	0.55	0.19
9/16" (02)	D-850-SS	#10-32	0.38	0.75	0.94	0.12	0.56	0.20	0.38	0.55	0.19
3/4" (04)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.26	0.50	0.69	0.25
7/8" (06)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.26	0.50	0.69	0.25
1-1/16" (09)	D-54564-SS	5/16-24	0.50	0.94	1.19	0.19	0.69	0.26	0.50	0.69	0.25
1-1/4" (12)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.39	0.75	1.03	0.37
1-1/2" (17)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.39	0.75	1.03	0.37
1-3/4" (24)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
2" (31)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
2-1/2" (50)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
3" (70)	D-8314-SS	5/8-18	1.00	2.25	2.75	0.38	1.50	0.50	1.00	1.38	0.50

How to Order

The model number of all All Stainless Steel Non-Repairable Original Line pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic All Stainless Steel Non-Repairable Original Line unit with 303 Stainless Steel end cap, 1-1/16" bore, 2" stroke, and additional options is shown below.

Model	
SS	303 Stainless Steel end caps
SSM	Includes magnetic piston

Stroke Lengths

In inches and decimal fractions (ex. 1.75"). See individual models for maximum standard stroke. Stroke lengths are available up to 50".

SS - 09 2 - D W

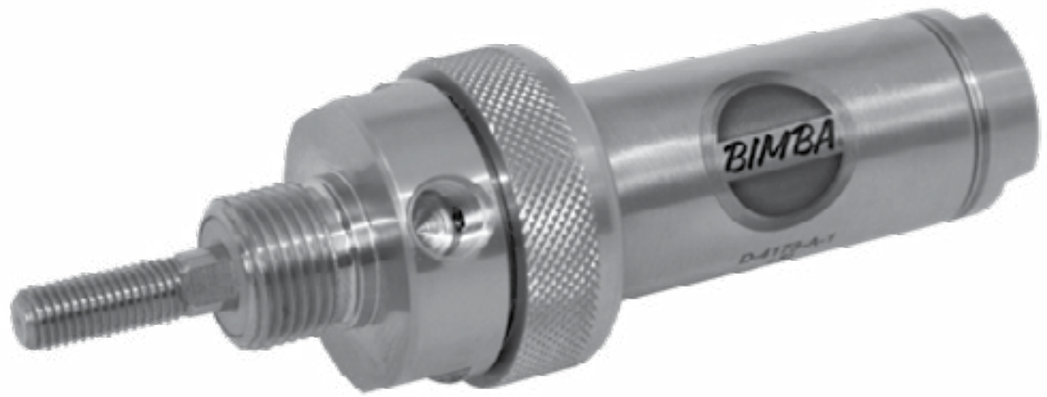
Bore Size	
007	5/16"
01	7/16"
02	9/16"
04	3/4"
06	7/8"
09	1-1/16"
12	1-1/4"
17	1-1/2"
24	1-3/4"
31	2"
50	2-1/2"
70	3"

Mounting Options	
D	Double acting, nose mount
DXP	Double acting, double end or rear pivot mount

Options* †	
99	HT-99 oil pre-lube[1]
F	Molycoated body
G	Magnalube® G lubrication
N	Low temperature seals and lubrication
NT	Non-threaded rod
V	Fluoroelastomer seals (for chemical compatibility)[2]
W	Rod wiper (standard)[3]
EEX.XX	Extra rod extension of X.XX

* Consult the option combination availability chart on page 54.
† When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.
[1] HT-99 pre-lube is NOT a food-grade lubricant.
[2] Specify for chemical compatibility only. For cylinders rated over 200° F, see the note under Operating Specifications.
[3] Rod wiper is standard; "W" option must be included in part number.

Product Features



The new "Blue and Improved" Original Line® All Stainless Steel Repairable cylinder is ideal for food processing, chemical, medical, pharmaceutical, offshore or marine equipment, energy production, or waste management applications. A bell ring design offers the benefit of full repairability without using hand tools by securing the body to the rod guide with a knurled, threaded nut.

All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinders

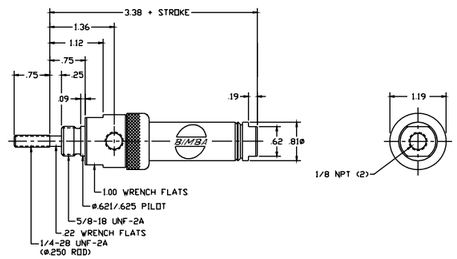
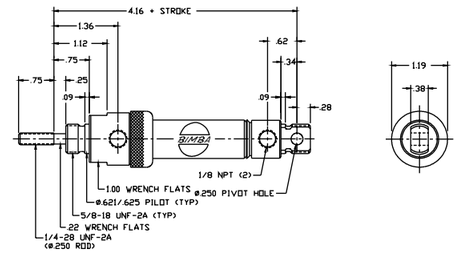
- Bore sizes: 3/4", 1-1/16"
- Maximum pressure rating: 250 psi
- Maximum stroke: 12"
- Composite FDA approved rod bearing and FDA approved lubricant
- 304 stainless steel body
- 303 stainless steel end caps, piston rod, and bell ring nut
- Low friction Buna N "U" cup seals and rod wiper

How to Specify

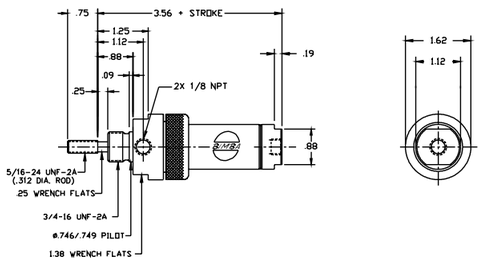
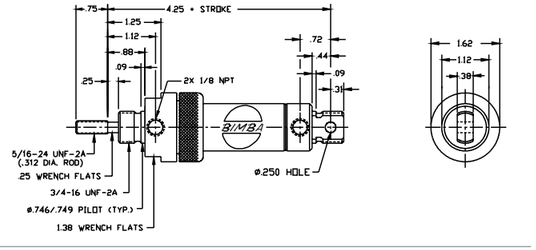
All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinders

☐ Enter Stroke Length as 3rd Digit

3/4" Bore

Model	Description/Weight (lbs)	Dimensions
D-4161-A-☐	Double-Acting - Air Return - Front Nose Mounting Optional Stainless Steel Accessories: D-129-SS Foot Bracket D-9-SS Mounting Nut D-54565-SS Rod Clevis	
D-4231-A-☐	Double-Acting - Universal Mounting - Pivot, or Double End Mounting - Air Return Optional Stainless Steel Accessories: D-129-SS Foot Bracket D-55203-SS Pivot Bracket D-9-SS Mounting Nut D-54565-SS Rod Clevis	

1-1/16" Bore

Model	Description/Weight (lbs)	Dimensions
D-4173-A-☐	Double-Acting - Air Return - Front Nose Mounting Optional Stainless Steel Accessories: D-241-SS Foot Bracket D-3556-SS Mounting Nut D-54564-SS Rod Clevis	
D-4232-A-☐	Double-Acting - Universal Mounting - Pivot, or Double End Mounting - Air Return Optional Stainless Steel Accessories: D-241-SS Foot Bracket D-55203-SS Pivot Bracket D-3556-SS Mounting Nut D-54564-SS Rod Clevis	

Engineering Specifications

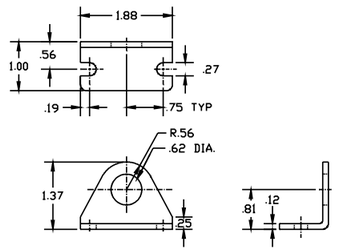
> 304 Stainless steel body
> Low friction Buna N “U” Cup seals and rod wiper
> 303 Stainless steel endcaps, piston rod, and bell ring nut
> Pressure Rating: 250 psi (air)
> Composite FDA approved rod bearing and FDA approved lubricant

How to Accessorize

All Stainless Steel Repairable (Bell Ring Style) Accessories

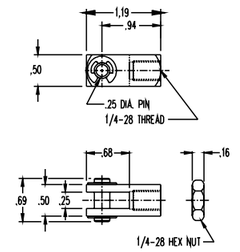
3/4" Bore

D-129-SS



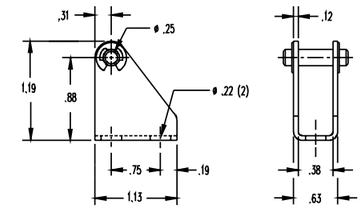
Foot Bracket

D-54565-SS



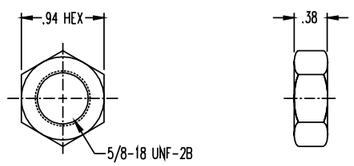
Rod Clevis

D-55203-SS



Pivot Bracket

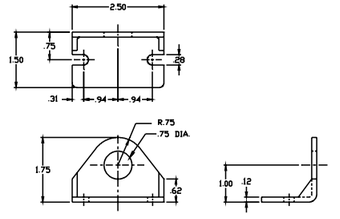
D-9-SS



Mounting Nut

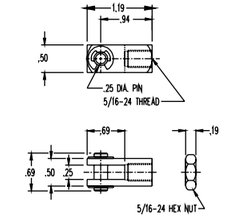
1-1/16" Bore

D-241-SS



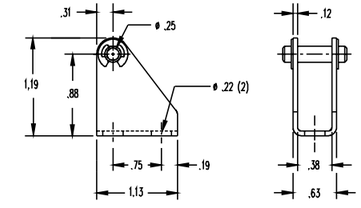
Foot Bracket

D-54564-SS



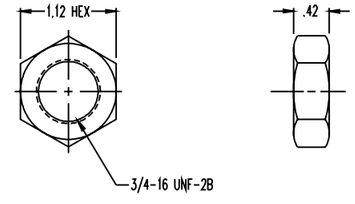
Rod Clevis

D-55203-SS



Pivot Bracket

D-3556-SS



Mounting Nut

How to Order

The model number of all All Stainless Steel Repairable (Bell Ring) Original Line pneumatic actuators consists of an alphanumeric cluster designating bore size, mounting style, and stroke length that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic All Stainless Steel Repairable (Bell Ring) Original Line unit with 3/4" bore, 5" stroke, and universal double end or pivot mounts is shown below.

Stroke Lengths

In inches and decimal fractions (ex. 1.75"). See individual models for maximum standard stroke. Stroke lengths are available up to 24".

D-4231-A - 5

Mounting Options		Bore Size
D-4161-A	Front nose	3/4" (04)
D-4231-A	Universal double end or pivot	3/4" (04)
D-4173-A	Front nose	1-1/16" (09)
D-4232-A	Universal double end or pivot	1-1/16" (09)

How to Repair

Bimba All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinders are repairable. A list of the individual components is given below that together make up the All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinder.

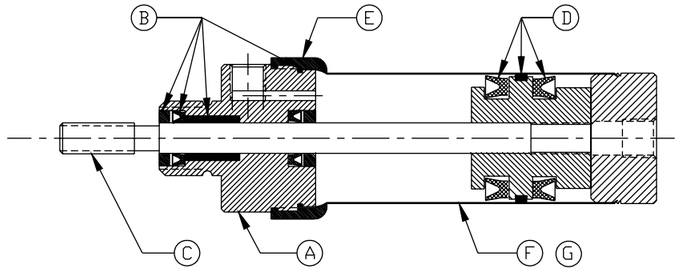
Please use the original purchase order number (if available) for all inquiries. Describe the part required along with part number below. Contact Bimba Customer Service at 800-442-4622 (800-44-BIMBA) or e-mail cs@bimba.com.

Repair Parts (3/4" bore)

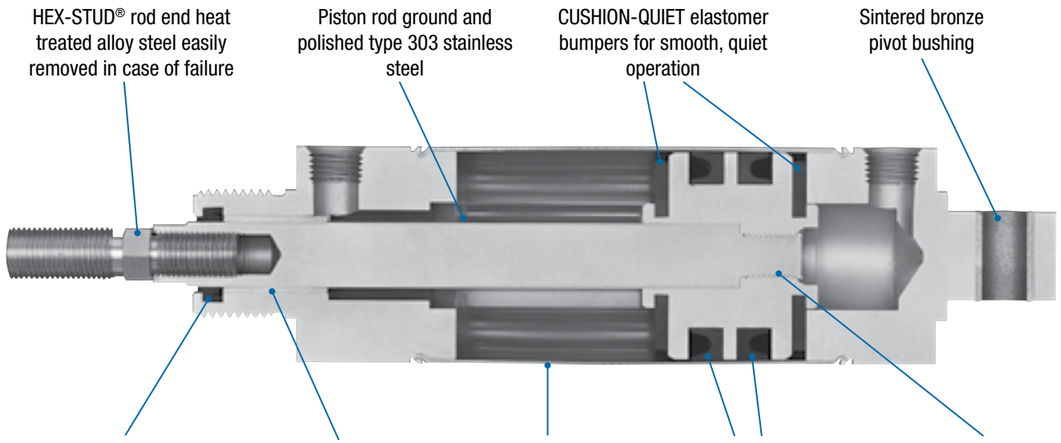
Item	Part No.	Part Description
A	D-4485-A	Rod guide assembly (includes rod guide and D-4530 kit)
B	D-4530-A	Rod seal kit (includes seals, bushing, seal retainer, and body seal)
C	D-4486-A-☐	Piston rod assembly (includes rod, piston and D-4531 kit)
D	D-4531	Piston seal kit (includes piston seals and piston guide ring)
E	D-3961-SS	Bell ring
F	D-4487-A-☐	Rear head and body assembly (nose mount)
G	D-4488-A-☐	Rear head and body assembly (universal mount)

Repair Parts (1-1/16" bore)

Item	Part No.	Part Description
A	D-4489-A	Rod guide assembly (includes rod guide and D-4533 kit)
B	D-4533-A	Rod seal kit (includes seals, bushing, seal retainer and body seal)
C	D-4490-A-	Piston rod assembly (includes rod, piston and D-4534 kit)
D	D-4534-A	Piston seal kit (includes piston seals and piston guide ring)
E	D-1778-SS	Bell ring
F	D-4491-A-	Rear head and body assembly (nose mount)
G	D-4492-A-	Rear head and body assembly (universal mount)



Product Features



Z Line Air Cylinders

- Larger diameter, two-piece 303 stainless steel piston rod
- HEX-STUD rod end thread of heat treated alloy steel – easily removed in case of failure due to overload
- CUSHION QUIET elastomer bumpers

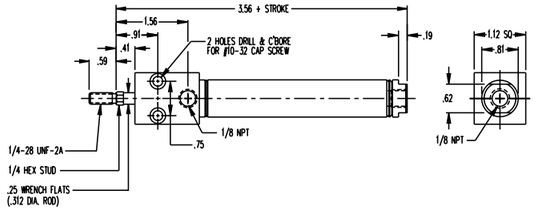
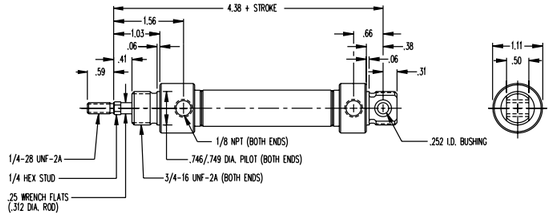
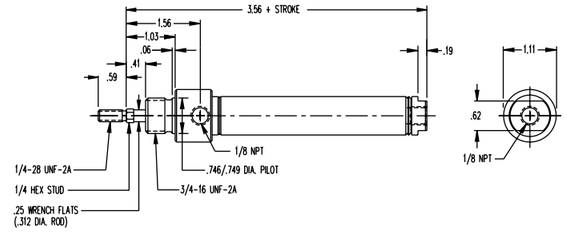
Options (for all Z Line models):

- **Magnalube® G (G)**
- **Extra Extension (EE), per inch of extension:**
- **Molycoated Body (F)**
- **Magnet (Prefix M)**
  - Must specify track(s) for use with miniature position sensing (T2, T3, T4). See page 57 for track location details. See Switch Products for switch selection information.

3/4" Bore Z Line Air Cylinders

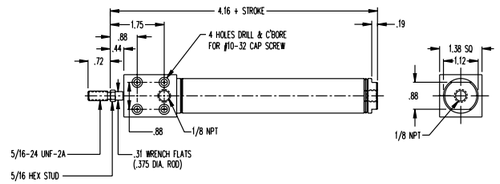
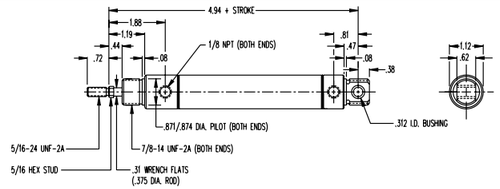
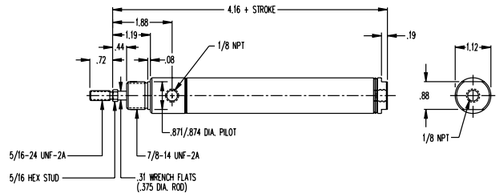
☐ Enter Stroke Length as 3rd Digit

Push Force = .441 x psi · Pull Force = .365 x psi

Model	Description/Weight (lbs)	Dimensions
04 ☐ -DBZ 	Block Mount – Double Acting – Two bolt holes are provided for positive mounting to a base. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .30 Adder Per Inch of Stroke: .04	
04 ☐ -DUZ 	Universal Mount – Double Acting – For double end mounting use D-8315 mounting bracket. For rear pivot mounting use D-8321-A pivot bracket. Use D-10139-A rod clevis. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Base Weight: .30 Adder Per Inch of Stroke: .04	
04 ☐ -DZ 	Nose Mount – Double Acting – Use D-8315 mounting bracket. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .27 Adder Per Inch of Stroke: .04	

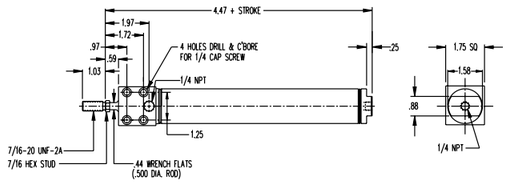
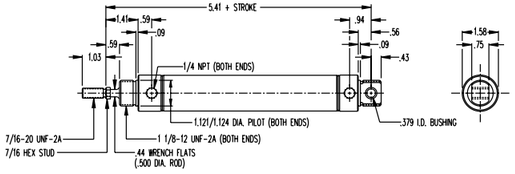
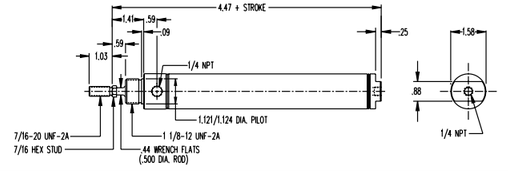
1-1/16" Bore Z Line Air Cylinders

Push Force = .886 x psi · Pull Force = .776 x psi

Model	Description/Weight (lbs)	Dimensions
09 ☐ -DBZ 	Block Mount – Double Acting – Four bolt holes are provided for positive mounting to a base. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .55 Adder Per Inch of Stroke: .06	
09 ☐ -DUZ 	Universal Mount – Double Acting – For double end mounting use D-8316 mounting bracket. For rear pivot mounting use D-8322-A pivot bracket. Use D-8309-A rod clevis. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Base Weight: .45 Adder Per Inch of Stroke: .06	
09 ☐ -DZ 	Nose Mount – Double Acting – Use D-8316 mounting bracket. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .38 Adder Per Inch of Stroke: .06	

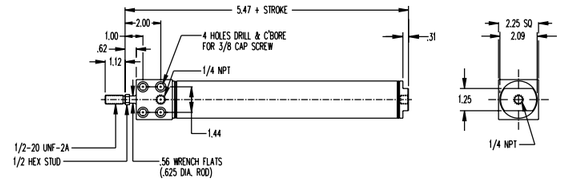
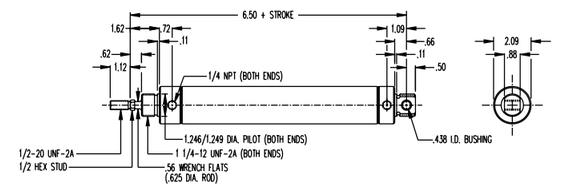
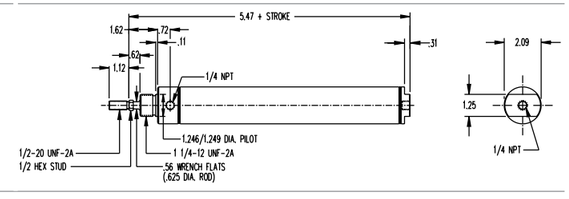
1-1/2" Bore Z Line Air Cylinders

Push Force = 1.77 x psi · Pull Force = 1.57 x psi

Model	Description/Weight (lbs)	Dimensions
17 ☐ -DBZ 	Block Mount – Double Acting – Four bolt holes are provided for positive mounting to a base. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: 1.00 Adder Per Inch of Stroke: .10	
17 ☐ -DUZ 	Universal Mount – Double Acting – For double end mounting, use D-8318 mounting bracket. For rear pivot mounting use D-8324-A pivot bracket. Use D-8311-A rod clevis. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Base Weight: .92 Adder Per Inch of Stroke: .10	
17 ☐ -DZ 	Nose Mount – Double Acting – Use D-8318 mounting bracket. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: .78 Adder Per Inch of Stroke: .10	

2" Bore Z Line Air Cylinders

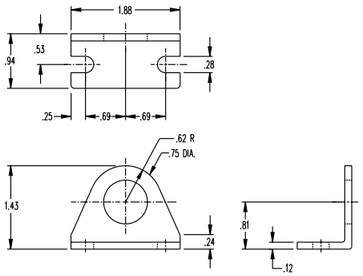
Push Force = 3.14 x psi · Pull Force = 2.83 x psi

Model	Description/Weight (lbs)	Dimensions
31 ☐ -DBZ 	Block Mount – Double Acting – Four bolt holes are provided for positive mounting to a base. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: 2.03 Adder Per Inch of Stroke: .15	
31 ☐ -DUZ 	Universal Mount – Double Acting – For double end mounting use D-8319 mounting bracket. For rear pivot mounting use D-8325-A pivot bracket. Use D-8313-A rod clevis. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12" Maximum Stroke – 32" Base Weight: 2.15 Adder Per Inch of Stroke: .15	
31 ☐ -DZ 	Nose Mount – Double Acting – Use D-8319 mounting bracket. Standard Stroke Lengths: 1", 2", 3", 4", 5", 6" Maximum Stroke – 12" Base Weight: 1.91 Adder Per Inch of Stroke: .15	

Z Line Accessories

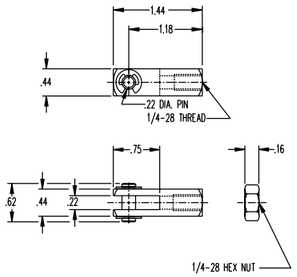
3/4" Bore Accessories

D-8315



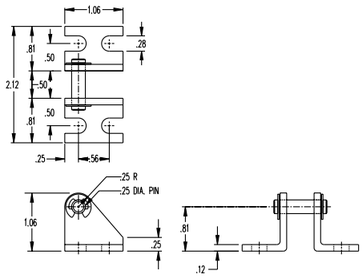
Mounting Bracket

D-10139-A



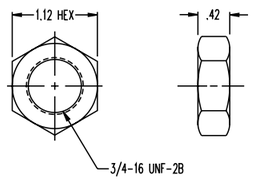
Rod Clevis

D-8321-A



Pivot Bracket

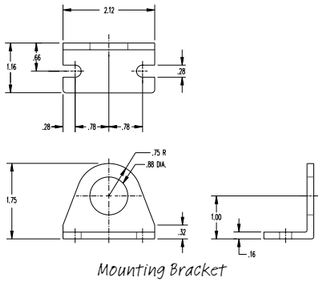
D-3556



Mounting Nut

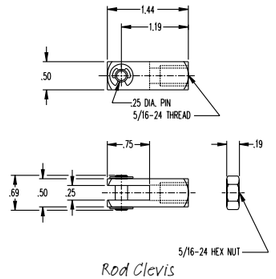
1-1/16" Bore Accessories

D-8316



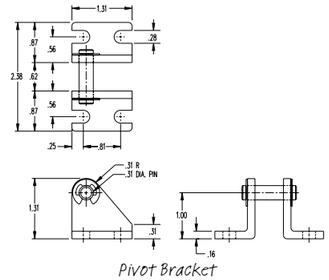
Mounting Bracket

D-8309-A



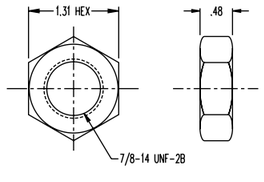
Rod Clevis

D-8322-A



Pivot Bracket

D-2545

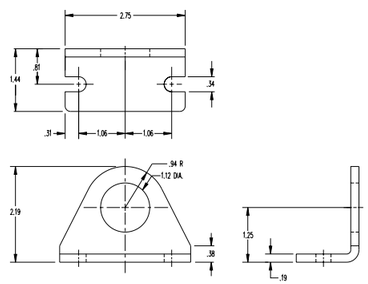


Mounting Nut

Z Line Accessories

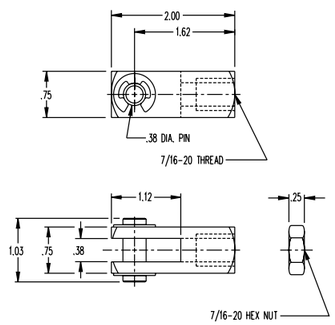
1-1/2" Bore Accessories

D-8318



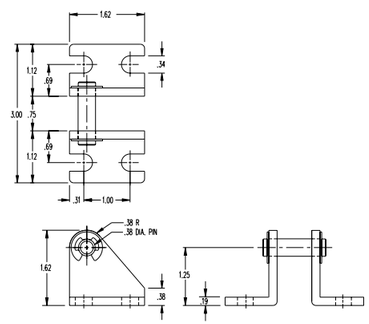
Mounting Bracket

D-8311-A



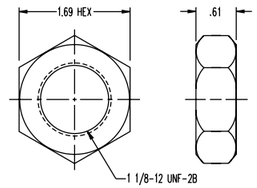
Rod Clevis

D-8324-A



Pivot Bracket

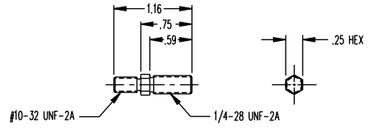
D-8484



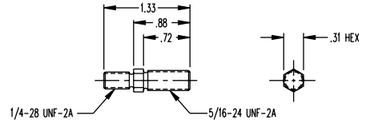
Mounting Nut

Hex-Stud

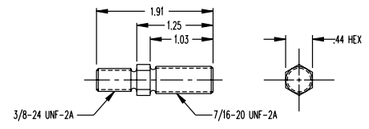
3/4" Bore
D-9868



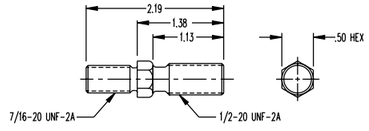
1-1/16" Bore
D-6583



1-1/2" Bore
D-6636



2" Bore
D-6637

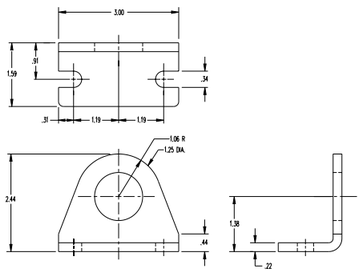


How to Accessorize

Z Line Accessories

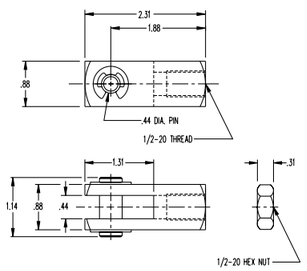
2" Bore Accessories

D-8319



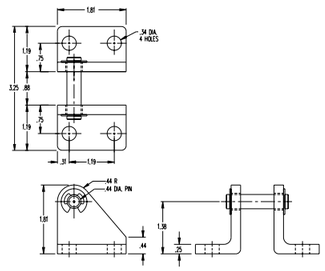
Mounting Bracket

D-8313-A



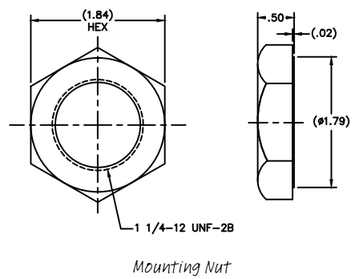
Rod Clevis

D-8325-A



Pivot Bracket

D-508



Mounting Nut

How to Order

The model number of all Z-Line Non-Repairable Original Line pneumatic actuators consists of an alphanumeric cluster designating bore size, stroke length, mounting options, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Z-Line Non-Repairable Original Line unit with 3/4" bore, 1" stroke, front block mounting, and additional options is shown below.

Stroke Lengths

In inches and decimal fractions (ex. 1.75"). See individual models for maximum standard stroke. Stroke lengths are available up to 50".

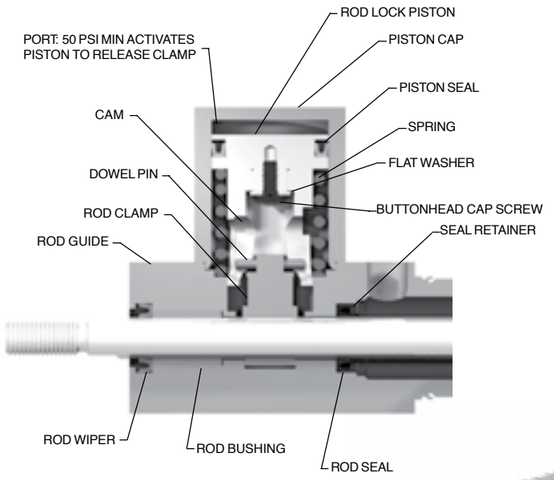
04 1 - DBZ NT

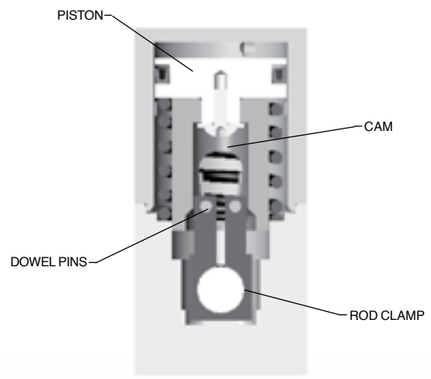
Bore Size	
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"

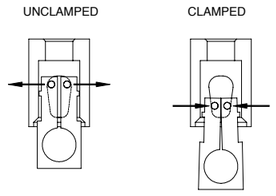
Mounting Options	
DZ	Front nose
DUZ	Universal double end or rear pivot
DBZ	Front block

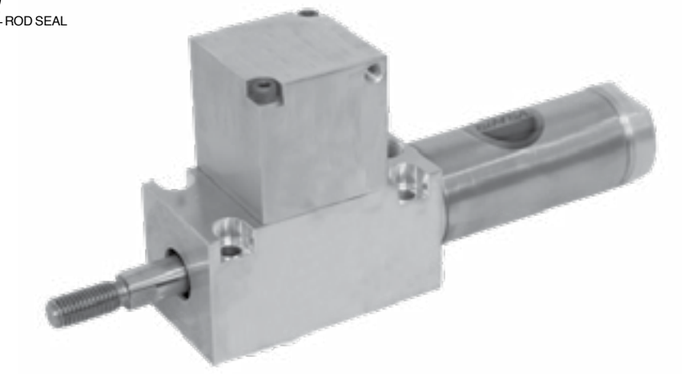
Options* †	
99	HT-99 oil pre-lube[1]
B	Bumpers
NT	Non-threaded rod
Q	Side port
EEX.XX	Extra rod extension of X.XX

* Consult the option combination availability chart on page 54.
† When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.
[1] HT-99 pre-lube is NOT a food-grade lubricant.







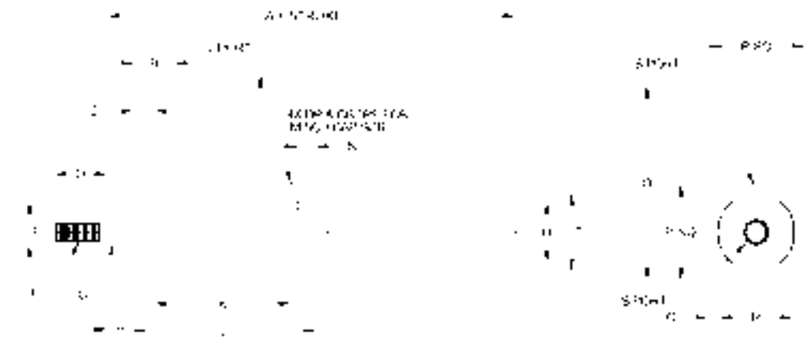


Original Line Rod Lock Cylinders

> Dowel pins ride in the cam groove.
> When air pressure is present, piston actuates and dowel pins follow cam to open position, allowing piston rod to travel freely through clamp.
> In absence of pressure, the spring actuates piston and dowels follow to closed position, activating the rod clamp.

Dimensions (Original Line Rod Lock Cylinders) (in)

D Mounting Style



Bore	A	B	C	D	E	F	G	H	J	K	L
3/4" (04)	4.48	0.72	0.37	0.75	0.31	1/4-28 UNF-2A	0.25	0.25	2.48	1.83	#10-32 UNF-2B
1-1/16" (09)	4.84	0.61	0.31	0.75	0.38	5/16-24 UNF-2A	0.31	0.38	2.6	1.95	#10-32 UNF-2B
1-1/2" (17)	5.75	0.82	0.32	1.25	0.5	7/16-20 UNF-2A	0.43	0.38	3.37	2.75	1/8 NPT
2" (31)	6.84	0.88	0.44	1.25	0.62	1/2-20 UNF-2A	0.56	0.38	3.97	3.13	1/8 NPT
2-1/2" (50)	7.48	0.87	0.43	1.25	0.75	1/2-20 UNF-2A	0.62	0.38	4.61	3.62	1/4 NPT
3" (70)	8.22	0.92	0.46	1.25	0.75	5/8-18 UNF-2A	0.62	0.38	5.15	4.17	1/4 NPT

Bore	M	N	O	P	Q	R	S	T	U
3/4" (04)	#10	0.25	2.32	1.12	0.16	0.81	1/8 NPT	0.80	0.62
1-1/16" (09)	#10	0.25	2.78	1.38	0.16	1.06	1/8 NPT	1.12	0.87
1-1/2" (17)	1/4	0.32	3.38	1.75	0.25	1.25	1/4 NPT	1.56	0.88
2" (31)	3/8	0.39	4.45	2.25	0.31	1.62	1/4 NPT	2.08	1.24
2-1/2" (50)	7/16	0.42	5.67	2.75	0.44	1.88	1/4 NPT	2.58	1.74
3" (70)	1/2	0.42	6.28	3.25	0.5	2.25	3/8 NPT	3.13	1.99

Options

Dimensional Deviations from Standard

Option	Dimensional Deviation
Q - Side Port Rear Head	Use DXP model, omit rear pivot tang
B - Bumpers Add to Overall Length by Bore Size:	04 - no adder 09 - .13" 17 - .13" 31 - .25" 50 - .25" 70 - .25"

Weights (lbs)

Bore	Base Weight	Adder per inch of Stroke
3/4" (04)	0.46	0.03
1-1/16" (09)	1.03	0.05
1-1/2" (17)	1.97	0.08
2" (31)	4.08	0.15
2-1/2" (50)	7.13	0.17
3" (70)	10.55	0.26

How to Specify

Dimensions (Original Line Rod Lock Cylinders) (in)

DXP Mounting Style



Bore	A	U	V	W	X	Y	Z	AA	BB
3/4" (04)	5.26	0.28	0.62	0.35	0.09	0.62	5/8-18 UNF-2A	0.25	0.37
1-1/16" (09)	5.44	0.28	0.62	0.34	0.09	0.62	5/8-18 UNF-2A	0.25	0.37
1-1/2" (17)	6.68	0.47	0.97	0.56	0.09	1.00	1-14 UNF-2A	0.38	0.68
2" (31)	7.78	0.44	1.03	0.56	0.13	1.37	1-1/4-12 UNF-2A	0.38	0.72
2-1/2" (50)	8.42	0.44	1.03	0.56	0.12	1.50	1-3/8-12 UNF-2A	0.38	0.72
3" (70)	9.47	0.63	1.34	0.81	0.19	1.62	1-1/2-12 UNF-2A	0.50	0.85

Engineering Specifications (Original Line Rod Lock Cylinders)

Operating Medium:	Air
Operating Pressure:	50 psi minimum (to actuate lock piston)
	125 psi maximum
Temperature Range:	-20° F to 200° F
Lubrication:	Semi-synthetic grease
Cylinder Body:	304 stainless steel
Rod Guide, Rear Head:	Aluminum
Cap:	Anodized aluminum
Piston & Rod Seal:	Buna-N
Rod & Pivot Bushing:	Sintered bronze
Piston Rod:	Hard chrome plated stainless steel
Expected Service Life:	3,000 miles
	1 million lock actuations

Rod Lock Holding Forces

Bore	Holding Force (lbs)
3/4" (04)	40
1-1/16" (09)	90
1-1/2" (17)	170
2" (31)	310
2-1/2" (50)	500
3" (70)	700

Operating Guidelines/Product Precautions

> The Rod Lock is not a safety device.
> Do not use for intermediate stopping; the cylinder is designed to prevent drift from a stationary position.
> Load weight must not exceed the stated holding force for the cylinder.

How to Order

The model number of all Original Line Rod Lock pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Rod Lock unit with 1-1/16" bore, 3" stroke, and additional options is shown below.

Model	
BFLM	Original Line Rod Lock (block front and magnet standard)

Standard stroke lengths

Refer by bore size to Original Line double-acting standard stroke lengths.

BFLM - 09 3 - D W

Bore Size	
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Mounting	
D	Axial rear port
DXP	Universal mount (includes pivot bushing)

Options*	
99	HT-99 oil pre-lube
B	Double-acting bumpers
N	Low temperature option (-40° F to 200° F)
Q	Side ported rear head
T	Add track for MS Series switch
V	High temperature option (0° F to 400° F)
W	Rod wiper (standard)
EE	Extra rod extension

* When configuring options, arrange options in alphabetical order except for EE; place option EE at the end of the configured part number.

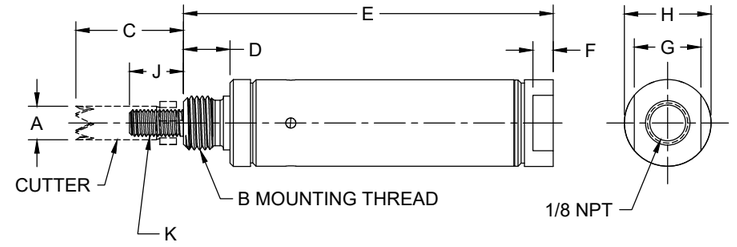


Our rugged hole punch cylinder has been redesigned with a removable cutter to allow customers to replace the cutter as needed without having to replace the entire cylinder. The razor sharp cutting teeth are designed to punch millions of holes in thin plastic film.

Original Line Hole Punch Cylinders

> High strength carbon steel rod is hollow with an ID of .07" to provide an air jet to eject cutter slugs from the cutting head.
> An oil soaked felt washer beside the rod seal provides a continuous source of lubrication to the rod on every stroke.
> Eight (8) models with seven (7) different cutter diameters for a wide range of applications.
> Available with no cutter for customers that choose to mount their own.
> Single acting, spring return 3/4" bore, 1" stroke cylinder is pre-lubricated for maximum life.
> Nickel plated steel rod guide offers improved fatigue resistance over competitors aluminum end caps which is critical in high speed/high cycle applications.
> Bumpers are present for both extend and retract strokes to minimize sound levels.
> Special cutter shapes and different stroke lengths are available on request.

Dimensions (Repairable Hole Punch Cylinders) (in)



Model No.	Hole Size	A	B	C	D	E	F	G	H	J	K
D-11840-A Base Weight: .18	1/4"	.250"	1/2-20	.50	.44	3.44	.19	.62	.81	.25	#10-322
D-9846-A1 Base Weight: .19	N/A	N/A	1/2-20	.50	.44	3.44	.19	.62	.81	.50	1/4-28
D-11811-A Base Weight: .20	5/16"	.312"	1/2-20	1.00	.44	3.44	.19	.62	.81	.50	1/4-282
D-11618-A Base Weight: .21	3/8"	.375"	1/2-20	1.00	.44	3.44	.19	.62	.81	.50	1/4-282
D-11998-A Base Weight: .23	7/16"	.438"	5/8-18	1.00	.50	3.50	.19	.62	.81	.50	3/8-403
D-11999-A Base Weight: .24	1/2"	.500"	5/8-18	1.00	.50	3.50	.19	.62	.81	.50	3/8-403
D-12107-A Base Weight: .29	9/16"	.562"	3/4-16	1.00	.63	3.63	.19	.62	.99	.50	3/8-403
D-12108-A Base Weight: .29	5/8"	.625"	3/4-16	1.00	.63	3.63	.19	.62	.99	.50	3/8-403

1 The Pneumatic Hole Puncher Cylinder may be ordered without the cutter under model number D-9846-A. This cylinder has the same features and dimensions as the Hole Puncher except 1/4-28 UNF-2A by 0.50 long rod threads are provided so you may attach your own cutter.
2 Cutter to rod mating threads
3 Cutter to rod end adapter mating threads

Engineering Specifications (Repairable Hole Punch Cylinders)

Maximum Pressure:	250 psi (air)
Temperature Range:	-20° F to 200° F
Body:	304 Stainless Steel
Rod:	Ground and Polished Carbon Steel
Front End Cap:	Nickel Plated Steel
Rear End Cap:	Aluminum
Lubrication:	Permanent Grease Lubrication for Piston Seals
	Oil Soaked Felt Washer for Rod Seal

How to Repair

Bimba Repairable Hole Punch Cylinders are repairable. A list of the individual components is given below that together make up the Repairable Hole Punch Cylinder. Each box of five (5) cutters includes five (5) O-rings and repair instructions.

Please use the original purchase order number (if available) for all inquiries. Describe the part required along with part number below. Contact Bimba Customer Service at 800-442-4622 (800-44-BIMBA) or e-mail cs@bimba.com.

Repair Parts

Part No.	Part Description
Repunch - 1/4	1/4" Replacement Cutter Kit
Repunch - 5/16	5/16" Replacement Cutter Kit
Repunch - 3/8	3/8" Replacement Cutter Kit
Repunch - 7/16	7/16" Replacement Cutter Kit
Repunch - 1/2	1/2" Replacement Cutter Kit
Repunch - 9/16	9/16" Replacement Cutter Kit
Repunch - 5/8	5/8" Replacement Cutter Kit

Notes

Notes

Compact Cylinders

If your application is tight on space, a Bimba compact cylinders is the answer. With a wide variety of model options, including the recently “Blue and Improved” Flat-1®, Bimba has a flat acutator that's right for you. Our array of stroke lengths, bore sizes, mounting styles, and other options, as well as your ability to engineer custom solutions, means a compact answer is never far away.



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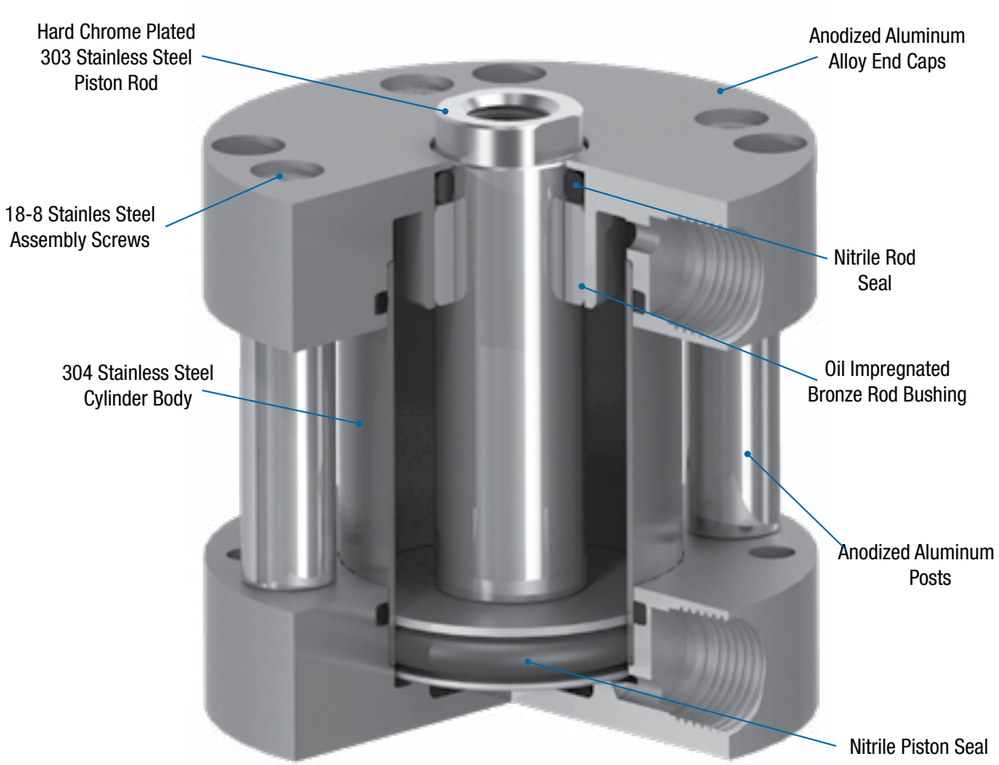
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Flat-1® Compact Cylinders

- Compact design provides machine designers the ability to use Flat-1® cylinders in tight spaces
- Hard chrome plated piston rod is corrosion resistant and provides a hard, smooth sealing surface extending the life of the cylinder's rod seals
- Body materials are available in standard Stainless Steel and optional Aluminum or Plastic providing design engineers with increased flexibility.
- Single acting spring return cylinders include rod seals to provide for standard fail safe operation
- New switch track options accept either Reed or Hall Effect switches allowing for either AC or DC switch circuitry.
- 3,000 mile life ratings when low frictions seals are specified provides customers the confidence associated with a low maintenance design.
- Mechanically retained bumpers reduce the sound typically associated with high cycle pneumatic cylinder applications.
- New "F Series" mounting options provide drop in interchanges for a competitive manufacturer.
- The addition of NPT rod threads on double rod end models makes it easier for designers to connect air and fluid fittings to the rod ends.
- Optional rod bearing materials are available for applications requiring smoother cylinder rod travel than is provided by the standard oil impregnated bronze rod bushings.

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	

Superior Product Breadth in a Compact Design

The compact Flat-1® offers mounting styles to fit most every application!



Pivot Mount



Front Trunnion Mount



Threaded Mounting Holes Both Ends



Clearance Holes Front



Nose Mount



F Series Counterbored Each End



F Series Threaded Both Ends



Basic Mount

Materials of Construction

End Caps: Anodized Aluminum Alloy

Cylinder Body: 304 Stainless Steel

Piston Rod: 303 Hard Chrome Plated Stainless Steel

Lubrication: Semi-Synthetic Grease

Seals: Buna-N Standard; High and Low Temperature (optional)

Engineering Specifications

Temperature*: -20° F to 200° F Standard
-40° F to 200° F (Low Temperature)
0° F to 400° F (High Temperature)

Pressure Rating: 200 PSI

* Cylinders operated for extended time at temperatures below 0° F or above 300° F may require special modifications.

Flat-1® Specifications

Maximum Stroke + Extra Extension Lengths

Model	Bore Sizes	Maximum Stroke	Maximum = Stroke + Ee
F0 & FOD	All bore sizes	16"	18"
FOS		4"	
FOR	9/16" (02) through 2-1/2" (50)		
FOR	3" (70) and 4" (125)	3"	

Please note the following:
It is recommended to support and guide the rod throughout the entire stroke.
All maximum lengths are based on tension (puling) loads. Compressive forces must be evaluated for column buckling.

Cylinder Weights

Approximate Cylinder Weights (oz.)

Bore	FO/FOS		FOD			FOR		Nose Mount Option
	Base (0" Stroke)	Adder Per 1/8" Of Stroke	Base	Adder Per 1/8" Of Stroke	Adder Per 1/8" Of Stroke For -H Option	Base	Adder Per 1/8" Of Stroke	Adder To Base Weight
9/16" (02)	1.2	0.08	1.3	0.15	0.1	1.3	0.08	0.1
3/4" (04)	1.9	0.1	2.1	0.2	0.15	2.0	0.1	0.2
1-1/16" (09)	0.28	0.01	4.72	0.34	0.29	5.40	0.11	4.33
1-1/2" (17)	0.43	0.02	8.30	0.58	0.51	8.65	0.23	6.65
2" (31)	0.68	0.03	9.44	0.81	0.68	13.10	0.29	6.94
2-1/2" (50)	1.25	0.04	21.31	0.84	0.71	24.15	0.33	7.54
3" (70)	1.64	0.05	27.64	1.10	0.93	31.14	0.41	7.98
4" (125)	55.7	1.0	71.8	1.3	1.1	61.8	1.0	5.9

Length Adders for Low Friction Seals (L) and Magnetic Piston (M)

Bore	Length Adder			
	Low Friction Seals (L)	Magnetic Position Sensing* (M)		
		FO/FOD	FOS	FOR
9/16" (02)	0.25	0.88	0.63	0.38
3/4" (04)	0.25	0.88	0.88	0.88
1-1/16" (09)	0.38	0.88	0.88	0.88
1-1/2" (17)	0.38	0.88	0.88	0.88
2" (31)	0.38	0.88	0.88	0.88
2-1/2" (50)	0.38	0.88	0.88	0.88
3" (70)	0.50	0.88	0.88	0.88
4" (125)	0.50	0.88	0.88	0.88

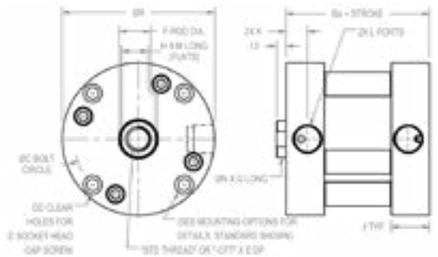
* If L and M are both selected, use the M length adder.

Enclosed Spring Forces

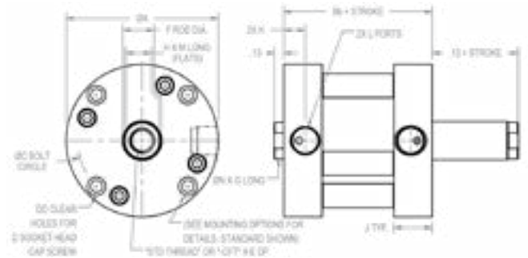
Bore	Maximum Force (Lb)	Spring Rates (Lb/In)			
		0.12 To 1" Stroke (Lb/In)	1.001 To 2" Stroke (Lb/In)	2.001 To 3" Stroke (Lb/In)	3.001 To 4" Stroke (Lb/In)
9/16" (02)	5.90	4.00	1.75	1.24	0.88
3/4" (04)	10.40	6.00	2.70	1.86	1.35
1-1/16" (09)	10.80	6.50	2.70	1.91	1.35
1-1/2" (17)	12.90	6.00	2.30	1.66	1.15
2" (31)	17.50	11.00	2.60	2.10	1.30
2-1/2" (50)	26.00	9.50	5.00	3.28	2.50
3" (70)	35.00	16.00	5.00	3.81	2.50
4" (125)	50.00	22.00	5.50	4.40	2.75

Flat-1® Basic Model Dimensions (in)

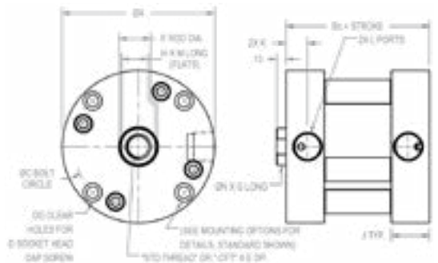
Model FO
(Double Acting Single End Rod)



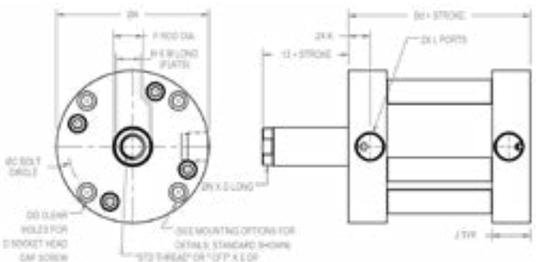
Model FOD
(Double Acting Double End Rod)



Model FOS
(Single Acting Rod Normally Retracted)



Model FOR
(Reverse Single Acting Rod Normally Extended)



Bore	A	Ba	Bb	Bc				Bd				C	D	DD	E*
				0-1"	1.001"-2"	2.001"-3"	3.001"-4"	0-1"	1.001"-2"	2.001"-3"	3.001"-4"				
9/16" (02)	1.11	0.56	0.69	0.81	1.38	1.96	2.52	1.06	1.62	2.14	2.70	0.88	#4	2	0.46
3/4" (04)	1.49	0.56	0.69	0.81	1.38	1.94	2.50	1.06	1.62	2.19	2.75	1.22	#6	4	0.46
1-1/16" (09)	1.99	0.88	0.94	0.88	1.50	2.13	2.75	1.38	2.00	2.63	3.25	1.69	#6	4	0.59
1-1/2" (17)	2.61	0.88	1.00	0.88	1.50	2.13	2.75	1.38	2.00	2.63	3.25	2.19	#10	4	0.59
2" (31)	3.11	0.94	1.06	0.94	1.56	2.19	2.81	1.44	2.06	2.69	3.31	2.69	#10	4	0.59
2-1/2" (50)	3.74	1.19	1.31	1.19	1.81	2.94	3.81	1.94	2.81	3.69	4.56	3.25	1/4	4	0.59
3" (70)	4.24	1.25	1.37	1.25	2.12	3.00	3.87	2.00	2.88	3.75	N/A	3.78	1/4	4	0.57
4" (125)	5.50	1.56	1.69	1.56	2.44	3.31	4.19	2.31	3.19	4.06	N/A	4.94	5/16	4	0.62

* FOD models with strokes less than or equal to 3/8 have reduced thread depths. Contact Bimba for details. Stroke threshold is 5/8 for 4" bore.

Bore	F	G	H	J	K	L	M	N	STD THREAD	CFT
9/16" (02)	0.25	0.14	0.22	0.34	0.17	#10-32	0.13	0.24	#8-32 UNC-2B	N/A
3/4" (04)	0.31	0.14	0.25	0.34	0.17	#10-32	0.13	0.29	#10-32 UNF-2B	#10-24 UNC-2B
1-1/16" (09)	0.50	0.14	0.44	0.50	0.28	1/8 NPT	0.13	0.48	5/16-24 UNF-2B	5/16-18 UNC-2B
1-1/2" (17)	0.63	0.14	0.50	0.50	0.26	1/8 NPT	0.13	0.59	3/8-24 UNF-2B	3/8-16 UNC-2B
2" (31)	0.75	0.14	0.62	0.53	0.28	1/8 NPT	0.13	0.71	1/2-20 UNF-2B	1/2-13 UNC-2B
2-1/2" (50)	0.75	0.14	0.62	0.66	0.35	1/4 NPT	0.13	0.71	1/2-20 UNF-2B	1/2-13 UNC-2B
3" (70)	0.88	0.14	0.75	0.69	0.35	1/4 NPT	0.13	0.84	5/8-18 UNF-2B	5/8-11 UNC-2B
4" (125)	1.00	0.14	0.87	0.84	0.42	3/8" NPT	0.13	0.96	3/4-16 UNF-2B	3/4-10 UNC-2B

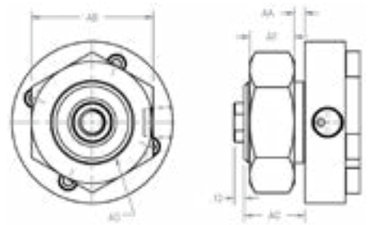
NOTE: Use caution when using a long screw that spans the length of the cylinder. If the endcap experiences flexing, we recommend the -4F or -4R mounting style.

How to Specify

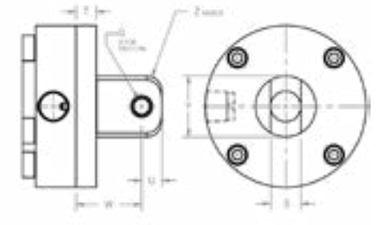
COMPACT CYLINDERS

Flat-1® Mounting Options and Dimensions (in)

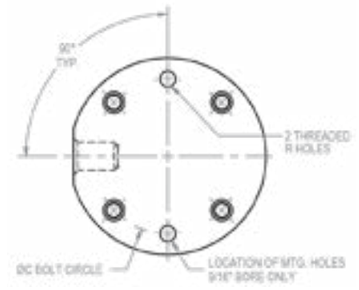
Nose Mount
(Option 5)
Available in FO, FOS, FOR models and includes rod wiper



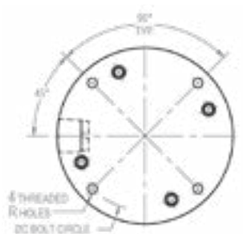
Pivot Mount
(Option 1, 1N)
Available in standard (as shown) or 90°
Includes bronze pivot bushing
Not available as an accessory



Threaded Mounting Holes for 9/16" bore (02)
(Option 3, 3F, 3R)
Available in front, rear, or both end caps
Option 3R shown



Threaded Mounting Holes for 3/4" bore (04) and larger



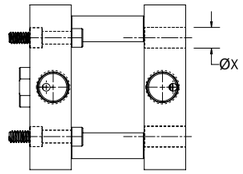
Mounting Option Dimensions

Bore	AA	AB	AC	AD	AF	C	M	N	P	Q	R	S	T	U	W	X	Y	Z
9/16" (02)	0.06	0.75	0.38	1/2-20 UNF-2A	0.31	0.88	N/A	N/A	N/A	0.19	#4-40 UNC-2B	0.38	0.19	0.25	0.75	0.19	0.63	0.19
3/4" (04)	0.06	0.75	0.38	5/8-18 UNF-2A	0.25	1.22	0.31	0.13	0.17	0.19	#6-32 UNC-2B	0.38	0.19	0.25	0.75	0.24	0.75	0.19
1-1/16" (09)	0.13	1.50	0.75	1-14 UNS-2A	0.55	1.69	0.50	0.25	0.25	0.19	#6-32 UNC-2B	0.38	0.25	0.25	0.81	0.25	0.75	0.19
1-1/2" (17)	0.13	1.88	0.75	1-1/4-12 UNF-2A	0.50	2.19	0.50	0.25	0.25	0.38	#10-24 UNC-2B	0.75	0.25	0.44	1.19	0.34	1.38	0.38
2" (31)	0.19	1.88	0.88	1-3/8-12 UNF-2A	0.50	2.69	0.50	0.25	0.25	0.38	#10-24 UNC-2B	0.75	0.31	0.44	1.25	0.34	1.38	0.38
2-1/2" (50)	0.25	1.88	1.00	1-3/8-12 UNF-2A	0.50	3.25	0.63	0.31	0.33	0.38	1/4-20 UNC-2B	0.75	0.38	0.44	1.31	0.41	1.38	0.38
3" (70)	0.25	1.88	1.00	1-3/8-12 UNF-2A	0.50	3.78	0.63	0.31	0.33	0.63	1/4-20 UNC-2B	1.00	0.38	0.56	1.69	0.41	1.88	0.38
4" (125)	0.19	2.63	1.13	1-3/4-12 UN-2A	0.88	4.94	0.75	0.38	0.42	0.63	5/16-18 UNC-2B	1.00	0.44	0.56	1.75	0.50	1.88	0.38

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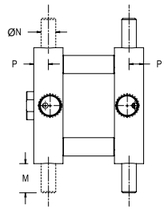
Flat-1® Mounting Options and Dimensions (in)

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.

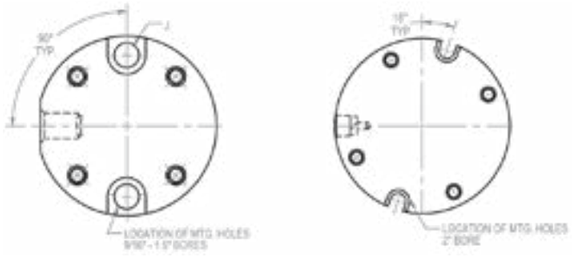
Trunnion Mount
(Option 2, 2F, 2R)
Available in front, rear, or both end caps
Not available in 9/16" (02) bore



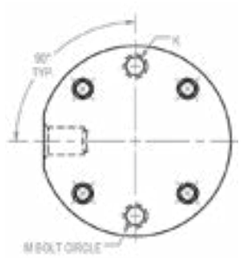
Mounting Option Dimensions

Bore	AA	AB	AC	AD	AF	C	M	N	P	Q	R	S	T	U	W	X	Y	Z
9/16" (02)	0.06	0.75	0.38	1/2-20 UNF-2A	0.31	0.88	N/A	N/A	N/A	0.19	#4-40 UNC-2B	0.38	0.19	0.25	0.75	0.19	0.63	0.19
3/4" (04)	0.06	0.75	0.38	5/8-18 UNF-2A	0.25	1.22	0.31	0.13	0.17	0.19	#6-32 UNC-2B	0.38	0.19	0.25	0.75	0.24	0.75	0.19
1-1/16" (09)	0.13	1.50	0.75	1-14 UNS-2A	0.55	1.69	0.50	0.25	0.25	0.19	#6-32 UNC-2B	0.38	0.25	0.25	0.81	0.25	0.75	0.19
1-1/2" (17)	0.13	1.88	0.75	1-1/4-12 UNF-2A	0.50	2.19	0.50	0.25	0.25	0.38	#10-24 UNC-2B	0.75	0.25	0.44	1.19	0.34	1.38	0.38
2" (31)	0.19	1.88	0.88	1-3/8-12 UNF-2A	0.50	2.69	0.50	0.25	0.25	0.38	#10-24 UNC-2B	0.75	0.31	0.44	1.25	0.34	1.38	0.38
2-1/2" (50)	0.25	1.88	1.00	1-3/8-12 UNF-2A	0.50	3.25	0.63	0.31	0.33	0.38	1/4-20 UNC-2B	0.75	0.38	0.44	1.31	0.41	1.38	0.38
3" (70)	0.25	1.88	1.00	1-3/8-12 UNF-2A	0.50	3.78	0.63	0.31	0.33	0.63	1/4-20 UNC-2B	1.00	0.38	0.56	1.69	0.41	1.88	0.38
4" (125)	0.19	2.63	1.13	1-3/4-12 UN-2A	0.88	4.94	0.75	0.38	0.42	0.63	5/16-18 UNC-2B	1.00	0.44	0.56	1.75	0.50	1.88	0.38

F Series Mounting Holes
(Option -6)



F Series Mounting Holes
(Option -7)

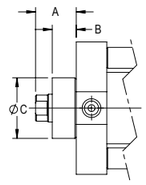


F Series Dimensions

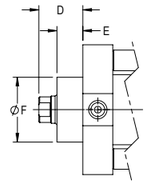
Bore	F Series Interchange					
	H	# Of Holes For Option 6	J	# Of Holes For Option 7	K	M
9/16" (02)	0.875	2	#6	2	#6-32	0.875
3/4" (04)	1.188	2	#6	2	#8-32	1.188
1-1/16" (09)	1.688	2	#10	2	#10-32	1.688
1-1/2" (17)	2.375	2	#10	N/A	N/A	N/A
2" (31)	2.810	2	1/4	N/A	N/A	N/A
2-1/2" (50)	3.250	4	1/4	N/A	N/A	N/A
3" (70)	3.812	4	1/4	N/A	N/A	N/A
4" (125)	5.000	4	1/4	N/A	N/A	N/A

Flat-1® Cylinder Options and Dimensions (in)

Rod Wiper
(Option W)



Metallic Rod Scraper
(Option Z)

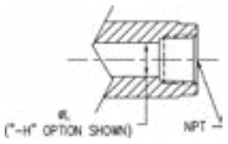


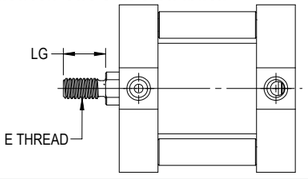
Bore	Wiper/Scraper					
	A	B	C	D	E	F
9/16" (02)	0.46	0.27	0.56	0.50	0.30	0.65
3/4" (04)	0.46	0.27	0.68	0.50	0.30	0.74
1-1/16" (09)	0.46	0.27	0.87	0.58	0.36	0.93
1-1/2" (17)	0.38	0.19	0.99	0.52	0.30	1.06
2" (31)	0.39	0.19	1.12	0.54	0.30	1.18
2-1/2" (50)	0.39	0.19	1.12	0.54	0.30	1.18
3" (70)	0.38	0.19	1.24	0.53	0.30	1.37
4" (125)	0.38	0.19	1.37	0.49	0.30	1.43

Maximum Torque Recommendations for Nose Mount Option

Bore	Maximum Torque
9/16" (02)	1
3/4" (04)	28
1-1/16" (09)	100
1-1/2" (17)	120
2" (31)	130
2-1/2" (50)	130
3" (70)	130
4" (125)	150

Hollow Rod Dimensions for FOD Cylinders and Male Thread Dimensions for All Models

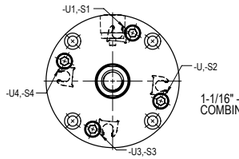




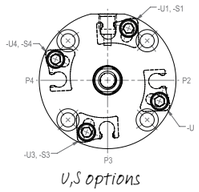
Bore	Rod Thread												
	-H Option	LØ	-CFTH Option	LØ	-HMT Option	LØ	-CMTH Option	LØ	-HNPT Option	LØ	LG	E	
												MT	CMT
9/16" (02)	#8-32 UNC-2B	0.12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.38	#8-32 UNC	N/A
3/4" (04)	#10-32 UNF-2B	0.14	#10-24 UNC-2B	0.14	#10-32 UNF-2A	0.09	N/A	N/A	N/A	N/A	0.38	#10-32 UNF	#10-24-UNC
1-1/16" (09)	5/16-24 UNF-2B	0.22	5/16-18 UNC-2B	0.22	5/16-24 UNF-2A	0.16	5/16-18 UNC-2A	0.16	1/8 NPT	0.22	0.50	5/16-24 UNF-2A	5/16-18 UNC-2A
1-1/2" (17)	3/8-24 UNF-2B	0.28	3/8-16 UNC-2B	0.28	3/8-24 UNF-2A	0.19	3/8-16 UNC-2A	0.19	1/8 NPT	0.28	0.50	3/8-24 UNF-2A	3/8-16 UNC-2A
2" (31)	1/2-20 UNF-2B	0.38	1/2-13 UNC-2B	0.38	1/2-20 UNF-2A	0.25	1/2-13 UNC-2A	0.25	1/4 NPT	0.38	0.63	1/2-20 UNF-2A	1/2-13 UNC-2A
2-1/2" (50)	1/2-20 UNF-2B	0.38	1/2-13 UNC-2B	0.38	1/2-20 UNF-2A	0.25	1/2-13 UNC-2A	0.25	1/4 NPT	0.38	0.63	1/2-20 UNF-2A	1/2-13 UNC-2A
3" (70)	5/8-18 UNF-2B	0.44	5/8-11 UNC-2B	0.44	5/8-18 UNF-2A	0.31	5/8-18 UNF-2A	0.31	3/8 NPT	0.44	0.75	5/8-18 UNF-2A	5/8-11 UNC-2A
4" (125)	3/4-16 UNF-2B	0.50	3/4-10 UNC-2B	0.50	3/4-16 UNF-2A	0.38	3/4-10 UNC-2A	0.38	3/8 NPT	0.50	0.75	3/4-16 UNF	3/4-10 UNC

Position Sensing Switches and Dimensions

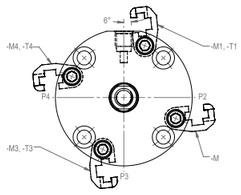
For real ROUND Flat-1 series cylinder -M options, the default switch mounting post location is Position 2. To locate the post to other positions, please specify options M1, M3, or M4. For additional tracks, please specify options T1, T3, or T4 for the appropriate location.



1-1/16" - 4" BORE -AB/-PB & U-TRACK OPTION COMBINATION TRACK LOCATIONS



U,S options



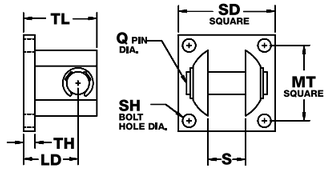
M, T options

Bore	G inch
9/16" (02)	0.29
3/4" (04)	0.25
1-1/16" (09)	0.07
1-1/2" (17)	0.02
2" (31)	0.03
2-1/2" (50)	0.02
3" (70)	0.03
4" (125)	0.00

Flat-1® Accessory Options and Dimensions (in)

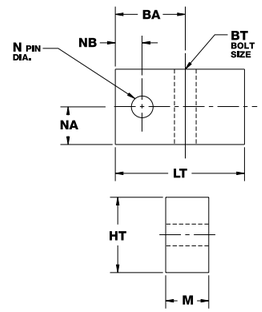
Anodized Aluminum Clevis Bracket complete with Stainless Steel Pin; Designed for use with Pivot Mounted Cylinder (Option 1 or 1N)

Bore	Model	LD	MT	Q	S	SH	SD	TH	TL
9/16" (02)	BC-1	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
3/4" (04)	BC-1	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
1-1/16" (09)	BC-1	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
1-1/2" (17)	BC-2	0.94	1.38	0.38	0.76	#10	1.75	0.22	1.34
2" (31)	BC-2	0.94	1.38	0.38	0.76	#10	1.75	0.22	1.34
2-1/2" (50)	BC-2	0.94	1.38	0.38	0.76	#10	1.75	0.22	1.34
3" (70)	BC-3	1.25	2.00	0.63	1.02	0.25	2.50	0.25	1.81
4" (125)	BC-3	1.25	2.00	0.63	1.02	0.25	2.50	0.25	1.81



Anodized Aluminum Trunnion Bracket (includes bronze pivot bushings; 2 pieces)

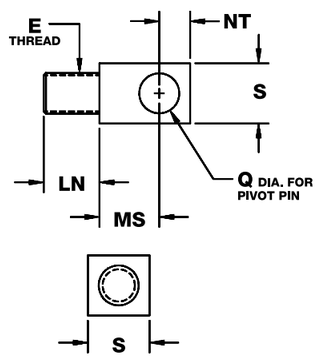
Bore	Model	BA	BT	HT	LT	M	N	NA	NB
3/4" (04)	BT-1	0.56	#10	0.63	1.12	0.31	0.13	0.30	0.22
1-1/16" (09)	BT-2	0.81	0.25	0.88	1.50	0.50	0.25	0.38	0.31
1-1/2" (17)	BT-2	0.81	0.25	0.88	1.50	0.50	0.25	0.38	0.31
2" (31)	BT-2	0.81	0.25	0.88	1.50	0.50	0.25	0.38	0.31
2-1/2" (50)	BT-3	0.94	0.31	1.00	1.63	0.63	0.31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



The Model Number for all Flat-1® cylinders 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 FO-170.25-1V. This is a double acting, 1-1/2" bore, 1/4" stroke, pivot mount cylinder with high temperature option.

Type	
FO	Double Acting, Single End Rod
FOD	Double Acting, Double End Rod
FOR	Reverse Acting (Spring Extend)
FOS	Single Acting (Spring Return)

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"
125	4"

Stroke Length	
0.25	1/4"
0.375	3/8"
0.5	1/2"
ETC.	

FO-170.25-1 V

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[1]
2F	Front trunnion mount[1]
2R	Rear trunnion mount[1]
3	Threaded mounting holes, both ends
3F	Threaded mounting holes, front
3R	Threaded mounting holes, rear
4F	Screw clearance holes, front[2]
4R	Screw clearance holes, rear[2]
5	Nose mount[3]
6	F series interchange; counterbored each end
7	F series interchange; threaded, both ends[5]
7F	F series interchange; threaded holes, front[4 5]
7R	F series interchange; threaded holes, rear[4 5]

[1] Not available in 9/16" bore
[2] "Screw clearance" to allow bolt head to pass through; no counter bores (see page 146)
[3] Available in FO, FOR, and FOS models; includes wiper
[4] Opposite endcap will have the standard Bimba hole pattern (see page 146 for dimensions)
[5] Available in 02, 04, and 09 bores only

Options (Enter in alphabetical order, except for EE which is last)	
99	Oil pre-lube
AB	Thick walled aluminum body[6]
B	Bumpers, both ends[1 2]
BF	Bumper, front only[1 2]
BR	Bumper, rear only[1 2]
CFT	Coarse female rod thread (fine thread standard) (see page 144)
CMT	Coarse male rod thread (see page 147)
D	Low pressure hydraulic design (250 PSI max, non-shock)
H	Hollow rod (FOD models only) (see page 147)
J	Failsafe operation; spring return (FOD models only)
K	Composite rod bushing[5]
L	Low friction seals (see table page 143 for length adders)
M, M1, M3, M4	Magnetic position sensing. Switch post designed for HC and HK style Hall Effect switches (see table page 143 and 147 for length adders and envelope dimensions)[2]
MT	Male rod thread (fine thread) (see page 147)
NPT	Female NPT thread, both ends (FOD models only)[4]
NPTF	Female NPT thread, front (FOD models only)[4]
NPTR	Female NPT thread, rear (FOD models only)[4]
NT	Non-threaded rod
PB	Composite body[6]
P2, P3, P4	Front port position (see page 147)
Q	Low temperature operation (-40° F to 200° F)
S1, S3, S4	Additional 90° right angle, 4mm diameter switch post located in position #1 or #3
SR	Stainless steel rod (not compatible with option D or Z)
T1, T3, T4	Additional Hall Effect switch mounting post located in position #1 or #3
U, U1, U3, U4	Magnetic position sensing. Switch post designed for 90° right angle, 4mm diameter magnetic reed switches (see table page 143 and 147 for length adders and envelope dimensions)[2]
V	High temperature option (0° F to 400° F)[2]
W	Rod wiper (see page 147) (-20° F to 200° F)
X	X-ring piston seal[3]
Z	Metallic rod scraper (see page 147) (Buna-N backup [-20° F to 200° F])
EE0.375	3/8" extra rod extension, etc.
EE1	1" extra rod extension, etc.

[1] There is no stroke reduction when the supply pressure is 80 PSI or greater. At 0 PSI, there will be a stroke reduction of approximately .040". Bumper compression is linear for 0 PSI to 80 PSI. FOS models have a rear bumper only. FOR models have a front bumper only.
[2] Bumpers and the piston magnet materials are rated only to 200° F. Magnetic position sensing and bumper operation is not reliable above 200° F and options B and M should only be specified with option V for chemical compatibility.
[3] Optional piston seal which may improve performance in certain short stroke applications where back pressure due to flow controls or reduced exhaust flow may exist.
[4] Must be ordered with Hollow Rod (H) option.
[5] FDA-approved grease lubrication is standard when the K option is specified.
[6] Not available in 9/16" or 3/4" bore.

Flat-1® Repair Kits

Bimba Flat-1® 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.

Single End Rod Repair Kits

Basic Repair Kits	Nose Mount Repair Kits	Rod Wiper Repair Kits
K-BIF-F0-__	K-BIF-F0-N-__	K-BIF-F0-W-__
K-BIF-F0-__-L	K-BIF-F0-N-__-L	K-BIF-F0-W-__-L
K-BIF-F0-__-Q	K-BIF-F0-N-__-Q	K-BIF-F0-W-__-Q
K-BIF-F0-__-V	K-BIF-F0-N-__-V	K-BIF-F0-W-__-V
K-BIF-F0-__-X	K-BIF-F0-__-X	K-BIF-F0-W-__-X
K-BIF-F0-__-V-L	K-BIF-F0-N__-V-L	K-BIF-F0-W__-V-L
K-BIF-F0-__-Q-L	K-BIF-F0-N__-Q-L	K-BIF-F0-W-__-Q-L
K-BIF-F0-__-D	K-BIF-F0-N__-D	K-BIF-F0-W-__-D
K-BIF-F0-__-D-V	K-BIF-F0-N__-D-V	K-BIF-F0-W-__-D-V

Rod Scraper Repair Kits
K-BIF-F0-Z-__
K-BIF-F0-Z-__-L
K-BIF-F0-Z-__-Q
K-BIF-F0-Z-__-V
K-BIF-F0-Z-__-X
K-BIF-F0-Z-__-V-L
K-BIF-F0-Z-__-Q-L
K-BIF-F0-Z-__-D
K-BIF-F0-Z-__-D-V

Double End Rod Repair Kits

Basic Repair Kits	Rod Wiper Repair Kits	Rod Scraper Repair Kits
K-BIF-F0D-__	K-BIF-F0D-W-__	K-BIF-F0D-Z-__
K-BIF-F0D-__-L	K-BIF-F0D-W-__-L	K-BIF-F0D-Z-__-L
K-BIF-F0D-__-Q	K-BIF-F0D-W-__-Q	K-BIF-F0D-Z-__-Q
K-BIF-F0D-__-V	K-BIF-F0D-W-__-V	K-BIF-F0D-Z-__-V
K-BIF-F0D-__-X	K-BIF-F0D-W-__-X	K-BIF-F0D-Z-__-X
K-BIF-F0D-__-V-L	K-BIF-F0D-W__-V-L	K-BIF-F0D-Z-__-V-L
K-BIF-F0D-__-Q-L	K-BIF-F0D-W-__-Q-L	K-BIF-F0D-Z-__-Q-L
K-BIF-F0D-__-D	K-BIF-F0D-W-__-D	K-BIF-F0D-Z-__-D-V
K-BIF-F0D-__-D-V	K-BIF-F0D-W-__-D-V	K-BIF-F0D-Z-__-Q-L

Option Legend	
(L)	Low Friction Seals
(Q)	Low Temp Seals
(V)	High Temp Seals
(X)	X-Ring Seals
(D)	Low Pressure Hydraulic



Square Flat-1® Compact Cylinders

- Compact design provides machine designers the ability to use Flat-1® cylinders in tight spaces
- Hard chrome plated piston rod is corrosion resistant and provides a hard, smooth sealing surface extending the life of the cylinder's rod seals
- Body materials are available in standard Stainless Steel and optional Aluminum or Plastic providing design engineers with increased flexibility.
- Single acting spring return cylinders include rod seals to provide for standard fail safe operation
- New switch track options accept either Reed or Hall Effect switches allowing for either AC or DC switch circuitry.
- 3,000 mile life ratings when low frictions seals are specified provides customers the confidence associated with a low maintenance design.
- Mechanically retained bumpers reduce the sound typically associated with high cycle pneumatic cylinder applications.
- New "F Series" mounting options provide drop in interchanges for a competitive manufacturer.
- The addition of NPT rod threads on double rod end models makes it easier for designers to connect air and fluid fittings to the rod ends.
- Optional rod bearing materials are available for applications requiring smoother cylinder rod travel than is provided by the standard oil impregnated bronze rod bushings.

Approximate power factors (for all models except f02, 3, 4)	
9/16" (02) = 0.25	For example, a 3/4" bore model F0-041 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	

Square Flat-1®

Materials of Construction

Cylinder Body: 304 Stainless Steel

Heads: Anodized Aluminum Alloy

Piston Rod: Ground and Polished 303 Stainless Steel

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

Rod Bushing: Oil-Impregnated Bronze

Tie Rods: 303 Stainless Steel

Engineering Specifications

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

150 PSI max., air only (bore sizes 2-1/2-4")

Spring Forces: See page 157

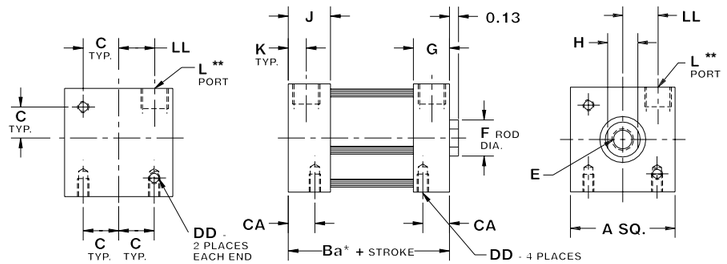
Temperature*: -20° F to 150° F (-35° C to 65° C) Standard

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.

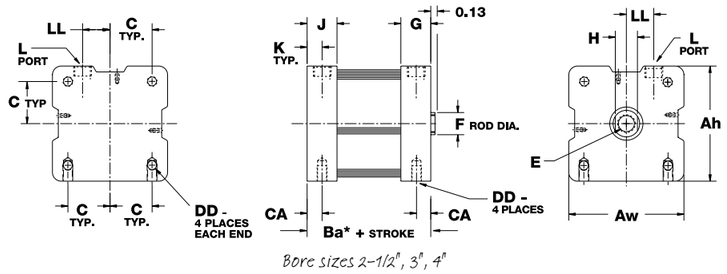
Square Flat-1® Basic Models

Bimba is a JIT manufacturer and we are able to provide FS 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 FS
(Double Acting, Single End Rod)



Bore sizes 3/4", 1-1/16", 1-1/2", 2"



Bore sizes 2-1/2", 3", 4"

*Some options affect cylinder length; see page 156.
**Port location is on the same side for M option only.

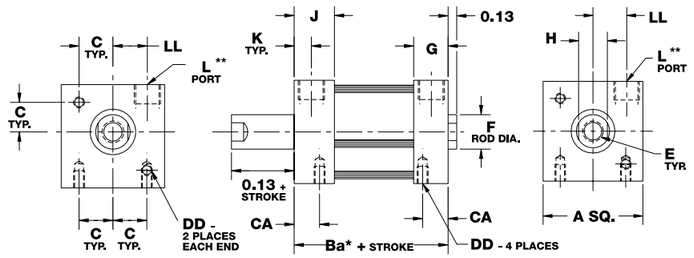
The table below represents our standard stroke lengths.

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"
2-1/2"	50	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"	70	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"
4"	125	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"

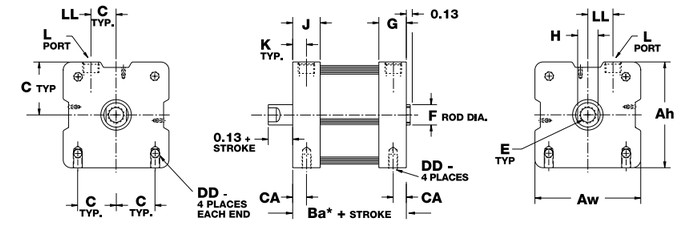
Square Flat-1® Basic Models

Model FSD
(Double Acting, Double End Rod)

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"



Bore sizes 3/4", 1-1/16", 1-1/2", 2"

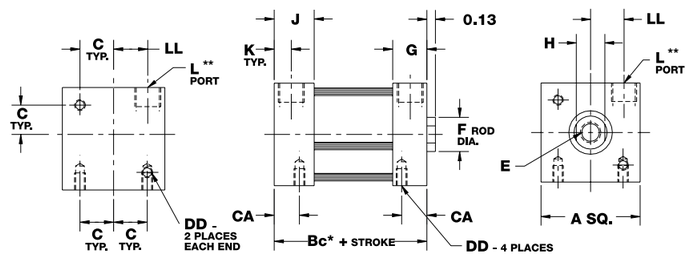


Bore sizes 2-1/2", 3", 4"

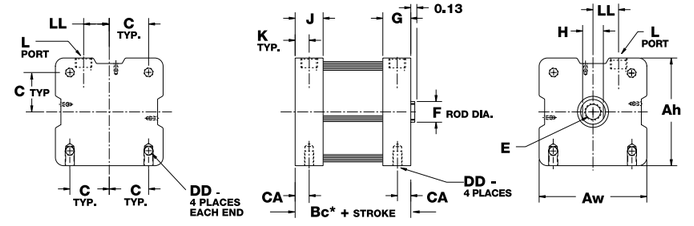
*Some options affect cylinder length; see page 156.
**Port location is on the same side for M option only.

Model FSS
(Single Acting, Spring Return, Rod Normally Retracted)

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"



Bore sizes 3/4", 1-1/16", 1-1/2", 2"



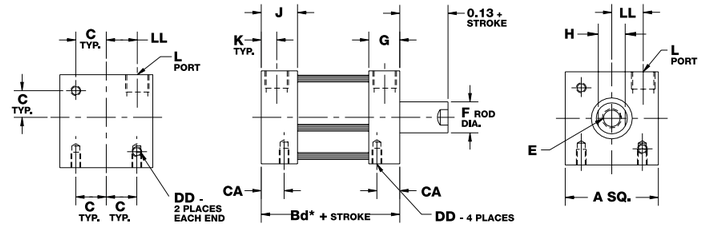
Bore sizes 2-1/2", 3", 4"

See page 157 for spring forces.
*Some options affect cylinder length; see page 156.
**Port location is on the same side for M option only.

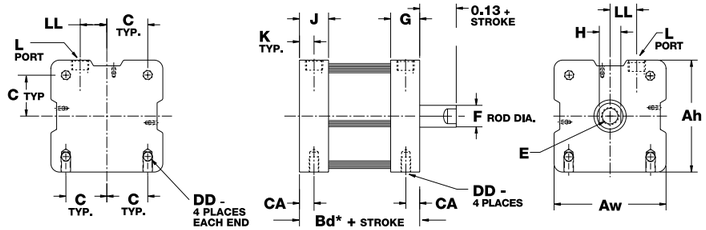
Square Flat-1® Basic Models

Model FSR
(Reverse Acting, Spring Return, Rod Normally Extended)

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"
2"-4" Bores: 3" stroke max



Bore sizes 3/4", 1-1/16", 1-1/2", 2"



Bore sizes 2-1/2", 3", 4"

See page 157 for spring forces.
*Some options affect cylinder length; see page 156.

Dimensions (in)

Bore	A	Aw	Ah	Ba*	Bc*				Bd*			
					0-1" Stk	1.001-2" Stk	2.001-3" Stk	3.001-4" Stk	0-1" Stk	1.001-2" Stk	2.001-3" Stk	3.001-4" Stk
3/4" (04)	1.25	N/A	N/A	0.75	1.00	1.56	2.13	2.69	1.25	1.81	2.38	2.94
1-1/16" (09)	1.50	N/A	N/A	1.25	1.25	1.88	2.50	3.13	1.75	2.38	3.00	3.63
1-1/2" (17)	2.00	N/A	N/A	1.25	1.25	1.88	2.50	3.13	1.75	2.38	3.00	3.63
2" (31)	2.5	N/A	N/A	1.31	1.31	1.94	2.56	3.19	1.81	2.44	3.06	N/A
2-1/2" (50)	N/A	3.28	3.25	1.66	1.66	2.54	3.41	4.29	2.39	3.27	3.29	N/A
3" (70)	N/A	3.78	3.75	1.71	1.71	2.58	3.46	4.33	2.44	3.31	3.33	N/A
4" (125)	N/A	5.04	5.00	2.00	2.00	2.88	3.75	4.63	2.75	3.62	3.63	N/A

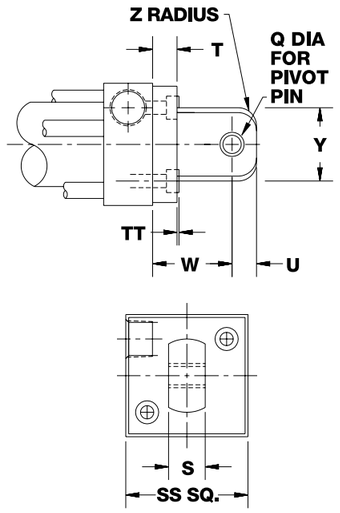
Bore	C	CA	DD	E Standard	E Coarse	E Depth	F	G	H	J	K	L	LL
3/4" (04)	0.38	0.28	#6-32 UNC	#10-32 UNF	#10-24 UNC	0.46	0.31	0.42	0.25	0.42	0.14	#10-32	0.30
1-1/16" (09)	0.50	0.38	#8-32 UNC	5/16-24 UNF	5/16-18 UNC	0.70	0.50	0.58	0.44	0.50	0.25	1/8 NPT	0.50
1-1/2" (17)	0.69	0.31	#10-24 UNC	3/8-24 UNF	3/8-16 UNC	0.70	0.63	0.58	0.50	0.50	0.25	1/8 NPT	0.69
2" (31)	0.88	0.38	1/4-20 UNC	1/2-20 UNF	1/2-13 UNC	0.70	0.75	0.63	0.63	0.63	0.25	1/8 NPT	0.77
2-1/2" (50)	1.18	0.42	5/16-18	1/2-20 UNF	1/2-13 UNC	0.70	0.75	0.84	0.62	0.84	0.42	1/4 NPT	0.78
3" (70)	1.44	0.44	5/16-18	5/8-18 UNF	5/8-11 UNC	0.73	0.88	0.88	0.75	0.88	0.44	1/4 NPT	0.98
4" (125)	1.81	0.50	7/16-14	3/4-16 UNF	3/4-10 UNC	0.83	1.00	1.00	0.88	1.00	0.50	3/8 NPT	1.25

Square Flat-1® Accessory Options and Dimensions (in)

Mounting Options

Pivot Attachment
Anodized aluminum alloy. Complete with 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



Length Adder Dimensions for Options
(Dimensional variations from standard as shown)

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)	0.38	0.50	0.50
1-1/2" (17)	0.38	0.63	0.63
2" (31)	0.38	0.63	0.63
2-1/2" (50)	0.38	0.88	0.88
3" (70)	0.50	0.88	0.88
4" (125)	0.50	0.88	0.88

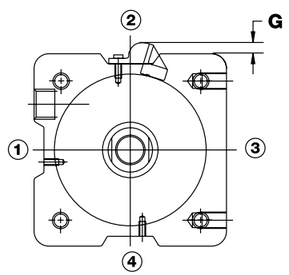
*A minimum stroke of 0.38" is required to sense extending end-of-stroke position. For port locations with Option-M, see below.

Weights

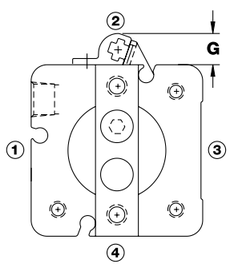
Bore	Approximate Cylinder Weights (oz.)	
	Base	Adder per 1/8" of stroke
3/4" (04)	2.7	0.1
1-1/16" (09)	6.4	0.5
1-1/2" (17)	12.2	0.7
2" (31)	18.4	0.9

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.



Square Flat-1®



Square Flat-II®

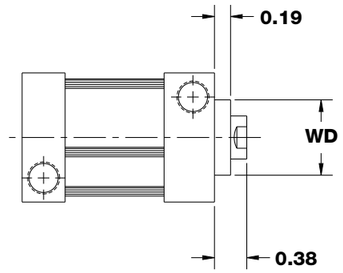
Bore Designator	Bore	G inch (mm)
04*	3/4" (19mm)	0.365 (9.3)
09	1-1/16" (27mm)	0.365 (9.3)
17	1-1/2" (38mm)	0.365 (9.3)
31	2" (50mm)	0.365 (9.3)
50	2-1/2" (63mm)	0.270 (6.9)
70	3" (76mm)	0.300 (7.6)
125	4" (101mm)	0.160 (4.1)

*Note: Option combinations MT1 and M1T4 cannot be ordered in combination due to interference concerns.

Square Flat-1® Accessory Options and Dimensions (in)

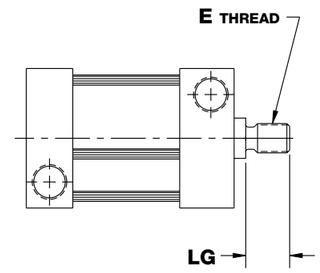
Options

Rod Wiper (Option W)
(Buna N standard, not available in FKM)



Bore	WD
3/4" (04)	0.69
1-1/16" (09)	0.88
1-1/2" (17)	1.00
2" (31)	1.12
2-1/2" (50)	1.13
3" (70)	1.25
4" (125)	1.38

Male Rod Ends (Option MT or CMT)



Bore	E		LG
	MT	CMT	
3/4" (04)	#10-32 UNF	#10-24 UNC	0.38
1-1/16" (09)	5/16-24 UNF	5/16-18 UNC	0.50
1-1/2" (17)	3/8-24 UNF	3/8-16 UNC	0.50
2" (31)	1/2-20 UNF	1/2-13 UNC	0.62
2-1/2" (50)	1/2-20 UNF	1/2-13 UNC	0.63
3" (70)	5/8-18 UNF	5/8-11 UNC	0.75
4" (125)	3/4-16 UNF	3/4-10 UNC	0.75

Enclosed Spring Forces

Bore	Maximum Force (lbs)	Spring Rate			
		0.12 to 1" Stroke (lbs/in)	1.001 to 2" Stroke (lbs/in)	2.001 to 3" Stroke (lbs/in)	3.001 to 4" Stroke (lbs/in)
3/4" (04)	10	6	2.5	1.76	1.25
1-1/16" (09)	11.5	6	2.5	1.76	1.25
1-1/2" (17) 2" (31)	13	5.5	2.25	1.60	1.13
2-1/2" (50) 3" (70) 4" (125)	25	6.5	2.75	1.93	1.38

FSD Hollow Rods (Option H)

Bore	Hole Diameter	
	Female Rod Thread	Male Rod Thread
3/4" (04)	0.14	0.09
1-1/16" (09)	0.22	0.16
1-1/2" (17)	0.28	0.19
2" (31)	0.38	0.25
2-1/2" (50)	0.38	0.25
3" (70)	0.44	0.31
4" (125)	0.50	0.38

Weights

Bore	Approximate Cylinder Weights (oz.)						
	FS, FSS		FSD			FSR	
	Base	Adder per 1/8" of stroke	Base	Adder per 1/8" of stroke	Adder per 1/8" of stroke for -H option	Base	Adder per 1/8" of stroke
3/4" (04)	2.2	0.1	2.4	0.2	0.15	2.2	0.1
1-1/16" (09)	5.1	0.2	5.7	0.4	0.3	5.5	0.2
1-1/2" (17)	10.1	0.3	10.5	0.6	0.5	10.4	0.3
2" (31)	14.2	0.4	16.0	0.8	0.6	15.0	0.4
2-1/2" (50)	28.6	0.4	34.2	0.6	0.5	31.2	0.4
3" (70)	40.2	0.6	49.3	0.9	0.7	43.8	0.6
4" (125)	71.6	0.6	87.7	0.9	0.7	77.7	0.6

The Model Number for all Square Flat-1® cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, and mounting and special options. Please refer to the charts below for an example of a standard Square Flat-1® model. This is a double acting, 1-1/2" bore, 3/8" stroke, pivot mount cylinder with high temperature option.

Type	
FS	Double Acting, Single End Rod
FSD	Double Acting, Double End Rod
FSR	Reverse Acting
FSS	Single Acting

Bore Size	
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"
125	4"

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

FS - 17 0.375 - 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)	
B	Bumpers, both ends[1]
BF	Bumper, front only[1]
BR	Bumper, rear only[1]
CFT	Coarse female rod thread (fine thread standard) (see page 155)
CMT	Coarse male rod thread (see page 157)
G	Magnalube® G
H	Hollow rod (double end models only) (see page 157)
J	Failsafe operation (FSS models)
L	Low friction seals (see table page 156 for length adders)
M, M1, M4	Magnetic position sensing. Switch post designed for HC and HK style Hall Effect switches (see table page 156 for length adders and envelope dimensions)
MT	Male rod end (fine thread) (see page 157)
NT	Non-threaded rod
Q	Low temperature operation (-40° F to 200° F)
T1, T4	Additional Hall Effect switch mounting post located in position #1 or #4
V	High temperature option (0° F to 400° F)
W	Rod wiper (Buna-N, see page 157)[2]
X	X-ring piston seal[3]
Y	Molycoat (MoS_2 I.D. coating)
EE0.375	3/8" extra rod extension, etc.
EE1	1" extra rod extension, etc.

[1] Stroke is reduced by .03" per end (.06" for option B); FSS, BR only; FSR, BF only.
[2] 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.
[3] Optional piston seal which may improve performance in certain short stroke applications where back pressure due to flow controls or reduced exhaust flow may exist.

Square Flat-1® Repair Kits

Bimba Square Flat-1® 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.

Single End Rod Repair Kits

Basic Repair Kit (K-B-FS-__)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	1
PF-2	Piston Seal	1
PF-41	Tube Seal	2
PF-4	Bushing	2

Wiper Option Basic Repair Kit (K-B-FS-W-__)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	1
PF-2	Piston Seal	1
PF-41	Tube Seal	2
PF-4	Bushing	1
PF-5	Wiper Bushing	1
PF-6	Wiper	1

Double End Rod Repair Kits

Basic Repair Kit (K-B-FSD-__)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	2
PF-2	Piston Seal	1
PF-41	Tube Seal	2
PF-4**	Bushing	3

Wiper Option Basic Repair Kit (K-B-FSD-W-__)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	2
PF-2	Piston Seal	1
PF-41	Tube Seal	2
PF-4**	Bushing	1
PF-5	Wiper Bushing	2
PF-6	Wiper	2

* Must specify bore size when ordered. Contact your local BIMBA Distributor for pricing on kits and other repair parts.
** On FSD (Double Acting, Double End Rod) models, two bushings are provided on the head end with tie rod nuts. Opposite head end has one bushing.



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.

Flat-II® Non-Rotating Compact 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	

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:

$$\text{Ø} = \frac{TL^3}{K}$$

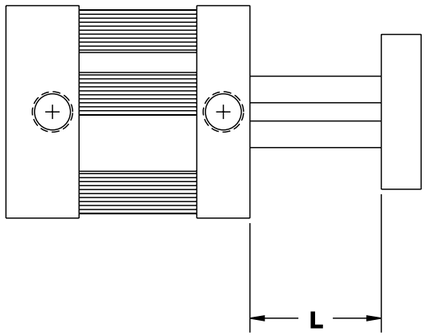
Where
- T = Torque (in-lb)
- L = Length (see sketch below)
- K = Per chart above
- Ø = Angular deflection

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")

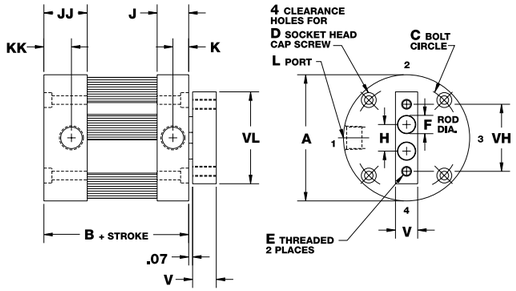
Temperature*: -20° F to 150° F (-35° C to 65° C) Standard

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

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)

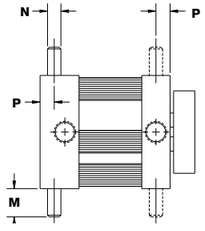


The table below represents our standard stroke lengths.

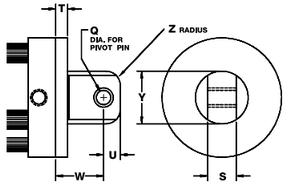
Nominal Bore Diameter	Bore Code	Standard Stroke Length Availability															
3/4"	04	1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/2"	3"	3-1/2"	4"
1-1/16"	09	1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/2"	3"	3-1/2"	4"
1-1/2"	17	1/8"	1/4"	3/8"	1/2"	5/8"	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

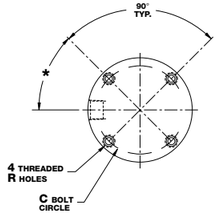
Trunnion Mount
(rear, front or both) (-2R shown)



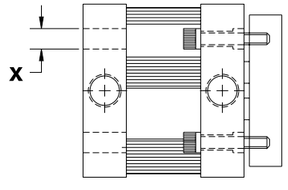
Pivot Mount
(complete with bronze bushing) (-1 shown)



Threaded Mounting Holes
(available either or both ends) (-3R shown)

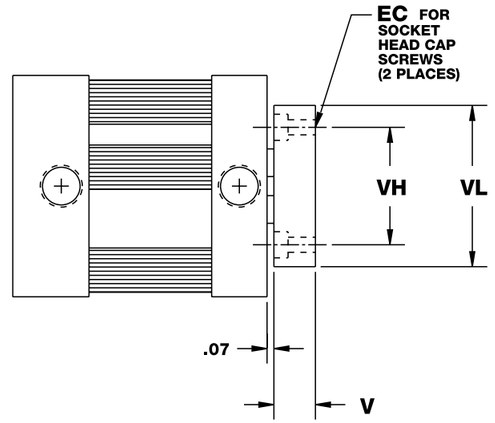


Screw Clearance Holes
(available either or both ends) (-4R shown)



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.

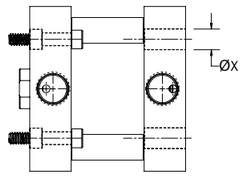
Flat-II® Accessory Options and Dimensions (in)

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.

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.

Flat-II® Repair Kits

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 BIMBA Distributor for pricing on kits and other repair parts.



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

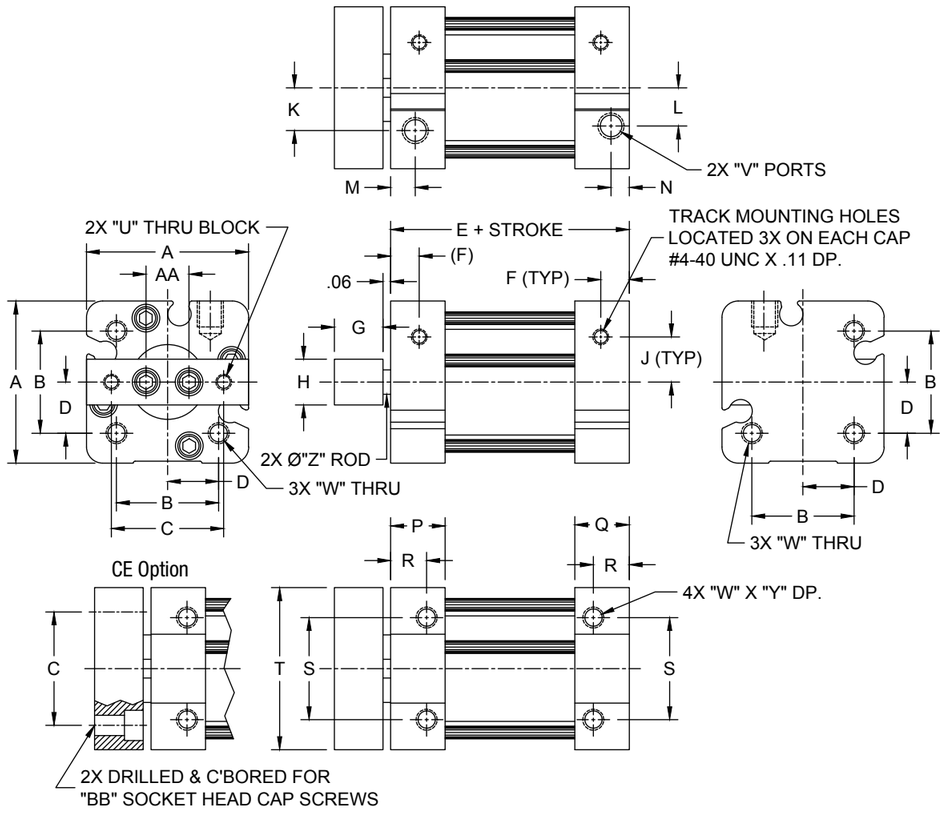
Temperature*: -20° F to 150° F (-35° C to 65° C) Standard

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:

$$Ø = \frac{TL^3}{K}$$

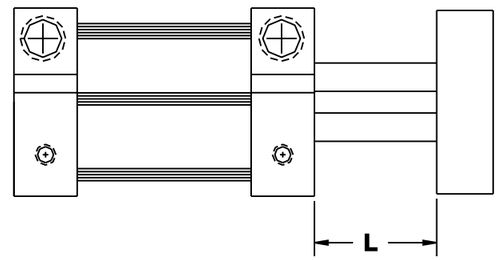
Where T = Torque (in.-lb.)
L = Length (see sketch below)
K = Per chart above
Ø = Angular deflection

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

Rotational Tolerance

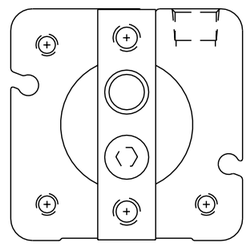
Bore	Maximum Rotation
3/4" (04)	±1°
1-1/16" (09)	±3/4°
1-1/2" (17)	±1/2°
2" (31)	±1/2°

Deflection L Value



L = .062 + STROKE

Option K - Endblock Rotated 90°



How to Order

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

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.

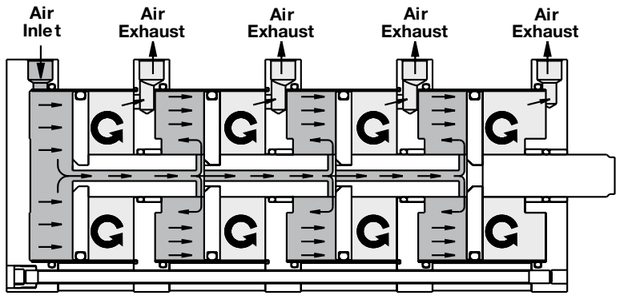
Product Features



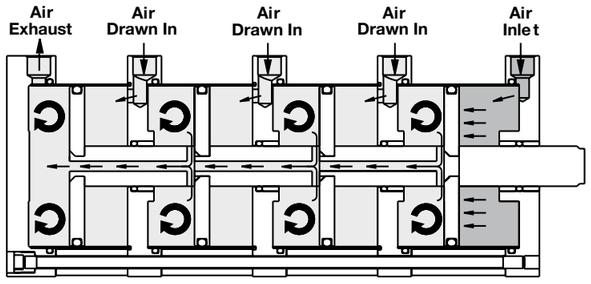
The Bimba FO2, FO3, FO4 Series Flat-1® are double-acting, single end rod cylinders that multiply the force output by supplying air to multiple pistons on extension. They save space and eliminate the need for a higher pressure system. Only one piston is powered on the return stroke, saving air volume and operating costs.

FO2/FO3/FO4 Flat-1® Compact Cylinders

> Bore sizes: 2-1/2", 3", 4"
> 304 stainless steel body prevents corrosion
> Standard oil impregnated bronze rod bushing
> Stainless piston rod
> Precision machined anodized aluminum heads
> Maximum Pressure: 100 PSI (air only)



Extension–air supplied to multiple pistons



Retraction–air supplied to one piston only

Technical Specifications

Materials of Construction

Cylinder Body: 304 Stainless Steel

Heads: Anodized Aluminum Alloy

Piston Rod: Ground and Polished 303 Stainless Steel

Seals: Buna-N (high temperature seals optional)

Rod Bushing: Oil-Impregnated Bronze

Engineering Specifications

Pressure Rating: 100 PSI maximum (air only)

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.

FO2, FO3, and FO4 Specifications (in)

Weights

Bore	Approximate Cylinder Weights (oz)					
	Base			Adder per 1/8" of stroke		
	FO2	FO3	FO4	FO2	FO3	FO4
2-1/2" (50)	37.2	53.3	69.4	1.2	1.8	2.4
3" (70)	49.9	71.0	92.1	1.6	2.4	3.2
4" (125)	93.1	133.8	174.5	2.0	3.0	4.0

Dimensions (in)

Bore	A	B**			C	D	E Standard	E Coarse	E Depth	F	H
		FO2	FO3	FO4							
2-1/2" (50)	3.75	2.29	3.15	4.02	3.25	1/4	1/2-20 UNF	1/2-13 UNC	0.70	0.75	0.63
3" (70)	4.25	2.39	3.28	4.18	3.78	1/4	5/8-18 UNF	5/8-11 UNC	0.73	0.88	0.75
4" (125)	5.50	3.04	4.15	5.27	4.94	5/16	3/4-16 UNF	3/4-10 UNC	0.80	1.00	0.88

Bore	J	K	L	R	T	V	X	Z	AA	BB	CC
2-1/2" (50)	0.66	0.33	1/4 NPT	1/4-20 UNC	0.91	0.58	0.41	N/A	1.00	1.79	2.65
3" (70)	0.69	0.33	1/4 NPT	1/4-20 UNC	0.94	0.58	0.39	0.28	1.03	1.85	2.75
4" (125)	0.84	0.42	3/8 NPT	5/16-18 UNC	1.22	0.80	0.50	0.34	1.43	2.47	3.58

** For Strokes .125, .188, and .250

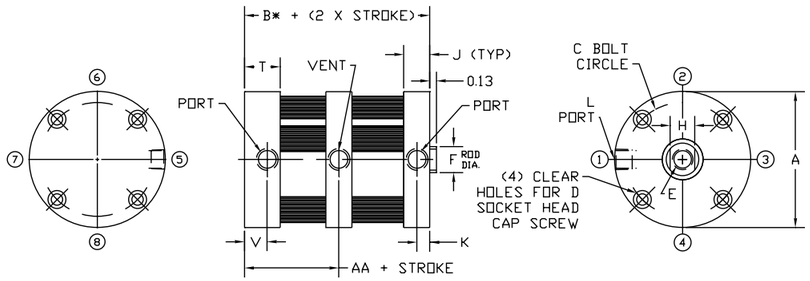
Bore	Type	Final Overall Cylinder Length*		
		Stroke		
		.125	.188	.250
2-1/2" (50)	FO2	2.65	2.71	2.77
	FO3	3.64	3.76	3.87
	FO4	4.63	4.81	4.97
3" (70)	FO2	2.75	2.81	2.88
	FO3	3.77	3.90	4.01
	FO4	4.79	4.98	5.15
4" (125)	FO2	3.38	3.44	3.53
	FO3	4.61	4.74	4.89
	FO4	5.85	6.04	6.24

*See page 176 for length adders for options.

FO2, FO3, and FO4 Basic Models

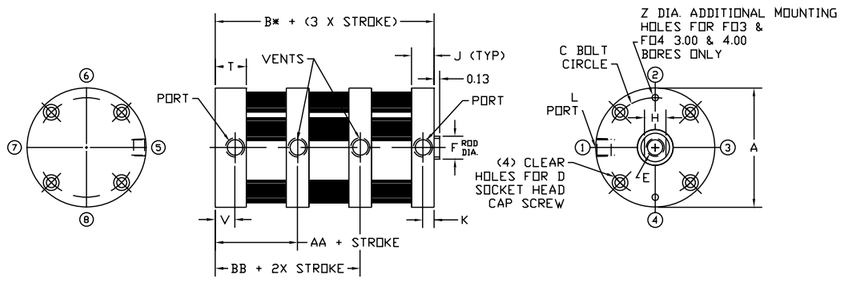
Standard Strokes: 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 1", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/2", 3", 3-1/2", 4". Special strokes available on request.

Model FO2



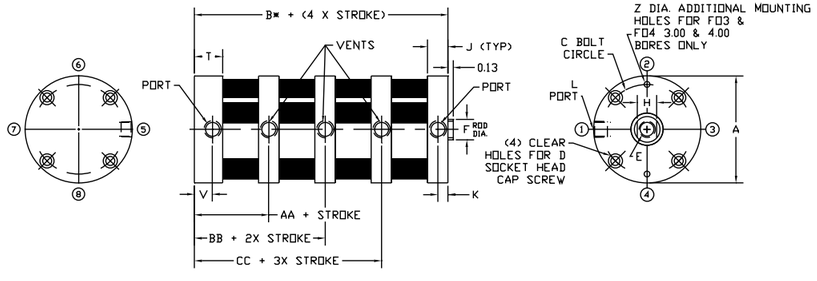
*Some options affect cylinder length, see page 176

Model FO3



*Some options affect cylinder length, see page 176

Model FO4



*Some options affect cylinder length, see page 176

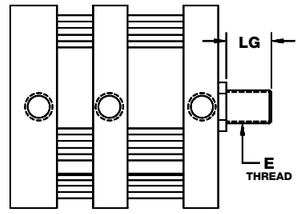
FO2, FO3, and FO4 Basic Models

Options

Bore	Type	Length Adder		
		Low Friction Seal (L)	Magnetic Position Sensing (M)	Low Friction Seals and Magnetic Position Sensing (LM)
2-1/2" (50)	FO2	0.75	.88	1.25
	FO3	1.13		1.63
	FO4	1.50		2.00
3" (70)	FO2	1.00	.88	1.38
	FO3	1.50		1.88
	FO4	2.00		2.38
4" (125)	FO2	1.00	.88	1.38
	FO3	1.50		1.88
	FO4	2.00		2.38

Male Rod Ends (Option MT or CMT)

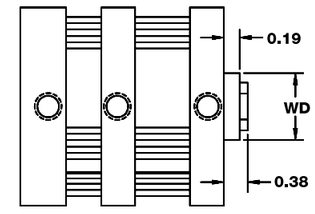
(Model FO2 shown)



Bore	E		LG
	MT	CMT	
2-1/2" (50)	1/2-20	1/2-13	0.63
3" (70)	5/8-18	5/8-11	0.75
4" (125)	3/4-16	3/4-10	0.75

Rod Wiper (Option W)

(Buna N standard, not available in high temperature option) (Model FO2 shown).

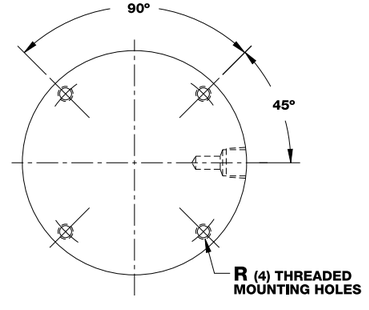


Bore	WD
2-1/2" (50)	1.13
3" (70)	1.25
4" (125)	1.38

Mounting Options

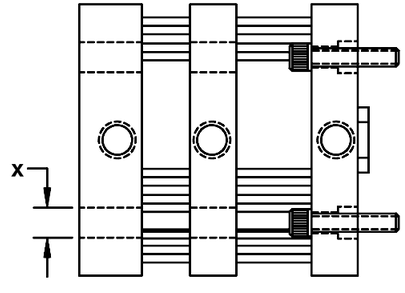
Threaded Mounting Holes

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



Screw Clearance Holes

(available either or both ends) (-4R shown) Screw clearance holes standard on all center sections



How to Order

The Model Number for all FO2, FO3, and FO4 Series Flat-1® 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 FO2 model. This is a 2-1/2" bore, 1" stroke, threaded mounting holes on both ends, and magnetic position sensing.

Type	
FO2	2 Stage Extend, Single Stage Retract
FO2	3 Stage Extend, Single Stage Retract
FO4	4 Stage Extend, Single Stage Retract

Bore Size	
50	2-1/2"
70	3"
125	4"

Stroke Length	
0.25	1/4"
1	1"
ETC.	

FO2 - 50 1 - 3 M

Mounting Options (Enter in numeric order)	
No number	Basic model (standard counterbored mounting holes)
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]

[1] "Screw clearance" to allow bolt head to pass through; no counter bores (see page 176).

Options (Enter in alphabetical order, except for EE which is last)	
CFT	Coarse female thread (fine thread standard) (see page 174)
CMT	Male rod end (coarse thread) (see page 176)
G	Magnalube® G
L	Low friction seals (see page 176)
M, M1, M3, M4	Magnetic position sensing[1]
P2, P3, P4	Front port position #2, #3, or #4 (see page 175)
P6, P7, P8	Rear port position #6, #7, or #8 (see page 175)
Q	Low temperature operation (-40° F to 200° F)
T1, T3, T4	Additional switch mounting post located in position #1, #3, or #4
V	High temperature option (0° F to 400° F)[2]
W	Rod wiper (Buna-N only) (see page 176)
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.

Approximate Power Factors					
Bore	Bore Model Designator	Power Factor Extension			Power Factor Retraction
		FO2	FO3	FO4	
2-1/2" (50)	50	9.4	13.8	18.3	4.5
3" (70)	70	13.5	20.0	26.5	6.5
4" (125)	125	24.3	36.1	47.9	11.8

Multiply the air line pressure by the power factor to get the approximate force. For example, an FO2-501-3 operated at 80 PSI will exert a force of 752lbs on extension, and 360lbs on retraction.

FO2, FO3, and FO4 Repair Kits

Bimba FO2, FO3, and FO4 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-FO-__)*		
Part No.	Description	Quantity**
PF-1	Rod Seal	2, 3 or 4
PF-2	Piston Seal	2, 3 or 4
PF-3	Tube Seal	3, 4 or 5
PF-4	Bushing	3, 4 or 5

*Must specify model and bore size when ordered.
**Quantities listed correspond with FO2, FO3 or FO4.

Wiper Option Repair Kit (K-B-FO-__-W)*		
Part No.	Description	Quantity**
PF-1	Rod Seal	2, 3 or 4
PF-2	Piston Seal	2, 3 or 4
PF-3	Tube Seal	3, 4 or 5
PF-4	Bushing	3, 4 or 5
PF-5	Wiper Bushing	1
PF-6	Wiper	1

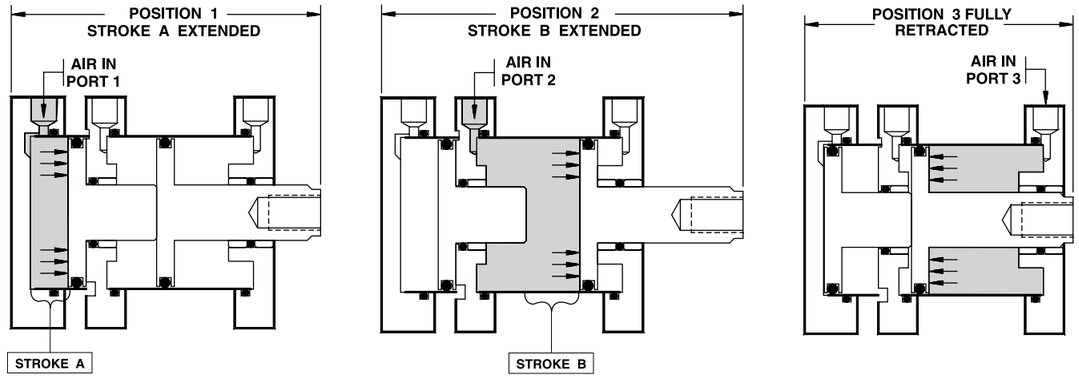
Product Features



Multiple Position FOP Flat-1® Compact Cylinders

> Bore sizes: 9/16", 3/4", 1-1/16", 1-1/2", 2", 2-1/2", 3", 4"
> 304 stainless steel body prevents corrosion
> Standard oil impregnated bronze rod bushing
> Stainless piston rod
> Maximum Pressure: 200 PSI (air only)
> Other positions (4, 5, etc.) are available as specials. Contact your local distributor for info.

How It Works



Position 1
Air is supplied to Port 1, cylinder extends stroke length A.

Position 2
Air is supplied to Port 2, cylinder extends stroke length B.

Position 3
Cylinder is fully retracted by supplying air to Port 3.

NOTE: For Magnetic Position Sensing option, magnet is mounted only on the piston of the Stroke B side.

Technical Specifications

Materials of Construction

Cylinder Body: 304 Stainless Steel

Heads: Anodized Aluminum Alloy

Piston Rod: Ground and Polished 303 Stainless Steel

Seals: Buna-N (high temperature seals optional)

Rod Bushing: Oil-Impregnated Bronze

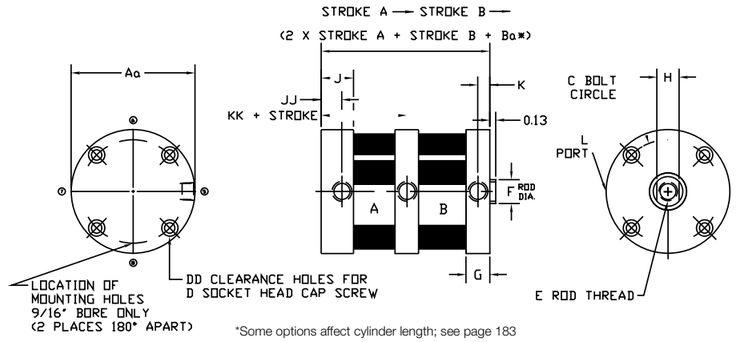
Engineering Specifications

Pressure Rating: 200 PSI maximum (air only)

Temperature: -20° F to 150° F (-25° 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.

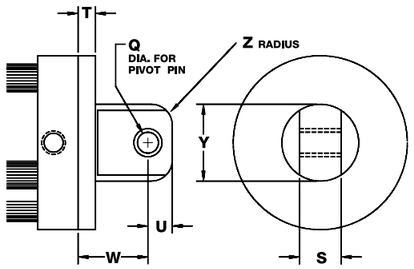
Multiple Position FOP Flat-1® Basic Models



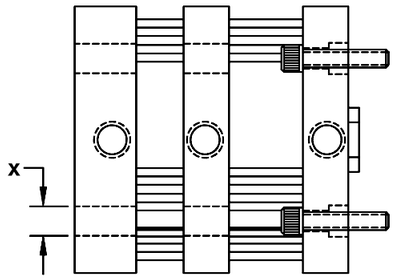
*Some options affect cylinder length; see page 183

Mounting Options

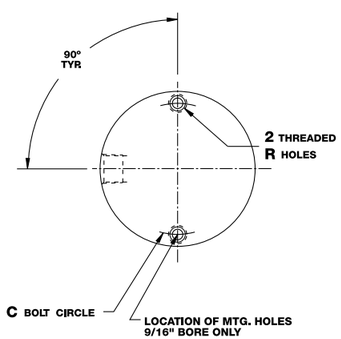
Pivot Mount
(-1 shown) Complete with bronze pivot bushing
(Not available as an accessory)



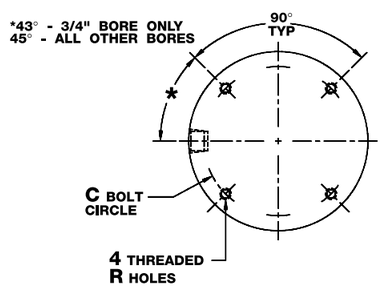
Screw Clearance Holes
(available either or both ends) (-4R shown) Screw clearance holes standard on all center sections



Threaded Mounting Holes
(available either or both ends) (3, -3F or -3R shown)
9/16" Bore



3/4" Bore and larger



Multiple Position FOP Flat-1® Dimensions (in)

Bore	Aa	Ba*	C	DD	D	E Standard	E Coarse	E Depth	F
9/16" (02)	1.13	1.14	0.88	2	#4	#8-32 UNC	N/A	0.46	0.25
3/4" (04)	1.50	1.14	1.22	4	#6	#10-32 UNF	#10-24 UNC	0.46	0.31
1-1/16" (09)	2.00	1.67	1.69	4	#6	5/16-24 UNF	5/16-18 UNC	0.70	0.50
1-1/2" (17)	2.63	1.70	2.19	4	#10	3/8-24 UNF	3/8-16 UNC	0.70	0.63
2" (31)	3.13	1.80	2.69	4	#10	1/2-20 UNF	1/2-13 UNC	0.70	0.75
2-1/2" (50)	3.75	2.25	3.25	4	1/4	1/2-20 UNF	1/2-13 UNC	0.70	0.75
3" (70)	4.25	2.34	3.78	4	1/4	5/8-18 UNF	5/8-11 UNC	0.73	0.88
4" (125)	5.50	3.00	4.94	4	5/16	3/4-16 UNF	3/4-10 UNC	0.80	1.00

Bore	G	H	J	JJ	K	KK	L
9/16" (02)	0.34	0.22	0.47	0.27	0.14	0.49	#10-32
3/4" (04)	0.34	0.25	0.47	0.27	0.14	0.49	#10-32
1-1/16" (09)	0.50	0.44	0.69	0.44	0.25	0.73	1/8 NPT
1-1/2" (17)	0.50	0.50	0.69	0.44	0.25	0.74	1/8 NPT
2" (31)	0.53	0.63	0.72	0.44	0.25	0.78	1/8 NPT
2-1/2" (50)	0.66	0.63	0.91	0.58	0.33	0.93	1/4 NPT
3" (70)	0.69	0.75	0.94	0.58	0.33	0.95	1/4 NPT
4" (125)	0.84	0.88	1.22	0.80	0.42	1.36	3/8 NPT

Bore	R	LG	WD	Q	S	T	U	W	X	Y	Z
9/16" (02)	#4-40 UNC	0.38	0.56	0.19	0.38	0.19	0.25	0.75	0.20	0.63	0.19
3/4" (04)	#6-32 UNC	0.38	0.69	0.19	0.38	0.19	0.25	0.75	0.23	0.75	0.19
1-1/16" (09)	#6-32 UNC	0.50	0.88	0.19	0.38	0.25	0.25	0.81	0.25	0.75	0.19
1-1/2" (17)	#10-24 UNC	0.50	1.00	0.38	0.75	0.25	0.44	1.19	0.34	1.38	0.38
2" (31)	#10-24-UNC	0.63	1.12	0.38	0.75	0.31	0.44	1.25	0.34	1.38	0.38
2-1/2" (50)	1/4-20 UNC	0.63	1.12	0.38	0.75	0.38	0.44	1.31	0.41	1.38	0.38
3" (70)	1/4-20 UNC	0.75	1.25	0.63	1.00	0.38	0.56	1.69	0.41	1.88	0.38
4" (125)	5/16-18 UNC	0.75	1.38	0.63	1.00	0.44	0.56	1.75	0.50	1.88	0.38

*See page 183 for length adders for options.

Multiple Position FOP Flat-1® Accessory Options and Dimensions (in)

Length Adder Dimensions for Options
(Dimensional variations from standard as shown)

Bore	Length Adder		
	Low Friction Seals (L)	Magnetic Position Sensing* (M)	Low Friction Seals and Magnetic Position Sensing
9/16" (02), 3/4" (04)	0.50	0.88	1.12
1-1/16" (09), 1-1/2" (17), 2" (31), 2-1/2" (50)	0.75	0.88	1.25
3" (70), 4" (125)	1.00	0.88	1.38

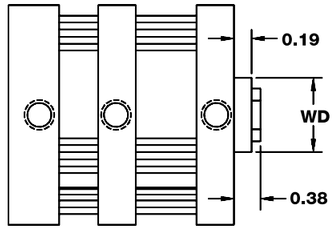
*A minimum total stroke of 0.38" is required to sense extending end-of-stroke position.

Minimum Stroke

	Bore							
Model	9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)	2-1/2" (50)	3" (70)	4" (125)
Base Model Stroke A	0.19	0.19	0.25	0.25	0.25	0.38	0.38	0.34

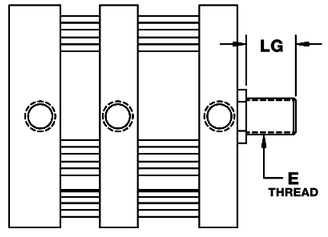
No minimum for stroke B. No minimum for stroke A or B with low friction seal option.

Rod Wiper (Option W)
(Buna N standard, not available in high temperature option)



Bore	WD
9/16" (02)	0.56
3/4" (04)	0.69
1-1/16" (09)	0.88
1-1/2" (17)	1.00
2" (31), 2-1/2" (50)	1.13
3" (70)	1.25
4" (125)	1.38

Male Rod Ends (Option MT or CMT)



Bore	E		LG
	MT	CMT	
9/16" (02)	#8-32	N/A	0.38
3/4" (04)	#10-32	#10-24	0.38
1-1/16" (09)	5/16-24	5/16-18	0.50
1-1/2" (17)	3/8-24	3/8-16	0.50
2" (31), 2-1/2" (50)	1/2-20	1/2-13	0.63
3" (70)	5/8-18	5/8-11	0.75
4" (125)	3/4-16	3/4-10	0.75

How to Accessorize

COMPACT CYLINDERS

Multiple Position FOP Flat-1® Accessory Options and Dimensions (in)

Weights

Bore	Approximate Cylinder Weights (oz)	
	Base	Adder per 1/8" of stroke
9/16" (02)	3.3	0.16
3/4" (04)	4.5	0.2
1-1/16" (09)	9.9	0.6
1-1/2" (17)	18.7	0.8
2" (31)	24.5	1
2-1/2" (50)	41.3	1.2
3" (70)	52.9	1.6
4" (125)	102.7	2

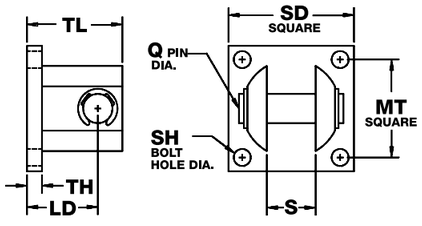
Flat-1® Accessory Selection Guide (All Models)

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

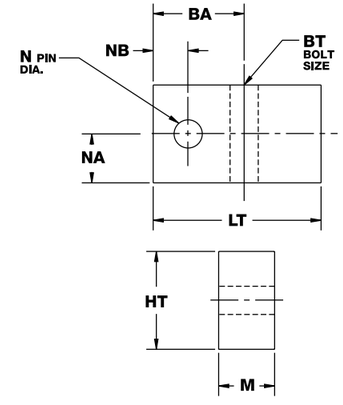
Model	Bore	LD	MT	Q	S	SH	SD	TH	TL
BC-1	9/16" (02), 3/4" (04), 1-1/16" (09)	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
BC-2	1-1/2" (17), 2" (31), 2-1/2" (50)	0.94	1.38	0.38	0.75	#10	1.75	0.22	1.34
BC-3	3" (70), 4" (125)	1.25	2.00	0.63	1.00	0.25	2.50	0.25	1.81

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



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How to Order

The Model Number for all Multiple Position FOP Flat-1® cylinders consists of alphanumeric clusters. These designate type, bore size, stroke lengths, mounting, and special options. Please refer to the charts below for an example of a standard FOP Flat-1® model. This is a multiple position 1-1/2" bore, 3/8" stroke for position A, 1/4" stroke for position B, rear head pivot mount cylinder with high temperature seals.

Type	
FOP	Double Acting Multiple Position, Single End Rod

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"
125	4"

Stroke Length A	
0.25	1/4"
0.375	3/8"
0.625	5/8"
ETC.	

Stroke Length B	
0.25	1/4"
0.375	3/8"
0.625	5/8"
ETC.	

FOP - 17 0.375 / 0.25 - 1 V

Mounting Options	
No number	Basic model (standard counter-bored mounting holes)
1	Pivot mount
1N	Pivot mount 90° from standard
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]

Options (Enter in alphabetical order, except for EE which is last)	
CFT	Coarse female rod thread (fine thread standard) (see page 182)
CMT	Male rod thread end (coarse thread) (see page 183)
G	Magnalube® G
L	Low friction seals (see table page 183)
M, M1, M3, M4	Magnetic position sensing (see table page 183)
MT	Male rod thread end (fine thread) (see page 183)
NT	Non-threaded rod
P2, P3, P4	Front port position #2, #3, or #4 (see page 181)[1]
P6, P7, P8	Rear port position #6, #7, or #8 (see page 181)[1]
Q	Low temperature operation (-40° F to 200° F)
T1, T3, T4	Additional switch mounting post located in position #1, #3, or #4
V	High temperature option (0° F to 400° F)[2]
W	Rod wiper (Buna-N only) (see page 183)
Y	Moly-coat (MoS_2 I.D. coating)
EE0.375	3/8" extra rod extension, etc.
EE1	1" extra rod extension, etc.

[1] Not available in 9/16" bore.
[2] 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.

Multiple Position FOP Repair Kits

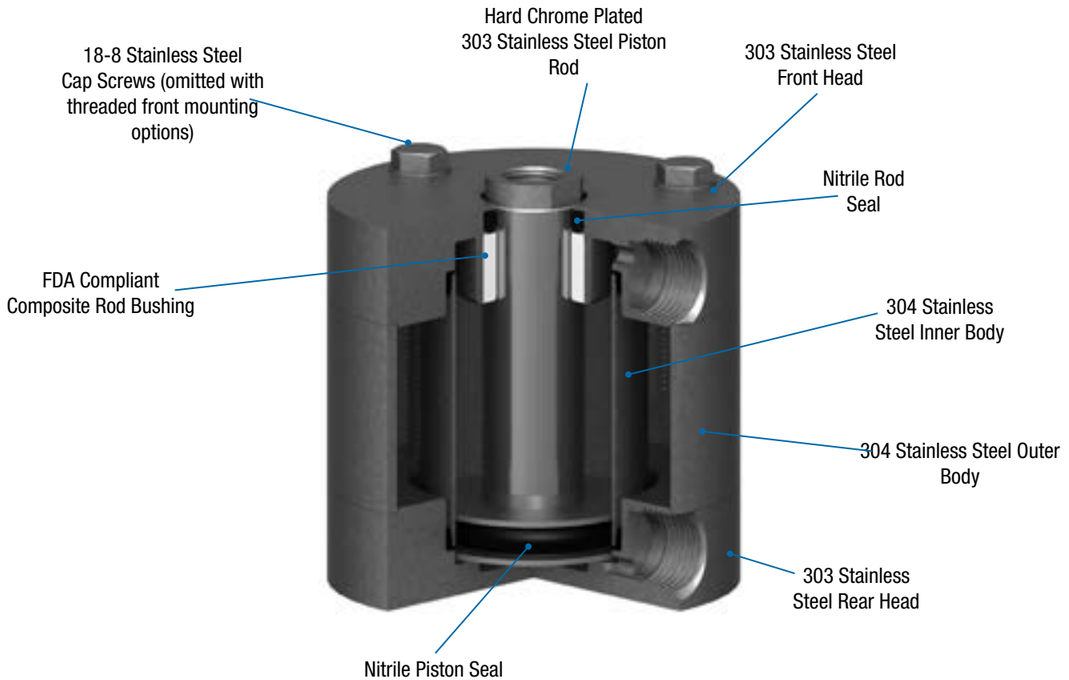
Bimba Multiple Position FOP cylinders are repairable. To order repair kits, please provide the correct bore code in the kit part number blank for the desired size repair kit. Optional seals are designated by the suffix option. Repair kits include the standard bronze rod bushing, piston, rod, and body 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-FOP)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	2
PF-2	Piston Seal	2
PF-3	Tube Seal	3
PF-4	Bushing	3

Wiper Option Repair Kit (K-B-FOP-W)*		
Part No.	**Description**	**Quantity**
PF-1	Rod Seal	2
PF-2	Piston Seal	2
PF-3	Tube Seal	3
PF-4	Bushing	2
PF-5	Wiper Bushing	1
PF-6	Wiper	1

*Must specify bore size when ordered. Contact your local Bimba distributor for pricing on kits and other repair parts.

Product Features



Stainless Steel Flat-1® Features and Benefits

> Hygienic design is easy to clean and eliminates holes and crevices that can propagate bacterial growth.
> All stainless steel construction provides superior corrosion resistance.
> Hard chrome plated piston rod reduces wear on the rod seal.
> IP69K rated design features a sealed outer body which prevents the ingress of washdown chemicals and application matter.
> Food grade plastic rod bushing and food grade grease lubricant is ideal for food processing and packaging applications.

The Ideal Solution for Washdown and Other Corrosive Environments!

The compact Stainless Steel Flat-1® offers mounting styles to fit most every application!


Pivot Mount


Front Trunnion


Rear Trunnion


Threaded Front


Threaded Rear


F Series Front


F Series Rear


Basic

> Minimal mounting holes present only where specified reduces catch points
> Sealed outer body prevents outside contamination from penetrating cylinder body
> F Series provides a mounting interchange to competitive designs

Technical Specifications

Materials of Construction

End Caps: 303 Stainless Steel
Inner and Outer Body: 304 Stainless Steel
Piston Rod: 303 Hard Chrome Plated Stainless Steel
Lubrication: Food Grade Grease
Seals: Buna-N Standard; High and Low Temperature (optional)

Engineering Specifications

Temperature: -20° F to 200° F Standard
-40° F to 200° F (Low Temperature)
0° F to 400° F (High Temperature)
Pressure Rating: 250 PSI
Ingress Protection Rating: IP69K

* Cylinders operated for extended time at temperatures below 0° F or above 300° F may require special modifications.

