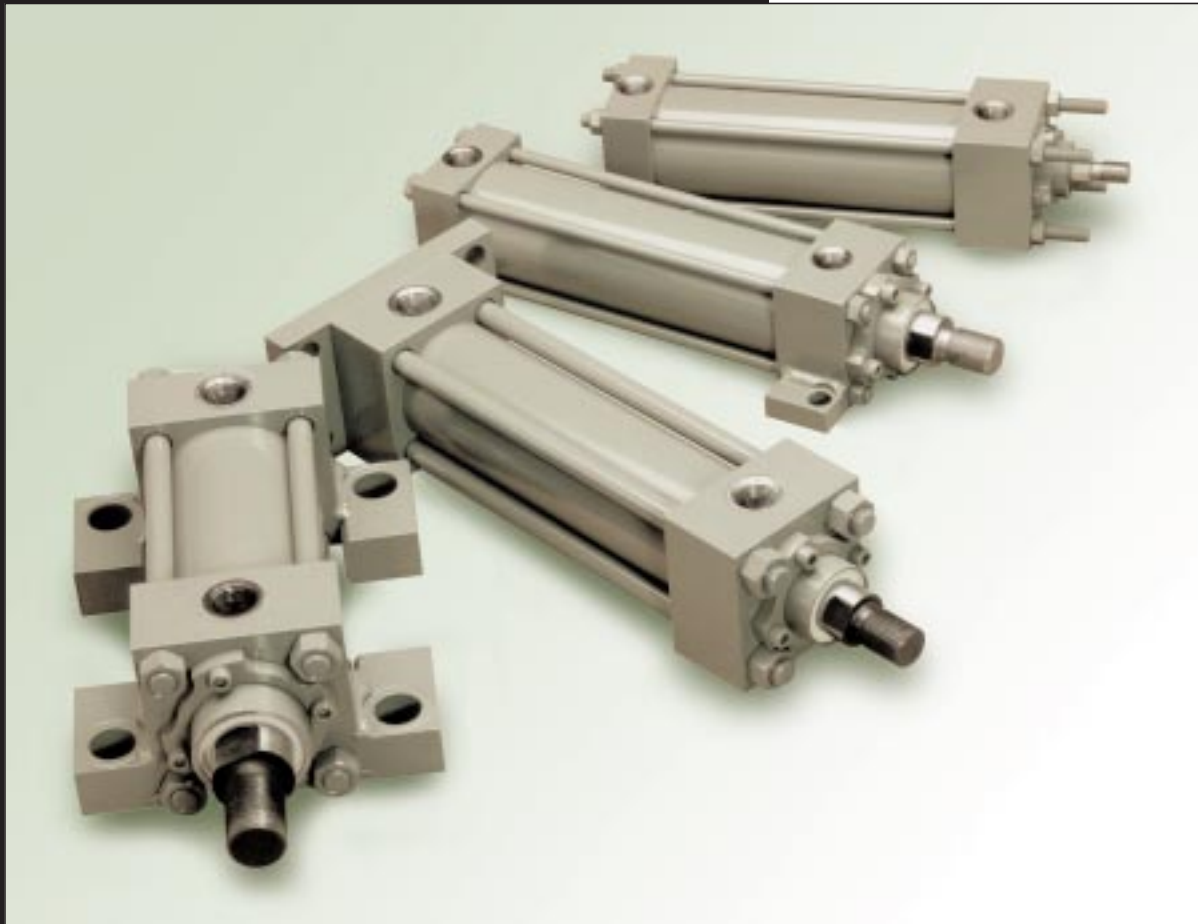


H Series

Hydraulic Cylinder



Up to 5000 PSI
Bore Sizes 1½" through 20"
NFPA Interchangeable

Miller H Series Hydraulic Cylinders

Table Of Contents

Miller Hydraulic Cylinder Selection Guide.....	Page 1
Hydraulic Cylinder Features	2-3
Mounting Styles.....	4-5
1½"-20" Bore Cylinder Reference Chart.....	6-7
Cylinder Mountings (1½"-8" Bores)	8-43
Model 50 Series, Tie Rods Extended	8-9
Model 61, Rectangular Flange - Head End.....	10-11
Model 62, Rectangular Flange - Cap End.....	12-13
Model 65, Square Flange - Head End	14-15
Model 66, Square Flange - Cap End	16-17
Model 67 & 68, Rectangular Head or Cap	18-19
Model 72, Side Lugs	20-21
Model 73, Centerline Lugs.....	22-23
Model 74, Side Tapped.....	24-25
Model 77, End Lugs	26-27
Model 71, End Angles	28-29
Model 81, Trunnion - Head End.....	30-31
Model 82, Trunnion - Cap End.....	32-33
Model 89, Intermediate Trunnion	34-35
Model 84, Fixed Clevis.....	36-37
Model 86, Detachable Clevis	38-39
Model 90, Rear Eye	40-41
Model 94, Spherical Rear Eye.....	42-43
Double Rod End.....	44
Large Bore Cylinder Dimensions (10"-20" Bores)	45-57
Models 50 & D50, No Mounting.....	46-47
Models 63 & 64, Square Head or Cap	48-49
Models 72 & 73, Side Lug or Centerline Lug.....	50-51
Models 81 & 82, Trunnion Head End or Cap End	52-53
Model 89, Intermediate Trunnion	54-55
Models 84 & 90, Fixed Clevis or Rear Eye.....	56-57
Rod End Styles.....	58
Rod End Couplers.....	59
Rod End Accessories.....	60-62
Cylinder Stroke Adjustment & Other Modifications.....	63
Proximity Switches.....	64-67
Position Sensing Cylinders	68-70
Determining Proper Bore Size.....	71
Determining Port Size and Pressure Drop	72-73
Determining Stop Tube Requirements.....	74-75
Determining Column Strength of Piston Rod.....	76
Non-Sag Piston Rods.....	77
Keying and Pinning of Cylinders	78
Cylinder Installation and Maintenance Instructions.....	79
Cylinder Parts List and Seal Kits	80
Warranty	81
How To Order.....	82

Other Miller Air and Hydraulic Cylinders. Order Catalog by File No.

A Series Cylinders

Up to 250 PSI Permanently Lubricated



Series A steel air cylinders are available in bore sizes from 1½" through 20" and up to 250 psi operating pressure. Standard NFPA dimensions and proven Miller design features. (File 7619)

AL Series Cylinders

Up to 250 PSI Permanently Lubricated



Our new aluminum AL Series air cylinders are available in bore sizes from 1½" through 8". Operating pressures up to 250 PSI. Dimensions are NFPA Standard. (File 8564)

J Series Cylinders

500-2500 PSI



Our popularly-priced line of medium pressure hydraulic cylinders, with bore sizes from 1½" to 20". (File 7620)

HV Series Cylinders

3000-5000 PSI



Miller's heavy-duty cylinder line for the most demanding hydraulic applications. Bore sizes from 1½" to 8". Heavy-duty construction. (File 8641)

Miller H Series Hydraulic Cylinder Selection Guide

Rapid Delivery from Stock Components

The Miller H Series of heavy duty hydraulic cylinders is available in 23 NFPA mounting styles and bore sizes from 1½" to 20". Miller produces components for the H Series of cylinders at all five of the Miller manufacturing facilities in North America. This enables unmatched delivery of custom stroke length cylinders. Our normal delivery for a standard cylinder is 3 to 5 working days.

H Series hydraulic cylinders are considered standard if they fall within the following criteria:

1 ½" - 8" bore sizes; Standard rod end; Standard or first oversize rod diameter; With or without optional cushions; All mounting styles except Models 73, 89, and 94; Standard seals, Standard bushing retention (see chart on page 6).

Large quantities, or special modifications will require additional delivery time. Please call Miller Fluid Power at 1-800-323-2520 with your specific delivery requirements.

Selecting a Miller Hydraulic Cylinder

Miller hydraulic cylinders are selected and sized primarily based on force requirements and available operating pressure. The H Series is a heavy-duty design intended for normal industrial service at internal operating pressures up to 3,000 PSI (5,000 PSI non-shock). It is available in 23 mounting styles and bore sizes from 1½" to 20".

H Series Pressure Rating

Moderate Service (non-shock) — 5,000 PSI

Severe Service (shock loaded) — 3,000 PSI

Proof Pressure — 6,000 PSI

Note: Certain mounting styles and over-sized rod combinations have pressure rating limitations due to their inherent design. See mounting style catalog page for details.

Other Miller Hydraulic Cylinder Models

When evaluating your application, please review our other hydraulic cylinder models to be sure that you are selecting the model most appropriate to your requirements.

Certified Dimensions

Miller Fluid Power guarantees that all cylinders ordered from this catalog will have the dimensions as specified in this catalog — no waiting for special drawings to be prepared and sent. When required however, special certified drawings are available at extra cost.

Steps in Selecting the Correct Cylinder

Detailed engineering information on bore size selection, oversize and non-sag rods, stop tubes, determining port and pipe size, and the like is located in this catalog. See Table of Contents on previous page.

Step 1 — Determine the correct cylinder bore size required based upon operating pressure and thrust required (See page 71).

Step 2 — Select the mounting style which is required for your application (see pages 4 & 5).

Step 3 — On the appropriate catalog page for the mounting style selected, review bore and rod sizes available and pressure rating limitations, if any.

Step 4 — Choose a rod end style (page 58) and, if desired, rod end accessories (pages 60-62), and optional cushions.

Step 5 — Consider the conditions listed below which may require further modifications to the cylinder you have selected. Application Engineering assistance is readily available by contacting any of the Miller facilities listed on the back cover of this catalog.

Step 6 — Refer to "How to Order" section on page 82 to develop the part number and place your order.

Application Condition	Check the following	Application Condition	Check the following
Rapid Starts or Stops	Use severe service pressure rating only. Confirm that sufficient thrust is available to accelerate or decelerate cylinder and load within prescribed distances. If optional cushions are selected and will be used to reduce shock during deceleration, check that peak pressures will be within acceptable limits.	Long Horizontal Stroke	Check to see if a non-sag piston rod is required to prevent excess sagging and resultant premature bushing and piston wear.
Long Stroke	Check whether stop tube may be required to prevent excess bearing loads and wear.	Operating Temperatures	The standard operating temperature range of the Urethane seals used in the H Series is -20° F to +160° F. For temperatures in excess of that range, optional spring-loaded Teflon® seals will be required.
High Column Loading- Long Push Stroke	Determine if standard size piston rod is strong enough to accommodate intended load without buckling.	Sufficient Speed	Confirm that standard port size permits sufficient flow to accommodate speed requirements. Fluid flow velocity should not exceed 15 feet per sec.
Loads	When high side loads and similar severe or unusual operating conditions are anticipated, please consult a Miller application engineer for recommendations concerning optional bushing material and design.	Fluid Compatibility	The standard H Urethane seals are compatible with petroleum based fluids. Teflon seals are available for use with water glycol, water/oil emulsions and phosphate ester fluids up to 150°F. For cylinders using these fluids in excess of 150°F the Miller Series H cylinders with spring-loaded Teflon® seals are recommended.

Fluid power cylinders are designed to be linear actuators. They are intended to provide motion and force along the centerline of the rod. Since they have limited capacity to withstand eccentric or radial loads, they should not be employed as linear bearings. Good machine design practice requires that proper alignment be maintained to avoid excessive bearing loads. Any premature failure resulting from side loading is not considered a warranty failure. If your design involves the possibility of side loading, please contact the Miller Fluid Power application engineering department.

Miller H Series Hydraulic Cylinders

Standard Design Features to
Maximize Performance and Uptime

Cushion

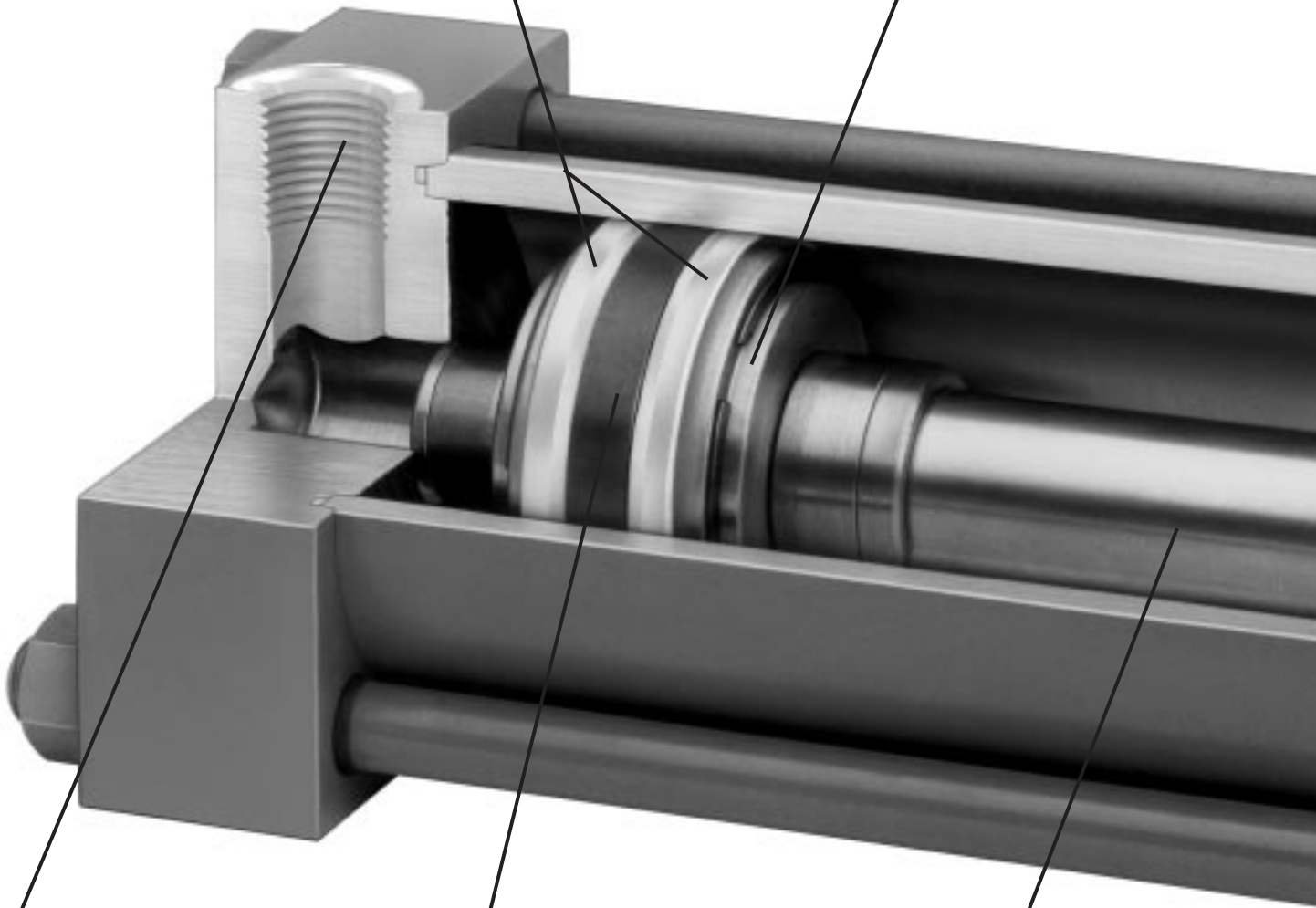
Unique, optional, self-regulating cushion automatically adjusts to pressure, load and speed variations. This reduces shock and cushioning time, which permits quick out-of-cushion starts, thus increasing machine cycle rates.

Piston Seals

Rugged Teflon U-cup seals are mechanically locked to prevent rolling or blowout. Temperatures to 200°F standard. To 450° when spring-loaded.

Piston

One-piece piloted piston provides maximum strength and protection against shock loads. Piston threads increase in size for added strength when oversize rods are required.



Ports

SAE "O" ring ports are standard. NPT ports are optional.

Wear Band

Durable, Torlon (1 1/2" - 6" Bores) (bronze 7" - 2" bores) piston wear band reduces possibility of damaging piston which can score expensive tubing. Reduces need for piston replacement.

Piston Rod

Case-hardened to 47 - 56 Rockwell C and chrome-plated rod resists mechanical damage and side loads.

Miller H Series Hydraulic Cylinders

Standard Design Features to Maximize Performance and Uptime

Tube End Seal

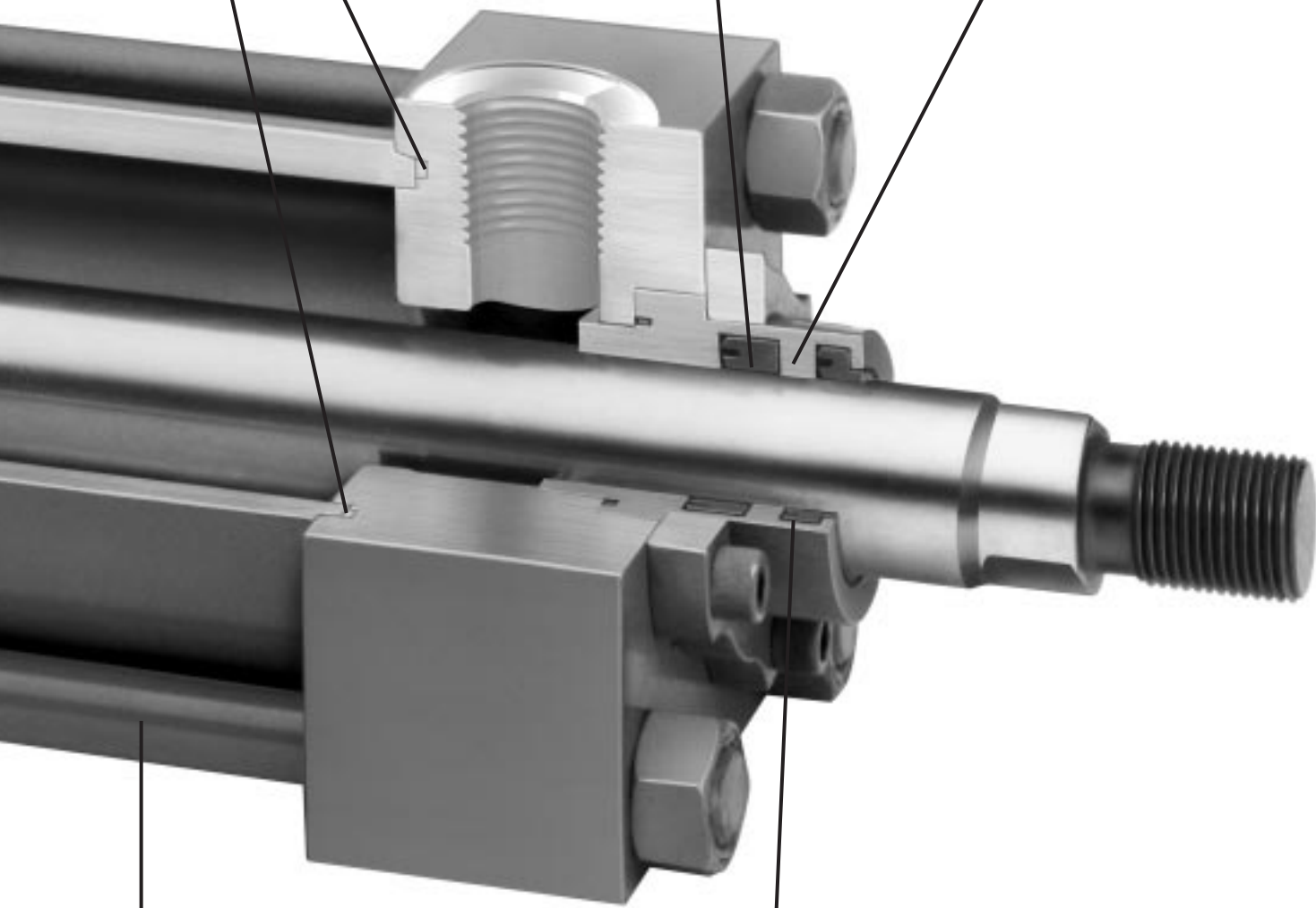
Teflon® "SHEF" tube-end seal resists heat, extrusion, shearing, and hydraulic fluids. Patented strip-type seal repairs all bore sizes with minimum inventory and downtime.

Rod Seal

Durable urethane rod seal is pressure-energized and wear-compensating for long, leak-free service.

Bushing

Nodular iron bushing provides 400% longer bearing life than conventional bronze bushings. Protects against side loads. Removes easily using a common Allen wrench. Cylinder tie rods not disturbed.



Tie Rods

High strength, 100,000 to 125,000 PSI minimum yield material. Provides protection against shock pressures.

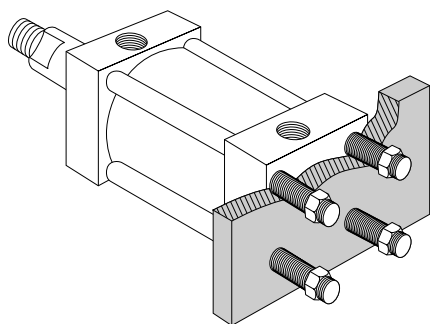
Wiper Seal

Wipes away dirt that may have accumulated on piston rod and prevents it from oversizing bushing. Also provides secondary rod seal.

Centerline

The preferred cylinder installation method, centerline mounting places the mounting bolts in simple tension so that the mounting mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and thus requires accurate cylinder alignment to prevent damage to cylinder working parts.

Miller Series H mounting configurations that provide centerline support are tie-rod mounts, flange mounts with square or rectangular flanges fastened to the cylinder head or cap, rectangular head and cap cylinders, and centerline lug cylinders.

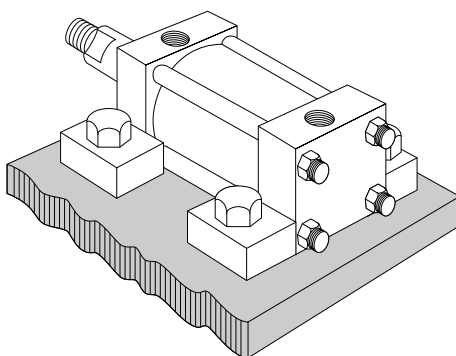


Centerline mounting is preferable since it prevents compound forces from acting on the mounting bolts (tie rod model shown).

Foot

Foot mounting secures the cylinder along its side. Since the mounting surface plane is thus not centered directly on the line of force, the mounting bolts are subjected to a significant amount of shear stress. The cylinder should be pinned or keyed to absorb the stress of shear loads and allow the mounting bolts to remain in simple tension. Because foot mounts are rigid, they require accurate cylinder alignment.

Lugs, either welded onto the sides of the head and cap or attached to the ends of the cylinder, are the usual form of foot mounts. Centerline lugs are available as Model H 73. See page 22. As an alternative to the use of lugs, flush mounting incorporates tapped mounting holes on the sides of the cylinder head and cap.



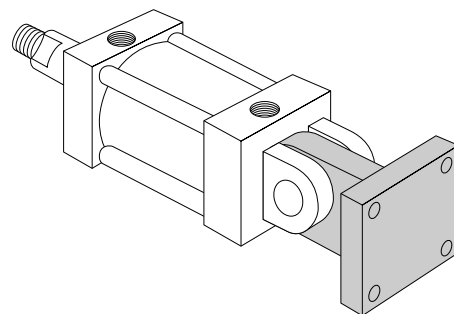
Foot mounting secures the cylinder on its side, but can subject the mounting bolts to compound stress (cylinder side lugs shown).

Pivot

Pivot mounting is used when the cylinder must pivot during piston motion. Clevis and trunnion mounts are the two methods used to allow this motion.

The clevis end design locates the pivot point at the cap end of the cylinder. Trunnion mounting uses trunnions on the head, cap or side of the cylinder to allow it to pivot at any of three locations. Both clevis and trunnion mounting configurations allow the cylinder to pivot in one plane only.

The rear eye cylinder is an additional pivot-mounted cylinder. Essentially a reversal of the fixed clevis assembly, the rear eye cylinder locates a clevis eye on the cylinder cap and mounts to a clevis bracket on the load surface.

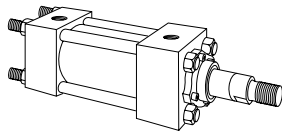


Pivot mounting allows the cylinder to pivot during piston motion (clevis method shown).

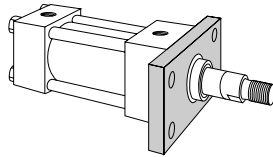
Miller H Series Hydraulic Cylinders

Index
23 Mounting Styles Available

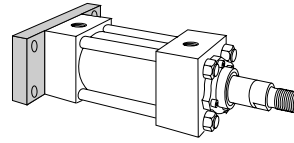
Centerline Mounts



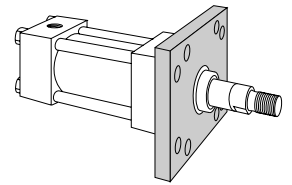
Tie Rod Models 50*, 51, (NFPA MX1), 52 (NFPA MX2) 53 (NFPA MX3), 54 (NFPA MX4)
See page 8



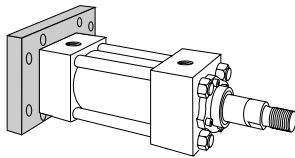
Rectangular Flange/Head End
Model 61 (NFPA MF1)
See page 10



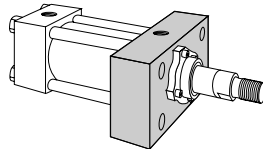
Rectangular Flange/Cap End
Model 62 (NFPA MF2)
See page 12



Square Flange/Head End
Model 65 (NFPA MF5)
See page 14

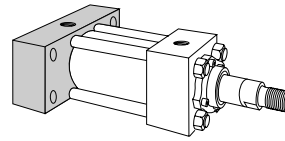


Square Flange/Cap End
Model 66 (NFPA MF6)
See page 16



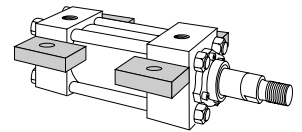
Rectangular Head
Model 67 (NFPA ME5)
See page 18

10" - 20" Bore Square Head
Model 63
See page 48



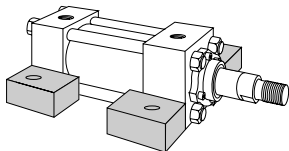
Rectangular Cap
Model 68 (NFPA ME6)
See page 18

10" - 20" Bore Square Cap
Model 64
See page 48

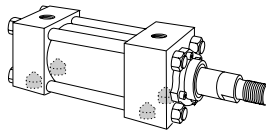


Centerline Lug
Model 73 (NFPA MS3)
See page 22
10" - 14" Bore
See page 50

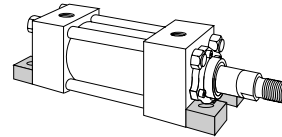
Foot Mounts



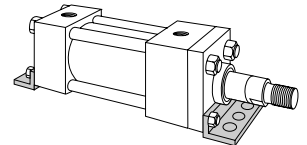
Side Lug
Model 72 (NFPA MS2)
See page 20
10" - 14" Bore
See page 50



Side Tapped
Model 74 (NFPA MS4)
See page 24

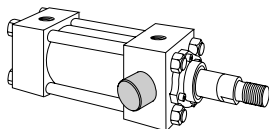


End Lug
Model 77 (NFPA MS7)
See page 26

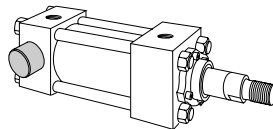


End Angle
Model 71 (NFPA MS1)
See page 28

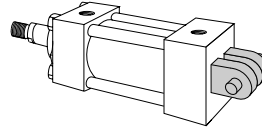
Pivot Mounts



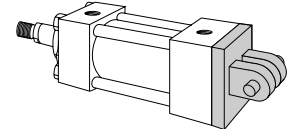
Trunnion/Head End
Model 81 (NFPA MT1)
See page 30
10" - 14" Bore
See page 52



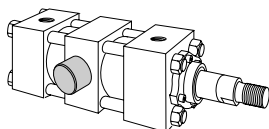
Trunnion/Cap End
Model 82 (NFPA MT2)
See page 32
10" - 14" Bore
See page 52



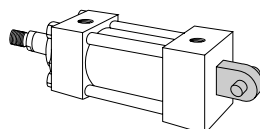
Fixed Clevis
Model 84 (NFPA MP1)
See page 36
10" - 20" Bore
See page 56



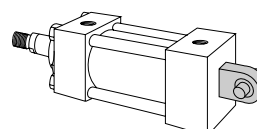
Detachable Clevis
Model 86 (NFPA MP2)
See page 38



Intermediate Trunnion
Model 89 (NFPA MT4)
See page 34
10" - 12" Bore
See page 54



Rear Eye
Model 90 (NFPA MP3)
See page 40
10" - 20" Bore
See page 56



Spherical Eye
Model 94
See page 42

* Model 50 - No tie rod extension
Model 51 - Tie rods extended head and cap
Model 52 - Tie rods extended cap end only
Model 53 - Tie rods extended head end only
Model 54 - Tie rods (2) extended head and cap at position No. 3

Miller H Series Hydraulic Cylinders

1½" thru 20" Bore Cylinders

Bushing Retainer Style

While the standard Miller cylinder design utilizes a bolted bushing, on certain combinations of bore size, rod size and/or mounting style a bolted bushing would interfere with the tie rod nuts. In those cases, a square retainer-held bushing is used.

The selection chart below lists all the possible combinations, with a ● indicating bolted type bushing and a ■ indicating use of the full square retainer method.

Please note that dimensional information is provided on the appropriate catalog pages for the two different styles.

