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This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

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2A/2AN Series

Heavy Duty Air Cylinders



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Piston Rod Stud –
 Furnished on 2" diameter rods and smaller when standard style #4 rod end threads are required. Also available in 2 times the catalog "A" dimension length. Studs have rolled threads and are made from high strength steel. Anaerobic adhesive is used to permanently lock the stud to the piston rod.

Primary Seal –
 Unique Serrated Lipseal™ is a proven leakproof design, completely self-compensating and self-relieving to withstand variations and conform to mechanical deflection that may occur.

Steel Head – Bored and grooved to provide concentricity for mating parts.

Ports – NPTF ports are standard.

Piston Rod – Medium carbon steel, induction case-hardened, hard chrome-plated and polished to 10 RMS finish. Piston rods are made from 90,000 to 100,000 PSI minimum yield material in 1/2" through 4" diameters. Larger diameters vary between 57,000 and 90,000 PSI minimum material, depending on rod diameter. The piston thread equals the catalog style #4 rod end thread for each rod diameter to assure proper piston-to-rod thread strength. Two wrench flats are provided for rod end attachment.

Steel Cap – Bored and grooved to provide concentricity for mating parts.

Ports – NPTF ports are standard.

End Seals – Pressure-actuated cylinder body-to-head and cap "O" rings.

Alloy Steel Tie Rod Nuts



"Jewel" Rod Gland Assembly – Externally removable without cylinder disassembly. Long bearing surface is inboard of the seals, assuring positive lubrication from within the cylinder. An "O" ring is used as a seal between gland and head, and also serves as a prevailing torque-type lock.

Secondary Seal –
 Double-Service Wiperseal™ acts as a secondary pressure seal on the extend stroke and cleans the rod on the return stroke.

High Strength Tie Rods – Made from 100,000 PSI minimum yield steel with rolled threads for added strength.

Adjustable Floating Cushions – Cushions are optional and can be supplied at head end, cap end, or both ends without change in envelope or mounting dimensions.

Align-A-Groove –
 (Patent #3043639) – A 3/16" wide surface machined at each end of the cylinder body. Makes precise mounting quick and easy.

The Cylinder Body –
 Hard chrome-plated bore, steel tubing honed to a 15 micro inch finish on 1-1/2" through 14" bore sizes. 1" bore size is aluminum with hard-coated bore.

One-Piece Nodular Iron Piston – The wide piston surface contacting cylinder bore reduces bearing loads. Anaerobic adhesive is used to permanently lock and seal the piston to the rod.

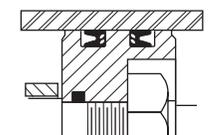
Pistons on Cylinder Bores 8" and larger come standard with a wear band to ensure long service life.

Piston Lipseal – Fully dynamic and self-compensating for variations in pressure, mechanical deflections and wear.

Prelubricated Wearing Surfaces

Parker Series 2A Air Cylinders are factory prelubricated. Lube-A-Cyl applied to seals, piston, cylinder bore, piston rod and gland surfaces provides lubrication for normal operation. Lube-A-Cyl has been field and laboratory tested, and is recommended by Parker for air cylinders where lubricant should remain in the cylinder and not be expelled into the atmosphere.

Piston with Retainer Nut –
 Optional at extra charge.

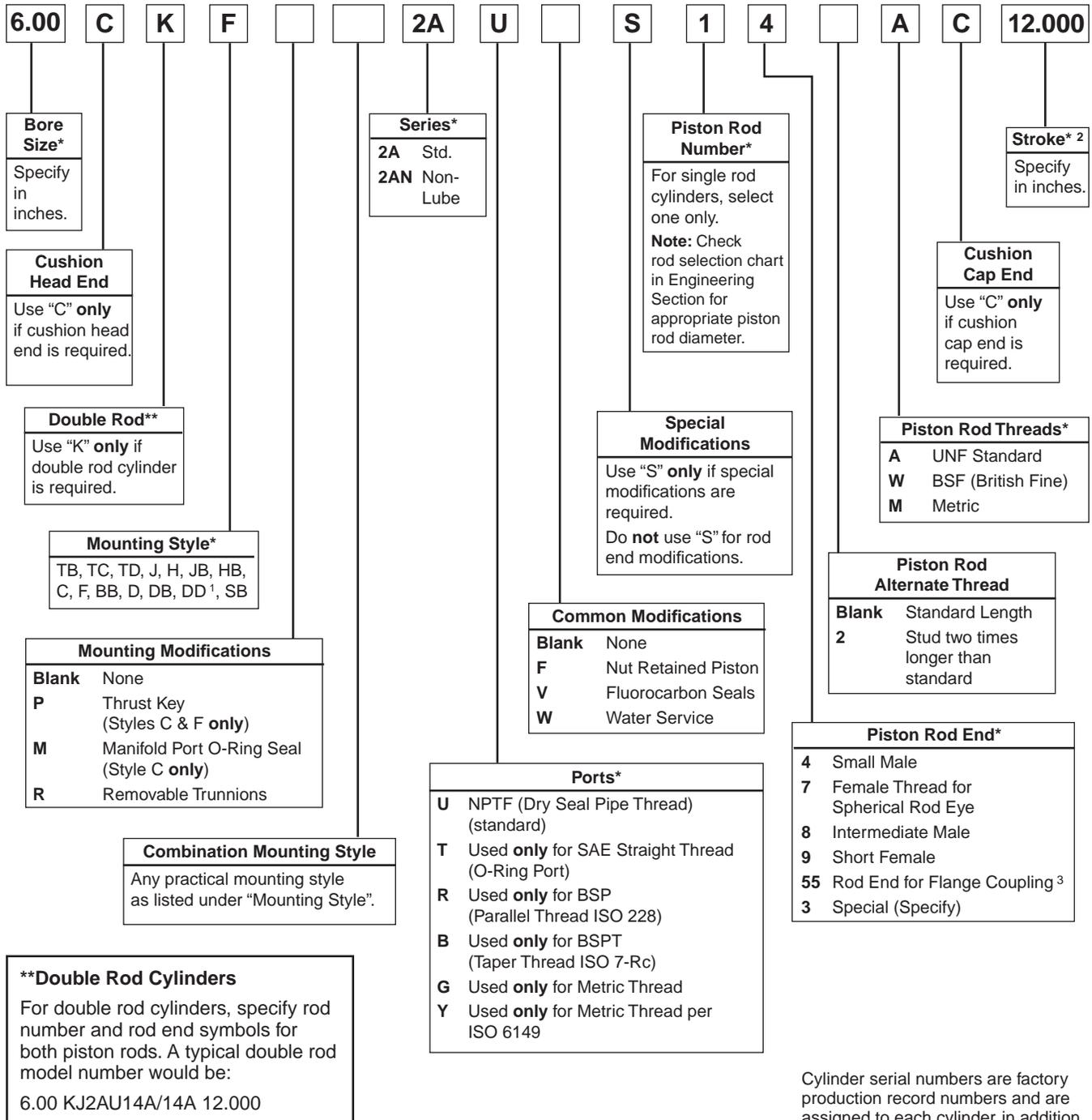


For guided version of the 2A cylinder, please see the HB Series in Section F.



Series 2A Model Numbers – How to Develop Them – How to “Decode” Them

Parker Series 2A cylinders can be completely and accurately described by a model number consisting of coded symbols. To develop a model number, select only those symbols that represent the cylinder required, and place them in the sequence indicated below.

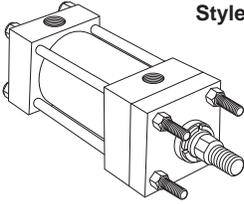
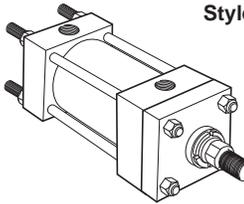
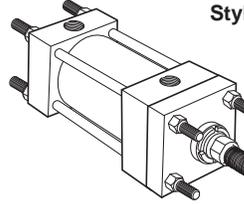
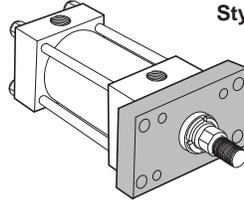
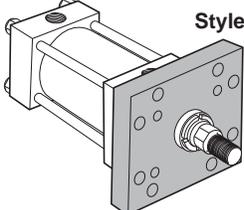
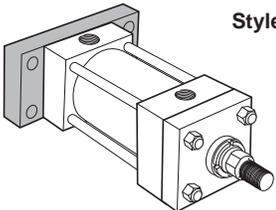
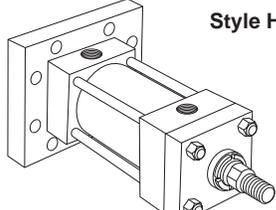
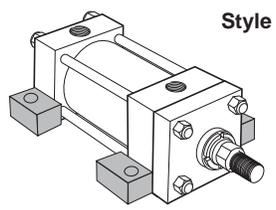
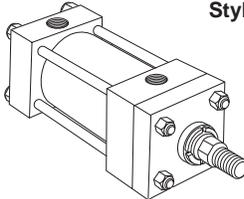
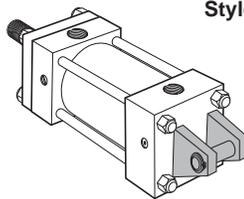
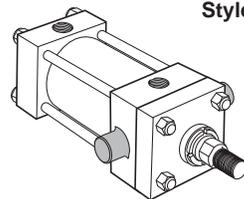
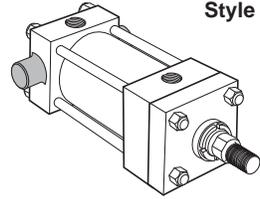
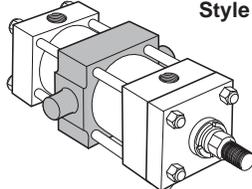
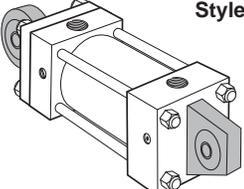
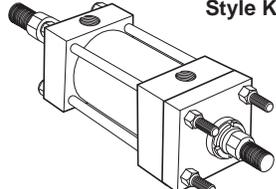


Cylinder serial numbers are factory production record numbers and are assigned to each cylinder in addition to the model number.

NOTE: For sensor specifications and part numbers, please see the Electronic Sensors section.

* Required for Basic Cylinder Model Number
 1 Specify XI dimension
 2 In case of Stop Tube, call out gross stroke length (net stroke + stop tube length).
 3 For information regarding Style 55 Rod Ends, please refer to page B205.

Available Mounting Styles

<p>Tie Rods Extended Head End Style TB</p>  <p>(NFPA MX3) 1"-6", Pg B180 7", B190 8"-14", Pg B192</p>	<p>Tie Rods Extended Cap End Style TC</p>  <p>(NFPA MX2) 1"-6", Pg B180 8"-14", Pg B192</p>	<p>Tie Rods Extended Both Ends Style TD</p>  <p>(NFPA MX1) 1"-6", Pg B180 8"-14", Pg B192</p>	<p>Head Rectangular Flange Style J</p>  <p>(NFPA MF1) 1"-6", Pg B180</p>
<p>Head Square Flange Style JB</p>  <p>(NFPA MF5) 1"-6", Pg B182 7", B190 8"-14", Pg B192</p>	<p>Cap Rectangular Flange Style H</p>  <p>(NFPA MF2) 1"-6", Pg B180</p>	<p>Cap Square Flange Style HB</p>  <p>(NFPA MF6) 1"-6", Pg B182 7", B190 8"-14", Pg B192</p>	<p>Side Lug Style C</p>  <p>(NFPA MS2) 1"-6", Pg B184 7", B191 8"-14", Pg B194</p>
<p>Side Tapped Style F</p>  <p>(NFPA MS4) 1"-6", Pg B184 8"-14", Pg B196</p>	<p>Cap Fixed Clevis Style BB</p>  <p>(NFPA MP1) 1"-6", Pg B188 7", B191 8"-14", Pg B198</p>	<p>Head Trunnion Style D</p>  <p>(NFPA MT1) 1"-6", Pg B186"- 14", Pg B200</p>	<p>Cap Trunnion Style DB</p>  <p>(NFPA MT2) 1"-6", Pg B186 7", B191 8"-14", Pg B200</p>
<p>Intermediate Fixed Trunnion Style DD</p>  <p>(NFPA MT4) 1-1/2"- 6", Pg B186 8"-14", Pg B200</p>	<p>Spherical Bearing Style SB</p>  <p>1-1/2"- 6", Pg B202 8"-14", Pg B203</p>	<p>Double Rod Cylinders Style KTB Shown</p>  <p>Most of the above illustrated mounting styles are available in double rod cylinders. See Catalog page B174.</p>	

When ordering Series 2A cylinders, please review the following:

Note: Duplicate cylinders can be ordered by giving the SERIAL NUMBER from the nameplate of the original cylinder. Factory records supply a quick positive identification.

Piston Rods: Specify rod code number based on diameter. Give thread style number for a standard thread or specify dimensions. See "Style 3 Rod End" below.

Cushions: If cushions are required specify according to the model number on the next page. If the cylinder is to have a double rod and only one cushion is required, be sure to specify clearly which end of the cylinder is to be cushioned.

Special Modifications: Additional information is required on orders for cylinders with special modifications. This is best handled with descriptive notes. For further information, consult factory.

Fluid Medium: Series 2A hydraulic cylinders are equipped with seals for use with lubricated air.

Class 1 Seals

Class 1 seals are the seals provided as standard in a cylinder assembly unless otherwise specified. For further information on fluid compatibility or operating limitations of all components, see section C.

For the 2A series cylinders the following make-up Class 1 Seals:
Primary Piston Rod Seal – Nitrile with PTFE back-up washers

Piston Rod Wiper – Nitrile
Piston Seals – Nitrile with polymyte back-up washers
O-Rings – Nitrile

Combination Mountings

Single Rod End The first mounting is the one called out on the head end of the cylinder. The second or subsequent mountings are called out as they appear in the assembly moving away from the rod end. Exception: When tie rod mountings are part of a combination, the model number should contain an "S" (Special) in the model code and a note in the body of the order clarifying the mounting arrangement. The "P" is used to define a thrust key and is not considered to be a mounting. However, it is located at the primary end.

Example: 4.00 CCBB2ALTS14AC x 10.000

Combination "C" mounting head only. "BB" mounting cap end
This cylinder is also cushioned at both ends.

Double Rod End In general, the model number is read left to right corresponding to the cylinder as viewed from left to right with the primary end at rod end #1. See Double Rod Models information

page in this section. For this option the piston rod number, piston rod end, and piston rod threads are to be specified for both ends. The simplest are for symmetric cylinders such as: TD, C, E, F, G, and CB mounts. All other mounting styles, the description of the first rod end will be at the mounting end. In the case of multiple mounts, the description of the first rod end will be at the primary mounting end. For "DD" mounts, the description of the first rod end will be the same location as the "XI" dimension.

Example: 4.00 KDD2ALT24A/18A x 10.000 XI=8

This is a center trunnion mounting cylinder with the XI dimension measured from the code 2 rod side of the cylinder which has the style 4 thread. The opposite end code 1 rod with the style 8 thread.

Style 3 Rod End

A style 3 rod end indicates a special rod end configuration. All special piston rod dimensions must have **all three:** KK; A; W/WF or LA/LAF specified with the rod fully retracted. A sketch or drawing should be submitted for rod ends requiring special machining such as snap ring grooves, keyways, tapers, multiple diameters, etc. It is good design practice to have this machining done on a diameter at least 0.065 inches smaller than the piston rod diameter. This allows the piston rod to have a chamfer preventing rod seal damage

during assembly or maintenance. Standard style 55 rod ends with a longer than standard WG dimension should call out a style 3 rod end and the note: **same as 55 except WG=_____**. A drawing should be submitted for special 55 rod ends that have specific tolerances or special radii. Special rod ends that have smaller than standard male threads, larger than standard female threads, or style 55 rod ends with smaller than standard AF or AE dimensions are to be reviewed by Engineering for proper strength at operating pressure.

Service Policy

On cylinders returned to the factory for repairs, it is standard policy for the Cylinder Division to make such part replacements as will put the cylinder in as good as new condition. Should the condition of the returned cylinder be such that expenses for repair would exceed the costs of a new one, you will be notified.

Address all correspondence and make shipments to, Service Department at your nearest regional plant listed in the pages of this catalog.

Certified Dimensions

Parker Cylinder Division guarantees that all cylinders ordered from this catalog will be built to dimensions shown. All dimensions are certified to be correct, and thus it is not necessary to request certified drawings.

Standard Specifications

- Heavy Duty Service – ANSI/(NFPA) T3.6.7R2-1996 Specifications and Mounting Dimension Standards
- Standard Construction – Square Head – Tie Rod Design
- Nominal Pressure – Up to 250 PSI Air Service
- Standard Fluid – Filtered Air
- Standard Temperature* – -10°F to +165°F
- Bore Sizes – 1" through 14" (Larger sizes available)**
- Piston Rod Diameter – 1/2" through 5-1/2" **
- Mounting Styles – 15 standard styles at various application ratings
- Strokes – Available in any practical stroke length
- Cushions – Optional at either end or both ends of stroke. "Float Check" at cap end.
- Rod Ends – Three Standard Choices – Specials to Order

* See page A4, "Operating Fluids and Temperature Range" for higher temperature service.

** See table below for standard bore sizes and available piston rod diameters.

NOTE: Series 2A Air Cylinders fully meet ANSI/(NFPA) T3.6.7R2-1996 Specifications and Mounting Dimension Standards for Square Head Industrial Fluid Power Cylinders. Parker Style TB, JB, HB, C, DB, and BB are available in 7" bore size, see pages C190-C191.

In line with our policy of continuing product improvement, specifications in this catalog are subject to change.

Available Bore Sizes and Piston Rod Diameters

Bore Size	Piston Rod Diameter												
	1/2"	5/8"	1"	1-3/8"	1-3/4"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"
1"	●	●											
1-1/2"		●	●										
2"		●	●	●									
2-1/2"		●	●	●	●								
3-1/4"			●	●	●	●							
4"			●	●	●	●	●						
5"			●	●	●	●	●	●	●				
6"				●	●	●	●	●	●	●			
8"				●	●	●	●	●	●	●	●	●	●
10"					●	●	●	●	●	●	●	●	●
12"						●	●	●	●	●	●	●	●
14"							●	●	●	●	●	●	●

The weights shown in Tables A and B are for Parker Series 2A/2AN cylinders with various piston rod diameters. To determine the net weight of a cylinder, first select the proper basic weight for zero stroke, then calculate the weight of the cylinder stroke and add the result to the basic weight. For

extra rod extension use piston rod weights per inch shown in Table B. Weights of cylinders with intermediate rods may be estimated from table below by taking the difference between the piston rod weights per inch and adding it to the Code 1 weight for the cylinder bore size involved.