Stainless Steel Flat-1® Specifications

Maximum Stroke + Extra Extension Lengths

Model	Bore Sizes	Maximum Stroke
SSFO (Standard Seals)	02 and 04	9"
SSFO (Standard Seals)	09 through 125	15"
SSFO (Low Friction Seals)	02 and 04	9"
SSFO (Low Friction Seals)	09 through 125	15"
SSFOD	All bore sizes	16"
SSFOS	All bore sizes	4"
SSFOR	02 through 50	4"
SSFOR	70 and 125	3"

Cylinder Weights

Approximate Cylinder Weights (lbs)

Bore	SSFO		SSFOD		SSFOR/SSFOS				
	0" Stroke	Adder Per 1/8" of Stroke	0" Stroke	Adder Per 1/8" of Stroke	0" Stroke (Up To 1")	1" Stroke (Up To 2")	2" Stroke (Up To 3")	3" Stroke (Up To 4")	Adder Per 1/8" of Stroke
9/16" (02)	0.15	0.01	0.17	0.01	0.20	0.36	0.52	0.68	0.01
3/4" (04)	0.27	0.02	0.31	0.02	0.34	0.56	0.78	1.00	0.02
1-1/16" (09)	0.70	0.03	0.76	0.03	0.78	1.14	1.47	1.85	0.02
1-1/2" (17)	1.20	0.04	1.35	0.05	1.34	1.88	2.43	2.97	0.03
2" (31)	1.63	0.05	1.82	0.06	1.81	2.45	3.02	3.72	0.04
2-1/2" (50)	3.13	0.05	3.44	0.07	3.42	4.58	5.63	6.79	0.04
3" (70)	3.97	0.07	4.35	0.09	4.35	5.58	7.00	8.19	0.05
4" (125)	6.20	0.09	8.17	0.12	8.49	9.96	11.63	13.08	0.07

Length Adders for Low Friction Seals

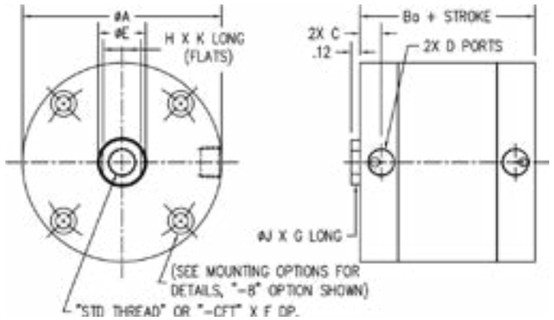
	Bore Size							
	9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)	2-1/2" (50)	3" (70)	4" (125)
Length adder (in)	0.25	0.25	0.38	0.38	0.38	0.38	0.50	0.50

Enclosed Spring Forces

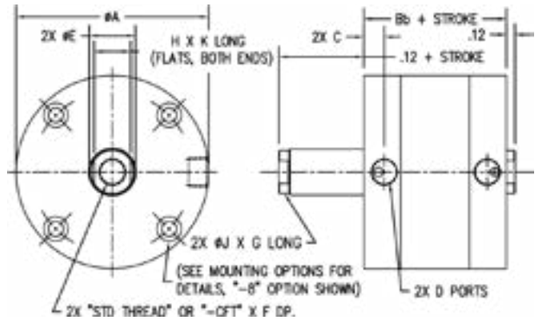
Bore	Maximum Force (lb)	Spring Rates (Lb/In)			
		0.12 To 1" Stroke (lb/in)	1.001 To 2" Stroke (lb/in)	2.001 To 3" Stroke (lb/in)	3.001 To 4" Stroke (lb/in)
9/16" (02)	5.90	4.00	1.75	1.24	0.88
3/4" (04)	10.40	6.00	2.70	1.86	1.35
1-1/16" (09)	10.80	6.50	2.70	1.91	1.35
1-1/2" (17)	12.90	6.00	2.30	1.66	1.15
2" (31)	17.50	11.00	2.60	2.10	1.30
2-1/2" (50)	26.00	9.50	5.00	3.28	2.50
3" (70)	35.00	16.00	5.00	3.81	2.50
4" (125)	50.00	22.00	5.50	4.40	2.75

Stainless Steel Flat-1® Basic Model Dimensions (in)

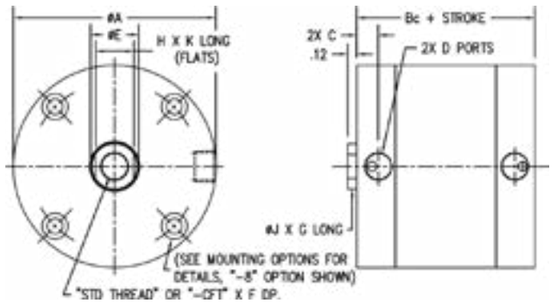
Model SSFO
(Double Acting Single End Rod)



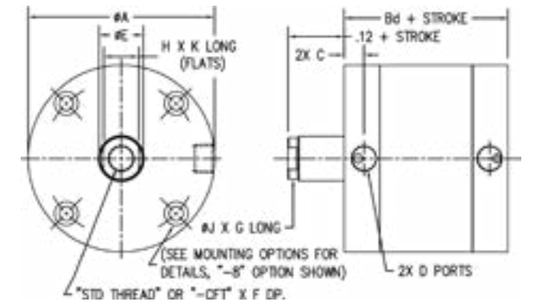
Model SSFOD
(Double Acting Double End Rod)



Model SSFOS
(Single Acting Rod Normally Retracted)



Model SSFOR
(Reverse Single Acting Rod Normally Extended)

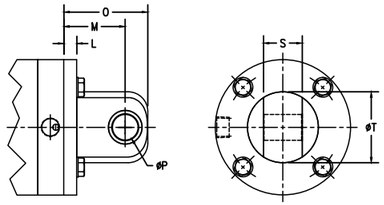


Bore	A	Ba	Bb	Bc				Bd				C	D	E
				0-1"	1.01"-2"	2.01"-3"	3.01"-4"	0-1"	1.01"-2"	2.01"-3"	3.01"-4"			
9/16" (02)	1.13	0.56	0.69	0.81	1.38	1.96	2.52	1.06	1.63	2.14	2.70	0.17	#10-32	0.25
3/4" (04)	1.50	0.56	0.69	0.81	1.38	1.94	2.50	1.06	1.62	2.19	2.75	0.17	#10-32	0.31
1-1/16" (09)	2.00	0.88	0.94	0.88	1.50	2.13	2.75	1.38	2.00	2.63	3.25	0.28	1/8 NPT	0.50
1-1/2" (17)	2.63	0.88	1.00	0.88	1.50	2.13	2.75	1.38	2.00	2.63	3.25	0.28	1/8 NPT	0.63
2" (31)	3.13	0.94	1.06	0.94	1.56	2.19	2.81	1.44	2.06	2.69	3.31	0.28	1/8 NPT	0.75
2-1/2" (50)	3.75	1.19	1.31	1.19	2.06	2.94	3.81	1.94	2.81	3.69	4.56	0.35	1/4 NPT	0.75
3" (70)	4.25	1.25	1.37	1.25	2.12	3.00	3.87	2.00	2.88	3.75	N/A	0.35	1/4 NPT	0.88
4" (125)	5.50	1.56	1.69	1.57	2.45	3.32	4.20	2.32	3.20	4.07	N/A	0.42	3/8 NPT	1.00

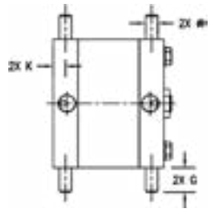
Bore	Std Thread	CFT	F	G	H	J	K
9/16" (02)	#8-32 UNC-2B	N/A	0.46	0.14	0.22	0.24	0.13
3/4" (04)	#10-32 UNF-2B	#10-24 UNC-2B	0.46	0.14	0.25	0.29	0.13
1-1/16" (09)	5/16-24 UNF-2B	5/16-18 UNC-2B	0.70	0.14	0.44	0.48	0.13
1-1/2" (17)	3/8-24 UNF-2B	3/8-16 UNC-2B	0.70	0.14	0.50	0.59	0.13
2" (31)	1/2-20 UNF-2B	1/2-13 UNC-2B	0.70	0.14	0.62	0.71	0.13
2-1/2" (50)	1/2-20 UNF-2B	1/2-13 UNC-2B	0.70	0.14	0.62	0.71	0.13
3" (70)	5/8-18 UNF-2B	5/8-11 UNC-2B	0.73	0.14	0.75	0.84	0.13
4" (125)	3/4-16 UNF-2B	3/4-10 UNC-2B	0.80	0.14	0.87	0.96	0.13

Stainless Steel Flat-1® Mounting Options and Dimensions (in)

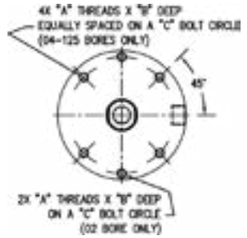
Pivot Mount (Option 1 or 1N)
Available in standard or 90˚
Complete with FDA compliant Pivot Bushing
Option 1 is shown; not available as an accessory



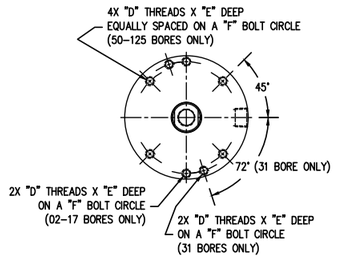
Trunnion Mount (Option 2, 2F, or 2R)
Available in Front, Rear, or Both Locations
Not available in 9/16" bore



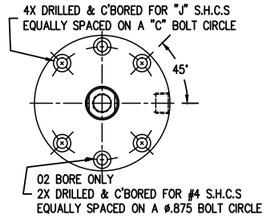
Threaded Mounting Holes (Option 3F and 3R)
Available in Front or Rear Locations



F Series Interchange Threaded Mounting Holes
(Option 7F and 7R) Available in Front or Rear Locations



Basic Model (Option 8)
Counterbored Mounting Holes Both Ends



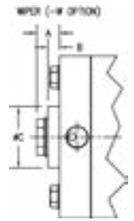
Mounting Option Dimensions

Bore	Front/Rear Mount															
	A	B	C	D	E	F	G	H	J	K	L	M	O	P	S	T
9/16" (02)*	#4-40 UNC-2B	0.22	0.88	#6-32 UNC-2B	0.20	0.88	N/A	N/A	#4	N/A	0.19	0.75	1.00	0.19	0.38	0.63
3/4" (04)	#6-32 UNC-2B	0.20	1.22	#8-32 UNC-2B	0.20	1.19	0.31	0.13	#6	0.17	0.19	0.75	1.00	0.19	0.38	0.75
1-1/16" (09)	#6-32 UNC-2B	0.36	1.69	#10-32 UNF-2B	0.30	1.69	0.50	0.25	#6	0.25	0.25	0.81	1.06	0.19	0.38	0.75
1-1/2" (17)	#10-24 UNC-2B	0.30	2.19	#10-32 UNF-2B	0.30	2.38	0.50	0.25	#10	0.25	0.25	1.19	1.63	0.38	0.75	1.38
2" (31)	#10-24 UNC-2B	0.33	2.69	1/4-20 UNC-2B	0.31	2.81	0.50	0.25	#10	0.25	0.31	1.25	1.69	0.38	0.75	1.38
2-1/2" (50)	1/4-20 UNC-2B	0.42	3.25	1/4-20 UNC-2B	0.42	3.25	0.63	0.31	1/4	0.33	0.38	1.31	1.75	0.38	0.75	1.38
3" (70)	1/4-20 UNC-2B	0.44	3.78	1/4-20 UNC-2B	0.44	3.81	0.63	0.31	1/4	0.33	0.38	1.69	2.25	0.63	1.00	1.88
4" (125)	5/16-18 UNC-2B	0.57	4.94	1/4-20 UNC-2B	0.59	5.00	0.75	0.38	5/16	0.42	0.44	1.75	2.31	0.63	1.00	1.88

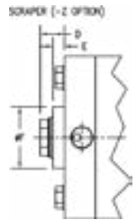
*=only 2 holes

Stainless Steel Flat-1® Cylinder Options and Dimensions (in)

Rod Wiper
(Option W)

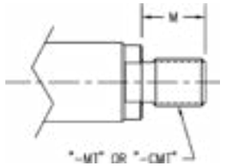


Metallic Rod Scraper
(Option Z)

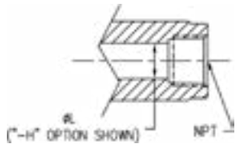


Bore	Wiper			Scraper		
	A	B	C	D	E	F
9/16" (02)	0.46	0.27	0.56	0.51	0.32	0.65
3/4" (04)	0.46	0.27	0.68	0.51	0.32	0.75
1-1/16" (09)	0.46	0.27	0.87	0.54	0.36	0.93
1-1/2" (17)	0.39	0.19	0.99	0.51	0.30	1.06
2" (31)	0.39	0.19	1.12	0.51	0.30	1.18
2-1/2" (50)	0.39	0.19	1.12	0.51	0.30	1.18
3" (70)	0.39	0.19	1.24	0.51	0.30	1.37
4" (125)	0.39	0.19	1.37	0.51	0.30	1.43

Male Rod End Dimension for MT or CMT Options



NPT Thread Dimensions for FOD Cylinders

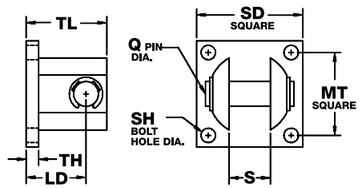


Bore	Rod Thread				
	Mt	Cmt	Npt	L	M
9/16" (02)	#8-32 UNC-2A	N/A	N/A	0.14	0.38
3/4" (04)	#10-32 UNF-2A	#10-24 UNC-2A	N/A	0.14	0.38
1-1/16" (09)	5/16-24 UNF-2A	5/16-18 UNC-2A	1/8 NPT	0.22	0.50
1-1/2" (17)	3/8-24 UNF-2A	3/8-16 UNC-2A	1/8 NPT	0.28	0.50
2" (31)	1/2-20 UNF-2A	1/2-13 UNC-2A	1/8 NPT	0.38	0.63
2-1/2" (50)	1/2-20 UNF-2A	1/2-13 UNC-2A	1/4 NPT	0.38	0.63
3" (70)	5/8-18 UNF-2A	5/8-11 UNC-2A	3/8 NPT	0.44	0.75
4" (125)	3/4-16 UNF-2A	3/4-10 UNC-2A	1/2 NPT	0.50	0.75

Stainless Steel Flat-1® Accessory Options and Dimensions (in)

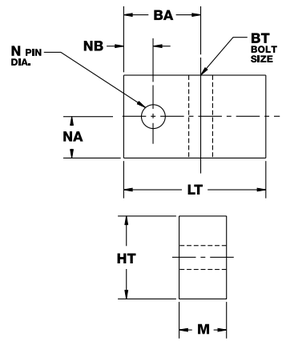
Stainless Steel Clevis Bracket complete with Stainless Steel Pin; Designed for use with Pivot Mounted Cylinder (Option 1 or 1N)

Bore	Model	LD	MT	Q	S	SH	SD	TH	TL
9/16" (02)	BC-1-SS	0.56	0.75	0.19	0.39	0.16	1.00	0.16	0.78
3/4" (04)	BC-1-SS	0.56	0.75	0.19	0.39	0.16	1.00	0.16	0.78
1-1/16" (09)	BC-1-SS	0.56	0.75	0.19	0.39	0.16	1.00	0.16	0.78
1-1/2" (17)	BC-2-SS	0.94	1.38	0.38	0.77	0.22	1.75	0.22	1.34
2" (31)	BC-2-SS	0.94	1.38	0.38	0.77	0.22	1.75	0.22	1.34
2-1/2" (50)	BC-2-SS	0.94	1.38	0.38	0.77	0.22	1.75	0.22	1.34
3" (70)	BC-3-SS	1.25	2.00	0.63	1.02	0.25	2.50	0.25	1.81
4" (125)	BC-3-SS	1.25	2.00	0.63	1.02	0.25	2.50	0.25	1.81



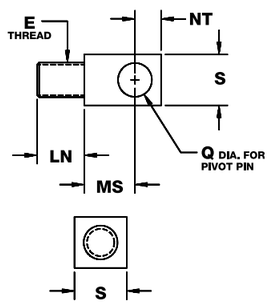
Stainless Steel Trunnion Bracket (2 pieces)

Bore	Model	BA	BT	HT	LT	M	N	NA	NB
3/4" (04)	BT-1-SS	0.56	0.22	0.62	1.13	0.31	0.13	0.30	0.22
1-1/16" (09)	BT-2-SS	0.81	0.28	0.87	1.50	0.50	0.25	0.38	0.31
1-1/2" (17)	BT-2-SS	0.81	0.28	0.87	1.50	0.50	0.25	0.38	0.31
2" (31)	BT-2-SS	0.81	0.28	0.87	1.50	0.50	0.25	0.38	0.31
2-1/2" (50)	BT-3-SS	0.94	0.34	0.98	1.63	0.63	0.32	0.45	0.38
3" (70)	BT-3-SS	0.94	0.34	0.98	1.63	0.63	0.32	0.45	0.38
4" (125)	BT-4-SS	1.06	0.41	1.23	1.88	0.75	0.38	0.55	0.44



Stainless Steel Rod Pivot; complete with Stainless Steel Nut

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



The Model Number for all Stainless Steel Flat-1® cylinders consists of three alphanumeric clusters. These designate type, bore size, stroke length, and mounting and special options. Please refer to the charts below for an example of Model Number SSFO-170.25-1V. This is a stainless steel, double acting, 1-1/2" bore, 1/4" stroke, pivot mount cylinder with high temperature option.

Type	
SSFO	Stainless Steel Double Acting
SSFOD	Stainless Steel Double End Rod
SSFOR	Stainless Steel Reverse Acting
SSFOS	Stainless Steel Single Acting

Bore Size			
02	9/16"	31	2"
04	3/4"	50	2-1/2"
09	1-1/16"	70	3"
17	1-1/2"	125	4"

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

SSFO - 17 0.25 - 1 V

Mounting Options	
Enter in numerical order	
1	Pivot mount
1N	Pivot mount 90° from standard
2	Trunnion both ends[1]
2F	Front trunnion mount[1]
2R	Rear trunnion[1]
3F	Threaded mounting holes, front
3R	Threaded mounting holes, rear
7F	F series interchange, threaded holes, front[2]
7R	F series interchange, threaded holes, rear[2]
8	Basic model (standard counterbored mounting holes, both ends)

[1] Not available in 9/16" bore
[2] Available in 02, 04, and 09 bores only

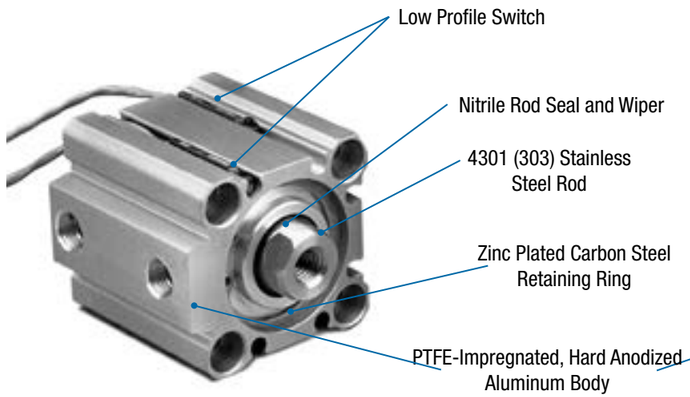
NOTE: To minimize catchpoints where application debris and bacteria may collect, mounting holes are present only where specified by part number. For example, when ordering the -3R option, you will receive threaded mounting holes on the rear cap. There will be NO mounting holes on the front cap.

Options	
Enter in numerical order, except for EE, which is last	
99	Oil pre-lube
B	Bumpers, both ends[1 2]
BF	Bumper, front only[1 2]
BR	Bumper, rear only[1 2]
CFT	Coarse female thread (fine thread standard) (see page 190)
CMT	Male rod end (coarse thread) (see page 192)
D	Low pressure hydraulic design (250 PSI maximum)
H	Hollow rod (FOD models only) (see page 192)
J	Failsafe operation, spring retract (FOD models)
L	Low friction seals (see table page 185 for length adders)
MT	Male rod end (fine thread) (see page 192)
NPT	Female NPT thread, both ends (FOD models only)[4]
NPTF	Female NPT thread, front (FOD models only) (see page 192)[4]
NPTR	Female NPT thread, rear (FOD models only) (see page 192)[4]
NT	Non-threaded rod
Q	Low temperature design (-40° F to 200° F)
SR	Stainless steel rod (no chrome plating)
V	High temperature option (0° F to 400° F)[2]
W	Rod wiper (Buna N only) (see page 192)
X	X-ring pistion seal[3]
Z	Metallic rod scraper (see page 192)
EE0.375	3/8" extra rod extension, etc.
EE1	1" extra rod extension, etc.

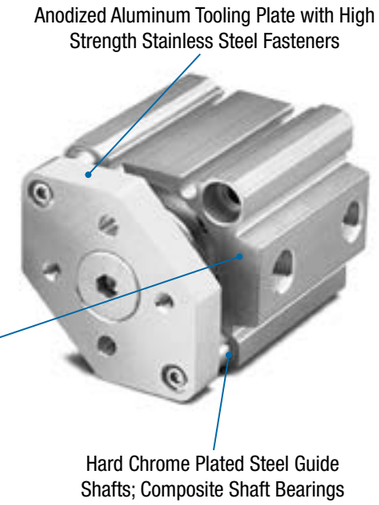
[1] There is no stroke reduction when the supply pressure is 80 PSI or greater. At 0 PSI, there will be a stroke reduction of approximately .040". Bumper compression is linear from 0 PSI to 80 PSI. FOS models have a rear bumper only, FOR models a front bumper only.
[2] Bumper material is rated to 200° F.
[3] Optional piston seal which may improve performance in certain short stroke applications where back pressure due to flow controls or reduced exhaust flow may exist.
[4] Must be ordered with Hollow Rod (H) option.

Product Features

EF Cylinder



EFT Cylinder



Not Pictured:

- Bronze Bushing (12-20mm); Self-lubricating Nylon (25-100mm)
- Bronze Rod Guide (12-20mm); Anodized Aluminum (25-100mm)
- Nitrile Rod Guide Seal
- Nitrile Piston Seal
- High Strength Aluminum Alloy Piston

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 Benefits

- 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.
- EFDT cylinders are 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.
- 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!

EF1 Cylinder Options and Dimensions (in)

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.

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

*EFR style is only available as a standard with the strokes listed in the table above. Any other stroke length must be ordered as a special.

Engineering Specifications

Operating Medium:	Air
Maximum Operating Pressure:	10 bar (140 PSI)
Ambient and Fluid Temperature:	-10° C to 70° C (15° F 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.

EF1 Cylinder Options and Dimensions (in)

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)

EF1 Cylinder Options and Dimensions (in)

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)

EF1 Cylinder Options and Dimensions (in)

Enclosed Spring Forces

Action	Bore	Compressed Spring Force N (lb)	Spring Rate N/mm (lb/in)
Spring 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)

EF1 Cylinder Options and Dimensions (mm [in])

Double Acting/Single Rod

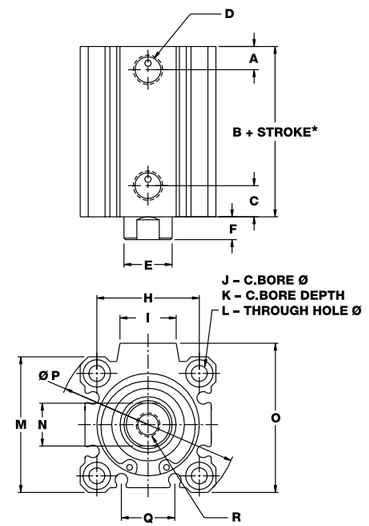
Bore	A	B	C	D	E	F	H
12mm (1/2")	3.8 (0.15)	17.0 (0.67)	8.9 (0.35)	M5 x 0.8 (#10-32)	6.0 (0.24)	3.5 (0.14)	15.5 (0.61)
16mm (5/8")	4.6 (0.18)	18.5 (0.73)	9.4 (0.37)	M5 x 0.8 (#10-32)	8.0 (0.31)	3.5 (0.14)	20.0 (0.79)
20mm (3/4")	4.8 (0.19)	19.5 (0.77)	9.4 (0.37)	M5 x 0.8 (#10-32)	10.0 (0.39)	4.5 (0.18)	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 205 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).



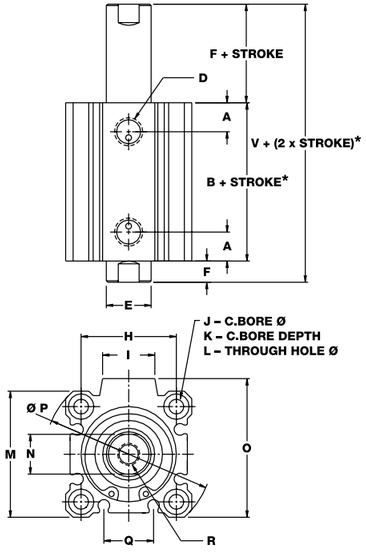
EF1 Cylinder Options and Dimensions (mm [in])

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 205 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).

How to Specify

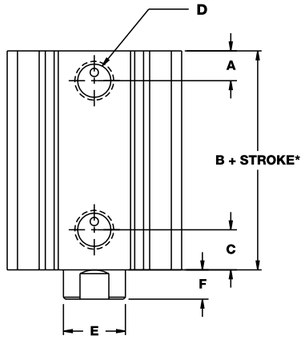
COMPACT CYLINDERS

EF1 Cylinder Options and Dimensions (mm [in])

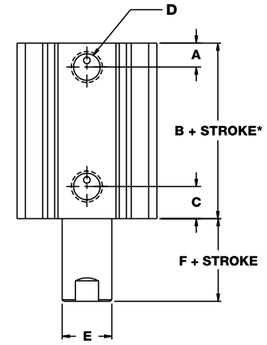
Spring Retract/Spring Extend

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 205 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)

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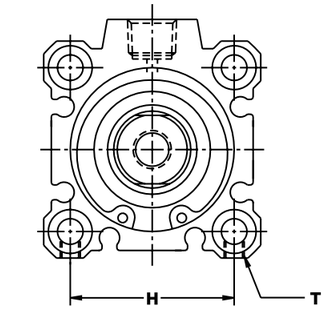
EF1 Cylinder Options and Dimensions (mm [in])

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)

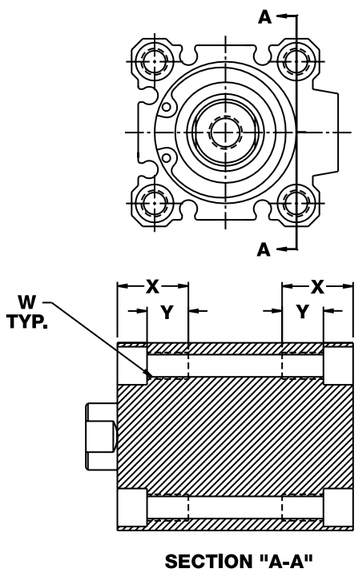
NOTE: On the following models, only the front set of threaded bottom mounting holes is provided; EF-205, EF-2010, EF-255, EF-325, EF-8010.



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.

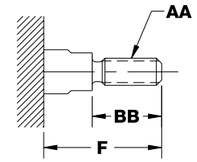


EF1 Cylinder Options and Dimensions (mm [in])

Options

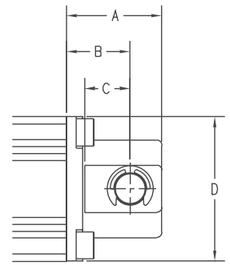
Male Rod End (MT)

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	32.5 (1.28)	43.5 (1.71)	3/4-16 UNF	28.5 (1.12)	40.5 (1.59)

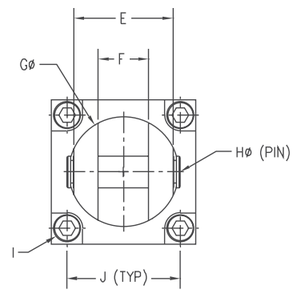


Rear Clevis Mount (6, 6N)

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)

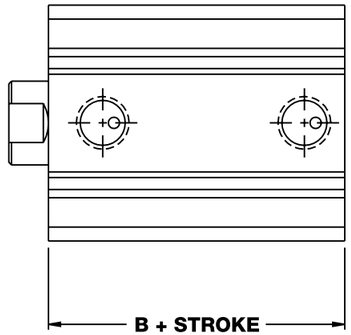


EF1 Cylinder Options and Dimensions (mm [in])

Options

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 (in)
Double Acting Single Rod End Double Acting Double Rod End	3.0 (.12)
Single Acting Spring Retract Reverse Acting Spring Extend	1.5 (.06)

EF2 Cylinder Stroke Length Availability

Bimba is a JIT manufacturer and we are able to provide EFT model cylinders in ANY 1mm or 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.

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

How to Specify

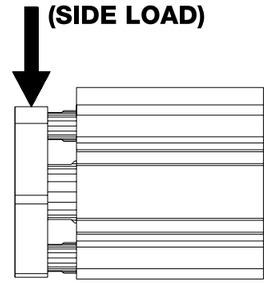
COMPACT CYLINDERS

EF2 Cylinder Options and Dimensions

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)

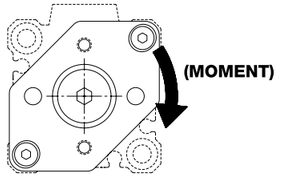
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EF2 Cylinder Options and Dimensions

EFT Cylinders

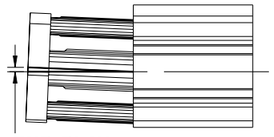
Maximum Moments N-m (in-lb)

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/	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)

How to Specify

COMPACT CYLINDERS

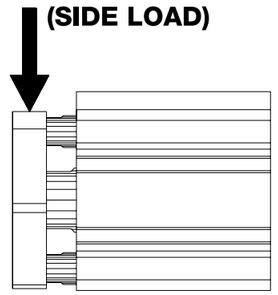
EF2 Cylinder Options and Dimensions

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)

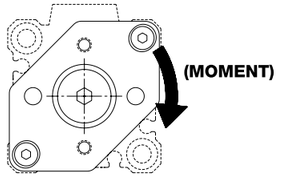
BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

EF2 Cylinder Options and Dimensions

EFT Cylinders with X Option

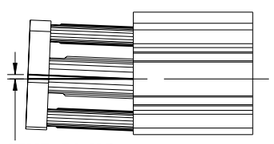
Maximum Moments N-m (in-lb)

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)



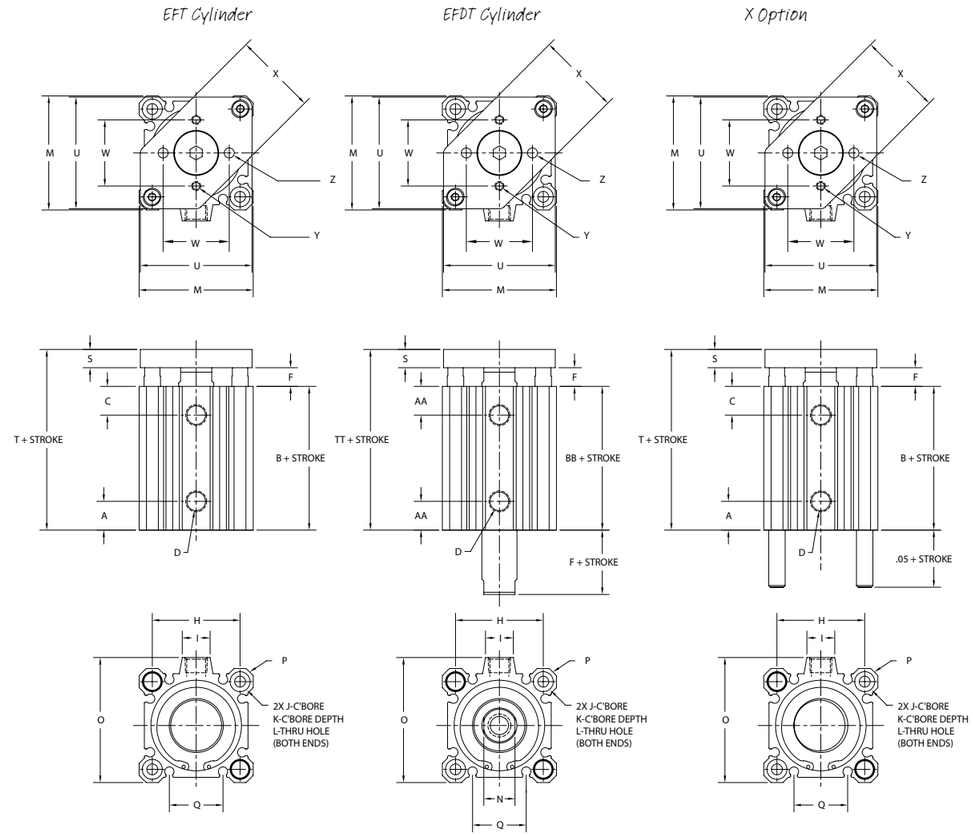
Tooling Plate End Play mm (in)

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)

EF2 Cylinder Options and Dimensions (mm [in])



Double Acting/Non-Rotating

Bore	A	AA	B	BB	C	D	F	H	I	J
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)

EF2 Cylinder Options and Dimensions (mm [in])

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 212 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).

EF2 Cylinder Options and Dimensions

Weights

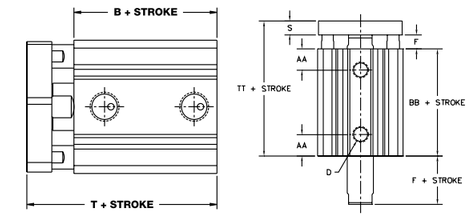
Bore	Approximate Base Weight of Cylinder gram-force (oz)	Weight Adder per 5mm of Stroke gram-force (oz)
12mm (1/2")	32.3 (1.14)	6.1 (0.22)
16mm (5/8")	53.4 (1.89)	8.6 (0.30)
20mm (3/4")	74.4 (2.62)	13.3 (0.47)
25mm (1")	114.6 (4.04)	16.3 (0.58)
32mm (1-1/4")	166.9 (5.89)	22.6 (0.80)
40mm (1-1/2")	250.7 (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.



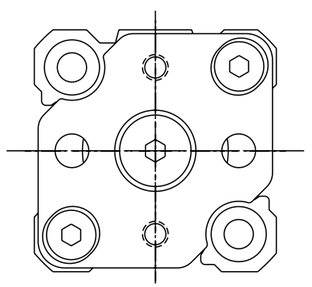
Bumpers (B)
(Stroke reduction by model for all bores)

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

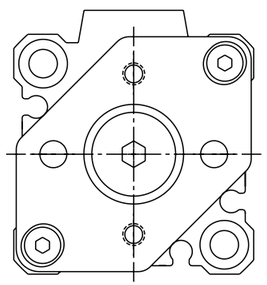
EF2 Accessory Options and Dimensions

Tooling Plate Styles

12mm to 16mm Bore

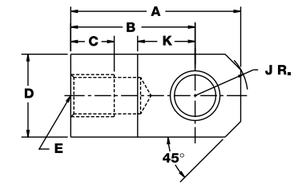


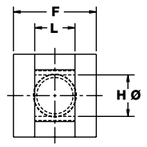
20mm to 100mm Bore



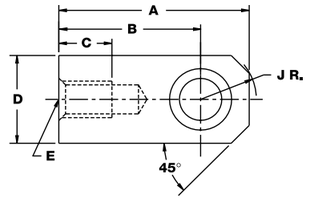
EF1 Accessory Options and Dimensions

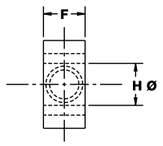
Rod Pivot



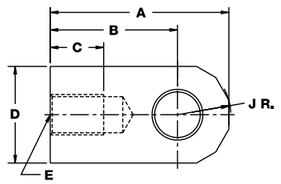


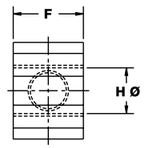
Metric Small Bore Rod Pivot (for 12mm to 63mm bore cylinders)
RPMK-12, RPMK-16, RPMK-20, RPMK-25, RPMK-32, RPMK-40, RPMK-50





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

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.

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)	5.0 (0.188)	6.2 (0.25)	6.9 N/A	4.7 N/A
RP(M,E)K-16	16mm (5/8")	12.0 (0.24)	5.0 (0.188)	7.8 (0.31)	13.9 N/A	6.2 N/A
RP(M,E)K-20	20mm (3/4")	15.9 (0.30)	8.0 (0.313)	10.2 (0.41)	11.4 N/A	7.7 N/A
RP(M,E)K-25	25mm (1")	20.0 (0.38)	10.0 (0.375)	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)	10.0 (0.375)	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)	10.0 (0.375)	11.9 (0.47)	13.9 N/A	17.6 N/A
RP(M,E)K-50	50mm (2") 63mm (2-/2")	28.0 (0.85)	14.0 (0.500)	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)	18.0 (0.750)	21.0 (0.83)	N/A	N/A
RP(M,E)K-100	100mm (4")	31.6 (1.24)	22.0 (0.875)	24.0 (0.94)	N/A	N/A

The Model Number for all EF1 cylinders consists of alphanumeric clusters. These designate type, bore size, stroke lengths, and special options. Please refer to the charts below for an example of a standard EF1 model. This is a 25mm bore, 10mm stroke, double acting, single end rod cylinder with additional options.

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

Stroke Length
See table - page 196

EF - 25 10 - 3 MMTV

Mounting Options	
No number	Basic model (standard counter-bored mounting holes)
1	Threaded bottom mounting option
3	Threaded front/rear mounting option
6	Rear clevis
6N	Rear clevis 90°

Options (Enter in alphabetical order, except for EE which is last)	
B	Bumpers (see page 212)[1]
C	Stainless steel retaining ring
E	U.S. customary units (inch)[2]
F	Full-flow port orifice[5]
M	Magnetic position sensing (see table page 205)[3]
MT	Male rod thread end (fine thread) (see page 213)[4]
NT	Non-threaded rod
V	High temperature option 15° F to 225° F (-10° C to 110° C)
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.

The Model Number for all EF2 cylinders consists of alphanumeric clusters. These designate type, bore size, stroke lengths, and special options. Please refer to the charts below for an example of a standard EF2 model. This is a double acting, guided cylinder with 32mm bore, 25mm stroke, and additional options.

Type	
EFT	Double Acting, Non-Rotating
EFDT	Double Acting, Double End Rod, Non-Rotating

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

Stroke Length
See table - page 205

EFT - 32 25 - 3 M

Mounting Options	
No number	Basic model
3	Threaded front/rear mounting option*
6	Rear clevis mount*
6N	Rear clevis 90°

*For dimensions, see page 202.

Options (Enter in alphabetical order, except for EE which is last)	
B	Bumpers (see page 212)[1]
C	Stainless steel retaining ring
E	U.S. customary units (inch)[2]
F	Full-flow port orifice[4]
M	Magnetic position sensing (see table page 212)[3]
P	Blank tooling plate
V	High temperature option 15° F to 225° F (-10° C to 110° C)
X	Rear guide sahft extension (see page 210)[5]
EE	Extra rod extension 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.

EF1 Repair Parts

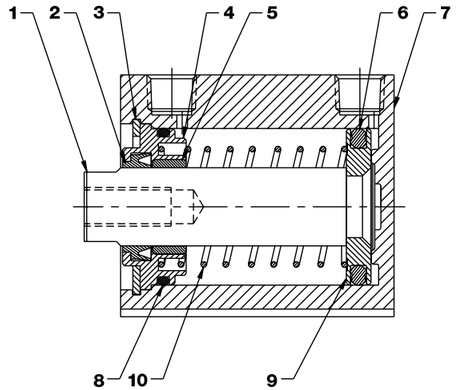
Bimba EF1 cylinders are repairable. To order repair kits, please provide the correct bore code in the kit part number blank for the desired size repair kit. Optional seals are designated by the suffix option. Repair kits include the standard bronze rod bushing, piston, rod, and body seals.*

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

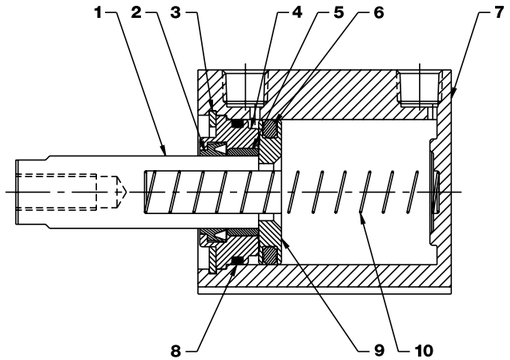
Part #	Description
K-B-EF-[Bore]	EF Series Repair Kit
K-B-EFD-[Bore]	EFD Series Repair Kit
K-B-EF-[Bore]-V	EF Series Repair Kit with FKM High Temperature Seals

NOTE: Replace [Bore] in the part number with the appropriate bore size indicator.

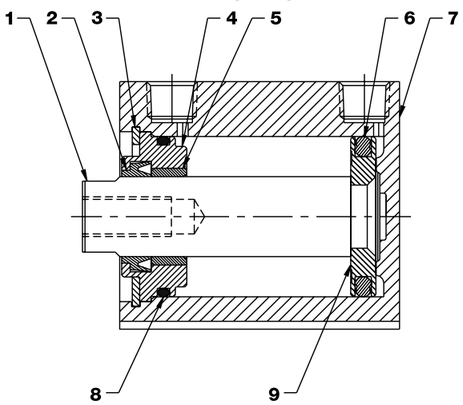
Single Acting/Spring Retract



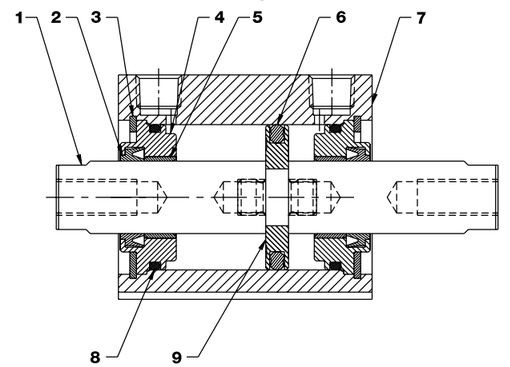
Single Acting/Spring Extend



Double Acting/Single Rod



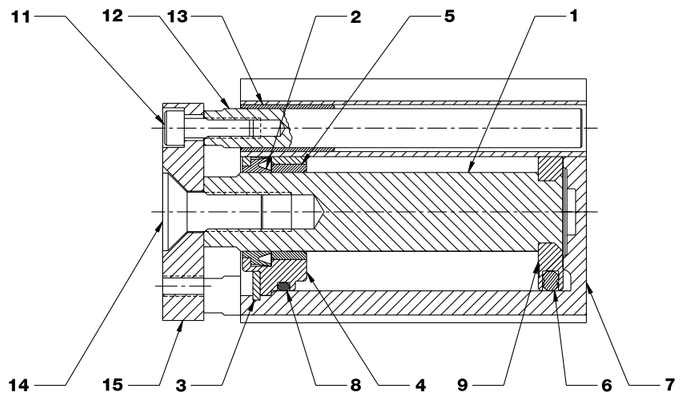
Double Acting/Double Rod



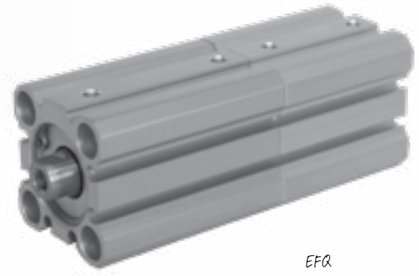
EF2 Repair Parts

EF2 cylinders use the same basic repair kits as EF1 cylinders. For additional part not included in these kits, contact your local Bimba distributor to request a quote.

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







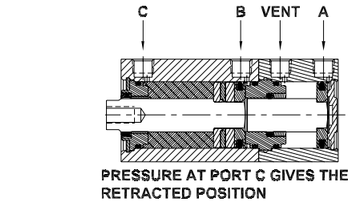
The Bimba EFP Extruded Flat Multi-Position cylinder is a double-acting, single rod end cylinder that provides three positions in one cylinder package. This cylinder is a two piston design that saves space using the existing EF footprint and eliminates the need for an additional cylinder. This unit can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

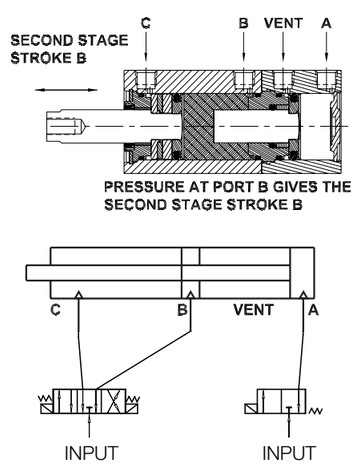
The Bimba EFQ Extruded Flat MultiForce cylinder is a double-acting, single end rod cylinder that DOUBLES the resultant force on extension. This cylinder is a two piston design that saves space using the existing EF footprint and eliminates the need for higher pressure systems or unique configurations.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

Extruded Flat Multi-Position (EFP) and Multi-Force (EFQ) Compact Cylinders

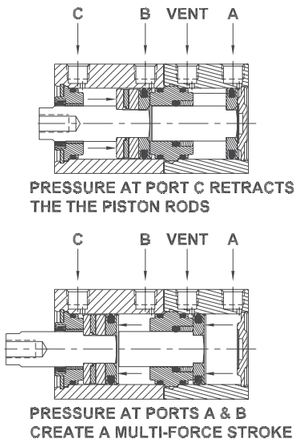
- EFP models provide three position output on extension using the same EF bore footprint to save space
- EFQ models double the force output on extension using the same EF bore footprint to save space
- Easily interchangeable to other compact extruded cylinders of the same bore size
- Available in 10 bore sizes from 12mm to 100mm for greater application versatility
- Versatile to easily connect and operate your application's pneumatic logic
- 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 at bimba.com/cad
- Shares the same 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

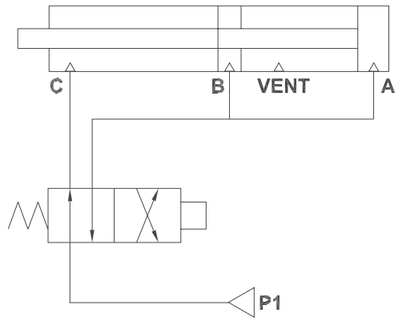
EFP Multi-Position Cylinders





EFQ MultiForce Cylinders





EFP Cylinder Options and Dimensions

Stroke Length Availability

The table below 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

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

EFQ Cylinder Options and Dimensions

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 Single 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

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

EFP and EFQ Cylinder Options and Dimensions

Engineering Specifications

Operating Medium:	Air
Maximum Operating Pressure:	10.0 bar (140 PSI)
Ambient and Fluid Temperature:	-10° C to 70° C (15° F 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 197 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 198.

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

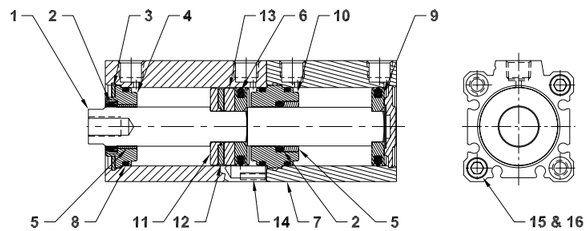
Bore	Direction	Power Factor (kg/bar)	Power Factor (lb/psi)
12mm (1/2")	Extend	1.9	0.30
	Retract	0.8	0.10
16mm (5/8")	Extend	3.5	0.55
	Retract	1.5	0.20
20mm (3/4")	Extend	5.5	0.86
	Retract	2.4	0.40
25mm (1")	Extend	8.4	1.33
	Retract	3.8	0.60
32mm (1-1/4")	Extend	13.8	2.19
	Retract	6.0	0.90
40mm (1-1/2")	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

EFP and EFQ Cylinder Options and Dimensions

Engineering Specifications

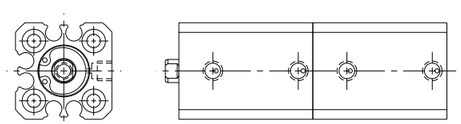
Components

#	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 25-100mm 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

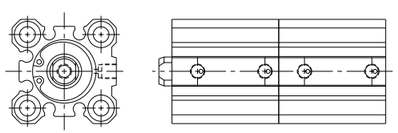


Body Styles

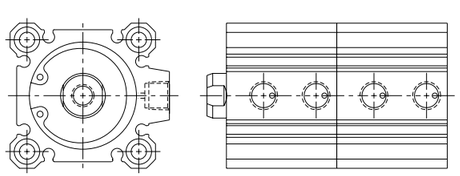
12mm Bore



16mm to 32mm Bore



40mm to 100mm Bore



EFP and EFQ Cylinder Options and Dimensions

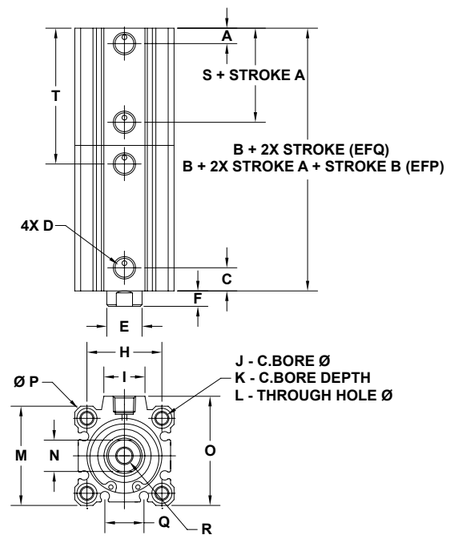
Dimensions (mm [in])

Double Acting/Single Rod

Bore	A	B	C	D	E	F	H	I
12mm (1/2")	3.8 (0.15)	43.7 (1.72)	8.9 (0.35)	(#10-32)	6.0 (0.24)	3.5 (0.14)	15.5 (0.61)	N/A
16mm (5/8")	4.6 (0.18)	47.0 (1.85)	9.4 (0.37)	(#10-32)	8.0 (0.31)	3.5 (0.14)	20.0 (0.79)	8.7 (0.34)
20mm (3/4")	4.8 (0.19)	51.1 (2.01)	9.4 (0.37)	(#10-32)	10.0 (0.39)	4.5 (0.18)	25.5 (1.00)	9.5 (0.37)
25mm (1")	5.1 (0.20)	56.4 (2.22)	10.9 (0.43)	(#10-32)	12.0 (0.47)	5.0 (0.20)	28.0 (1.10)	10.3 (0.41)
32mm (1-1/4")	7.1 (0.28)	57.7 (2.27)	10.4 (0.41)	(NPT 1/8)	16.0 (0.63)	7.0 (0.28)	34.0 (1.34)	18.5 (0.73)
40mm (1-1/2")	7.4 (0.29)	71.6 (2.82)	13.2 (0.52)	(NPT 1/8)	16.0 (0.63)	7.0 (0.28)	40.0 (1.57)	17.3 (0.68)
50mm (2")	9.4 (0.37)	74.4 (2.93)	13.7 (0.54)	(NPT 1/4)	20.0 (0.79)	8.0 (0.31)	50.0 (1.97)	20.0 (0.79)
63mm (2-1/2")	9.7 (0.38)	84.2 (3.31)	15.7 (0.62)	(NPT 1/4)	20.0 (0.79)	8.0 (0.31)	60.0 (2.36)	20.0 (0.79)
80mm (3-1/4")	11.7 (0.46)	100.6 (3.96)	17.8 (0.70)	(NPT 3/8)	25.0 (0.98)	10.0 (0.39)	77.0 (3.03)	26.0 (1.02)
100mm (4")	12.2 (0.48)	121.4 (4.78)	24.4 (0.96)	(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	Q
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)	5.3 (0.21)
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)	7.8 (0.31)
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)	10.5 (0.41)
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)	11.5 (0.45)
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)	17.7 (0.70)
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)	24.5 (0.96)
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)	29.3 (1.16)
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)	29.1 (1.15)
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)	28.1 (1.11)
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)	32.3 (1.27)

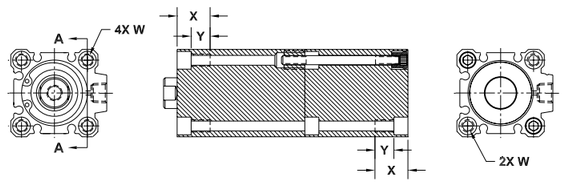
Bore	R	S	T
12mm (1/2")	(#8-32 UNC-2B)	8.1 (0.32)	20.8 (0.82)
16mm (5/8")	(#8-32 UNC-2B)	9.1 (0.36)	23.1 (0.91)
20mm (3/4")	(#10-32 UNF-2B)	10.2 (0.40)	26.4 (1.04)
25mm (1")	(1/4-28 UNF-2B)	11.7 (0.46)	29.2 (1.15)
32mm (1-1/4")	(5/16-24 UNF-2B)	0.7 (0.50)	31.5 (1.24)
40mm (1-1/2")	(3/8-24 UNF-2B)	16.3 (0.64)	40.3 (1.59)
50mm (2")	(1/2-20 UNF-2B)	16.8 (0.66)	41.9 (1.65)
63mm (2-1/2")	(1/2-20 UNF-2B)	20.3 (0.80)	47.2 (1.86)
80mm (3-1/4")	(5/8-18 UNF-2B)	25.7 (1.01)	57.5 (2.26)
100mm (4")	(3/4-16 UNF-2B)	28.7 (1.13)	69.7 (2.74)



EFP and EFQ Accessory Options and Dimensions

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)



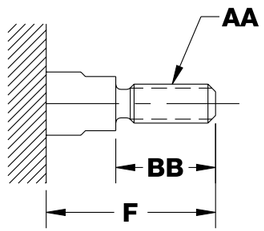
*All four bolt holes are recommended to be used for front mounting.

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)



The Model Number for all EFP cylinders consists of alphanumeric clusters. These designate type, bore size, stroke lengths, and special options. Please refer to the charts below for an example of a standard EFP model. This is a 25mm bore, 10mm stroke, double acting, single end rod cylinder with additional options.

Type	
EFP	Double Acting, Single End Rod

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

Stroke Length A
See table - page 221

Stroke Length B
See table - page 221

EFP - 25 50 / 25 - 3 EMV

Mounting Options	
3	Threaded front/rear mounting option (standard)*

* For dimensions, see page 213.

Options (Enter in alphabetical order, except for EE which is last)	
B	Bumpers[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 table page 205)[3] (standard)
MT	Male rod thread end (fine thread) (see page 213)[4]
NT	Non-threaded rod
V	High temperature option 15° F to 225° F (-10° C to 110° C)
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: Number in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.

How to Order

The Model Number for all EFQ MultiForce cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard EFQ model with 25mm bore, 10mm stroke, and additional options.

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

Type	
EFQ	Double Acting, Single End Rod

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

Stroke Length
See table - page 222

EFQ - 25 10 - 3 EMMTV

Mounting Options	
3	Threaded front/rear mounting option (standard)*

*For dimensions, see page 213

Options (Enter in alphabetical order, except for EE which is last)	
B	Bumpers[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 table page 205)[3] (standard)
MT	Male rod end (fine thread) (see page 213)[4]
NT	Non-threaded rod
V	High temperature option 15° F to 225° F (-10° C to 110° C)
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: Number in parentheses are the equivalent bore size in inches and listed FOR REFERENCE ONLY. DO NOT use for model designation.



The Bimba Twist Clamp Cylinder combines linear and 90° rotary motion with an internal pin/cam mechanism. The rotary action moves a clamping arm away from the workpiece, allowing for easy loading and unloading of parts.

Twist Clamp Compact Cylinders

Materials of Construction

End Caps: Anodized Aluminum Alloy

Cylinder Body: 304 Stainless Steel

Piston Rod: 303 Hard Chrome Plated Stainless Steel

Lubrication: Semi-Synthetic Grease

Seals: Buna-N Standard; High and Low Temperature (optional)

Engineering Specifications

Operating Medium: Air

Maximum Operating Pressure: 140 PSI

Ambient and Fluid Temperature: 15° F to 160° F

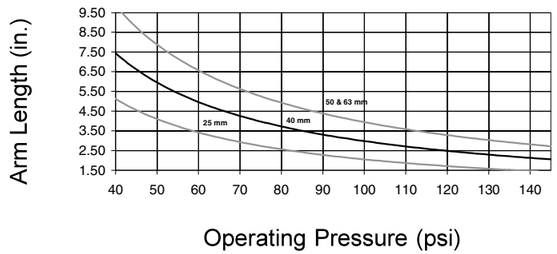
Lubrication: PTFE Grease

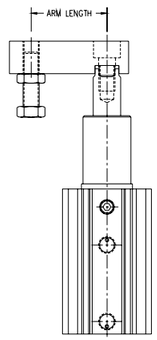
Shipping Weight

Bore	Weight
25mm	0.76
40mm	1.34
50mm	3.22
63mm	4.33

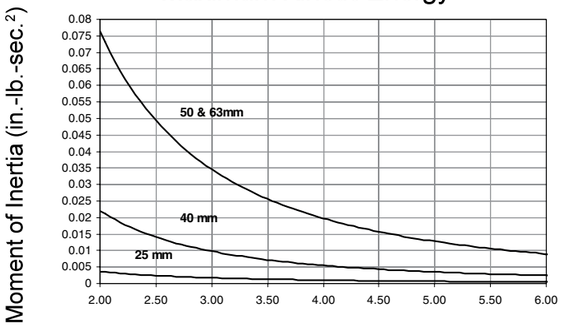
Twist Clamp Cylinders

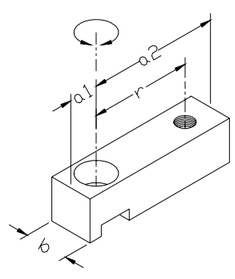
Maximum Clamp Arm Length





Maximum Kinetic Energy





$$I = \frac{W_{a1}}{g} * \frac{4(a1)^2 + b^2}{12} + \frac{W_{a2}}{g} * \frac{4(a2)^2 + b^2}{12}$$

Example, for standard EFCA-40-E

a1 - .50 in Wa1 = .028 lbs
a2 = 2.25 in Wa2 = .127 lbs
b = .75 in
r = 1.75 in
g = 386 in/sec²
clamp bolt and nut = .081 lbs

$$I \text{ arm} = \frac{.028 \text{ lb.}}{386 \text{ in./sec.}^2} * \frac{4(.50 \text{ in})^2 + (.75 \text{ in.})^2}{12} + \frac{.127 \text{ lb.}}{386 \text{ in./sec.}^2} * \frac{4(2.25 \text{ in})^2 + (.75 \text{ in.})^2}{12}$$

I arm = .000578 in.-lb.-sec.²

$$I \text{ bolt/nut} = \frac{.081 \text{ lbs.}}{386 \text{ in./sec.}^2} * (1.75 \text{ in.})^2 = .000642 \text{ in.-lb.-sec.}^2$$

I total = .000578 + .000642 = 0.00122 in.-lb.-sec.²

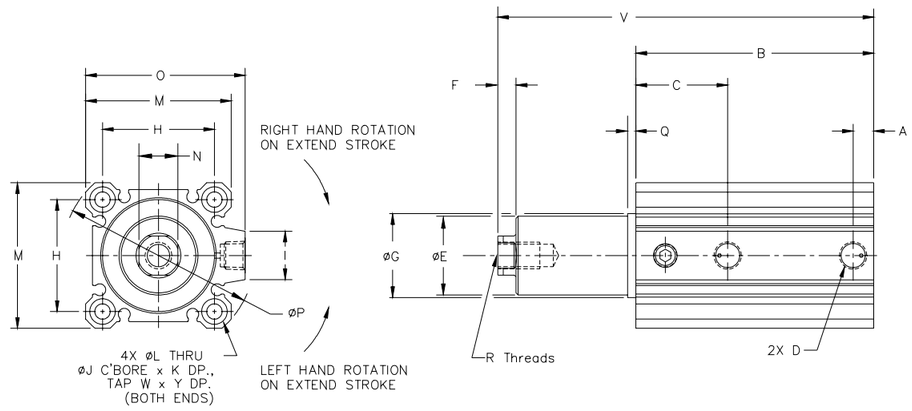
Operating Precautions:

- Do not clamp during rotary portion of stroke.
- Cylinder should be mounted vertically.
- Any force applied to clamped part perpendicular to clamping direction should not exceed 5% of the clamp force.

Bore	Power Factor
25mm	0.58
40mm	1.63
50mm	2.55
63mm	4.34

Clamp Force (lbs.) = pressure (psi) x power factor

Twist Clamp Cylinder Options and Dimensions

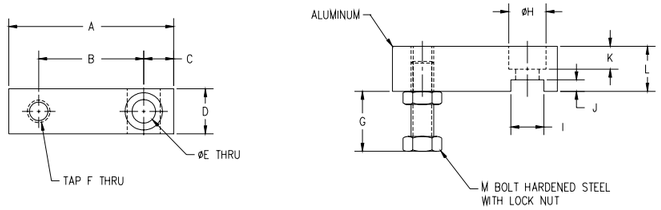


Bore	A	B	C	D	E	F	G	H	I	J
25mm	0.20	3.27	1.22	#10-32	0.84	0.16	0.905	1.10	0.41	0.35
40mm	0.29	3.34	1.29	1/8 NPT	1.12	0.26	1.180	1.57	0.68	0.35
50mm	0.37	4.98	1.29	1/4 NPT	1.39	0.30	1.456	1.97	0.79	0.44
63mm	0.38	5.12	1.37	1/4 NPT	1.82	0.30	1.888	2.36	0.79	0.56

Bore	K	L	M	N	Rod Dia.	O	P	Q	R	V	W	Y
25mm	0.28	0.22	1.57	0.39	0.47	1.57	2.05	0.16	5/16-24	4.47	1/4-20	0.67
40mm	0.28	0.22	2.05	0.54	0.63	2.24	2.72	0.11	3/8-24	5.30	1/4-20	0.67
50mm	0.31	0.27	2.52	0.66	0.79	2.80	3.39	0.14	1/2-20	8.35	5/16-18	0.86
63mm	0.41	0.35	3.03	0.66	0.79	3.31	4.06	0.16	1/2-20	8.47	7/16-14	1.12

Twist Clamp Accessory Options and Dimensions

Clamp Arm



Bore	A	B	C	D	E	F	G	H	I	J	K	L	M
25mm	2.00	1.38	0.38	0.63	0.34	1/4-20	1.13	0.50	0.393	0.08	0.32	0.63	1/4-20
40mm	2.75	1.75	0.50	0.75	0.39	3/8-16	1.00	0.62	0.550	0.19	0.38	0.75	3/8-16
50mm	3.44	2.50	0.50	1.25	0.53	3/8-16	1.00	0.78	0.668	0.19	0.50	1.00	3/8-16
63mm	3.44	2.50	0.50	1.25	0.53	3/8-16	1.00	0.78	0.668	0.19	0.50	1.00	3/8-16

The Model Number for all EF Twist Clamp cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard EFCL model with 63mm bore, 77mm stroke, and additional options.

Please note the following features are standard, and are included in all model numbers: 3 (threaded front/rear mounting holes), E (US/inch units), and M (magnetic position sensing).

Type	
EFCL	EF clamp cylinder, left rotation*
EFCR	EF clamp cylinder, right rotation

Stroke Length			
Bore	Rotary	Clamp	Total
25mm	20mm	15mm	35
40mm	28mm	15mm	43
50mm	39mm	38mm	77
63mm	39mm	38mm	77

EFCL - 63 77 - 3EM

Bore Size	
25	25mm (1")
40	40mm (1-1/2")
50	50mm (2")
63	63mm (2-1/2")

Options (Enter in alphabetical order)	
3	Threaded mounting holes (front/rear)
E	U.S. customary units (inch) (standard)
M	Magnetic position sensing (standard)
V	High temperature fluoroelastomer seals 15° F to 225° F (-10° C to 110° C)

* Left rotation is achieved as cylinder extends. As cylinder retracts, rotation will be to the right.
** Stroke in model number is called out as TOTAL stroke.

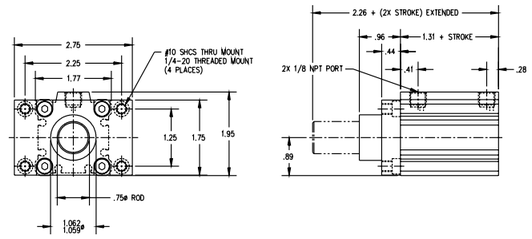


The stopper cylinder is a modified EF-I cylinder designed specifically for conveyor stopping applications. It features a heavy-duty mounting plate, and the cylinder's rod/bearing design was developed specifically to withstand side impact loading. It is available in two double acting models, including a double acting failsafe spring extend design.

Stopper Compact Cylinders

> Standard U.S. customary (inch) threads for ports, mounting, and rods
> Stroke lengths available: 15, 20, 25mm
> Maximum Operating Pressure: 140 PSI
> Operating Temperature: 15° to 160°F (15° - 225° with -V option)
> Lubrication: PTFE grease
> Cylinder Body: Aluminum, hard coat with PTFE

Stopper Cylinder Options and Dimensions

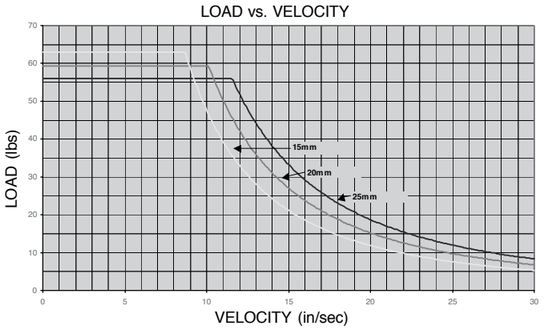


Engineering Specifications

Maximum Operating Pressure:	140 PSI
Operating Temperature:	15° F to 160° F (15° - 225° with -V option)
Lubrication:	PTFE Grease
Cylinder Body:	Aluminum; Hard-Coat with PTFE
Piston Rod:	303 Stainless Steel
Mounting Flange:	Anodized Aluminum
Seals:	Nitrile (fluoroelastomer optional)
Rod Bearing:	Sintered Iron
Spring Pre-final Loads:	2-8 lbs

Impact Limitations

Maximum Side Load	
Stroke (mm)	**Side Load (lb)**
15	12
20	11
25	10



How to Order

The Model Number for all Stopper cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard Stopper model. This is a 32mm bore, 25mm stroke cylinder with additional options.

Type	
EFL	Double Acting, Load-Bearing Conveyor-Stop
EFLR	Double Acting Failsafe, Spring Extended

Bore Size	
32	32mm (1-1/4")

Stroke Length	
15	15mm
20	20mm
25	25mm

EFL - 32 25 - E MV

Options (Enter in alphabetical order, except for EE which is last)	
M	Magnetic position sensing (see D-83136-AS)
V	High temperature option 15° F to 225° F (-10° C to 110° C)
EE	Extra rod extension in 1mm increments (up to 25mm)

NOTE: Part number must include option -E; available only in inch series.

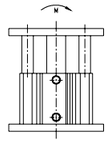


The Lift Table is an EF1-based, guided cylinder with four shafts for maximum rigidity. It is designed for lifting applications where other non-rotating cylinders cannot handle an overhung load and space is at a premium.

Extruded Flat Lift Tables

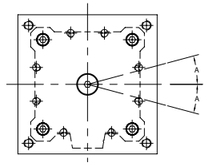
- Four-shaft support withstands offset loads and moments.
- Simple, efficient design provides economical alternative to other costly guided actuators.
- Joins the EF family of products and shares all the same benefits--long service life, low friction operation, fast delivery.
- Convenient wide tooling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

Extruded Flat Lift Table Technical Specifications



Maximum Moment
Due to Side or Overhung Load

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



Maximum Moment
Non-Rotational Accuracy

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

Materials of Construction

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

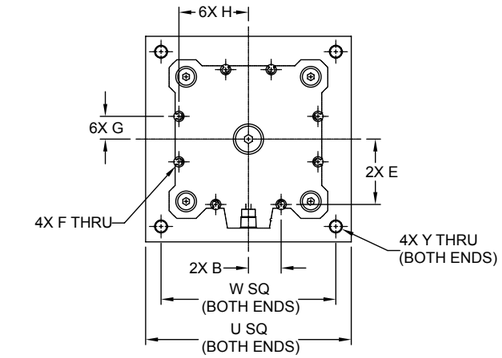
Piston Rod: Stainless Steel

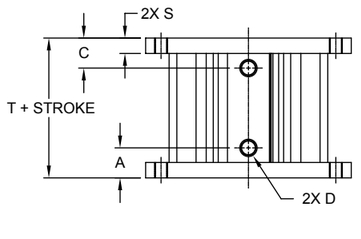
Rod Guide: Aluminum Alloy

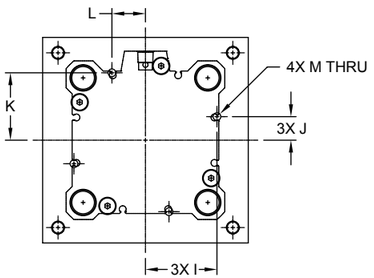
Seals: Nitrile (Fluoroelastomer optional)

Piston: Aluminum Alloy

Extruded Flat Lift Table Options and Dimensions







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

Bore	A	B	C	D	E	F	G
50mm	0.58	0.56	0.58	1/8 NPT	1.06	0.25	0.58
80mm	0.73	0.80	0.73	1/8 NPT	1.59	0.25	0.55
125mm	1.00	1.07	1.00	3/8 NPT	2.43	0.25	0.85

Bore	H	I	J	K	L	M	S
50mm	1.05	1.09	0.60	1.11	0.58	0.25	0.25
80mm	1.68	1.74	0.57	1.64	0.82	0.19	0.38
125mm	2.52	2.57	0.87	2.48	1.09	0.19	0.50

Bore	T	U	W	Y
50mm	See Table Above	3.00	2.50	#10-32 UNF
80mm		5.00	4.25	5/16-24 UNF
125mm		7.00	5.88	1/2-20 UNF

How to Order

The Model Number for all Extruded Flat Lift Tables consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard Lift Table model. This is a 80mm bore, 50mm stroke cylinder with additional options.

TYPE		Stroke length
EFF	Double Acting, Non-Rotating Lift Table	5mm increments to 100mm max.

EFF - 80 50 - EM

Bore Size	
50	50mm
80	80mm
125	125mm

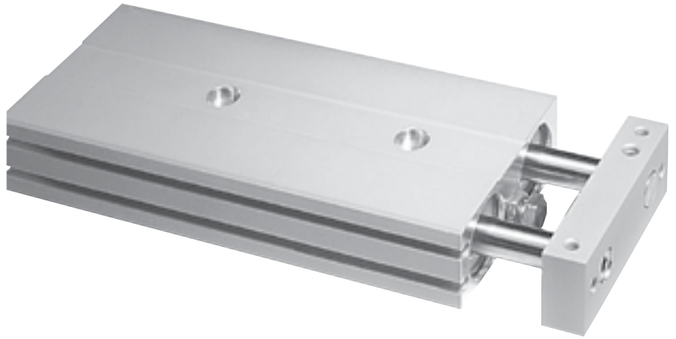
Options (Enter in alphabetical order)	
B	Internal bumpers[1]
E	U.S. customary (inch)[2]
M	Magnetic position sensing
V	High temperature (15° F to 225° F)

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

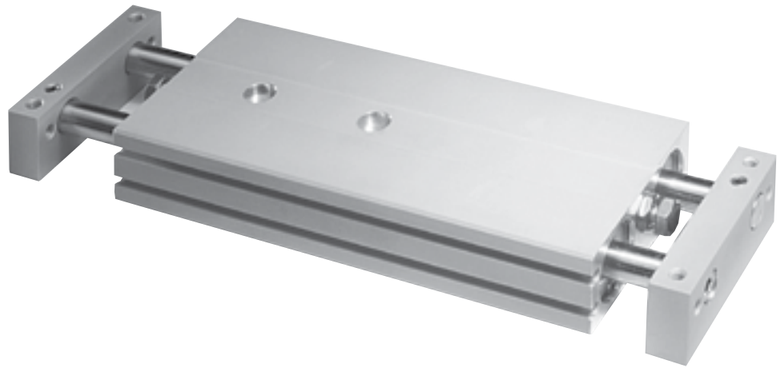
Product Features

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.



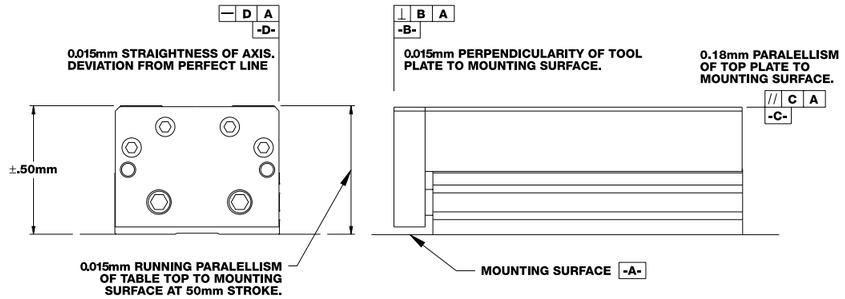
Double End Twin Bore (TBD)
Double rod end provides a saddle-mount unit with improved loading and resistance to deflection.



Twin Bore Air Table (TBA)
Smooth, precise movement is achieved via integration of a highly accurate recirculating ball bushing rail.



Twin Bore Air Table (TBA Models)



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

Engineering Specifications

Operating Medium: Air

Maximum Operating Pressure: 10 bar (140 PSI)

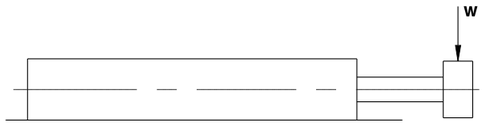
Temperature Range: -10° to 70° C (15° to 160° F)

Lubrication: PTFE Grease

Expected Service Life: 2500 kilometers (1500 miles)

Twin Bore (TB Models; Standard Bearings and Option X)

Maximum Radial Load kg-Force (lb)



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

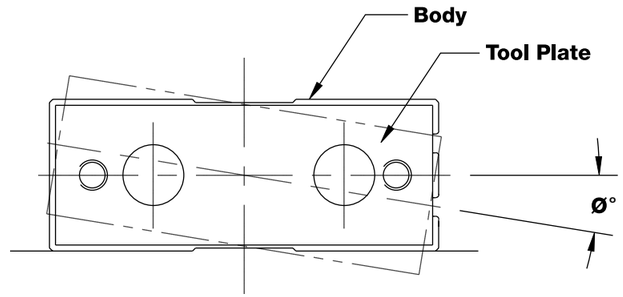
TB Standard Maximum Radial Loads Kgf (lb)							
Model No.	**10**	**20**	**30**	**40**	**50**	**75**	**100**
TB-6	0.15 (0.33)	0.12 (0.26)	0.10 (0.21)	0.08 (0.18)	0.07 (0.16)	N/A	N/A
TB-8	0.14 (0.31)	0.11 (0.24)	0.09 (0.20)	0.08 (0.17)	0.07 (0.15)	0.05 (0.11)	N/A
TB-12	1.0 (2.14)	0.8 (1.77)	0.7 (1.51)	0.6 (1.31)	0.5 (1.16)	0.4 (0.90)	N/A
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
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)

Twin Bore (TB Models; Standard Bearings and Option X)

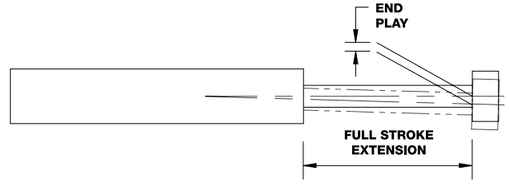
Maximum Radial Load kg-Force (lb)
Non-Rotational Accuracy (degrees)

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

Maximum End Play mm (inch)

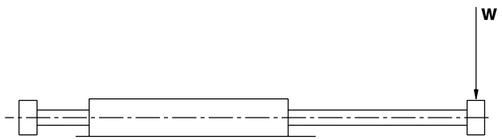


Maximum allowable movement of the tooling plate in the vertical direction with rods aligned in horizontal direction.

TB Model							
Model No. (Standard Bushings)	**Stroke Length mm**						
	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
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
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)

Twin Bore (Tb Models; Standard Bearings and Option X)

Maximum Radial Load kg-Force (lb)



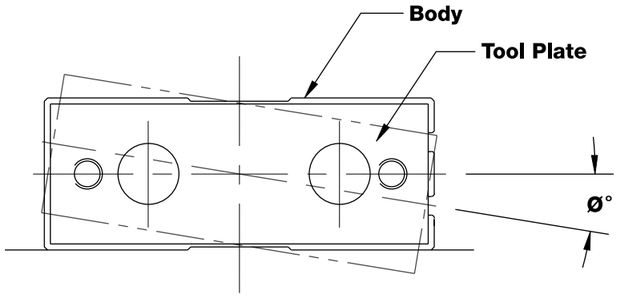
Maximum allowable load for horizontally mounted Double Rod End cylinder with rods aligned in horizontal direction.

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
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
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
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
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)

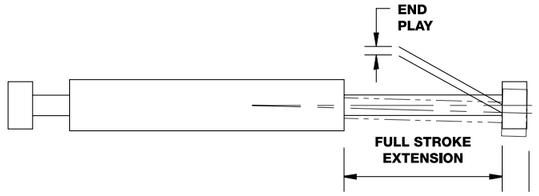
Maximum allowable value for Ø° in a free unloaded condition.



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

Twin Bore (TBD Models; 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. (Standard Bushings)	**Stroke Length mm**						
	10	**20**	**30**	**40**	**50**	**75**	**100**
TB-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
TB-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
TB-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)
TB-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)
TB-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)
TB-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)
TB-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**
TB-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)
TB-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)
TB-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)
TB-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)
TB-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)

Twin Bore Air Table (TBA Models)

Table Deflection By Pitch Moment

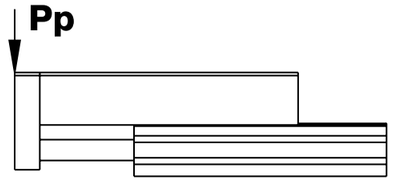
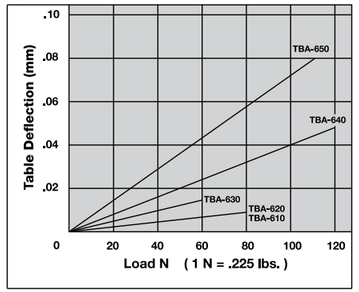
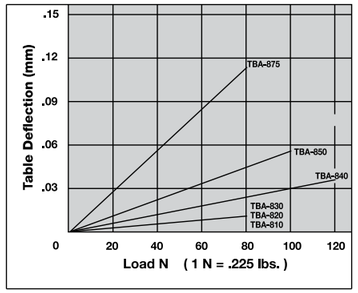


Table pitch deflection due to static pitch moment applied at arrow for fully extended stroke of slide table.

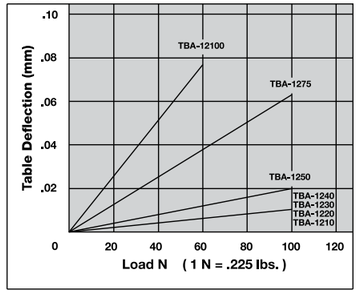
TBA-6



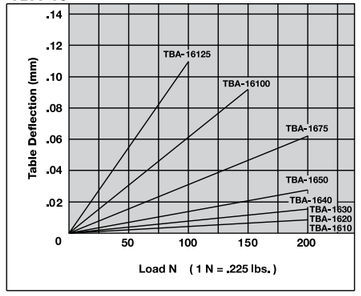
TBA-8



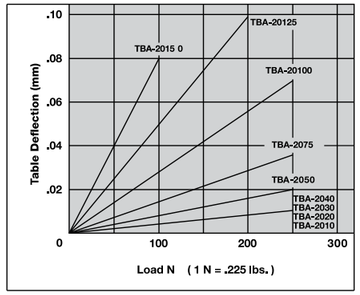
TBA-12



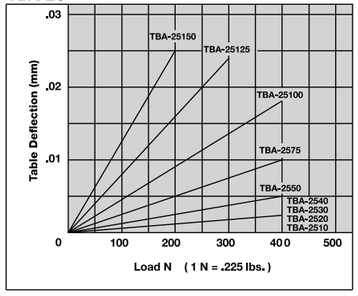
TBA-16



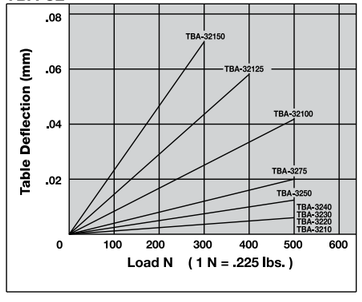
TBA-20



TBA-25



TBA-32



Twin Bore Air Table (TBA Models)

Table Deflection By Yaw Moment

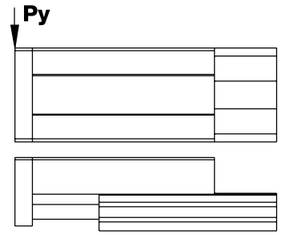
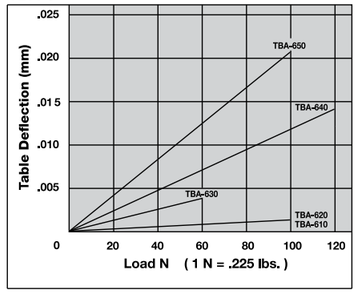
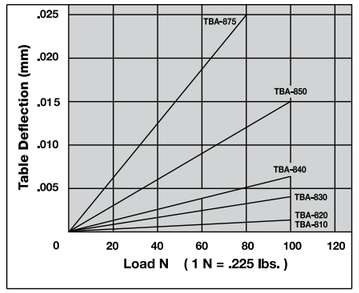


Table yaw deflection due to static yaw moment applied at arrow for fully extended stroke of slide table.

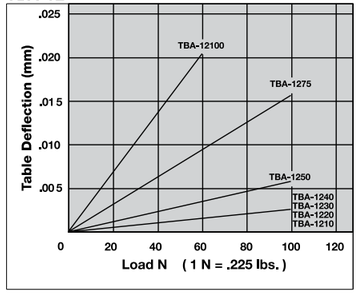
TBA-6



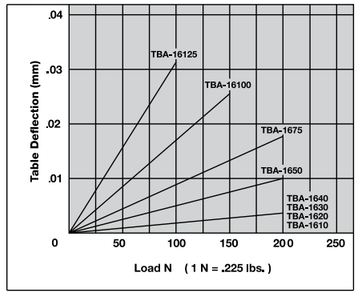
TBA-8



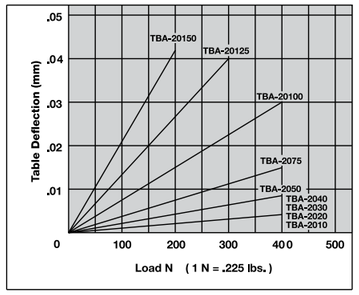
TBA-12



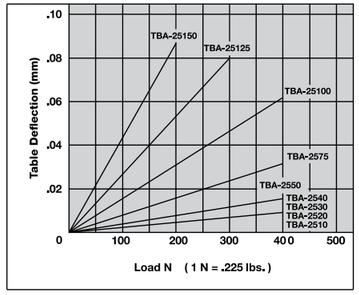
TBA-16



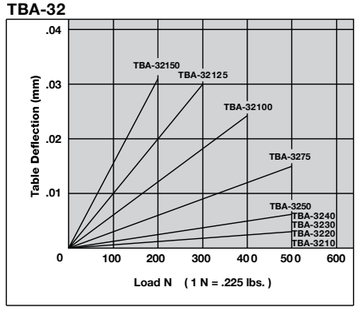
TBA-20



TBA-25

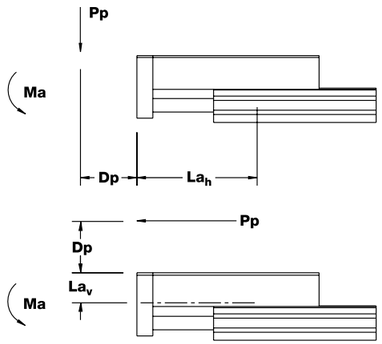


TBA-32



Twin Bore Air Table (TBA Models)

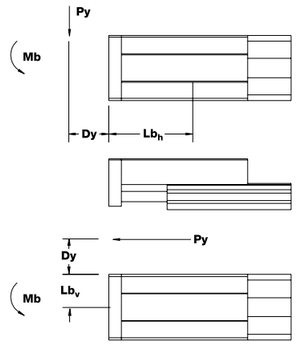
Formula for Calculation of Allowable Static Load Pp, Py and Pr



Pp = Ma x 1000 (Newtons)
Dp + La
Dp = Distance from load point to body (mm)
La = Moment arm (mm) see chart

Ma (Pitching Moment)

Model	Maximum Allowable Moment (Nm) by Stroke								
	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

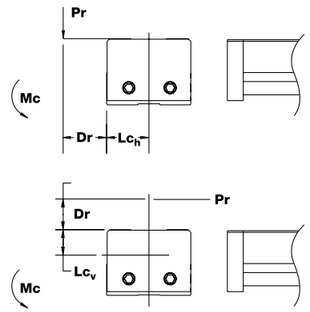


Py = Mb x 1000 (Newtons)
Dy + Lb
Dy = Distance from load point to body (mm)
Lb = Moment arm (mm) see chart

Mb (Yawing Moment)

Model	Maximum Allowable Moment (Nm) by Stroke								
		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

Twin Bore Air Table (TBA Models)



Pr = Mc x 1000 (Newtons)
Dr + Lc
Dr = Distance from load point to body (mm)
Lc = Moment arm (mm) see chart

Mc (Rolling Moment)

Model	Maximum Allowable Moment (Nm) by Stroke								
	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	Lah and Lbh Moment Lever Arm (mm) by Stroke								
	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)			
	Lav	Lbv	Lch	Lcv
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

Twin Bore Air Table (TBA Models)

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

Twin Bore 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)

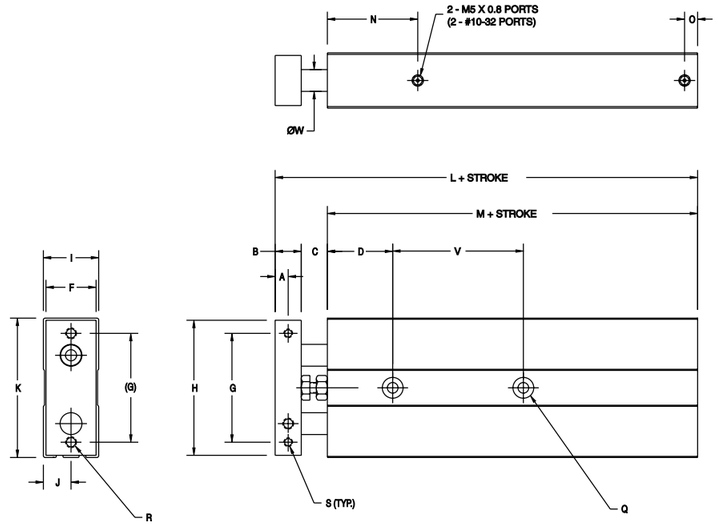
TBD Cylinder

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	75mm	100mm	125mm	150mm
6	119.6 (4.22)	139.4 (4.92)	158.6 (5.60)	219.8 (7.75)	240.5 (8.48)	N/A	N/A	N/A	N/A
8	159.8 (5.64)	178.5 (6.30)	202.9 (7.16)	267.2 (9.42)	295.0 (10.41)	391.0 (13.79)	N/A	N/A	N/A
12	236.0 (8.3)	240.4 (8.4)	244.9 (8.6)	283.0 (9.9)	342.0 (12.0)	479.9 (16.9)	616.9 (21.7)	N/A	N/A
16	378.7 (13.3)	386.5 (13.6)	394.4 (13.9)	433.1 (15.2)	561.4 (19.8)	699.8 (24.6)	821.7 (28.9)	984.5 (34.7)	N/A
20	631.4 (22.2)	643.7 (22.7)	656.0 (23.1)	728.0 (25.6)	827.9 (29.2)	1047.4 (36.9)	1438.4 (50.7)	1645.0 (58.0)	1872.4 (66.0)
25	992.5 (35.0)	1010.2 (35.6)	1027.9 (36.2)	1128.3 (39.8)	1253.4 (44.2)	1636.0 (57.7)	2019.1 (71.2)	2525.8 (89.1)	2710.5 (95.6)
32	1660.0 (58.5)	1691.6 (59.6)	1723.1 (60.7)	1882.1 (66.3)	2078.8 (73.3)	2741.4 (96.7)	3277.9 (115.6)	4093.6 (144.4)	4591.6 (161.9)

TB Cylinder Dimensions mm (in)



Bore	A	B	C
6	2.8 (0.11)	5.5 (0.22)	8 (0.32)
8	3 (0.12)	6 (0.24)	8 (0.32)
12	4 (0.16)	8 (0.32)	9 (0.35)
16	5 (0.20)	10 (0.39)	9 (0.35)
20	6 (0.24)	12 (0.47)	12 (0.47)
25	6 (0.24)	12 (0.47)	12 (0.47)
32	8 (0.32)	16 (0.63)	14 (0.55)

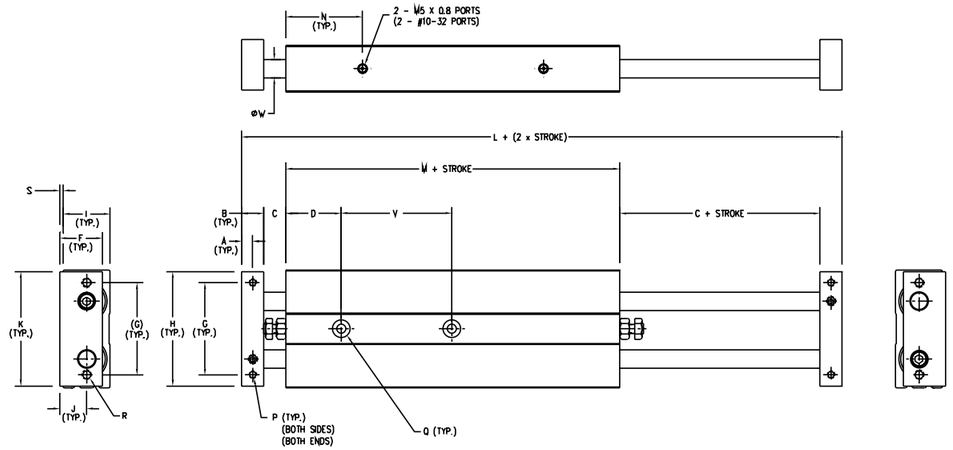
Bore	D	F	G
6	13 (0.51)	12 (0.47)	25 (0.98)
8	13 (0.51)	13 (0.51)	28 (1.10)
12	20 (0.79)	15 (0.59)	35 (1.38)
16	30 (1.18)	18 (0.71)	45 (1.77)
20	30 (1.18)	23 (0.91)	50 (1.97)
25	30 (1.18)	28 (1.10)	66 (2.60)
32	30 (1.18)	36 (1.42)	80 (3.15)

Bore	H	I	J	K	L	M	N	O
6	31 (1.22)	13.2 (0.52)	6.4 (0.25)	32 (1.26)	58.5 (2.30)	45 (1.77)	16 (0.63)	6.7 (0.27)
8	36 (1.42)	14.7 (0.58)	7.3 (0.29)	37.8 (1.49)	64 (2.52)	50 (1.97)	16.1 (0.64)	6.7 (0.27)
12	44 (1.73)	17.3 (0.68)	8.7 (0.34)	46 (1.81)	72 (2.83)	55 (2.17)	30.6 (1.20)	5 (0.20)
16	55 (2.17)	20.4 (0.80)	10.2 (0.40)	57 (2.24)	80 (3.16)	61 (2.41)	36.2 (1.42)	4.5 (0.18)
20	62 (2.44)	25.4 (1.00)	12.7 (0.50)	64 (2.52)	94 (3.70)	70 (2.76)	41.5 (1.63)	6 (0.24)
25	78 (3.07)	30.4 (1.20)	15.2 (0.60)	80 (3.15)	96 (3.78)	72 (2.84)	45 (1.77)	5 (0.20)
32	96 (3.78)	38.4 (1.51)	19.2 (0.76)	98 (3.86)	115 (4.51)	85 (3.33)	53 (2.09)	7.2 (0.28)

Bore	Q (Body Mounting Holes)	R	S	T (Ports)
6	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	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	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	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	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	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	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	25 (0.98)	N/A	30 (1.18)	35 (1.38)	N/A	N/A	N/A	3 (.12)
8	15 (0.59)	20 (0.79)	N/A	N/A	25 (0.98)	N/A	30 (1.18)	35 (1.38)	47.5 (1.87)	N/A	N/A	4 (.16)
12	N/A	N/A	30 (1.18)	30 (1.18)	N/A	40 (1.58)	N/A	N/A	N/A	50 (1.97)	N/A	6 (.24)
16	N/A	N/A	25 (0.98)	35 (1.38)	N/A	35 (1.38)	N/A	N/A	N/A	45 (1.77)	55 (2.17)	8 (.32)
20	N/A	N/A	30 (1.18)	30 (1.18)	N/A	40 (1.58)	N/A	N/A	N/A	60 (2.36)	60 (2.36)	10 (.39)
25	N/A	N/A	30 (1.18)	30 (1.18)	N/A	40 (1.58)	N/A	N/A	N/A	60 (2.36)	60 (2.36)	12 (.47)
32	N/A	N/A	40 (1.58)	40 (1.58)	N/A	50 (1.97)	N/A	N/A	N/A	70 (2.76)	70 (2.76)	16 (.63)

TBD Cylinder Dimensions mm (in)

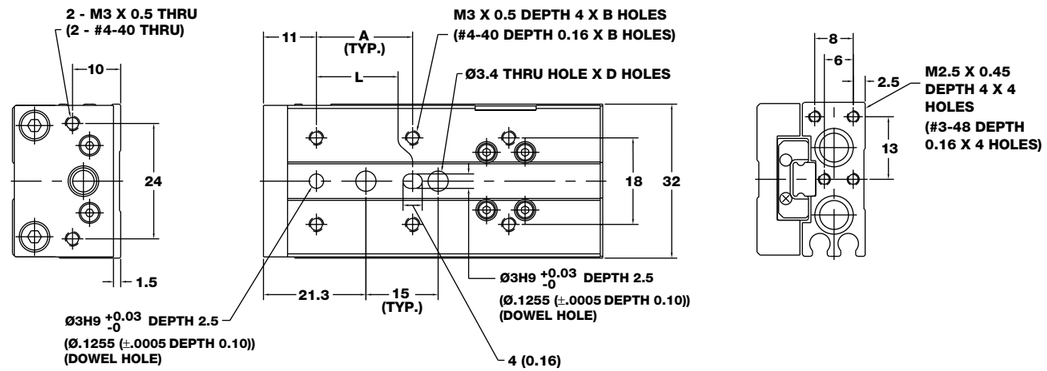


Bore	A	B	C	D	F	G	H	I	J	K	L	M	N
6	2.8 (0.11)	5.5 (0.22)	8 (0.32)	13 (0.51)	12 (0.47)	25 (0.98)	31 (1.22)	13.2 (0.52)	7.8 (0.31)	32 (1.26)	92.9 (3.66)	66 (2.60)	16 (0.63)
8	3 (0.12)	6 (0.24)	8 (0.32)	13 (0.51)	13 (0.51)	28 (1.10)	36 (1.42)	14.7 (0.58)	8.6 (0.34)	37.8 (1.49)	92.9 (3.66)	66 (2.60)	16.1 (0.64)
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 (5.16)	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)

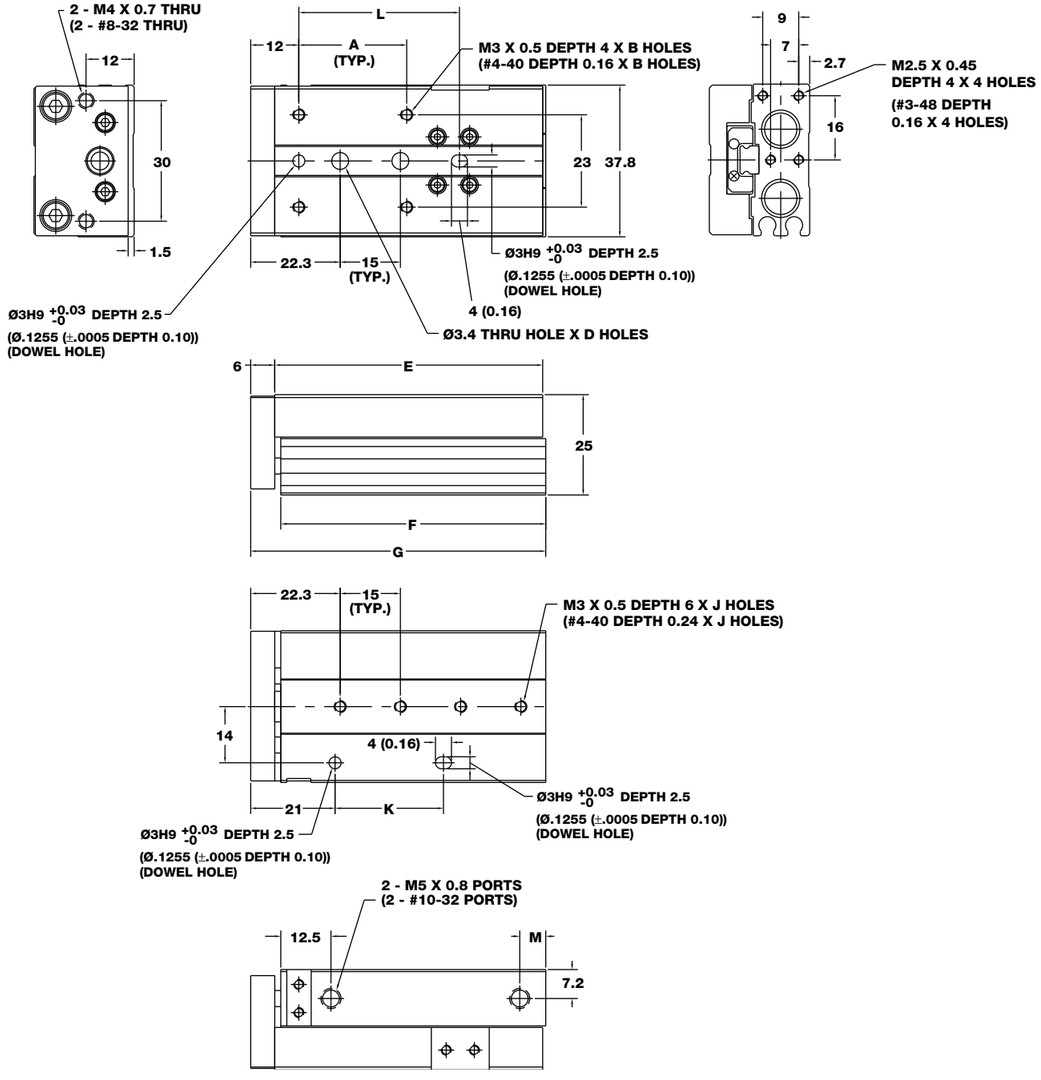
Bore	V Based on Stroke											W
	0-10mm	11-20mm	0-20mm	21-25mm	21-30mm	26-50mm	31-40mm	41-50mm	51-75mm	51-80mm	81-100mm	
6	15 (0.59)	20 (0.79)	N/A	N/A	25 (0.98)	N/A	30 (1.18)	35 (1.38)	N/A	N/A	N/A	3 (.12)
8	15 (0.59)	20 (0.79)	N/A	N/A	25 (0.98)	N/A	30 (1.18)	35 (1.38)	47.5 (1.87)	N/A	N/A	4 (.16)
12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

TBA Cylinder (6mm bore) Dimensions mm (in)



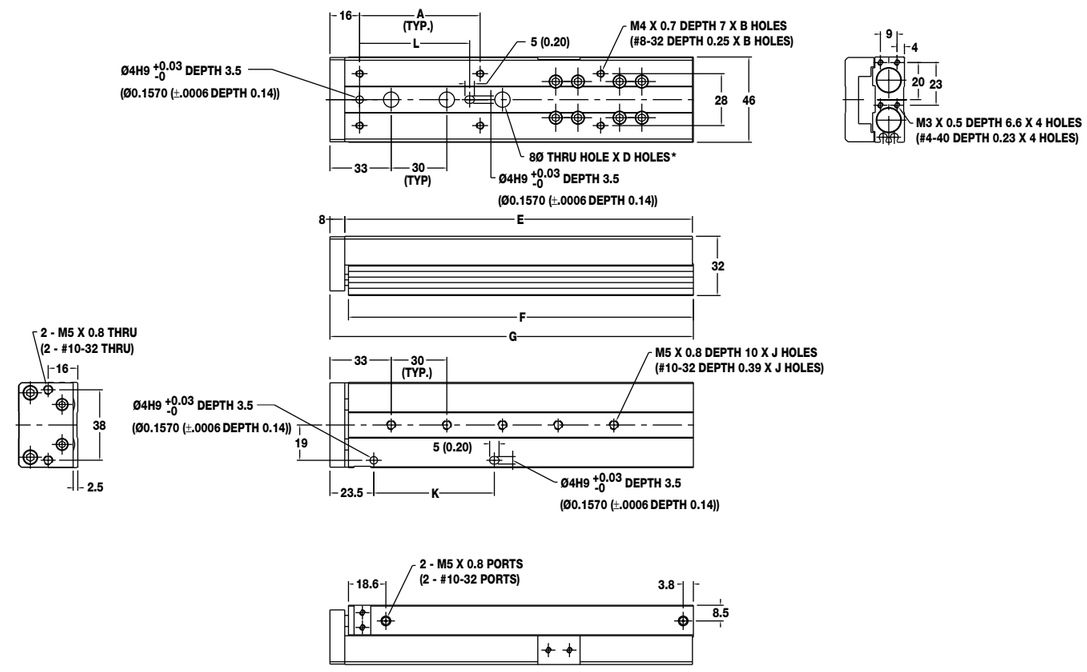
Stroke	A	B	D	E	F	G	J	K	L
10	20 (0.79)	4	2	45 (1.77)	44 (1.73)	50.5 (1.99)	2	16 (0.630)	20 (0.787)
20	30 (1.18)	4	2	55 (2.17)	54 (2.13)	60.5 (2.38)	3	18 (0.709)	20 (0.787)
30	20 (0.79)	6	2	65 (2.56)	64 (2.52)	70.5 (2.78)	3	20 (0.787)	20 (0.787)
40	28 (1.10)	6	3	95 (3.74)	94 (3.70)	100.5 (3.96)	5	28 (1.102)	35 (1.378)
50	38 (1.50)	6	3	104.5 (4.11)	104.5 (4.11)	111 (4.37)	6	28 (1.102)	35 (1.378)

TBA Cylinder (8mm bore) Dimensions mm (in)



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 (0.748)	18 (0.709)	6.5 (0.26)
20	25 (0.98)	4	3	56.7 (2.23)	56 (2.21)	62.5 (2.46)	3	28 (1.102)	18 (0.709)	6.5 (0.26)
30	40 (1.58)	4	2	66.7 (2.63)	66 (2.60)	72.5 (2.85)	3	28 (1.102)	40 (1.575)	6.5 (0.26)
40	50 (1.97)	4	3	91.2 (3.59)	90.4 (3.56)	97 (3.82)	5	31 (1.220)	50 (1.969)	11 (0.43)
50	38 (1.50)	6	3	102.3 (4.03)	101.5 (4.0)	108 (4.25)	6	58 (2.283)	50 (1.969)	6.5 (0.26)
75	50 (1.97)	6	5	133.7 (5.27)	133 (5.24)	139.5 (5.49)	8	60 (2.362)	50 (1.969)	6.5 (0.26)

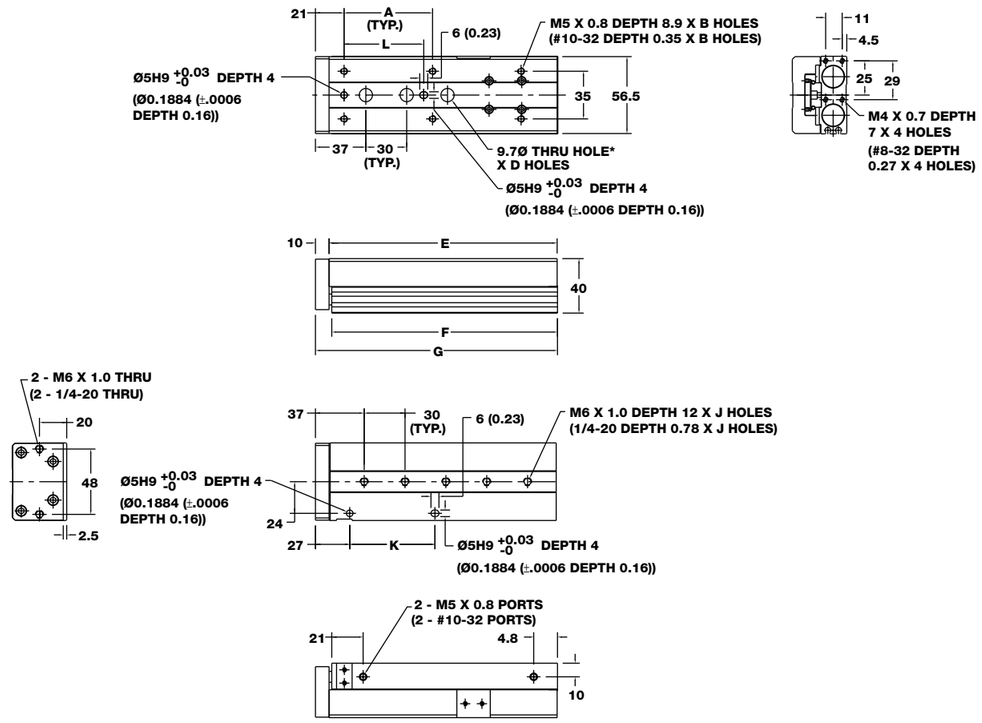
TBA Cylinder (12mm bore) Dimensions mm (in)



*Thru holes go through table top to access smaller counter-bored mounting holes in the cylinder body.

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 (1.378)	35 (1.378)
20	35 (1.38)	4	1	73 (2.86)	71 (2.80)	81 (3.20)	2	35 (1.378)	35 (1.378)
30	35 (1.38)	4	1	73 (2.86)	71 (2.80)	81 (3.20)	2	35 (1.378)	35 (1.378)
40	50 (1.97)	4	1	85 (3.36)	83 (3.28)	93 (3.67)	2	50 (1.968)	50 (1.968)
50	35 (1.38)	6	1	105 (4.12)	103 (4.06)	113 (4.46)	3	35 (1.378)	35 (1.378)
75	55 (2.17)	6	2	151 (5.93)	149 (5.88)	159 (6.27)	4	55 (2.165)	55 (2.165)
100	65 (2.56)	6	3	189 (7.43)	187 (7.37)	197 (7.76)	5	65 (2.559)	65 (2.559)

TBA Cylinder (16mm bore) Dimensions mm (in)



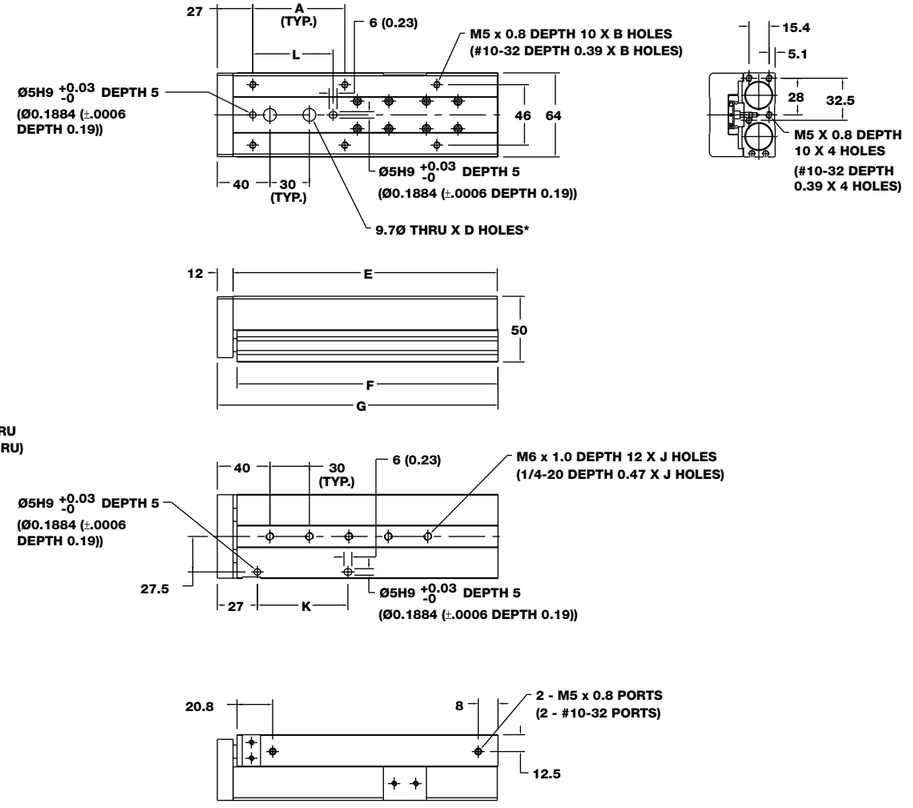
*Thru holes go through table top to access smaller counterbored mounting holes in the cylinder body.

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 (1.378)	35 (1.378)
20	35 (1.38)	4	1	79 (3.11)	77 (3.05)	89 (3.52)	2	35 (1.378)	35 (1.378)
30	35 (1.38)	4	1	79 (3.11)	77 (3.05)	89 (3.52)	2	35 (1.378)	35 (1.378)
40	40 (1.58)	6	1	89 (3.50)	87 (3.44)	99 (3.91)	3	40 (1.575)	40 (1.575)
50	30 (1.18)	6	1	116 (4.56)	114 (4.51)	126 (4.98)	3	30 (1.181)	30 (1.181)
75	55 (2.17)	6	2	145 (5.71)	143 (5.65)	155 (6.12)	4	55 (2.165)	55 (2.165)
100	65 (2.56)	6	3	170 (6.69)	168 (6.63)	180 (7.10)	5	65 (2.559)	65 (2.559)
125	70 (2.70)	8	4	205 (8.07)	203 (8.01)	215 (8.48)	6	70 (2.756)	70 (2.756)

How to Specify

COMPACT CYLINDERS

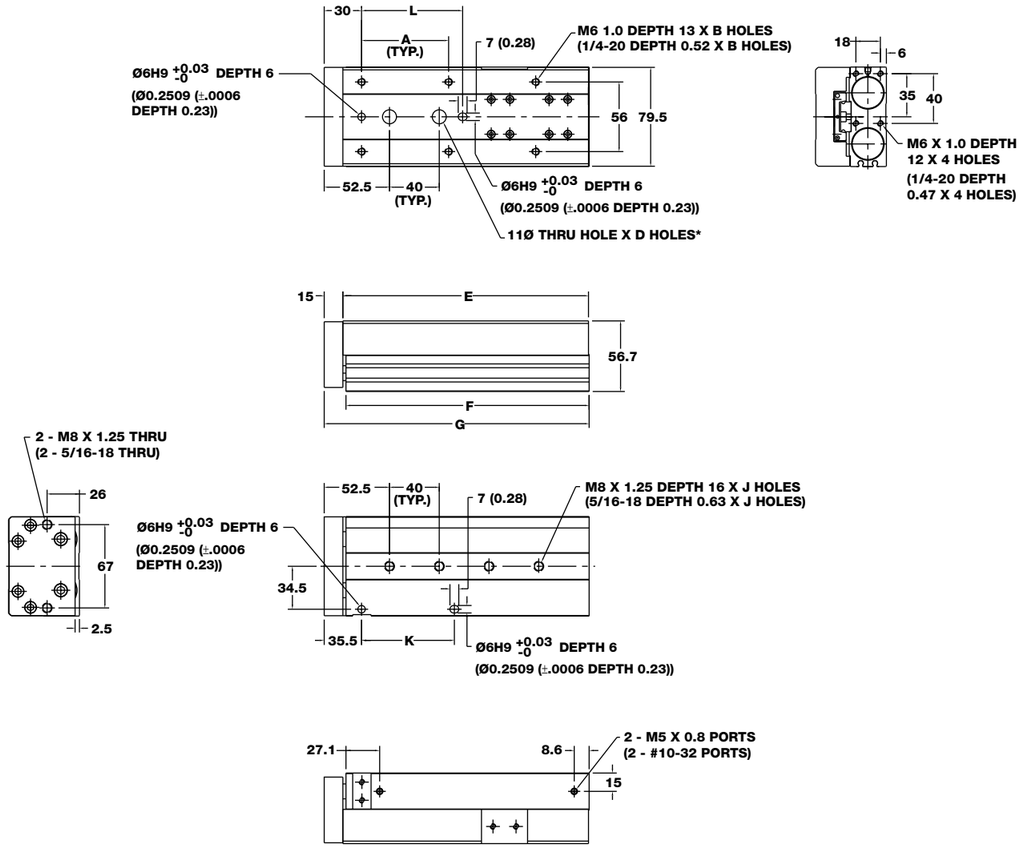
TBA Cylinder (20mm bore) Dimensions mm (in)



*Thru holes go through table top to access smaller counterbored mounting holes in the cylinder body.

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 (1.968)	50 (1.968)
20	50 (1.97)	4	1	84 (3.30)	81.5 (3.21)	96 (3.78)	2	50 (1.968)	50 (1.968)
30	50 (1.97)	4	1	84 (3.30)	81.5 (3.21)	96 (3.78)	2	50 (1.968)	50 (1.968)
40	60 (2.36)	4	1	94 (3.69)	91.5 (3.60)	106 (4.17)	2	60 (2.362)	60 (2.362)
50	35 (1.38)	6	1	108.5 (4.27)	106.5 (4.19)	121 (4.76)	3	35 (1.378)	35 (1.378)
75	60 (2.36)	6	2	140 (5.51)	138 (5.44)	152.5 (6.01)	4	60 (2.362)	60 (2.362)
100	70 (2.76)	6	3	200.5 (7.89)	198.5 (7.82)	213 (8.39)	5	70 (2.756)	64 (2.520)
125	70 (2.76)	8	4	230 (9.06)	228 (8.98)	242.5 (9.55)	6	70 (2.756)	64 (2.520)
150	80 (3.15)	8	5	263 (10.36)	261 (10.28)	275.5 (10.85)	7	80 (3.150)	80 (3.150)

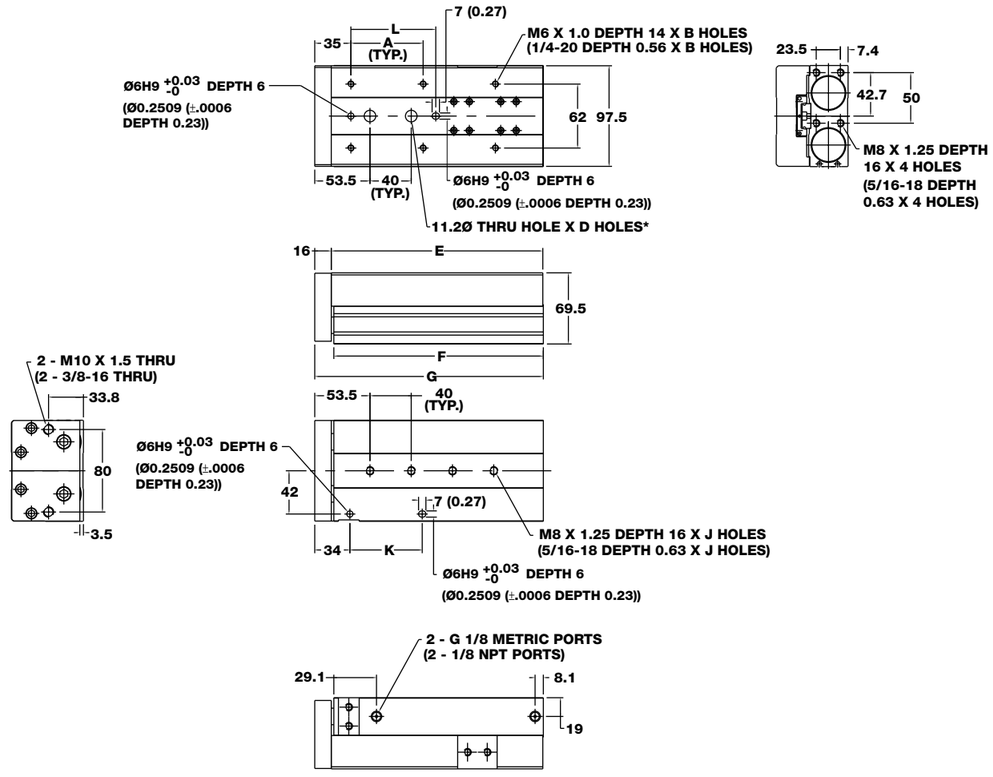
TBA Cylinder (25mm bore) Dimensions mm (in)



*Thru holes go through table top to access smaller counterbored mounting holes in the cylinder body.

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 (1.968)	50 (1.968)
20	50 (1.97)	4	1	92.5 (3.64)	90.5 (3.56)	108 (4.25)	2	50 (1.968)	50 (1.968)
30	50 (1.97)	4	1	92.5 (3.64)	90.5 (3.56)	108 (4.25)	2	50 (1.968)	50 (1.968)
40	60 (2.36)	4	1	102.5 (4.04)	100.5 (3.96)	118 (4.65)	2	60 (2.362)	60 (2.362)
50	35 (1.38)	6	1	115.5 (4.55)	113.5 (4.47)	131 (5.16)	2	35 (1.378)	35 (1.378)
75	60 (2.36)	6	1	156.5 (6.16)	154.5 (6.08)	172 (6.77)	3	60 (2.362)	60 (2.362)
100	70 (2.76)	6	2	197.5 (7.78)	195.5 (7.70)	213 (8.39)	4	70 (2.756)	76 (2.992)
125	75 (2.95)	8	3	253.5 (9.98)	251.5 (9.90)	269 (10.59)	5	75 (2.953)	75 (2.953)
150	80 (3.15)	8	3	270.5 (10.65)	268.5 (10.57)	286 (11.26)	6	80 (3.150)	80 (3.150)

TBA Cylinder (32mm bore) Dimensions mm (in)



*Thru holes go through table top to access smaller counterbored mounting holes in the cylinder body.

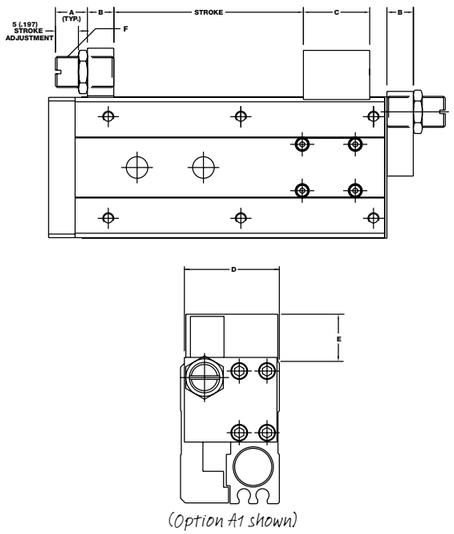
Stroke	A	B	D	E	F	G	J	K	L
10	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.968)	50 (1.968)
20	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.968)	50 (1.968)
30	50 (1.97)	4	NA	102 (4.02)	100 (3.94)	119 (4.67)	2	50 (1.968)	50 (1.968)
40	60 (2.36)	4	1	112 (4.41)	110 (4.34)	129 (5.06)	2	60 (2.362)	60 (2.362)
50	35 (1.38)	6	1	125 (4.93)	123 (4.85)	142 (5.58)	2	35 (1.378)	35 (1.378)
75	60 (2.36)	6	1	171 (6.73)	169 (6.66)	188 (7.39)	3	60 (2.362)	60 (2.362)
100	70 (2.76)	6	2	207 (8.15)	205 (8.08)	224 (8.80)	4	70 (2.756)	76 (2.992)
125	75 (2.95)	8	3	265 (10.44)	263 (10.36)	282 (11.09)	5	75 (2.953)	75 (2.953)
150	80 (3.15)	8	3	298 (11.74)	296 (11.66)	315 (12.39)	6	80 (3.150)	80 (3.150)

Twin Bore Air Table Cylinder Options

Stroke Adjuster (Options A1, A2, A3)

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

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



(Option A1 shown)

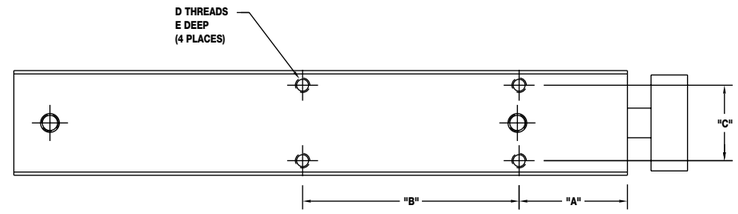
How to Specify

COMPACT CYLINDERS

Twin Bore Air Table Cylinder Options

Side Mounting Holes (Option S)

Use for TB and TBD model cylinders



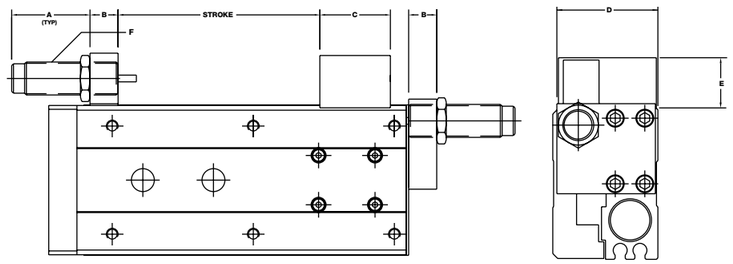
Bore	A	B	Stroke Length	C	D		E
					Standard	Option E	
6mm	10 (0.394)	23 (0.906)	0-10mm	6 (0.236)	M2x0.4	#2-56 UNC	3 (0.118)
		33 (1.299)	11-20mm				
		43 (1.693)	21-30mm				
		53 (2.087)	31-40mm				
		63 (2.480)	41-50mm				
8mm	10 (0.394)	23 (0.906)	0-10mm	7 (0.276)	M2.5x0.45	#3-48 UNC	3 (0.118)
		33 (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				

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Twin Bore Air Table Cylinder Options

Shock Absorbers (Option K)

Provides shock absorption 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 (.30)	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.

Cylinder Bore Diameter	d(mm)
Operating Pressure	p(bar)
Load on the Actuator	W(kg)
Impact Velocity*	v(m / sec)
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).**

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.
Dampening must be chosen from graphs.

* Impact velocity may be estimated at 2 times average velocity.
** The “work Energy” calculation varies with mounting orientation, Ewh for horizontal and Ewv for “vertical” applications.

How to Specify

COMPACT CYLINDERS

Twin Bore Air Table Cylinder Options

Shock Absorbers (Option K)

Shock Specifications

Model Bore	Shock Bore (mm)	K_3 Shock Constant	Thread Size	E_t Max Nm per Cycle	E_tC 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 (k1)

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

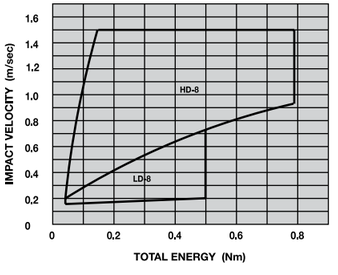
Bore	Dampening		
	Light Duty	Std. Duty	Heavy Duty
8	LD-8	SD-8	N/A
12	LD-12	SD-12	HD-12
16	LD-16	SD-16	HD-16
20	LD-20	SD-20	HD-20
25	LD-25	SD-25	HD-25
32	LD-32	SD-32	HD-32
Order Code	1	2	3

Cylinder Constant (k2)

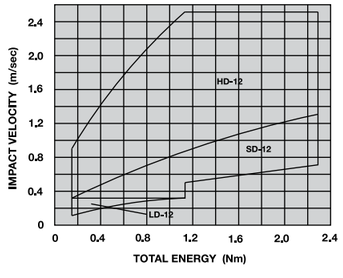
Bore	k
8	10.06
12	22.62
16	40.22
20	62.84
25	98.19
32	160.87

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

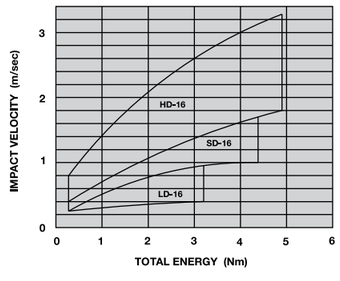
8mm Bore



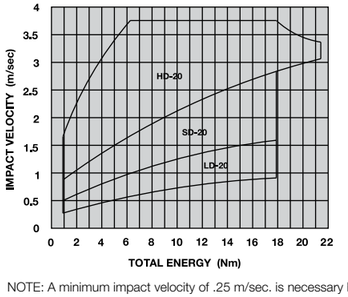
12mm Bore



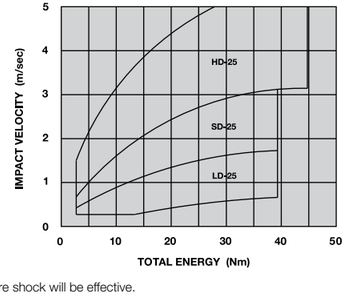
16mm Bore



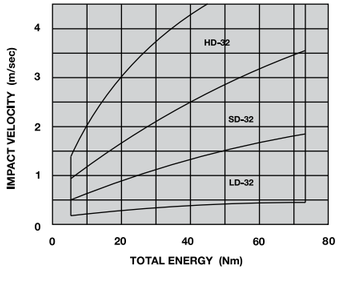
20mm Bore



25mm Bore



32mm Bore



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

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How to Order

The Model Number for all Twin Bore cylinders consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard double-acting Twin Bore model with 16mm bore, 10mm stroke, ball bushings, and U.S. customary threads.

Type	
TB	Twin Bore
TBD	Twin Bore, Double End
TBA	Twin Bore Air Table

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

TB - 16 10 - EX

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

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	
	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)[4]
M	Magnetic position sensing	
S	Side mounting holes[2]	
V	High temperature; -15 to 135 C (0 to 275 F)	
X	Ball bushings[2 3 4]	

NOTE: Bumpers standard on all models.
[1] TBA models only.
2 TB and TBD models only. (TB and TBD stroke lengths 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. TBA models available only in those stroke lengths listed as standard above.
3 Not available on 6mm bore.
[4] Not available on 8mm bore.

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

Options	All Bore Sizes
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

Twin Bore Repair Kits

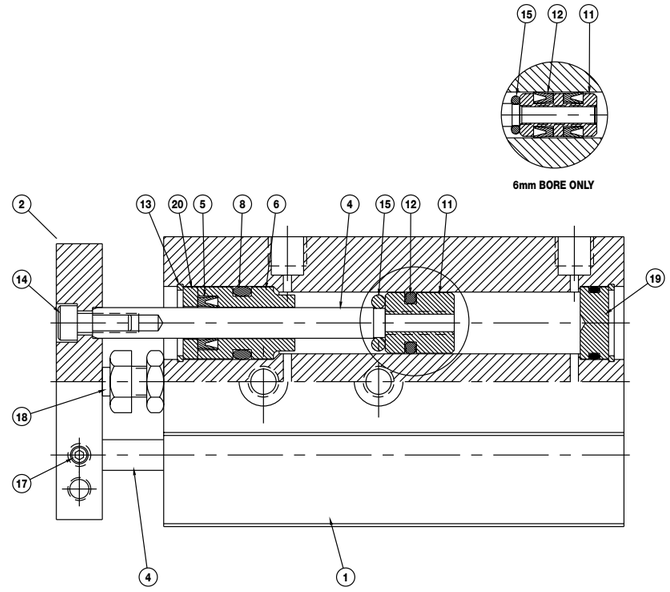
Repair Kit
K2-B-TB-[Bore]
K2-B-TB-[Bore]-V
K2-B-TBD-[Bore]
K2-B-TBD-[Bore]-V
K2-B-TB-[Bore]-X
K2-B-TB-[Bore]-VX
K2-B-TBD-[Bore]-X
K2-B-TBD-[Bore]-VX
K2-B-TBA-[Bore]
K2-B-TBA-[Bore]-V

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. Repair kits are not available on 6mm and 8mm.

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 example, on cylinder part number TB-1610-EM, order repair kit number K2-B-TB-16.**

Contact your local Bimba distributor for additional information.

Standard Model 6mm - 8mm Bore



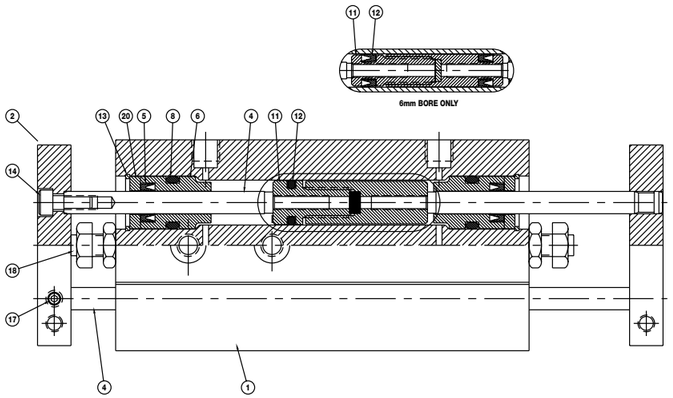
Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal	Nitrile
6	Rod Guide	White Delrin®
8	Rod Guide Seal	Nitrile
11	Piston	Aluminum
12	Piston Seal	Nitrile
13	Snap Ring	Zinc Plated Carbon Steel
14	Socket 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

NOTE: Field repair requires special assembly tooling and may not be practical. Factory rework is recommended.

Contact Bimba for all repair options.

Twin Bore Repair Kits

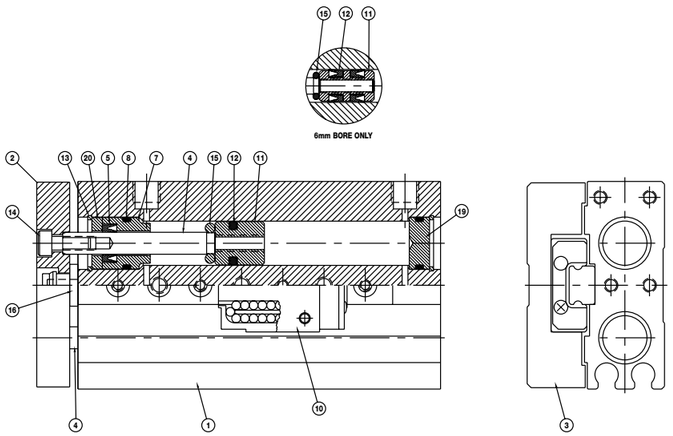
TBD (Double Rod End) 6mm - 8mm Bore



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

NOTE: Contact Bimba for all repair options.

TBA (Air Table Model) 6mm - 8mm Bore



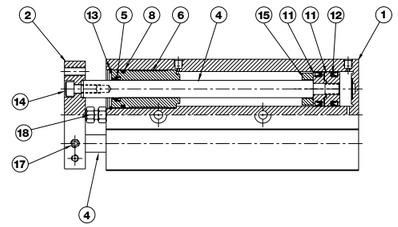
Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
3	Table Plate	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal	Nitrile
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	Nitrile
10	Table Bearing	Stainless Steel Rail + Stainless Steel 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

NOTE: Contact Bimba for all repair options.

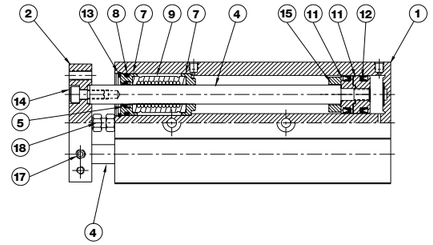
Twin Bore Repair Kits

12mm - 32mm Bore

Standard Model

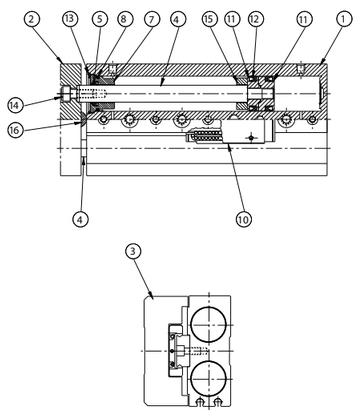


Ball Bearing Model (Option X)



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

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

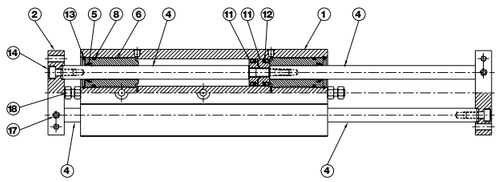


Part #	Description	Material
1	Body	Aluminum - (Anodized over wear surfaces)
2	End Block	Anodized Aluminum
3	Table Plate	Anodized Aluminum
4	Rod	Hard Chrome Plated Carbon Steel
5	Rod Seal/Wiper	Nitrile (Standard) or Fluoroelastomer (High Temperature Option)
7	Rod Guide	Anodized Aluminum
8	Rod Guide Seal	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

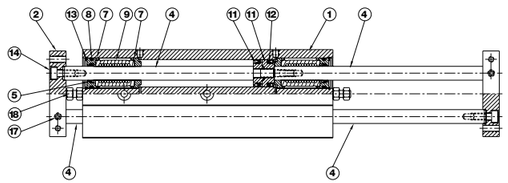
Twin Bore Repair Kits

TBD (Double Rod End) 12mm - 32mm Bore

Standard Model



Ball Bearing Model (Option X)



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

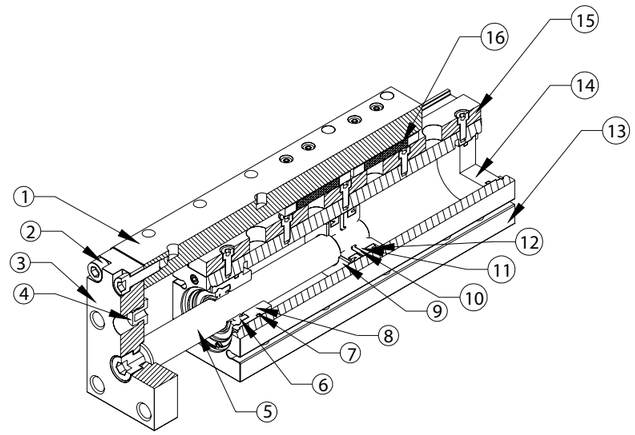


The Narrow Profile (NPA) actuator provides precise load guiding with a recirculating ball rail above its bore. Two bearing styles are offered (single/double bearing block) to accommodate both lower cost and higher precision/cost applications. With standard strokes up to 120mm, the NPA offers longer travel length than any competitive actuator of its type.