MOUNT CONFIGURE MODEL NO.	1½" BORE		2" BORE		2½" BORE		3¼" BORE		4" BORE		5" BORE			6" BORE		7" BORE		8" BORE									
	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD	STD ROD	OS ROD									
	5/8 **	1 **	1 **	1 3/8 **	1 **	1 3/8 **	1 3/4	1 3/8 **	1 3/4	2	1 3/4	2	2 1/2	2	2 1/2	3	3 1/2	2 1/2	3, 3 1/2	4	3	3 1/2, 4 4 1/2	5	3 1/2	4	4 1/2, 5 5 1/2	
50, 52	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
51	■	■	■	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
53	■	■	■	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
54	■	■	■	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
61	■	■	■	■	●	■	■	●	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
62	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
65	■	■	■	■	●	■	■	●	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
66	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
67	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
68	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
71	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
72	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
73	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
74	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	†	†	●	●	†	●	†
77	●*	■+	●*	■+	●	●*	■+	●	●	■+	●	●	■	●	●	■	●	●	■	●	●	N/A	●	●	●	●	●
81	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
82	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
84	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
86	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
89	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
90	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
94	●	■	●	■	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mounting Configuration (Model No.)	BORE/ROD SIZE AVAILABILITY										
	10" Bore		12" Bore		14" Bore		16" Bore		18" Bore		20" Bore
	STD. ROD	OVERSIZED RODS	STD. ROD	OVERSIZED RODS	STD. ROD	OVERSIZED RODS	STD. ROD	OVERSIZED ROD	STD. ROD	OVERSIZED RODS	STD. ROD
	4½	5, 5½, 7	5½	7, 8	7	8, 9, 10	8	9, 10	9	10	10
63, 64, 84, 90	●	●	●	●	●	●	●	●	●	●	●
81, 82, 72, 73	●	●	●	●	●	●	NA	NA	NA	NA	NA
89	●	●	●	●	NA	NA	NA	NA	NA	NA	NA

- Bolted type bushing construction
- Full Square retainer construction
- * Mounting lugs at head end must be removed before bushing
- ** Bolted Bushing Construction Rated at 3000psi
- N/A Not Available

- + If rod eye is used on Style 2 rod end, it will interfere with Model 77 mounting lugs.
- † Reduced pressure ratings due to shallow tapped mounting holes. Consult Miller Application Engineering.

Miller H Series Hydraulic Cylinders

1½" thru 20" Bore Cylinders Port Size Reference Chart

1½" thru 8" Bore Size Reference Chart SAE Ports Standard — NPT Ports Optional

Cylinder Bore Diam. (inches)	Standard SAE Port			Optional NPT Port		4 Bolt SAE 5000psi
	NFPA Standard	First Oversize		Standard	** Maximum Oversize	
		Head	Cap			
1½	(-8)	(-10)	(-10)	½ - 14	¾ - 14	NA
2	(-8)	(-10)	(-10)	½ - 14	¾ - 14	NA
2½	(-8)	**(-10)	(-10)	½ - 14	¾ - 14	½
3¼	(-12)	**(-14)	(-14)	¾ - 14	1 - 11½	¾
4	(-12)	**(-14)	(-14)	¾ - 14	1 - 11½	¾
5	(-12)	**(-16)	**(-16)	¾ - 14	1 - 11½	¾
6	(-16)	**(-20)	**(-20)	1 - 11½	1¼ - 11½	1
7	(-20)	**(-24)	**(-24)	1¼ - 11½	1½ - 11½	1¼ (4000 psi)
8	(-24)	**(-32)	**(-32)	1½ - 11½	2 - 11½	1½ (3000 psi)
10	(-32)	**(-32)	**(-32)	2 - 11½	◆	2 (3000 psi)
12	(-32)	**(-32)	**(-32)	2½ - 8	◆	2½ (2500 psi)
14	(-32)	**(-32)	**(-32)	3 - 8	◆	3 (2000 psi)
16	(-32)	**(-32)	**(-32)	3½ - 8	◆	—
18	(-32)	**(-32)	**(-32)	4 - 8	◆	—
20	(-32)	**(-32)	**(-32)	5 - 8	◆	—

1½" thru 20" Bore Port Size Reference Chart

DASH Number	Tube O.D. (in.)	Thread Size (in.)
(8)	.50	.75 - 16
(10)	.62	.88 - 14
(12)	.75	1.06 - 12
(14)	.88	1.18 - 12
(16)	1	1.31 - 12
(20)	1.25	1.62 - 12
(24)	1.50	1.88 - 12
(32)	2	2.50 - 12

Miller SAE O-Ring ports conform to SAE standard J514 (straight thread O-Ring boss).

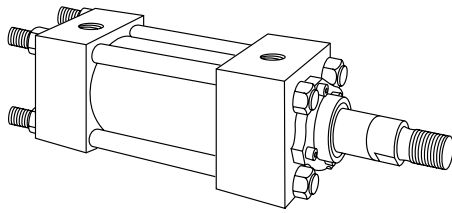
** Welded ◆ Consult Miller Application Engineering

Note: All Optional Maximum Oversize NPT Ports are Welded.

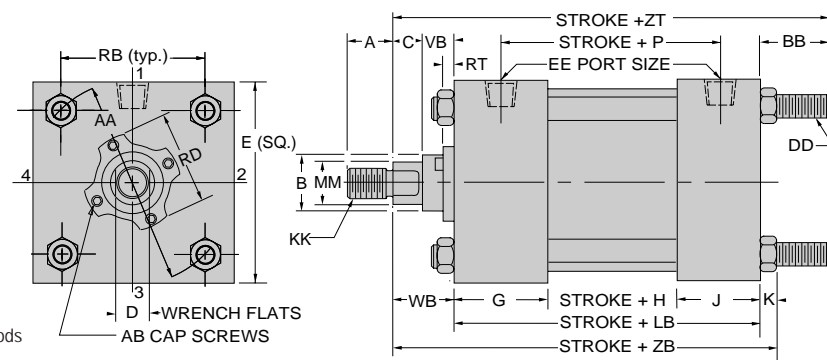
Miller H Series Hydraulic Cylinders

Tie Rods Extended
1½" – 8" Bore Cylinders

Model 52-B (NFPA MX2)
Bolted Bushing
Tie Rods Extended Cap End

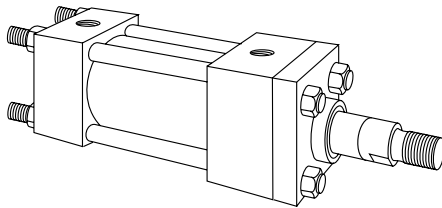


Mounting Dimensions
(see tables on opposite page)

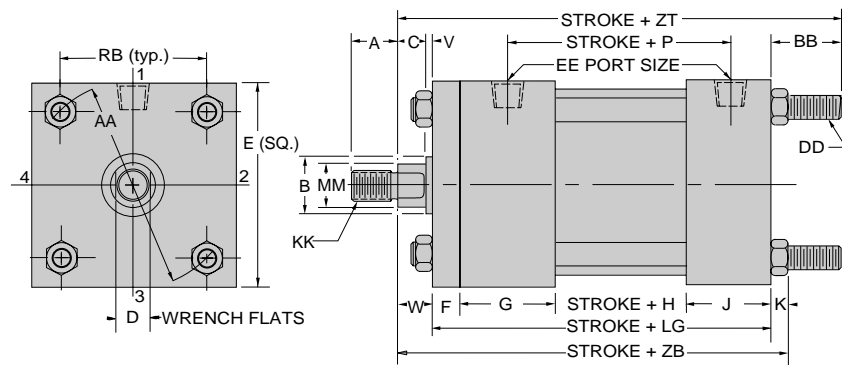


Also Available
Model 50-B No Tie Rods Extended, Model 51-B (NFPA MX1) Tie Rods
Extended both ends, Model 53-B (NFPA MX3)
Tie Rods Extended head end, Model 54-B (NFPA MX4)
two Tie Rods Extended both ends at position #3.
All of the above models can be dimensioned from Model 52-B shown.

Model 52-R (NFPA MX2)
Square Retainer Held Bushing
Tie Rods Extended Cap End



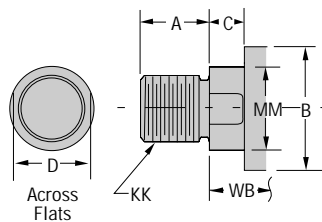
Mounting Dimensions
(see tables on opposite page)



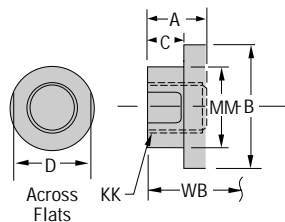
Also Available
Model 50-R No Tie Rods Extended, Model 51-R (NFPA
MX1) Tie Rods Extended both ends, Model 53-R (NFPA
MX3)
Tie Rods Extended head end, Model 54-R (NFPA MX4)
two Tie Rods Extended both ends at position #3. All of
the above models can be dimensioned from Model 52-R
shown.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

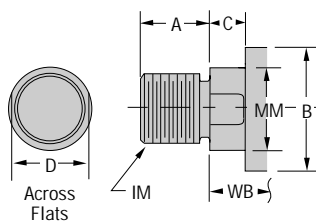
Style No. 2-Standard
Threaded on Turndown Section



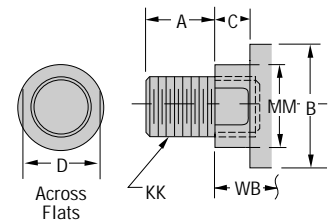
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



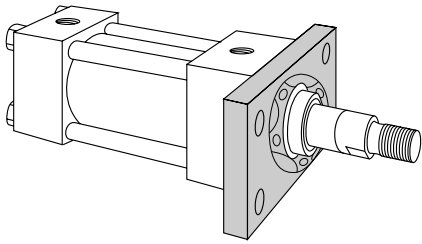
Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

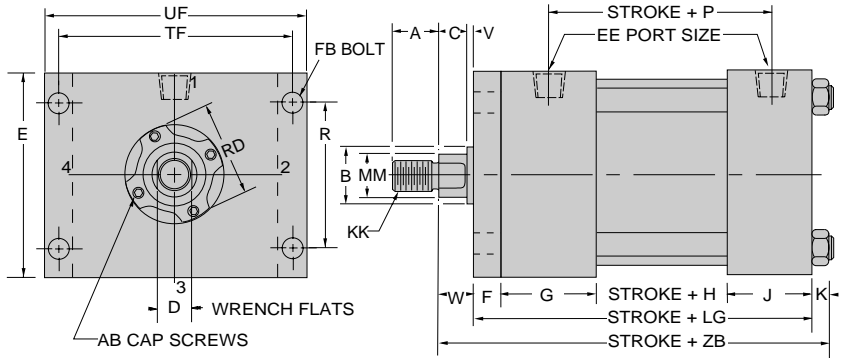
Rectangular Flange/Head End
1 1/2" – 8" Bore Cylinders

Model 61-B (NFPA MF1) Bolted Bushing Rectangular Flange/Head End

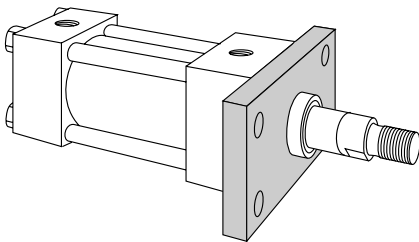


Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

Mounting Dimensions (see tables on opposite page)

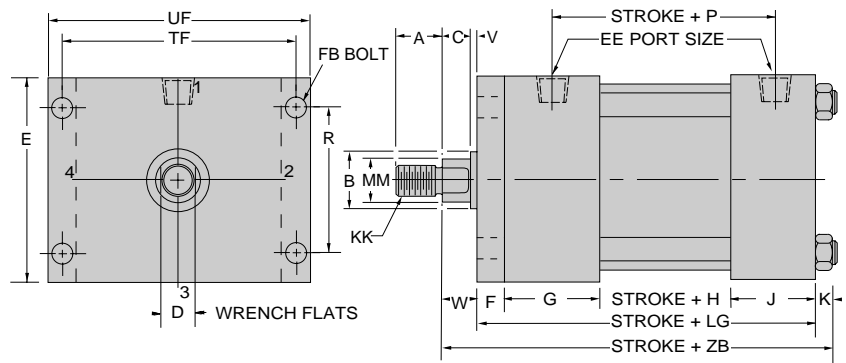


Model 61-R (NFPA MF1) Rectangular Retainer Rectangular Flange/Head End (1 1/2" - 6" Bores)



Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 6" bore cylinders.

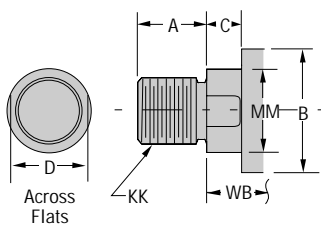
Mounting Dimensions (see tables on opposite page)



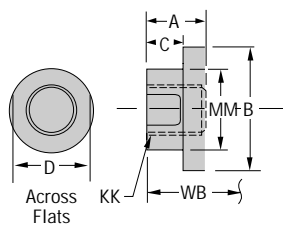
Note: To achieve higher pressure ratings in some size combinations retainer construction can be furnished in lieu of standard bolted bushing construction. -See pressure limitation chart for retainer held bushings on page 11.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

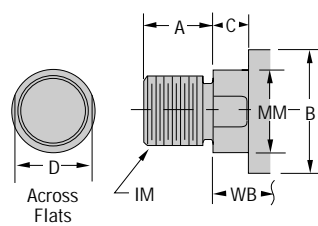
Style No. 2-Standard Threaded on Turndown Section



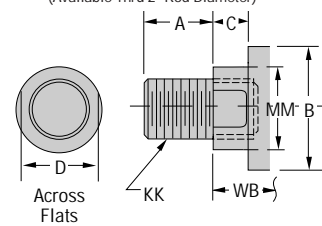
Style No. 4 Short Rod End-Internal Threads



Style No. 5 Threaded Intermediate Male



Style No. 6 Studded Rod End (Available Thru 2" Rod Diameter)



Pressure Limitations For Model 61-B

Rod Dia.	1"		1 3/8"		1 3/4"		2"		2 1/2"		3"		3 1/2"		4"		4 1/2"		5"		5 1/2"		
	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	
2 1/2	1560	940																					
3 1/4			1720	1030	1110	670																	
4					1850	1110	1710	1030	1080	650													
5							1700	1020	1380	830	1100	660	810	490									
6									1580	950	1350	810	1130	680	820	490							
7											1240	740	1090	650	750	450	600	360	450	270			
8												1030	620	780	470	680	410	570	340	460	280		

For higher rated Head End Mounted Cylinders, see Model H-67 Mounting on page 18.

Miller H Series Hydraulic Cylinders

Rectangular Flange/Head End 1 1/2" - 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	*EE		FB	TF	UF
							SAE	NPT			
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	1.63	-8	1/2	3/8	3 7/16	4 1/4
2	3	5/8	1 3/4	1 1/2	7/16	2.05	-8	1/2	1/2	4 1/8	5 1/8
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	2.55	-8	1/2	1/2	4 5/8	5 5/8
3 1/4	4 1/2	3/4	2	1 3/4	9/16	3.25	-12	3/4	5/8	5 7/8	7 1/8
4	5	7/8	2	1 3/4	9/16	3.82	-12	3/4	5/8	6 3/8	7 5/8
5	6 1/2	7/8	2	1 3/4	1 3/16	4.95	-12	3/4	7/8	8 3/16	9 3/4
6	7 1/2	1	2 1/4	2 1/4	1 5/16	5.73	-16	1	1	9 7/16	11 1/4
7	8 1/2	1	2 3/4	2 3/4	1	6.58	-20	1 1/4	1 1/8	10 5/8	12 5/8
8	9 1/2	1	3	3	1 1/4	7.50	-24	1 1/2	1 1/4	11 13/16	14

Add Stroke

H	LB	†LD	LG	P
1 3/8	4 5/8	4 7/8	5	2 7/8
1 3/8	4 5/8	4 7/8	5 1/4	2 7/8
1 1/2	4 3/4	5	5 3/8	3
1 3/4	5 1/2	5 3/4	6 1/4	3 1/2
2	5 3/4	6	6 5/8	3 3/4
2 1/2	6 1/4	6 1/2	7 1/8	4 1/4
2 7/8	7 3/8	7 3/8	8 3/8	4 7/8
3	8 1/2	8 1/2	9 1/2	5 3/8
3 1/2	9 1/2	9 1/2	10 1/2	6 1/8

*SAE ports are standard, NPT ports are available at no extra charge.
†LD dimension is for double rod end models. See page 44.
Note: Mounting holes are 1/16" larger than bolt sizes (FB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8		1 1/2-20	7/16-20	
	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16	
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4		7/8-14	3/4-16	
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14	
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14	
	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4		1 1/2-12	1 1/4-12	
3 1/4	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1/4-28	1 1/4-12	1-14	2.972
	1 3/4	2	2.375	3/4	1 1/2	3/8	1 1/8	1/4-28	1 1/2-12	1 1/4-12	3.470
	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4		1 3/4-12	1 1/2-12	
4	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252
5	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252
	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1/4-28	3 1/4-12	2 1/2-12	5.252
6	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	1/4-28	2 1/4-12	1 7/8-12	4.252
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 3/4-12	3-12	5.939
7	3	3 1/2	3.750	1	2 5/8			1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3			1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8			5/16-24	3 3/4-12	3-12	5.939
	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439
	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939
8	3 1/2	3 1/2	4.250	1	3			1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8			5/16-24	3 3/4-12	3-12	5.939
	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439
	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939
	5 1/2	5 1/2	6.250	1	4 5/8			5/16-24	5 1/4-12	4-12	7.439

Add Stroke

ZB
6
6 3/8
6 7/16
6 11/16
6 9/16
6 13/16
7 1/16
7 11/16
7 15/16
8 1/16
8 3/16
8 5/16
8 9/16
9 1/16
9 5/16
9 9/16
9 5/16
10 9/16
10 2/16
10 9/16
10 9/16
11 3/4
11 3/4
11 3/4
11 3/4
13
13
13
13

Pressure Limitations For Model 61-R

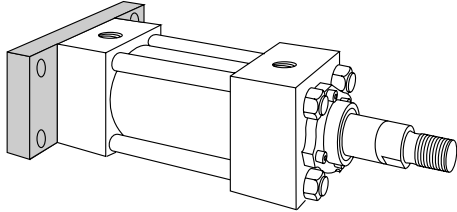
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Rod Dia.	5/8"		1"		1 3/8"		1 3/4"		2"		2 1/2"		3"		3 1/2"		4"		
	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	
1 1/2	2480	1490	1740	1040															
2			3610	2170	2220	1330													
2 1/2			3560	2140	2670	1600	2000	1200											
3 1/4					3080	1850	2620	1570	2320	1390									
4							3240	1940	2960	1780	2400	1440							
5									2330	1400	2050	1230	1700	1020	1410	850			
6											2110	1270	1830	1100	1600	960	1380	830	

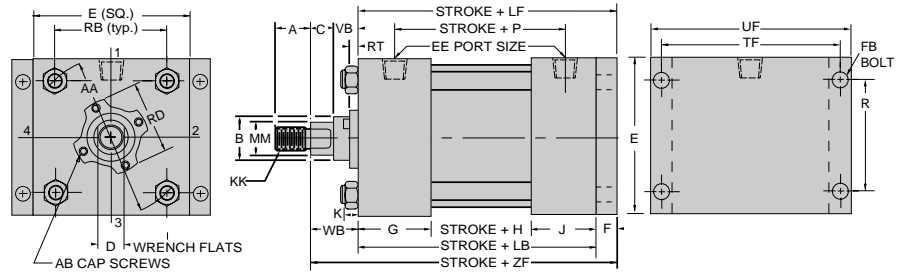
Miller H Series Hydraulic Cylinders

Rectangular Flange/Cap End 1½" – 8" Bore Cylinders

Model 62-B (NFPA MF2)
Bolted Bushing
Rectangular Flange/Cap End

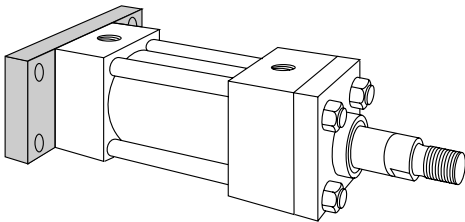


Mounting Dimensions
(see tables on opposite page)

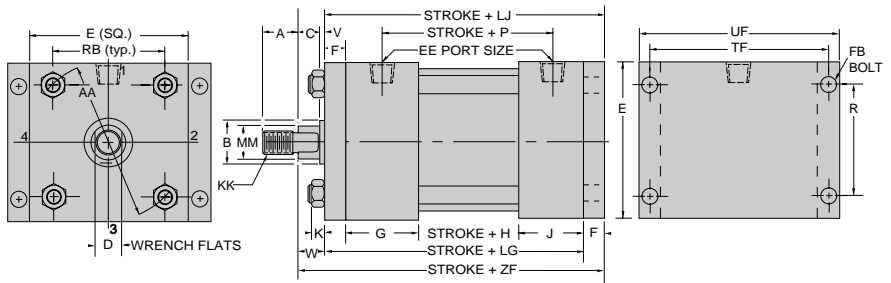


Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2½" through 8" bore cylinders.

Model 62-R (NFPA MF2)
Square Retainer
Rectangular Flange/Cap End
(1½" - 6" Bore)



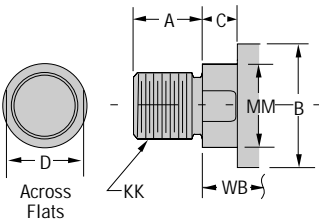
Mounting Dimensions
(see tables on opposite page)



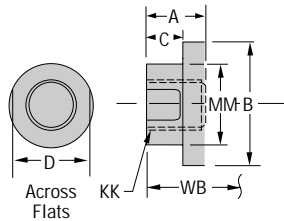
Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2½" through 6" bore cylinders.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

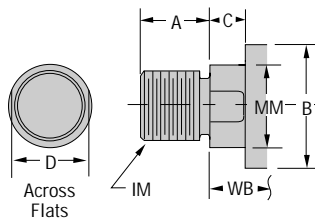
Style No. 2-Standard
Threaded on Turndown Section



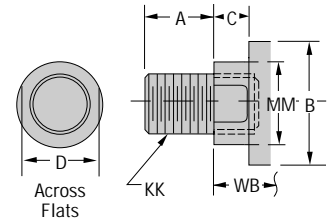
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Models 62-B and 62-R

Bore		1½	2	2½	3¼	4	5	6	7	8
Pressure	MOD.	2480	3610	3560	3080	3240	2330	2110	1240	1030
	SEVERE	1490	2170	2140	1850	1940	1400	1270	740	620

For higher rated cap end mounted cylinders, see Model H-68 mounting on page 18.

Miller H Series Hydraulic Cylinders

Rectangular Flange/Cap End 1½" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	AA	*EE		FB	RB	TF	UF
								SAE	NPT				
1½	2½	¾	1¾	1½	¾	1.63	2.3	-8	½	¾	1.63	3 ⁷ / ₁₆	4¼
2	3	5⁄8	1¾	1½	7⁄16	2.05	2.9	-8	½	½	2.05	4⅛	5⅛
2½	3½	5⁄8	1¾	1½	7⁄16	2.55	3.6	-8	½	½	2.55	4 ⁵ / ₈	5 ⁵ / ₈
3¼	4½	¾	2	1¾	9⁄16	3.25	4.6	-12	¾	5⁄8	3.25	5 ⁷ / ₈	7⅛
4	5	7⁄8	2	1¾	9⁄16	3.82	5.4	-12	¾	5⁄8	3.82	6 ³ / ₈	7 ⁵ / ₈
5	6½	7⁄8	2	1¾	1 ³ / ₁₆	4.95	7.0	-12	¾	7⁄8	4.95	8 ³ / ₁₆	9 ³ / ₄
6	7½	1	2¼	2¼	1 ⁵ / ₁₆	5.73	8.1	-16	1	1	5.73	9 ⁷ / ₁₆	11¼
7	8½	1	2¾	2¾	1	6.58	9.3	-20	1¼	1⅛	6.58	10 ⁵ / ₈	12 ⁵ / ₈
8	9½	1	3	3	1¼	7.50	10.6	-24	1½	1¼	7.50	11 ¹³ / ₁₆	14

* SAE ports are standard, NPT ports are available at no extra charge.
Note: Mounting holes are 1⁄16" larger than bolt sizes (FB) shown.

Add Stroke

H	LB	LD	LF	LG	LJ	P
1¾	4 ⁵ / ₈	4 ⁷ / ₈	5	5	5 ³ / ₈	2 ⁷ / ₈
1¾	4 ⁵ / ₈	4 ⁷ / ₈	5¼	5¼	5 ⁷ / ₈	2 ⁷ / ₈
1½	4¾	5	5 ³ / ₈	5 ³ / ₈	6	3
1¾	5½	5¾	6¼	6¼	7	3½
2	5¾	6	6 ⁵ / ₈	6 ⁵ / ₈	7½	3¼
2½	6¼	6½	7⅛	7⅛	8	4¼
2 ⁷ / ₈	7 ³ / ₈	7 ³ / ₈	8 ³ / ₈	8 ³ / ₈	9 ³ / ₈	4 ⁷ / ₈
3	8½	8½	9½			5 ³ / ₈
3½	9½	9½	10½			6⅞

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1½	5⁄8	¾	1.125	¾	½	¼	5⁄8	10-32	½-20	7⁄16-20	1.972	.316	5⁄8	1
	1	1⅛	1.500	½	7⁄8	½	1		7⁄8-14	¾-16				
2	1	1⅛	1.500	½	7⁄8	¼	¾	¼-28	7⁄8-14	¾-16	2.472	.328	7⁄8	1¾
	1¾	1⅝	2.000	5⁄8	1⅛	¾	1		1¼-12	1-14				
2½	1	1⅛	1.500	½	7⁄8	¼	¾	¼-28	7⁄8-14	¾-16	2.472	.328	7⁄8	1¾
	1¾	1⅝	2.000	5⁄8	1⅛	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	1 ⁵ / ₈
3¼	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	1⅛	1 ⁷ / ₈
	1¾	1⅝	2.000	5⁄8	1⅛	¼	7⁄8	¼-28	1¼-12	1-14	2.972	.328	1	1 ⁵ / ₈
4	1¾	2	2.375	¾	1½	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	1⅛	2
	2	2¼	2.625	7⁄8	1 ¹¹ / ₁₆	¼	1	¼-28	1¾-12	1½-12	3.470	.313	1⅛	1 ⁷ / ₈
5	2	2¼	2.625	7⁄8	1 ¹¹ / ₁₆	¼	1 ¹ / ₈	¼-28	1¾-12	1½-12	3.720	.313	1⅛	2
	2½	3	3.125	1	2 ¹ / ₁₆	¾	1 ³ / ₈	¼-28	2¼-12	1 ⁷ / ₈ -12	4.252	.313	1¼	2¼
6	3	3½	3.750	1	2 ⁵ / ₈	¾	1 ³ / ₈	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¾	1 ³ / ₈	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
7	2½	3	3.125	1	2 ¹ / ₁₆	¼	1¼	¼-28	2¼-12	1 ⁷ / ₈ -12	4.252	.313	1¼	2¼
	3	3½	3.750	1	2 ⁵ / ₈	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
8	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3 ³ / ₈	¼	1¼	5⁄16-24	3¾-12	3-12	5.939	.610	1¼	2¼
9	3	3½	3.750	1	2 ⁵ / ₈			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
10	4	4	4.750	1	3 ³ / ₈			5⁄16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3 ⁷ / ₈			5⁄16-24	4¼-12	3¾-12	6.439	.610	1¼	2¼
11	5	5	5.750	1	4¼			5⁄16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
12	4	4	4.750	1	3 ³ / ₈			5⁄16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3 ⁷ / ₈			5⁄16-24	4¼-12	3¾-12	6.439	.610	1¼	2¼
13	5	5	5.750	1	4¼			5⁄16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	5½	5½	6.250	1	4 ⁵ / ₈			5⁄16-24	5¼-12	4-12	7.439	.610	1¼	2¼

Add Stroke

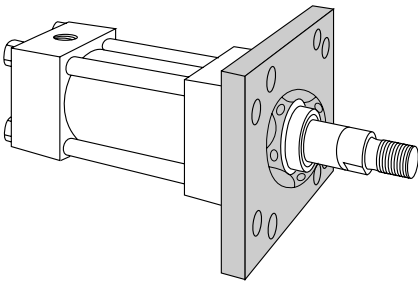
ZF
6
6 ³ / ₈
6 ⁵ / ₈
6 ⁷ / ₈
6¾
7
7¼
7 ⁷ / ₈
8⅛
8¼
8½
8 ⁷ / ₈
9⅛
9 ³ / ₈
9 ⁵ / ₈
10 ⁵ / ₈
10 ⁷ / ₈
10 ⁹ / ₈
10 ¹¹ / ₈
11¾
11¾
11¾
11¾
12¾
12¾
12¾
12¾

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

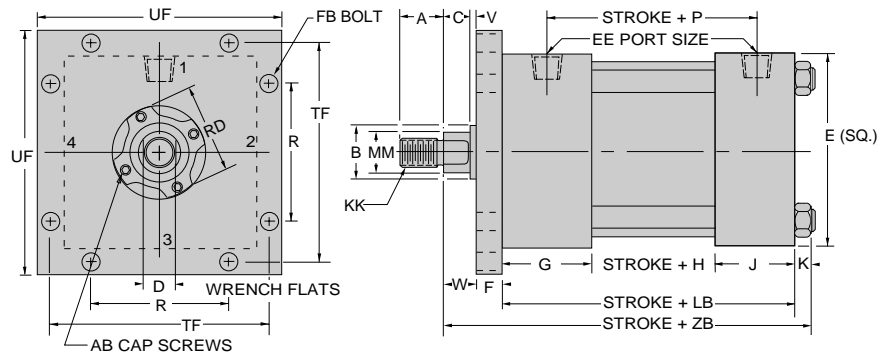
Square Flange/Head End
1 1/2" – 8" Bore Cylinders