Table A Cylinder Weights, in pounds, for Series 2A/2AN cylinders

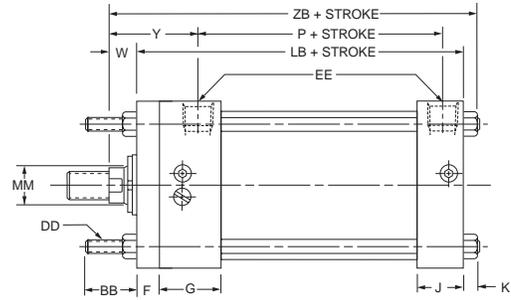
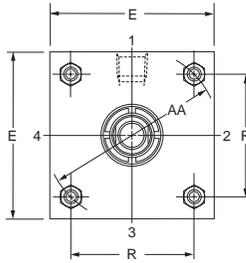
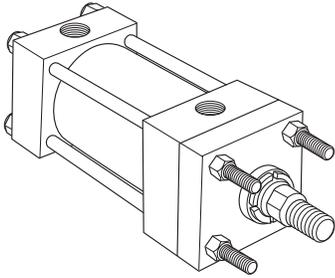
Bore Size	Rod Dia.	Single Rod Cylinders Basic Wt. Zero Stroke		Add Per Inch of Stroke 2A, 2AN	Double Rod Cylinders Basic Wt. Zero Stroke		Add Per Inch of Stroke 2A, 2AN
		T, TB, TC, TD, F, H, J	BB, C, D, DB DD, HB, JB		KF, KJ KT KTB, KTD	KC, KD KDD, KJB	
1"	1/2"	2.5	2.9	.20	4.7	5.5	.40
	5/8"	2.6	3.0	.23	4.9	5.7	.46
1-1/2"	5/8"	3.7	4.3	.3	4.2	4.8	.6
	1"	4.5	5.1	.4	5.8	6.7	.8
2"	5/8"	6.5	6.9	.5	8.2	8.6	1.0
	1"	7.0	7.5	.63	9.0	9.5	1.3
	1-3/8"	8.5	8.9	.8	11.2	11.6	1.6
2-1/2"	5/8"	9.0	9.7	.6	11.4	12.1	1.2
	1"	9.5	10.0	.73	12.0	12.5	1.5
	1-3/4"	13.2	13.6	1.1	19.8	20.5	2.2
3-1/4"	1"	16.5	17.5	.8	22.0	23.0	1.6
	1-3/8"	17.0	18.0	1.0	22.5	23.5	2.0
	2"	27.0	28.0	1.4	43.0	44.0	2.8
4"	1"	26.0	31.0	1.0	33.0	38.0	2.0
	1-3/8"	26.5	31.5	1.2	33.5	38.5	2.5
	2-1/2"	36.0	42.0	2.0	53.0	58.0	4.0
5"	1"	39.0	46.0	1.1	48.0	55.0	2.2
	1-3/8"	39.5	46.5	1.3	48.5	55.5	2.6
	3-1/2"	63.0	66.0	3.6	96.0	103.0	7.2
6"	1-3/8"	68.0	77.0	1.5	80.0	89.0	3.0
	4"	100.0	102.0	4.5	144.0	153.0	9.0
7"	1-3/8"	80.0	85.0	2.0	92.0	97.0	4.0
	2"	82.0	87.0	3.5	96.0	101.0	7.0
8"	1-3/8"	94.0	99.0	2.0	108.0	113.0	4.0
	5/2"	168.0	172.0	8.0	256.0	261.0	16.0
10"	1-3/4"	182.0	188.0	2.5	178.0	184.0	5.0
	5-1/2"	258.0	264.0	8.5	330.0	335.0	17.0
12"	2"	274.0	282.0	3.5	270.0	280.0	7.0
	5-1/2"	350.0	358.0	9.5	420.0	430.0	19.0
14"	2-1/2"	435.0	448.0	4.5	440.0	655.0	9.0
	5-1/2"	510.0	519.0	10.0	490.0	705.0	20.0

Table B

Rod Dia.	Piston Rod Wt. Per Inch	Rod Dia.	Piston Rod Wt. Per Inch	Rod Dia.	Piston Rod Wt. Per Inch
5/8"	0.09	2"	0.89	4"	3.56
1"	0.22	2-1/2"	1.40	4-1/2"	4.51
1-3/8"	0.42	3"	2.00	5"	5.56
1-3/4"	0.68	3-1/2"	2.72	5-1/2"	6.72

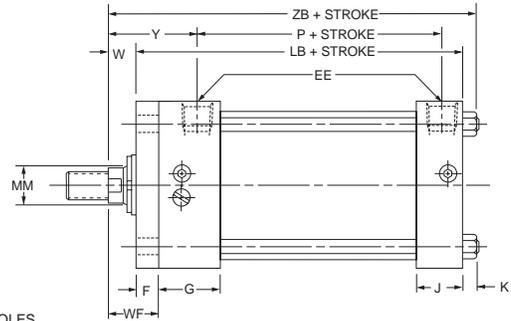
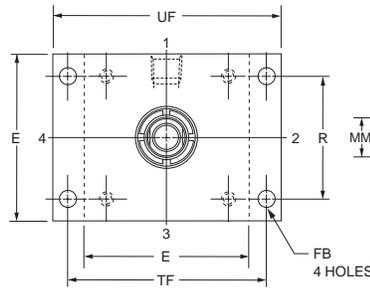
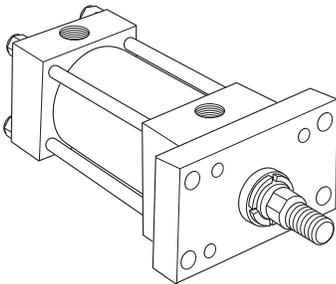
Tie Rods Extended*
Style TB
(NFPA Style MX3)

Basic Mounting (T) —
NFPA MX0 — no tie rods extended
can be supplied upon request.

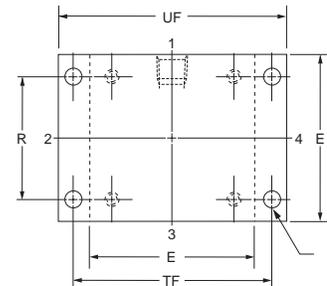
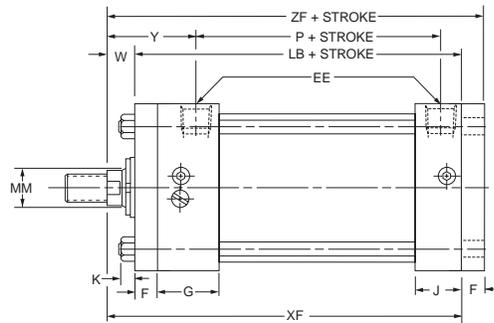
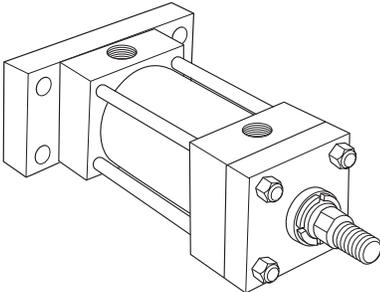


* Style TB (NFPA MX3), Head Tie Rods Extended, illustrated. Style TC (NFPA MX2), Cap Tie Rods Extended; and Style TD (NFPA MX1), Both Ends Tie Rods Extended are also available. All "T" styles can be dimensioned from Style TB drawing at right.

Head Rectangular Flange
Style J
(NFPA Style MF1)

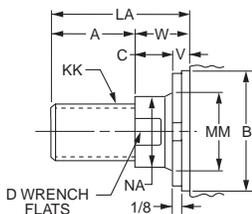


Cap Rectangular Flange
Style H
(NFPA Style MF2)



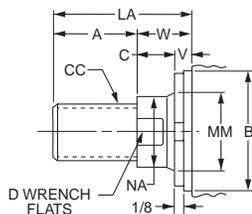
Rod End Dimensions — see table 2

Thread Style 4
(NFPA Style SM)
Small Male



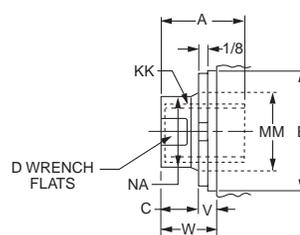
A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered,

Thread Style 8
(NFPA Style IM)
Intermediate Male



style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Thread Style 9
(NFPA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

Mounting Information – 1" to 6" Bore Sizes

C052

Table 1—Envelope and Mounting Dimensions

Bore	AA	BB	DD	E	EE NPTF	F	FB	G	J	K	R	TF	UF	Add Stroke	
														LB	P
1*	1.53	3/4	10-24	■	1/4	3/8	1/4	1-1/2	1	3/16	1.08	2	2-1/2	3-7/8	2-1/8
1-1/2	2.02	1	1/4-28	2	3/8**	3/8	5/16	1-1/2	1	1/4	1.43	2-3/4	3-3/8	4	2-1/4
2	2.6	1-1/8	5/16-24	2-1/2	3/8**	3/8	3/8	1-1/2	1	5/16	1.84	3-3/8	4-1/8	4	2-1/4
2-1/2	3.1	1-1/8	5/16-24	3	3/8**	3/8	3/8	1-1/2	1	5/16	2.19	3-7/8	4-5/8	4-1/8	2-3/8
3-1/4	3.9	1-3/8	3/8-24	3-3/4	1/2	5/8	7/16	1-3/4	1-1/4	3/8	2.76	4-11/16	5-1/2	4-7/8	2-5/8
4	4.7	1-3/8	3/8-24	4-1/2	1/2	5/8	7/16	1-3/4	1-1/4	3/8	3.32	5-7/16	6-1/4	4-7/8	2-5/8
5	5.8	1-13/16	1/2-20	5-1/2	1/2	5/8	9/16	1-3/4	1-1/4	7/16	4.10	6-5/8	7-5/8	5-1/8	2-7/8
6	6.9	1-13/16		6-1/2	3/4	3/4	9/16	2	1-1/2	7/16	4.88	7-5/8	8-5/8	5-3/4	3-1/8

* Cushions not available on 1" bore.

** On 1", 1-1/2", 2" and 2-1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with No. 2 rods. Minimum of three full threads available.

■ 1" bore head dimension is 1-3/4" x 1-1/2". See page B183.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W	WF
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8	1
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	1-5/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2	1-7/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	1-5/8
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	2-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8	2-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
	6	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	2-1/4
	7	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5-1/8	2-7/8	5/8	1-5/8	2-1/4
6	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	1-5/8
	2	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	2-1/4
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	1-7/8
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	2
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	2-1/4
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	2-1/4
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	2-1/4

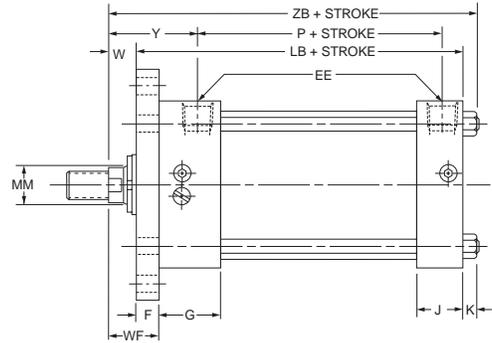
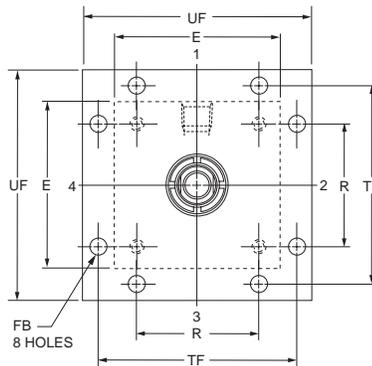
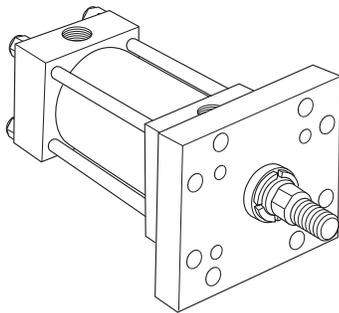
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Add Stroke			
			Y	XF	ZB	ZF
1	1(Std.)	1/2	1-15/16	4-1/2	4-11/16	4-7/8
	2	5/8	1-15/16	4-1/2	4-11/16	4-7/8
1-1/2	1(Std.)	5/8	1-15/16	4-5/8	4-7/8	5
	2	1	2-5/16	5	5-1/4	5-3/8
2	1(Std.)	5/8	1-15/16	4-5/8	4-15/16	5
	2	1-3/8	2-9/16	5-1/4	5-9/16	5-5/8
	3	1	2-5/16	5	5-5/16	5-3/8
2-1/2	1(Std.)	5/8	1-15/16	4-3/4	5-1/16	5-1/8
	2	1-3/4	2-13/16	5-5/8	5-15/16	6
	3	1	2-5/16	5-1/8	5-7/16	5-1/2
	4	1-3/8	2-9/16	5-3/8	5-11/16	5-3/4
3-1/4	1(Std.)	1	2-7/16	5-5/8	6	6-1/4
	2	2	3-1/16	6-1/4	6-5/8	6-7/8
	3	1-3/8	2-11/16	5-7/8	6-1/4	6-1/2
	4	1-3/4	2-15/16	6-1/8	6-1/2	6-3/4
4	1(Std.)	1	2-7/16	5-5/8	6	6-1/4
	2	2-1/2	3-5/16	6-1/2	6-7/8	7-1/8
	3	1-3/8	2-11/16	5-7/8	6-1/4	6-1/2
	4	1-3/4	2-15/16	6-1/8	6-1/2	6-3/4
	5	2	3-1/16	6-1/4	6-5/8	6-7/8
5	1(Std.)	1	2-7/16	5-7/8	6-5/16	6-1/2
	2	3-1/2	3-5/16	6-3/4	7-3/16	7-3/8
	3	1-3/8	2-11/16	6-1/8	6-9/16	6-3/4
	4	1-3/4	2-15/16	6-3/8	6-13/16	7
	5	2	3-1/16	6-1/2	6-15/16	7-1/8
	6	2-1/2	3-5/16	6-3/4	7-3/16	7-3/8
	7	3	3-5/16	6-3/4	7-3/16	7-3/8
6	1(Std.)	1-3/8	2-13/16	6-5/8	7-1/16	7-3/8
	2	4	3-7/16	7-1/4	7-11/16	8
	3	1-3/4	3-1/16	6-7/8	7-5/16	7-5/8
	4	2	3-3/16	7	7-7/16	7-3/4
	5	2-1/2	3-7/16	7-1/4	7-11/16	8
	6	3	3-7/16	7-1/4	7-11/16	8
	7	3-1/2	3-7/16	7-1/4	7-11/16	8



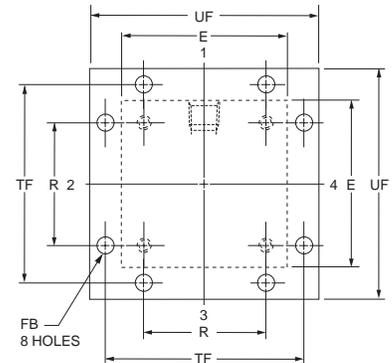
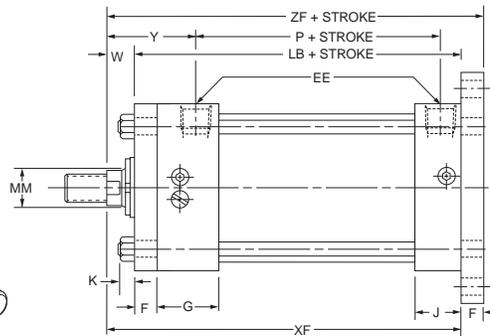
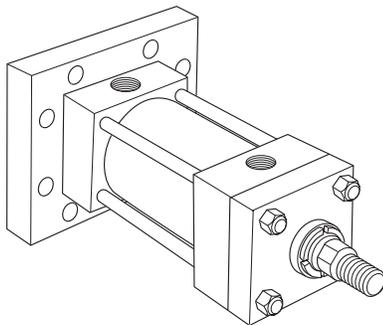
Head Square Flange

Style JB
(NFPA Style MF5)



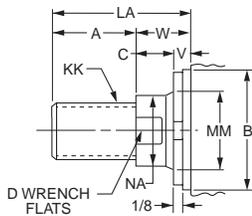
Cap Square Flange

Style HB
(NFPA Style MF6)

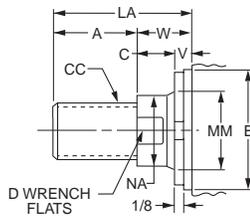


Rod End Dimensions — see table 2

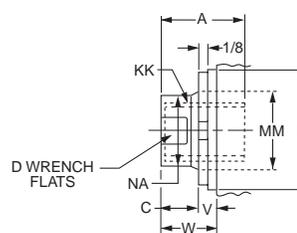
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, rod eye, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2” diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered,

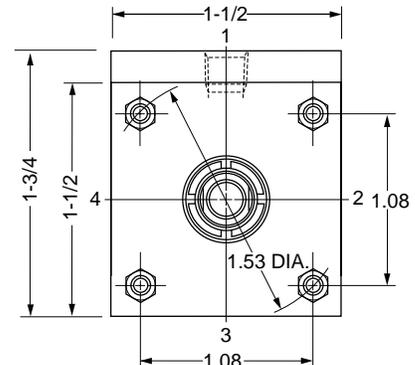
style 4 rod ends are recommended through 2” piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Mounting Information – 1" to 6" Bore Sizes

C052

Table 1—Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	FB	G	J	K	R	TF	UF	Add Stroke	
											LB	P
1*	■	1/4	3/8	1/4	1-1/2	1	3/16	1.08	2	2-1/2	3-7/8	2-1/8
1-1/2	2	3/8**	3/8	5/16	1-1/2	1	1/4	1.43	2-3/4	3-3/8	4	2-1/4
2	2-1/2	3/8**	3/8	3/8	1-1/2	1	5/16	1.84	3-3/8	4-1/8	4	2-1/4
2-1/2	3	3/8**	3/8	3/8	1-1/2	1	5/16	2.19	3-7/8	4-5/8	4-1/8	2-3/8
3-1/4	3-3/4	1/2	5/8	7/16	1-3/4	1-1/4	3/8	2.76	4-11/16	5-1/2	4-7/8	2-5/8
4	4-1/2	1/2	5/8	7/16	1-3/4	1-1/4	3/8	3.32	5-7/16	6-1/4	4-7/8	2-5/8
5	5-1/2	1/2	5/8	9/16	1-3/4	1-1/4	7/16	4.10	6-5/8	7-5/8	5-1/8	2-7/8
6	6-1/2	3/4	3/4	9/16	2	1-1/2	7/16	4.88	7-5/8	8-5/8	5-3/4	3-1/8



Head Dimensions for 1" Bore Size
(Cap is 1-1/2" square.)

* Cushions not available on 1" bore.

** On 1", 1-1/2", 2" and 2-1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with No. 2 rods. Minimum of three full threads available.

■ 1" bore head dimension is 1-3/4" x 1-1/2". See drawing at right.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W	WF
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8	1
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	1-5/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2	1-7/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-3/8
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	1-5/8
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	2-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1-3/8
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8	2-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1-5/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1-7/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	2
	6	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	2-1/4
	7	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5-1/8	2-7/8	5/8	1-5/8	2-1/4
6	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	1-5/8
	2	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	2-1/4
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	1-7/8
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	2
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	2-1/4
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	2-1/4
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	2-1/4

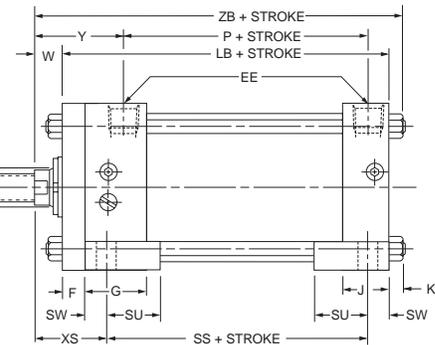
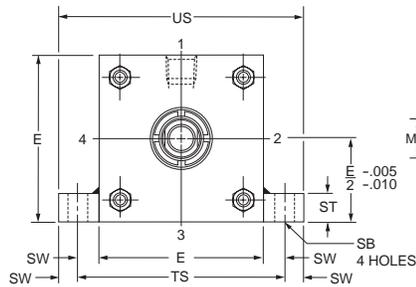
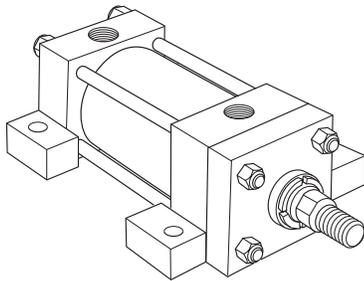
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Add Stroke			
			Y	XF	ZB	ZF
1	1(Std.)	1/2	1-15/16	4-1/2	4-11/16	4-7/8
	2	5/8	1-15/16	4-1/2	4-11/16	4-7/8
1-1/2	1(Std.)	5/8	1-15/16	4-5/8	4-7/8	5
	2	1	2-5/16	5	5-1/4	5-3/8
2	1(Std.)	5/8	1-15/16	4-5/8	4-15/16	5
	2	1-3/8	2-9/16	5-1/4	5-9/16	5-5/8
	3	1	2-5/16	5	5-5/16	5-3/8
2-1/2	1(Std.)	5/8	1-15/16	4-3/4	5-1/16	5-1/8
	2	1-3/4	2-13/16	5-5/8	5-15/16	6
	3	1	2-5/16	5-1/8	5-7/16	5-1/2
	4	1-3/8	2-9/16	5-3/8	5-11/16	5-3/4
3-1/4	1(Std.)	1	2-7/16	5-5/8	6	6-1/4
	2	2	3-1/16	6-1/4	6-5/8	6-7/8
	3	1-3/8	2-11/16	5-7/8	6-1/4	6-1/2
	4	1-3/4	2-15/16	6-1/8	6-1/2	6-3/4
4	1(Std.)	1	2-7/16	5-5/8	6	6-1/4
	2	2-1/2	3-5/16	6-1/2	6-7/8	7-1/8
	3	1-3/8	2-11/16	5-7/8	6-1/4	6-1/2
	4	1-3/4	2-15/16	6-1/8	6-1/2	6-3/4
	5	2	3-1/16	6-1/4	6-5/8	6-7/8
5	1(Std.)	1	2-7/16	5-7/8	6-5/16	6-1/2
	2	3-1/2	3-5/16	6-3/4	7-3/16	7-3/8
	3	1-3/8	2-11/16	6-1/8	6-9/16	6-3/4
	4	1-3/4	2-15/16	6-3/8	6-13/16	7
	5	2	3-1/16	6-1/2	6-15/16	7-1/8
	6	2-1/2	3-5/16	6-3/4	7-3/16	7-3/8
	7	3	3-5/16	6-3/4	7-3/16	7-3/8
6	1(Std.)	1-3/8	2-13/16	6-5/8	7-1/16	7-3/8
	2	4	3-7/16	7-1/4	7-11/16	8
	3	1-3/4	3-1/16	6-7/8	7-5/16	7-5/8
	4	2	3-3/16	7	7-7/16	7-3/4
	5	2-1/2	3-7/16	7-1/4	7-11/16	8
	6	3	3-7/16	7-1/4	7-11/16	8
	7	3-1/2	3-7/16	7-1/4	7-11/16	8



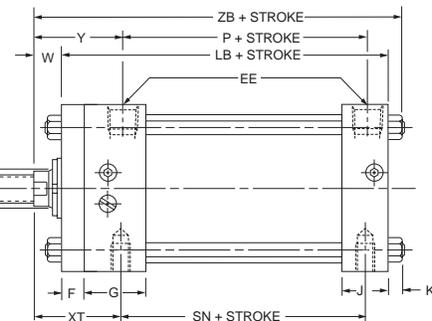
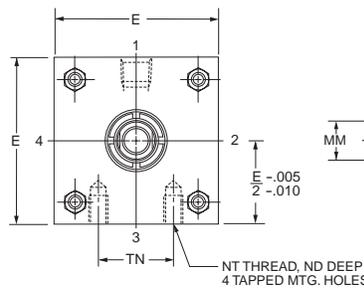
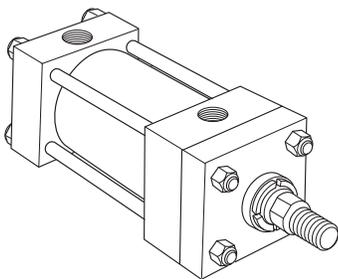
Side Lug