Narrow Profile Air Table

- Standard metric threads for ports, mounting, and rods (Specify “E” option for inch threads)
- Bore sizes: 12mm, 20mm, 32mm
- Double carrier bearing block optional
- Anodized aluminum body
- Stainless steel, hard chrome plated piston rod
- Maximum Operating Pressure: 10 bar (140 PSI)

Narrow Profile Air Table



Part #	Description	Material
1	Table	Aluminum, anodized
2	SHCS	Steel, zinc plated
3	Tooling Plate	Aluminum, anodized
4	Retract Bumper	Urethane
5	Piston Rod	Stainless steel, hard chrome plated
6	Rod Seal	Nitrile (fluoroelastomer optional)
7	Rod Guide Seal	Nitrile (fluoroelastomer optional)
8	Rod Guide	Aluminum
9	Extend Bumper	Urethane
10	Magnet	Nitrile base
11	Piston	Aluminum
12	Piston Seal	Nitrile (fluoroelastomer optional)
13	Body	Aluminum, anodized
14	Rear Head	Aluminum
15/16	Table Bearing	Stainless steel

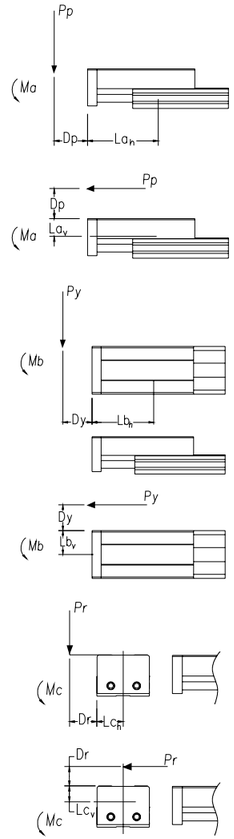
Engineering Specifications

Operating Medium: Air

Maximum Operating Pressure: 10 bar (140 PSI)

Temperature Range: -10° to 70° C (15° to 160° F)

Narrow Profile Air Table



Pp = Ma x 1000 (Newtons)
Dp + La

Dp = Distance from load point to body (mm)

La = Moment arm (mm) see chart

Py = Mb x 1000 (Newtons)
Dy + Lb

Dy = Distance from load point to body (mm)

Lb = Moment arm (mm) see chart

Pr = Mc x 1000 (Newtons)
Dr + Lc

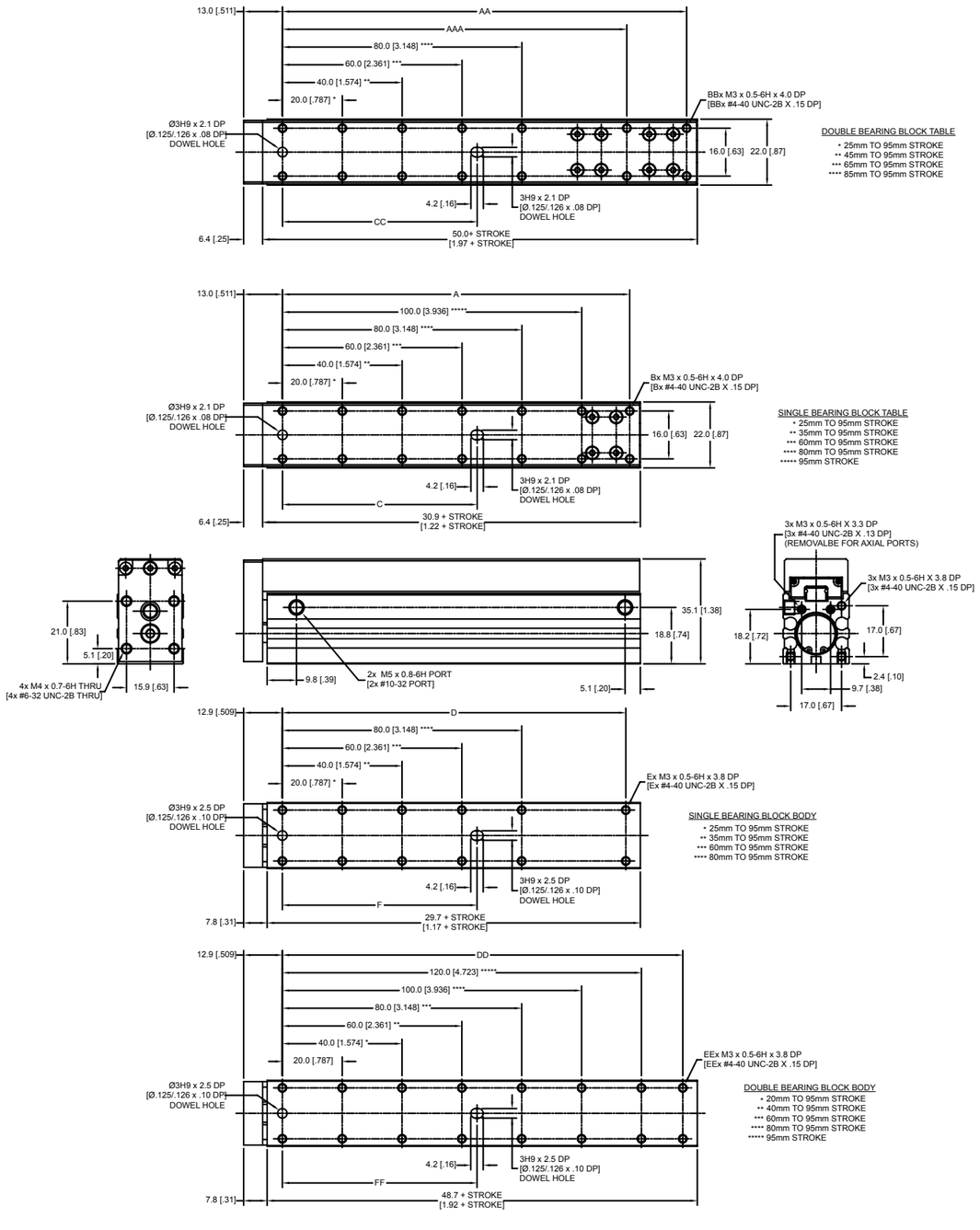
Dr = Distance from load point to body (mm)

Lc = Moment arm (mm) see chart

	Maximum Allowable Moment (Nm)					
	12mm		20mm		32mm	
	Standard	Option D	Standard	Option D	Standard	Option D
Ma	2.55	8.65	22.0	27.0	36.0	70.2
Mb	2.55	8.65	22.0	27.0	36.0	70.2
Mc	5.10	13.10	59.0	70.0	107.0	157.0

	Moment Lever Arm Constants (mm)					
	12mm		20mm		32mm	
	Standard	Option D	Standard	Option D	Standard	Option D
Lah	25 + stroke	32 + stroke	45 + stroke	46 + stroke	60 + stroke	38 + stroke
Lbh	25 + stroke	32 + stroke	45 + stroke	46 + stroke	60 + stroke	38 + stroke
Lav	10.9	10.9	21.2	21.2	22.0	22.0
Lbv	10.6	10.6	17.5	17.5	23.0	23.0
Lch	10.6	10.6	17.5	17.5	23.0	23.0
Lcv	10.9	10.9	21.2	21.2	22.0	22.0

Narrow Profile Air Table (NPA-12 models) Dimensions mm (in)



Narrow Profile Air Table (NPA-12 models) Dimensions

Metric Dimensions (mm)

Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	26	45	25	4	6	26	45	24.7	43.8	4	6	24.8	43.9
10	31	50	30	4	6	31	50	29.7	48.8	4	6	29.8	48.9
15	36	55	35	4	6	36	55	34.7	53.8	4	6	34.8	53.9
20	41	60	40	4	6	41	60	39.7	58.8	4	8	39.9	58.9
25	46	65	45	6	8	46	65	44.7	63.8	6	8	44.8	63.9
30	51	70	50	6	8	51	65	49.7	68.8	6	8	49.8	65.0
35	56	75	55	8	8	56	65	54.7	73.8	8	8	54.8	65.0
40	61	80	60	8	8	61	65	59.7	78.8	8	10	59.8	65.0
45	66	85	65	8	10	65	65	64.7	83.8	8	10	65.0	65.0
50	71	90	70	8	10	65	65	69.7	88.8	8	10	65.0	65.0
55	76	95	75	8	10	65	65	74.7	93.8	8	10	65.0	65.0
60	81	100	80	10	10	65	65	79.7	98.8	10	12	65.0	65.0
65	86	105	85	10	12	65	65	84.7	103.8	10	12	65.0	65.0
70	91	110	90	10	12	65	65	89.7	108.8	10	12	65.0	65.0
75	96	115	95	10	12	65	65	94.7	113.8	10	12	65.0	65.0
80	101	120	100	12	12	65	65	99.7	118.8	12	14	65.0	65.0
85	106	125	105	12	14	65	65	104.7	123.7	12	14	65.0	65.0
90	111	130	110	12	14	65	65	109.7	128.8	12	14	65.0	65.0
95	116	135	115	14	14	65	65	114.7	133.8	12	16	65.0	65.0

English Dimensions (in [stroke is specified in mm])

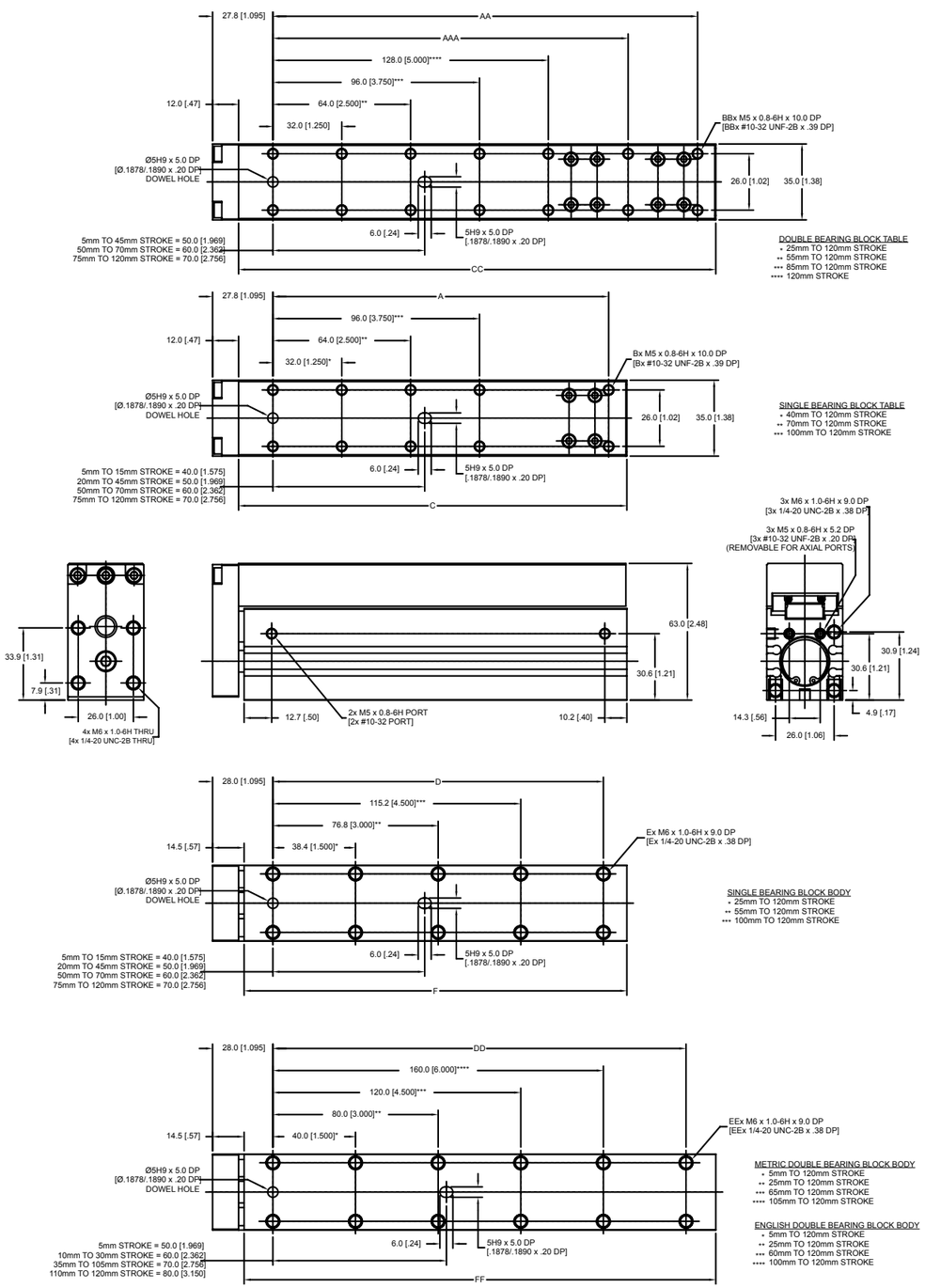
Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	1.023	1.772	0.985	4	6	1.023	1.772	0.974	1.723	4	6	0.978	1.727
10	1.220	1.969	1.182	4	6	1.220	1.969	1.171	1.920	4	6	1.175	1.924
15	1.417	2.166	1.379	4	6	1.417	2.165	1.368	2.117	4	6	1.372	2.121
20	1.613	2.362	1.575	4	6	1.614	2.362	1.564	2.313	4	8	1.569	2.318
25	1.810	2.559	1.772	6	8	1.810	2.559	1.761	2.510	6	8	1.765	2.514
30	2.007	2.756	1.969	6	8	2.007	2.560	1.958	2.707	6	8	1.962	2.560
35	2.204	2.953	2.166	8	8	2.204	2.560	2.155	2.904	8	8	2.159	2.560
40	2.401	3.150	2.363	8	8	2.401	2.560	2.352	3.101	8	10	2.356	2.560
45	2.598	3.347	2.560	8	10	2.560	2.560	2.549	3.298	8	10	2.560	2.560
50	2.795	3.544	2.757	8	10	2.560	2.560	2.746	3.495	8	10	2.560	2.560
55	2.991	3.740	2.953	8	10	2.560	2.560	2.942	3.691	8	10	2.560	2.560
60	3.188	3.937	3.150	10	10	2.560	2.560	3.139	3.888	10	12	2.560	2.560
65	3.385	4.134	3.347	10	12	2.560	2.560	3.336	4.085	10	12	2.560	2.560
70	3.582	4.331	3.544	10	12	2.560	2.560	3.533	4.282	10	12	2.560	2.560
75	3.779	4.528	3.741	10	12	2.560	2.560	3.730	4.479	10	12	2.560	2.560
80	3.976	4.725	3.938	12	12	2.560	2.560	3.927	4.676	12	14	2.560	2.560
85	4.172	4.921	4.134	`12	14	2.560	2.560	4.123	4.872	12	14	2.560	2.560
90	4.369	5.118	4.331	12	14	2.560	2.560	4.320	5.069	12	14	2.560	2.560
95	4.566	5.315	4.528	14	14	2.560	2.560	4.517	5.266	12	16	2.560	2.560

How to Specify

COMPACT CYLINDERS

BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

Narrow Profile Air Table (NPA-20 models) Dimensions mm (in)



Narrow Profile Air Table (NPA-20 models) Dimensions

Metric Dimensions (mm)

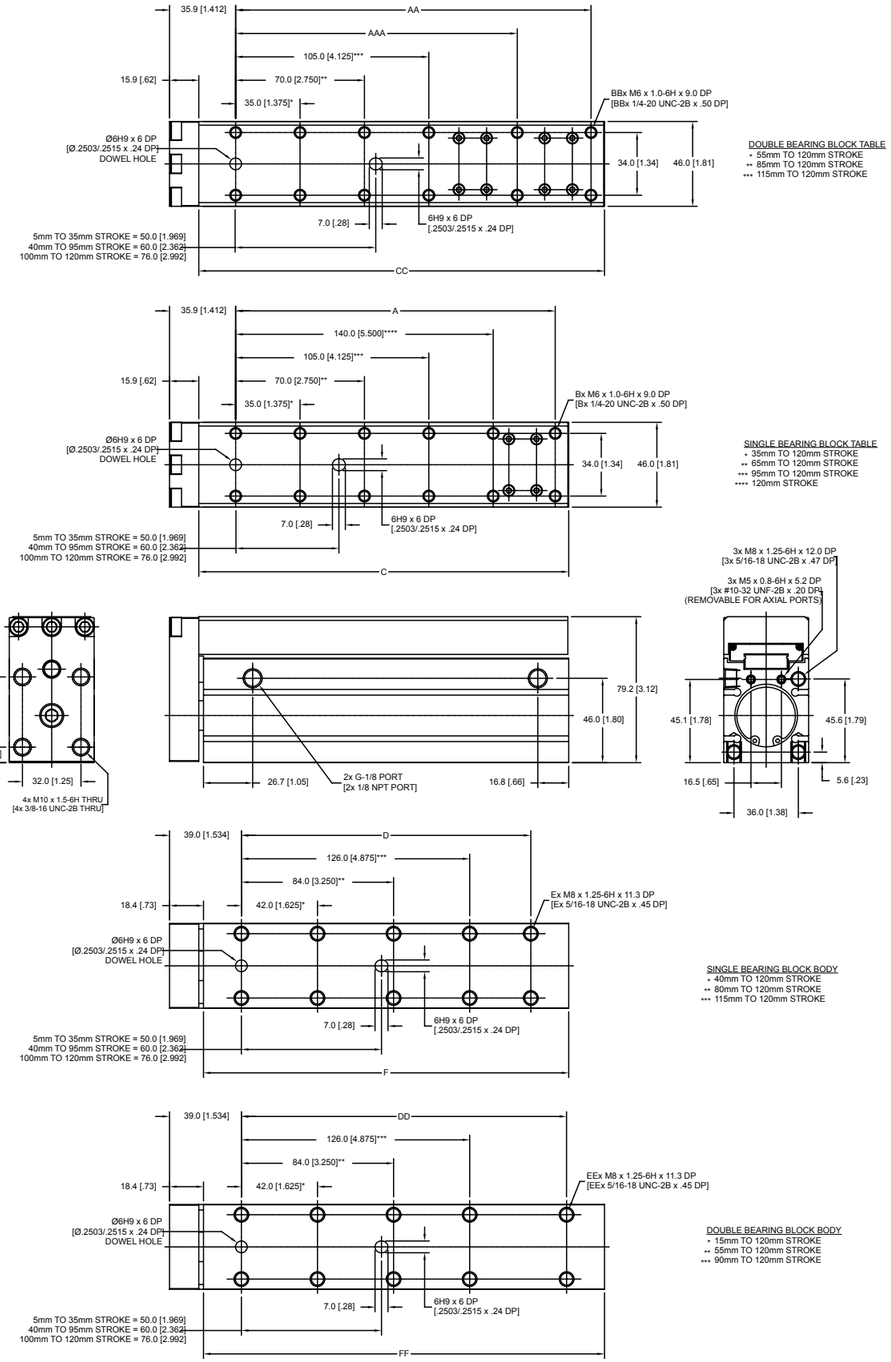
Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	39.8	80.8	48.8	4	6	63.6	104.6	35	76	4	6	61.5	102.5
10	44.8	85.8	53.8	4	6	68.6	109.6	40	81	4	6	66.5	107.5
15	49.8	95.8	63.8	4	6	73.6	119.6	45	91	4	6	71.5	117.5
20	54.8	95.8	63.8	4	6	78.6	119.6	50	91	4	6	76.5	117.5
25	64.8	100.8	68.8	4	8	88.6	124.6	60	96	6	8	86.5	122.5
30	64.8	105.8	73.8	4	8	88.6	129.6	60	101	6	8	86.5	127.5
35	69.8	110.8	78.8	4	8	93.6	134.6	65	106	6	8	91.5	132.5
40	74.8	115.8	83.8	6	8	98.6	139.6	70	111	6	8	96.5	132.5
45	79.8	125.8	93.8	6	8	103.6	149.6	75	121	6	8	101.5	147.5
50	84.8	125.8	93.8	6	8	108.6	149.6	80	121	6	8	106.5	147.5
55	94.8	130.8	98.8	6	10	118.6	154.6	90	126	6	8	116.5	152.5
60	94.8	135.8	103.8	6	10	118.6	159.6	90	131	6	8	116.5	157.5
65	99.8	140.8	108.8	6	10	123.6	164.6	95	136	8	10	121.5	162.5
70	104.8	145.8	113.8	8	10	128.6	169.6	100	141	8	10	126.5	167.5
75	109.8	155.8	123.8	8	10	133.6	179.6	105	151	8	10	131.5	177.5
80	114.8	155.8	123.8	8	10	138.6	179.6	110	151	8	10	136.5	177.5
85	124.8	160.8	128.8	8	12	148.6	184.6	120	156	8	10	146.5	182.5
90	124.8	165.8	133.8	8	12	148.6	189.6	120	161	8	10	146.5	187.5
95	129.8	170.8	138.8	8	12	153.6	194.6	125	166	8	10	151.5	192.5
100	134.8	175.8	143.8	10	12	158.6	199.6	130	171	8	10	156.5	197.5
105	139.8	185.8	153.8	10	12	163.6	209.6	135	181	10	12	161.5	207.5
110	144.8	185.8	153.8	10	12	168.6	209.6	140	181	10	12	166.5	207.5
115	154.8	190.8	158.8	10	12	178.6	214.6	150	186	10	12	176.5	212.5
120	154.8	195.8	163.8	10	14	178.6	219.6	150	191	10	12	176.5	217.5
125	159.8	200.8	168.8	12	14	183.6	224.6	155	196	10	12	181.5	222.5
130	164.8	205.8	173.8	12	14	188.6	229.6	160	201	10	12	186.5	227.5
135	169.8	215.8	183.8	12	14	193.6	239.6	165	206	10	12	191.5	237.5
140	174.8	215.8	183.8	12	14	198.6	239.6	170	216	10	12	196.5	237.5
145	184.8	220.8	188.8	12	14	208.6	244.6	180	216	12	14	206.5	242.5
150	184.8	225.8	193.8	12	16	208.6	249.6	180	221	12	14	206.5	247.5
155	189.8	230.8	198.5	14	16	213.6	254.6	185	226	12	14	211.5	252.5
160	194.8	235.8	203.8	14	16	218.6	259.6	190	231	12	14	216.5	257.5
165	199.8	N/A	N/A	14	N/A	223.6	N/A	195	N/A	12	N/A	221.5	N/A
170	204.8	N/A	N/A	14	N/A	228.6	N/A	200	N/A	12	N/A	226.5	N/A
175	214.8	N/A	N/A	14	N/A	238.6	N/A	210	N/A	12	N/A	236.5	N/A
180	214.8	N/A	N/A	14	N/A	238.6	N/A	210	N/A	12	N/A	236.5	N/A
185	219.8	N/A	N/A	16	N/A	243.6	N/A	215	N/A	14	N/A	241.5	N/A
190	224.8	N/A	N/A	16	N/A	248.6	N/A	220	N/A	14	N/A	246.5	N/A
195	229.8	N/A	N/A	16	N/A	253.6	N/A	225	N/A	14	N/A	251.5	N/A
200	234.8	N/A	N/A	16	N/A	258.6	N/A	230	N/A	14	N/A	256.5	N/A

Narrow Profile Air Table (NPA-20 models) Dimensions

English Dimensions (in [stroke is specified in mm])

Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	1.568	3.182	1.922	4	6	2.50	4.12	1.377	2.991	4	6	2.42	4.04
10	1.764	3.379	2.119	4	6	2.70	4.32	1.574	3.188	4	6	2.62	4.23
15	1.961	3.772	2.512	4	6	2.90	4.71	1.771	3.582	4	6	2.82	4.63
20	2.158	3.772	2.512	4	6	3.09	4.71	1.968	3.582	4	6	3.01	4.63
25	2.552	3.969	2.709	4	8	3.49	4.91	2.362	3.779	6	8	3.41	4.82
30	2.552	4.166	2.906	4	8	3.49	5.10	2.362	3.976	6	8	3.41	5.02
35	2.749	4.363	3.103	4	8	3.69	5.30	2.558	4.173	6	8	3.60	5.22
40	2.946	4.560	3.300	6	8	3.88	5.50	2.755	4.369	6	8	3.80	5.41
45	3.142	4.953	3.693	6	8	4.08	5.89	2.952	4.763	6	8	4.00	5.81
50	3.339	4.953	3.693	6	8	4.28	5.89	3.149	4.763	6	8	4.19	5.81
55	3.733	5.150	3.890	6	10	4.67	6.09	3.543	4.960	8	8	4.59	6.00
60	3.733	5.347	4.087	6	10	4.67	6.28	3.543	5.157	8	10	4.59	6.20
65	3.930	5.544	4.284	6	10	4.87	6.48	3.739	5.354	8	10	4.78	6.40
70	4.127	5.741	4.481	8	10	5.06	6.68	3.936	5.550	8	10	4.98	6.59
75	4.324	6.135	4.875	8	10	5.26	7.07	4.133	5.944	8	10	5.18	6.99
80	4.520	6.135	4.875	8	10	5.46	7.07	4.330	5.944	8	10	5.37	6.99
85	4.914	6.331	5.071	8	12	5.85	7.27	4.724	6.141	8	10	5.77	7.19
90	4.914	6.528	5.268	8	12	5.85	7.46	4.724	6.338	8	10	5.77	7.38
95	5.111	6.725	5.465	8	12	6.05	7.66	4.921	6.535	8	10	5.97	7.58
100	5.308	6.922	5.662	10	12	6.24	7.86	5.117	6.732	10	12	6.16	7.78
105	5.505	7.316	6.056	10	12	6.44	8.25	5.314	7.125	10	12	6.36	8.17
110	5.701	7.316	6.056	10	12	6.64	8.25	5.511	7.125	10	12	6.56	8.17
115	6.095	7.513	6.253	10	12	7.03	8.45	5.905	7.322	10	12	6.95	8.37
120	6.095	7.709	6.449	10	14	7.03	8.65	5.905	7.519	10	12	6.95	8.56
125	6.292	7.906	6.646	12	14	7.23	8.84	6.102	7.716	10	12	7.15	8.76
130	6.489	8.103	6.843	12	14	7.43	9.04	6.299	7.913	10	12	7.34	8.96
135	6.686	8.497	7.237	12	14	7.62	9.43	6.495	8.306	12	14	7.54	9.35
140	6.883	8.497	7.237	12	14	7.82	9.43	6.692	8.306	12	14	7.74	9.35
145	7.276	8.694	7.434	12	14	8.21	9.63	7.086	8.503	12	14	8.13	9.55
150	7.276	8.890	7.630	12	16	8.21	9.83	7.086	8.700	12	14	8.13	9.74
155	7.473	9.087	7.827	14	16	8.41	10.02	7.283	8.897	12	14	8.33	9.94
160	7.670	9.284	8.024	14	16	8.61	10.22	7.480	9.094	12	14	8.52	10.14
165	7.867	N/A	N/A	14	N/A	8.80	N/A	7.676	N/A	12	N/A	8.72	N/A
170	8.064	N/A	N/A	14	N/A	9.00	N/A	7.873	N/A	12	N/A	8.92	N/A
175	8.457	N/A	N/A	14	N/A	9.39	N/A	8.267	N/A	14	N/A	9.31	N/A
180	8.457	N/A	N/A	14	N/A	9.39	N/A	8.267	N/A	14	N/A	9.31	N/A
185	8.654	N/A	N/A	16	N/A	9.59	N/A	8.464	N/A	14	N/A	9.51	N/A
190	8.851	N/A	N/A	16	N/A	9.79	N/A	8.661	N/A	14	N/A	9.71	N/A
195	9.048	N/A	N/A	16	N/A	9.98	N/A	8.858	N/A	14	N/A	9.90	N/A
200	9.245	N/A	N/A	16	N/A	10.18	N/A	9.054	N/A	14	N/A	10.10	N/A

Narrow Profile Air Table (NPA-32 models) Dimensions mm (in)



Narrow Profile Air Table (NPA-32 Models) Dimensions

Metric Dimensions (mm)

Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	53.3	77.7	37.7	4	6	80.2	104.6	37	61.4	4	4	78.1	102.5
10	58.3	82.8	42.7	4	6	85.2	109.6	42	66.4	4	4	83.1	107.5
15	63.3	92.8	52.8	4	6	90.2	119.6	47	76.4	4	6	88.1	117.5
20	68.3	92.8	52.8	4	6	95.2	119.6	52	76.4	4	6	93.1	117.5
25	73.3	97.8	57.8	4	6	100.2	124.6	57	81.4	4	6	98.1	122.5
30	78.3	102.8	62.8	4	6	105.2	129.6	62	86.4	4	6	103.1	127.5
35	83.3	107.8	67.8	6	6	110.2	134.6	67	91.4	4	6	108.1	132.5
40	93.3	112.8	72.7	6	6	120.2	139.6	77	96.4	6	6	118.1	137.5
45	93.3	117.8	77.7	6	6	120.2	144.6	77	101.4	6	6	118.1	142.5
50	98.3	122.8	82.8	6	6	125.2	149.6	82	106.4	6	6	123.1	147.5
55	103.3	132.8	92.8	6	8	130.2	159.6	87	116.4	6	8	128.1	157.5
60	108.3	132.8	92.8	6	8	135.2	159.6	92	116.4	6	8	133.1	157.5
65	113.3	137.8	97.8	8	8	140.2	164.6	97	121.4	6	8	138.1	162.5
70	118.3	142.7	102.7	8	8	145.2	169.6	102	126.4	6	8	143.1	167.5
75	123.3	147.8	107.7	8	8	150.2	174.6	107	131.4	6	8	148.1	172.5
80	133.3	152.8	112.8	8	8	160.2	179.6	117	136.4	8	8	158.1	177.5
85	133.3	157.8	117.8	8	10	160.2	184.6	117	141.4	8	8	158.1	182.5
90	138.3	162.8	122.8	8	10	165.2	189.6	122	146.4	8	10	163.1	187.5
95	143.3	172.8	132.8	10	10	170.2	199.6	127	156.4	8	10	168.1	197.5
100	148.3	172.8	132.8	10	10	175.2	199.6	132	156.4	8	10	173.1	197.5
105	153.3	177.7	137.7	10	10	180.2	204.6	137	161.4	8	10	178.1	202.5
110	158.3	182.8	142.7	10	10	185.2	209.6	142	166.4	8	10	183.1	207.5
115	163.3	187.8	147.8	10	12	190.2	214.6	147	171.4	10	10	188.1	212.5
120	173.3	192.8	152.8	12	12	200.2	219.6	157	176.4	10	10	198.1	217.5
125	173.3	N/A	N/A	12	N/A	200.2	N/A	157	N/A	10	N/A	198.1	N/A
130	178.3	N/A	N/A	12	N/A	205.2	N/A	162	N/A	10	N/A	203.1	N/A
135	183.3	N/A	N/A	12	N/A	210.2	N/A	167	N/A	10	N/A	208.1	N/A
140	188.3	N/A	N/A	12	N/A	215.2	N/A	172	N/A	10	N/A	213.1	N/A
145	193.3	N/A	N/A	12	N/A	220.2	N/A	177	N/A	10	N/A	218.1	N/A
150	198.3	N/A	N/A	12	N/A	225.2	N/A	182	N/A	12	N/A	223.1	N/A
155	203.3	N/A	N/A	14	N/A	230.2	N/A	187	N/A	12	N/A	228.1	N/A
160	213.3	N/A	N/A	14	N/A	240.2	N/A	192	N/A	12	N/A	233.1	N/A
165	213.3	N/A	N/A	14	N/A	240.2	N/A	197	N/A	12	N/A	238.1	N/A
170	218.3	N/A	N/A	14	N/A	245.2	N/A	202	N/A	12	N/A	243.1	N/A

Narrow Profile Air Table (NPA-32 models) Dimensions

English Dimensions (in [stroke is specified in mm])

Stroke	A	AA	AAA	B	BB	C	CC	D	DD	E	EE	F	FF
5	2.100	3.061	1.486	4	6	3.16	4.12	1.457	2.417	4	4	3.08	4.04
10	2.297	3.258	1.683	4	6	3.35	4.32	1.654	2.614	4	4	3.27	4.23
15	2.494	3.652	2.077	4	6	3.55	4.71	1.851	3.008	4	6	3.47	4.63
20	2.690	3.652	2.077	4	6	3.75	4.71	2.047	3.008	4	6	3.67	4.63
25	2.887	3.849	2.274	4	6	3.94	4.91	2.244	3.205	4	6	3.86	4.82
30	3.084	4.046	2.471	4	6	4.14	5.10	2.441	3.402	4	6	4.06	5.02
35	3.281	4.243	2.668	6	6	4.34	5.30	2.638	3.599	4	6	4.26	5.22
40	3.675	4.439	2.864	6	6	4.73	5.50	3.032	3.795	6	6	4.65	5.41
45	3.675	4.636	3.061	6	6	4.73	5.69	3.032	3.992	6	6	4.65	5.61
50	3.872	4.833	3.258	6	6	4.93	5.89	3.229	4.189	6	6	4.85	5.81
55	4.068	5.227	3.652	6	8	5.13	6.28	3.425	4.583	6	8	5.04	6.20
60	4.265	5.227	3.652	6	8	5.32	6.28	3.622	4.583	6	8	5.24	6.20
65	4.462	5.424	3.849	8	8	5.52	6.48	3.819	4.780	6	8	5.44	6.40
70	4.659	5.620	4.045	8	8	5.72	6.68	4.016	4.976	6	8	5.63	6.59
75	4.856	5.817	4.242	8	8	5.91	6.87	4.213	5.173	6	8	5.83	6.79
80	5.249	6.014	4.439	8	8	6.31	7.07	4.606	5.370	8	8	6.22	6.99
85	5.249	6.211	4.636	8	10	6.31	7.27	4.606	5.567	8	8	6.22	7.19
90	5.446	6.408	4.833	8	10	6.50	7.47	4.803	5.764	8	10	6.42	7.38
95	5.643	6.802	5.227	10	10	6.70	7.86	5.000	6.158	8	10	6.62	7.78
100	5.840	6.802	5.227	10	10	6.90	7.86	5.197	6.158	8	10	6.82	7.78
105	6.037	6.998	5.423	10	10	7.09	8.06	5.394	6.354	8	10	7.01	7.97
110	6.234	7.195	5.620	10	10	7.29	8.25	5.591	6.551	8	10	7.21	8.17
115	6.431	7.392	5.817	10	12	7.49	8.45	5.788	6.748	10	10	7.41	8.37
120	6.824	7.589	6.014	12	12	7.88	8.65	6.181	6.945	10	10	7.80	8.56
125	6.824	N/A	N/A	12	N/A	7.88	N/A	6.181	N/A	10	N/A	7.80	N/A
130	7.021	N/A	N/A	12	N/A	8.08	N/A	6.378	N/A	10	N/A	8.00	N/A
135	7.218	N/A	N/A	12	N/A	8.28	N/A	6.575	N/A	10	N/A	8.19	N/A
140	7.415	N/A	N/A	12	N/A	8.47	N/A	6.772	N/A	10	N/A	8.39	N/A
145	7.612	N/A	N/A	12	N/A	8.67	N/A	6.969	N/A	10	N/A	8.59	N/A
150	7.809	N/A	N/A	12	N/A	8.87	N/A	7.166	N/A	12	N/A	8.78	N/A
155	8.005	N/A	N/A	14	N/A	9.06	N/A	7.362	N/A	12	N/A	8.98	N/A
160	8.399	N/A	N/A	14	N/A	9.46	N/A	7.756	N/A	12	N/A	9.37	N/A
165	8.399	N/A	N/A	14	N/A	9.46	N/A	7.756	N/A	12	N/A	9.37	N/A
170	8.596	N/A	N/A	14	N/A	9.65	N/A	7.953	N/A	12	N/A	9.57	N/A

How to Order

The Model Number for all Narrow Profile Air Tables consists of alphanumeric clusters. These designate type, bore size, stroke length, and special options. Please refer to the charts below for an example of a standard NPA model. This is a 20mm bore, 50mm stroke cylinder with additional options.

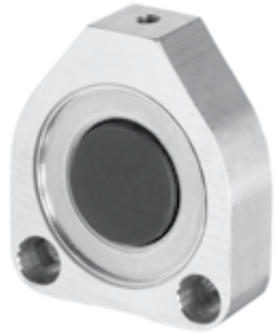
Type	
NPA	Narrow Profile Air Table

Stroke Length	
Bore	**Strokes**
12mm	5-95mm
20-32mm	5-120mm

NPA - 20 50 - DEM

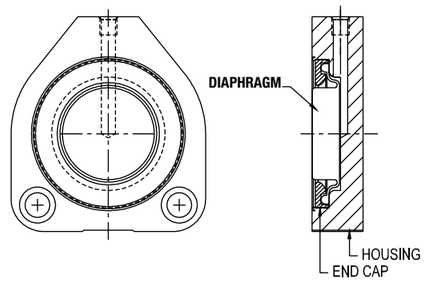
Bore Size	
12	12mm
20	20mm
32	32mm

Options (Enter in alphabetical order)	
D	Double carrier bearing block
E	U.S. customary (inch)
M	Magnetic position sensing
V	High temperature (15° F to 225° F)



This 1-1/4" bore diaphragm cylinder is designed for a clamping application with minimal friction losses. Its short overall height allows the cylinder to fit into a tight space with minimal friction.

Diaphragm Cylinder



Engineering Specifications

Maximum Operating Pressure: 120 PSI

Operating Temperature: 150° F

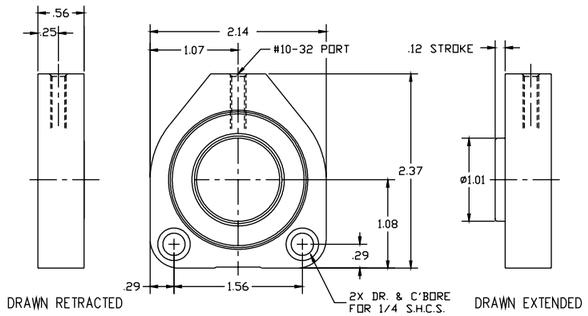
Cylinder Body: Aluminum

Diaphragm: 50 Durometer Nitrile with reinforced polyester fabric

NOTES:
Output force will be approximately 15% less than theoretical when units are not extended full stroke.
Cylinders should not be operated without a part being clamped (extension should be limited by customer to maximize life).

How to Order

The Model Number for all Diaphragm Cylinders is not configurable. Please contact Bimba's Customer Service for additional information.



CSS - 00119 - A

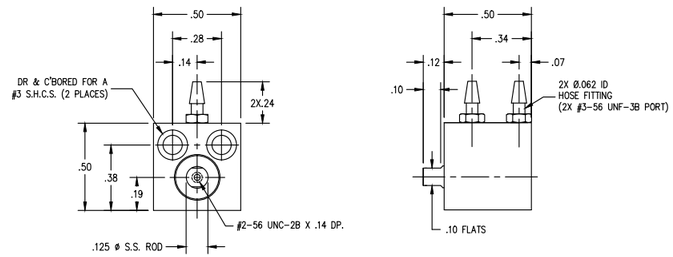
Type
Diaphragm Cylinders

Product Features



CFS-01011-A double-acting, miniature "cube" cylinders (1/2" x 1/2" x 1/2") are ideal for applications requiring low output force in extremely tight spaces. This cylinder has been successfully applied in various semiconductor industry applications. Several are mounted side-by-side in a test fixture for circuit board continuity testing. Another application involves silicon wafer processing, in which the cylinders are used to clamp wafers during certain operations.

Miniature "Cube" Cylinder



Engineering Specifications

Maximum Operating Pressure: 100 PSI

Power Factors: Extend: 0.028; Retract: 0.015

Cylinder Body: Aluminum Alloy

Piston Rod: 303 Stainless Steel

Rod Bearing: Brass

Weight: 0.25 oz (7.8 grams)

Lubrication: Silicone Fluid

How to Order

The Model Number for all Miniature "Cube" Cylinders is not configurable. Please contact Bimba's Customer Service for additional information.

CFS - 01011 - A

Type
Miniature "Cube" Cylinder

MACQ Actuators

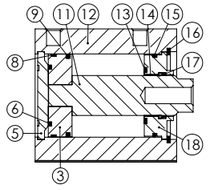
Engineering Specifications



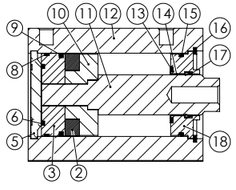
Bore Size (mm)		12	16	20	25	32	40	50	63	80	100
Fluid		Air (Clean/Dry)									
Action		Double Acting									
Pressure Range		14 to 145 PSI (0.1 to 1.0 MPa)									
Proof Pressure		215 PSI (1.5 MPa)									
Temperature Range		-4 °F to 176 °F (-20 °C to 80 °C)									
Cushion Type		Bumper									
Speed Range		30 to 500 mm/s									
Stroke Tolerance		+1.0 / -0									
Port Size		M5 X 0.8				1/8 NPT		1/4 NPT		3/8 NPT	
Thrust, N (lbs)[1]	Pushing Force	68 (15)	121 (27)	189 (42)	295 (66)	483 (108)	754 (169)	1178 (264)	1870 (420)	3016 (678)	4712 (1059)
	Pulling Force	51 (11)	91 (20)	141 (32)	227 (51)	362 (81)	633 (142)	990 (222)	1682 (378)	2721 (611)	4230 (950)
Sensor Switch Compatibility[2]	Reed Switch	MCS1-G									
	Solid State Switch	MDS1-G									

[1] Thrust at 0.6 MPa (87psi) inlet pressure.
[2] See Switch chapter for switch specifications.
See page 286 for male thread adapter.

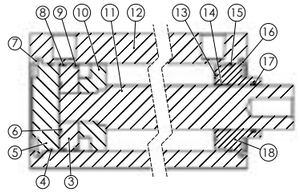
Stroke ≤100mm, No Magnet



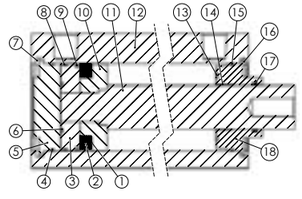
Stroke ≤100mm, With Magnet



Stroke >100mm, No Magnet



Stroke >100mm, With Magnet



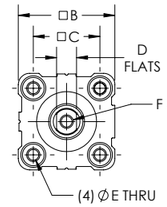
Materials

Number	Item	Material
1	Washer	No Washer (Ø12-Ø25 and Ø32-Ø100 with stroke ≤100mm); NBR (Ø32-Ø100 with stroke >100mm)
2	Magnet	Sintered Metal (Neodymium-Iron-Boron) (Ø12-Ø25); Plastic (Ø32-Ø100)
3	Piston	Brass (Ø12, Ø16); Aluminum Alloy (Ø20-Ø100)
4	O-Ring	NBR
5	Back Cap	Cap incorporated into body (Ø12, Ø16); Hard Anodized Aluminum Alloy
6	Bumper	TPU (Ø12-Ø25); NBR (Ø32-Ø100)
7	Retaining Ring	Spring Steel
8	Wear Ring	No Wear Ring (Ø12-Ø32); Polymer Bearing Material (Ø40-Ø100)
9	Piston Seal	NBR
10	Magnet Holder	Brass (Ø12, Ø16); Aluminum Alloy (Ø20-Ø100)
11	Piston Rod	Carbon Steel with 20µm Chrome Plating
12	Body	Hard Anodized Aluminum Alloy
13	Bumper	NBR
14	Bearing	No Bearing (Ø12-Ø32); Bearing Alloy (Ø40-Ø100)
15	O-Ring	NBR
16	Retaining Ring	Spring Steel
17	Rod Seal	NBR
18	Front Cap	Aluminum Alloy

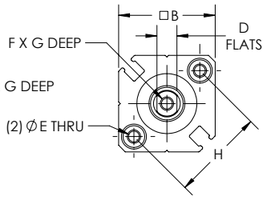
MACQ Cylinder Dimensions (mm)

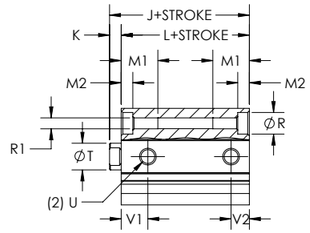
Ø12, Ø16

No Magnet



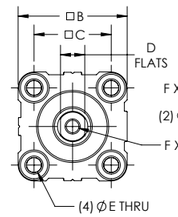
Magnet



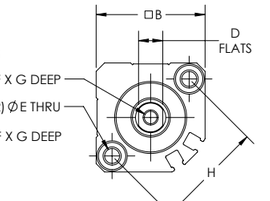


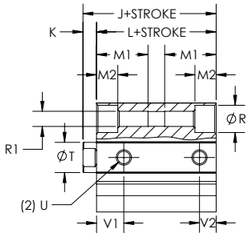
Ø20, Ø25

No Magnet

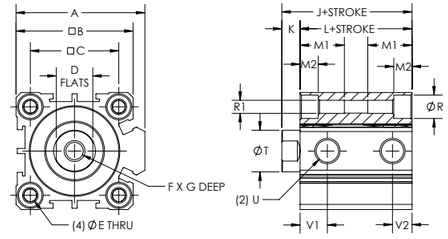


Magnet

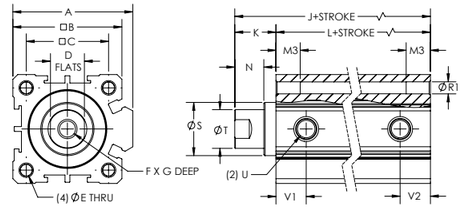




Ø32 - Ø100 (Stroke ≤ 100)



Ø32 - Ø100 (Stroke > 100)



Dimensions (mm)

	Stroke (mm)	Bore Size (mm)									
		12	16	20	25	32	40	50	63	80	100
A		-	-	-	-	49.5	57	71	84	104	123.5
B		25	29	36	40	45	53	64	77	98	117
C		15.5	20	25.5	28	34	40	50	60	77	94
D		5	6	8	10	14	14	17	17	22	27
E		3.4	3.4	5.2	5.2	5.2	5.2	6.8	8.5	10.3	10.3
F		M3 X 0.5	M4 X 0.7	M5 X 0.8	M6 X 1.0	M8 X 1.25	M8 X 1.25	M10 X 1.5	M10 X 1.5	M16 X 2.0	M20 X 2.5
G	5-100	6	8	7	12	13	13	15	15	20	26
	125+	-	-	-	-	13	13	15	15	21	27
H		22	28	36	40	-	-	-	-	-	-
J	5-50	20.5* 31.5**	22* 34**	24* 36**	27.5* 37.5**	30* 40**	36.5* 46.5**	38.5* 48.5**	44* 54**	53.5* 63.5**	65* 75**
	75-100	-	-	34* 36**	37.5	40	46.5	48.5	54	63.5	75
	125+	-	-	-	-	62.5	72	73.5	75	86	97.5
K	5-50	3.5	3.5	4.5	5	7	7	8	8	10	12
	125+	-	-	-	-	17	17	18	18	20	22
L	5-50	17* 28**	18.5* 30.5**	19.5* 31.5**	22.5* 32.5**	23* 33**	29.5* 39.5**	30.5* 40.5**	36* 46**	43.5* 53.5**	53* 63**
	75-100	-	-	29.5* 31.5**	32.5	33	39.5	40.5	46	53.5	63
	125+	-	-	-	-	45.5	55	55.5	57	66	75.5
M1		11	11	17	17	17	17	22	28.5	35.5	35.5
M2		3.5	3.5	7	7	7	7	8	10.5	13.5	13.5
M3		-	-	-	-	17	17	22	27	32	33
N	5-100	-	-	-	-	-	-	-	-	-	-
	125+	-	-	-	-	12	12	13	13	15	17
P		3.5	3	4	4.5	6	6	6.5	6.5	8.5	9.5
R	5-100	6.5	6.5	9	9	9	9	11	14	17.5	17.5
R1		M4 X 0.7	M4 X 0.7	M6 X 1.0	M6 X 1.0	M6 X 1.0	M6 X 1.0	M8 X 1.25	M10 X 1.5	M12 X 1.75	M12 X 1.75
S	5-100	-	-	-	-	-	-	-	-	-	-
	125+	-	-	-	-	22	28	35	35	43	59
T		6	8	10	12	16	16	20	20	25	32
U		M5 X 0.8	M5 X 0.8	M5 X 0.8	M5 X 0.8	1/8 NPT	1/8 NPT	1/4 NPT	1/4 NPT	3/8 NPT	3/8 NPT
V1	5	7.5* 9**	8* 9.5**	9* 9.5*	11	7.5* 10.5**	11	9* 10.5**	14* 15**	16	20
	10-100	7.5* 9**	8* 9.5**	9* 9.5**	11	10.5	11	10.5	15	16	20
	125+	-	-	-	-	12.5	14	14	16.5	19	23
V2	5	5* 7**	5.5	5.5	5.5	6.5* 7.5**	8	9* 10.5**	9.5* 10.5**	14	17.5
	10-100	5* 7**	5.5	5.5	5.5	7.5	8	10.5	10.5	14	17.5
	125+	-	-	-	-	12.5	14	14	16.5	19	23

* No Magnet
** With Magnet
See page 286 for male thread adapter.

The Model Numbers for all MACQ compact cylinders are configurable. Designate bore size, stroke, magnet, and ports.

MACQ - 16 x 30 - S - T

Product
MACQ Compact Cylinder

Magnet

Blank	No Magnet
S	with Magnet

Ports

T	Standard[1]

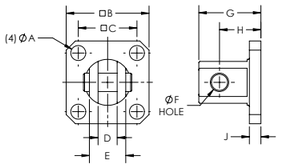
[1] See page 282 for the Port Sizes listed in the Engineering Specifications table.

Stroke (mm)	Bore Size (mm)									
	12	16	20	25	32	40	50	63	80	100
5	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X	X
15	X	X	X	X	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X	X	X
40	X	X	X	X	X	X	X	X	X	X
50	X	X	X	X	X	X	X	X	X	X
75			X	X	X	X	X	X	X	X
100			X	X	X	X	X	X	X	X
125					X	X	X	X	X	X
150					X	X	X	X	X	X

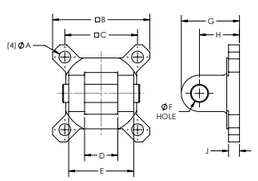
Product Information

Clevis Brackets for MACQ Series

Ø12 - Ø25



Ø32 - Ø100

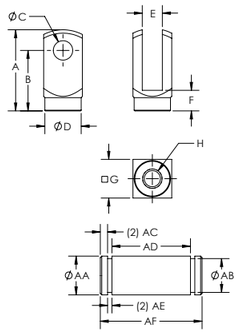


Model	A	B	C	D	E	F	G	H	J
F-MACQ-12-CB	4.5	25	15.5	5.3	9.8	5	20	14	4
F-MACQ-16-CB	4.5	29	20	6.8	11.8	5	21	15	4
F-MACQ-20-CB	6.5	36	25.5	8.3	15.8	8	27	18	5
F-MACQ-25-CB	6.5	40	28	10.3	19.8	10	30	20	5
F-MACQ-32-CB	6.5	45.5	34	18.3	35.8	10	30	20	5.5
F-MACQ-40-CB	6.5	53.5	40	18.3	35.8	10	32	22	7
F-MACQ-50-CB	8.5	64.5	50	22.3	43.8	14	42	28	8
F-MACQ-63-CB	10.5	77.5	60	22.3	43.8	14	44	30	10
F-MACQ-80-CB	12.5	98.5	77	28.3	55.8	18	56	38	10
F-MACQ-100-CB	12.5	117.5	94	32.3	63.8	22	67	45	13

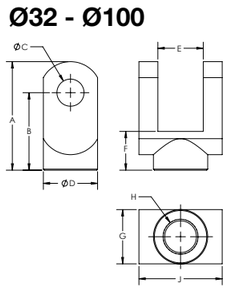
Pin, c-clips, and hardware included with all Clevis Brackets

Rod Clevis Brackets for MACQ Series

Ø12 - Ø25



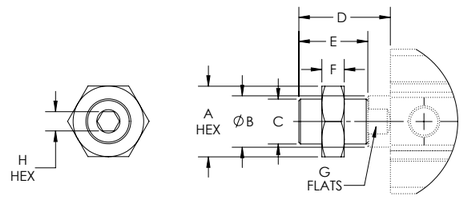
Ø32 - Ø100



Model	A	B	C	D	E	F	G	H	J	AA	AB	AC	AD	AE	AF
F-MACQ-12-Y	22	16	5 +.048/-0	9	5.3±0.1	6	10	M5 X 0.8	-	5 -.03/-.06	4	1.5	10.2	0.7	14.6
F-MACQ-16-Y	28	21	5 +.048/-0	11	6.6±0.1	11	12	M6 X 1.0	-	5 -.03/-.06	4	1.5	12.4	0.7	16.8
F-MACQ-20-Y	34	25	8 +.058/-0	15	8.3±0.1	8.5	16	M8 X 1.25	-	8 -.04/-.076	7	1.5	16.2	0.9	21
F-MACQ-25-Y	41	30	10 +.058/-0	19	10.3±0.1	10.5	20	M10 X 1.25	-	10 -.04/-.076	8	2	20.2	1.1	26.4
F-MACQ-32-Y	42	30	10 +.058/-0	22	18.4±0.1	16	22	M14 X 1.5	36	10 -.04/-.076	8	2	36.2	1.1	42.4
F-MACQ-40-Y	42	30	10 +.058/-0	22	18.4±0.1	16	22	M14 X 1.5	36	10 -.04/-.076	8	2	36.2	1.1	42.4
F-MACQ-50-Y	56	40	14 +.07/-0	28	22.4±0.1	20	28	M18 X 1.5	44	14 -.05/-.093	12	2	44.2	1.1	50.4
F-MACQ-63-Y	56	40	14 +.07/-0	28	22.4±0.1	20	28	M18 X 1.5	44	14 -.05/-.093	12	2	44.2	1.1	50.4
F-MACQ-80-Y	71	50	18 +.07/-0	38	28.4±0.1	23	38	M22 X 1.5	56	18 -.05/-.093	15	2	56.2	1.7	63.6
F-MACQ-100-Y	79	55	22 +.084/-0	44	32.4±0.1	22	44	M26 X 1.5	64	22 -.065/-.117	19	2.5	64.2	1.7	72.6

Pin, c-clips, and male adapter included with all Rod Clevis Brackets

Male Adapter for MACQ Series



Male Adapter includes jam nut (cylinder not included).

Model	A	B	C	D	E	F	G	H
F-MACQ-12-A	8	6	M5 X 0.8	14	10.5	4	5	2.5
F-MACQ-16-A	10	8	M6 X 1.0	15.5	12	5	6	3
F-MACQ-20-A	12	10	M8 X 1.25	18.5	14	6	8	4
F-MACQ-25-A	17	12	M10 X 1.25	22.5	17.5	6	10	5
F-MACQ-32-A	19	16	M14 X 1.5	28.5* / 38.5**	21.5	8	14	6
F-MACQ-40-A	19	16	M14 X 1.5	28.5* / 38.5**	21.5	8	14	6
F-MACQ-50-A	27	20	M18 X 1.5	33.5* / 43.5**	25.5	11	17	8
F-MACQ-63-A	27	20	M18 X 1.5	33.5* / 43.5**	25.5	11	17	8
F-MACQ-80-A	32	25	M22 X 1.5	43.5* / 53.5**	33.5	13	22	10
F-MACQ-100-A	36	32	M26 X 1.5	43.5* / 53.5**	31.5	13	27	10

* Stroke = 5 to 100 ** Stroke = 125, 150

Space Saver

Full Power in Half the Space

Space Saver cylinders provide the power and stroke of standard cylinders in less than half the space. They are ideally suited for use in machinery where space and weight are at a premium. Best of all, Space Saver cylinders cost up to 50% less than standard models.



SS-250



SS-300

Built to Last

> Oil impregnated sintered bronze rod bearing and hard chrome plated piston rod work together to prolong cylinder life.
> Hard coated cylinder bore eliminates cylinder wall scoring.

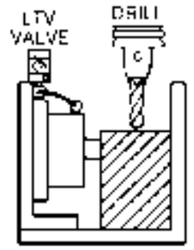
Offers A Wide Range Of Power

Bore	3/4"	1-1/8"	1-1/2"	2"	2-1/2"	3"	4"
Force @ 100 PSI (lbs)	44	100	177	314	491	707	1257

NOTE: Pull force is approximately 10% less.

Perfect for Tooling

Space Saver cylinders are ideal for use on drill fixtures and other automated tooling to provide compact, lightweight holding power.



Valving

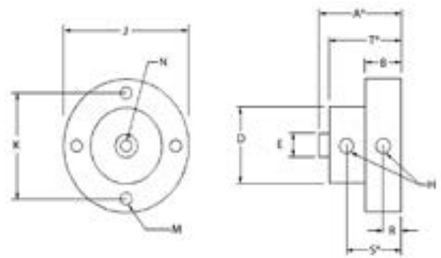
Efficient 4-way LTV valves, shown in the Valves catalog, are perfect with Space Saver cylinders. Valve hookup is made easy because the top cylinder port re-indexes to any position.

Technical Data

Specifications	
Pressure:	0-150 PSI, Air only
Temperature:	-40° F to 250° F (-40° C to 121° C) (to 400° F [204° C] with FKM)
Lubrication:	Petroleum base oil
Filtration:	40 Micron minimum
Seals:	Buna-N

Product Information

Dimensions



NOTE: 3/4" - 2" Bore Models have two (2) Mounting Holes. See Dimension M.

Bore	3/4"	1-1/8"	1-1/2"	2"	2-1/2"	3"	4"
A*	0.77	0.78	0.91	1.06	1.08	1.37	1.52
B	0.50	0.50	0.50	0.56	0.56	0.75	0.75
D	1.00	1.38	1.75	2.25	2.75	3.25	4.25
E	0.31	0.50	0.50	0.63	0.63	0.75	0.75
H	#10-32	#10-32	#10-32	1/8 NPT	1/8 NPT	1/8 NPT	1/8 NPT
J	1.74	2.12	2.49	3.11	3.74	4.24	5.22
K	1.41	1.78	2.16	2.72	3.25	3.78	4.78
M	0.19	0.19	0.19	0.19	0.27	0.27	0.27
N	#10-32 X .25	5/16-24 X .38	5/16-24 X .38	3/8-24 X .38	3/8-24 X .38	1/2-20 X .50	1/2-20 X .50
R	0.16	0.16	0.16	0.31	0.31	0.33	0.33
S*	0.38	0.38	0.51	0.69	0.68	0.91	1.04
T*	0.76	0.77	0.90	1.05	1.06	1.36	1.50

* Plus Stroke
NOTE: To obtain a 1/8" or 3/16" stroke on 3/4" or 1-1/8" bore models, a 1/4" stroke cylinder is used and spacers are added.

Stroke Availability

Model	Stroke Lengths												
	Bore	1/8	3/16	1/4	3/8	1/2	5/8	3/4	1	1-1/2	2	2-1/2	3
SS-075	3/4"	X*	-	X*	X	X	X	X	X	X	X	-	-
SS-112	1-1/8"	X*	X*	X*	-	X	-	X	X	X	X	X	X
SS-150	1-1/2"	X*	-	X	-	X	-	X	X	X	X	X	X
SS-200	2"	X	-	X	-	X	-	X	X	X	X	X	X
22-250	2-1/2"	X	-	X	-	X	-	X	X	X	X	X	X
SS-300	3"	X	-	X	-	X	-	X	X	X	X	X	X
SS-400	4"	X	-	X	-	X	-	X	X	X	X	X	X

* Includes special fitting
NOTE: To obtain a 1/8" or 3/16" stroke on 3/4" on 1-1/8" bore models, a 1/4" stroke cylinder is used and spacers are added.
Non-standard strokes subject to special machining charge.

Mounting Options

Uniform base thickness makes mounting easy regardless of stroke.

How to Order

When ordering, specify model number, stroke length, and FKM seal option if required

Example: SS-150 X 0.25 - FB-VI

Common Cylinder Design Modifications

This table shows common modifications to our standard design which have been provided to customers. Please contact your local distributor for information on pricing and delivery for these special options.

Feature	Deviation From Standard Model
Body or End Cap	Add customer logo
Clean Room Design	Design modifications
End Caps	Additional standard ports
End Caps	Reduced port size
End Caps	Rotated ports
End Caps	Omit Bimba logo
Lubrication	Customer-specified lubricants
Rod	Cross-drilled hole
Rod	Spherical rod end
Rod	Screwdriver slot in rod end
Rod	MT one end only (FOD models)
Rod	EE one end only (FOD models)
Rod	Special thread sizes
Rod	Special thread lengths/depths
Rod	Non-standard OD or ID
Rod	Case hardened
Seals	Non-standard materials
Seals	U-Cup style rod seal
Stroke Length	Longer than standard

Common Cylinder Design Modifications (Stainless Steel Flat-1®)

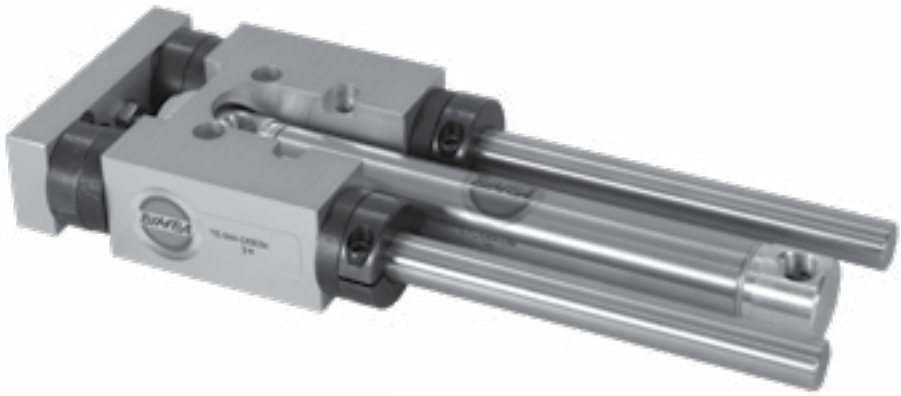
This table shows common modifications to our standard design which have been provided to customers. Please contact your local distributor for information on pricing and delivery for these special options.

Feature	Deviation From Standard Model
Rod	Thread modification, non-standard threads on existing rod diameter
Lubrication	Customer specified non-standard lubricants
Seals	Special compounds, EPDM, internally lubricated, Teflon coated
Mounting Dimensions	Special hole patterns and sizes, mounting flanges and plates
Non-Rotating Rod	Square piston rod prevents piston rod rotation

Notes

Linear Thrusters

BImba offers a wide variety of linear thruster options to accommodate applications where side or moment loading can be present. Sleek body designs incorporate a rugged construction and a cylinder integral to the thruster block to create a durable, space-efficient pneumatic cylinder.





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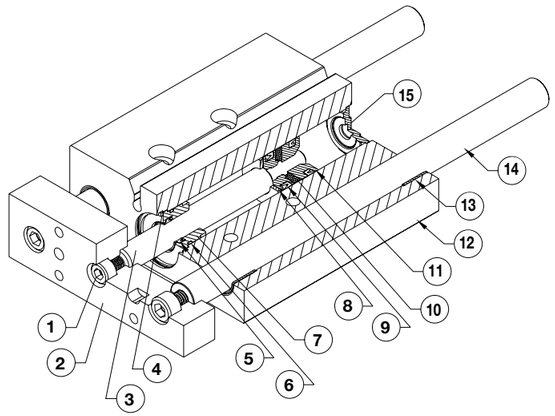
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ET Series Extruded Thrusters

Materials of Construction



Item #	Description	Material
1	Assembly Bolt	Zinc-Plated Steel
2	Tooling Plate	Anodized Aluminum
3	Piston Rod	Hard Chrome Plated Stainless Steel
4	Retaining Ring	Zinc-Plated Steel
5	Rod Seal	Nitrile (Fluoroelastomer optional)
6	Rod Guide Seal	Nitrile (Fluoroelastomer optional)
7	Rod Guide	Anodized Aluminum
8	Bumper	Urethane
9	Piston Seal	Nitrile (Fluoroelastomer optional)
10	Magnet	Nitrile
11	Piston	Aluminum
12	Body	Anodized Aluminum
13	Guide Bushing	Self-Lubricating Nylon
		Ball Bushings optional
14	Guide Shaft	Stainless Steel
		Case Hardened Steel with X Option
15	Rear Head	Anodized Aluminum

Engineering Data

> Rated 250 PSI
> Low breakaway friction

Components:
> 303 stainless steel shafts through 2" bore
> Hardchrome plated shafts for 2-1/2" and 3" bores
> Clear anodized aluminum housing and tooling plate
> Plastic composite guide shaft bearings

Cylinder:
> 304 stainless steel body
> High-strength aluminum alloy porting ends
> 303 stainless steel piston rods
> Buna N “U” cup seals
> Sintered bronze rod guide bushing

Options:
> Internal Buna N or external urethane bumpers
> Patented adjustable cushions*
> Buna N magnet for position sensing

Temperature Range:
> Buna N seals with a temperature range of -20ºF (-25ºC) to 200ºF (95ºC) are standard in all BIMBA air cylinders. High temperature option V seals rated for higher temperature applications are available. If cylinders are operated at temperatures below 0ºF for extended time periods, special modifications may be required. Special seal materials are available on request.
> With -M option: -20ºF to +185ºF (-25ºC to +85ºC).

*U.S. Patent nos. 4,794,681 and 4,862,786
NOTE: All product is sold F.O.B. shipping point. Prices are subject to change without notice.

Engineering Specifications (ET Models)

Maximum Operating Pressure:	140 psi (10 bar)
Temperature Range:	15° to 160° F (-10° to 70° C)
Expected Service Life:	1,500 miles (with filtered, lubricated air)
Cylinder Lubrication:	PTFE grease

Theoretical Cylinder Forces

FORCE = Power Factor (PF) x Input Pressure

PF x bar = kg; PF x psi = pounds

Bore	Input = PSI		Input = Bar	
	PF Extend	PF Retract	PF Extend	PF Retract
12mm	0.2	0.1	1.1	0.8
16mm	0.3	0.2	2.0	1.5
20mm	0.5	0.4	3.1	2.4
25mm	0.8	0.6	4.9	3.8
32mm	1.2	0.9	8.0	6.0

Tooling Plate Endplay

Maximum Tooling Plate Movement

in Unloaded Condition (values in inches)

ETS with Standard Bearings

Bore	25mm	50mm	75mm	100mm	125mm	150mm	175mm	200mm	225mm	250mm	275mm
12mm	0.019	0.031	0.042	0.054	0.066	0.078	0.089	0.101	0.113	0.124	0.136
16mm	0.019	0.031	0.042	0.054	0.066	0.078	0.089	0.101	0.113	0.124	0.136
20mm	0.019	0.030	0.042	0.053	0.064	0.075	0.087	0.098	0.109	0.120	0.132
25mm	0.017	0.026	0.035	0.044	0.053	0.062	0.071	0.080	0.089	0.098	0.107
32mm	0.016	0.024	0.032	0.039	0.047	0.055	0.063	0.070	0.078	0.086	0.094

ETS with Ball Bearings

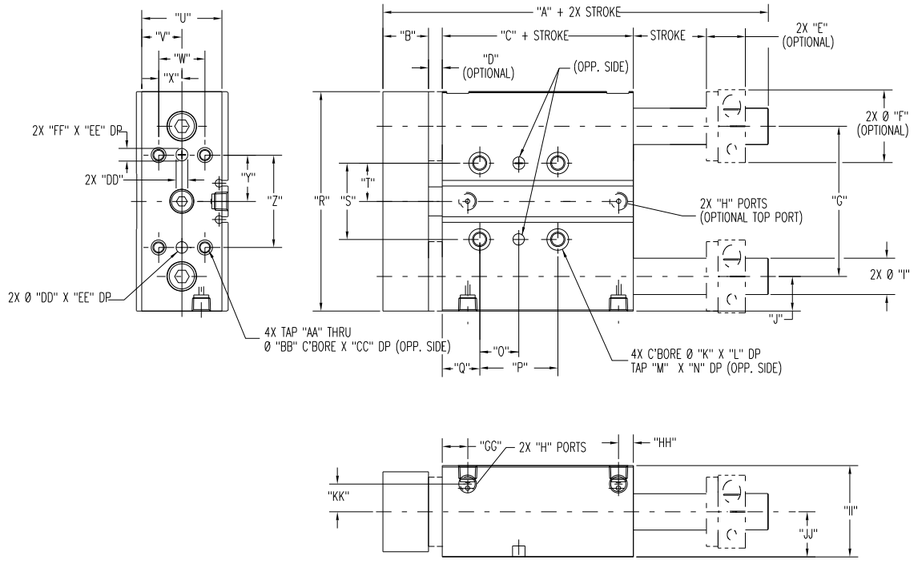
Bore	25mm	50mm	75mm	100mm	125mm	150mm	175mm	200mm	225mm	250mm	275mm
12mm	0.006	0.010	0.014	0.018	0.022	0.026	0.030	0.034	0.038	0.042	0.046
16mm	0.006	0.010	0.014	0.018	0.022	0.026	0.030	0.034	0.038	0.042	0.046
20mm	0.007	0.011	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043	0.047
25mm	0.005	0.008	0.011	0.014	0.016	0.019	0.022	0.025	0.028	0.031	0.033
32mm	0.006	0.009	0.012	0.015	0.018	0.021	0.024	0.027	0.030	0.033	0.037

ET and ETD with Standard Bearings

Bore	25mm	50mm	75mm	100mm	125mm	150mm	175mm	200mm	225mm	250mm	275mm
12mm	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
16mm	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
20mm	0.003	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005
25mm	0.003	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005
32mm	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.006

ET and ETD; with Ball Bearings
Endplay on all ET and ETD Thrusters with Option "X" not to exceed .003"

Dimensions (ET Models)



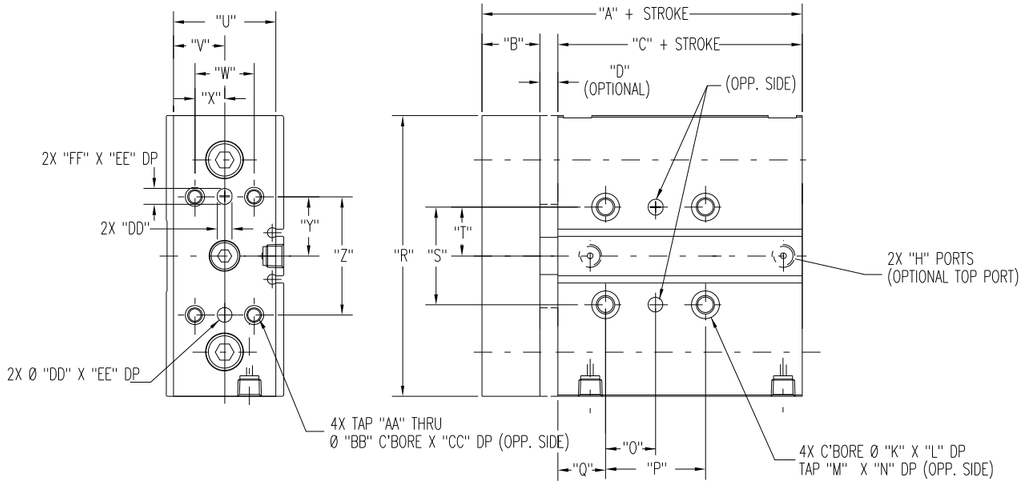
Bore	A	B	C	D	E	F	G	H	I
12mm	3.20	.55	1.66	.25	0.60	0.95	2.00	#10-32	.39 (10mm)
16mm	3.36	.55	1.81	.25	0.60	0.95	2.00	#10-32	.39 (10mm)
20mm	3.79	.62	1.91	.25	0.68	1.10	2.50	1/8 NPT	.47 (12mm)
25mm	3.90	.79	1.96	.25	0.76	1.34	2.75	1/8 NPT	.63 (16mm)
32mm	4.43	.98	2.21	.25	0.84	1.57	3.25	1/8 NPT	.79 (20mm)

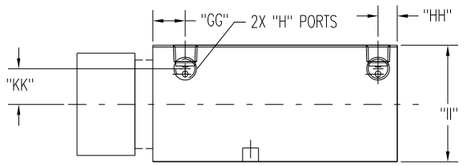
Bore	J	K	L	M	N	O	P	Q	R	S
12mm	.43	.28	.16	#10-32	.50	.44	.88	.63	2.85	1.00
16mm	.43	.28	.16	#10-32	.50	.53	1.06	.65	2.85	1.00
20mm	.50	.38	.21	1/4-20	.63	.63	1.25	.79	3.50	1.39
25mm	.62	.38	.21	1/4-20	.63	.75	1.50	.79	3.99	1.39
32mm	.75	.47	.26	5/16-18	.77	.84	1.69	.85	4.75	1.65

Bore	T	U	V	W	X	Y	Z	AA	BB	CC
12mm	.50	.86	.43	.50	.25	.50	1.00	#8-32	.25	.20
16mm	.50	.86	.43	.63	.31	.63	1.25	#8-32	.25	.20
20mm	.69	1.10	.55	.75	.38	.75	1.50	#10-32	.28	.20
25mm	.69	1.30	.65	.88	.44	.88	1.75	#10-32	.28	.30
32mm	.82	1.73	.87	1.00	.50	1.00	2.00	1/4-20	.33	.44

Bore	DD	EE	FF	GG	HH	II	JJ	KK
12mm	0.1565 / 0.1577	.14	.20	.48	.19	.98	.45	.37
16mm	0.1878 / 0.1890	.20	.24	.51	.19	1.11	.45	.37
20mm	0.1878 / 0.1890	.20	.24	.57	.32	1.36	.57	.49
25mm	0.2503 / 0.2515	.24	.28	.57	.32	1.49	.73	.50
32mm	0.2503 / 0.2515	.24	.28	.63	.32	1.98	.98	.58

Dimensions (ETS Models)





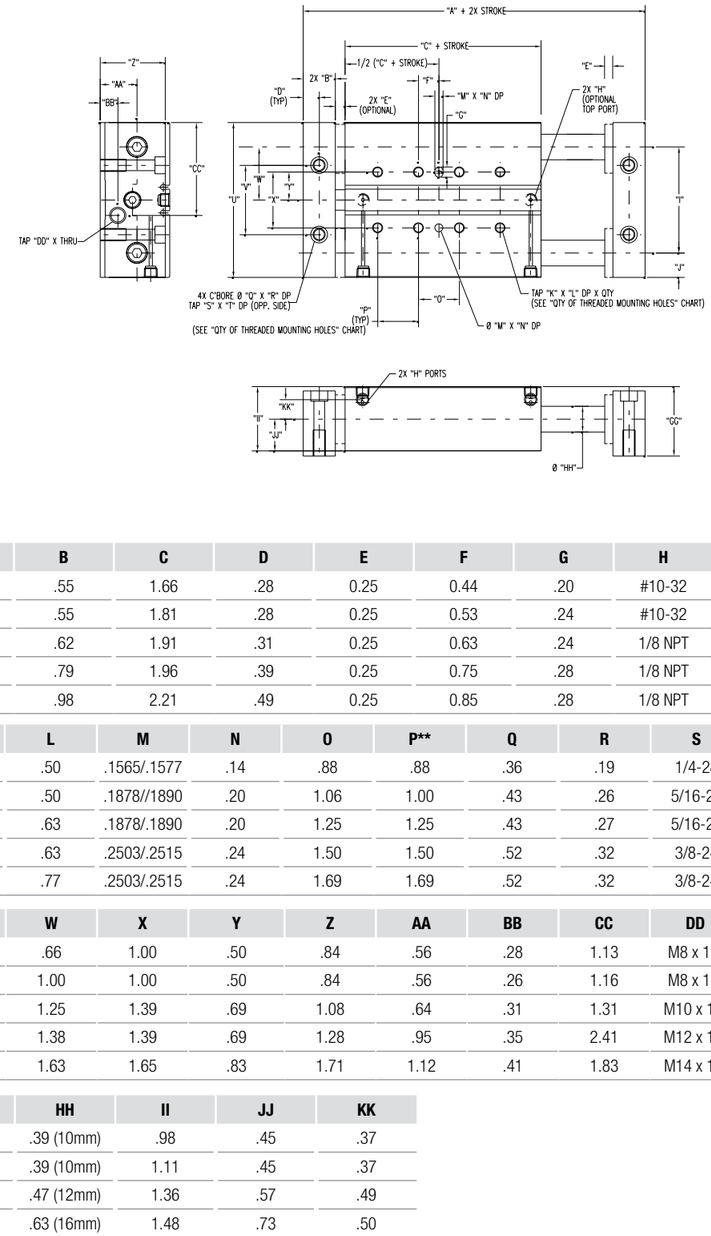
Bore	A*	B	C	D	H	K	L	M	N	O
12mm	2.21	.55	1.66	.25	#10-32	.28	.16	#10-32	.50	.44
16mm	2.36	.55	1.81	.25	#10-32	.28	.16	#10-32	.50	.53
20mm	2.53	.62	1.91	.25	1/8 NPT	.38	.21	1/4-20	.63	.63
25mm	2.75	.79	1.96	.25	1/8 NPT	.38	.21	1/4-20	.63	.75
32mm	3.19	.98	2.21	.25	1/8 NPT	.47	.26	5/16-18	.77	.84

Bore	P	Q	R	S	T	U	V	W	X	Y
12mm	.88	.63	2.85	1.00	.50	.86	.43	.50	.25	.50
16mm	1.06	.65	2.85	1.00	.50	.86	.43	.63	.31	.63
20mm	1.25	.79	3.50	1.39	.69	1.10	.55	.75	.38	.75
25mm	1.50	.79	3.99	1.39	.69	1.30	.65	.88	.44	.88
32mm	1.69	.85	4.75	1.65	.82	1.73	.87	1.00	.50	1.00

Bore	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	KK
12mm	1.00	#8-32	.25	.20	.16	.14	.20	.48	.19	.98	.37
16mm	1.25	#8-32	.25	.20	.19	.20	.24	.51	.19	1.11	.37
20mm	1.50	#10-32	.28	.20	.19	.20	.24	.57	.32	1.36	.49
25mm	1.75	#10-32	.28	.30	.25	.24	.28	.57	.32	1.49	.50
32mm	2.00	1/4-20	.33	.44	.25	.24	.28	.63	.32	1.98	.58

*Optional bumpers (EB) add .25" to overall length

Dimensions (ETD Models)



Bore	A*	B	C	D	E	F	G	H	I	J
12mm	2.76	.55	1.66	.28	0.25	0.44	.20	#10-32	2.00	.43
16mm	2.91	.55	1.81	.28	0.25	0.53	.24	#10-32	2.00	.43
20mm	3.16	.62	1.91	.31	0.25	0.63	.24	1/8 NPT	2.50	.50
25mm	3.54	.79	1.96	.39	0.25	0.75	.28	1/8 NPT	2.75	.62
32mm	4.18	.98	2.21	.49	0.25	0.85	.28	1/8 NPT	3.25	.75

Bore	K	L	M	N	O	P**	Q	R	S	T	U
12mm	#10-32	.50	.1565/.1577	.14	.88	.88	.36	.19	1/4-28	.49	2.85
16mm	#10-32	.50	.1878//1890	.20	1.06	1.00	.43	.26	5/16-24	.50	2.85
20mm	1/4-20	.63	.1878/.1890	.20	1.25	1.25	.43	.27	5/16-24	.68	3.50
25mm	1/4-20	.63	.2503/.2515	.24	1.50	1.50	.52	.32	3/8-24	.58	3.99
32mm	5/16-18	.77	.2503/.2515	.24	1.69	1.69	.52	.32	3/8-24	.80	4.75

Bore	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF
12mm	1.31	.66	1.00	.50	.84	.56	.28	1.13	M8 x 1.0	.48	.19
16mm	1.26	1.00	1.00	.50	.84	.56	.26	1.16	M8 x 1.0	.51	.19
20mm	1.69	1.25	1.39	.69	1.08	.64	.31	1.31	M10 x 1.0	.57	.32
25mm	1.76	1.38	1.39	.69	1.28	.95	.35	2.41	M12 x 1.0	.57	.32
32mm	2.13	1.63	1.65	.83	1.71	1.12	.41	1.83	M14 x 1.0	.63	.32

Bore	GG	HH	II	JJ	KK
12mm	1.09	.39 (10mm)	.98	.45	.37
16mm	1.22	.39 (10mm)	1.11	.45	.37
20mm	1.43	.47 (12mm)	1.36	.57	.49
25mm	1.70	.63 (16mm)	1.48	.73	.50
32mm	2.12	.79 (20mm)	1.98	.98	.58

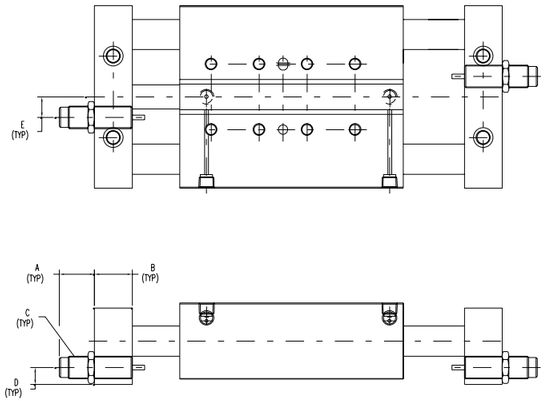
Dimensions (ETD Models)

**Quantity of Threaded Mounting Holes

Bore	4	8	12	16	20	24
	For stroke lengths (mm):					
12mm	13.5 - 57.9	58.0 - 102.3	102.4 - 146.8	146.9 - 191.2	191.3 - 235.7	235.8 - 254.0
16mm	16.0 - 69.6	69.7 - 123.6	123.7 - 177.6	177.7 - 231.6	231.7 - 254.0	N/A
20mm	26.0 - 89.3	89.4 - 152.8	152.9 - 216.3	216.4 - 254.0	N/A	N/A
25mm	31.0 - 107.0	107.1 - 183.2	183.3 - 254.0	N/A	N/A	N/A
32mm	33.0 - 118.6	118.7 - 203.6	203.7 - 254.0	N/A	N/A	N/A

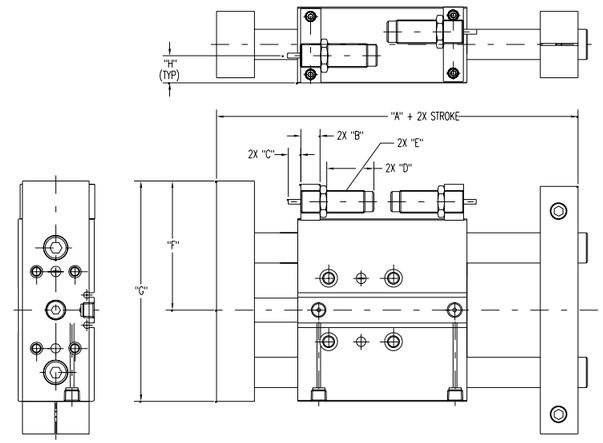
*Optional bumpers (EB, EB1, EB2) add .25" per end to overall length

Option Dimensions - ETD with Shock Absorbers



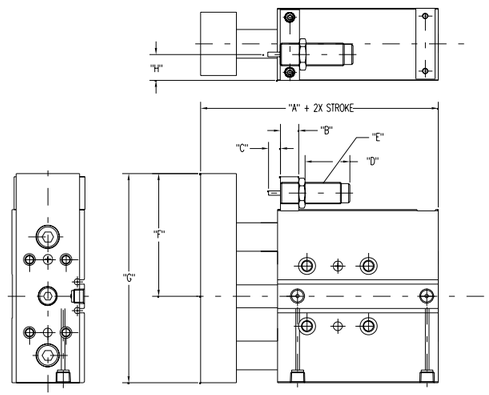
Bore	A	B	C	D	E
12mm	0.57	0.55	M8 x 1.0	0.28	0.30
16mm	0.57	0.55	M8 x 1.0	0.26	0.27
20mm	0.51	0.62	M10 x 1.0	0.31	0.44
25mm	1.17	0.79	M12 x 1.0	0.35	0.42
32mm	2.25	0.99	M14 x 1.0	0.41	0.55

Option Dimensions - ET with Shock Absorbers



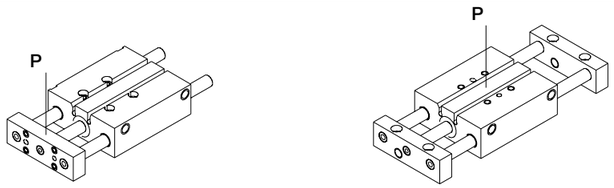
Bore	A	B	C	D	E	F	G	H
12mm	3.20	0.23	0.22	0.89	M8 x 1.0	1.91	3.34	0.20
16mm	3.36	0.23	0.22	0.89	M8 x 1.0	1.91	3.34	0.33
20mm	3.79	0.31	0.26	0.82	M10 x 1.0	2.42	4.17	0.79
25mm	3.90	0.39	0.40	1.57	M12 x 1.0	2.71	4.70	0.36
32mm	4.43	0.47	0.63	2.77	M14 x 1.0	3.23	5.60	0.56

Option Dimensions - ETS with Shock Absorbers



Bore	A	B	C	D	E	F	G	H
12mm	2.46	0.23	0.22	0.89	M8 x 1.0	1.91	3.34	0.20
16mm	2.61	0.23	0.22	0.89	M8 x 1.0	1.91	3.34	0.33
20mm	2.78	0.31	0.26	0.82	M10 x 1.0	2.42	4.17	0.79
25mm	3.00	0.39	0.40	1.57	M12 x 1.0	2.71	4.70	0.36
32mm	3.44	0.47	0.63	2.77	M14 x 1.0	3.23	5.60	0.56

Maximum Side Load



Maximum Load "P" as shown for ET, ETS, ETD with Standard Bearings (pounds)

			ETS; by Stroke										
Bore	**ET**	**ETD**	**25mm**	**50mm**	**75mm**	**100mm**	**125mm**	**150mm**	**175mm**	**200mm**	**225mm**	**250mm**	**275mm**
12mm	19	64	3.5	2.2	1.6	1.3	1.0	0.9	0.8	0.7	0.6	0.6	0.5
16mm	19	64	3.5	2.2	1.6	1.3	1.0	0.9	0.8	0.7	0.6	0.6	0.5
20mm	26	92	5.6	3.7	2.8	2.2	1.8	1.6	1.4	1.2	1.1	1.0	0.9
25mm	43	156	11.1	7.5	5.7	4.6	3.8	3.3	2.9	2.6	2.3	2.1	1.9
32mm	68	255	21.5	15.0	11.6	9.4	7.9	6.8	6.0	5.4	4.9	4.4	4.1

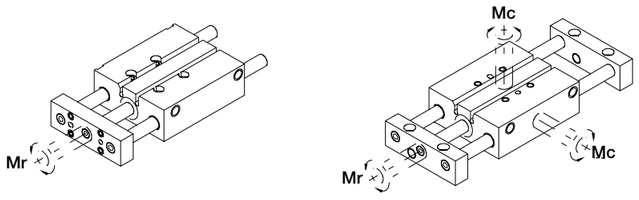
Maximum Load "P" as shown for ET, ETS, ETD with Ball Bearings, Option "X" (pounds).
For Ball Bearing mode, use 2x load rating for standard bearings in above table.

Maximum Moments

Maximum Radial Moment (Mr) as shown for ET, ETS, ETD Standard Bearings (inch-pounds)

Standard Bearings		
Bore	**ET/ETD**	**ETS**
12mm	64	32
16mm	64	32
20mm	115	57
25mm	214	107
32mm	414	207

For Ball Bearing model, use 2x Moment Rating for Standard Bearings in above table.



Maximum Axial (Ma) and Cross (Mc) Moments as shown for ETD Standard Bearings (inch-pounds)

	ETD by Stroke										
Bore	**25mm**	**50mm**	**75mm**	**100mm**	**125mm**	**150mm**	**175mm**	**200mm**	**225mm**	**250mm**	**275mm**
12mm	72	104	136	168	200	232	264	296	328	360	392
16mm	77	109	141	173	205	237	269	301	332	365	370
20mm	112	158	203	250	295	341	387	433	478	525	570
25mm	184	262	340	417	495	573	650	729	806	885	960
32mm	309	437	564	690	819	947	1074	1200	1329	1457	1584

For Ball Bearing model, use 2x Moment Rating for Standard Bearings in above table.

The model number of the Extruded Linear Thruster consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number. **Please note that the following features are standard, and are included in all model numbers: E (inch series threading) and M (magnetic position sensing).**

An example of a basic ET unit with 16mm bore, 100mm stroke, inch series porting/mounting, medium duty shock absorbers on both ends, and magnetic position sensing.

Model	
ET	Extended Shafts (four bushings)
ETS	Shafts Flush (two bushings)
ETD	Double End (saddle mount)

Bore Size	
12	12mm
16	16mm
20	20mm
25	25mm
32	32mm

ET - 16100 - EK12M

Standard Stroke Lengths (1mm increments to 255mm)				
	ETD	ET with Option X (Ball Bearings)	ET with Option K (Shock Absorbers)	ETD with Option X Only two bushings (not four) when stroke is less than:
Bore	Minimum Stroke Length			
12mm	13.5mm	26mm	N/A	26mm
16mm	16mm	26mm	N/A	26mm
20mm	26mm	26mm	N/A	26mm
25mm	31mm	39mm	16mm	39mm
32mm	33mm	42mm	45mm	42mm

Options (U.S. Customary Units)		
E	Inch Series Porting/Mounting[1]	
EB	External Bumpers, Retract[2]	
EB1	External Bumpers, Extend[2 3]	
EB2	External Bumpers, Both Ends[2 3]	
K _ _	First _ will be	1 (Both Ends)
		2 (Extend Only)
		3 (Retract Only)[4]
	Second _ will be	1 (Light Duty)
		2 (Medium Duty)
		3 (Heavy Duty)[5]
M	MRS Position Sensing[1]	
P	Ports on Top Surface[6]	
V	High Temperature Fluoroelastomer Seals (0°-275° F)	
X	Ball Bushings and Hardened Shafts[7]	

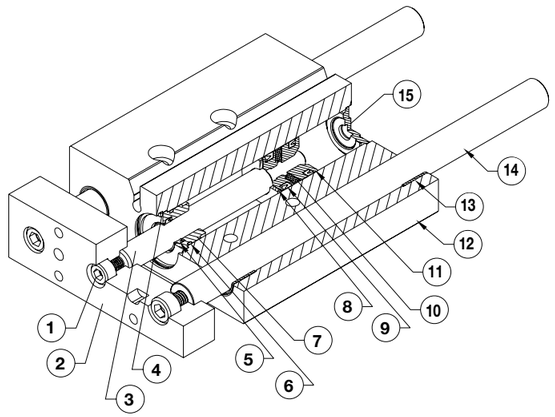
[1] Standard; included on all model numbers
[2] No stroke reduction with bumpers; extend bumpers include one set of collars
[3] Not available on ETS models
[4] ETS models must choose K3 (retract only)
[5] Not available on 12mm and 16mm bores
[6] Must be specified if Option X is ordered
[7] Must be specified if Option P is ordered

How to Repair

Bimba Linear Thrusters are repairable. A list of the individual components is given below that together make up Bimba Linear Thrusters.

For questions or more information, contact Bimba Customer Service at 800-442-4622 (800-44-BIMBA) or e-mail cs@bimba.com.

Repair Parts (Extruded Thrusters)



Item #	Description
1	Assembly Bolt
2	Tooling Plate
3	Piston Rod
4	Retaining Ring
5	Rod Seal
6	Rod Guide Seal
7	Rod Guide
8	Bumper
9	Piston Seal
10	Magnet
11	Piston
12	Body
13	Guide Bushing
14	Guide Shaft
15	Rear Head

Repair Kits (Extruded Thrusters)

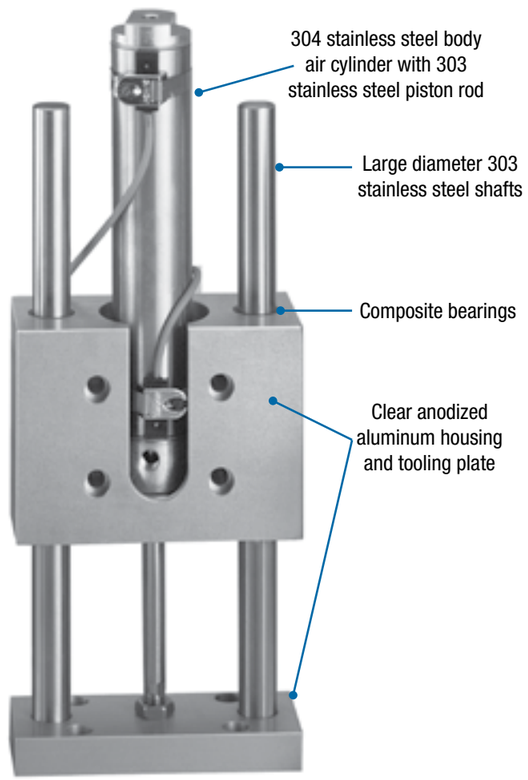
The basic repair kit includes: piston seals, a rod seal, and a rod guide seal. Specify as K-B-ET- (bore size) - V (if applicable).

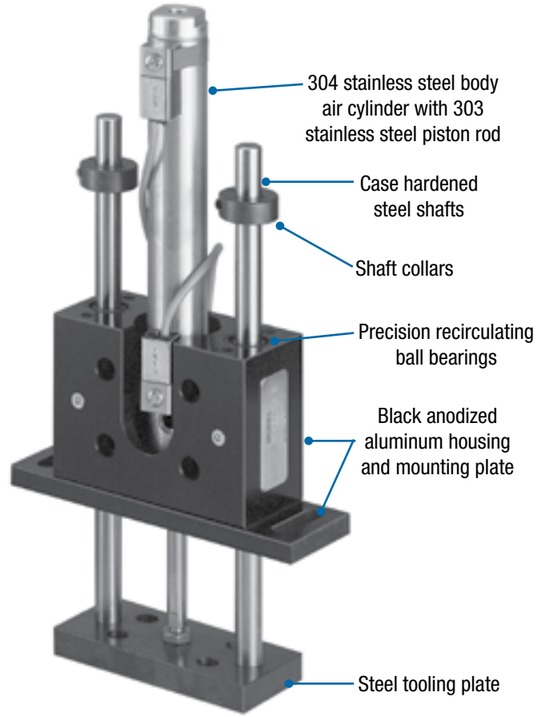
Kit	Description
K-B-ET-[BORE]	Basic repair kit
K-B-ET-[BORE]-V	Basic repair kit (high temperature)

All product is sold F.O.B. shipping point. Prices are subject to change without notice.

Product Features

T and TE Series Linear Thrusters





TE Series

> Large diameter stainless steel shafts (hard chrome-plated carbon steel on 2-1/2" and 3" bores).
> Mounting plate and shaft collars optional.
> High-strength composite bearing made of fiber-imbedded plastic.
> Composite bearing may perform better in certain environments (for example, dust or lint).
> Composite bearing/stainless steel shaft combination is ideal for corrosive environments.
> High load capabilities.

T Series

> Less friction
> High precision
> Easily accessible lubrication ports
> Mounting plate and shaft collars standard

Advantages

> Bimba stainless steel body air cylinders for long, reliable life.
> Optional magnetic piston for use with Hall Effect or Magnetic Reed Switches. (Hall Effect Switch not available for 9/16" bore.)
> Optional adjustable cushions for smooth deceleration of load at end of stroke. (Not available for 9/16".)
> Optional internal or external bumpers to absorb shock or adjust stroke.
> Easily accessible ports.
> Choice of TE (composite bearing) and T (ball bearing).

Engineering Data (T-Series Models)

Components:
> Case hardened steel shafts
> Steel tooling plate and collars
> Black anodized aluminum housing and mounting plate
> Precision recirculating ball bearings

Cylinder:
> 304 stainless steel body
> High-strength aluminum alloy porting ends
> 303 stainless steel piston rods
> Buna N “U” cup seals
> Sintered bronze rod guide bushing

Options:
> Internal Buna N or external urethane bumpers
> Patented adjustable cushions*
> Buna N magnet for position sensing

Lubrication:
> The two spring-loaded oiler ports on the housing face should receive several drops of medium to heavy inhibited hydraulic or general purpose oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.

Engineering Data (Multiple Position Models)

Components:
> Case hardened or hard chrome plated carbon steel shafts
> Steel or clear anodized aluminum tooling plate and collars
> Precision recirculating ball bearings or plastic composite

Cylinder:
> 304 stainless steel body
> High-strength aluminum alloy porting ends
> 303 stainless steel piston rods
> Buna N “U” cup seals
> Sintered bronze rod guide bushing

Options:
> Internal Buna N or external urethane bumpers
> Buna N magnet for position sensing

Lubrication:
> Air cylinders are pre-lubricated and sealed at the factory for extensive maintenance-free life. Cylinder life can be lengthened by providing additional lubricant with an air line mist lubricator or direct introduction of oil to the cylinder every 500 hours of operation. Recommended oil is medium to heavy inhibited hydraulic and general purpose oil.
> The two spring-loaded oiler ports on the housing face should also receive several drops of the same oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.
> T-700 series incorporates grease fittings.

Engineering Data (T4 Models)

Components:
> Case hardened steel shafts
> Steel tooling plate and collars
> Black anodized aluminum housing and mounting plate
> Precision recirculating ball bearings

Cylinder:
> 304 stainless steel body
> High-strength aluminum alloy porting ends
> 303 stainless steel piston rods
> Buna N “U” cup seals
> Sintered bronze rod guide bushing

Options:
> Internal Buna N or external urethane bumpers
> Patented adjustable cushions
> Buna N magnet for position sensing

Lubrication:
> Air cylinders are pre-lubricated and sealed at the factory for extensive maintenance-free life. Cylinder life can be lengthened by providing additional lubricant with an air line mist lubricator or direct introduction of oil to the cylinder every 500 hours of operation. Recommended oils are medium to heavy inhibited hydraulic and general purpose oil.
> The two spring-loaded oiler ports on the housing face should also receive several drops of the same oil every 100 hours of operation. For applications that involve rapid cycling, oil these ports more often.

Approximate Weights (T4 Models)

Bore	Base Weight (lbs.)	Adder per 1" (lbs.)
2" (31)	24	0.67
2-1/2" (50)	41	1.16
3" (70)	82.5	1.82

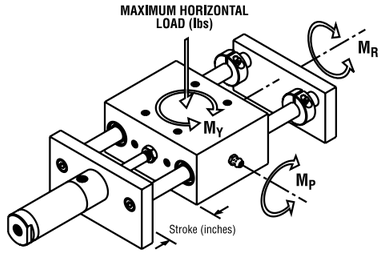
Engineering Data (Movable Housing Models)

Horizontal and Torsional Load Capacities

The following charts and tables provide loading and deflection data to assist in the sizing of Movable Housing Linear Thrusters. The Capacity tables provide the maximum loading for the thrusters under dynamic and static conditions. The dynamic capacities are presented as a function of travel life stated in millions of linear inches. As shown by the tables, the travel life is a function of load. Therefore, higher dynamic loads can be applied but will reduce travel life.

The deflection curves shown reflect the theoretical deflections of the guide shafts at mid-stroke.

Example: The 02 bore has a maximum dynamic load capacity of 45 lbs. for a travel life of 200 million inches.



Horizontal Load Capacity

Bore	Max Dynamic Load (lbs)				Max Static Load (lbs)
	Travel Life (x 10^6 inches)				
	50	200	500	1000	
02	71	45	32	26	87
04/09	209	131	96	76	256
17	328	231	169	133	328
31/50	403	259	190	150	403
70	938	579	419	326	1062

Torque Capacity - M_R

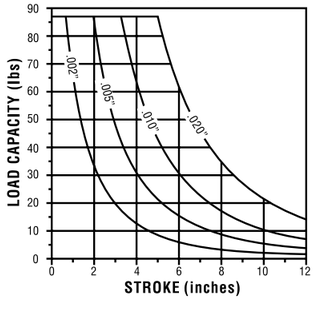
Bore	Max Dynamic Torque (in-lbs)				Max Static Torque (in-lbs)
	Travel Life (x 10^6 inches)				
	50	200	500	1000	
02	68	43	32	25	82
04/09	159	100	74	59	193
17	372	267	196	156	372
31/50	430	279	205	163	430
70	1756	1106	815	647	1952

Torque Capacity - M_P and M_Y

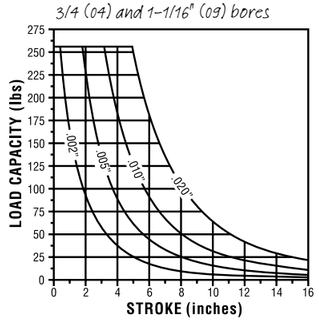
Bore	Max Dynamic Torque (in-lbs)				Max Static Torque (in-lbs)
	Travel Life (x 10^6 inches)				
	50	200	500	1000	
02	77	48	36	28	93
04/09	331	209	154	122	403
17	662	474	349	277	662
31/50	1012	655	483	383	1012
70	3875	2441	1798	1427	4308

Horizontal Load and Deflection Charts

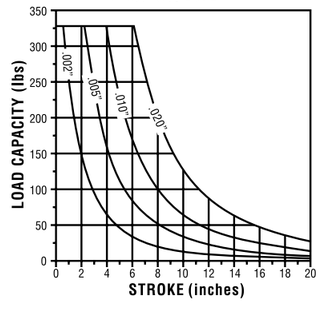
9/16" (02) bore



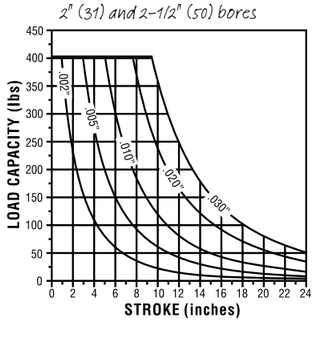
3/4 (04) and 1-1/16" (09) bores



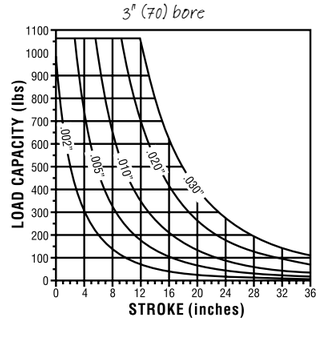
1-1/2" (17) bore



2" (31) and 2-1/2" (50) bores



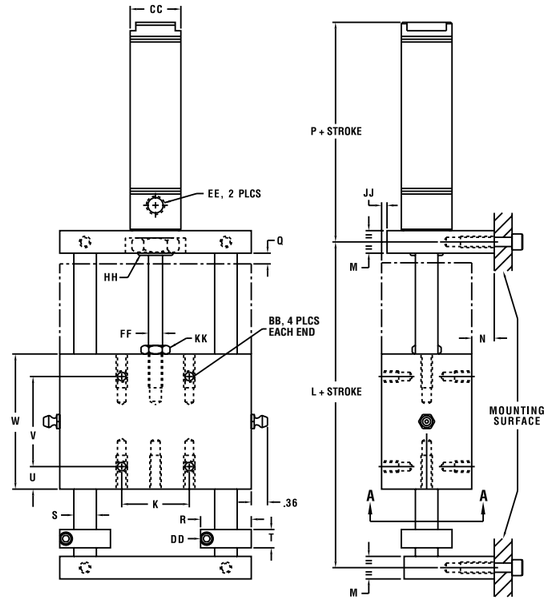
3" (70) bore

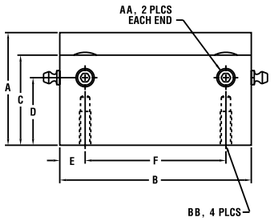


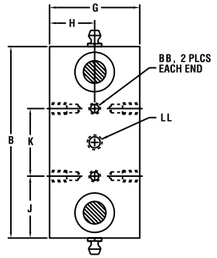
Approximate Weights

Bore	Base (lbs)	Adder per inch of stroke
02	1.8	0.10
04/09	3.6	0.20
17	8.5	0.29
31/50	12.5	0.42
70	47.5	1.12

Dimensions (Movable Housing Models)







VIEW A-A

NOTE: All dimensions are in inches.

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
A	1.50	2.50	2.50	3.00	3.50	4.00	5.002
B	3.00	4.25	4.25	5.50	7.00	8.50	11.00
C	1.25	2.00	2.00	2.50	3.00	3.50	4.00
D	0.87	1.50	1.50	1.75	2.00	2.25	2.75
E	0.44	0.56	0.56	0.75	1.00	1.125	1.50
F	2.125	3.125	3.125	4.00	5.00	6.25	8.00
G	1.25	2.00	2.00	2.50	3.00	3.50	4.00
H	0.62	1.00	1.00	1.25	1.50	1.75	2.00
J	1.00	1.38	1.38	1.75	2.00	2.50	3.50
K	1.00	1.50	1.50	2.00	3.00	3.50	4.00
L	4.38	4.63	4.63	6.00	6.50	8.50	11.00
M	0.38	0.50	0.50	0.75	0.75	1.00	1.00
N	0.25	0.50	0.50	0.50	0.50	0.50	0.75
P	2.10	2.72	2.88	3.19	3.88	4.00	4.38
Q	0.21	0.21	0.21	0.38	0.911	0.581	0.51
R	0.87	1.12	1.12	1.31	1.50	1.75	2.06
S	0.375	0.50	0.50	0.625	0.75	1.00	1.25
T	0.34	0.41	0.41	0.44	0.50	0.50	0.50
U	0.50	0.50	0.50	0.75	0.75	1.00	1.00
V	2.00	2.00	2.00	2.50	2.50	4.00	5.00
W	3.00	3.00	3.00	4.00	4.00	6.00	7.00
AA	10-32	1/4-20	1/4-20	3/8-16	3/8-16	1/2-13	1/2-13
BB	10-32	1/4-20	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13
CC	0.62	0.81	1.12	1.56	2.08	2.62	3.16
DD	6-32	8-32	8-32	10-32	1/4-28	1/4-28	1/4-28
EE	10-32	1/8 NPT	1/8 NPT	1/8 NPT	1/4 NPT	1/4 NPT	3/8 NPT
FF	0.188	0.25	0.312	0.437	0.625	0.625	0.75
HH	7/16-20	5/8-18	5/8-18	3/4-16	1-1/4-12	1-3/8-12	1-1/2-12
JJ	0.06	0.12	0.12	0.12	0.12	0.12	-
KK	10-32	1/4-28	5/16-24	7/16-20	1/2-20	1/2-20	5/8-18
LL	1/4-28	5/16-24	1/4-28	1/2-20	5/8-18	5/8-18	1-14

NOTES:
Dimension Q = 0.70 inches for strokes longer than 6 inches.
Dimension shown is to top of cylinder end mounting plate.
Dimension to top of housing is 4.75 inches.

Dimensional Notes:

> Cylinder options Q, C, B will increase the overall length of the cylinder. Dimension P will grow (see charts below).
> When specifying Position Feedback (TMHF or TEMHF), or the Bimba 500 Cylinder (option H), dimension P will increase and the stroke will be reduced.

Contact 1-800-44-BIMBA for dimensional information.

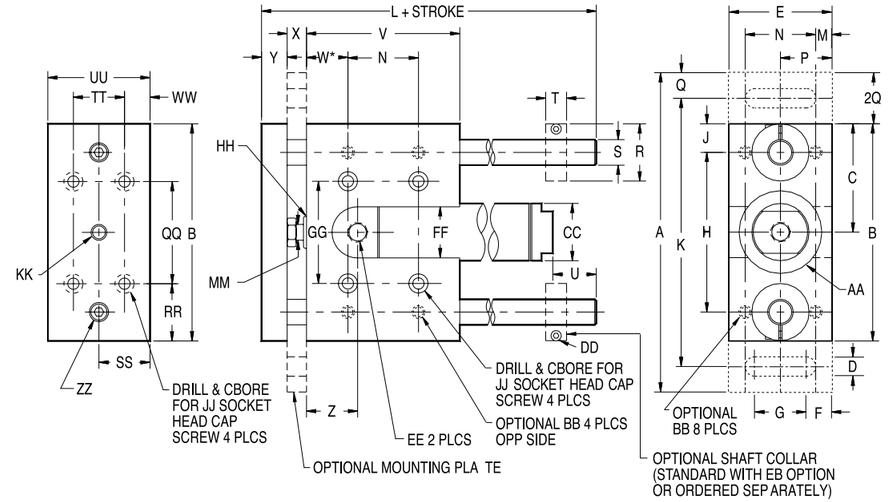
P Dimension Length Adders

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
B-Option	0.13	--	0.13	0.13	0.25	0.25	0.25
C-Option	N/A	0.43	0.25	0.18	0.38	0.38	0.44
Q-Option	0.03	0.44	0.25	0.19	0.38	0.38	0.44
Z-Option	N/A	N/A	0.35	0.25	0.34	N/A	N/A
PFC-Option	N/A	N/A	0.90	0.94	0.85	1.41	1.22

Q Dimension Length Adders

Bore	9/16"	3/4"	1-1/16"	1-1/2"	2"	2-1/2"	3"
Z-Option	N/A	N/A	0.57	0.40	0.30	N/A	N/A
PFC-Option	N/A	N/A	0.48	0.12	0.05	0.17	0.43

Dimensions (TE Models)



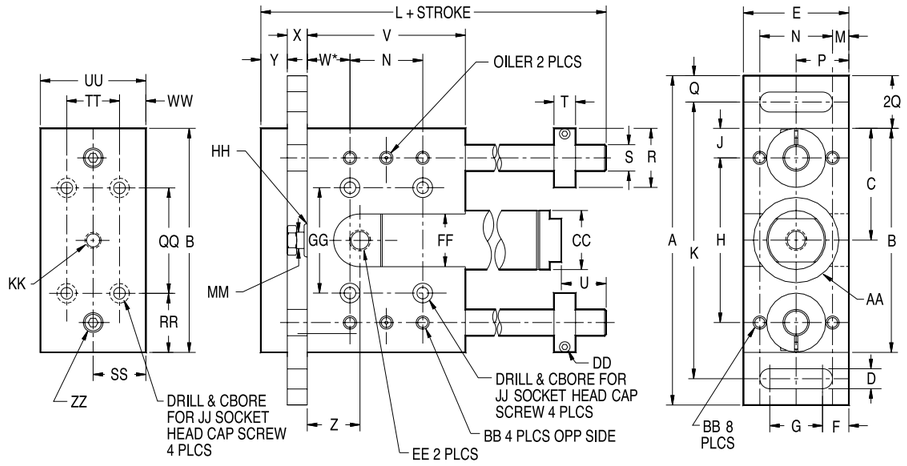
Bore	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
9/16" (02)	3.50	2.50	1.25	0.22	1.00	0.31	0.38	1.75	0.38	3.00	3.50	0.12	0.75	0.50	0.25
3/4" (04)	4.50	3.00	1.50	0.25	1.25	0.38	0.50	2.12	0.44	3.75	4.25	0.16	0.94	0.62	0.38
1-1/16" (09)	6.25	4.25	2.12	0.38	2.00	0.50	1.00	3.12	0.56	5.25	5.00	0.31	1.38	1.00	0.50
1-1/2" (17)	7.50	5.50	2.75	0.44	2.50	0.59	1.31	4.00	0.75	6.50	6.38	0.38	1.75	1.25	0.50
2" (31)	8.00	6.00	3.00	0.44	3.00	0.75	1.50	4.25	0.88	7.00	7.12	0.50	2.00	1.50	0.50
2-1/2" (50)	11.50	7.50	3.75	0.69	3.50	0.84	1.81	5.37	1.06	9.50	9.75	0.50	2.50	1.75	1.00
3" (70)	13.00	9.00	4.50	0.81	4.50	1.15	2.19	6.50	1.25	11.00	11.50	0.75	3.00	2.25	1.00

Bore	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE
9/16" (02)	0.88	0.38	0.34	0.60	2.25	1.25	0.25	0.38	0.86	0.75	8-32	0.62	6-32	10-32
3/4" (04)	1.12	0.50	0.41	0.52	2.50	0.78	0.38	0.50	0.85	1.00	10-32	0.81	8-32	1/8 NPT
1-1/16" (09)	1.31	0.62	0.44	0.98	3.00	0.81	0.38	0.62	1.00	1.50	1/4-20	1.12	10-32	1/8 NPT
1-1/2" (17)	1.50	0.75	0.50	1.57	4.00	1.12	0.50	0.75	1.38	2.00	5/16-18	1.56	1/4-28	1/8 NPT
2" (31)	1.62	0.88	0.50	1.07	4.00	1.00	0.75	1.00	1.60	2.25	5/16-18	2.08	1/4-28	1/4 NPT
2-1/2" (50)	1.87	1.13	0.50	2.20	6.00	1.75	0.75	1.25	1.45	3.00	3/8-16	2.62	1/4-28	1/4 NPT
3" (70)	2.25	1.38	0.56	3.73	7.00	2.00	1.00	1.50	1.62	3.50	1/2-13	3.12	1/4-28	3/8 NPT

Bore	FF	GG	HH	JJ	KK	MM	QQ	RR	SS	TT	UU	WW	ZZ
9/16" (02)	0.69	1.00	7/16-20	#8	10-32	0.19	1.25	0.63	0.45	0.60	0.90	0.15	#10-32
3/4" (04)	0.94	1.25	5/8-18	#10	1/4-28	0.25	1.50	0.75	0.58	0.75	1.15	0.20	1/4-20
1-1/16" (09)	1.12	1.88	5/8-18	1/4	5/16-24	0.31	2.00	1.12	0.88	1.00	1.75	0.38	5/16-18
1-1/2" (17)	1.12	2.38	3/4-16	5/16	7/16-20	0.44	3.00	1.25	1.12	1.50	2.25	0.38	3/8-16
2" (31)	1.25	2.70	1-1/4-12	5/16	1/2-20	0.62	3.00	1.50	1.38	2.00	2.75	0.38	3/8-16
2-1/2" (50)	1.50	3.50	1-3/8-12	3/8	1/2-20	0.63	3.75	1.88	1.63	2.25	3.25	0.50	1/2-13
3" (70)	1.75	4.20	1-1/2-12	1/2	5/8-18	0.75	4.50	2.25	2.00	2.75	4.00	0.63	3/4-16

NOTES:
9/16" (02) model: Drawing is not an accurate depiction.
Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.
Linear Thrusters ordered with PFC Technology (model TEF) include a sideported, extended rearhead.
Dimension X will also grow as much as 3/16". Contact Technical Assistance for details.

Dimensions (T Models)



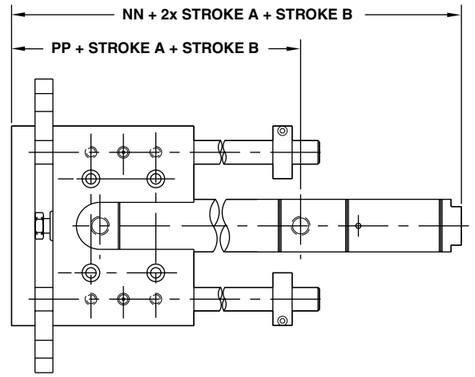
Bore	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
9/16" (02)	3.50	2.50	1.25	0.22	1.00	0.31	0.38	1.75	0.38	3.00	3.50	0.12	0.75	0.50	0.25	0.62
3/4" (04)	4.50	3.00	1.50	0.25	1.25	0.38	0.50	2.12	0.44	3.75	4.12	0.16	0.94	0.62	0.38	0.88
1-1/16" (09)	6.25	4.25	2.12	0.38	2.00	0.50	1.00	3.12	0.56	5.25	4.75	0.31	1.38	1.00	0.50	1.12
1-1/2" (17)	7.50	5.50	2.75	0.44	2.50	0.59	1.31	4.00	0.75	6.50	6.25	0.38	1.75	1.25	0.50	1.31
2" (31)	9.50	7.00	3.50	0.56	4.00	1.22	1.56	5.00	1.00	8.25	7.00	0.94	2.12	2.00	0.63	1.50
2-1/2" (50)	12.50	8.50	4.25	0.63	4.50	1.25	2.00	6.25	1.13	10.50	9.50	0.94	2.63	2.25	1.00	1.75
3" (70)	15.00	11.00	5.50	0.81	6.00	1.41	3.19	8.00	1.50	13.00	11.50	1.00	4.00	3.00	1.00	2.06

Bore	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF
9/16" (02)	0.25	0.28	0.67	2.25	1.25	0.25	0.31	0.86	0.75	8-32	0.62	4-40	10-32	0.69
3/4" (04)	0.38	0.34	0.51	2.50	0.78	0.38	0.38	0.85	0.94	10-32	0.81	6-32	1/8 NPT	0.94
1-1/16" (09)	0.50	0.41	0.85	3.00	0.81	0.38	0.50	1.00	1.62	1/4-20	1.12	8-32	1/8 NPT	1.12
1-1/2" (17)	0.62	0.44	1.44	4.00	1.12	0.50	0.75	1.50	2.12	5/16-18	1.56	10-32	1/8 NPT	1.12
2" (31)	0.75	0.50	0.95	4.00	0.94	0.75	1.00	1.60	3.00	3/8-16	2.08	1/4-28	1/4 NPT	1.25
2-1/2" (50)	1.00	0.50	2.92	6.00	1.69	0.75	1.25	1.48	3.50	3/8-16	2.62	1/4-28	1/4 NPT	1.25
3" (70)	1.25	0.50	3.75	7.00	1.50	1.00	1.50	1.88	4.63	1/2-13	3.12	1/4-28	3/8 NPT	1.25

Bore	GG	HH	JJ	KK	MM	QQ	RR	SS	TT	UU	WW	ZZ
9/16" (02)	1.00	7/16-20	#8	10-32	0.19	1.25	0.62	0.50	0.60	1.00	0.20	N/A
3/4" (04)	1.25	5/8-18	#10	1/4-28	0.25	1.50	0.75	0.62	0.75	1.25	0.25	10-32
1-1/16" (09)	1.88	5/8-18	1/4	5/16-24	0.31	2.00	1.12	1.00	1.00	2.00	0.50	1/4-20
1-1/2" (17)	2.38	3/4-16	5/16	7/16-20	0.437	3.00	1.25	1.25	1.50	2.50	0.50	3/8-16
2" (31)	3.25	1-1/4-12	3/8	1/2-20	0.625	4.00	1.50	1.50	2.00	3.00	0.50	3/8-16
2-1/2" (50)	4.10	1-3/8-12	3/8	1/2-20	0.63	4.75	1.76	2.00	3.00	4.00	0.50	1/2-13
3" (70)	5.25	1-1/2-12	1/2	5/8-18	0.75	6.00	2.50	2.00	3.00	4.00	0.50	3/4-16

NOTES:
9/16" (02) model: Drawing is not an accurate depiction.
Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.
Linear Thrusters ordered with PFC Technology (model TEF) include a sideported, extended rearhead.
Dimension X will also grow as much as 3/16". Contact Technical Assistance for details.

Dimensions (Multiple Position Thruster Models)

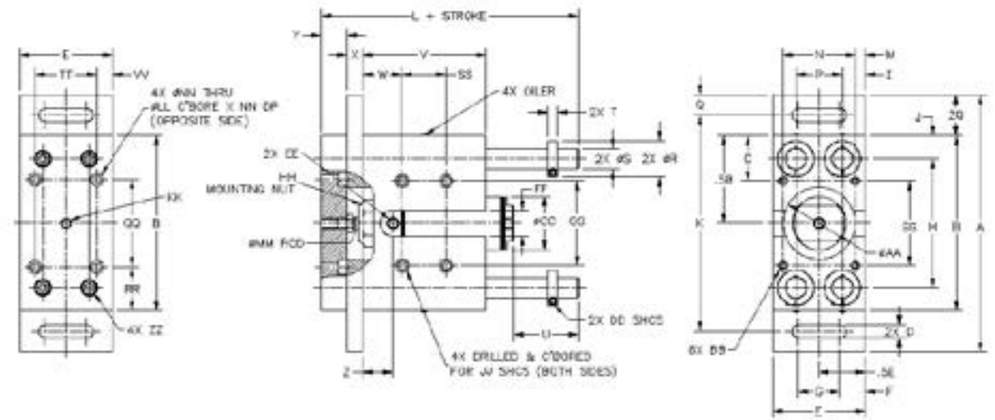


(T Series shown)

Bore Size	NN	PP
9/16" (02)	4.67	2.80
3/4" (04)	6.11	3.76
1-1/16" (09)	6.62	3.90
1-1/2" (17)	7.62	4.81
2" (31)	9.61	6.14

NOTE: Additional T and TE dimensions can be found on pages 307 and 308.

Dimensions (T4 Models)



Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R
2" (31)	9.50	7.00	1.75	0.56	4.00	1.22	1.56	5.25	1.00	0.88	8.25	7.00	0.63	2.75	2.00	0.63	1.50
2-1/2" (50)	12.50	8.50	2.20	0.63	4.50	1.25	2.00	6.25	1.13	1.13	10.50	9.50	0.50	3.50	2.25	1.00	1.75
3" (70)	15.00	11.00	2.88	0.81	6.00	1.41	3.19	8.00	1.50	1.50	13.00	11.50	0.50	5.00	3.00	1.00	2.06

Bore	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH
2" (31)	0.75	0.50	0.95	4.00	1.25	0.75	1.00	1.53	3.00	3/8-16	2.08	1/4-28	1/4 NPT	1.25	3.50	1-1/4-12
2-1/2" (50)	1.00	0.50	3.17	6.00	1.94	0.75	1.25	1.49	3.50	3/8-16	2.62	1/4-28	1/4 NPT	1.25	4.10	1-3/8-12
3" (70)	1.25	0.50	3.87	7.00	1.75	1.00	1.50	1.97	4.63	1/2-13	3.12	1/4-28	3/8 NPT	1.25	5.25	1-3/8-12

Bore	JJ	KK	LL	MM	NN	QQ	RR	SS	TT	UU	VV	ZZ
2" (31)	3/8	1/2-20	0.63	0.63	0.41	3.50	1.75	1.50	3.00	10.00	0.50	3/8-16 SHCS
2-1/2" (50)	3/8	1/2-20	0.63	0.63	0.41	4.25	2.13	2.13	3.00	12.25	0.75	1/2-13 SHCS
3" (70)	1/2	5/8-18	0.81	0.75	0.53	5.50	2.75	3.50	4.50	15.00	0.75	3/4-16 Hex Bolt

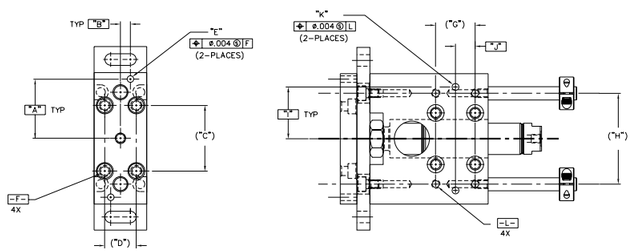
Linear Thrusters ordered with adjustable cushions incorporate a side port on rear of cylinder.

Approximate Weights (T and TE Series)

Bore	Base Weight (oz.)	Adder per 1" (oz.)	Mounting Plate (oz.)
9/16" (02)	13	1	1
3/4" (04)	32	2.2	2.2
1-1/16" (09)	46	5.7	5
1-1/2" (17)	154	6.3	10
2" (31)	296	8.3	32
Model T			
2-1/2" (50)	586	9.9	191
3" (70)	1048	15.2	408
Model TE			
2-1/2" (50)	400	11.7	137
3" (70)	640	17.6	265

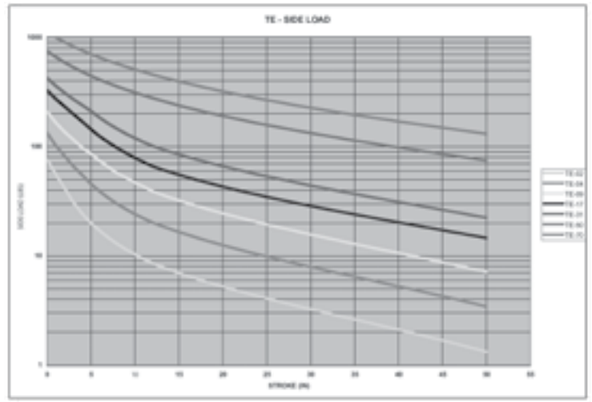
Transition Plates

Dowel Pin Hole Locations



Bore	A	B	C	D	E	G	H	I	J	K
020 (9/16")	1.125	.188	1.250	.600	.1270/.1280 THRU.	.750	1.750	.8750	.375	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.313	.250	1.500	.750	.1895/.1905 THRU.	.938	2.125	1.1250	.469	.1895/.1905 x .290/.310 DP.
090 (1-1/16")	1.813	.375	2.000	1.000	.2520/.2530 THRU.	1.375	3.125	1.5625	.688	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.375	.500	3.000	1.500	.3145/.3155 THRU.	1.750	4.000	2.0000	.875	.3145/.3155 x .560/.580 DP.
310 (2")	3.000	.625	4.000	2.000	.3770/.3780 THRU.	2.125	5.000	2.5000	1.063	.3770/.3780 x .810/.830 DP.
310 (2") TE	2.500	.625	3.000	2.000	.3770/.3780 THRU.	2.000	4.250	2.1250	1.000	.3770/.3780 x .810/.830 DP.
500 (2-1/2")	3.750	1.000	4.750	3.000	.3770/.3780 THRU.	2.630	6.250	3.1250	1.312	.3770/.3780 x .1.000/1.020 DP.
500 (2-1/2") TE	3.250	.750	3.750	2.250	.3770/.3780 THRU.	2.500	5.375	2.6875	1.250	.3770/.3780 x .1.000/1.020 DP.
700 (3")	4.750	1.000	6.000	3.000	.5020/.5030 THRU.	4.000	8.000	4.0000	2.000	.5020/.5030 x .1.250/1.270 DP.
700 (3") TE	4.000	1.000	4.500	2.750	.5020/.5030 THRU.	3.000	6.500	3.2500	1.500	.5020/.5030 x .1.250/1.270 DP.

Maximum Side Loads (lbs) (TE Models)



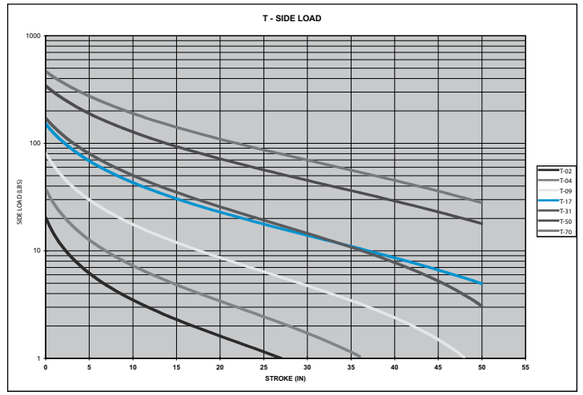
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
TE-02	76.52	55.8	41.50	31.00	24.40	19.96	16.94	14.65	12.83	11.44	10.32	9.30	8.54	7.95
TE-04	133.95	102.00	82.00	66.00	55.02	45.50	38.78	33.77	29.78	26.71	24.11	21.99	20.16	18.81
TE-09	210.00	165.60	136.00	116.00	98.00	86.00	74.00	65.00	57.00	52.00	47.00	43.00	39.00	36.46
TE-17	328.24	273.00	233.00	199.00	170.00	144.00	124.00	109.00	97.00	87.00	79.00	72.00	66.00	62.03
TE-31	425.18	359.17	310.00	271.00	240.00	211.67	183.91	162.33	145.22	131.26	119.66	109.74	101.38	95.03
TE-50	752.44	661.79	590.3	532.45	484.67	444.52	410.31	380.8	355.07	332.44	312.38	294.46	278.35	263.80
TE-70	1000.00	999.87	905.3	826.67	760.25	703.38	654.14	611.07	573.07	539.30	509.07	481.85	457.20	434.78

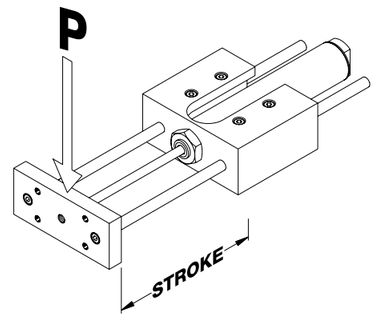
	14	15	16	17	18	19	20	21	22	23	24	25	26	27
TE-02	7.43	6.96	6.54	6.16	5.82	5.51	5.22	4.95	4.71	4.48	4.27	4.07	3.89	3.71
TE-04	17.61	16.53	15.57	14.70	13.90	13.18	12.51	11.89	11.32	10.79	10.30	9.84	9.41	9.00
TE-09	34.20	32.17	30.35	28.69	27.18	25.79	24.52	23.34	22.25	21.23	20.29	19.40	18.57	17.79
TE-17	58.48	55.27	52.36	49.71	47.28	45.05	42.99	41.08	39.31	37.66	36.12	34.67	33.31	32.03
TE-31	89.66	84.80	80.39	76.36	72.67	69.26	66.12	63.20	60.49	57.96	55.59	53.37	51.28	49.32
TE-50	250.57	238.5	227.44	217.25	207.85	199.14	191.04	183.49	176.43	169.82	163.62	157.77	522.26	147.06
TE-70	414.28	395.47	378.15	362.13	347.28	333.46	320.58	308.53	297.23	286.62	276.63	267.21	258.30	249.87

	28	29	30	31	32	33	34	35	36	37	38	39	40	41
TE-02	3.55	3.39	3.25	3.11	2.97	2.85	2.73	2.61	2.50	2.40	2.29	2.20	2.10	2.01
TE-04	8.62	8.25	7.91	7.59	7.28	6.98	6.70	6.43	6.18	5.93	5.69	5.47	5.25	5.04
TE-09	17.06	16.36	15.70	15.08	14.48	13.92	13.38	12.86	12.37	11.90	11.44	11.01	10.59	10.19
TE-17	30.83	29.69	28.61	27.58	26.61	25.68	24.79	23.95	23.14	22.37	21.63	20.91	20.23	19.57
TE-31	47.46	45.70	44.04	42.46	40.96	39.52	38.16	36.85	35.60	34.41	33.26	32.16	31.10	30.08
TE-50	142.13	137.46	133.02	128.79	124.77	120.93	117.27	113.76	110.41	107.19	104.10	101.13	98.27	95.52
TE-70	241.87	234.28	227.05	220.17	213.6	207.32	201.32	195.58	190.07	184.78	179.71	174.82	170.12	165.60

	42	43	44	45	46	47	48	49	50
TE-02	1.93	1.84	1.76	1.68	1.60	1.53	1.46	1.39	1.32
TE-04	4.83	4.64	4.45	4.26	4.09	3.91	3.75	3.58	3.43
TE-09	9.80	9.42	9.06	8.71	8.37	8.04	7.73	7.42	7.12
TE-17	18.94	18.33	17.74	17.17	16.61	16.08	15.56	15.06	14.58
TE-31	29.10	28.15	27.24	26,35	25.50	24.67	23.87	23.09	22.34
TE-50	92.87	90.32	87.85	85.47	83.16	80.93	78.77	76.67	74.64
TE-70	161.23	157.01	152.94	149.01	145.20	141.52	137.95	134.49	131.13

Maximum Side Loads (lbs) (T Models)





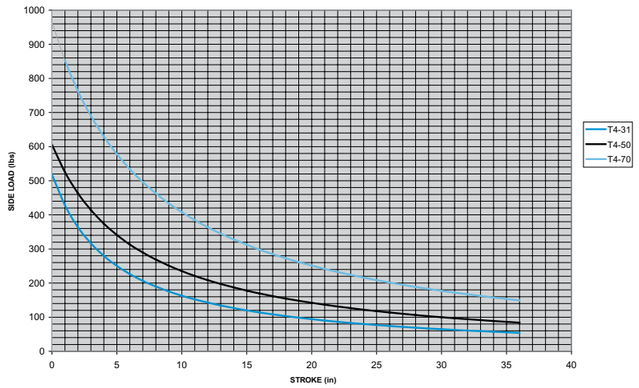
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TE-02	20.34	14.11	10.76	8.67	7.24	6.19	5.40	4.77	4.26	3.84	3.48	3.18	2.91	2.68	2.48
TE-04	37.49	27.17	21.23	17.38	14.66	12.65	11.09	9.85	8.83	7.98	7.26	6.64	6.10	5.63	5.21
TE-09	80.50	60.61	48.46	40.26	34.34	29.87	26.37	23.54	21.22	19.27	17.61	16.17	14.92	13.82	12.83
TE-17	151.62	122.73	102.88	88.39	77.34	68.63	61.58	55.75	50.86	46.68	43.07	39.92	37.14	34.67	32.47
TE-31	171.30	140.62	118.91	102.73	90.19	80.18	72.00	65.19	59.41	54.46	50.16	46.38	43.04	40.06	37.39
TE-50	342.37	295.93	260.13	231.67	208.5	189.25	173.00	159.10	147.06	136.52	127.22	118.95	111.54	104.85	98.80
TE-70	465.67	410.17	365.92	329.78	299.7	274.27	252.46	233.56	217.00	202.37	189.34	177.66	167.13	157.57	148.86

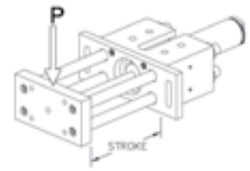
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
T-02	2.30	2.13	1.98	1.85	1.72	1.61	1.50	1.41	1.31	1.23	1.15	1.07	1.00	-
T-04	4.83	4.49	4.18	3.90	3.64	3.40	3.18	2.98	2.78	2.60	2.44	2.28	2.12	1.98
T-09	11.96	11.16	10.44	9.79	9.18	8.63	8.11	7.64	7.19	6.78	6.39	6.02	5.67	5.34
T-17	30.48	28.67	27.03	25.53	24.15	22.87	21.69	20.59	19.57	18.61	17.71	16.86	16.06	15.31
T-31	34.97	32.77	30.77	28.92	27.22	25.65	24.19	22.83	21.56	20.37	19.25	18.2	17.20	16.26
T-50	93.28	88.33	83.58	79.30	75.33	71.64	68.20	64.99	61.97	59.14	56.48	53.96	51.58	49.32
T-70	140.88	133.54	126.77	120.49	114.66	109.22	104.14	99.37	94.89	90.67	86.68	82.91	79.34	75.94

	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
T-02	-	-	-		-		-		-		-		-		-	-	-
T-04	1.84	1.71	1.59	1.47	1.36	1.25	1.14	1.04	-	-	-	-	-	-	-	-	-
T-09	5.03	4.74	4.45	4.18	3.93	3.68	3.45	3.22	3.00	2.79	2.59	2.39	2.20	2.02	1.84	1.67	1.50
T-17	14.60	13.92	13.28	12.66	12.08	11.52	10.98	10.47	9.98	9.50	9.05	8.61	8.19	7.78	7.38	7.00	6.63
T-31	15.36	14.51	13.70	12.93	12.19	11.48	10.80	10.15	9.52	8.92	8.34	7.78	7.24	6.72	6.21	5.72	5.24
T-50	47.18	45.14	43.20	41.35	39.58	37.89	36.26	34.70	33.21	31.77	30.38	29.05	27.76	26.51	25.30	24.14	23.01
T-70	72.72	69.64	66.71	63.90	61.22	58.64	56.18	53.8	51.52	49.33	47.21	45.16	43.19	41.28	39.43	37.64	35.91

	46	47	48	49	50
T-02	-	-	-	-	-
T-04	-	-	-	-	-
T-09	1.33	1.17	1.02	-	-
T-17	6.27	5.92	5.58	5.25	4.93
T-31	4.78	4.33	3.89	3.47	3.05
T-50	21.91	20.85	19.82	18.82	17.84
T-70	34.22	32.59	31.00	29.46	27.95

Maximum Side Loads (lbs) (T4 Models)





	0	1	2	3	4
T4-31	518.70	428.08	364.07	316.45	279.63
T4-50	605.94	525.43	463.46	414.28	374.30
T4-70	965.54	852.80	763.04	689.88	629.11

	5	6	7	8	9
T4-31	250.32	226.43	206.58	189.83	175.51
T4-50	341.16	313.25	289.41	268.83	250.86
T4-70	577.82	533.96	496.02	462.88	433.68

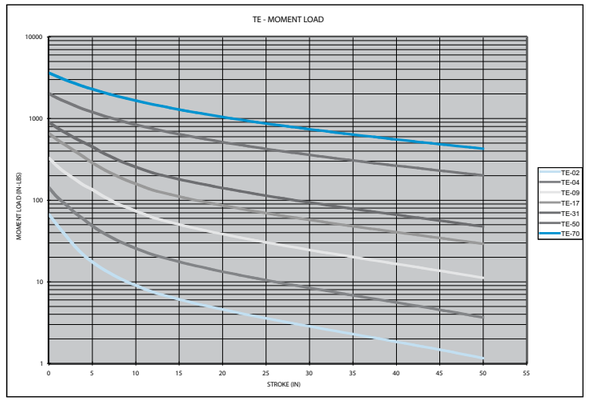
	10	11	12	13	14
T4-31	163.12	152.30	142.76	134.30	126.74
T4-50	235.05	221.03	208.50	197.25	187.09
T4-70	407.77	384.60	363.78	344.95	327.85

	15	16	17	18	19
T4-31	119.94	113.79	108.21	103.11	98.45
T4-50	177.86	169.45	161.75	154.67	148.14
T4-70	312.25	297.97	284.83	272.71	261.49

	20	21	22	23	24
T4-31	94.16	90.20	86.54	83.14	79.97
T4-50	142.11	136.50	131.29	126.43	129.89
T4-70	251.09	241.40	232.36	223.91	215.99

	25	26	27	28	29	30	31	32	33	34	35	36
T4-31	77.02	74.26	71.68	69.25	66.96	64.81	62.78	60.86	59.03	57.31	55.67	54.11
T4-50	117.63	113.64	109.88	106.33	102.99	99.83	96.83	94.00	91.30	88.74	86.30	83.97
T4-70	208.56	201.56	194.97	188.74	182.85	177.28	171.99	166.97	162.19	157.64	153.30	149.17

Maximum Moments (in-lbs) (TE Models)



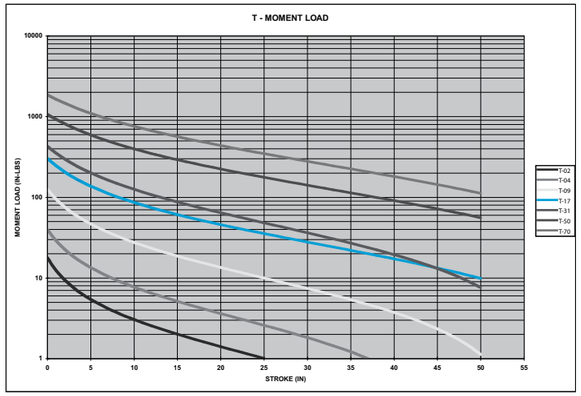
	0	1	2	3	4	5	6	7	8	9	10	11	12
TE-02	66.96	48.83	36.31	27.13	21.35	17.47	14.82	12.82	11.23	10.01	9.03	8.14	7.47
TE-04	142.32	108.38	87.13	70.13	58.46	48.34	41.20	35.88	31.64	28.38	25.62	23.36	21.42
TE-09	328.12	258.75	212.50	181.25	153.13	134.38	115.63	101.56	89.06	81.25	73.44	67.19	60.94
TE-17	656.48	546.00	466.00	398.00	340.00	288.00	248.00	218.00	194.00	174	158.00	144.00	132.00
TE-31	903.51	763.24	658.75	575.88	510.00	449.80	390.81	344.95	308.59	278.93	254.28	233.2	215.43
TE-50	2022.18	1778.57	1586.43	1430.96	1302.54	1194.65	1102.70	1023.39	954.26	893.44	839.52	791.36	748.08
TE-70	3623.75	3249.57	2942.22	2686.67	2470.8	2285.99	2125.94	1985.97	1862.49	1752.72	1654.47	1566.00	1485.90

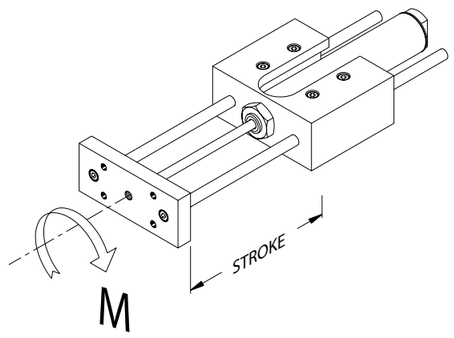
	13	14	15	16	17	18	19	20	21	22	23	24	25
TE-02	6.95	6.50	6.09	5.72	5.39	5.09	4.82	4.57	4.34	4.12	3.92	3.74	3.56
TE-04	19.98	18.71	17.57	16.54	15.62	14.77	14.00	13.29	12.64	12.03	11.47	10.94	10.45
TE-09	56.97	53.44	50.27	47.41	44.82	42.46	40.30	38.31	36.47	34.76	33.18	31.70	30.32
TE-17	124.07	116.95	110.54	104.72	99.42	94.56	90.10	85.98	82.17	78.62	75.32	72.23	69.34
TE-31	201.93	190.52	180.20	170.83	162.27	154.41	147.18	140.50	134.30	128.54	123.16	118.13	113.42
TE-50	708.96	673.41	640.97	611.24	583.87	558.60	535.18	513.41	493.13	474.16	456.40	439.72	424.01
TE-70	1413.03	1346.42	1285.29	1228.98	1176.92	1128.65	1083.75	1041.87	1002.71	966.01	931.52	899.05	868.43

	26	27	28	29	30	31	32	33	34	35	36	37	38
TE-02	3.4	3.25	3.1	2.97	2.84	2.72	2.6	2.49	2.39	2.29	2.19	2.1	2.01
TE-04	9.99	9.56	9.15	8.77	8.41	8.06	7.73	7.42	7.12	6.83	6.56	6.3	6.05
TE-09	29.02	27.8	26.65	25.56	24.53	23.56	22.63	21.74	20.9	20.1	19.33	18.59	17.88
TE-17	66.62	64.07	61.65	59.37	57.21	55.16	53.21	51.36	49.59	47.9	46.28	44.74	43.25
TE-31	108.98	104.8	100.86	97.12	93.59	90.23	87.03	83.99	81.09	78.31	75.66	73.12	70.68
TE-50	409.21	395.21	381.97	369.41	357.48	346.14	335.33	325.01	315.16	305.74	296.71	288.06	279.76
TE-70	839.48	812.08	786.09	761.4	737.91	715.54	694.19	673.8	654.3	635.63	617.73	600.55	584.05

	39	40	41	42	43	44	45	46	47	48	49	50
TE-02	1.92	1.84	1.76	1.68	1.61	1.54	1.47	1.4	1.34	1.28	1.21	1.15
TE-04	5.81	5.58	5.35	5.14	4.93	4.73	4.53	4.34	4.16	3.98	3.81	3.64
TE-09	17.2	16.55	15.92	15.31	14.73	14.16	13.61	13.08	12.57	12.07	11.59	11.12
TE-17	41.83	40.46	39.14	37.87	36.65	35.47	34.33	33.23	32.16	31.13	30.12	29.15
TE-31	68.34	66.09	63.92	61.83	59.82	57.88	56	54.19	52.43	50.73	49.08	47.47
TE-50	271.78	264.1	256.71	249.59	242.73	236.09	229.69	223.49	217.5	211.69	206.06	200.6
TE-70	568.18	552.9	538.18	523.99	510.3	497.07	484.28	471.91	459.93	448.33	437.08	426.16

Maximum Moments (in-lbs) (T-Series Models)





	0	1	2	3	4	5	6	7	8	9	10	11	12
T-02	17.80	12.35	9.42	7.59	6.33	5.42	4.72	4.17	3.73	3.36	3.05	2.78	2.55
T-04	39.83	28.86	22.56	18.46	15.58	13.44	11.78	10.46	9.38	8.48	7.72	7.06	6.49
T-09	125.78	94.70	75.72	62.90	53.66	46.67	41.20	36.79	33.16	30.11	27.51	25.27	23.31
T-17	303.23	245.46	205.76	176.78	154.68	137.26	123.16	111.51	101.71	93.36	86.14	79.84	74.28
T-31	428.25	351.56	297.28	256.83	225.48	200.46	180.01	162.96	148.53	136.15	125.39	115.96	107.61
T-50	1069.92	924.78	812.90	723.97	651.55	591.41	540.64	497.18	459.55	426.62	397.56	371.71	348.55
T-70	1862.69	1640.7	1463.66	1319.12	1198.81	1097.07	1009.86	934.23	868.00	809.47	757.37	710.65	668.51

	13	14	15	16	17	18	19	20	21	22	23	24	25
T-02	2.35	2.17	2.01	1.86	1.73	1.62	1.51	1.41	1.32	1.23	1.15	1.08	1.01
T-04	5.98	5.54	5.13	4.77	4.45	4.15	3.87	3.62	3.38	3.16	2.96	2.77	2.59
T-09	21.59	20.05	18.68	17.44	16.32	15.29	14.35	13.48	12.68	11.93	11.24	10.59	9.98
T-17	69.35	64.93	60.95	57.35	54.06	51.06	48.30	45.74	43.38	41.18	39.13	37.22	35.42
T-31	100.16	93.47	87.43	81.93	76.91	72.31	68.06	64.13	60.48	57.08	53.91	50.93	48.13
T-50	327.67	308.74	291.49	275.71	261.19	247.80	235.40	223.87	213.12	203.08	193.66	184.82	176.49
T-70	630.29	595.44	563.53	534.18	507.08	481.98	458.64	436.89	416.54	397.47	379.55	362.66	346.72

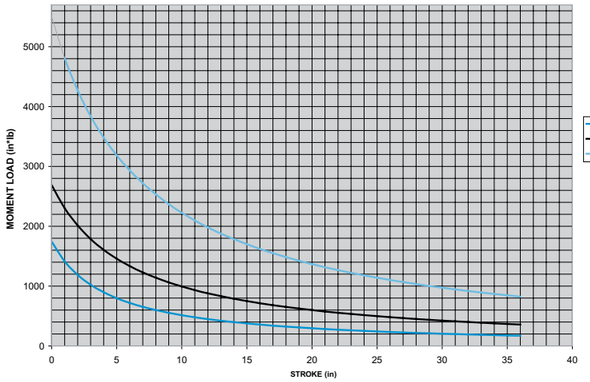
	26	27	28	29	30	31	32	33	34	35	36	37	38
T-02	-	-	-	-	-	-	-	-		-	-	-	-
T-04	2.42	2.26	2.10	1.96	1.82	1.69	1.56	1.44	1.33	1.21	1.11	1.00	-
T-09	9.40	8.86	8.35	7.86	7.40	6.96	6.54	6.14	5.75	5.38	5.03	4.69	4.36
T-17	33.72	32.13	30.62	29.19	27.84	26.55	25.33	24.16	23.04	21.97	20.94	19.96	19.01
T-31	45.49	43.00	40.64	38.40	36.27	34.25	32.31	30.47	28.70	27.00	25.37	23.81	22.30
T-50	168.62	161.18	154.13	147.44	141.07	135.01	129.22	123.69	118.39	113.32	108.45	103.77	99.27
T-70	331.64	317.35	303.78	290.87	278.56	266.83	255.61	244.87	234.58	224.70	215.22	206.09	197.30

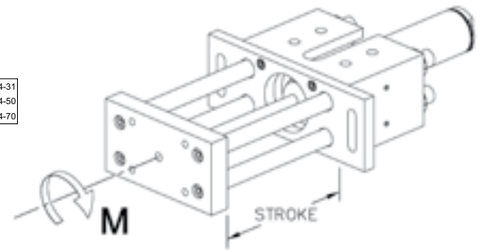
	39	40	41	42	43	44	45	46	47	48	49	50
T-02	-	-	-	-	-	-	-	-	-	-	-	-
T-04	-	-	-	-	-	-	-	-	-	-	-	-
T-09	4.04	3.74	3.44	3.15	2.87	2.60	2.34	2.08	1.83	1.59	1.36	1.13
T-17	18.10	17.22	16.37	15.56	14.77	14.00	13.26	12.54	11.84	11.17	10.51	9.87
T-31	20.85	19.45	18.10	16.79	15.52	14.29	13.10	11.95	10.82	9.73	8.66	7.63
T-50	94.94	90.77	86.74	82.84	79.08	75.43	71.90	68.48	65.16	61.94	58.80	55.75
T-70	188.83	180.65	172.76	165.12	157.73	150.57	143.63	136.90	130.36	124.00	117.82	111.81

Frictional characteristics of TE Series Linear Thrusters deteriorate as stroke length increases.