Model 65-B (NFPA MF5)
Bolted Bushing
Square Flange/Head End

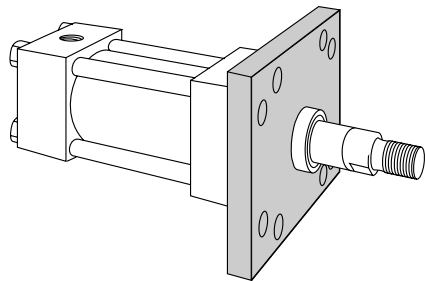


Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

Mounting Dimensions
(See tables on opposite page)

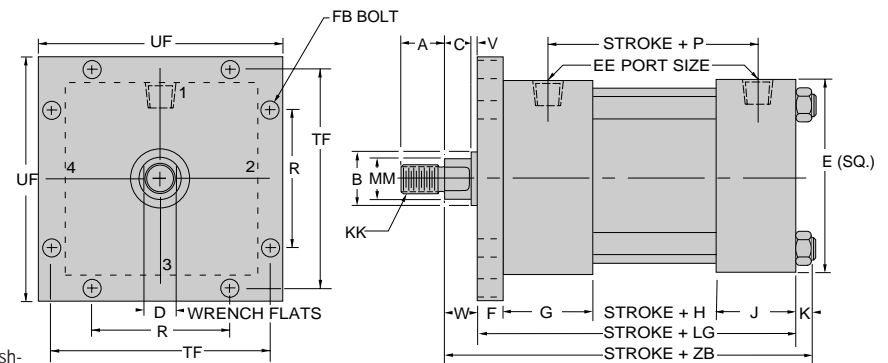


Model 65-R (NFPA MF5)
Square Retainer Held Bushing
Square Flange/Head End



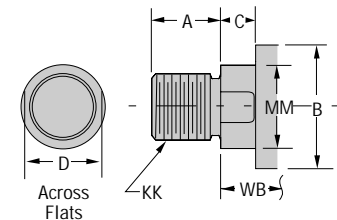
Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

Mounting Dimensions
(See tables on opposite page)

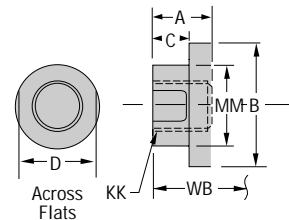


Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

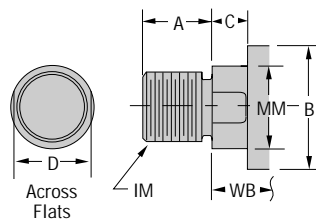
Style No. 2-Standard
Threaded on Turndown Section



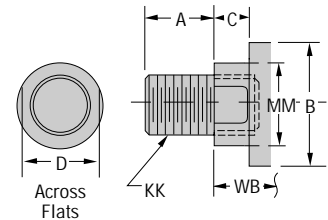
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Model 65-B and 65-R

Rod Dia.	1 3/4"		2"		2 1/2"		3"		3 1/2"		4"		4 1/2"		5"		5 1/2"		
Bore Sizes	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	Mod.	Sev.	
4	4000	2400	4000	2400	4000	2400													
5			4000	2400	4000	2400	3780	2270	3230	1940									
6					3000	1800	3000	1800	3000	1800									
7							3000	1800	3000	1800	2580	1550	2280	1370	1980	1190			
8									2890	1730	2400	1440	2180	1310	1970	1180	1750	1050	

Miller H Series Hydraulic Cylinders

Square Flange/Head End
1 1/2" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	*EE		FB	TF	UF
							SAE	NPT			
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	1.63	-8	1/2	3/8	3 7/16	4 1/4
2	3	5/8	1 3/4	1 1/2	7/16	2.05	-8	1/2	1/2	4 1/8	5 1/8
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	2.55	-8	1/2	1/2	4 5/8	5 5/8
3 1/4	4 1/2	3/4	2	1 3/4	9/16	3.25	-12	3/4	5/8	5 7/8	7 1/8
4	5	7/8	2	1 3/4	9/16	3.82	-12	3/4	5/8	6 3/8	7 5/8
5	6 1/2	7/8	2	1 3/4	1 1/16	4.95	-12	3/4	7/8	8 3/16	9 3/4
6	7 1/2	1	2 1/4	2 1/4	1 5/16	5.73	-16	1	1	9 7/16	11 1/4
7	8 1/2	1	2 3/4	2 3/4	1	6.58	-20	1 1/4	1 1/8	10 5/8	12 5/8
8	9 1/2	1	3	3	1 1/4	7.50	-24	1 1/2	1 1/4	11 13/16	14

Add Stroke

H	LB	±LD	LG	P
1 3/8	4 5/8	4 7/8	5	2 7/8
1 3/8	4 5/8	4 7/8	5 1/4	2 7/8
1 1/2	4 3/4	5	5 3/8	3
1 3/4	5 1/2	5 3/4	6 1/4	3 1/2
2	5 3/4	6	6 5/8	3 3/4
2 1/2	6 1/4	6 1/2	7 1/8	4 1/4
2 7/8	7 3/8	7 3/8	8 3/8	4 7/8
3	8 1/2	8 1/2	9 1/2	5 3/8
3 1/2	9 1/2	9 1/2	10 1/2	6 1/8

* SAE ports are standard, NPT ports are available at no extra charge.

† LD dimension is for double rod end models. See page 44.

Note: Mounting holes are 1/16" larger than bolt sizes (FB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8		1/2-20	7/16-20	
	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16	
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4		7/8-14	3/4-16	
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14	
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14	
	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4		1 1/2-12	1 1/4-12	
3 1/4	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1/4-28	1 1/4-12	1-14	2.972
	1 3/4	2	2.375	3/4	1 1/2	3/8	1 1/8	1/4-28	1 1/2-12	1 1/4-12	3.470
	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4		1 3/4-12	1 1/2-12	
4	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252
5	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252
	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1/4-28	3 1/4-12	2 1/2-12	5.252
6	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	1/4-28	2 1/4-12	1 7/8-12	4.252
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 3/4-12	3-12	5.939
7	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1/4-28	2 3/4-12	2 1/4-12	4.752
	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 3/4-12	3-12	5.939
	4 1/2	4 1/2	5.250	1	3 7/8	1/4	1 1/4	5/16-24	4 1/4-12	3 1/4-12	6.439
	5	5	5.750	1	4 1/4	1/4	1 1/4	5/16-24	4 3/4-12	3 1/2-12	6.939
8	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 3/4-12	3-12	5.939
	4 1/2	4 1/2	5.250	1	3 7/8	1/4	1 1/4	5/16-24	4 1/4-12	3 1/4-12	6.439
	5	5	5.750	1	4 1/4	1/4	1 1/4	5/16-24	4 3/4-12	3 1/2-12	6.939
	5 1/2	5 1/2	6.250	1	4 5/8	1/4	1 1/4	5/16-24	5 1/4-12	4-12	7.439

Add Stroke

ZB
6
6 3/8
6 7/16
6 11/16
6 9/16
6 13/16
7 1/16
7 11/16
7 15/16
8 1/16
8 3/16
8 5/16
8 9/16
9 1/16
9 5/16
9 9/16
10 9/16
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11 3/4
11 3/4
11 3/4
11 3/4
11 3/4
13
13
13
13
13

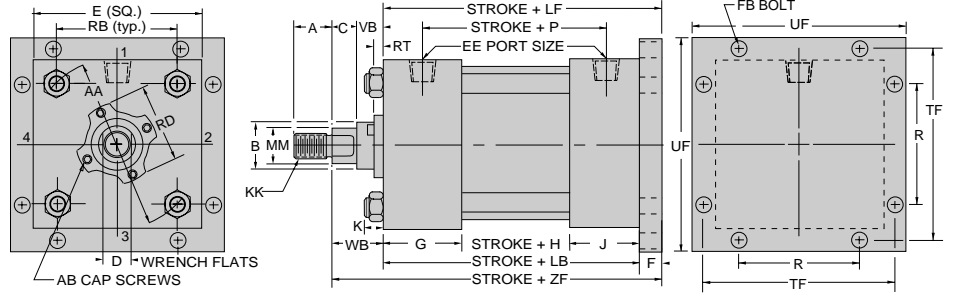
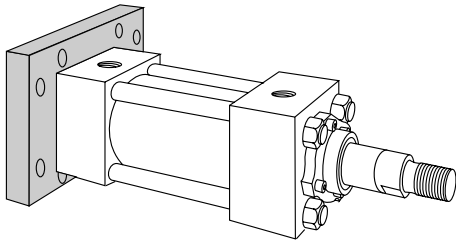
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

Square Flange/Cap End
1 1/2" - 8" Bore Cylinders

Model 66-B (NFPA MF6)
Bolted Bushing
Square Flange/Cap End

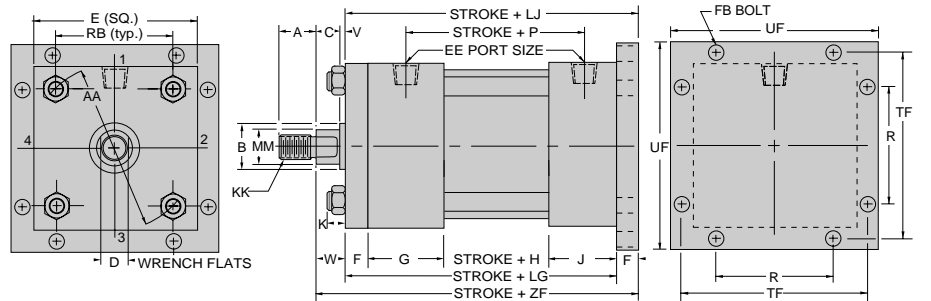
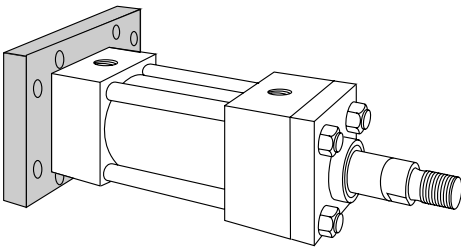
Mounting Dimensions
(See tables on opposite page)



Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

Model 66-R (NFPA MF6)
Square Retainer Held Bushing
Square Flange/Cap End

Mounting Dimensions
(See tables on opposite page)



Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

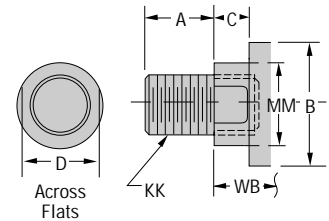
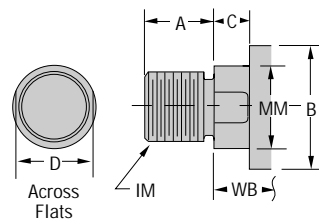
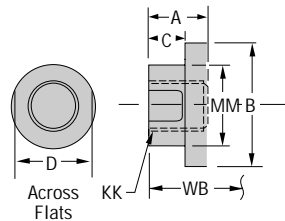
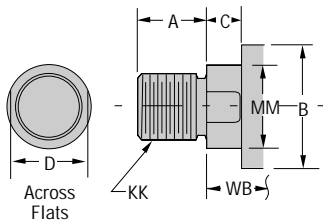
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Model 66-B and 66-R

Bore		4	5	6	7	8
Pressure	MOD.	4000	4000	3000	3000	2890
	SEVERE	2400	2400	1800	1800	1730

Miller H Series Hydraulic Cylinders

Square Flange/Cap End
1½" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	AA	*EE		FB	RB	TF	UF
								SAE	NPT				
1½	2½	¾	1¾	1½	¾	1.63	2.3	-8	½	¾	1.63	3/16	4¼
2	3	5/8	1¾	1½	7/16	2.05	2.9	-8	½	½	2.05	4/8	5½
2½	3½	5/8	1¾	1½	7/16	2.55	3.6	-8	½	½	2.55	4/8	5½
3¼	4½	¾	2	1¾	9/16	3.25	4.6	-12	¾	5/8	3.25	5/8	7½
4	5	7/8	2	1¾	9/16	3.82	5.4	-12	¾	5/8	3.82	6/8	7½
5	6½	7/8	2	1¾	13/16	4.95	7.0	-12	¾	7/8	4.95	83/16	9¾
6	7½	1	2¼	2¼	15/16	5.73	8.1	-16	1	1	5.73	9/16	11¼
7	8½	1	2¾	2¾	1	6.58	9.3	-20	1¼	1½	6.58	105/8	125/8
8	9½	1	3	3	1¼	7.50	10.6	-24	1½	1¼	7.50	113/16	14

* SAE ports are standard, NPT ports are available at no extra charge.
Note: Mounting holes are 1/16" larger than bolt sizes (FB) shown.

Add Stroke

H	LB	LF	LG	P	LJ
1¾	45/8	5	5	27/8	53/8
1¾	45/8	5¼	5¼	27/8	57/8
1½	4¾	53/8	53/8	3	6
1¾	5½	6¼	6¼	3½	7
2	5¾	65/8	65/8	3¾	7½
2½	6¼	71/8	71/8	4¼	8
27/8	73/8	83/8	83/8	47/8	93/8
3	8½	9½		53/8	
3½	9½	10½		61/8	

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1½	5/8	¾	1.125	¾	½	¼	5/8	10-32	½-20	7/16-20	1.972	.316	5/8	1
	1	1½	1.500	½	7/8	½	1		7/8-14	¾-16				
2	1	1½	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾
	1¾	15/8	2.000	5/8	11/8	¾	1		1¼-12	1-14				
2½	1	1½	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾
	1¾	15/8	2.000	5/8	11/8	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	15/8
3¼	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	1½	17/8
	1¾	15/8	2.000	5/8	11/8	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	15/8
4	2	2¼	2.625	7/8	11/16	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	1½	2
	1¾	15/8	2.000	5/8	11/8	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	15/8
5	2	2¼	2.625	7/8	11/16	¼	11/8	¼-28	1¾-12	1½-12	3.720	.313	1½	2
	2½	3	3.125	1	21/16	¾	1¾	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼
6	3	3½	3.750	1	25/8	¾	1¾	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¾	1¾	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
7	2½	3	3.125	1	21/16	¼	1¼	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	25/8	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
8	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	33/8	¼	1¼	5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
9	3	3½	3.750	1	25/8			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
10	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
11	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	5½	5½	6.250	1	47/8			5/16-24	5¼-12	4-12	7.439	.610	1¼	2¼

Add Stroke

ZF
6
63/8
65/8
67/8
6¾
7
7¼
77/8
81/8
8¼
8½
85/8
87/8
91/8
93/8
95/8
97/8
105/8
105/8
105/8
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113/4
113/4
113/4
123/4
123/4
123/4
123/4
123/4

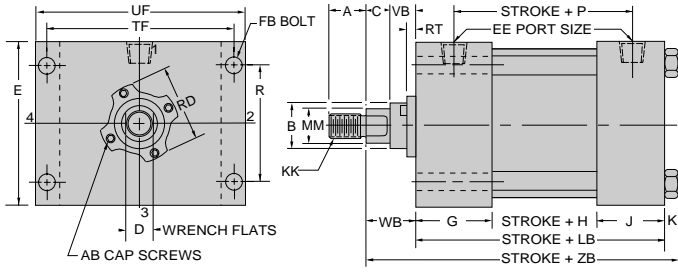
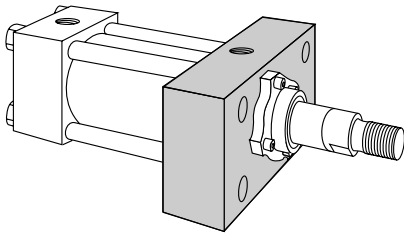
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

Rectangular Head/Cap
1 1/2" – 8" Bore Cylinders

Model 67-B (NFPA ME5)
Bolted Bushing
Rectangular Head

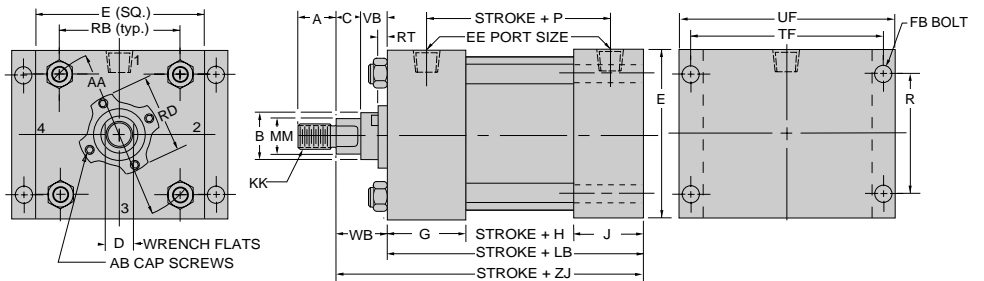
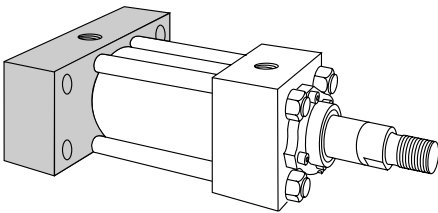
Mounting Dimensions
(See tables on opposite page)



Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders. Not available in Retainer Held Bushing construction.

Model 68-B (NFPA ME6)
Bolted Bushing
Rectangular Cap

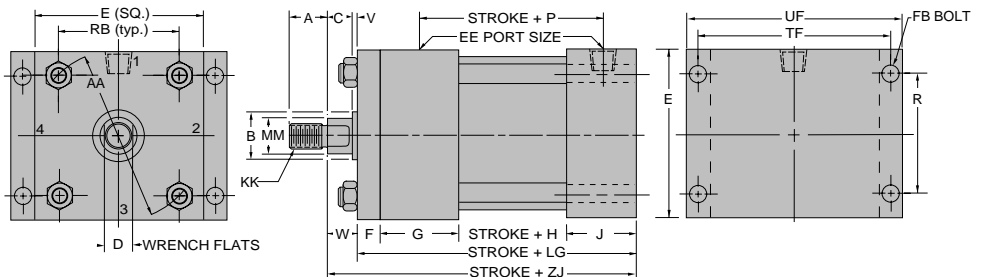
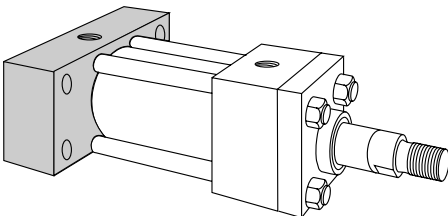
Mounting Dimensions
(See tables on opposite page)



Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

Model 68-R (NFPA ME6)
Square Retainer Held Bushing
Rectangular Cap End

Mounting Dimensions
(See tables on opposite page)



See Page 45 for Rod End Styles.

Note: High tensile mounting bolts should be used. Hardened flat washers should be used on 2 1/2" through 8" bore cylinders.

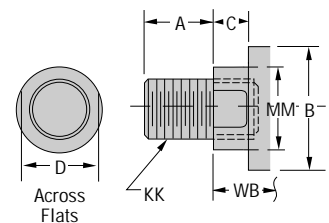
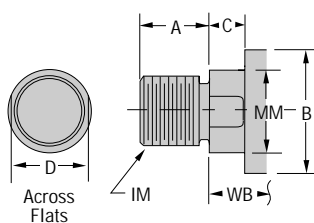
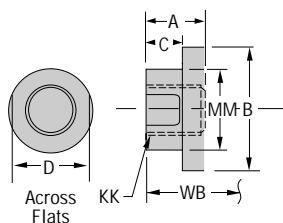
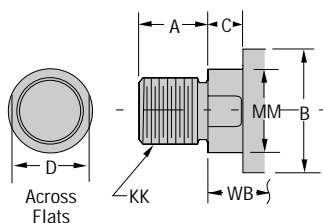
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

Rectangular Head/Cap 1½"–8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	AA	*EE		FB	RB	TF	UF
								SAE	NPT				
1½	2½	¾	1¾	1½	¾	1.63	2.3	-8	½	¾	1.63	3⅞	4¼
2	3	⅝	1¾	1½	7/16	2.05	2.9	-8	½	½	2.05	4⅞	5⅞
2½	3½	⅝	1¾	1½	7/16	2.55	3.6	-8	½	½	2.55	4⅝	5⅝
3¼	4½	¾	2	1¾	9/16	3.25	4.6	-12	¾	⅝	3.25	5⅞	7⅞
4	5	7/8	2	1¾	9/16	3.82	5.4	-12	¾	⅝	3.82	6⅞	7⅝
5	6½	7/8	2	1¾	13/16	4.95	7.0	-12	¾	7/8	4.95	8⅞	9¾
6	7½	1	2¼	2¼	15/16	5.73	8.1	-16	1	1	5.73	9⅞	11¼
7	8½		2¾	2¾	1	6.58	9.3	-20	1¼	1⅞	6.58	10⅝	12⅝
8	9½		3	3	1¼	7.50	10.6	-24	1½	1¼	7.50	11⅞	14

Add Stroke

H	LB	±LD	LG	P
1⅜	4⅝	4⅞	5	2⅞
1⅜	4⅝	4⅞	5¼	2⅞
1½	4¾	5	5⅜	3
1¾	5½	5¾	6¼	3½
2	5¾	6	6⅝	3¾
2½	6¼	6½	7⅞	4¼
2⅞	7⅞	7⅞	8⅞	4⅞
3	8½	8½		5⅜
3½	9½	9½		6⅞

* SAE ports are standard, NPT ports are available at no extra charge. ±LD dimension is for double rod end models. See page 44.
Note: Mounting holes are ⅞" larger than bolt sizes (FB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1½	5/8	¾	1.125	¾	½	¼	5/8	10-32	½-20	7/16-20	1.972	.316	5/8	1
	**1	1⅞	1.500	½	7/8	½	1	¼-28	7/8-14	¾-16	2.472	.328	7/8	1⅞
2	1	1⅞	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1⅞
	**1⅜	1⅝	2.000	5/8	1⅞	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	1⅝
2½	1	1⅞	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1⅞
	1⅝	1⅝	2.000	5/8	1⅞	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	1⅝
	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	1⅞	1⅞
3¼	1⅝	1⅝	2.000	5/8	1⅞	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	1⅝
	1¾	2	2.375	¾	1½	¾	1⅞	¼-28	1½-12	1¼-12	3.470	.313	1⅞	1⅞
	2	2¼	2.625	7/8	1⅞	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	1⅞	2
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	3.470	.313	1⅞	1⅞
	2	2¼	2.625	7/8	1⅞	¼	1⅞	¼-28	1¾-12	1½-12	3.720	.313	1⅞	2
	2½	3	3.125	1	2⅞	¾	1⅞	¼-28	2¼-12	1⅞-12	4.252	.313	1¼	2¼
5	2	2¼	2.625	7/8	1⅞	¼	1⅞	¼-28	1¾-12	1½-12	3.720	.313	1⅞	2
	2½	3	3.125	1	2⅞	¾	1⅞	¼-28	2¼-12	1⅞-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	2⅝	¾	1⅞	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¾	1⅞	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
6	2½	3	3.125	1	2⅞	¼	1¼	¼-28	2¼-12	1⅞-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	2⅝	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3⅝	¼	1¼	5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
7	3	3½	3.750	1	2⅝			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3⅝			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3⅞			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
8	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3⅝			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3⅞			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	5½	5½	6.250	1	4⅝			5/16-24	5¼-12	4-12	7.439	.610	1¼	2¼

Add Stroke

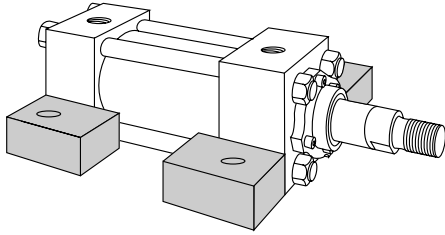
ZB	ZJ
6	5⅝
6⅞	6
6⅞	6
6⅞	6¼
6⅞	6⅞
6⅞	6⅞
7⅞	6⅞
7⅞	7⅞
7⅞	7⅞
8⅞	7½
8⅞	7⅞
8⅞	7¾
8⅞	8
9⅞	8¼
9⅞	8½
9⅞	8½
9⅞	8½
9⅞	8½
10⅞	9⅞
10⅞	9⅞
10⅞	9⅞
10⅞	9⅞
11¾	10¾
11¾	10¾
11¾	10¾
11¾	10¾
11¾	10¾
13	11¾
13	11¾
13	11¾
13	11¾

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.
**1½" Bore with 1" Rod Diameter and 2" Bore with 1⅝" Rod Diameter. Not Available with Bolted Bushing on Model 68.

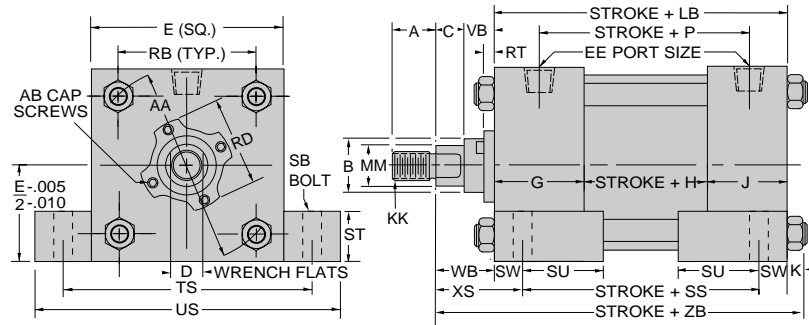
Miller H Series Hydraulic Cylinders

Side Lug
1½"–8" Bore Cylinders

Model 72-B (NFPA MS2)
Bolted Bushing
Side Lug

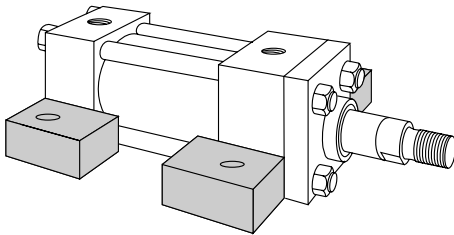


Mounting Dimensions
(See tables on opposite page)

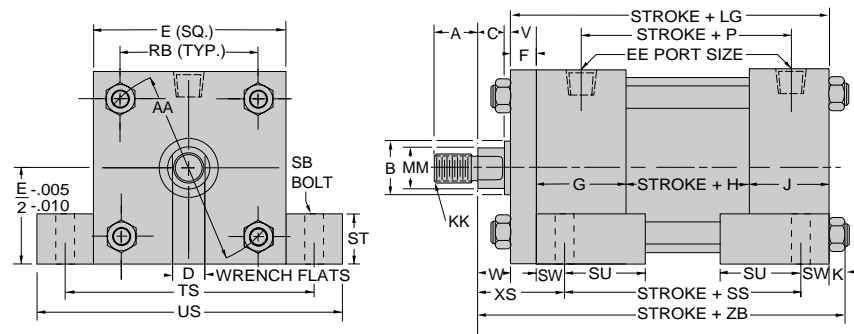


Note: Lugs should be blocked, or a "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Model 72-R (NFPA MS2)
Square Retainer Held Bushing
Side Lug



Mounting Dimensions
(See tables on opposite page)



Note: Lugs should be blocked, or a "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

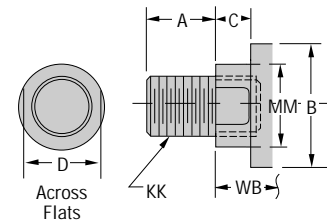
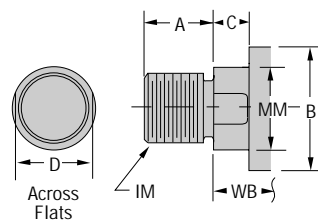
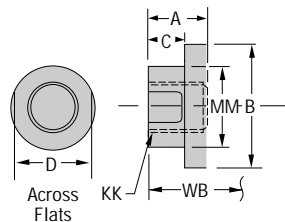
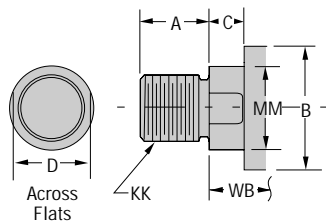
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Models 72-B & 72-R

Bore		1½	2	2½	3¼	4	5	6	7	8
Pressure	MOD.	5000	5000	4400	3800	2520	2400	2340	2470	2370
	SEVERE	3000	3000	2640	2280	1510	1440	1400	1480	1420

Miller H Series Hydraulic Cylinders

Side Lug 1½" - 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	*EE		RB	SB	ST	SU	SW	TS	US
							SAE	NPT							
1½	2½	¾	1¾	1½	¾	2.3	-8	½	1.63	¾	½	15/16	¾	3¼	4
2	3	5/8	1¾	1½	7/16	2.9	-8	½	2.05	½	¾	1¼	½	4	5
2½	3½	5/8	1¾	1½	7/16	3.6	-8	½	2.55	¾	1	19/16	11/16	47/8	6¼
3¼	4½	¾	2	1¾	9/16	4.6	-12	¾	3.25	¾	1	19/16	11/16	57/8	7¼
4	5	7/8	2	1¾	9/16	5.4	-12	¾	3.82	1	1¼	2	7/8	6¾	8½
5	6½	7/8	2	1¾	13/16	7.0	-12	¾	4.95	1	1¼	2	7/8	8¼	10
6	7½	1	2¼	2¼	15/16	8.1	-16	1	5.73	1¼	1½	2½	17/8	9¾	12
7	8½		2¾	2¾	1	9.3	-20	1¼	6.58	1½	1¾	27/8	13/8	11¼	14
8	9½		3	3	1¼	10.6	-24	1½	7.50	1½	1¾	27/8	13/8	12¼	15

Add Stroke

H	LB	†LD	LG	P	†SS
1¾	45/8	47/8	5	27/8	37/8
1¾	45/8	47/8	5¼	27/8	37/8
1½	4¾	5	53/8	3	33/8
1¾	5½	5¾	6¼	3½	47/8
2	5¾	6	63/8	3¾	4
2½	6¼	6½	77/8	4¼	4½
27/8	73/8	73/8	83/8	47/8	57/8
3	8½	8½		53/8	5¾
3½	9½	9½		67/8	6¾

* SAE ports are standard, NPT ports are available at no extra charge.