Style C
(NFFPA Style MS2)



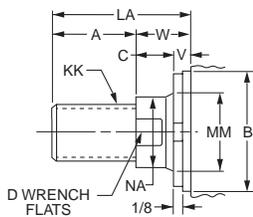
Side Tapped

Style F
(NFFPA Style MS4)

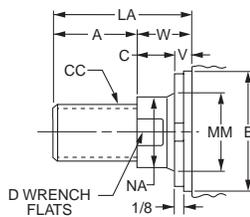


Rod End Dimensions — see table 2

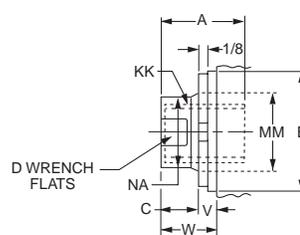
Thread Style 4
(NFFPA Style SM)
Small Male



Thread Style 8
(NFFPA Style IM)
Intermediate Male



Thread Style 9
(NFFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2” diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered,

style 4 rod ends are recommended through 2” piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Table 1—Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	NT	SB*	ST	SU	SW	TN	TS	US	Add Stroke			
															LB	P	SN	SS
1*	■	1/4	3/8	1-1/2	1	3/16	10-24	9/32	5/16	3/4	5/16	9/16	2-1/8	2-3/4	3-7/8	2-1/8	2-1/8	2-7/8
1-1/2	2	3/8**	3/8	1-1/2	1	1/4	1/4-20	7/16	1/2	15/16	3/8	5/8	2-3/4	3-1/2	4	2-1/4	2-1/4	2-7/8
2	2-1/2	3/8**	3/8	1-1/2	1	5/16	5/16-18	7/16	1/2	15/16	3/8	7/8	3-1/4	4	4	2-1/4	2-1/4	2-7/8
2-1/2	3	3/8**	3/8	1-1/2	1	5/16	3/8-16	7/16	1/2	15/16	3/8	1-1/4	3-3/4	4-1/2	4-1/8	2-3/8	2-3/8	3
3-1/4	3-3/4	1/2	5/8	1-3/4	1-1/4	3/8	1/2-13	9/16	3/4	1-1/4	1/2	1-1/2	4-3/4	5-3/4	4-7/8	2-5/8	2-5/8	3-1/4
4	4-1/2	1/2	5/8	1-3/4	1-1/4	3/8	1/2-13	9/16	3/4	1-1/4	1/2	2-1/16	5-1/2	6-1/2	4-7/8	2-5/8	2-5/8	3-1/4
5	5-1/2	1/2	5/8	1-3/4	1-1/4	7/16	5/8-11	1-3/16	1	1-9/16	11/16	2-11/16	6-7/8	8-1/4	5-1/8	2-7/8	2-7/8	3-1/8
6	6-1/2	3/4	3/4	2	1-1/2	7/16	3/4-10	1-3/16	1	1-9/16	11/16	3-1/4	7-7/8	9-1/4	5-3/4	3-1/8	3-1/8	3-5/8

* Cushions not available on 1" bore.

** On 1", 1-1/2", 2" and 2-1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with No. 2 rods. Minimum of three full threads available.

• Upper surface spot-faced for socket head screws. ■ 1" bore head dimension is 1-3/4" x 1-1/2". See page B183.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke				
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W					
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8	1/4	1-5/16	1-15/16	1-15/16	4-11/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1/4	1-5/16	1-15/16	1-15/16	4-11/16
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	5/16	1-3/8	1-15/16	1-15/16	4-7/8
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	5/16	1-3/4	2-5/16	2-5/16	5-1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-1/32	1-3/8	1-15/16	1-15/16	4-15/16
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	1-1/32	2	2-9/16	2-9/16	5-9/16
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	1-1/32	1-3/4	2-5/16	2-5/16	5-5/16
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	7/16	1-3/8	1-15/16	1-15/16	5-1/16
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2	7/16	2-1/4	2-13/16	2-13/16	5-15/16
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	7/16	1-3/4	2-5/16	2-5/16	5-7/16
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	7/16	2	2-9/16	2-9/16	5-11/16
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	1/2	1-7/8	2-7/16	2-7/16	6
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	1/2	2-1/2	3-1/16	3-1/16	6-5/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	1/2	2-1/8	2-11/16	2-11/16	6-1/4
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	1/2	2-3/8	2-15/16	2-15/16	6-1/2
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	5/8	1-7/8	2-7/16	2-7/16	6
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	5/8	2-3/4	3-5/16	3-5/16	6-7/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	5/8	2-1/8	2-11/16	2-11/16	6-1/4
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	5/8	2-3/8	2-15/16	2-15/16	6-1/2
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	5/8	2-1/2	3-1/16	3-1/16	6-5/8
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	3/4	2-1/16	2-7/16	2-7/16	6-5/16
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8	3/4	2-15/16	3-5/16	3-5/16	7-3/16
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	3/4	2-5/16	2-11/16	2-11/16	6-9/16
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	3/4	2-9/16	2-15/16	2-15/16	6-13/16
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3/4	2-11/16	3-1/16	3-1/16	6-15/16
	6	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3/4	2-15/16	3-5/16	3-5/16	7-3/16
	7	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5-1/8	2-7/8	5/8	1-5/8	3/4	2-15/16	3-5/16	3-5/16	7-3/16
6	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	7/8	2-5/16	2-13/16	2-13/16	7-1/16
	2	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	7/8	2-15/16	3-7/16	3-7/16	7-11/16
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	7/8	2-9/16	3-1/16	3-1/16	7-5/16
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	7/8	2-11/16	3-3/16	3-3/16	7-7/16
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	7/8	2-15/16	3-7/16	3-7/16	7-11/16
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	7/8	2-15/16	3-7/16	3-7/16	7-11/16
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	7/8	2-15/16	3-7/16	3-7/16	7-11/16

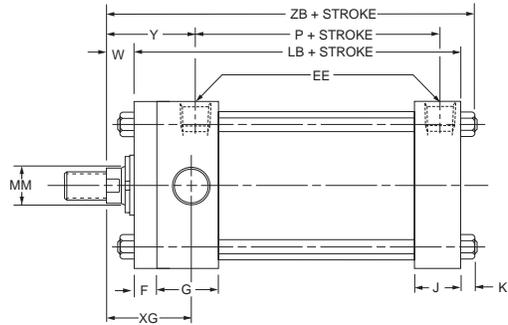
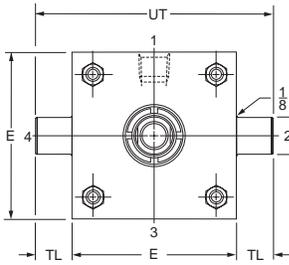
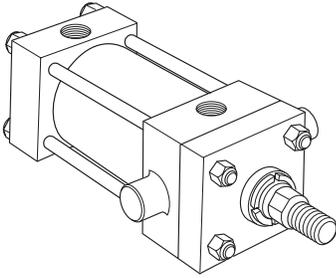
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Thread	Rod Extensions and Pilot Dimensions	Add Stroke					
						ND	XS	XT	Y	ZB
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	1/4	1-5/16	1-15/16	1-15/16	4-11/16
	2	5/8	1/2-20	7/16-20	3/4	1/4	1-5/16	1-15/16	1-15/16	4-11/16
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	5/16	1-3/8	1-15/16	1-15/16	4-7/8
	2	1	7/8-14	3/4-16	1-1/8	5/16	1-3/4	2-5/16	2-5/16	5-1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1-1/32	1-3/8	1-15/16	1-15/16	4-15/16
	2	1-3/8	1-1/4-12	1-14	1-5/8	1-1/32	2	2-9/16	2-9/16	5-9/16
	3	1	7/8-14	3/4-16	1-1/8	1-1/32	1-3/4	2-5/16	2-5/16	5-5/16
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	7/16	1-3/8	1-15/16	1-15/16	5-1/16
	2	1-3/4	1-1/2-12	1-1/4-12	2	7/16	2-1/4	2-13/16	2-13/16	5-15/16
	3	1	7/8-14	3/4-16	1-1/8	7/16	1-3/4	2-5/16	2-5/16	5-7/16
	4	1-3/8	1-1/4-12	1-14	1-5/8	7/16	2	2-9/16	2-9/16	5-11/16
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1/2	1-7/8	15/16	1/4	3/4
	2	2	1-3/4-12	1-1/2-12	2-1/4	1/2	2-1/2	3-1/16	3-1/16	6-5/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1/2	2-1/8	2-11/16	2-11/16	6-1/4
	4	1-3/4	1-1/2-12	1-1/4-12	2	1/2	2-3/8	2-15/16	2-15/16	6-1/2
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	5/8	1-7/8	15/16	1/4	3/4
	2	2-1/2	2-1/4-12	1-7/8-12	3	5/8	2-3/4	3-5/16	3-5/16	6-7/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	5/8	2-1/8	2-11/16	2-11/16	6-1/4
	4	1-3/4	1-1/2-12	1-1/4-12	2	5/8	2-3/8	2-15/16	2-15/16	6-1/2
	5	2	1-3/4-12	1-1/2-12	2-1/4	5/8	2-1/2	3-1/16	3-1/16	6-5/8
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	3/4	2-1/16	2-7/16	2-7/16	6-5/16
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	3/4	2-15/16	3-5/16	3-5/16	7-3/16
	3	1-3/8	1-1/4-12	1-14	1-5/8	3/4	2-5/16	2-11/16	2-11/16	6-9/16
	4	1-3/4	1-1/2-12	1-1/4-12	2	3/4	2-9/16	2-15/16	2-15/16	6-13/16
	5	2	1-3/4-12	1-1/2-12	2-1/4	3/4	2-11/16	3-1/16	3-1/16	6-15/16
	6	2-1/2	2-1/4-12	1-7/8-12	3	3/4	2-15/16	3-5/16	3-5/16	7-3/16
	7	3</								

Head Trunnion

Style D

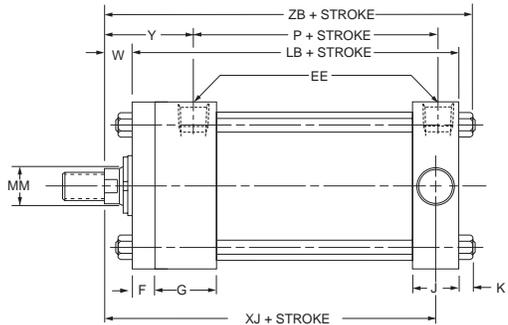
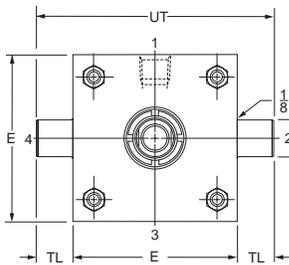
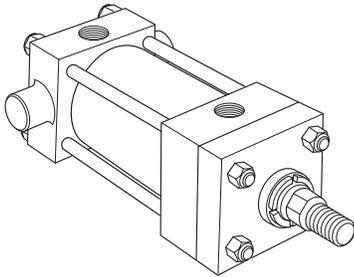
(NFA Style MT1)



Cap Trunnion

Style DB

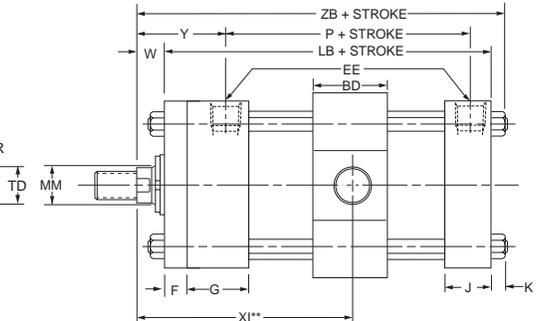
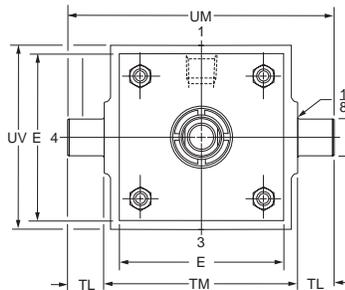
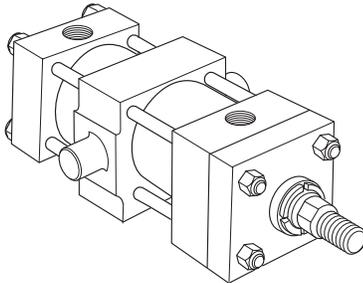
(NFA Style MT2)



Intermediate Fixed Trunnion

Style DD

(NFA Style MT4)

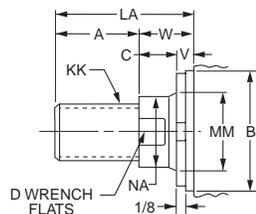


Rod End Dimensions — see table 2

Thread Style 4

(NFA Style SM)

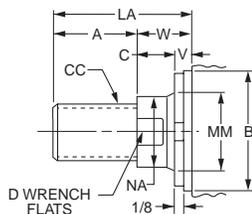
Small Male



Thread Style 8

(NFA Style IM)

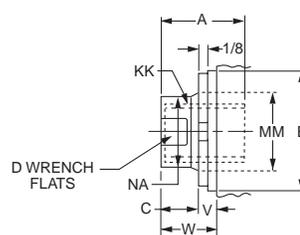
Intermediate Male



Thread Style 9

(NFA Style SF)

Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered,

style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.



Mounting Information – 1" to 6" Bore Sizes

C052

Table 1—Envelope and Mounting Dimensions

Bore	BD	E	EE NPTF	F	G	J	K	+.000 -.002 TD	TL	TM	UM	UT	UV	Add Stroke		Style DD Min. Stroke
														LB	P	
1*	•	■	1/4	3/8	1-1/2	1	3/16	.750•	3/4•	•	•	3	•	3-7/8	2-1/8	•
1-1/2	1-1/4	2	3/8**	3/8	1-1/2	1	1/4	1.000	1	2-1/2	4-1/2	4	2-1/2	4	2-1/4	1/4
2	1-1/2	2-1/2	3/8**	3/8	1-1/2	1	5/16	1.000	1	3	5	4-1/2	3	4	2-1/4	1/2
2-1/2	1-1/2	3	3/8**	3/8	1-1/2	1	5/16	1.000	1	3-1/2	5-1/2	5	3-1/2	4-1/8	2-3/8	3/8
3-1/4	2	3-3/4	1/2	5/8	1-3/4	1-1/4	3/8	1.000	1	4-1/2	6-1/2	5-3/4	4-1/4	4-7/8	2-5/8	7/8
4	2	4-1/2	1/2	5/8	1-3/4	1-1/4	3/8	1.000	1	5-1/4	7-1/4	6-1/2	5	4-7/8	2-5/8	7/8
5	2	5-1/2	1/2	5/8	1-3/4	1-1/4	7/16	1.000	1	6-1/4	8-1/4	7-1/2	6	5-1/8	2-7/8	5/8
6	2-1/2	6-1/2	3/4	3/4	2	1-1/2	7/16	1.375	1-3/8	7-5/8	10-3/8	9-1/4	7	5-3/4	3-1/8	1-1/8

* Cushions not available on 1" bore.

** On 1", 1-1/2", 2" and 2-1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with No. 2 rods. Minimum of three full threads available.

• Mounting style not available in 1" bore.

■ 1" bore head dimension is 1-3/4" x 1-1/2". See page B183.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions							
			Style 8 CC	Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8
	6	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8
	7	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5-1/8	2-7/8	5/8	1-5/8
6	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8
	2	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2

Table 3 — Envelope and Mounting Dimensions

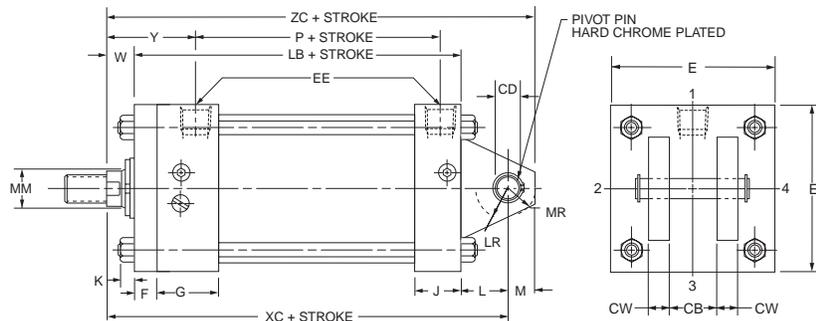
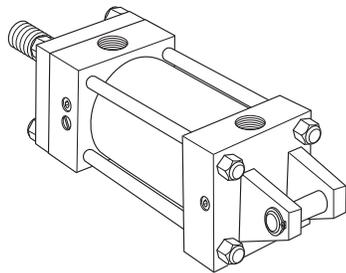
XG	Min.** Xi	Y	Add Stroke	
			XJ	ZB
1-3/4	*	1-15/16	4	4-11/16
1-3/4	*	1-15/16	4	4-11/16
1-3/4	3-3/16	1-15/16	4-1/8	4-7/8
2-1/8	3-9/16	2-5/16	4-1/2	5-1/4
1-3/4	3-5/16	1-15/16	4-1/8	4-15/16
2-3/8	3-15/16	2-9/16	4-3/4	5-9/16
2-1/8	3-11/16	2-5/16	4-1/2	5-5/16
1-3/4	3-5/16	1-15/16	4-1/4	5-1/16
2-5/8	4-3/16	2-13/16	5-1/8	5-15/16
2-1/8	3-11/16	2-5/16	4-5/8	5-7/16
2-3/8	3-15/16	2-9/16	4-7/8	5-11/16
2-1/4	4-3/16	2-7/16	5	6
2-7/8	4-13/16	3-1/16	5-5/8	6-5/8
2-1/2	4-7/16	2-11/16	5-1/4	6-1/4
2-3/4	4-11/16	2-15/16	5-1/2	6-1/2
2-1/4	4-3/16	2-7/16	5	6
3-1/8	5-1/16	3-5/16	5-7/8	6-7/8
2-1/2	4-7/16	2-11/16	5-1/4	6-1/4
2-3/4	4-11/16	2-15/16	5-1/2	6-1/2
2-7/8	4-13/16	3-1/16	5-5/8	6-5/8
2-1/4	4-5/16	2-7/16	5-1/4	6-5/16
3-1/8	5-1/16	3-5/16	6-1/8	7-3/16
2-1/2	4-7/16	2-11/16	5-1/2	6-9/16
2-3/4	4-11/16	2-15/16	5-3/4	6-13/16
2-7/8	4-13/16	3-1/16	5-7/8	6-15/16
3-1/8	5-1/16	3-5/16	6-1/8	7-3/16
2-5/8	4-15/16	2-13/16	5-7/8	7-1/16
3-1/4	5-9/16	3-7/16	6-1/2	7-11/16
2-7/8	5-3/16	3-1/16	6-1/8	7-5/16
3	5-5/16	3-3/16	6-1/4	7-7/16
3-1/4	5-9/16	3-7/16	6-1/2	7-11/16
3-1/4	5-9/16	3-7/16	6-1/2	7-11/16
3-1/4	5-9/16	3-7/16	6-1/2	7-11/16

* Mounting style DD not available in 1" bore.

**Dimension XI to be specified by customer.



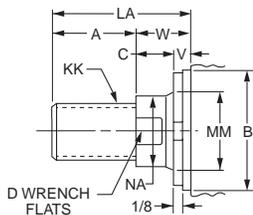
Cap Fixed Clevis
Style BB
(NFPA Style MP1)



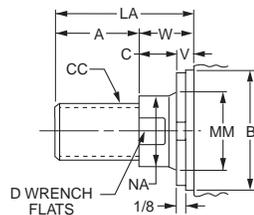
The 1", 4", 5" and 6" bore sizes have tie rod nuts at both ends as shown. Tie rods thread into cap on all other bore sizes.

Rod End Dimensions — see table 2

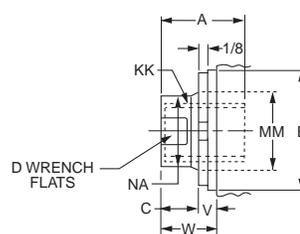
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK , A and LA . If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered,

style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Mounting Information – 1" to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

Bore	CB	+.000 -.002 CD	CW	E	EE NPTF	F	G	J	K	L	LR	M	MR	Add Stroke	
														LB	P
1*	†	.441†	†	■	1/4	3/8	1-1/2	1	3/16	1/2†	1/2†	7/16†	1/2†	3-7/8	2-1/8
1-1/2	3/4	.501	1/2	2	3/8**	3/8	1-1/2	1	1/4	3/4	3/4	1/2	5/8	4	2-1/4
2	3/4	.501	1/2	2-1/2	3/8**	3/8	1-1/2	1	5/16	3/4	3/4	1/2	5/8	4	2-1/4
2-1/2	3/4	.501	1/2	3	3/8**	3/8	1-1/2	1	5/16	3/4	3/4	1/2	5/8	4-1/8	2-3/8
3-1/4	1-1/4	.751	5/8	3-3/4	1/2	5/8	1-3/4	1-1/4	3/8	1-1/4	1	3/4	15/16	4-7/8	2-5/8
4	1-1/4	.751	5/8	4-1/2	1/2	5/8	1-3/4	1-1/4	3/8	1-1/4	1	3/4	15/16	4-7/8	2-5/8
5	1-1/4	.751	5/8	5-1/2	1/2	5/8	1-3/4	1-1/4	7/16	1-1/4	1	3/4	15/16	5-1/8	2-7/8
6	1-1/2	1.001	3/4	6-1/2	3/4	3/4	2	1-1/2	7/16	1-1/2	1-1/4	1	1-3/16	5-3/4	3-1/8

* Cushions not available on 1" bore.