NOTE: Static load data represented

Maximum Moment Loads (in-lbs) (T4 Models)





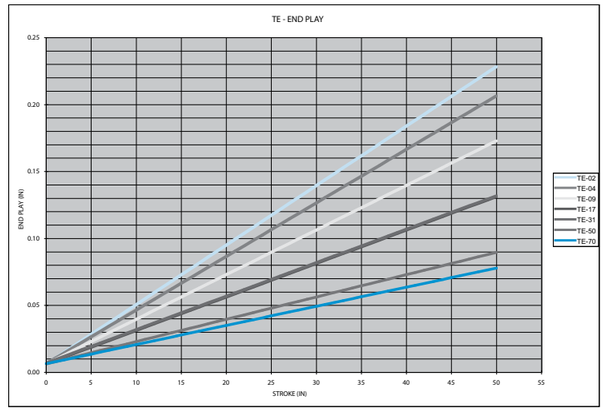
NOTE: Static load data represented.

	0	1	2	3	4	5	6	7	8	9	10	11	12
T4-31	1745.02	1413.35	1186.76	1022.14	897.12	798.95	719.81	654.66	600.09	553.72	513.83	479.14	448.70
T4-50	2687.72	2302.45	2012.74	1786.95	1606.03	1457.82	1334.17	1229.45	1139.62	1061.71	993.50	993.28	879.73
T4-70	5504.63	4810.54	4269.61	3836.17	3481.08	3184.85	2933.96	2718.74	2532.09	2368.66	2224.38	2096.06	1981.20

	13	14	15	16	17	18	19	20	21	22	23	24	25
T4-31	421.78	397.80	376.30	356.91	339.34	323.35	308.72	295.30	282.94	271.51	260.92	251.08	241.91
T4-50	831.79	788.63	749.56	714.03	681.58	651.83	624.44	599.16	575.74	553.99	533.74	514.83	497.13
T4-70	1877.78	1784.17	1699.04	1621.28	1549.98	1484.36	1423.77	1367.65	1315.53	1266.98	1221.66	1179.25	1139.48

	26	27	28	29	30	31	32	33	34	35	36
T4-31	233.34	225.32	217.79	210.71	204.05	197.76	191.82	186.19	180.86	175.80	170.99
T4-50	480.54	464.95	450.27	436.43	423.36	410.99	399.26	388.14	377.57	367.51	357.94
T4-70	1102.11	1066.93	1033.75	1002.40	972.75	944.64	917.97	892.63	868.51	845.54	823.63

Tooling Plate End Play (in) (TE Models)

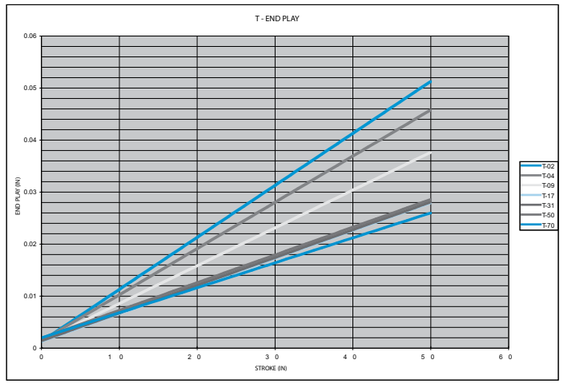


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TE-02	0.006	0.011	0.015	0.019	0.024	0.028	0.033	0.037	0.042	0.046	0.051	0.055	0.059	0.064	0.068	0.073	0.077
TE-04	0.007	0.011	0.015	0.019	0.023	0.027	0.031	0.035	0.039	0.043	0.047	0.051	0.055	0.059	0.063	0.067	0.071
TE-09	0.006	0.010	0.013	0.016	0.020	0.023	0.026	0.030	0.033	0.036	0.040	0.043	0.046	0.050	0.053	0.056	0.060
TE-17	0.006	0.009	0.011	0.014	0.016	0.019	0.021	0.024	0.026	0.029	0.031	0.034	0.036	0.039	0.041	0.044	0.046
TE-31	0.007	0.009	0.012	0.014	0.017	0.019	0.022	0.024	0.027	0.029	0.032	0.034	0.037	0.039	0.042	0.044	0.047
TE-50	0.006	0.008	0.010	0.011	0.013	0.015	0.016	0.018	0.020	0.021	0.023	0.025	0.026	0.028	0.030	0.031	0.033
TE-70	0.006	0.008	0.009	0.011	0.012	0.014	0.015	0.016	0.018	0.019	0.021	0.022	0.024	0.025	0.026	0.028	0.029

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
TE-02	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.113	0.117	0.122	0.126	0.131	0.135	0.139	0.144	0.148	0.153
TE-04	0.075	0.079	0.083	0.087	0.091	0.095	0.099	0.103	0.107	0.111	0.115	0.119	0.123	0.127	0.131	0.135	0.139
TE-09	0.063	0.066	0.070	0.073	0.076	0.080	0.083	0.086	0.090	0.093	0.096	0.100	0.103	0.106	0.110	0.113	0.116
TE-17	0.049	0.051	0.054	0.056	0.059	0.061	0.064	0.066	0.069	0.071	0.074	0.076	0.079	0.081	0.084	0.086	0.089
TE-31	0.049	0.052	0.054	0.057	0.059	0.062	0.064	0.067	0.069	0.072	0.074	0.077	0.079	0.082	0.084	0.087	0.089
TE-50	0.035	0.036	0.038	0.040	0.041	0.043	0.045	0.046	0.048	0.050	0.051	0.053	0.055	0.056	0.058	0.060	0.061
TE-70	0.031	0.032	0.034	0.035	0.036	0.038	0.039	0.041	0.042	0.044	0.045	0.046	0.048	0.049	0.051	0.052	0.054

	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
TE-02	0.157	0.162	0.166	0.171	0.175	0.179	0.184	0.188	0.193	0.197	0.202	0.206	0.211	0.215	0.219	0.224	0.228
TE-04	0.143	0.147	0.151	0.155	0.159	0.163	0.167	0.171	0.175	0.179	0.183	0.187	0.191	0.195	0.199	0.203	0.207
TE-09	0.120	0.123	0.126	0.130	0.133	0.136	0.140	0.143	0.146	0.150	0.153	0.156	0.160	0.163	0.166	0.17	0.173
TE-17	0.091	0.094	0.096	0.099	0.101	0.104	0.106	0.109	0.111	0.114	0.116	0.119	0.121	0.124	0.126	0.129	0.131
TE-31	0.092	0.094	0.097	0.099	0.102	0.104	0.107	0.109	0.112	0.114	0.117	0.119	0.122	0.124	0.127	0.129	0.132
TE-50	0.063	0.065	0.066	0.068	0.070	0.071	0.073	0.075	0.076	0.078	0.080	0.081	0.083	0.085	0.086	0.088	0.09
TE-70	0.055	0.056	0.058	0.059	0.061	0.062	0.064	0.065	0.066	0.068	0.069	0.071	0.072	0.074	0.075	0.076	0.078

Tooling Plate End Play (in) (T-Series Models)



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
T-02	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.01	0.011	0.012	0.013	0.014	0.015	0.016
T-04	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.008	0.009	0.01	0.011	0.012	0.013	0.014	0.015
T-09	0.001	0.002	0.003	0.003	0.004	0.005	0.006	0.006	0.007	0.008	0.009	0.009	0.01	0.011	0.011	0.012
T-17	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009
T-31	0.001	0.002	0.002	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009
T-50	0.002	0.002	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.01
T-70	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
T-02	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.03	0.031	0.032
T-04	0.016	0.016	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.024	0.025	0.026	0.027	0.028	0.029
T-09	0.013	0.014	0.014	0.015	0.016	0.017	0.017	0.018	0.019	0.019	0.02	0.021	0.022	0.022	0.023	0.024
T-17	0.01	0.01	0.011	0.011	0.012	0.012	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018
T-31	0.01	0.01	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018
T-50	0.01	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.015	0.015	0.016	0.016	0.017	0.017	0.018	0.018
T-70	0.01	0.01	0.011	0.011	0.012	0.012	0.013	0.013	0.014	0.014	0.014	0.015	0.015	0.016	0.016	0.017

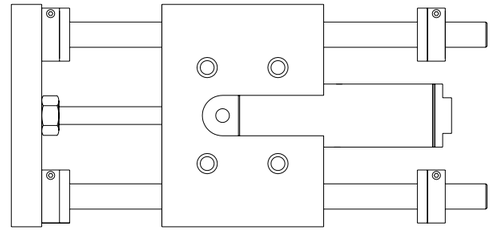
	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
T-02	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.044	0.045	0.046	0.047	0.048
T-04	0.03	0.031	0.032	0.032	0.033	0.034	0.035	0.036	0.037	0.038	0.039	0.04	0.04	0.041	0.042	0.043
T-09	0.025	0.025	0.026	0.027	0.027	0.028	0.029	0.03	0.03	0.031	0.032	0.033	0.033	0.034	0.035	0.035
T-17	0.018	0.019	0.019	0.02	0.02	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026
T-31	0.018	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026
T-50	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025	0.025	0.026	0.026	0.027
T-70	0.017	0.018	0.018	0.019	0.019	0.02	0.02	0.021	0.021	0.022	0.022	0.023	0.023	0.024	0.024	0.025

	48	49	50
T-02	0.049	0.05	0.051
T-04	0.044	0.045	0.046
T-09	0.036	0.037	0.038
T-17	0.027	0.027	0.028
T-31	0.027	0.028	0.028
T-50	0.028	0.028	0.029
T-70	0.025	0.026	0.026

External Bumpers

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They are 1/4" thick through 2" bore, 1/2" for 2-1/2" bore, and 3/4" for 3" bore and fit over the guide shafts at the ends of the housing (see illustration). Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of two collars; with -EB2 option, there will be four shaft collars. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in.)	
Bore Size	Length Adder
9/16"	0.5
3/4"	0.5
1-1/16"	0.63
1-1/2"	0.75
2"	0.875
2-1/2"	1.38
3"	1.50



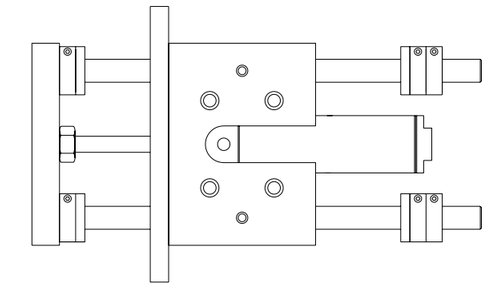
Retraction Stroke Reduction with Bumpers (in.)		
Bore Size	Reduction	
	Standard	With Mounting Plate Option
9/16"	0.34	0.59
3/4"	0.28	0.66
1-1/16"	0.31	0.69
1-1/2"	0.25	0.75
2"	0	0.75
2-1/2"	.25	1.06
3"	.31	1.31

External Bumpers (T Models)

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They are 1/4" thick through 2" bore, 1/2" for 2-1/2" bore, and 3/4" for 3" bore and fit over the guide shafts at the ends of the housing (see illustration). Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of four collars; with -EB2 option, there will be six shaft collars.

Flat stainless steel washers are also installed to protect the shaft seals from impact damage. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke if the mounting plate is used in the shipped position (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in.)	
Bore Size	Length Adder
9/16"	0.5
3/4"	0.5
1-1/16"	0.63
1-1/2"	0.75
2"	0.875
2-1/2"	1.38
3"	1.50



Retraction Stroke Reduction with Bumpers (in.)		
Bore Size	With Mounting Plate	Without Mounting Plate
9/16"	0.56	0.31
3/4"	0.62	0.24
1-1/16"	0.70	N/A
1-1/2"	0.73	0.25
2"	0.81	N/A
2-1/2"	1.06	0.31
3"	1.31	0.31

NOTE: The single set of shaft collars supplied with each Linear Thruster are for setup only. DO NOT use them to limit the stroke or damage can occur. Thin washer included with EB Option to protect housing wipers from impact damage.

External Bumpers (T4 Models)

The stroke can be adjusted with external urethane bumpers. These are available on one or both ends (-EB1 and -EB2 options). They fit over the guide shafts at the ends of the housing. Shaft collars are supplied with each set of bumpers to eliminate movement possible with high loads and velocities. Thus, with -EB1 option, there will be a total of eight collars; with -EB2 option, there will be twelve shaft collars.

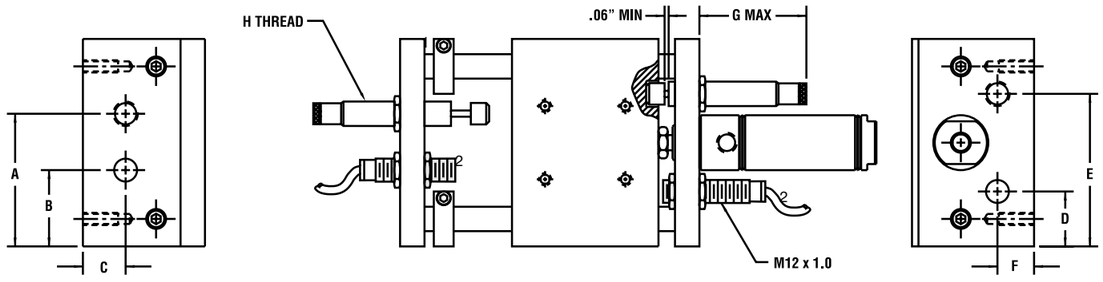
Flat stainless steel washers are also installed to protect the shaft seals from impact damage. Guide shafts are lengthened so stroke on extension isn't affected; however, bumpers reduce the retraction stroke if the mounting plate is used in the shipped position (see charts below). Higher loads and velocities may dictate the use of external means of deceleration such as shock absorbers.

Guide Shaft Extension with Bumpers (in)	
Bore Size	Length Adder
2"	0.875
2-1/2"	1.38
3"	1.50

Retraction Stroke Reduction with Bumpers (in)		
Bore Size	With Mounting Plate	Without Mounting Plate
2"	0.81	0.25
2-1/2"	1.06	0.50
3"	1.31	0.75

NOTE: The single set of shaft collars supplied with each Linear Thruster are for setup only. DO NOT use them to limit the stroke or damage can occur. Thin washer included with EB Option to protect housing wipers from impact damage.

Options

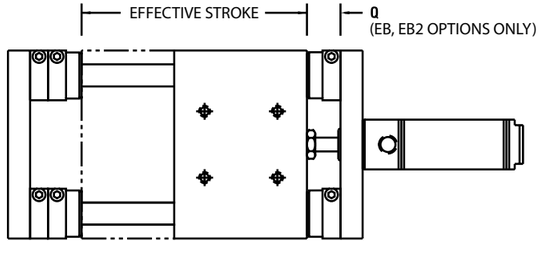


NOTE: Maintain the .06" clearance gap between the nylon cap and shock absorber housing to prevent damage to the shock absorber.
1 The single shaft collars supplied with each Linear Thruster are intended for setup purposes only. They must not be used to limit the stroke or serious damage to the Linear Thruster may occur!
2 Position sensing switch shown in drawing is sold separately.

Model	A	B	C	D	E	F	G	H
02	1.88	1.13	0.56	0.84	2.17	0.40	3.00	.500-20
04/09	2.65	1.60	1.50	1.13	3.13	0.75	3.75	.750-16
17	3.50	2.00	1.75	1.46	4.00	0.84	3.25	.750-16
31/50	3.50	2.25	2.00	1.75	5.31	0.90	4.75	1.00-12
70	5.50	3.50	2.75	1.75	9.25	4.19	4.80	1.00-12

Stroke Reduction Table

Bore	External Bumper Option			Q
	EB	EB1	EB2	
02	0.41	0.17	0.58	0.62
04/09	0.48	0.18	0.66	0.69
17	0.37	0.32	0.69	0.75
31	0.00	0.47	0.47	0.81
50	0.00	0.39	0.39	0.81
70	0.80	0.00	0.80	1.31



The model number of TE Series Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

All options listed below are to be alphabetically applied to the last part of your Thruster part number, except the EEx.xx option which is length sensitive and should be listed at the very end of all the options selected. Options are listed below in three categories for improved organization and understanding.

Please refer to the charts below for an example of model number TE-098-EB1M. This is a 1-1/16" bore, 8" stroke TE series Linear Thruster with extension external bumpers and a magnet for position sensing.

Model	
TE	Composite Bearing Thruster
TEF	Position Feedback Thruster (09-70 bores)
TEV	Composite Bearing Thruster with the cylinder omitted

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Standard Stroke Lengths*	
Bore	Stroke Lengths
02	1" increments up to 6"
04	1" increments up to 12"
09	
17	
31	
50	
70	

*Stroke lengths beyond maximum are available; the rear of the cylinder must be supported in horizontal applications. Contact Bimba or your local distributor for pricing.

TE - 09 8 - EB1M

Thruster Housing Options	
D	Dowel pin holes for Transition Plates[1]
EB1	External Bumpers, Extend (one set) (see page 319)
EB2	External Bumpers, Both Ends (two sets) (see page 319)
K _ _	Shock Absorbers[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)
H	Tapped Holes
P	Mounting Plate (includes 12 tapped holes)
S	Stainless Steel Tooling Plate, Shafts, and Collars[2]

Cylinder Options	
B	Cylinder option for internal bumpers[3 4]
C	Cylinder option for adjustable cushions[3 4]
M	MRS® magnetic position sensing[5]
N	Cylinder option for low temperature service lubricant and seals[4]
Q	Cylinder option for side ported read head[4]
T1	Cylinder option for low profile switch track[4]
V	Cylinder option for high temperature seals and lubricant[4]
EEX.XX	Cylinder and thruster guide shaft option for extra rod and guide shaft extension[4]
99	Cylinder option for oil pre-lubrication[4]

PFC Cylinder options	
L	PFC cylinder option for low friction seals[6]
PC	PFC cylinder option for M8 corded connector[6]
PA	PFC cylinder option for M8 plug connector[6]

[1] Transition Plate Applications: Option -D must be ordered if dowel pin holes are required. Not available in 2-1/2" and 3" bores with S option. Dowel pin hole locations shown in Appendix.
[2] Not available in 2-1/2" and 3" bores.
[3] Internal bumpers and cushions cannot be ordered in combination. Adjustable cushions are not available for 9/16" bore size.
[4] See Original Line catalog section for more details.
[5] Hall Effect Switch not available for 9/16" bore size.
[6] See PFC catalog section for more information.

NOTE: TE Series Linear Thruster includes shaft collars only when external bumpers are ordered as an option (see page 319). Shaft collars can also be ordered separately as a repair part.

Approximate Power Factors		
9/16"	=	0.2
3/4"	=	0.4
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a TE-046-CM will exert a force of 0.4 times the air line pressure; a TE-173-M will exert a force of 1.7 times the air pressure, etc.

How to Order

The model number of T-Series Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number. **Please note that the following features are standard, and are included in all model numbers: E (inch series threading) and M (magnetic position sensing).**

All options listed below are to be alphabetically applied to the last part of your Thruster part number, except the EEx.xx option which is length sensitive and should be listed at the very end of all the options selected. Options are listed below in three categories for improved organization and understanding.

An example of a basic T Series unit with a 3/4" bore, 6" stroke, adjustable cushions, and a magnet for position sensing.

Model	
T	Ball Bearing Thruster
TF	Position Feedback, Ball Bearing Thruster (09-70 bores)
TV	Ball Bearing Thruster with the cylinder omitted

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Standard Stroke Lengths*	
Bore	Stroke Lengths
02	1" increments up to 6"
04	1" increments up to 12"
09	
17	
31	
50	
70	

*Stroke lengths beyond maximum are available; the rear of the cylinder must be supported in horizontal applications. Contact Bimba or your local distributor for pricing.

T - 04 6 - CM

Thruster Housing Options		
D	Dowel pin holes for Transition Plates[1]	
EB1	External Bumpers, Extend (one set) (see page 319)	
EB2	External Bumpers, Both Ends (two sets) (see page 319)	
K _ _	Shock Absorbers[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)
NP	No Mounting Plate	
S	Stainless Steel Tooling Plate, Shafts, and Collars[2]	

Cylinder Options	
B	Cylinder option for internal bumpers[3 4]
C	Cylinder option for adjustable cushions[3 4]
M	MRS® magnetic position sensing[5]
N	Cylinder option for low temperature service lubricant and seals[4]
Q	Cylinder option for side ported read head[4]
T1	Cylinder option for low profile switch track[4]
V	Cylinder option for high temperature seals and lubricant[4]
EEX.XX	Cylinder and thruster guide shaft option for extra rod and guide shaft extension[4]
99	Cylinder option for oil pre-lubrication[4]

PFC Cylinder Options	
L	PFC cylinder option for low friction seals[6]
PC	PFC cylinder option for M8 corded connector[6]
PA	PFC cylinder option for M8 plug connector[6]

[1] Transition Plate Applications: Option -D must be ordered if dowel pin holes are required. Not available in 2-1/2" and 3" bores with S option. Dowel pin hole locations shown in Appendix.
[2] Not available in 2-1/2" and 3" bores.
[3] Internal bumpers and cushions cannot be ordered in combination. Adjustable cushions are not available for 9/16" bore size.
[4] See Original Line catalog section for more details.
[5] Hall Effect Switch not available for 9/16" bore size.
[6] See PFC catalog section for more information.

Approximate Power Factors		
9/16"	=	0.2
3/4"	=	0.4
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a T-046-CM will exert a force of 0.4 times the air line pressure; a T-173-M will exert a force of 1.7 times the air pressure, etc.

How to Order

LINEAR THRUSTERS

The model number of Multiple Position Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke lengths, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Multiple Position Linear Thruster model with a ball bearing 1-1/16" thruster, initial 1" stroke to the intermediate position, and a total stroke of 3" with a magnet for position sensing.

Model	
T	Ball Bearing Thruster
TE	Composite Bearing Thruster

Stroke Lengths				
Stroke A		Stroke B		Standard Strokes and Stroke Maximums
Inches	Code	Inches	Code	
1/2	0.5	1/2	0.5	1" increments to 12" Stroke A + Stroke B Maximum 12"
1	1	1	1	

T - 09 1/2 - M

Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"

Options	
M	MRS® magnetic position sensing

How to Order

The model number of T4 Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic T4 unit with a 2” bore, 6” stroke, adjustable cushions, and a magnet for position sensing.

Bore Size	
31	2”
50	2-1/2”
70	3”

Standard Stroke Lengths[1]	
31	1” increments to 12”
50	
70	

T4 - 31 6 - CM

Options	
B	Bumpers, both ends[2]
C	Adjustable cushions, both ends[2]
EB1	External bumpers, extension (one set)[3]
EB2	External bumpers, both ends (two sets)[3]
M	MRS® magnetic position sensing
NP	No mounting plate

[1] Stroke lengths beyond maximum are available; the rear of the cylinder must be supported in horizontal applications.
[2] Internal bumpers and cushions cannot be ordered in combination.
[3] Shock Absorbers available upon request.

NOTE: For Multiple Position, specify Stroke A/Stroke B.

Approximate Power Factors		
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a T-31-CM will exert a force of 3.1 times the air line pressure.

How to Order

The model number of Movable Housing Linear Thrusters consists of three alphanumeric clusters designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Movable Housing Linear Thruster model with a 1-1/16” bore, 6” stroke movable housing, external bumpers, and a magnet for position sensing.

Model	
TMH	Ball Bearing Movable Housing Thruster
TEMH	Composite Bearing Movable Housing Thruster
TMHF/TEMHF	Movable Housing Thruster with Position Feedback (09-70 bores only)
TMHV/TEMHV	Movable Housing Thruster without the cylinder

Stroke Lengths
1” to 12” 1” increments standard Any length available
Multiple Position: specify stroke A or stroke B
32” stroke maximum

TMH - 09 6 - EB2M

Bore Size	
02	9/16”
04	3/4”
09	1-1/16”
17	1-1/2”
31	2”
50	2-1/2”
70	3”

Options	
Enter in alphabetical order	
B	Internal bumpers
C	Cushions, both ends
E	Non-lube service seals and lubrication
EB	External bumpers, retract
EB1	External bumpers, extend
EB2	External bumpers, both ends
F	MolyCoated body
G	Grease lubricant
K _ _	Shock absorbers (specify as Thrusters)
L	PFC lip seal
M	Magnet
N	Low temperature service seals and lubrication
Q	Side ported rear head, ports kept in-line
S	Stainless steel shafts
T1, T2, T3	Switch track(s) used to accommodate miniature track mounting
V	High temperature seals and lubrication (bumpers stay)
Z	Bimba 500 Hydraulic Cylinder replaces air cylinder

Repair Parts (TE Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 as applicable. For example, shaft collars for a 1-1/16" bore Linear Thruster Series TE would be SCTE-09. The Basic Shaft for the same thruster with 8-1/2" stroke would be BSTE-09-8.5. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
BTE- _	Shaft Bearing	4
BSTE- _	-X.XX Basic Shaft	2
EBTE- _	External Bumper	2 or 4
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM*	Cylinder	1
LT-Bore Stroke-DBM*	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
SCTE- _	Shaft Collars	2 or 4
TNTE- _	Cylinder Lock Nut	1

*For 1-1/16" bore use LTE prefix.
NOTE: Part numbers listed are individual components.
Order the quantity needed to be replaced.

Repair Parts (T Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 and -S as applicable. For example, shaft seals for a 1-1/16" bore Linear Thruster would be S-09. The Basic Shaft for the same thruster with 8-1/2" stroke would be BS-09-8.5. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
B-	Shaft Bearing	4
BS-	-X.XX Basic Shaft	2
EB-	External Bumper Assembly	2 or 4
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM*	Cylinder	1
LT-Bore Stroke-DBM*	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
S-	Shaft Seal	4
SC-	Shaft Collars	2, 4 or 6
TN-	Cylinder Lock Nut	1

NOTE: We recommend that if bearings are replaced, seals be replaced at the same time. Part numbers listed are individual components. Order the quantity needed to be replaced.

*For 1-1/16" bore use LTE prefix.

Repair Parts (T4 Models)

Add the bore size to the basic model number shown below. For the Basic Shaft, specify the stroke length in inches and indicate options -EB1 or -EB2 as applicable. Cylinder repair part number corresponds to number shown on cylinder shipped with Linear Thruster.

Part Number	Description	Quantity
B-	Shaft Bearing	8
BS-	-X.XX Basic Shaft	4
EB-	External Bumper Assembly	4 or 8
LT-Bore Stroke-D	Cylinder	1
LT-Bore Stroke-DB	Cylinder	1
LT-Bore Stroke-DM	Cylinder	1
LT-Bore Stroke-DBM	Cylinder	1
LTC-Bore Stroke-D	Cylinder	1
LTC-Bore Stroke-DM	Cylinder	1
S-	Shaft Seal	8
SC-	Shaft Collars	4, 8 or 16
TN-	Cylinder Lock Nut	1

NOTE: We recommend that if bearings are replaced, seals be replaced at the same time. Part numbers listed are individual components. Order the quantity needed to be replaced.

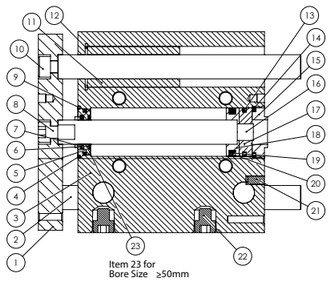
MTC Extruded Thrusters

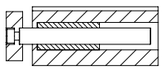
Engineering Specifications

Bore Size (mm)		12	16	20	25	32	40	50	63
Fluid		Air (Clean/Dry)							
Action		Double Acting							
Pressure Range		14 to 145 PSI (0.1 to 1.0 MPa)							
Proof Pressure		215 PSI (1.5 MPa)							
Temperature Range		-4 °F to 158 °F (-20 °C to 70 °C)							
Lubrication		Not Required							
Cushion Type		Bumper							
Speed Range		30 to 500 mm/s							
Stroke Tolerance		+1.0 / -0							
Non-Rotating Tolerance	Linear Bushing (MTCL)	± 0.08°		± 0.07°		± 0.06°		± 0.05°	
	Brass Bushing (MTCM)	± 0.10°		± 0.09°		± 0.08°		± 0.06°	
Port Size		M5X0.8		1/8NPT				1/4NPT	
Sensor Switch Compatibility[1]	Reed Switch	MCS1-G							
	Solid State Switch	MDS1-G							

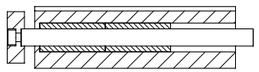
[1] See Switch chapter for switch specifications



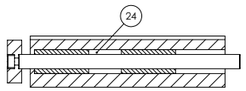




Type	Bore Size	Stroke
MTCL	Ø12 ~ Ø16	≤30mm
	Ø20 ~ Ø63	≤50mm
MTCM	Ø12 ~ Ø63	≤50mm



Type	Bore Size	Stroke
MTCL	Ø12 ~ Ø16	30<Stroke≤100mm
	Ø20 ~ Ø63	50<Stroke≤100mm
MTCM	Ø12 ~ Ø63	50<Stroke≤100mm



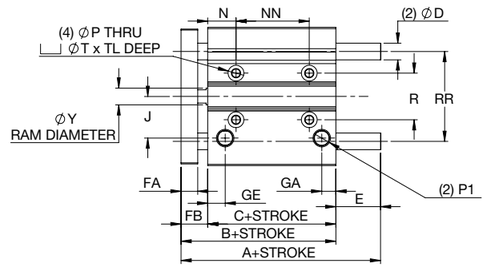
Type	Bore Size	Stroke
MTCL	Ø12 ~ Ø63	>100mm
MTCM	Ø12 ~ Ø63	>100mm

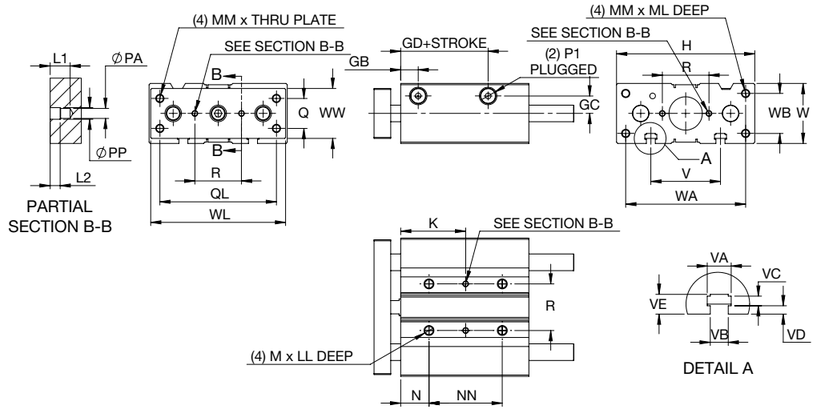
Materials

No.	Item	Material	No.	Item	Material
1	Tooling Plate	Free-Machining Steel	13	O-Ring	NBR
2	Guide Shaft	SAE440/SUS440C Steel; Chrome Plated	14	O-Ring	NBR
3	Body	Aluminum; 6463-T5; Anodized	15	Rear Cap	Brass; Ni Plated
4	Retaining Ring	Spring Steel	16	Piston Rod	Carbon Steel; Chrome Plated
5	Rod Guide	Brass; Ni Plated	17	Piston	Brass; Ni Plated
6	Bumper	Urethane	18	Magnet Seat	Brass; Ni Plated
7	Rod Seal	NBR	19	Magnet Washer	NBR
8	Screw	Stainless Steel	20	Magnet	Sintered Metal (Neodymium)
9	O-Ring	NBR	21	Plug	Carbon Steel; Zinc Plated
10	Screw/Rivet[2]	Stainless Steel	22	Auxiliary Port Plug	Carbon Steel; Zinc Plated
11	Bearing	MTCM: Bronze MTCL: Steel Ball	23	Rod Bearing	Bronze (50mm and 63mm only)
12	Retaining Ring	Spring Steel	24	Spacer	Aluminum Alloy

[2] Item number 10 on MTCL-12 and MTCL-16 thrusters are screws. All other thrusters are rivets.

Dimensions (mm)





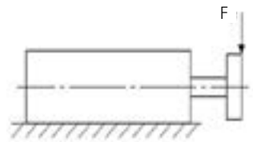
How to Specify

Dimensions (mm)

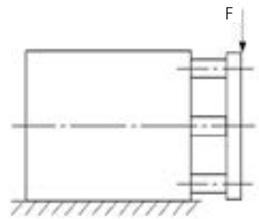
	Stroke (mm)	Bore Size (mm)			
		12	16	20	25
A	0-30	42	46	53	53.5
	31-100	55	65	80	82
	101-200	85	95	104	104.5
	201+	-	-	122	122
B		42	46	53	53.5
C		29	33	37	37.5
D		6 (MTCL) 8 (MTCM)	8 (MTCL) 10 (MTCM)	10 (MTCL) 12 (MTCM)	12 (MTCL) 16 (MTCM)
E	0-30	0	0	0	0
	31-50	13 (MTCL) 0 (MTCM)	19 (MTCL) 0 (MTCM)	27 (MTCL) 0 (MTCM)	28.5 (MTCL) 0 (MTCM)
	51-100	13	19	27	28.5
	101-200	43	49	51	51
	201+	-	-	69	68.5
FA		8	8	10	10
FB		13	13	16	16
GA		7.5	8	9	9
GB		11	11	10.5	11.5
GC		8	10	10.5	13.5
GD		13	15	12.5	12.5
GE		11	11	10.5	11.5
H		58	64	83	93
J		18	19	25	28.5
K	0-30	15	17	29	29
	31-100	25	27	39	39
	101-200	60	60	77	77
	201+	-	-	117	117
LL		10	10	12	12
L1		6	6	6	6
L2		3	3	3	3
M		M5 X 0.8	M5 X 0.8	M6 X 1.0	M6 X 1.0
ML		10	12	13	15
MM		M4 X 0.7	M5 X 0.8	M5 X 0.8	M6 X 1.0
N		5	5	17	17
NN	0-30	20	24	24	24
	31-100	40	44	44	44
	101-200	110	110	120	120
	201+	-	-	200	200
P		4.5	4.5	5.5	5.5
PA		3	3	3	4
PP		3.5	3.5	3.5	4.5
P1		M5 X 0.8	M5 X 0.8	1/8 NPT	1/8 NPT
Q		14	16	18	26
QL		48	54	70	78
R		23	24	28	34
RR		41	46	54	64
T		8	8	9.5	9.5
TL		4.5	4.5	5.5	5.5
V		37	38	44	50
VA		7.5	7.5	8.5	8.5
VB		4.5	4.5	5.5	5.5
VC		4	4	4.5	4.5
VD		2	2.5	3	3
VE		6.5	7	8	8.5
W		26	30	36	42
WA		50	56	72	82
WB		18	22	24	30
WL		56	62	81	91
WW		22	25	30	38
Y		6	8	10	12

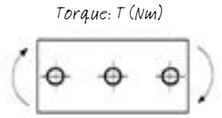
	Stroke (mm)	Bore Size (mm)			
		32	40	50	63
A	0-50	65 (MTCL) 78 (MTCM)	66 (MTCL) 78 (MTCM)	76 (MTCL) 89 (MTCM)	77 (MTCL) 89 (MTCM)
	51-100	102	102	118	118
	101-200	118	118	134	134
	201+	140	140	161	161
B		59.5	66	72	77
C		37.5	44	44	49
D		16 (MTCL) 20 (MTCM)	16 (MTCL) 20 (MTCM	20	20
E	0-50	5.5 (MTCL) 18.5 (MTCM)	0 (MTCL) 12 (MTCM)	4 (MTCL) 17 (MTCM)	0 (MTCL) 12 (MTCM)
	51-100	42.5	36	46	41
	101-200	58.5	52	62	57
	201+	80.5	74	89	84
FA		12	12	16	16
FB		22	22	28	28
GA		9	10	11	13.5
GB		12.5	14	12	16.5
GC		15	18	21.5	28
GD		7	13	9	14
GE		12.5	14	14	16.5
H		112	120	148	162
J		34	38	47	55
K	0-40	33	34	36	38
	41-100	45	46	48	50
	101-200	83	84	86	88
	201+	121	122	124	124
LL		16	16	20	20
L1		6	6	8	8
L2		3	3	4	4
M		M8 X 1.25	M8 X 1.25	M10 X 1.5	M10 X 1.5
ML		20	20	22	22
MM		M8 X 1.25	M8 X 1.25	M10 X 1.5	M10 X 1.5
N		21	22	24	24
NN	0-40	24	24	24	28
	41-100	48	48	48	52
	101-200	124	124	124	128
	201+	200	200	200	200
P		6.5	6.5	8.5	8.5
PA		4	4	5	5
PP		4.5	4.5	6	6
P1		1/8 NPT	1/8 NPT	1/4 NPT	1/4 NPT
Q		30	30	40	50
QL		96	104	130	130
R		42	50	66	80
RR		78	86	110	124
T		11	11	14	14
TL		7.5	7.5	9	9
V		63	72	92	110
VA		10.5	10.5	13.5	18
VB		6.5	6.5	8.5	11
VC		5.5	5.5	7.5	10
VD		3.5	4	4.5	7
VE		9.5	11	13.5	18.5
W		48	54	64	78
WA		98	106	130	142
WB		34	40	46	58
WL		110	118	146	158
WW		44	44	60	70
Y		16	16	20	20

Maximum Recommended Loads



Note: F applied at full extention



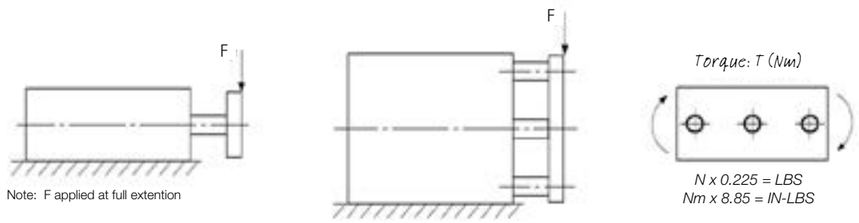


N x 0.225 = LBS
Nm x 8.85 = IN-LBS

Bore Size (mm)	Type	Maximum Side Load (N)																	
		Stroke (mm)																	
		10	20	25	30	40	50	60	70	75	80	90	100	125	150	175	200	225	250
12	MTCM	44	33	29	26	41	36	30	28	26	25	24	22	19	17	-	-	-	-
	MTCL	37	27	25	22	35	30	27	24	23	21	19	18	15	12	-	-	-	-
16	MTCM	67	51	42	37	63	58	49	41	37	35	33	32	27	24	22	20	-	-
	MTCL	54	40	37	32	54	47	42	38	35	32	30	28	23	20	17	15	-	-
20	MTCM	-	78	61	57	123	112	99	91	87	84	79	75	66	59	54	49	45	42
	MTCL	-	58	52	48	101	90	83	74	70	69	63	58	62	54	48	43	39	35
25	MTCM	-	93	89	76	142	131	119	107	101	97	90	85	68	79	71	65	61	55
	MTCL	-	82	79	68	132	118	109	99	93	88	81	77	80	70	62	55	50	45
32	MTCM	-	-	203	190	179	164	221	197	182	172	163	157	142	127	116	106	98	91
	MTCL	-	-	191	182	166	157	207	178	164	156	150	144	203	186	171	158	146	137
40	MTCM	-	-	203	190	179	164	221	197	182	172	163	159	142	127	116	106	97	91
	MTCL	-	-	190	182	166	157	210	179	163	156	150	144	203	185	171	158	146	137
50	MTCM	-	-	296	283	268	245	303	288	273	266	253	241	216	195	179	164	155	142
	MTCL	-	-	208	196	185	173	259	232	223	212	207	199	264	242	224	207	195	181
63	MTCM	-	-	296	283	268	245	303	288	273	266	253	241	216	195	179	164	153	142
	MTCL	-	-	206	196	180	171	259	232	221	212	205	196	262	240	221	205	191	178

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Maximum Recommended Loads



Note: F applied at full extention

Bore Size (mm)	Type	Maximum Torque (Nm)																	
		Stroke (mm)																	
		10	20	25	30	40	50	60	70	75	80	90	100	125	150	175	200	225	250
12	MTCM	0.90	0.79	0.71	0.65	0.77	0.72	0.65	0.53	0.50	0.47	0.41	0.36	0.31	0.27	-	-	-	-
	MTCL	0.61	0.45	0.40	0.35	0.58	0.50	0.44	0.39	0.37	0.35	0.32	0.29	0.24	0.20	-	-	-	-
16	MTCM	1.21	1.04	0.94	0.88	1.23	1.11	0.99	0.72	0.69	0.65	0.61	0.58	0.50	0.44	0.40	0.36	-	-
	MTCL	0.99	0.74	0.66	0.59	0.99	0.86	0.77	0.69	0.65	0.61	0.57	0.52	0.43	0.37	0.32	0.28	-	-
20	MTCM	-	1.57	1.42	1.31	2.39	2.15	1.97	1.90	1.88	1.86	1.72	1.63	1.44	1.28	1.16	1.06	1.01	0.90
	MTCL	-	1.26	1.14	1.03	2.17	1.94	1.79	1.59	1.52	1.46	1.33	1.25	1.34	1.17	1.03	0.93	0.88	0.76
25	MTCM	-	2.40	2.22	2.01	3.66	3.35	3.17	3.06	2.96	2.91	2.77	2.57	2.26	2.02	1.83	1.67	1.57	1.42
	MTCL	-	2.11	1.96	1.75	3.37	3.02	2.71	2.42	2.38	2.33	2.19	1.97	2.05	1.78	1.58	1.41	1.22	1.16
32	MTCM	-	-	6.35	6.00	5.73	5.13	5.98	5.74	5.69	5.62	5.11	4.97	4.42	3.98	3.61	3.31	2.97	2.84
	MTCL	-	-	5.95	5.73	5.44	4.89	5.43	5.15	5.11	5.02	4.70	4.51	6.34	5.79	5.33	4.93	4.33	4.29
40	MTCM	-	-	7.00	6.60	6.11	5.66	6.66	6.31	6.27	6.23	5.86	5.48	4.87	4.38	3.98	3.65	3.34	3.13
	MTCL	-	-	6.55	6.21	5.77	5.39	6.17	5.67	5.62	5.58	5.33	4.96	6.98	6.38	5.87	5.43	5.00	4.72
50	MTCM	-	-	13.0	12.6	11.0	10.8	13.7	12.7	12.0	11.8	11.1	10.8	9.50	8.60	7.86	7.24	6.80	6.24
	MTCL	-	-	9.17	8.75	8.30	7.62	10.3	9.94	9.83	9.77	8.82	8.74	11.6	10.7	9.83	9.12	8.95	7.95
63	MTCM	-	-	14.7	13.6	12.9	12.1	19.4	16.2	13.5	12.7	12.1	11.9	10.7	9.69	8.86	8.16	7.52	7.04
	MTCL	-	-	10.2	9.74	9.20	8.48	17.5	14.0	11.0	10.6	10.2	9.74	13.0	11.9	11.0	10.2	9.63	8.84

The model number of MTC extruded thrusters consists of six alphanumeric clusters designating product, bushing type, bore, stroke, magnet, and ports that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic MTC unit with bronze bushings, 16mm bore, 70mm stroke, magnets, and standard ports is below.

MTC M - 16 x 70 - S - T

Product	Bushing Type	Magnet	Ports
MTC Extruded Thruster	M Bronze Bushing L Linear Ball Bushing	S with Magnet	T Standard[1]

[1] See page 328 for the Port Sizes listed in the Engineering Specifications table.

Stroke (mm)	Bore Size (mm)							
	12	16	20	25	32	40	50	63
10	X	X						
20	X	X	X	X				
25	X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X
40	X	X	X	X	X	X	X	X
50	X	X	X	X	X	X	X	X
60	X	X	X	X	X	X	X	X
70	X	X	X	X	X	X	X	X
75	X	X	X	X	X	X	X	X
80	X	X	X	X	X	X	X	X
90	X	X	X	X	X	X	X	X
100	X	X	X	X	X	X	X	X
125	X	X	X	X	X	X	X	X
150	X	X	X	X	X	X	X	X
175		X	X	X	X	X	X	X
200		X	X	X	X	X	X	X
225			X	X	X	X	X	X
250			X	X	X	X	X	X

Notes

Pneumoment™

The Bimba PneuMoment™ pneumatic actuator features a revolutionary, compact design that uses conventional pneumatic technology but has the capacity to carry high loads and moments.



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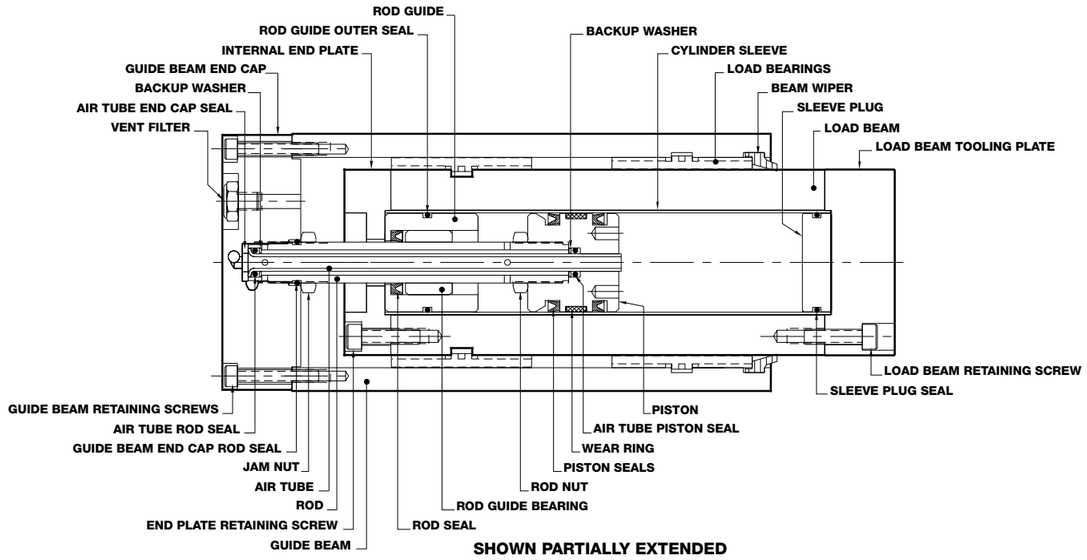
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SHOWN PARTIALLY EXTENDED

Features and Benefits

- > Carries high moment loads
- > Compact design
- > Long life
- > Available in U.S. customary units (inches) or metric
- > Non-lube bearings
- > Built-in track for position sensing switches
- > Corrosion-resistant, hard coat anodized aluminum load and guide beams with PTFE impregnation
- > Guide beam end cap ports transmit air or vacuum through the actuator from the guide beam end cap to connect additional automation devices such as grippers.
- > Standard vacuum port for clean room applications
- > Standard side or end ports
- > Base, front or rear flange mounting

Options

- > Internal or external bumpers
- > External shock absorbers for retract and extend strokes
- > Internal stroke adjustment – full stroke, retract and extend (1-1/16" and 2" bores only)
- > Magnetic Position Sensing
- > Auxiliary ports to transmit air or vacuum through the actuator to operate automation devices.

The PneuMoment™ guide beam provides the mounting surface and remains stationary, and the load beam provides the motion, extending and retracting. A stationary piston and rod assembly is attached to the guide beam end cap. The piston rod is a coaxial assembly of two hollow rods which convey air to and from each side of the piston. Air let into one hollow rod pressurizes the chamber at one end of the piston, causing the load beam to extend. Air let into the other rod pressurizes the other end of the piston and causes the load beam to retract.

The PneuMoment™ has eight flat bearings to support the load beam. These bearings ride on hard anodized, PTFE-impregnated surfaces to allow the PneuMoment™ to carry heavy loads and large moments. No lubrication is needed for the bearings, although standard air line lubrication should be used to enhance the actuator's seal life. The Bimba PneuMoment™ pneumatic actuator features a revolutionary, compact design that uses conventional pneumatic technology but has the capacity to carry high loads and moments.

Weights

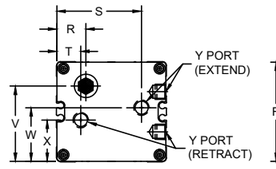
Weights – Pounds (Kilograms)								
Model/Option	1-1/16" (09)		1-1/2" (17)		2" Bore		2-1/2" Bore	
	At 0" Stroke	Adder per Inch (25mm) of Stroke	At 0" Stroke	Adder per Inch (25mm) of Stroke	At 0" Stroke	Adder per Inch of Stroke	At 0" Stroke	Adder per Inch of Stroke
Standard Model	2.75 (1.25)	0.37 (0.17)	3.30 (1.50)	.44 (.20)	17 lb.	.98 lb.	16.90	1.12 lb.
Adder for A Option	0.50 (0.23)	0.04 (0.02)	N/A	N/A	.59	.067	N/A	N/A
Adder for B Option	0.01 (0.004)	N/A	0.01 (0.004)	N/A	0.03	N/A	0.03	N/A
Adder for EB Option	1.75 (0.79)	0.06 (0.03)	1.75 (0.79)	0.06 (0.03)	5.47	0.17	5.47	0.17
Adder for R Option	0.15 (0.07)	0.06 (0.03)	0.15 (0.07)	0.06 (0.03)	0.15	0.02	0.15	0.02
Adder for S Option	3.62 (1.64)	0.06 (0.03)	3.62 (1.64)	0.06 (0.03)	9.67	0.17	9.67	0.17
Adder for S1 Option	3.43 (1.56)	0.06 (0.03)	3.43 (1.56)	0.06 (0.03)	8.50	0.17	8.50	0.17
Adder for S2 Option	3.43 (1.56)	0.06 (0.03)	3.43 (1.56)	0.06 (0.03)	8.50	0.17	8.50	0.17

Engineering Specifications

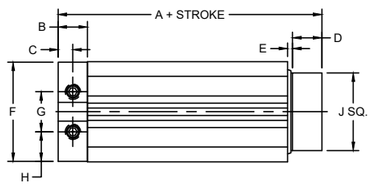
Components	
Guide beam	PTFE-impregnated, hard-coat anodized extruded aluminum
Load beam	PTFE-impregnated, hard-coat anodized extruded aluminum
Guide beam end cap	Black anodized aluminum
Load beam tooling plate	Black anodized aluminum
Load bearings	PTFE-filled polymer
Beam wiper	Urethane
Rod	Welded DOM steel
Air tube	304 stainless steel
Internal end plate	6061 aluminum
Cylinder sleeve	304 stainless steel
Sleeve plug	2011 aluminum
Rod guide	2011 aluminum
Rod guide bearing	Phosphor bronze
Rod nut	Carbon steel-plated
Piston	2011 aluminum
Port plugs	Galvanized steel
Vent filter	Sintered bronze
Internal seals	Buna-N
Retaining screws	Grade 8 Alloy Steel
Options:	
Bumpers (internal and external)	Urethane
Stroke adjusters	303 stainless steel
Shock absorbers	Anodized aluminum end plates, 303 stainless steel guide rods
Auxiliary air tube	303 stainless steel
Magnet	Neodynium

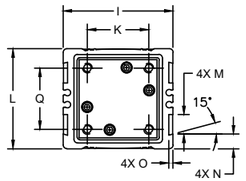
Rated Air Pressure	
150 PSI (10.34 bar)	
Power Factors	
1-1/16" bore	2" bore
Extend .888 x Air Pressure	Extend 3.1 x Air Pressure
Retract .734 x Air Pressure	Retract 2.65 x Air Pressure
1-1/2" bore	2-1/2" bore
Extend 1.7 x Air Pressure	Extend 5.0 x Air Pressure
Retract 1.5 x Air Pressure	Retract 4.42 x Air Pressure
Velocity @ 80 psi	
1-1/16" bore – 27mm-27 in/sec.	
1-1/2" bore – 38mm-27 in/sec.	
2" bore – 30 in/sec.	
2-1/2" bore – 26 in/sec.	
*Special units with increased velocity are available. Contact your Bimba distributor.	
Temperature Range:	
-20º F to 140º F (-29º C to 60º C)	
Breakaway:	
Less than 13 psi without external bumper or shock option.	
Less than 18 psi if external bumper or shock option is included.	
Lubrication:	
All Bimba PneuMoment actuators are pre-lubricated with our special HT-99 lubrication and sealed at the factory for extensive maintenance-free life. Actuator life can be extended by providing additional lubricant with an air line mist lubricator. Actuator life is also dependent upon operational temperature, velocity and load. The PTFE-filled plastic bearings require no additional lubrication for the life of the bearing.	

Dimensions

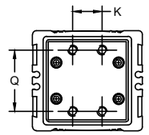


09 & 17 BORE GUIDE BEAM
PORT PLUG CONFIGURATION

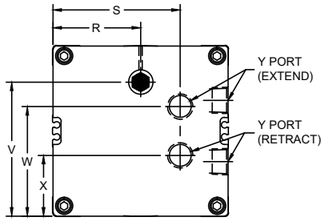




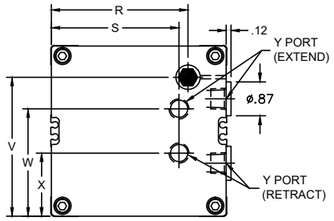
09 BORE TOOLING PLATE
BOLT HOLE PATTERN



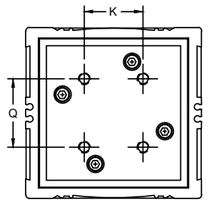
17 BORE TOOLING PLATE
BOLT HOLE PATTERN



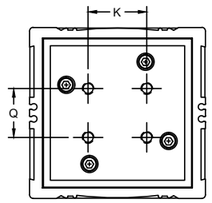
31 BORE GUIDE BEAM
PORT PLUG CONFIGURATION



50 BORE GUIDE BEAM
PORT PLUG CONFIGURATION



31 BORE TOOLING PLATE
BOLT HOLE PATTERN



50 BORE TOOLING PLATE
BOLT HOLE PATTERN

Bore		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
(09)	1-1/16"	5.75	0.75	0.38	0.75	0.12	2.54	1.02	0.76	2.81	2.00	1.57	2.56	0.50	0.38	0.11
	27mm	146.00	19.00	9.50	19.00	3.20	64.60	26.00	19.30	71.40	50.70	39.90	65.00	12.70	9.50	2.80
(17)	1-1/2"	5.88	0.88	0.33	0.75	0.12	2.54	1.17	0.69	2.81	2.00	0.75	2.56	0.50	0.38	0.11
	38mm	149.40	22.40	8.40	19.00	3.20	64.60	29.70	17.40	71.40	50.70	19.00	65.00	12.70	9.50	2.80
(31)	2"	10.48	1.19	0.59	1.00	0.12	4.35	1.65	1.35	4.50	3.43	1.50	4.38	1.28	0.50	0.11
	50mm	266.20	30.10	15.10	25.40	3.20	110.60	41.90	34.40	114.30	87.10	38.10	111.10	32.60	12.70	2.80
(50)	2-1/2"	10.48	1.19	0.59	1.00	0.12	4.35	1.65	1.35	4.50	3.43	1.50	4.38	1.28	0.50	0.11
	63mm	266.20	30.10	15.10	25.40	3.20	110.60	41.90	34.40	114.30	87.10	38.10	111.10	32.60	12.70	2.80

Bore		P	Q	R	S	T	U	V	W	X	Y
(09)	1-1/16"	1/4-20 UNC	1.57	2.17	0.74	0.61	#10-32	1.93	1.38	1.06	1/8 NPT
	27mm	M6 x 1.0	39.9	55.0	18.8	15.5	M5x0.8	49.0	35.0	26.9	G 1/8
(17)	1-1/2"	1/4-20 UNC	1.66	1.98	1.25	0.81	#10-32	1.93	1.76	0.88	1/4 NPT
	38mm	M6 x 1.0	42.1	50.4	31.8	20.5	M5x0.8	49.0	44.8	22.4	G 1/4
(31)	2"	5/16-18 UNC	1.75	3.50	2.24	N/A	1/8 NPT	3.43	2.74	1.61	3/8 NPT
	50mm	M8 x 1.25	44.5	88.8	56.9	N/A	G 1/8	87.1	69.7	40.9	G 1/4
(50)	2-1/2"	5/16-18 UNC	1.25	2.24	3.51	N/A	1/8 NPT	3.55	2.80	1.55	3/8 NPT
	63mm	M8 x 1.25	31.8	56.9	89.2	N/A	G 1/8	90.2	71.1	39.5	G 1/4

Ports

The basic unit offers both end and side ports in the guide beam end cap. The unit is supplied with flush surface plugs installed in the side ports unless the PneuMoment™ is ordered with the “Y” option. This no charge option has the plugs installed in the end ports.

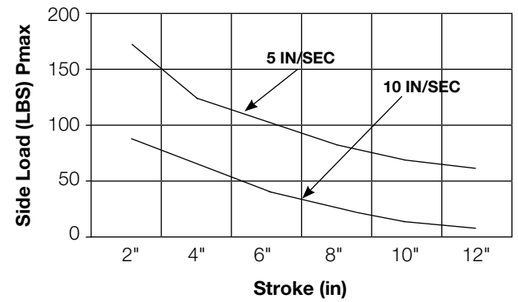
Vent Filter – Vacuum Port

The vent port can be used to connect a vacuum line. Remove the vent filter and connect a vacuum line to this port for clean room applications.

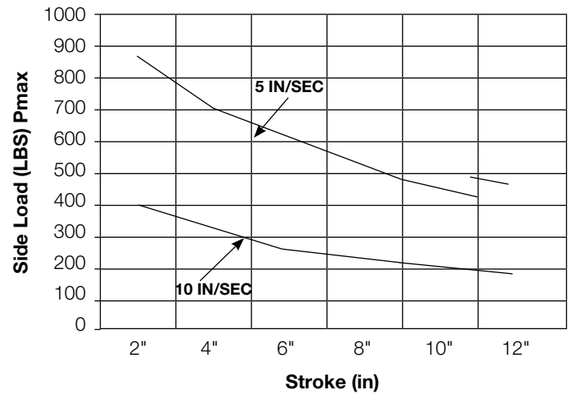
Maximum Allowable Side Load (Pmax)

These graphs illustrate the PneuMoment’s capability to carry large sides loads. Examples for all four bore sizes are shown. Use the formulas on page 343 to calculate the maximum allowable side load using your application parameters or visit our website and use the PneuMoment sizing program. 80° F temperature used for graph calculations.

Max Side Load (Pmax) 1-1/16" and 1-1/2" Bores



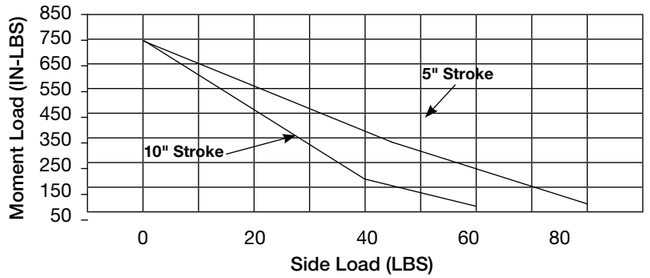
Max Side Load (Pmax) 2" and 2-1/2" Bores



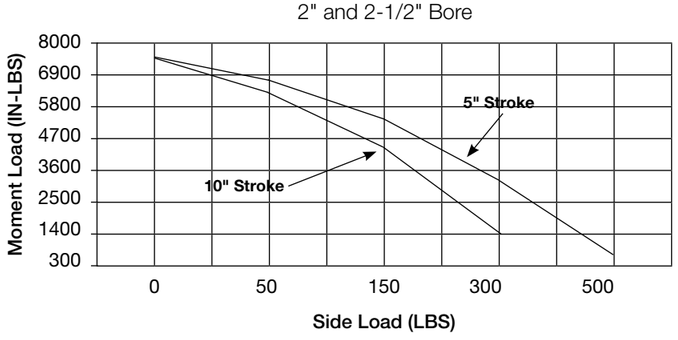
Combination Side and Moment Load

The following graphs illustrate the PneuMoment's capability to carry a combination of side and moment load. Examples for all 4 bore sizes are shown. Use the formulas on page 343 to calculate the maximum load carrying capabilities for your application or visit our web-site and use the PneuMoment sizing program. 80° F temperature used for graph calculations.

Combination Side and Moment Load
1-1/16" and 1-1/2" Bore



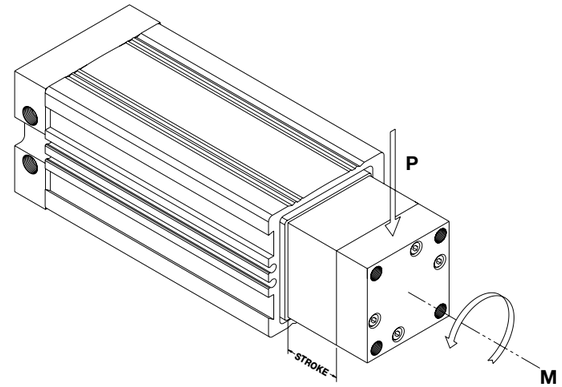
Combination Side and Moment Load
2" and 2-1/2" Bore



Capability

Use the following formulas to calculate PneuMoment's capability to solve your application requirement.

Smax	=	The maximum allowable stress in the bearing material in PSI (MPa)
PV	=	One of the limiting factors of the bearing depending on ambient temperature and cycle velocity.
V	=	Velocity in feet per minute (meters per second)
T	=	Ambient temperature in degrees F (degrees C)
Pmax	=	Maximum side load in pounds (Newtons)
Mmax	=	Maximum moment load in inch-pounds (Newton-meters)
P	=	Actual side load in pounds (Newtons)
M	=	Actual Moment Load in inch-pounds (Newton-meters)
W	=	Actual load weight in pounds (kilograms)



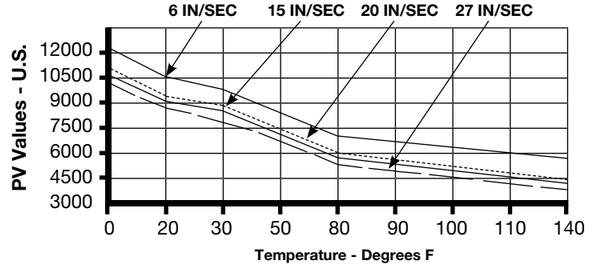
Please note that a sizing program located on our website can perform these calculations for you.

Step One: For all bore sizes - find the PV Value from the charts below or calculate it using the formula:

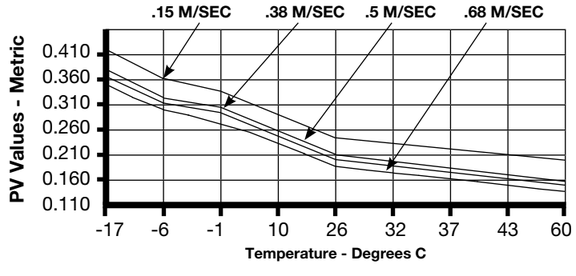
> U.S. PV (PSI*ft/min.) = 0.044V2 – 25.6V + 0.27T2 – 87T + 12,970

> Metric PV (MPs*m/s) = (1703V2 – 5039.4V + 0.875T2 – 125.5T + 10462.5) / 28550 (T = Ambient temperature degrees – F or C)

PV Limits - U.S.



PV Limits - Metric



Capability

Step Two: Calculate maximum bearing stress. All bore sizes use this calculation.

> Smax = PV Limit (U.S. or Metric) / Velocity (ft/min. or n/m²)

Step Three: Calculate maximum Moment Load

> 1-1/16" (27mm) or 1-1/2" (38mm) bore sizes:
  - » U.S. – Mmax (in/lbs.) = 3.165 x Smax
  - » Metric – Mmax (nm) = 51.79 x Smax

> 2" (31mm) or 2-1/2" (50mm) bore sizes:
  - » U.S. – Mmax (in/lbs.) = 31.841 x Smax
  - » Metric – Mmax (nm) = 515.448 x Smax

Step Four: Calculate maximum Side Load

> 1-1/16" (27mm) or 1-1/2" (38mm) bore sizes:
  - » U.S. – Pmax (lbs.) = (3.281 x Smax) / (3.5 + stroke)
  - » Metric – Pmax (n) = (53,240 x Smax) / (88.9 + stroke)

> 2" (31mm) or 2-1/2" (50mm) bore sizes:
  - » U.S. – Pmax (lbs.) = (26.416 x Smax) / (6.720 + stroke)
  - » Metric – Pmax (n) = (432,423 x Smax) / (170.69 + Stroke)

Applications with Both Moment and Side Load

If you know the actual Moment load (M) in/lbs. or (nm), calculate the allowable Side Load:

> 1-1/16"(27mm) or 1-1/2"(38mm) bore sizes:
  - » U.S. – Pmax (lbs.) = (Smax – M / 3.165) x 3.281 / (3.5 + stroke)
  - » Metric – Pmax (n) = Smax – M / 51.87) x 53,240 / (88.9 + stroke)

> 2"(31mm) or 2-1/2"(50mm) bore sizes:
  - » Pmax (lbs.) - (Smax – M / 31.841) x 26.416 / (6.720 + stroke)
  - » Pmax (n) + (Smax – M / 515.448) x 432,423 / (170.69 + stroke)

If you know the actual Side load (P) lbs. or (n), calculate the allowable Moment Load:

> 1-1/16"(27mm) or 1-1/2"(38mm) bore sizes:
  - » Mmax (in/lbs.) = 3.165 x {Smax – [P x (3.5 + stroke) / 3.281]}
  - » Mmax (nm) = 51.87 x {Smax – [P x (88.9 + stroke) / 53,770]}

> 2"(31mm) or 2-1/2"(50mm) bore sizes:
  - » Mmax (in/lbs.) = 31.841 x {Smax – [P x (6.720 + stroke) / 26.416]}
  - » Mmax (nm) = 515.448 x {Smax – [P x (170.69 + stroke) / 432,423]}

Kinetic Energy

PneuMoment maximum KE rating:

Bore	KE
1-1/16"(27mm) or 1-1/2"(38mm)	.135 (ft./lbs.) – 0.183 (nm)
2"(31mm) or 2-1/2"(63mm)	.270 (ft./lbs.) – 0.366 (nm)

Loads generating a KE factor above these KE values require - Shock Option (S) or other external deceleration devices. To calculate the applications KE rating use the formula 1/2mV2; where m is the mass of the load, V is the velocity in ft./sec. or m/s, i.e. 4 in/sec would be expressed as 4/12 or .33 ft./sec.

Additional KE information:

1-1/16" (27mm) or 1-1/2" (38mm)	U.S. m = {W + [0.162 * (3.5 + stroke {in})]} / 32.179 slugs Metric m - {W + [0.028 * (88.9 + stroke {mm})]} / 9.81
2" (31mm) or 2-1/2" (50mm)	U.S. m = {W + [0.916 * (6.72 + stroke {in})]} / 32.179 slugs Metric m - {W + [.1635 * (170.69 + stroke {mm})]} / 9.81
W = actual side load being moved	

Deflection and End Play

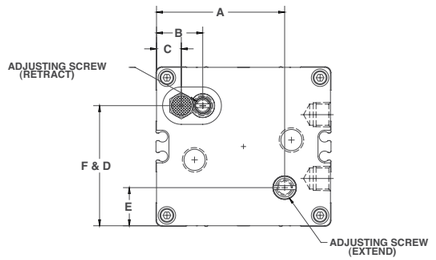
End play is defined as load beam movement in any one direction at full extension and 80 PSI, with a specified load applied. Refer to the table on the right. Measurements are taken off the face of the load beam tooling plate. End play numbers are double when load beam movement is measured in two opposing directions.

PneuMoment Stroke Length	1-1/16"(27mm) or 1-1/2"(38mm) 5 lbs. (1.86 kg) load applied	2"(31mm) or 2-1/2"(50mm) 35 lbs. (13.06 kg) load applied
1"	.0083" - (.210mm)	.0025" - (.064mm)
2"	.0110" - (.279mm)	.0040" - (.102mm)
3"	.0140" - (.355mm)	.0045" - (.114mm)
4"	.0174" - (.441mm)	.0055" - (.140mm)
5"	.0210" - (.533mm)	.0075" - (.190mm)
6"	.0251" - (.637mm)	.0095" - (.241mm)
7"	.0294" - (.746mm)	.0110" - (.279mm)
8"	.0341" - (.866mm)	.0125" - (.318mm)
9"	.0391" - (.993mm)	.0140" - (.356mm)
10"	.0444" - (1.12mm)	.0150" - (.381mm)

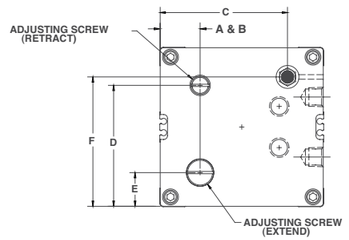
Options

Internal Stroke Adjustment – Option A

Optional internal stroke adjustment screws on the rear of the guide beam end cap limit the stroke in either direction. Each screw limits the stroke in one direction. Approximate adjustment per 1/4 turn – Extend .008", Retract .014" for 1-1/16 (27mm) bore. Extend .021", Retract .025" for 2" (31mm) bore. Note: Within the unit's stroke length there are no dimensional limitations for either extend or retract adjustments. Not compatible with shock absorbers, external bumpers or internal bumpers.



090 (1.06) BORE INTERNAL STROKE ADJUSTER CONFIGURATION



310 (2.00) BORE INTERNAL STROKE ADJUSTER CONFIGURATION

Bore		A	B	C	D	E
(09)	1-1/16"	2.06	0.73	0.36	1.94	0.61
	(27mm)	52.2	18.5	9.1	49.3	15.5

Option A – is not available for 1-1/2" and 2-1/2" bore. Use External Bumper – Option EB to achieve stroke adjustment.

Internal Stroke Adjustment – Option B

Provides internal bumpers for end of stroke noise reduction in both directions.

Air Pressure Effect on Stroke

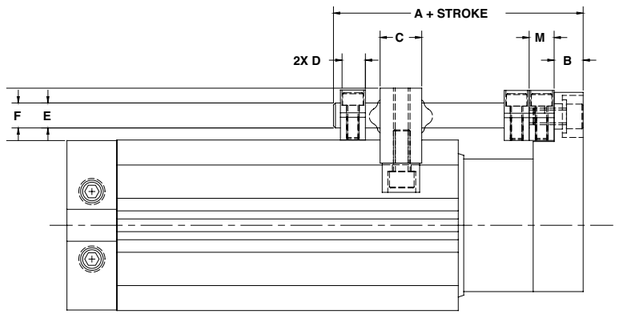
Air Pressure	20 psi	40 psi	60 psi	80 psi
1-1/16", 1-1/2"	-0.77	-0.047	-0.020	0
27mm, 38mm	-19.0mm	-1.2mm	-0.51mm	0
2"	-0.090	-0.080	-0.020	0
50mm	-2.3mm	-2mm	-0.5mm	0
2-1/2"	-0.027	-0.018	-0.010	0
63mm	-0.68mm	-.45mm	-.25mm	0

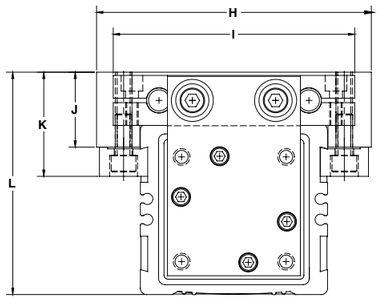
NOTE: not compatible with shock absorbers, end flange mounting on the guide beam end, internal stroke adjustment and internal bumpers.

Options

External Bumpers – Option EB

Optional external bumpers provide both end-of-stroke noise reduction and end-of-stroke adjustment. The external bumper assembly is mounted to the actuator with clamps that connect to the channel that runs along the length of the guide beam.



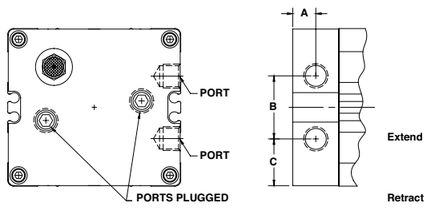


Bore		A	B	C	D	E	F	G	H	I	J	K	L
(09), (17)	1-1/16", 1-1/2"	2.75	0.44	0.62	0.38	0.38	0.73	0.75	4.12	3.62	1.16	1.59	3.37
	(27mm), (38mm)	69.80	11.10	15.90	9.50	9.50	18.50	19.00	104.8	92.00	29.40	40.50	85.60

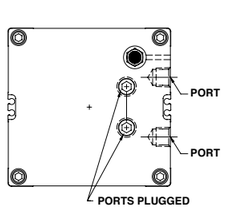
Bore		A	B	C	D	E	F	G	H	I	J	K	L	M
(31) (50)	2", 2-1/2"	4.44	0.68	1.54	0.50	0.62	1.56	1.57	6.25	5.69	1.75	2.30	5.95	0.75
	50mm - 63mm	112.80	17.30	39.10	12.70	15.90	39.60	40.00	158.90	144.40	44.30	58.30	151.10	19.10

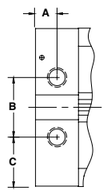
End and Side Ports – Option Y

All PneuMoments have both end and side ports in the guide beam end cap. Removable flush port plugs are installed at the factory in the side ports unless the “Y” option is specified. PneuMoments with this option are shipped with plugs installed in the end ports.



090 & 170 (1.06 & 1.50) BORE GUIDE BEAM END CAP
PORT PLUG CONFIGURATION





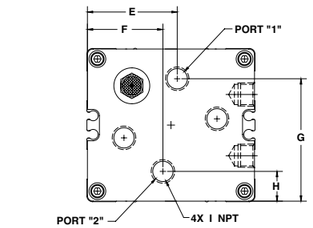
310 & 500 (2.00 & 2.50) BORE GUIDE BEAM END CAP
PORT PLUG CONFIGURATION

Bore		A	B	C
(09)	1-1/16"	0.38	1.02	0.76
	(27mm)	9.5	26.0	19.3
(17)	1-1/2"	0.33	1.17	0.69
	(38mm)	8.4	29.7	17.4
(31)	2"	0.59	1.65	1.35
	(50mm)	15.1	41.9	34.4
(50)	2-1/2"	0.59	1.65	1.35
	(63mm)	15.1	41.9	34.4

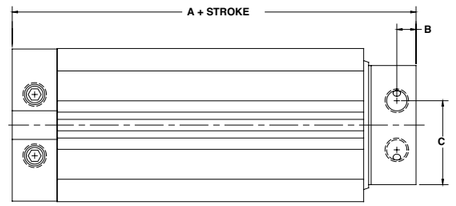
Options

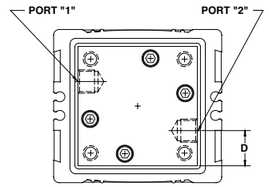
Auxiliary Port-Air/Vacuum – Option R

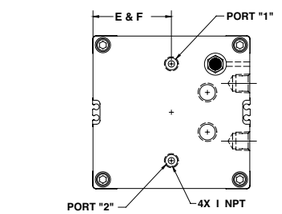
Optional air/vacuum ports can be supplied to transmit air or vacuum through the actuator to the load beam tooling plate for use by other automation devices.



090 & 170 (1.06 & 1.50) BORE GUIDE BEAM END CAP
AUXILIARY PORT CONFIGURATION





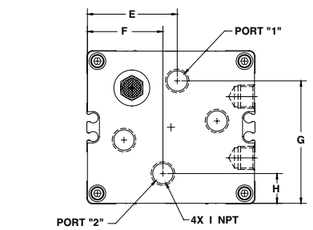


310 & 500 (2.00 & 2.50) BORE GUIDE BEAM END CAP
AUXILIARY PORT CONFIGURATION

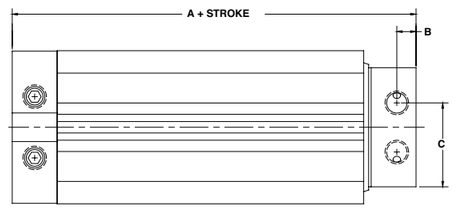
Bore		A	B	C	D	E	F	G	H	I
(09)	1-1/16"	5.75	0.32	1.41	0.59	1.50	1.26	2.05	0.50	1/8 NPT
	(27mm)	146.00	8.20	35.80	14.90	38.10	32.10	52.00	12.60	G 1/8
(17)	1-1/2"	5.88	0.32	1.00	1.00	0.65	2.06	2.02	0.48	1/8 NPT
	(38mm)	149.40	8.20	25.30	25.30	16.50	52.20	51.30	12.20	G 1/8
(31)	2"	10.48	0.50	2.84	0.60	2.24	2.24	3.56	0.80	1/8 NPT
	50mm	266.20	12.70	72.10	15.20	56.90	56.90	90.40	20.20	G 1/8
(50)	2-1/2"	10.48	0.50	1.68	1.76	0.99	3.49	3.43	0.83	1/4 NPT
	63mm	266.20	12.70	42.60	44.70	25.10	88.70	87.10	21.00	G 1/4

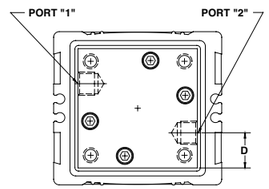
Auxiliary Port-Air/Vacuum – Option R

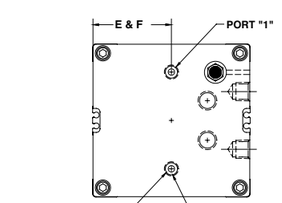
Optional air/vacuum ports can be supplied to transmit air or vacuum through the actuator to the load beam tooling plate for use by other automation devices.



090 & 170 (1.06 & 1.50) BORE GUIDE BEAM END CAP
AUXILIARY PORT CONFIGURATION







310 & 500 (2.00 & 2.50) BORE GUIDE BEAM END CAP
AUXILIARY PORT CONFIGURATION

Bore		A	B	C	D	E	F	G	H	I
(09)	1-1/16"	5.75	0.32	1.41	0.59	1.50	1.26	2.05	0.50	1/8 NPT
	(27mm)	146.00	8.20	35.80	14.90	38.10	32.10	52.00	12.60	G 1/8
(17)	1-1/2"	5.88	0.32	1.00	1.00	0.65	2.06	2.02	0.48	1/8 NPT
	(38mm)	149.40	8.20	25.30	25.30	16.50	52.20	51.30	12.20	G 1/8
(31)	2"	10.48	0.50	2.84	0.60	2.24	2.24	3.56	0.80	1/8 NPT
	50mm	266.20	12.70	72.10	15.20	56.90	56.90	90.40	20.20	G 1/8
(50)	2-1/2"	10.48	0.50	1.68	1.76	0.99	3.49	3.43	0.83	1/4 NPT
	63mm	266.20	12.70	42.60	44.70	25.10	88.70	87.10	21.00	G 1/4

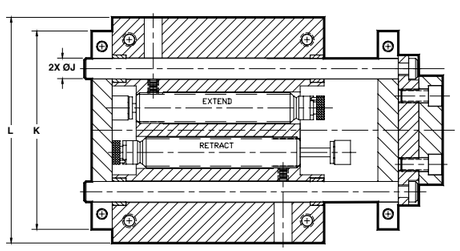
Options

Shock Absorbers – Option S, S1, S2

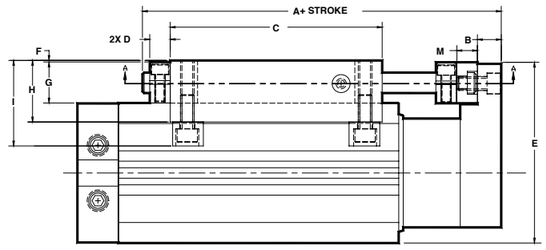
Optional adjustable shock absorbers are available to control the deceleration of heavier loads as well as limit the stroke of the actuator. The shock absorber assembly is mounted with clamps that connect to the channel that runs along the length of the guide beam. Option S includes two shocks to decelerate loads in both directions. Option S1 provides one shock in the extend direction. Option S2 provides one shock in the retract direction. See page 344 to select the proper shock absorber setting for your application.

The load-carrying capabilities of the PneuMoment can be enhanced by the use of external deceleration devices such as shock absorbers. Shocks, when used properly, can also increase actuator life. Use the following data to determine the requirements for your specific application. The shock allows multiple deceleration settings. Set the adjustable shock dial to the setting that meets your application.

NOTE: not compatible with external bumpers, end flange mounting on either end, internal stroke adjustment and internal bumpers.



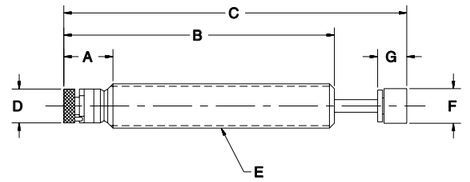
SECTION A-A



	Bore	A	B	C	D	E	F	G	H	I	J	K	L	M
(09) (17)	1-1/16", 1-1/2"	5.56	0.44	3.88	0.38	3.37	0.02	0.73	1.16	1.59	0.38	3.62	4.12	N/A
	(27mm), (38mm)	141.20	11.10	98.40	9.50	85.60	0.40	18.50	29.40	40.50	9.50	92.00	104.80	N/A
(31) (50)	2", 2-1/2"	8.17	0.68	5.71	0.50	5.84	0.02	1.56	1.75	2.30	0.62	5.69	6.25	0.75
	(50mm) - (63mm)	207.50	17.30	145.00	12.70	148.40	0.40	39.60	44.30	58.30	15.90	144.40	158.90	19.10

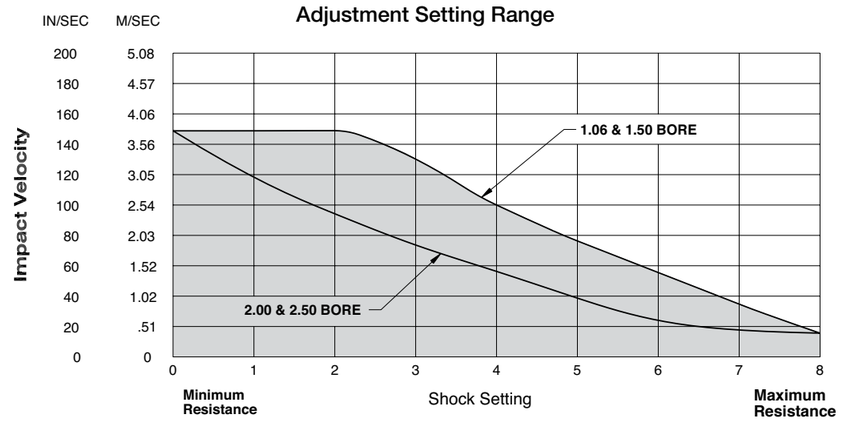
Options

Shock Absorbers – Option S, S1, S2



Bore	A	B	C	D	E	F	G
1-1/16" - 1-1/2"	0.69	3.31	4.36	0.59	9/16-18 UNF	0.50	0.47
27mm-38mm	17.40	84.10	110.70	15.10	M16 x 1.5	-	11.90
2" - 2-1/2"	0.58	4.45	6.52	0.88	1-3/8-12 UNF	1.22	N/A
50mm-63mm	14.70	113.00	165.60	22.40	N/C	31.00	N/A

The shock allows multiple deceleration settings. The blue area represents the range of settings to consider based on velocity. Set the adjustable shock dial to the setting that meets your application.



Use this charts to determine the shock absorber's maximum energy levels.

Shock Absorber Specifications						
Bore	Model	Shock Absorber Bore	(S) Stroke	Thread Type	(ET) Max. Per Cycle	(ET-C) Max. Per Hour
1-16" 1-1/2"	U.S.	.28 in	.5 in	3/4-16UNF-2A	250 in-lbs.	284,000 in-lbs.
27mm 38mm	Metric	(7.11mm)	(12.7mm)	M16 x 1.5	(16.95 Nm)	(33,900 Nm)
2"-2-1/2"	U.S.	.63"	1.00"	1-3/8-12UNF-2A	1100 in-lbs.	808,000 in-lbs.
*31mm 50mm	*Metric	(16.0mm)	(25.4mm)	____	(124.5 Nm)	(91,291.7 Nm)

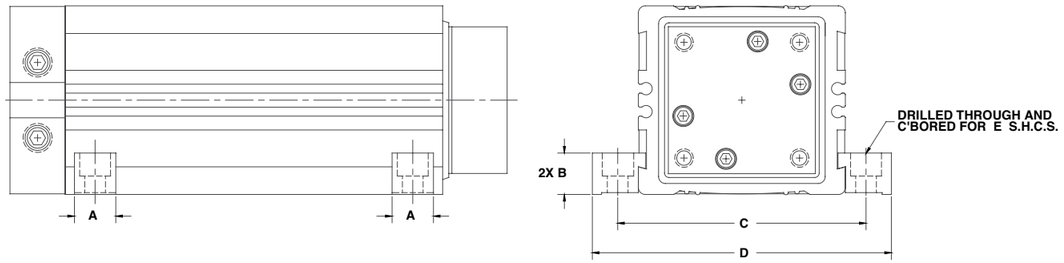
Shock Absorber Specifications						
Bore	Model	(Fp) Max. Shock Force	Normal Coil Spring Force		(FD) Max. Propelling Force	Weight
			Extension	Compression		
1-16" 1-1/2"	U.S.	775 lbs.	1.25 lbs.	2.75 lbs.	250 lbs.	5 oz.
27mm 38mm	Metric	(2 KN)	(4.44 N)	(9.77 N)	(534 N)	(85 g.)
2"-2-1/2"	U.S.	1700 lbs.	9.00"	13.00"	500 lbs.	20 oz.
*31mm 50mm	*Metric	(7.5 KN)	(40 N)	(57.8 N)	(2224.1 N)	(567 g.)

*Uses U.S. shock for 2" - 2-1/2".

How to Accessorize

Mounting Accessories

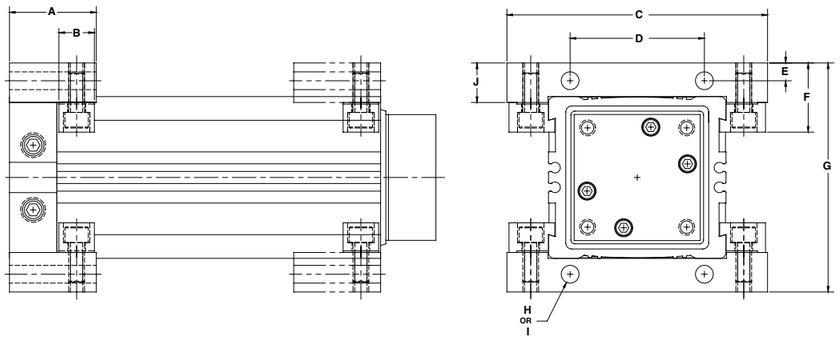
Mounting Clamps



Bore		Part No.	A	B	C	D	E
(09)	1-1/16"-1-1/2"	PM-MC-09	0.56	0.56	3.37	4.06	1/4-20 UNC
	(27mm-38mm)		14.30	14.30	85.60	103.10	M6 x 1.0
(31)	2"-2-1/2"	PM-MC-31	1.50	.69	5.30	6.18	3/8-16 UNC
(50)	(50mm-63mm)		38.10	17.50	134.50	156.90	M10 x 1.5

Mounting clamps can be used any time the PneuMoment™ is mounted to a flat surface. They are supplied with through holes for socket head cap screws. The clamps connect to the channel that runs along the length of the guide beam. Mounting clamps can be located anywhere along the length of the guide beam but we recommend they be as close to the ends as possible with the width of the clamp engaged into the guide beam channel. Mounting clamps are supplied in packets of four. The same clamp is used for U.S. customary unit and metric mountings.

End Flanges



End flanges can be used to mount the actuator at either end of the guide beam. The clamps connect to the flange bracket using screws and threaded holes. Two flange bracket styles are available; one with through holes and the other with threaded holes. End flanges are supplied in a kit containing two flange brackets and four clamps.

Threaded Holes (U.S. PM-EF-09, Metric PMM-EF-09*) U.S. PM-EF-31, Metric PMM-EF-31
Through Holes (U.S. PM-EFT-09, Metric PMM-EFT-09*) U.S. PM-EFT-31, Metric PMM-EFT-31

Bore	A	B	C	D	E	F	G	H	I	J
1-1/16", 1-1/2"	1.50	0.56	4.12	2.12	0.28	1.06	3.62	0.28	1/4-20 UNC	0.62
(27mm), (38mm)	38.30	14.30	104.80	53.90	7.10	27.00	92.00	7.10	M6 x 1.0	15.90
2" - 2-1/2"	2.74	1.50	6.25	3.82	0.38	1.47	5.88	0.41	3/8-16 UNC	0.92
(50mm), (63mm)	69.60	38.10	158.90	97.10	9.50	37.40	149.20	0.42	M10 x 1.5	23.40

*1-1/16" and 1-1/2" bore sizes use the same End Flange.
2" and 2-1/2" bore sizes use the same End Flange.

How to Order

The model number of PneuMoment™ pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic PneuMoment™ unit with 1-1/16" bore, 6" stroke, and additional options is shown below.

Model	
PM	US Customary units
PMM	Metric units (all external fasteners and ports are metric)

Stroke Lengths*
1" increments to 6"
25mm increments to 150mm

* Stroke lengths beyond 6" are available up to a maximum of 30" (762mm). Stroke lengths above 15" require application review. Fractional stroke lengths are also available. Consult your distributor for price and availability.

PM - 09 6 - EBMRY

Bore Size**	
09	1-1/16" / 27mm
17	1-1/2" / 38mm
31	2" / 50mm
50	2-1/2" / 63mm

** Bore sizes are not directly interchangeable. Refer to dimensional drawing for details.

Options	
A	Internal stroke adjustment, both ends[1]
B	Internal bumpers, both ends
EB	External bumpers, both ends (can be used for stroke adjustment)
M	Magnetic position sensing
R	Auxiliary port (air/vacuum)[2]
S	Shock absorber, both directions with stroke adjustment
S1	Shock absorber, extend with stroke adjustment
S2	Shock absorber, retract with stroke adjustment
Y	Air ports, side[3]

[1] Not required with shock absorber or external bumper. Not available in stroke lengths above 15". (Above 4" on 2" bore). Not available on 1-1/2" and 2-1/2" bores.
[2] Seals used allow air or vacuum transmitted through the actuator to the load beam tooling plate.
[3] The standard unit offers both end and side ports in the guide beam end cap. The standard unit has flush surface plugs installed in the side ports. PneuMoments ordered with the "Y" option are shipped with the plugs installed in the end ports.

NOTE: (Stroke lengths 15" and above) Stroke adjustment can be achieved by using External Bumper - Option EB or Shock Absorber - option S, S1, S2. These options will require a modified stop plate to compensate for guide rod deflection.

Option/Combination Availability

Bore	A	B	EB	M	R	S	Y
1-1/16" (27mm)	M, R, Y	M, R, Y	M, R, Y	A, B, EB, R, S, Y	A, B, EB, M, S, Y	M, R, Y	A, B, EB, M, R, S
1-1/2" (38mm)	N/A	M, R, Y	M, R, Y	B, EB, R, S, Y	B, EB, M, S, Y	M, R, Y	B, EB, M, R, S
2" (50mm)	M, R, Y	M, R, Y	M, R, Y	A, B, EB, R, S, Y	A, B, EB, M, S, Y	M, R, Y	A, B, EB, M, R, S, Y
2-1/2" (63mm)	N/A	M, R, Y	M, R, Y	B, EB, R, S, Y	A, B, EB, M, S, Y	M, R, Y	A, B, EB, M, R, S, Y

PneuMoment™ actuators are repairable. A list of the individual components is given below that together make up the PneuMoment™ actuator.

Repair Kits

Order #		Part Description	Quantity
Seal Kits 1-1/16" – PMKS-09 1-1/2" – PMKS-17 2" – PMKS-31 2-1/2" – PMKS-50 (US and Metric)		Piston Seals	2
		Air Tube Piston Seal	2
		Rod Guide Inner Seal	1
		Rod Guide Outer Seal	1
		Rod Seal	1
		Sleeve Plug Seal	1
		Beam Wiper	1
		Tube Gasket	1
		Wrench – For Piston Removal	1
1-1/16" 1-1/2"	RD-76758 (U.S. Customary)	Replacement Shock	1
27mm 38mm	RD-68404-M (Metric)	Replacement Shock	1
2" 2-1/2"	RD-80179 (U.S. Customary)	Replacement Shock	1
31mm 50mm	RD-80179-M (Metric)	Replacement Shock	1

Notes

Rotary Actuators

Bimba rotary actuators are designed to accommodate a variety of rotary motion applications.

Pneu-Turn® rotary actuators are manufactured using corrosive resistant components including 304 stainless steel gear shaft and cylinder bodies, anodized aluminum housing and end caps. Standard models include a self-lubricating sintered iron copper shaft bearing. Optional shaft ball bearings are also available.

MHRQ actuators are a cost-effective rack and pinion rotary motion option. Their robust double-acting design can be piped from the front or the side, adding versatilty to tight machine designs.



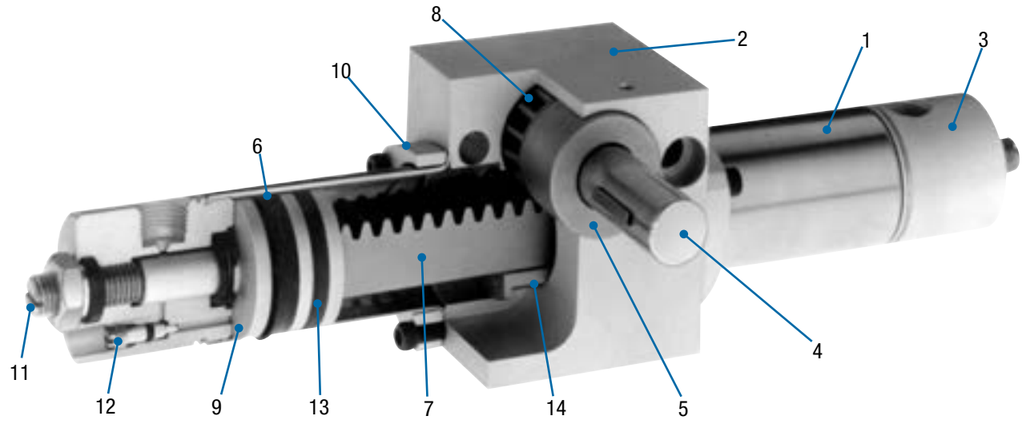
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The Bimba Pneu-Turn Rotary Actuator is available with these catalog options:

- > Angle Adjustment
- > Bumpers
- > Adjustable Cushions
- > Dual Shaft
- > Square Key
- > MRS® Magnetic Position Sensing
- > Spring Return
- > Oil Service Seals
- > High Temperature Option
- > Ball Bearing
- > Rear Shaft
- > Hardened Shaft
- > Anti-backlash Rack



1. Cylinder Bodies – 304 stainless steel for maximum seal life.
2. Actuator Body – High strength, anodized aluminum alloy for maximum corrosion protection.
3. Porting Ends – High strength, anodized aluminum alloy.
4. Shaft – High strength, 303 stainless steel for maximum wear resistance and long life. (hardened steel optional).
5. Shaft Bearings – Self-lubricating, sintered iron copper material for lower friction. (ball bearings optional).
6. Piston Seals – Buna "N", U-cup type for low breakaway friction and long life.
7. Rack – Carbon steel for maximum wear resistance.
8. Pinion – High strength, alloy steel for greater durability.
9. Piston – High strength, aluminum alloy.
10. Cylinder Body Retainer Ring – High strength, stainless steel for maximum corrosion protection.
11. Angle Adjustment – An option that allows 45° of adjustability each end.
12. Adjustable Cushions – An option that controls deceleration at the end of the rotation.
13. MRS® Magnetic Position Sensing – An option that provides a magnet for sensing position.
14. Rack Support – Sintered brass material for increased load carrying capabilities.

Actuator Operation

Rotary action of the Pneu-Turn Rotary Actuator is achieved through the use of a rack and pinion assembly. Just as with a pneumatic or hydraulic cylinder, the speed of rotation may be controlled through the use of flow controls. The action at the end of the rotation can be controlled by the use of adjustable cushions, which are available as an option.

Care should be taken to insure that the inertial force does not exceed the published torque capacity. An external stop may be necessary to avoid exceeding the torque capacity due to inertial loads.

When mounting the Pneu-Turn against the shaft side of the housing, be sure to provide clearance for the pilot diameter to avoid excessive bearing pressure.

For standard models, axial loads must only be applied in the direction indicated on the dimensional drawings. The Dual Shaft or Rear Shaft options can be used to correctly orient tension induced axial loads. With the Ball Bearing option, axial loads can be applied in either direction.

The Angle Adjustment Option will allow 45˚ of adjustability. If cushions are ordered in conjunction with the angle adjustment option, adjustability will be 10˚.

Port Positioning

Ports on the Pneu-Turn may be repositioned to accommodate any air line configuration by loosening the three body retainer screws. Once desired port positions are obtained, tighten screws to specified torque values.

Lubrication

The Pneu-Turn Rotary Actuator is pre-lubricated at the factory for extensive, maintenance-free operation. The life of the rotary actuator can be lengthened by providing additional lubrication with an air line mist lubricator or direct introduction of oil to the actuator every 500 hours of operation. Recommended oils for Buna N seals are medium to heavy inhibited hydraulic and general purpose oil. If High Temperature seals, use Dow Corning #710. Other types of pre-lube are available upon request.

The rack and pinion gear and ball bearings are pre-lubricated at the factory for extensive, maintenance-free operation. If additional lubrication should be required, use a high grade bearing grease.

Woodruff Key Location

The standard position of the woodruff key is 12 o'clock at the center of rotation. For Three-Position PneuTurn, the center position is 12 o'clock, ± 2°.

Engineering Specifications

Ratings

Pressure Rating:	150 PSI
Rotation Tolerance*:	9/16" - 3/4" Bore: 0°-15°
	1-1/16" - 2" Bore: 0°-10°
Temperature Range:**	Buna-N (Standard): -20° F to 200° F
	Option V High Temperature Seals: 0° F to 400° F
	High Temperature Seals with Ball Bearing: 0° F to 250° F
Backlash:	Without X option: 1-1/2˚ of Arc Maximum. Double rack actuators have zero backlash at end of rotational stroke.
	With X option: Single rack models have zero mid rotational and end of rotation backlash. Double rack models have zero mid-rotational backlash.
Breakaway:	<5 PSI

* Bumper option allows compression under pressure which may exceed tolerance. If higher accuracy desired, please specify angle adjustment.
** If cylinders are operated at temperatures below 0˚ for extended time periods, special modifications may be required. Special seal materials are available on request.

Standard Line

Series	9/16"		3/4"		1-1/16"		1-1/2"		2"	
	(006)	(014)	(017)	(033)	(037)	(074)	(098)	(196)	(247)	(494)
Theoretical Torque Capacity (in.-lbs./PSI)	0.068	0.135	0.166	0.331	0.369	0.739	0.982	1.963	2.468	4.935
Bearing Load (Axial) (lbs.)	25	25	25	25	40	40	40	40	80	80
Bearing Load (Radial) (lbs.)	200	200	250	250	300	300	350	350	500	500
Distance Between Bearing Midpoints (in.)	0.77	0.77	0.96	0.96	1.24	1.24	1.70	1.70	1.98	1.98
Maximum Rate of Rotation (@ 100 PSI With No Load)	3000°/ sec.	3000°/ sec.	3500°/ sec.	3500°/ sec.	2000°/ sec.	2000°/ sec.	1500°/ sec.	1500°/ sec.	1000°/ sec.	1000°/ sec.
Weight (Approximate) (oz.)	6	11.5	11	20.5	21	38	48	89	105	152
Body Retainer Cap Screw Recommended Tightening Torque (in.-lbs.)	10	10	12	12	12	12	20	20	20	20

For Ball Bearing Option, the Following Specifications Apply

Series	9/16"		3/4"		1-1/16"		1-1/2"		2"	
	(006)	(014)	(017)	(033)	(037)	(074)	(098)	(196)	(247)	(494)
Bearing Load (Axial) (lbs.)	55	55	75	75	100	100	110	110	130	130
Bearing Load (Radial) (lbs.)	205	205	270	270	380	380	425	425	740	740
Distance Between Bearing Midpoints (in.)	.72	.72	.96	.96	1.26	1.26	1.71	1.71	1.82	1.82
Weight (Approximate) (oz.)	6	11.5	10.5	20	20.5	37.5	47	88	103	150

Engineering Specifications

Kinetic Energy Capacity

A load connected to the shaft of a Pneu-Turn will produce kinetic energy as it is rotated. This kinetic energy must be absorbed by the Pneu-Turn or other stopping device. If the Pneu-Turn is to stop the load without external devices, then the application kinetic energy must not exceed the maximums noted in the table below.

The kinetic energy developed by your application can be determined by using the equations noted below:

KE = 0.5 * I * w2
w = 1.20 * (ø / t)

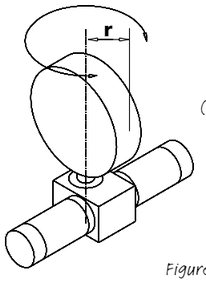
LEGEND:

KE = Kinetic energy (in.-lbs.)
I = Moment of inertia (in.-lb.-sec.2)
w = Rotational speed (radians/sec.)
ø = Angle of rotation (radians)
t = Time of rotation (sec.)
W = Weight of load (lb.)
g = Acceleration of gravity (386 in./sec.2)

Maximum Allowable Kinetic Energy (in-lbs)

Size	Without Cushions	With Cushions
9/16" (006 / 014)	0.02	N/A
3/4" (017 / 033)	0.04	0.08
1-1/16" (037 / 074)	0.07	0.88
1-1/2" (098 / 196)	0.41	7.80
2" (247 / 494)	1.60	13.00

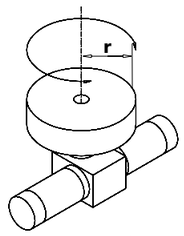
Below are examples of attachments, their geometry, and the equation to use to determine the Moment of Inertia.



Thin Disc (mounted on side through center)

$$I = \frac{W}{g} * \frac{r^2}{4}$$

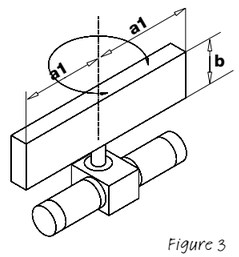
Figure 1



Thin Disc (centered)

$$I = \frac{W}{g} * \frac{r^2}{2}$$

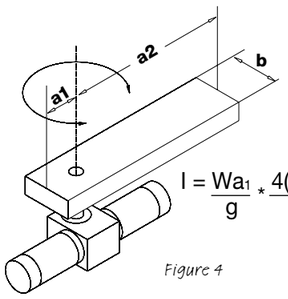
Figure 2



Thin Rectangular Plate (Centered and mounted on side)

$$I = \frac{W}{g} * \frac{(2(a1))^2}{12}$$

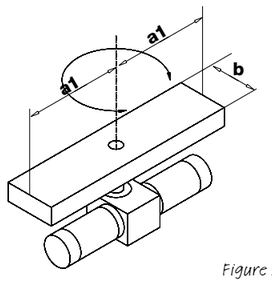
Figure 3



Thin Rectangular Plate (Off-centered)

$$I = \frac{Wa_1}{g} * \frac{4(a1)^2 + b^2}{12} + \frac{Wa_2}{g} * \frac{4(a2)^2 + b^2}{12}$$

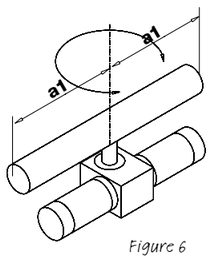
Figure 4



Thin Rectangular Plate (Centered)

$$I = \frac{W}{g} * \frac{(2(a1))^2 + b}{12}$$

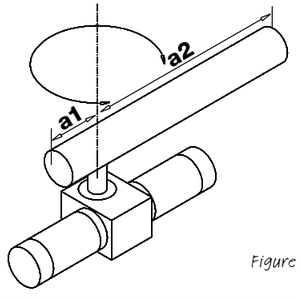
Figure 5



Slender Rod (Centered)

$$I = \frac{W}{g} * \frac{(2(a1))^2}{12}$$

Figure 6



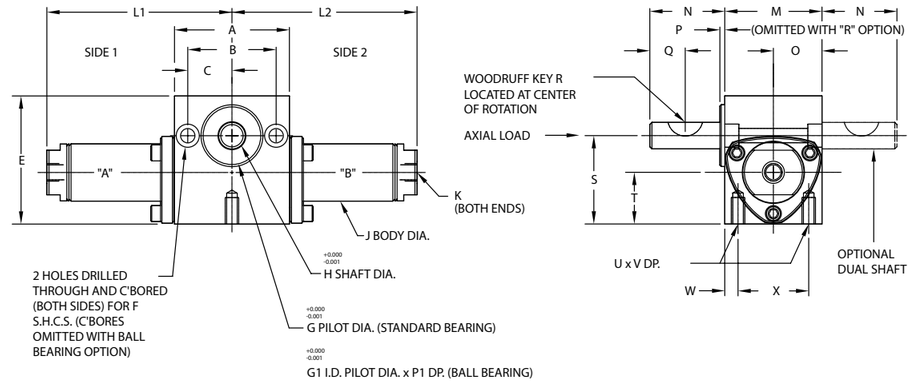
Slender Rod (Off-centered)

$$I = \frac{Wa_1}{g} * \frac{a1^2}{3} + \frac{Wa_2}{g} * \frac{a2^2}{3}$$

Figure 7

Dimensions

Single Rack Models (in)



L1/L2 dimensions shown in chart on page 365.

Bore	A	B	C	E	E (With R Option)	F (C' Bores Omitted with Ball Bearing Option)	G (Std Bearing O.D. Pilot Dia.)
9/16" (006)	1.38	1.00	0.50	1.44	1.44	#8 S.H.C.S.	0.675
3/4" (017)	1.62	1.25	0.62	1.81	1.81	#10 S.H.C.S.	0.875
1-1/16" (037)	1.88	1.44	0.72	2.12	2.19	1/4" S.H.C.S.	0.968
1-1/2" (098)	2.38	1.81	0.90	2.81	2.84	5/16" S.H.C.S.	1.249
2" (247)	3.00	2.38	1.19	3.75	3.75	5/16" S.H.C.S.	1.749

Bore	G1 (Ball Bearing I.D. Pilot)	H	J	K	M	N	O	P	P1
9/16" (006)	0.750	0.250	0.61	#10-32 [1]	1.12	0.69	0.56	0.06	0.06
3/4" (017)	0.875	0.375	0.82	#10-32 [1]	1.37	1.06	0.69	0.06	0.06
1-1/16" (037)	1.125	0.500	1.12	1/8 NPT	1.75	1.31	0.88	0.06	0.09
1-1/2" (098)	1.375	0.625	1.56	1/8 NPT	2.25	1.38	1.12	0.09	0.09
2" (247)	1.875	0.875	2.08	1/4 NPT	2.56	2.00	1.28	0.11	0.10

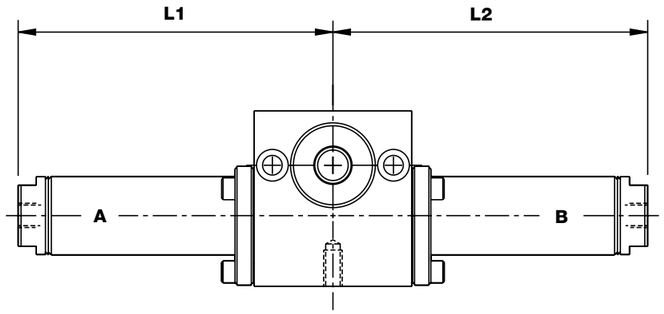
Bore	Q	R2	S	T	U	V	W	X
9/16" (006)	0.31	#202.5	1.03	0.61	#8-32	0.44	0.19	0.75
3/4" (017)	0.50	#204	1.25	0.73	#10-24	0.38	0.19	1.00
1-1/16" (037)	0.62	#305	1.56	0.88	1/4-20	0.50	0.25	1.25
1-1/2" (098)	0.62	#405	2.09	1.16	5/16-18	0.62	0.31	1.62
2" (247)	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00

[1] Option-S ports are 1/8 NPT
[2] Key dimensions on page 369.

Dimensions

Single Rack Options (in)

(Dimensional variations from standard as shown.)



SIDE 1 **SIDE 2**

	9/16" (006)		3/4" (017)		1-1/16" (037)		1-1/2" (098)		2" (247)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder Per Degree of Rotation	0.0048	0.0048	0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
Plus One Length Adder Below Per Side										
Base Unit (No Options)	1.52	1.52	1.63	1.63	2.03	2.03	2.34	2.34	2.84	2.84
Bumper Both Sides (B1)	1.64	1.64	1.77	1.77	2.18	2.18	2.49	2.49	3.04	3.04
Bumper CCW Side (B2)	1.52	1.64	1.63	1.77	2.03	2.18	2.34	2.49	2.84	3.04
Bumper CW Side (B3)	1.64	1.52	1.77	1.63	2.18	2.03	2.49	2.34	3.04	2.84
Cushion Both Sides (C1)	N/A	N/A	2.16	2.16	2.66	2.66	2.98	2.98	3.65	3.65
Cushion CCW Side (C2)	N/A	N/A	1.63	2.16	2.03	2.66	2.34	2.98	2.84	3.65
Cushion CW Side (C3)	N/A	N/A	2.16	1.63	2.66	2.03	2.98	2.34	3.65	2.84
Oil Service Seals (S)	1.93	1.93	2.18	2.18	2.34	2.34	2.77	2.77	3.38	3.38
Oil Service with Angle Adjustment (AS)	N/A	N/A	N/A	N/A	2.97	2.97	3.41	3.41	4.19	4.19

Note: Option A- Angle Adjustment and Option M- Magnetic Position Sensing is found on pages 369-370.

"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator.

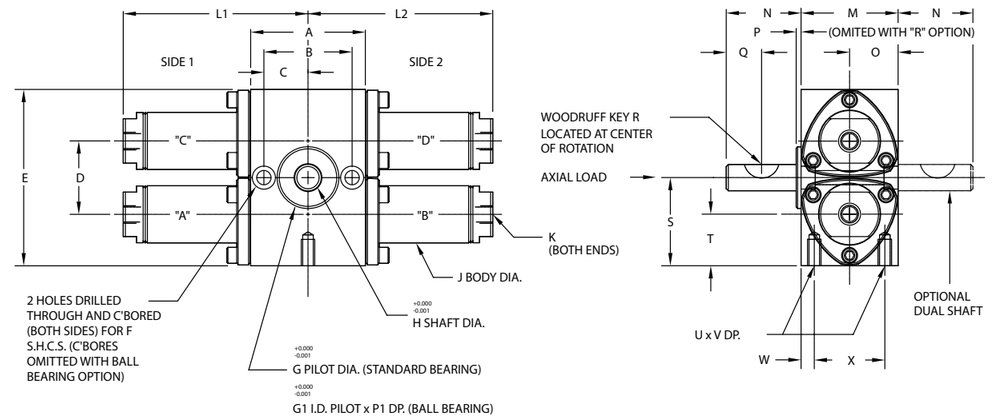
The location of the optional feature chosen will be on tube B for single rack actuators.

"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube A for single rack actuators.

Dimensions

Double Rack Models (in)



NOTE: Body retainer on 2" bore has 4 corners. L1/L2 dimensions shown in chart on page 365.

Bore	A	B	C	D	E	F (C' Bores Omitted with Ball Bearing Option)	G (Std Bearing O.D. Pilot Dia.)
9/16" (014)	1.38	1.00	0.50	0.83	2.06	#8 S.H.C.S.	0.675
3/4" (033)	1.62	1.25	0.62	1.04	2.50	#10 S.H.C.S.	0.875
1-1/16" (074)	1.88	1.44	0.72	1.36	3.12	1/4" S.H.C.S.	0.968
1-1/2" (196)	2.38	1.81	0.90	1.88	4.19	5/16" S.H.C.S.	1.249
2" (494)	3.00	2.38	1.19	2.56	5.13	5/16" S.H.C.S.	1.749

Bore	G1 (Ball Bearing I.D. Pilot)	H	J	K	M	N	O	P	P1
9/16" (014)	0.750	0.250	0.61	#10-32 1	1.12	0.69	0.56	0.06	0.06
3/4" (033)	0.875	0.375	0.82	#10-32 1	1.37	1.06	0.69	0.06	0.06
1-1/16" (074)	1.125	0.500	1.12	1/8 NPT	1.75	1.31	0.88	0.06	0.09
1-1/2" (196)	1.375	0.625	1.56	1/8 NPT	2.25	1.38	1.12	0.09	0.09
2" (494)	1.875	0.875	2.08	1/4 NPT	2.56	2.00	1.28	0.11	0.10

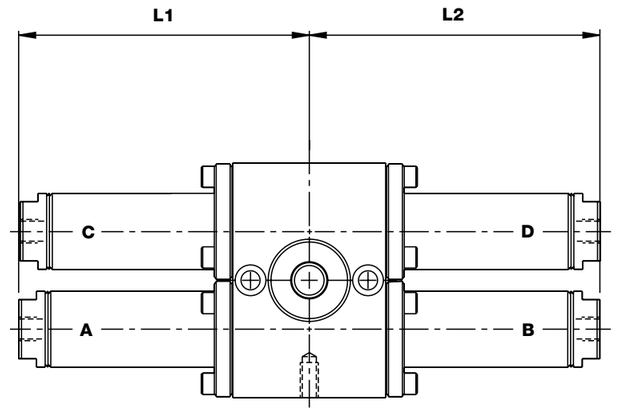
Bore	Q	R2	S	T	U	V	W	X
9/16" (014)	0.31	#202.5	1.03	0.61	#8-32	0.44	0.19	0.75
3/4" (033)	0.50	#204	1.25	0.73	#10-24	0.38	0.19	1.00
1-1/16" (074)	0.62	#305	1.56	0.88	1/4-20	0.50	0.25	1.25
1-1/2" (196)	0.62	#405	2.09	1.16	5/16-18	0.62	0.31	1.62
2" (494)	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00

[1] Option-S ports are 1/8 NPT (bodies "A" and "C" only).
[2] Key dimensions on page 369.

Dimensions

Double Rack Options (in)

(Dimensional variations from standard as shown.)



SIDE 1 **SIDE 2**

	9/16" (014)		3/4" (033)		1-1/16" (074)		1-1/2" (196)		2" (494)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder Per Degree of Rotation	0.0048	0.0048	0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
Plus One Length Adder Below Per Side										
Base Unit (No Options)	1.52	1.57	1.63	1.68	2.03	2.08	2.34	2.39	2.84	2.89
Bumper Both Sides (B1)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Bumper CCW Side (B2)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Bumper CW Side (B3)	1.64	1.57	1.77	1.68	2.18	2.08	2.49	2.39	3.04	2.89
Cushion Both Sides (C1)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Cushion CCW Side (C2)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Cushion CW Side (C3)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Oil Service Seals (S)	1.93	1.57	2.18	1.68	2.34	2.08	2.77	2.39	3.38	2.89
Oil Service with Angle Adjustment (AS)	N/A	N/A	N/A	N/A	2.97	2.08	3.41	2.39	4.19	2.89

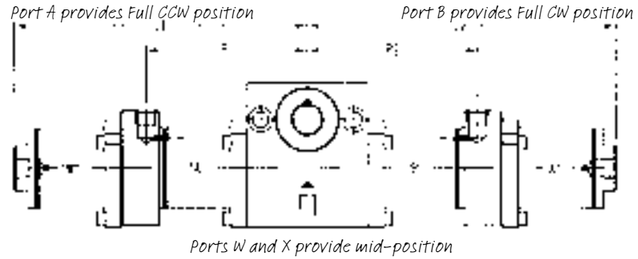
"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube C for single rack actuators.

"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator.

The location of the optional feature chosen will be on tube A for double rack actuators.

Dimensions (Three Position Models)



Single Rack Model Dimensions

	9/16" (006)				3/4" (017)				1-1/16" (037)			
	P1	P2	L1	L2	P1	P2	L1	L2	P1	P2	L1	LR
Degrees of Full Rotation Adder per degree of rotation	**Full rot. 0.0048**	**Full rot. 0.0048**	**Full rot. 0.0048**	**Full rot. 0.0048**	**Full rot. 0.0066**	**Full rot. 0.0066**	**Full rot. 0.0066**	**Full rot. 0.0066**	**Full rot. 0.0073**	**Full rot. 0.0073**	**Full rot. 0.0073**	**Full rot. 0.0073**
Degree of Stop Rotation Adder per degree of rotation	2nd stop N/A	1st stop N/A	2nd stop 0.0048	1st stop 0.0048	2nd stop N/A	1st stop N/A	2nd stop 0.0066	1st stop 0.0066	2nd stop N/A	1st stop N/A	2nd stop 0.0073	1st stop 0.0073
Base Unit (No Option)	1.41	1.41	2.82	2.82	1.63	1.63	3.05	3.05	2.03	2.03	3.89	3.89
Bumpers Both Sides (B1)	1.53	1.53	3.06	3.06	1.77	1.77	3.33	3.33	2.18	2.18	4.19	4.19
Bumper CCW Side (B2)	1.41	1.53	2.82	3.06	1.63	1.77	3.05	3.33	2.03	2.18	3.89	4.19
Bumper CW Side (B3)	1.53	1.41	3.06	2.82	1.77	1.63	3.33	3.05	2.18	2.03	4.19	3.89
Cushion/Flow Both Sides (C1) (Q1)	N/A	N/A	N/A	N/A	1.63	1.63	3.58	3.58	2.03	2.03	4.51	4.51
Cushion/Flow CCW Side (C2) (Q2)	N/A	N/A	N/A	N/A	1.63	1.63	3.05	3.58	2.03	2.03	3.89	4.51
Cushion/Flow CW Side (C3) (Q3)	N/A	N/A	N/A	N/A	1.63	1.63	3.58	3.05	2.03	2.03	4.51	3.89
Angle Adjustment Both Sides (A1)	1.41	1.41	3.05	3.05	1.63	1.63	3.27	3.27	2.03	2.30	4.28	4.28
Angle Adjustment CCW Side (A2)	1.41	1.41	2.82	3.05	1.63	1.63	3.05	3.27	2.03	2.03	3.89	4.28
Angle Adjustment CW Side (A3)	1.41	1.41	3.05	2.82	1.63	1.63	3.27	3.05	2.03	2.03	4.28	3.89

	1-1/2" (098)				2" (247)			
	P1	P2	L1	L2	P1	P2	L1	L2
Degrees of Full Rotation Adder per degree of rotation	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0137**	**full rot. 0.0137**	**full rot. 0.0137**	**full rot. 0.0137**
Degree of Stop Rotation Adder per degree of rotation	2nd stop N/A	1st stop N/A	2nd stop 0.0048	1st stop 0.0048	2nd stop N/A	1st stop N/A	2nd stop 0.0066	1st stop 0.0066
Base Unit (No Option)	2.28	2.28	4.39	4.39	2.81	2.81	5.13	5.13
Bumpers Both Sides (B1)	2.43	2.43	4.69	4.69	3.01	3.01	5.53	5.53
Bumper CCW Side (B2)	2.28	2.43	4.39	4.69	2.81	3.01	5.13	5.53
Bumper CW Side (B3)	2.43	2.28	4.69	4.39	3.01	2.81	5.53	5.13
Cushion/Flow Both Sides (C1) (Q1)	2.28	2.28	5.03	5.03	2.81	2.81	5.95	5.95
Cushion/Flow CCW Side (C2) (Q2)	2.28	2.28	4.39	5.03	2.81	2.81	5.13	5.95
Cushion/Flow CW Side (C3) (Q3)	2.28	2.28	5.03	4.39	2.81	2.81	5.95	5.13
Angle Adjustment Both Sides (A1)	2.28	2.28	4.80	4.80	2.81	2.81	5.66	5.66
Angle Adjustment CCW Side (A2)	2.28	2.28	4.39	4.80	2.81	2.81	5.13	5.66
Angle Adjustment CW Side (A3)	2.28	2.28	4.80	4.39	2.81	2.81	5.66	5.13

**Select Magnetic Position Sensing adder from MRS table

MRS Length Adder (in)					
Total Rot. Degrees	**006/014**	**017/033**	**037/074**	**098/196**	**247/494**
45°	0.66	0.66	0.75	0.75	0.75
90°	0.55	0.52	0.59	0.53	0.44
180°	0.34	0.22	0.26	0.09	0.00
270°	0.12	0.00	0.00	0.00	0.00
360°	0.00	0.00	0.00	0.00	0.00

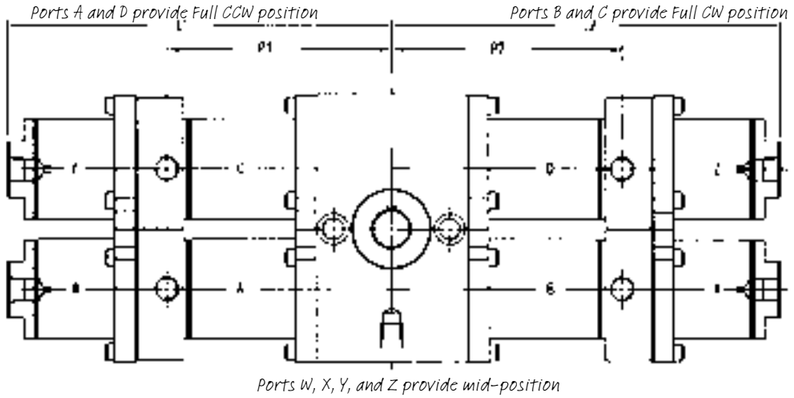
NOTE: Overall length calculator spreadsheet available. Contact the Technical Assistance Center for details.

Single rack overall width calculation:

PT-098180/045-8C1--Using the chart above, calculate L1 and L2 dimensions as follows:

> L1 = total rotation (180) * (.0097) full rotation adder + degrees to 2nd stop (135) * (.0097) 2nd stop rotation adder + cushion adder (5.03")
> L2 = total rotation (180) * (.0097) full rotation adder + degrees to 1st stop (45) * (.0097) 1st stop rotation adder + cushion adder (5.03")
> [L1 = (1.746" + 1.310" + 5.03") = 8.086"] + [L2 = (1.746" + .437 + 5.03") = 7.213"]; Total width = 8.086" + 7.213" = 15.30"

Dimensions (Three Position Models)



Double Rack Model Dimensions

	9/16" (014)				3/4" (033)				1-1/16" (074)			
	P1	P2	L1	L2	P1	P2	L1	L2	P1	P2	L1	LR
Degrees of Full Rotation Adder per degree of rotation	**full rot. 0.0048**	**full rot. 0.0048**	**full rot. 0.0048**	**full rot. 0.0048**	**full rot. 0.0066**	**full rot. 0.0066**	**full rot. 0.0066**	**full rot. 0.0066**	**full rot. 0.0073**	**full rot. 0.0073**	**full rot. 0.0073**	**full rot. 0.0073**
*Degrees to longest stop Adder per degree of rotation	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0048	Stop rot. 0.0048	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0066	Stop rot. 0.0066	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0073	Stop rot. 0.0073
Base Unit (No Option)	1.41	1.46	2.82	2.87	1.63	1.68	3.05	3.10	2.03	2.08	3.89	3.94
Bumpers Both Sides (B1)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Bumper CCW Side (B2)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Bumper CW Side (B3)	1.53	1.46	3.06	2.87	1.77	1.68	3.33	3.10	2.18	2.08	4.19	3.94
Cushion/Flow Both Sides (C1) (Q1)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Cushion/Flow CCW Side (C2) (Q2)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Cushion/Flow CW Side (C3) (Q3)	N/A	N/A	N/A	N/A	1.63	1.68	3.58	3.10	2.03	2.08	4.51	3.94
Angle Adjustment Both Sides (A1)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94
Angle Adjustment CCW Side (A2)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94
Angle Adjustment CW Side (A3)	1.41	1.46	3.05	2.87	1.63	1.68	3.27	3.10	2.03	2.08	4.28	3.94

	1-1/2" (196)				2" (494)			
	P1	P2	L1	L2	P1	P2	L1	L2
Degrees of Full Rotation Adder per degree of rotation	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0097**	**full rot. 0.0137**	**full rot. 0.0137**	**full rot. 0.0137**	**full rot. 0.0137**
Degree of Stop Rotation Adder per degree of rotation	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0097	Stop rot. 0.0097	Stop rot. N/A	Stop rot. N/A	Stop rot. 0.0137	Stop rot. 0.0137
Base Unit (No Option)	2.28	2.33	4.39	4.44	2.81	2.86	5.13	5.18
Bumpers Both Sides (B1)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Bumper CCW Side (B2)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Bumper CW Side (B3)	2.43	2.33	4.69	4.44	3.01	2.86	5.53	5.18
Cushion/Flow Both Sides (C1) (Q1)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Cushion/Flow CCW Side (C2) (Q2)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Cushion/Flow CW Side (C3) (Q3)	2.28	2.33	5.03	4.44	2.81	2.86	5.95	5.18
Angle Adjustment Both Sides (A1)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18
Angle Adjustment CCW Side (A2)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18
Angle Adjustment CW Side (A3)	2.28	2.33	4.80	4.44	2.81	2.86	5.66	5.18

NOTE: Overall length calculator spreadsheet available. Contact the Technical Assistance Center for details.

*Select Magnetic Position Sensing adder from MRS table.
** Largest stop rotation is used for double rack models to calculate overall L1 and L2 length. Double rack models - one body on each side will be shorter if the shaft mid-position is not 1/2 of the total rotation, the above calculation still provides the units overall width.

Double rack overall width calculation:**

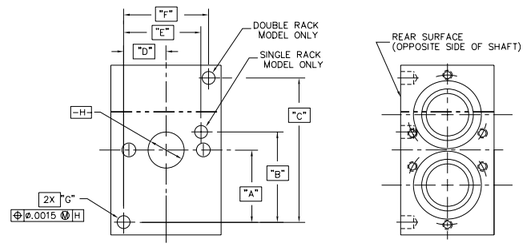
PT-196180/045-8C1--Using the chart above, calculate L1 and L2 dimensions as follows:

> L1 = Total rotation (180) * (.0097) Full rotation adder + Largest Degrees stop (135) * (.0097) stop rotation adder + Cushion adder (5.03")
> L2 = Total rotation (180) * (.0097) Full rotation adder + Largest Degrees stop (135) * (.0097) stop rotation adder + Cushion adder (4.44")
> [L1 = (1.746" + 1.310" + 5.03") = 8.086"] + [L2 = (1.746" + 1.310 + 4.44") = 7.496"]; Total width = 8.086" + 7.496" = 15.58"

How to Specify

ROTARY ACTUATORS

Dowel Pin Hole Locations



Bore	A	B	C	D
020 (9/16")	.874	1.101	1.754	.500
040 (3/4")	1.061	1.330	2.125	.623
090 (1-1/16")	1.311	1.730	2.625	.718
170 (1-1/2")	1.811	2.281	3.625	.905
310 (2")	2.187	3.000	4.375	.625

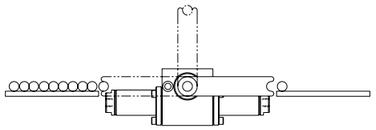
Bore	E	F	G
020 (9/16")	.928	1.000	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.139	1.250	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.437	1.437	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	1.812	1.812	.3145/.3155 x .560/.580 DP.
310 (2")	1.813	1.250	.3770/.3780 x .560/.580 DP.