† LD dimension is for double rod end models. See page 44. For end to end bolt centerlines on double rod-end cylinders, use common dimension

"Stroke plus LD" instead of "Stroke Plus SS" and subtract dimension "SW" from each end.

Note: Mounting holes are 1/16" larger than bolt sizes (SB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB	XS
1½	5/8	¾	1.125	¾	½	¼	5/8	10-32	½-20	7/16-20	1.972	.316	5/8	1	1¾
	1	11/8	1.500	½	7/8	½	1		7/8-14	¾-16					1¾
2	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	13/8	17/8
	1¾	15/8	2.000	5/8	17/8	¾	1		1¼-12	1-14					27/8
2½	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	13/8	21/16
	1¾	15/8	2.000	5/8	17/8	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	15/8	25/16
	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	29/16
3¼	1¾	15/8	2.000	5/8	17/8	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	15/8	25/16
	1¾	2	2.375	¾	1½	¾	17/8	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	29/16
	2	2¼	2.625	7/8	111/16	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	211/16
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	2¾
	2	2¼	2.625	7/8	111/16	¼	17/8	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	27/8
	2½	3	3.125	1	21/16	¾	13/8	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	31/8
5	2	2¼	2.625	7/8	111/16	¼	17/8	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	27/8
	2½	3	3.125	1	21/16	¾	13/8	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	31/8
	3	3½	3.750	1	25/8	¾	13/8	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	31/8
	3½	3½	4.250	1	3	¾	13/8	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	31/8
6	2½	3	3.125	1	21/16	¼	1¼	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	33/8
	3	3½	3.750	1	25/8	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	33/8
	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	33/8
	4	4	4.750	1	33/8	¼	1¼	5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	33/8
7	3	3½	3.750	1	25/8			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	35/8
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	35/8
	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	35/8
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¾-12	6.439	.610	1¼	2¼	35/8
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼	35/8
8	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	35/8
	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	35/8
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¾-12	6.439	.610	1¼	2¼	35/8
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼	35/8
	5½	5½	6.250	1	45/8			5/16-24	5¼-12	4-12	7.439	.610	1¼	2¼	35/8

Add Stroke

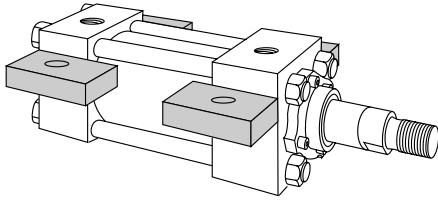
ZB
6
63/8
67/16
611/16
69/16
613/16
77/16
711/16
715/16
87/16
83/16
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87/16
97/16
95/16
99/16
95/16
109/16
109/16
109/16
113/4
113/4
113/4
113/4
113/4
13
13
13
13

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

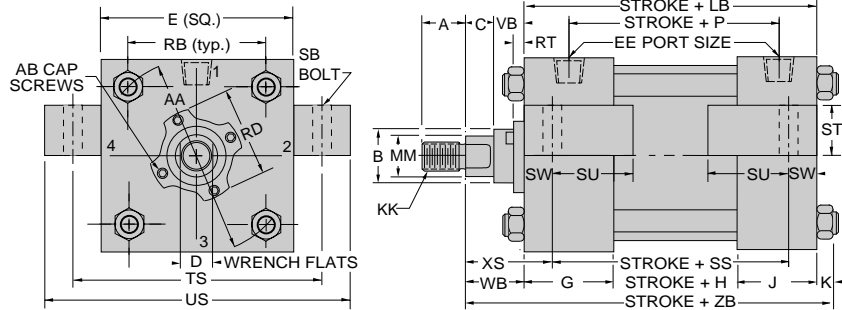
Miller H Series Hydraulic Cylinders

Centerline Lug
1 1/2" - 8" Bore Cylinders

Model 73-B (NFPA MS3)
Bolted Bushing
Centerline Lug

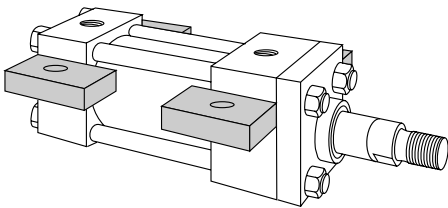


Mounting Dimensions
(See tables on opposite page)

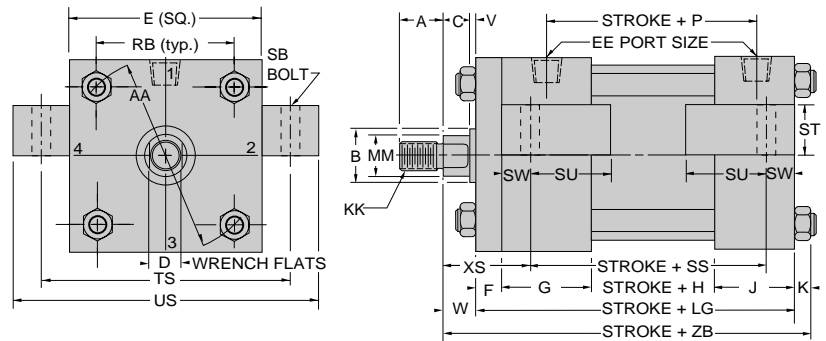


Note: Lugs should be blocked, or pinned on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Model 73-R (NFPA MS3)
Square Retainer Held Bushing
Centerline Lug



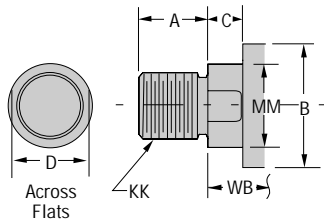
Mounting Dimensions
(See tables on opposite page)



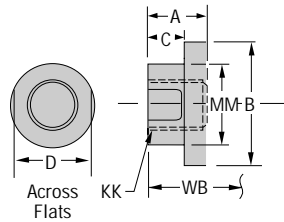
Note: Lugs should be blocked, or pinned on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

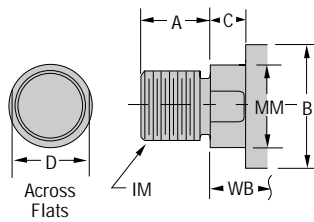
Style No. 2-Standard
Threaded on Turndown Section



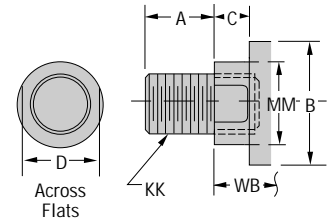
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

Centerline Lug 1½" - 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	*EE		RB	SB	ST	SU	SW	TS	US
							SAE	NPT							
1½	2½	¾	1¾	1½	¾	2.3	-8	½	1.63	¾	½	15/16	¾	3¼	4
2	3	5/8	1¾	1½	7/16	2.9	-8	½	2.05	½	¾	1¼	½	4	5
2½	3½	5/8	1¾	1½	7/16	3.6	-8	½	2.55	¾	1	19/16	11/16	47/8	6¼
3¼	4½	¾	2	1¾	9/16	4.6	-12	¾	3.25	¾	1	19/16	11/16	57/8	7¼
4	5	7/8	2	1¾	9/16	5.4	-12	¾	3.82	1	1¼	2	7/8	6¾	8½
5	6½	7/8	2	1¾	13/16	7.0	-12	¾	4.95	1	1¼	2	7/8	8¼	10
6	7½	1	2¼	2¼	15/16	8.1	-16	1	5.73	1¼	1½	2½	1½	9¾	12
7	8½		2¾	2¾	1	9.3	-20	1¼	6.58	1½	1¾	27/8	1¾	11¼	14
8	9½		3	3	1¼	10.6	-24	1½	7.50	1½	1¾	27/8	1¾	12¼	15

Add Stroke

H	LB	LD	LG	P	SS
1¾	45/8	47/8	5	27/8	37/8
1¾	45/8	47/8	5¼	27/8	35/8
1½	4¾	5	53/8	3	33/8
1¾	5½	5¾	6¼	3½	47/8
2	5¾	6	63/8	3¼	4
2½	6¼	6½	77/8	4¼	4½
27/8	73/8	73/8	83/8	47/8	51/8
3	8½	8½		53/8	5¾
3½	9½	9½		67/8	6¾

* SAE ports are standard, NPT ports are available at no extra charge.

† LD dimension is for double rod end models. See page 44. For end to end bolt centerlines on double rod-end cylinders, use common dimension

"Stroke plus LD" instead of "Stroke Plus SS" and subtract dimension "SW" from each end.

Note: Mounting holes are 1/16" larger than bolt sizes (SB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB	XS
1½	5/8	¾	1.125	¾	½	¼	5/8	10-32	½-20	7/16-20	1.972	.316	5/8	1	1¾
	1	11/8	1.500	½	7/8	½	1		7/8-14	¾-16					1¾
2	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾	17/8
	1¾	15/8	2.000	5/8	11/8	¾	1		1¼-12	1-14					27/8
2½	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾	21/16
	1¾	15/8	2.000	5/8	11/8	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	15/8	25/16
	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	29/16
3¼	1¾	15/8	2.000	5/8	11/8	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	15/8	25/16
	1¾	2	2.375	¾	1½	¾	11/8	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	29/16
	2	2¼	2.625	7/8	111/16	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	211/16
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	3.470	.313	11/8	17/8	2¾
	2	2¼	2.625	7/8	111/16	¼	11/8	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	27/8
	2½	3	3.125	1	27/16	¾	13/8	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	37/8
5	2	2¼	2.625	7/8	111/16	¼	11/8	¼-28	1¾-12	1½-12	3.720	.313	11/8	2	27/8
	2½	3	3.125	1	27/16	¾	13/8	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	37/8
	3	3½	3.750	1	25/8	¾	13/8	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	37/8
	3½	3½	4.250	1	3	¾	13/8	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	37/8
6	2½	3	3.125	1	27/16	¼	1¼	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼	33/8
	3	3½	3.750	1	25/8	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	33/8
	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	33/8
7	4	4	4.750	1	33/8	¼	1¼	5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	33/8
	3	3½	3.750	1	25/8			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼	35/8
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	35/8
	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	35/8
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼	35/8
8	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼	35/8
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼	35/8
	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼	35/8
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼	35/8
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼	35/8
5½	5½	6.250	1	45/8			5/16-24	5¼-12	4-12	7.439	.610	1¼	2¼	35/8	

Add Stroke

ZB
6
63/8
67/16
611/16
69/16
613/16
71/16
711/16
715/16
81/16
83/16
85/16
87/16
91/16
95/16
95/16
95/16
109/16
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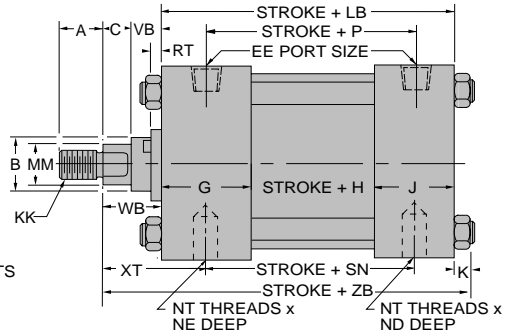
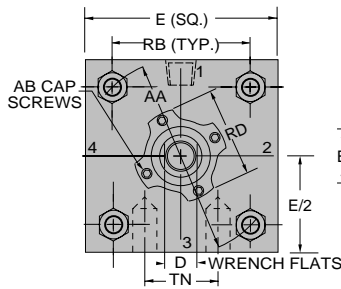
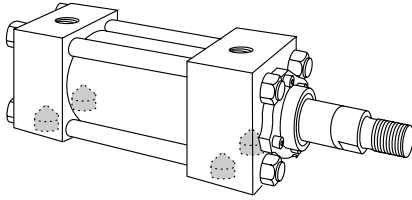
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

Side Tapped
1½" - 8" Bore Cylinders

Model 74-B (NFPA MS4)
Bolted Bushing
Side Tapped

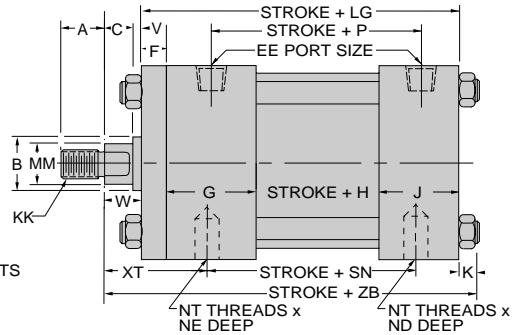
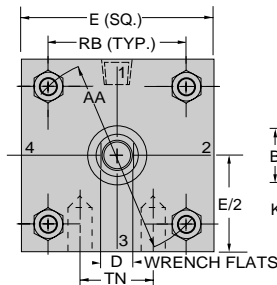
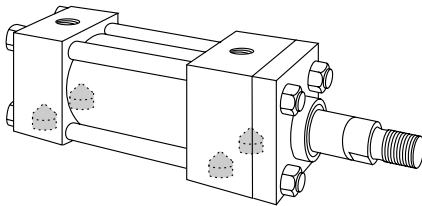
Mounting Dimensions
(See tables on opposite page)



Note: A "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Model 74-R (NFPA MS4)
Square Retainer Held Bushing
Side Tapped

Mounting Dimensions
(See tables on opposite page)



Note: A "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

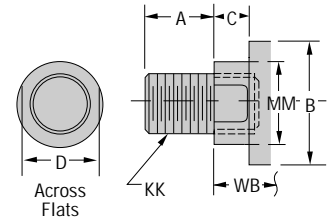
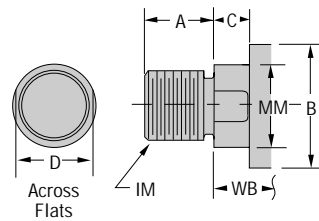
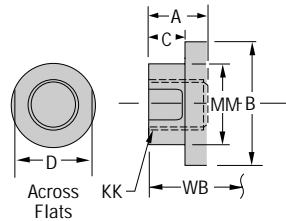
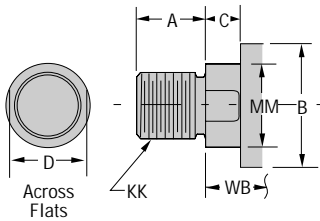
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Model 74-B and 74-R

Bore		1½	2	2½	3¼	4	5	6	7	8
Pressure	MOD.	4700	4600	4300	4200	4000	4000	3000	3000	3000
	SEVERE	2820	2760	2580	2520	2400	2400	1800	1800	1800

Note: Reduced pressure ratings on some oversize rod models due to shallow tapped mounting holes in the rod end head. See NE dimension for tap depth.

Miller H Series Hydraulic Cylinders

Side Tapped
1½" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	*EE		ND	NT	RB	TN
							SAE	NPT				
1½	2½	¾	1¾	1½	¾	2.3	-8	½	½	¾-16	1.63	¾
2	3	⅝	1¾	1½	7/16	2.9	-8	½	9/16	1½-13	2.05	15/16
2½	3½	⅝	1¾	1½	7/16	3.6	-8	½	7/8	5/8-11	2.55	15/16
3¼	4½	¾	2	1¾	9/16	4.6	-12	¾	1½	¾-10	3.25	1½
4	5	7/8	2	1¾	9/16	5.4	-12	¾	1½	1-8	3.82	2½
5	6½	7/8	2	1¾	13/16	7.0	-12	¾	1½	1-8	4.95	2½
6	7½	1	2¼	2¼	15/16	8.1	-16	1	1¾	1¼-7	5.73	35/16
7	8½		2¾	2¾	1	9.3	-20	1¼	2	1½-6	6.58	3¾
8	9½		3	3	1¼	10.6	-24	1½	2	1½-6	7.50	4¼

Add Stroke

H	LB	±LD	LG	P	SN‡
1¾	45/8	47/8	5	27/8	27/8
1¾	45/8	47/8	5¼	27/8	27/8
1½	4¾	5	53/8	3	3
1¾	5½	5¾	6¼	3½	3½
2	5¾	6	65/8	3¾	3¾
2½	6¼	6½	71/8	4¼	4¼
27/8	73/8	73/8	83/8	47/8	51/8‡
3	8½	8½		53/8	57/8‡
3½	9½	9½		61/8	65/8‡

* SAE ports are standard, NPT ports are available at no extra charge.

‡ LD dimension is for double rod end models. See page 44.

SN dimension on double rod end (Model DH-74): For 6" bore is 47/8", 7" bore SN=53/8", and 8" bore SN=61/8".

1½"-5" bores the SN dimension is the same for both single and double rod end cylinders.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	NE	RD (Max.)	RT	VB	WB	XT
1½	5/8	¾	1.125	3/8	½	¼	5/8	10-32	1/2-20	7/16-20	½	1.972	.316	5/8	1	2
	1	11/8	1.500	½	7/8	½	1		7/8-14	¾-16	25/64					23/8
2	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	9/16	2.472	.328	7/8	13/8	23/8
	13/8	15/8	2.000	5/8	11/8	3/8	1		1¼-12	1-14	7/16					25/8
2½	1	11/8	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	7/8	2.472	.328	7/8	13/8	23/8
	13/8	15/8	2.000	5/8	11/8	3/8	1	¼-28	1¼-12	1-14	23/32	2.972	.328	1	15/8	25/8
3¼	13/8	15/8	2.000	5/8	11/8	¼	7/8	¼-28	1¼-12	1-14	11/16	2.972	.328	1	15/8	23/4
	1¾	2	2.375	¾	1½	3/8	11/8	¼-28	1½-12	1¼-12	7/8	3.470	.313	11/8	17/8	3
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	11/16	3.470	.313	11/8	17/8	3
	2	2¼	2.625	7/8	11/16	¼	11/8	¼-28	1¾-12	1½-12	1	3.720	.313	11/8	2	31/8
5	2½	3	3.125	1	21/16	3/8	13/8	¼-28	2¼-12	17/8-12	1½	4.252	.313	1¼	2¼	33/8
	3	3½	3.750	1	25/8	3/8	13/8	¼-28	2¾-12	2¼-12	1¼	4.752	.313	1¼	2¼	33/8
6	3½	3½	4.250	1	3	3/8	13/8	¼-28	3¼-12	2½-12	11/16	5.252	.313	1¼	2¼	33/8
	4	4	4.750	1	33/8	¼	1¼	¼-28	3¾-12	3-12	113/32	5.939	.610	1¼	2¼	3½
7	3	3½	3.750	1	25/8			¼-28	2¾-12	2¼-12	2	4.752	.313	1¼	2¼	313/16
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	2¼	5.252	.313	1¼	2¼	313/16
8	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	115/16	5.939	.610	1¼	2¼	313/16
	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¼-12	15/8	6.439	.610	1¼	2¼	313/16
8	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	2	5.252	.313	1¼	2¼	315/16
	4	4	4.750	1	33/8			5/16-24	3¾-12	3-12	2	5.939	.610	1¼	2¼	315/16
8	4½	4½	5.250	1	37/8			5/16-24	4¼-12	3¼-12	2¼	6.439	.610	1¼	2¼	315/16
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	129/32	6.939	.610	1¼	2¼	315/16
8	5½	5½	6.250	1	43/8			5/16-24	5¼-12	4-12	137/64	7.439	.610	1¼	2¼	315/16

Add Stroke

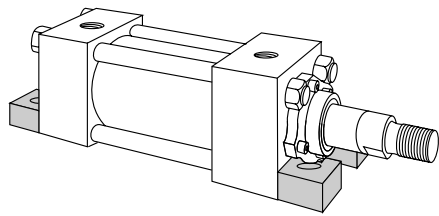
ZB
6
63/8
67/16
611/16
69/16
613/16
71/16
711/16
715/16
81/16
83/16
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89/16
91/16
95/16
95/16
95/16
109/16
109/16
109/16
109/16
113/4
113/4
113/4
113/4
113/4
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13

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

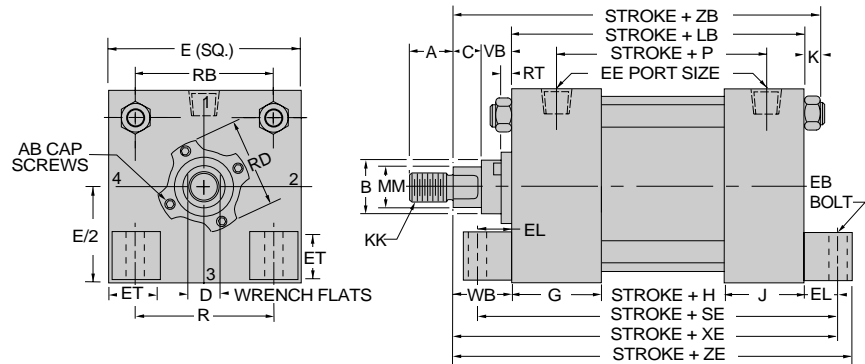
End Lug
1½" – 8" Bore Cylinders

Model 77-B (NFPA MS7)
Bolted Bushing
End Lug

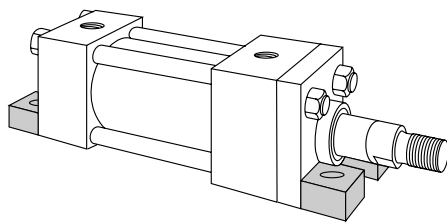


Note: Mounting bolts should not carry shear load. Lugs should be blocked or a "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. See Page 78

Mounting Dimensions
(See tables on opposite page)

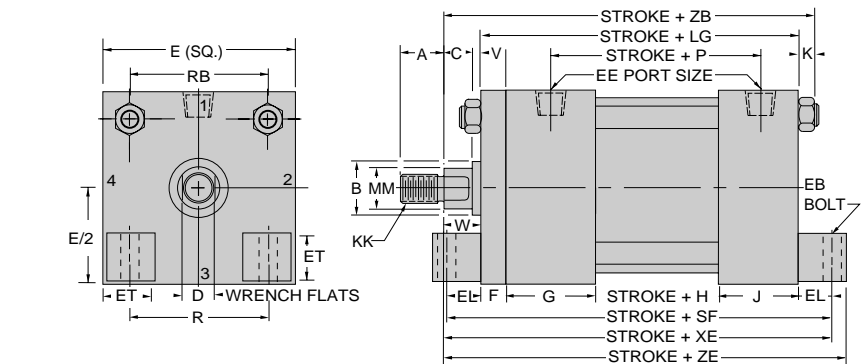


Model 77-R (NFPA MS7)
Square Retainer Held Bushing
End Lug



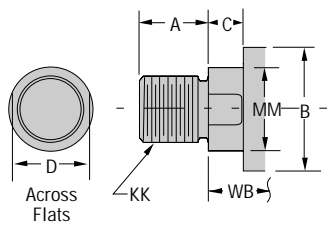
Note: Mounting bolts should not carry shear load. Lugs should be blocked or a "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. See Page 78

Mounting Dimensions
(See tables on opposite page)

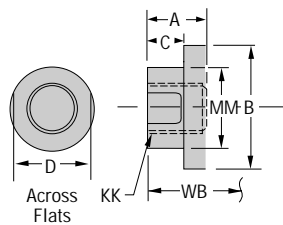


Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

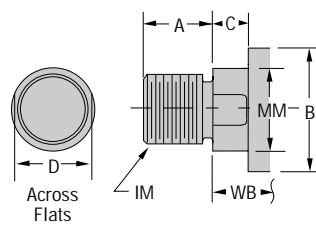
Style No. 2-Standard
Threaded on Turndown Section



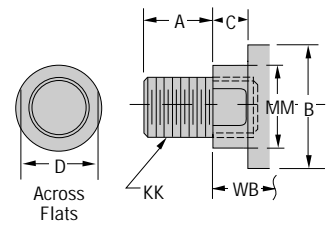
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Models 77-B & 77-R

Bore		1½	2	2½	3¼	4	5	6	7	8
Pressure	MOD.	4700	4600	4300	4200	4000	4000	3000	3000	3000
	SEVERE	2820	2760	2580	2520	2400	2400	1800	1800	1800

Miller H Series Hydraulic Cylinders

End Lug
1½" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	R	EB	*EE		EL	ET	RB
								SAE	NPT			
1½	2½	¾	1¾	1½	¾	1.63	¾	-8	½	⅞	1³/₁₆	1.63
2	3	⅝	1¾	1½	⅞	2.05	½	-8	½	1⁵/₁₆	⅞	2.05
2½	3½	⅝	1¾	1½	⅞	2.55	½	-8	½	1⁵/₁₆	⅞	2.55
3¼	4½	¾	2	1¾	⅞	3.25	⅝	-12	¾	1⅛	1³/₁₆	3.25
4	5	⅞	2	1¾	⅞	3.82	⅝	-12	¾	1⅛	1⅛	3.82
5	6½	⅞	2	1¾	1³/₁₆	4.95	⅞	-12	¾	1½	1¹⁵/₃₂	4.95
6	7½	1	2¼	2¼	1⁵/₁₆	5.73	1	-16	1	1¹¹/₁₆	1¹¹/₁₆	5.73
7	8½		2¾	2¾	1	6.58	1⅛	-20	1¼	1¹³/₁₆	1²⁷/₃₂	6.58
8	9½		3	3	1¼	7.50	1¼	-24	1½	2	1¹⁵/₁₆	7.50

* SAE ports are standard, NPT ports are available at no extra charge.
 † LD dimension is for double rod end models. See page 44. For overall length on double rod-end cylinder, use common dimension "Stroke plus LD" instead of figures "ZE", "XE", "SF" and "SE", and add end lug dimensions.
 Note: Mounting holes are 1/16" larger than bolt sizes (FB) shown.

Add Stroke

H	LB	±LD	LG	P	±SE	±SF
1¾	4⅝	4⅞	5	2⅞	6³/₈	6¾
1¾	4⅝	4⅞	5¼	2⅞	6½	7⅛
1½	4¾	5	5⅜	3	6⅝	7¼
1¾	5½	5¾	6¼	3½	7¾	8½
2	5¾	6	6⅝	3¾	8	8⅞
2½	6¼	6½	7⅛	4¼	9¼	10⅛
2⅞	7⅜	7⅜	8⅜	4⅞	10¾	11¾
3	8½	8½		5⅜	12⅛	13⅛
3½	9½	9½		6⅛	13½	14½

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1½	⅝	¾	1.125	¾	½	¼	⅝	10-32	½-20	⅞-20	1.972	.316	⅝	1
	1	1⅛	1.500	½	⅞	½	1		⅞-14	¾-16				
2	1	1⅛	1.500	½	⅞	¼	¾	¼-28	⅞-14	¾-16	2.472	.328	⅞	1³/₈
	1³/₈	1⅝	2.000	⅝	1⅛	¾	1		1¼-12	1-14				
2½	1	1⅛	1.500	½	⅞	¼	¾	¼-28	⅞-14	¾-16	2.472	.328	⅞	1³/₈
	1³/₈	1⅝	2.000	⅝	1⅛	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	1⅝
	1¾	2	2.375	¾	1½	½	1¼		1½-12	1¼-12				
3¼	1³/₈	1⅝	2.000	⅝	1⅛	¼	⅞	¼-28	1¼-12	1-14	2.972	.328	1	1⅝
	1¾	2	2.375	¾	1½	¾	1⅛	¼-28	1½-12	1¼-12	3.470	.313	1⅛	1⅞
	2	2¼	2.625	⅞	1¹¹/₁₆	¾	1¼		1¾-12	1½-12				
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	3.470	.313	1⅛	1⅞
	2	2¼	2.625	⅞	1¹¹/₁₆	¼	1⅛	¼-28	1¾-12	1½-12	3.720	.313	1⅛	2
	2½	3	3.125	1	2¹/₁₆	¾	1³/₈		2¼-12	1⅞-12				
5	2	2¼	2.625	⅞	1¹¹/₁₆	¼	1⅛	¼-28	1¾-12	1½-12	3.720	.313	1⅛	2
	2½	3	3.125	1	2¹/₁₆	¾	1³/₈	¼-28	2¼-12	1⅞-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	2⁵/₈	¾	1³/₈	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¾	1³/₈		3¼-12	2½-12				
6	2½	3	3.125	1	2¹/₁₆	¼	1¼	¼-28	2¼-12	1⅞-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	2⁵/₈	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾	¼	1¼		3¾-12	3-12				
7	3	3½	3.750	1	2⁵/₈			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾			5/₁₆-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3⅞			5/₁₆-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
8	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾			5/₁₆-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3⅞			5/₁₆-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
	5	5	5.750	1	4¼			5/₁₆-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	5½	5½	6.250	1	4⁵/₈			5/₁₆-24	5¼-12	4-12	7.439	.610	1¼	2¼

Add Stroke

±XE	ZB	±ZE
6½	6	6⅞
6⅞	6³/₈	7¼
6¹⁵/₁₆	6⅞	7⅞
7³/₁₆	6¹¹/₁₆	7¹¹/₁₆
7⅞	6⁹/₁₆	7⁹/₁₆
7⁵/₁₆	6¹³/₁₆	7¹³/₁₆
7⁹/₁₆	7¹/₁₆	8¹/₁₆
8¼	7¹¹/₁₆	8⅞
8½	7¹⁵/₁₆	9⅞
8⁵/₈	8¹/₁₆	9¼
8¾	8³/₁₆	9³/₈
8⅞	8⁵/₁₆	9½
9⅞	8⁹/₁₆	9¾
9¾	9¹/₁₆	10½
10	9⁵/₁₆	10¾
10	9⁵/₁₆	10¾
10	9⁵/₁₆	10¾
11⁵/₁₆	10⁹/₁₆	12³/₁₆
11⁵/₁₆	10⁹/₁₆	12³/₁₆
11⁵/₁₆	10⁹/₁₆	12³/₁₆
11⁵/₁₆	10⁹/₁₆	12³/₁₆
12⁹/₁₆	11¾	13¹/₁₆
12⁹/₁₆	11¾	13¹/₁₆
12⁹/₁₆	11¾	13¹/₁₆
12⁹/₁₆	11¾	13¹/₁₆
13¾	13	14⅞
13¾	13	14⅞
13¾	13	14⅞
13¾	13	14⅞

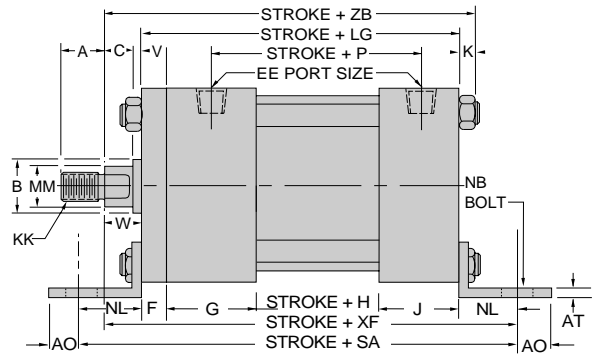
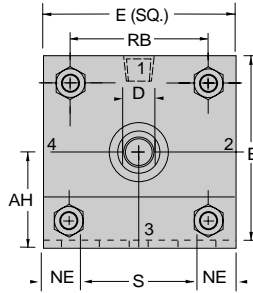
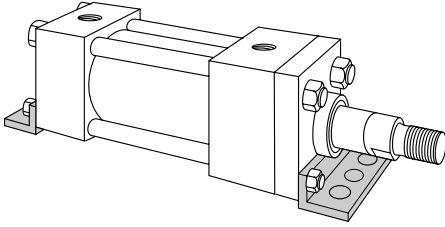
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart and rod eye limitations with certain bore and rod diameter combinations.