** On 1", 1-1/2", 2" and 2-1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with No. 2 rods. Minimum of three full threads available.

† In 1" bore size model only, a single eye mounting, 7/16" thick, is used. Dimension CD (.441") is hole diameter – pin not supplied.

• Dimension CD is pin diameter except in 1" bore. ■ 1" bore head dimension is 1-3/4" x 1-1/2". See page B183.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke		
			Style 8 CC	Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W	Y	XC	ZC
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8	1-15/16	5	5-7/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5	5-7/16
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-3/8	5-7/8
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-3/4	6-1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-3/8	5-7/8
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	2-9/16	6	6-1/2
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-3/4	6-1/4
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-1/2	6
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2	2-13/16	6-3/8	6-7/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-7/8	6-3/8
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	2-9/16	6-1/8	6-5/8
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	6-7/8	7-5/8
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3-1/16	7-1/2	8-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	2-11/16	7-1/8	7-7/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	2-15/16	7-3/8	8-1/8
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	6-7/8	7-5/8
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3-5/16	7-3/4	8-1/2
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	2-11/16	7-1/8	7-7/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	2-15/16	7-3/8	8-1/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3-1/16	7-1/2	8-1/4
	6	1-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3-1/16	7-1/2	8-1/4
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	7-1/8	7-7/8
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8	3-5/16	8	8-3/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	2-11/16	7-3/8	8-1/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	2-15/16	7-5/8	8-3/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3-1/16	7-3/4	8-1/2
	6	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3-5/16	8	8-3/4
	7	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5-1/8	2-7/8	5/8	1-5/8	3-5/16	8	8-3/4
	8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	2-13/16	8-1/8
6	2	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	3-7/16	8-3/4	9-3/4
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	3-1/16	8-3/8	9-3/8
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	3-3/16	8-1/2	9-1/2
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	3-7/16	8-3/4	9-3/4
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	3-7/16	8-3/4	9-3/4
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	3-7/16	8-3/4	9-3/4

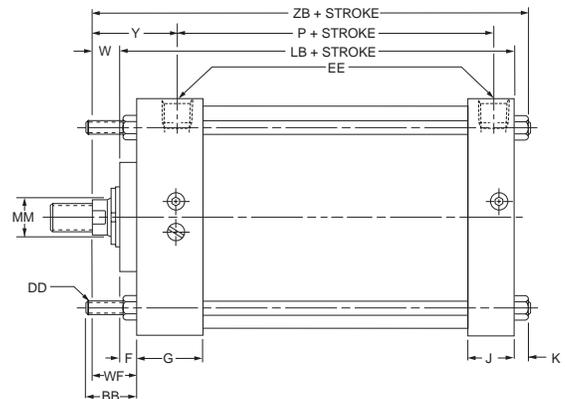
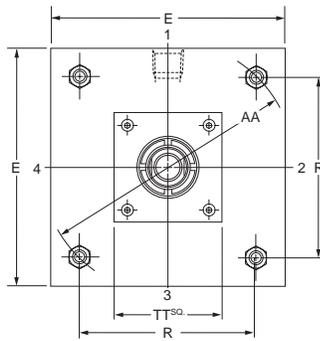
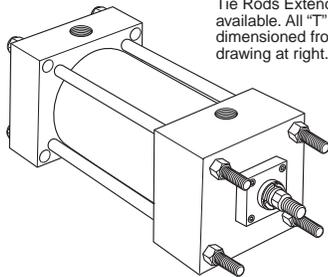
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Rod Extensions and Pilot Dimensions								Add Stroke				
			A	+.000 -.002 B	C	D	LA	NA	V	W	Y	XC	ZC		
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	1-1/4	7/16	1/4	5/8	1-15/16	5	5-7/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5	5-7/16
1-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-3/8	5-7/8
	2	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-3/4	6-1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-3/8	5-7/8
	2	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	2-9/16	6	6-1/2
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-3/4	6-1/4
2-1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	1-3/8	9/16	1/4	5/8	1-15/16	5-1/2	6
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/2	1-11/16	3/4	1-1/2	2-13/16	6-3/8	6-7/8
	3	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	2-1/8	15/16	1/2	1	2-5/16	5-7/8	6-3/8
	4	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-7/8	1-5/16	5/8	1-1/4	2-9/16	6-1/8	6-5/8
3-1/4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	6-7/8	7-5/8
	2	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3-1/16	7-1/2	8-1/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	2-11/16	7-1/8	7-7/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	2-15/16	7-3/8	8-1/8
4	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	6-7/8	7-5/8
	2	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3-5/16	7-3/4	8-1/2
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16	3/8	1	2-11/16	7-1/8	7-7/8
	4	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/4	1-11/16	1/2	1-1/4	2-15/16	7-3/8	8-1/8
	5	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-5/8	1-15/16	1/2	1-3/8	3-1/16	7-1/2	8-1/4
	6	1-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-5/8	2-3/8	5/8	1-5/8	3-1/16	7-1/2	8-1/4
5	1(Std.)	1	7/8-14	3/4-16	1-1/8	1.499	1/2	7/8	1-7/8	15/16	1/4	3/4	2-7/16	7-1/8	7-7/8
	2	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5-1/8	3-3/8	5/8	1-5/8	3-5/16	8	8-3/4
	3	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-5/8	1-5/16					

Tie Rods Extended

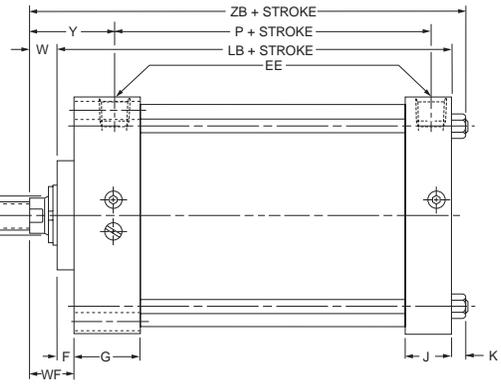
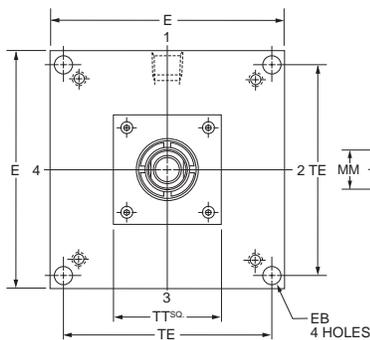
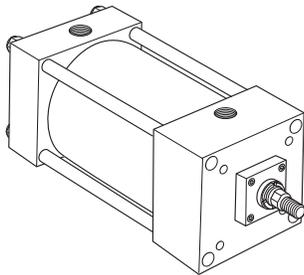
Style TB
(NFA Style MX3)

Style TB (NFA MX3) Head Tie Rods Extended, illustrated: Style TC (NFA MX2), Cap Tie Rods Extended; and Style TD (NFA MX1), Both Ends Tie Rods Extended are also available. All "T" styles can be dimensioned from Style TB drawing at right.



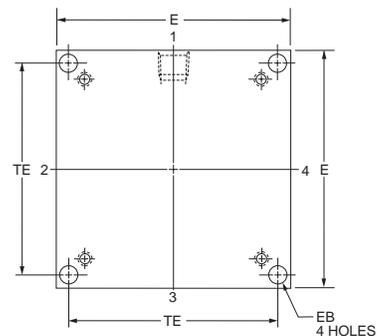
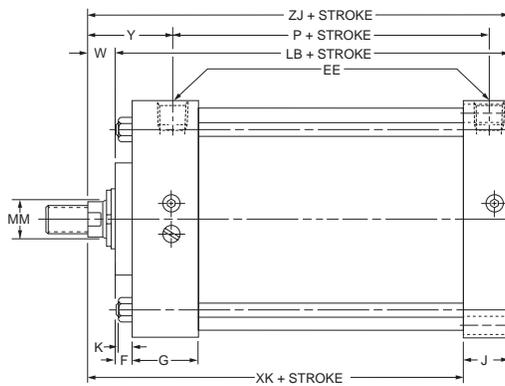
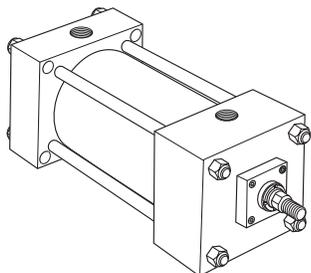
Head Square Flange

Style JB
(NFA Style ME3)



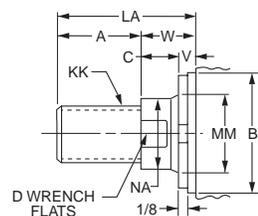
Cap Square Flange

Style HB
(NFA Style ME4)

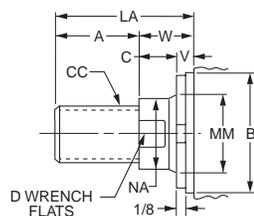


Rod End Dimensions — see table 2

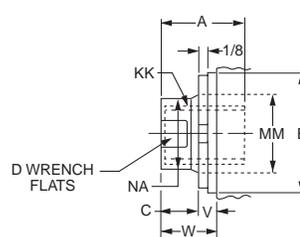
Thread Style 4
(NFA Style SM)
Small Male



Thread Style 8
(NFA Style IM)
Intermediate Male



Thread Style 9
(NFA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

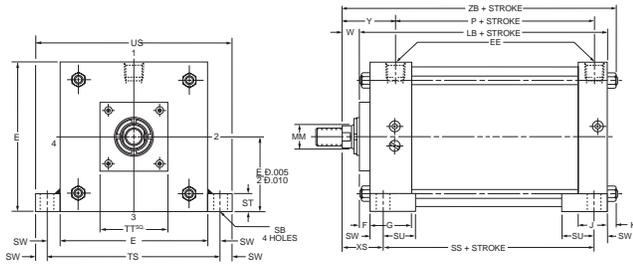
To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

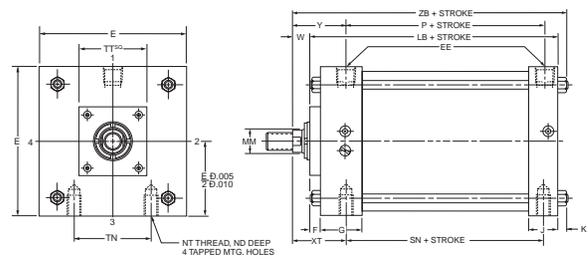
Side Lug

Style C
(NFFA Style MS2)



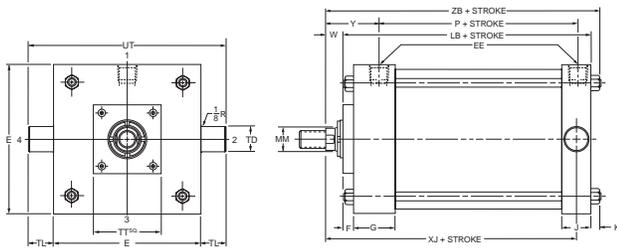
Side Tapped

Style F
(NFFA Style MS4)



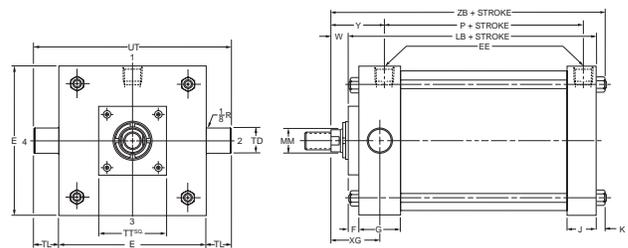
Cap Trunnion

Style DB
(NFFA Style MT2)



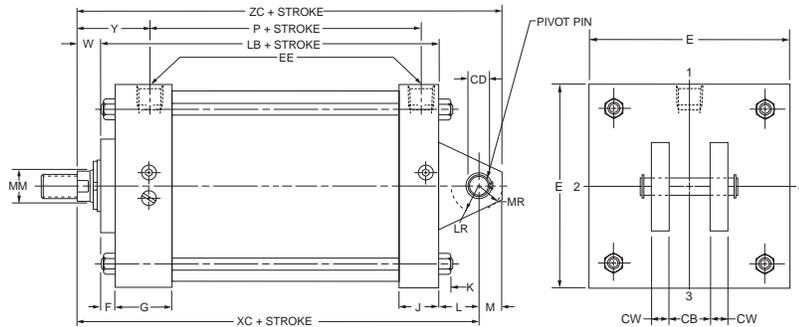
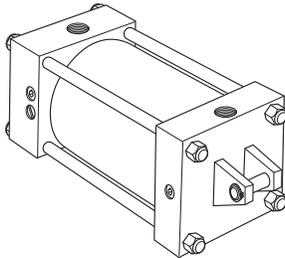
Head Trunnion

Style D
(NFFA Style MT1)



Cap Fixed Clevis

Style BB
(NFFA Style MP1)



Note: Other mounting styles and double rod end cylinders are available on request. Consult factory for details.

Table 1—Envelope and Mounting Dimensions

Bore	AA	BB	CB	CD	CW	DD	E	EB	EE	F	G	J	K	L	LR	M	MR	ND	NT	R	SB	ST	SU	SW	TD	TE	TL	TN	TS	US	UT	Add Stroke			
																																LB	P	SN	SS
7	8.1	2-5/16	1-1/2	1.001	3/4	5/8-18	7-1/2	9/16	3/4	3/4	2	1-1/2	9/16	1-1/2	1-1/4	1	1-3/16	1-1/8	3/4-10	5.73	13/16	1	1-9/16	11/16	1.375	6-3/4	1-3/8	3-1/2	8-7/8	10-1/4	10-1/4	5-7/8	3-1/4	3-1/4	3-3/4

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions									
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	LA	NA	V	W	WF	Y
7	1	1-35/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	1-5/8	2-13/16
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-115/16	3/8	1-1/8	1-7/8	3-1/16
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	1/2	1-1/4	2	3-3/16

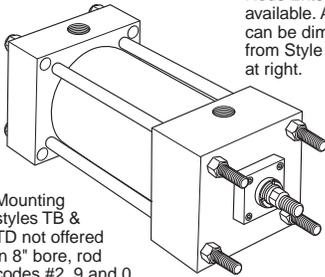
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Thread	Rod Dia. MM	Add Stroke																															
																																		ZB	ZC	ZJ
7	1	1-35/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	1-5/8	2-13/16	4	2-5/8	2-5/16	2-13/16	8-1/4	6	5-1/4	7-5/16	9-1/4	6-3/4												
	2	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-115/16	3/8	1-1/8	1-7/8	3-1/16	4	2-7/8	2-9/16	3-1/16	8-1/2	6-1/4	5-1/2	7-9/16	9-1/2	7												
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	1/2	1-1/4	2	3-3/16	4	3	2-11/16	3-3/16	8-5/8	6-3/8	5-5/8	7-11/16	9-5/8	7-1/8												

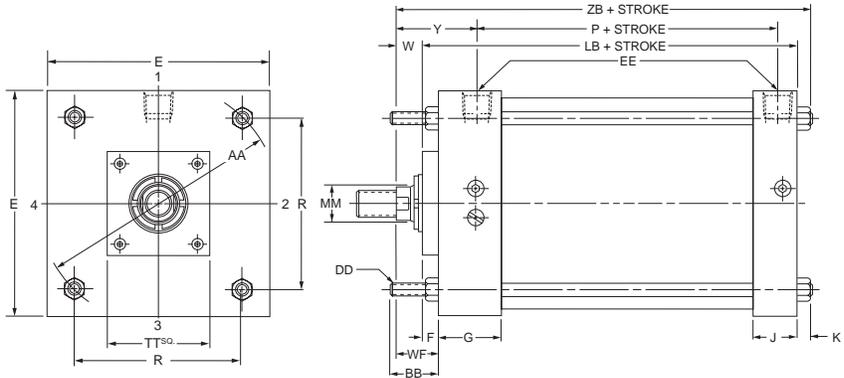


Tie Rods Extended
Style TB
(NFA Style MX3)

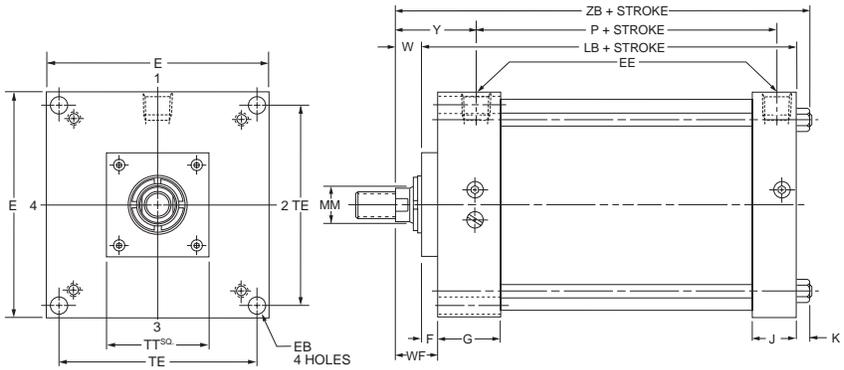
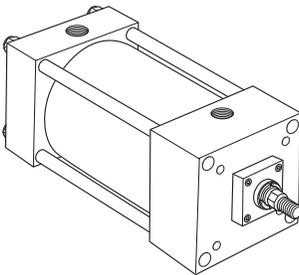
Style TB (NFA MX3) Head Tie Rods Extended, illustrated: Style TC (NFA MX2), Cap Tie Rods Extended; and Style TD (NFA MX1), Both Ends Tie Rods Extended are also available. All "T" styles can be dimensioned from Style TB drawing at right.



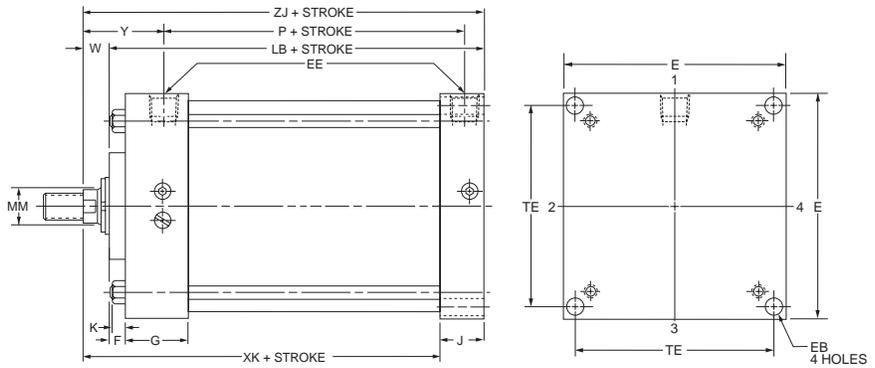
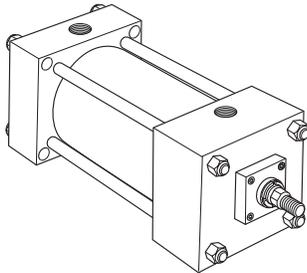
Mounting styles TB & TD not offered in 8" bore, rod codes #2, 9 and 0.