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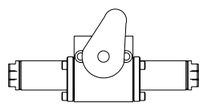
Application Possibilities

Picture the possibilities. Consider the many benefits of using the Bimba Pneu-Turn Rotary Actuator: compact, space-saving design, lightweight, corrosion-resistant components, and low cost. Now, using the pictures on this page as a springboard, you can understand that the applications are limitless. All you need is your imagination and a Bimba Pneu-Turn Rotary Actuator.

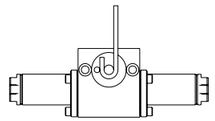
Transferring



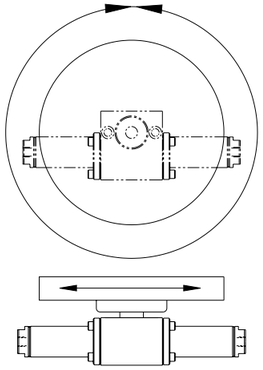
Camming



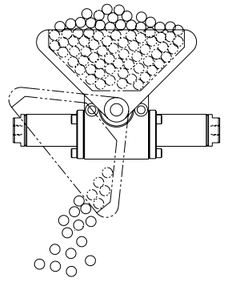
Bending (Tube or Wire)



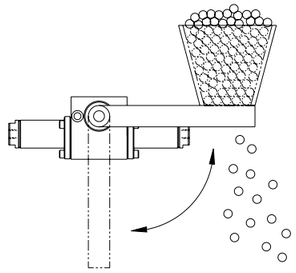
Indexing



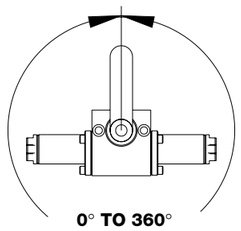
Unloading



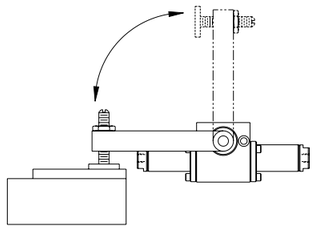
Opening/Closing



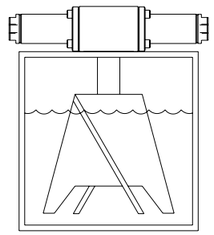
Turning



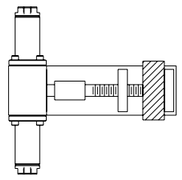
Clamping



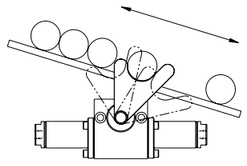
Mix/Agitate



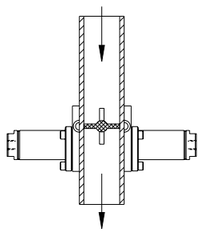
Screw/Clamping



Feeding



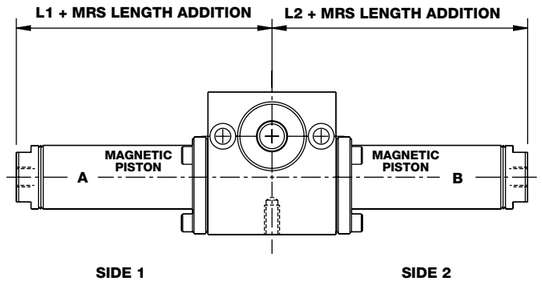
Valve Actuator

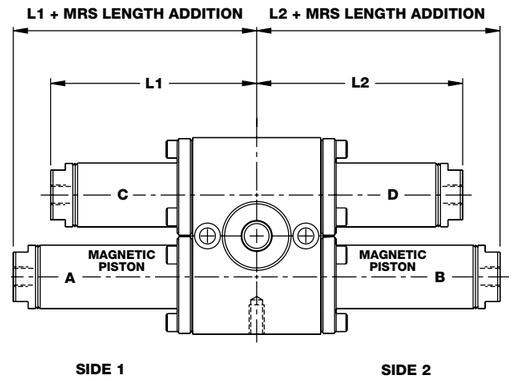


Options

MRS® Magnetic Position Sensing

Magnetic pistons are located on the A and B tubes of both the single and double rack rotary actuators, guaranteeing switch operation at any point in the rotation.

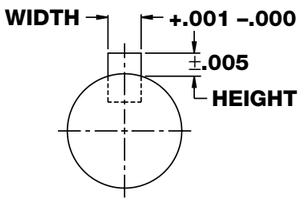




MRS® Length Adder (in)

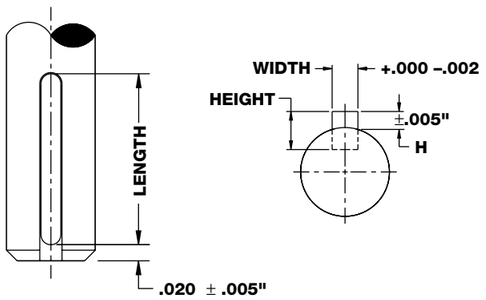
Degrees	006/014	017/033	037/074	098/196	247/494
45º	0.66	0.66	0.75	0.75	0.75
90º	0.55	0.52	0.59	0.53	0.44
180º	0.34	0.22	0.26	0.09	0.00
270º	0.12	0.00	0.00	0.00	0.00
360º	0.00	0.00	0.00	0.00	0.00

Woodruff Key (in)

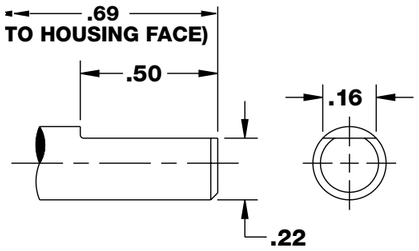


Key No.	Width	Height
202.5	0.0625	0.032
204	0.0625	0.032
305	0.0938	0.047
405	0.1250	0.063
606	0.1875	0.094

Square Key Option (in)



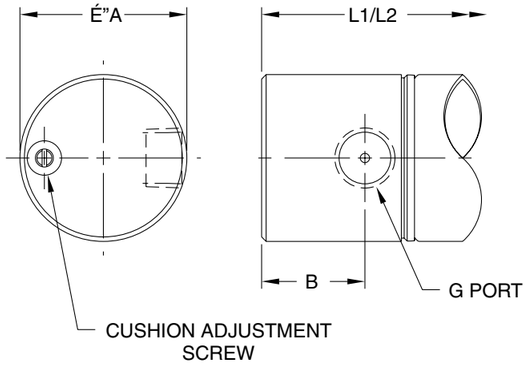
Flat Key (in) (006 and 014)



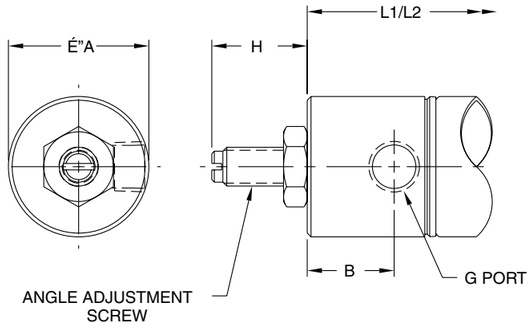
Bore Size	Length	Width	Height	H
3/4" (017 / 033)	.718	.094	.094	.047
1-1/16" (037 / 074)	.797	.125	.125	.063
1-1/2" (098 / 196)	.797	.188	.188	.094
2" (247 / 494)	1.781	.25	.25	.125

Option Dimensions (in.)

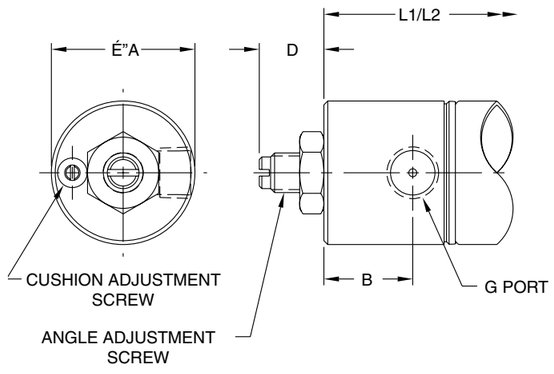
Cushion (C Option)



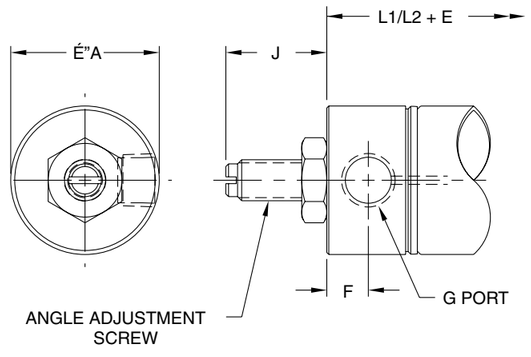
Angle Adjustment with Oil Service Seals (AS Option)



Angle Adjustment with Cushion (AC Option)



Angle Adjustment (A Option)



Bore	A	B	D	E	F	G	H	J
9/16" (006)	0.81	N/A	N/A	0.23	0.24	#10-32	N/A	0.53
9/16" (014)	0.81	N/A	N/A	0.23	0.24	#10-32	N/A	0.53
3/4" (017)	0.87	0.41	0.48	0.22	0.23	#10-32	N/A	0.71
3/4" (033)	0.87	0.41	0.48	0.22	0.23	#10-32	N/A	0.71
1-1/16" (037)	1.11	0.69	0.51	0.40	0.31	1/8 NPT	0.76	0.76
1-1/16" (074)	1.11	0.69	0.51	0.40	0.31	1/8 NPT	0.76	0.76
1-1/2" (098)	1.56	0.77	0.60	0.42	0.34	1/8 NPT	0.94	0.94
1-1/2" (196)	1.56	0.77	0.60	0.42	0.34	1/8 NPT	0.94	0.94
2" (247)	2.08	0.87	0.80	0.53	0.41	1/4 NPT	1.28	1.28
2" (494)	2.08	0.87	0.80	0.53	0.41	1/4 NPT	1.28	1.28

Option N

Low Temperature Seals

Option N (Low Temperature Operation) is now available as a standard catalog offering. Pneu-Turns with seals and lubricant allowing operation to -40° F can now be ordered directly from the catalog. Please note when ordering this option that cylinder performance may be affected beginning at temperatures below -20° F.

Operational Note: Dry air with a dew point below the lowest temperature the actuator will experience or dry nitrogen is recommended.

Product Availability: 3 business days

Option Q

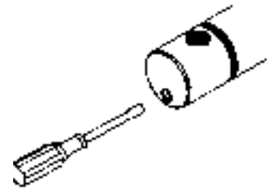
Internal Flow Control

Internal flow control is now available as a standard catalog option in bore sizes 3/4", 1-1/16", 1-1/2", and 2"; both single and double rack models. Use this option as a space saving feature and to avoid "tampering" associated with externally installed flow controls.

Flow control is achieved using a sealing disk that restricts the flow of air to the port when the piston moves towards the end cap. The restricted air is channeled through a small orifice within the end cap, on its way to the exhaust port. Controlling the flow through this orifice is achieved by adjusting a screw located on the face of the end cap. Single rack units: Clockwise (CW) and counter-clockwise (CCW) rotational flow is controlled using the end cap adjustment screw, opposite the direction of the shaft. Double rack units: CW rotation flow is adjusted using the screw in the lower end cap; CCW rotational flow is adjusted using the screw in the upper end cap. Bore sizes 3/4" and 1-1/16" provide three turns of adjustment. All larger bore sizes provide four turns of adjustment.

Option designators:
Q1 - Internal flow control (both sides)
Q2 - Internal flow control (counter-clockwise rotation)
Q3 - Internal flow control (clockwise rotation)

Product Availability: 3 business days



Option Q - Dimensional Variations from Standard (in.)

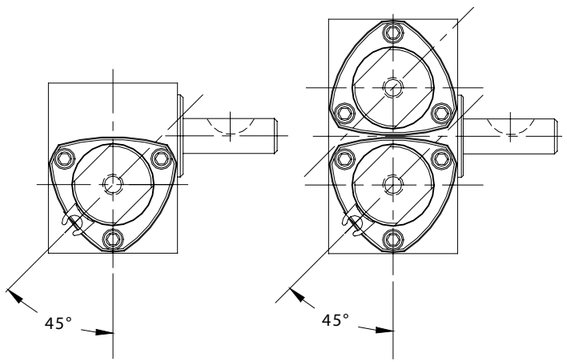
Single Rack	9/16" (006)		3/4" (017)		1-1/16" (037)		1-1/2" (098)		2" (247)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Adder per Degree of Rotation	-		0.0066	0.0066	0.0073	0.0073	0.0097	0.0097	0.0137	0.0137
Flow Control Both Sides (Q1)	N/A	N/A	2.16	2.16	2.66	2.66	2.98	2.98	3.65	3.65
Flow Control Both Sides (Q2)	N/A	N/A	1.63	2.16	2.03	2.66	2.34	2.98	2.84	3.65
Flow Control Both Sides (Q3)	N/A	N/A	2.16	1.63	2.66	2.03	2.98	2.34	3.65	2.84

Double Rack	Degree of Rotation Adder Same as Single Rack									
	9/16" (014)		3/4" (033)		1-1/16" (074)		1-1/2" (196)		2" (494)	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Flow Control Both Sides (Q1)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Flow Control Both Sides (Q2)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89
Flow Control Both Sides (Q3)	N/A	N/A	2.16	1.68	2.66	2.08	2.98	2.39	3.65	2.89

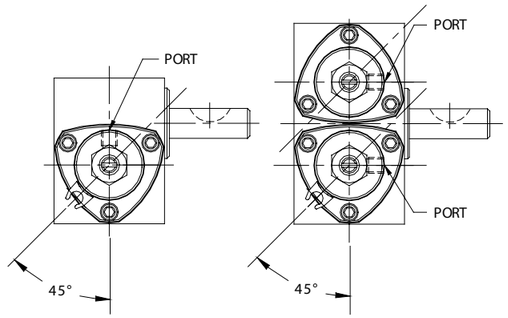
Switch Track (T Option)

Track Locations (All other dimensions remain unchanged)

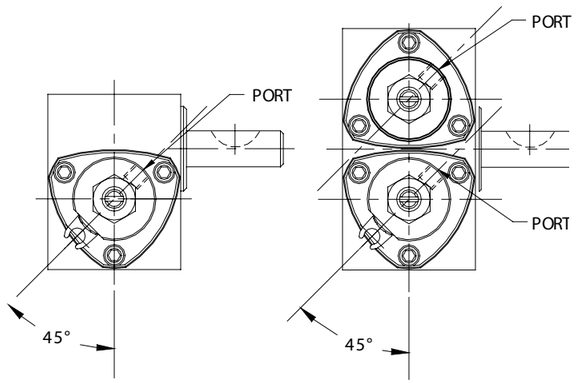
Standard “T” All Bores



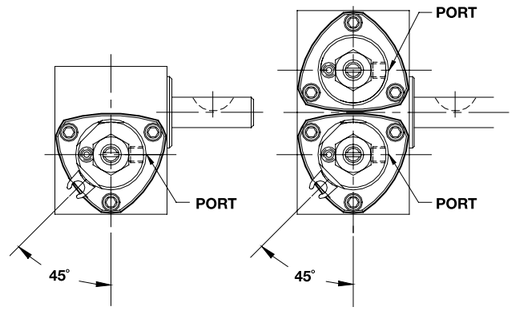
All Other Options
All Bores Except 3/4 & 9/16

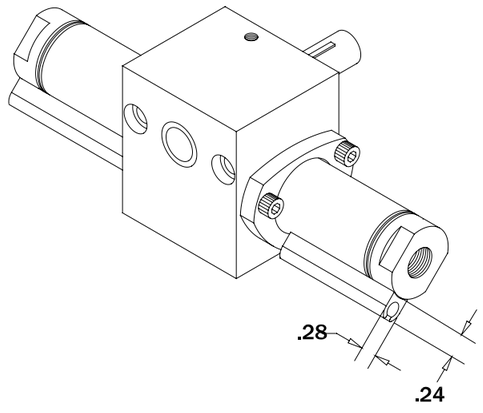


“At” For 3/4 9/16 Bore



“Act” & “Ct” For 3/4 Bore



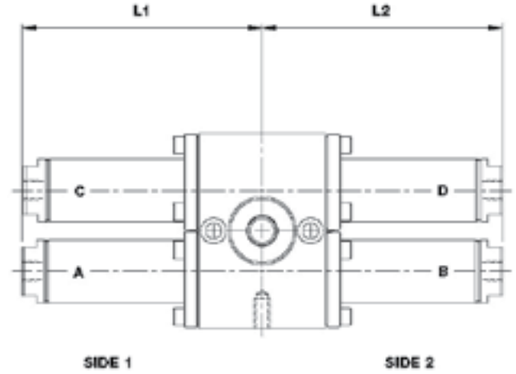


Double Rack Z2 and Z3 Option (in.)

(Dimensional variations from standard as shown.)

Z2 Option
> Adder applies to L1 and L2, bodies A and D only

Z3 Option
> Adder applies to L1 and L2, bodies C and B only

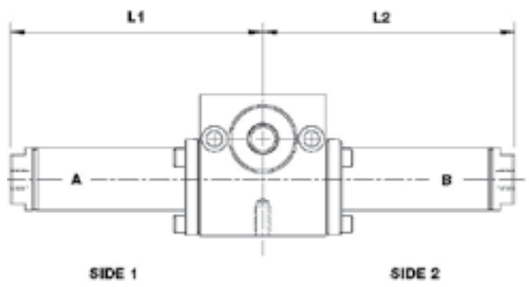


Single Rack Z2 and Z3 Option (in.)

(Dimensional variations from standard as shown.)

Z2 Option
> Adder applies to L1 dimension

Z3 Option
> Adder applies to L2 dimension



Length Adder for Return Spring Option in Inches, per Body

Bore Size	0- 75˚	0- 90˚	0- 120˚	0- 150˚	76- 150˚	91- 180˚	151- 225˚	121- 240˚	181- 270˚	151- 300˚	226- 300˚	241- 360˚	271- 360˚	301- 360˚
9/16"	-	.688	-	-	-	1.313	-	-	1.938	-	-	-	2.563	-
3/4"	-	-	-	.750	-	-	-	-	-	1.438	-	-	-	2.126
1-1/16"	-	-	.813	-	-	-	-	1.375	-	-	-	1.937	-	-
1-1/2"	-	.751	-	-	-	1.439	-	-	2.127	-	-	-	2.815	-
2"	1.262	-	-	-	2.262	-	2.512	-	-	-	4.450	-	-	4.812

	Torque generated by spring (in-lbs.)	
Bore Size	Pre-load	Final
9/16"	0.5	1.0
3/4"	1.0	2.0
1-1/16"	1.0	2.5
1-1/2"	4.0	8.0
2"	12.0	24.0

The model number of Pneu-Turn rotary actuators consists of an alphanumeric cluster designating product type, series, angle of rotation, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Pneu-Turn unit with 1-1/16” bore, single rack, 90° angle of rotation, angle adjustment on both sides, dual shaft, and the high temperature option is shown here.

Angle of Rotation	
045	45
090	90
180	180
270	270
360	360

PT - 037 090 - A1 D V

Bore Size	
006	9/16” bore, single rack
014	9/16”, double rack
017	3/4” bore, single rack
033	3/4” bore, double rack
037	1-1/16” bore, single rack
074	1-1/16” bore, double rack
098	1-1/2” bore, single rack
196	1-1/2” bore, double rack
247	2” bore, single rack
494	2” bore, double rack

Options	
A1	Angle adjustment (both sides)
A2	Angle adjustment (counter-clockwise rotation)
A3	Angle adjustment (clockwise rotation)
B1	Bumpers (both sides)
B2	Bumper (counter-clockwise rotation)
B3	Bumper (clockwise rotation)
C1	Cushions (both sides)[1]
C2	Cushion (counter-clockwise rotation)[1]
C3	Cushion (clockwise rotation)[1]
D	Dual shaft
E	Rear shaft (front portion of dual shaft removed to accommodate hanging axial load)
F	Hardened shaft[2]
G	Polymer grease
K	Square key[3]
M	Magnetic position sensing[4]
N	Low temperature option (-40° F)[5]
Q1	Internal flow control (both sides)[6]
Q2	Internal flow control (counter-clockwise rotation only)[6]
Q3	Internal flow control (clockwise rotation only)[6]
R	Ball bearing[2]
S	Seals - oil serivce[7]
T	Switch track[8]
V	High temperature option (0° F to 400° F)
X	Anti-backlash (for 1-1/16” to 2” bores only)[9]
Z2[10]	Spring return, side A single rack, bodies A and D double rack
Z3[10]	Spring return, side B single rack, bodies C and B double rack

NOTES:
[1] Not available in Series 006 or 014. See below for option combination availability. See pages 362 and 364 for explanation of clockwise/counter-clockwise.
[2] When ordering option F, option R must be ordered. Option R will include dowel pin holes. Dowel pin hole locations shown in Related Products section of this catalog.
[3] 006 and 014 have flat shaft.
[4] Option M can be ordered with option V, but option V’s rating will change to 180° F.
[5] Low temperature bumpers not available.
[6] 3/4”, 1-1/16”, 1-1/2”, 2” bore only.
[7] Oil service applications require 40 psi at all times or leakage will occur. 1/8 NPT ports provided (orifice omitted) for 9/16” and 3/4” bores. For double rack models, oil service seals and 1/8” ports provided on bodies A and C only.
[8] Option T must be ordered in conjunction with Option M. Option M can be ordered with Option V, but Option V’s rating will change to 180° F. See Switch Products section of this catalog for additional switch information.
[9] Option X (Anti-backlash) is available in bore sizes 1-1/16”, 1-1/2” and 2”, single and double rack up to 360° rotation. This option eliminates mid-rotational and end of rotation backlash in single rack models. It also eliminates mid-rotational backlash in double rack models. Double rack models do not have end of rotation backlash. All Pneu-Turns with this option include ball bearings Option R. Use this option to provide smooth rotation along with rotational precision.
[10] Z2 and Z3 options cannot be ordered together. If spring return on both sides is desired, contact Technical Support and request a special. Z2 may be combined with A2 or B2. Z3 may be combined with A3 or B3.

How to Order

ROTARY ACTUATORS

The model number of Three Position Pneu-Turn rotary actuators consists of an alphanumeric cluster designating product type, bore size, total rotation, degrees to mid-position, position of the shaft key at the mid-rotational position, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Three Position Pneu-Turn unit with 1-1/2” bore, single rack, 225° angle of rotation, 45° rotation to middle position, key located at mid-position 8, and angle adjustment on both sides is shown here.

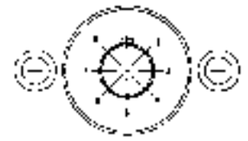
Angle of Total Rotation — **Degrees to mid-position**

PT - 098 225/045 - 8 A1

Bore Size	
006	9/16” bore, single rack
014	9/16”, double rack
017	3/4” bore, single rack
033	3/4” bore, double rack
037	1-1/16” bore, single rack
074	1-1/16” bore, double rack
098	1-1/2” bore, single rack
196	1-1/2” bore, double rack
247	2” bore, single rack
494	2” bore, double rack

Key Location

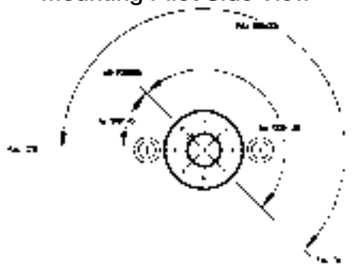
From the graphic below, select the position of the shaft key when the shaft is at the middle position:



Mounting Pilot Side

All other key positions are available. Contact your Bimba distributor.

Mounting Pilot Side View



Example of rotation for PT-098225/045-8A1
Shaft Front View

Options	
A1	Angle adjustment (both sides)
A2	Angle adjustment (counter-clockwise rotation)
A3	Angle adjustment (clockwise rotation)
B1	Bumpers (both sides)
B2	Bumper (counter-clockwise rotation)
B3	Bumper (clockwise rotation)
C1	Cushions (both sides)[1]
C2	Cushion (counter-clockwise rotation)[1]
C3	Cushion (clockwise rotation)[1]
D	Dual shaft
E	Rear shaft (front portion of dual shaft removed to accommodate hanging axial load)
F	Hardened shaft[2]
G	Polymer grease
K	Square key[3]
M	Magnetic position sensing[4]
N	Low temperature option (-40° F)[5]
Q1	Internal flow control (both sides)[6]
Q2	Internal flow control (counter-clockwise rotation only)[6]
Q3	Internal flow control (clockwise rotation only)[6]
R	Ball bearing[2]
S	Seals - oil serivce[7]
V	High temperature option (0° F to 400° F)
X	Anti-backlash (for 1-1/16” to 2” bores only)[8]
Z2[9]	Spring return, side A single rack, bodies A and D double rack
Z3[9]	Spring return, side B single rack, bodies C and B double rack

NOTES:
[1] Not available in Series 006 or 014. See below for option combination availability. See pages 362 and 364 for explanation of clockwise/counter-clockwise.
[2] When ordering option F, option R must be ordered. Option R will include dowel pin holes. Dowel pin hole locations shown in Related Products section of this catalog.
[3] 006 and 014 have flat shaft.
[4] Option M can be ordered with option V, but option V’s rating will change to 180° F.
[5] Low temperature bumpers not available.
[6] 3/4”, 1-1/16”, 1-1/2”, 2” bore only.
[7] Oil service applications require 40 psi at all times or leakage will occur. 1/8 NPT ports provided (orifice omitted) for 9/16” and 3/4” bores. For double rack models, oil service seals and 1/8” ports provided on bodies A and C only.
[8] Option X (Anti-backlash) is available in bore sizes 1-1/16”, 1-1/2” and 2”, single and double rack up to 360° rotation. This option eliminates mid-rotational and end of rotation backlash in single rack models. It also eliminates mid-rotational backlash in double rack models. Double rack models do not have end of rotation backlash. All Pneu-Turns with this option include ball bearings Option R. Use this option to provide smooth rotation along with rotational precision.
[9] Z2 and Z3 options cannot be ordered together. If spring return on both sides is desired, contact Technical Support and request a special. Z2 may be combined with A2 or B2. Z3 may be combined with A3 or B3.

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Option Combination Availability

Due to design or compatibility restrictions, the following options may not be ordered in combination. For example, F and E options are not available in combination.

	Options											
Series	**A**	**B**	**C**	**D**	**E**	**F**	**N**	**Q**	**R***	**S**	**X**	**Z**
9/16" (006)	S	S	N/A	E	D,F,R,X	D,E,K	B,G,M,V	N/A	E	A,B		B,C
9/16" (014)		S	N/A	E	D,F,R,X	D,E,K	B,G,M,V	N/A	E	B		B,C
3/4" (017)	S	C,S	B,Q,S	E	D,F,R,X	D,E,K	B,G,M,Q,V	A,C,N,S	E	A,B,C		B,C
3/4" (033)		C,S	B,Q,S	E	D,F,R,X	D,E,K	B,G,M,Q,V	A,C,N,S	E	B,C		B,C
1-1/16" (037)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/16" (074)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/2" (098)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
1-1/2" (196)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
2" (247)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C
2" (494)		C,S	B,Q,S	E	D,F,R,X	D,E,K,X	B,G,M,Q,V	A,C,N,S	E	B,C	E,F	B,C

* Temperature range of ball bearing option with high temperature option is 0˚F to +250˚F.
Option T - "Switch track" should only be ordered with options M or V if the actuator will be operated between -20˚ to 85˚

Option Combination Availability (Three Position Models)

This chart provides the options that cannot be combined due to design or compatibility restrictions. For example, F and E options are not available in combination.

	Option														
Series	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**K**	**M**	**N**	**Q**	**R**	**S**	**V**	**X**
9/16" Single	S	N,Q,S	N/A	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,V	N/A	E	A,B,G	N	N/A
9/16" Double	S	N,Q,S	N/A	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,V	N/A	E	A,B,G	N	N/A
3/4" Single	Q,S	C,N,S	B,Q,S	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	A,B,C,G,Q	N	N/A
3/4" Double	Q,S	C,N,S	B,Q,S	E,F	D,F,R	D,E,K	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	A,B,C,G,Q	N	N/A
1-1/16" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/16" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/2" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
1-1/2" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
2" Single	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F
2" Double	Q	C,N,S	B,Q,S	E,F	D,F,R,X	D,E,K,X	N,S	F	N	B,G,M,Q,V	A,C,N,S	E	B,C,G,Q	N	E,F

How to Order Repair Kits

To order individual parts, simply place the applicable "PT" number in front of your cylinder part number.

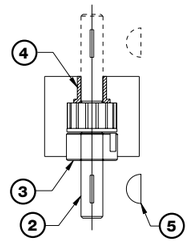
Example: for a replacement shaft/pinion assembly for part number PT-098180-A1C1, order part number PT2-PT-098180-A1C1. For the PT6 or PT3, specify the location at the end, i.e. PT6-PT-098180-A1C1-AB.

Part No.	Part Description	Options	Location
*PT1	Actuator Body	only possible option needed R	
*PT2	Shaft/Pinion Assembly	only possible options needed D, E, F, K, R	
*PT3	Front Shaft Bearing	only possible option needed R	
*PT4	Rear Shaft Bearing	only possible option needed R	
*PT5	Shaft Key	only possible option needed K	
*PT6	Piston/Rack Assembly	only possible options needed B, C, M, S, X	AB or CD
*PT7	Rack Support	only possible option needed X	
*PT8	Piston Seal	only possible options needed S, V	
*PT9	Piston Wear Ring	no options	
*PT10	Magnet	no options	
*PT11	Bumper	only possible options needed V	
*PT12	Bearing Retainer Set Screw	no options	
PT13	Body Assembly	only possible options needed A, B, C, M, S, T, V	A, B, C, or D
*PT14	Body Retainer Cap Screw	no options	
*PT15	Body Thread Seal	only possible options needed V	
*PT16	Body Thread Seal Ring	no options	
*PT17	Body Jam Nut	no options	
*PT18	Angle Adj. Screw	only possible options needed C, S (A if with S)	
*PT19	Retaining Ring	no options	
*PT20	Shim Package	no options	
#PT21	Shaft Spacers	no options	
*K-A-PT	Bearing Kit	only possible option needed R	
*K-L-PT	Seal Kit	only possible options needed S, V, N	
*K-S-PT	Shaft Kit	only possible options needed D, E, F, K, R	

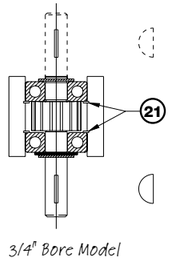
How to Repair

Bimba Pneu-Turn actuators are repairable. A list of the individual components is given below that together make up a Pneu-Turn actuator.

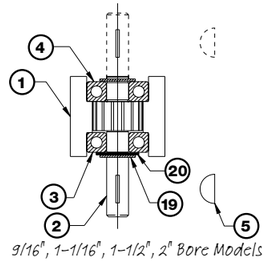
Standard Shaft



Ball Bearing (R) Option

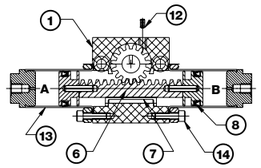


3/4" Bore Model

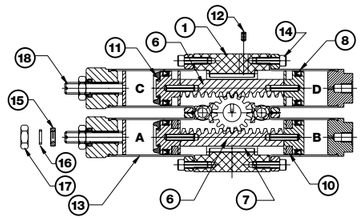


9/16", 1-1/16", 1-1/2", 2" Bore Models

Single Rack Model



Double Rack Model



Repair Parts

No.	Part Description	Quantity Required	
		Single	Double
PT1	Actuator Body	1	1
PT2	Shaft/Pinion Assembly	1	1
PT3	Front Shaft Bearing	1	1
PT4	Rear Shaft Bearing	1	1
PT5	Shaft Key	1	1
PT6	Piston/Rack Assembly (Includes Rack, Roll Pins and 2 Pistons)	1	2
PT7	Rack Support	1	2
PT8	Piston Seal[1]	2	4
PT9	Piston Wear Ring (Required for Oil Service only)	2	2
PT10	Magnet	2	2

No.	Part Description	Quantity Required	
		Single	Double
PT11	Bumper	2	2
PT12	Bearing Retainer Set Screw	1	1
PT13	Cylinder Body Assembly (Includes Body, End Cap, and Retainer Ring)	2	4
PT14	Cylinder Body Retainer Cap Screw[3]	6	12
PT15	Cylinder Body Thread Seal	2	2
PT16	Cylinder Body Thread Seal Ring	2	2
PT17	Cylinder Body Jam Nut	2	2
PT18	Angle Adjustment Screw	2	2
PT19	Retaining Ring	2	2
PT20	Shim Package	1	1
PT21	Shaft Spacers[2]	1	1

Repair Kits

Bearing Kit (K-A-PT)[4]		
PT3	Front Shaft Bearing	1
PT4	Rear Shaft Bearing	1

Shaft Kit (K-S-PT)		
PT2	Shaft/Pinion Assembly	1
PT5	Shaft Key	1

Seal Kit (K-L-PT)[1]		
PT8	Piston Seals	2

[1] Double Rack Models require two repair kits per rotary actuator. Oil Service Option: Single Rack models require four oil service seals or two oil service seal kits. Double Rack models require four oil service seals and two standard seals or two oil service seal kits and one standard seal kit.
[2] Used on 3/4" bore single and doubl rack units with Ball Bearing option.
[3] 2" bore requires 8 or 16.
[4] Bearing Kit for Ball Bearings includes retaining rings and shim package.

MHRQ Rotary Actuators

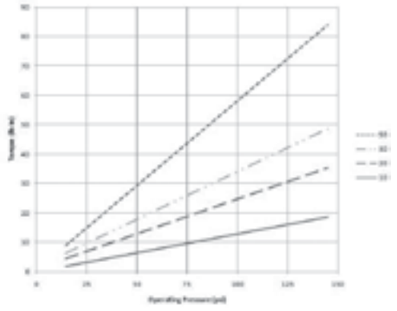
Engineering Specifications

Model		10	20	30	50
Fluid		Air (Clean/Dry)			
Action		Double Rack and Pinion (Double Acting)			
Pressure Range	Bolt Adjustment	14 to 145 PSI (0.1 to 1.0 MPa)			
	Shock Absorber	14 to 87 PSI (0.1 to 0.6 MPa)			
Proof Pressure		215 PSI (1.5 MPa)			
Temperature Range		32 °F to 140 °F (0 °C to 60 °C)			
Adjustment Angle Range		0° to 190° Rotation			
Repeatable Precision	Bolt Adjustment	0.2°			
	Shock Absorber	0.05°			
Rotation Times (s/90°)	Bolt Adjustment	0.2~1.0			
	Shock Absorber	0.2~0.7			
Cushion Type	Bolt Adjustment	Rubber Bumper			
	Shock Absorber	Shock Absorber			
Port Size		M5 X 0.8		Rear Ports 1/8 NPT Side Ports M5 X 0.8	
Sensor Switch Compatibility[1]	Reed Switch	MCS1-H			
	Solid State Switch	MDS1-H			
Includes		Magnet			

[1] See Switch chapter for switch specifications



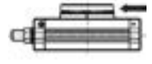
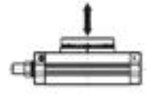
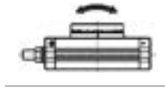
Torque Output



Maximum Energy Absorbsion (J)

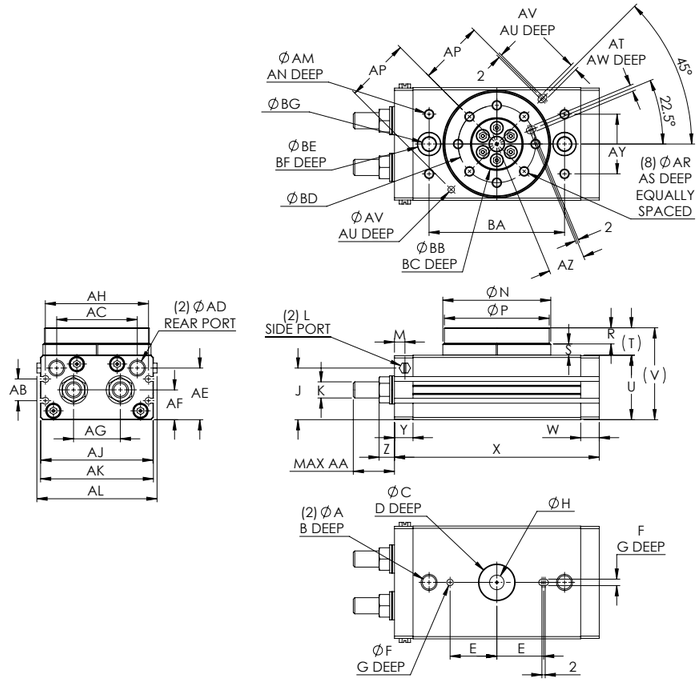
Model	With Bolt Adjustment	With Shock Absorber
MHRQ10	0.01	0.04
MHRQ20	0.025	0.12
MHRQ30	0.05	0.12
MHRQ50	0.08	0.30

Maximum Loads

	Loading Type	MHRQ10	MHRQ20	MHRQ30	MHRQ50
	Maximum allowed radial loading	80N (18lbs)	150N (33.7lbs)	200N (45lbs)	300N (67.4lbs)
	Maximum allowed axial loading	80N (18lbs)	150N (33.7lbs)	200N (45lbs)	300N (67.4lbs)
	Maximum allowed bending moment	2.5Nm (22.1in-lbs)	4.0Nm (35.4in-lbs)	5.5Nm (48.7in-lbs)	10.0Nm (88.5in-lbs)

How to Specify

Dimensions (mm)



Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P
MHRQ10	M8 X 1.25	12	15 +.043/-0	3	20	3 +.03/-0	3.5	5	29	M10 X 1.0	M5 X 0.8	4.5	46 +0/-0.062	45 +0/-0.062
MHRQ20	M10 X 1.5	15	17 +.043/-0	2.5	25	4 +.03/-0	4.5	9	30	M12 X 1.0	M5 X 0.8	6	61 +0/-0.074	60 +0/-0.074
MHRQ30	M10 X 1.5	15	22 +.052/-0	3	29	4 +.03/-0	4.5	9	34	M12 X 1.0	M5 X 0.8	6.5	67 +0/-0.074	65 +0/-0.074
MHRQ50	M12 X 1.75	18	26 +.052/-0	3	34	5 +.03/-0	5.5	10	38	M14 X 1.5	M5 X 0.8	10	77 +0/-0.074	75 +0/-0.074

Model	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM
MHRQ10	8	4.5	13	34	47	9.5	92	9.5	9.5	17.5* / 28.5**	13.5	34.5	M5 X 0.8	28	15.5	20.5	45	49.5	50	54.5	M5 X 0.8
MHRQ20	10	6.5	17	37	54	11	117	11	9.8	26* / 39**	12	47	M5 X 0.8	30	16	27.5	59	64.5	65	69.5	M6 X 1.0
MHRQ30	10	6.5	17	40	57	11.5	127	11.5	9.5	25.5* / 39**	13.5	50	1/8 NPT	32	18.5	29	64	69.5	70	74.5	M6 X 1.0
MHRQ50	12	7.5	20	46	66	15	152	15	14	31.5* / 51**	15	63	1/8 NPT	38	22	38	74.5	79.5	80	84.5	M8 X 1.25

Model	AN	AP	AR	AS	AT	AU	AV	AW	AY	AZ	BA	BB	BC	BD	BE	BF	BG
MHRQ10	8	28	M5 X 0.8	8	3 +.03/-0	3.5	3 +.03/-0	3.5	27	15	60	20 +.052/-0	4.5	32	11	6.5	6.5
MHRQ20	8	37	M6 X 1.0	10	4 +.03/-0	4.5	4 +.03/-0	4.5	34	20.5	76	28 +.052/-0	6.5	43	14	8.5	8.5
MHRQ30	8	40	M6 X 1.0	10	4 +.03/-0	4.5	4 +.03/-0	5	37	23	84	32 +.062/-0	5	48	14	8.5	8.5
MHRQ50	8	46	M8 X 1.25	12	5 +.03/-0	5.5	5 +.03/-0	6	50	26.5	100	35 +.062/-0	5.5	55	18	10.5	10.5

* Bolt Adjustment
** Shock Absorber

How to Order

The model number of MHRQ rotary actuators consists of an alphanumeric cluster designating product line, model, and end stop that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic model 20 MHRQ unit with shock absorbers is shown here.

MHRQ 20-A

Product Line
MHRQ Series

Model
10
20
30
50

End Stop
Blank = Bolt Adjustment
A = Shock Absorber

Notes

Ultran Cylinders

Bimba Ultran® Rodless cylinders feature magnets on the carriage and piston that form a strong bond that holds them together. When the cylinder is actuated, the piston and carriage move back and forth as one unit. Ultran® Band cylinders are mechanically coupled and utilize a specially engineered sealing strip to provide exceptional band life. Common application uses for Ultran® cylinders include transferring product, feeding, opening doors, cutting, and more.







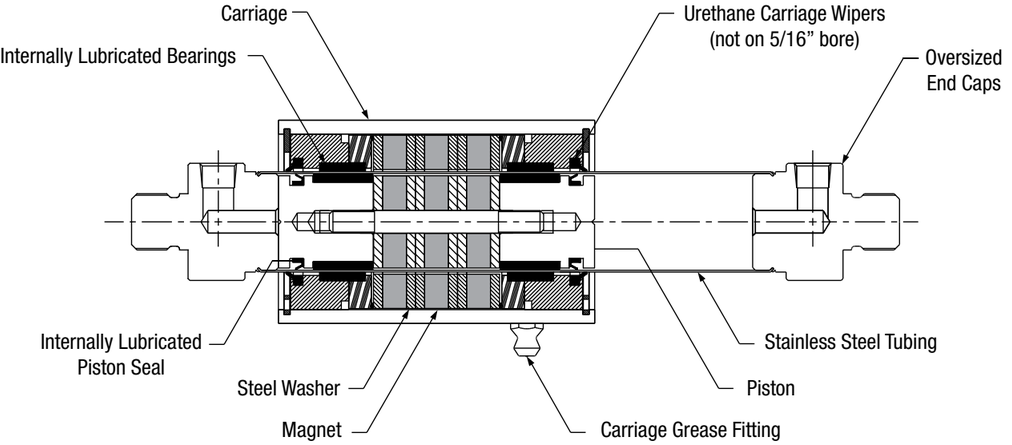
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385 Ultran/Ultran Slide
- 385 – Product Features
- 387 – Engineering Specifications
- 388 – Application Possibilities
- 389 – Size/Application Considerations (Ultran)
- 390 – Velocity vs. Load for Basic Ultran Models
- 392 – Size/Application Considerations (Ultran Slide)
- 394 – Dimensions (Ultran)
- 395 – Stroke Adjustment (Ultran)
- 396 – Axial Ports (in) (Ultran)
- 396 – Floating Mount Bracket (in) (Ultran)
- 397 – Pivot Option (in) (Ultran)
- 397 – Switch Track for Miniature Switches (Ultran Slide)
- 398 – Ultran Slide Mounting Instructions
- 398 – Dowel Pin Hole Locations
- 399 – Dimensions (Ultran Slide)
- 400 – Shock Absorber/Stroke Adjustment (in) (Ultran Slide)
- 401 – Mounting Block (in)
- 402 – Shock Absorber/Switch Bracket (for 9/16” bore and larger only) (Ultran)
- 403 – How to Order (Ultran)
- 404 – How to Order (Ultran Slide)
- 405 – Basic Repair Kits (Ultran Slide)

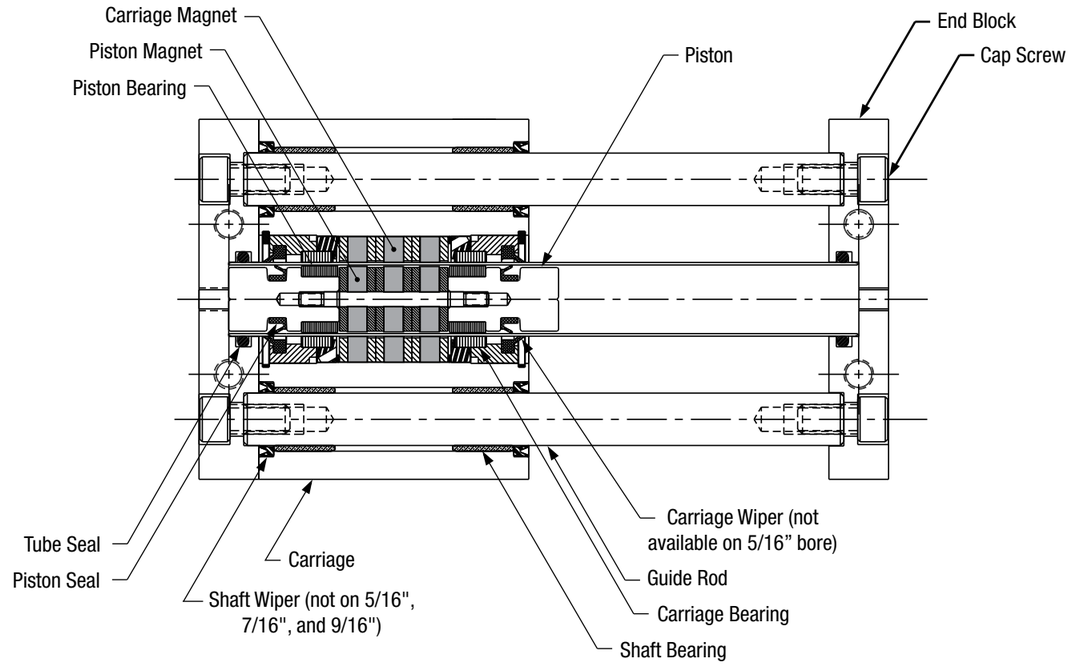
406 Ultran High Load Slide
- 406 – Features and Benefits
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- 409 – Size/Application Considerations
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- 413 – Shock Absorber/Stroke Adjustment (in)
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- 421 - Floating Mounting Bracket
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- 424 - Mounting Block
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- 426 - How to Order
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Ultran



Ultran Slide

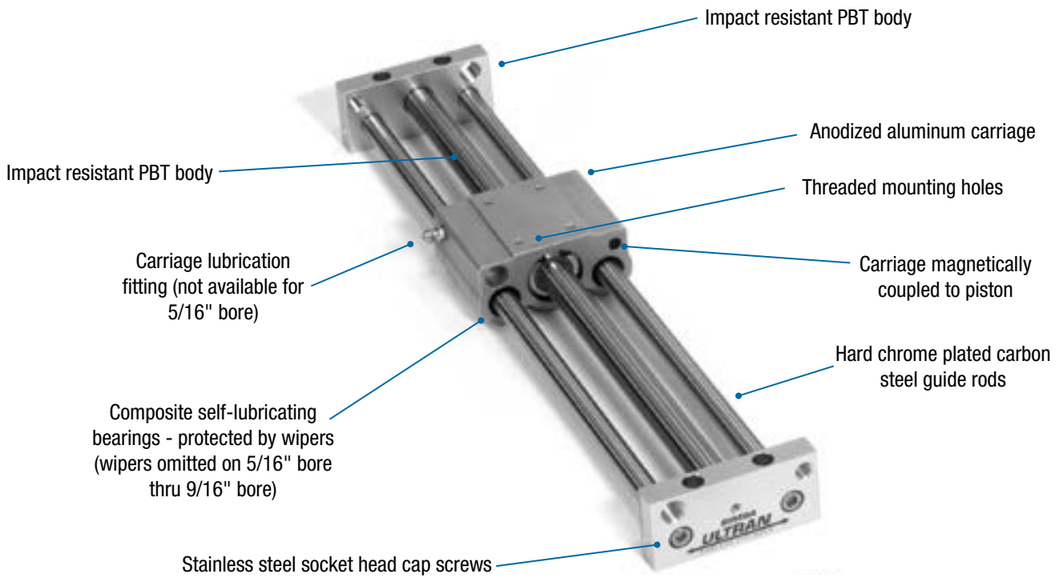


The above cutaway drawings show how Bimba magnetically-coupled Ultran rodless cylinders work. Three magnets are located on the carriage, with three matching magnets on the piston. (For 5⁄16" bore, five magnets are used.) These magnets form a strong bond that holds the carriage and piston together. When the cylinder is actuated, the piston and carriage move as one unit. The magnetic attraction between the magnets determines a cylinder's magnetic coupling strength.

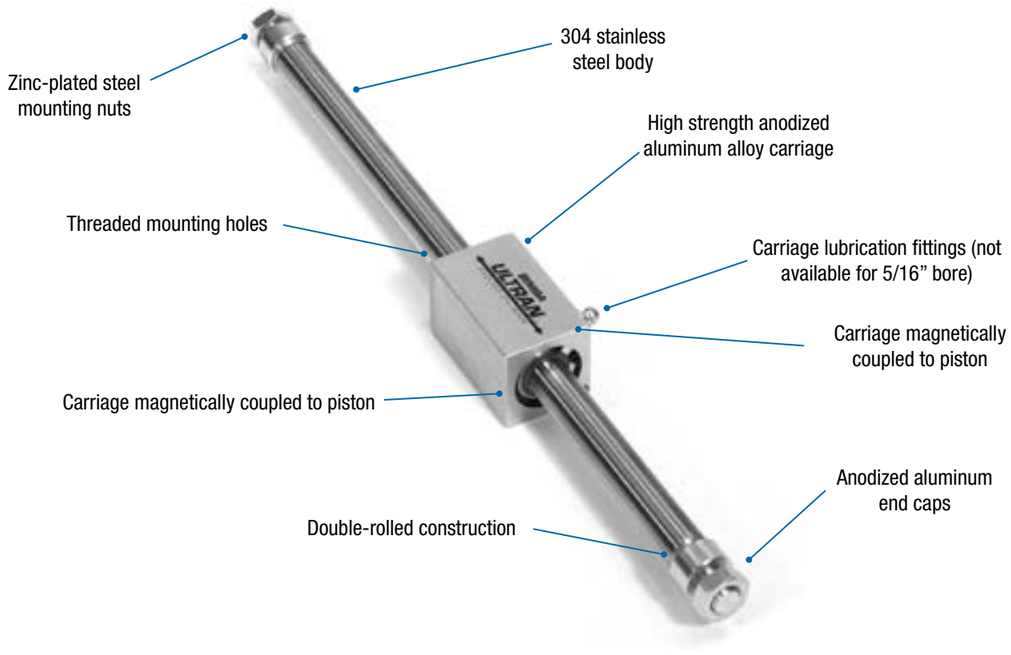
Ultran rodless cylinders provide one of the highest coupling strengths available, carrying higher loads without causing the piston to uncouple from the carriage. Bimba also offers two magnetic coupling strength options (Gold and Silver) to suit a wide variety of applications. The Silver option uses two sets of magnets instead of three. (For 5⁄16" bore, four sets of magnets are used.)

Bimba offers a model with built-in guides (Ultran Slide) and an unguided unit (Ultran).

Ultran Slide



Ultran



Engineering Specifications (Ultran and Ultran Slide)

Ratings

Pressure Rating:	100 PSI (Air or Hydraulic)
Temperature Range:	0° to 170°F
Breakaway:	Ultran Gold Coupling Strength - Less than 25 PSI
	Ultran Silver Coupling Strength - Less than 20 PSI
	Ultran Slide Gold Coupling Strength - Less than 30 PSI
	Ultran Slide Silver Coupling Strength - Less than 25 PSI

Magnetic Coupling Strength (lbs)

Cylinder Bore	Ultran Gold (UG/UGS)	Ultran Silver (US/USS)
5/16" (007)	13	8
7/16" (01)	20	10
9/16" (02)	29	16
3/4" (04)	61	33
7/8" (06)	102	55
1-1/16" (09)	127	74
1-1/4" (12)	190	110
1-1/2" (17)	270	150
2" (31)	552	332

Weight (lbs) (Ultran)

Cylinder Bore	Base Weight (0" Stroke)		Adder per 1"
	(UG)	(US)	
5/16" (007)	0.10	0.09	0.006
7/16" (01)	0.22	0.21	0.01
9/16" (02)	0.56	0.51	0.01
3/4" (04)	1.18	1.11	0.02
7/8" (06)	1.54	1.42	0.02
1-1/16" (09)	2.54	2.34	0.03
1-1/4" (12)	3.16	2.90	0.03
1-1/2" (17)	6.36	5.76	0.05
2" (31)	16.46	15.15	0.07

Weight (lbs) (Ultran Slide)

Cylinder Bore	Base Weight (0" Stroke)		Adder per 1"
	(UGS)	(USS)	
5/16" (007)	0.24	0.23	0.05
7/16" (01)	0.52	0.51	0.08
9/16" (02)	1.44	1.38	0.10
3/4" (04)	2.70	2.58	0.13
7/8" (06)	3.61	3.49	0.21
1-1/16" (09)	5.66	5.47	0.28
1-1/4" (12)	7.38	7.12	0.35
1-1/2" (17)	14.48	13.90	0.49
2" (31)	38.48	37.17	1.13

Lubrication

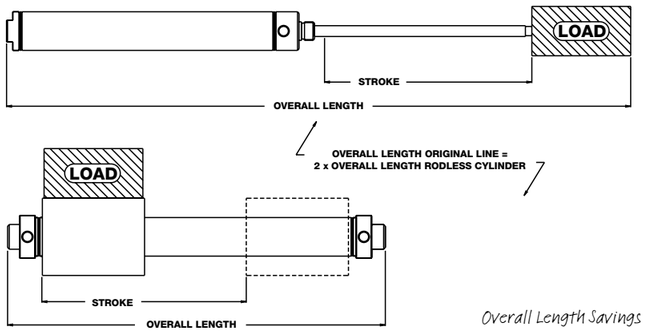
The Ultran rodless cylinder is pre-lubricated at the factory with a permanent grease eliminating the need for airline lubrication. The carriage should be lubricated every 100 linear miles with a high grade of bearing grease. Other types of pre-lubrication are available upon request. The lubricant used by the factory can be ordered as part number MS-2861-14OZ. The lubricant is packaged in a 14 oz grease gun cartridge.

Repairs

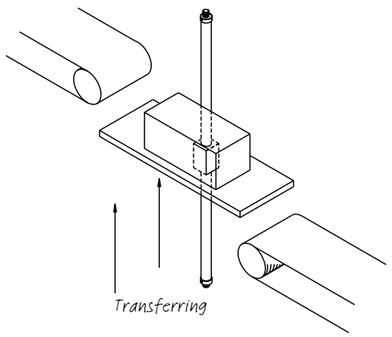
The Ultran rodless cylinder must be returned to the factory for repairs. Repair parts are available for the Ultran Slide - see How to Repair on page 405.

Application Possibilities

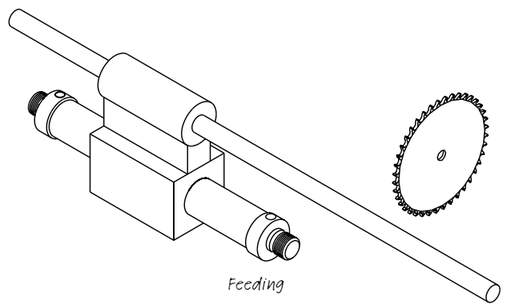
Save space and streamline your design with the Bimba Ultran rodless cylinder.



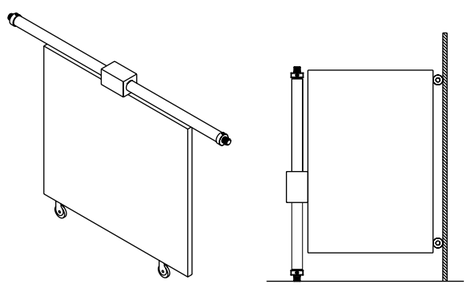
Overall Length Savings



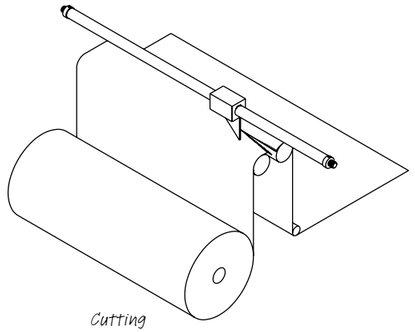
Transferring



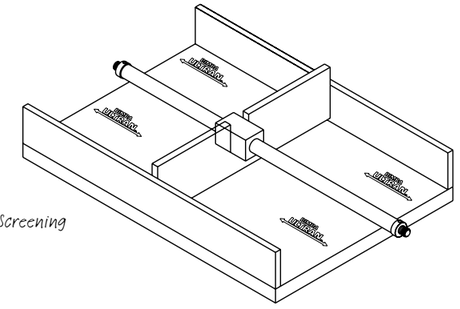
Feeding



Door Opening



Cutting



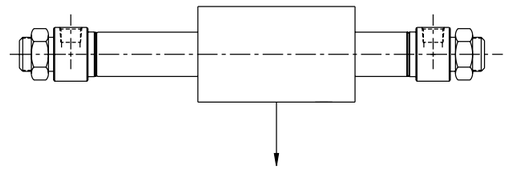
Silk Screening

Size/Application Considerations (Ultran)

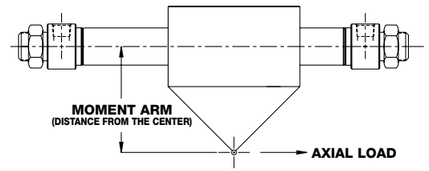
Each bore size of the Bimba Ultran Slide rodless cylinder has specific load carrying capabilities. These capabilities can be enhanced by externally supporting the load or by ordering the internal cushion option or external shock absorbers. The load should always be guided and supported for optimum life. Cushions or shock absorbers will also increase cylinder life when used properly. Use the following procedures to determine the requirements for specific applications.

NOTE: Exceeding the load can cause the carriage and piston to decouple.

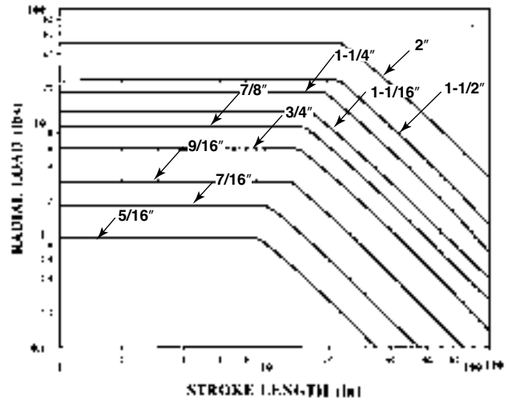
1. Check radial load requirements. Graph C, Radial Load vs. Stroke Length, shows the maximum radial load the cylinder will support for a specific bore size and stroke length. If your radial load requirements fall above the curve, the load must be externally supported.
2. Check axial load requirements. Graph D, Axial Load vs. Moment Arm, shows the maximum axial load the cylinder will support for a specific bore size and moment arm length. If your axial load requirements fall above the curve for the specific bore size, the load must be externally supported.
3. Check End-of-Stroke Velocity and Load Requirements. From Graphs E through H, Velocity vs. Load, choose the graph for your Ultran model and mounting position. If your velocity and load requirements fall above the curve for the specific bore size, you will need internal cushions or external shock absorbers to decelerate the load without causing the carriage and piston to decouple.
4. Maximum Velocity. If cylinder speed will exceed 20 in/sec or cycle rate will exceed 15 per minute, special application considerations may be required. Please consult your local distributor.
5. Internal Cushions. From Graphs I through L, Velocity vs. Load for Cushions, choose the graph for your Ultran model and mounting position. If your velocity and load requirements fall above the curve for the specific bore size, you will need external shock absorbers to decelerate the load.
6. External Shock Absorbers. Choose from Graphs EE through RR (Related Products), Velocity vs. Load for Shock Absorbers, for your bore size. Choose model LS, SS or HS based on your velocity and load.



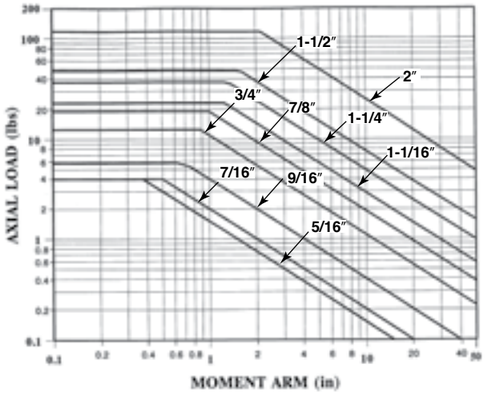
Radial Load



Radial Load Vs Stroke Length*



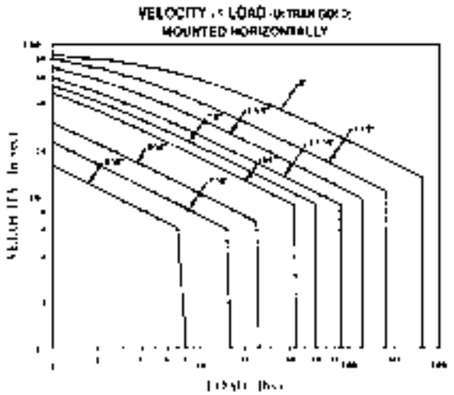
Axial Load Vs Moment Arm

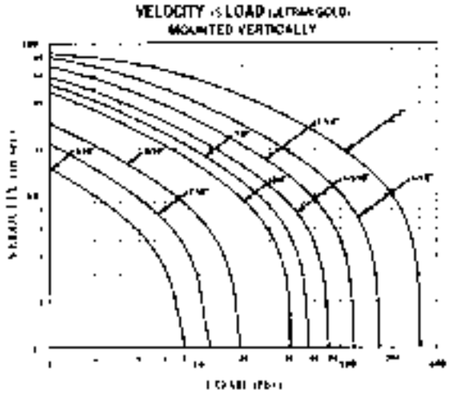


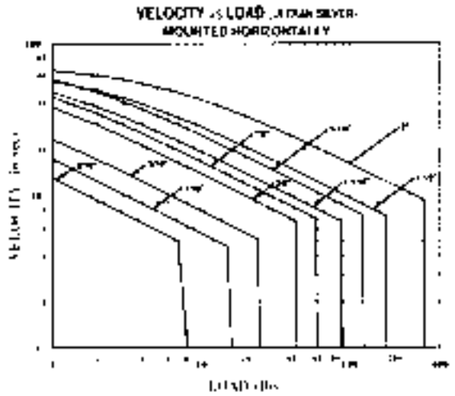
*Stud mount only. Consult factory if pivot mounted.

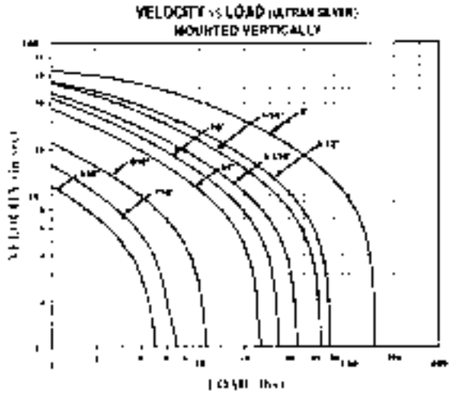
Velocity vs. Load for Basic Ultran Models

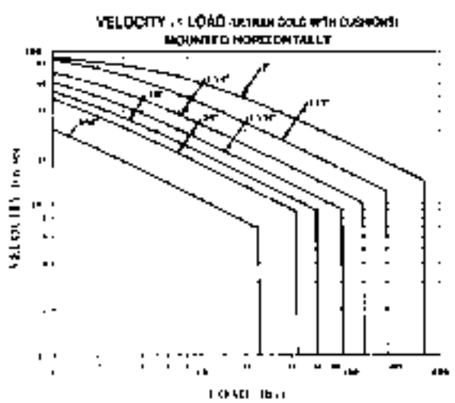
NOTE: Velocities in excess of 20 in/sec require application review by Bimba.

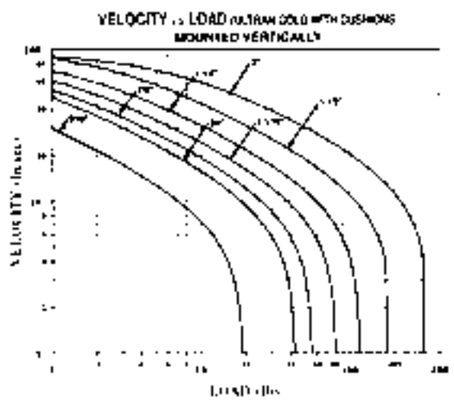






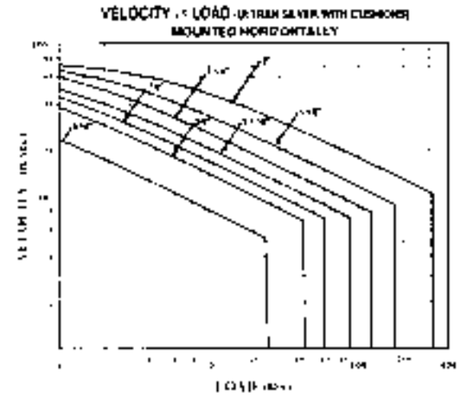


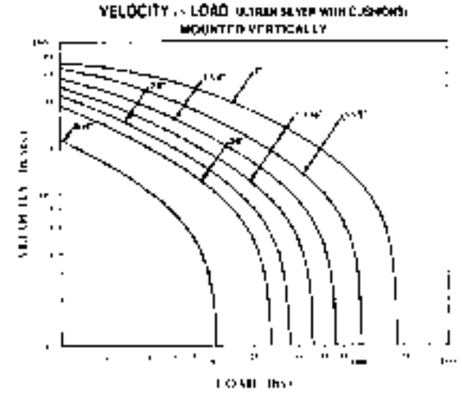




Velocity vs. Load for Basic Ultran Models

NOTE: Velocities in excess of 20 in/sec require application review by Bimba.





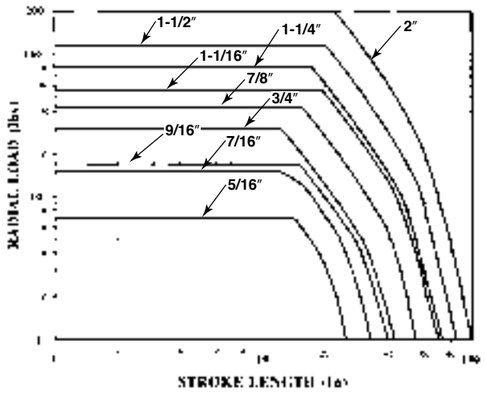
Size/Application Considerations (Ultran Slide)

Each bore size of the Bimba Ultran Slide rodless cylinder has specific load carrying capabilities. These capabilities can be enhanced by ordering external shock absorbers. Shock absorbers will also increase cylinder life when used properly. Use the following procedures to determine the requirements for specific applications.

NOTE: Exceeding the load can cause the carriage and piston to decouple.

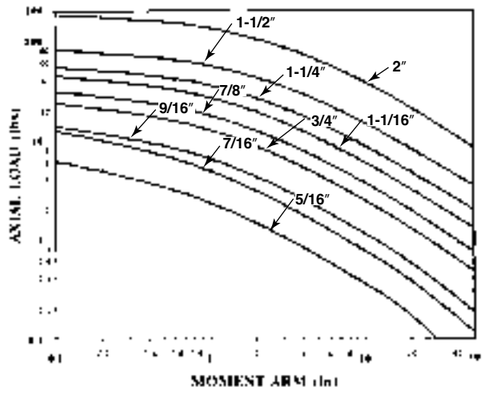
1. Check side load or radial load requirements. Graph A, Side Load/Radial Load vs. Stroke Length, shows the maximum load the cylinder will support for a specific bore size and stroke length.
2. Check axial load requirements. Graph B, Axial Load vs. Moment Arm, shows the maximum load the cylinder will support for a specific bore size and stroke length. Use the illustrations and formulas beside the graph to determine the load on the Ultran Slide.
3. External Shock Absorbers. If your load requirements fall above the curve for the specific bore size, external shock absorbers may allow you to decelerate the load. Choose from Graphs M through DD - Velocity versus Load for Related Products for your bore size.
4. Maximum Velocity. If cylinder speed will exceed 20 in/sec or cycle rate will exceed 15 per minute, special application considerations may be required. Please consult your local distributor.

SIDE/RADIAL LOAD vs STROKE LENGTH



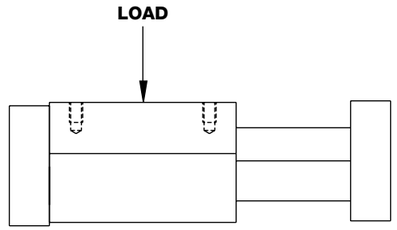
Graph A

AXIAL LOAD vs MOMENT ARM

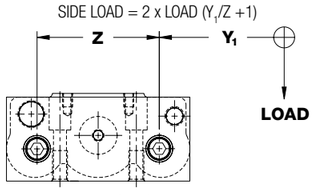


Graph B

Radial Load

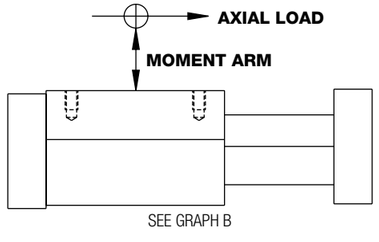


Side Load



Cylinder Bore	Z
5/16" (007)	1.312
7/16" (01)	1.562
9/16" (02)	2.000
3/4" (04)	2.518
7/8" (06)	2.750
1-1/16" (09)	3.062
1-1/4" (12)	3.500
1-1/2" (17)	4.500
2" (31)	5.750

Axial Load



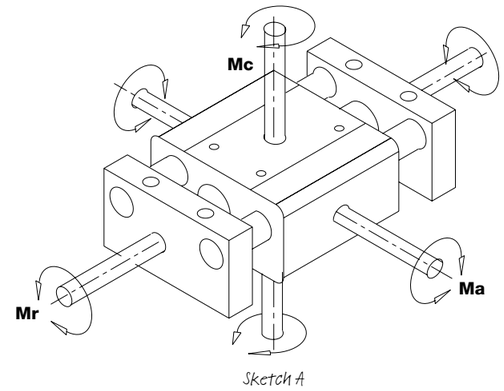
Size/Application Considerations (Ultran Slide)

Moments About the Carriage:

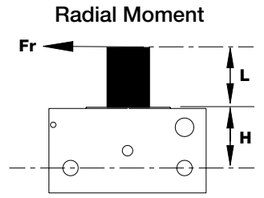
The table below gives the maximum allowable moment an Ultran Slide will support. There are three different directions that the moment can be applied (see Sketch A).

Maximum Allowable Moment (in-lb)

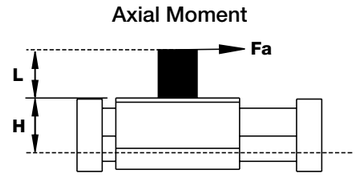
Bore	Radial Mr max.	Axial Ma max.	Cross MC max.	H
5/16" (007)	2.3	5.2	5.2	0.625
7/16" (01)	4.9	9.4	9.4	0.656
9/16" (02)	6.6	17.2	17.2	0.906
3/4" (04)	11.1	37.5	37.5	1.168
7/8" (06)	14.3	68.4	68.4	1.374
1-1/16" (09)	19.5	89.1	89.1	1.563
1-1/4" (12)	26.5	160	160	1.937
1-1/2" (17)	40.4	250	250	2.281
2" (31)	67.0	800	800	3.000



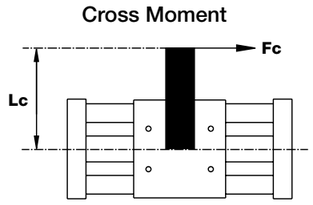
Sketch A



Sketch B



Sketch C



Sketch D

Sketches B, C, and D demonstrate how a force is applied to a moment arm to produce the moments shown in Sketch A. Use the equations below to determine the actual moments created by your application. The results of each calculated moment should be compared to the maximums listed in the table. (If the actual moments are greater than the listed maximums, then the load and moments should be evaluated using the next larger Ultran Slide.)

Radial Moment = Mr = Fr x (L+H)

Axial Moment = Ma = Fa x (L+H)

Cross Moment = Mc = Fc x (Lc)

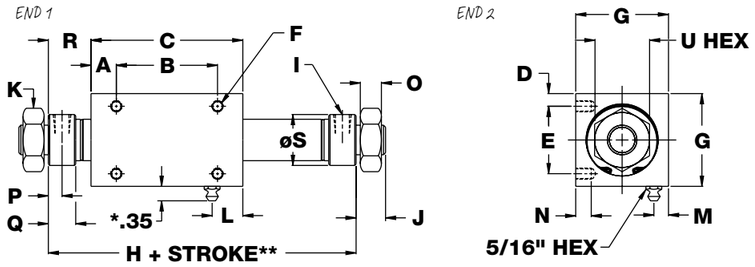
An Ultran Slide can withstand compound moments but the maximum allowable will be determined by the total percentage of the axial, radial and cross moments. The equation below will determine the compound moment percent based on the total moments. The compound moment percent must not be greater than 100. (If the compound moment percent is greater than 100, then the load and moments should be evaluated using the next larger Ultran Slide.)

$$M\ compound\ \% = 100 \times \left(\frac{Mr}{Mr\ max} + \frac{Ma}{Ma\ max} + \frac{Mc}{Mc\ max} \right) < \underline{100}\%$$

Dimensions (Ultran)

Bore	A	B	C	D	E	F	G	H	I	J
5/16" (007)	0.344	1.062	1.750	0.141	0.469	4-40-UNC	0.750	3.014	10-32	0.368
7/16" (01)	0.344	1.188	1.875	0.125	0.750	6-32 UNC	1.000	3.139	10-32	0.438
9/16" (02)	0.375	1.500	2.250	0.188	1.000	8-32 UNC	1.375	3.514	10-32	0.438
3/4" (04)	0.562	1.750	2.875	0.188	1.375	10-24 UNC	1.750	4.875	1/8 NPT	0.625
7/8" (06)	0.500	2.125	3.125	0.188	1.625	10-24 UNC	2.000	5.125	1/8 NPT	0.625
1-1/16" (09)	0.500	2.500	3.500	0.250	1.750	1/4-20 UNC	2.250	5.500	1/8 NPT	0.625
1-1/4" (12)	0.562	2.750	3.875	0.250	2.125	1/4-20 UNC	2.625	5.875	1/8 NPT	0.875
1-1/2" (17)	0.500	3.500	4.500	0.312	2.500	5/16-18 UNC	3.125	6.500	1/8 NPT	0.875
2" (31)	1.188	5.000	7.375	0.500	3.250	1/2-13 UNC	4.250	10.000	1/4 NPT	1.000

Bore	K	L	M	N	O	P	Q	R	S	U
5/16" (007)	5/16-24 NUT	N/A	N/A	0.125	0.188	0.203	0.406	0.632	0.625	0.500
7/16" (01)	7/16-20 NUT	0.395	0.312	0.125	0.250	0.203	0.406	0.632	0.704	0.688
9/16" (02)	7/16-20 NUT	0.455	0.312	0.220	0.250	0.203	0.406	0.632	0.755	0.688
3/4" (04)	5/8-18 NUT	0.572	0.375	0.312	0.375	0.315	0.630	1.000	0.985	0.938
7/8" (06)	5/8-18 NUT	0.635	0.375	0.375	0.375	0.315	0.630	1.000	1.110	0.938
1-1/16" (09)	5/8-18 NUT	0.706	0.500	0.375	0.375	0.315	0.630	1.000	1.297	0.938
1-1/4" (12)	3/4-16 NUT	0.750	0.375	0.500	0.420	0.315	0.630	1.000	1.545	1.125
1-1/2" (17)	3/4-16 NUT	0.756	0.750	0.520	0.420	0.315	0.630	1.000	1.735	1.125
2" (31)	1-1/4-12 NUT	1.500	0.750	0.750	0.500	0.438	0.875	1.312	2.312	1.875

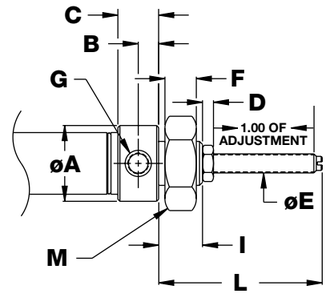


*Grease fitting on 2" bore is recessed.
**See page 395 for option length adders.

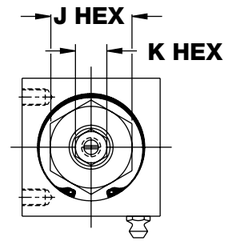
Stroke Adjustment (Ultran)

Stroke Adjustment Dimensions (in)

Bore	A	B	C	D	E	F
5/16" (007)	0.625	0.203	0.406	0.094	6-40 UNF	0.188
7/16" (01)	0.704	0.203	0.406	0.109	10-32 UNF	0.250
9/16" (02)	0.755	0.203	0.406	0.109	10-32 UNF	0.250
3/4" (04)	0.985	0.315	0.630	0.156	1/4-28 UNF	0.375
7/8" (06)	1.110	0.315	0.630	0.188	5/16-24 UNF	0.375
1-1/16" (09)	1.297	0.315	0.630	0.188	5/16-24 UNF	0.375
1-1/4" (12)	1.545	0.315	0.630	0.220	3/8-24 UNF	0.420
1-1/2" (17)	1.735	0.315	0.630	0.220	3/8-24 UNF	0.420
2" (31)	2.312	0.438	0.875	0.250	7/16-20 UNF	0.500



Bore	G	I	J	K	L	M
5/16" (007)	10-32	0.368	0.500	0.188	1.795	5/16-24 NUT
7/16" (01)	10-32	0.438	0.688	0.313	1.469	7/16-20 NUT
9/16" (02)	10-32	0.438	0.688	0.313	1.469	7/16-20 NUT
3/4" (04)	1/8-NPT	0.625	0.938	0.438	1.905	5/8-18 NUT
7/8" (06)	1/8-NPT	0.625	0.938	0.438	1.943	5/8-18 NUT
1-1/16" (09)	1/8-NPT	0.625	0.938	0.438	1.943	5/8-18 NUT
1-1/4" (12)	1/8-NPT	0.875	1.125	0.563	2.115	3/4-16 NUT
1-1/2" (17)	1/8-NPT	0.875	1.125	0.563	2.115	3/4-16 NUT
2" (31)	1/4-NPT	1.000	1.875	0.688	2.278	1-1/4-12 NUT



Stroke Adjustment Length Adder (in)

Bore	5/16" (007)	7/16" (01)	9/16" (02)	3/4" (04)	7/8" (06)	1-1/16" (09)	1-1/4" (12)	1-1/2" (17)	2" (31)
Add to overall length: (per end)	0.044	0.060	0.060	0.060	0.080	0.080	0.110	0.110	0.120

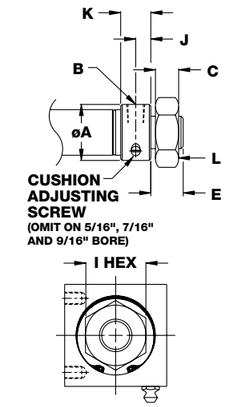
Bumper Length Adder (in)

Bore	5/16" (007)	7/16" (01)	9/16" (02)	3/4" (04)	7/8" (06)	1-1/16" (09)	1-1/4" (12)	1-1/2" (17)	2" (31)
Add to overall length: (per end)	0.095	0.120	0.120	0.140	0.140	0.150	0.150	0.150	0.200

Cushions (in)

Bore	A	B	C	E	I	J	K	L
9/16" (02)	0.755	10-32	0.250	0.438	0.688	0.203	0.406	7/16-20 NUT
3/4" (04)	0.985	1/8 NPT	0.375	0.625	0.938	0.315	0.630	5/8-18 NUT
7/8" (06)	1.110	1/8 NPT	0.375	0.625	0.938	0.315	0.630	5/8-18 NUT
1-1/16" (09)	1.297	1/8 NPT	0.375	0.625	0.938	0.315	0.630	5/8-18 NUT
1-1/4" (12)	1.545	1/8 NPT	0.420	0.875	1.125	0.315	0.630	3/4-16 NUT
1-1/2" (17)	1.735	1/8 NPT	0.420	0.875	1.125	0.315	0.630	3/4-16 NUT
2" (31)	2.312	1/4 NPT	0.500	1.000	1.875	0.438	0.875	1-1/4-12 NUT

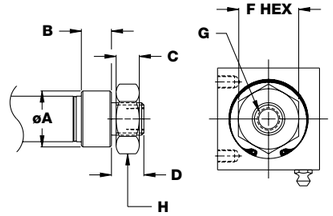
NOTE: There is no length adder for the cushion option. Cushion option not available for 5/16" and 7/16" bores.



Axial Ports (in) (Ultran)

Bore	A	B	C	D	F	G	H
5/16" (007)	0.625	0.406	0.188	0.368	0.500	10-32	5/16-24 NUT
7/16" (01)	0.704	0.406	0.250	0.438	0.688	10-32	7/16-20 NUT
9/16" (02)	0.755	0.406	0.250	0.438	0.688	10-32	7/16-20 NUT
3/4" (04)	0.985	0.630	0.375	0.625	0.938	1/8 NPT	5/8-18 NUT
7/8" (06)	1.110	0.630	0.375	0.625	0.938	1/8 NPT	5/8-18 NUT
1-1/16" (09)	1.297	0.630	0.375	0.625	0.938	1/8 NPT	5/8-18 NUT
1-1/4" (12)	1.545	0.630	0.420	0.875	1.125	1/8 NPT	3/4-16 NUT
1-1/2" (17)	1.735	0.630	0.420	0.875	1.125	1/8 NPT	3/4-16 NUT
2" (31)	2.312	0.875	0.500	1.000	1.875	1/4 NPT	1-1/4-12 NUT

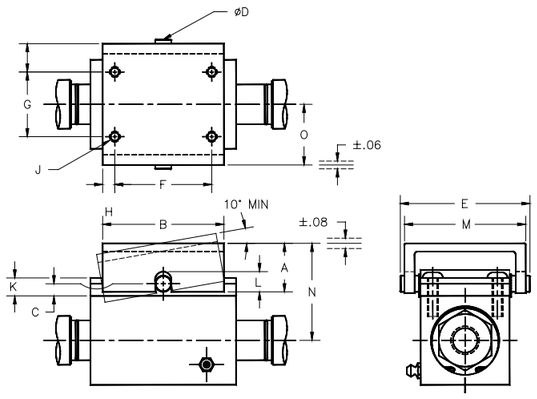
NOTE: There is no length adder for the Axial port option.



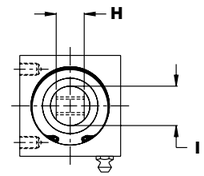
Floating Mount Bracket (in) (Ultran)

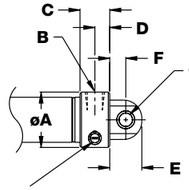
Bore	A	B	C	D	E	F	G	H	I	J	K
5/16" (007)	0.532	1.438	0.188	0.187	1.317	1.062	0.469	0.188	0.360	4-40 UNC	0.236
7/16" (01)	0.625	1.688	0.188	0.249	1.646	1.188	0.750	0.250	0.383	6-32 UNC	0.248
9/16" (02)	0.750	1.875	0.188	0.249	2.005	1.500	1.000	0.188	0.437	8-32 UNC	0.278
3/4" (04)	0.875	2.375	0.250	0.312	2.442	1.750	1.375	0.312	0.459	10-24 UNC	0.340
7/8" (06)	0.938	2.750	0.312	0.374	2.849	2.125	1.625	0.312	0.547	10-24 UNC	0.421
1-1/16" (09)	1.062	3.000	0.312	0.374	3.068	2.500	1.750	0.250	0.594	1/4-20 UNC	0.421
1-1/4" (12)	1.125	3.562	0.375	0.437	3.599	2.750	2.125	0.406	0.672	1/4-20 UNC	0.484
1-1/2" (17)	1.188	4.250	0.375	0.437	4.068	3.500	2.500	0.375	0.719	5/16-18 UNC	0.484
2" (31)	1.938	6.500	0.500	0.624	6.000	5.000	3.250	0.750	1.250	1/2-13 UNC	0.634

Bore	L	M	N	O
5/16" (007)	0.250	1.188	1.019	0.594
7/16" (01)	0.312	1.516	1.206	0.758
9/16" (02)	0.312	1.875	1.518	0.938
3/4" (04)	0.375	2.312	1.861	1.156
7/8" (06)	0.438	2.719	2.080	1.359
1-1/16" (09)	0.438	2.937	2.330	1.469
1-1/4" (12)	0.500	3.469	2.612	1.734
1-1/2" (17)	0.500	3.937	2.924	1.969
2" (31)	0.688	5.750	4.268	2.875



Pivot Option (in) (Ultran)



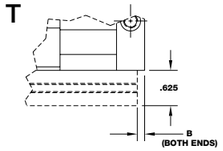


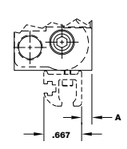
Cushion Option Only
Cushion Adjustment Screw Location For 04, 06, 09, 12, 17, And 31 Bores

Bore	A	B	C	D	E	F	G	H	I
5/16" (007)	0.625	10-32	0.406	0.203	0.368	0.212	0.127	0.243	0.375
7/16" (01)	0.704	10-32	0.406	0.203	0.437	0.250	0.157	0.305	0.500
9/16" (02)	0.755	10-32	0.406	0.203	0.437	0.250	0.157	0.305	0.500
3/4" (04)	0.985	1/8-NPT	0.630	0.315	0.625	0.344	0.253	0.368	0.750
7/8" (06)	1.110	1/8-NPT	0.630	0.315	0.625	0.344	0.253	0.368	0.750
1-1/16" (09)	1.297	1/8-NPT	0.630	0.315	0.625	0.344	0.253	0.368	0.875
1-1/4" (12)	1.545	1/8-NPT	0.630	0.315	0.875	0.500	0.378	0.493	1.000
1-1/2" (17)	1.735	1/8-NPT	0.630	0.315	0.875	0.500	0.378	0.493	1.125
2" (31)	2.312	1/4-NPT	0.876	0.438	1.000	0.500	0.439	0.868	1.375

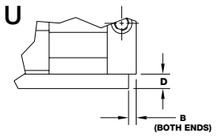
Switch Track for Miniature Switches (Ultran Slide)

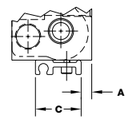
Option T





Option U

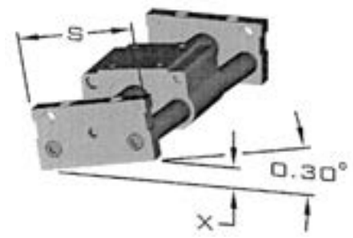




Bore	A	B	C	D
5/16" (007)	0.000	0.024	0.787	0.299
7/16" (01)	0.000	0.023	0.787	0.248
9/16" (02)	0.188	0.625	0.787	0.248
3/4" (04)	0.563	0.125	0.787	0.248
7/8" (06)	0.784	0.117	0.787	0.248
1-1/16" (09)	1.125	0.125	0.655	0.367
1-1/4" (12)	1.250	0.242	0.655	0.367
1-1/2" (17)	1.500	0.250	0.655	0.367
2" (31)	2.596	0.492	0.655	0.367

Ultran Slide Mounting Instructions (Ultran Slide)

Improper mounting of the Ultran slide could result in binding and/or excess breakaway. As a rule of thumb, the end blocks should be mounted flat with no more than 0.30˚ of differential misalignment end-to-end (including both end blocks, i.e., 0.30˚ on one end block if other end block is square. If both end blocks are out of square, the total between them cannot exceed 0.30˚. The x dimension represents how much displacement 0.30˚ represents using 0.0175" per inch per degree of misalignment.)



The following table shows the S dimension (End Block width dimension as found in the catalog) for all bore sizes:

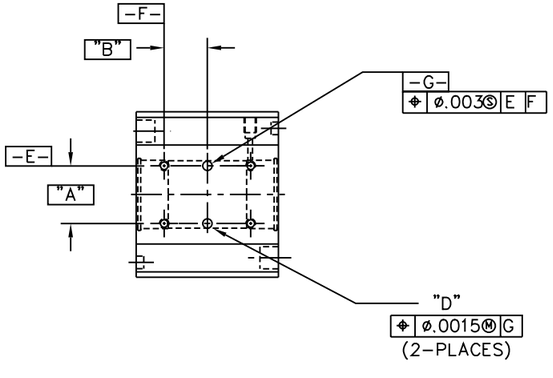
Model	S in (mm)	x in (mm)
007 (5/16" Bore)	2.000 (50.8)	0.010 (0.25)
01 (7/16" Bore)	2.312 (58.7)	0.012 (0.30)
02 (9/16" Bore)	3.000 (76.2)	0.016 (0.40)
04 (3/4" Bore)	3.375 (85.7)	0.018 (0.46)
06 (7/8" Bore)	3.750 (95.3)	0.020 (0.51)
09 (1-1/16" Bore)	4.250 (108.0)	0.022 (0.56)
12 (1-1/4" Bore)	4.812 (122.2)	0.025 (0.64)
17 (1-1/2" Bore)	6.000 (152.4)	0.031 (0.79)
31 (2" Bore)	8.000 (203.2)	0.042 (1.07)

For example:

> A Model 007 (5/16" Bore) has a S dimension of 2.00". 0.30˚ of misalignment would yield approximately 0.010" of differential misalignment from end-to-end before binding and/or excess breakaway would occur.

> A Model 17 (1-1/2" Bore) has a S dimension of 6.00". 0.30˚ of misalignment would yield approximately 0.031" of differential misalignment from end-to-end before binding and/or excess breakaway would occur.

Dowel Pin Hole Locations



Bore	A	B	D
020 (9/16")	1.000	.750	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.375	.876	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.750	1.250	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.500	1.750	.3145/.3155 x .560/.580 DP.

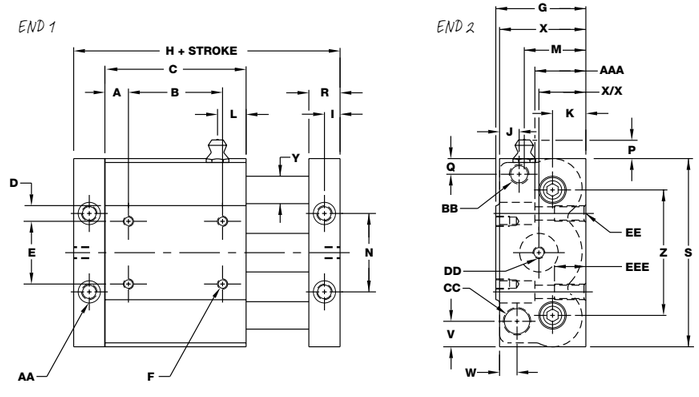
Dimensions (Ultran Slide)

Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
5/16" (007)	0.344	1.062	1.750	0.141	0.469	4-40-UNC	1.062	2.750	0.250	0.188	0.438	N/A	N/A	0.750	N/A
7/16" (01)	0.344	1.188	1.875	0.125	0.750	6-32 UNC	1.062	2.875	0.250	0.188	0.406	0.395	0.788	0.938	0.288
9/16" (02)	0.375	1.500	2.250	0.250	1.000	8-32 UNC	1.438	3.250	0.250	0.312	0.531	0.455	0.982	1.250	0.297
3/4" (04)	0.562	1.750	2.875	0.312	1.375	10-24 UNC	1.832	4.125	0.312	0.312	0.664	0.572	1.239	1.625	0.234
7/8" (06)	0.500	2.125	3.125	0.188	1.625	10-24 UNC	2.062	4.625	0.375	0.375	0.688	0.635	1.438	1.625	0.225
1-1/16" (09)	0.500	2.500	3.500	0.375	1.750	1/4-20 UNC	2.313	5.000	0.375	0.250	0.750	0.706	1.549	1.875	0.172
1-1/4" (12)	0.562	2.750	3.875	0.318	2.125	1/4-20 UNC	2.687	5.875	0.500	0.500	0.750	0.750	1.562	2.125	0.162
1-1/2" (17)	0.500	3.500	4.500	0.500	2.500	5/16-18 UNC	3.188	6.500	0.500	0.750	0.906	0.756	1.736	2.500	0.109
2" (31)	1.188	5.000	7.375	0.500	3.250	1/2-13 UNC	4.312	10.375	0.750	0.813	1.312	1.500	2.688	3.250	0.000

Bore	Q	R	S	V	W	X	X/X	Y	Z	AA	BB	CC	DD
5/16" (007)	0.188	0.500	2.000	0.215	0.215	1.000	0.562	0.312	1.312	#6	5/16-24 UNF	3/8-32 UNEF	10-32
7/16" (01)	0.219	0.500	2.312	0.218	0.220	1.000	0.562	0.375	1.562	#10	5/16-24 UNF	3/8-32 UNEF	10-32
9/16" (02)	0.250	0.500	3.000	0.406	0.281	1.375	0.749	0.438	2.000	#10	5/16-24 UNF	7/16-28 UNEF	10-32
3/4" (04)	0.313	0.625	3.375	0.406	0.313	1.750	0.957	0.500	2.518	1/4	5/16-24 UNF	7/16-28 UNEF	1/8 NPT
7/8" (06)	0.313	0.750	3.750	0.500	0.438	2.000	1.063	0.625	2.750	1/4	5/16-24 UNF	1/2-20 UNF	1/8 NPT
1-1/16" (09)	0.375	0.750	4.250	0.594	0.375	2.250	1.188	0.750	3.062	5/16	5/16-24 UNF	1/2-20 UNF	1/8 NPT
1-1/4" (12)	0.375	1.000	4.812	0.656	0.562	2.625	1.375	0.812	3.500	5/16	5/16-24 UNF	3/4-16 UNF	1/8 NPT
1-1/2" (17)	0.438	1.000	6.000	1.000	0.906	3.125	1.625	1.000	4.500	3/8	5/16-24 UNF	3/4-16 UNF	1/8 NPT
2" (31)	0.250	1.500	8.000	1.125	0.938	4.250	2.188	1.500	5.750	3/4	5/16-24 UNF	1-12 UNF	1/4 NPT

Bore	EE	AAA	EEE
5/16" (007)	10-32 UNF	0.750	0.315
7/16" (01)	1/4-28 UNF	0.750	0.322
9/16" (02)	1/4-28 UNF	0.750	0.500
3/4" (04)	5/16-24 UNF	1.080	0.625
7/8" (06)	5/16-24 UNF	1.375	0.625
1-1/16" (09)	3/8-24 UNF	1.375	0.750
1-1/4" (12)	3/8-24 UNF	1.750	0.750
1-1/2" (17)	7/16-20 UNF	1.750	0.750
2" (31)	7/8-9 UNC	3.125	1.000

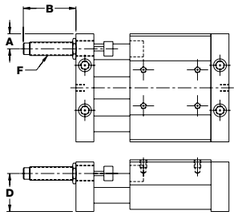
NOTE: H+ stroke tolerance for stroke lengths less than 42" is +/- 0.032". For stroke lengths greater than 42" the tolerance is +0.104/-0.047".



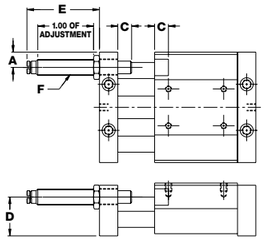
Shock Absorber/Stroke Adjustment (in) (Ultran Slide)

Bore	A	B	C	D	E	F
5/16" (007)	0.215	0.750	0.000	0.785	1.093	3/8-32 UNEF
7/16" (01)	0.218	0.750	0.000	0.780	1.093	3/8-32 UNEF
9/16" (02)	0.406	1.460	0.375	1.094	1.594	7/16-28 UNEF
3/4" (04)	0.406	1.335	0.375	1.438	1.469	7/16-28 UNEF
7/8" (06)	0.500	2.490	0.375	1.562	1.438	1/2-20 UNF
1-1/16" (09)	0.594	2.490	0.375	1.875	1.438	1/2-20 UNF
1-1/4" (12)	0.656	2.890	0.500	2.062	1.500	3/4-16 UNF
1-1/2" (17)	1.000	2.890	0.562	2.219	1.438	3/4-16 UNF
2" (31)	1.125	3.500	0.562	3.312	1.563	1-12 UNF

Shock Absorber



Stroke Adjustment

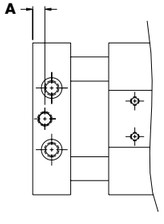


NOTE: Do not let the shock absorbers bottom out. The shock should not be used as a stroke adjuster. A stop collar is needed for the shock if stroke adjustment is required.

Cylinder Bore Size	Shock Absorbers			Stroke Adjustment	*Stop Collar
	Model			Model	Model
	Light	Standard	Heavy		
5/16" (007)	LS-02	SS-02	HS-02	USA-01	N/A
7/16" (01)					
9/16" (02)	LS-04	SS-04	HS-04	USA-02	USC-04
3/4" (04)				USA-04	
7/8" (06)	LS-09	SS-09	HS-09	USA-09	USC-09
1-1/16" (09)					
1-1/4" (12)	LS-17	SS-17	HS-17	USA-17	USC-17
1-1/2" (17)					
2" (31)	LS-31	SS-31	HS-31	USA-31	USC-31

*The Ultran Slide Cylinder needs to be increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable. See Related Products section for dimensions.

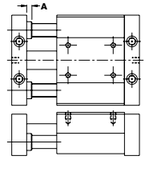
Alternate Port (in.)



Bore	A
5/16" (007)	0.162
7/16" (01)	0.150
9/16" (02)	0.162
3/4" (04)	0.188
7/8" (06)	0.312
1-1/16" (09)	0.312
1-1/4" (12)	0.500
1-1/2" (17)	0.500
2" (31)	0.750

NOTE: 3/4" port size is 10-32, all other sizes are same as standard.

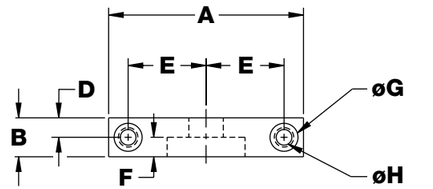
Bumper Adder (per end) (in.)

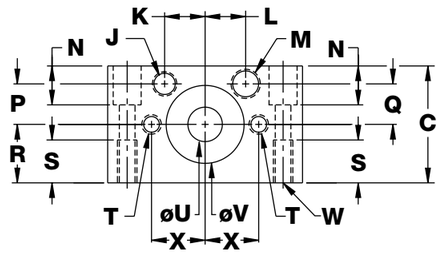


Bore	A
5/16" (007)	0.157
7/16" (01)	0.157
9/16" (02)	0.281
3/4" (04)	0.281
7/8" (06)	0.312
1-1/16" (09)	0.312
1-1/4" (12)	0.312
1-1/2" (17)	0.312
2" (31)	0.312

NOTE: Internal bumpers reach full compression at 80 PSI. External bumpers will not contact carriage until internal bumpers are fully compressed.

Mounting Block (in)



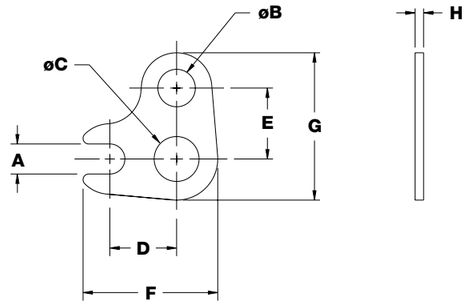


J – Hole for Switch
M – Hole for Shock Absorber

Bore	Model	A	B	C	D	E	F	G	H	J	K	L
5/16" (007)	MB-007	2.000	0.375	0.875	0.188	0.813	0.250	0.272	0.159	5/16-24 UNF	0.500	N/A
7/16" (01)	MB-01	2.500	0.500	1.125	0.250	0.938	0.250	0.357	0.213	5/16-24 UNF	0.562	N/A
9/16" (02)	MB-02	2.500	0.500	1.500	0.250	1.000	0.250	0.354	0.213	5/16-24 UNF	0.520	0.520
3/4" (04)	MB-04	3.500	0.750	1.875	0.375	1.312	0.375	0.422	0.272	5/16-24 UNF	0.671	0.671
7/8" (06)	MB-06	3.500	0.750	2.125	0.375	1.375	0.375	0.422	0.273	5/16-24 UNF	0.789	0.789
1-1/16" (09)	MB-09	4.000	0.750	2.500	0.375	1.563	0.375	0.515	0.332	5/16-24 UNF	0.893	0.893
1-1/4" (12)	MB-12	5.000	1.000	2.875	0.500	2.000	0.443	0.609	0.391	5/16-24 UNF	1.062	1.016
1-1/2" (17)	MB-17	5.000	1.000	3.375	0.500	2.000	0.443	0.609	0.391	5/16-24 UNF	1.240	1.240
2" (31)	MB-31	8.500	1.500	4.500	0.750	3.250	1.000	1.187	0.779	5/16-24 UNF	1.625	1.607

Bore	Model	M	N	P	Q	R	S	T	U	V	W	X
5/16" (007)	MB-007	N/A	0.312	0.250	N/A	0.438	0.315	6-40 UNF	0.318	0.776	6-40 UNF	0.594
7/16" (01)	MB-01	N/A	0.380	0.375	N/A	0.563	0.380	1/4-28 UNF	0.442	0.995	1/4-28 UNF	0.688
9/16" (02)	MB-02	3/8-32 UNEF	0.500	0.520	0.520	0.750	0.500	1/4-28 UNF	0.442	1.000	1/4-28 UNF	0.688
3/4" (04)	MB-04	7/16-28 UNEF	0.625	0.671	0.671	0.938	0.500	5/16-24 UNF	0.629	1.375	5/16-24 UNF	0.938
7/8" (06)	MB-06	1/2-20 UNF	0.625	0.789	0.789	1.063	0.750	5/16-24 UNF	0.629	1.375	5/16-24 UNF	0.938
1-1/16" (09)	MB-09	1/2-20 UNF	0.875	0.893	0.893	1.250	0.750	3/8-24 UNF	0.629	1.375	3/8-24 UNF	1.125
1-1/4" (12)	MB-12	3/4-16 UNF	1.125	1.062	1.016	1.438	1.125	7/16-20 UNF	0.754	1.625	7/16-20 UNF	1.375
1-1/2" (17)	MB-17	3/4-16 UNF	1.375	1.240	1.240	1.688	1.000	7/16-20 UNF	0.753	1.625	7/16-20 UNF	1.375
2" (31)	MB-31	1-12 UNF	1.625	1.625	1.607	2.250	1.500	7/8-9 UNC	1.380	2.750	7/8-9 UNC	2.125

Shock Absorber/Switch Bracket (For 9/16" bore and larger only) (Ultran)



A – Slot for Switch
B – Hole for Shock Absorber
C – Hole for Cylinder

Bore	Model	A	B	C	D	E	F	G	H
9/16" (02)	BU-02	0.320	0.399	0.442	0.710	0.755	1.433	1.568	0.090
3/4" (04)	BU-04	0.320	0.478	0.629	0.910	0.900	1.820	1.900	0.120
7/8" (06)	BU-06	0.320	0.556	0.629	0.875	1.116	1.785	2.179	0.120
1-1/16" (09)	BU-09	0.320	0.556	0.629	0.910	1.047	1.820	2.110	0.120
1-1/4" (12)	BU-12	0.320	0.793	0.754	0.375	1.437	2.410	2.812	0.120
1-1/2" (17)	BU-17	0.320	0.793	0.754	1.450	1.453	2.485	2.828	0.120
2" (31)	BU-31	0.320	1.005	1.254	2.230	2.290	3.640	4.165	0.224

Ultran

The model number of Ultran rodless cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Ultran unit with Silver coupling strength, 1-1/2" bore, 66.375" stroke, and additional options is shown below.

US - 17 66.375 - A1B1F

Model	
UG	Ultran Rodless, Gold coupling strength
US	Ultran Rodless, Silver coupling strength*

* Specify silver coupling strengths for lower breakaway application requirements. Use caution as decoupling can occur at pressures less than 100 PSI. Refer to the engineering specifications on page 387 for details.

Bore Size	
007	5/16"
01	7/16"
02	9/16"
04	3/4"
06	7/8"
09	1-1/16"
12	1-1/4"
17	1-1/2"
31	2"

Stroke Length	
Standard	**Maximum**
1/4" - 30" (007)	30"
1/4" - 40" (01)	50"
1/4" - 40" (02)	90"
1/4" - 80" (04)	120"
1/4" - 80" (06)	120"
1/4" - 80" (09)	120"
1/4" - 80" (12)	120"
1/4" - 80" (17)	120"
1/4" - 80" (31)	100"

Options	
A	Stroke adjustment (both ends)
A1	Stroke adjustment (end 1)
A2	Stroke adjustment (end 2)
B	Bumpers (both ends)
B1	Bumpers (end 1)[1]
B2	Bumpers (e nd 2)
C	Cushions (both ends)[*2]
C1	Cushions (end 1)
C2	Cushions (end 2)
F	Floating Mount Bracket [3]
K	Pivot (both ends)
K1	Pivot (end 1)
K2	Pivot (end 2)
P	Axial ports (both ends)
P1	Axial port (end 1)
P2	Axial port (end 2)
S	Seals - oil service (low pressure hydraulic service)

[1] 80 PSI required to reach full stroke due to bumper compression.
[2] Not available for 5/16" and 7/16" bores. 9/16" bore has fixed cushions, other sizes have adjustable cushions.
[3] For use when application requirements dictate a non-parallel or floating interface with the Ultran carriage to prevent binding between the Ultran and external guiding systems. Refer to page 396 for dimensions.
The 9/16" bore fixed cushion operates like an air spring. A small amount of air is trapped behind the piston to help slow it down. Since there is no air bleed-off, this air will remain trapped behind the piston until the cylinder is cycled. A minimum of 40 psi is needed to move the cylinder to full stroke. If air pressure is removed from the front side of the piston, the trapped air will act like a spring and move the piston away from the end cap about 3/16 of an inch.

Combination Availability

	A	B	C	F	K	P	S
5/16"(007) 7/16"(01)	B,F,S	A,F,K,P	N/A	A,B,K,P,S	B,F,S	B,F,S	A,F,K,P
All other sizes	B,F,S	A,F,K,P	F,K	A,B,C,K,P,S	B,C,F,S	B,F,S	A,F,K,P

Location

See diagram on page 394 for location of End 1 and End 2. Incompatible options cannot be ordered on the same end (see combination availability chart above).

Ultran Slide

The model number of Ultran Slide cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Ultran Slide unit with 1-1/2” bore, 23.375” stroke, and additional options is shown below.

UGS - 17 23.375 - A1T

Model	
UGS	Ultran Slide, Gold coupling strength
USS	Ultran Slide, Silver coupling strength

Bore Size	
007	5/16”
01	7/16”
02	9/16”
04	3/4”
06	7/8”
09	1-1/16”
12	1-1/4”
17	1-1/2”
31	2”

Stroke Length	
Standard	**Maximum**
1/4” - 15” (007)	25”
1/4” - 20” (01)	30”
1/4” - 30” (02)	40”
1/4” - 30” (04)	40”
1/4” - 40” (06)	50”
1/4” - 60” (09)	70”
1/4” - 60” (12)	70”
1/4” - 60” (17)	85”
1/4” - 60” (31)	100”

Options	
A	Stroke adjustment (both ends)
A1	Stroke adjustment (end 1)
A2	Stroke adjustment (end 2)
B	Bumpers (both ends)1
B1	Bumpers (end 1)
B2	Bumpers (end 2)
D	Dowel pin holes for Transition Plates [2]
L	Remove guide rod wipers in 3/4”-2” bores
S	Seals - oil service (low pressure hydraulic service)
T	Switch track
U	Switch track for miniature switch
Y	Alternate port (both ends)
Y1	Alternate port (end 1)
Y2	Alternate port (end 2)

[1] Increases overall dimension. Internal bumpers reach full compression at 80 PSI. External bumpers will not contact carriage until internal bumpers are fully compressed.
[2] Transition Plate Applications: Option -D must be ordered if dowel pin holes are required. Not available on all bore sizes. Refer to Related Products/Transition Plates for details. Hole locations shown in Related Products/Appendix.

Combination Availability

	A	B	D	S	T, U	Y
For all sizes	D,S,T,Y	D,T,Y	A,B,D,S,T,Y	A,D,T,Y	A,B,D,S,Y	A,B,D,S,T

NOTE: Option -A can be ordered with option -B if they are ordered on different ends, i.e., A1B2 or A2B1.

Location

See diagram on page 399 for location of End 1 and End 2.

Basic Repair Kits (Ultran Slide)

Bimba recommends that the Ultran Slide be returned to the factory for repairs. However, the following parts and kits are available for the Ultran Slide rodless cylinder.

Part	Cylinder Bore Size								
	5/16" (007)	**7/16" (01)**	**9/16" (02)**	**3/4" (04)**	**7/8" (06)**	**1-1/16" (09)**	**1-1/4" (12)**	**1-1/2" (17)**	**2" (31)**
Shaft bearing	RD-50644	RD-50645	RD-48996	RD-48997	RD-50646	RD-48998	RD-50647	RD-48999	RD-50648
Shaft wiper	N/A	N/A	RD-22720	RD-23079	RD-15679	RD-23086	RD-50656	RD-16174	RD-50657
Tube seal	RD-1476	RD-22653	RD-13012	RD-1078	RD-10050	RD-48874	RD-50769	RD-1147	RD-50770
Carriage bearing	RD-51006	RD-51007	RD-41631	RD-41633	RD-51433	RD-41635	RD-51434	RD-41637	RD-51438
Carriage wiper	N/A	RD-49806	RD-47191	RD-47192	RD-49805	RD-47193	RD-49804	RD-47194	RD-49803
Piston bearing	N/A	N/A	RD-41632	RD-41634	RD-51435	RD-41636	RD-51436	RD-41638	RD-51439
Piston seal	RD-13970-T	RD-13435-T	RD-45616	RD-45621	RD-50651	RD-45622	RD-50652	RD-45623	RD-50653
Piston bumper	RD-50468	RD-50469	RD-33072	RD-33073	RD-33073	RD-33071	RD-33071	RD-33076	RD-36326
Shaft bumper	RD-50802	RD-50803	RD-50279	RD-50280	RD-50804	RD-50281	RD-50805	RD-50282	RD-50806
Shaft washer	RD-50797	RD-50798	RD-50283	RD-50284	RD-50799	RD-50285	RD-50800	RD-50286	RD-50801
Body[1]	KUB-007	KUB-01	KUB-02	KUB-04	KUB-06	KUB-09	KUB-12	KUB-17	KUB-31
Guide Rods[1]	KUG-007	KUG-01	KUG-02	KUG-04	KUG-06	KUG-09	KUG-12	KUG-17	KUG-31
Switch Track[1]-T	KUT-007	KUT-01	KUT-02	KUT-04	KUT-06	KUT-09	KUT-12	KUT-17	KUT-31
Switch Track[1]-U	KUU-007	KUU-01	KUU-02	KUU-04	KUU-06	KUU-09	KUU-12	KUU-17	KUU-31
Repair kit[2]	KU-007	KU-01	KU-02	KU-04	KU-06	KU-09	KU-12	KU-17	KU-31

[1] Option-B must be included at the end of part number if bumpers are being used with the Ultran Slide. (i.e., KUT-007-B)
[2] Includes required quantity of all except bumpers, oil service piston seals, bodies, guide rods and switch track, which are sold separately. Consult your local stocking Bimba distributor for prices.

Ultran High Load Slide



Features and Benefits

> Large load bearing capabilities
> Greater carriage precision
> Leak-free construction
> Piston seals are internally lubricated for long life
> Special rare earth magnet configuration for high magnetic coupling strengths.
> 304 stainless steel body and “U” cup seals for lower dynamic friction.
> Pre-lubricated for miles of maintenance-free travel, with easily-accessible carriage lubrication port.
> Shock absorbers to decelerate loads.
> Optional 1” stroke length adjustment available.
> Midstroke position sensing available. End-of-stroke sensing available for all models.
> Optional bumpers to reduce noise.
> Oil service seal option available for low pressure hydraulic service.

Engineering Specifications (Ultran High Load Slide)

Ratings

Operating Medium:	Air or Hydraulic
Pressure Rating:	100 PSI
Temperature Range:	0˚ F to +170˚ F
Breakaway:	Less than 25 PSI

Lubrication

All Bimba High Load Ultran Slide actuators are pre-lubricated internally and externally with our special bearing grade grease. The guide shafts are pre-lubricated with lightweight oil. The cylinder's life can be extended by providing additional lubrication with an air line mist lubricator and by lubricating the carriage every 100 miles with a high grade bearing grease. The guide shafts should be lubricated periodically with a lightweight oil. Do not over oil–there is an internal wick to retain the lightweight oil.

Repairs

The High Load Ultran Slide actuators must be returned to the factory for repairs.

Material of Construction

Carriage:	Anodized aluminum
End Block:	Anodized aluminum
Guide Shaft:	Case-hardened steel
Base Plate:	Anodized aluminum
Guide Shaft Support:	Anodized aluminum
End Block Screws:	Stainless steel
Guide Shaft Screws:	Black oxide carbon steel
Carriage Retaining Rings:	Plated carbon steel
Body Wiper:	Urethane
Guide Shaft Bearing:	Ball bearings in plastic housing
Port Plug:	Carbon steel
Bearing Retaining Screw:	Stainless steel

Options

Bumpers (Internal & External):	Urethane
Stroke Adjuster Screw:	Stainless steel
Shock Absorbers:	Anodized aluminum end plates, 303 stainless steel guide rods
Bumper Plug:	Anodized aluminum
Stroke Adjuster Bumper Plate:	Anodized aluminum
Switch Track:	Anodized aluminum

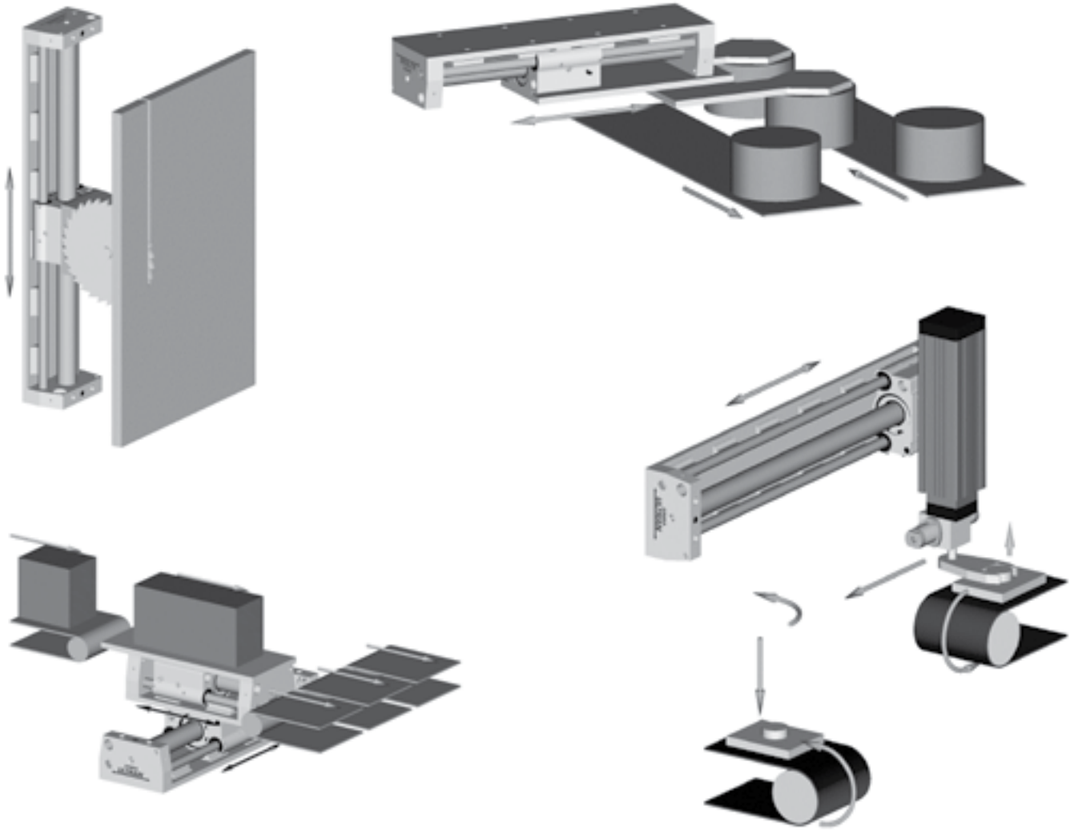
Weight (lbs)

Bore Size	Base Weight (0˚ Stroke)	Adder per 1"
1-1/16" (09)	5.43	0.23
1-1/4" (12)	7.87	0.44
1-1/2" (17)	14.1	0.45
Option Adders for 1-1/16"		
A Option Adder	0.19	N/A
A1 Option Adder	0.1	N/A
A2 Option Adder	0.1	N/A
B Option Adder	0.01	N/A
Option Adders for 1-1/4" and 1-1/2"		
A Option Adder	2.67	N/A
A1 Option Adder	1.33	N/A
A2 Option Adder	1.33	N/A
B Option Adder	0.01	N/A

Magnetic Coupling Strength (lbs)

Bore Size	Strength
1-1/16" (09)	127
1-1/4" (12)	190
1-1/2" (17)	270

Ultran High Load Slide



Provides high load carrying capability within an Ultran Slide Cylinder. The unit incorporates a ball bearing system offering large load bearing capabilities with greater carriage precision.

Size/Application Considerations (Ultran High Load Slide)

Each bore size of the High Load Ultran Slide has specific load-carrying capabilities. Shock absorbers can extend cylinder life when used properly. See subsequent section on shock absorbers to calculate maximum allowable kinetic energy before a shock absorber is required. Use the following procedures to determine the requirements for specific applications.

NOTE: Exceeding the recommended loads can result in improper cylinder function: piston/carriage decoupling, unacceptable deflections, etc.

1. Check the loading condition requirements and find that condition below. See sketches A and B for illustration of loading conditions.
2. Depending on the loading condition, use the appropriate chart, graph or formula to help determine maximum allowable loads and/or moment arms.

Table 1. Maximum Allowable Loads and Moments*

Bore	Maximum Load			Maximum Moment		
	Radial (lbs)	Pull Off (lbs)	Side (lbs)	Axial (Ma) (in-lbs)	Radial (Mr) (in-lbs)	Cross (Mc) (in-lbs)
1-1/16" (09)	1440	992	1440	1111	435	1613
1-1/4" (12)	2480	220	992	261	385	1178
1-1/2" (17)	2480	992	1984	1488	2232	2976

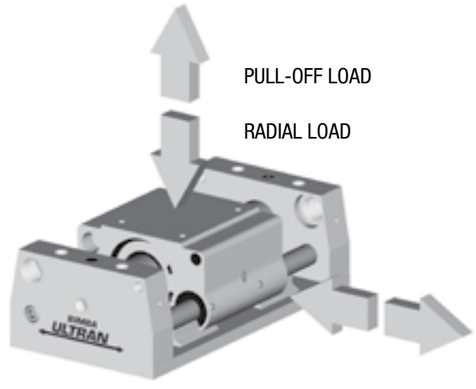
*Dynamic Ratings

The values shown in Table 1 are the maximum allowable loads for the load carrying system. To achieve these values, the base plate must be fully supported along its full length and the load must be equally distributed among all four bearings. For best results, your application analysis should determine maximum loading on each bearing. Do not exceed 20 in/sec velocity or 15 cycle/minute cycle rate; the internal piston bearings will heat up and cause sluggish motion.

Radial Load and Pull-off Load

A load applied perpendicular to both the base plate and to the direction of actuation. Load directed toward the base plate represents the maximum loading capacity of the system. Load directed away from the base plate reduces the system's load rating to approximately 40% of maximum radial loading. This is what's called the "pull-off" capacity.

In this loading condition, the maximum radial load-carrying capability is 620 pounds per bearing. The maximum "pull-off" load in the same mounting condition is 248 pounds per bearing.



SKETCH A

Side Load

A load that is applied parallel to the base plate, but perpendicular to the direction of actuation. Depending on bore size, the maximum side load will be at least 20% less than the maximum radial loading capacity.

In this loading condition, the maximum load carrying capability is 496 pounds per bearing. Only two bearings are used to calculate the load carrying capability of the 1-1/4" bore unit.

Size/Application Considerations (Ultran High Load Slide)

Radial Moment Load (Mr)

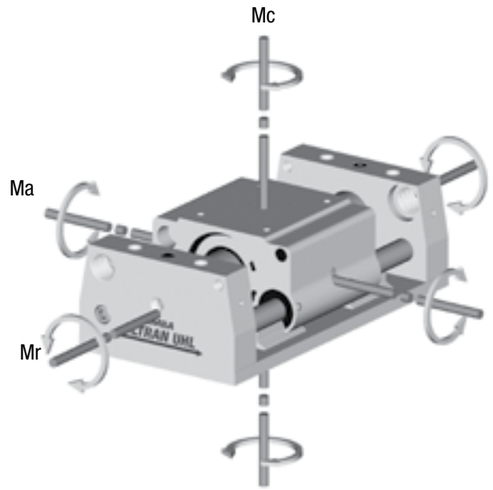
An unbalanced radial or side load applied to the system. The center of the radial load must be outside the span of the guide shafts, or the center of the side load must be at some point other than the center of the guide shafts to cause a radial moment loading condition.

Axial Moment Load (Ma)

An axial (same as the direction of actuation) load applied to the system, where the center of the load is at some point other than the center of the guide shafts. The load must also be between the span of the guide shafts to be a pure axial moment loading condition.

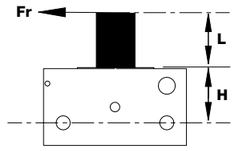
Cross Moment Load (Mc)

An axial load applied to the system, where the center of the load is at some point outside of the span of the guide shafts.



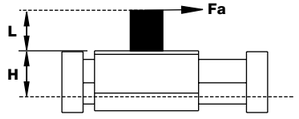
SKETCH B

Radial Moment



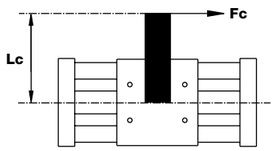
SKETCH C

Axial Moment



SKETCH D

Cross Moment



SKETCH E

Sketches C, D, and E demonstrate how a force is applied to a moment arm to produce the moments shown in Sketch B. Use the equations below to determine the actual moments created by your application. The results of each calculated moment should be compared to the maximums listed in the table. (If the actual moments are greater than the listed maximums, then the load and moments should be re-evaluated.)

Radial Moment =	Mr	=	Fr x (L+H)
Axial Moment	=	Ma	= Fa x (L+H)
Cross Moment =	Mc	=	Fc x (Lc)

A High Load Ultran Slide can withstand compound moments but the maximum allowable will be determined by the total percentage of the axial, radial and cross moments. The equation below will determine the compound moment percent based on the total moments. The compound moment percent must not be greater than 100. (If the compound moment percent is greater than 100, then the load and moments should be re-evaluated.)

$$M\ compound\ \% = 100 \times \left(\frac{Mr}{Mr\ max} + \frac{Ma}{Ma\ max} + \frac{Mc}{Mc\ max} \right) < 100\%$$

How to Specify

ULTRAN CYLINDERS

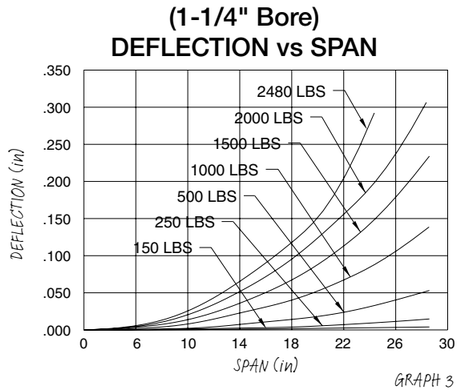
Size/Application Considerations (Ultran High Load Slide)

Unsupported Loads

If your application does not fully support the base plate, refer to Graphs 1-3. Graph 1, “Load vs. Span” displays the maximum load allowable with a maximum 0.005" deflection.

If your application allows for greater deflections, refer to Graphs 2 and 3, “Deflection vs. Span”. Use the following steps to determine resultant loads or deflections pertinent to your application.

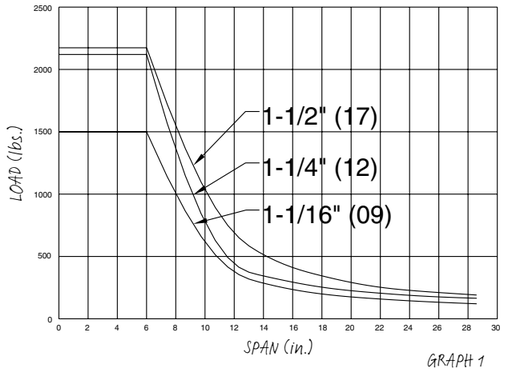
1. If you know the length (span) that the base plate will be supported, find that span on the X-Axis of the graph. From this point, go up to the approximate location that best represents your weight or load. Across to the left from this point where it intersects the Y-Axis identifies what deflection can be expected between the supported points.
2. If you know the maximum amount of deflection that your application can tolerate, find this deflection on the Y-Axis of the graph. Once you locate the desired deflection, go across to the approximate location that best represents your weight or load. Directly under this point on the X-Axis is the recommended span length.



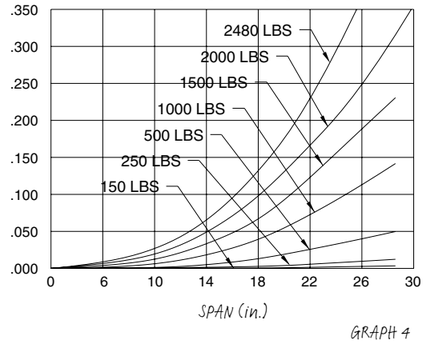
GRAPH 3

If your application combines radial and moment loads, or exceeds the deflections from Graphs 2 and 3, consult your authorized Bimba distributor to determine if the application is feasible.

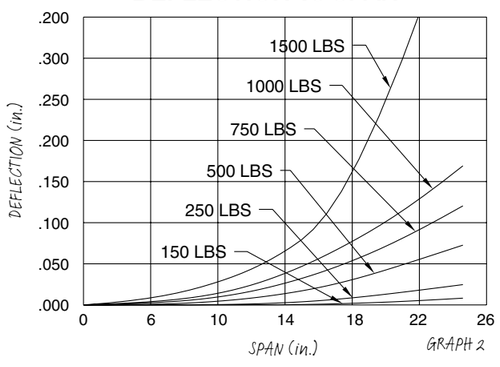
NOTE: Velocities exceeding 20 in/sec or 15 cycle/minute require review by Bimba.



GRAPH 1



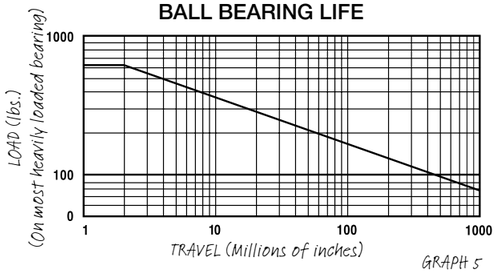
GRAPH 4



GRAPH 2

Bearing Life

The life of the ball bearing bushings are primarily affected by the amount of load it is required to carry. This can be best illustrated by Graph 5 below.



GRAPH 5

BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

Dimensions (Ultran High Load Slides)

Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1-1/16" (09)	0.500	0.706	2.500	3.500	5.000	0.375	1.750*	1.750	1/4-20 UNC	0.375	0.750	0.500	0.250	0.375
1-1/4" (12)	0.562	0.750	2.750	3.875	5.875	0.318	2.125	1.938	1/4-20 UNC	0.500	1.000	0.625	0.306	0.514
1-1/2" (17)	0.500	0.756	3.500	4.500	6.500	0.500	2.500	2.250	5/16-18 UNC	0.520	1.000	0.625	0.559	0.486

Bore	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB
1-1/16" (09)	5/16-24 UNF	1/8 NPT	1/2-20 UNF	0.594	0.375	2.300	3.062	4.250	0.172	0.375	1.125	1.563	1.922	2.625
1-1/4" (12)	5/16-24 UNF	1/8 NPT	3/4-16 UNF	0.742	0.563	1.660	3.500	5.000	0.109	0.375	1.125	1.750	1.938	3.000
1-1/2" (17)	5/16-24 UNF	1/8 NPT	3/4-16 UNF	0.992	0.906	1.917	4.500	6.000	0.140	0.375	1.281	2.000	2.109	3.500

Bore	CC	II	DD	EE
1-1/16" (09)	2.688	#10	0.252	0.420
1-1/4" (12)	3.062	#10	—	—
1-1/2" (17)	3.562	1/4"	—	—

* The 09 base plate mounting holes are 1.56" apart. Other bore sizes have carriage mounting holes and base plates mounting holes in line as shown.

Mounting Hole Calculation for 1-1/16" bore

$$JJ = \frac{KK - (INT(\frac{KK}{4}) \times 4)}{2}$$

If Result < 1.60, use:

$$JJ = \frac{KK - [(INT(\frac{KK}{4}) - 1) \times 4)]}{2}$$

Where KK = (E + Stroke) and INT is integer.

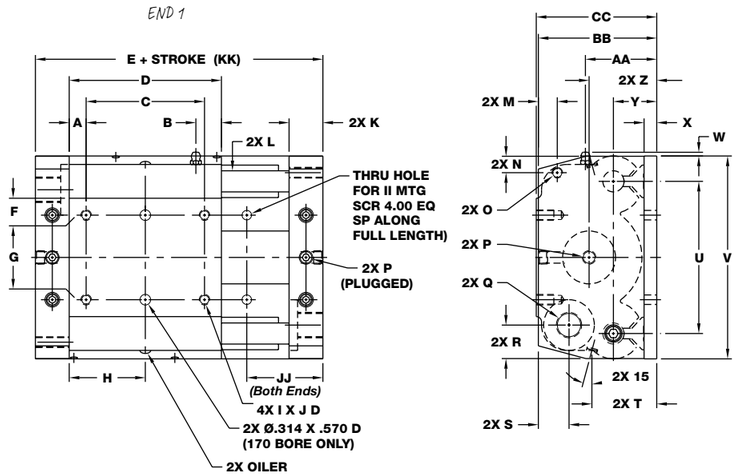
Mounting Hole Calculation for 1-1/4" and 1-1/2" bores

$$JJ = \frac{KK - (INT(\frac{KK}{4}) \times 4)}{2}$$

If Result < 1.85, use:

$$JJ = \frac{KK - [(INT(\frac{KK}{4}) - 1) \times 4)]}{2}$$

Where KK = (E + Stroke) and INT is integer.



Ports

The Base Model High Load Ultran Slide offers both axial and alternate port locations. The base unit comes with flush surface plugs installed on top of the End Blocks unless the “Y” option is specified. This no charge option has the plugs installed on the side of the End Blocks.

Shock Absorber/Stroke Adjustment (in) (Ultran High Load Slides)

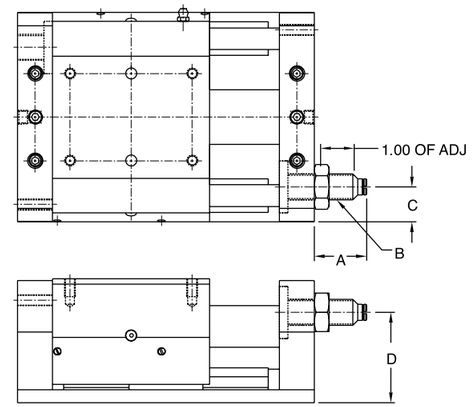
High Load Ultran Slides requiring shock absorbers with stop collars for stroke adjustment or a larger kinetic energy rating should use the following shock absorber.

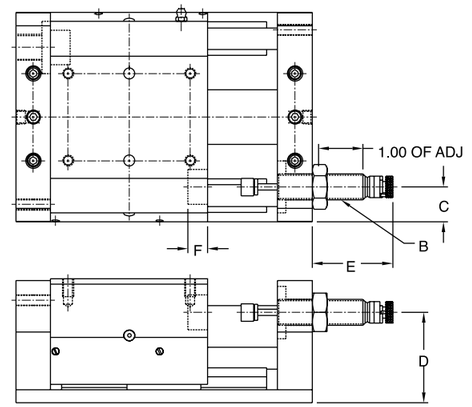
Bore	A	B	C	D	E	F
1-1/16" (09)	1.562	1/2-20 UNF	0.594	2.250	2.060	0.465
1-1/4" (12)	1.750	3/4-16 UNF	0.742	2.438	2.312	0.550
1-1/2" (17)	1.750	3/4-16 UNF	0.992	2.594	2.312	0.550

NOTE: Do not let the shock absorbers bottom out. The shock should not be used as a stroke adjuster. An optional stop collar is needed if stroke adjustment is required.

Bore	Shock Absorber Model	Stop Collar* Model
1-1/16" (09)	HS-09	USC-09
1-1/4" (12)	HS-17	USC-17
1-1/2" (17)	HS-17	USC-17

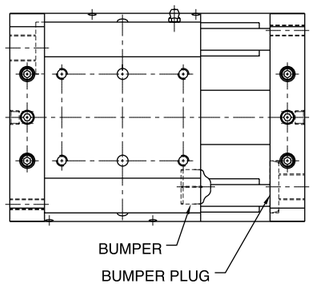
*The Ultran Slide Cylinder needs to be increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable. See Related Products for dimensions.





Bumper Compression

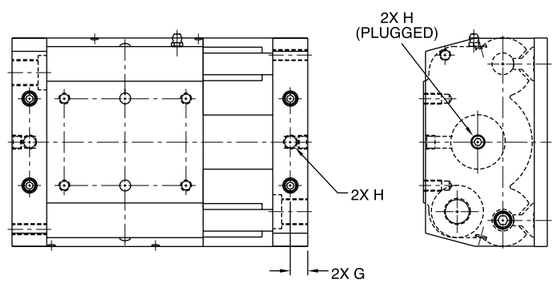
Bore	Pressure
1-1/16" (09)	80 PSI
1-1/4" (12)	80 PSI
1-1/2" (17)	60 PSI



The Bumper option does not add overall length to the cylinder. However, the unit will not go full stroke until the specified pressure in table above is applied to the cylinder. If full stroke is required at a pressure less than that specified above, the stroke adjustment option may be utilized in combination with the bumper option to obtain full stroke. Example: If 5 inches of stroke is required at 40 psi, order a 5.5 inch stroke unit with the Stroke Adjustment Option and adjust the stroke down to 5 inches.

Alternate Port (in)

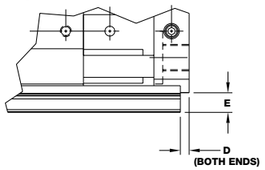
Bore	G	H
1-1/16" (09)	0.375	1/8 NPT
1-1/4" (12)	0.500	1/8 NPT
1-1/2" (17)	0.500	1/8 NPT

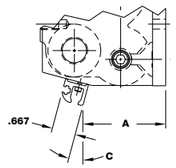


The Base Model High Load Ultran Slide offers both axial and alternate port locations. The base unit comes with flush surface plugs installed in the top ports of the End Blocks unless the “Y” option is specified. This no charge option has the plugs installed in the End Block side ports.

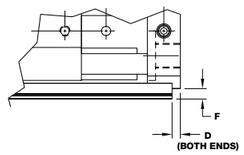
Switch Track for Miniature Switches (Ultan High Load Slides)

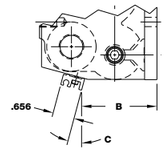
Option T





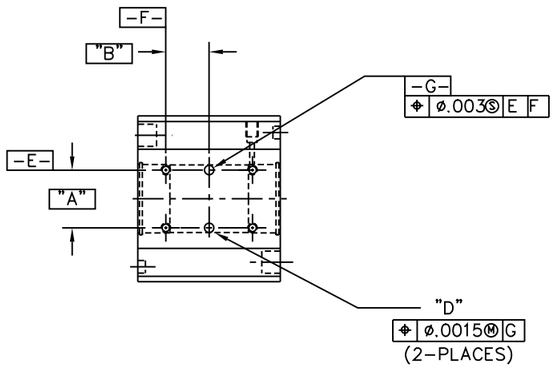
Option U





Bore	A	B	C	D	E	F
1-1/16" (09)	1.497	1.494	0°	0.125	0.531	0.272
1-1/4" (12)	1.999	1.954	10°	0.242	0.522	0.267
1-1/2" (17)	2.356	2.289	15°	0.250	0.577	0.327

Dowel Pin Hole Locations (Ultan High Load Slides)



Bore	A	B	D
020 (9/16")	1.000	.750	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.375	.876	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.750	1.250	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.500	1.750	.3145/.3155 x .560/.580 DP.