Miller H Series Hydraulic Cylinders

End Angle
1 1/2" - 6" Bore Cylinders

Model 71-R (NFPA MS1)
Square Retainer Held Bushing
End Angle

Mounting Dimensions
(See tables on opposite page)



Note: Mounting bolts should not carry shear load. End Angles should be blocked or a "K" retainer should be mounted on the appropriate end to absorb hydraulic or mechanical shock. See Page 78

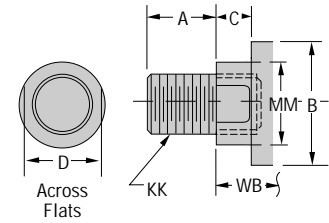
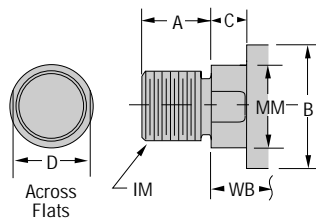
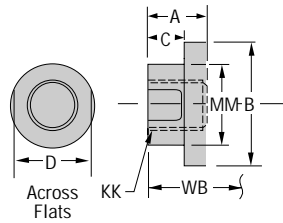
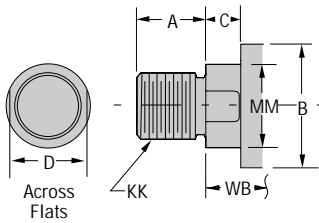
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Note: Pressure rating for Model H-71 cylinders will vary based on cylinder stroke and loads. Use Model H-77 in place of the end angle mount wherever possible or check with Miller Application Engineering Dept. for specific H-71 cylinder pressure rating.

Miller H Series Hydraulic Cylinders

End Angle
1 1/2" – 6" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	S	AH	AO	AT	*EE		NB	NE	NL	RB
										SAE	NPT				
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	1 3/4	1 3/8	3/8	1/8	-8	1/2	3/8	3/8	1	1.63
2	3	5/8	1 3/4	1 1/2	7/16	2	1 11/16	1/2	1/8	-8	1/2	1/2	1/2	1 1/4	2.05
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	2 3/8	1 15/16	9/16	1/8	-8	1/2	5/8	9/16	1 3/16	2.55
3 1/4	4 1/2	3/4	2	1 3/4	9/16	3 1/8	2 9/16	1 1/16	1/4	-12	3/4	3/4	1 1/16	1 13/16	3.25
4	5	7/8	2	1 3/4	9/16	3 1/4	2 13/16	7/8	1/4	-12	3/4	1	7/8	2 1/8	3.82
5	6 1/2	7/8	2	1 3/4	1 3/16	4 3/4	3 11/16	7/8	5/16	-12	3/4	1	7/8	2 1/8	4.95
6	7 1/2	1	2 1/4	2 1/4	1 5/16	5 3/8	4 1/4	1 1/16	3/8	-16	1	1 1/4	1 1/16	2 7/16	5.73

Add Stroke

H	‡LD	LG	P	‡SA
1 3/8	4 7/8	5	2 7/8	7
1 3/8	4 7/8	5 1/4	2 7/8	7 3/4
1 1/2	5	5 3/8	3	7 3/4
1 3/4	5 3/4	6 1/4	3 1/2	9 7/8
2	6	6 5/8	3 3/4	10 7/8
2 1/2	6 1/2	7 1/8	4 1/4	11 3/8
2 7/8	7 3/8	8 3/8	4 7/8	13 1/4

* SAE ports are standard, NPT ports are available at no extra charge.

‡ LD dimension is for double rod end models. See page 44. For overall length on double rod-end cylinder, use common dimension "Stroke plus LD" instead of figures "XF", and "SA", and add end angle dimensions.
Note: Mounting holes are 1/16" larger than bolt sizes (NB) shown.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	IM Style 5	KK Styles 2,4,6
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8	1/2-20	7/16-20
	1	1 1/8	1.500	1/2	7/8	1/2	1	7/8-14	3/4-16
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	7/8-14	3/4-16
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1 1/4-12	1-14
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	7/8-14	3/4-16
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1 1/4-12	1-14
3 1/4	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4	1 1/2-12	1 1/4-12
	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1 1/4-12	1-14
4	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1 1/2-12	1 1/4-12
	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1 3/4-12	1 1/2-12
5	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	2 1/4-12	1 7/8-12
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1 3/4-12	1 1/2-12
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	2 1/4-12	1 7/8-12
	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	2 3/4-12	2 1/4-12
6	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	3 1/4-12	2 1/2-12
	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	2 1/4-12	1 7/8-12
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	2 3/4-12	2 1/4-12
	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	3 1/4-12	2 1/2-12
4	4	4.750	1	3 3/8	1/4	1 1/4	3 3/4-12	3-12	

Add Stroke

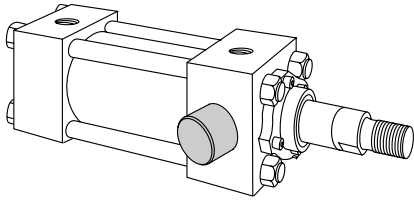
‡XF	ZB
6 5/8	6
7	6 3/8
7 1/4	6 1/16
7 1/2	6 11/16
7 5/16	6 9/16
7 9/16	6 13/16
7 13/16	7 1/16
8 15/16	7 11/16
9 3/16	7 15/16
9 5/16	8 1/16
9 3/4	8 3/16
9 7/8	8 5/16
10 1/8	8 9/16
10 3/8	9 1/16
10 5/8	9 5/16
10 5/8	9 5/16
10 5/8	9 5/16
12 1/16	10 9/16
12 1/16	10 9/16
12 1/16	10 9/16
12 1/16	10 9/16

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

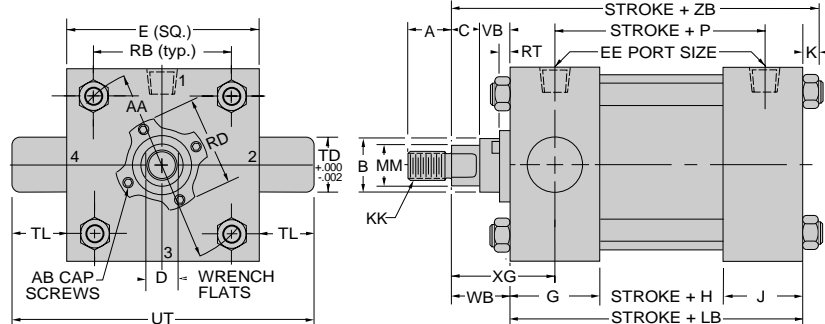
Trunnion/Head End
1½" – 8" Bore Cylinders

Model 81-B (NFPA MT1)
Bolted Bushing
Trunnion Head End

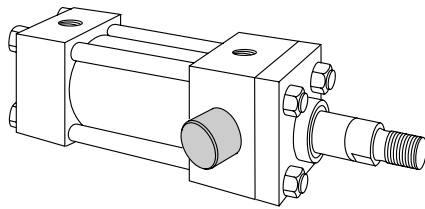


Note: Pins designed for shear (not bending) loads.

Mounting Dimensions
(See tables on opposite page)

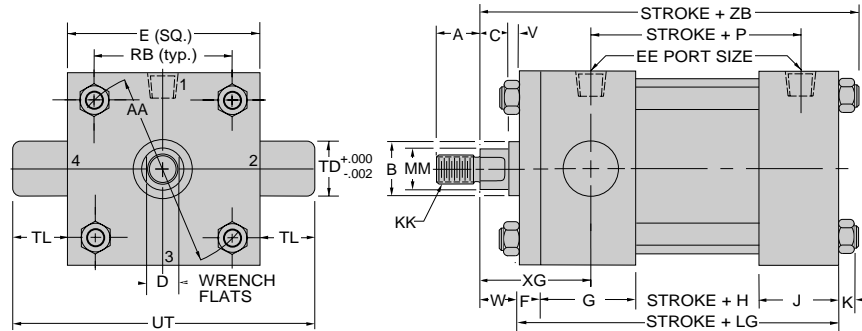


Model 81-R (NFPA MT1)
Rectangular Retainer
Trunnion Head End



Note: Pins designed for shear (not bending) loads.

Mounting Dimensions
(See tables on opposite page)



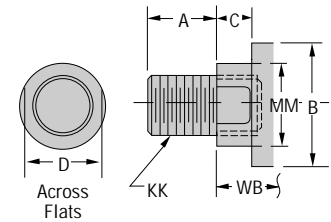
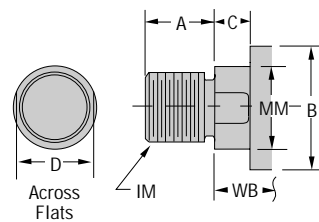
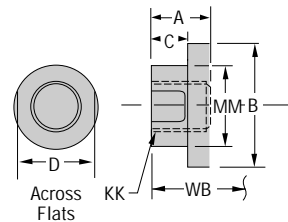
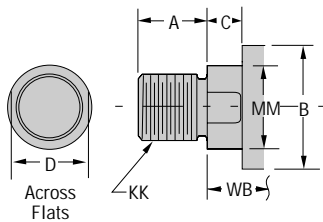
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Models 81-B & 81-R

Bore		4	5	6	7	8
Pressure	MOD.	3760	2410	2190	2510	2770
	SEVERE	2250	1440	1310	1500	1660

Miller H Series Hydraulic Cylinders

Trunnion/Head End
1 1/2"–8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	*EE		RB	TD	TL	UT
							SAE	NAE				
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	2.3	-8	1/2	1.63	1	1	4 1/2
2	3	5/8	1 3/4	1 1/2	7/16	2.9	-8	1/2	2.05	1 3/8	1 3/8	5 3/4
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	3.6	-8	1/2	2.55	1 3/8	1 3/8	6 1/4
3 1/4	4 1/2	3/4	2	1 3/4	9/16	4.3	-12	3/4	3.25	1 3/4	1 3/4	8
4	5	7/8	2	1 3/4	9/16	5.4	-12	3/4	3.82	1 3/4	1 3/4	8 1/2
5	6 1/2	7/8	2	1 3/4	13/16	7.0	-12	3/4	4.95	1 3/4	1 3/4	10
6	7 1/2	1	2 1/4	2 1/4	15/16	8.1	-16	1	5.73	2	2	11 1/2
7	8 1/2		2 3/4	2 3/4	1	9.3	-20	1 1/4	6.58	2 1/2	2 1/2	13 1/2
8	9 1/2		3	3	1 1/4	10.6	-24	1 1/2	7.50	3	3	15 1/2

* SAE ports are standard, NPT ports are available at no extra charge.
† LD dimension is for double rod end models. See page 44.

Add Stroke

H	LB	†LD	LG	P
1 3/8	4 5/8	4 7/8	5	2 7/8
1 3/8	4 5/8	4 7/8	5 1/4	2 7/8
1 1/2	4 3/4	5	5 3/8	3
1 3/4	5 1/2	5 3/4	6 1/4	3 1/2
2	5 3/4	6	6 5/8	3 3/4
2 1/2	6 1/4	6 1/2	7 1/8	4 1/4
2 7/8	7 3/8	7 3/8	8 3/8	4 7/8
3	8 1/2	8 1/2		5 3/8
3 1/2	9 1/2	9 1/2		6 1/8

Rod End Dimensions

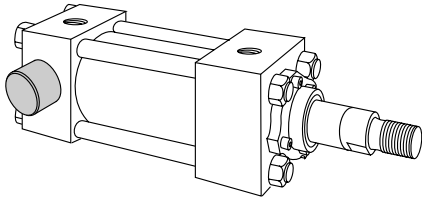
Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB	XG	ZB
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8	10-32	1/2-20	7/16-20	1.972	.316	5/8	1	1 7/8	6
	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16					2 1/4	6 3/8
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	2 1/4	6 7/16
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14					2 1/2	6 11/16
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	2 1/4	6 9/16
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8	2 1/2	6 13/16
3 1/4	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8	2 3/4	7 1/16
	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8	2 5/8	7 11/16
4	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2	3	8 1/16
	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8	2 7/8	8 3/16
5	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2	3	8 5/16
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	3 1/4	8 9/16
6	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2	3	9 1/16
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	3 1/4	9 5/16
7	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4	3 1/4	9 5/16
	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	3 1/4	9 5/16
8	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	3 3/8	10 9/16
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4	3 3/8	10 9/16
9	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	3 3/8	10 9/16
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4	3 3/8	10 9/16
10	3	3 1/2	3.750	1	2 5/8			1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4	3 5/8	11 3/4
	3 1/2	3 1/2	4.250	1	3			1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	3 5/8	11 3/4
11	4	4	4.750	1	3 3/8			5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4	3 5/8	11 3/4
	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4	3 5/8	11 3/4
12	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4	3 5/8	11 3/4
	3 1/2	3 1/2	4.250	1	3			1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	3 3/4	13
13	4	4	4.750	1	3 3/8			5/16-24	3 3/4-12	3-12	5.939	.610	1 1/4	2 1/4	3 3/4	13
	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4	3 3/4	13
14	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4	3 3/4	13
	5 1/2	5 1/2	6.250	1	4 5/8			5/16-24	5 1/4-12	4-12	7.439	.610	1 1/4	2 1/4	3 3/4	13

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

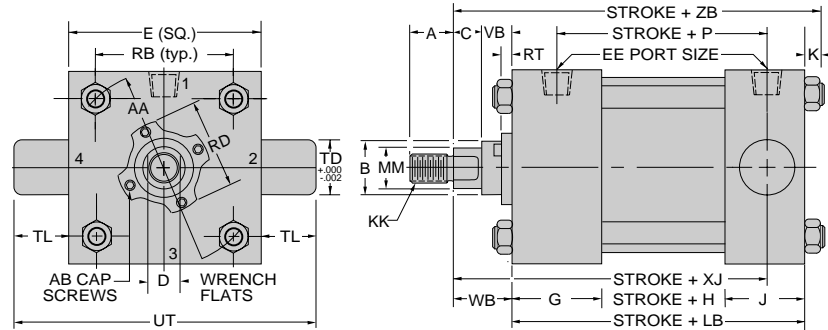
Trunnion/Cap End
1½" – 8" Bore Cylinders

Model 82-B (NFPA MT2)
Bolted Bushing
Trunnion Cap End

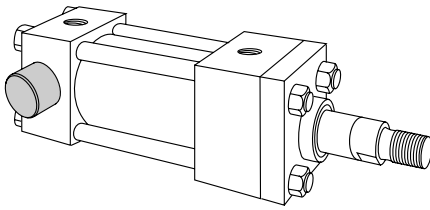


Note: Pins designed for shear (not bending) loads.

Mounting Dimensions
(See tables on opposite page)

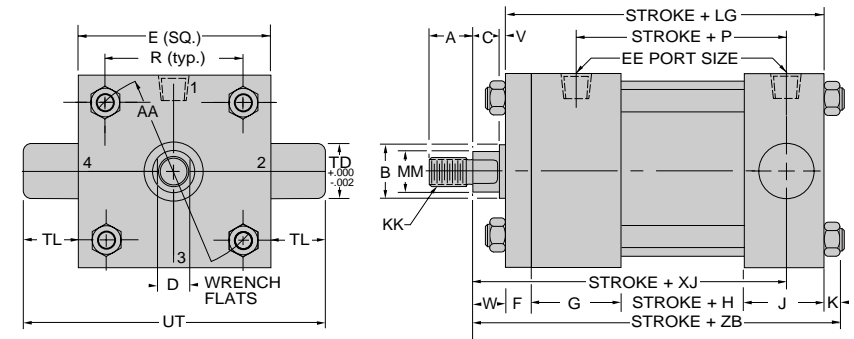


Model 82-R (NFPA MT2)
Square Retainer Held Bushing
Trunnion Cap End



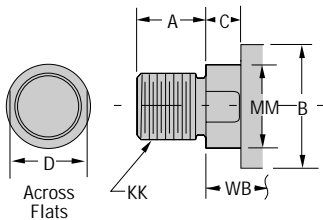
Note: Pins designed for shear (not bending) loads.

Mounting Dimensions
(See tables on opposite page)

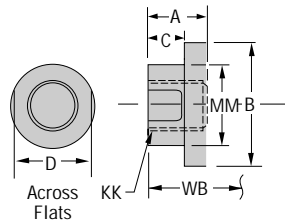


Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

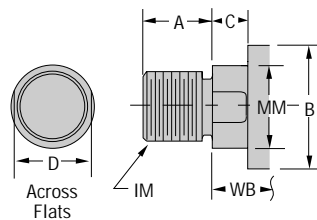
Style No. 2-Standard
Threaded on Turndown Section



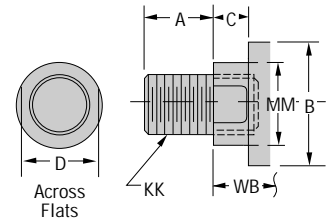
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations For Models 82-B & 82-R

Bore		4	5	6	7	8
Pressure	MOD.	3760	2410	2190	2510	2770
	SEVERE	2250	1440	1310	1500	1660

Miller H Series Hydraulic Cylinders

Trunnion/Cap End
1 1/2"–8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	*EE		RB	TD	TL	UT
							SAE	NAE				
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	2.3	-8	1/2	1.63	1	1	4 1/2
2	3	5/8	1 3/4	1 1/2	7/16	2.9	-8	1/2	2.05	1 3/8	1 3/8	5 3/4
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	3.6	-8	1/2	2.55	1 3/8	1 3/8	6 1/4
3 1/4	4 1/2	3/4	2	1 3/4	9/16	4.3	-12	3/4	3.25	1 3/4	1 3/4	8
4	5	7/8	2	1 3/4	9/16	5.4	-12	3/4	3.82	1 3/4	1 3/4	8 1/2
5	6 1/2	7/8	2	1 3/4	13/16	7.0	-12	3/4	4.95	1 3/4	1 3/4	10
6	7 1/2	1	2 1/4	2 1/4	15/16	8.1	-16	1	5.73	2	2	11 1/2
7	8 1/2		2 3/4	2 3/4	1	9.3	-20	1 1/4	6.58	2 1/2	2 1/2	13 1/2
8	9 1/2		3	3	1 1/4	10.6	-24	1 1/2	7.50	3	3	15 1/2

* SAE ports are standard, NPT ports are available at no extra charge.

Add Stroke

H	LB	LG	P
1 3/8	4 5/8	5	2 7/8
1 3/8	4 5/8	5 1/4	2 7/8
1 1/2	4 3/4	5 3/8	3
1 3/4	5 1/2	6 1/4	3 1/2
2	5 3/4	6 5/8	3 3/4
2 1/2	6 1/4	7 1/8	4 1/4
2 7/8	7 3/8	8 3/8	4 7/8
3	8 1/2		5 3/8
3 1/2	9 1/2		6 1/8

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8	10-32	1/2-20	7/16-20	1.972	.316	5/8	1
	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16				
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14				
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8
3 1/4	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8
4	2	2 1/4	2.625	3/4	1 1/2	3/8	1 1/4	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
5	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
6	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
7	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
8	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4
	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4
9	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4
10	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4
11	3	3 1/2	3.750	1	2 5/8			1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4
	3 1/2	3 1/2	4.250	1	3			1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4
12	4	4	4.750	1	3 3/8			5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4
	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4
13	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4
	5 1/2	5 1/2	6.250	1	4 5/8			5/16-24	5 1/4-12	4-12	7.439	.610	1 1/4	2 1/4

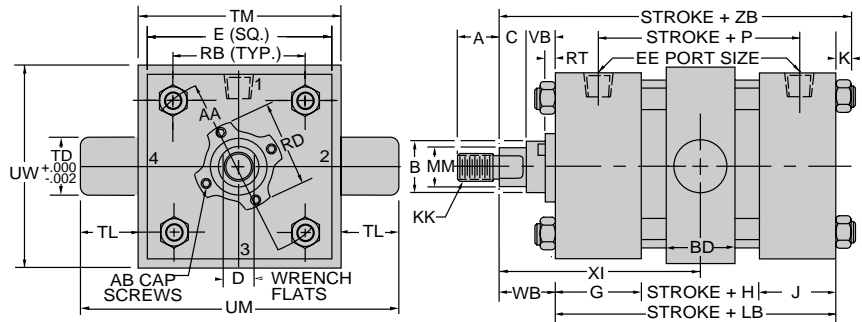
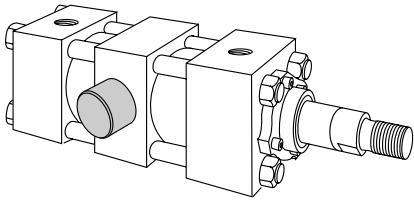
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

Intermediate Trunnion
1 1/2" – 8" Bore Cylinders

Model 89-B (NFPA MT4)
Bolted Bushing
Intermediate Trunnion

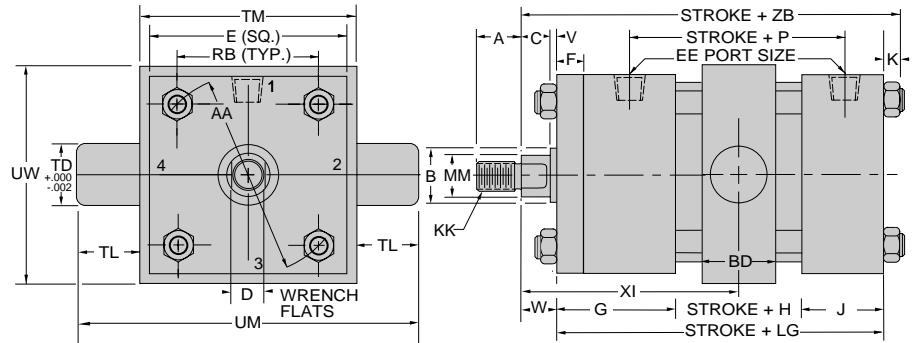
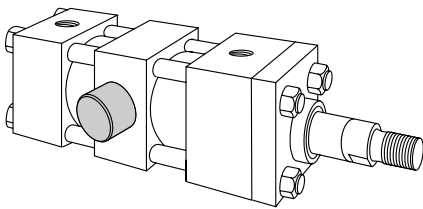
Mounting Dimensions
(See tables on opposite page)



Note: Pins designed for shear (not bending) loads.
Specify dimension "XI" when ordering.

Model 89-R (NFPA MT4)
Square Retainer Held Bushing
Intermediate Trunnion

Mounting Dimensions
(See tables on opposite page)



Note: Pins designed for shear (not bending) loads.
Specify dimension "XI" when ordering.

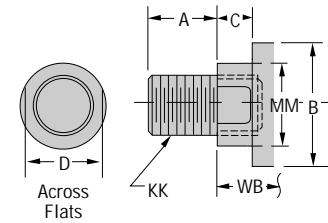
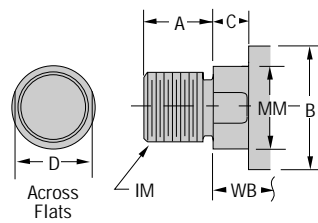
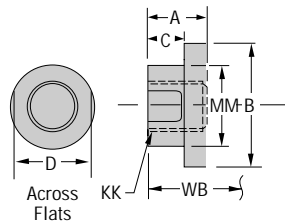
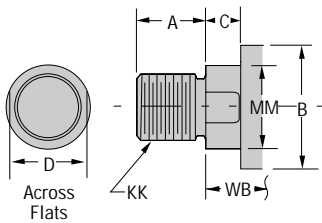
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Pressure Limitations, Minimum XI Dimension and Minimum Stroke For Models 89-B & 89-R

Bore		1 1/2	2	2 1/2	3 1/4	4	5	6	7	8
Pressure	MOD.	—	—	2950	2500	1400	1100	1375	1360	1030
	SEVERE	—	—	1770	1500	840	660	825	816	618
Min. XI		3 3/4	4 1/8	4.5	5 1/8	5 3/4	5 3/4	6 1/4	7	7 1/2
Min. Stroke		0	.125	.25	.5	1	.5	.625	1	1

Miller H Series Hydraulic Cylinders

Intermediate Trunnion
1½" – 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	AA	BD	*EE		RB	TD	TL	TM	UM	UW
								SAE	NPT						
1½	2½	¾	1¾	1½	¾	2.3	1¼	-8	½	1.63	1	1	3	5	3¼
2	3	5/8	1¾	1½	7/16	2.9	1½	-8	½	2.05	1¾	1¾	3½	6¼	4
2½	3½	5/8	1¾	1½	7/16	3.6	1¾	-8	½	2.55	1¾	1¾	4	6¾	4½
3¼	4½	¾	2	1¾	9/16	4.6	2¼	-12	¾	3.25	1¾	1¾	5	8½	5¾
4	5	7/8	2	1¾	9/16	5.4	2½	-12	¾	3.82	1¾	1¾	5½	9	6
5	6½	7/8	2	1¾	13/16	7.0	2½	-12	¾	4.95	1¾	1¾	7	10½	8
6	7½	1	2¼	2¼	15/16	8.1	3	-16	1	5.73	2	2	8½	12½	9½
7	8½		2¾	2¾	1	9.3	3½	-20	1¼	6.58	2½	2½	9¾	14¾	11¾
8	9½		3	3	1¼	10.6	4	-24	1½	7.50	3	3	11	17	12

Add Stroke

H	LB	LD	LG	P
1¾	4¾	4¾	5	2¾
1¾	4¾	4¾	5¼	2¾
1½	4¾	5	5¾	3
1¾	5½	5¾	6¼	3½
2	5¾	6	6¾	3¾
2½	6¼	6½	7¾	4¼
2¾	7¾	7¾	8¾	4¾
3	8½	8½		5¾
3½	9½	9½		6¾

* SAE ports are standard, NPT ports are available at no extra charge.
† LD dimension is for double rod end models. See page 44.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
1½	5/8	¾	1.125	¾	½	¼	5/8	10-32	½-20	7/16-20	1.972	.316	5/8	1
	1	1½	1.500	½	7/8	½	1		7/8-14	¾-16				
2	1	1½	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾
	1¾	15/8	2.000	5/8	1½	¾	1		1¼-12	1-14				
2½	1	1½	1.500	½	7/8	¼	¾	¼-28	7/8-14	¾-16	2.472	.328	7/8	1¾
	1¾	15/8	2.000	5/8	1½	¾	1	¼-28	1¼-12	1-14	2.972	.328	1	15/8
	1¾	2	2.375	¾	1½	½	1¼	¼-28	1½-12	1¼-12	3.470	.313	1½	1¾
3¼	1¾	15/8	2.000	5/8	1½	¼	7/8	¼-28	1¼-12	1-14	2.972	.328	1	15/8
	1¾	2	2.375	¾	1½	¾	1½	¼-28	1½-12	1¼-12	3.470	.313	1½	1¾
	2	2½	2.625	7/8	11/16	¾	1¼	¼-28	1¾-12	1½-12	3.720	.313	1½	2
4	1¾	2	2.375	¾	1½	¼	1	¼-28	1½-12	1¼-12	3.470	.313	1½	1¾
	2	2¼	2.625	7/8	11/16	¼	1½	¼-28	1¾-12	1½-12	3.720	.313	1½	2
	2½	3	3.125	1	21/16	¾	1¾	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼
5	2	2¼	2.625	7/8	11/16	¼	1½	¼-28	1¾-12	1½-12	3.720	.313	1½	2
	2½	3	3.125	1	21/16	¾	1¾	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	25/8	¾	1¾	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¾	1¾	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
6	2½	3	3.125	1	21/16	¼	1¼	¼-28	2¼-12	17/8-12	4.252	.313	1¼	2¼
	3	3½	3.750	1	25/8	¼	1¼	¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3	¼	1¼	¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾	¼	1¼	5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
7	3	3½	3.750	1	25/8			¼-28	2¾-12	2¼-12	4.752	.313	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3¾			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
8	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
	3½	3½	4.250	1	3			¼-28	3¼-12	2½-12	5.252	.313	1¼	2¼
	4	4	4.750	1	3¾			5/16-24	3¾-12	3-12	5.939	.610	1¼	2¼
	4½	4½	5.250	1	3¾			5/16-24	4¼-12	3¼-12	6.439	.610	1¼	2¼
	5	5	5.750	1	4¼			5/16-24	4¾-12	3½-12	6.939	.610	1¼	2¼
5½	5½	6.250	1	45/8			5/16-24	5¼-12	4-12	7.439	.610	1¼	2¼	

Add Stroke

ZB
6
6¾
67/16
611/16
69/16
613/16
71/16
711/16
715/16
81/16
83/16
85/16
87/16
91/16
95/16
99/16
911/16
101/16
105/16
109/16
113/16
11¾
11¾
11¾
11¾
13
13
13
13
13

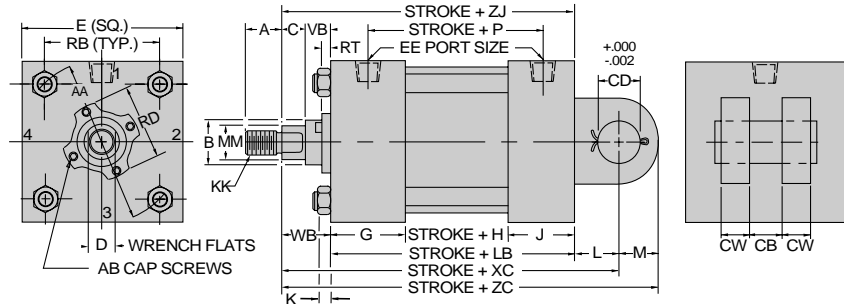
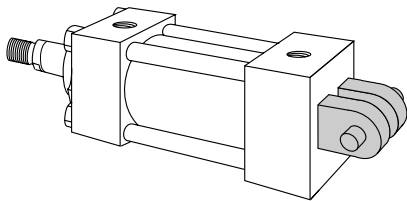
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart.