Head Square Flange
Style JB
(NFA Style ME3)

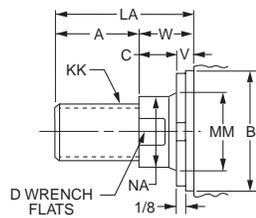


Cap Square Flange
Style HB
(NFA Style ME4)



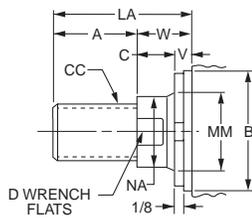
Rod End Dimensions — see table 2

Thread Style 4
(NFA Style SM)
Small Male



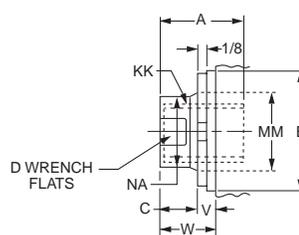
A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

Thread Style 8
(NFA Style IM)
Intermediate Male



ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Thread Style 9
(NFA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

Table 1—Envelope and Mounting Dimensions

Bore	AA	BB	DD	E	EB	EE NPTF	F	G	J	K	R	TE	Add Stroke	
													LB	P
8	9.1	2-5/16	5/8-18	8-1/2	11/16	3/4	3/4	2	1-1/2	9/16	6.44	7.57	5-7/8	3-1/4
10	11.2	2-11/16	3/4-16	10-5/8	13/16	1	3/4	2-1/4	2	11/16	7.92	9.40	7-1/8	4-1/8
12	13.3	2-11/16	3/4-16	12-3/4	13/16	1	3/4	2-1/4	2	11/16	9.40	11.10	7-5/8	4-5/8
14	15.4	3-3/16	7/8-14	14-3/4	15/16	1-1/4	3/4	2-3/4	2-1/4	3/4	10.90	12.87	8-7/8	5-1/2

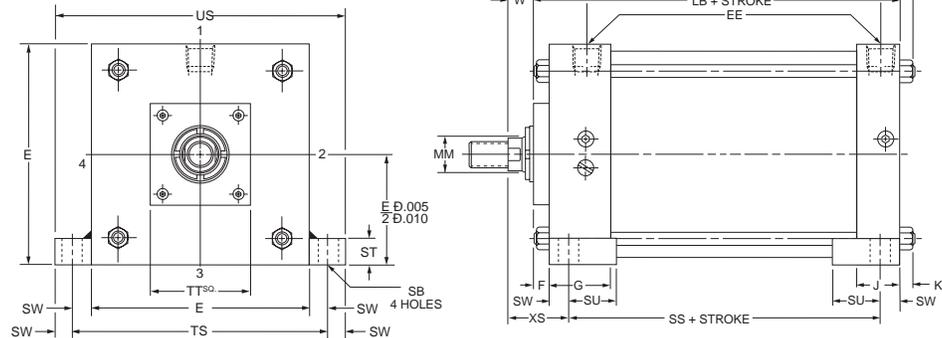
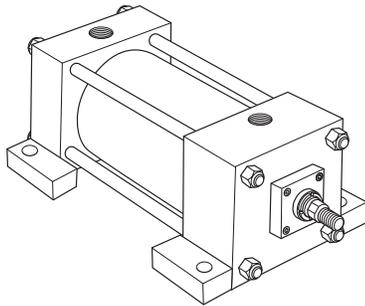
Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke					
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W	TT	WF	Y	XK	ZB	ZJ
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	4	1-5/8	2-13/16	5-1/4	7-5/16	6-3/4
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	1-7/8	3-1/16	5-1/2	7-9/16	7
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	2	3-3/16	5-5/8	7-11/16	7-1/8
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
	0	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	2-1/4	3-7/16	5-7/8	7-15/16	7-3/8
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	1-7/8	3-1/8	6-1/4	8-15/16	8-1/4
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	2	3-1/4	6-3/8	9-1/16	8-3/8
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	2-1/4	3-1/2	6-5/8	9-5/16	8-5/8
	12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	2	3-1/4	6-7/8	9-9/16
3		2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
4		3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
5		3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
6		4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
7		4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
8		5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
9		5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	2-1/4	3-1/2	7-1/8	9-13/16	9-1/8
14	1(Std.)	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	3	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	4	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	5	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	6	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	7	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8
	8	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	2-1/4	3-13/16	8-1/8	11-1/8	10-3/8

Table 3 — Envelope and Mounting Dimensions

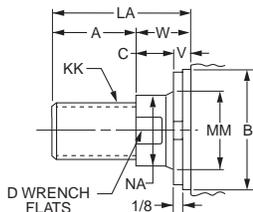


Side Lug
Style C
(NFA Style MS2)

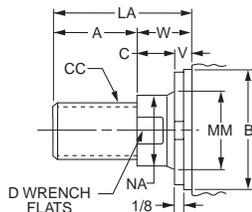


Rod End Dimensions — see table 2

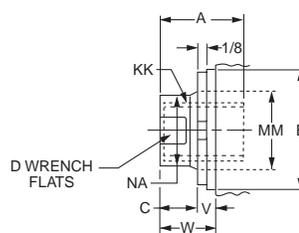
Thread Style 4
(NFA Style SM)
Small Male



Thread Style 8
(NFA Style IM)
Intermediate Male



Thread Style 9
(NFA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Mounting Information – 8" to 14" Bore Sizes

Table 1—Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	SB*	ST	SU	SW	TS	US	Add Stroke		
													LB	P	SS
8	8-1/2	3/4	3/4	2	1-1/2	9/16	13/16	1	1-9/16	11/16	9-7/8	11-1/4	5-7/8	3-1/4	3-3/4
10	10-5/8	1	3/4	2-1/4	2	11/16	1-1/16	1-1/4	2	7/8	12-3/8	14-1/8	7-1/8	4-1/8	4-5/8
12	12-3/4	1	3/4	2-1/4	2	11/16	1-1/16	1-1/4	2	7/8	14-1/2	16-1/4	7-5/8	4-5/8	5-1/8
14	14-3/4	1-1/4	3/4	2-3/4	2-1/4	3/4	1-5/16	1-1/2	2-1/2	1-1/8	17	19-1/4	8-7/8	5-1/2	5-7/8

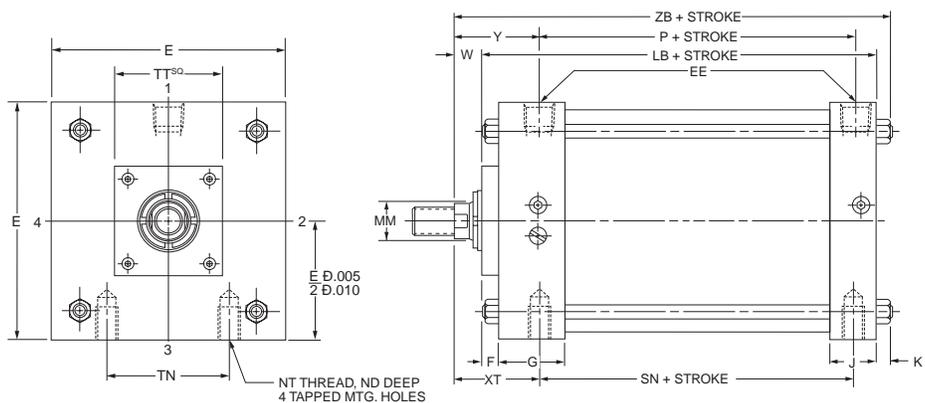
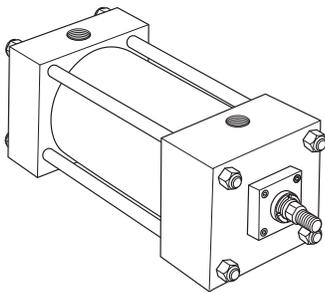
* Upper surface spotfaced for socket head screws.

Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke			
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W	TT	XS	Y	ZB
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	4	2-5/16	2-13/16	7-5/16
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	53/8	1/2	1-1/2	7	2-15/16	3-7/16	7-15/16
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	2-9/16	3-1/16	7-9/16
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	2-11/16	3-3/16	7-11/16
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	2-15/16	3-7/16	7-15/16
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	2-15/16	3-7/16	7-15/16
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	2-15/16	3-7/16	7-15/16
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	2-15/16	3-7/16	7-15/16
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	2-15/16	3-7/16	7-15/16
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	2-3/4	3-1/8	8-15/16
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	2-7/8	3-1/4	9-1/16
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/8	3-1/2	9-5/16
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-5/16
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-5/16
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-5/16
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/8	3-1/2	9-5/16
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/8	3-1/2	9-5/16
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/8	3-1/2	9-5/16
12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-1/16	3-1/2	1-15/16	3/8	1-1/4	4	2-7/8	3-1/4	9-9/16
	3	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/8	3-1/2	9-13/16
	4	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-13/16
	5	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-13/16
	6	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/8	3-1/2	9-13/16
	7	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/8	3-1/2	9-13/16
	8	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/8	3-1/2	9-13/16
	9	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/8	3-1/2	9-13/16
	14	1(Std.)	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-3/8	3-13/16
3		3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-3/8	3-13/16	11-1/8
4		3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-3/8	3-13/16	11-1/8
5		4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-3/8	3-13/16	11-1/8
6		4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-3/8	3-13/16	11-1/8
7		5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-3/8	3-13/16	11-1/8
8		5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-3/8	3-13/16	11-1/8

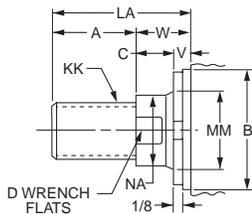


Side Tapped
Style F
(NFA Style MS4)

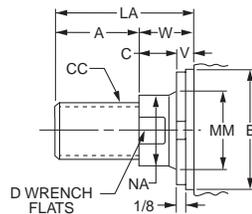


Rod End Dimensions — see table 2

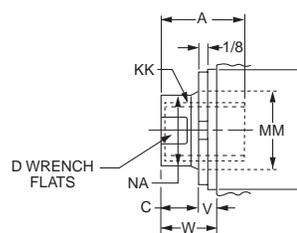
Thread Style 4
(NFA Style SM)
Small Male



Thread Style 8
(NFA Style IM)
Intermediate Male



Thread Style 9
(NFA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Mounting Information – 8" to 14" Bore Sizes

C052

Table 1—Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	ND	NT	R	TN	Add Stroke		
											LB	P	SN
8	8-1/2	3/4	3/4	2	1-1/2	9/16	1-1/8	3/4-10	6.44	4-1/2	5-7/8	3-1/4	3-1/4
10	10-5/8	1	3/4	2-1/4	2	11/16	1-1/2	1-8	7.92	5-1/2	7-1/8	4-1/8	4-1/8
12	12-3/4	1	3/4	2-1/4	2	11/16	1-1/2	1-8	9.40	7-1/4	7-5/8	4-5/8	4-5/8
14	14-3/4	1-1/4	3/4	2-3/4	2-1/4	3/4	1-7/8	1-1/4-7	10.90	8-3/8	8-7/8	5-1/2	5-1/2

Table 2—Rod Dimensions

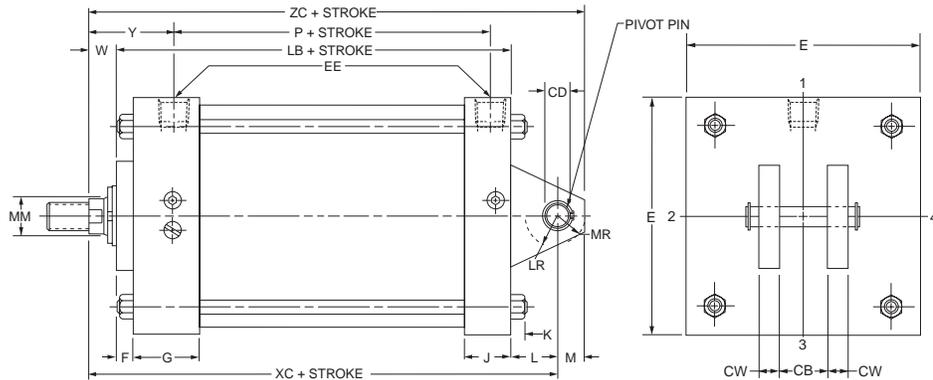
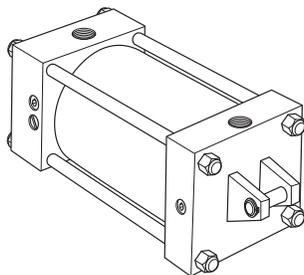
Bore	Rod No.	Rod Dia MM	Thread		Rod Extensions and Pilot Dimensions								TT	XT	Y	Add Stroke ZB
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	V	W				
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	4	2-13/16	2-13/16	7-5/16
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-7/16	3-7/16	7-15/16
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	3-1/16	3-1/16	7-9/16
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-3/16	3-3/16	7-11/16
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-7/16	3-7/16	7-15/16
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-7/16	3-7/16	7-15/16
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-7/16	3-7/16	7-15/16
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-7/16	3-7/16	7-15/16
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-7/16	3-7/16	7-15/16
0	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-7/16	3-7/16	7-15/16	
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	3-1/8	3-1/8	8-15/16
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	3-1/4	9-1/16
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	3-1/2	9-5/16
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-5/16
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-5/16
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-5/16
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/2	3-1/2	9-5/16
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	3-1/2	9-5/16
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/2	3-1/2	9-5/16
12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	3-1/4	9-9/16
	3	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	3-1/2	9-13/16
	4	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-13/16
	5	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-13/16
	6	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	3-1/2	9-13/16
	7	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	11/2	7	3-1/2	3-1/2	9-13/16
	8	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	3-1/2	9-13/16
	9	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/2	3-1/2	9-13/16
	0															
14	1(Std.)	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-13/16	3-13/16	11-1/8
	3	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-13/16	3-13/16	11-1/8
	4	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-13/16	3-13/16	11-1/8
	5	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-13/16	3-13/16	11-1/8
	6	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-13/16	3-13/16	11-1/8
	7	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-13/16	3-13/16	11-1/8
	8	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-13/16	3-13/16	11-1/8
	0															

Table 3 — Envelope and Mounting Dimensions

TT	XT	Y	ZB

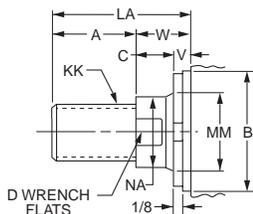


Cap Fixed Clevis
Style BB
(NFA Style MP1)

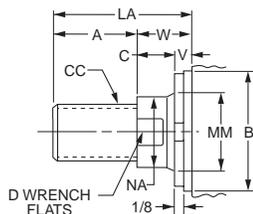


Rod End Dimensions — see table 2

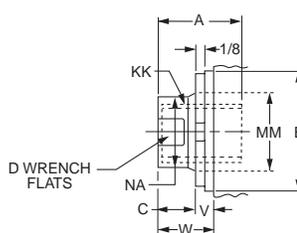
Thread Style 4
(NFA Style SM)
Small Male



Thread Style 8
(NFA Style IM)
Intermediate Male



Thread Style 9
(NFA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK , A and LA . If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Mounting Information – 8" to 14" Bore Sizes

C052

Table 1—Envelope and Mounting Dimensions

Bore	CB	+.000 -.002 CD*	CW	E	EE NPTF	F	G	J	K	L	LR	M	MR	Add Stroke	
														LB	P
8	1-1/2	1.001	3/4	8-1/2	3/4	3/4	2	1-1/2	9/16	1-1/2	1-1/4	1	1-3/16	5-7/8	3-1/4
10	2	1.376	1	10-5/8	1	3/4	2-1/4	2	1-1/16	2-1/8	1-7/8	1-3/8	1-5/8	7-1/8	4-1/8
12	2-1/2	1.751	1-1/4	12-3/4	1	3/4	2-1/4	2	1-1/16	2-1/4	2-1/8	1-3/4	2-1/8	7-5/8	4-5/8
14	2-1/2	2.001	1-1/4	14-3/4	1-1/4	3/4	2-3/4	2-1/4	3/4	2-1/2	2-3/8	2	2-3/8	8-7/8	5-1/2

* CD is pin diameter.

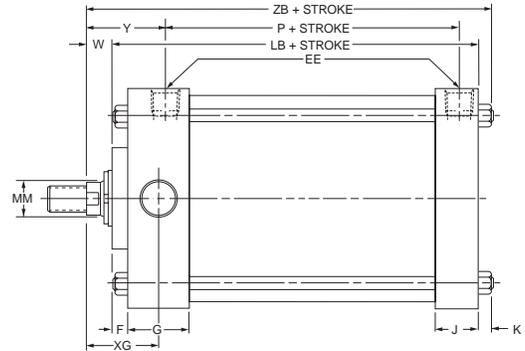
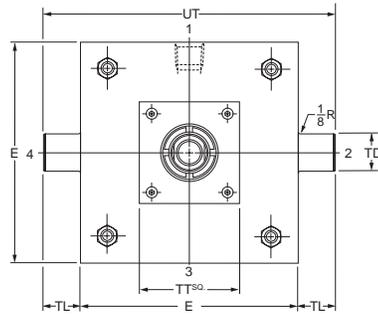
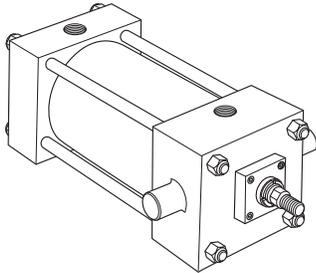
Table 2—Rod Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke				
			Style 8 CC	Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W	TT	Y	XC	ZC	
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	4	2-13/16	8-1/4	9-1/4	
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8	
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	11-1/16	3/8	1-1/8	4	3-1/16	8-1/2	9-1/2	
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	11-5/16	3/8	1-1/4	4	3-3/16	8-5/8	9-5/8	
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-7/16	8-7/8	9-7/8	
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8	
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8	
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8	
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8	
	0	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8	
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	3-1/8	10-3/8	11-3/4	
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	10-1/2	11-7/8	
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	10-3/4	12-1/8	
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8	
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8	
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8	
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8	
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8	
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8	
	12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	11-1/8	12-7/8
3		2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	11-3/8	13-1/8	
4		3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8	
5		3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8	
6		4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8	
7		4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/2	11-3/8	13-1/8	
8		5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	11-3/8	13-1/8	
9		5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/2	11-3/8	13-1/8	
14		1(Std.)	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-13/16	12-7/8	14-7/8
		3	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-13/16	12-7/8	14-7/8
	4	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-13/16	12-7/8	14-7/8	
	5	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-13/16	12-7/8	14-7/8	
	6	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-13/16	12-7/8	14-7/8	
	7	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-13/16	12-7/8	14-7/8	
	8	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-13/16	12-7/8	14-7/8	

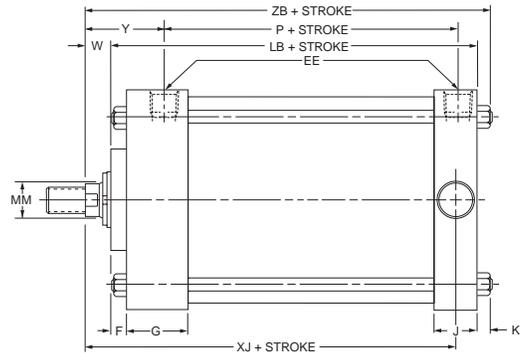
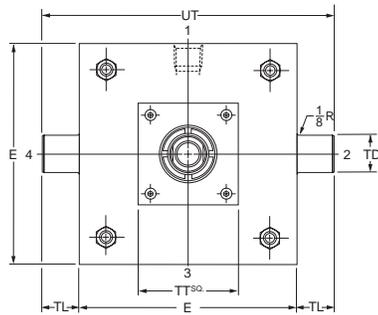
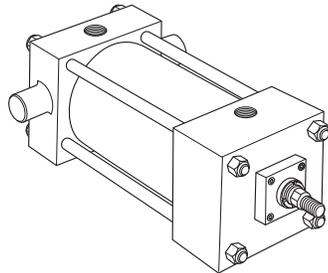
Table 3 — Envelope and Mounting Dimensions

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Pilot Dimensions								Add Stroke			
			Style 8 CC	Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W	TT	Y	XC	ZC
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8	4	2-13/16	8-1/4	9-1/4
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	11-1/16	3/8	1-1/8	4	3-1/16	8-1/2	9-1/2
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	11-5/16	3/8	1-1/4	4	3-3/16	8-5/8	9-5/8
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-7/16	8-7/8	9-7/8
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-7/16	8-7/8	9-7/8
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8
	0	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-7/16	8-7/8	9-7/8
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8	4	3-1/8	10-3/8	11-3/4
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	10-1/2	11-7/8
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	10-3/4	12-1/8
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	10-3/4	12-1/8
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2	7	3-1/2	10-3/4	12-1/8
	12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4	4	3-1/4	11-1/8
3		2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2	4	3-1/2	11-3/8	13-1/8
4		3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8
5		3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8
6		4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2	5-1/2	3-1/2	11-3/8	13-1/8
7		4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2	7	3-1/2	11-3/8	13-1/8
8		5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	7	3-1/2	11-3/8	13-1/8
9		5-1/2														

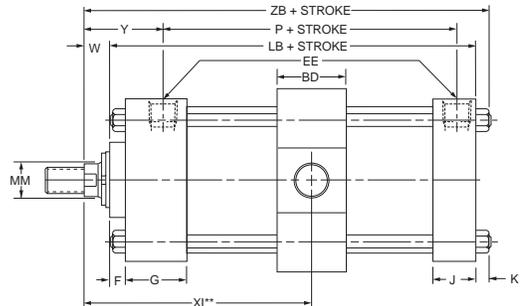
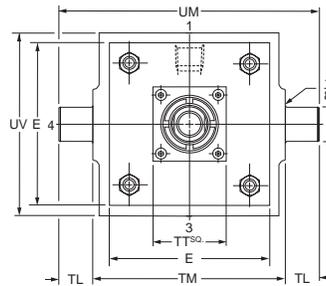
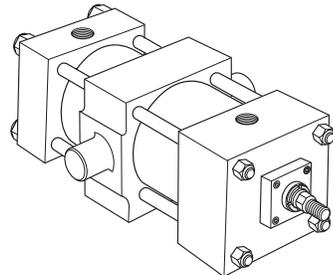
Head Trunnion
Style D
(NFA Style MT1)



Cap Trunnion
Style DB
(NFA Style MT2)

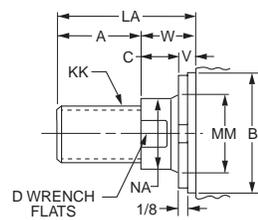


Intermediate Fixed Trunnion
Style DD
(NFA Style MT4)



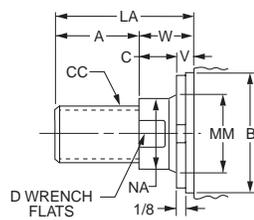
Rod End Dimensions — see table 2

Thread Style 4
(NFA Style SM)
Small Male



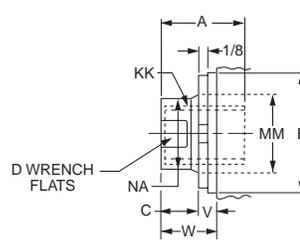
A high strength rod end stud is supplied on thread style 4 through 2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod

Thread Style 8
(NFA Style IM)
Intermediate Male



ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

Thread Style 9
(NFA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

Mounting Information – 8" to 14" Bore Sizes

Envelope and Mounting Dimensions

Bore	BD	E	EE NPTF	F	G	J	K	+.000 -.001 TD	TL	TM	UM	UT	UV	Add Stroke		Style DD Min. Stroke
														LB	P	
8	2-1/2	8-1/2	3/4	3/4	2	1-1/2	9/16	1.375	1-3/8	9-3/4	12-1/2	11-1/4	9-1/2	5-7/8	3-1/4	7/8
10	3	10-5/8	1	3/4	2-1/4	2	1-1/16	1.750	1-3/4	12	15-1/2	14-1/8	11-3/4	7-1/8	4-1/8	7/8
12	3	12-3/4	1	3/4	2-1/4	2	1-1/16	1.750	1-3/4	14	17-1/2	16-1/4	13-3/4	7-5/8	4-5/8	3/8
14	3-1/2	14-3/4	1-1/4	3/4	2-3/4	2-1/4	3/4	2.000	2	16-1/4	20-1/4	18-3/4	16	8-7/8	5-1/2	3/8

Table 2—Rod Dimensions

Bore	Rod No.	Thread			Rod Extensions and Pilot Dimensions							
		Rod Dia. MM	Style 8 CC	Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W
8	1(Std.)	1-3/8	1-1/4-12	1-14	1-5/8	1.999	5/8	1-1/8	2-1/2	1-5/16	1/4	7/8
	2	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2
	3	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/8	1-1/2	3-1/8	1-11/16	3/8	1-1/8
	4	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4
	5	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2
	6	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2
	7	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2
	8	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2
	9	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2
0	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2	
10	1(Std.)	1-3/4	1-1/2-12	1-1/4-12	2	2.374	3/4	1-1/2	3-1/8	1-11/16	3/8	1-1/8
	3	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4
	4	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2
	5	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2
	6	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2
	7	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2
	8	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2
	9	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2
	0	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2
12	1(Std.)	2	1-3/4-12	1-1/2-12	2-1/4	2.624	7/8	1-11/16	3-1/2	1-15/16	3/8	1-1/4
	3	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2
	4	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2
	5	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2
	6	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2
	7	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2
	8	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2
	9	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2
	0	6	5-3/4-12	4-12	6	6.749	1	5-1/4	7-1/2	5-7/8	1/2	1-1/2
14	1(Std.)	2-1/2	2-1/4-12	1-7/8-12	3	3.124	1	2-1/16	4-1/2	2-3/8	1/2	1-1/2
	3	3	2-3/4-12	2-1/4-12	3-1/2	3.749	1	2-5/8	5	2-7/8	1/2	1-1/2
	4	3-1/2	3-1/4-12	2-1/2-12	3-1/2	4.249	1	3	5	3-3/8	1/2	1-1/2
	5	4	3-3/4-12	3-12	4	4.749	1	3-3/8	5-1/2	3-7/8	1/2	1-1/2
	6	4-1/2	4-1/4-12	3-1/4-12	4-1/2	5.249	1	3-7/8	6	4-3/8	1/2	1-1/2
	7	5	4-3/4-12	3-1/2-12	5	5.749	1	4-1/4	6-1/2	4-7/8	1/2	1-1/2
	8	5-1/2	5-1/4-12	4-12	5-1/2	6.249	1	4-5/8	7	5-3/8	1/2	1-1/2
	9	6	5-3/4-12	4-12	6	6.749	1	5-1/4	7-1/2	5-7/8	1/2	1-1/2
	0	7	6-1/4-12	5-12	7	7.249	1	6-1/4	8-1/2	6-7/8	1/2	1-1/2

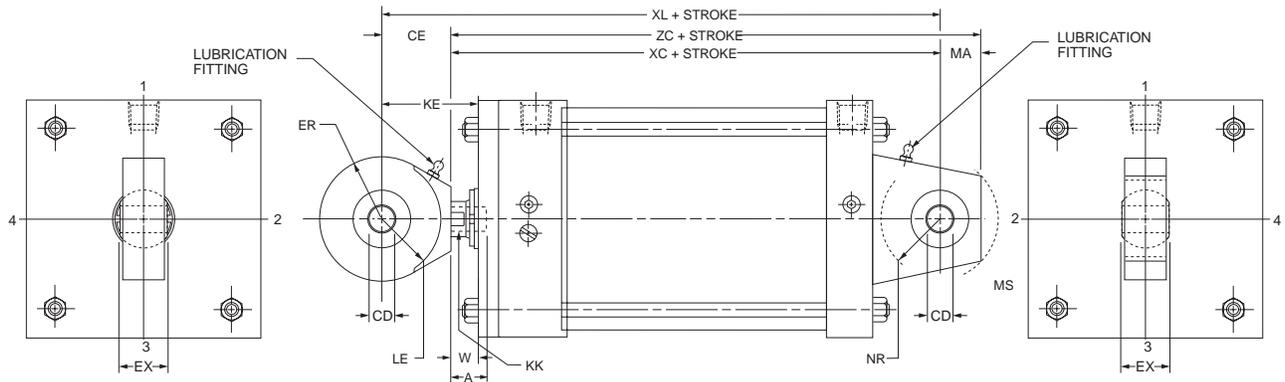
Table 3 — Envelope and Mounting Dimensions

TT	XG	Min.** XI	Y	Add Stroke	
				XJ	ZB
4	2-5/8	4-15/16	2-13/16	6	7-5/16
7	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
4	2-7/8	5-3/16	3-1/16	6-1/4	7-9/16
4	3	5-5/16	3-3/16	6-3/8	7-11/16
4	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
5-1/2	3-1/4	5-3/16	3-7/16	6-5/8	7-15/16
5-1/2	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
5-1/2	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
7	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
7	3-1/4	5-9/16	3-7/16	6-5/8	7-15/16
4	3	5-11/16	3-1/8	7-1/4	8-15/16
4	3-1/8	5-13/16	3-1/4	7-3/8	9-1/16
4	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
5-1/2	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
5-1/2	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
5-1/2	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
7	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
7	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
7	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
7	3-3/8	6-1/16	3-1/2	7-5/8	9-5/16
4	3-1/8	5-13/16	3-1/4	7-7/8	9-9/16
4	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
5-1/2	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
5-1/2	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
5-1/2	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
7	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
7	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
7	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
7	3-3/8	6-1/16	3-1/2	8-1/8	9-13/16
4	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
5-1/2	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
5-1/2	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
5-1/2	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
7	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
7	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
7	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8
7	3-5/8	6-13/16	3-13/16	9-1/4	11-1/8

**Dimension XI to be specified by customer.



Style SB – 1-1/2" to 6" Bore Sizes



Bore	Rod No.	Rod Dia. MM	Thread		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	2A	Max. Oper. PSI
			Style 9 KK	Style 7 KK			XC	XL	ZC											
1-1/2	1(Std.)	5/8	7/16-20	—	3/4	5/8	5-3/8	6-1/4	6-1/8	1- 1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	
	2	1	**	7/16-20	3/4	1	5-3/4	6-5/8	6-1/2	1-7/8	.5000									
2	1(Std.)	5/8	7/16-20	—	3/4	5/8	5-3/8	6-1/4	6-1/8	1-1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	
	2	1-3/8	**	7/16-20	3/4	1-1/4	6	6-7/8	6-3/4	2-1/8	.5000									
	3	1	**	7/16-20	3/4	1	5-3/4	6-5/8	6-1/2	1-7/8										
2-1/2	1(Std.)	5/8	7/16-20	—	3/4	5/8	5-1/2	6-3/8	6-1/4	1-1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	
	2	1-3/4	**	7/16-20	3/4	1-1/2	6-3/8	7-1/4	7-1/8	2-3/8	.5000									
	3	1	**	7/16-20	3/4	1	5-7/8	6-3/4	6-5/8	1-7/8										
	4	1-3/8	**	7/16-20	3/4	1-1/4	6-1/8	7	6-7/8	2-1/8										
3-1/4	1(Std.)	1	3/4-16	—	1-1/8	3/4	6-7/8	8-1/8	7-7/8	2	-.0005	1-1/4	1-1/8	2-1/32	1-1/16	1	1-3/8	1	250	
	2	2	**	3/4-16	1-1/8	1-3/8	7-1/2	8-3/4	8-1/2	2-5/8	.7500									
	3	1-3/8	**	3/4-16	1-1/8	1	7-1/8	8-3/8	8-1/8	2-1/4										
	4	1-3/4	**	3/4-16	1-1/8	1-1/4	7-3/8	8-5/8	8-3/8	2-1/2										
4	1(Std.)	1	3/4-16	—	1-1/8	3/4	6-7/8	8-1/8	7-7/8	2	-.0005	1-1/4	1-1/8	2-1/32	1-1/16	1	1-3/8	1	250	
	2	2-1/2	**	3/4-16	1-1/8	1-5/8	7-3/4	9	8-3/4	2-7/8	.7500									
	3	1-3/8	**	3/4-16	1-1/8	1	7-1/8	8-3/8	8-1/8	2-1/4										
	4	1-3/4	**	3/4-16	1-1/8	1-1/4	7-3/8	8-5/8	8-3/8	2-1/2										
	5	2	**	3/4-16	1-1/8	1-3/8	7-1/2	8-3/4	8-1/2	2-5/8										
5	1(Std.)	1	3/4-16	—	1-1/8	3/4	7-1/8	8-3/8	8-1/8	2	-.0005	1-1/4	1-1/8	2-1/32	1-1/16	1	1-3/8	1	250	
	2	3-1/2	**	3/4-16	1-1/8	1-5/8	8	9-1/4	9	2-7/8	.7500									
	3	1-3/8	**	3/4-16	1-1/8	1	7-3/8	8-5/8	8-3/8	2-1/4										
	4	1-3/4	**	3/4-16	1-1/8	1-1/4	7-5/8	8-7/8	8-5/8	2-1/2										
	5	2	**	3/4-16	1-1/8	1-3/8	7-3/4	9	8-3/4	2-5/8										
	6	2-1/2	**	3/4-16	1-1/8	1-5/8	8	9-1/4	9	2-7/8										
	7	3	**	3/4-16	1-1/8	1-5/8	8	9-1/4	9	2-7/8										
6	1(Std.)	1-3/8	1-14	—	1-5/8	7/8	8-1/8	10	9-3/8	2-3/4	-.0005	1-7/8	1-1/4	7/8	1-7/16	1-1/4	1-11/16	1-1/4	250	
	2	4	**	1-14	1-5/8	1-1/2	8-3/4	10-5/8	10	3-3/8	1.0000									
	3	1-3/4	**	1-14	1-5/8	1-1/8	8-3/8	10-1/4	9-5/8	3										
	4	2	**	1-14	1-5/8	1-1/4	8-1/2	10-3/8	9-3/4	3-1/8										
	5	2-1/2	**	1-14	1-5/8	1-1/2	8-3/4	10-5/8	10	3-3/8										
	6	3	**	1-14	1-5/8	1-1/2	8-3/4	10-5/8	10	3-3/8										
	7	3-1/2	**	1-14	1-5/8	1-1/2	8-3/4	10-5/8	10	3-3/8										

Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings.

Note: For additional dimensions see Series 2A, page B158.

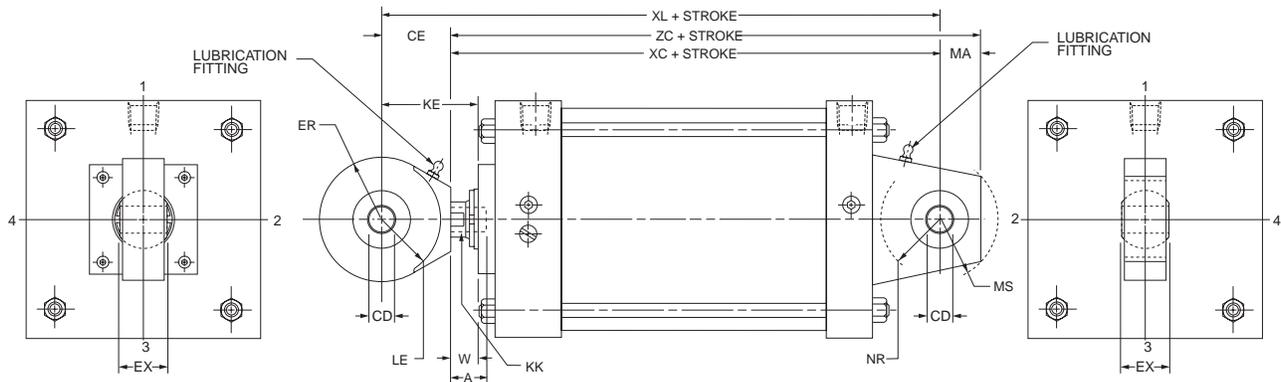
* Dimension CD is hole diameter.

** Corresponding rod eye pin diameter may not match pin diameter of cap.

Rod No. 1 is standard.



Style SB – 8" to 14" Bore Sizes



Bore	Rod No.	Rod Dia. MM	Thread		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max. Oper. PSI 2A
			Style 9 KK	Style 7 KK			XC	XL	ZC										
8	1(Std.)	1-3/8	1-14	—	1-5/8	7/8	8-1/4	10-1/8	9-1/2	2-3/4	-0.0005 1.0000	1-7/8	1-1/4	7/8	1-7/16	1-1/4	1-11/16	1-1/4	250
	2	5-1/2	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
	3	1-3/4	**	1-14	1-5/8	1-1/8	8-1/2	10-3/8	9-3/4	3									
	4	2	**	1-14	1-5/8	1-1/4	8-5/8	10-1/2	9-7/8	3-1/8									
	5	2-1/2	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
	6	3	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
	7	3-1/2	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
	8	4	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
	9	4-1/2	**	1-14	1-5/8	1-1/2	8-7/8	10-3/4	10-1/8	3-3/8									
10	1(Std.)	1-3/4	1-1/4-12	—	2	1-1/8	10-3/8	12-1/2	12-1/4	3-1/4	-0.0005 1.3750	2-1/8	1-11/16	1-3/16	17/8	1-7/8	2-7/16	1-5/8	250
	3	2	**	1-1/4-12	2	1-1/4	10-1/2	12-5/8	12-3/8	3-3/8									
	4	2-1/2	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	5	3	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	6	3-1/2	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	7	4	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	8	4-1/2	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	9	5	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
	0	5-1/2	**	1-1/4-12	2	1-1/2	10-3/4	12-7/8	12-5/8	3-5/8									
12	1(Std.)	2	1-1/2-12	—	2-1/4	1-1/4	11-1/8	13-5/8	13-5/8	3-3/4	-0.0005 1.7500	2-1/2	2-1/16	11-7/32	2-1/8	2-1/2	2-7/8	2-1/16	250
	3	2-1/2	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	4	3	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	5	3-1/2	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	6	4	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	7	4-1/2	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	8	5	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	9	5-1/2	**	1-1/2-12	2-1/4	1-1/2	11-3/8	13-7/8	13-7/8	4									
	14	1(Std.)	2-1/2	1-7/8-12	—	3	1-1/2	12-7/8	15-5/8	15-3/8									
3		3	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									
4		3-1/2	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									
5		4	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									
6		4-1/2	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									
7		5	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									
8		5-1/2	**	1-7/8-12	3	1-1/2	12-7/8	15-5/8	15-3/8	4-1/4									

Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings.

Note: For additional dimensions see Series 2A, page B210.

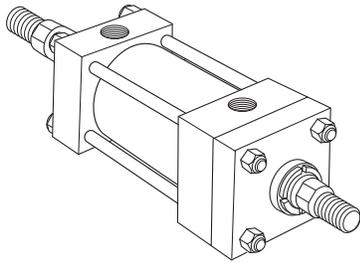
* Dimension CD is hole diameter.

** Corresponding rod eye pin diameter may not match pin diameter of cap.

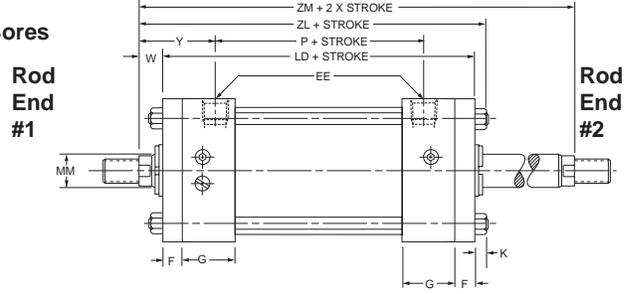
Rod No. 1 is standard.



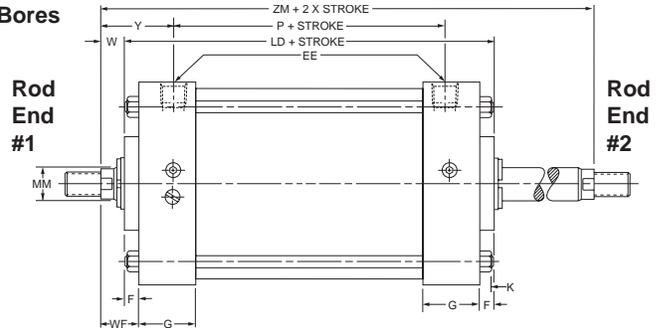
How to Use Double Rod Cylinder Dimensioned Drawings



1" - 6" Bores



7" - 14" Bores



Mounting Styles for Single Rod Models	Mounting Styles for Corresponding Double Rod Models*	Dimensions Shown on This Page Supplement Dimensions on Pages Listed Below	
		1" - 6" Bores	8" - 14" Bores
T	KT	B192	B204
TB**	KTB	B192	B204
TD	KTD	B192	B204
J	KJ	B102	—
JB**	KJB	B194	B204
C**	KC	B196	B206
F	KF	B196	B208
D	KD	B198	B212
DD	KDD†	B198	B212

*If only one end of these Double Rod Cylinders is to be cushioned, be sure to specify clearly which end this will be.

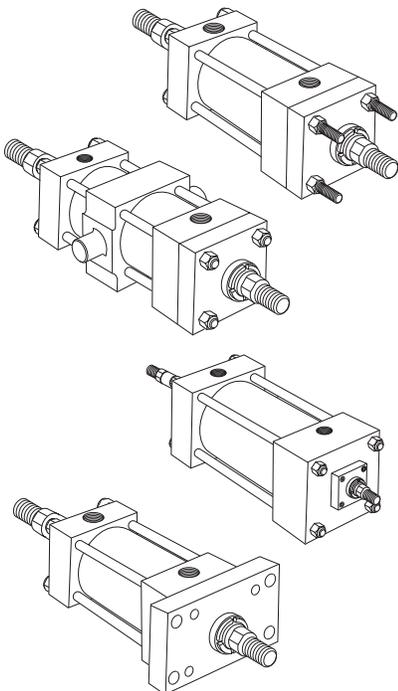
**Available in 7" bore, pages B190-B191.

†Specify XI dimension from rod end #1. Mounting style KDD not available in 1" and 7" bore sizes.

To determine dimensions for a double rod cylinder, first refer to the desired single rod mounting style cylinder shown on preceding pages of this catalog. (See table at left.) After selecting necessary dimensions from that drawing, return to this page supplement the single rod dimensions with those shown on drawings at right and dimension table below. Note that double rod cylinders have a head (Dim. G) at both ends and that dimension LD replace LB and ZL replaces ZB, etc. The double rod dimensions differ from,

or are in addition to those for single rod cylinders shown on preceding pages and provide the information needed to completely dimension a double rod cylinder.

On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from rod end #1 only. See port position information in the Engineering Section (Section A).



All dimensions are in inches and apply to Code 1 rod sizes only. For alternate rod sizes, determine all envelope dimensions (within LD dim.) as described above and then use appropriate rod end dimensions for proper rod size from single rod cylinder.

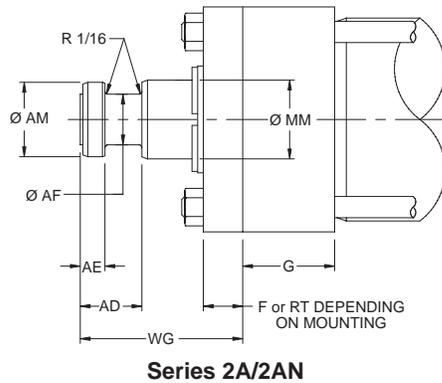
Bore	Rod No.	Rod Dia. MM	Add Stroke				Add 2X Stroke
			LD	ZL	SSK	SNK	ZM
1	1	1/2	4-3/4	5-1/2	3-3/8	2-1/8	6
1-1/2	1	5/8	4-7/8	5-3/4	3-3/8	2-1/4	6-1/8
2	1	5/8	4-7/8	5-13/16	3-3/8	2-1/4	6-1/8
2-1/2	1	5/8	5	5-15/16	3-1/2	2-3/8	6-1/4
3-1/4	1	1	6	7-1/8	3-3/4	2-5/8	7-1/2
4	1	1	6	7-1/8	3-3/4	2-5/8	7-1/2
5	1	1	6-1/4	7-7/16	3-5/8	2-7/8	7-3/4
6	1	1-3/8	7	8-5/16	4-1/8	3-1/8	8-3/4
7	1	1-3/8	7-1/8	—	4-1/4	3-1/4	8-7/8
8	1	1-3/8	7-1/8	—	4-1/4	3-1/4	8-7/8
10	1	1-3/4	8-1/8	—	4-7/8	4-1/8	10-3/8
12	1	2	8-5/8	—	5-3/8	4-5/8	11-1/8
14	1	2-1/2	10-1/8	—	6-3/8	5-1/2	13-1/8
Replaces:			LB	ZB	SS	SN	—
On single rod mounting styles:			All Mtg. Styles		C	F	All Mtgs.