Ultran High Load Slide

The model number of Ultran High Load Slide cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic High Load Ultran Slide unit with 1-1/4" bore, 25.75" stroke, and additional options is shown below.

UHL - 12 25.75 - A1T

Model	
UHL	High Load Ultran Slide

Bore Size	
09	1-1/16"
12	1-1/4"
17	1-1/2"

Stroke Length

6" to 132"

Available in 1/4" increments[1]

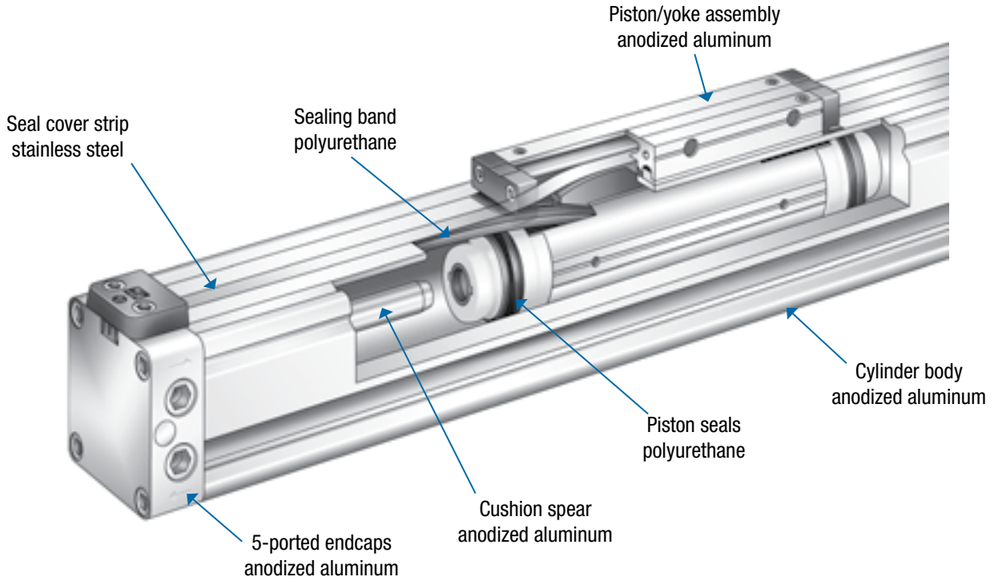
[1] Contact your authorized Bimba distributor if smaller stroke increments are required for your application.

Options	
A	Stroke adjustment (both ends)
A1	Stroke adjustment (end 1)
A2	Stroke adjustment (end 2)
B	Bumpers (both ends)1
B1	Bumpers (end 1)
B2	Bumpers (end 2)
S	Seals - oil service (low pressure hydraulic service)
T	Switch track
U	Switch track for miniature switches
Y	Alternate port (both ends)
Y1	Alternate port (end 1)
Y2	Alternate port (end 2)

NOTE: All options are compatible, except bumpers (option B) and oil service seals (option S) and T and U switch tracks.
Dowel pin holes are standard on 1-1/16" (09) and 1-1/2" (17) bore cylinder. Not available on 1-1/4" (12) bore cylinder.

Product Features

Ultran Band



Features and Benefits

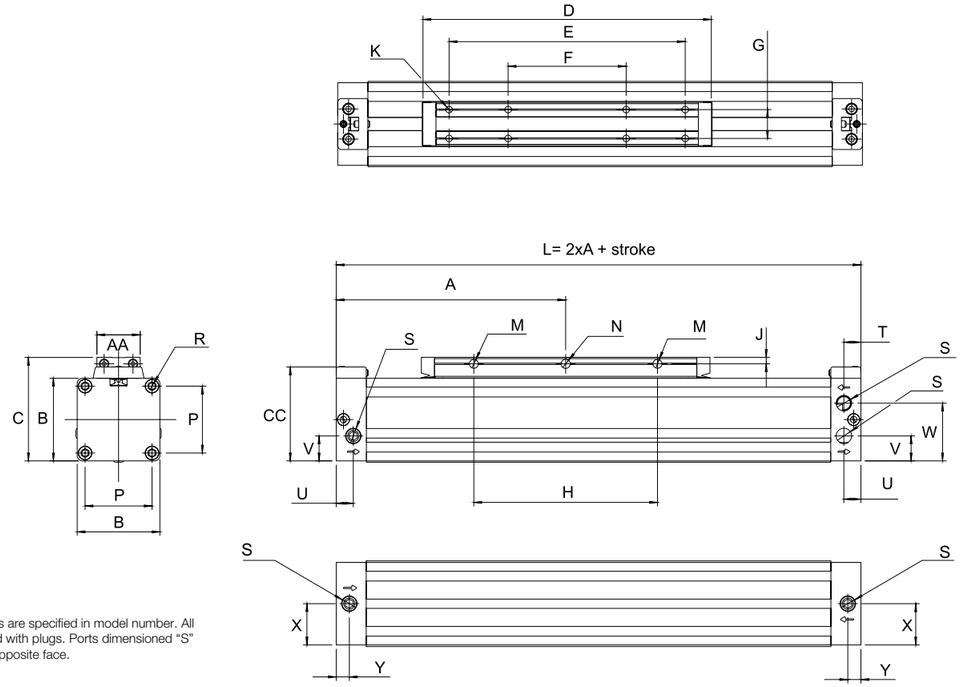
- The Bimba Ultran Band is a mechanically- coupled rodless cylinder, providing overall length savings in excess of 40% vs. traditional cylinders.
- Specially engineered sealing strip out performs all other band sealing systems on the market.
- Stainless steel cover strip protects the sealed area and prolongs band life.
- Bore sizes range from 18mm to 63mm in basic model as well as with additional guiding.
- All models are switch-ready and come standard with finely adjustable cushioning.
- Unique five-ported endcaps provide maximum plumbing flexibility.





How to Specify

Dimensions (Ultran Band)



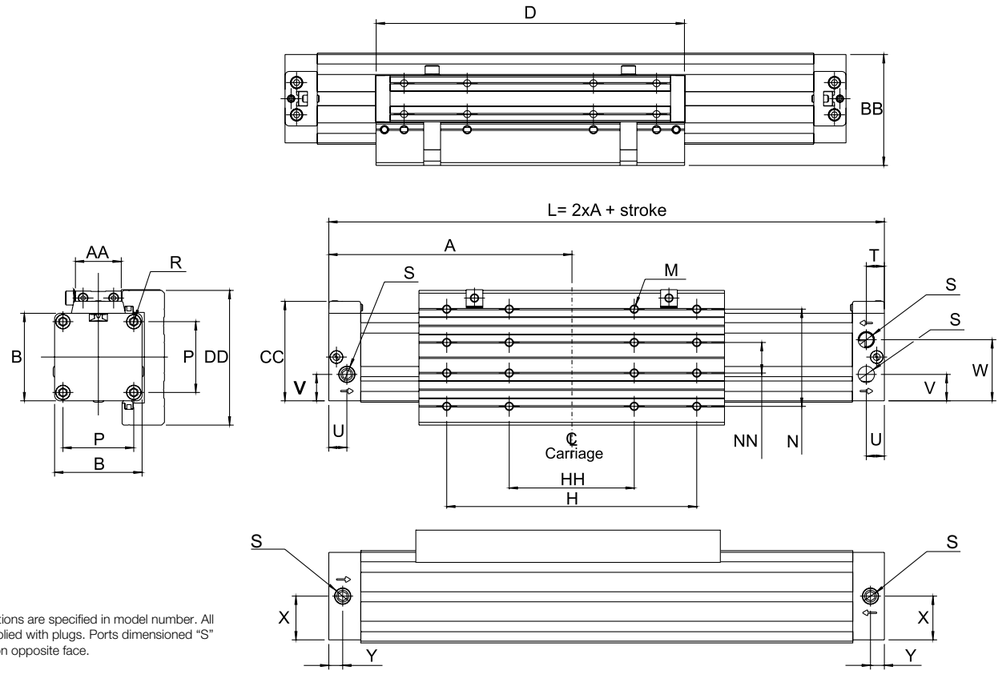
Active port positions are specified in model number. All other ports supplied with plugs. Ports dimensioned "S" are duplicated on opposite face.

Bore Size	A	AA	B	C	CC	D	E	F	G	H
18mm	80 (3.15)	15.5 (0.61)	30 (1.18)	39 (1.54)	36.5 (1.44)	103 (4.06)	75 (2.95)	-	10 (0.39)	50 (1.97)
25mm	100 (3.94)	20 (0.79)	42 (1.65)	53 (2.09)	50.2 (1.98)	131 (5.16)	100 (3.94)	50 (1.97)	13 (0.51)	70 (2.76)
32mm	120 (4.72)	25 (0.98)	52 (2.05)	65 (2.56)	60.2 (2.37)	171 (6.73)	140 (5.51)	70 (2.76)	16 (0.63)	100 (3.94)
40mm	150 (5.91)	33 (1.3)	63 (2.48)	79 (3.11)	71.6 (2.82)	220 (8.66)	180 (7.09)	90 (3.54)	22 (0.87)	140 (5.51)
50mm	180 (7.09)	42 (1.65)	78 (3.07)	96 (3.78)	86.6 (3.41)	280 (11.02)	220 (8.66)	110 (4.33)	29 (1.14)	180 (7.09)
63mm	215 (8.46)	54 (2.13)	93 (3.66)	113.5 (4.47)	101.6 (4)	333 (13.11)	280 (11.02)	140 (5.51)	40 (1.57)	230 (9.06)

Bore Size	J	K	OM	ON	P	R	Port S	T
18mm	3 (0.12)	M3x7 (#4-48x0.28)	3.4 (0.13)	3.5 (0.14)	23.5 (0.93)	M3x8 (#4-48x0.31)	M5 (10-32)	9.5 (0.37)
25mm	3.5 (0.14)	M4X7 (#8-36x0.28)	4.4 (0.17)	4.5 (0.18)	33 (1.3)	M4x10 (#8-36x0.39)	G1/8 (1/8 NPT)	7 (0.28)
32mm	4.5 (0.18)	M5X9 (#10-32x0.35)	5.3 (0.21)	5.5 (0.22)	41 (1.61)	M5x11 (#10-32x0.43)	G1/8 (1/8 NPT)	7 (0.28)
40mm	5 (0.20)	M6X10 (1/4-28x0.39)	6.8 (0.27)	7 (0.28)	51 (2.01)	M6x13 (1/4-28x0.51)	G1/4 (1/4 NPT)	13 (0.51)
50mm	6.5 (0.26)	M8X12.5 (5/16-24x0.49)	6.8 (0.27)	7 (0.28)	63 (2.48)	M8x13 (5/16-24x0.51)	G1/4 (1/4 NPT)	12 (0.47)
63mm	8 (0.31)	M8X15 (5/16-24x0.59)	8.8 (0.35)	9 (0.35)	78 (3.07)	M8x13 (5/16-24x0.51)	G3/8 (3/8 NPT)	13 (0.51)

Bore Size	U	V	W	X	Y
18mm	9.5 (0.37)	9.3 (0.37)	20.7 (0.81)	15 (0.59)	6.5 (0.26)
25mm	13 (0.51)	13.5 (0.53)	28.5 (1.12)	21 (0.83)	7.0 (0.28)
32mm	7 (0.28)	15.5 (0.61)	36.5 (1.44)	26 (1.02)	9.0 (0.35)
40mm	13 (0.51)	19 (0.75)	44 (1.73)	31.5 (1.24)	10 (0.39)
50mm	12 (0.47)	21 (0.83)	50 (1.97)	39 (1.54)	12 (0.47)
63mm	12 (0.47)	23 (0.91)	61.5 (2.42)	46.5 (1.83)	12 (0.47)

Dimensions (Ultran Band)



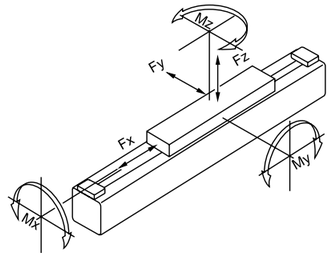
Active port positions are specified in model number. All other ports supplied with plugs. Ports dimensioned "S" are duplicated on opposite face.

Bore Size	A	AA	B	BB	CC	D	DD	H	HH
18mm	80 (3.15)	15.5 (0.61)	30 (1.18)	39 (1.54)	36.5 (1.44)	103 (4.06)	50 (1.97)	75 (2.95)	-
25mm	100 (3.94)	20 (0.79)	42 (1.65)	53 (2.09)	50.2 (1.98)	131 (5.16)	66 (2.6)	100 (3.94)	50 (1.97)
32mm	120 (4.72)	25 (0.98)	52 (2.05)	65 (2.56)	60.2 (2.37)	171 (6.73)	80 (3.15)	140 (5.51)	70 (2.76)
40mm	150 (5.91)	33 (1.3)	63 (2.48)	79 (3.11)	71.6 (2.82)	220 (8.66)	97 (3.82)	180 (7.09)	90 (3.54)
50mm	180 (7.09)	42 (1.65)	78 (3.07)	96 (3.78)	86.6 (3.41)	280 (11.02)	116 (4.57)	220 (8.66)	110 (4.33)
63mm	215 (8.46)	54 (2.13)	93 (3.66)	113.5 (4.47)	101.6 (4)	333 (13.11)	136 (5.35)	280 (11.02)	140 (5.51)

Bore Size	M	N	NN	P	R	Port S	T	U
18mm	M3x7 (#4-48x0.28)	35 (1.38)	10 (0.39)	23.5 (0.93)	M3x8 (#4-48x0.31)	M5 (#10-32)	9.5 (0.37)	9.5 (0.37)
25mm	M4x7 (#8-36x0.28)	45 (1.77)	13 (0.51)	33 (1.30)	M4x10 (#8-36x0.39)	G1/8 (1/8 NPT)	7 (0.28)	13 (0.51)
32mm	M5x9 (#10-32x0.35)	55 (2.17)	16 (0.63)	41 (1.61)	M5x11 (#10-32x0.43)	G1/8 (1/8 NPT)	7 (0.28)	7 (0.28)
40mm	M6x10 (1/4-28x0.39)	70 (2.76)	22 (0.87)	51 (2.01)	M6x13 (1/4-28x0.51)	G1/4 (1/4 NPT)	13 (0.51)	13 (0.51)
50mm	M8x12.5 (5/16-24x0.49)	85 (3.35)	29 (1.14)	63 (2.48)	M8x13 (5/16-24x0.51)	G1/4 (1/4 NPT)	12 (0.47)	12 (0.47)
63mm	M8x15 (5/16-24x0.59)	105 (4.13)	40 (1.57)	78 (3.07)	M8x13 (5/16-24x0.51)	G3/8 (3/8 NPT)	13 (0.51)	12 (0.47)

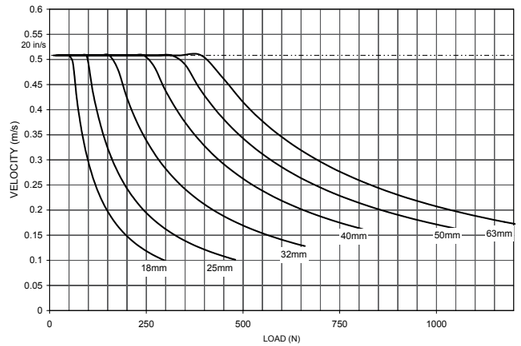
Bore Size	V	W	X	Y
18mm	9.3 (0.37)	20.7 (0.81)	15 (0.59)	6.5 (0.26)
25mm	13.5 (0.53)	28.5 (1.12)	21 (0.83)	7 (0.28)
32mm	15.5 (0.61)	36.5 (1.44)	26 (1.02)	9 (0.35)
40mm	19 (0.75)	44 (1.73)	31.5 (1.24)	10 (0.39)
50mm	21 (0.83)	50 (1.97)	39 (1.54)	12 (0.47)
63mm	23 (0.91)	61.5 (2.42)	46.5 (1.83)	12 (0.47)

Engineering Specifications (Ultran Band)

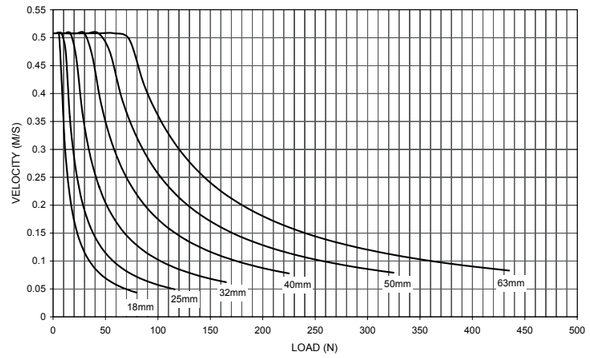


Bore Size	Maximum Moment, Nm (in-lb)		
	Mx	My	Mz
18mm	1 (8.8)	3 (26.5)	3 (26.5)
25mm	2 (17.7)	13 (115)	13 (115)
32mm	3.5 (31)	25 (221.2)	25 (221.2)
40mm	5.5 (48.7)	40 (354)	40 (354)
50mm	10 (88.5)	65 (575.2)	65 (575.2)
63mm	16 (141.6)	100 (885)	100 (885)

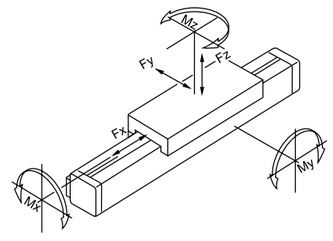
Load (Fz) vs. Velocity



Load (Fy) vs. Velocity



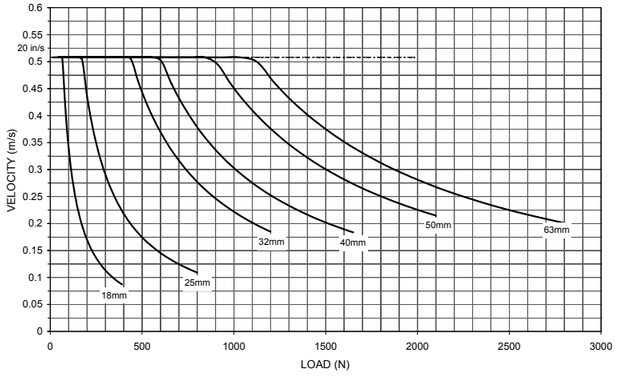
Engineering Specifications (UBS, UBSM)



Bore Size	Maximum Moment, Nm (in-lb)		
	Mx	My	Mz
18mm	3.5 (31)	6 (53.1)	6 (53.1)
25mm	10 (88.5)	20 (177)	20 (177)
32mm	25 (221.2)	45 (398.2)	45 (398.2)
40mm	40 (354)	75 (663.7)	75 (663.7)
50mm	80 (708)	150 (1327.4)	150 (1327.4)
63mm	110 (973.5)	250 (2212.4)	250 (2212.4)

Nx 0.225 = LB
m/sec x 39.4 = in/sec

Load (Fy or Fz) vs. Velocity



Engineering Specifications (Ultran Band)

Kinetic Energy

Term	Description	S.I. Units	U.S. Units
KE	Kinetic energy	N-m	in-lb.
W	Weight of applied load	kg	lb.
k	Bore constant	kg	lb.
V	Maximum velocity*	M/sec	in/sec

NOTE: Maximum velocity, or impact velocity, is typically = 2 x average velocity

Using S.I. Units
KE = 1/2 x (W + k) x V2

Bore Size	UB, UBM	UBS, UBSM	UB, UBM, UBS, UBSM	UBS, UBSM	
	Bore Constant (k) (kg)		Max KE, no shocks* (N-m)	Max KE with shocks (N-m)	Max KE/hr with shocks (N-m/hr)
18mm	0.07	0.16	0.56	27	33894
25mm	0.15	0.33	1.70	27	33894
32mm	0.30	0.62	4.52	27	33894
40mm	0.55	1.15	8.20	192	75698
50mm	1.02	1.99	12.35	192	75698
63mm	1.73	3.09	15.46	192	75698

Using U.S. Units
KE = 1/773 x (W + k) x V2

Bore Size	UB, UBM	UBS, UBSM	UB, UBM UBS, UBSM	UBS, UBSM	
	Bore Constant (k) (lb)		Max KE, no shocks* (in-lb.)	Max KE with shocks (in-lb.)	Max KE/hr with shocks (in-lb./hr)
18mm	0.15	0.35	4.96	239	299947
25mm	0.33	0.73	15.04	239	299947
32mm	0.66	1.37	40.00	239	299947
40mm	1.21	2.53	72.57	1699	669894
50mm	2.25	4.38	109.29	1699	669894
63mm	3.81	6.81	136.81	1699	669894

NOTE: Any application where velocity exceeds 0.5 m/sec (20 in/sec) requires shock absorbers.

General Specifications

Pressure Rating:	2 to 8 bar (30 to 110 PSI), dry filtered air
Breakaway:	15 PSI or less (UB, UBM)
	30 PSI or less (UBS, UBSM)
Leakage:	100 sccm or less
Operating Temperature:	20˚ C to 80˚ C (-4˚ F to 175˚ F)
Expected Service Life:	1,000 linear miles
Lubrication:	Silicone grease
Maximum Speed:	100 in/sec (impact velocity)
	50 in/sec (average velocity)

How to Specify

ULTRAN CYLINDERS

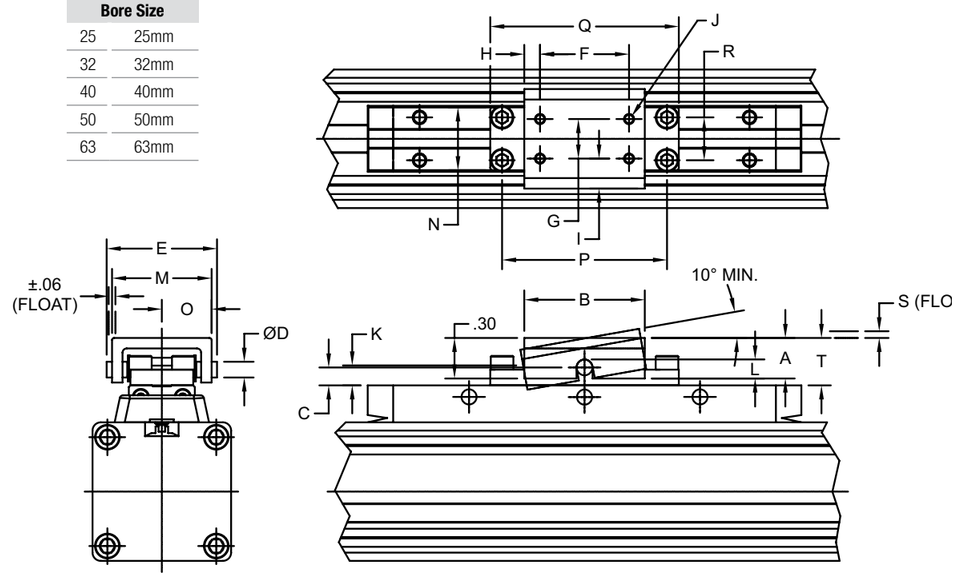
Floating Mounting Bracket (Ultran Band)

Only suitable for use on UB models sized 25mm and larger. Not suitable for use on UBS, UBM, and UBSM models. If a floating mounting bracket is required for these models, contact Bimba.

Ideal when a non-parallel or floating interface is required for interfacing the carriage to an external guiding system. Prevents binding between the UB and the external guiding hardware.

UBFM -

Bore Size	
25	25mm
32	32mm
40	40mm
50	50mm
63	63mm



Dimensions (in)

Bore Size	A	B	C	D	E	F	G	H	I	J
25mm	0.53	1.44	0.19	0.19	1.32	1.06	0.47	0.19	0.36	#4-40 UNC
32mm	0.63	1.69	0.19	0.25	1.65	1.19	0.75	0.25	0.38	#6-32 UNC
40mm	0.75	1.88	0.19	0.25	2.01	1.50	1.00	0.19	0.44	#8-32 UNC
50mm	0.75	1.88	0.25	0.25	2.01	1.50	1.00	0.19	0.44	#8-32 UNC
63mm	0.94	2.75	0.31	0.37	2.85	2.13	1.63	0.31	0.55	#10-24 UNC

Bore Size	K	L	M	N	O	P	Q	R	S	T
25mm	0.24	0.25	1.19	0.75	0.59	1.97	2.25	0.51	0.15	0.56
32mm	0.25	0.31	1.52	1.00	0.76	2.76	3.25	0.63	0.19	0.63
40mm	0.28	0.31	1.88	1.30	0.94	3.54	4.13	0.87	0.19	0.75
50mm	0.28	0.31	1.88	1.61	0.94	4.33	4.91	1.14	0.19	0.81
63mm	0.42	0.44	2.72	2.04	1.36	5.51	6.25	1.58	0.25	1.00

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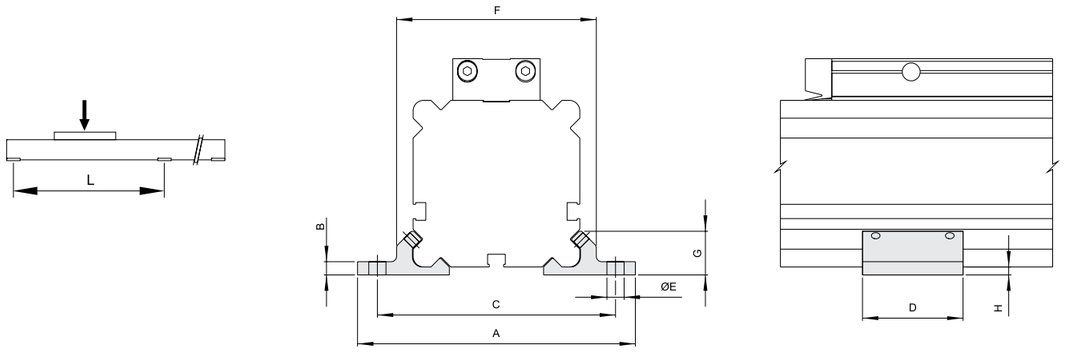
Center Supports

Kit includes: 2 supports and mounting hardware. Additional cylinder support is needed for cylinder span and load combinations as shown in table.

Bore Size	Distance L mm (inch) with 0.5mm deflection						
	250 N (56 lb)	500N (112 lb)	750N (169 lb)	1000N (225 lb.	1500N (337 lb)	2000N (450 lb)	2500N (562 lb)
18mm	700 (28)	-	-	-	-	-	-
25mm	1100 (43)	1350 (53)	700 (28)	-	-	-	-
32mm	1400 (55)	1100 (43)	950 (37)	850 (33)	-	-	-
40mm	1600 (63)	1300 (51)	1150 (45)	1050 (41)	900 (35)	-	-
50mm	2050 (81)	1700 (67)	1550 (61)	1350 (53)	1150 (45)	1050 (41)	-
63mm	2450 (96)	2050 (81)	1850 (73)	1700 (67)	1550 (61)	1350 (53)	1250 (49)

UBCS -

Bore Size	
18	18mm
25	25mm
32	32mm
40	40mm
50	50mm
63	63mm

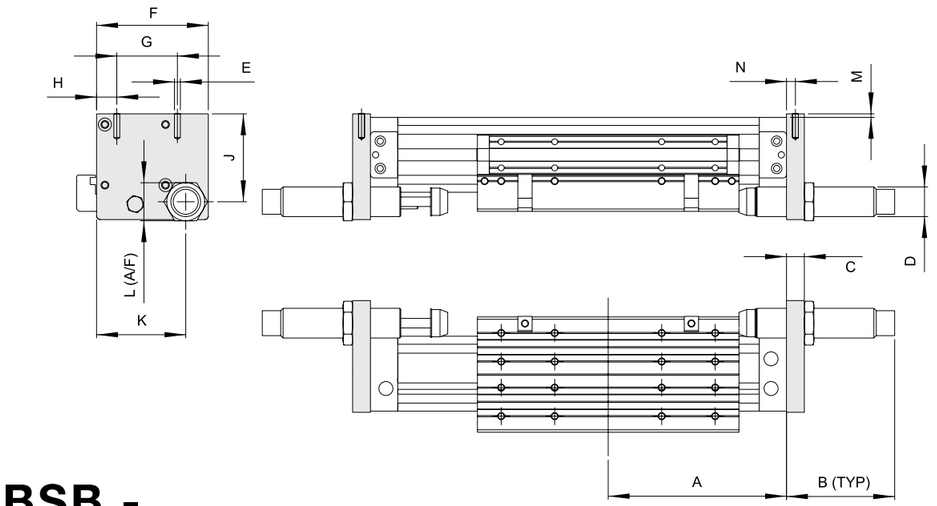


Dimensions mm (in)

Bore Size	A	B	C	D	ØE	F	G	H
18mm	56 (2.20)	2.5 (0.10)	46 (1.81)	23 (0.91)	4.3 (0.17)	36.5 (1.44)	8.3 (0.33)	2.0 (0.08)
25mm	70 (2.76)	3.5 (0.14)	60 (2.36)	28 (1.10)	5.3 (0.21)	50.0 (1.97)	11.0 (0.43)	2.0 (0.08)
32mm	85 (3.35)	4.0 (0.16)	73 (2.87)	33 (1.30)	5.3 (0.21)	61.5 (2.42)	13.8 (0.54)	3.0 (0.12)
40mm	105 (4.13)	4.5 (0.18)	90 (3.54)	38 (1.50)	6.5 (0.26)	75.0 (2.95)	16.5 (0.65)	3.0 (0.12)
50mm	122 (4.80)	5.0 (0.20)	106 (4.17)	43 (1.69)	8.5 (0.33)	91.0 (3.58)	19.0 (0.75)	3.0 (0.12)
63mm	144 (5.67)	6.0 (0.22)	125 (4.92)	48 (1.89)	8.5 (0.33)	107 (4.21)	22.0 (0.87)	4.5 (0.18)

Shock Absorber Bracket (Ultran Band)

Kit includes: 2 brackets and mounting hardware.



Shock absorber shown fully compressed with cylinder at end of stroke.

UBSB -

UBMSB -

Bore Size	
18	18mm
25	25mm
32	32mm
40	40mm
50	50mm
63	63mm

Dimensions (in)

Bore Size	A	B	C	D	E	F	G	H
18mm	80 (3.15)	62 (2.44)	8 (0.31)	M14x1.0 (1/2-20)	M3x10 (#4-40)	44.5 (1.75)	23.5 (0.93)	9 (0.35)
25mm	100 (3.94)	56 (2.2)	10 (0.39)	M14x1.0 (1/2-20)	M4x10 (#8-32)	58 (2.28)	33 (1.3)	13.5 (0.53)
32mm	120 (4.72)	56 (2.2)	12 (0.47)	M14x1.0 (1/2-20)	M5x12 (10-24)	71 (2.79)	41 (1.61)	15.5 (0.61)
40mm	150 (5.91)	91 (3.58)	15 (0.59)	M25x1.5 (1-12)	M6x15 (1/4-20)	94 (3.70)	51 (2.01)	17 (0.67)
50mm	180 (7.09)	91 (3.58)	15 (0.59)	M25x1.5 (1-12)	M8x20 (5/16-18)	103 (4.06)	63 (2.48)	23.5 (0.93)
63mm	215 (8.46)	82.5 (3.25)	15 (0.59)	M25x1.5 (1-12)	M8x20 (5/16-18)	119.5 (4.7)	78 (3.07)	21 (0.83)

Bore Size	J	K	L	M	Shock Absorber PIN
18mm	37 (1.46)	36.5 (1.44)	17 (0.67)	2 (0.08)	SSM-27 (SS-09)
25mm	50 (1.97)	50 (1.97)	17 (0.67)	2 (0.08)	SSM-27 (SS-09)
32mm	61.5 (2.42)	61 (2.4)	17 (0.67)	2 (0.08)	SSM-27 (SS-09)
40mm	74 (2.91)	75 (2.95)	32 (1.26)	3 (0.12)	SSM-50 (SS-31)
50mm	90 (3.54)	89 (3.5)	32 (1.26)	3 (0.12)	SSM-50 (SS-31)
63mm	107 (4.21)	105.5 (4.15)	32 (1.26)	4.5 (0.18)	SSM-50 (SS-31)

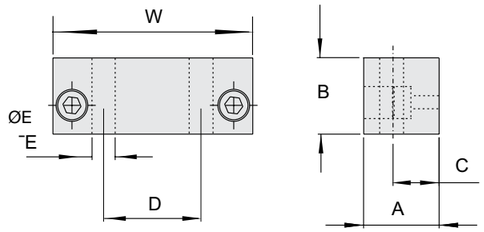
Mounting Block (Ultran Band)

Kit includes: 2 blocks, 4 bolts to attach to cylinder.

UBMB -

UBMMB -

Bore Size	
18	18mm
25	25mm
32	32mm
40	40mm
50	50mm
63	63mm



Dimensions mm (in)

Bore Size	A	B	C	D	ØE	W
18mm	10 (0.39)	14.5 (0.57)	5 (0.2)	14 (0.55)	4.5 (0.18)	30 (1.18)
25mm	15 (0.59)	17 (0.67)	7.5 (0.3)	22 (0.87)	5.5 (0.22)	42 (1.65)
32mm	15 (0.59)	20 (0.79)	7.5 (0.3)	23.5 (0.93)	7 (0.28)	52 (2.05)
40mm	15 (0.59)	23 (0.91)	7.5 (0.3)	30 (1.18)	9 (0.35)	63 (2.48)
50mm	16 (0.63)	26 (1.02)	8 (0.31)	39 (1.54)	9 (0.35)	78 (3.07)
63mm	20 (0.79)	27.5 (1.08)	10 (0.39)	52 (2.05)	11 (0.43)	93 (3.66)

Position Sensing Switches

Switch Model Numbers		Description
18mm bore only	25mm-63mm bores	
MSK	UBSK	GMR, Sinking, 3m cable (NPN)
MSC	UBSC	GMR, Sourcing, 3m cable (PNP)
MR	UBR	Reed, 3m cable
MSKQ	UBSKQ	GMR, Sinking, M8 quick connect (NPN)
MSCQ	UBSCQ	GMR, Sourcing, M8 quick connect (PNP)
MRQ	UBRQ	Reed, M8 quick connect

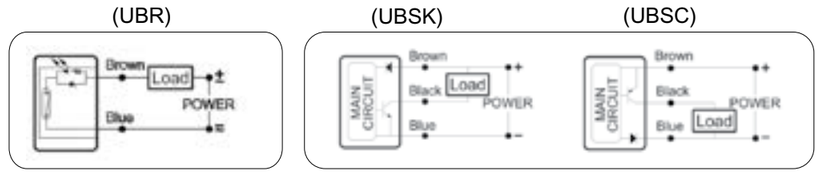
Switch Specifications (25mm-63mm Bores)*

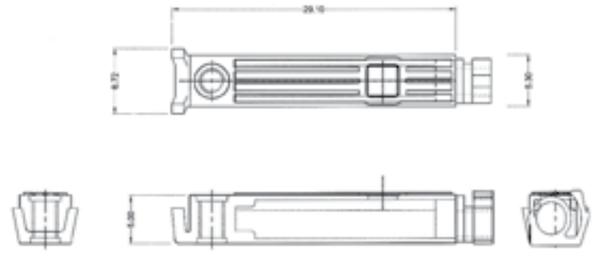
Characteristic	UBR	UBSK	UBSC
Switching Logic	SPST N/O	Solid State Output Normally Open	
Sensor Type	Reed Switch	NPN Current Sinking	PNP Current Sourcing
Operating Voltage	5~240V DC/AC	5~28V DC	
Switching Current	100mA max	200mA max	
Switching Power	10W max	6W max	
Current Consumption	- -	20mA max @ 24V (Active)	18mA max @ 24V (Active)
Voltage Drop	2.5V max @ 40mA DC	0.5V @ 200mA max (Resistive Load)	
Leakage Current	- -	0	.01mA max
Indicator	Red LED	Red LED	Green LED
Sensitivity	60 Gauss	40 Gauss	
Max Switching Frequency	1000 Hz	1000 Hz	
Temp Range	-10 ~ 70 deg C	-10 ~ 70 deg C	
Shock	30G	50G	
Vibration	9G	9G	
Enclosure Protection	IP67	IP67	
Circuit Protection	N one	Reverse Source Polarity; Surge suppression	

*For specifications on 18mm bore switches MS/MR, and Quick Connect mating cables, see Related Products Section.

Wiring Diagram

(UBR) (UBSK) (UBSC)





Ultran Band

The model number of Ultran Band cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Ultran Band unit with 25mm bore, 12” stroke, and additional options is shown below.

UB - 25 12 - 1XCM

Model	
UB	Ultran Band
UBS	Ultran Band, Side Guide
UBM	Ultran Band, Metric
UBSM	Ultran Band, Metric, Side Guide

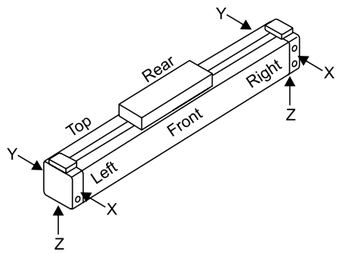
Bore Size	
18	18mm
25	25mm
32	32mm
40	40mm
50	50mm
63	63mm

Stroke Length
1” increments to 120” max.1 (UB, UBS)
25mm increments to 3000mm max. (UBM, UBSM)

[1] Price adder applies to strokes over 48 inches (1220 mm). Contact Bimba Customer Service for more information.

Options	
1	Single end porting (RH) (X, Y positions only)
2	Single end porting (LH) (X, Y positions only)
3	Double end porting (X, Y, or Z positions)
F	Floating mounting bracket2
X	Side front port position
Y	Side rear port position
Z	Bottom port position
C	Adjustable cushions
M	MRS position sensing

[2] Only available on UB models sized 25mm and larger. Not available on 18mm models, or on UBS, UBM, and UBSM. If a floating mounting bracket is required for these models, contact Bimba. For use when a non-parallel or floating interface with the carriage is required to prevent binding between the UB and external guiding systems. Refer to page 417 for dimensions.



Notes:
Must specify port function and location.
All models have cushions; include “C” in all part numbers.
All models include magnet and are switch-ready; include “M” in all part numbers.
For port positioning, use diagram above.

Basic Repair Kits (Ultran Band)

Kits include: all seals, sealing band, cover strip, all assembly hardware. Two kits are offered; one for strokes up to 3m stroke and one for strokes 3-6m.

Example: Basic repair kit for UB-2536-1XCM = RK9N0253

Bore Size	Kits for Stroke 0-3m (0-118")		Kits for Strokes 3-6m (118" +)	
	Seal Kit (3m) NPT (inch)	Seal Kit (3m) Metric	Seal Kit (6m) NPT (inch)	Seal Kit (6m) Metric
18mm	RK9N0183	RK9Y0183	RK9N0186	RK9Y0186
25mm	RK9N0253	RK9Y0253	RK9N0256	RK9Y0256
32mm	RK9N0323	RK9Y0323	RK9N0326	RK9Y0326
40mm	RK9N0403	RK9Y0403	RK9N0406	RK9Y0406
50mm	RK9N0503	RK9Y0503	RK9N0506	RK9Y0506
63mm	RK9N0633	RK9Y0633	RK9N0636	RK9Y0636

Notes

ULTRAN CYLINDERS

BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

Notes

Heavy Duty Round Line Cylinders

Bimba offers a variety of heavy duty repairable round line cylinders as counterparts to our non-repairable Original Line offerings.

Double-Wall® cylinders convert into six NFPA mounting styles and utilize easy to assemble “bolt on” mounting kits. An epoxy coated aluminum tie-tube outer shell protects the inner 304 stainless steel body tube from harsh environments. This design allows these cylinders to withstand dents and dings that would normally cause single wall cylinders to fail.

Bimba’s repairable stainless steel cylinders offer a corrosion resistant design that is ideal for washdown applications and is designed specifically to reduce sharp edges and corners and provide a smooth transition from end cap to cylinder body. Tapped holes are provided to allow easy mounting of USDA approved secondary wiper retainers as an option.





Contents

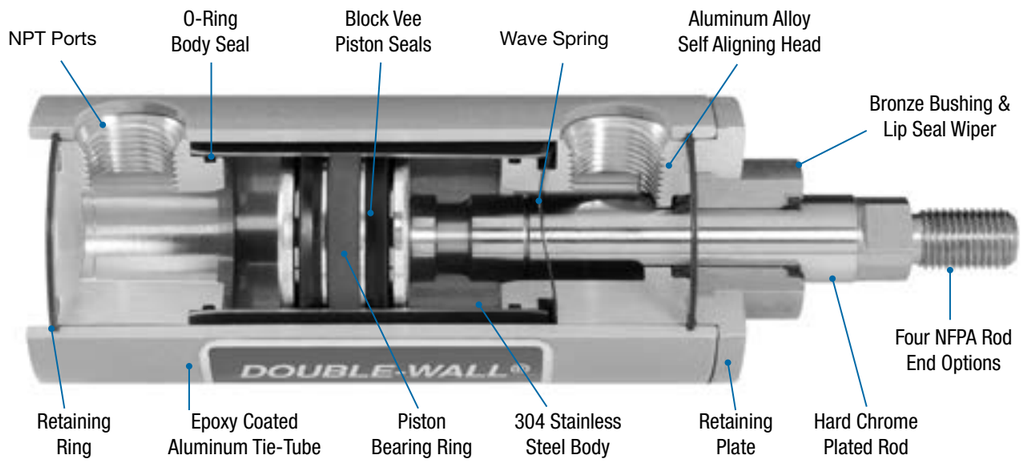
433 Double-Wall® Cylinders
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- 434 – How it Works
- 434 – Engineering Specifications
- 435 – Double-Wall® Long Stroke Cylinder Selection
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Double-Wall® Cylinders





Piston Rod Diameter

5/8" and 1" diameter rods are standard. These rods are made of high strength steel and are suitable for most applications. On long stroke, high thrust applications caution should be exercised and the column strength and stop length chart on page 435 should be reviewed.

Material

Hard chrome plated rods are supplied as standard on all models except 1-1/2" MRS, which are 303 stainless steel. Special materials such as 303 stainless steel are available on request.

Rod End Options

Bimba offers six popular NFPA rod end styles (see page 443). Bimba considers the one-piece male style #2, as the primary standard rod end. A small male rod stud, style #2S, is also offered as a standard option. The stud is made from 125,000 PSI minimum yield steel and is roll threaded for increased strength. Special rod ends with different thread lengths, pitch and class are available upon request.

Cushions

The Double-Wall® offers exclusive Stainless-Cushions®, type 304 stainless steel sleeves which enhance cushion performance and life. The cushion seal is contained on the piston rod for easy inspection and replacement when necessary. Air cushions may be specified on either or both ends without changing the cylinder's overall length.

The cushion design allows for a flush mounted adjustment screw even in the fully open setting. Unless otherwise specified, cushioned models are shipped with the adjustment screws located in positions 4 and 8 as shown on the cylinder dimensional drawings.

Adjustment screws may be ordered in other than standard positions at no additional charge. Simply add these designations as the last digits of the model number:

A2 – Head Adjustment Screw – Position 2
A3 – Head Adjustment Screw – Position 3
A6 – Cap Adjustment Screw – Position 6
A7 – Cap Adjustment Screw – Position 7
A26 – Adjustment Screws – Positions 2 and 6
A37 – Adjustment Screws – Positions 3 and 7

Mountings

Double-Wall cylinders utilize easy to assemble “bolt on” mounting kits. Basic cylinders (less mountings) and mounting kits are ordered and shipped as separate items. All necessary hardware is contained in the kit. The clevis mounting kit for example contains the clevis cap, pivot pin, retaining rings, and mounting cap screws.

The clevis and pivot caps are high strength aluminum die castings and have oil-filled bronze bushings. Side and end lug kits contain brackets which are stamped from high strength steel. Flange kits are offered in both steel and aluminum. All mountings are epoxy coated.

“Bolt on” Double-Wall mounting kits give your local BIMBA Distributor inventory versatility allowing him to stock Basic cylinders of various popular strokes and bores without committing them exclusively to one mounting style. This means greater “off the shelf” availability for you.

Delivery

Ordering standard cylinders with the primary standard style #2 rod end will allow you to take advantage of a substantial local Distributor stock of Double-Wall cylinders. A very large stock of cushioned (both ends) and non-cushioned finished cylinders is always maintained at our Monee, Illinois plant. In addition we maintain a vast inventory of finished heads, caps, rods, etc. for quick assembly of your optional feature or non-standard stroke requirement.

Specials

Bimba Manufacturing welcomes the opportunity to custom design a cylinder to meet your exact specifications and requirements. As a leading manufacturer of custom special cylinders, we can provide the engineering expertise to help you with whatever design problem you face. We also maintain a specials department within our manufacturing facilities to assure you of the most expedient delivery possible. Please contact your local Bimba Distributor or Customer Service Department with details of your special requirement.

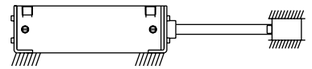
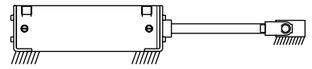
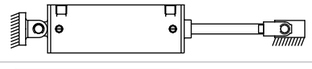
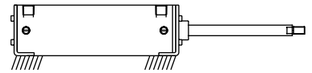
Engineering Specifications

Tie Tube:	Epoxy coated Aluminum
Cylinder Body:	Smooth 304 stainless steel
Piston Rod:	Hard Chrome Plated standard; 303 stainless optional
Seals:	Buna N Standard; High Temperature Fluoroelastomer optional
Lubrication:	PTFE Grease

Temperature:	-20º to 200º F standard; 0º to 300º F with high temperature option
Pressure Rating:	200 PSI; 150 PSI with high temperature option
Life:	1400 miles of travel when lubricated (Lubrication every 500 miles recommended)
Stroke Maximum:	72" (strokes beyond 72" require an application review)

Double-Wall® Long Stroke Cylinder Selection

Application of Long Stroke Cylinders are controlled by two factors: column strength of piston rod and mounting configuration. Dual Piston construction provides needed additional bearing surface through the cycle of the cylinder. Dual Pistons consist of mounting two pistons on the rod, separated a calculated distance to provide the required stop length. Available in one inch increments, required stop lengths are determined from mounting class and stroke information.

Determining Mounting Class		Mounting Style	Rod End Connection
Class 1		Side Lug End Lug Flange	Rigidly guided, pivoted
Class 2		Side Lug End Lug Flange	Pivoted, supported but not rigidly guided
Class 3		Pivot Clevis	Pivoted, supported
Class 4		Side Lug End Lug Flange	Free end unguided and unsupported

Dual Piston Stop Length Calculation

Select mounting class. Move over to the column showing a stroke length equal to or less than required. Figure at top of column is required Dual Piston stop length. Examples: Class 2, 62" stroke length = 2" stop length. Class 3, 62" - 5" stop length. All lengths shown here are in inches.

Mounting Class	Dual Piston – Stop Length Required											
	1	2	3	4	5	6	7	8	9	10	11	12
1	64	88	1.10	130	-	-	-	-	-	-	-	-
2	46	62	78	93	108	122	136	-	-	-	-	-
3	25	34	43	51	59	67	74	81	88	95	101	108
4	16	22	28	28	40	46	51	56	61	66	70	74

Net (effective) stroke + stop length = Gross stroke of cylinder. Mounting dimensions are determined from gross stroke. Consult your local distributor for Dual Piston Pricing.

Column Strength Limitations

Select mounting class, rod diameter, and stroke length in inches: read maximum push force in pounds for that combination. Where no value is shown, the rod is safe for the maximum rated cylinder push force.

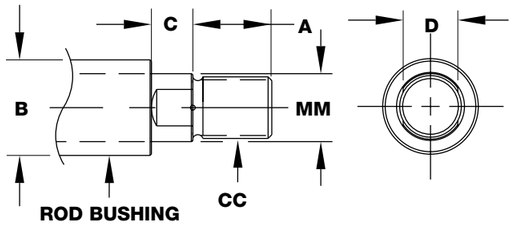
Rod Diameter/ Inches Stroke	Class 1		Class 2		Class 3		Class 4	
	5/8"	1"	5/8"	1"	5/8"	1"	5/8"	1"
10	-	-	-	-	-	-	820	-
15	-	-	-	-	820	-	360	2390
20	-	-	-	-	460	-	200	1340
25	-	-	-	-	290	1940	130	860
30	-	-	820	-	200	1340	90	600
40	820	--	460	-	110	750	50	330
50	540		290	1940	70	480	30	210
60	360	2390	200	1340	50	330	20	150

Weights

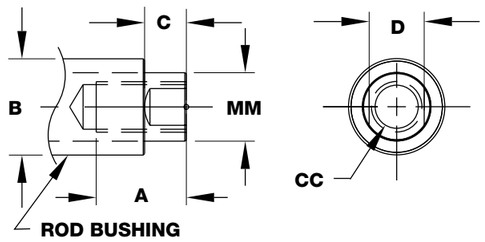
Approximate Weights (lbs)		
Bore	**Base Weight**	**Adder Per Inch Of Stroke**
1-1/2" (17)	1.36	0.19
2" (31)	1.81	0.22
2-1/2" (50)	2.9	0.31
3-1/4" (83)	5.62	0.51
4" (125)	7.5	0.57

Dimensions

Rod Thread – 2, 2S, 1, 4C, 5C



Rod Thread – 4



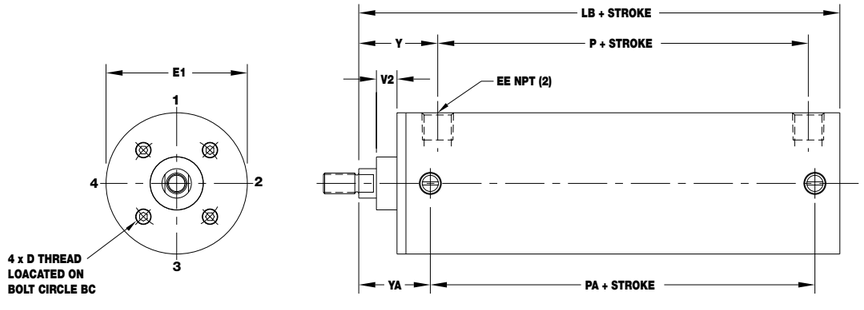
Rod End (1-1/2", 2" and 2-1/2" Bores)

Rod End Style	A	B	C	Cc	D	Mm
2	.75	1.12	.38	7/16-20 UNF	.5	.62
2S	.75	1.12	.38	7/16-20 UNF	.5	.62
1	.75	1.12	.38	1/2-20 UNF	.5	.62
4 (tapped)	.75	1.12	.38	7/16-20 UNF	.5	.62
4C	1.25	1.00	.19	1/2-13 UNC	.5	.62
5C	1.25	1.00	.19	5/8-11 UNC	.5	.62

Rod End (3-1/4", 4" Bores)

Rod End Style	A	B	C	Cc	D	Mm
2	1.12	1.5	.5	3/4-16 UNF	.88	1.00
2S	1.12	1.5	.5	3/4-16 UNF	.88	1.00
1	1.12	1.5	.5	7/8-14 UNF	.88	1.00
4 (tapped)	1.12	1.5	.5	3/4-16 UNF	.88	1.00

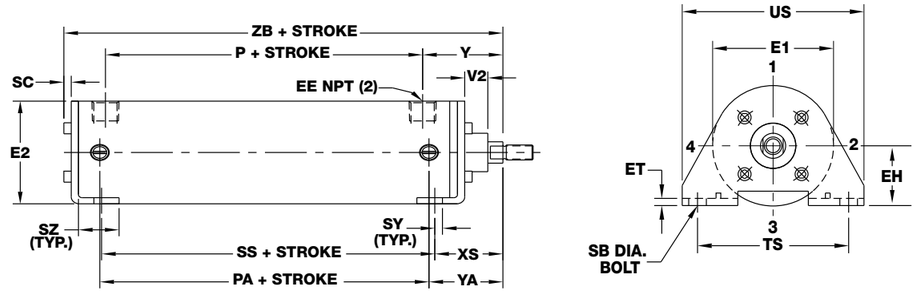
Double-Wall (no mounting)



Bore	LB	P	Y	V2	EE	YA	PA	E1	D	D Depth	BC
1-1/2"	4.62	2.28	1.67	.44	3/8 NPT	1.52	2.58	2.00	#6-32	0.51	1.48
2"	4.62	2.28	1.67	.44	3/8 NPT	1.52	2.58	2.34	#8-32	0.66	1.75
2-1/2"	4.75	2.41	1.67	.44	3/8 NPT	1.52	2.70	2.94	#10-24	0.69	2.00
3-1/4"	5.63	2.62	2.19	.74	1/2 NPT	2.00	3.00	3.69	5/16-18	0.75	2.83
4"	5.63	2.62	2.19	.74	1/2 NPT	2.00	3.00	4.44	5/16-18	0.75	2.83

Dimensions

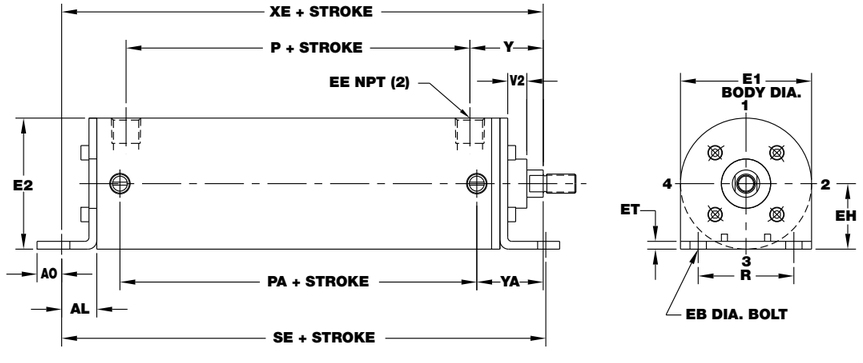
Side Lug Mount (NFPA MS-2) (in)



Bore	Kit	ZB	P	SS	PA	V2	Y	EE	SY	XS	YA
1-1/2"	MSL-17	4.90	2.28	2.87	2.58	.31	1.67	3/8 NPT	0.19	1.38	1.52
2"	MSL-31	4.92	2.28	2.87	2.58	.31	1.67	3/8 NPT	0.19	1.38	1.52
2-1/2"	MSL-50	5.12	2.41	3.00	2.70	.26	1.67	3/8 NPT	0.19	1.38	1.52
3-1/4"	MSL-83	6.11	2.62	3.25	3.00	.49	2.19	1/2 NPT	0.16	1.88	2.00
4"	MSL-125	6.17	2.62	3.25	3.00	.43	2.19	1/2 NPT	0.16	1.88	2.00

Bore	Kit	SC	E2	SZ	US	E1	EH	ET	TS	SB
1-1/2"	MSL-17	.14	2.00	1.00	3.51	2.00	1.00	.13	2.75	.38
2"	MSL-31	.16	2.34	1.00	4.01	2.34	1.25	.13	3.25	.38
2-1/2"	MSL-50	.19	3.00	1.00	4.51	2.94	1.49	.18	3.75	.38
3-1/4"	MSL-83	.23	3.75	1.25	5.76	3.69	1.87	.25	4.75	.50
4"	MSL-125	.23	4.50	1.25	6.51	4.44	2.24	.31	5.50	.50

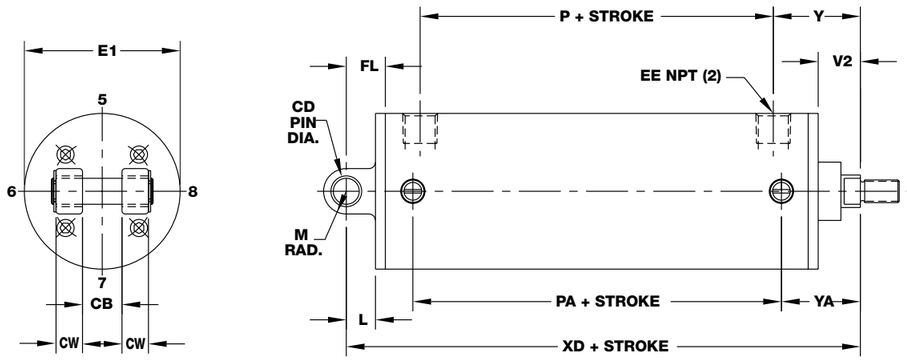
End Lug Mount (NFPA MS-7) (in)



Bore	Kit	XE	P	PA	SE	V2	Y	EE	YA	AO	AL	E2	E1	EH	ET	EB	R
1-1/2"	MEL-17	5.38	2.28	2.58	5.12	.31	1.67	3/8 NPT	1.52	.26	.75	2.00	2.00	1.00	.13	.25	1.43
2"	MEL-31	5.56	2.28	2.58	5.50	.31	1.67	3/8 NPT	1.52	.32	.94	2.34	2.34	1.25	.13	.31	1.84
2-1/2"	MEL-50	5.81	2.41	2.70	5.88	.26	1.67	3/8 NPT	1.52	.30	1.07	3.00	2.94	1.49	.18	.31	2.19
3-1/4"	MEL-83	6.50	2.62	3.00	6.00	.49	2.19	1/2 NPT	2.00	.38	1.18	3.75	3.69	1.87	.25	.38	2.76
4"	MEL-125	6.63	2.62	3.00	6.25	.43	2.19	1/2 NPT	2.00	.37	1.32	4.50	4.44	2.24	.31	.38	3.32

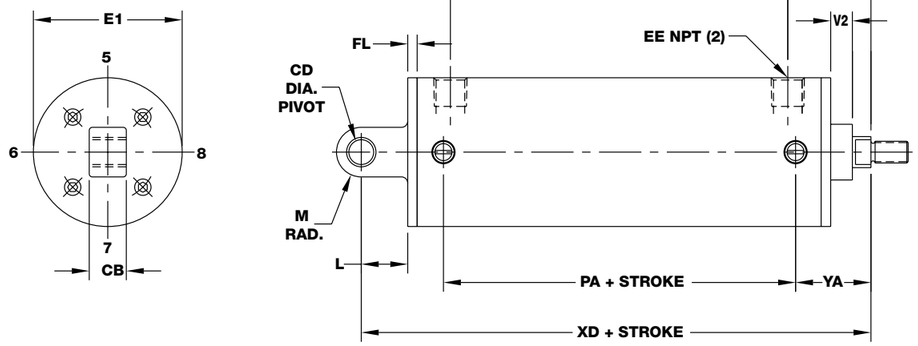
Dimensions

Clevis Mount (NFPA MP-1) (in)



Bore	Kit	P	PA	XD	Y	V2	EE	YA	FL	CD	M	L	E1	CB	CW
1-1/2"	MC-17	2.28	2.58	5.38	1.67	.82	3/8 NPT	1.52	.75	.50	.44	.56	2.00	.76	.51
2"	MC-31	2.28	2.58	5.38	1.67	.82	3/8 NPT	1.52	.75	.50	.44	.56	2.34	.76	.51
2-1/2"	MC-50	2.41	2.70	5.50	1.67	.82	3/8 NPT	1.52	.75	.50	.50	.56	2.94	.76	.51
3-1/4"	MC-83	2.62	3.00	6.88	2.19	1.24	1/2 NPT	2.00	1.26	.75	.69	.88	3.69	1.26	.62
4"	MC-125	2.62	3.00	6.88	2.19	1.24	1/2 NPT	2.00	1.26	.75	.69	.88	4.44	1.26	.62

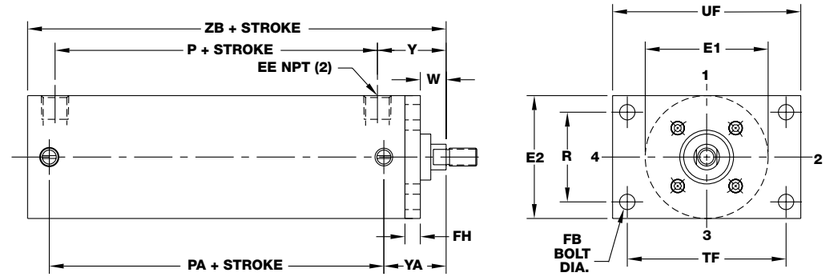
Pivot Mount (NFPA MP-4) (in)



Bore	Kit	P	PA	XD	Y	V2	EE	YA	FL	CD	M	L	E1	CB
1-1/2"	MP-17	2.28	2.58	5.75	1.67	.44	3/8 NPT	1.52	.19	.50	.50	.93	2.00	.75
2"	MP-31	2.28	2.58	5.75	1.67	.44	3/8 NPT	1.52	.19	.50	.50	.93	2.34	.75
2-1/2"	MP-50	2.41	2.70	5.87	1.67	.44	3/8 NPT	1.52	.19	.50	.50	.93	2.94	.75
3-1/4"	MP-83	2.62	3.00	7.50	2.19	.74	1/2 NPT	2.00	.50	.75	.69	1.38	3.69	1.25
4"	MP-125	2.62	3.00	7.50	2.19	.74	1/2 NPT	2.00	.50	.75	.69	1.38	4.44	1.25

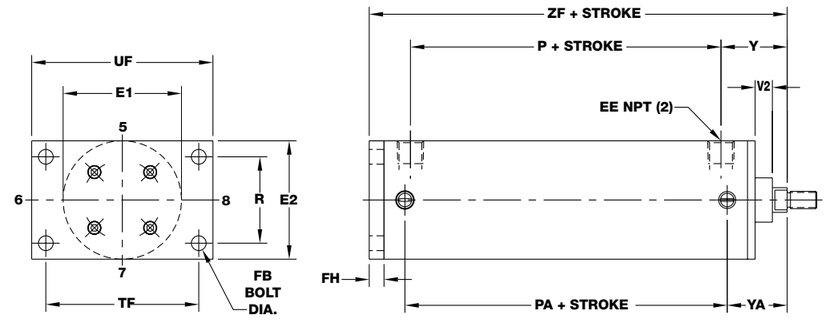
Dimensions

Front Flange Mount (NFPA MF-1) (in)



Bore	Kit	ZB	P	PA	Y	W	EE	YA	FH	UF	E1	E2	R	TF	FB
1-1/2"	MFFA-17 MFFS-17	4.62	2.28	2.58	1.67	.63	3/8 NPT	1.52	.38	3.38	2.00	2.00	1.43	2.75	.25
2"	MFFA-31 MFFS-31	4.62	2.28	2.58	1.67	.63	3/8 NPT	1.52	.38	4.12	2.34	2.50	1.84	3.38	.31
2-1/2"	MFFA-50 MFFS-50	4.75	2.41	2.70	1.67	.63	3/8 NPT	1.52	.38	4.62	2.94	3.00	2.19	3.88	.31
3-1/4"	MFFA-83 MFFS-83	5.63	2.62	3.00	2.19	.75	1/2 NPT	2.00	.62	5.50	3.69	3.75	2.76	4.69	.38
4"	MFFA-125 MFFS-125	5.63	2.62	3.00	2.19	.75	1/2 NPT	2.00	.62	6.25	4.44	4.50	3.32	5.44	.38

Rear Flange Mount (NFPA MF-2) (in)

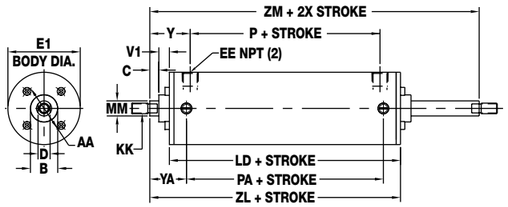


Bore	Kit	ZF	P	PA	Y	V2	EE	YA	FH	UF	E1	E2	R	TF	FB
1-1/2"	MFRA-17 MFRS-17	5.00	2.28	2.58	1.67	.44	3/8 NPT	1.52	.38	3.38	2.00	2.00	1.43	2.75	.25
2"	MFRA-31 MFRS-31	5.00	2.28	2.58	1.67	.44	3/8 NPT	1.52	.38	4.12	2.34	2.50	1.84	3.38	.31
2-1/2"	MFRA-50 MFRS-50	5.12	2.41	2.70	1.67	.44	3/8 NPT	1.52	.38	4.62	2.94	3.00	2.19	3.88	.31
3-1/4"	MFRA-83 MFRS-83	6.25	2.62	3.00	2.19	.74	1/2 NPT	2.00	.62	5.50	3.69	3.75	2.76	4.69	.38
4"	MFRA-125 MFRS-125	6.25	2.62	3.00	2.19	.74	1/2 NPT	2.00	.62	6.25	4.44	4.50	3.32	5.44	.38

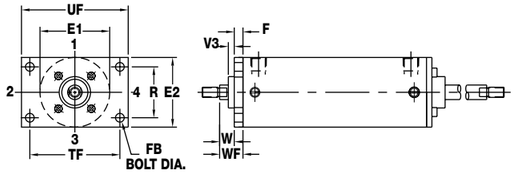
Dimensions (Double End Rod Models)



Basic Double-End Rod Cylinder

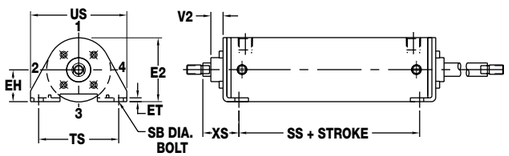


Flange Mount (NFPA MF-1)



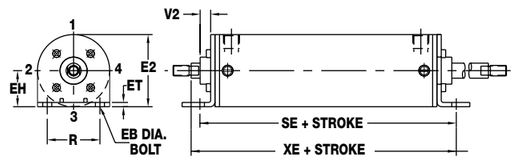
Mounting Kit # MFF

Side Lug Mount (NFPA MS-2)



Mounting Kit # MSL

End Lug Mounts (NFPA MS-7)



Mounting Kit # MEL

Bore	AA	B	C	D	EB	EE	EH	ET	E1	E2	F	FB	KK	LD	MM	P	PA	R
1-1/2"	1.48	1.124	.38	.56	.25	3/8	1.00	.13	2.00	2.00	.38	.25	7/16-20	4.16	.62	2.44	2.74	1.43
2"	1.75	1.124	.38	.56	.31	3/8	1.25	.13	2.34	2.50	.38	.31	7/16-20	4.16	.62	2.44	2.74	1.84
2-1/2"	2.00	1.124	.38	.56	.31	3/8	1.49	.18	2.94	3.00	.38	.31	7/16-20	4.16	.62	2.44	2.74	2.19
3-1/4"	2.83	1.499	.50	.88	.38	1/2	1.87	.25	3.69	3.75	.62	.38	3/4-16	4.64	1.00	2.75	3.12	2.76
4"	2.83	1.499	.50	.88	.38	1/2	2.24	.31	4.44	4.50	.62	.38	3/4-16	4.64	1.00	2.75	3.12	3.32

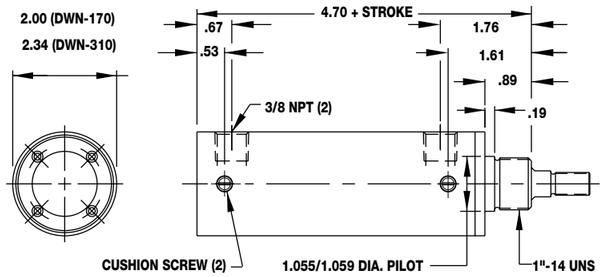
Bore	SB	SE	SS	TF	TS	UF	US	V1	V2	V3	W	WF	XE	XS	Y	YA	ZL	ZM
1-1/2"	.38	5.46	3.22	2.75	2.75	3.38	3.51	.44	.31	.25	.62	1.00	5.72	1.38	1.67	1.52	4.96	5.77
2"	.38	5.84	3.22	3.38	3.25	4.12	4.01	.44	.31	.25	.62	1.00	5.90	1.38	1.67	1.52	4.96	5.77
2-1/2"	.38	6.10	3.22	3.88	3.75	4.62	4.51	.44	.26	.25	.62	1.00	6.03	1.38	1.67	1.52	4.96	5.77
3-1/4"	.50	6.26	3.51	4.69	4.75	5.50	5.76	.74	.49	.25	.75	1.37	6.76	1.88	2.19	2.00	5.89	7.13
4"	.50	6.51	3.51	5.44	5.50	6.25	6.51	.74	.43	.25	.75	1.37	6.89	1.88	2.19	2.00	5.89	7.13

NOTE: When ordering "Cushions Both Ends," specify DWDC – One End DWDS. EE will provide extra extension on both ends.

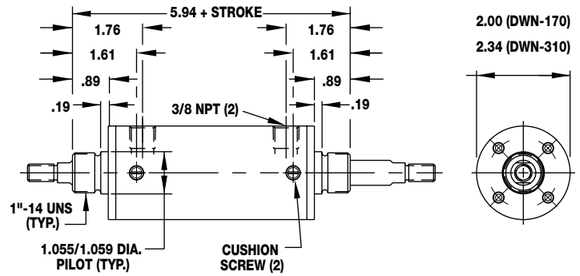
Double-Wall® Front Nose Mounting (in)

Single End Rod

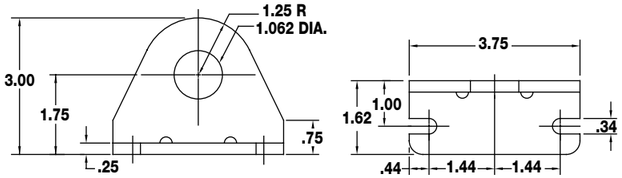




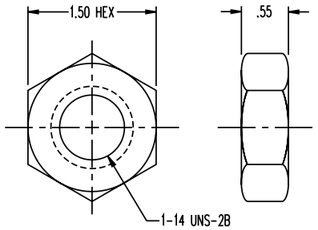
Double End Rod



Foot Bracket (D-17920) Accessory for Nose Mount



Mounting Nut (D-1331)



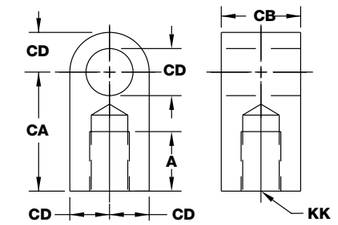
How to Accessorize

Accessories

Rod Eye

Bore	Part #
1-1/2 - 2-1/2	ARE-1
3-1/4 - 4	ARE-2

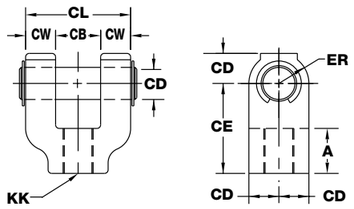
(For -2 Rod End style only)



Rod Clevis

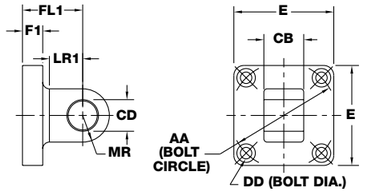
Bore	Part #
1-1/2 - 2-1/2	ARC-1
3-3/4 - 4	ARC-2

Nickel Steel includes Case Hardened Pin (For -2 Rod End style only)



Pivot Bracket

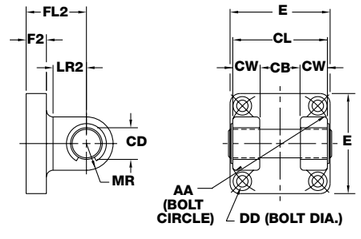
Bore	Part #
1-1/2 - 2-1/2	APB-1
3-1/4 - 4	APB-2



Clevis Bracket

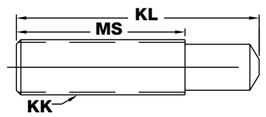
Bore	Part #
1-1/2 - 2-1/2	ACB-1
3-1/4 - 4	ACB-2

(Includes Case Hardened Pin)



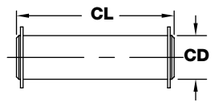
Rod Stud (Rolled Threads)

Bore	Part #
1-1/2 - 2-1/2	ARS-1
3-1/4 - 4	ARS-2



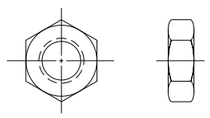
Case Hardened Pivot Pin with Rings

Bore	Part #
1-1/2 - 2-1/2	APP-1
3-1/4 - 4	APP-2



Hex Nut (in)

Part	Hex	THD	THK
D-154	0.69	7/16"-20	0.25
D-98	0.75	1/2"-20	0.31
D-3556	1.12	3/4"-16	0.42
D-2545	1.31	7/8"-14	0.48



Accessories Dimensions (in)

Bore	A	AA	CA	CB	CD	CE	CW	CL	DD
1-1/2", 2", 2-1/2"	0.75	2	1.5	0.75	0.5	1.5	0.5	1.75	0.19
3-1/4", 4"	1.12	2.83	2.06	1.25	0.75	2.38	0.62	2.5	0.312

Bore	E	ER	F1	F2	FL1	FL2	KK	KL	LR1	LR2	MR
1-1/2", 2", 2-1/2"	1.88	0.59	0.38	0.38	1.12	1.12	7/16" -20	2.12	0.745	0.745	0.5
3-1/4", 4"	2.75	0.84	0.5	0.38	1.88	1.25	3/4" - 16	3.27	1.1	0.85	0.69

How to Order

The model number of Double-Wall® pneumatic actuators consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Options are written with rod end options first, followed by special options, and extra extensions last. Mounting kits must be ordered as a separate item, and are shown with their respective bore sizes starting on page 440. Use the ordering information below to build a valid part number.

An example of a basic Double-Wall® unit with 1-1/2" bore, 10" stroke, and additional options is shown below.

Bore Size	
17	1-1/2"
31	2"
50	2-1/2"
83	3-1/4"
125	4"

Rod End Style*	
1	Large male, one piece
2	Small male, one piece
2S	Small male stud (rolled threads)
4	Female threads
4C	Small male, one piece, coarse thread (1-1/2", 2", and 2-1/2" bores only)
5C	Large male, one piece coarse thread (1-1/2", 2", and 2-1/2" bores only)
NT	No threads

* See page 436 for dimensions.

DWC - 17 10 - 2 V

Model	
DW	Double acting
DWC	Double acting, cushions on both ends
DWF	Double acting, front head cushion
DWR	Double acting, rear cushion
DWD	Double acting, double rod end
DWDC	Double acting, double rod end, cushions both ends
DWDS	Double acting, double rod end, cushion one end
DWM (C, F, R)	Double acting, magnetic position sensing (cushion optional)
DWDM (C, F, R)	Double rod end, magnetic position sensing (cushion optional)
DW(M)N (C, F, R)	Nose mount, 1-1/2" and 2" bores only (cushion and magnet optional)
DWD(M)N (C, F, R)	Nose mount, double rod end, 1-1/2" and 2" bores only (cushion and magnet optional)

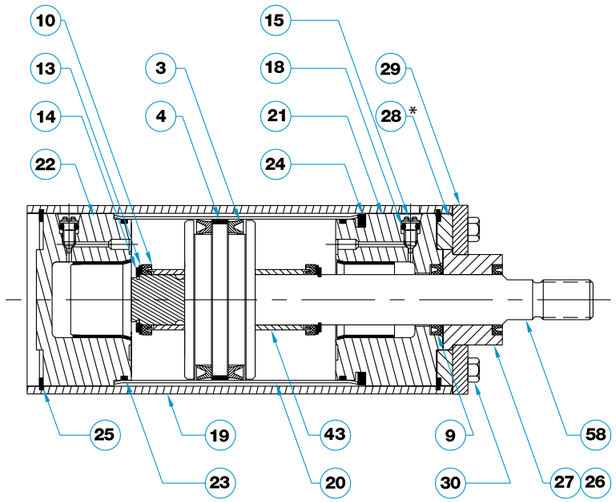
Stroke Length	
0.5	1/2"
1	1"
2	2"
2.5	2-1/2"
etc.	

Options	
99	HT-99 oil pre-lube
DPX.XX	Dual piston[1]
V	High temperature seals (300° F maximum)
EEX.XX	Extra rod extension[2]
AXX	Alternate cushion screw locations[3]
SR	Stainless steel rod

[1] See page 435 for details.
[2] Add to end of model number.
[3] Locations available: 2 and 3 for head end, 6 and 7 for cap end. See dimensional drawing of cylinder for port locations.

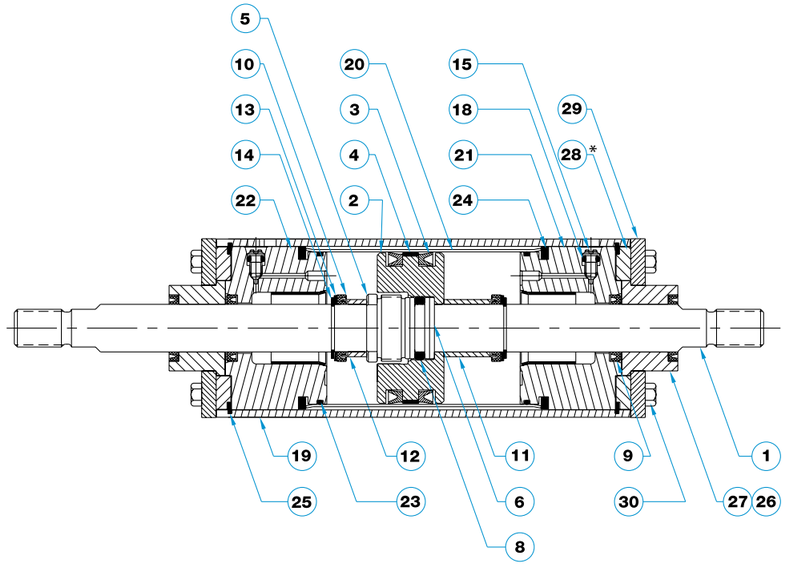
Repair Instructions

Basic DW Series



* Used in most mounting kits and on all 3¼" and 4" bore basic cylinders.

Basic DWD Series



* Used on all 3-1/4" and 4" bore basic cylinders.

Individual Repair Parts and Kits are listed on page 445. When ordering, specify the applicable "P" number followed by the cylinder part number. For example, to get a rod seal for a DWC-1710-2 cylinder, order P-9-DWC-1710-2.

Repair Parts

No.	Part Description	Quantity By Model Type						
		DW	DWF	DWR	DWC	DWD	DWDF	DWDC
P-1	Rod					1	1	1
P-2	Piston					1	1	1
P-3	Piston Seal	2	2	2	2	2	2	2
P-4	Piston Bearing Ring	1	1	1	1	1	1	1
P-5	Free Thread Nut*					1	1	1
P-6	Free Thread Ring*					4	4	4
P-8	O-Ring (Free Thread)*					1	1	1
P-9	Rod Seal*	1	1	1	1	2	2	2
P-10	Cushion Seal*		1	1	2		1	2
P-11	Cushion Sleeve (Head End)*						1	1
P-12	Cushion Sleeve (Cap End)*							1
P-13	Cushion B/U Washer*		1	1	2		1	2
P-14	Cushion Retaining Ring*		1	1	2		1	2
P-15	Cushion Adjusting Screw		1	1	2		1	2
P-18	O-Ring (Cushion Screws)*		1	1	2		1	2
P-19	Tie-Tube	1	1	1	1	1	1	1
P-20	Stainless Steel Body	1	1	1	1	1	1	1
P-21	Head	1	1	1	1	2	2	2
P-22	Cap	1	1	1	1			
P-23	O-Ring (Stainless Steel Body)	2	2	2	2	2	2	2
P-24	Wave Spring	1	1	1	1	2	2	2
P-25	Retaining Ring (Tie-Tube)	2	2	2	2	2	2	2
P-26	Rod Wiper (w/o Bushing)*	1	1	1	1	2	2	2
P-27	Rod Wiper Bushing Assembly*	1	1	1	1	2	2	2
P-28	Spacer	1	1	1	1	2	2	2
P-29	Retaining Plate	1	1	1	1	2	2	2
P-30	Screw (Ret. Plate)	4	4	4	4	8	8	8
P-43	Cushion Sleeve		1	1	2			
P-58	Piston/Rod Assembly	1	1	1	1			
HT-99-7CC	Lubrication	1	1	1	1	1	1	1
Mag-G-3CC	Polymer Grease Lubricant	1	1	1	1	1	1	1

Repair Kits

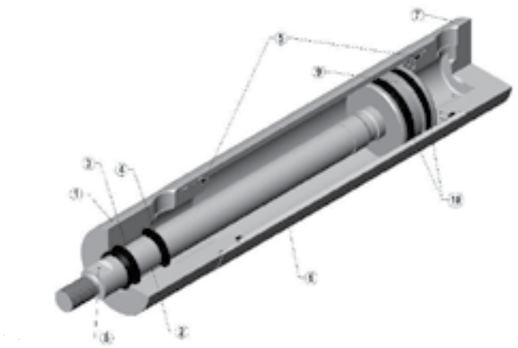
Basic Repair Kit (K-B-_) Includes:**		
P-25	Retaining Ring (Tie-Tube)	2
P-23	O-ring	2
P-24	Wave Spring	1
P-3	Piston Seal	2
P-4	Piston Bearing Ring	1
DWD Basic Repair Kit (K-D-_) Includes: **		
P-25	Retaining Ring (Tie-Tube)	2
P-23	O-ring	2
P-24	Wave Spring	2
P-3	Piston Seal	2
P-4	Piston Bearing Ring	1

Cushion Repair Kit (K-C-_) Includes:*		
P-10	Cushion Seal	1
P-13	Cushion B/U Washer	1
P-14	Cushion Retaining Ring	1
P-15	Cushion Adjusting Screw	1
P-18	O-Ring (Cushion Screws)	1
Rod Seal Repair Kit (K-A-_) Includes: *		
P-27	Rod Wiper Bushing Assembly	1
P-9	Rod Seal	1
MRS Piston Repair Kit (K-P-M-_) Includes:**		
P-33	Piston Seal Assembly	1
P-34	Magnet	1
P-4	Piston Bearing Ring	1

* Parts and kits that are common to multiple bore sizes, which are available in two sizes: 1-1/2", 2", 2-1/2" bores are designated as –S. 3-1/4", 4" bores are designated as –L.
** Specify the bore code in the blank space.

Repairable Stainless Steel Cylinders

1. Rod Guide: Corrosion resistant 303 stainless steel is ideal for washdown applications. Designed specifically to reduce sharp edges and corners and provide a smooth transition to the cylinder body eliminating catch points for contamination and to allow ease in cleaning. Tapped holes are provided to allow easy mounting of USDA approved secondary wiper retainer as an option.
2. Rod Bushing: Material is PTFE (Polytetrafluoroethylene) for extended life, larger bores (5", 6", 8") utilize an acetal bushing.
3. Rod Wiper: A Urethane rod wiper is standard (high temperature material is optional) and offers resistance to a wide variety of washdown chemicals. Larger bores offer a PTFE rod wiper as standard.
4. Rod Seal: Nitrile rod seal (high temperature material is optional) is pressure activated and wear compensating for long life.
5. Body Seal: Nitrile material is standard (high temperature material is optional).
6. Body: Thick walled 316 stainless steel offers superior corrosion resistance and is designed to minimize gaps with the mating end caps where contamination can build up.
7. Rear Head: Corrosion resistant 303 stainless steel is ideal for washdown applications. Designed specifically to reduce sharp edges and corners and provide a smooth transition to the cylinder body eliminating catch points for contamination and to allow ease in cleaning. Optional tapped holes allow for easy mounting of NFPA rear pivot or rear clevis mounting brackets.



8. Piston Rod: Ground and roller burnished 303 stainless steel for maximum corrosion resistance.
9. Piston: Precision machined from aluminum (optional bearing strip) may also be ordered in stainless steel for internal corrosion resistance when required.
10. Piston Seals: Nitrile material is standard, high temperature material is optional. Seals are pressure activated and wear compensating.
11. Lubricant: Food Grade (H1) Grease.

Operating Specifications

Temperature:	-20º to 200º F standard; 0º to 400º F with V option
Stroke Maximum:	24" (strokes beyond 24" require an application review)
Operating Pressure:	200 PSI maximum

USDA Accepted
(Option U, see pages 450 and 451)

EQUIPMENT ACCEPTANCE CERTIFICATE

The issuance of this form is based on U.S. Department of Agriculture, Dairy Grading Branch, Equipment Design Review Section, evaluation of the equipment listed above for compliance with:

USDA Dairy Equipment Guidelines

Materials of Construction

Tie Tube:	Epoxy coated aluminum
Cylinder Body:	Smooth 304 stainless steel
Piston Rod:	Hard Chrome Plated standard; 303 stainless optional
Seals:	Buna N standard; high temperature fluoroelastomer optional
Lubrication:	Factory pre-lubed for non-lube service

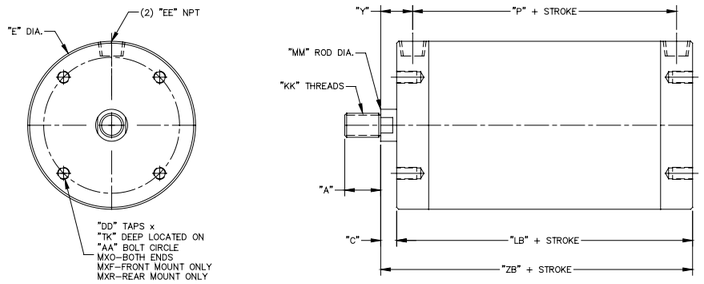
Weights of Cylinders

Approximate Weights (lbs.)		
Bore	**Base Weight**	**Adder per inch of stroke**
1-1/2"	2.82	0.27
2"	5.25	0.33
2-1/2"	8.92	0.39
3-1/4"	20.63	0.61
4"	30.20	0.70
5"	24.10	0.84
6"	36.45	1.12
8"	69.80	1.80

Engineering Specifications

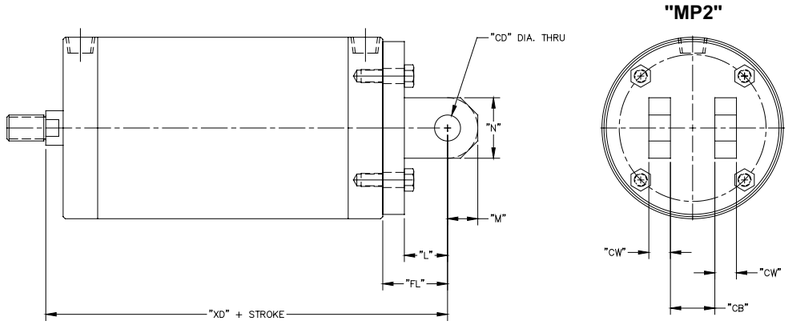
Temperature:	-20º to 200º F standard; 0º to 300º F with high temperature option
Pressure Rating:	200 PSI; 150 PSI with high temperature option
Life:	1400 miles of travel when lubricated (lubrication every 500 miles recommended)
Stroke Maximum:	72" (strokes beyond 72" require an application review)

Dimensions (MXO, MXR, MXR) (in)



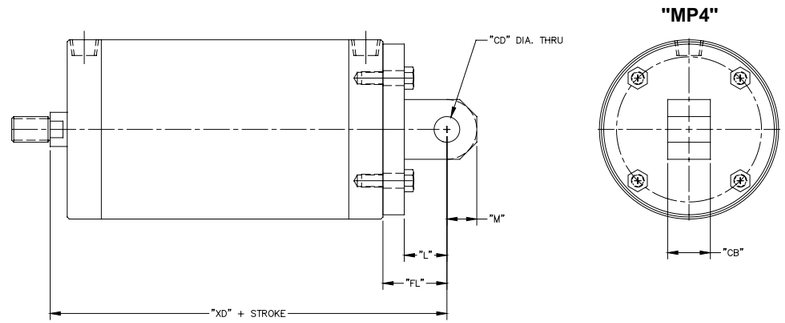
MXO, MXR & MXF Mount Dimensions														
Bore	**Rod Diameter**	**A**	**AA**	**C**	**DD**	**E DIA.**	**EE NPT**	**KK**	**LB**	**MM**	**TK**	**Y**	**P**	**ZB**
1.50	0.625 Standard	0.750	1.450	0.560	8-32	1.750	0.375	7/16-20	5.210	0.625	0.330	2.050	3.260	5.770
2.00	0.625 Standard	0.750	1.850	0.560	10-24	2.250	0.375	7/16-20	5.450	0.625	0.375	2.050	3.500	6.010
2.50	0.625 Standard	0.750	2.150	0.560	1/4-20	2.750	0.375	7/16-20	5.950	0.625	0.500	2.050	4.000	6.510
3.25	1.000 Standard	1.125	2.620	0.640	5/16-18	3.500	0.500	3/4-16	7.430	1.000	0.625	2.420	5.120	8.070
4.00	1.000 Standard	1.125	3.250	0.640	3/8-16	4.250	0.500	3/4-16	7.430	1.000	0.750	2.420	5.120	8.070
5.00	1.000 Standard	1.125	4.250	0.500	3/8-16	5.250	0.500	3/4-16	5.750	1.000	0.625	1.000	4.750	6.250
	1.375 Oversized	1.625	4.250	0.625	3/8-16	5.250	0.500	1-14	5.750	1.375	0.625	1.125	4.750	6.375
6.00	1.375 Standard	1.625	5.000	0.625	1/2-13	6.250	0.500	1-14	5.750	1.375	0.875	1.125	4.750	6.375
	1.750 Oversized	2.000	5.000	0.750	1/2-13	6.250	0.500	1-1/4-12	5.750	1.750	0.875	1.250	4.750	6.500
8.00	1.375 Standard	1.625	6.500	0.625	5/8-11	8.375	0.500	1-14	5.875	1.375	1.000	1.125	4.875	6.500
	1.750 Oversized	2.000	6.500	0.750	5/8-11	8.375	0.500	1-1/4-12	5.875	1.750	1.000	1.250	4.875	6.625

Dimensions (MP2) (in)



MP2 Clevis Mount Dimensions									
Bore	**Rod Diameter**	**CB**	**CD**	**CW**	**FL**	**L**	**M**	**N**	**XD**
1.50	0.625 Standard	0.750	0.500	0.490	1.125	0.750	0.350	0.700	6.900
2.00	0.625 Standard	0.750	0.500	0.500	1.125	0.750	0.400	0.800	7.140
2.50	0.625 Standard	0.750	0.500	0.500	1.125	0.750	0.400	0.800	7.640
3.25	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.600	1.000	9.940
4.00	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.750	1.400	9.940
5.00	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.875	1.750	8.125
	1.375 Oversized	1.250	0.750	0.625	1.875	1.250	0.875	1.750	8.250
6.00	1.375 Standard	1.500	1.000	0.750	2.250	1.500	1.000	2.000	8.625
	1.750 Oversized	1.500	1.000	0.750	2.250	1.500	1.000	2.000	8.750
8.00	1.375 Standard	1.500	1.000	0.750	2.250	1.500	1.000	3.500	8.750
	1.750 Oversized	1.500	1.000	0.750	2.250	1.500	1.000	3.500	8.875

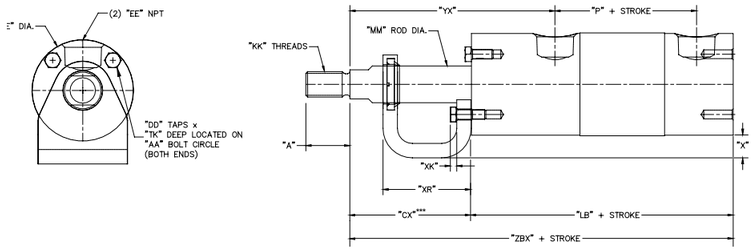
Dimensions (MP4) (in)



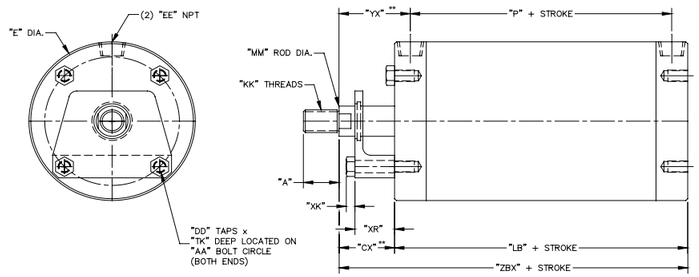
MP4 Pivot Mount Dimensions								
Bore	**Rod Diameter**	**CB**	**CD**	**FL**	**L**	**M**	**N**	**XD**
1.50	0.625 Standard	0.750	0.500	1.125	0.750	0.350	0.700	6.900
2.00	0.625 Standard	0.750	0.500	1.125	0.750	0.400	0.800	7.140
2.50	0.625 Standard	0.750	0.500	1.125	0.750	0.400	0.800	7.640
3.25	1.000 Standard	1.250	0.750	1.875	1.250	0.600	1.000	9.940
4.00	1.000 Standard	1.250	0.750	1.875	1.250	0.750	1.400	9.940
5.00	1.000 Standard	1.250	0.750	1.875	1.250	0.875	1.750	8.125
	1.375 Oversized	1.250	0.750	1.875	1.250	0.875	1.750	8.250
6.00	1.375 Standard	1.500	1.000	2.250	1.500	1.000	2.000	8.625
	1.750 Oversized	1.500	1.000	2.250	1.500	1.000	2.000	8.750
8.00	1.375 Standard	1.500	1.000	2.250	1.500	1.000	3.500	8.750
	1.750 Oversized	1.500	1.000	2.250	1.500	1.000	3.500	8.875

Dimensions (Option “U”) (in)

1-1/2" to 4" Bores



5", 6", and 8" Bores



External Wiper (Option U) Dimensions

Bore	Rod Diameter	A	AA	CX	DD	E Dia.	EE NPT	KK	LB
1-1/2"	.63	3/4	1.45	2.06	8-32	1-3/4	3/8	7/16-20	5.21
2"	.63	3/4	1.85	2.06	10-24	2-1/4	3/8	7/16-20	5.45
2-1/2"	.63	3/4	2.15	2.06	1/4-20	2-3/4	3/8	7/16-20	5.95
3-1/4"	1.00	1-1/8	2.62	2.14	5/16-18	3-1/2	1/2	3/4-16	7.43
4"	1.00	1-1/8	3.25	2.14	3/8-16	4-1/4	1/2	3/4-16	7.43
5"	1.00	1-1/8	4.25	1.75	3/8-16	5-1/4	1/2	3/4-16	5.75
6"	1.38	1-5/8	5.00	1.88	1/2-13	6-1/4	1/2	1-14	5.75
8"	1.38	1-5/8	6.50	1.88	5/8-11	8-3/8	1/2	1-14	5.88

Bore	Rod Diameter	MM	TK	YX	P	XR	XK	ZBX	X
1-1/2"	.63	5/8	.33	3.49	3.16	1.50	.10	7.27	.38
2"	.63	5/8	.38	3.44	3.15	1.50	.12	7.51	.50
2-1/2"	.63	5/8	1/2	3.43	3.39	1.50	.17	8.01	.26
3-1/4"	1.00	1	5/8	4.14	3.83	1.50	.24	9.57	.25
4"	1.00	1	3/4	4.02	3.93	1.50	.27	9.57	.25
5"	1.00	1	5/8	2.25	4.75	1.25	.27	7.50	N/A
6"	1.38	1-3/8	7/8	2.38	4.75	1.25	.36	7.63	N/A
8"	1.38	1-3/8	1	2.38	4.88	1.25	.44	7.75	N/A

NOTE: The USDA-approved option “U” includes an external wiper as required by the USDA. Cylinder rod length is increased as shown. Oversized rods are available in 5", 6", and 8" bore in each mounting style. Please contact distributor.

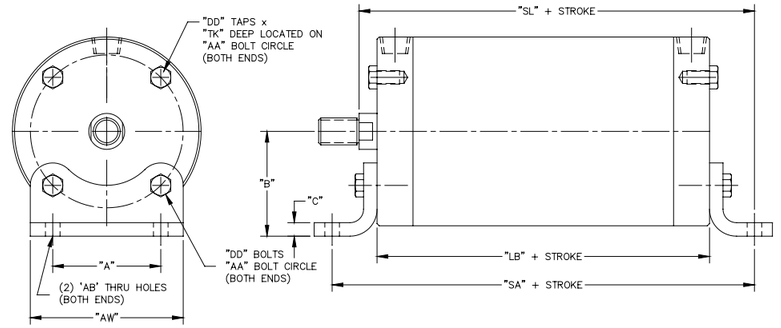
Dimensions

Examples of “U” Option Mounting Bracket





Dimensions (Foot Bracket) (in)



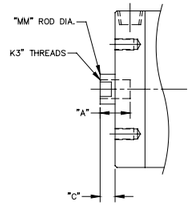
RS Series Foot Mounting Brackets

Bore	Foot Bracket Kit	A	AB	AW	B	C	DD	AA	LB	TK	SA	SL
1-1/2"	RS-FB150	1.03	3/16	1.52	1.25	1/4	8-32	1.45	5.21	.38	6.62	6.46
2"	RS-FB200	1.31	7/32	1.81	1.62	1/4	10-24	1.85	5.45	.38	7.58	7.07
2-1/2"	RS-FB250	1.55	9/32	2.30	1.64	1/4	1/4-20	2.15	5.95	1/2	7.90	7.48
3-1/4"	RS-FB325	1.86	11/32	2.86	2.00	1/4	5/16-18	2.62	7.43	5/8	9.74	9.23
4"	RS-FB400	2.30	13/32	3.50	2.38	1/4	3/8-16	3.25	7.43	3/4	10.05	9.39
5"	RS-FB500	3.00	11/16	4.50	2.88	3/16	3/8-16	4.25	5.75	5/8	8.50	7.63
6"	RS-FB600	4.00	13/16	5.50	3.38	3/16	1/2-13	5.00	5.75	7/8	8.50	7.75
8"	RS-FB800	5.00	13/16	7.00	4.44	1/4	5/8-11	6.50	5.88	1	9.50	8.31

NOTES: Foot bracket mounting kits include two brackets and eight stainless steel screws. Can only be applied to MXO mounting styles.

Dimensions (Option KK3) (in)

Bore	MM Rod Diameter	KK3	A (Thread Depth)	C
1-1/2", 2", 2-1/2"	5/8" Standard	7/16-20	3/4	.56
3-1/4", 4"	1" Standard	3/4-16	1-1/8	.64
5"	1" Standard	3/4-16	1-1/8	.50
6", 8"	1-3/8" Standard	1-14	1-5/8	.63



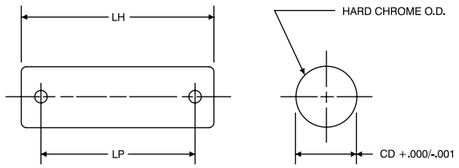
Dimensions (Stainless Steel Accessories) (in)

Clevis Pin

Part No.	CD (+.000/-.001)	LH	LP
RS-CP500	1/2	2-1/4	1-15/16
RS-CP750	3/4	3	2-23/32
RS-CP1000	1	3-1/2	3-7/32
RS-CP1375	1-3/8	5	4-1/4

Clevis Pin sold with (2) S.S. Cotter Pins.

CLEVIS PIN (INCLUDES COTTER PINS)



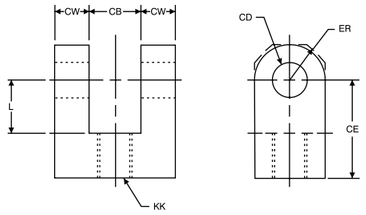
(Clevis Pins sold with (2) S.S. Cotter Pins)

Rod Clevis

Part No.	CB	CD	CE	CW	ER	KK	L
RS-RC437	3/4	1/2	1-1/2	1/2	1/2	7/16-20	3/4
RS-RC500						1/2-20	
RS-RC750	1-1/4	3/4	2-3/8	5/8	3/4	3/4-16	1-1/4
RS-RC1000	1-1/2	1	3-1/8	3/4	1	1-14	1-1/2

Clevis Pins sold separately.

ROD CLEVIS



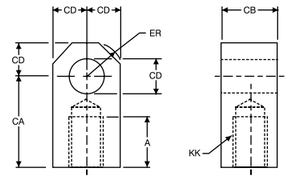
(Clevis Pins sold separately from Rod Clevis)

Rod Eye

Part No.	A	CA	CB	CD	ER	KK
RS-RE437	3/4	1-1/2	3/4	1/2	5/8	7/16-20
RS-RE500						1/2-20
RS-RE750	1-1/8	2-1/16	1-1/4	3/4	7/8	3/4-16
RS-RE1000	1-5/8	2-13/16	1-1/2	1	1-13/16	1-14

Clevis Pins sold separately.

ROD EYE

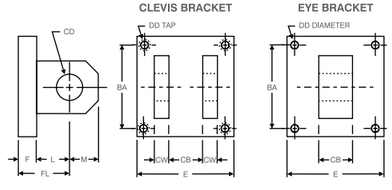


(Clevis Pins sold separately from Rod Eyes)

Clevis Brackets and Eye Brackets

Part No.	BA	CB	CD	CW	DD	E	F	FL	L	M
Clevis Brackets										
RS-CB500	1-5/8	3/4	1/2	1/2	3/8-24	2-1/2	3/8	1-1/8	3/4	5/8
RS-CB750	2-9/16	1-1/4	3/4	5/8	1/2-20	3-1/2	5/8	1-7/8	1-1/4	3/4
RS-CB1000	3-1/4	1-1/2	1	3/4	5/8-18	4-1/2	3/4	2-1/4	1-1/2	1
RS-CB1375	3-13/16	2	1-3/8	1	5/8-18	5	7/8	3	2-1/8	1-3/8
Eye Brackets										
RS-EB500	1-5/8	3/4	1/2	N/A	13/32	2-1/2	3/8	1-1/8	3/4	1/2
RS-EB750	2-9/16	1-1/4	3/4		17/32	3-1/2	5/8	1-7/8	1-1/4	3/4
RS-EB1000	3-1/4	1-1/2	1		21/32	4-1/2	3/4	2-1/4	1-1/2	1
RS-EB1375	3-13/16	2	1-3/8		21/32	5	7/8	3	2-1/8	1-3/8

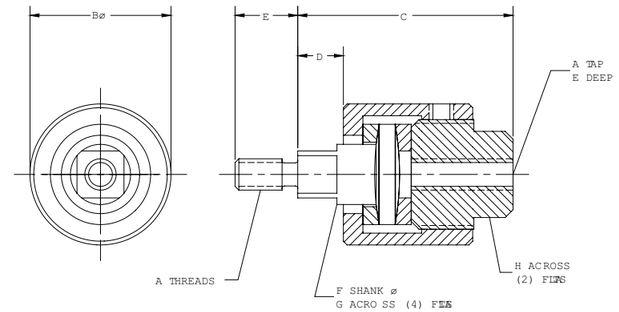
CLEVIS BRACKET **EYE BRACKET**



(Clevis Pins sold separately from Clevis & Eye Brackets)

Dimensions (Stainless Steel Accessories)

Stainless Steel Alignment Couplers (in)

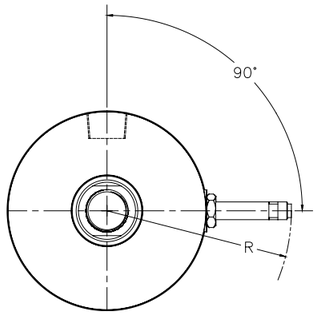


Part Number	A	B	C	D	E	F	G	H	Maximum Pull at Yield (lbs.)
AC250-SS	1/4-28	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	225
AC312-SS	5/16-24	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	375
AC375-SS	3/8-24	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	575
AC437-SS	7/16-20	1-1/4	2	7/16	3/4	5/8	1/2	13/16	800
AC500-SS	1/2-20	1-1/4	2	7/16	3/4	5/8	1/2	13/16	1100
AC625-SS	5/8-18	1-1/4	2	7/16	3/4	5/8	1/2	13/16	1750
AC750-SS	3/4-16	1-3/4	2-5/16	7/16	1-1/8	31/32	13/16	1-1/8	2600
AC875-SS	7/8-14	1-3/4	2-5/16	7/16	1-1/8	31/32	13/16	1-1/8	3550
AC1000-SS	1-14	2-1/2	2-15/16	7/16	1-5/8	1-11/32	1-5/32	1-5/8	4800
AC1250-SS	1-1/4-12	2-1/2	2-15/16	7/16	1-5/8	1-11/32	1-5/32	1-5/8	7600

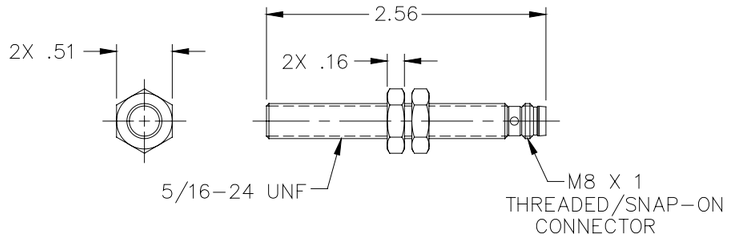
Examples of Specials Capability



Dimensions (Proximity Switch [Option P])



Bore Size	Dimension R
1-1/2"	3.04"
2"	3.04"
2-1/2"	3.04"
3-1/4"	3.19"
4"	3.19"
5"	N/A
6"	N/A
8"	N/A



Specifications

Output:	PNP Sourcing Output, normally open
Load Current:	100mA max.
Leakage Current:	10uA max.
Voltage Drop:	2 VDC
Short Circuit and Overload Protection:	yes
Reverse Polarity Protection:	yes
Supply voltage:	10-30 VDC
LED:	yes
Current Consumption:	15mA
Repeatability:	0.010º (.25mm)
Hysteresis:	5%
Response Time:	330uS
Electromagnetic Compatibility Compliance:	NEMA ICS5-1996
Protection Class:	IP67
Ambient Temperature:	-14ºF to 158ºF (-25ºC to 70ºC)
Housing Material:	Stainless steel
Sensing Face:	Crastin
Approvals:	UL-General Purpose
	CSA-General Purpose
	FM-Non-incendive

The model number of Repairable Stainless pneumatic actuators consists of an alphanumeric cluster designating mounting style, bore size, stroke, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Repairable Stainless unit with 4" bore, 1.50" stroke, rear clevis mounting, and additional options is shown below.

RS - MP2 - 4 x 1.50 - U

Series	
RS	Repairable Stainless Steel

NFPA Mounts	
MX0	Tapped Both Ends
MXF	Tapped Front
MXR	Tapped Rear
MP2	Clevis Rear
MP4	Pivot Rear

NOTE: Consult factory for mount rotation options R45 or R90

Bore	
1.5	1.50"
2	2.00"
2.5	2.50"
3.25	3.25"
4	4.00"
5	5.00"
6	6.00"
8	8.00"

Stroke

0" to 48"
Made to order

NOTE: Consult factory for strokes longer than 24"

	Options	
	A	Extended Piston Rod Thread (Example: A = 2")
»	B	Urethane Bumper Both Ends
»	BC	Urethane Bumper Cap Only
»	BH	Urethane Bumper Head Only
	BP	Bumper Piston Seals (1.50"-8.00" Bore)
	C	Extended Piston Rod (Specify) (Example: C = 2)
	FC	Fixed Cushions
	KK2	Intermediate Male Rod Thread
	KK3	Female Rod Thread
	KK4	Full Diameter Male Rod Thread
	KK5	Blank Rod End (No Threads, "A" = 0")
	L001	Magnalube G Grease
	LF	Low Friction Seals
	MPR	Magnetic Piston For Reed Switches
	OS	Oversize Rod Diameter (5.00"-8.00" Only)
	P	Proximity Switch Both Ends (1.50"-4.00" Only)
	PXX	Sinking Proximity Switch (1.50"-4.00" Only)
	RWU	Urethane Rod Wiper
	RWV	Fluorocarbon Rod Wiper
	SSP	Stainless Steel Piston (With Wear-Band)
	U	USDA Approved Options*
	VS	Fluorocarbon Seals**
	XX	Special Variation (Specify) (Example - No Piston Wear Band, Etc.)

* USDA approved option includes an external wiper as required by the USDA. The cylinder rod length will automatically increase by the amount required to accommodate the seal retaining bracket.
** PTFE scraper will be used unless otherwise specified.
» Refer to Option Length Adder

> Option (B) Bumpers and Option (FC) Cushions are not a valid combination.
> Option (B) Bumpers and Option (P) Proximity Switches are not a valid combination.
> If Option (B) and Option (V) are ordered in combination, the standard Bumper material will be used in bore sizes 5, 6, and 8".
> Option (M) Magnetic Piston and Option (V) High Temperature Seals should be specified for chemical compatibility requirements only. The piston magnet is nitrile based, hence the temperature rating remains at 200 degrees F.
> No Charge: (KK3) Female Rod Threads, (NT) Non-threaded Rod

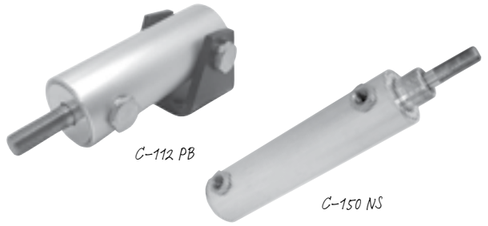
Product Features

Centaur Repairable Cylinders

Low Cost Mounting

The flush bottom cylinder mounts directly onto a base plate with only two bolts... no need for mounting brackets or other hardware. The pivot bracket is built-in for easy pivoting at the inlet axis. The bracket pivots within the cylinder length to save space and to eliminate one entire bracket that would be needed to mount other cylinders.

Because Centaur's trunnions serve both as mounts and as assembly elements, they cost less than any other trunnion mount on the market.



Economical & Repairable

Bimba Centaur cylinders are built to match tie-rod performance, but are up to 45% less expensive and offer lubrication-free service. Centaur cylinders are not permanently crimped like most other round cylinders, so they can be disassembled for maintenance.

Teflon Seals Create Smooth Breakaway

Centaur's unique Teflon® piston seal eliminates the forward lurch that occurs when rubber seals breakaway from the cylinder tube surface. Rod motion remains smooth throughout the stroke.

Non-Lube

During the cylinder break-in period, molecules from the unique graphite-filled Teflon® piston seal became embedded in the pores of the hard coated aluminum cylinder tube. This forms a long-lasting, super-smooth, self-lubricated surface.



Built-In Bumpers Absorb Impact

Rubber bumpers are built into each cylinder head to eliminate the metallic "clank" that occurs at stroke completion.



Self Aligning Rod Couplers

Rod couplers simplify cylinder alignment problems by compensating for 2° angular error and 1/16" lateral misalignment on both extension and retraction strokes.



Model	C-112	C-150	C-200	C-250	C-300
Rod Coupler	DMA-312	DMA-500	DMA-625	DMA-750	DMA-1000

Proximity Switches

Solid State and Reed switches can sense rod position anywhere within the stroke. A stainless steel clamp facilitates mounting at any location along the cylinder tube. Switches may be used singly or in multiples and positioned at any point around the cylinder tube. The cylinder must have a magnetic piston. For technical information, see the Switch chapter.



Model	C-112	C-150	C-200	C-250	C-300
Sinking	N/A	CS-6100N-150	CS-6100N-200	CS-6100N-250	CS-6100N-300
Sourcing	N/A	CS-6100P-150	CS-6100P-200	CS-6100P-250	CS-6100P-300
Reed	N/A	CS-6100R-150	CS-6100R-200	CS-6100R-250	CS-6100R-300

Technical Data

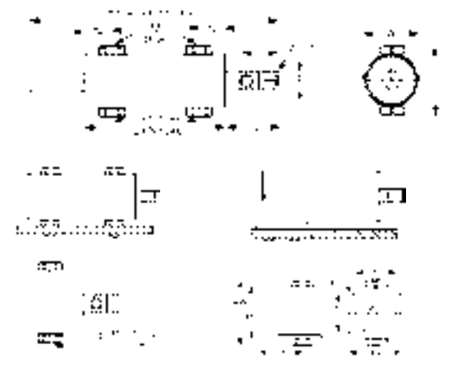
Operating Parameters

Technical Specifications	
Pressure:	150 PSI Air
Bore Sizes:	1-1/8", 1-1/2", 2", 2-1/2" and 3"
Body:	Hard Coated Aluminum
Rod Bearing:	Oil Impregnated Porous Bronze
Temperature Range:	-40° F to 250° F (-40° C to 121° C) (to 400° F [204° C] on request)

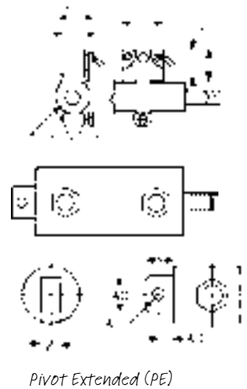
How to Specify

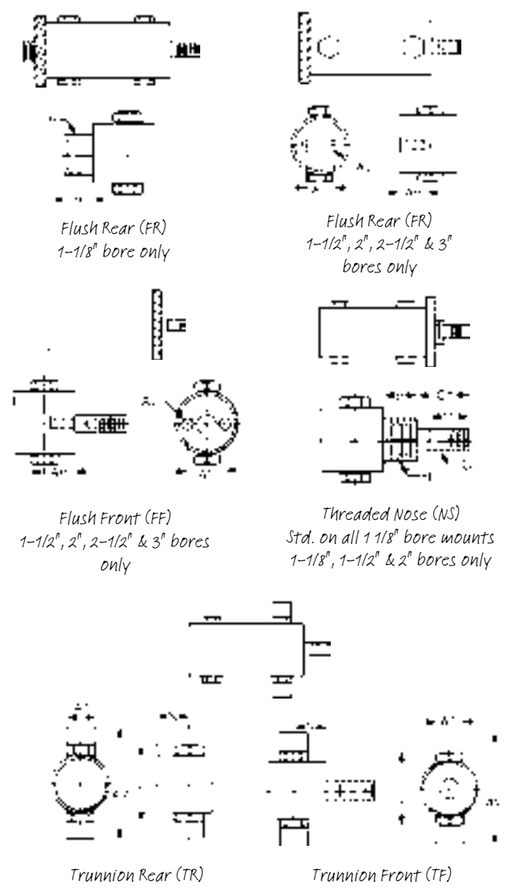
Product Information

Dimensions



Hall Effect



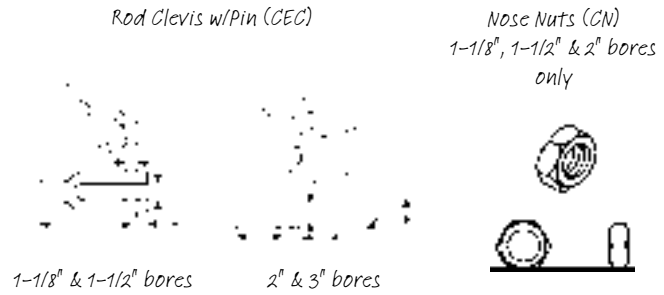


	Bore Sizes				
	1-1/8"	1-1/2"	2"	2-1/2"	3"
A	1-3/8	1-3/4	2-1/4	2-3/4	3-1/4
B	5/8	13/16	13/16	-	-
C1	5/8	1-5/8	1-7/8	-	-
C2	-	1-7/16	1-11/16	1-3/4	2-1/16
D	1/2	1-1/4	1-1/2	1-1/2	1-3/4
F	5/16	1/2	5/8	3/4	1
G	5/16-24	1/2-20	5/8-18	3/4-16	1-14
H	3/4-16	1-14	1 1/4-12	-	-
L	2-3/32	2-1/8	2-5/8	3-1/8	3-5/8
M	1/8 NPT*	1/4 NPSF	1/4 NPSF	1/4 NPSF	1/4 NPSF
N	7/16	51/64	51/64	51/64	51/64
P+Stroke	1-21/64	1-27/32	1-59/64	2-3/64	2-11/64
Q+Stroke	2-13/64	3-7/16	3-1/2	3-5/8	3-3/4
R	10-32	3/8-24	3/8-24	3/8-24	3/8-24
Y	5/8	15/16	1-1/8	-	-
Z	3/8	11/16	3/4	-	-
AB	1/4	3/8	1/2	-	-
AC	3/8	9/16	5/8	-	-
AD	5/8	1	1-1/4	-	-
AE	-	1-1/8	1-1/2	1-3/4	2
AH	-	1/2	5/8	3/4	7/8
AJ	-	1/4-28	5/16-24	3/8-24	1/2-20
AK	1-5/8	2-1/4	2-1/4	2-7/8	3-1/8
AL	1-1/4	1-5/8	1-5/8	2-1/8	2-3/8
AN	1-3/4	2-13/32	2-29/32	3-13/32	3-29/32
AP	1	1-1/8	1-5/8	2-1/8	2-5/8
AQ	13/64	9/32	9/32	9/32	9/32
AR	31/32	1-9/16	1-13/16	1-15/16	2-5/16
AT	.418	.731	.731	.731	.731
AV	2-5/32	3-5/8	4-1/8	4-5/8	5-1/8
AW	2-17/64	2-13/16	3-5/16	3-13/16	4-5/16
YY +(2 X STK)	4-23/32	6-5/16	6-7/8	7-1/8	7-1/8

* 1-1/8 bore model with trunnion mounts has 1/4-28 ports.

How to Order

How To Accessorize



Rod Clevis Accessory Dimensions

Bore	E	CA	CB	CE	DD
1-1/8"	-	19/64	11/32	13/16	5/16
1-1/2"	-	15/32	9/16	1-13/16	1/2
2"	1-1/4	7/16	5/8	2-1/16	1/2
2-1/2"	1-1/2	3/4	1-1/4	2-3/8	3/4
3"	1-1/4	7/16	5/8	2-1/16	1/2

Model Numbers

Bore Sizes Accessory	1-1/8"	1-1/2"	2"	2-1/2"	3"
Rod Clevis, Pin	CEC-112	CEC-150	CEC-200	DMC-4	CEC-300
Nose Nut	CN-112	CN-150	CN-200	-	-

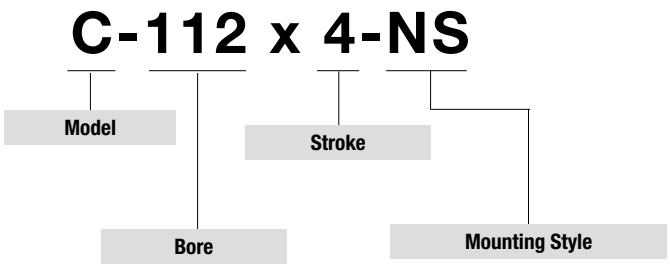
How To Order

Air Reservoirs

Two Centaur rear heads and a tube form an economical air tank. Consult factory for more information. Simply add AR to model.

Ordering Information

When ordering Centaur cylinders, list the model number, stroke length and mounting option(s) required. Please consult the factory for stainless steel rods, air reservoirs or any special cylinder need.



Bore	1-1/8"	1-1/2"	2"	2-1/2"	3"
Model	C-112	C-150	C-200	C-250	C-300
Nose Mount (NS)	•	•	•	NA	NA
Flush Bottom (FB)	•	•	•	•	•
Flush Front (FF)	NA	•	•	•	•
Flush Rear (FR)	•	•	•	•	•
Pivot Bracket (PB)	•	•	•	•	•
Pivot Extended (PE)	•	•	•	NA	NA
Trunnion Front (TF)	•	•	•	•	•
Trunnion Rear (TR)	•	•	•	•	•
Other Options:	•	•	•	•	•
Double Rod (DR)	**	•	•	•	•
Dupont Viton Seals (VI)	•	•	•	•	•
Magnetic Piston (MP)	NA	•	•	•	•
Air Reservoir (AR)	•	•	•	•	•

Δ Nose (NS) mounts standard on both ends of 1 1/8" bore model with double rod.

Position Feedback Cylinders

The Position Feedback Cylinder (PFC) provides continuous position sensing in a lightweight, small bore air cylinder. It can be used for measuring and gauging, positioning, and “on-the-fly” applications. It is available with or without a rod lock. Combine the PFC with the Bimba Pneumatic Control System (PCS), Digital Panel Meter (DPM), or the Electronic Controller to maximize performance.



Contents

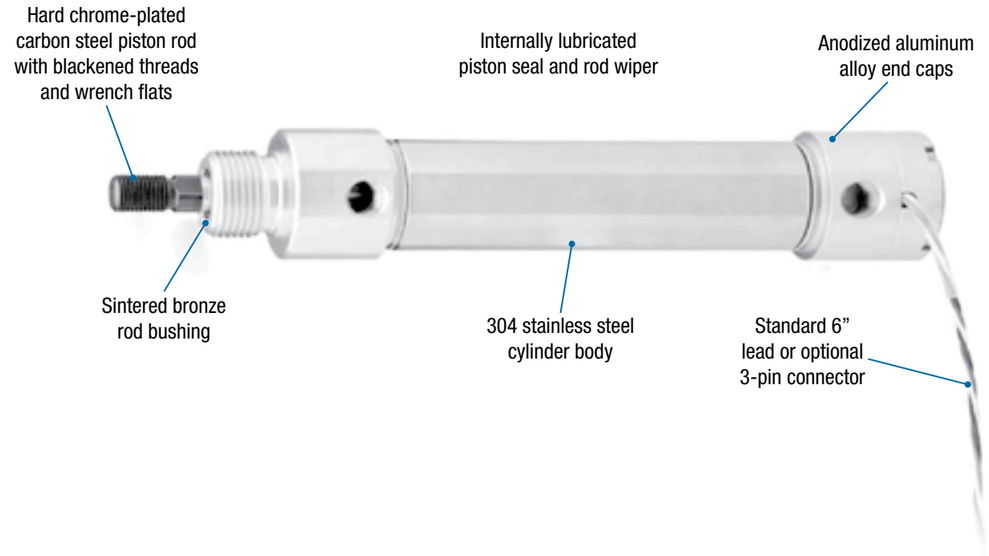
461 Position Feedback Cylinders (PFC Models)
- 461 – Features and Benefits
- 462 – How It Works
- 463 – Engineering Specifications
- 464 – Mount Dimensions
- 465 – Dimensions
- 466 – 3-Pin Connector
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489 SPCS-2 Servo Pneumatic Control System with Software Setup
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Position Feedback Cylinders (PFC Models)



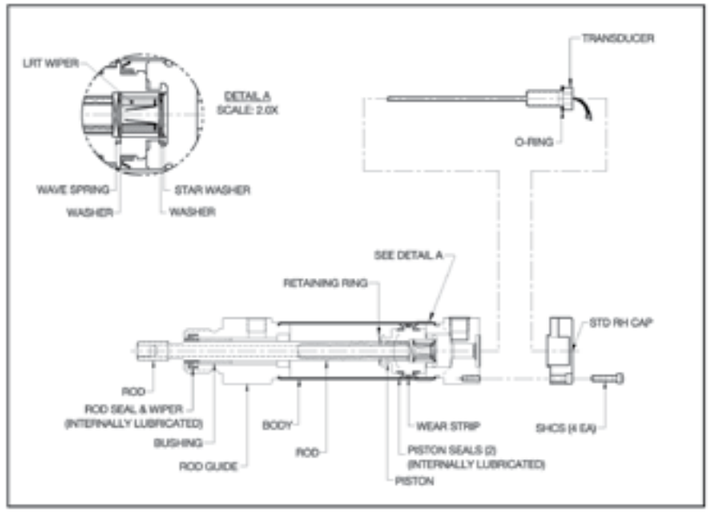
The Position Feedback Cylinder (Model PFC) is a linear pneumatic actuator that contains an internal LRT (Linear Resistive Transducer). The PFC can be used for measuring and gauging, positioning, and "on-the-fly" applications. It is available with or without a rod lock. Combine the PFC with the Bimba Servo Pneumatic Control Systems, model SPCS-2, to maximize performance.

Features and Benefits

- > Higher loads and velocities than multiple position actuators, at a lower price point than electric actuators
- > Programmability with electronic controls leads to quicker changeovers and less overall downtime
- > Accurate to 0.010", comparable to electric motion
- > Closed loop control for precision upstream/downstream communication
- > Easy to set up and install

Position Feedback Cylinders (PFC)

The Bimba Position Feedback Cylinder contains a Linear Resistive Transducer (LRT) or potentiometer mounted in the cylinder rear head. The LRT probe, which has a resistive element on one side and a collector strip on the other, is inside the cylinder rod. A wiper assembly is installed in the piston. As the piston moves, an electrical circuit is created between the resistive element and collector strip. A variable resistance (approximately 1KΩ per inch of stroke) proportional to piston position in the cylinder is produced by the cylinder. The cylinder can be easily setup to produce an analog signal compatible with 0-10 VDC PLC analog inputs.



The accuracy of an LRT is determined by three factors: resolution, linearity and repeatability.

Resolution refers to the smallest change that can be detected on the LRT. The Bimba LRT has infinite resolution, and can be divided into as many parts as the electronics allow. For example, with a 12-bit, 4096-part controller, the stroke could be divided into 4096 parts. When 10 VDC are placed on a 10" cylinder, the smallest detectable increment would be 10 VDC ÷ 4096 = 2.4 millivolts or 0.0024". Resolution is stroke sensitive–the longer the stroke, the less the resolution.

Linearity refers to the maximum deviation of the output voltage to a straight line. The Bimba LRT's linearity is ± 1 percent of stroke. Repeatability is the ability of the LRT to provide the same output voltage relative to a unique cylinder position each time the cylinder is cycled. Mechanical repeatability of the Bimba Position Feedback Cylinder is ± 0.001".

Engineering Specifications (PFC)

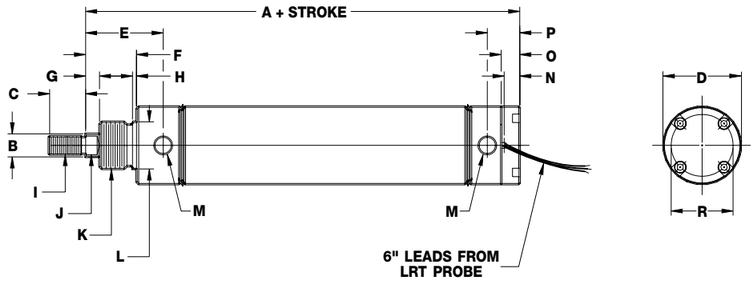
Repeatability:	±0.001" Cylinder Only.
	Refer to specifications in the following sections for positioning or measuring repeatability. Power supply ripple and A/D error may reduce repeatability when PFC is utilized with industrial control systems.
Nonlinearity:	± 1 percent of full stroke
Resolution:	Infinite
Signal Input:	10 VDC typical
Input Impedance Required:	1 MOhm
Signal Output:	> 0 to slightly less than FS signal input
	(The internal electrical stroke is slightly larger than the mechanical stroke of cylinder)
Maximum Speed:	25 in./sec.
Rated Life of LRT Wiper:	1,0001 miles of travel
Rated Life of Probe:	10 million cycles[1]
Air Requirements:	Filtered to 5 micron with 0° dewpoint recommended.
	Moisture inside cylinder will cause output signal fluctuation.
Pressure Rating:	150 PSI
Temperature Rating:	0° to 200° F[2]
Interface:	6" standard leads or optional 8mm DIN connector
Cylinder Body:	304 stainless steel
Piston Rod:	Hard chrome plated carbon steel with blackened threads and wrench flats
Rod Bushing:	Sintered bronze
End Caps:	Anodized aluminum alloy
Piston Seal:	Internally lubricated urethane (standard)
	Internally lubricated Buna (L option)
Rod Wiper:	Internally lubricated Buna N (omitted on L option)
Rod Seal:	Internally lubricated Buna N (N/A on standard model)

[1] Higher velocities increase wear rate.
[2] Special low temperature lubrication is required for positioning applications using option L seals below 35° F.

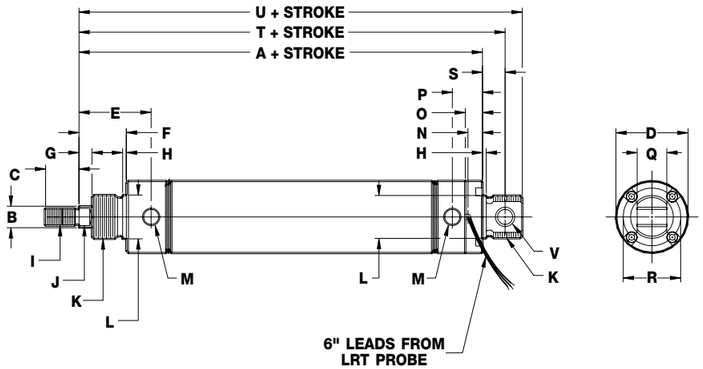
Estimated Cylinder Weights (lbs)					
	1-1/16"	1-1/2"	2	2-1/2"	3
PFC-	0.44	0.88	2.02	2.78	3.62
PFC-X	0.49	0.96	2.14	2.96	3.85
PFC-BF	0.54	1.07	2.28	3.02	4.08
ADDER WT/IN	0.06	0.10	0.15	0.20	0.29

Mount Dimensions (PFC Models)

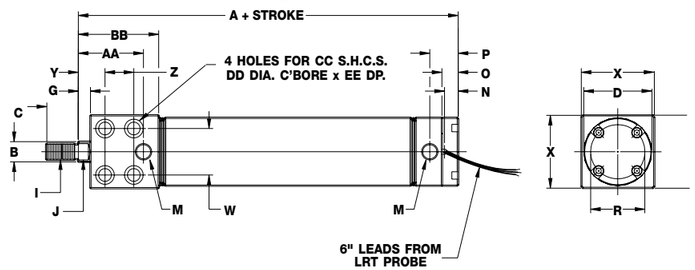
Nose Mount



Universal Mount for stud or pivot (includes bushing)

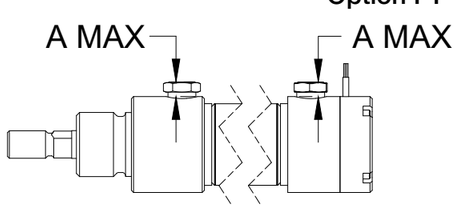


Block Mount



NOTE: Mounting holes farthest from rod end are omitted for -L option for 11/16" bore.

Option FT



Bore	A
1-1/16" (09)	0.35
1-1/2" (17)	0.41
2" (31)	0.41
2-1/2" (50)	0.52
3" (70)	0.52

Dimensions

	1-1/16" Bore (09)	1-1/2" Bore (17)	2" Bore (31)	2-1/2" Bore (50)	3" Bore (70)
A	4.59	4.88	5.72	6.41	6.78
B	Ø 0.38	Ø 0.50	Ø 0.63	Ø 0.75	Ø 0.75
C	0.63	0.88	1.00	1.25	1.25
D	Ø 1.31	Ø 1.58	Ø 2.09	Ø 2.58	Ø 3.13
E	1.75 / Option L 1.52	1.72	2.10	2.28	2.53
F	1.06	1.13	1.38	1.50	1.69
G	0.31	0.31	0.38	0.44	0.44
H	0.08	0.09	0.11	0.13	0.13
I	3/8-24 UNF	7/16-20 UNF	1/2-20 UNF	5/8-18 UNF	5/8-18 UNF
J	0.31	0.44	0.50	0.63	0.63
K	7/8-14 UNF	1-1/8-12 UNF	1-1/4-12 UNF	1-3/8-12 UNF	1-1/2-12 UNF
L	Ø 0.87	Ø 1.12	Ø 1.25	Ø 1.37	Ø 1.62
M	1/8 NPT	1/4 NPT	1/4 NPT	3/8 NPT	3/8 NPT
N	0.36	0.36	0.42	0.48	0.55
O	0.44	0.44	0.50	0.56	0.63
P	0.84	0.81	0.88	1.12	1.88
Q	0.62	0.74	0.86	0.99	0.99
R	Ø 1.09	Ø 1.36	Ø 1.67	Ø 2.06	Ø 2.44
S	0.47	0.56	0.66	0.75	0.81
T	5.06	5.44	6.38	7.16	7.60
U	5.44	5.91	6.88	7.78	8.22
V	Ø 0.31	Ø 0.38	Ø 0.44	Ø 0.50	Ø 0.50
W	0.88	1.25	1.44	1.88	2.25
X	1.38	1.75	2.25	2.75	3.25
Y	0.75	0.69	0.75	0.88	0.94
Z	0.88	0.75	1.00	1.25	1.38
AA	1.63 / Option L 1.52	1.68	1.75	2.13	2.31
BB	2.03	2.00	2.41	2.72	2.91
CC	#10	1/4	3/8	7/16	1/2
DD	Ø 0.33	Ø 0.41	Ø 0.58	Ø 0.67	Ø 0.77
EE	0.20	0.25	0.39	0.45	0.52

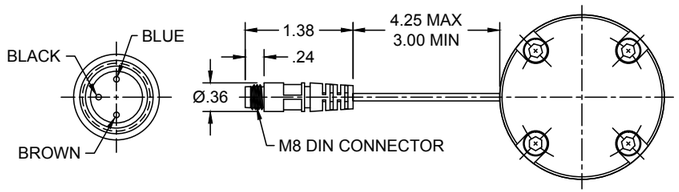
Bumper Length Adder: 0.25"

3-Pin Connector

Wire Colors

Wires	6" Leads and PA Option	P Option
Input	Red	Blue
Ground	Black	Black
Output	White	Brown

P Option



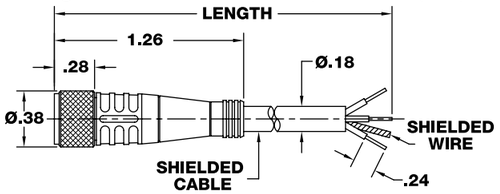
PA Option

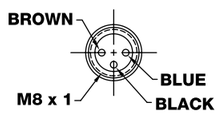
Bore	N (in)
09	0.25
17	0.25
31	0.31
50	0.38
70	0.44



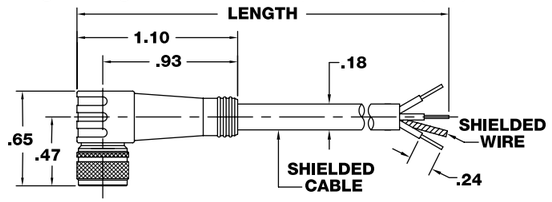


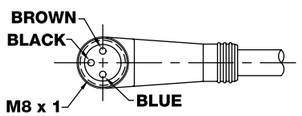
Straight-Models C4-S (2m), C4X-S (5m)





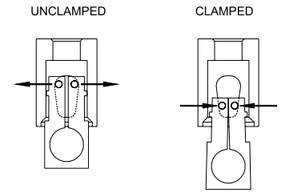
Right Angle-Models C5 (2m), C5X (5m)

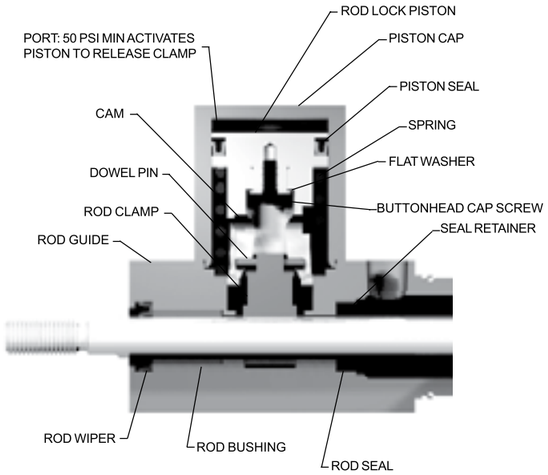


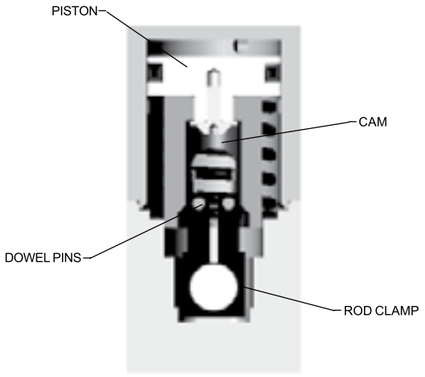


PFCL Models

> Dowel pins ride in the cam groove.
> When air pressure is present, piston actuates and dowel pins follow cam to open position, allowing piston rod to travel freely through clamp.
> In absence of pressure, the spring actuates piston and dowels follow to closed position, activating the rod clamp.







Engineering Specifications

Operating Medium:	Air
Operating Pressure:	50 PSI minimum (to actuate lock piston)
	125 PSI maximum
Temperature Range:	-20° to 200° F
Lubrication:	HT-99
Cylinder Body:	304 stainless steel
Rod Guide:	Aluminum
Cap:	Anodized aluminum
Piston and Rod Seal:	Buna-N
Rod and Pivot Bushing:	Sintered bronze
Piston Rod:	Hard chrome plated carbon steel
Expected Service Life:	5 million cylinder actuations
	1 million lock actuations

*PFC specifications are on pages 464-465.