Miller H Series Hydraulic Cylinders

Fixed Clevis
1½" – 8" Bore Cylinders

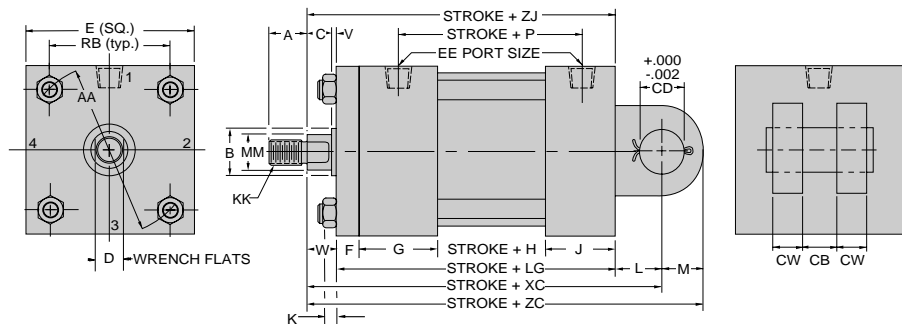
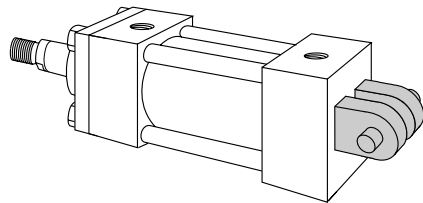
Model 84-B (NFPA MP1)
Bolted Bushing
Fixed Clevis
(Pivot Pin Included)

Mounting Dimensions
(See tables on opposite page)



Model 84-R (NFPA MP1)
Square Retainer Held Bushing
Fixed Clevis
(Pivot Pin Included)

Mounting Dimensions
(See tables on opposite page)



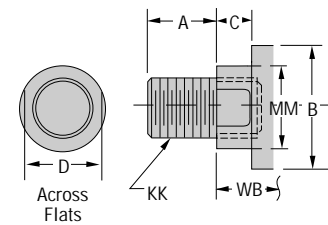
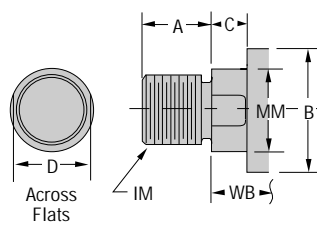
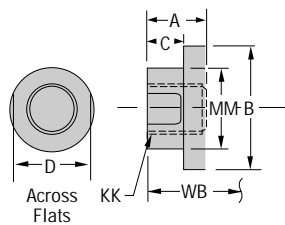
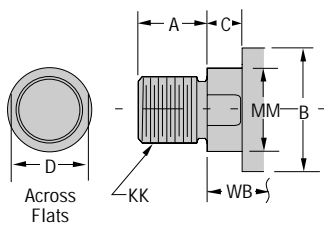
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

Fixed Clevis
1 1/2"-8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	L	M	AA	CB	CD	CW	*EE		RB
												SAE	NPT	
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	3/4	1/2	2.3	3/4	1/2	1/2	-8	1/2	1.63
2	3	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	2.9	1 1/4	3/4	5/8	-8	1/2	2.05
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	3.6	1 1/4	3/4	5/8	-8	1/2	2.55
3 1/4	4 1/2	3/4	2	1 3/4	9/16	1 1/2	1	4.6	1 1/2	1	3/4	-12	3/4	3.25
4	5	7/8	2	1 3/4	9/16	2 1/8	1 3/8	5.4	2	1 3/8	1	-12	3/4	3.82
5	6 1/2	7/8	2	1 3/4	13/16	2 1/4	1 3/4	7.0	2 1/2	1 3/4	1 1/4	-12	3/4	4.95
6	7 1/2	1	2 1/4	2 1/4	15/16	2 1/2	2	8.1	2 1/2	2	1 1/4	-16	1	5.73
7	8 1/2		2 3/4	2 3/4	1	3	2 1/2	9.3	3	2 1/2	1 1/2	-20	1 1/4	6.58
8	9 1/2		3	3	1 1/4	3 1/4	2 3/4	10.6	3	3	1 1/2	-24	1 1/2	7.50

* SAE ports are standard, NPT ports are available at no extra charge.

Add Stroke

H	LB	LG	P
1 3/8	4 5/8	5	2 7/8
1 3/8	4 5/8	5 1/4	2 7/8
1 1/2	4 3/4	5 3/8	3
1 3/4	5 1/2	6 1/4	3 1/2
2	5 3/4	6 5/8	3 3/4
2 1/2	6 1/4	7 1/8	4 1/4
2 7/8	7 3/8	8 3/8	4 7/8
3	8 1/2		5 3/8
3 1/2	9 1/2		6 1/8

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
2	1	1 1/8	1.500	1/2	7/8	1/2	1	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8
2 1/2	1 1/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8
3 1/4	1 3/8	2	2.375	3/4	1 1/2	1/2	1 1/4	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
4	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
5	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
6	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
7	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4
8	3 1/2	4	4.250	1	3	1/4	1 1/4	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4
9	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4
10	4 1/2	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4
11	5	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4
12	5 1/2	5 1/2	6.250	1	4 5/8			5/16-24	5 1/4-12	4-12	7.439	.610	1 1/4	2 1/4

Add Stroke

XC	ZC	ZJ
6 3/8	6 7/8	5 5/8
6 3/4	7 1/4	6
7 1/4	8	6
7 1/2	8 1/4	6 1/4
7 3/8	8 1/8	6 1/8
7 5/8	8 3/8	6 3/8
7 7/8	8 5/8	6 5/8
8 5/8	9 5/8	7 1/8
8 7/8	9 7/8	7 3/8
9	10	7 1/2
9 3/4	11 1/8	7 5/8
9 7/8	11 1/4	7 3/4
10 1/8	11 1/2	8
10 1/2	12 1/4	8 1/4
10 3/4	12 1/2	8 1/2
10 3/4	12 1/2	8 1/2
10 3/4	12 1/2	8 1/2
10 3/4	12 1/2	8 1/2
12 1/8	14 1/8	9 5/8
12 1/8	14 1/8	9 5/8
12 1/8	14 1/8	9 5/8
13 3/4	16 1/4	10 3/4
13 3/4	16 1/4	10 3/4
13 3/4	16 1/4	10 3/4
13 3/4	16 1/4	10 3/4
13 3/4	16 1/4	10 3/4
15	17 3/4	11 3/4
15	17 3/4	11 3/4
15	17 3/4	11 3/4
15	17 3/4	11 3/4
15	17 3/4	11 3/4

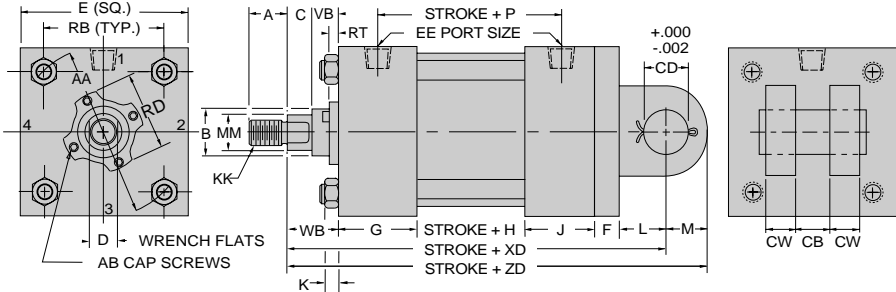
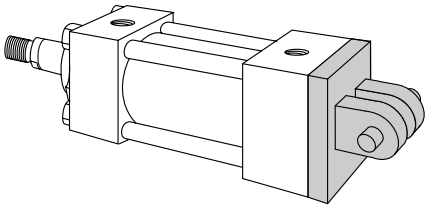
Note: See page 6 for bore, rod, bolted/retainer bushing availability chart. See pages 60 & 61 for Rod End Accessories.

Miller H Series Hydraulic Cylinders

Detachable Clevis
1 1/2" - 5" Bore Cylinders

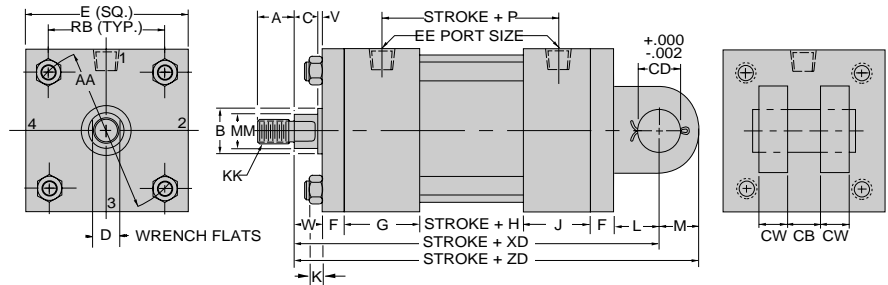
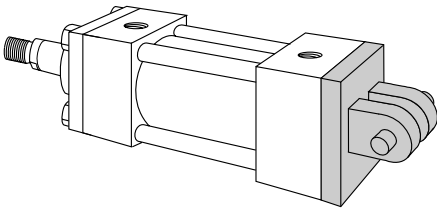
Model 86-B (NFPA MP2)
Bolted Bushing
Detachable Clevis
(Pivot Pin Included)

Mounting Dimensions
(See tables on opposite page)



Model 86-R (NFPA MP2)
Square Retainer Held Bushing
Detachable Clevis
(Pivot Pin Included)

Mounting Dimensions
(See tables on opposite page)



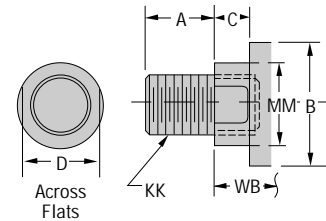
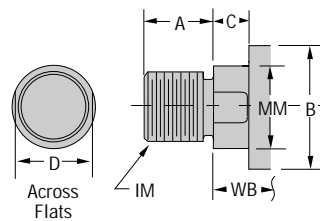
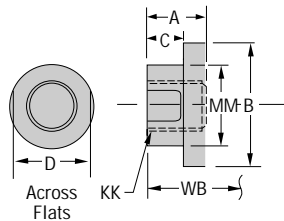
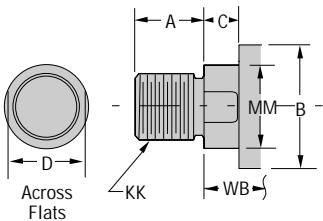
Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male

Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

Detachable Clevis
1 1/2" – 5" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	L	M	AA	CB	CD	CW	*EE		RB
												SAE	NPT	
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	3/4	1/2	2.3	3/4	1/2	1/2	-8	1/2	1.63
2	3	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	2.9	1 1/4	3/4	5/8	-8	1/2	2.05
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	3.6	1 1/4	3/4	5/8	-8	1/2	2.55
3 1/4	4 1/2	3/4	2	1 3/4	9/16	1 1/2	1	4.6	1 1/2	1	3/4	-12	3/4	3.25
4	5	7/8	2	1 3/4	9/16	2 1/8	1 3/8	5.4	2	1 3/8	1	-12	3/4	3.82
5	6 1/2	7/8	2	1 3/4	13/16	2 1/4	1 3/4	7.0	2 1/2	1 3/4	1 1/4	-12	3/4	4.95

Add Stroke

H	P
1 3/8	2 7/8
1 3/8	2 7/8
1 1/2	3
1 3/4	3 1/2
2	3 3/4
2 1/2	4 1/4

* SAE ports are standard, NPT ports are available at no extra charge.

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2, 4&6	RD (Max.)	RT	VB	WB
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8	10-32	1/2-20	7/16-20	1.972	.316	5/8	1
	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16				
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1 1/4-12	1-14				
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8
3 1/4	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8
4	1 3/4	2	2.375	3/4	1 1/2	3/8	1 1/8	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
5	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
5	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2
5	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4
	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4
5	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4

Add Stroke

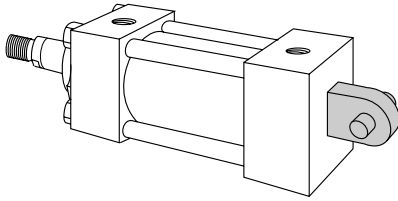
XD	ZD
6 3/4	7 1/4
7 1/8	7 5/8
7 7/8	8 5/8
8 1/8	8 7/8
8	8 3/4
8 1/4	9
8 1/2	9 1/4
9 3/8	10 3/8
9 5/8	10 5/8
9 3/4	10 3/4
10 5/8	12
10 3/4	12 1/8
11	12 3/8
11 3/8	13 1/8
11 5/8	13 3/8
11 5/8	13 3/8

Note: See page 6 for bore, rod, bolted/retainer bushing availability chart. See pages 60 & 61 for Rod End Accessories.

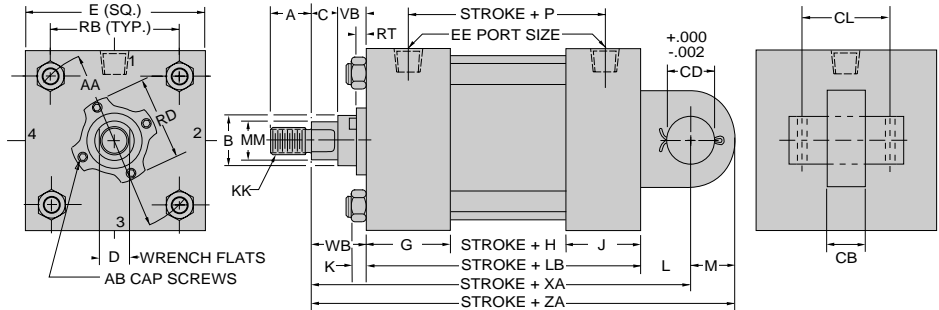
Miller H Series Hydraulic Cylinders

Rear Eye
1 1/2" - 8" Bore Cylinders

Model 90-B (NFPA MP3)
Bolted Bushing
Rear Eye
(Pivot Pin Included)

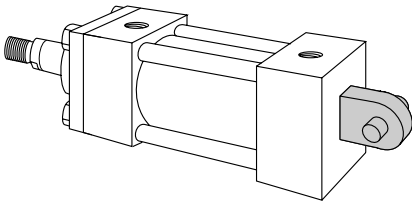


Mounting Dimensions
(See tables on opposite page)

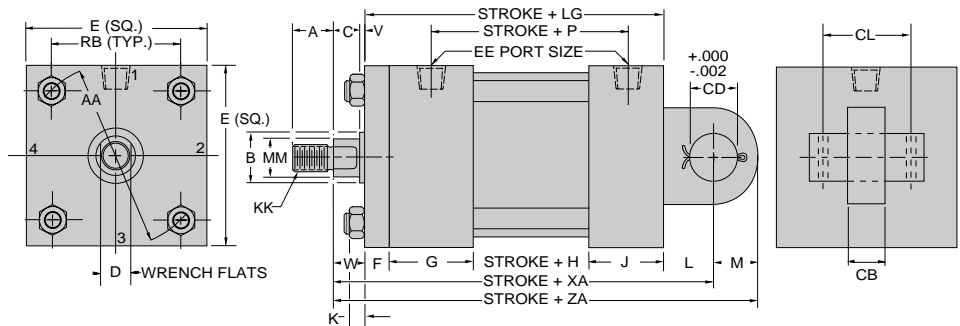


Note: See page 46 for pivot pin dimensions.

Model 90-R (NFPA MP3)
Square Retainer Held Bushing
Rear Eye
(Pivot Pin Included)



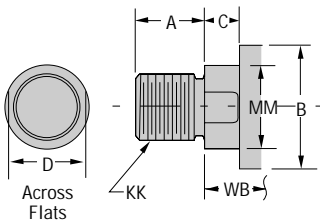
Mounting Dimensions
(See tables on opposite page)



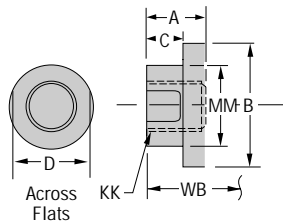
Note: See page 46 for pivot pin dimensions.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

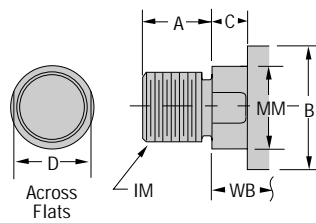
Style No. 2-Standard
Threaded on Turndown Section



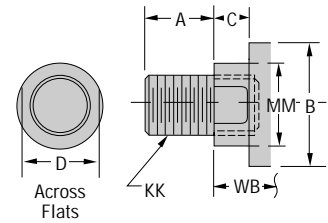
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Miller H Series Hydraulic Cylinders

Rear Eye
1 1/2" - 8" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	F	G	J	K	L	M	AA	CB	CD	CL	*EE		RB
												SAE	NPT	
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	3/4	1/2	2.3	3/4	1/2	1.83	-8	1/2	1.63
2	3	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	2.9	1 1/4	3/4	2.58	-8	1/2	2.05
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	1 1/4	3/4	3.6	1 1/4	3/4	2.58	-8	1/2	2.55
3 1/4	4 1/2	3/4	2	1 3/4	9/16	1 1/2	1	4.6	1 1/2	1	3.08	-12	3/4	3.25
4	5	7/8	2	1 3/4	9/16	2 1/8	1 3/8	5.4	2	1 3/8	4.08	-12	3/4	3.82
5	6 1/2	7/8	2	1 3/4	13/16	2 1/4	1 3/4	7.0	2 1/2	1 3/4	5.08	-12	3/4	4.95
6	7 1/2	1	2 1/4	2 1/4	15/16	2 1/2	2	8.1	2 1/2	2	5.08	-16	1	5.73
7	8 1/2		2 3/4	2 3/4	1	3	2 1/2	9.3	3	2 1/2	6.09	-20	1 1/4	6.58
8	9 1/2		3	3	1 1/4	3 1/4	2 3/4	10.6	3	3	6.09	-24	1 1/2	7.50

* SAE ports are standard, NPT ports are available at no extra charge.

Add Stroke

H	LB	LG	P
1 3/8	4 5/8	5	2 7/8
1 3/8	4 5/8	5 1/4	2 7/8
1 1/2	4 3/4	5 3/8	3
1 3/4	5 1/2	6 1/4	3 1/2
2	5 3/4	6 5/8	3 3/4
2 1/2	6 1/4	7 1/8	4 1/4
2 7/8	7 3/8	8 3/8	4 7/8
3	8 1/2		5 3/8
3 1/2	9 1/2		6 1/8

Rod End Dimensions

Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	IM Style 5	KK Styles 2,4&6	RD (Max.)	RT	VB	WB
2	1	1 1/8	1.500	1/2	7/8	1/2	1		7/8-14	3/4-16				
	1 1/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	
2 1/2	1 1/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	
	1 3/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	
3 1/4	1 3/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	7/8-14	3/4-16	2.472	.328	7/8	1 3/8	
	1 5/8	2.000	5/8	1 1/8	3/8	1	1 1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8	
4	1 5/8	2.000	5/8	1 1/8	3/8	1	1 1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8	
	2	2.375	3/4	1 1/2	1/2	1 1/4	1 1/4-28	1 1/2-12	1 1/4-12	3.470	.313	1 1/8	1 7/8	
5	2	2.375	3/4	1 1/2	1/2	1 1/4	1 1/4-28	1 1/4-12	1-14	2.972	.328	1	1 5/8	
	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1 1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2	
6	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1 1/4-28	1 3/4-12	1 1/2-12	3.720	.313	1 1/8	2	
	2 1/2	3	1	2 1/16	3/8	1 3/8	1 1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	
7	2 1/2	3	1	2 1/16	3/8	1 3/8	1 1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	
	3	3.750	1	2 5/8	3/8	1 3/8	1 1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4	
8	3 1/2	4.250	1	3	3/8	1 3/8	1 1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	
	3 1/2	4.250	1	3	1/4	1 1/4	1 1/4-28	2 1/4-12	1 7/8-12	4.252	.313	1 1/4	2 1/4	
9	3 1/2	4.250	1	3	1/4	1 1/4	1 1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	
	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4	
10	3 1/2	4.250	1	3			1 1/4-28	2 3/4-12	2 1/4-12	4.752	.313	1 1/4	2 1/4	
	3 1/2	4.250	1	3			1 1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	
11	4	4.750	1	3 3/8			5/16-24	3 1/4-12	3-12	5.939	.610	1 1/4	2 1/4	
	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4	
12	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4	
	3 1/2	4.250	1	3			1 1/4-28	3 1/4-12	2 1/2-12	5.252	.313	1 1/4	2 1/4	
13	4	4.750	1	3 3/8			5/16-24	3 3/4-12	3-12	5.939	.610	1 1/4	2 1/4	
	4 1/2	5.250	1	3 7/8			5/16-24	4 1/4-12	3 1/4-12	6.439	.610	1 1/4	2 1/4	
14	5	5.750	1	4 1/4			5/16-24	4 3/4-12	3 1/2-12	6.939	.610	1 1/4	2 1/4	
	5 1/2	6.250	1	4 5/8			5/16-24	5 1/4-12	4-12	7.439	.610	1 1/4	2 1/4	

Add Stroke

XA	ZA
6 3/8	6 7/8
6 3/4	7 1/4
7 1/4	8
7 1/2	8 1/4
7 3/8	8 1/8
7 5/8	8 3/8
7 7/8	8 5/8
8 5/8	9 5/8
8 7/8	9 7/8
9	10
9 3/4	11 1/8
9 7/8	11 1/4
10 1/8	11 1/2
10 1/2	12 1/4
10 3/4	12 1/2
10 3/4	12 1/2
10 3/4	12 1/2
12 1/8	14 1/8
12 1/8	14 1/8
12 1/8	14 1/8
12 1/8	14 1/8
13 3/4	16 1/4
13 3/4	16 1/4
13 3/4	16 1/4
13 3/4	16 1/4
15	17 3/4
15	17 3/4
15	17 3/4
15	17 3/4

Note: See page 6 for bore, rod, bolted/retainer bushing compatibility chart.

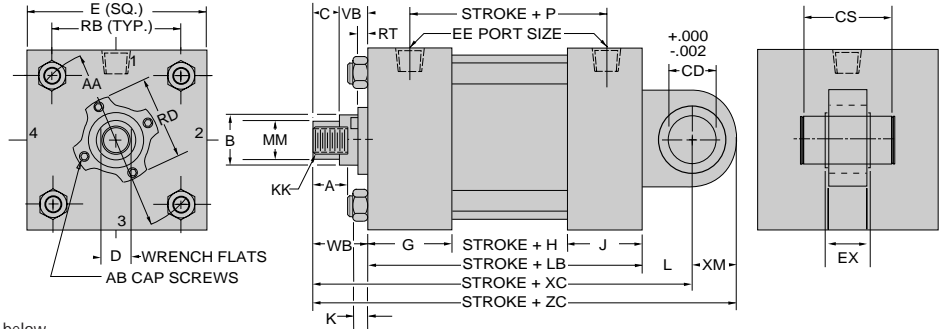
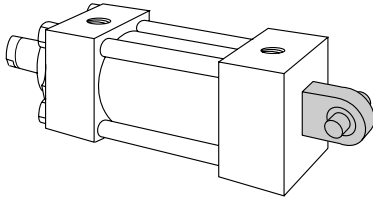
See pages 60 & 61 for Rod End Accessories.

Miller H Series Hydraulic Cylinders

Rear Eye Spherical Bearing 1½" – 6" Bore Cylinders

Model 94-B
Bolted Bushing
Rear Eye Spherical Bearing
(Pivot Pin Included)

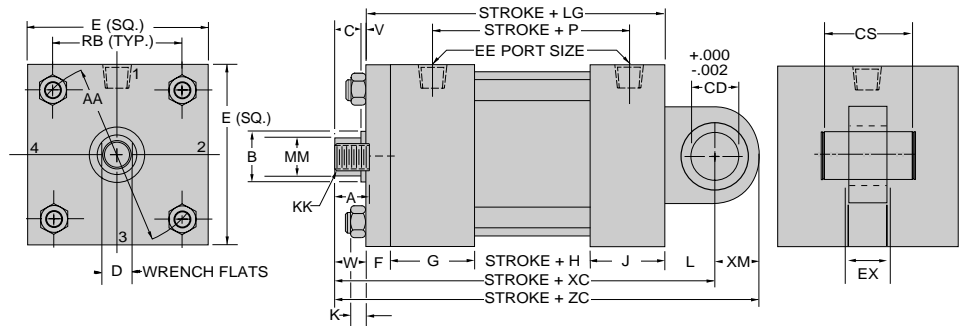
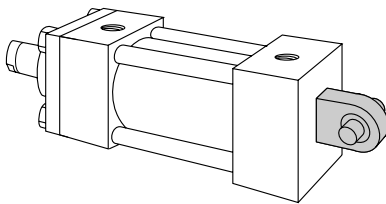
Mounting Dimensions
(See tables on opposite page)



Note: See page 43 for pivot pin dimensions.
Model 94 should use Spherical Rod Eye on Rod End. See below.
See Maximum Cylinder Pressure Rating below.

Model 94-R
Square Retainer Held Bushing
Rear Eye Spherical Bearing
(Pivot Pin Included)

Mounting Dimensions
(See tables on opposite page)

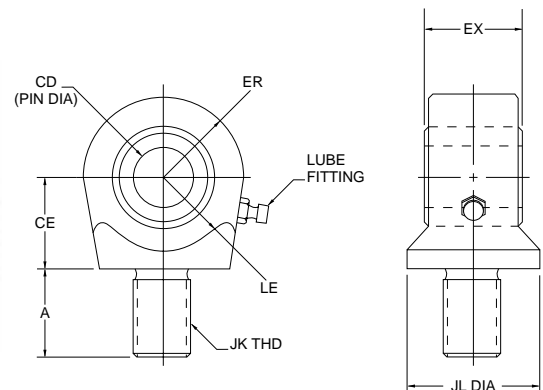


Note: See page 43 for pivot pin dimensions.
Model 94 should use Spherical Rod Eye on Rod End. See below.
See Maximum Cylinder Pressure Rating below.

Maximum Cylinder Pressure Rating

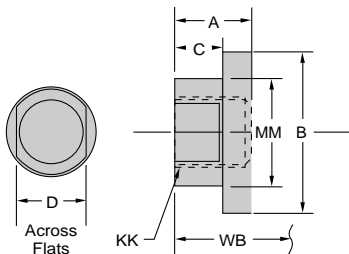
Bore	Max Press (psi)
1½	2000
2	2330
2½	1330
3¼	1310
4	1980
5	2170
6	1510

Spherical Rod Eye



Rod End Style

Style No. 4
Short Rod End-Internal Threads



Part No.	CD ± .0000 0005	A	CE	EX	ER	LE	JK	JL	MAX. LOAD CAPACITY (lbs)
057-SRE02-00063	.5000	.688	.875	.438	.875	.750	7/16-20	.875	3,000
057-SRE02-00100	.7500	1.000	1.250	.656	1.250	1.063	3/4-16	1.313	8,650
057-SRE02-00138	1.0000	1.500	1.875	.875	1.375	1.438	1-14	1.500	15,000
057-SRE02-00175	1.3750	2.000	2.125	1.188	1.813	1.875	1¼-12	2.000	27,000
057-SRE02-00200	1.7500	2.125	2.500	1.531	2.188	2.125	1½-12	2.250	33,000
057-SRE02-00250	2.0000	2.875	2.750	1.750	2.625	2.500	1⅞-12	2.750	54,000

Miller H Series Hydraulic Cylinders

Rear Eye Spherical Bearing 1 1/2" - 6" Bore Cylinders

Cylinder Body Dimensions

Bore	E Size	F	G	J	K	L	XM	AA	EX	CD	CS	Ports		RB
												SAE	NPT	
1 1/2	2 1/2	3/8	1 3/4	1 1/2	3/8	3/4	3/4	2.3	7/16	1/2	1 9/16	-8	1/2	1.63
2	3	5/8	1 3/4	1 1/2	7/16	1 1/4	1	2.9	2 1/32	3/4	2 1/32	-8	1/2	2.05
2 1/2	3 1/2	5/8	1 3/4	1 1/2	7/16	1 1/4	1	3.6	2 1/32	3/4	2 1/32	-8	1/2	2.55
3 1/4	4 1/2	3/4	2	1 3/4	9/16	1 1/2	1 1/4	4.6	1/8	1	2 1/2	-12	3/4	3.25
4	5	7/8	2	1 3/4	9/16	2 1/8	1 7/8	5.4	1 3/16	1 3/8	3 5/16	-12	3/4	3.82
5	6 1/2	7/8	2	1 3/4	1 3/16	2 1/4	2 1/2	7.0	1 11/32	1 3/4	4 7/32	-12	3/4	4.95
6	7 1/2	1	2 1/4	2 1/4	1 5/16	2 1/2	2 1/2	8.1	1 3/4	2	4 15/16	-16	1	5.73

Add Stroke

H	LB	LG	P
1 3/8	4 5/8	5	2 7/8
1 3/8	4 5/8	5 1/4	2 7/8
1 1/2	4 3/4	5 3/8	3
1 3/4	5 1/2	6 1/4	3 1/2
2	5 3/4	6 5/8	3 3/4
2 1/2	6 1/4	7 1/8	4 1/4
2 7/8	7 3/8	8 3/8	4 7/8

* SAE ports are standard, NPT ports are available at no extra charge.