Parker “Style 55” Piston Rod End

Rod end flange coupling for Parker Series 2A and 2AN Pneumatic Cylinders:

- Simplifies alignment
- Reduces assembly time
- Allows full rated pneumatic pressure in push and pull directions
- Available in 5/8" through 5-1/2" piston rod diameters



How To Order

Complete Model Number and place a “55” in the Piston Rod End designator position.

Example: 6.00J2AU155X12.000

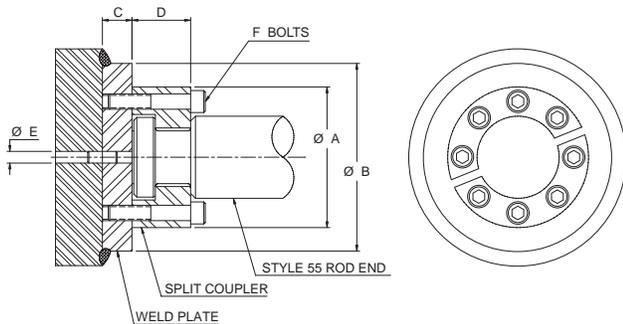
Consult Factory for availability of mounting accessories and Hardware.

Dimensions Style 55 Rod End

MM Rod Dia.	AD	AE	AF	AM	WG
5/8	5/8	1/4	3/8	.57	1-3/4
1	15/16	3/8	11/16	.95	2-3/8
1-3/8	1-1/16	3/8	7/8	1.32	2-3/4
1-3/4	1-5/16	1/2	1-1/8	1.70	3-1/8
2	1-11/16	5/8	1-3/8	1.95	3-3/4
2-1/2	1-15/16	3/4	1-3/4	2.45	4-1/2
3	2-7/16	7/8	2-1/4	2.95	4-7/8
3-1/2	2-11/16	1	2-1/2	3.45	5-5/8
4	2-11/16	1	3	3.95	5-3/4
4-1/2	3-3/16	1-1/2	3-1/2	4.45	6-1/2
5	3-3/16	1-1/2	3-7/8	4.95	6-5/8
5-1/2	3-15/16	1-7/8	4-3/8	5.45	7-1/2

See Cylinder Catalog for F, G and RT per bore and series.

Split Couplers and Weld Plates



⚠ WARNING: Piston rod separation from the machine member can result in severe personal injury or even death to nearby personnel. The cylinder user must make sure the weld holding the weld plate to the machine is of sufficient quality and size to hold the intended load. The cylinder user must also make sure the bolts holding split coupler to the weld plate are of sufficient strength to hold the intended load and installed in such a way that they will not become loose during the machine's operation.

NOTE: Screws are not included with split coupler or weld plate.

Table 1 — Part Numbers and Dimensions

Rod Dia.	A	B	C	D	E	F	Bolt Size	Bolt Circle	Split Coupler Part No.	Weld Plate Part No.
0.625	1.50	2.00	0.50	0.56	0.250	4	#10-24 x .94 LG	1.125	147234 0062	148174 0062
1.00	2.00	2.50	0.50	0.88	0.250	6	.250-20 x 1.25 LG	1.500	147234 0100	148174 0100
1.375	2.50	3.00	0.63	1.00	0.250	6	.312-18 x 1.50 LG	2.000	147234 0138	148174 0138
1.75	3.00	4.00	0.63	1.25	0.250	8	.312-18 x 1.75 LG	2.375	147234 0175	148174 0175
2.00	3.50	4.00	0.75	1.63	0.375	12	.375-16 x 2.25 LG	2.687	147234 0200	148174 0200
2.50	4.00	4.50	0.75	1.88	0.375	12	.375-16 x 2.50 LG	3.187	147234 0250	148174 0250
3.00	5.00	5.50	1.00	2.38	0.375	12	.500-13 x 3.25 LG	4.000	147234 0300	148174 0300
3.50	5.88	7.00	1.00	2.63	0.375	12	.625-11 x 3.50 LG	4.687	147234 0350	148174 0350
4.00	6.38	7.00	1.00	2.63	0.375	12	.625-11 x 3.50 LG	5.187	147234 0400	148174 0400
4.50	6.88	8.00	1.00	3.13	0.375	12	.625-11 x 4.00 LG	5.687	147234 0450	148174 0450
5.00	7.38	8.00	1.00	3.13	0.375	12	.625-11 x 4.00 LG	6.187	147234 0500	148174 0500
5.50	8.25	9.00	1.25	3.88	0.375	12	.750-10 x 5.00 LG	6.875	147234 0550	148174 0550

Adjustable Floating Cushions

Cushions are optional, and can be supplied at head end, cap end, or both ends without change in envelope or mounting dimensions. All Parker cushions are adjustable.

The Series 2A cylinder design incorporates the longest cushion sleeve and cushion spear that can be provided in the standard envelope without decreasing the rod bearing and piston bearing lengths.

(1) When a cushion is specified at the head end:

- a. A self-centering sleeve is furnished on the piston rod assembly.
- b. A needle valve is provided that is flush with the side of the head when wide open. It may be identified by the fact that it is socket-keyed. It is located on side number 2, in all mounting styles except D, DB and DD. In these styles it is located on side number 3.
- c. A springless check valve is provided that is also flush with the side of the head and is mounted adjacent to the needle valve except on certain bores of mounting style C where it is mounted opposite the needle valve. It may be identified by the fact that it is slotted.
- d. The check and needle valves are interchangeable in the head.

(2) When a cushion is specified at the cap end:

- a. A cushion spear is provided on the piston rod assembly.
- b. A “float check” self-centering bushing is provided which incorporates a large flow check valve for fast “out-stroke” action.
- c. A socket-keyed needle valve is provided that is flush with the side of the cap when wide open. It is located on side number 2 in all mounting styles except D, DB and DD. In these styles it is located on side number 3.

Cushion Length

Cylinder Bore (Inches)	Rod Diameter* (Inches)	Rod Number	Cushion Length (Inches)	
			Head*	Cap
1-1/2	5/8	1	7/8	13/16
	1	2	7/8	13/16
2	5/8	1	7/8	13/16
	1-3/8	2	7/8	13/16
2-1/2	5/8	1	7/8	13/16
	1-3/4	2	7/8	13/16
3-1/4	1	1	1-1/8	1
	2	2	13/16	1
4	1	1	1-1/8	1
	2-1/2	2	13/16	1
5	1	1	1-1/8	1
	3-1/2	2	13/16	1

Cylinder Bore (Inches)	Rod Diameter* (Inches)	Rod Number	Cushion Length (Inches)	
			Head*	Cap
6	13/8	1	1-3/8	1-1/4
	4	2	1-1/16	1-1/4
7	1-3/8	1	1-1/16	1-1/4
	2	4	1-1/16	1-1/4
8	1-3/8	1	1-1/16	1-1/4
	5-1/2	2	1-5/16	1-1/4
10	1-3/4	1	1-5/16	1-3/4
	5-1/2	0	1-3/16	1-3/4
12	2	1	1-5/16	1-3/4
	5-1/2	9	1-3/16	1-3/4
14	2-1/2	1	1-3/4	2
	5-1/2	8	1-11/16	2

* Head end cushions for rod diameters not listed have cushion lengths with the limits shown.

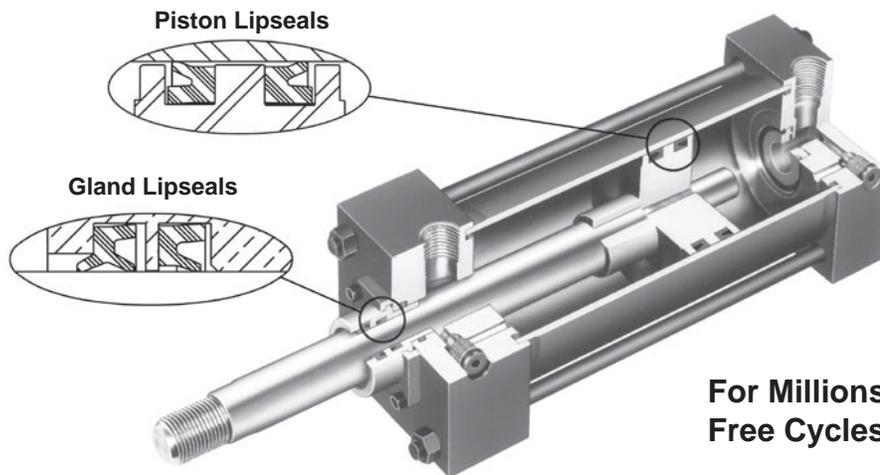
For cushion selection and sizing see Engineering Section.

Non-Lube Air Cylinder (2AN)

Today's industrial market demands more from a pneumatic cylinder. Cylinders are still required to handle tough, heavy-duty applications. But, more and more, these cylinders operate in environments or circumstances where it is not possible or advantageous to add lubrication to the compressed air entering the cylinder. Certain packaging and assembly operations, food environments, and microprocessor chip manufacturing are typical examples of areas where the exhausting of oil into the environment is not desirable. In many other situations, "non-lube" systems are used when proper air line lubrication is not present because of the time and expense of keeping lubricators filled and operating correctly.

In bore sizes to 12" diameter and rod diameters to 2-1/2", the Parker Series 2AN air cylinder features rounded lip rod and piston seals. These seals glide over the PTFE based lubricant that is provided at the time of manufacture. The Parker Series 2AN Non Lubricated Air Cylinder maintains the lubricant film where it belongs; on the seals bearing surfaces, piston rod and cylinder bore.

Benefits include... long seal and bearing life. No oil needs to be added through the use of lubricators. As the cylinder strokes, no oil is expelled into the atmosphere with the exhaust air.



For Millions of Trouble Free Cycles

Standard Specifications

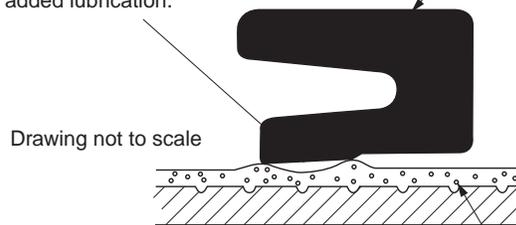
- Heavy Duty Service — ANSI/(NFPA) T3.6.7R2-1996 Specifications and Mounting Dimension Standards
- NFPA Interchangeable
- 15 Standard Mounting Styles
- Strokes — Available in any Practical Stroke Length
- Cushions — Optional at either end or both ends of stroke. "Float Check" at cap end.
- Exceeds Automotive Specifications
- Nominal Pressure – 250 PSI Air Service
- Standard Temperature — -10°F to +165°F
- Standard Fluid — Filtered Dry Air

In line with our policy of continuing product improvement, specifications in this catalog are subject to change.

**Anatomy of Series 2AN
 Sealing and Lubricant Retention Systems**

Rounded sealing lip glides over lubricant film instead of scraping it off. Reduces friction, increases life and eliminates the need for added lubrication.

Increased heel thickness and outer lip extension improve stability, resist rolling.



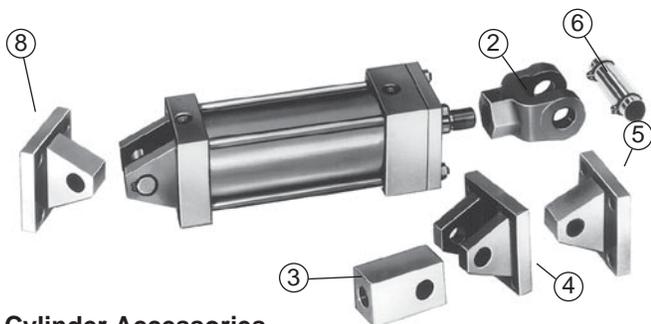
High integrity lubricant film with suspended PTFE particles

Available Bore and Rod Sizes*

Bore Sizes Available	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	8"	10"	12"	14"
-----------------------------	--------	----	--------	--------	----	----	----	----	-----	-----	-----

Rod Sizes Available	5/8"	1"	1-3/8"	1-3/4"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"
----------------------------	------	----	--------	--------	----	--------	----	--------	----	--------	----	--------

*For specific cylinder bore size/piston rod availabilities and dimensions, see Series 2A Cylinder.



Cylinder Accessories

Parker offers a complete range of cylinder accessories to assure you of greatest versatility in present or future cylinder applications.

Rod End Accessories

Accessories offered for the rod end of the cylinder include Rod Clevis, Eye Bracket, Knuckle, Clevis Bracket and Pivot Pin. To select the proper part number for any desired accessory, refer to Chart A below and look opposite the thread size of the rod end as indicated in the first column. The Pivot Pins, Eye Brackets and Clevis Brackets are listed opposite the thread size which their mating Knuckles or Clevises fit.

Thread Size	Mating Parts			Mating Parts			Alignment Coupler
	Rod Clevis	Eye Bracket	Pin	Knuckle	Clevis Bracket	Pin	
5/16-24	51221	74077	—	74075	74076	74078	134757 0031
7/16-20	50940	69195	68368	69089	69205	68368	134757 0044
1/2-20	50941	69195	68368	69090	69205	68368	134757 0050
3/4-16	50942	69196	68369	69091	69206†	68369	134757 0075
3/4-16	133284	69196	68369	69091	69206	68369	134757 0075
7/8-14	50943	*85361	68370	69092	69207	68370	134757 0088
1-14	50944	*85361	68370	69093	69207	68370	134757 0100
1-14	133285	*85361	68370	69093	69207	68370	134757 0100
1-1/4-12	50945	69198	68371	69094	69208	68371	134757 0125
1-1/4-12	133286	69198	68371	69094	69208	68371	134757 0125
1-1/2-12	50946	*85362	68372	69095	69209	68372	133739 0150
1-3/4-12	50947	*85363	68373	69096	69210	69215	133739 0175
1-7/8-12	50948	*85363	68373	69097	69210	69215	133739 0188
2-1/4-12	50949	*85364	68374	69098	69211	68374	Consult Factory
2-1/2-12	50950	*85365	68375	69099	69212	68375	
2-3/4-12	50951	*85365	68375	69100	69213	69216	
3-1/4-12	50952	73538	73545	73536	73542	73545	
3-1/2-12	50953	73539	73547	73437	73542	73545	
4-12	50954	73539	73547	73438	73543	82181	
4-1/2-12	—	—	—	73439	73544	73547	

†For alignment coupler dimensions, see Section C.

*Cylinder accessory dimensions conform to NFPA recommended standard NFPA/T3.6.8 R1-1984, NFPA recommended standard fluid power systems — cylinder — dimensions for accessories for cataloged square head industrial types. Parker adopted this standard in April, 1985. Eye Brackets or Mounting Plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style Eye Brackets or Mounting Plates consult Drawing #144805 or previous issues of this catalog.

NOTE: For economical accessory selection, it is recommended that rod end style 4 be specified on your cylinder order.

Accessory Load Capacity

The various accessories on Pages B179 and B180 have been load rated for your convenience. The load capacity in lbs. shown on page B179, is the recommended maximum load for that accessory based on a 4:1 design factor in tensions. (Pivot Pin is rated in shear.) Before specifying, compare the actual load or the tension (pull) force at maximum operating pressure of the cylinder with the load capacity of the accessory you plan to use. If load or pull force of cylinder exceeds load capacity of accessory, consult factory.

Chart B

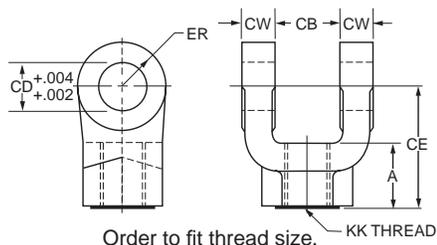
Mtg. Plate Part No.	Series 2A Bore Size
74076†	1"
69195	1-1/2", 2", 2-1/2"
69196	3-1/4", 4", 5"
*85361	6", 7", 8"
69198	10"
*85362	12"
*85363	14"

† Mounting plate for 1" bore single lug BB cylinder mounting style is Clevis Bracket P/N 74076.

Mounting Plates

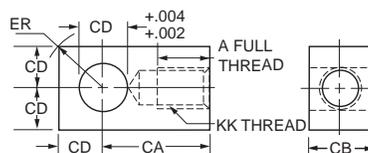
Mounting Plates for Style BB (Clevis mounted) cylinders are offered. To select proper part number for your application, refer to Chart B, above right.

② Female Rod Clevis



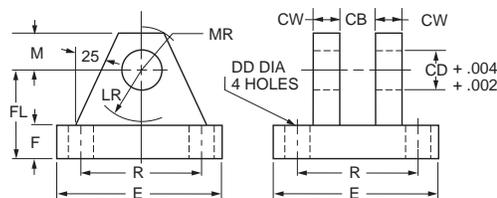
Order to fit thread size.

③ Knuckle (Female Rod Eye)



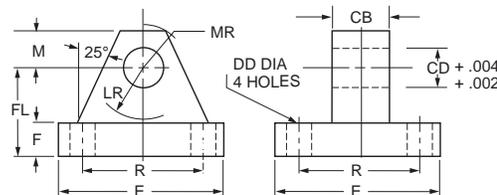
Order to fit thread size.

④ Clevis Bracket for Knuckle



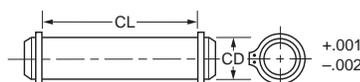
Order to fit Knuckle.

⑧ Mounting Plate or ⑤ Eye Bracket



1. When used to mate with the Rod Clevis, select from Chart A.
2. When used to mount the Style BB cylinders, select from the Mounting Plate Selection Table. See Chart B at lower left.

⑥ Pivot Pin



1. Pivot Pins are furnished with Clevis Mounted Cylinders as standard.
2. Pivot Pins are furnished with (2) Retainer Rings.
3. Pivot Pins must be ordered as a separate item if to be used with Knuckles, Rod Clevises, or Clevis Brackets.