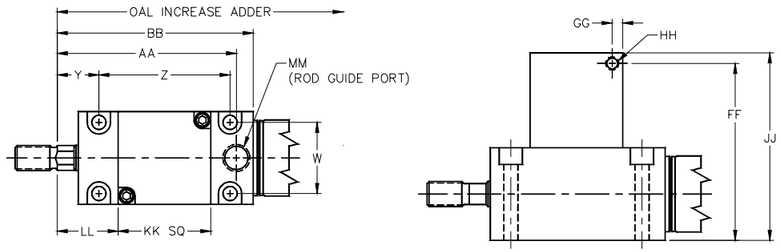
Rod Lock Holding Forces

Bore	Holding Force (lbs)
3/4" (04)	40
1-1/16" (09)	90
1-1/2" (17)	170
2" (31)	310
2-1/2" (50)	500
3" (70)	700

Operating Guidelines/Product Precautions

> The Rod Lock is not a safety device.
> Do not use for intermediate stopping; the cylinder is designed to prevent drift from a stationary position.
> Load weight must not exceed the stated holding force for the cylinder.
> Do not release rod lock if full pressure is present on either extend or retract. Uncontrolled motion will result that could damage internal components or cause personal harm.

Dimensions (PFCL Models)

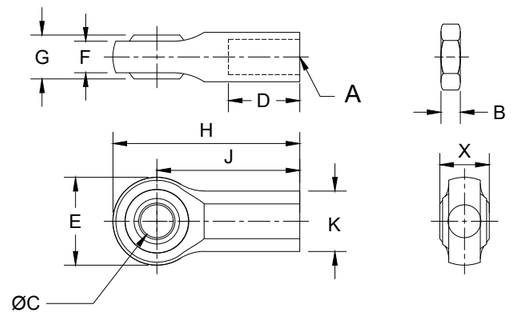


Bore	W	Y	Z	AA	BB	FF	GG	HH	JJ	KK	LL	MM	OAL Increase Adder
1-1/16" (09)	1.06	.62	1.95	2.66	2.91	2.62	.16	#10-32	2.78	1.38	0.90	1/8 NPT	1.08
1-1/2" (17)	1.25	.64	2.75	3.36	3.68	3.13	.25	1/8 NPT	3.38	1.75	1.14	1/4 NPT	1.68
2" (31)	1.62	.82	3.13	3.97	4.34	4.20	.38	1/8 NPT	4.45	2.25	1.26	1/4 NPT	1.94
2-1/2" (50)	1.88	.87	3.62	4.62	5.05	5.34	.33	1/4 NPT	5.67	2.75	1.31	3/8 NPT	2.33
3" (70)	2.25	.90	4.17	5.17	5.59	5.86	.50	1/4 NPT	6.28	3.25	1.35	3/8 NPT	2.69

*All other dimensions are same as the non-contact PFC cylinders.

Accessories (PFC/PFCN)

Rod Eye for Option FT

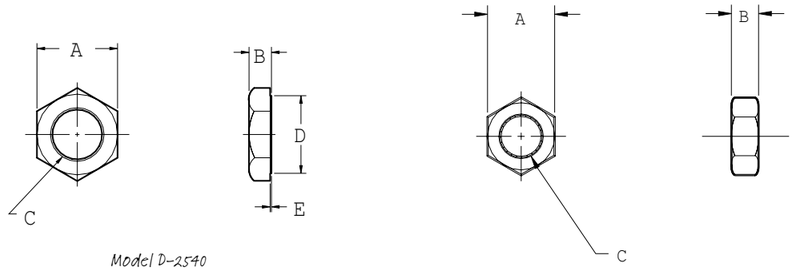


Bore	Model	A	B	C	D	E	F	G	H	J	K	X
1-1/16" (09)	D-117351-A	3/8"-24 THD	0.22	0.375	0.81	1.00	0.36	0.50	2.13	1.63	0.69	0.56
1-1/2" (17)	D-117352-A	7/16"-20 THD	0.25	0.438	0.94	1.13	0.41	0.56	2.38	1.81	0.75	0.63
2" (31)	D-117353-A	1/2"-20 THD	0.31	0.500	1.06	1.31	0.45	0.63	2.78	2.13	0.88	0.75
2-1/2" (50)	D-117354-A	5/8"-18 THD	0.38	0.625	1.38	1.50	0.48	0.75	3.25	2.50	1.00	0.75
3" (70)	D-117354-A	5/8"-18 THD	0.38	0.625	1.38	1.50	0.48	0.75	3.25	2.50	1.00	0.88

Control Units

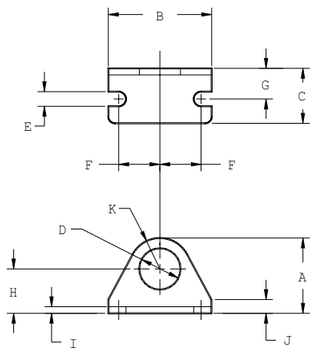
> SPCS-2 Servo Pneumatic Control Units are described on pages 489-492. Please use the table on page 490 to select the right SPCS products for your applications.

Mounting Nuts



Bore	Model	A	B	C	D	E
1-1/16" (09)	D-2545	1.31	0.48	7/8-14 UNF-2B	N/A	N/A
1-1/2" (17)	D-8484	1.69	0.61	1-1/8-12 UNF-2B	N/A	N/A
2" (31)	D-508	1.88	0.50	1-1/4-12 UNF-2B	1.81	0.03
2-1/2" (50)	D-2540	1.88	0.50	1-3/8-12 UNF-2B	1.81	0.03
3" (70)	D-5379	2.25	0.50	1-1/2-12 UNF-2B	2.25	0.02

Mounting Bracket

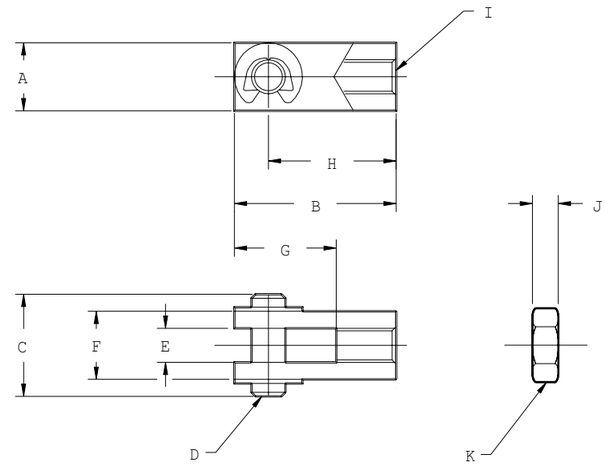


Bore	Model	A	B	C	D	E	F	G	H	I	J
1-1/16" (09)	D-8316	1.75	2.12	1.16	0.875	0.28	0.78	0.66	1.00	0.16	0.32
1-1/2" (17)	D-8318	2.19	2.75	1.44	1.125	0.34	1.06	0.81	1.25	0.19	0.38
2" (31)	D-8319	2.44	3.00	1.59	1.25	0.34	1.19	0.91	1.38	0.22	0.44
2-1/2" (50)	D-8320	2.81	3.75	1.88	1.312	0.41	1.50	1.06	1.62	0.25	0.50
3" (70)	D-19127	3.14	4.38	1.62	1.625	0.34	1.75	1.00	1.89	0.25	0.89

How to Accessorize

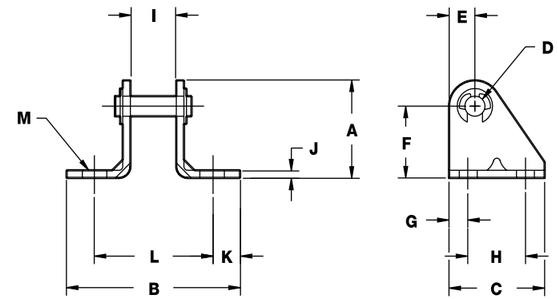
POSITION FEEDBACK CYLINDERS

Rod Clevis



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
1-1/16" (09)	D-8310-A	0.62	1.69	0.88	0.312	0.31	0.62	0.94	1.38	3/8-24 THD	0.22	3/8-24 HEX NUT
1-1/2" (17)	D-8311-A	0.75	2.00	1.03	0.375	0.38	0.75	1.12	1.62	7/16-20 THD	0.25	7/16-20 HEX NUT
2" (31)	D-8313-A	0.88	2.31	1.14	0.438	0.44	0.88	1.31	1.88	1/2-20 THD	0.31	1/2-20 HEX NUT
2-1/2" (50) 3" (70)	D-8314-A	1.00	2.75	1.38	0.50	0.50	1.00	1.50	2.25	5/8-18 THD	0.38	5/8-18 HEX NUT

Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K	L	M
1-1/16" (09)	D-8322-A	1.31	2.38	1.31	0.312	0.31	1.00	0.25	0.81	0.62	0.16	0.31	1.75	0.28
1-1/2" (17)	D-8324-A	1.62	3.00	1.62	0.375	0.38	1.25	0.31	1.00	0.75	0.19	0.44	2.13	0.34
2" (31)	D-8325-A	1.81	3.25	1.81	0.438	0.44	1.38	0.31	1.19	0.88	0.25	0.44	2.38	0.34
2-1/2" (50) 3" (70)	D-8326-A	2.12	4.00	2.12	0.50	0.50	1.62	0.38	1.38	1.00	0.25	0.62	2.75	0.41

The model number of Position Feedback cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, mounting style, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Position Feedback unit with 1-1/16” bore, 12” stroke, block front mount, and additional options is shown below.

PFC - 09 12 - BF L

Bore Size	
09	1-1/16”
17	1-1/2”
31	2”
50	2-1/2”
70	3”

Standard Stroke Lengths
1”, 2”, 4”, 6”, 8”, 12”, 18”, 24”

Mounting	
Blank	Front nose
BF	Block front
X	Universal mount

Options	
B	Bumpers[1]
EE	0.375 - 3/8” extra rod extension, etc.
FT	Non-pneumatic feedback transducer[2]
L	Low friction[3]
P	M8 corded connector
PA	Plug connector

[1] 10” is the maximum rod extension.
[2] Piston seal removed; breather plugs inserted in the ports. Not compatible with option L, Y, YN, or YQ.
[3] Low friction option includes special seals and lubrication. Rod wiper is omitted.

The model number of Position Feedback Rod Lock cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Position Feedback Rod Lock unit with 1-1/16” bore, 12” stroke, and additional options is shown below.

PFCL - 09 12 - X B

Bore Size	
09	1-1/16”
17	1-1/2”
31	2”
50	2-1/2”
70	3”

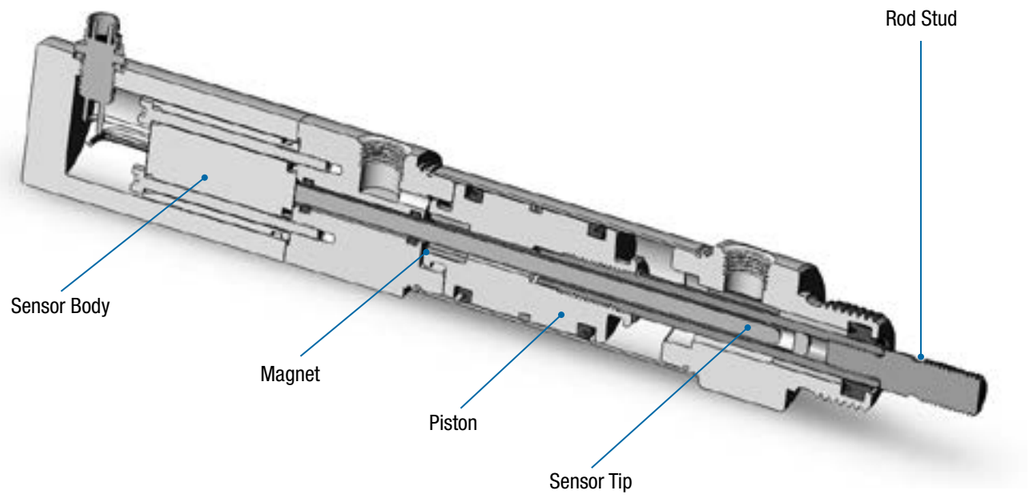
Standard Stroke Lengths*
1”, 2”, 4”, 6”, 12”, 18”, 24”

Mounting	
Blank	Block front
X	Universal mount

Options	
B	Bumpers
EE	0.375 - 3/8” extra rod extension, etc.
P	Plug connector

NOTES: Low friction seals on the piston are standard on the PFCL. Rod wiper is included on PFCL to keep out contaminants. Only available in Block Front Mounting on the Rod Guide.

Position Feedback Cylinders (PFCN Models)



The Position Feedback Cylinders Non-Contact (Model PFCN) is similar to the original Model PFC, except it employs a magnetostrictive sensor instead of a LRT. The new technology is ideal for applications that involve dirty or moist environments, rapid oscillation over a small increment of stroke, and vibration. In addition, it is relatively immune to air line contamination. It is calibrated to produce exactly 0 volts fully retracted and 10 volts fully extended. Like our original PFC, it is available with or without a rod lock.

Bimba's Non-Contact Position Feedback Cylinders employ a new magnetostrictive sensor. The sensor tip, fixed inside the cylinder, senses position as a magnet mounted to the piston moves back and forth across the sensor tip's length. This provides many important advantages, and makes the Non-Contact Position Feedback Cylinder the preferred solution for closed-loop pneumatic positioning applications.

Features and Benefits

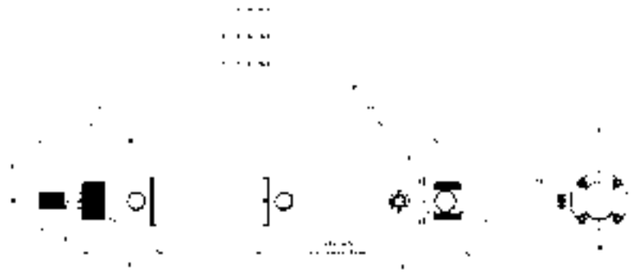
- The PFCN is immune to many of the conditions that deteriorate older technology PFC's, such as the presence of moisture, dirt, dirty air lines, and debris generated as pneumatic products wear, especially at high speeds.
- The PFCN is immune to wear from oscillation back and forth over a narrow range of stroke.
- The PFCN is calibrated for 0 volts fully retracted and 10 volts fully extended for all stroke lengths. Both offset and scale factor are user adjustable. This simplifies installation of multiple cylinders in an application and recalibration of replacement cylinders.
- The PFCN connector is sealed to IP68.
- Avoid applications that subject the non-contact PFC to:
  - Side loads (Guiding is required. For detail on acceptable side loads contact Bimba Technical Support.)
  - High speeds above 10 in/sec with no means to control impact energy at end of stroke
  - High temperatures 200°F
  - Low temperatures below - 20°F
  - High electric or magnetic fields

Mount Dimensions (PFCN Models)

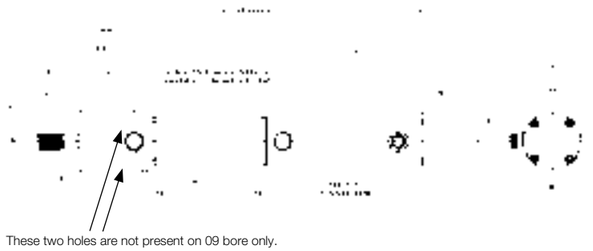
Nose Mount



Universal Mount for stud or pivot (includes bushing)



Block Mount



These two holes are not present on 09 bore only.

Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1-1/16" (09)	7.47	0.38	0.63	1.31	1.54/Option L 1.52	1.06	0.31	0.08	3/8-24 UNF	0.31	7/8-14 UNF	0.87	1/8 NPT	0.56
1-1/2" (17)	7.80	0.50	0.88	1.58	1.72	1.13	0.31	0.09	7/16-20 UNF	0.44	1-1/8-12 UNF	1.12	1/4 NPT	0.56
2" (31)	7.75	0.63	1.00	2.09	2.10	1.38	0.38	0.11	1/2-20 UNF	0.50	1-1/4-12 UNF	1.25	1/4 NPT	0.40
2-1/2" (50)	8.31	0.75	1.25	2.58	2.28	1.50	0.44	0.13	5/8-18 UNF	0.63	1-3/8-12 UNF	1.37	3/8 NPT	0.40
3" (70)	8.62	0.75	1.25	3.13	2.53	1.69	0.44	0.13	5/8-18 UNF	0.63	1-1/2-12 UNF	1.62	3/8 NPT	0.40

Bore	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF
1-1/16" (09)	2.38	3.14	0.62	1.11	0.47	7.94	8.31	0.31	0.88	1.38	0.75	N/A	1.52	1.82	#10	0.33	0.20	0.38
1-1/2" (17)	2.38	3.25	0.74	1.33	0.56	8.36	8.83	0.38	1.25	1.75	0.69	0.75	1.68	2.00	1/4	0.41	0.25	0.38
2" (31)	2.03	2.91	0.86	1.63	0.63	8.38	8.88	0.44	1.44	2.25	0.75	1.00	1.75	2.41	3/8	0.58	0.39	0.38
2-1/2" (50)	2.00	3.03	0.99	2.06	0.75	9.06	9.69	0.50	1.88	2.75	0.88	1.25	2.13	2.72	7/16	0.67	0.45	0.38
3" (70)	2.00	3.03	0.99	2.44	0.81	9.43	10.06	0.50	2.25	3.25	0.94	1.38	2.31	2.91	1/2	0.77	0.52	0.38

Bumper length adder 0.25"

Specifications (PFCN Non-Contact Models)

Positioning error due to temperature		
Microns/°C	Inches/°C	Inches/°F
20	0.000787	0.000437

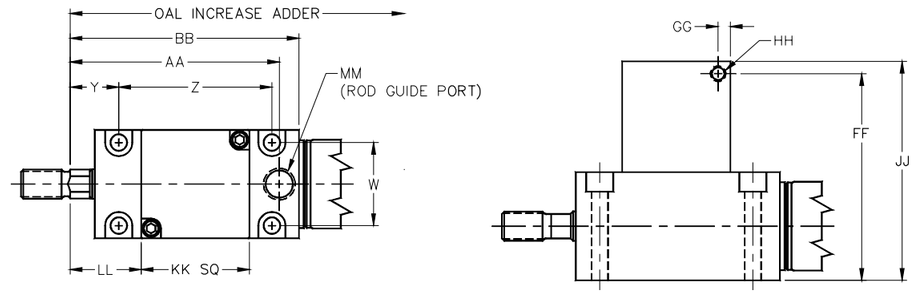
- > Operating temperature: -20° to 200° F (-28° to 93° C)
- > Accuracy: ± 0.016 inch maximum anywhere along the stroke (calculated value combining Non-Linearity, Repeatability, Hysteresis effects at a constant temperature)
- > Non-Linearity: ± 0.011 inch
- > Repeatability: ± 0.006 inch
- > Signal output: 0 V DC ± 6 mV retracted and 10 V DC ± 6 mV extended, all stroke lengths (into 100 kOhms minimum and 300 pF maximum)
- > Excitation (Supply) Voltage: 24 ± 10% V DC (50mA maximum current)
- > Maximum end of stroke impact speed: 10 in/sec.
- > Rated Life of the Cylinder: 1400 linear miles (at 10 inches/sec, no load, room temperature dry, 5 micron filtered air, continuous cycling)
- > Over voltage and reverse polarity protection
- > Cylinder RoHs compliant
- > IP-68 rated connector standard

NOTE: The device that digitizes the PFCN feedback output must have an input impedance of at least 100 kOhms.

Estimated Cylinder Weights (lbs)

	1-1/16"	1-1/2"	2"	2-1/2"	3"
PFCN	0.81	1.35	2.48	3.93	5.68
PFCN-X	0.82	1.43	2.59	4.10	5.87
PFCN-BF	0.95	1.57	2.90	4.64	6.79
Adder WT/IN	0.05	0.08	0.14	0.18	0.24

Dimensions (PFCNL Models)



Bore	W	Y	Z	AA	BB	FF	GG	HH	JJ	KK	LL	MM	OAL Increase Adder
1-1/16" (09)	1.06	0.62	1.95	2.66	2.91	2.62	0.16	#10-32	2.78	1.38	0.90	1/8 NPT	1.08
1-1/2" (17)	1.25	0.64	2.75	3.36	3.68	3.13	0.25	1/8 NPT	3.38	1.75	1.14	1/4 NPT	1.68
2" (31)	1.62	0.82	3.13	3.97	4.34	4.20	0.38	1/8 NPT	4.45	2.25	1.26	1/4 NPT	1.94
2-1/2" (50)	1.88	0.87	3.62	4.62	5.05	5.34	0.33	1/4 NPT	5.67	2.75	1.31	3/8 NPT	2.33
3" (70)	2.25	0.90	4.17	5.17	5.59	5.86	0.50	1/4 NPT	6.28	3.25	1.35	3/8 NPT	2.69

NOTE: All other dimensions are same as the non-contact PFCN cylinders.

Accessories (PFCN Models)

Bore	Mounting Nut	Mounting Bracket	Rod Clevis	Pivot Bracket
1-1/16" (09)	D-2545	D-8316	D-8310-A	D-8322-A
1-1/2" (17)	D-8484	D-8318	D-8311-A	D-8324-A
2" (31)	D-508	D-8319	D-8313-A	D-8325-A
2-1/2" (50)	D-2540	D-8320	D-8314-A	D-8326-A
3" (70)	D-5379	D-19127	D-8314-A	D-8326-A

Controllers

> SPCS-2 Servo Pneumatic Control Units are described on pages 489-492. Please use the table on page 490 to select the right SPCS products for your applications.

Cables (for connection to standard plug connector)

Model	Description
C4-S	Straight Female Shielded Cord Set IP67, 2m
C4X-S	Straight Female Shielded Cord Set IP67, 5m
C5-S	Right Angle Female Shielded Cord Set IP67, 2m
C5X-S	Right Angle Female Shielded Cord Set IP67, 5m
SPCS-CBL-PWR-CMD	SPCS Quick Connect, Female/Strip Wire, 2m
SPCS-CBL-FBK	SPCS Female Connector, Both Ends, 2m
SPCS-USB-CBL	SPCS USB Setup Cable, 2m

The model number of Non-Contact Position Feedback cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, mounting style, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Non-Contact Position Feedback unit with 2" bore, 6" stroke, universal mount, and additional options is shown below.

PFCN - 31 6 - X L

Bore Size	
09	1-1/16"
17	1-1/2"
31	2"
50	2-1/2"
70	3"

Standard Stroke Lengths*

1", 2", 3", 4", 5", 6", 7", 8", 9", etc.

* 0.5" increments, 1" minimum.

Mounting	
Blank	Front nose
BF	Block front
X	Universal mount

Options	
B	Bumpers[1]
EE	0.375 - 3/8" extra rod extension, etc.
L	Low friction[2]

[1] Bumpers (used to control end of stroke impact) will lengthen the time required for the piston to settle into position at end of stroke as they slowly compress.
[2] Low friction option includes special seals and lubrication.

Approximate Power Factors		
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1
2-1/2"	=	5.0
3"	=	7.0

For example, a PFCN-096-BF will exert a force of 0.9 times the air lines pressure; a PFCN-506-XB will exert a force of 5.0 times the air line pressure.

How to Order

The model number of Non-Contact Position Feedback Rod Lock cylinders consists of an alphanumeric cluster designating product type, bore size, stroke length, mounting styles, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Non-Contact PFC Rod Lock unit with 3” bore, 3” stroke, universal mount, and additional options is shown below.

PFCNL - 70 3 - X B

Bore Size	
09	1-1/16”
17	1-1/2”
31	2”
50	2-1/2”
70	3”

Standard Stroke Lengths*
1”, 2”, 3”, 4”, 5”, 6”, 7”, 8”, 9”, etc.

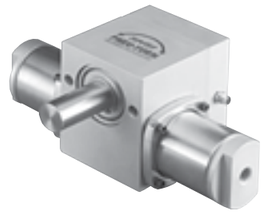
* 0.5” increments, 0.5” minimum.

Mounting	
Blank	Block front
X	Universal mount

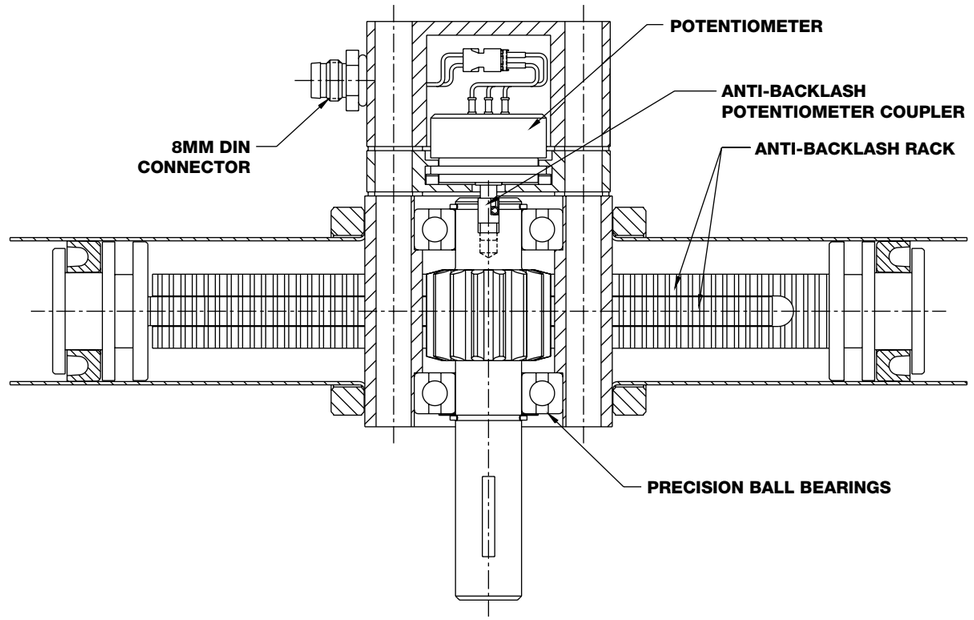
Options	
B	Bumpers
EE	0.375 - 3/8” extra rod extension, etc.

How It Works

Pneu-Turn® Position Feedback Rotary Actuator (PTF Models)



The Bimba Pneu-Turn® position feedback rotary actuator (PTF) provides continuous shaft position sensing. Standard features include shaft ball bearings and the elimination of mid-rotational backlash. Use the Bimba PTF in conjunction with Bimba’s Pneumatic Control System (PCS) to achieve rotary shaft positioning accuracy within ±0.5°.



Engineering Specifications (PTF Models)

Repeatability:	± 0.01° (of potentiometer itself)
Nonlinearity:	± 88° (± 0.25% of 340±4°)
Resolution:	Infinite
Signal Input:	10 VDC typical
Input Impedance Required:	100 Kohm
Signal Output:	0 to 10 VDC FS (depends on FS mechanical rotation)
Rated Life of Potentiometer:	10 million cycles
Temperature Coefficient:	± 600 ppm/°C
Electrical Rotation:	340° ±4°

General Specifications

Rotary action of the Pneu-Turn rotary actuator is achieved through the use of a rack and pinion assembly. Just as with any hydraulic or pneumatic cylinder, the speed of rotation may be controlled through the use of flow controls. The PTF may also be controlled with Bimba's Pneumatic Control System, Model PCS.

Care should be taken to insure that the inertial force does not exceed the published torque capacity.

Port Positioning

Ports on the PTF may be repositioned to accommodate any air line configuration by loosening the three body retainer screws. Once desired port positions are obtained, screws must be tightened to specified torque values in the table below.

Lubrication

The PTF is prelubricated at the factory for extensive, maintenance free operation. The life of the rotary actuator can be lengthened by providing additional lubrication with an air line mist lubricator or direct introduction of the oil to the actuator every 500 hours of operation. Recommended oils for Buna N seals are medium to heavy inhibited hydraulic or general purpose oil.

The rack and pinion gear and ball bearings are prelubricated at the factory for extensive maintenance free operation. If additional lubrication is required, use a high grade bearing grease.

Woodruff Key Location

The standard position of the woodruff key is 12 o'clock at the center of rotation.

Ratings

Pressure Rating: 150 psi air or oil with S Option

Rotation Tolerance: 1-1/16" - 2" bore is -0° to +10 °. The Angle Adjustment Option allows 45° of adjustability. If cushions are ordered in conjunction with the angle adjustment option, adjustability will be 10°.
Temperature Range: Standard Seals: -20° to 200° F; V Option High Temp seals: 0° to 250°. NOTE: If used for positioning applications, it is recommended to use low temperature lubricant for temperatures less than 35° F.

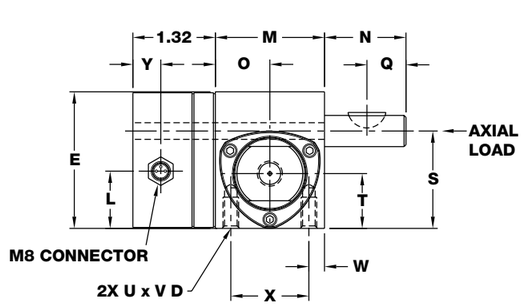
Backlash: Both single and double rack models have zero mid-rotational and end of rotation backlash.

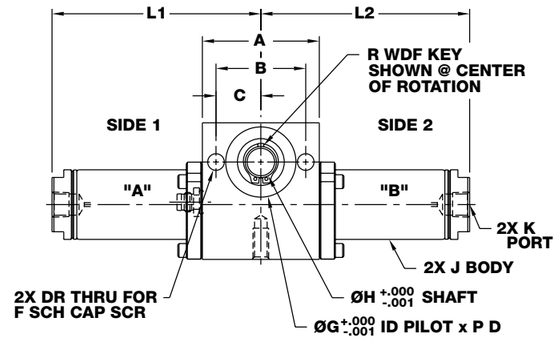
Breakaway: Less than 3 PSI.

Series	1-1/2"		2"	
	(098)	(196)	(247)	(494)
Theoretical Torque Capacity (in-lbs/PSI)	0.982	1.963	2.468	4.935
Bearing Load (Axial lbs)	110	110	130	130
Bearing Load (Radial lbs)	425	425	740	740
Distance between bearing midpoints (in)	1.71	1.71	1.82	1.82
Maximum rate of rotation (@ 100 PSI with no load)	1500 deg/sec	1500 deg/sec	1000 deg/sec	1000 deg/sec
Weight (approximate oz)	47	88	103	150
Body Retainer cap screw recommended tightening torque (in-lbs)	20	20	20	20

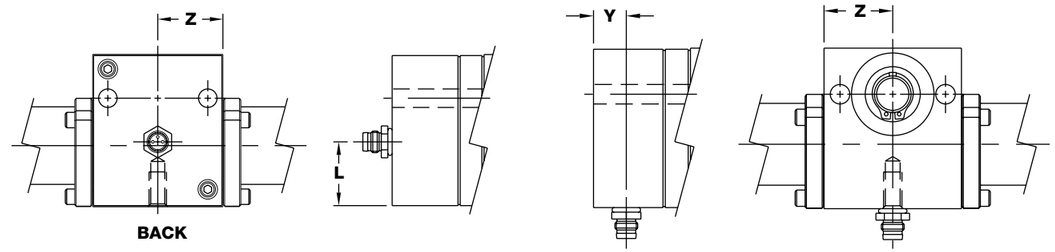
Dimensions (PTF Models)

Single Rack Models (in)





Plug connector shown in standard position. The H1 option dimensionally positions the connector on the clockwise rotation side.

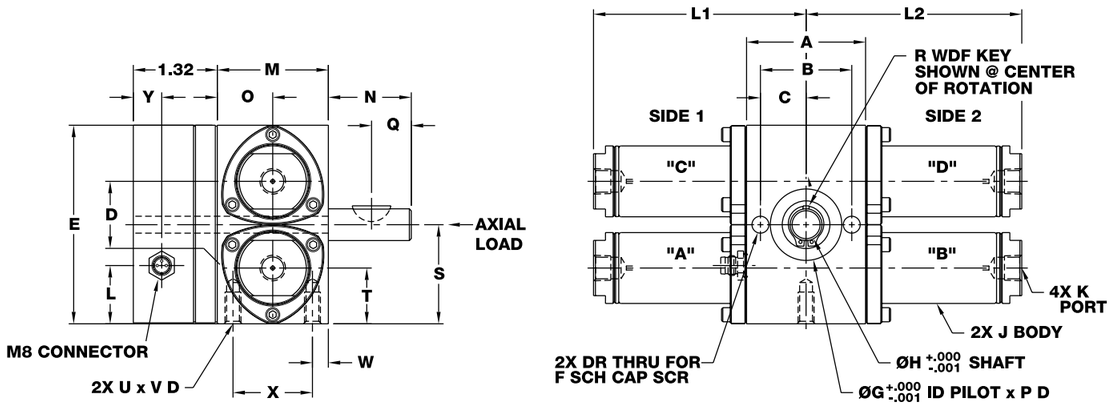


Bore	A	B	C	E	F	G (Ball Bearing I.D. Pilot)	H	J	K	L	M
1-1/2" (098)	2.38	1.81	0.90	2.84	5/16" S.H.C.S.	1.375	0.625	1.56	1/8 NPT	1.449	2.25
2" (247)	3.00	2.38	1.19	3.75	5/16" S.H.C.S.	1.875	0.875	2.08	1/4 NPT	1.918	2.56

Bore	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1-1/2" (098)	1.38	1.12	0.09	0.62	#405	2.09	1.15	5/16-18	0.62	0.31	1.62	0.45	1.19
2" (247)	2.00	1.28	0.10	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00	0.45	1.50

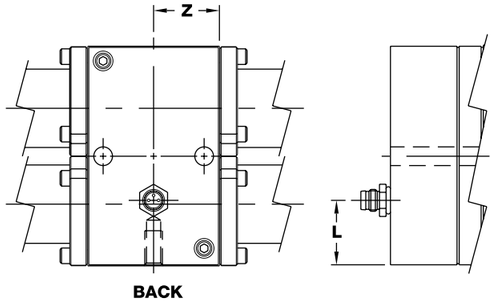
Dimensions (PTF Models)

Double Rack Models (in)

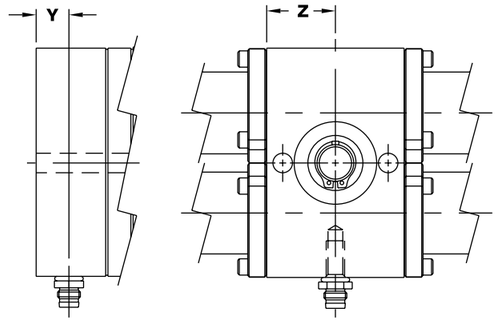


Plug connector shown in standard position. The H1 option dimensionally positions the connector on the clockwise rotation side.

H2 Option



H3 Option

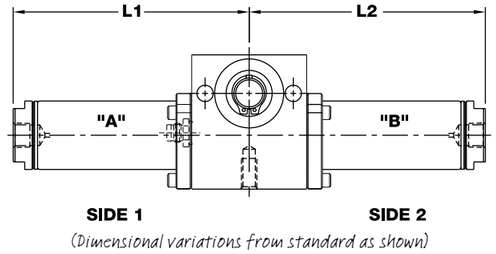


Bore	A	B	C	D	E	F	G (Ball Bearing I.D. Pilot)	H	J	K	L	M
1-1/2" (196)	2.38	1.81	0.90	1.88	4.19	5/16" S.H.C.S.	1.375	0.625	1.56	1/8 NPT	1.449	2.25
2" (494)	3.00	2.38	1.19	2.56	5.13	5/16" S.H.C.S.	1.875	0.875	2.08	1/4 NPT	1.918	2.56

Bore	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1-1/2" (196)	1.38	1.12	0.09	0.62	#405	2.09	1.15	5/16-18	0.62	0.31	1.62	0.45	1.19
2" (494)	2.00	1.28	0.10	0.75	#606	2.56	1.28	5/16-18	0.62	0.28	2.00	0.45	1.50

Position Feedback Pneu-Turn Options

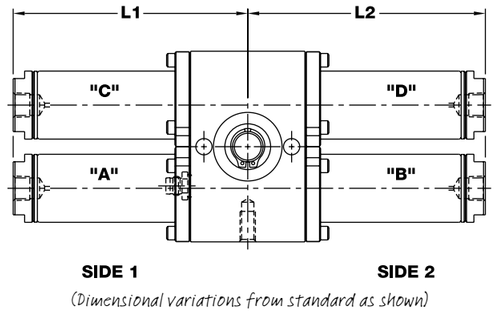
Single Rack Options (in)



(Dimensional variations from standard as shown)

	1-1/2" (098)		2" (247)	
	L1	L2	L1	L2
Adder per Degree of Rotation	0.0097	0.0097	0.0137	0.0137
Base Unit (No Options)	2.34	2.34	2.84	2.84
Bumper Both Sides (B1)	2.49	2.49	3.04	3.04
Bumper CCW Side (B2)	2.34	2.49	2.84	3.04
Bumper CW Side (B3)	2.49	2.34	3.04	2.84
Cushion Both Sides (C1)	2.98	2.98	3.65	3.65
Cushion CCW Side (C2)	2.34	2.98	2.84	3.65
Cushion CW Side (C3)	2.98	2.34	3.65	2.84
Oil Service Seals (S)	2.77	2.77	3.38	3.38
Oil Service with Angle Adjustment (AS)	3.41	3.41	4.19	4.19

Double Rack Options (in)



(Dimensional variations from standard as shown)

	1-1/2" (098)		2" (247)	
	L1	L2	L1	L2
Adder per Degree of Rotation	0.0097	0.0097	0.0137	0.0137
Base Unit (No Options)	2.34	2.39	2.84	2.89
Bumper Both Sides (B1)	2.49	2.39	3.04	2.89
Bumper CCW Side (B2)	2.49	2.39	3.04	2.89
Bumper CW Side (B3)	2.49	2.39	3.04	2.89
Cushion Both Sides (C1)	2.98	2.39	3.65	2.89
Cushion CCW Side (C2)	2.98	2.39	3.65	2.89
Cushion CW Side (C3)	2.98	2.39	3.65	2.89
Oil Service Seals (S)	2.77	2.39	3.38	2.89
Oil Service with Angle Adjustment (AS)	3.41	2.39	4.19	2.89

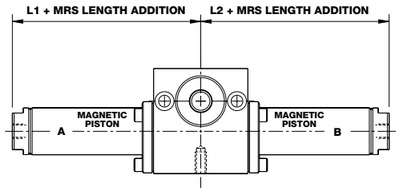
"CCW Side" refers to the extreme rotation of the shaft in the counter-clockwise direction as viewed from the mounting pilot side of the actuator. The location of the optional feature chosen will be on tube B for single rack models and tube C for double rack models.

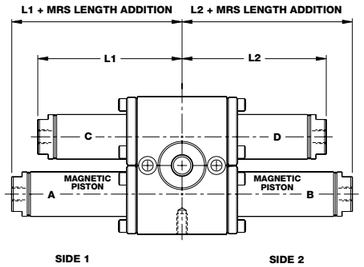
"CW Side" refers to the extreme rotation of the shaft in the clockwise direction as viewed from the mounting pilot side of the actuator. The location of the optional feature chosen will be on tube A for both single and double rack models.

Position Feedback Pneu-Turn Options

MRS® Magnetic Position Sensing

Magnetic pistons are located on the A and B tubes of both the single and double rack rotary actuators, guaranteeing switch operation at any point in the rotation.

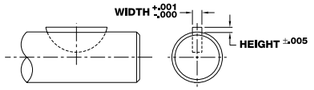




MRS® Length Adder (in)

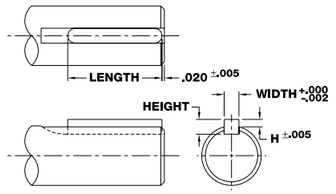
Degrees	098/196	247/494
45º	0.75	0.75
90º	0.53	0.44
180º	0.09	0.00
325º	0.00	0.00

Woodruff Key (in)



Key No.	Width	Height
405	0.1250	0.063
606	0.1875	0.094

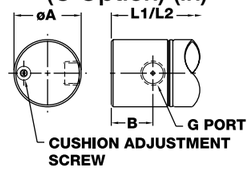
Square Key (in)



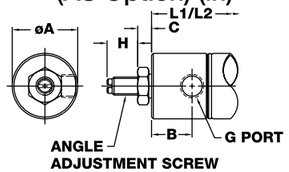
Bore Size	Length	Width	Height	H
1-1/2" (098/196)	0.797	0.188	0.188	0.094
2" (247/494)	1.781	0.250	0.250	0.125

Position Feedback Pneu-Turn Option Dimensions

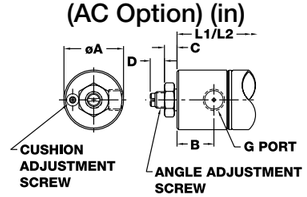
Cushion (C Option) (in)



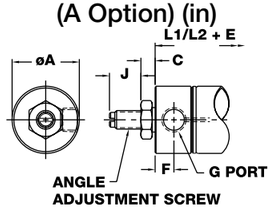
Angle Adjustment with Oil Service Seals (AS Option) (in)



Angle Adjustment with Cushion (AC Option) (in)



Angle Adjustment (A Option) (in)



Bore Size	A	B	C	D	E	F	G	H	J
1-1/2" (098 and 196)	1.56	0.77	0.27	0.33	0.42	0.34	1/8 NPT	0.67	0.67
2" (247 and 494)	2.08	0.87	0.31	0.49	0.53	0.41	1/4 NPT	0.97	0.97

The model number of Pneu-Turn rotary actuators with shaft position feedback capabilities consists of an alphanumeric cluster designating product type, angle of rotation, and other optional components that together make up the complete part number to use in ordering. Use the ordering information below to build a valid part number.

An example of a basic Position Feedback Pneu-Turn unit with 1-1/2" bore, single rack, 180° rotation, and additional options is shown below.

PTF - 098 180 - A1H1

Bore Size	
098	1-1/2" bore, single rack
196	1-1/2" bore, double rack
247	2" bore, single rack
494	2" bore, double rack

Standard Stroke Lengths*	
045	45°
090	90°
180	180°
325	325°

* Larger rotational angles are available. Contact your Bimba distributor.

Options	
A1	Angle adjustment, both sides
A2	Angle adjustment, counter-clockwise rotation
A3	Angle adjustment, clockwise rotation
B1	Bumpers, both sides
B2	Bumpers, counter-clockwise rotation
B3	Bumpers, clockwise rotation
C1	Cushion, both sides[1]
C2	Cushion, counter-clockwise rotation[1]
C3	Cushion, clockwise rotation[1]
G	Magnalube® G lubrication
H1	Plug connector, clockwise side
H2	Plug connector, back of plate
H3	Plug connector, bottom of plate
K	Square key
M	MRS® magnetic position sensing
S	Seals, oil service[2]
V	High temperature option (0° F to 250° F)

®Magnalube is a registered trademark of Carleton Stuart Corporation.

Option Combination Availability

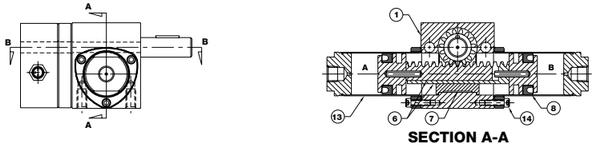
Due to design or compatibility restrictions, the following options may not be ordered in combination. For example, C (Cushions) and B (Bumpers) are not available in combination.

	Option						
Series	A	B	C	K	M	S	V
1-1/2" (098)	N/A	C,S	B,S	N/A	V	B,C	M
1-1/2" (196)	N/A	C,S	B,S	N/A	V	B,C	M
2" (247)	N/A	C,S	B,S	N/A	V	B,C	M
2" (494)	N/A	C,S	B,S	N/A	V	B,C	M

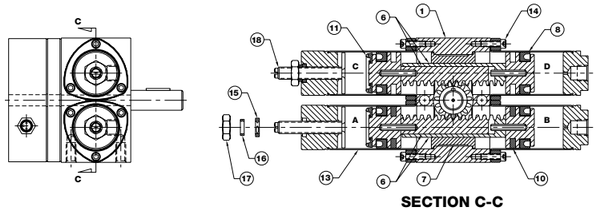
NOTE: Temperature range of ball bearing units with high temperature option is 0° F to 250° F.

Position Feedback Cylinder Repair Parts

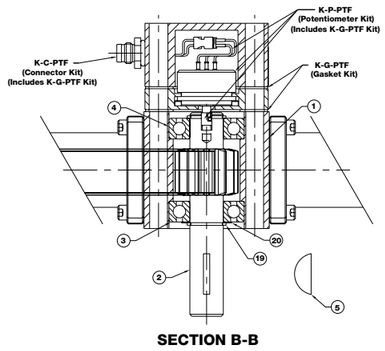
Single Rack Model



Double Rack Model



Ball Bearing® Option



No.	Part Description	Quantity Required	
		Single	Double
PT-1-R	Actuator Body	1	1
PTF-2	Shaft/Pinion Assembly	1	1
PT-3-R	Front Shaft Ball Bearing	1	1
PT-4-R	Rear Shaft Ball Bearing	1	1
PT-5	Shaft Key	1	1
PT-7-X	Rack Support	1	2
PTF-8	Piston Seal[1]	2	4
PT-9	Piston Wear Ring (required for oil service only)	2	2
PT-10	Magnet	2	2
PT-11	Bumper	2	2
PT-13	Cylinder Body Assembly (includes Body, End Cap, and Retainer Ring)	2	4
PT-14	Cylinder Body Retainer Cap Screw[2]	6	12
PT-15	Cylinder Body Thread Seal	2	2
PT-16	Cylinder Body Thread Seal Ring	2	2
PT-17	Cylinder Body Jam Nut	2	2
PT-18	Angle Adjustment Screw	2	2
PT-19	Retainer Ring	2	2
PT-20	Shim Package	1	1

[1] Double Rack Models require two repair kits per rotary actuator. Oil Service Option: Single Rack models require four oil service seals or two oil service seal kits. Double Rack models require four oil service seals and two standard seals or two oil service seal kits and one standard seal kit.
[2] 2" bore requires 8 or 16.

Repair Kits

Bearing Kit (K-A-PT-R)		
PT-3-R	Front Shaft Ball Bearing	1
PT-4-R	Rear Shaft Ball Bearing	1

Shaft Kit (K-S-PTF)		
PTF-2	Shaft/Pinion Assembly	1
PT-5	Shaft Key	1

Seal Kit (K-L-PTF)		
PTF-8	Piston Seals	2

Gasket Kit (K-G-PTF)	
Gasket	1

Connector Kit (K-C-PTF)	
Connector Assembly	1
Gasket	2

Potentiometer Kit (K-P-PTF)	
Pin Header	1
Potentiometer Assembly	1
Potentiometer Coupler	1
Gasket	2

SPCS-2 Servo Pneumatic Control System with Software Setup

The updated SPCS-2 provides a robust solution to accurate closed loop pneumatic positioning. Easily installed and software configured, this servo pneumatic control provides positioning accuracy up to ± 1% of the actuator's full stroke with loads up to 225 lbs and average velocity as high as 20 inches per second. Use the SPCS-2 with any of Bimba's position feedback actuators (PFC, PFCN, PTF) bore sizes 1-1/16" through 3", or actuators with external feedback sensors, to create a solution to your motion control application.



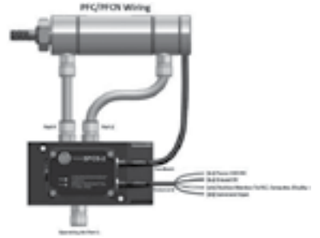
Software Configured Setup Including:

- Linear, rotary, or rodless actuator selection
- 0-10VDC or 4-20mA command feedback selection
- Response, overshoot, force, and orientation adjustments
- Effective rod extend and retract control along with ramp up and ramp down speed adjustments
- Square wave generator to simulate performance



Easy Connection

- Standard power, control, and feedback cables
- No manual switch or jumper tuning
- IP65 compatible



SPCS-2 Application Sizing

Horizontal Applications

Bore Size	Average Velocity Without Overshoot @ Max Payload (in/sec)	Maximum Payload (lbs)	Average Velocity @ 50% Max Payload (in/sec)	Average Velocity @ 25% Max Payload (in/sec)
09	20	50	20	30
17	10	100	20	30
31	15	200	20	30
50	15	315	25	30
70	15	450	20	20

Vertical Applications

Bore Size	Average Velocity Without Overshoot @ Max Payload (in/sec)	Maximum Payload (lbs)	Average Velocity @ 50% Max Payload (in/sec)	Average Velocity @ 25% Max Payload (in/sec)
09	70	5	100	100
17	70	10	60	60
31	50	30	40	60
50	15	95	30	30
70	20	135	20	20

Complimentary Bimba Products to Create a Closed Loop Pneumatic Motion Control Solution

> PFC – Linear Resistive position feedback cylinder
> PFCN – Non-contact magnetostrictive sensor position feedback cylinder
> PFCL and PFCNL – Rod lock models of the above cylinders. The rod lock activates and holds the cylinder in place in the event operating air is lost.
> PTF - Rotary potentiometric feedback
> 5 µm particulate
> 0.3 µm coalescing filter

The model number of SPCS servo pneumatic control systems and supporting parts are non-configurable. Use the ordering information below to select a valid part number. Contact Bimba at cs@bimba.com for additional information and customization options.

Part Number	Description
SPCS-2	Servo Pneumatic Control System
SPCS-CBL-PWR-CMD	2 Meters Female/Strip Wire
SPCS-CBL-FBK	2 Meters Female Connector Both Ends
SPCS2-USB-CBL	2 Meter USB Setup Cable

Notes

Notes

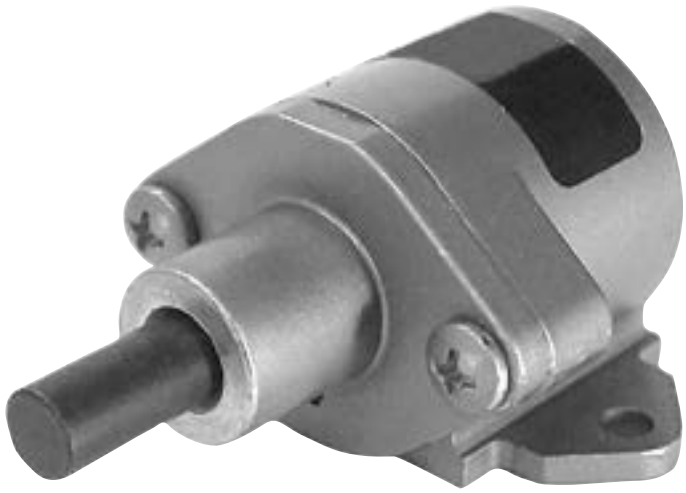
POSITION FEEDBACK CYLINDERS

BIMBA BIM-PFL-0320 Catalog 2020 | For Technical Assistance: 800-442-4622

Notes

Specialty Cylinders

Bimba manufactures cylinders for every application, large or small, common or custom. Some actuators are designed to serve specialized applications, filling niches that more typical pneumatic actuators cannot.



Contents

497 Miniature Air Cylinders
- 497 – Technical Data
- 498 – Product Information
- 499 – Accessories
- 499 – How to Order

500 Single Acting Air Clamps
- 500 – Technical Data
- 501 – Product Information
- 502 – How to Order

Miniature Air Cylinders

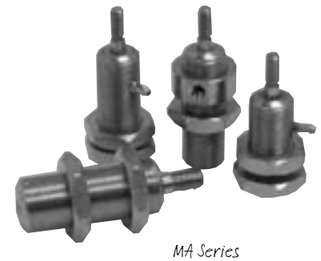
MA Series – Mini Adjustable Location Cylinders

These threaded body cylinders install quickly and easily without special mounting devices. Either drill a hole, insert your cylinder, and position with the pair of jam nuts or tap a hole and lock into position with a single jam nut. The MA-Series cylinders are electroless nickel plated for excellent corrosion resistance and a gleaming appearance.

Non-rotating: This option is available on 3/8" and 1/2" bore, single-acting, spring return cylinders.

Stroke Length Availability

The MA-250 (1/4" Bore) single acting is only available in 1/4" stroke lengths. The MA-250 double acting is available in 1/4", 1/2" and 1" stroke lengths. The MA-375 (3/8" Bore) and MA-500 (1/2" Bore) single acting is available in 1/4" and 1/2"; the double acting version is available in 1/4", 1/2", 1", 1 1/2" and 2" stroke lengths. By adding a spacer, all models are also available in fractional stroke lengths for no additional charge. (Dimensionally the cylinder will be the same as the next closest size up.) If other strokes are required, contact Bimba to quote a custom stroke length.



MA Series

MF Series – Mini Flat Mount Cylinders

Bimba's MF Series are miniature, rectangular flat mount cylinders. MF cylinders are available in both single and double-acting models with strokes up to 2".

All ports are tapped 10-32 except the front ports of 1/4" bore models, which have a 6-32 barb fitting. The standard location for the rear extend port is denotated by location "N" on the dimensional drawing. As an option, a rear side port can be ordered special. Contact Bimba for details.

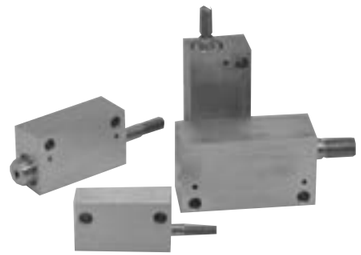
Mini Cylinders Mount Anywhere!

Bimba's line of miniature air cylinders offers users a wide range of low-profile linear actuators. These versatile cylinders are available in both single-acting and double-acting models. They are ideal actuators in any application where space is limited.

Stroke Length Availability

This series is available in 1/4" and 1/2" standard stroke lengths.* By adding a spacer, all models are also available in fractional stroke lengths for no additional charge. (Dimensionally the cylinder will be the same as the next closest size up.) If other strokes are required, contact Bimba to quote a custom stroke length.

***NOTE:** The MF-250 (1/4" bore), Single Acting (SR or SE) is only available in 1/4" standard stroke length.



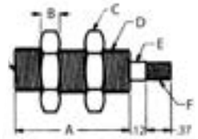
MF Series

Technical Data

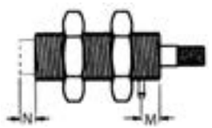
General Specifications	
Seals:	Buna-N (Viton Optional)
Temperature:	Buna-N seals = 0° F to 220° F (-18° C to 104° C)
Viton Seals:	0° F to 400° F
Operating Pressure:	to 125 PSI
Piston Rods:	Stainless Steel
Rod Bearings:	660 Bronze
Lubrication:	Recommended - non detergent petroleum based
Filtration:	40 Micron

Product Information

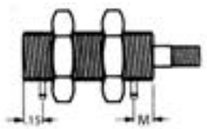
Dimensions – MA Series



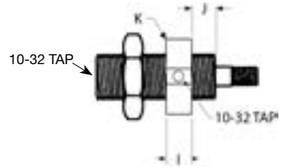
Basic Cylinder



Spring Extend Only



6-32 Barbs
(for use with 1/16" ID Hose)



Side and Rear Tapped

Bore	A=Stroke+	B	C	D	E	F	I	J	K	M	N
1/4"	0.81	.15	.62	3/8-32	.14	6-32	.31	.06	.62	.20	.10
3/8"	1.00	.18	.75	1/2-32	.17	8-32	.31	.21	.75	.37	.18
1/2"	1.06	.18	.87	5/8-32	.25	1/4-28	.31	.21	.87	.37	-

Dimensions – MF Series

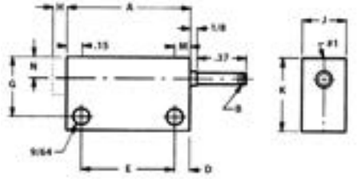


Figure 1: For strokes up to 1/2"

#1: Indicates port locations. The H dimension is for spring extend cylinders only.

When nominal forces are adequate, this table may be helpful.

Typical Spring Forces			
Spring Return Stroke	**Ounces**	**Spring Extend Stroke**	**Ounces**
250 - 1/4"	14-18	250 - 1/4"	25-29
375 - 1/4"	22-26	375 - 1/4"	30-34
375 - 1/2"	22-26	375 - 1/2"	54-58
500 - 1/4"	42-46	500 - 1/4"	62-66
500 - 1/2"	51-55	500 - 1/2"	78-80

Bore	Stroke	A	B	D	E	G	H	I	J	K	M	N	O	Front Port	Rear Port
1/4"	1/4"	1.06	6-32	.12	0.81	7/16"	.10	.31	3/8"	5/8"	.20	.18	5/16"	6-32	10-32
	1/2"	1.31	6-32	.12	1.06	7/16"	-	.31	3/8"	5/8"	.20	.18	5/16"	Barb	Tap
3/8"	1/4"	1.25	8-32	.15	0.93	5/8"	.18	.37	1/2"	3/4"	.37	.25	7/16"	10-32	10-32
	1/2"	1.50	8-32	.15	1.18	5/8"	.18	.37	1/2"	3/4"	.37	.25	7/16"	Tap	Tap
1/2"	1/4"	1.31	1/4-28	.15	1.00	3/4"	-	.37	5/8"	7/8"	.37	.31	9/16"	10-32	10-32
	1/2"	1.56	1/4-28	.15	1.25	3/4"	-	.37	5/8"	7/8"	.37	.31	9/16"	Tap	Tap

Dimensions For Cylinders With Strokes Over 1/2"

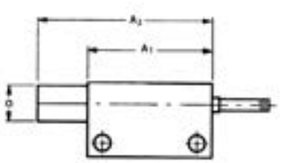


Figure 2: For strokes over 1/2"

Bore	A_1	A_2
1/4"	1.06	0.81 + Stroke
3/8"	1.25	1.00 + Stroke
1/2"	1.31	1.06 + Stroke

Accessories

Description	Model Number
Fitting: 10-32 to 1/16" ID Hose	PMHF
Fitting: 6-32 Barb to 1/16" ID Hose	PMBF
Hex Nut for 1/4" Bore Cylinder	PMH-250
Hex Nut for 3/8" Bore Cylinder	PMH-375
Hex Nut for 1/2" Bore Cylinder	PMH-500
1/16" ID Tube Clear Polyurethane (50 ft.)	11NAT

Mounting Blocks



PMB-250



PMB-375



PMB-500

Bore	PMB 250 1/4"	PMB 375 3/8"	PMB 500 1/2"
Width	0.503	0.626	0.75
Height	0.879	0.876	0.94
Depth	0.314	0.314	0.38
Hole (2)	0.14	0.139	0.136

How to Order

MA - 500 x 1.00 - DA - R B (***)

Series		Bore		Stroke	Type		Rear Port		Front Port		Options	
MA	Mini Adjustable	250	1/4" Bore	See "Stroke Length Availability" on page 497 for particular series	DA	Double Acting	O	None (Spring Extend)	O	None (Spring Return)	VI	Viton Seal
MF	Mini Flat	375	3/8" Bore		SR	Spring Return	R	Rear Tapped (10-32)	S	Side Tapped (10-32)	NR	Non-Rotating (Hex Rod) (MA Series only)
		500	1/2" Bore		SE	Spring Extended	S	Side Tapped (10-32)*	B	6-32 Barb (for 1/16" ID Hose)		
							B	6-32 Barb (for 1/16" ID Hose)				

* Special Order (non-stock; contact factory)

Single Acting Air Clamps

Economical single-acting air clamps provide gripping power on the out stroke and spring retraction. They are ideal for use in drill fixtures and for bending, swaging, forming, crimping, and pressing operations. Because 3-way valves may be used, hook-ups are quick and easy.

Adjustable Stroke Models

H0X01, H1X12, V0X01, and V1X12 models are supplied with an adjustable front head so that the user may adjust the length of the stroke by as much as one inch.



V0X01



H-1



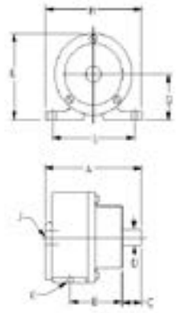
V-1

Technical Data

Specifications	
Pressure:	Air to 150 PSI
Temperature:	-40° F to 250° F (-40° C to 121° C)
Rod Material:	Nitrotec plated steel on 1" bore models, ground and polished on all others.
Seals:	Custom molded one-piece neoprene cups
Body & Cover:	Aluminum on adjustable models, cast aluminum on all other models. Cast iron on H-12 and H-283.
Lubrication:	Petroleum base oil
Filtration:	40 Micron minimum

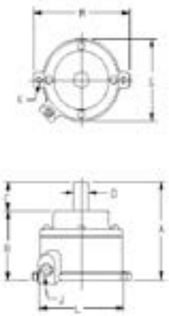
Product Information

Dimensions



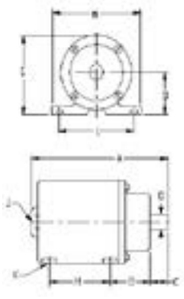
Single Side Lug

Dimension	H-1	H0X-01	H1X-12	H-41	H-71
A	2-25/32	4	5	4-7/8	5-5/16
B	1-11/32	Var.		2-1/4	2-3/4
C	5/8	Var.		1-1/2	1-7/16
D	5/16	5/16		1/2	3/4
G	1-1/4	1-9/16		3-1/16	3-23/32
J	1/8 NPTF	1/8 NPTF		1/8 NPTF	1/4 NPTF
K	3/16	.200		1/2 Slot	21/64
L	1-5/8	1-5/8		3 1/2	4-5/8
M	2	2-1/8		4-7/16	5-3/8
Q	5/8	13/16		1-9/16	1-15/16



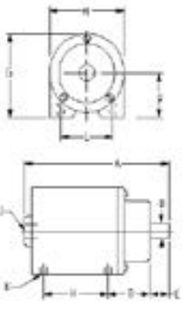
Base Mount

Dimension	V-1	V0X-01	V1X-12	V-41
A	2-5/8	3-13/16	4-13/16	4-5/8
B	1-15/16	Var.		3-3/16
C	11/16	Var.		1-7/16
D	5/16	5/16		1/2
G	1-9/16	1-3/4		3
J	1/8 NPTF	1/8 NPTF		1/8 NPTF
K	3/16	.200		.257
L	1-11/16	1-5/8		3-3/4
M	2-1/8	2		4-1/4



Double Side Lug

Dimension	H-72	H-73	H-12	H-283
A	6-5/16	7-5/16	7	9
B	2-3/16	2-3/16	2-9/16	3-1/2
C	1-7/16	1-7/16	1-7/16	1-7/16
D	3/4	3/4	3/4	1-1/4
G	3-11/16	3-11/16	5-1/16	7-1/16
H	2-1/16	3-1/16	2-5/16	7-1/16
J	1/4 NPTF	1/4 NPTF	3/8 NPTF	1/2 NPTF
K	21/64	21/64	1/2 Slot	1/2-13
L	4-5/8	4-5/8	5-1/2	5-5/8
M	5-1/4	5-1/4	7	6-3/4
Q	1-7/8	1-7/8	2-9/16	3-9/16



Bottom Flush

Dimension	H-42	H-122
A	5-13/16	7-9/16
B	2-5/8	2-5/8
C	1-7/16	1-7/16
D	1/2	3/4
G	3-1/16	4-31/32
H	-	2-1/2
J	1/8 NPTF	3/8 NPTF
K	1/4-20	5/16-18
L	2-1/4	2-1/4
M	3	4-13/16
Q	1-9/16	2-9/16

How To Order

Models	Return‡	Bore(")	Stroke(")	Output*
H-1 & V-1	4	1	11/16	68
H0X01 & V0X01	5	1	0 to 1	62
H1X12 & V1X12	5	1	1 to 2	61
H-41 & V-41	9	2-1/4	1	361
H-42	10	2-1/4	2	353
H-71	18	3	1	682
H-72	13	3	2	675
H-73	14	3	3	679
H-12	39	4	2	1206
H-122	27	4	2-5/8	1204
H-283	40	6	3	2763

‡ Maximum weight in pounds that spring will return.
** Force in pounds at 100 PSI input pressure with maximum spring resistance.*

Magnetic Switch Products

Magnetic switch products are designed to signal when an actuator with an integrated magnet has reached a set point in its travel. Bimba switches are pretested for use with Bimba actuators, eliminating the costly and time-consuming design and fabrication required to integrate third party switches. Switches are available in multiple configurations to meet your application needs. A variety of outputs are offered for each switch family, including PNP (transistor sourcing), NPN (transistor sinking), normally open contacts, and higher power triac.



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Switch and Cable Selection Chart

Switch Type	Base Part Number	General Description	Original Line Original Line With Rod Lock	Double-Wall	EF/Twist Clamp Twin Bore/ET Pneu-Moment Stopper/ LPA/NPA	Flat-1 Flat-II	PA NFPA	Pneu Turn	Linear Thruster	Ultran	Ultran Slide High Load Ultran	Repairable Stainless Steel All Stainless OL	Ultran Band	Ultran Band Plus	ISO 15552	ISO 6431	ISO 6432
Track Mounted	HC	PNP, LED				X					X6						
	HK	NPN, LED				X					X6						
	MR	Reed, 4mm round, LED	X3		X			X3	X3		X5		X7				X6
	MS	PNP or NPN, 4mm round, LED	X3		X			X3	X3		X5		X7				X6
	MSC	PNP, 4mm round, LED	X3		X			X3	X3		X5		X7				X6
	MSK	NPN, 4mm round, LED	X3		X			X3	X3		X5		X7				X6
	MHC	Mini EdgeSwitch™, PNP, 4mm round, LED	X3		X	X9		X3	X3		X5		X7				X6
	MHK	Mini EdgeSwitch™, NPN, 4mm round, LED	X3		X	X9		X3	X3		X5		X7				X6
	MHF	Mini EdgeSwitch™, 4mm round, LED	X3		X	X9		X3	X3		X5		X7				X6
	MRS-.027	Reed, 2 wire, No LED	X1														
	MRS-.087	Reed, 2 wire, No LED	X2								X6						
	MRS-1.5	Triac, 2 wire, No LED 1.5 amp, AC only	X2														
	MRS-1.5-S	Triac, 2 wire, No LED, 1.5 amp, AC only	X1														
	MRS-AB	Reed, Square slot, LED														X	
	HSC-AB	PNP, Square slot, LED														X	
	HSK-AB	NPN, Square slot, LED														X	
	UBR	Reed, Square slot, LED											X8				
	UBSC	PNP, Square slot, LED											X8				
	UBSK	NPN, Square slot, LED											X8				
	MRN	Reed, 2 wire					X							X	X		
	MDN	Solid State, 2 wire					X							X	X		
	MSN	Solid State Auto Select NPN or PNP					X							X	X		

X1 - MRS Series with -Z option 9/16" and 3/4" bore only
X2 - MRS Series with -Z option 1-1/16" through 2-1/2" bore only
X3 - "T" option required
X4 - Not for use with 9/16" bore
X5 - "U" option required
X6 - "T" option required – not available on 8, 10, or 12mm bore with options ED, Q, U
X7 - 18mm bore only
X8 - 25mm through 63mm bore only
X9 - "-90" with the "S" option available for Flat-1 only

Cables (Compatible with all Bimba Switches with the "Q" Option)

Part Number	Description
C4	Straight M8 Female Connector, Threaded Connection with 2 Meter Cable
C4-S	Straight M8 Female Connector, Threaded Connection with 2 Meter Shielded Cable
C4X	Straight M8 Female Connector, Threaded Connection with 5 Meter Cable
C4X-S	Straight M8 Female Connector, Threaded Connection with 5 Meter Shielded Cable
C5-S	Right Angle M8 Female Connector, Threaded Connection with 2 Meter Shielded Cable
C5X-S	Right Angle M8 Female Connector, Threaded Connection with 5 Meter Shielded Cable

Switch and Cable Selection Chart

Switch Type	Base Part Number	General Description	Original Line Original Line with Rod Lock	Double-Wall	EF/Twist Clamp Twin Bore/ET Pneu-Moment Stopper/LPA/ NPA	Flat-1 Flat-II	Pneu Turn	Linear Thruster	Ultran	Ultran Slide High Load Ultran	Repairable Stainless Steel All Stainless OL	Ultran Band	ISO 6431	ISO 6432
Band Mounted	HSC	PNP, LED	X				X	X4						
	HSK	NPN, LED	X				X	X4						
	MSS	PNP/NPN, 2 wire LED	X								X			
	MRS-.027-B	Reed, 2 wire, No LED, 3 watts												X
	MRS-.027-BL	Reed, 3 wire, LED, 2.8 watts												X
	MRS-.087-B	Reed, 2 wire, No LED, 10 watts	X	X			X	X						
	MRS-.087-BL	Reed, 3 wire, LED, 9 watts	X	X			X	X						
	MRS-.087-PBL	Reed, 2 wire, LED 2.5 watts	X	X			X	X						
	MRS-1.5-B	Triac, 2 wire, No LED, 1.5 amp, AC only	X	X			X	X						
	R10	Reed, 2 wire, LED	X								X			
	RAC	Reed, 2 wire, No LED, AC only	X								X			
	R10P	Reed, 2 wire, LED	X								X			
	RHT	Reed, 2 wire, No LED, High Temperature	X								X			
End of Stroke (Ultran)	RSU-1	Reed, 2 wire, No LED							X	X				
	PCQ	PNP, Proximity, LED							X	X				
	PKQ	NPN, Proximity, LED							X	X				

How to Specify

MAGNETIC SWITCH PRODUCTS

Switch and Cable Specifications

Switch Type	Base Part Number	General Description	Sensor Type	Output Type	Operating Voltage (V)	Actuating Time	Maximum Load Current
Track Mounted	HC	PNP, LED	GMR	Sourcing, PNP	4.5 to 30 VDC	1.0 mS	150 mA
	HK	NPN, LED	GMR	Sinking, NPN	4.5 to 30 VDC	1.0 mS	150 mA
	MR	Reed, 4mm round, LED	Reed	Normally Open Contact	5 to 120 V AC or DC	1.0 mS	30 mA
	MS	PNP or NPN, 4mm round, LED	GMR	Auto Configure, Sinking or Sourcing	5 to 30 VDC	0.2 mS	100 mA
	MSC	PNP, 4mm round, LED	GMR	Sourcing, PNP	4.5 to 30 VDC	1.0 mS	200 mA
	MSK	NPN, 4mm round, LED	GMR	Sinking, NPN	4.5 to 30 VDC	1.0 mS	200 mA
	MHC	Mini EdgeSwitch™, PNP, 4mm round, LED	GMR	Sourcing, PNP	5 to 28 VDC	1.0 mS	100 mA
	MHK	Mini EdgeSwitch™, NPN, 4mm round, LED	GMR	Sinking, NPN	5 to 28 VDC	1.0 mS	100 mA
	MHF	Mini EdgeSwitch™, 4mm round, LED	GMR	Normally Open, Solid-State	10 to 28 VDC	1.0 mS	50 mA
	MRS-.027	Reed, 2 wire, No LED	Reed	Normally Open Contact	28 V max, AC or DC	1.0 mS	250 mA
	MRS-.087	Reed, 2 wire, No LED	Reed	Normally Open Contact	200 V max, AC or DC	1.0 mS	500 mA
	MRS-1.5	Triac, 2 wire, No LED, 1.5 amp, AC only	Reed	Triac	12 to 230 V, AC only	2.0 mS	1.5 A
	MRS-1.5-S	Triac, 2 wire, No LED, 1.5 amp, AC only	Reed	Triac	12 to 230 V, AC only	2.0 mS	1.5 A
	MRS-AB	Reed, Square slot, LED	Reed	Normally Open Contact	5 to 240 V, AC or DC	1.0 mS	100 mA
	HSC-AB	PNP, Square slot, LED	GMR	Sourcing, PNP	5 to 30 VDC	1.0 mS	200 mA
	HSK-AB	NPN, Square slot, LED	GMR	Sinking, NPN	5 to 30 VDC	1.0 mS	200 mA
	UBR	Reed, Square slot, LED	Reed	Normally Open Contact	5 to 240 V, AC or DC	1.0 mS	100 mA
	UBSC	PNP, Square slot, LED	GMR	Sourcing, PNP	5 to 30 VDC	1.0 mS	200 mA
	UBSK	NPN, Square slot, LED	GMR	Sinking, NPN	5 to 30 VDC	1.0 mS	200 mA
	MRN	Reed, 2-wire flying lead or M8	Reed	Normally Open Contact	240 V max, AC or DC	1.0 mS	100 mA
	MDN	Solid State, 2-wire flying lead or M8	GMR	Normally Open Contact	10 to 28 V, DC only	1.0 mS	50 mA
	MSN	Solid State auto select, 3-wire flying lead or M8	GMR	Sinking, NPN or Sourcing, PNP	5 to 30 V, DC only	1.0 mS	200 mA
Band Mounted	HSC	PNP, LED	GMR	Sourcing, PNP	4.5 to 30 VDC	1.0 mS	150 mA
	HSK	NPN, LED	GMR	Sinking, NPN	4.5 to 30 VDC	1.0 mS	150 mA
	MSS	PNP/NPN, 2 wire LED	GMR	Sinking or Sourcing	10 to 30 VDC	1.0 mS	300 mA
	MRS-.027-B	Reed, 2 wire, No LED, 3 watts	Reed	Normally Open Contact	28 V max, AC or DC	1.0 mS	250 mA
	MRS-.027-BL	Reed, 3 wire, LED, 2.8 watts	Reed	Normally Open Contact	6 to 24 V, AC or DC	1.0 mS	250 mA
	MRS-.087-B	Reed, 2 wire, No LED, 10 watts	Reed	Normally Open Contact	120 (200) V, AC or DC	1.0 mS	500 mA
	MRS-.087-BL	Reed, 3 wire, LED, 9 watts	Reed	Normally Open Contact	6 to 24 V, AC or DC	1.0 mS	500 mA
	MRS-.087-PBL	Reed, 2 wire, LED, 2.5 watts	Reed	Normally Open Contact	3 to 120 V, AC or DC	1.0 mS	20 mA
	MRS-1.5-B	Triac, 2 wire, No LED 1.5 amp, AC only	Reed	Triac	12 to 230 VAC	2.0 mS	1.5 A
	R10	Reed, 2 wire, LED	Reed	Normally Open Contact	5 to 120V, AC or DC	1.0 mS	500 mA
	RAC	Reed, 2 wire, No LED, AC only	Reed	Triac	12 to 240 VAC	2.0 mS	800 mA
	R10P	Reed, 2 wire, LED	Reed	Normally Open Contact	5 to 120V, AC or DC	1.0 mS	150 mA
	RHT	Reed, 2 wire, No LED	Reed	Normally Open Contact	5 to 120V, AC or DC	1.0 mS	500 mA
End of Stroke (Ultran)	RSU-1	Reed, 2 wire, No LED	Reed	Normally Open Contact	200 VDC	1.0 mS	500 mA
	PCQ	PNP, Proximity, LED	Inductive	Sourcing, PNP	10 to 30 VDC	0.33 mS	150 mA
	PKQ	NPN, Proximity, LED	Inductive	Sinking, NPN	10 to 30 VDC	0.33 mS	150 mA

Quick Connect Cable Specifications

Contact Carrier Material:	Nylon
Conductors:	3 x 24 AWG
Molded Connector Head:	Polyurethane (PUR)
Contact Material:	Gold plated brass
Power Rating:	125 V @ 3A
Wire Insulation Material:	Polyvinyl Chloride (PVC)
Jacket Material:	Polyurethane (PUR)
Temperature Range:	-4° F to 200° F (-20° C to 90° C)
Protection Class:	NEMA 1, 3, 4, 6 and IEC IP67
Insulation Resistance:	109

BIMBA BIM-PFL-0920 Catalog 2020 | For Technical Assistance: 800-442-4622

How to Specify

Switch and Cable Specifications

Switch Type	Base Part Number	General Description	Reverse Polarity Protection	Over-Voltage Protection	Transient Protection	Temperature Rating	Enclosure
Track Mounted	HC	PNP, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	HK	NPN, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	MR	Reed, 4mm round, LED	No	No	No	-10°C to 60°C	IP67
	MS	PNP or NPN, 4mm round, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	MSC	PNP, 4mm round, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	MSK	NPN, 4mm round, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	MHC	Mini EdgeSwitch™, PNP, 4mm round, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
	MHK	Mini EdgeSwitch™, NPN, 4mm round, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
	MHF	Mini EdgeSwitch™, 4mm round, LED	No	Yes	Yes	-10°C to 70°C	IP67
	MRS-.027	Reed, 2 wire, No LED	No	No	No	-25°C to 85°C	IP65
	MRS-.087	Reed, 2 wire, No LED	No	No	No	-25°C to 85°C	IP65
	MRS-1.5	Triac, 2 wire, No LED, 1.5 amp, AC only	No	No	No	-25°C to 85°C	IP65
	MRS-1.5-S	Triac, 2 wire, No LED, 1.5 amp, AC only	No	No	No	-25°C to 85°C	IP65
	MRS-AB	Reed, Square slot, LED	No	No	No	-10°C to 70°C	IP67
	HSC-AB	PNP, Square slot, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
	HSK-AB	NPN, Square slot, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
	UBR	Reed, Square slot, LED	No	No	No	-10°C to 70°C	IP67
	UBSC	PNP, Square slot, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
	UBSK	NPN, Square slot, LED	Yes	Yes	Yes	-10°C to 70°C	IP67
Band Mounted	HSC	PNP, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	HSK	NPN, LED	Yes	Yes	Yes	-20°C to 80°C	IP67
	MSS	PNP/NPN, 2 wire LED	Yes	Yes	Yes	-20°C to 70°C	IP67
	MRS-.027-B	Reed, 2 wire, No LED, 3 watts	No	No	No	-25°C to 85°C	IP65
	MRS-.027-BL	Reed, 3 wire, LED, 2.8 watts	No	No	No	-25°C to 85°C	IP65
	MRS-.087-B	Reed, 2 wire, No LED, 10 watts	No	No	No	-25°C to 85°C	IP65
	MRS-.087-BL	Reed, 3 wire, LED, 9 watts	No	No	No	-25°C to 85°C	IP65
	MRS-.087-PBL	Reed, 2 wire, LED, 2.5 watts	No	No	No	-25°C to 85°C	IP65
	MRS-1.5-B	Triac, 2 wire, No LED, 1.5 amp, AC only	No	No	No	-25°C to 85°C	IP65
	R10	Reed, 2 wire, LED	No	No	No	-20°C to 70°C	IP67
	RAC	Reed, 2 wire, No LED, AC only	No	No	No	-20°C to 70°C	IP67
	R10P	Reed, 2 wire, LED	No	Yes	Yes	-20°C to 70°C	IP67
	RHT	Reed, 2 wire, No LED	No	No	No	-40°C to 125°C	IP67
End of Stroke (Ultran)	RSU-1	Reed, 2 wire, No LED	No	No	No	-25°C to 85°C	IP65
	PCQ	PNP, Proximity, LED	Yes	Yes	Yes	-25°C to 70°C	IP67
	PKQ	NPN, Proximity, LED	Yes	Yes	Yes	-25°C to 70°C	IP67

Wire Color Codes

Generally the wire colors for Bimba switches conform to CENELEC EN 50 044 wiring standard. All switches with the “Q” option used with Bimba cables conform to the standard which is: Brown – Positive, Blue – Ground, and Black – Output. Some legacy switches do not conform to the standard as indicated in the catalog and documentation provided with the switch.

NOTE: 2 wire switches use only the brown and blue wires. (Some legacy switches use red and black). Do not connect the blue and brown wires across the power supply without a load in series the switch, it will be destroyed by the short circuit.

Product Features

Bimba offers more than twenty switch product series. The series are grouped by mounting style: band or track mounted. The choice of mounting style depends on the actuator used and user preference. Each series offers a unique mix of features allowing the user to select the right balance of price, performance and features for their application.

Features

Magnetic Reed Switch

> Lower cost
> Optional integrated LED
> AC or DC options
> Compact size
> Straight or 90° take out
> Quick disconnect or flying lead cable ends
> Track or band mounted

Solid State Switch

> Solid state reliability
> Faster response time
> Integrated LED
> Compact size
> Straight or 90° take out
> Quick disconnect or flying lead cable ends
> Reverse polarity and over-voltage protection
> Track or band mounted

Benefits

> Small operating window enables precise control of machine and processes
> Solid State switches have longer life than mechanical switches, reducing downtime
> Optional 90° take out simplifies wire routing
> Multiple cable length options simplify installation
> LED provides visual confirmation of switch function
> Compact size enables multiple switches to be installed on one actuator
> Multiple mounting options enable users to select the option that fits their needs

Band Mounted Solid State Switches

HSC and HSK

Compatible and Tested for use with:

Original Line Cylinders, Pneu-Turn Rotary Actuators, and Linear Thrusters



Band Size	
Bore Size	**Band Size**
No Band	Blank
9/16" (14mm)	02
3/4" (19mm)	04
7/8"	06
1-1/16" (27mm)	09
1-1/4"	12
1-1/2" (38mm)	17
1-3/4"	24
2" (50mm)	31
2-1/2"	50
3"	70

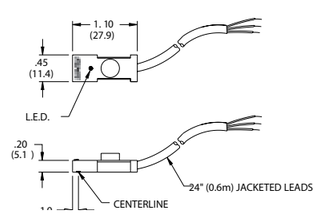
Part Numbers

Part Number	Description
HSC	Sourcing Switch (PNP), LED, 30VDC, 150mA with 24" Pigtail Leads, No Band
HSC-□□[1]	Sourcing Switch (PNP), LED, 30VDC, 150mA with 24" Pigtail Leads, Band Included
HSCQ	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector, No Band
HSCQ-□□[1]	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector, Band Included
HSCQC	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable, No Band
HSCQC-□□[1]	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable, Band Included
HSCQCX	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable, No Band
HSCQCX-□□[1]	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable, Band Included
HSCX	Sourcing Switch (PNP), LED, 30VDC, 150mA with 144" Pigtail Leads, No Band
HSCX-□□[1]	Sourcing Switch (PNP), LED, 30VDC, 150mA with 144" Pigtail Leads, Band Included
HSK	Sinking Switch (NPN), LED, 30VDC, 150mA with 24" Pigtail Leads, No Band
HSK-□□[1]	Sinking Switch (NPN), LED, 30VDC, 150mA with 24" Pigtail Leads, Band Included
HSKQ	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector, No Band
HSKQ-□□[1]	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector, Band Included
HSKQC	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable, No Band
HSKQC-□□[1]	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable, Band Included
HSKQCX	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable, No Band
HSKQCX-□□[1]	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable, Band Included
HSKX	Sinking Switch (NPN), LED, 30VDC, 150mA with 144" Pigtail Leads, No Band
HSKX-□□[1]	Sinking Switch (NPN), LED, 30VDC, 150mA with 144" Pigtail Leads, Band Included

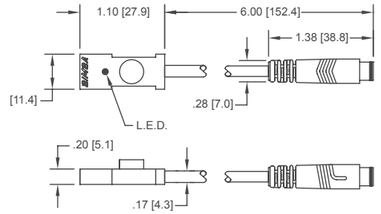
[1] Replace boxes with band size.
Example Part Number with band size from table: HSC-02 is an HSC switch with a band for 9/16" or 14 mm cylinder.

Dimensions

Band Mounted Solid State Switches
HSC and HSK



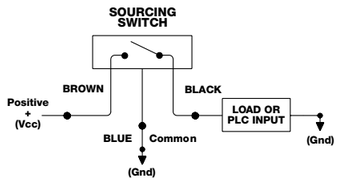
HSC, HSK



HSCQ, HSKQ

Wiring Diagrams

Typical Solid State Sourcing Configuration for HSC Models (PNP)

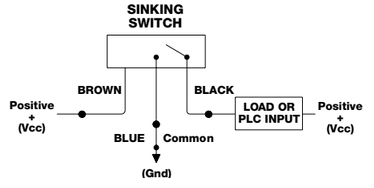


HSC, HC

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

CAUTION: Shorting black wire to ground will damage switch.

Typical Solid State Sinking Configuration for HSK Models (NPN)

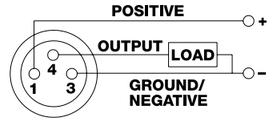


HSK, HK

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

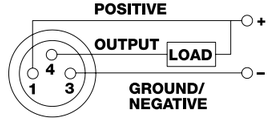
CAUTION: Shorting black wire to supply voltage will damage switch.

8mm Male Connector Sourcing Solid State Switch



HSCQ, HCQ

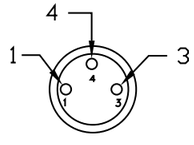
8mm Male Connector Sinking Solid State Switch



HSKQ, HKQ

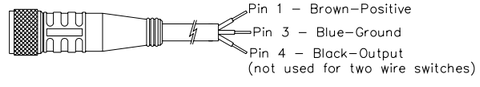
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

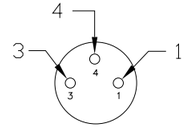


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
NOT CONNECTED
FOR 2 WIRE SWITCH
MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



How to Order

HS Series, Band Mounted, Solid State Switches

Series	
HS	Solid State Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
X	144" (3.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

HSCQCX - M25

Output	
C	3 Wire Sourcing (PNP)
K	3 Wire Sinking (NPN)

Mating Cable[1]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] Q option required

Band	
Blank	No band
-02	9/16" (14mm)
-04	3/4" (19mm)
-06	7/8"
-09	1-1/16" (27mm)
-12	1-1/4"
-17	1-1/2" (38mm)
-24	1-3/4"
-31	2" (50mm)
-50	2-1/2"
-70	3"
-M10	10mm
-M12	12mm
-M16	16mm
-M20	20mm
-M25	25mm

Compatible and Tested for use with:

> Original Line Cylinders
> Pneu-Turn Rotary Actuators
> Linear Thrusters



Product Features

Heavy Duty Band Mounted Switches

MRS-.087-B, MRS-.087-PB, and MRS-1.5-B
Compatible and Tested for use with:
Original Line Cylinders, Pneu-Turn Rotary Actuators, Linear Thrusters, and Double-Wall Cylinders



Band Size	
Bore Size	**Band Size**
No Band	Blank
9/16" (14mm)	02
3/4" (19mm)	04
7/8"	06
1-1/16" (27mm)	09
1-1/4"	12
1-1/2" (38mm)	17
1-3/4"	24
2" (50mm)	31
2-1/2"	50
3"	70

Metric Band Size	
Bore Size	**Band Size**
10mm	M10
12mm	M12
16mm	M16
20mm	M20
25mm	M25

Double-Wall Band Size	
Bore Size	**Band Size**
1-1/2"	DW1
2"	DW2
2-1/2"	DW3
3-1/4"	DW4
4"	DW5

Part Numbers

Part Number	Description
MRS-.087-B	Reed Switch, 2 wire, No LED, 200 V, 500mA, 24" Pigtail Leads, No Band
MRS-.087-B-□□[1]	Reed Switch, 2 wire, No LED, 200 V, 500mA, 24" Pigtail Leads, Band Included
MRS-.087-BQ	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, No Band
MRS-.087-BQ-□□[1]	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, Band Included
MRS-.087-BQC	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, 2m Mating Cable, No Band
MRS-.087-BQC-□□[1]	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, 2m Mating Cable, Band Included
MRS-.087-BQCX	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, 5m Mating Cable, No Band
MRS-.087-BQCX-□□[1]	Reed Switch, 2 wire, No LED, 120 V, 500mA, M8 Male Connector, 5m Mating Cable, Band Included
MRS-.087-XB	Reed Switch, 2 wire, No LED, 200 V, 500mA, 144" Pigtail Leads, No Band
MRS-.087-XB-□□[1]	Reed Switch, 2 wire, No LED, 200 V, 500mA, 144" Pigtail Leads, Band Included
MRS-.087-BL	Reed Switch, 3 wire, LED, 24 V, 500mA, 24" Pigtail Leads, No Band
MRS-.087-BL-□□[1]	Reed Switch, 3 wire, LED, 24 V, 500mA, 24" Pigtail Leads, Band Included
MRS-.087-BLQ	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, No Band
MRS-.087-BLQ-□□[1]	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, Band Included
MRS-.087-BLQC	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, 2m Mating Cable, No Band
MRS-.087-BLQC-□□[1]	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, 2m Mating Cable, Band Included
MRS-.087-BLQCX	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, 5m Mating Cable, No Band
MRS-.087-BLQCX-□□[1]	Reed Switch, 3 wire, LED, 24 V, 500mA, M8 Male Connector, 5m Mating Cable, Band Included
MRS-.087-XBL	Reed Switch, 3 wire, LED, 24 V, 500mA, 144" Pigtail Leads, No Band
MRS-.087-XBL-□□[1]	Reed Switch, 3 wire, LED, 24 V, 500mA, 144" Pigtail Leads, Band Included
MRS-.087-PBL	Reed Switch, 2 wire, LED, 120 V, 20mA, 24" Pigtail Leads, No Band
MRS-.087-PBL-□□[1]	Reed Switch, 2 wire, LED, 120 V, 20mA, 24" Pigtail Leads, Band Included
MRS-.087-PBLQ	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, No Band
MRS-.087-PBLQ-□□[1]	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, Band Included
MRS-.087-PBLQC	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, 2m Mating Cable, No Band
MRS-.087-PBLQC-□□[1]	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, 2m Mating Cable, Band Included
MRS-.087-PBLQCX	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, 5m Mating Cable, No Band
MRS-.087-PBLQCX-□□[1]	Reed Switch, 2 wire, LED, 120 V, 20mA, M8 Male Connector, 5m Mating Cable, Band Included
MRS-.087-PXBL	Reed Switch, 2 wire, LED, 120 V, 20mA, 144" Pigtail Leads, No Band
MRS-.087-PXBL-□□[1]	Reed Switch, 2 wire, LED, 120 V, 20mA, 144" Pigtail Leads, Band Included
MRS-1.5-B	Reed Switch, 2 wire, No LED, 12 to 230V AC only, 1.5A, 24" Pigtail Leads, No Band
MRS-1.5-B-□□[1]	Reed Switch, 2 wire, No LED, 12 to 230V AC only, 1.5A, 24" Pigtail Leads, Band Included
MRS-1.5-XB	Reed Switch, 2 wire, No LED, 12 to 230V AC only, 1.5A, 144" Pigtail Leads, No Band
MRS-1.5-XB-□□[1]	Reed Switch, 2 wire, No LED, 12 to 230V AC only, 1.5A, 144" Pigtail Leads, Band Included

[1] Replace boxes with band size.
Example Part Number with band size from table: HSC-02 is an HSC switch with a band for 9/16" or 14 mm cylinder.

Heavy Duty Band Mounted Switches

MRS-.027-B, MRS-.027-BL

Compatible and Tested for use with:
ISO 6432 Cylinders



Band Size	
Bore Size	**Band Size**
No Band	Blank
10mm	M10
12mm	M12
16mm	M16
20mm	M20
25mm	M25

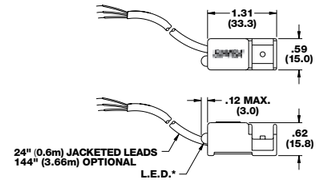
Part Numbers

Part Number	Description
MRS-.027-B	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, 0.6m Pigtail Leads, No Band
MRS-.027-B-□□[1]	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, 0.6m Pigtail Leads, Band Included
MRS-.027-XB	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, 3.6m Pigtail Leads, No Band
MRS-.027-XB-□□[1]	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, 3.6m Pigtail Leads, Band Included
MRS-.027-BQ	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, M8 Male Connector, No Band
MRS-.027-BQ-□□[1]	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250mA, M8 Male Connector, Band Included
MRS-.027-BQC	Reed Switch, 2 wire, No LED, 28 V AD/DC max., 250 mA, M8 Male Connector, 2m Mating Cable, No Band
MRS-.027-BQC-□□[1]	Reed Switch, 2 wire, No LED, 28 V AD/DC max., 250 mA, M8 Male Connector, 2m Mating Cable, Band Included
MRS-.027-BQCX	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250 mA, M8 Male Connector, 5m Mating Cable, No Band
MRS-.027-BQCX-□□[1]	Reed Switch, 2 wire, No LED, 28 V AC/DC max., 250 mA, M8 Male Connector, 5m Mating Cable, Band Included
MRS-.027-BL	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, 0.6m Pigtail Leads, No Band
MRS-.027-BL-□□[1]	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, 0.6m Pigtail Leads, Band Included
MRS-.027-XBL	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, 3.6m Pigtail Leads, No Band
MRS-.027-XBL-□□[1]	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, 3.6m Pigtail Leads, Band Included
MRS-.027-BLQ	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, M8 Male Connector, No Band
MRS-.027-BLQ-□□[1]	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, M8 Male Connector, Band Included
MRS-.027-BLQC	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, M8 Male Connector, 2m Mating Cable, No Band
MRS-.027-BLQC-□□[1]	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250 mA, M8 Male Connector, 2m Mating Cable, Band Included
MRS-.027-BLQCX	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250mA, M8 Male Connector, 5m Mating Cable, No Band
MRS-.027-BLQCX-□□[1]	Reed Switch, 3 wire, LED, 6-24 V AC/DC, 250mA, M8 Male Connector, 5m Mating Cable, Band Included

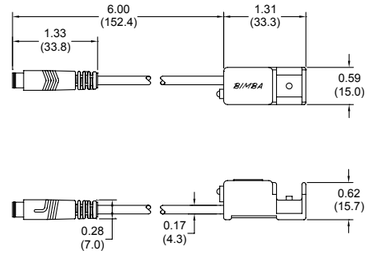
[1] Price includes band. Replace boxes with band size.

Dimensions

Heavy Duty Band Mounted Switches
MRS-.087-B, MRS-.087-PB, and MRS-1.5-B



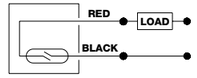
MRS-.087-B
MRS-.087-BL
MRS-.087-PBL
MRS-1.5-B



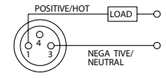
MRS-.087-BQ
MRS-.087-BLQ
MRS-.087-PBLQ

Wiring Diagrams

MRS-.087-B



MRS-.087-BQ
MRS-.087-PBLQ

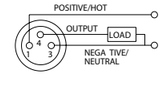


8mm Male Connector

MRS-.087-BL

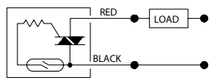


MRS-.087-BLQ

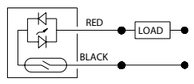


8mm Male Connector

MRS-1.5-B

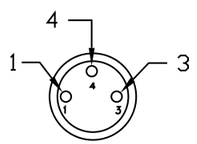


MRS-.087-PBL



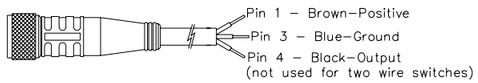
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

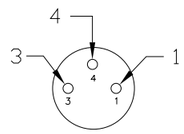


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
NOT CONNECTED
FOR 2 WIRE SWITCH
MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector

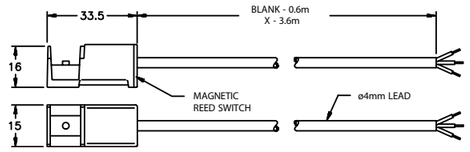


Face View of M8 Female Connector

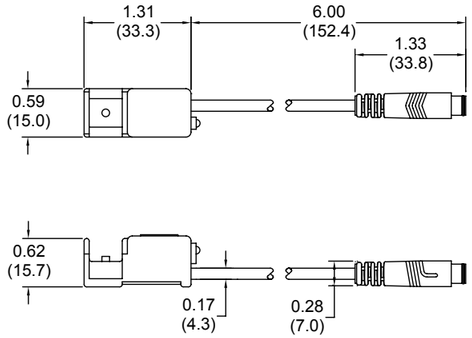


Dimensions

Heavy Duty Band Mounted Switches
MRS-.027-B, MRS-.027-BL

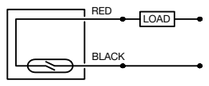


LED INDICATOR: A 'L' in the model number signifies the presence of a LED indicator.
CABLE LENGTH: The standard cable length is 0.6m. Switches with a 'X' in the model number indicate a cable length of 3.6m.



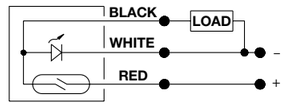
Wiring Diagrams

MRS-.027-B



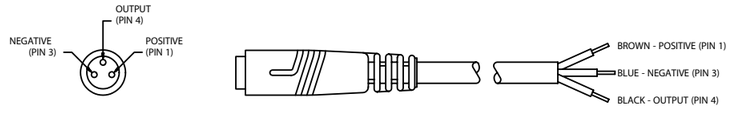
2 wire models, no LED

MRS-.027-BL



3 wire models, with LED

Pin and Wire Assignments for Quick Connect



8mm Female Connector

NOTE: Terminal 4 is not connected for 2 wire switch models.

MRS-.027-B Series, Band Mounted (ISO 6432), Heavy Duty Reed Switches

Series	
MRS-.027	AC/DC Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

MRS - .027 - XBLQCX - M25

Cable Length	
Blank	24" (0.6m) with Flying Leads
X[1]	144" (3.6m) with Flying Leads

[1] Q option not available

Wire Count, Led	
B	2 Wire, No LED
BL	3 Wire, LED

Mating Cable[2]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[2] Q option required

Band	
Blank	No band
-M10	10mm
-M12	12mm
-M16	16mm
-M20	20mm
-M25	25mm

Compatible and Tested for use with:

> ISO 6432 Cylinders



MRS-.087-B Series, Band Mounted, Heavy Duty Reed Switches

Series	
MRS-.087	AC/DC Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

MRS - .087 - BLQCX - DW5

Wire Count, Cable Length, LED	
B[1]	2 Wire, 24" (0.6m) with Flying Leads, No LED
PBL[1]	2 Wire, 24" (0.6m) with Flying Leads, LED
BL[1]	3 Wire, 24" (0.6m) with Flying Leads, LED
XB[2]	2 Wire, 144" (3.6m) with Flying Leads, No LED
PXBL[2]	2 Wire, 144" (3.6m) with Flying Leads, LED
XBL[2]	3 Wire, 144" (3.6m) with Flying Leads, LED

[1] Cable length applies to flying lead only
[2] Not valid with Q option
[3] Q option required

Mating Cable[3]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

Band	
Blank	No band
-02	9/16" (14mm)
-04	3/4" (19mm)
-06	7/8"
-09	1-1/16" (27mm)
-12	1-1/4"
-17	1-1/2" (38mm)
-24	1-3/4"
-31	2" (50mm)
-50	2-1/2"
-70	3"
-M10	10mm
-M12	12mm
-M16	16mm
-M20	20mm
-M25	25mm
-DW1	1-1/2" Double Wall
-DW2	2" Double Wall
-DW3	2-1/2" Double Wall
-DW4	3-1/4" Double Wall
-DW5	4" Double Wall

Compatible and Tested for use with:

> Original Line Cylinders
> Pneu-Turn Rotary Actuators
> Linear Thrusters
> Double-Wall Cylinders



MRS-1.5-B Series, Band Mounted, Heavy Duty High Current AC-Only Reed Switch

Series	
MRS-1.5	AC Switch

MRS - 1.5 - XB - DW5

Wire Count, Cable Length, LED	
B	2 Wire, 24" (0.6m) with Flying Leads, No LED
XB	2 Wire, 144" (3.6m) with Flying Leads, No LED

Band	
Blank	No band
-02	9/16" (14mm)
-04	3/4" (19mm)
-06	7/8"
-09	1-1/16" (27mm)
-12	1-1/4"
-17	1-1/2" (38mm)
-24	1-3/4"
-31	2" (50mm)
-50	2-1/2"
-70	3"
-M10	10mm
-M12	12mm
-M16	16mm
-M20	20mm
-M25	25mm
-DW1	1-1/2" Double Wall
-DW2	2" Double Wall
-DW3	2-1/2" Double Wall
-DW4	3-1/4" Double Wall
-DW5	4" Double Wall

Compatible and Tested for use with:

> Original Line Cylinders
> Pneu-Turn Rotary Actuators
> Linear Thrusters
> Double-Wall Cylinders



High Illumination and High Power Band Mounted Switches

MSS, R10, R10P, RAC

Compatible and Tested for use with:

Original Line Cylinders, All Stainless Original Line Cylinders, Pneu-Turn Rotary Actuators, Linear Thrusters, and Repairable Stainless Steel Cylinders



Part Numbers

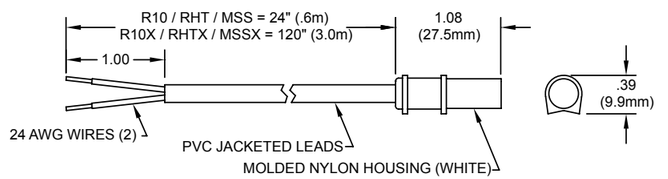
Part Number	Description
MSS	Sourcing or Sinking Switch, 2 wire, High Illumination Body, 24 VDC, 300mA, 24" Pigtail Leads
MSSQ	Sourcing or Sinking Switch, 2 wire, High Illumination Body, 24 VDC, 300mA, M8 Male Connector
MSSQC	Sourcing or Sinking Switch, 2 wire, High Illumination Body, 24 VDC, 300mA, M8 Male Connector with 2m Mating Cable
MSSQCX	Sourcing or Sinking Switch, 2 wire, High Illumination Body, 24 VDC, 300mA, M8 Male Connector with 5m Mating Cable
MSSX	Sourcing or Sinking Switch, 2 wire, High Illumination Body, 24 VDC, 300mA, 120" Pigtail Leads
R10	Reed Switch, 2 wire, High Illumination Body, 120 V, 500mA, 24" Pigtail Leads
R10Q	Reed Switch, 2 wire, High Illumination Body, 120 V, 500mA, M8 Male Connector
R10QC	Reed Switch, 2 wire, High Illumination Body, 120 V, 500mA, M8 Male Connector with 2m Mating Cable
R10QCX	Reed Switch, 2 wire, High Illumination Body, 120 V, 500mA, M8 Male Connector with 5m Mating Cable
R10X	Reed Switch, 2 wire, High Illumination Body, 120 V, 500mA, 120" Pigtail Leads
R10P	Reed Switch with Transient and Over-voltage Protection, 2 wire, High Illumination Body, 120 V, 150mA, 24" Pigtail Leads
R10PQ	Reed Switch with Transient and Over-voltage Protection, 2 wire, High Illumination Body, 120 V, 150mA, M8 Male Connector
R10PQC	Reed Switch with Transient and Over-voltage Protection, 2 wire, High Illumination Body, 120 V, 150mA, M8 Male Connector with 2m Mating Cable
R10PQCX	Reed Switch with Transient and Over-voltage Protection, 2 wire, High Illumination Body, 120 V, 150mA, M8 Male Connector with 5m Mating Cable
R10PX	Reed Switch with Transient and Over-voltage Protection, 2 wire, High Illumination Body, 120 V, 150mA, 120" Pigtail Leads
RAC	High Current Reed Switch, 2 wire, No LED, 240 V AC only, 800mA, 24" Pigtail Leads
RACX	High Current Reed Switch, 2 wire, No LED, 240 V AC only, 800mA, 120" Pigtail Leads
RHT	High Temperature Reed Switch, 2 wire, No LED, 120 V, 500 mA, 24" Pigtail Leads
RHTX	High Temperature Reed Switch, 2 wire, No LED, 120 V, 500 mA, 120" Pigtail Leads
USB25[1]	Mounting band for cylinders up to 2-1/2" bore
USB50[1]	Mounting band for cylinders with 2-1/2" bore up to 5" bore
USB80[1]	Mounting band for cylinders with greater than 5" bore

[1] All switches above are band mounted, band is ordered separately.

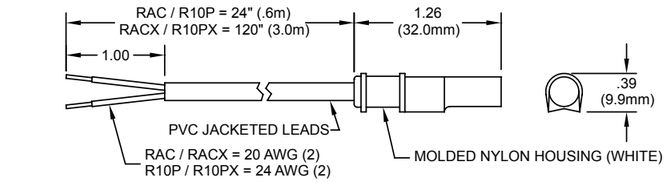
Dimensions

High Illumination and High Power Band Mounted Switches
MSS, R10, R10P, RAC

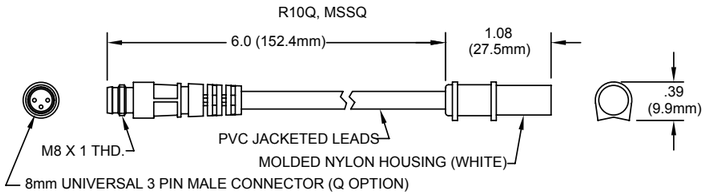
R10, R10X, MSS, MSSX, RHT, RHTX



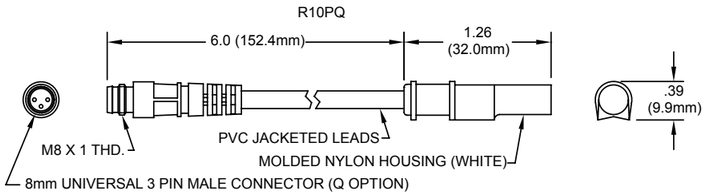
RAC, RACX, R10P, R10PX



R10Q, MSSQ



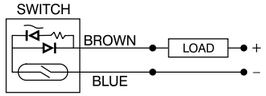
R10PQ



Wiring Diagrams

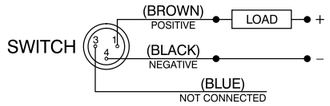
High Illumination and High Power Band Mounted Switches
MSS, R10, R10P, RAC

R10 / R10X / RHT (No LED) / RHTX
Miniature Reed Switch, Cable Type, (2 Wire Switch)



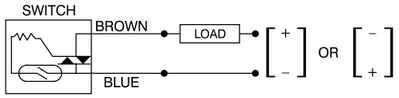
Input Voltage: 120 Volts Max. (AC or DC)
Maximum Load Current:500 mA Max. (Resistive)
Operating Temperature: -20° C to 70° C

R10Q / R10PQ
Miniature Reed Switch, 8mm Male Quick Connect, (2 Wire Switch)



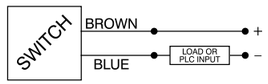
Input Voltage: 120 Volts Max. (AC or DC)
Maximum Load Current: 500 mA Max. (Resistive)
Operating Temperature: -20° C to 70° C

RAC / RACX
High Power AC Reed Switch, Cable Type, (2 Wire Switch)

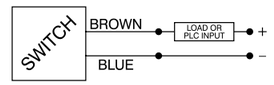


Contact Rating: 200 Watts Max.
Input Voltage: 12 to 240 Volts (AC only)
Minimum Load Current: 80 mA
Maximum Load Current: 800 mA

MSS / MSSX
Miniature Solid State Switch, Cable Type, (2 Wire Switch)



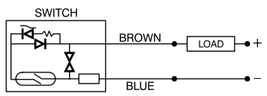
Typical Current Sourcing (PNP) Configuration



Typical Current Sinking (NPN) Configuration

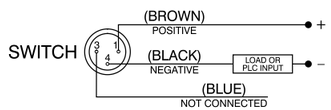
Input Voltage: 10 to 30 V DC
Minimum Load Current: 4 mA
Maximum Load Current: 300 mA
On Voltage Drop: 2.5 Volts @ 4 mA
3.5 Volts @ 300 mA
Operating Temperature: -20° C to 70° C

R10P / R10PX
Miniature Reed Switch, Cable Type, Circuit Protected (2 Wire Switch)

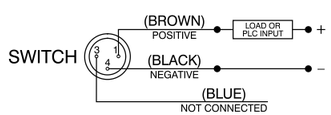


Input Voltage: 120 Volts Max. (AC or DC)
Maximum Load Current: 150 mA Max.
Operating Temperature : -20° C to 70° C
Circuit Protection:
Varistor: 138 Volts
Choke: 680 µH

MSSQ
Miniature Solid State Switch, 8mm Male Quick Connect, (2 Wire Switch)



Typical Current Sourcing (PNP) Configuration



Typical Current Sinking (NPN) Configuration

R Series Band Mounted, High Illumination, Reed Switches

Cable End	
Blank	24" (0.6m) with Flying Leads
X	120" (3m) with Flying Leads
Q[1]	6" (0.15m) M8 Male Connector

R10XCX

Series	
MSS	2 Wire, Solid State Sourcing (PNP)/Sinking (NPN)
R10	2 Wire, Reed Switch
R10P	2 Wire, Reed Switch with Circuit Protection
RAC	2 Wire, High Current Reed Switch
RHT	2 Wire, High Temperature Reed Switch

Mating Cable[2]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

Band Size[3]	
Part Number	**Bore Size**
USB25	Mounting band for cylinders up to 2-1/2" (63mm) bore
USB50	Mounting band for cylinders 2-1/2" (63mm) bore up to 5" (127mm) bore
USB80	Mounting band for cylinders 2-1/2" (63mm) bore up to 8" (203mm) bore

[1] Not available with RAC/RHT switch
[2] Q option required
[3] All switches above are band mounted. Band is ordered separately.

Compatible and Tested for use with:

- > Original Line Cylinders
- > All Stainless Original Line Cylinders
- > Pneu-Turn Rotary Actuators
- > Linear Thrusters
- > Repairable Stainless Steel Cylinders



Track Mounted Solid State Switches

HC and HK

Compatible and Tested for use with:

Flat-1 Cylinders, Square Flat-1 Cylinders, Flat-II Cylinders, Square Flat-II Cylinders, and Ultran Rodless Actuators (with -T option)

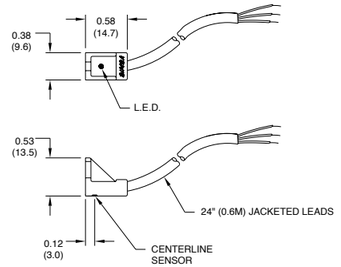


Part Numbers

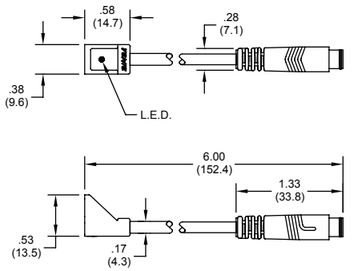
Part Number	Description
HC	Sourcing Switch (PNP), LED, 30VDC, 150mA with 24" Pigtail Leads
HCQ	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector
HCQC	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable
HCQCX	Sourcing Switch (PNP), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable
HCX	Sourcing Switch (PNP), LED, 30VDC, 150mA with 144" Pigtail Leads
HK	Sinking Switch (NPN), LED, 30VDC, 150mA with 24" Pigtail Leads
HKQ	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector
HKQC	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 2m Mating Cable
HKQCX	Sinking Switch (NPN), LED, 30VDC, 150mA with M8 Male Connector and 5m Mating Cable
HKX	Sinking Switch (NPN), LED, 30VDC, 150mA with 144" Pigtail Leads

Dimensions

Track Mounted Solid State Switches
HC and HK



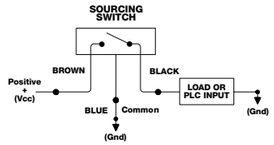
HC, HK



HCQ, HKQ

Wiring Diagrams

Typical Solid State Sourcing Configuration for HC Models (PNP)

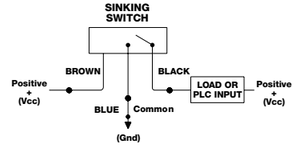


HSC, HC

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

CAUTION: Shorting black wire to ground will damage switch

Typical Solid State Sinking Configuration for HK Models (NPN)

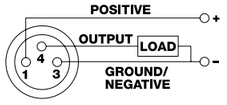


HSK, HK

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

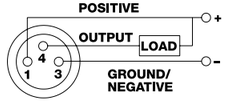
CAUTION: Shorting black wire to ground will damage switch

8mm Male Connector Sourcing Solid State Switch



HCQ

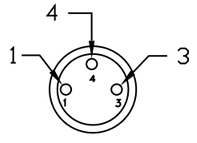
8mm Male Connector Sinking Solid State Switch



HKQ

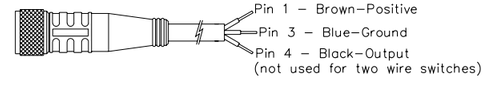
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

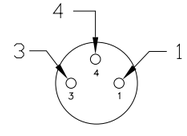


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



How to Order

H Series, Flat Actuator Track Mounted, Solid State Switches

Series	
H	Solid State Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
X	144" (3.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

HCQCX

Output	
C	3 Wire Sourcing (PNP)
K	3 Wire Sinking (NPN)

Mating Cable[1]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] Q option required

Compatible and Tested for use with:

- > Flat-1® Cylinders
- > Square Flat-1® Cylinders
- > Flat-II® Cylinders
- > Square Flat-II® Cylinders
- > Ultran® Rodless Actuators (with -T option)



Mini 4mm Round (C-Slot) Track Mounted Switches

MHF, MHF-90, MHC, MHC-90, MHK, MHK-90, MR, MR-90, MS, MS-90, MSC, MSC-90, MSK, MSK-90

Compatible and Tested for use with:

Original Line Cylinders, Pneu-Turn Rotary Actuators, Linear Thrusters (-T option required), Extruded Flat, Twist Clamp, Twin Bore, Stopper Cylinders, Extruded Flat Lift Table, Narrow Profile Air Table, Low Profile Air Table, PneuMoment, and ISO 6432 Cylinders

EdgeSwitch™ Solid-State Switch Features:

- > Solid-State construction
- > Direct replacement for Reed Switch
- > Responsive 40-800 Gauss Detection
- > Precise Edge Detection technology senses magnet edges/thickness
- > Smaller operating window than Reed Switch
- > Better repeatability than Reed Switch
- > Longer life than Reed Switch
- > Low leakage currrent, 0.1 mA at 28VDC
- > CE, RoHS compliant
- > Stock units



90° Switch (MHF-90 shown)

Part Numbers

Part Number	Description
MHF	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, 24" Pigtail Leads
MHF-90	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, 24" Pigtail Leads, 90° version
MHFX	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, 144" Pigtail Leads
MHFX-90	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, 144" Pigtail Leads, 90° version
MHFQS	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector
MHFQS-90	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector, 90° version
MHFQCS	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector and 2m Mating Cable
MHFQCS-90	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector and 2m Mating Cable, 90° version
MHFQCXS	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector and 5m Mating Cable
MHFQCXS-90	Mini EdgeSwitch™, 2-wire, Solid-State Type, LED, 10-28VDC, 50mA, with M8 Male Swivel Connector and 5m Mating Cable, 90° version
MHC	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 24" Pigtail Leads
MHC-90	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 24" Pigtail Leads, 90° version
MHCX	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 144" Pigtail Leads
MHCX-90	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 144" Pigtail Leads, 90° version
MHCQS	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector
MHCQS-90	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector, 90° version
MHCQCS	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 2m Mating Cable
MHCQCS-90	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 2m Mating Cable, 90° version
MHCQCXS	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 2m Mating Cable
MHCQCXS-90	Mini EdgeSwitch™ Sourcing Switch (PNP), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 5m Mating Cable, 90° version
MHK	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 24" Pigtail Leads
MHK-90	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 24" Pigtail Leads, 90° version

Mini 4mm Round (C-Slot) Track Mounted Switches

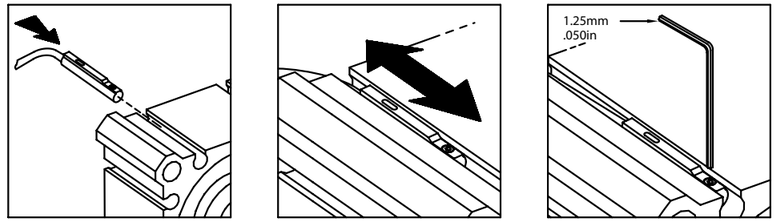
Part Number	Description
MHKX	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 144" Pigtail Leads
MHKX-90	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, 144" Pigtail Leads, 90° version
MHKQS	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector
MHKQS-90	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector, 90° version
MHKQCS	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 2m Mating Cable
MHKQCS-90	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 2m Mating Cable, 90° version
MHKQCXS	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 5m Mating Cable
MHKQCXS-90	Mini EdgeSwitch™ Sinking Switch (NPN), 3-wire, Solid-State Type, LED, 5-28VDC, 100mA, with M8 Male Swivel Connector and 5m Mating Cable, 90° version
MR	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, 1m Pigtail Leads
MR-90	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, 1m Pigtail Leads, 90° version
MRQ	Reed Switch, 2 wire, LED, 5-120VAC/VDC, with M8 Male Connector
MRQ-90	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, with M8 Male Connector, 90° version
MRQC	Reed Switch, 2 wire, LED, 5-120VAC/VDC, with M8 Male Connector and 2m Mating Cable
MRQC-90	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, with M8 Male Connector and 2m Mating Cable, 90° version
MRQCX	Reed Switch, 2 wire, LED, 5-120VAC/VDC, with M8 Male Connector and 5m Mating Cable
MRQCX-90	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, with M8 Male Connector and 5m Mating Cable, 90° version
MRX	Reed Switch, 2 wire, LED, 5-120VAC/VDC, with 144" Pigtail Leads
MRX-90	Reed Switch, 2 wire, LED, 5-120VAC/VDC, 30mA, with 144" Pigtail Leads, 90° version
MS	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with 24" Pigtail Leads
MS-90	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with 24" Pigtail Leads, 90° version
MSQ	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector
MSQ-90	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector, 90° version
MSQC	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector and 2m Mating Cable
MSQC-90	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector and 2m Mating Cable, 90° version
MSQCX	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector and 5m Mating Cable
MSQCX-90	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with M8 Male Connector and 5m Mating Cable, 90° version
MSX	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with 144" Pigtail Leads
MSX-90	Auto Configure, PNP or NPN, 3 wire, LED, 30VDC, 100mA, with 144" Pigtail Leads, 90° version
MSC	Sourcing Switch (PNP), LED, 30VDC, 50mA, with 24" Pigtail Leads
MSC-90	Sourcing Switch (PNP), LED, 30VDC, 200mA, with 24" Pigtail Leads, 90° version
MSCQ	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector
MSCQ-90	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector, 90° version
MSCQC	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector and 2m Mating Cable
MSCQC-90	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector and 2m Mating Cable, 90° version
MSCQCX	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector and 5m Mating Cable
MSCQCX-90	Sourcing Switch (PNP), LED, 30VDC, 200mA, with M8 Male Connector and 5m Mating Cable, 90° version
MSCX	Sourcing Switch (PNP), LED, 30VDC, 200mA, with 144" Pigtail Leads
MSCX-90	Sourcing Switch (PNP), LED, 30VDC, 200mA, with 144" Pigtail Leads, 90° version
MSK	Sinking Switch (NPN), LED, 30VDC, 200mA, with 24" Pigtail Leads
MSK-90	Sinking Switch (NPN), LED, 30VDC, 200mA, with 24" Pigtail Leads, 90° version
MSKQ	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Male Connector
MSKQ-90	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Cable Connector, 90° version
MSKQC	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Male Connector and 2m Mating Cable
MSKQC-90	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Cable Connector and 2m Mating Cable, 90° version
MSKQCX	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Male Connector and 5m Mating Cable
MSKQCX-90	Sinking Switch (NPN), LED, 30VDC, 200mA, with M8 Cable Connector and 5m Mating Cable, 90° version
MSKX	Sinking Switch (NPN), LED, 30VDC, 200mA, with 144" Pigtail Leads
MSKX-90	Sinking Switch (NPN), LED, 30VDC, 200mA, with 144" Pigtail Leads, 90° version

Mounting Instructions

Mini 4mm Round (C-Slot) Track Mounted Switches

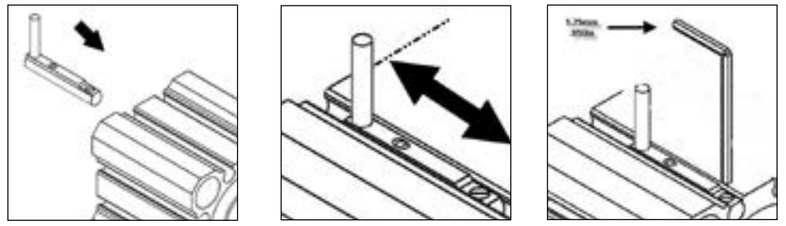
Bimba Mini Round Switches are designed to easily slide mount and lock into the existing "C-Slot" on the cylinder extension or on the attached switch track (optional) as shown below for both inline and 90° switch types. See the provided switch assembly instructions for additional detail.

MHF, MHC, MHK, MR, MS, MSC, MSK



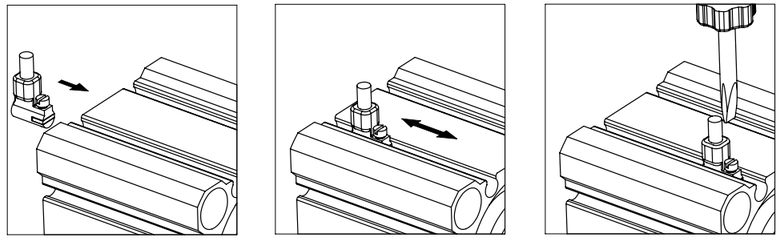
NOTE: Maximum torque on set screw is .170 N-m (1.5 in-lbs.). Do not overtorque.

MR-90, MS-90, MSC-90, MSK-90



NOTE: Maximum torque on set screw is .170 N-m (1.5 in-lbs.). Do not overtorque.

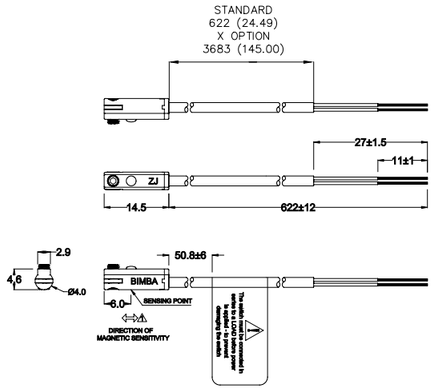
MHF-90, MHC-90, MHK-90



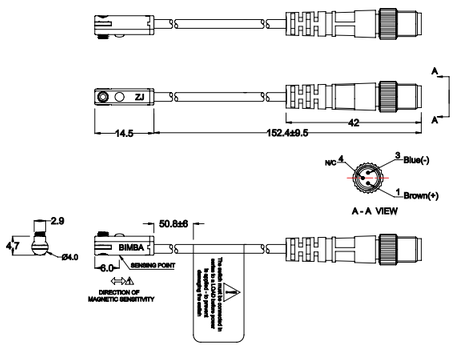
NOTE: Maximum torque on set screw is .170 N-m (1.5 in-lbs.). Do not overtorque.

Dimensions

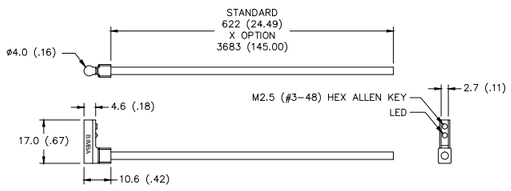
Mini 4mm Round (C-Slot) Track Mounted Switches



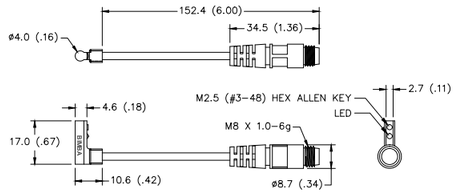
MHF, MHFX, MHK, MHKX, MHC, MHCX



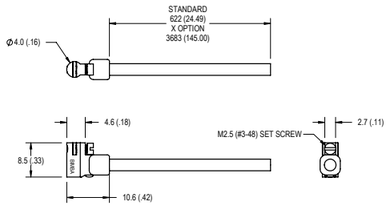
MHFQS, MHFQCS, MHFQCXS
MHKQS, MHKQCS, MHKQCXS
MHCQS, MHCQCS, MHCQCXS



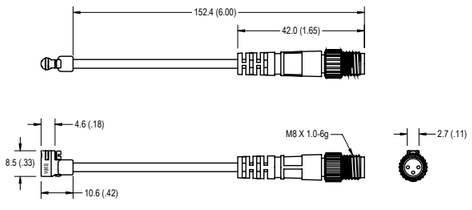
MSC-90, MSCX-90, MSK-90, MSKX-90



MSCQ-90, MSCQC-90, MSCQCX-90,
MSKQ-90, MSKQC-90, MSKQCX-90



MHF-90, MHFX-90, MHC-90, MHCX-90, MHK-90, MHKX-90



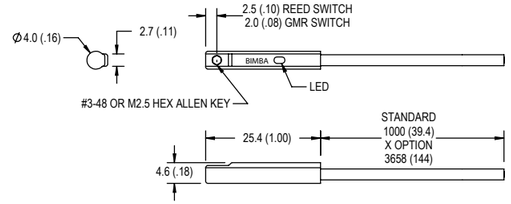
MHFQS-90, MHFQCS-90, MHFQCXS-90,
MHCQS-90, MHCQCS-90, MHCQCXS-90
MHKQS-90, MHKQCS-90, MHKQCXS-90

How to Specify

MAGNETIC SWITCH PRODUCTS

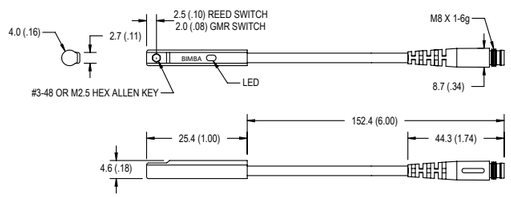
Dimensions

Mini 4mm Round (C-Slot) Track Mounted Switches

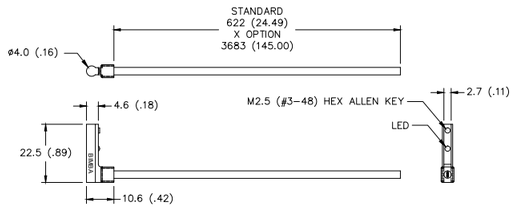


MR, MRX, MS*, MSX, MSC*, MSCX, MSK*, MSKX

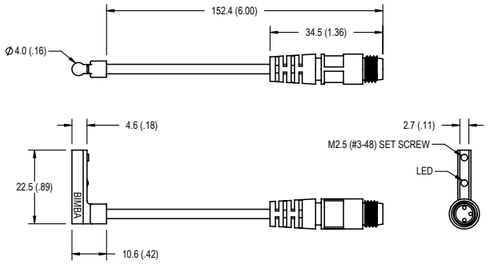
*Standard pigtail length for MS, MSC, and MSK switches is 622 (24.49)



MRQ, MRQC, MRQCX, MSQ, MSQC,
MSQCX, MSCQ, MSCQC, MSCQCX,
MSKQ, MSKQC, MSKQCX



MR-90, MRX-90, MS-90, MSX-90

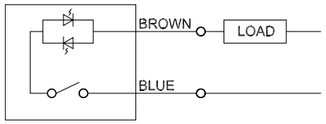


MRQ-90, MRQC-90, MRQCX-90,
MSQ-90, MSQC-90, MSQCX-90

BIMBA BIM-PFL-0920 Catalog 2020 | For Technical Assistance: 800-442-4622

Wiring Diagrams

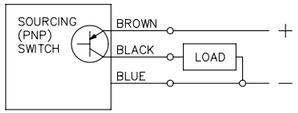
MHF (All types)



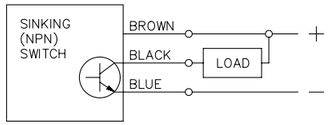
Reverse Polarity Not Protected

On Quick Connect switch models, connect only the Blue and Brown wires on the mating cable and cut back the Black wire. Do not connect switch to a mating cable that has been previously wired for a three-wire solid state switch as it will short the MHFQ switch.

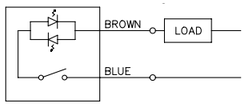
MHC, MSC (All types) (PNP, Sourcing, Solid State)



MHK, MSK (All types) (NPN, Sinking, Solid State)



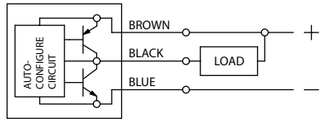
MR (All types) (Reed Switch)



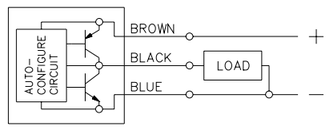
Reverse Polarity Not Protected

On Quick Connect switch models, connect only the Blue and Brown wires on the mating cable and cut back the Black wire. Do not connect switch to a mating cable that has been previously wired for a three-wire solid state switch as it will short the MRQ switch.

MS (All types) (Auto Configure PNP, Sourcing)



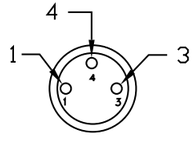
MS (All types) (Auto Configure NPN, Sinking)



Color Codes	
Brown	(+) Positive
Black	Output
Blue	(-) Negative

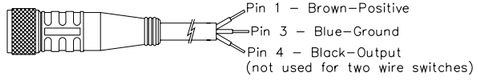
Pin and Wire Assignments for Quick Connect

Switch “Q” Option Male Connector
Face View of M8 Male Connector

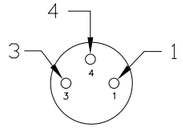


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



M Series, 4mm Round Track (C-Slot), Edgeswitch™, Mini-Edgeswitch™, Reed And Solid State Switches

Series	
MH	Mini EdgeSwitch Solid State
MR	Reed Switch
MS	Solid State Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
	MR Series 39" (1m) with Flying Leads
X	144" (3.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

MHKQCXS - 90

Output	
Blank[1]	MR Series - 2 Wire Reed Switch
	MS Series - 3 Wire Auto Configure NPN/PNP
C[2]	3 Wire Sourcing (PNP)
K[2]	3 Wire Sinking (NPN)
F[2, 3]	2 Wire Solid State

Mating Cable[4]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

Swivel Connector[5]	
S[6]	Swivel Connector

Cable Take Out	
Blank	Straight
90	90°

[1] Not applicable to MH Series
[2] Not applicable to MR Series
[3] Not applicable to MS Series
[4] Q option required
[5] MH Series with Q option requires S option
[6] Not applicable to MR/MS Series

Compatible and Tested for use with:

- > Original Line® Cylinders
- > Pneu-Turn® Actuators
- > Linear Thrusters (-T option required)
- > Extruded Flat
- > Twist Clamp
- > Twin Bore
- > Stopper Cylinders
- > Extruded Flat Lift Table
- > Narrow Profile Air Table
- > Low Profile Air Table
- > PneuMoment™
- > ISO 6432 Cylinders (-T option required)
- > Flat-1® Cylinders (-U option required)





M Series, 6mm Round Track (C-Slot), Reed Switch, EdgeSwitch™ and Autoselect Solid Stage Switches

MRN, MDN, MSN

Compatible and Tested for use with:
PA Series NFPA Cylinders
Ultran® Band Plus Rodless Cylinders
ISO 15552 Cylinders



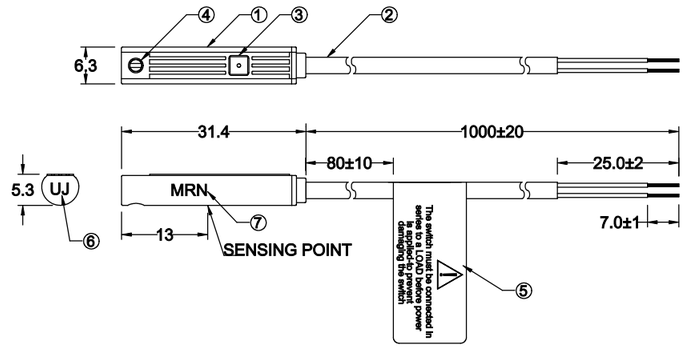


Part Numbers

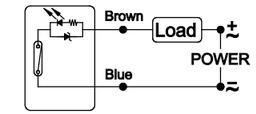
Part Number	Description
MRN	Reed, 2-Wire Flying Lead, 240V AC/DC, 100 Current Maximum mA, Normally Open
MRNQS	Reed, 2-Wire M8, 240V AC/DC, 100 Current Maximum mA, Normally Open
MDN	Solid State, 2-Wire Flying Lead, 10-28V DC, 50 Current Maximum mA, Normally Open
MDNQS	Solid State, 2-Wire M8, 10-28V DC, 50 Current Maximum mA, Normally Open
MSN	Solid State Auto Select, 3-Wire Flying Lead, 5-30V DC, 200 Current Maximum mA, NPN or PNP
MSNQS	Solid State Auto Select, 3-Wire M8, 5-30V DC, 200 Current Maximum mA, NPN or PNP

Reed Switches - MRN

MRN Reed, 2-Wire Flying Lead

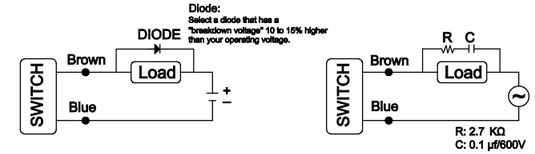


Circuit & Connect Diagram



The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

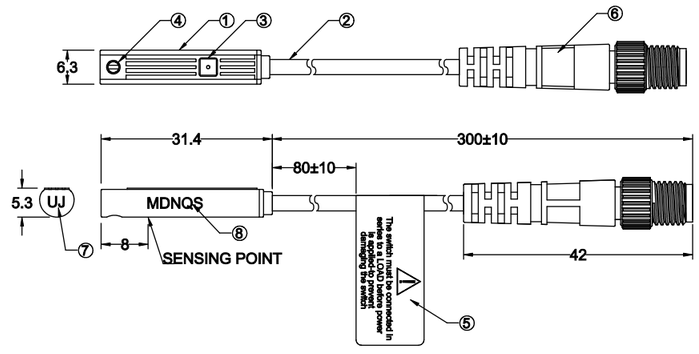
External Protect Circuit



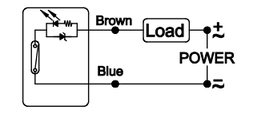
Applicably to DC Conductive Load

Applicably to AC Conductive Load

MRNQS Reed, 2-Wire M8

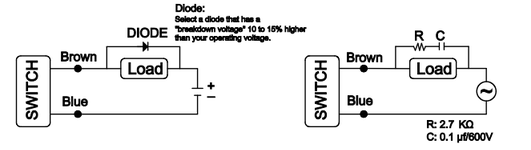


Circuit & Connect Diagram



The brown wire series load to the positive (+) and the blue to the negative (-) of power source.

External Protect Circuit

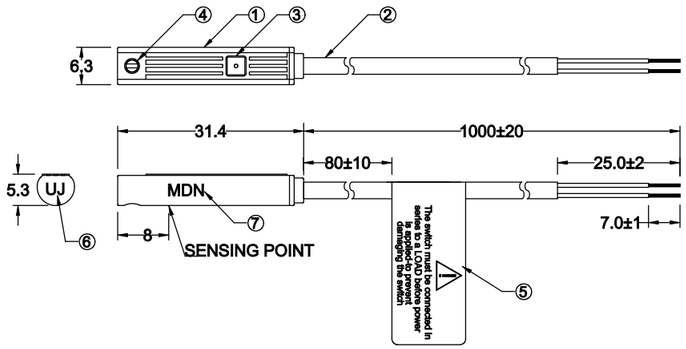


Applicably to DC Conductive Load

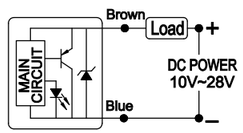
Applicably to AC Conductive Load

Solid State Switches - MDN

MDN Solid State, 2-Wire Flying Lead

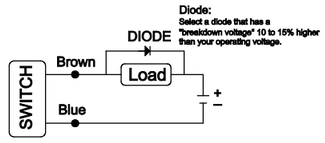


Circuit & Connect Diagram



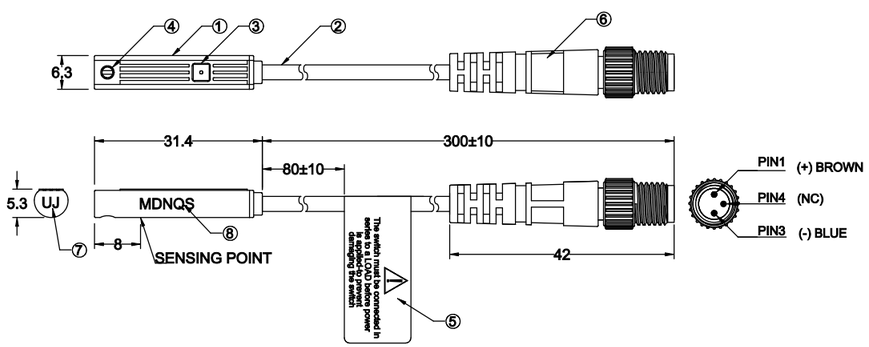
The brown wire series load to the positive (+)
and the blue to the negative (-) of power source.

External Protect Circuit

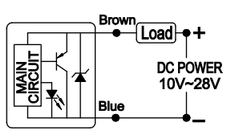


Applicably to
DC Conductive Load

MDNQS Solid State, 2-Wire M8

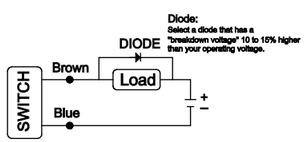


Circuit & Connect Diagram



The brown wire series load to the positive (+)
and the blue to the negative (-) of power source.