Rod End Dimensions

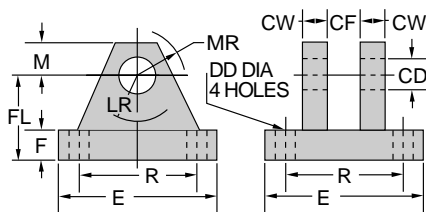
Bore Size	Rod Dia (MM)	A	B -.001 to -.003	C	D	V	W	AB	KK Styles 4	RD (Max.)	RT	VB	WB
1 1/2	5/8	3/4	1.125	3/8	1/2	1/4	5/8	10-32	7/16-20	1.972	.316	5/8	1
	1	1 1/8	1.500	1/2	7/8	1/2	1		3/4-16				
2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1		1-14				
2 1/2	1	1 1/8	1.500	1/2	7/8	1/4	3/4	1 1/4-28	3/4-16	2.472	.328	7/8	1 3/8
	1 3/8	1 5/8	2.000	5/8	1 1/8	3/8	1	1 1/4-28	1-14	2.972	.328	1	1 5/8
	1 3/4	2	2.375	3/4	1 1/2	1/2	1 1/4	1 1/4-28	1 1/4-12	3.470	.313	1 1/8	1 7/8
3 1/4	1 3/8	1 5/8	2.000	5/8	1 1/8	1/4	7/8	1 1/4-28	1-14	2.972	.328	1	1 5/8
	1 3/4	2	2.375	3/4	1 1/2	3/8	1 1/8	1 1/4-28	1 1/4-12	3.470	.313	1 1/8	1 7/8
	2	2 1/4	2.625	7/8	1 11/16	3/8	1 1/4	1 1/4-28	1 1/2-12	3.720	.313	1 1/8	2
4	1 3/4	2	2.375	3/4	1 1/2	1/4	1	1 1/4-28	1 1/4-12	3.470	.313	1 1/8	1 7/8
	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1 1/4-28	1 1/2-12	3.720	.313	1 1/8	2
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1 1/4-28	1 7/8-12	4.252	.313	1 1/4	2 1/4
5	2	2 1/4	2.625	7/8	1 11/16	1/4	1 1/8	1 1/4-28	1 1/2-12	3.720	.313	1 1/8	2
	2 1/2	3	3.125	1	2 1/16	3/8	1 3/8	1 1/4-28	1 7/8-12	4.252	.313	1 1/4	2 1/4
	3	3 1/2	3.750	1	2 5/8	3/8	1 3/8	1 1/4-28	2 1/4-12	4.752	.313	1 1/4	2 1/4
	3 1/2	3 1/2	4.250	1	3	3/8	1 3/8	1 1/4-28	2 1/2-12	5.252	.313	1 1/4	2 1/4
6	2 1/2	3	3.125	1	2 1/16	1/4	1 1/4	1 1/4-28	1 7/8-12	4.252	.313	1 1/4	2 1/4
	3	3 1/2	3.750	1	2 5/8	1/4	1 1/4	1 1/4-28	2 1/4-12	4.752	.313	1 1/4	2 1/4
	3 1/2	3 1/2	4.250	1	3	1/4	1 1/4	1 1/4-28	2 1/2-12	5.252	.313	1 1/4	2 1/4
	4	4	4.750	1	3 3/8	1/4	1 1/4	5/16-24	3-12	5.939	.610	1 1/4	2 1/4

Add Stroke

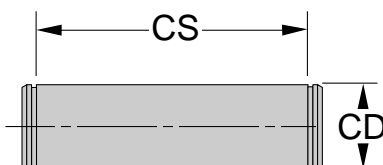
XC	ZC
6 3/8	7 1/8
6 3/4	7 1/2
7 1/4	8 1/4
7 1/2	8 1/2
7 3/8	8 3/8
7 5/8	8 5/8
7 7/8	8 7/8
8 5/8	9 7/8
8 7/8	10 1/8
9	10 1/4
9 3/4	11 5/8
9 7/8	11 3/4
10 1/8	12
10 1/2	13
10 3/4	13 1/4
10 3/4	13 1/4
10 3/4	13 1/4
12 1/8	14 5/8
12 1/8	14 5/8
12 1/8	14 5/8

Note: See page 6 for bore, rod, bolted/retainer bushing compatibility chart.

Clevis Bracket for Spherical Eye



Pivot Pin for Spherical Eye



Note: Maximum Cylinder Pressure Ratings for Model 94 Cylinders are shown on page 42. Load capacities of accessories or Model 94 cylinders at Maximum Pressure Ratings should not be exceeded.

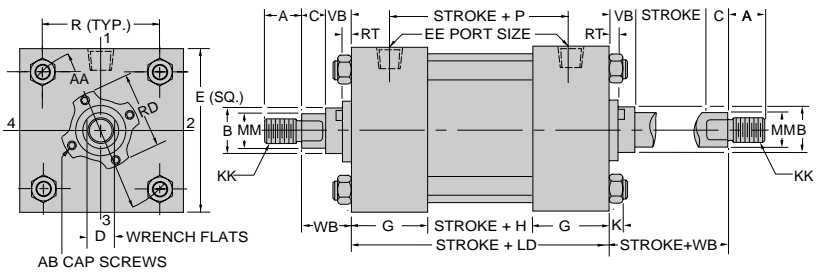
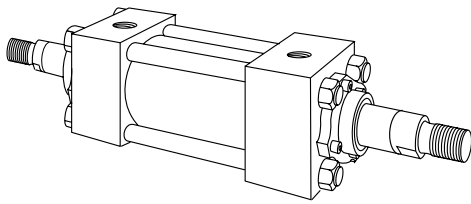
Part No.	057-SMB01 50	057-SMB01 75	057-SMB01 100	057-SMB01 138	057-SMB01 175	057-SMB01 200
CD	1/2	3/4	1	1 3/8	1 3/4	2
CF	7/16	2 1/32	7/8	1 3/16	1 17/32	1 3/4
CW	1/2	5/8	3/4	1	1 1/4	1 1/2
DD	1 3/32	1 1/32	1 1/32	2 1/32	2 9/32	2 9/32
E	3	3 3/4	5 1/2	6 1/2	8 1/2	10 5/8
F	1/2	5/8	3/4	7/8	1 1/4	1 1/2
FL	1 1/2	2	2 1/2	3 1/2	4 1/2	5
LR	1 5/16	1 3/8	1 11/16	2 1/16	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 3/4	2 1/16	2 3/8
R	2.05	2.76	4.10	4.95	6.58	7.92
Load Capacity	2,600	8,650	15,000	27,000	33,000	54,000

Part No.	057-PP005 -050	057-PP005 -075	057-PP005 -100	057-PP005 -138	057-PP005 -175	057-PP005 -200
CD	1/2	3/4	1	1 3/8	1 3/4	2
CS	1 9/16	2 1/32	2 1/2	3 5/16	4 7/32	4 15/16
Load (lb) Capacity	4,900	11,000	19,600	37,000	60,000	78,500

Miller H Series Hydraulic Cylinders

Double Rod End

Bolted Bushing Double Rod End

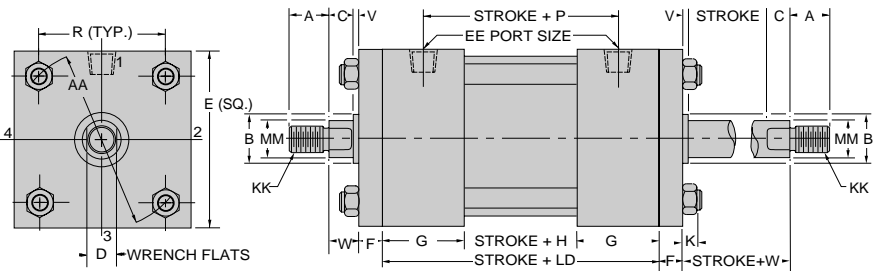
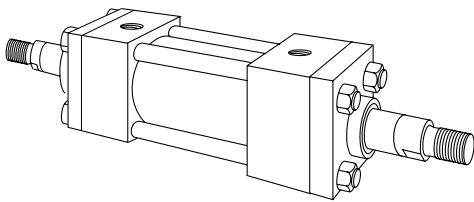


Note: To determine the dimensions for your Double Rod End cylinder:

- Refer to the Single Rod mounting style you are selecting on the preceding pages.
- Select the necessary dimensions which pertain to your mounting style.
- Return to this page and use these dimensions to finish sizing your cylinder.

Note: Double Rod End cylinders have head (G dimensions) at both ends and LD replaces the LB dimension. On Double Rod End cylinders where the rod end styles differ, be sure to clearly state which rod end is on which cylinder end. (port position 1 is standard).

Square Retainer Held Bushing Double Rod End



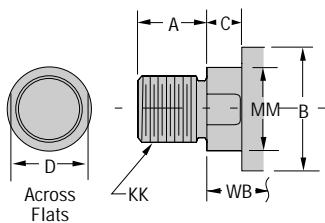
Note: To determine the dimensions for your Double Rod End cylinder:

- Refer to the Single Rod mounting style you are selecting on the preceding pages.
- Select the necessary dimensions which pertain to your mounting style.
- Return to this page and use these dimensions to finish sizing your cylinder.

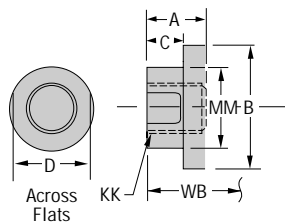
Note: Double Rod End cylinders have head (G dimensions) at both ends and LD replaces the LB dimension. On Double Rod End cylinders where the rod end styles differ, be sure to clearly state which rod end is on which cylinder end. (port position 1 is standard).

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

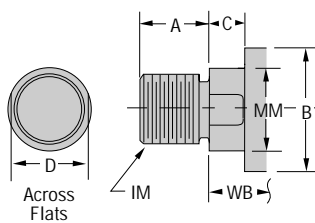
Style No. 2-Standard
Threaded on Turndown Section



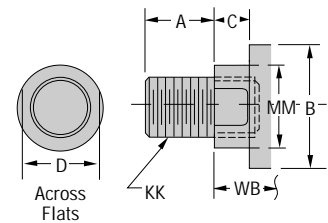
Style No. 4
Short Rod End-Internal Threads



Style No. 5
Threaded Intermediate Male



Style No. 6
Studded Rod End
(Available Thru 2" Rod Diameter)



Large Bore Hydraulic Cylinders

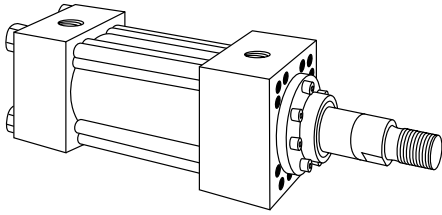
10" - 20" Bores

Miller H Series Hydraulic Cylinders

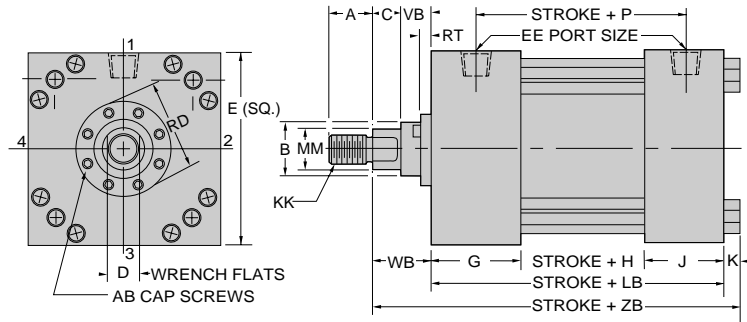
No Mounting
10" – 20" Bore Cylinders

Model 50-B Bolted Bushing

Mounting Dimensions (see tables on opposite page)

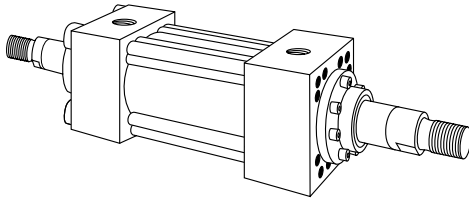


Model 50-B No Tie Rods Extended.



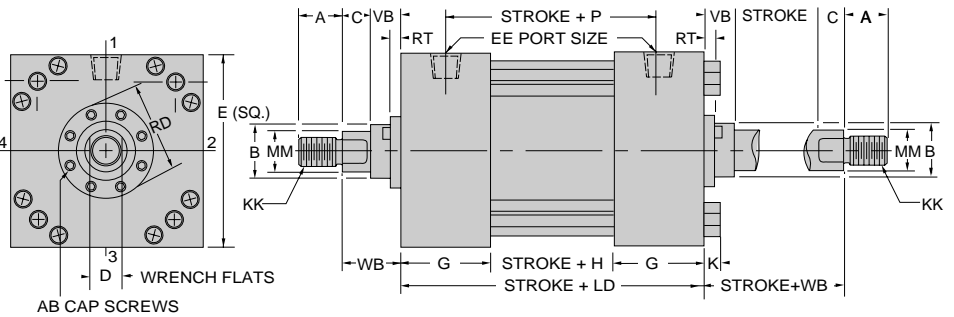
Bolted Bushing Double Rod End Model DH-50B

Mounting Dimensions (see tables on opposite page)



Note: To determine the dimensions for your Double Rod End cylinder:

- Refer to the Single Rod mounting style you are selecting on the following pages.
- Select the necessary dimensions which pertain to your mounting style.
- Return to this page and use these dimensions to finish sizing your cylinder.



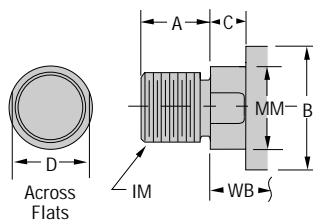
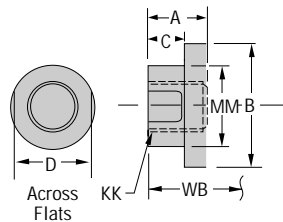
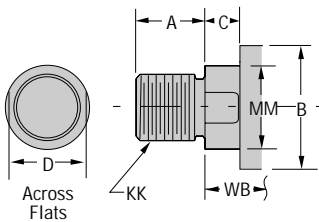
Note: Double Rod End cylinders have had (G dimensions) at both ends and LD replaces the LB dimension. On Double Rod End cylinders where the rod end styles differ, be sure to clearly state which rod is on which cylinder end. (port position 1 is standard).

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male



Miller H Series Hydraulic Cylinders

No Mounting
10"-20" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	G	J	K	AA	*EE	
						SAE	NPT
10	12 ⁵ / ₈	3 ¹¹ / ₁₆	3 ¹¹ / ₁₆	1 ¹ / ₂	12.69	-32	2
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	15.06	-32	2 ¹ / ₂
14	17 ¹ / ₂	4 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₂	17.31	-32	3
16	20 ¹ / ₂	5 ⁷ / ₈	5 ⁷ / ₈	1 ¹ / ₂	19.75	-32	4
18	23	6 ³ / ₈	6 ³ / ₈	1 ¹³ / ₁₆	22.25	-32	4
20	25 ¹ / ₂	7 ³ / ₈	7 ³ / ₈	1 ¹³ / ₁₆	24.50	-32	5

Add Stroke

H	LB	LD	P
4 ³ / ₄	12 ¹ / ₈	12 ¹ / ₈	8
5 ⁵ / ₈	14 ¹ / ₂	14 ¹ / ₂	9 ³ / ₈
5 ⁷ / ₈	15 ⁵ / ₈	15 ⁵ / ₈	10 ³ / ₈
6 ⁷ / ₈	18 ⁵ / ₈	18 ⁵ / ₈	12 ³ / ₄
8 ¹ / ₄	21	21	14 ¹ / ₄
9 ¹ / ₄	24	24	16

Rod End Dimensions

Bore Size	Rod Dia	A	B -.001 to -.003	C	D	AB	KK	RD	RT MAX.	VB	WB
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	1	3 ⁷ / ₈	5 ¹ / ₁₆ -24	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆
	5"	5	5.750	1	4 ¹ / ₄	5 ¹ / ₁₆ -24	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
14"	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
16"	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
18"	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
20"	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆

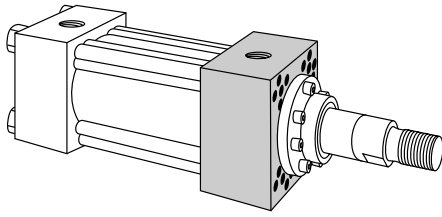
Add Stroke

ZB
16 ⁹ / ₁₆
16 ¹³ / ₁₆
16 ¹³ / ₁₆
17 ¹ / ₁₆
19 ³ / ₁₆
19 ⁷ / ₁₆
19 ⁷ / ₁₆
20 ⁹ / ₁₆
20 ⁹ / ₁₆
20 ⁹ / ₁₆
20 ⁹ / ₁₆
23 ⁹ / ₁₆
23 ⁹ / ₁₆
23 ⁹ / ₁₆
26 ¹ / ₄
26 ¹ / ₄
29 ¹ / ₄

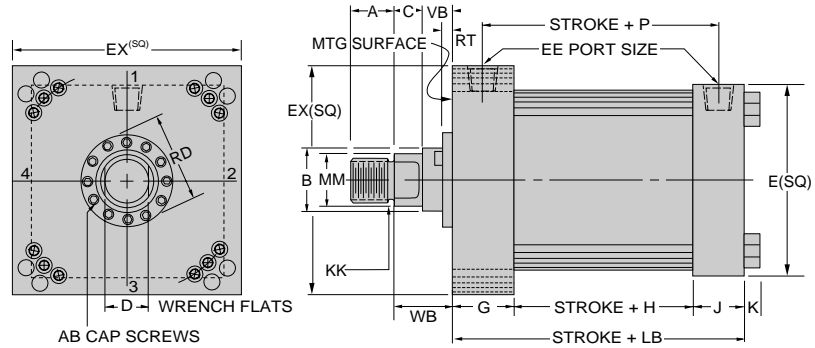
Miller H Series Hydraulic Cylinders

Square Head/Cap 10" - 20" Bore Cylinders

Model 63-B Bolted Bushing Square Head



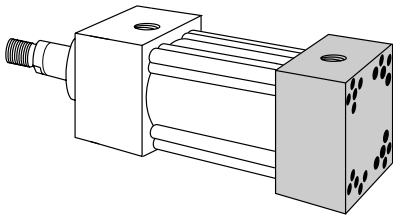
Mounting Dimensions (see tables on opposite page)



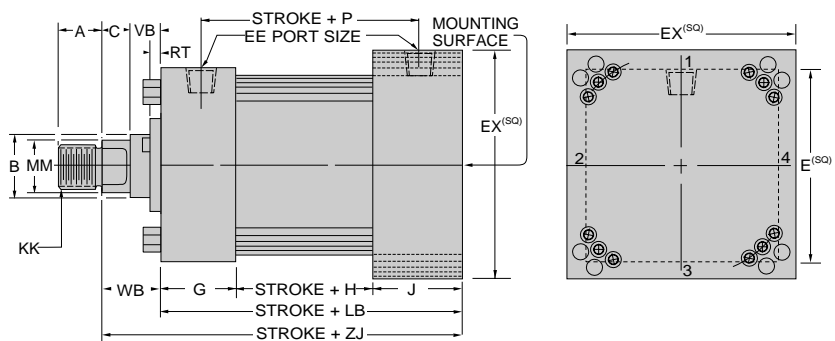
Note: Double Rod End cylinders have head (G dimensions) at both ends and LD replaces the LB dimension. On Double Rod End cylinders where the rod end styles differ, be sure to clearly state which rod is on which cylinder end. (port position 1 is standard).

See Chart below for mounting hole locations

Model 64-B Bolted Bushing Square Cap



Mounting Dimensions (see tables on opposite page)

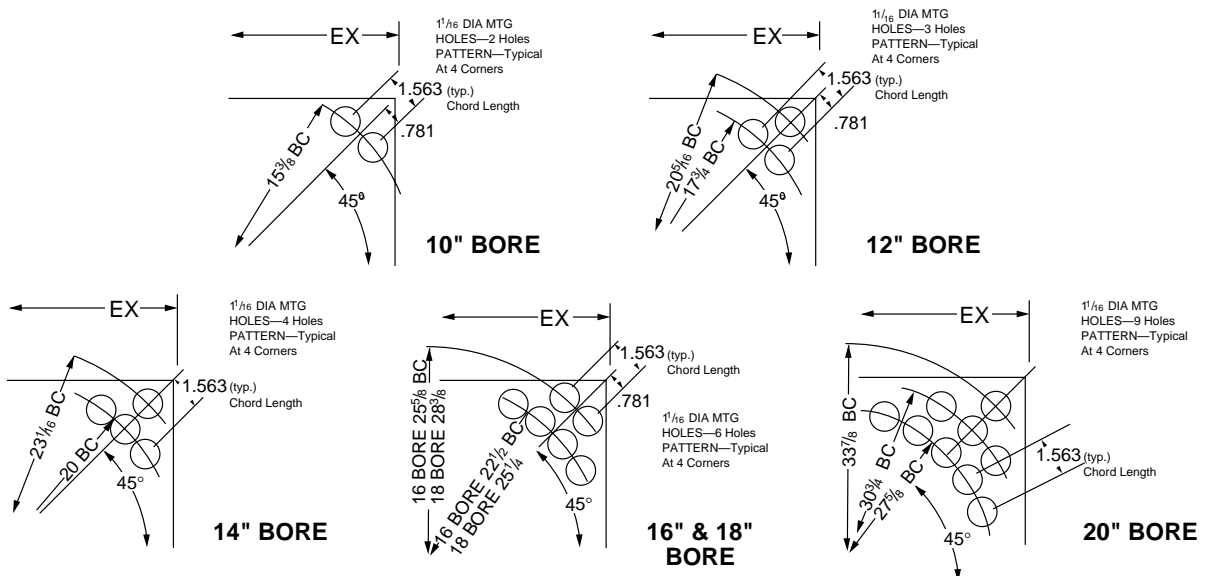


Tie Rod Construction For 10" - 20" Bore Cylinders

BORE SIZE	10	12	14	16	18	20
NO. TIE RODS PER CORNER	3	4	5	7	6	7

See Chart below for mounting hole locations

Model 63/64 Multiple Mounting Holes



Note: Mount on outside face with high tensile socket head cap screws. Hardened 1/4" thick bearing plates are furnished with cylinder and must be used under bolt head.

Cylinder Body Dimensions

Bore Size	E	G	J	K	*EE		EX
					SAE	NPT	
10	12 ⁵ / ₈	3 ¹ / ₁₆	3 ¹ / ₁₆	1 ¹ / ₂	-32	2	13 ¹ / ₂
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	-32	2 ¹ / ₂	16
14	17 ¹ / ₂	4 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₂	-32	3	17 ⁷ / ₈
16	20 ¹ / ₂	5 ⁷ / ₈	5 ⁷ / ₈	1 ¹ / ₂	-32	4	20 ¹ / ₂
18	23	6 ³ / ₈	6 ³ / ₈	1 ¹³ / ₁₆	-32	4	23
20	25 ¹ / ₂	7 ³ / ₈	7 ³ / ₈	1 ¹³ / ₁₆	-32	5	25 ¹ / ₂

Add Stroke

H	LB	P
4 ³ / ₄	12 ¹ / ₈	8
5 ⁵ / ₈	14 ¹ / ₂	9 ³ / ₈
5 ⁷ / ₈	15 ⁵ / ₈	10 ³ / ₈
6 ⁷ / ₈	18 ⁵ / ₈	12 ³ / ₄
8 ¹ / ₄	21	14 ¹ / ₄
9 ¹ / ₄	24	16

Rod End Dimensions

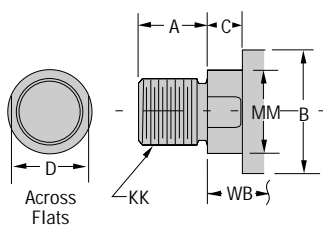
Bore Size	Rod Dia	A	B -.001 to -.003	C	D	AB	KK	RD	RT MAX.	VB	WB
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	1	3 ⁷ / ₈	5 ¹ / ₁₆ -24	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆
	5"	5	5.750	1	4 ¹ / ₄	5 ¹ / ₁₆ -24	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
14"	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
16"	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
18"	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
20"	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆

Add Stroke

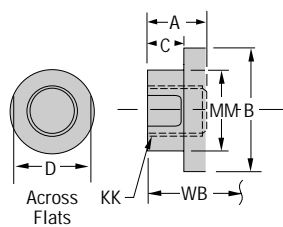
ZJ
15 ¹ / ₁₆
15 ⁵ / ₁₆
15 ⁵ / ₁₆
15 ⁹ / ₁₆
17 ¹¹ / ₁₆
17 ¹⁵ / ₁₆
17 ¹⁵ / ₁₆
19 ¹ / ₁₆
19 ¹ / ₁₆
19 ¹ / ₁₆
19 ¹ / ₁₆
22 ¹ / ₁₆
22 ¹ / ₁₆
22 ¹ / ₁₆
24 ⁷ / ₁₆
24 ⁷ / ₁₆
27 ⁷ / ₁₆

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

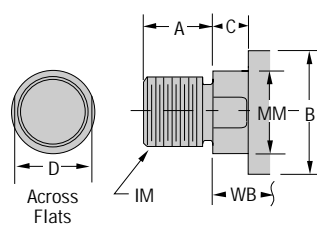
Style No. 2-Standard
Threaded on Turndown Section



Style No. 4
Short Rod End-Internal Threads



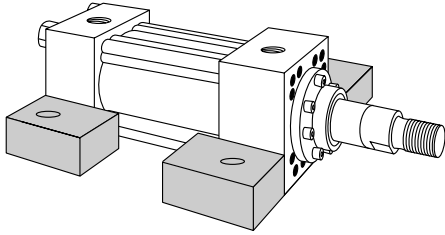
Style No. 5
Threaded Intermediate Male



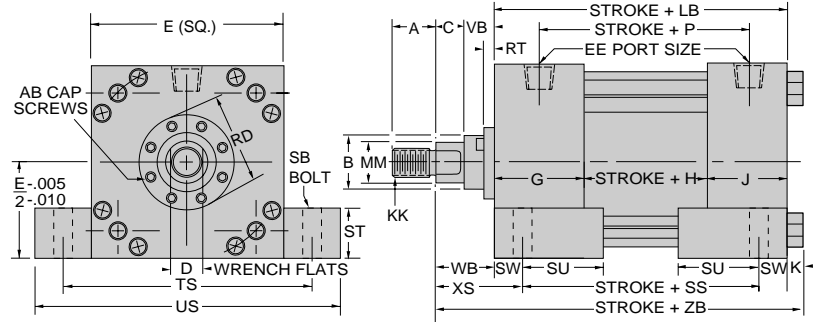
Miller H Series Hydraulic Cylinders

Side Lug/Centerline Lug
10" – 14" Bore Cylinders

Model 72-B (NFPA MS2) Bolted Bushing Side Lug

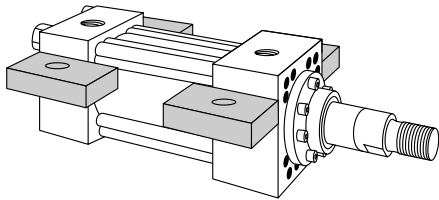


Mounting Dimensions (See tables on opposite page)

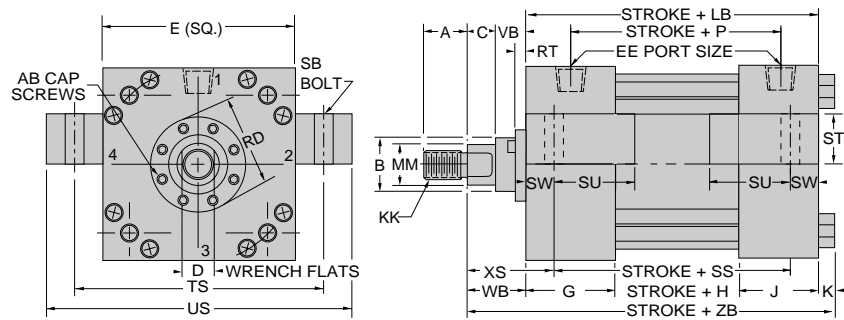


Note: Lugs should be blocked on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Model 73-B (NFPA MS3) Bolted Bushing Centerline Lug



Mounting Dimensions (See tables on opposite page)



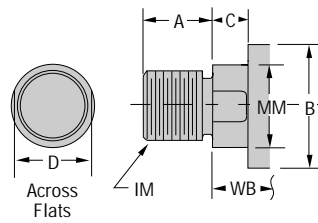
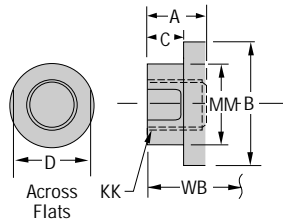
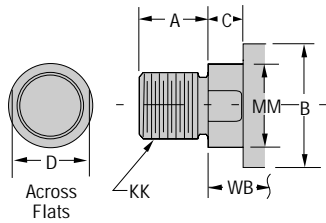
Note: Lugs should be blocked on the appropriate end to absorb hydraulic or mechanical shock. Bolts should not carry shear load. See Page 78