	Female Rod Clevis Part Number																			
	51221†	50940	50941	50942	133284	50943	50944	133285	50945	133286	50946	50947	50948	50949	50950	50951	50952	50953	50954	
A	13/16	3/4	3/4	1-1/8	1-1/8	1-5/8	1-5/8	1-5/8	1-7/8	2	2	2-1/4	3	3	3-1/2	3-1/2	3-1/2	3-1/2‡	4‡	4‡
CB	11/32	3/4	3/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	4	4-1/2	4-1/2	
CD	5/16	1/2	1/2	3/4	3/4	1	1	1	1-3/8	1-3/8	1-3/4	2	2	2-1/2	3	3	3-1/2	4	4	
CE	2-1/4	1-1/2	1-1/2	2-1/8	2-3/8	2-15/16	2-15/16	3-1/8	3-3/4	4-1/8	4-1/2	5-1/2	5-1/2	6-1/2	6-3/4	6-3/4	7-3/4	8-13/16	8-13/16	
CW	13/64	1/2	1/2	5/8	5/8	3/4	3/4	3/4	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2	2	2-1/4	2-1/4	
ER	19/64	1/2	1/2	3/4	3/4	1	1	1	1-3/8	1-3/8	1-3/4	2	2	2-1/2	2-3/4	2-3/4	3-1/2	4	4	
KK	5/16-24	7/16-20	1/2-20	3/4-16	3/4-16	7/8-14	1-14	1-14	1-1/4-12	1-1/4-12	1-1/2-12	1-3/4-12	1-7/8-12	2-1/4-12	2-1/2-12	2-3/4-12	3-1/4-12	3-1/2-12	4-12	
Load Capacity Lbs.⊖	2600	4250	4900	11200	11200	18800	19500	19500	33500	33500	45600	65600	65600	98200	98200	98200	156700	193200	221200	

	Knuckle Part Number																
	74075	69089	69090	69091	69092	69093	69094	69095	69096	69097	69098	69099	69100	73536	73437	73438	73439
A	3/4	3/4	3/4	1-1/8	1-1/8	1-5/8	2	2-1/4	2-1/4	3	3-1/2	3-1/2	3-5/8	4-1/2	5	5-1/2	5-1/2
CA	1-1/2	1-1/2	1-1/2	2-1/16	2-3/8	2-13/16	3-7/16	4	4-3/8	5	5-13/16	6-1/8	6-1/2	7-5/8	7-5/8	9-1/8	9-1/8
CB	7/16	3/4	3/4	1-1/4	1-1/2	1-1/2	2	2-1/2	2-1/2	3	3	3-1/2	4	4	4-1/2	5	
CD	7/16	1/2	1/2	3/4	1	1	1-3/8	1-3/4	2	2	2-1/2	3	3	3-1/2	3-1/2	4	4
ER	19/32	23/32	23/32	1-1/16	1-7/16	1-7/16	1-31/32	2-1/2	2-27/32	2-27/32	3-9/16	4-1/4	4-1/4	4-31/32	4-31/32	5-11/16	5-11/16
KK	5/16-24	7/16-20	1/2-20	3/4-16	7/8-14	1-14	1-1/4-12	1-1/2-12	1-3/4-12	1-7/8-12	2-1/4-12	2-1/2-12	2-3/4-12	3-1/4-12	3-1/2-12	4-12	4-1/2-12
Load Capacity Lbs.⊖	3300	5000	5700	12100	13000	21700	33500	45000	53500	75000	98700	110000	123300	161300	217300	273800	308500

	Clevis Bracket for Knuckle Part Number												
	74076	69205	69206	69207	69208	69209	69210	69211	69212	69213	73542	73543	73544
CB	15/32	3/4	1-1/4	1-1/2	2	2-1/2	2-1/2	3	3	3-1/2	4	4-1/2	5
CD	7/16	1/2	3/4	1	1-3/8	1-3/4	2	2-1/2	3	3	3-1/2	4	4
CW	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2
DD	17/64	13/32	17/32	21/32	21/32	29/32	1-1/16	1-3/16	1-5/16	1-5/16	1-13/16	2-1/16	2-1/16
E	2-1/4	3-1/2	5	6-1/2	7-1/2	9-1/2	12-3/4	12-3/4	12-3/4	12-3/4	15-1/2	17-1/2	17-1/2
F	3/8	1/2	5/8	3/4	7/8	7/8	1	1	1	1	1-11/16	1-15/16	1-15/16
FL	1	1-1/2	1-7/8	2-1/4	3	3-5/8	4-1/4	4-1/2	6	6	6-11/16	7-11/16	7-11/16
LR	5/8	3/4	1-3/16	1-1/2	2	2-3/4	3-3/16	3-1/2	4-1/4	4-1/4	5	5-3/4	5-3/4
M	3/8	1/2	3/4	1	1-3/8	1-3/4	2-1/4	2-1/2	3	3	3-1/2	4	4
MR	1/2	5/8	29/32	1-1/4	1-21/32	2-7/32	2-25/32	3-1/8	3-19/32	3-19/32	4-1/8	4-7/8	4-7/8
R	1.75	2.55	3.82	4.95	5.73	7.50	9.40	9.40	9.40	9.40	12.00	13.75	13.75
Load Capacity Lbs.⊖	3600	7300	14000	19200	36900	34000	33000	34900	33800	36900	83500	102600	108400

	Eye Bracket and Mounting Plate Part Number										
	74077	69195	69196	85361*	69198	85362*	85363*	85364*	85365*	73538	73539
CB	5/16	3/4	1-1/4	1-1/2	2	2-1/2	2-1/2	3	3	4	4-1/2
CD	5/16	1/2	3/4	1	1-3/8	1-3/4	2	2-1/2	3	3-1/2	4
DD	17/64	13/32	17/32	21/32	21/32	29/32	1-1/16	1-3/16	1-5/16	1-13/16	2-1/16
E	2-1/4	2-1/2	3-1/2	4-1/2	5	6-1/2	7-1/2	8-1/2	9-1/2	12-5/8	14-7/8
F	3/8	3/8	5/8	7/8	7/8	1-1/8	1-1/2	1-3/4	2	1-11/16	1-15/16
FL	1	1-1/8	1-7/8	2-3/8	3	3-3/8	4	4-3/4	5-1/4	5-11/16	6-7/16
LR	5/8	3/4	1-1/4	1-1/2	2-1/8	2-1/4	2-1/2	3	3-1/4	4	4-1/2
M	3/8	1/2	3/4	1	1-3/8	1-3/4	2	2-1/2	2-3/4	3-1/2	4
MR	1/2	9/16	7/8	1-1/4	1-5/8	2-1/8	2-7/16	3	3-1/4	4-1/8	5-1/4
R	1.75	1.63	2.55	3.25	3.82	4.95	5.73	6.58	7.50	9.62	11.45
Load Capacity Lbs.⊖	1700	4100	10500	20400	21200	49480	70000	94200	121900	57400	75000

	Pivot Pin Part Number													
	74078	68368	68369	68370	68371	68372	68373	69215	68374	68375	69216	73545	82181	73547*
CD	7/16	1/2	3/4	1	1-3/8	1-3/4	2	2	2-1/2	3	3	3-1/2	4	4
CL	1-5/16	1-7/8	2-5/8	3-1/8	4-1/8	5-3/16	5-3/16	5-11/16	6-3/16	6-1/4	6-3/4	8-1/4	8-5/8	9
Shear Capacity Lbs.⊖	6600	8600	19300	34300	65000	105200	137400	137400	214700	309200	309200	420900	565800	565800

*Cylinder accessory dimensions conform to NFPA recommended standard NFPA/3.6.8 R1-1984, NFPA recommended standard fluid power systems — cylinder — dimensions for accessories for cataloged square head industrial types. Parker adopted this standard in April, 1985. Eye Brackets or Mounting Plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style Eye Brackets or Mounting Plates consult Drawing #144805 or previous issues of this catalog.

⊖ See Accessory Load Capacity note on page B186.

*These sizes supplied with cotter pins.

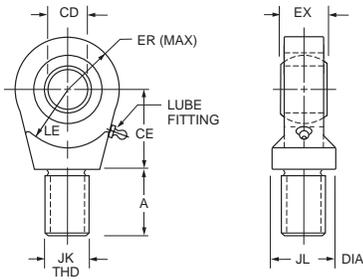
†Includes Pivot Pin.

‡Consult appropriate cylinder rod end dimensions for compatibility.



Parker offers a complete range of Cylinder Accessories to assure you of the greatest versatility in present or future cylinder applications. Accessories offered for the respective cylinder include the Rod Eye, Pivot Pin and Clevis Bracket. To select the proper part number for any desired accessory refer to the charts below.

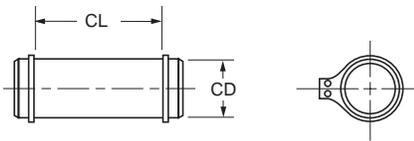
Spherical Rod Eye



Bore Size	Series 2A	1-1/2, 2 & 2-1/2	3-1/4, 4 & 5	6 & 8	10	12	14
Rod Eye	Part No.	132290	132291	132292	132293	132294	132295
CD		.5000 ^{-0.0005}	.7500 ^{-0.0005}	1.0000 ^{-0.0005}	1.3750 ^{-0.0005}	1.7500 ^{-0.0005}	2.0000 ^{-0.0005}
A		11/16	1	1-1/2	2	2-1/8	2-7/8
CE		7/8	1-1/4	1-7/8	2-1/8	2-1/2	2-3/4
EX		7-16	21-32	7/8	1-3/16	1-17/32	1-3/4
ER		13/16	1-1/8	1-1/4	1-11/16	2-1/16	2-1/2
LE		3/4	1-1/16	1-7/16	1-7/8	2-1/8	2-1/2
JK		7/16-20	3/4-16	1-14	1-1/4-12	1-1/2-12	1-7/8-12
JL		7/8	1-5/16	1-1/2	2	2-1/4	2-3/4
Load Capacity Lbs.		2644	9441	16860	28562	43005	70193

Order to fit Piston Rod Thread Size.

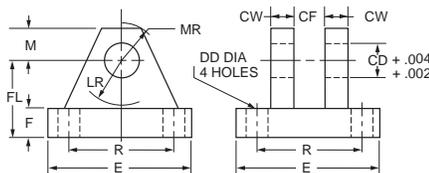
Pivot Pin



Bore Size	Series 2A	1-1/2, 2 & 2-1/2	3-1/4, 4 & 5	6 & 8	10	12	14
Pivot Pin	Part No.	83962	83963	83964	83965	83966	83967
CD		.4997 ^{-0.0004}	.7497 ^{-0.0005}	.9997 ^{-0.0005}	1.3746 ^{-0.0006}	1.74960 ^{-0.0006}	1.9996 ^{-0.0007}
CL		1-9/16	2-1/32	2-1/2	3-5/16	4-7/32	4-15/16
Load Capacity Lbs.		8600	19300	34300	65000	105200	137400

Pivot Pins are furnished with (2) Retainer Rings.

Clevis Bracket



Bore Size	Series 2A	1-1/2, 2 & 2-1/2	3-1/4, 4 & 5	6 & 8	10	12	14
Clevis Bracket	Part No.	83947	83948	83949	83950	83951	83952
CD		1/2	3/4	1	1-3/8	1-3/4	2
CF		7/16	21/32	7/8	1-3/16	1-17/32	1-3/4
CW		1/2	5/8	3/4	1	1-1/4	1-1/2
DD		13/32	17-32	17/32	21/32	29/32	29/32
E		3	3-3/4	5-1/2	6-1/2	8-1/2	10-5/8
F		1/2	5/8	3/4	7/8	1-1/4	1-1/2
FL		1-1/2	2	2-1/2	3-1/2	4-1/2	5
LR		15/16	1-3/8	1-11/16	2-7/16	2-7/8	3-5/16
M		1/2	7/8	1	1-3/8	1-3/4	2
MR		5/8	1	1-3/16	1-5/8	2-1/16	2-3/8
R		2.05	2.76	4.10	4.95	6.58	7.92
Load Capacity Lbs.		5770	9450	14300	20322	37800	50375

Order to fit Mounting Plate or Rod Eye.

Seal Kits for Class 1 & 2 Service

Series 2A (Class 1 Series 3L, 2H, VH)				
Rod Dia	RG	RK	Gland Wrench	Spanner Wrench
	Gland (Sym. 62) Cartridge Kits	Rod Seal Kits		
	Contains Symbols 14, 40, 41, 43 & 45	Contains Symbols 40, 41, 43 & 45		
1/2	RG2AHL 0051	RK2AHL 0051	069590 0000	011676 0000
5/8	RG2AHL 0061	RK2AHL 0061	069590 0000	011676 0000
1	RG2AHL 0101	RK2AHL 0101	069591 0000	011676 0000
1-3/8	RG2AHL 0131	RK2AHL 0131	069592 0000	011703 0000
1-3/4	RG2AHL 0171	RK2AHL 0171	069593 0000	011677 0000
2	RG2AHL 0201	RK2AHL 0201	069594 0000	011677 0000
2-1/2	RG2AHL 0251	RK2AHL 0251	069595 0000	011677 0000
3	RG2AHL 0301	RK2AHL 0301	069596 0000	011677 0000
3-1/2	RG2AHL 0351	RK2AHL 0351	069597 0000	011677 0000
4	RG2AHL 0401	RK2AHL 0401	069598 0000	011678 0000
4-1/2	RG2AHL 0451	RK2AHL 0451	083877 0000	011678 0000
5*	RG2AHL 0501	RK2AHL 0501	069599 0000	011678 0000
5-1/2*	RG2AHL 0551	RK2AHL 0551	069600 0000	011678 0000

*RG & RK kits listed are not applicable to 10" & 12" bore series 2H cylinders. See bulletin 0995-M4.

Bore Size	PK/Piston Seal Kits Series
	Series 2A Only
	Contains 2 Ea. Symbols: 42, 44 & 47
1	PK1002A001
1-1/2	PK1502A001
2	PK2002A001
2-1/2	PK2502A001
3-1/4	PK3202A001
4	PK4002A001
5	PK5002A001
6	PK6002A001
7	PK7002A001
8	PK8002A001
10	PK9002A001
12	PK9202A001
14	PK9402A001

Bore Size	CB Cylinder Body Seal Kits
	Series 2A Series
	Contains 2 Ea. Symbol 47
1	CB102HL001
1-1/2	CB152HL001
2	CB202HL001
2-1/2	CB252HL001
3-1/4	CB322A0001
4	CB402A0001
5	CB502A0001
6	CB602A0001
7	CB702A0001
8	CB802A0001
10	CB902A0001
12	CB922A0001
14	-



Seal Kits for Class 5 Service

Series 2A, 2H, 3L & VH Cylinders				
Rod Dia	RG	RK	Gland Wrench	Spanner Wrench
	Gland (Sym. 62) Cartridge Kits	Rod Seal Kits		
	Contains Symbols 14, 40, 41, 43 & 45	Contains Symbols 40, 41, 43 & 45		
1/2	RG2AHL 0055	RK2AHL 0055	069590 0000	011676 0000
5/8	RG2AHL 0065	RK2AHL 0065	069590 0000	011676 0000
1	RG2AHL 0105	RK2AHL 0105	069591 0000	011676 0000
1-3/8	RG2AHL 0135	RK2AHL 0135	069592 0000	011703 0000
1-3/4	RG2AHL 0175	RK2AHL 0175	069593 0000	011677 0000
2	RG2AHL 0205	RK2AHL 0205	069594 0000	011677 0000
2-1/2	RG2AHL 0255	RK2AHL 0255	069595 0000	011677 0000
3	RG2AHL 0305	RK2AHL 0305	069596 0000	011677 0000
3-1/2	RG2AHL 0355	RK2AHL 0355	069597 0000	011677 0000
4	RG2AHL 0405	RK2AHL 0405	069598 0000	011678 0000
4-1/2	RG2AHL 0455	RK2AHL 0455	083877 0000	011678 0000
5*	RG2AHL 0505	RK2AHL 0505	069599 0000	011678 0000
5-1/2*	RG2AHL 0555	RK2AHL 0555	069600 0000	011678 0000

*RG & RK kits listed are not applicable to 10" & 12" bore series 2H cylinders. See bulletin 0995-M4.

Bore Size	PK/Piston Seal Kits Series
	Series 2A Only
	Contains 2 Ea. Symbols: 42, 44 & 47
1	PK1002A005
1-1/2	PK1502A005
2	PK2002A005
2-1/2	PK2502A005
3-1/4	PK3202A005
4	PK4002A005
5	PK5002A005
6	PK6002A005
7	PK7002A005
8	PK8002A005
10	PK9002A005
12	PK9202A005
14	PK9402A005

Bore Size	CB Cylinder Body Seal Kits
	Series 2A Series
	Contains 2 Ea. Symbol 47
1	CB102HL005
1-1/2	CB152HL005
2	CB202HL005
2-1/2	CB252HL005
3-1/4	Use (PK) Piston Seal Kits for these Sizes
4	
5	
6	
7	
8	
10	
12	
14	

Seal Kits for 2AN & MAN

Bore Size	PK Piston Seal Kits for Series 2AN & MAN Cylinders	CB Cylinder Body Seal Kits for Series 2AN & MAN	Rod Dia.	Gland Cartridge Wrenches Part No.	Spanner Wrenches Part No.
1-1/2	PK1502 AN01	CB152H L001	5/8	069590 0000	011676 0000
2	PK2002 AN01	CB202H L001	1	069591 0000	011676 0000
2-1/2	PK2502 AN01	CB252H L001	1-3/8	069592 0000	011703 0000
3-1/4	PK3202 AN01	CB322A 0001	1-3/4	069593 0000	011677 0000
4	PK4002 AN01	CB402A 0001	2	069594 0000	011677 0000
5	PK5002 AN01	CB502A 0001	2-1/2	069595 0000	011677 0000
6	PK6002 AN01	CB602A 0001	3-1/2	069597 0000	011677 0000
7	PK7002 AN01	CB702A 0001	4	069598 0000	011678 0000
8	PK8002 AN01	CB802A 0001	4-1/2	083877 0000	011678 0000
10	PK9002 AN01	CB902A 0001	5*	069599 0000	011678 0000
12	PK9202 AN01	CB922A 0001	5-1/2*	069600 0000	011678 0000
14	PK9402 AN01	CB942A 0001			

Safety Guide for Selecting and Using Hydraulic, Pneumatic Cylinders and Their Accessories

WARNING: ⚠ FAILURE OF THE CYLINDER, ITS PARTS, ITS MOUNTING, ITS CONNECTIONS TO OTHER OBJECTS, OR ITS CONTROLS CAN RESULT IN:

- Unanticipated or uncontrolled movement of the cylinder or objects connected to it.
- Falling of the cylinder or objects held up by it.
- Fluid escaping from the cylinder, potentially at high velocity.

THESE EVENTS COULD CAUSE DEATH OR PERSONAL INJURY BY, FOR EXAMPLE, PERSONS FALLING FROM HIGH LOCATIONS, BEING CRUSHED OR STRUCK BY HEAVY OR FAST MOVING OBJECTS, BEING PUSHED INTO DANGEROUS EQUIPMENT OR SITUATIONS, OR SLIPPING ON ESCAPED FLUID.

Before selecting or using Parker (The Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using The Company's products.

1.0 General Instructions

1.1 Scope – This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

1.2 Fail Safe – Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

1.3 Distribution – Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use The Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

1.4 User Responsibility – Due to very wide variety of cylinder applications and cylinder operating conditions, The Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to The Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

1.5 Additional Questions – Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2.0 Cylinder and Accessories Selection

2.1 Seals – Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

2.2 Piston Rods – Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Follow the recommendations of the "Piston Rod Selection Chart and Data" in the publication for the series of cylinders of interest. The suggested piston rod diameter in these charts must be followed in order to avoid piston rod buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

On occasion cylinders are ordered with double rods (a piston rod extended from both ends of the cylinder). In some cases a stop is threaded on to one of the piston rods and used as an external stroke adjuster. On occasions spacers are attached to the machine member connected to the piston rod and also used as a stroke adjuster. In both cases the stops will create a pinch point and the user should consider appropriate use of guards. If these external stops are not perpendicular to the mating contact surface, or if debris is trapped between the contact surfaces, a bending moment will be placed on the piston rod, which can lead to piston rod failure. An external stop will also negate the effect of cushioning and will subject the piston rod to impact loading. Those two (2) conditions can cause piston rod failure. Internal stroke adjusters are available with and without cushions. The use of external stroke adjusters should be reviewed with our engineering department.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston to rod joint.

2.3 Cushions – Cushions should be considered for cylinder applications when the piston velocity is expected to be over 4 inches/second.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be reviewed by our engineering department.

2.4 Cylinder Mountings – Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

2.5 Port Fittings – Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end. The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure} \times \text{effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

3.0 Cylinder and Accessories Installation and Mounting

3.1 Installation

3.1.1 – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

3.1.2 – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

3.1.3 – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

3.1.4 – Sometimes it may be necessary to rotate the piston rod in order to thread the piston rod into the machine member. This operation must always be done with zero pressure being applied to either side of the piston. Failure to follow this procedure may result in loosening the piston to rod-threaded connection. In some rare cases the turning of the piston rod may rotate a threaded piston rod gland and loosen it from the cylinder head. Confirm that this condition is not occurring. If it does, re-tighten the piston rod gland firmly against the cylinder head.

For double rod cylinders it is also important that when attaching or detaching the piston rod from the machine member that the torque be applied to the piston rod end of the cylinder that is directly attaching to the machine member with the opposite end unrestrained. If the design of the machine is such that only the rod end of the cylinder opposite to where the rod attaches to the machine member can be rotated, consult the factory for further instructions.

3.2 Mounting Recommendations

3.2.1 – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

3.2.2 – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

3.2.3 – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. The standard tie rod extension is shown as BB in dimension tables. Longer or shorter extensions can be supplied. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

3.2.4 – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

3.2.5 – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

3.2.6 – Clevis Mountings – Cylinders should be pivoted at both ends with centerline of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

4.1 Storage – At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

4.1.1 – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

4.1.2 – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

4.1.3 – Port protector plugs should be left in the cylinder until the time of installation.

4.1.4 – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

4.1.5 – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

4.2 Cylinder Trouble Shooting

4.2.1 – External Leakage

4.2.1.1 – Rod seal leakage can generally be traced to worn or

damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to gland wear. If clearance is excessive, replace rod bushing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F (+177°C.) and replace with fluorocarbon seals.

4.2.1.2 – Cylinder body seal leak can generally be traced to loose tie rods. Torque the tie rods to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque tie rods as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the tie rods replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

4.2.2 – Internal Leakage

4.2.2.1 – Piston seal leak (by-pass) 1 to 3 cubic inches per minute leakage is considered normal for piston ring construction. Virtually no static leak with lipseal type seals on piston should be expected. Piston seal wear is a usual cause of piston seal leakage. Replace seals as required.

4.2.2.2 – With lipseal type piston seals excessive back pressure due to over-adjustment of speed control valves could be a direct cause of rapid seal wear. Contamination in a hydraulic system can result in a scored cylinder bore, resulting in rapid seal wear. In either case, replace piston seals as required.

4.2.2.3 – What appears to be piston seal leak, evidenced by the fact that the cylinder drifts, is not always traceable to the piston. To make sure, it is suggested that one side of the cylinder piston be pressurized and the fluid line at the opposite port be disconnected. Observe leakage. If none is evident, seek the cause of cylinder drift in other component parts in the circuit.

4.2.3 – Cylinder Fails to Move the Load

4.2.3.1 – Pneumatic or hydraulic pressure is too low. Check the pressure at the cylinder to make sure it is to circuit requirements.

4.2.3.2 – Piston Seal Leak – Operate the valve to cycle the cylinder and observe fluid flow at valve exhaust ports at end of cylinder stroke. Replace piston seals if flow is excessive.

4.2.3.3 – Cylinder is undersized for the load – Replace cylinder with one of a larger bore size.

4.3 Erratic or Chatter Operation

4.3.1 – Excessive friction at rod gland or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

4.3.2 – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

4.3.3 – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

4.4 Cylinder Modifications, Repairs, or Failed Component – Cylinders as shipped from the factory are not to be disassembled and/or modified. If cylinders require modifications, these modifications must be done at company locations or by The Company's certified facilities. The Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, tie rod, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

Offer of Sale

The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and Divisions ("Company") and its authorized distributors, are hereby offered for sale at prices to be established by the Company, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such item, when communicated to the Company, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from the Company. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NOWARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGN OR SPECIFICATIONS.

5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter,

discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer, or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.