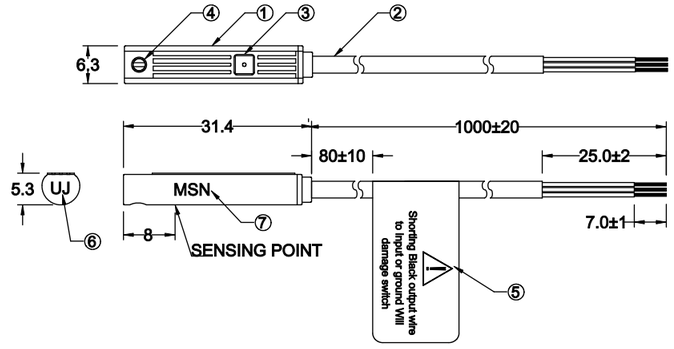
External Protect Circuit



Applicably to
DC Conductive Load

Solid State Switches - MSN

MSN Solid State Auto Select, 3-Wire Flying Lead

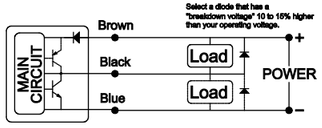


Circuit & Connect Diagram



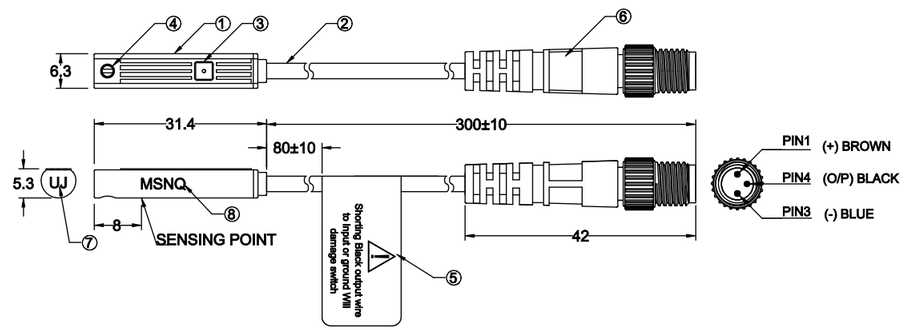
The brown wire to the positive (+) and the
blue to the negative (-) from DC power.
The black wire have to connect to the load.

External Protect Circuit

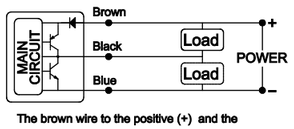


Applicably to Conductive Load
Attach an extenal diode between Brown(+) and Black(out) when NPN connection
Attach an extenal diode between Blue(-) and Black(out) when PNP connection

MSNQS Solid State Auto Select, 3-Wire M8

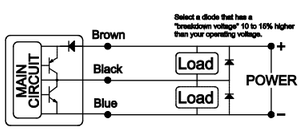


Circuit & Connect Diagram



The brown wire to the positive (+) and the
blue to the negative (-) from DC power.
The black wire have to connect to the load.

External Protect Circuit



Applicably to Conductive Load
Attach an extenal diode between Brown(+) and Black(out) when NPN connection
Attach an extenal diode between Blue(-) and Black(out) when PNP connection

M Series, 6mm Round Track (C-Slot), Reed Switch, EdgeSwitch™ and Autoselect Solid Stage Switches

Output	
RN	Reed Switch
DN	2-Wire Solid State EdgeSwitch™
SN	Auto Select NPN or PNP

MSNQS

Series	
M	Magnetic Reed Switch

Cable End	
Blank	1 Meter Flying Lead
QS	3 Pin M8 Swivel Connector

Compatible and Tested for use with:

- PA Series NFPA Cylinders
- Ultran® Band Plus Rodless Cylinders
- ISO 15552 Cylinders



Heavy Duty Track Mounted Switches

MRS-.027, MRS-.087, and MRS-1.5-S
Compatible and Tested for use with:
Original Line Cylinders and MRS Series Cylinders with -Z option





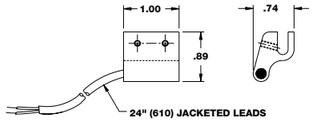
Part Numbers

Part Number	Description
MRS-.027[1]	Reed Switch, 2 wire, No LED, 28 V, 250mA, 24" Pigtail Leads
MRS-.027-Q[1]	Reed Switch, 2 wire, No LED, 28 V, 250mA, with M8 Male Connector
MRS-.027-QC[1]	Reed Switch, 2 wire, No LED, 28 V, 250mA, with M8 Male Connector and 2m Mating Cable
MRS-.027-QCX[1]	Reed Switch, 2 wire, No LED, 28 V, 250mA, with M8 Male Connector and 5m Mating Cable
MRS-.087[2]	Reed Switch, 2 wire, No LED, 200 V, 500mA, 24" Pigtail Leads
MRS-.087-Q[2]	Reed Switch, 2 wire, No LED, 200 V, 500mA, with M8 Male Connector
MRS-.087-QC[2]	Reed Switch, 2 wire, No LED, 200 V, 500mA, with M8 Male Connector and 2m Mating Cable
MRS-.087-QCX[2]	Reed Switch, 2 wire, No LED, 200 V, 500mA, with M8 Male Connector and 5m Mating Cable
MRS-1.5[2]	Reed Switch, 2 wire, No LED, 230 V AC only, 1.5A, 24" Pigtail Leads
MRS-1.5-S[1]	Reed Switch, 2 wire, No LED, 230 V AC only, 1.5A, 24" Pigtail Leads

[1] MRS Series with -Z option 9/16" and 3/4" bore only
[2] MRS Series with -Z option 1-1/16" through 2-1/2" bore only

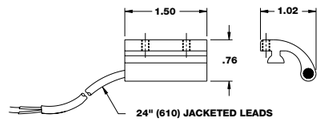
Dimensions

Heavy Duty Track Mounted Switches



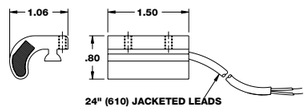
MRS-.027

To order longer leads, specify D-12660-A- lead length in inches. Consult BIMBA distributor or factory for prices.



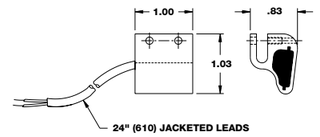
MRS-.087

To order longer leads, specify D-7000-A-lead length in inches. Consult BIMBA distributor or factory for prices.



MRS-1.5

To order longer leads, specify D-7001-A-lead length in inches. Consult BIMBA distributor or factory for prices.

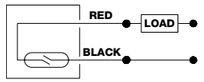


MRS-1.5-S

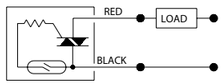
To order longer leads, specify D-16312-A-lead length in inches. Consult BIMBA distributor or factory for prices.

Wiring Diagrams

MRS-.027
MRS-.087

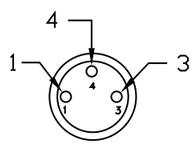


MRS-1.5
MRS-1.5-S



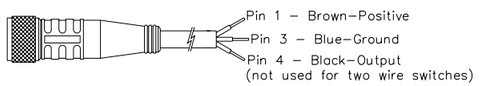
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

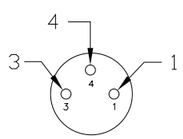


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



MRS® Series, MRS-Z Actuator, Heavy Duty Reed Switches

Series	
MRS	Magnetic Reed Switch

Model	
.027[1]	2 Wire, 28V Max., AC or DC
.087[2]	2 Wire, 200V Max., AC or DC
1.5	2 Wire, 12V to 230V, AC only

MRS - .087 - QCX

Cable End	
Blank	24" (0.6m) with Flying Leads
Q[3]	6" (0.15m) M8 Male Connector
S[1 4]	24" (0.6m) with Flying Leads

Mating Cable[5]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] MRS series cylinders with -Z option, 9/16" and 3/4" bore only
[2] MRS series cylinders with -Z option, 1-1/16" through 2-1/2" bore only
[3] Not applicable to Model 1.5
[4] 1.5 Model only
[5] Q option required

Compatible and Tested for use with:

> MRS® Series Cylinders (-Z option required)



5mm Square Track Mounted Switches

HSC-AB, HSK-AB, and MRS-AB
Compatible and Tested for use with:
ISO-15552 Cylinders

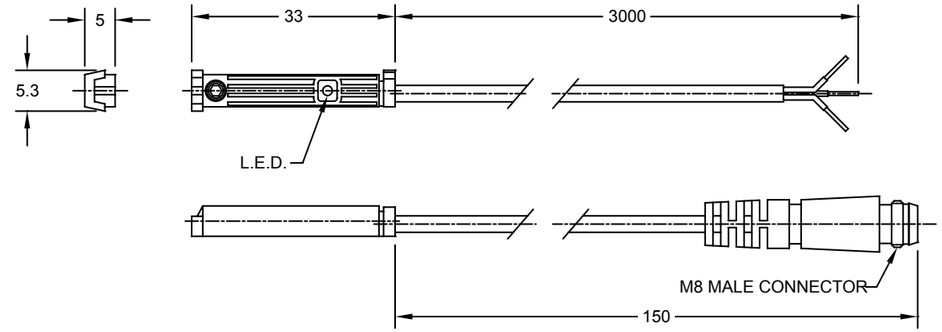


Part Numbers

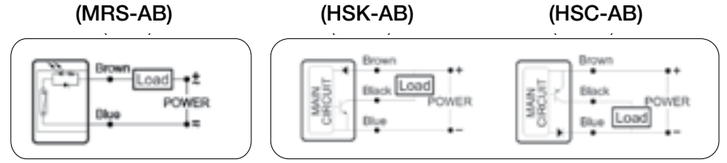
Part Number	Description
MRS-AB	Reed Switch, 2 wire, LED, 240 V, 100mA, 24" Pigtail Leads
MRS-ABQ	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector
MRS-ABQC	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector and 2m Mating Cable
MRS-ABQCX	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector and 5m Mating Cable
HSC-AB	Sourcing Switch (PNP), LED, 30VDC, 200mA with 24" Pigtail Leads
HSC-ABQ	Sourcing Switch (PNP), LED, 30VDC, 200mA with M8 Male Connector
HSC-ABQC	Sourcing Switch (PNP), LED, 30VDC, 200mA with M8 Male Connector and 2m Mating Cable
HSC-ABQCX	Sourcing Switch (PNP), LED, 30VDC, 200mA with M8 Male Connector and 5m Mating Cable
HSK-AB	Sinking Switch (NPN), LED, 30VDC, 200mA with 24" Pigtail Leads
HSK-ABQ	Sinking Switch (NPN), LED, 30VDC, 200mA with M8 Male Connector
HSK-ABQC	Sinking Switch (NPN), LED, 30VDC, 200mA with M8 Male Connector and 2m Mating Cable
HSK-ABQCX	Sinking Switch (NPN), LED, 30VDC, 200mA with M8 Male Connector and 5m Mating Cable

Dimensions

5mm Square Track Mounted Switches

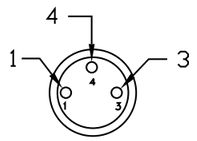


Wiring Diagrams



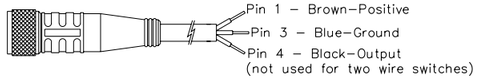
Pin and Wire Assignments for Quick Connect

Switch “Q” Option Male Connector
Face View of M8 Male Connector

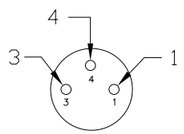


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



AB Series, 5mm Square Track (ISO 15552), Reed or Solid State Switches

Series	
MRS-AB	2 Wire, 5V to 240V, AC or DC
HSC-AB	3 Wire Sourcing (PNP)
HSK-AB	3 Wire Sinking (NPN)

Mating Cable[1]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] Q option required

MRS - ABQCX

Cable End	
Blank	24" (0.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

Compatible and Tested for use with:

> ISO 15552



5mm Square Track Mounted Switches

UBR, UBSC, and UBSK

Compatible and Tested for use with:

Ultran Band Cylinders (25mm to 63mm bore sizes)

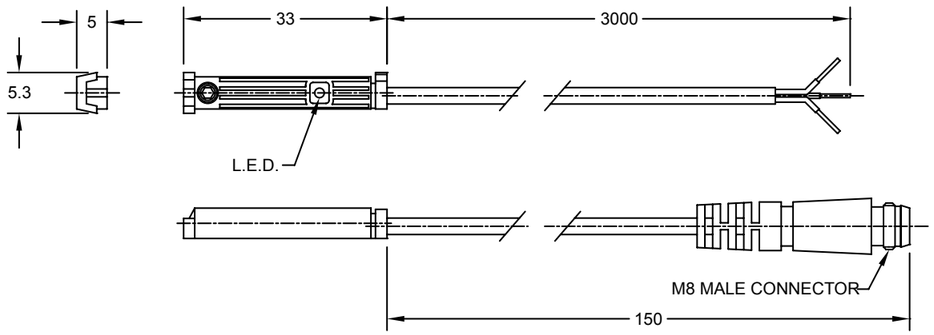


Part Numbers

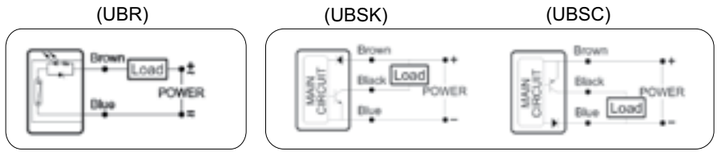
Part Number	Description
UBR	Reed Switch, 2 wire, LED, 240 V, 100mA, 24" Pigtail Leads
UBRQ	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector
UBRQC	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector and 2m Mating Cable
UBRQCX	Reed Switch, 2 wire, LED, 240 V, 100mA, with M8 Male Connector and 5m Mating Cable
UBSC	Sourcing Switch (PNP), LED, 30 VDC, 200mA with 24" Pigtail Leads
UBSCQ	Sourcing Switch (PNP), LED, 30 VDC, 200mA with M8 Male Connector
UBSCQC	Sourcing Switch (PNP), LED, 30 VDC, 200mA with M8 Male Connector and 2m Mating Cable
UBSCQCX	Sourcing Switch (PNP), LED, 30 VDC, 200mA with M8 Male Connector and 5m Mating Cable
UBSK	Sinking Switch (NPN), LED, 30 VDC, 200mA with 24" Pigtail Leads
UBSKQ	Sinking Switch (NPN), LED, 30 VDC, 200mA with M8 Male Connector
UBSKQC	Sinking Switch (NPN), LED, 30 VDC, 200mA with M8 Male Connector and 2m Mating Cable
UBSKQCX	Sinking Switch (NPN), LED, 30 VDC, 200mA with M8 Male Connector and 5m Mating Cable

Dimensions

5mm Square Track Mounted Switches
Magnetic Sensor Dimensional Data

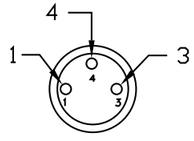


Wiring Diagrams



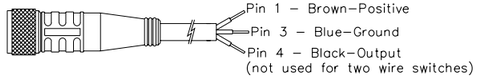
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

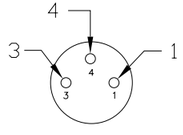


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



UB Series, 5mm Square Track (Ultran®), Reed or Solid State Switches

Series	
UB	Ultran® Band Switch

Cable End	
Blank	24" (0.6m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

UBSCQCX

Output	
R	2 Wire, 5V to 240V, AC or DC
SC	3 Wire Sourcing (PNP)
SK	3 Wire Sinking (NPN)

Mating Cable[1]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] Q option required

Compatible and Tested for use with:

> Ultran® Band Cylinders (25mm to 63mm bore sizes)



Ultran End of Stroke Switches

PCQ, PKQ, RSU-1

Compatible and Tested for use with:
Ultran Rodless Cylinders

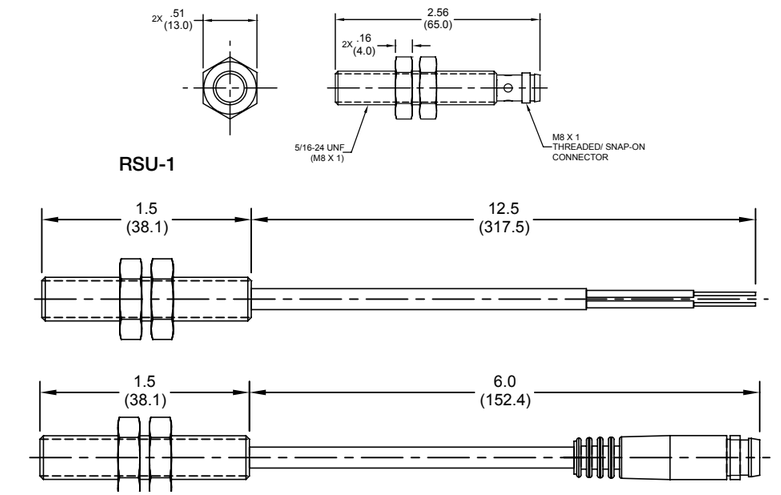


Part Numbers

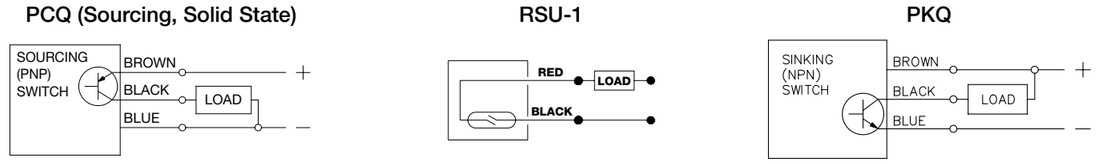
Part Number	Description
PCQ	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sourcing (PNP) Output, M8 Male Connector
PKQ	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sinking (NPN) Output, M8 Male Connector
RSU-1	5/16-24 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, 12.5" Pigtail Leads
RSU-1-Q	5/16-24 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, M8 Male Connector
PCQC	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sourcing (PNP) Output, M8 Male Connector and 2m Mating Cable
PKQC	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sinking (NPN) Output, M8 Male Connector and 2m Mating Cable
RSU-1-QC	5/16-24 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, M8 Male Connector and 2m Mating Cable
PCQCX	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sourcing (PNP) Output, M8 Male Connector and 5m Mating Cable
PKQCX	5/16-24 Threaded Barrel Type Inductive Proximity Sensor with Sinking (NPN) Output, M8 Male Connector and 5m Mating Cable
RSU-1-QCX	5/16-24 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, M8 Male Connector and 5m Mating Cable
RSUM-1	M8 by 1.25 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, 12.5" Pigtail Leads
RSUM-1-Q	M8 by 1.25 Threaded Barrel Type Magnetic Reed Sensor with Normally Open Contact Output, M8 Male Connector and 5m Mating Cable

Dimensions

Ultran End of Stroke Switches

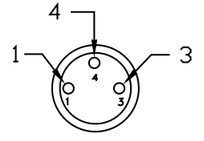


Wiring Diagrams



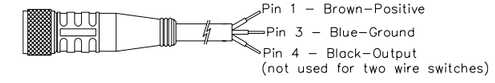
Pin and Wire Assignments for Quick Connect

Switch "Q" Option Male Connector
Face View of M8 Male Connector

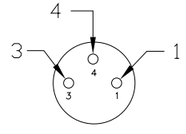


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



RSU Series, Threaded Barrel (Ultran), Reed Switches

Series	
RSU	Threaded Barrel Reed Switch

Cable End	
Blank	12.5" (0.3m) with Flying Leads
Q	6" (0.15m) M8 Male Connector

RSUM - 1QCX

Barrel	
-1	5/16-24 Threaded Barrel
M-1	M8 by 1.25 Threaded Barrel

Mating Cable[1]	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

[1] Q option required

Compatible and Tested for use with:

> Ultran Rodless Cylinders



P Series, Threaded Barrel (Ultran), Inductive switches

Series	
P	5/16-24 Threaded Inductive Proximity Sensor

Cable End	
Q	6" (0.15m) M8 Male Connector

PCQCX

Output	
C	3 Wire Sourcing (PNP)
K	3 Wire Sinking (NPN)

Mating Cable	
Blank	No cable
C	2m Mating Cable (C4)
CX	5m Mating Cable (C4X)

Compatible and Tested for use with:

> Ultran Rodless Cylinders

M8 Female Quick Connect Cables

C4 and C5

Compatible and Tested for use with:
All Bimba Actuators with “Q” Option

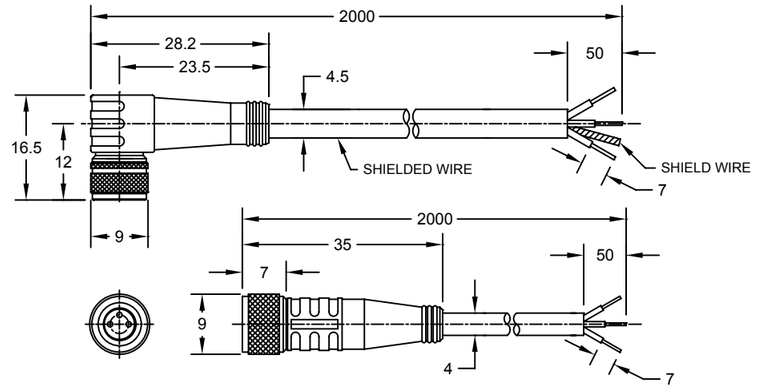


Part Numbers

Part Number	Description
C4	Straight M8 Female Connector, Threaded Connection with 2 Meter Cable
C4-S	Straight M8 Female Connector, Threaded Connection with 2 Meter Shielded Cable
C4X	Straight M8 Female Connector, Threaded Connection with 5 Meter Cable
C4X-S	Straight M8 Female Connector, Threaded Connection with 5 Meter Shielded Cable
C5-S	Right Angle M8 Female Connector, Threaded Connection with 2 Meter Shielded Cable
C5X-S	Right Angle M8 Female Connector, Threaded Connection with 5 Meter Shielded Cable

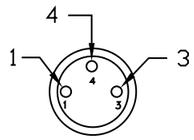
Dimensions

M8 Femle Quick Connect Cables



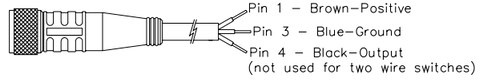
Pin and Wire Assignments for Quick Connect

Switch “Q” Option Male Connector
Face View of M8 Male Connector

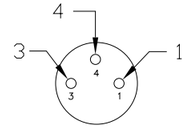


1. POSITIVE / HOT
3. NEGATIVE / NEUTRAL
4. OUTPUT
   NOT CONNECTED
   FOR 2 WIRE SWITCH
   MODELS

C4 and C5 Cable Female Connector
Side View of M8 Female Connector



Face View of M8 Female Connector



M8 Female Quick Connect Cables (C4 and C5)

Compatible and Tested for use with:
All Bimba Actuators with “Q” Option

Cable End	
4	Straight 3-Pin M8 Female Connector
5	Right Angle 3-Pin M8 Female Connector

Cable Length	
Blank	2 meter
X	5 meter

C4X - S

Series	
C	Cable

Shielding	
Blank[1]	Unshielded Cable
S	Shielded Cable

[1] Not available with Right Angle Connector



SW Series, Extruded Body Electric, Solid State Switches

Output, Cable End	
P	3 Wire Sourcing (PNP), 12" (0.3m) M8 Male Connector
N	3 Wire Sinking (NPN), 12" (0.3m) M8 Male Connector

SW - PNO

Series	
SW	Solid State Switch

Switch Contact	
NO	Normally Open
NC	Normally Closed

Compatible and Tested for use with:

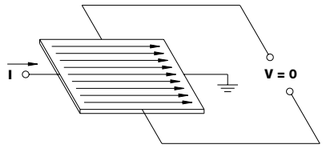
> Belt Driven Actuator S Series B27
> Belt Driven Actuator S Series B80-B110
> Belt Driven Actuator ST Series ST80
> Belt Driven Actuator D Series LP15B-LP20B
> Belt Transfer Actuator Series BAT80-BT80
> Ballscrew Actuator Series S27
> Ballscrew Actuator Series S80-S110
> IntelliAxisTM H- Bot
> IntelliAxisTM T- Bot
> RS Rack Slide

Bimba Solid State Magnetic Switch

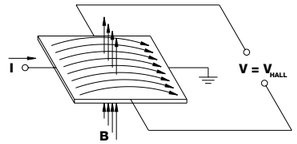
A Bimba solid state switch is a three-wire device recommended for low current DC loads such as interfacing with programmable controllers. It provides compact, reliable sensing with virtually infinite life. An LED indicator light illuminates when switching occurs. Models are available in current sinking (NPN) and current sourcing (PNP) models. Either can be used for loads like counters and solid state relays. Selection of sinking or sourcing models depends on the requirements of the programmable controller.

The Bimba Solid State Switch is based on giant magnetoresistive (GMR) technology. It includes four solid state resistors (two active, two shielded), each of which has many thin layers of magnetoresistive material. In each layer, the electrons are oriented opposite the adjacent layer, providing a great deal of resistance to electrical flow. The presence of a magnetic field overcomes the magnetic coupling between the adjacent layers, causing parallel alignment of magnetic moments between layers, and resistance drops significantly.

By connecting the four resistors in a classic Wheatstone bridge configuration, the voltage across a single resistor is doubled, providing a linear output. This voltage is then amplified and sent to a comparator that switches the sensor output when it detects that a minimum magnetic field strength is present. High voltage transistors provide TTL-compatible output rated at 25 milliamps. The switch includes reverse polarity, overvoltage, and transient protection.



PRINCIPLE OF SOLID STATE (NO MAGNETIC FIELD)



PRINCIPLE OF SOLID STATE (MAGNETIC FIELD PRESENT)

Sinking vs. Sourcing

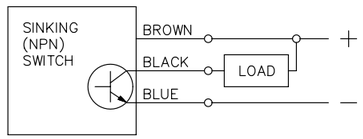
Bimba offers both sinking and sourcing Solid State Switch models:

- **Sinking switches** are applied to the **negative** side of a load. When the switch is activated, the negative (ground) is connected, completing the circuit.
- **Sourcing switches** are applied to the **positive** side of a load. When the switch is activated, power is connected, completing the circuit.

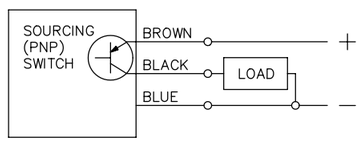
The model needed will be determined by a number of factors, including:

- Company standards.
- PLC input cards. (You may have sinking input cards available or your PLC only has a sinking type. Be aware that for some PLC manufacturers, sourcing input cards require a sinking switch or sinking input cards require a sourcing switch; check the specifications to clarify.)
- Type of circuit. PLC manufacturers typically filter input modules that use sourcing field devices and use unfiltered input modules with sinking field devices.

Typical Solid State Sinking Configuration (NPN)



Typical Solid State Sourcing Configuration (PNP)



Switch Information Location

Actuator Application Data

Hysteresis and Operating Windows

Hysteresis

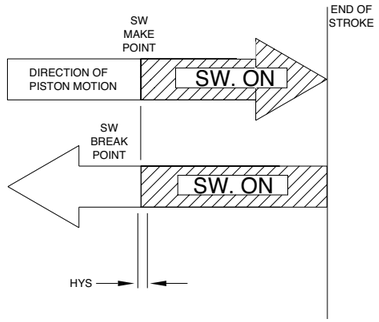
Bimba Solid State switches are subject to hysteresis. Hysteresis is the difference in magnetic field strength needed to initiate switch operation versus the field strength needed to sustain switch operation. The effect is that the switch break point will be different from the switch make point in the piston travel.

Operating Window

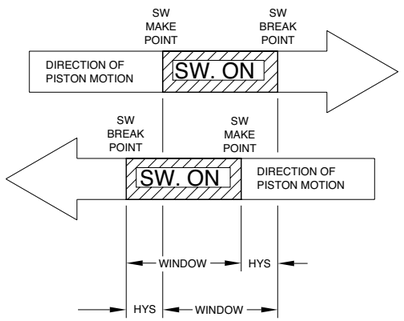
The operating window is the distance the piston travels while the switch is in the “ON” state, and includes the hysteresis action. For the Solid State Switch, hysteresis is greater on one side of the operating window because this switch is sensitive to only one side of the magnet.

For high speed equipment, the time duration of the switch signal may be critical. The time duration is a function of the operating window length and the speed of operation of the actuator. It is calculated by dividing the minimum travel in the operating window by the piston speed, taking into account the hysteresis effect. The illustrations and chart below show the operating windows for the Solid State Switch.

END OF STROKE OPERATION



MID STROKE OPERATION



Switch Application Information

Original Line Cylinders with Indicated Switches

Bore Size		MR, MS, MSC, MSK			MHF, MHC, MHK		
		Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability
007	5/16"	0.250"	0.040"	±0.010"	0.055"	0.030"	±0.005"
01	7/16"	0.275"	0.040"	±0.010"	0.125"	0.030"	±0.005"
02	9/16"	0.350"	0.040"	±0.010"	0.125"	0.030"	±0.005"
04	3/4"	0.375"	0.045"	±0.010"	0.125"	0.030"	±0.005"
06	7/8"	0.425"	0.045"	±0.010"	0.125"	0.030"	±0.005"
09	1-1/16"	0.450"	0.045"	±0.010"	0.125"	0.030"	±0.005"
12	1-1/4"	0.450"	0.050"	±0.010"	0.125"	0.030"	±0.005"
17	1-1/2"	0.450"	0.050"	±0.010"	0.125"	0.030"	±0.005"
24	1-3/4"	0.450"	0.050"	±0.010"	0.125"	0.030"	±0.005"
31	2"	0.450"	0.050"	±0.010"	0.125"	0.030"	±0.005"
50	2-1/2"	0.450"	0.050"	±0.010"	0.125"	0.030"	±0.005"
70	3"	0.500"	0.050"	±0.010"	0.125"	0.030"	±0.005"

Bore Size		MRS-.087, MRS-1.5			MRS-.027, MRS-1.5-S			HSC, HSK		
		Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability
02	9/16"	0.350"	0.040"	±0.015"	0.345"	0.015"	±0.015"	0.290"	0.040"	±0.015"
04	3/4"	0.350"	0.040"	±0.015"	0.345"	0.015"	±0.015"	0.310"	0.040"	±0.015"
06	7/8"	0.350"	0.040"	±0.015"				0.320"	0.040"	±0.015"
09	1-1/16"	0.350"	0.040"	±0.015"				0.330"	0.040"	±0.015"
12	1-1/4"	0.350"	0.040"	±0.015"				0.340"	0.040"	±0.015"
17	1-1/2"	0.440"	0.040"	±0.015"				0.350"	0.040"	±0.015"
24	1-3/4"	0.440"	0.040"	±0.015"				0.350"	0.040"	±0.015"
31	2"	0.440"	0.040"	±0.015"				0.360"	0.040"	±0.015"
50	2-1/2"	0.440"	0.040"	±0.015"				0.370"	0.040"	±0.015"
70	3"	0.440"	0.040"	±0.015"				0.380"	0.040"	±0.015"

Flat Cylinders with Track Mounted Switches

Bore Size		HK, HC, MR, MS, MSC, MSK			MHF, MHC, MHK		
		Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability
02	9/16"	0.250"	0.040"	±0.015"	0.125"	0.030"	±0.005"
04	3/4"	0.300"	0.040"	±0.015"	0.125"	0.030"	±0.005"
09	1-1/16"	0.300"	0.040"	±0.015"	0.125"	0.030"	±0.005"
17	1-1/2"	0.300"	0.040"	±0.015"	0.125"	0.030"	±0.005"
31	2"	0.325"	0.040"	±0.015"	0.125"	0.030"	±0.005"
50	2-1/2"	0.325"	0.040"	±0.015"	0.125"	0.030"	±0.005"
70	3"	0.375"	0.040"	±0.015"	0.125"	0.030"	±0.005"
125	4"	0.400"	0.040"	±0.015"	0.125"	0.030"	±0.005"

How to Specify

MAGNETIC SWITCH PRODUCTS

Switch Application Information

Pneu-Turn Rotary Actuators with Indicated Switches

Bore Size		MR, MS, MSC, MSK			MHF, MHC, MHK		
		Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability
02	9/16"	73°	8°	±2°	26°	6°	±1°
04	3/4"	57°	7°	±1.5°	19°	5°	±0.8°
09	1-1/16"	57°	6°	±1.5°	17°	4°	±0.7°
17	1-1/2"	47°	5°	±1°	13°	3°	±0.5°
31	2"	33°	4°	±0.75°	9°	2°	±0.3°

Bore Size		HSC, HSK			MRS-.087 -B		
		Operating Window	Maximum Hysteresis	Repeatability	Operating Window	Maximum Hysteresis	Repeatability
02	9/16"	84°	7°	±3°	62°	9°	±3°
04	3/4"	61°	5°	±2°	51°	7°	±2°
09	1-1/16"	55°	5°	±2°	54°	9°	±2°
17	1-1/2"	41°	4°	±2°	40°	6°	±2°
31	2"	29°	3°	±1°	30°	5°	±1°

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Notes

Related Products

Bimba's pneumatic motion products work with a variety of supporting and supplementary products, including flow controls, boosters, reservoirs, and much more.



Contents

557 Flow Controls
- 557 – Materials of Construction
- 558 – Cutaways
- 558 – C_v Factors for Flow Controls
- 559 – FQPS Series Flow Controls
- 560 – FCP Series Flow Controls
- 561 – FQP Series Flow Controls
- 562 – Bimba Needle Valves
- 563 – Metric Flow Control Specifications (FCPM Models)

568 Air Boosters and Reservoirs
- 568 – Basic 2:1 Air Booster
- 568 – High Flow 2:1 Air Booster
- 568 – Air Reservoir
- 569 – Basic 2:1 Air Booster Specifications
- 570 – High Flow 2:1 Air Booster Specifications
- 571 – Air Reservoir Dimensions
- 572 – Air Reservoir Weights and Volumes
- 573 – Mounting Options (Air Reservoirs)
- 574 – How to Order (Basic 2:1 Air Booster)
- 574 – How to Order (High Flow 2:1 Air Booster)
- 574 – How to Order (Air Reservoirs)

575 3 and 4 Way Disc Air Valves

576 Shock Absorbers
- 577 – Specifications (Ultran Slide and Ultran Rodless Models)
- 580 – Specifications (High Load Ultran)
- 580 – Specifications (Stop Collar, Ultran Models)
- 581 – Specifications (Linear Thrusters)

583 Transition Plates
- 584 – Dowel Pin Hole Locations
- 585 – Linear Thruster to Pneu-Turn Rotary Actuator, Shaft Parallel
- 587 – Pneu-Turn Rotary Actuator to Linear Thruster, Shaft Perpendicular
- 589 – Ultran Rodless to Linear Thruster, Mounted Perpendicular
- 590 – Ultran Rodless to Linear Thruster, Mounted Parallel
- 591 – Linear Thruster to Linear Thruster, Mounted Perpendicular
- 592 – PneuMoment to PneuMoment
- 593 – Sizing a Multi-Axis Configuration
- 596 – How to Order

597 Alignment Couplers
- 597 – Features and Advantages
- 598 – Specifications (Models 1/4"-28 through 1"-1/4)

Materials of Construction (FQPS Models)

Adjusting Knob and Thread:	Brass (RoHS approved)
Body:	Thermoplastic Polymer
Tubing:	Nylon and polyurethane tubing
Maximum Operating Pressure:	150 PSI air only
Operating Temperature Range:	30° F to 140° F (0° C to 60° C)

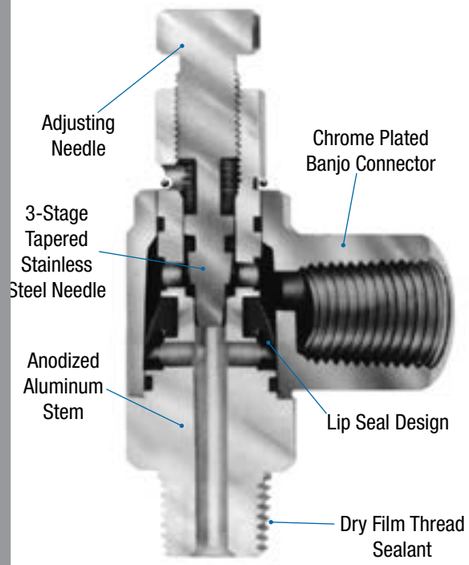
Materials of Construction (FQP Models)

Banjo Connector:	Chrome plated, zinc die cast
Banjo Retaining Ring:	Zinc plated steel
Stem:	High strength anodized aluminum alloy
Adjusting Needle:	Stainless steel
O-Rings and Lip Seal:	Buna N
Collet:	Acetal copolymer
Gripping Teeth:	Stainless steel
Collet Retainer (if applicable):	Brass
Locknut:	416 Stainless steel
Tube Types:	All plastic tubing, including nylon and polyethylene
Maximum Operating Pressure:	150 PSI air only
Operating Temperature Range:	14° to 167° F (-25°C to 75°C)

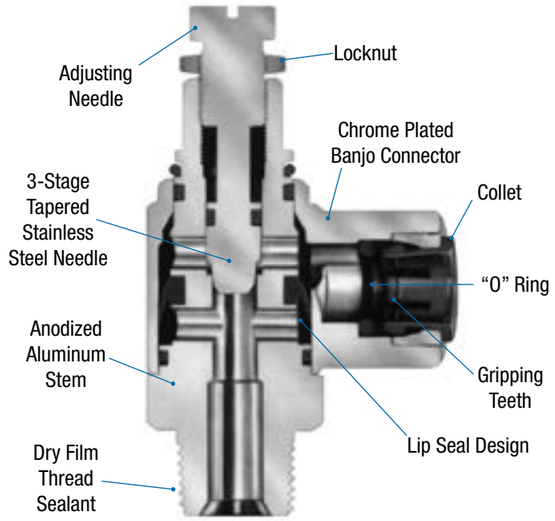
Materials of Construction (FCP Models)

Banjo Connector:	Chrome plated, zinc die cast
Banjo Retaining Ring:	Zinc plated steel
Stem:	High strength anodized aluminum alloy
Adjusting Needle:	Stainless steel
"O" Rings and Lip Seal:	Buna N
Maximum Operating Pressure:	150 PSI air only
Operating Temperature Range:	-20° to 200° F (-25° C to 95° C)

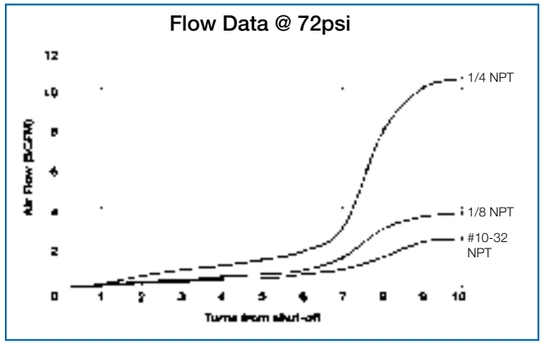
FCP



FQP

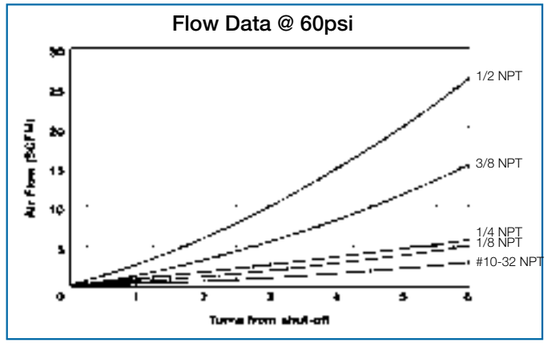


Flow Data @ 72psi



FQPS Series

Flow Data @ 60psi

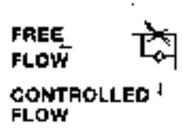


FQP & FCP Series

C_v Factors for Bimba Flow Controls

The following estimated C_v factors apply to Bimba Flow Controls in both the FCP and FQP Series.

Models	Free Flow	Controlled Flow
FCP1, FCP1K, FCP1L, FQP1, FQP1K	0.12	0.09
FCP2, FCP2K, FCP2L, FQP21L, FQP2, FQP2K, FQP21K	0.24	0.21
FCP4, FCP4K, FCP4L, FQP4, FQP4K, FQP44, FQP44K	0.50	0.44
FCP6, FCP6K, FCP6L, FQP6, FQP6K	0.91	0.73
FCP8, FCP8K, FCP8L, FQP8, FQP8K	1.33	1.19



Bimba Miniature Quik-Flo® Flow Controls – FQPS Series

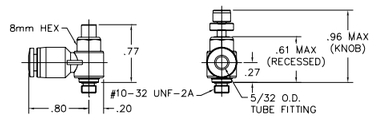
For 10-32 port, 5/32" OD tubing:

FQPS1



FQPS1K





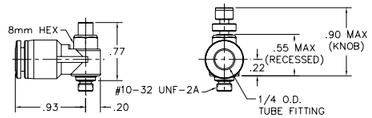
For 10-32 port, 1/4" OD tubing:

FQPS12



FQPS12K





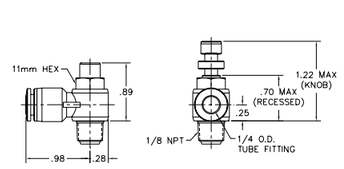
For 1/8 port, 1/4" OD tubing:

FQPS2



FQPS2K





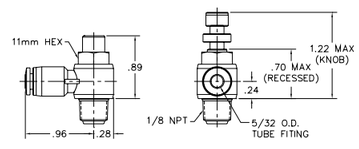
For 1/8 port,5/32" OD tubing:

FQPS21



FQPS21K





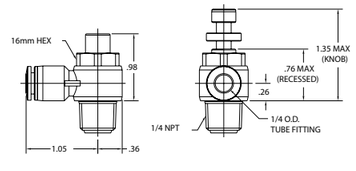
For 1/4 port,1/4" OD tubing:

FQPS44



FQPS44K



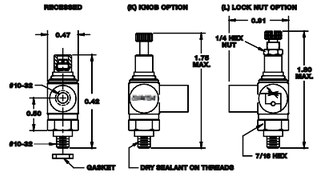


Bimba Flow Controls – FCP Series

For 10-32 port:

FCP1 FCP1K FCP1L

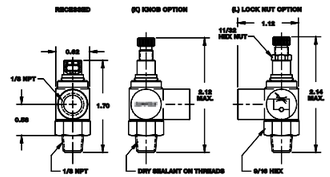




For 1/8 port:

FCP2 FCP2K FCP2L

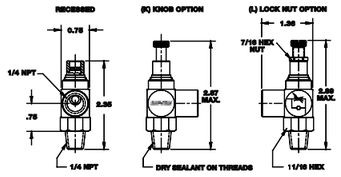




For 1/4 port:

FCP4 FCP4K FCP4L

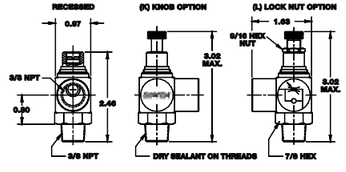




For 3/8 port:

FCP6 FCP6K FCP6L

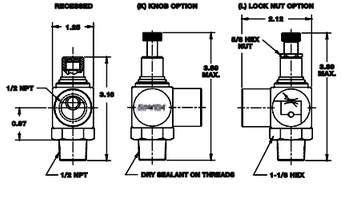




For 1/2 port:

FCP8 FCP8K FCP8L

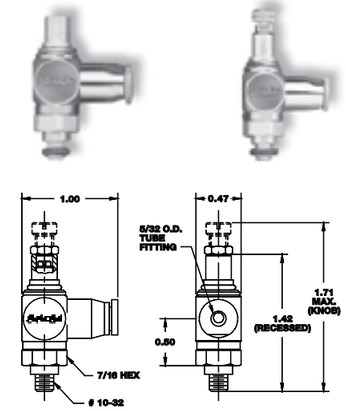




Bimba Quik-Flo® Flow Controls – FQP Series

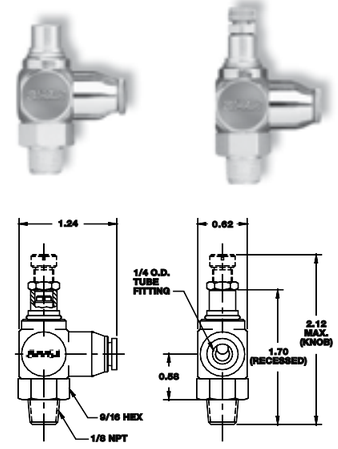
For 10-32 port, 5/32" OD tubing:

FQP1 FQwP1K



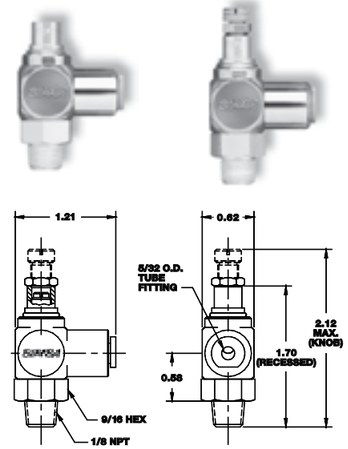
For 1/8 port, 1/4" OD tubing:

FQP2 FQP2K



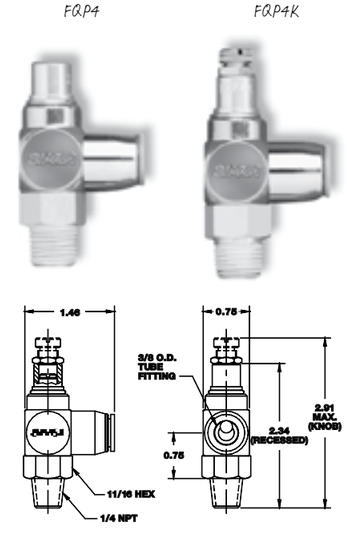
For 1/8 port, 5/32" OD tubing:

FQP21 FQP21K



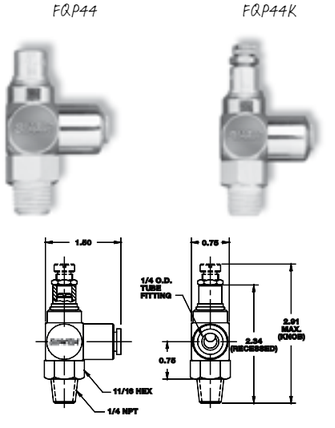
For 1/4 port, 3/8" OD tubing:

FQP4 FQP4K



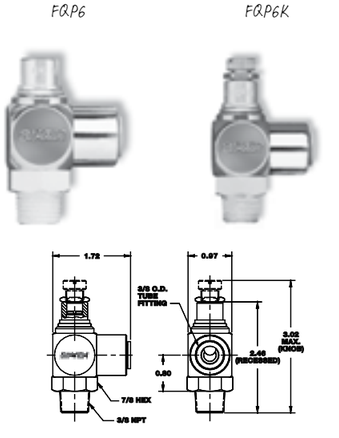
For 1/4 port, 1/4" OD tubing:

FQP44 FQP44K



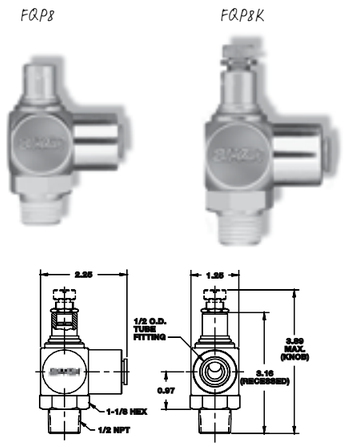
For 3/8 port, 3/8" OD tubing:

FQP6 FQP6K



Bimba Quik-Flo® Flow Controls – FQP Series

For 1/2 port, 1/2" OD tubing:



Bimba Needle Valves

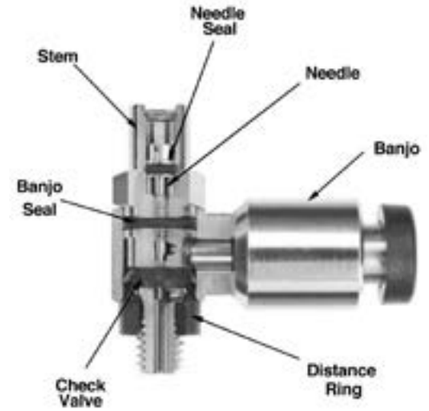
Bimba offers a range of Quik-Flo® Needle Valves, allowing for controlled flow of both the air intake and exhaust through the same valve. A needle valve can control a double acting cylinder's extension and retraction by controlling the volume of air entering the cylinder and the volume of air leaving the cylinder.

For additional dimensional information, reference Quik-Flo® Flow Controls on pages 559-561. For example, reference FQP1 for QNV1 dimensions.

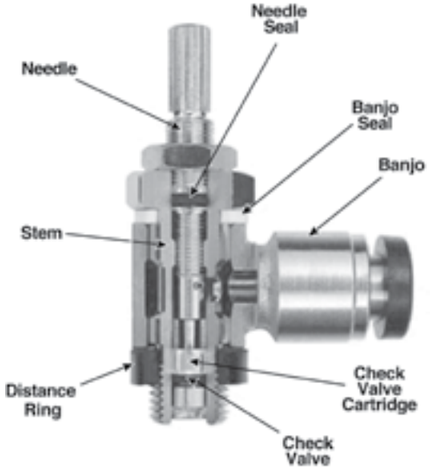
Model	Price	Tube Size	Port Size	C_v
QNV1	$13.52	5/32"	#10-32	.09
QNV1K	15.65	5/32"	#10-32	.09
QNV2	16.12	1/4"	1/8" NPT	.21
QNV2K	18.56	1/4"	1/8" NPT	.21
QNV44	20.59	1/4"	1/4" NPT	.44
QNV44K	23.50	1/4"	1/4" NPT	.44
QNV6	25.53	3/8"	3/8" NPT	.73
QNV6K	29.02	3/8"	3/8" NPT	.73

Metric Flow Control Specifications (FCPM Models)

Fluid:	Air
Maximum Operating Pressure:	10 bar (145 PSI)
Minimum Operating Pressure:	0.1 bar (1.5 PSI)
Temperature Range:	-10° C to +80°C (-14° F to +176° F)



Material Specifications for M5	
Banjo	Nickel Plated Brass
Stem	Nickel Plated Brass
Needle	Nickel Plated Brass
Check Valve	NBR (Buna-N)
Needle Seal	NBR (Buna-N)
Banjo Seal	NBR (Buna-N)
Distance Ring	Reinforced Nylon



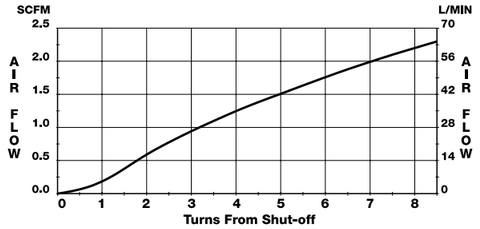
Material Specifications for G1/8" and G1/4"	
Banjo	Nickel Plated Brass
Stem	Nickel Plated Brass
Needle	Nickel Plated Brass
Check Valve	NBR (Buna-N)
Check Valve Cartridge	Brass
Needle Seal	NBR (Buna-N)
Banjo Seal	Reinforced Nylon
Distance Ring	Reinforced Nylon

Metric Flow Control Specifications (FCPM Models)

M5 Port Mounted Flow Control Valves

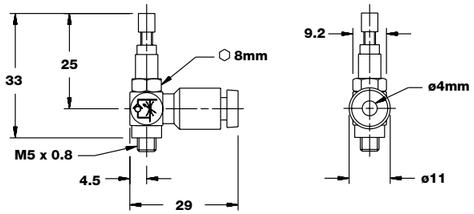


M5 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 91–122 l/min



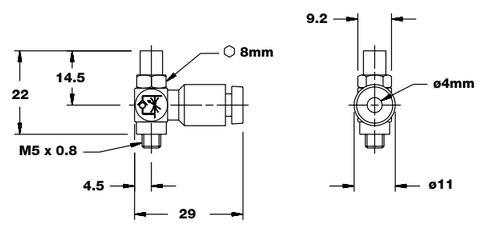
For M5 port, FCPM-1-Q4-L
4mm OD tubing
2mm ID tubing





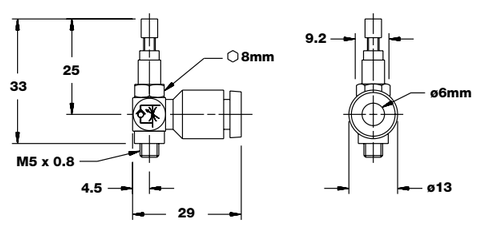
For M5 port, FCPM-1-Q4-R
4mm OD tubing
2mm ID tubing





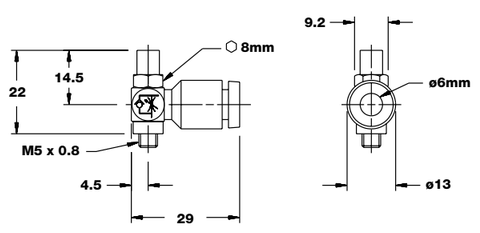
For M5 port, FCPM-1-Q6-L
6mm OD tubing
4mm ID tubing





For M5 port, FCPM-1-Q6-R
6mm OD tubing
4mm ID tubing



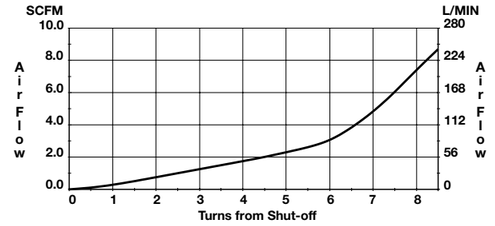


Metric Flow Control Specifications (FCPM Models)

G1/8 Port Mounted Flow Control Valves

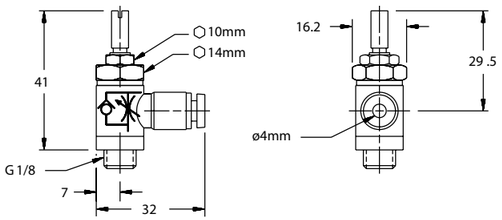


G1/8 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 110–334 l/min



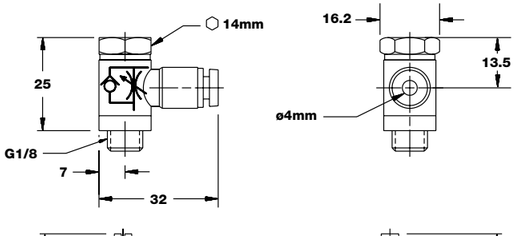
For G-1/8 port, FCPM-2-Q4-L
4mm OD tubing
2mm ID tubing





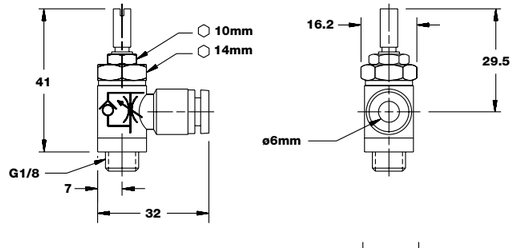
For G-1/8 port, FCPM-2-Q4-R
4mm OD tubing
2mm ID tubing





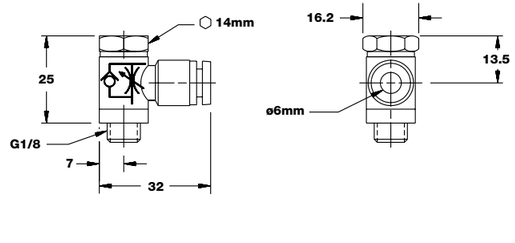
For G-1/8 port, FCPM-2-Q6-L
6mm OD tubing
4mm ID tubing





For G-1/8 port, FCPM-2-Q6-R
6mm OD tubing
4mm ID tubing



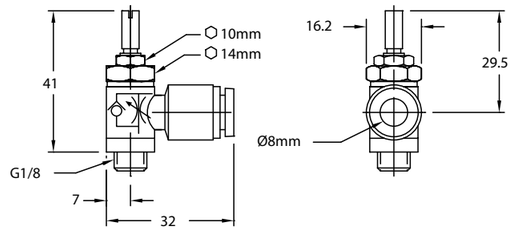


Metric Flow Control Specifications (FCPM Models)

G1/8 Port Mounted Flow Control Valves

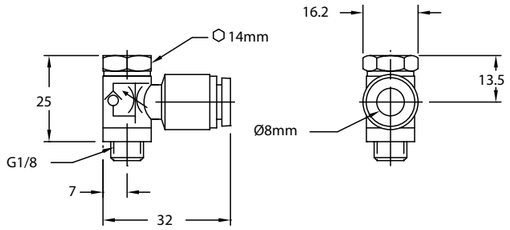
For G-1/8 port, FCPM-2-Q8-L
8mm OD tubing
6mm ID tubing





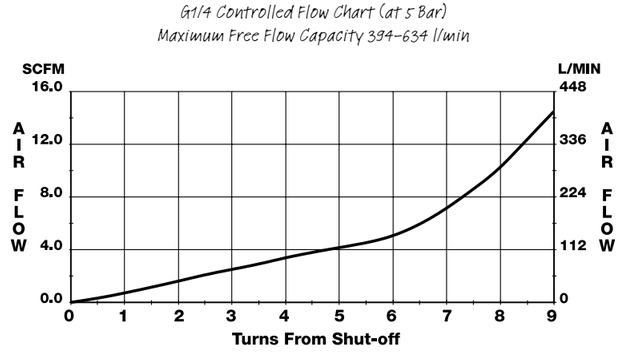
For G-1/8 port, FCPM-2-Q8-R
8mm OD tubing
6mm ID tubing





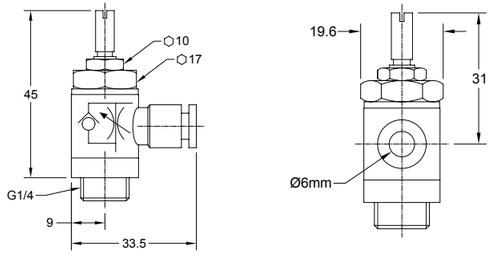
G1/4 Port Mounted Flow Control Valves





For G1/4 port, FCPM-4-Q6-L
6mm OD tubing
4mm ID tubing



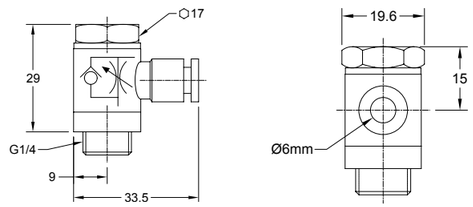


Metric Flow Control Specifications (FCPM Models)

G1/4 Port Mounted Flow Control Valves

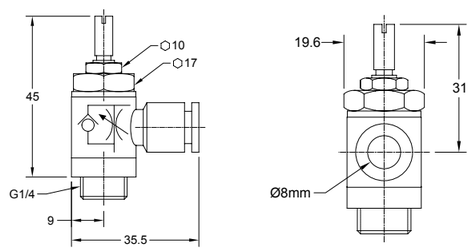
For G1/4 port, FCPM-4-Q6-R
6mm OD tubing
4mm ID tubing





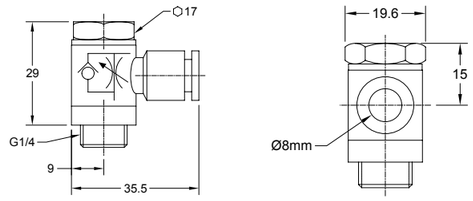
For G1/4 port, FCPM-4-Q8-L
8mm OD tubing
6mm ID tubing





For G1/4 port, FCPM-4-Q8-R
8mm OD tubing
6mm ID tubing





Basic 2:1 Air Booster



Bimba Basic 2:1 Air Boosters are designed to amplify inadequate air pressure applications. The unit is a self-contained design of integral valve components that reciprocate pistons to double the output pressure. Increasing the output air pressure will increase the output force of a pneumatic cylinder where space constraints exist.

High Flow 2:1 Air Booster



The Bimba High Flow 2:1 Air Booster doubles the air pressure at a greater flow rate than our basic booster model. The unit is a self-contained system of integral valve components that reciprocate pistons to increase the output pressure. This is a compact solution to deliver the output force required of a pneumatic cylinder under limited space conditions.

Air Reservoir

Bimba reservoirs are available in four different configurations. Traditional reservoirs are available with three different end cap materials, and an extruded aluminum body version is offered with the option of adding multiple ports for manifold applications.



Aluminum End Caps
A Series



Plastic End Caps
P Series

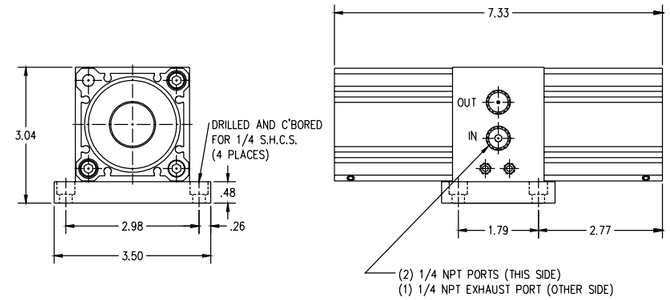


Stainless Steel End Caps
S Series



Extruded Body with
Optional Ports
E Series

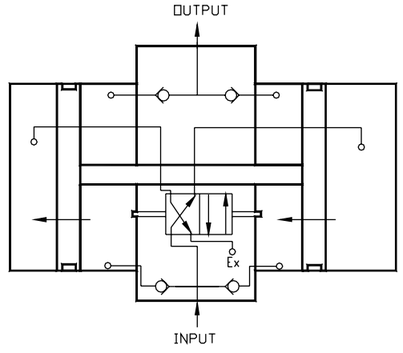
Basic 2:1 Air Booster Specifications

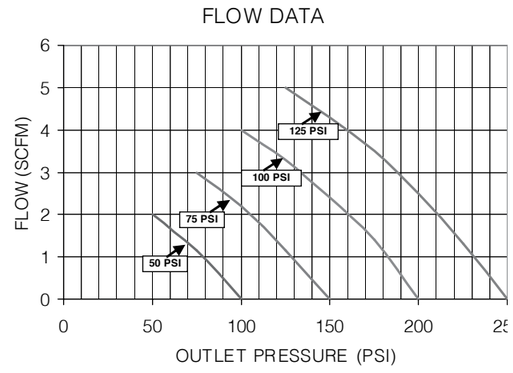


Engineering Specifications

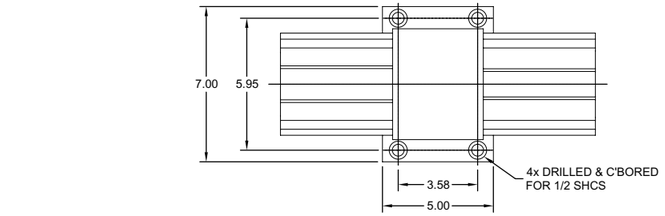
Maximum Input Pressure:	125 PSI
Operating Temperature:	15° to 160° F
Lubrication:	HT-99 oil
Bodies and Center Section:	Aluminum; Hard Coat with PTFE
Mounting Plate:	Anodized Aluminum
Estimated Charge Time:	28 seconds per 1 gallon reservoir

NOTE: Bimba Air Boosters are designed for intermittent duty usage such as maintaining pressure in an air reservoir. Continuous cycling decreases seal life.





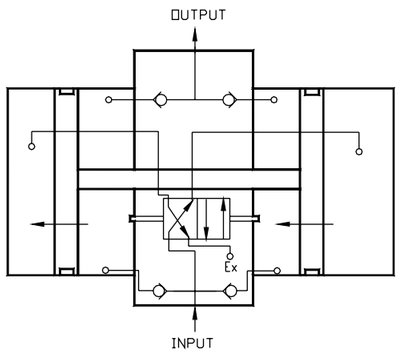
High Flow 2:1 Air Booster Specifications

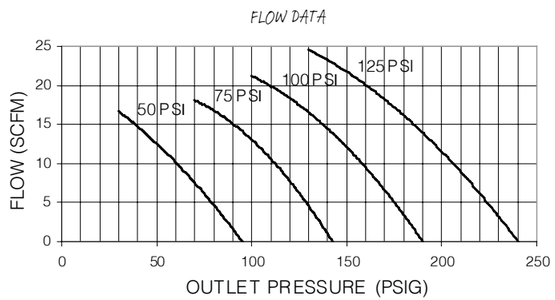


Engineering Specifications

Maximum Input Pressure:	125 PSI
Operating Temperature:	15° to 160° F
Lubrication:	HT-99 oil
Bodies and Center Section:	Aluminum; Hard Coat with PTFE
Mounting Plate:	Anodized Aluminum

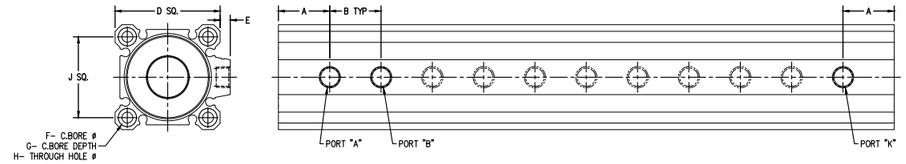
NOTE: Bimba Air Boosters are designed for intermittent duty usage such as maintaining pressure in an air reservoir. Continuous cycling decreases seal life.





Air Reservoirs

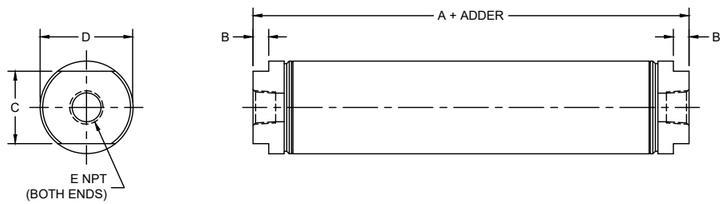
Dimensions
Series E



Bore	A	B	D	E	F
20mm (3/4")	25.4mm (1")	25.4mm (1")	36.3mm (1.43")	0mm (0")	9mm (0.35")
25mm (1-1/16")	25.4mm (1")	25.4mm (1")	40.4mm (1.59")	0mm (0")	9mm (0.35")
40mm (1-1/2")	25.4mm (1")	25.4mm (1")	52.3mm (2.06")	5.08mm (0.20")	9mm (0.35")
63mm (2-1/2")	25.4mm (1")	25.4mm (1")	77.5mm (3.05")	7.11mm (0.28")	14.1mm (0.56")
100mm (4")	25.4mm (1")	25.4mm (1")	117.6mm (4.63")	6.60mm (0.26")	17.5mm (0.69")

Bore	G	H	J	Port
20mm (3/4")	7.0mm (0.28")	5.5mm (0.22")	25.5mm (1.00")	M5 X 0.8 (#10-32)
25mm (1-1/16")	7.0mm (0.28")	5.5mm (0.22")	28.0mm (1.10")	M5 X 0.8 (#10-32)
40mm (1-1/2")	7.0mm (0.28")	5.5mm (0.22")	40.0mm (1.57")	G - 1/8 (NPT 1/8)
63mm (2-1/2")	10.5mm (0.41")	8.8mm (0.35")	60.0mm (2.36")	G - 1/4 (NPT 1/4)
100mm (4")	13.5mm (0.53")	11.0mm (0.43")	94.0mm (3.70")	G - 3/8" (NPT 3/8)

Series A, P, S



Bore	A	B	C	D	E (ports)
3/4"	1.94"	0.18"	0.63"	0.81"	1/8 NPT
1-1/16"	2.38"	0.19"	0.88"	1.13"	1/8 NPT
1-1/4"	1.38"	0.25"	0.88"	1.33"	1/8 NPT
1-1/2"	2.25"	0.31"	0.88"	1.56"	1/8 NPT
2"	2.88"	0.31"	1.25"	2.08"	1/4 NPT
2-1/2"	2.88"	0.31"	1.75"	2.61"	1/4 NPT
3"	3.19"	0.31"	2"	3.13"	3/8 NPT

Air Reservoirs

Weights and Volumes
All Series

Bore	Model	Base Weight (lbs)	Weight Adder per inch of length (lbs)	Base Volume (cu. in)	Volume Adder (cu. in)
3/4"	D-1022-A	0.06	0.02	0.43	0.45
	D-1022-S	0.13		0.43	0.45
	D-1022-P	0.04		0.47	0.45
	D-1022-E	0.19	0.10	0.78	0.47
1-1/16"	D-1500-A	0.14	0.03	1.06	0.89
	D-1500-S	0.33		1.06	0.89
	D-1500-P	0.08		1.21	0.89
	D-1500-E	0.23	0.12	1.18	0.74
1-1/4"	D-27715-A	0.13	0.03	0.39	1.23
	D-27715-S	0.36		0.39	1.23
1-1/2"	D-5096-A	0.23	0.04	1.95	1.77
	D-5096-S	0.57		1.95	1.77
	D-5096-P	0.14		1.97	1.77
	D-5096-E	0.31	0.15	3.05	1.90
2"	D-2485-A	0.49	0.06	4.74	3.15
	D-2485-S	1.33		4.31	3.15
	D-2485-P	0.31		4.74	3.15
2-1/2"	D-11846-A	0.77	0.08	7.14	4.92
	D-11846-S	1.76		7.99	4.92
	D-11846-E	0.64	0.32	6.84	4.71
3"	D-17469-A	1.40	0.14	10.07	7.09
	D-17469-S	3.65		10.07	7.09
4"	D-116067-E	1.44	0.72	15.43	11.95

Materials and Specifications

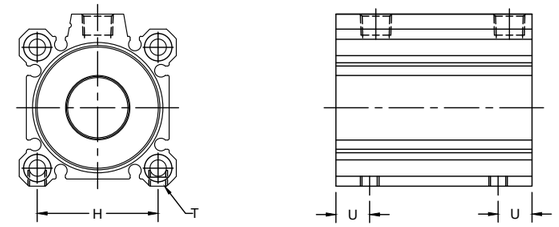
Series	End Cap Material	Body Material	Maximum Pressure	Maximum Temperature
A	6000 Series Aluminum	304 Stainless Steel	250 PSI	400º F
S	303 Stainless Steel	304 Stainless Steel	250 PSI	400º F
P	Delrin®	304 Stainless Steel	100 PSI	32º F to 160º F
E	Aluminum	Anodized Aluminum	200 PSI	250º F

Mounting Options (Air Reservoirs)

Series E

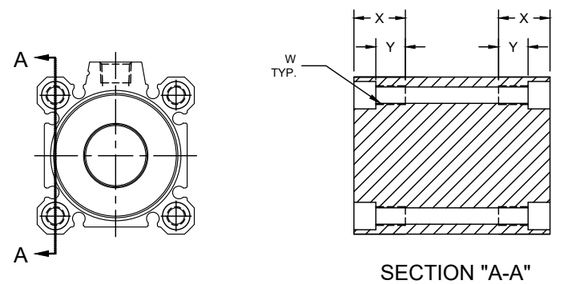
Threaded Bottom Mount (-1)

Bore	H	T	U
20mm (3/4")	25.5mm (1.00")	M6 x 1.0 6H (1/4-20 UNC-2B)	11.2mm (0.44")
25mm (1")	28.0mm (1.10")	M6 x 1.0 6H (1/4-20 UNC-2B)	11.2mm (0.44")
40mm (1-1/2")	40.0mm (1.57")	M6 x 1.0 6H (1/4-20 UNC-2B)	11.2mm (0.44")
63mm (2-1/2")	60.0mm (2.36")	M10 x 1.5 6H (7/16-14 UNC-2B)	16.8mm (0.66")
100mm (4")	94.0mm (3.70")	M12 x 1.75 6H (1/2-13 UNC-2B)	20.8mm (0.82")



Threaded Front/Rear Mount (-3)

Bore	W	X	Y
20mm (3/4")	M6 x 1.0 6H (1/4-20 UNC-2B)	17.0mm (0.67")	10.0mm (0.39")
25mm (1")	M6 x 1.0 6H (1/4-20 UNC-2B)	17.0mm (0.67")	10.0mm (0.39")
40mm (1-1/2")	M6 x 1.0 6H (1/4-20 UNC-2B)	17.0mm (0.67")	10.0mm (0.39")
63mm (2-1/2")	M10 x 1.5 6H (7/16-14 UNC-2B)	28.5mm (1.12")	18.0mm (0.71")
100mm (4")	M12 x 1.75 6H (1/2-13 UNC-2B)	35.6mm (1.40")	22.0mm (0.87")



SECTION "A-A"

How to Order

Basic 2:1 Air Booster

Bimba Basic 2:1 Air Boosters can be ordered using a standard part number. They are non-configurable; please contact the factory for customization options.

CSS-00118-A

High Flow 2:1 Air Booster

Bimba High Flow 2:1 Air Boosters can be ordered using a standard part number. They are non-configurable; please contact the factory for customization options.

CSS-00416-A

Air Reservoirs

Bimba Air Reservoirs can be configured using basic alphanumeric clusters. To create a basic part number, choose bore size, series, length, port locations, mounting options, and port/mounting threads.

D - 1500 - A - 4 - _ _ _ _ * - _ _ *

Bore Size	
1022	3/4"
1500	1-1/16"
27715	1-1/4"
5096	1-1/2"
2485	2"
11846	2-1/2"
17469	3"
116067	4"

Series	
A	Aluminum end caps (3/4"-3" bores only)
E	Extruded aluminum manifold designs (3/4", 1-1/16", 1-1/2", 2-1/2", and 4" bore only)
P	Plastic end caps (3/4", 1-1/16", 1-1/2", and 2" bore only)
S	Stainless steel end caps (3/4"-3" bore only)

Length	
Series A, P, S	1"-50" (.01" increments)
Series E	1"-11" (1" increments)

Port Locations**
The number of ports cannot exceed the model's length.

Mounting Options and Port/Mounting Threads**	
1	Threaded bottom mounting and metric port and mounting threads
1E	Threaded bottom mounting and imperial port and mounting threads
3	Threaded front/rear mounting and metric port and mounting threads
3E	Threaded front/rear mounting and imperial port and mounting thread
5	Basic counterbored mounting holes and metric port threads
5E	Basic counterbored mounting holes and imperial threads (previous "standard" design)

* Ports located on manifold style E: The total number of ports is signified by the number of letters shown (ex.: A C D = three ports). The location of ports is signified by the letter (see drawing). Location A = A, Location B = B, etc.
** Required for Extruded Body "E" series only.

Product Features

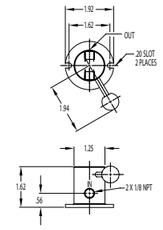
3 and 4 Way Disc Air Valves

Model 3MV8



3 Way Disc Air Valve – Operates single acting cylinders. Full 1/8" orifice - 1/8" NPT inlet and outlet ports. To operate, a precision lapped disc is rotated through 60° by means of a ball handle which will hold set position. To repair, remove handle and retaining ring.

Weight: .22

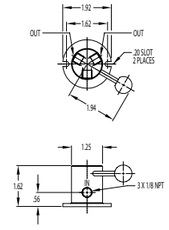


Model 4MV8



4 Way Disc Air Valve – Operates double acting cylinders. Ball handle will rotate through 120° and will hold set position – 1/8" NPT ports are located 120° apart – orifice 1/8" diameter. To repair, remove handle and retaining ring.

Weight: .22



Shock Absorbers

Shock Absorbers
Shock Absorbers can be used to decelerate loads or to absorb excess Kinetic Energy.

Calculating Kinetic Energy
When a load is being moved by the High Load Ultran, kinetic energy is generated. This energy must be absorbed either by the High Load Ultran or by some external device. If the energy is to be absorbed by the High Load Ultran, then the energy must not exceed 3.5 foot-pounds (42 inch-pounds).

Kinetic energy is defined by the formula $1/2mV^2$, where m is the mass of the load being moved and V is the speed at which the load is moving upon impact.

m is defined as W/g, where W is the known weight of the load including the weight of the carriage, and g is acceleration due to gravity. V is defined in feet per second.

Considering Total Energy
In addition to the energy generated by the moving load, other external (propelling) forces must be considered to ensure the proper use of the shock absorber. See page 577 for maximum force information. Propelling forces are those forces generated by cylinder air pressure, springs, gravity, etc. Once the energy generated by these forces is determined, it must be added to the kinetic energy generated by the moving load to determine total energy (ET) to be absorbed by the shock (see example below).

Selecting Shock Absorber Setting
The shock absorber offered for the High Load Ultran Slide is adjustable. This means that the shock absorber is capable of decelerating loads over a range of velocities. Use Graph 5 to determine the appropriate setting for your application. Some adjustment to this setting may be required to achieve the desired deceleration rate. Page 577 shows the shock absorber ratings.

Example (Total Energy):

Operating a UHL-17 at 60 psi in a horizontal application, carrying a 100-pound load at 10 inches per second end-of-stroke velocity, the total energy, ET, is determined as follows.

1. Determine kinetic energy generated by the moving load using the formula, KE = 1/2 mV2.
   m = (W + weight of carriage)/g = (7.5 + 100)/32.179 = 3.34 lbm
   V = 10 in/sec = 0.833 feet per second
   KE = 1/2 * 3.34 * 0.8332 = 1.16 foot-pounds or 13.92 inch-pounds (1.16 x 12 inches)
2. Determine the propelling forces and their respective energy.
   Force (F) = piston area * air pressure = 1.76 * 60 = 106 pounds
   Energy (E) = F * stroke of shock = 106 * 0.5 = 53 inch-pounds
3. Total Energy (ET) = 53 + 13.92 = 66.92 inch-pounds

Bore	Carriage Weight
1-1/4" (12)	3.9 lbs.
1-1/2" (17)	7.5 lbs.

Table 2

NOTE: If the total energy (ET) of your application exceeds the allowable maximum of 100 inch-pounds for the adjustable shock absorber, the standard HS-17 shock absorber may be used. Refer to page 578 for specifications.

Shock Absorber (Ultran Slide and Ultran Rodless Cylinders)

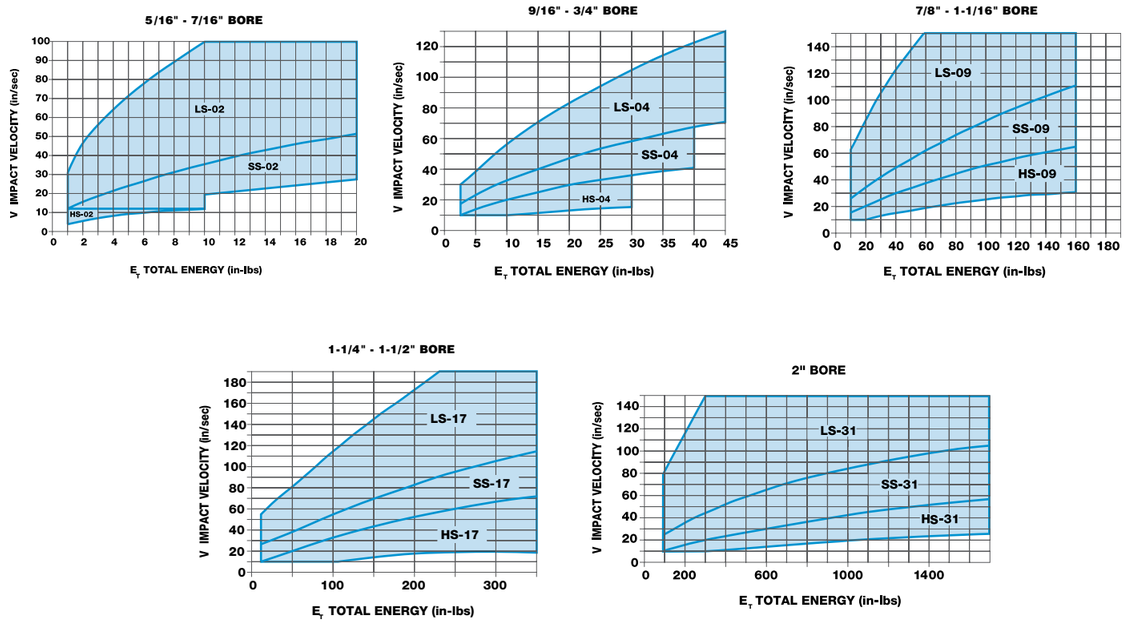
Ultran Slide

Bore	007	01	02	04	06	09	12	17	31
SF	0.250	0.250	0.410	0.410	0.630	0.630	0.880	0.880	1.560
UF1	0.077	0.150	0.249	0.442	0.601	0.887	1.227	1.767	3.142
UF2	0.285	0.385	0.805	1.565	2.195	3.140	4.750	7.530	24.380
ET	20	20	45	45	190	190	400	400	1,700
ET-C	36,000	36,000	125,000	125,000	300,000	300,000	475,000	475,000	670,000

Ultran Standard

Bore	007	01	02	04	06	09	12	17	31
SF	N/A	N/A	0.250	0.410	0.630	0.630	0.880	0.880	1.560
UF1	N/A	N/A	0.249	0.442	0.601	0.887	1.227	1.767	3.142
UF2	N/A	N/A	0.485	1.060	1.585	2.285	3.500	5.845	16.965
E_T	N/A	N/A	20	45	190	190	400	400	1,700
E_T-C	N/A	N/A	36,000	125,000	300,000	300,000	475,000	475,000	670,000

Velocity vs. Load for Shock Absorbers



*Ultran Maximum Velocity: 20 inches per second or cycle rate not to exceed 15 per minute

Shock Absorber (Ultran Slide and Ultran Rodless Cylinders)

For each model, dimensions and engineering specifications are the same for Light, Standard, and Heavy Duty Shock Absorbers. (LS, SS and HS model numbers).

Shock Absorber Selection Guide

Bore	Ultran	Ultran Slide
5/16" (007)	N/A	☐ S-02
7/16" (01)		
9/16" (02)	☐ S-02	☐ S-04
3/4" (04)	☐ S-04	
7/8" (06)	☐ S-09	☐ S-09
1-1/16" (09)		
1-1/4" (12)	☐ S-17	☐ S-17
1-1/2" (17)		
2" (31)	☐ S-31	☐ S-31

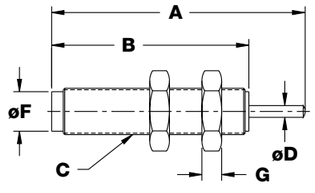
NOTE: Do not let shock absorbers bottom out. The shock should not be used as a stroke adjuster. A stop collar is needed for the shock if stroke adjustment is required.

Dimensions (in)

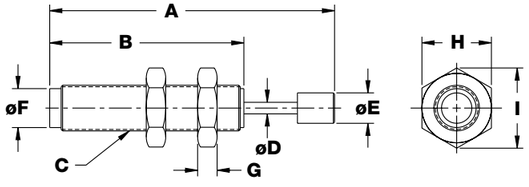
Model	A	B	C	D	E	F	G	H	I
☐ S-02	1.39	1.13	3/8-32 UNEF	0.12	N/A	0.32	0.09	0.50	0.58
☐ S-04	2.74	1.96	7/16-28 UNEF	0.12	0.40	0.39	0.16	0.56	0.65
☐ S-09	4.25	3.20	1/2-20 UNF	0.16	0.44	0.43	0.12	0.63	0.72
☐ S-17	5.13	3.76	3/4-16 UNF	0.19	0.50	0.64	0.18	0.94	1.08
☐ S-31	7.93	5.21	1-12 UNF	0.31	0.88	N/A	0.18	1.13	1.30

Model (LS, SS, HS)

☐ S-02



☐ S-04, ☐ S-09, ☐ S-17, ☐ S-31



Engineering Specifications

Model	Shock Absorber Bore	(S) Stroke (in)	Thread Type	(E_T) Max. in-lbs Per Cycle	(E_T-C) Max. in-lbs Per Hour	(F_P) Max. Shock Force (lbs)	Nominal Coil Spring Force		(F_D) Max. Propelling Force (lbs)	Model Weight (oz)
							Extension (lbs)	Compression (lbs)		
☐ S-02	0.28	0.25	3/8-32 UNEF	20	36,000	160	0.65	1.13	20	0.4
☐ S-04	0.25	0.41	7/16-28 UNEF	45	125,000	225	0.7	1.6	50	2
☐ S-09	0.28	0.63	1/2-20 UNF	190	300,000	500	1	3.6	120	3
☐ S-17	0.44	0.88	3/4-16 UNF	400	475,000	700	2	6.8	200	7
☐ S-31	0.56	1.56	1-12 UNF	1,700	670,000	1,700	4	11	500	16

How to Specify

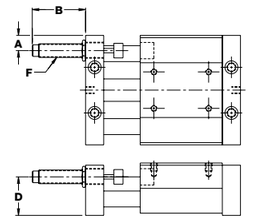
RELATED PRODUCTS

Shock Absorber (Ultran Slide and Ultran Rodless Cylinders)

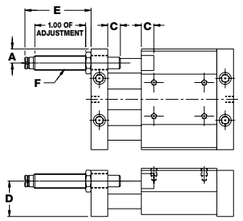
Shock Absorber/Stroke Adjustment (in)

Bore	A	B	C	D	E	F
5/16" (007)	0.215	0.750	0.000	0.785	1.093	3/8-32 UNEF
7/16" (01)	0.218	0.750	0.000	0.780	1.093	3/8-32 UNEF
9/16" (02)	0.406	1.460	0.375	1.094	1.594	7/16-28 UNEF
3/4" (04)	0.406	1.335	0.375	1.438	1.469	7/16-28 UNEF
7/8" (06)	0.500	2.490	0.375	1.562	1.438	1/2-20 UNF
1-1/16" (09)	0.594	2.490	0.375	1.875	1.438	1/2-20 UNF
1-1/4" (12)	0.656	2.890	0.500	2.062	1.500	3/4-16 UNF
1-1/2" (17)	1.000	2.890	0.562	2.219	1.438	3/4-16 UNF
2" (31)	1.125	3.500	0.562	3.312	1.563	1-12 UNF

Shock Absorber



Stroke Adjustment



NOTE: Do not let the shock absorbers bottom out. The shock should not be used as a stroke adjuster. A stop collar is needed for the shock if stroke adjustment is required.

How to Size a Shock Absorber

Selecting the proper shock absorber model is accomplished using the shock absorber graph given for each Ultran bore. The intersection of the total energy per stroke "E_T", and velocity at shock absorber contact "V", indicates the proper shock absorber model. E_T is calculated by the equation given below using values determined for:

P = Air pressure (PSI)
V = Velocity at impact (in/sec)
W_U = Load attached to the Ultran mounting plate (lbs.)
C = Cycles per hour
SF = Shock factor
UF1 = Ultran factor #1
UF2 = Ultran factor #2

E_T (Total energy) equals the sum of E_K (Kinetic energy) and E_W (Work energy)

NOTE: the Work energy calculation varies with mounting position, E_{WH} Horizontal, or E_{WV} Vertical.

$E_K = ((W_U + UF2) / 772) \times V^2$ (Kinetic energy, in-lbs)

E_{WH} = UF1 x SF x P (Work energy, in-lbs) **HORIZONTAL**

$E_{WV} = ((UF1 \times P) + W_U + UF2) \times SF$ (Work energy, in-lbs) **VERTICAL**

Example: determine the proper shock absorber for a model Ultran Slide mounted vertically with an attached load of 15 lbs, operating air pressure of 80 PSI, and a velocity of 20 in/sec, at a cycle rate of 3,600 per hour.

P = 80 PSI
V = 20 in/sec
S = 6 in
W_U = 15 lbs
C = 3,600 cycles/hr

From the charts for a 3/4" bore Ultran Slide

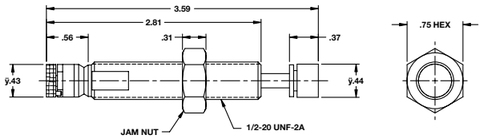
SF = 0.410
UF1 = 0.442
UF2 = 1.565
E_K = (15 lbs + 1.565) / 772) x (20 in/sec)^2 → E_K = 8.56 in-lbs
E_{WV} = ((0.442 x 80 PSI) + 15 lbs + 1.565 x 0.410 → E_{WV} = 21.29 in-lbs
E_T = $E_K + E_{WV}$ = 29.85 in-lbs → $E_TC = E_T \times C$ = 107,457 in-lbs/hr

Checking specifications chart, both E_T and E_TC are less than maximum. Per the sizing graph for a model UGS-04 with 21.29 in-lbs total energy at 20 in/sec velocity, use a heavy duty model HS-04 shock absorbers.

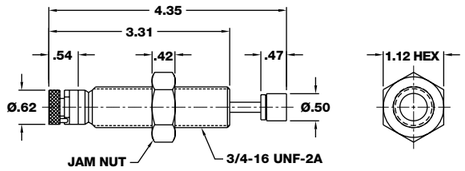
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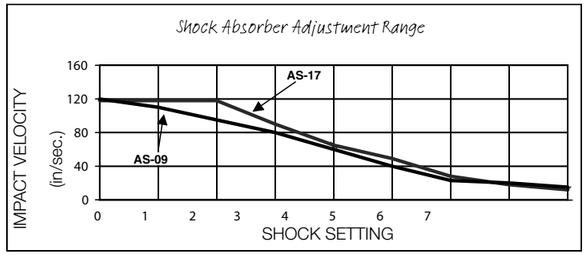
Shock Absorber (High Load Ultran)

Dimensions (in)
1-1/16" bore



Dimensions (in)
1-1/2" bore





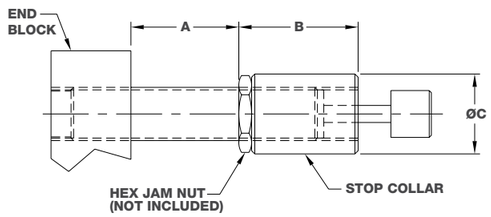
GRAPH 5

Table 3. Shock Absorber Ratings

Model	Shock Absorber Bore	(S) Stroke	Thread Type	(E_T) Max. In-Lb Per Cycle	(E_T-C) Max. In-Lb Per Cycle	(F_p) Max. Shock Force	Normal Coil Spring Force		(F_p) Max. Propelling Force	Weight
							Extension	Compression		
AS-09	.25	.38	1/2"-20 UNF	50	178,000	200	.8	1.7	8	2
AS-17	.28	.5	3/4"-16 UNF	100	284,000	300	1.5	2.0	150	5

Stop Collar (Ultran Models)

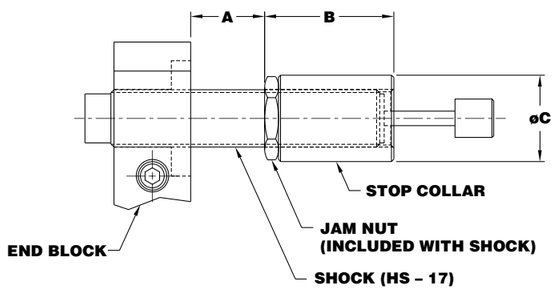
Ultran Slide & Ultran Rodless Cylinders



Model	A	B	øC
USC-04	1.0	.91	.63
USC-09	1.5	1.12	.69
USC-17	2.0	1.68	1.12
USC-31	3.0	1.93	1.50

NOTE: The Ultran Stroke Length needs increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable. The Hex Jam Nut is included with the shock absorber.

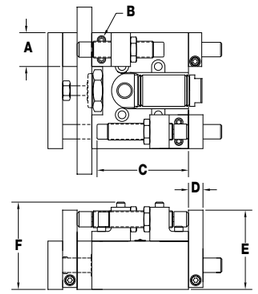
High Load Ultran



Model	A	B	øC
USC-09	.96	1.12	ø1.69
USC-17	.96	1.68	ø1.12

NOTE: The High Load Ultran Slide needs increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable.

Shock Absorber (Linear Thruster Cylinders)



Dimensions

Bore	A	B	C	D	E	F
9/16" (02)	0.75	#6-32	1.14	0.25	1.65	1.88
3/4" (04)	0.88	#6-32	2.37	0.38	2.05	2.13
1-1/16" (09)	1	#8-32	3.68	0.38	2.87	3
1-1/2" (17)	1.25	#10-32	4.47	0.5	3.75	4
2" (31)	1.5	1/4-20	4.75	0.75	4.50 (TE) 5.50 (T)	4.75 (TE) 5.75 (T)

How to Size a Shock Absorber

Selecting the proper shock absorber model is accomplished using the shock absorber graph given for each Thruster bore. The intersection of the total energy per stroke "E_T", and velocity at shock absorber contact "V", indicates the proper shock absorber model. E_T is calculated by the equation given below using values determined for:

E_T (Total energy) equals the sum of E_K (Kinetic energy) and E_W (Work energy).

NOTE: the Work energy calculation varies with mounting position, E_{WH} Horizontal, or E_{WV} Vertical.

$E_K = ((W_U + (TF2 + (TF3 \times S))) / 772) \times V^2$ (Kinetic energy, in-lbs)

$E_{WH} = TF1 \times SF \times P$ (Work energy, in-lbs)

HORIZONTAL

$E_{WV} = ((TF1 \times P) + W_U + (TF2 + (TF3 \times S))) \times SF$ (Work energy, in-lbs)

VERTICAL

$E_T = E_K + E_W$ (Total energy per stroke, in-lbs)

$E_TC = E_T \times C$ (Total energy per hour, in-lbs/hr)

P	=	Air pressure (PSI)
V	=	Velocity at impact (in/sec)
S	=	Stroke of the Thruster (in)
W_U	=	Load attached to the Thruster mounting plate (lbs)
C	=	Cycles per hour
SF	=	Shock factor
TF1	=	Thruster factor #1
TF2	=	Thruster factor #2
TF3	=	Thruster factor #3

E_T and E_TC must not exceed maximum listed in specifications.

Example: determine the proper shock absorber for a model T-046 Thruster mounted vertically with an attached load of 15 lbs, operating air pressure of 80 PSI, and a velocity of 20 in/sec, at a cycle rate of 3,600 per hour.

P	=	80 PSI
V	=	20 in/sec
S	=	6 in
W_U	=	15 lbs
C	=	3,600 cycles/hr

From the charts for a 3/4" bore "T" series Thruster:

SF	=	0.410	
TF1	=	0.442	
TF2	=	0.632	
TF3	=	0.063	
E_K	=	$((15 \text{ lbs} + (0.632 + (0.063 \times 6 \text{ in}))) / 772) \times (20 \text{ in/sec})^2$	E_K = 8.30 in-lbs
E_{WV}	=	$((0.442 \times 80 \text{ PSI}) + 15 \text{ lbs} + (0.632 + (0.063 \times 6 \text{ in}))) \times 0.410$	E_{WV} = 21.06 in-lbs
E_T	=	$E_K + E_{WV}$ = 29.36 in-lbs	$E_TC = E_T \times C$ = 105,685 in-lbs/hr

Checking specifications chart, both E_T and E_TC are less than maximum. Per sizing graph for a model T-04 with 29.36 in-lbs total energy at 20 in/sec velocity, use a heavy duty model HS-04 shock absorbers.

Shock Absorber (Linear Thruster Cylinders)

T Series Thruster Calculation Constants

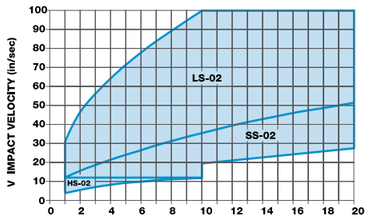
Model T					
Factor	**9/16"**	**3/4"**	**1-1/16"**	**1-1/2"**	**2"**
SF	0.250	0.410	0.630	0.880	1.000
TF1	0.249	0.442	0.887	1.767	3.142
TF2	0.310	0.632	1.675	3.874	7.444
TF3	0.028	0.063	0.111	0.174	0.250
(ET) max. in-lbs per cycle	20	45	190	400	650
(ET-C) max. in-lbs per hour	36,000	125,000	300,000	475,000	622,000

TE Series Thruster Calculation Constants

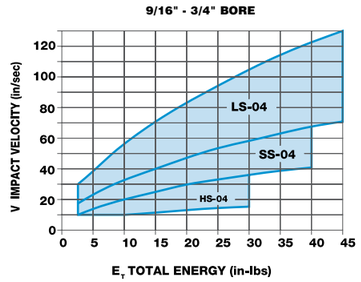
Model TE					
Factor	**9/16"**	**3/4"**	**1-1/16"**	**1-1/2"**	**2"**
SF	0.250	0.410	0.630	0.880	1.000
TF1	0.249	0.442	0.887	1.767	3.142
TF2	0.434	0.905	2.075	4.033	6.754
TF3	0.063	0.111	0.174	0.250	0.340
(ET) max. in-lbs per cycle	20	45	190	400	650
(ET-C) max. in-lbs per hour	36,000	125,000	300,000	475,000	622,000

Velocity vs. Load for Shock Absorbers

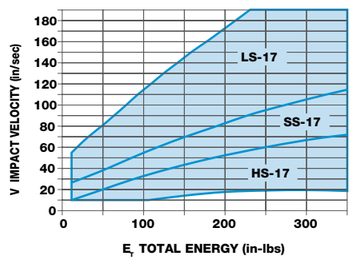
5/16" - 7/16" BORE



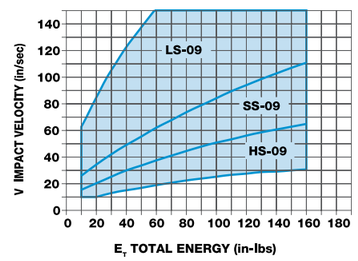
9/16" - 3/4" BORE



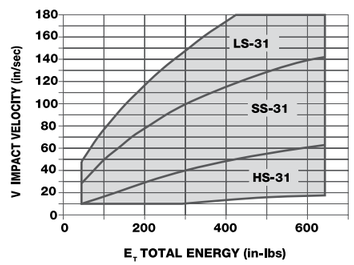
1-1/4" - 1-1/2" BORE



7/8" - 1-1/16" BORE

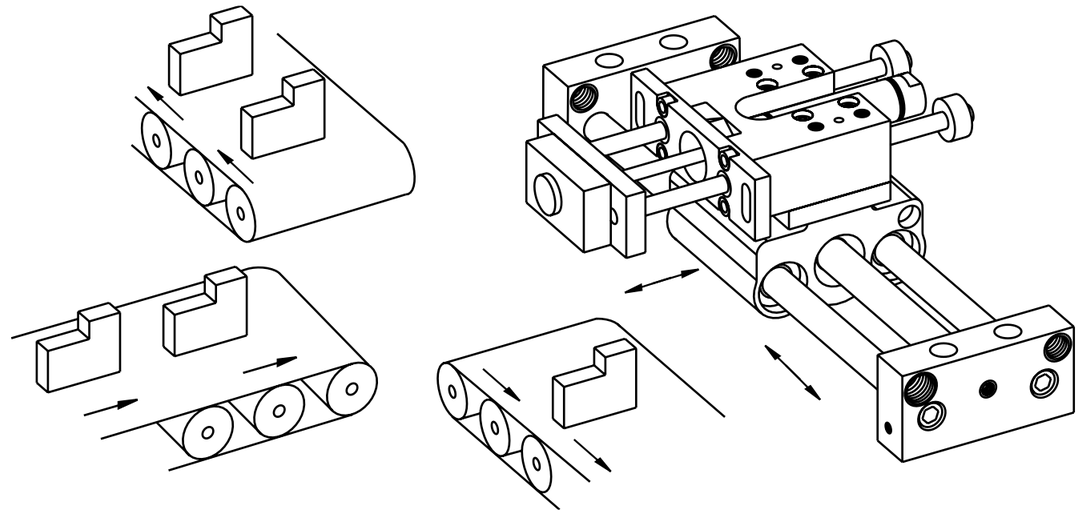


2" BORE



Transition Plates

Aluminum plates that couple Bimba actuators–Ultran® rodless cylinders, Pneu-Turn® rotary actuators, and Linear Thrusters–into a variety of multi-axis configurations.



The customer's attachment reads a bar code on the product to determine the required paint scheme. The Ultran Slide Rodless Cylinder and Linear Thruster picks the item off the incoming conveyor and places it on the appropriate out-going one.

How to Choose a Transition Plate

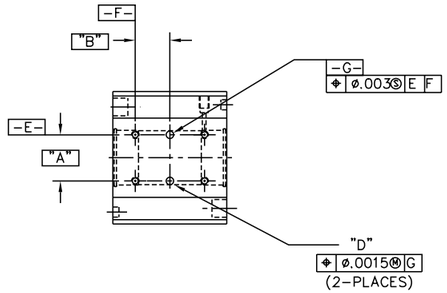
Page 596 shows how to build the Transition Plate model numbers. Choose the configuration (base product and coupled product) that best suits your application and turn to that section. It will describe the valid bore size combinations and provide basic dimensions, weights and prices for those Transition Plates. It will also show alignment of the products to help you determine the outside dimensions of your configuration, and provide information on the options you may need to include when ordering your actuators. Unless otherwise noted, all Transition Plates are designed for mounting hole center to center alignment.

NOTE: Actuators can be coupled together in the bore size combinations noted in each section. However, critical engineering specifications must be met for each specific application. In addition, for a precision positioning system, the deflection of the components should be compensated for by incorporating external adjustments into the system design. See the engineering specifications for the individual actuators for more information.

Transition Plates

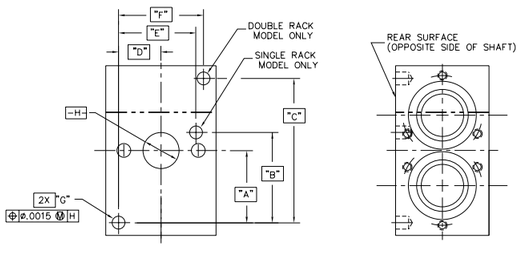
Dowel Pin Hole Locations

Ultran



Bore	A	B	D
020 (9/16")	1.000	.750	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.375	.876	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.750	1.250	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.500	1.750	.3145/.3155 x .560/.580 DP.

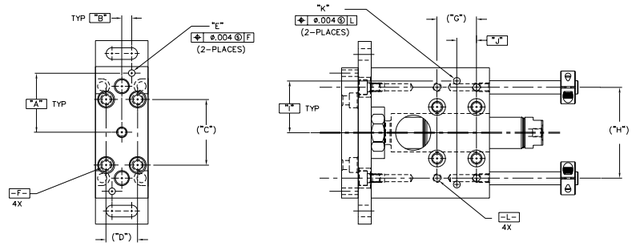
Pneu-Turn



Bore	A	B	C	D
020 (9/16")	.874	1.101	1.754	.500
040 (3/4")	1.061	1.330	2.125	.623
090 (1-1/16")	1.311	1.730	2.625	.718
170 (1-1/2")	1.811	2.281	3.625	.905
310 (2")	2.187	3.000	4.375	.625

Bore	E	F	G
020 (9/16")	.928	1.000	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.139	1.250	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.437	1.437	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	1.812	1.812	.3145/.3155 x .560/.580 DP.
310 (2")	1.813	1.250	.3770/.3780 x .560/.580 DP.

Linear Thruster



Bore	A	B	C	D	E	G	H	I	J	K
020 (9/16")	1.125	.188	1.250	.600	.1270/.1280 THRU.	.750	1.750	.8750	.375	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.313	.250	1.500	.750	.1895/.1905 THRU.	.938	2.125	1.1250	.469	.1895/.1905 x .290/.310 DP.
090 (1-1/16")	1.813	.375	2.000	1.000	.2520/.2530 THRU.	1.375	3.125	1.5625	.688	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.375	.500	3.000	1.500	.3145/.3155 THRU.	1.750	4.000	2.0000	.875	.3145/.3155 x .560/.580 DP.
310 (2")	3.000	.625	4.000	2.000	.3770/.3780 THRU.	2.125	5.000	2.5000	1.063	.3770/.3780 x .810/.830 DP.
310 (2") TE	2.500	.625	3.000	2.000	.3770/.3780 THRU.	2.000	4.250	2.1250	1.000	.3770/.3780 x .810/.830 DP.
500 (2-1/2")	3.750	1.000	4.750	3.000	.3770/.3780 THRU.	2.630	6.250	3.1250	1.312	.3770/.3780 x .1.000/1.020 DP.
500 (2-1/2") TE	3.250	.750	3.750	2.250	.3770/.3780 THRU.	2.500	5.375	2.6875	1.250	.3770/.3780 x .1.000/1.020 DP.
700 (3")	4.750	1.000	6.000	3.000	.5020/.5030 THRU.	4.000	8.000	4.0000	2.000	.5020/.5030 x .1.250/1.270 DP.
700 (3") TE	4.000	1.000	4.500	2.750	.5020/.5030 THRU.	3.000	6.500	3.2500	1.500	.5020/.5030 x .1.250/1.270 DP.

Transition Plates

Linear Thruster (Base Product) to Pneu-Turn Rotary Actuator (Coupled Product) Shaft Parallel*

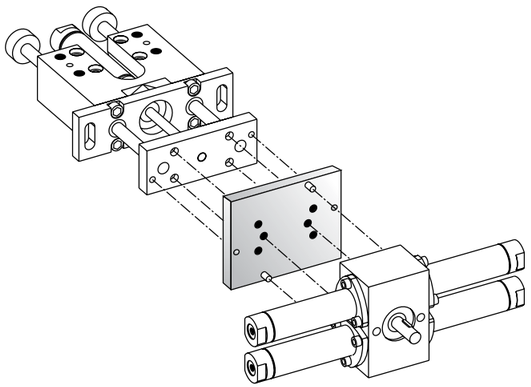
Pneu-Turn Rotary Actuator			Linear Thruster 9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
	9/16"	Single rack (006)	TPT02-PT006A TPT02-PT014A	TPT04-PT006A TPT04-PT014A			
		Double rack (014)					
	3/4"	Single rack (017)		TPT04-PT017A TPT04-PT033A	TPT09-PT017A TPT09-PT033A		
		Double rack (033)					
	1-1/16"	Single rack (037)			TPT09-PT037A TPT09-PT074A	TPT17-PT037A TPT17-PT074A	
		Double rack (074)					
	1-1/2"	Single rack (098)				TPT17-PT098A	TPT31-PT098A TPTE31-PT098A
		Double rack (196)				TPT17-PT196A	TPT31-PT196A TPTE31-PT196A
	2"	Single rack (247)					TPT31-PT247A TPTE31-PT247A
		Double rack (494)					TPT31-PT494A TPTE31-PT494A

NOTE: Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)
	Length (in)	Width (in)	Thickness (in)	
TPT02-PT006A TPT02-PT014A	2.50	2.00	0.28	0.14
TPT04-PT006A TPT04-PT014A	3.00	2.00	0.28	0.17
TPT04-PT017A TPT04-PT033A	3.00	2.50	0.36	0.26
TPT09-PT017A TPT09-PT033A	4.00	2.50	0.36	0.35
TPT09-PT037A TPT09-PT074A	4.00	3.12	0.47	0.58
TPT17-PT037A TPT17-PT074A	5.38	3.00	0.47	0.74
TPT17-PT098A TPT17-PT196A	5.38	4.25	0.72	1.61
TPT31-PT098A TPT31-PT196A	6.75	4.25	0.72	2.02
TPT31-PT247A TPT31-PT494A	6.75	5.00	0.72	2.38
TPTE31-PT098A TPTE31-PT196A	5.75	4.25	0.72	1.72
TPTE31-PT247A TPTE31-PT494A	5.75	5.00	0.72	2.03

Transition Plates

Linear Thruster (Base Product) to Pneu-Turn Rotary Actuator (Coupled Product) Shaft Parallel*



Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Linear Thruster (-D option); and the ball bearing (-R) and hardened shaft (-F) options must be selected for your Pneu-Turn Rotary Actuator (the ball bearing option includes dowel pin holes). For example, your order would include:

> T-096-DM
> PT-033180-FMR
> TPT09-PT017AD

This provides: a 1-1/16" bore, 6" stroke Linear Thruster with dowel pin holes and a magnetic piston; a single rack 3/4" bore, 180˚ Pneu-Turn with hardened shafts, magnetic piston, and ball bearing (with dowel pin holes); and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

Transition Plates

Pneu-Turn Rotary Actuator (Base Product) to Linear Thruster (Coupled Product) Shaft Perpendicular*

	Pneu-Turn Rotary Actuator					
		9/16" (006 or 014)	3/4" (017 or 033)	1-1/16" (037 or 074)	1-1/2" (098 or 196)	2" (247 or 494)
Linear Thruster	9/16" (02)	TPPT02-T02P				
	3/4" (04)		TPPT04-T04P	TPPT09-T04P		
	1-1/16" (09)			TPPT09-T09P	TPPT17-T09P	TPPT31-T17P
	1-1/2" (17)				TPPT17-T17P	TPPT31-T31P
	2" (31)					TPPT31-TE31P

NOTE: Two plates are needed for this configuration. Both plates will be included if part number TPP☐ - T☐P is ordered. If needed, part TPPT☐ can be ordered separately. Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown.

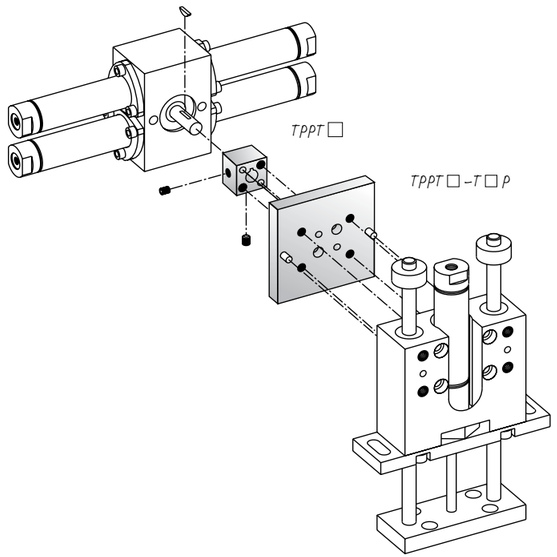
Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)
	Length (in)	Width (in)	Thickness (in)	
TPPT02-T02P	2.00	2.00	0.28	0.15
(includes TPPT02)	0.62	0.62	0.50	0.04
TPPT04-T04P	2.50	2.25	0.36	0.28
(includes TPPT04)	0.75	0.75	0.75	0.08
TPPT09-T04P	3.50	3.00	0.47	0.67
(includes TPPT09)	1.00	1.00	0.94	0.19
TPPT09-T09P	3.50	3.00	0.47	0.67
(includes TPPT09)	1.00	1.00	0.94	0.19
TPPT17-T09P	4.50	4.25	0.72	1.82
(includes TPPT17)	1.50	1.50	0.94	0.47
TPPT17-T17P	4.50	4.25	0.72	1.84
(includes TPPT17)	1.50	1.50	0.94	0.47
TPPT31-T17P	4.50	4.25	0.72	1.84
(includes TPPT31)	1.50	1.50	1.12	0.47
TPPT31-T31P	6.00	3.00	0.72	1.76
(includes TPPT31)	1.50	1.50	1.12	0.47
TPPT31-TE31P	5.25	3.00	0.72	1.60
(includes TPPT31)	1.50	1.50	1.12	0.47

NOTE: The key on the Pneu-Turn shaft is mounted in the 12 o'clock position, therefore, rotation of the Linear Thruster will be equal in the clockwise and counterclockwise directions. Please order sufficient angle of rotation, angle adjustment option or a Pneu-Turn rotary actuator with the key mounted in a special position as required for your application.

Transition Plates

Pneu-Turn Rotary Actuator (Base Product) to Linear Thruster (Coupled Product) Shaft Perpendicular*



* Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, the ball bearing (-R) and hardened shaft (-F) options must be selected for your Pneu-Turn Rotary Actuator (the -R option includes dowel pin holes), and the dowel pin option (-D) must be selected for your Linear Thruster. For example, your order would include:

> PT-247180-FMR
> T-096-DM
> TPPT31-T17PD

This provides: a single rack 2" bore, 180˚ Pneu-Turn with hardened shafts magnetic piston, and ball bearing (with dowel pin holes); a 1-1/2" bore, 6" stroke Linear Thruster with dowel pin holes and magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

Toleranced Clearance Hole Sizes	
TPPT02	.1270/.1280
TPPT04	.1895/.1905
TPPT09	.2520/.2530
TPPT17	.3145/.3155
TPPT31	.3145/.3155

NOTE: Dowel pins to attach part TPPT ☐ are not provided, although clearance holes are available for dowel pins.

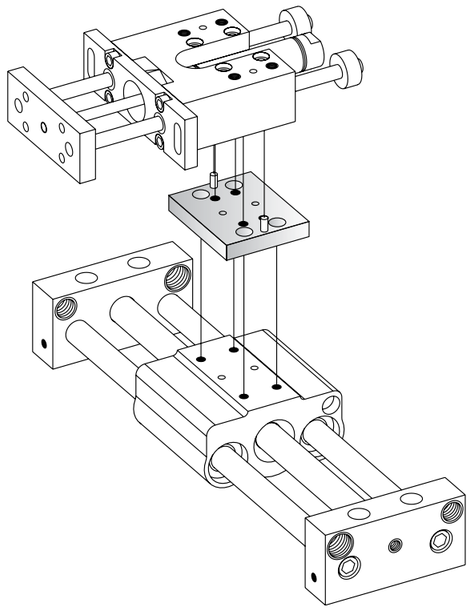
Transition Plates

Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product) Mounted Perpendicular*

Linear Thruster	Ultran Rodless Cylinder				
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)
	9/16" (02)	TPU02-T02P			
	3/4" (04)		TPU04-T04P	TPU09-T04P	
	1-1/16" (09)			TPU09-T09P	TPU17-T09P
	1-1/2" (17)				TPU17-T17P

NOTE: Use model numbers shown for both T and TE Series Linear Thrusters. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)
	Length (in)	Width (in)	Thickness (in)	
TPU02-T02P	2.00	2.00	0.28	0.11
TPU04-T04P	2.50	2.25	0.36	0.20
TPU09-T04P	3.50	3.00	0.47	0.48
TPU09-T09P	3.50	3.00	0.47	0.48
TPU17-T09P	4.50	4.25	0.72	1.35
TPU17-T17P	4.50	4.25	0.72	1.35



Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Ultran rodless cylinder and Linear Thruster (-D option). For example, your order would include:

> UGS-0915-ADT
> T-096-DM
> TPU09-T09PD

This provides: 1-1/16" bore, 15" stroke Ultran Slide with gold coupling strength, stroke adjustment on both ends, dowel pin holes and switch track; a 1-1/16" bore, 6" stroke, Linear Thruster with dowel pin holes and a magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

* Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

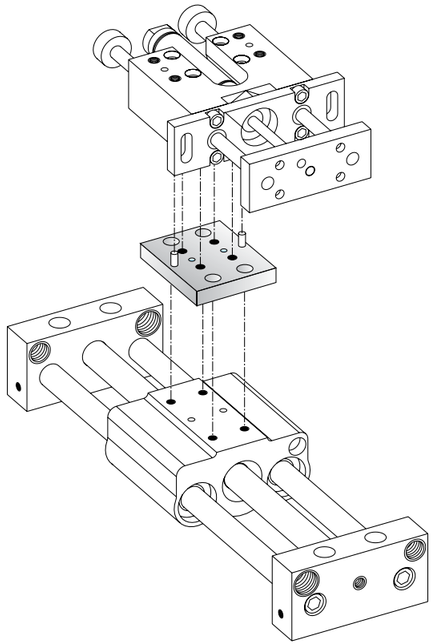
Transition Plates

Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product) Mounted Parallel*

Linear Thruster	Ultran Rodless Cylinder				
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)
	9/16" (02)	TPU02-T02A			
	3/4" (04)		TPU04-T04A	TPU09-T04A	
	1-1/16" (09)			TPU09-T09A	TPU17-T09A
	1-1/2" (17)				TPU17-T17A

NOTE: Use model numbers shown for both T and TE Series Linear Thrusters. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)
	Length (in)	Width (in)	Thickness (in)	
TPU02-T02A	2.00	2.00	0.28	0.11
TPU04-T04A	2.50	2.25	0.36	0.20
TPU09-T04A	3.50	3.00	0.47	0.48
TPU09-T09A	3.50	3.00	0.47	0.48
TPU17-T09A	4.50	4.25	0.72	1.35
TPU17-T17A	4.50	4.25	0.72	1.35



Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Ultran rodless cylinder and Linear Thruster (-D option). For example, your order would include:

> UGS-0915-ADT
> T-096-DM
> TPU09-T09AD

This provides: 1-1/16" bore, 15" stroke Ultran Slide with gold coupling strength, stroke adjustment on both ends, dowel pin holes and switch track; a 1-1/16" bore, 6" stroke, Linear Thruster with dowel pin holes and a magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

* Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

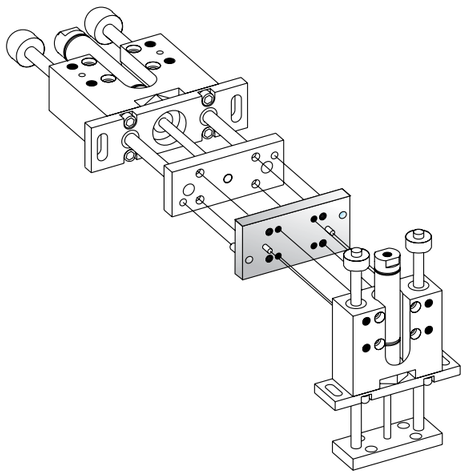
Transition Plates

Linear Thruster (Base Product) to Linear Thruster (Coupled Product) Mounted Perpendicular*

Linear Thruster	Linear Thruster					
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
	9/16" (02)	TPT02-T02P	TPT04-T02P			
	3/4" (04)		TPT04-T04P	TPT09-T04P		
	1-1/16" (09)			TPT09-T09P	TPT17-T09P	
	1-1/2" (17)				TPT17-T17P	TPT31-T17P TPTE31-T17P
	2" (31)					TPT31-T31P TPTE31-TE31P

NOTE: Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)
	Length (in)	Width (in)	Thickness (in)	
TPT02-T02P	2.50	1.50	0.28	0.10
TPT04-T02P	3.00	1.50	0.36	0.16
TPT04-T04P	3.00	1.50	0.36	0.16
TPT09-T04P	4.25	2.00	0.47	0.39
TPT09-T09P	4.25	2.00	0.47	0.39
TPT17-T09P	5.50	3.00	0.72	1.16
TPT17-T17P	5.50	3.00	0.72	1.16
TPT31-T17P	7.00	3.00	0.97	2.00
TPT31-T31P	7.00	4.50	0.97	2.99
TPTE31-T17P	6.00	3.00	0.97	1.71
TPTE31-TE31P	6.00	4.50	0.97	2.57



Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Linear Thrusters (-D option). For example, your order would include:

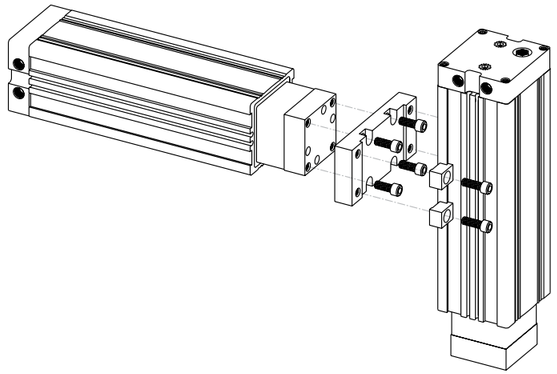
> T-096-DM
> T-042-DM
> TPT09-T04PD

This provides: a 1-1/16" bore, 6" stroke Linear Thruster with dowel pin holes and a magnetic piston; a 3/4" bore, 2" stroke Linear Thruster with dowel pin holes and magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

* Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

Transition Plates

PneuMoment to PneuMoment



Mounting Kits

Model Number	Type
TPPM09-PM09	Imperial
TPPMM09-PMM09	Metric

Kits Include: the plate, four clamps and four S.H.C.S.

Components

Plates:	Anodized aluminum alloy. Part TPPT □, for Rotary Actuator to Linear Thruster configuration, is 303 stainless steel.
Socket head cap screws and socket set screws:	Heat treated high alloy Grade 8 carbon steel with black oxide coating.
Dowel pins:	Hardened and ground carbon steel alloy with black oxide coating.

Recommended Seating Torque

Recommended Seating Torque (in/lbs)		
Nominal Diameter - Threads per Inch	**Socket Head Cap Screws**	**Socket Set Screws**
8-32	20	15
10-24	35	25
1/4-20	60	50
5/16-18	125	100
3/8-16	225	N/A

Transition Plates

Sizing a Multi-Axis Configuration

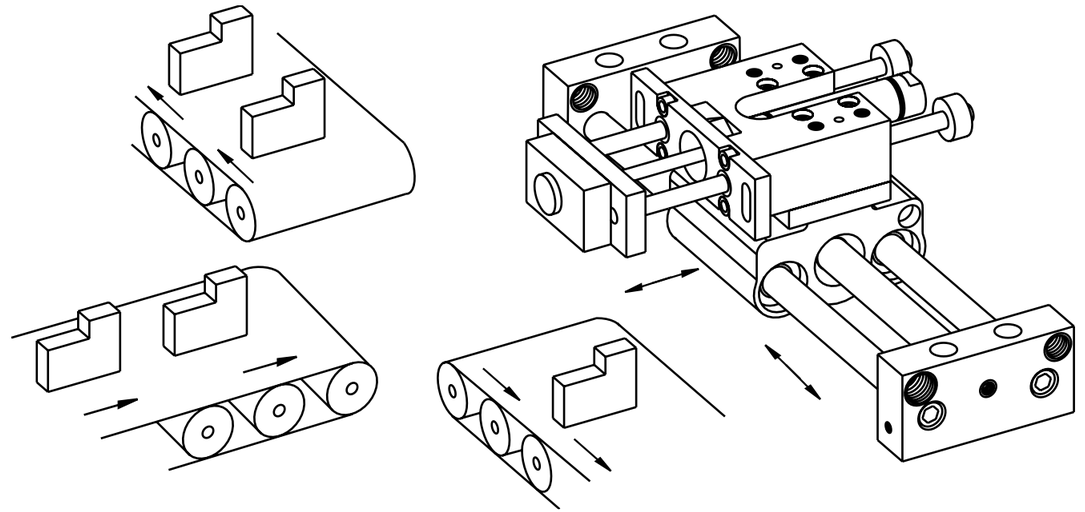
General Comments:

Selection of the actuators and the transition plates that connect them is the most important part of engineering a motion system. To begin the sizing of individual actuators into a complete motion system, you should begin at your attachment or item to move. As you select the type of Bimba product to use, be sure to reference the size and engineering data in this bulletin and in the individual product catalogs. We recommend the following method:

1. Determine the weight and center of gravity of your attachment or item to move.
2. Determine the best actuator to be connected to your attachment or item to create the desired movement.
3. Determine the size of the actuator by referencing the engineering data in this catalog and in the specific product catalog. Select the product by its load, moment, torque, and speed capability as compared to those required by your application. Remember to add in any loads, moments or torques created by any attached actuators.
4. Select the next actuator that will create movement you need.
5. Continue with steps 3 through 5 until all the motion requirements are satisfied.

In the case of a precision positioning system, the deflection of the components should be compensated for by incorporating external adjustments into the system design.

Sizing Example:



Transition Plates

Sizing a Multi-Axis Configuration

An example of a motion system is shown on page 595 using an Ultran Slide rodless cylinder combined with a Linear Thruster by means of a Transition Plate. The application requires a product to be painted in one of two paint colors. The product coming down the conveyor is identified by a bar code which indicates the required paint color. The Linear Thruster extends to the end of its six inch stroke and picks the product by means of a vacuum system. The Linear Thruster retracts three inches before the Ultran Slide begins to move in the direction of one of the two outgoing conveyors. The slide must move eight inches in either direction from its center position to place the product on an outgoing conveyor which will send it to a specific paint booth.

To begin the sizing, we will start with the item that is to be moved. Each product weighs 5lbs and has flat surfaces that allow a vacuum gripper to grasp and lift it from the incoming conveyor. The center of gravity of the product is 3" from the grip surface and in the middle of the product width and height. The vacuum gripper weighs 1lb and has a center of gravity that is .75" from the tooling plate surface and in the middle of its width and height. The gripper is mounted on the center of the Linear Thruster tooling plate. A Linear Thruster with a 6" stroke is chosen to move the product. The combined weight of the product and gripper is 6lbs. Comparing the 6lb load to the maximum side load table for a standard Linear Thruster with a 6" stroke, a 3/4" bore unit has the capability of 11.09lbs. This should be sufficient to handle the 6lb load and take into account any light, unforeseen loads. Since the product and gripper will be centered on the tooling plate, there are no radial moments. The 3/4" bore Linear Thruster will be chosen as the coupled unit.

An Ultran Slide was chosen to move the Linear Thruster, vacuum gripper and product into position on an outgoing conveyor. The 3/4" bore Linear Thruster will be fastened to the center of the Ultran Slide carriage by means of a Transition Plate. The Ultran Slide must carry the load of the Transition Plate (0.20lb), Linear Thruster (2.82lbs), the gripper (1lb), and the product (5lbs) The total weight the Ultran Slide will move is 9.02lbs Comparing this to the maximum allowable radial loads for 16" stroke Ultran Slides, a 3/4" bore unit can carry approximately a 20lb load. The Linear Thruster is fully extended when it picks the product from the incoming conveyor, then retracts 3" before the Ultran begins to move toward an out-going conveyor. In this case, the dynamic side loading conditions on the Ultran Slide will be determined when the Linear Thruster has retracted 3". Since the Linear Thruster has retracted to half of its stroke length, the guide shafts are extending the same amount from each side of the Linear Thruster body. In this case there is no side load because of the guide rods. The actual side load created by the product, gripper, and Linear Thrusters are found by rearranging and solving the equation found on page 595 and then comparing the result to the 20lb limit.

Transition Plates

Sizing a Multi-Axis Configuration

Side Load = ∑ Actual Load* [2* [(Y1/Z+ 1]]

Actual Loads: product - 5lbs
gripper - 1lb
Linear Thruster tooling plate - .40lb

Side Load = 5lbs *[2* [(8.25 in/2.518 in) + 1]] +
1lb * [2* [(4.50 in/2.518 in) + 1]] +
.40lb * [2* [(3.56 in/2.518 in) + 1]]

Side Load 3/4" bore = 50.25lbs

This side load is greater than the 20lb maximum for a side loading condition on a 3/4 bore Ultran Slide. The next larger Ultran Slide, 1-1/16" inch bore, has a side load capability of approximately 55lbs. This Slide will be reviewed for the side load condition using the equation above.

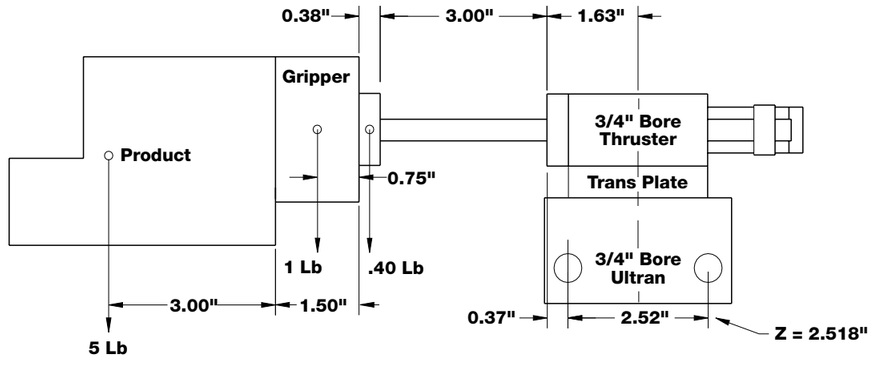
Side Load1-1/16 bore = 42.48lbs

This side load is within the capability of an 1-1/16 inch bore Ultran Slide and this unit will be chosen as the base unit. Other considerations in choosing a model include:

1. The need for a Hall Effect switch that will signal a controller when the Linear Thruster has retracted three inches. Also, external bumpers will be used to soften the impact at end-of-stroke.
2. Hall Effect Switches will be used for end-of-stroke and mid-stroke signalling on the Ultran Slide rodless cylinder.
3. Dowel pins will be used with the Transition Plate.

Thus the products selected will be:

Linear Thruster	T-046-EB2MD
Ultran Slide rodless cylinder	USS-0916-TD
Transition Plate	TPU09-T04PD



Transition Plates

The model number of all Transition Plates consists of two alphanumeric clusters. The first cluster designates product type, base product and bore size of the base product. The second cluster designates coupled product and bore size of the coupled product, mounting orientation, and an optional character for dowel pins. Please refer to the charts below for an example of model number TPU17-T09PD. This is a transition plate for a 1-1/2" bore Ultran rodless cylinder that will be coupled to a 1-1/16" bore Linear Thruster (ball bearing), in a perpendicular orientation, with dowel pins.

Model	
TP	Transition Plate

Base Product Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"

Mounting Orientation[3]	
A	Axial (parallel)
P	Perpendicular

Dowel Pin[3]	
Blank	No dowel pin
D	Dowel pin

TP U 17 - T 09 P D

Base Product	
U	Ultran Slide Rodless Cylinder
T[1]	Linear Thruster, Ball Bearing
TE[1]	Linear Thruster, Composite Bearing
PT[2]	Pneu-Turn Rotary Actuator
PM	PneuMoment (imperial)[3]
PMM	PneuMoment (metric)[3]

Coupled Product	
U	Ultran Rodless Cylinder
T[1]	Linear Thruster, Ball Bearing
TE[1]	Linear Thruster, Composite Bearing
PT[2]	Pneu-Turn Rotary Actuator
PM	PneuMoment (imperial)
PMM	PneuMoment (metric)

Coupled Product Bore Size	
02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"
For Pneu-Turn	
006	9/16" single rack
014	9/16" double rack
017	3/4" single rack
033	3/4" double rack
037	1-1/16" single rack
074	1-1/16" double rack
098	1-1/2" single rack
196	1-1/2" double rack
247	2" single rack
494	2" double rack

NOTE: See sections on specific configurations for more information on valid product combinations.

[1] As shown on the following pages, use the "T" designation for either T or TE Series Linear Thruster, except where the TE is specifically called out.
[2] Pneu-Turn Rotary Actuator must be ordered with both the ball bearing (-R) and the hardened shaft (-F) options.
[3] PneuMoment to PneuMoment only. Mounting orientation and dowel pin do not apply. Only available for the 1-1/16" bore.

Transition Plates are attached to the base and coupled products with socket head cap screws and socket set screws. Screws are included with the Transition Plate. Dowel pins can be ordered as an option for ease of assembly and/or improved shear loading.

Alignment Couplers

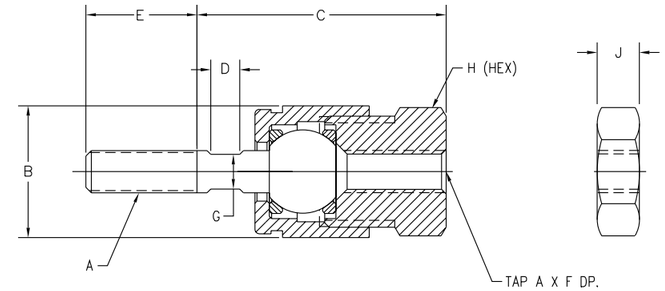
Features and Advantages



- Bimba's miniature coupler design allows excellent freedom of movement on the three new, miniature sizes; #5-40 through #10-32 sizes.
- The miniature couplers allow up to 20° of spherical movement and 0.02" lateral allowance with only .002" of axial play, and are manufactured from high tensile, hardened and blackened steel components.
- Larger sizes are available, from 1/4"-28 to 1"-14, with 1° of spherical movement and 1/16" of lateral allowance.
- The alignment allowances can eliminate the need for expensive precision machining in rigidly mounted applications.
- Alignment couplers help reduce binding and simplify field alignment problems, enhancing cylinder performance and reducing seal and bearing wear.
- An innovative design to resist vibrational loosening is available on sizes 5/16"-24 and larger. In the ACH style coupler, a slot is milled through the tapped mounting threads. Two socket head cap screws are strategically placed to allow the coupler to be clamped to the rod, offering superior strength connection.

Dimensions

Models #5-40 through #10-32



Model*	A	B	C	D	E	F
AC5-40	#5-40	15/32"	31/32"	1/8"	3/8"	3/8"
AC8-32	#8-32	17/32"	31/32"	1/8"	3/8"	3/8"
AC10-32	#10-32	19/32"	1-1/8"	1/8"	1/2"	1/2"

Model*	G	H	J	Maximum Pull at Yield (lbs)	Alignment Allowance		Weight (oz)
					Lateral	Spherical	
AC5-40	1/8"	3/8"	1/8"	200	0.02	20°	0.3
AC8-32	1/8"	7/16"	1/8"	650	0.02	10°	0.5
AC10-32	5/32"	1/2"	1/8"	1200	0.02	10°	0.8

* Specify SS at the end of the part number for Stainless Steel.

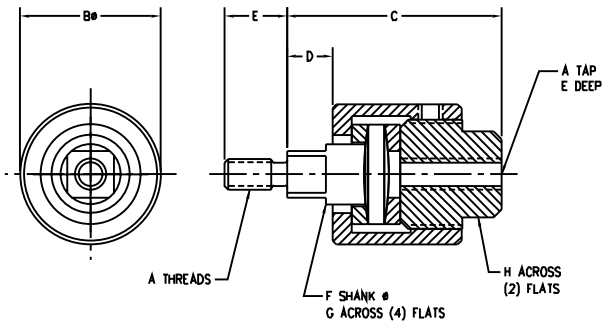
Additional Jam Nuts

Size	Part Number	Stainless Steel Part No.
#5-40	D-3745	D-3745-SS
#8-32	D-D0737	D-D0737-SS
#10-32	D-5288	D-5288-SS

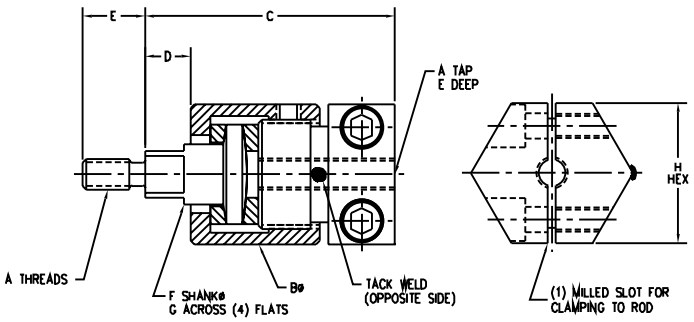
Alignment Couplers

Models 1/4"-28 through 1"-1/4

Standard Coupler
AC250-AC1000



ACH Coupler
ACH312-ACH1000



1/16" of lateral allowance
1° spherical movement

Part Number	A	B	C	C Hex	D	E	F	G	H	H Hex	Maximum Pull at Yield (lbs)
AC250	1/4"-28	1-1/8"	1-3/4"	--	3/8"	1/2"	1/2"	3/8"	11/16"	--	6,000
AC312	5/16"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8,300
AC375	3/8"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8.300
AC437	7/16"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	10,000
AC500	1/2"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	14,000
AC625	5/8"-18	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	19,000
AC750	3/4"-16	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	34,000
AC875	7/8"-14	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	39,000
AC1000	1"-14	2-1/2"	2-15/16"	2-15/16"	7/16"	1-5/8"	1-11/32"	1-5/32"	1-5/8"	2-1/2"	64,000

Please specify AC, ACH coupler when ordering AC750 (Standard Coupler) ACH750 (Hex Coupler)
Please specify – SS at the end of the part number for Stainless Steel.
Jam nut sold separately for 1/4"-28 through 1"-14 size
*SS valid for AC models only

Jam Nuts

Size	Part Number Standard	Stainless Steel Part No.
1/4"-28	D-344	D-344-SS
5/16"-24	D-746	D-746-SS
3/8"-24	D-801	D-801-SS
7/16"-20	D-154	D-154-SS
1/2"-20	D-98	D-98-SS
5/8"-18	D-9	D-9-SS
3/4"-16	D-3556	D-3556-SS
7/8"-14	D-2545	D-2545-SS
1"-14	D-1331	D-1331-SS

For further information, scan this QR code or visit
www.bimba.com

7 **ORIGINAL LINE CYLINDERS**



139 **FLAT CYLINDERS**



291 **LINEAR THRUSTERS**



335 **PNEUMOMENT™**



355 **ROTARY ACTUATORS**



383 **ULTRAN CYLINDERS**



431 **HEAVY DUTY ROUND LINE CYLINDERS**



459 **POSITION FEEDBACK CYLINDERS**



495 **SPECIALTY CYLINDERS**



503 **MAGNETIC SWITCH PRODUCTS**



555 **RELATED PRODUCTS**



Due to our policy of continuous development, Bimba reserve the right to change specifications without prior notice.

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