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male



Pressure Limitations For Model 72-B

Bore		10	12	14
Pressure	MOD.	2060	2200	2000
	SEVERE	1230	1320	1200

Pressure Limitations For Model 73-B

Bore		10	12	14
Pressure	MOD.	2210	2480	2700
	SEVERE	1320	1480	1620

Miller H Series Hydraulic Cylinders

Side Lug/Centerline Lug
10" – 14" Bore Cylinders

Cylinder Body Dimensions

Bore	E	G	J	K	*EE		SB	ST	SU	SW	TS	US
					SAE	NPT						
10	12 ⁵ / ₈	3 ¹ / ₁₆	3 ¹ / ₁₆	1 ¹ / ₂	-32	2	1 ¹ / ₂	2 ¹ / ₄	3 ¹ / ₂	1 ⁵ / ₈	15 ⁷ / ₈	19 ¹ / ₈
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	-32	2 ¹ / ₂	1 ¹ / ₂	3	4 ¹ / ₄	2	19 ¹ / ₈	23 ¹ / ₈
14	17 ¹ / ₂	4 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₂	-32	3	1 ¹ / ₂	4	5	2 ¹ / ₂	22 ¹ / ₂	27 ¹ / ₂

Add Stroke

H	LB	LD	P	SS
4 ³ / ₄	12 ¹ / ₈	12 ¹ / ₈	8	8 ⁷ / ₈
5 ⁵ / ₈	14 ¹ / ₂	14 ¹ / ₂	9 ³ / ₈	10 ¹ / ₂
5 ⁷ / ₈	15 ⁵ / ₈	15 ⁵ / ₈	10 ³ / ₈	10 ⁵ / ₈

Rod End Dimensions

Bore	Rod Dia Size	A	B -.001 to -.003	C	D	AB	KK	RD	RT MAX.	VB	WB
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	1	3 ⁷ / ₈	5 ¹ / ₁₆ -24	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆
	5"	5	5.750	1	4 ¹ / ₄	5 ¹ / ₁₆ -24	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
14"	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆

Add Stroke

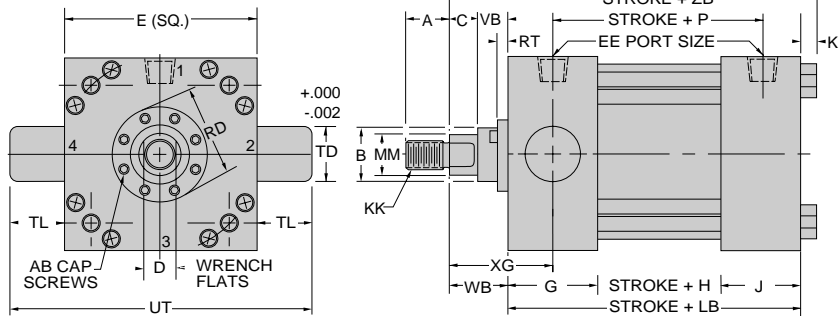
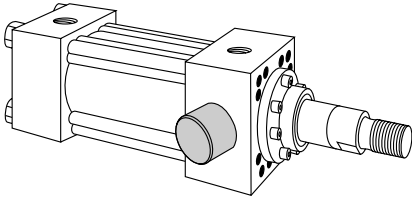
XS	ZB
4 ⁹ / ₁₆	16 ⁹ / ₁₆
4 ¹³ / ₁₆	16 ¹³ / ₁₆
4 ¹³ / ₁₆	16 ¹³ / ₁₆
5 ¹ / ₁₆	17 ¹ / ₁₆
5 ³ / ₁₆	19 ³ / ₁₆
5 ⁷ / ₁₆	19 ⁷ / ₁₆
5 ⁷ / ₁₆	19 ⁷ / ₁₆
5 ¹⁵ / ₁₆	20 ⁹ / ₁₆
5 ¹⁵ / ₁₆	20 ⁹ / ₁₆
5 ¹⁵ / ₁₆	20 ⁹ / ₁₆
5 ¹⁵ / ₁₆	20 ⁹ / ₁₆

Miller H Series Hydraulic Cylinders

Trunnion Head End/Cap End
10" – 14" Bore Cylinders

Model 81-B (NFPA MT1)
Bolted Bushing
Trunnion Head End

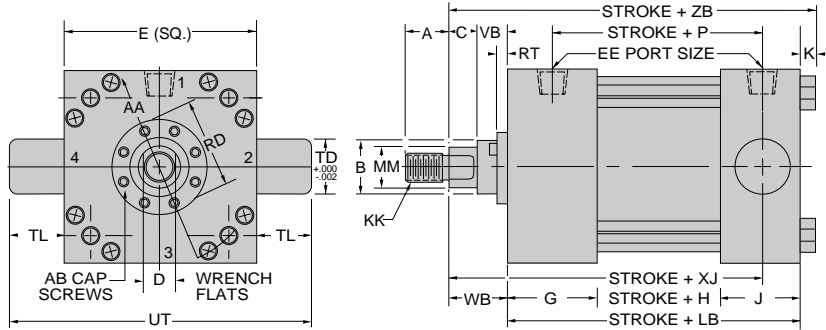
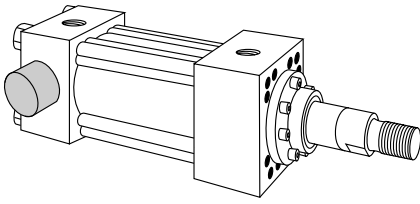
Mounting Dimensions
(See tables on opposite page)



Note: Hard chrome-plated pins designed for shear, (not bending) loads.

Model 82-B (NFPA MT2)
Bolted Bushing
Trunnion Cap End

Mounting Dimensions
(See tables on opposite page)



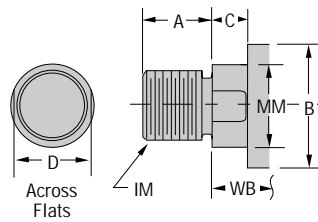
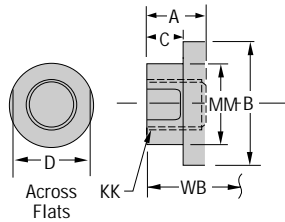
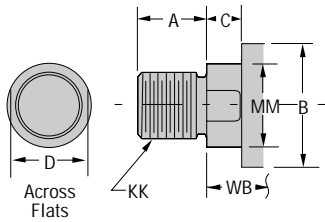
Note: Hard chrome-plated pins designed for shear, (not bending) loads.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male



Pressure Limitations For Models 81-B & 82-B

Bore		10	12	14
Pressure	MOD.	1500	1270	1460
	SEVERE	900	760	870

Miller H Series Hydraulic Cylinders

Trunnion Head End/Cap End
10" – 14" Bore Cylinders

Cylinder Body Dimensions

Bore	E	G	J	K	*EE		TD	TL	UT
					SAE	NPT			
10	12 ⁵ / ₈	3 ¹¹ / ₁₆	3 ¹¹ / ₁₆	1 ¹ / ₂	-32	2	3 ¹ / ₂	3 ¹ / ₂	19 ⁵ / ₈
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	-32	2 ¹ / ₂	4	4	23 ¹ / ₈
14	17 ¹ / ₂	4 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₂	-32	3	5	5	27 ¹ / ₂

Add Stroke

H	LB	LD	P
4 ³ / ₄	12 ¹ / ₈	12 ¹ / ₈	8
5 ⁵ / ₈	14 ¹ / ₂	14 ¹ / ₂	9 ³ / ₈
5 ⁷ / ₈	15 ⁵ / ₈	15 ⁵ / ₈	10 ³ / ₈

Rod End Dimensions

Bore	Rod Dia Size	A	B -.001 to -.003	C	D	AB	KK	RD	RT MAX.	VB	WB	XG
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	1	3 ⁷ / ₈	5 ¹ / ₁₆ -24	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆	4 ³ / ₄
	5"	5	5.750	1	4 ¹ / ₄	5 ¹ / ₁₆ -24	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆	5
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆	5
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ¹ / ₄
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	5 ¹ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆	5 ³ / ₈
	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ⁵ / ₈
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ⁵ / ₈
14"	7"	7	7.750	1	6 ¹ / ₈	5 ¹ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ¹³ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	5 ¹ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ¹³ / ₁₆
	9"	9	9.750	1	7 ⁷ / ₈	5 ¹ / ₁₆ -24	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ¹³ / ₁₆
	10"	10	10.750	1	8 ⁵ / ₈	5 ¹ / ₁₆ -24	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆	5 ¹³ / ₁₆

Add Stroke

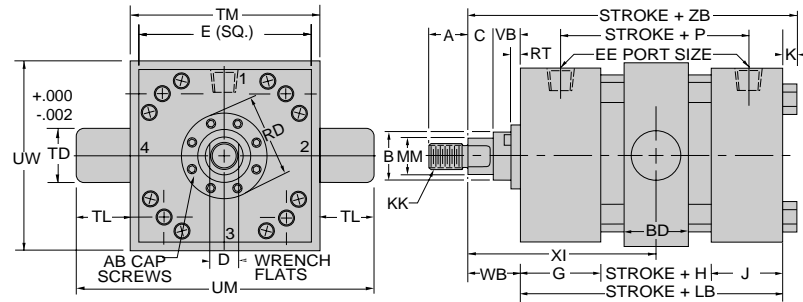
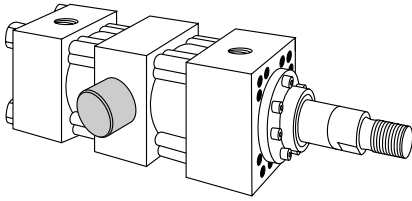
XJ	ZB
13 ⁵ / ₁₆	16 ⁹ / ₁₆
13 ⁹ / ₁₆	16 ¹³ / ₁₆
13 ⁹ / ₁₆	16 ¹³ / ₁₆
13 ¹³ / ₁₆	17 ¹ / ₁₆
15 ⁹ / ₁₆	19 ³ / ₁₆
15 ¹³ / ₁₆	19 ⁷ / ₁₆
15 ¹³ / ₁₆	19 ⁷ / ₁₆
16 ³ / ₄	20 ⁹ / ₁₆
16 ³ / ₄	20 ⁹ / ₁₆
16 ³ / ₄	20 ⁹ / ₁₆
16 ³ / ₄	20 ⁹ / ₁₆

Miller H Series Hydraulic Cylinders

Intermediate Trunnion
10" – 12" Bore Cylinders

Model 89-B (NFPA MT4)
Bolted Bushing
Intermediate Trunnion

Mounting Dimensions
(See tables on opposite page)



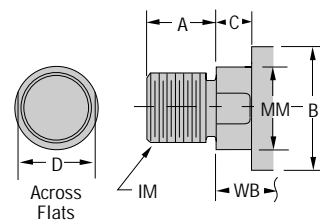
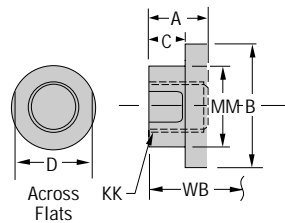
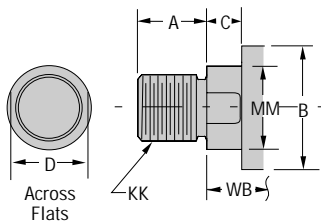
Note: Hard chrome-plated pins designed for shear (not bending) loads.
Specify dimension "XI" when ordering.

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male



Pressure Limitations, Minimum XI and Minimum Stroke For Model 89-B

Bore		10	12
Pressure	MOD.	1040	910
	SEVERE	624	546
Min. XI		9 ⁵ / ₈	10 ⁷ / ₈
Min. Stroke		.25	.375

Miller H Series Hydraulic Cylinders

Intermediate Trunnion
10" – 12" Bore Cylinders

Cylinder Body Dimensions

Bore	E	G	J	K	BD	*EE		TD	TL	TM	UM	UW
						SAE	NPT					
10	12 ⁵ / ₈	3 ¹¹ / ₁₆	3 ¹¹ / ₁₆	1 ¹ / ₂	4 ¹ / ₂	-32	2	3 ¹ / ₂	3 ¹ / ₂	14	21	16
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	5 ¹ / ₂	-32	2 ¹ / ₂	4	4	16 ¹ / ₂	24 ¹ / ₂	20

* Note customer to specify XI dimension at time of order.

Add Stroke

H	LB	LD	P
4 ³ / ₄	12 ¹ / ₈	12 ¹ / ₈	8
5 ⁵ / ₈	14 ¹ / ₂	14 ¹ / ₂	9 ³ / ₈

Rod End Dimensions

Bore	Rod Dia Size	A	B -.001 to -.003	C	D	AB	KK	RD	RT MAX.	VB	WB
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	1	3 ⁷ / ₈	⁵ / ₁₆ -24	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆
	5"	5	5.750	1	4 ¹ / ₄	⁵ / ₁₆ -24	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	⁵ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	⁵ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	1	4 ⁵ / ₈	⁵ / ₁₆ -24	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	1	6 ¹ / ₈	⁵ / ₁₆ -24	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	1	6 ⁷ / ₈	⁵ / ₁₆ -24	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆

Add Stroke

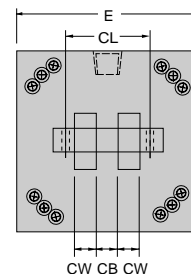
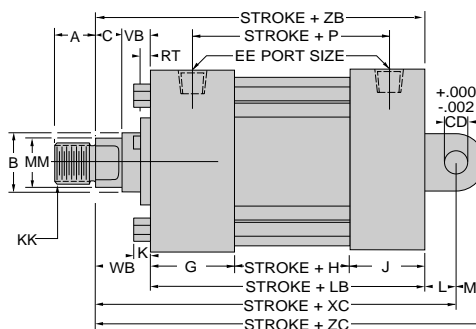
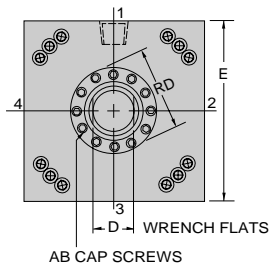
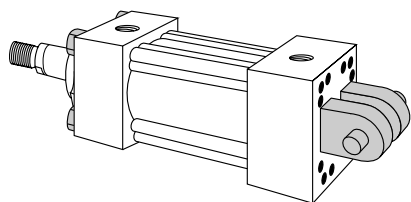
ZB
16 ⁹ / ₁₆
16 ¹³ / ₁₆
16 ¹³ / ₁₆
17 ¹ / ₁₆
19 ³ / ₁₆
19 ⁷ / ₁₆
19 ⁷ / ₁₆

Miller H Series Hydraulic Cylinders

Fixed Clevis and Rear Eye
10" – 20" Bore Cylinders

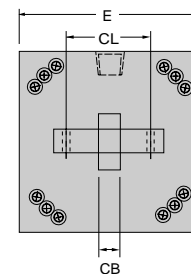
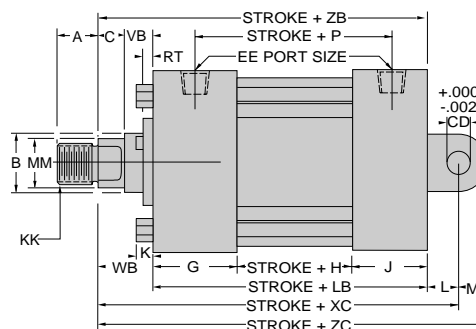
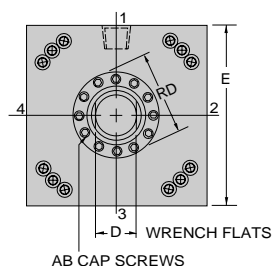
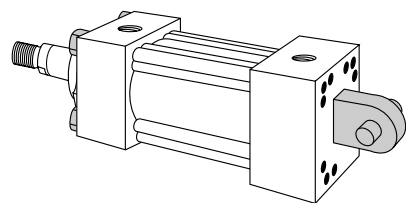
Model 84-B
Bolted Bushing
Fixed Clevis

Mounting Dimensions
(See tables on opposite page)



Model 90-B
Bolted Bushing
Rear Eye

Mounting Dimensions
(See tables on opposite page)



Pressure Limitations For Models 84-B & 90-B

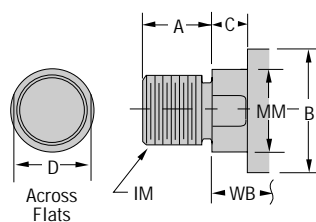
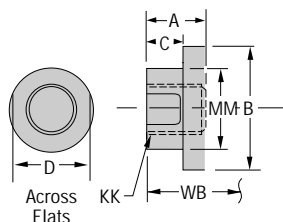
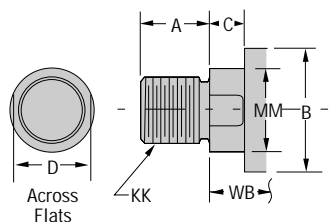
Bore		10	12	14	16	18	20
Pressure	MOD.	5000	5000	4190	4170	4440	4380
	SEVERE	3000	3000	2510	2500	2660	2620

Common Rod End Styles & Dimensions (See page 58 for complete listing of rod end styles)

Style No. 2-Standard
Threaded on Turndown Section

Style No. 4
Short Rod End-Internal Threads

Style No. 5
Threaded Intermediate Male



Miller H Series Hydraulic Cylinders

Fixed Clevis and Rear Eye
10" – 20" Bore Cylinders

Cylinder Body Dimensions

Bore Size	E	G	J	K	L	M	*EE		CB	CD	CL	CW
							SAE	NPT				
10	12 ⁵ / ₈	3 ¹ / ₁₆	3 ¹ / ₁₆	1 ¹ / ₂	4	3 ¹ / ₂	-32	2	4	3 ¹ / ₂	8.41	2
12	15 ¹ / ₈	4 ⁷ / ₁₆	4 ⁷ / ₁₆	1 ¹ / ₂	4 ¹ / ₂	4	-32	2 ¹ / ₂	4 ¹ / ₂	4	9.41	2 ¹ / ₄
14	17 ¹ / ₂	4 ⁷ / ₈	4 ⁷ / ₈	1 ¹ / ₂	5 ³ / ₄	5	-32	3	6	5	12.47	3
16	20 ¹ / ₂	5 ⁷ / ₈	5 ⁷ / ₈	1 ¹ / ₂	6 ³ / ₄	6	-32	4	6 ¹ / ₂	6	13.50	3 ¹ / ₄
18	23	6 ³ / ₈	6 ³ / ₈	1 ¹³ / ₁₆	7 ³ / ₄	7	-32	4	7 ¹ / ₂	7	15.47	3 ³ / ₄
20	25 ¹ / ₂	7 ³ / ₈	7 ³ / ₈	1 ¹³ / ₁₆	8 ³ / ₄	8	-32	5	8	8	16.53	4

Add Stroke

H	P	LB
4 ³ / ₄	8	12 ¹ / ₈
5 ⁵ / ₈	9 ³ / ₈	14 ¹ / ₂
5 ⁷ / ₈	10 ³ / ₈	15 ⁵ / ₈
6 ⁷ / ₈	12 ³ / ₄	18 ⁵ / ₈
8 ¹ / ₄	14 ¹ / ₄	21
9 ¹ / ₄	16	24

Rod End Dimensions

Bore Size	Rod Dia	A	B -.001 to -.003	C	D	AB	CC	KK	RD MAX.	RT	VB	WB
10"	4 ¹ / ₂ "	4 ¹ / ₂	5.250	7/8	3 ⁷ / ₈	5/16-24	4 ¹ / ₂ -12	3 ¹ / ₄ -12	6.439	.610	1 ¹ / ₄	2 ¹⁵ / ₁₆
	5"	5	5.750	7/8	4 ¹ / ₄	5/16-24	5-12	3 ¹ / ₂ -12	6.939	.610	1 ¹ / ₄	3 ³ / ₁₆
	5 ¹ / ₂ "	5 ¹ / ₂	6.250	7/8	4 ⁵ / ₈	5/16-24	5 ¹ / ₂ -12	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	7/8	6 ¹ / ₈	5/16-24	7-8	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
12"	5 ¹ / ₂ "	5 ¹ / ₂	6.250	7/8	4 ⁵ / ₈	5/16-24	5 ¹ / ₂ -12	4-12	7.439	.610	1 ¹ / ₄	3 ³ / ₁₆
	7"	7	7.750	7/8	6 ¹ / ₈	5/16-24	7-8	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	7/8	6 ⁷ / ₈	5/16-24	8-6	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
14"	7"	7	7.750	7/8	6 ¹ / ₈	5/16-24	7-8	5 ¹ / ₂ -12	8.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	8"	8	8.750	7/8	6 ⁷ / ₈	5/16-24	8-6	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	7/8	7 ¹ / ₈	5/16-24	9-6	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	7/8	8 ⁵ / ₈	5/16-24	10-6	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
16"	8"	8	8.750	7/8	6 ⁷ / ₈	5/16-24	8-6	5 ³ / ₄ -8	9.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	9"	9	9.750	7/8	7 ¹ / ₈	5/16-24	9-6	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	7/8	8 ⁵ / ₈	5/16-24	10-6	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
18"	9"	9	9.750	7/8	7 ¹ / ₈	5/16-24	9-6	6 ¹ / ₂ -8	10.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
	10"	10	10.750	7/8	8 ⁵ / ₈	5/16-24	10-6	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆
20"	10"	10	10.750	7/8	8 ⁵ / ₈	5/16-24	10-6	7-8	11.939	.610	2 ⁷ / ₁₆	3 ⁷ / ₁₆

Add Stroke

XC	ZB	ZC
19 ¹ / ₁₆	16 ⁹ / ₁₆	22 ⁹ / ₁₆
19 ⁵ / ₁₆	16 ¹³ / ₁₆	22 ¹³ / ₁₆
19 ⁵ / ₁₆	16 ¹³ / ₁₆	22 ¹³ / ₁₆
19 ⁹ / ₁₆	17 ¹ / ₁₆	23 ¹ / ₁₆
22 ³ / ₁₆	19 ³ / ₁₆	26 ³ / ₁₆
22 ⁷ / ₁₆	19 ⁷ / ₁₆	26 ⁷ / ₁₆
22 ⁷ / ₁₆	19 ⁷ / ₁₆	26 ⁷ / ₁₆
24 ¹³ / ₁₆	20 ⁹ / ₁₆	29 ¹³ / ₁₆
24 ¹³ / ₁₆	20 ⁹ / ₁₆	29 ¹³ / ₁₆
24 ¹³ / ₁₆	20 ⁹ / ₁₆	29 ¹³ / ₁₆
24 ¹³ / ₁₆	20 ⁹ / ₁₆	29 ¹³ / ₁₆
28 ¹³ / ₁₆	23 ⁹ / ₁₆	34 ¹³ / ₁₆
28 ¹³ / ₁₆	23 ⁹ / ₁₆	34 ¹³ / ₁₆
28 ¹³ / ₁₆	23 ⁹ / ₁₆	34 ¹³ / ₁₆
32 ³ / ₁₆	26 ¹ / ₄	39 ³ / ₁₆
32 ³ / ₁₆	26 ¹ / ₄	39 ³ / ₁₆
36 ³ / ₁₆	29 ¹ / ₄	44 ³ / ₁₆

Miller H Series Hydraulic Cylinders

Rod End Styles and Dimensions

Rod End Styles

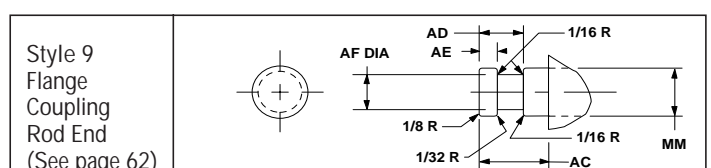
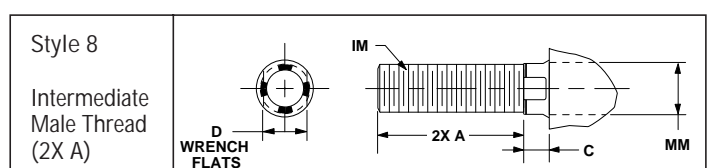
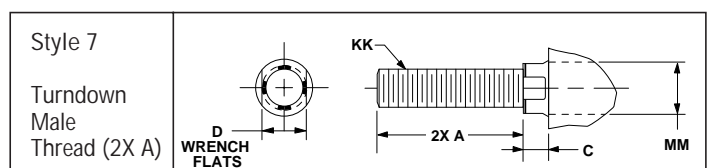
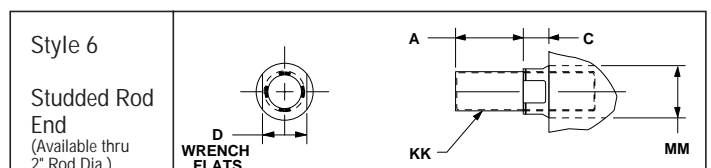
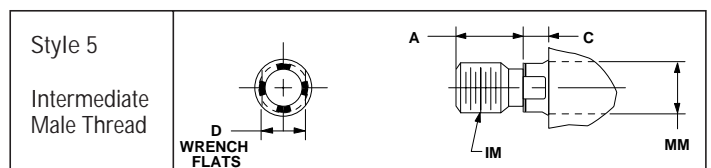
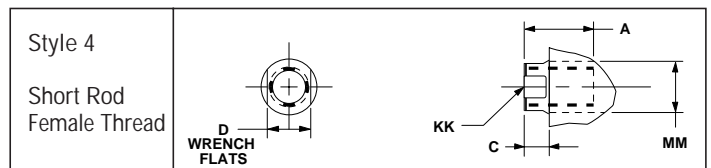
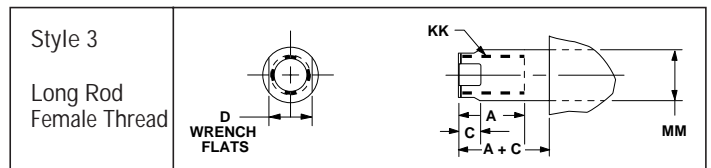
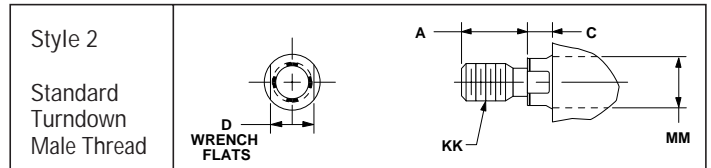
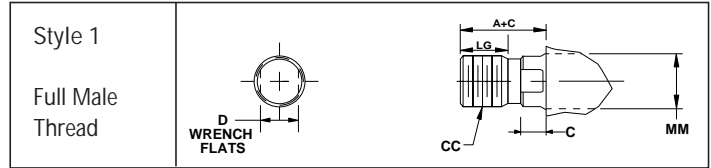
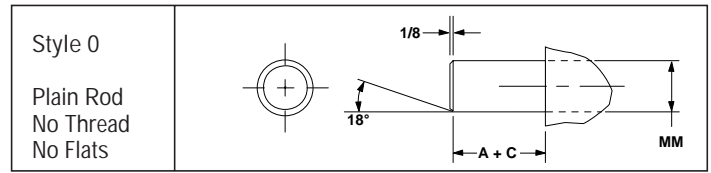
Rod End Style 2 is the standard rod end on Miller Fluid Power cylinders and will be furnished unless otherwise specified.

The rod end styles shown on this page represent most of the more commonly used rod end connections. If a rod end is required other than any of those shown, it would be machined from the Style "O" Rod end and identified as a Style "O" modified.

Rod end modifications to your specifications can be readily made and could include a radius, a spherical radius, special thread size or length or both, keyway, special drilled holes and many other variations too numerous to mention.

Rod Dia. mm.	A	AC	AD	AE	AF	C	D	IM	KK	CC	LG
5/8	3/4	1 1/8	5/8	1/4	3/8	3/8	1/2*	1/2-20	7/16-20	5/8-18	1/2
1	1 1/8	1 1/2	15/16	3/8	1 1/16	1/2	7/8*	7/8-14	3/4-16	1-14	13/16
1 3/8	1 5/8	1 3/4	1 1/16	3/8	7/8	5/8	1 1/8	1 1/4-12	1-14	1 3/8-12	1 1/4
1 3/4	2	2	1 5/16	1/2	1 1/8	3/4	1 1/2	1 1/2-12	1 1/4-12	1 3/4-12	1 5/8
2	2 1/4	2 5/8	1 11/16	5/8	1 3/8	7/8	1 11/16	1 3/4-12	1 1/2-12	2-12	1 13/16
2 1/2	3	3 1/4	1 15/16	3/4	1 3/4	1	2 1/16	2 1/4-12	1 7/8-12	2 1/2-12	2 5/8
3	3 1/2	3 3/4	2 7/16	7/8	2 1/4	1	2 5/8	2 3/4-12	2 1/4-12	3-12	3 3/8
3 1/2	3 1/2	4 3/8	2 11/16	1	2 1/2	1	3	3 1/4-12	2 1/2-12	3 1/2-12	3 3/8
4	4	4 1/2	2 11/16	1	3	1	3 3/8	3 3/4-12	3-12	4-12	3 5/8
4 1/2	4 1/2	5 1/4	3 3/16	1 1/2	3 1/2	1	3 7/8	4 1/4-12	3 1/4-12	4 1/2-12	4 7/8
5	5	5 3/8	3 3/16	1 1/2	3 7/8	1	4 1/4	4 3/4-12	3 1/2-12	5-12	4 5/8
5 1/2	5 1/2	6 1/4	3 15/16	1 7/8	4 3/8	1	4 5/8	5 1/4-12	4-12	5 1/2-12	5 1/8
7	7	6 7/8	4 5/16	1 7/8	5 3/4	1	6 1/8	6 1/2-12	5 1/2-12	7-8	6 5/8
8	8	5 3/4	3 3/16	1 1/2	6 3/8	1	6 7/8	6 1/2-12	5 3/4-8	8-6	7 5/8
9	9	6 3/4	4 1/8	2	7 1/4	1	7 7/8	8 1/2-12	6 1/2-8	9-6	8 5/8
10	10	4 3/8	2 1/16	1	8 1/2	1	8 5/8	9 1/2-12	7-8	10-6	9 5/8

*For Style #1 Rod End "D" Dimension: 5/8" Rod D = 7/16"
1" Rod D = 13/16"



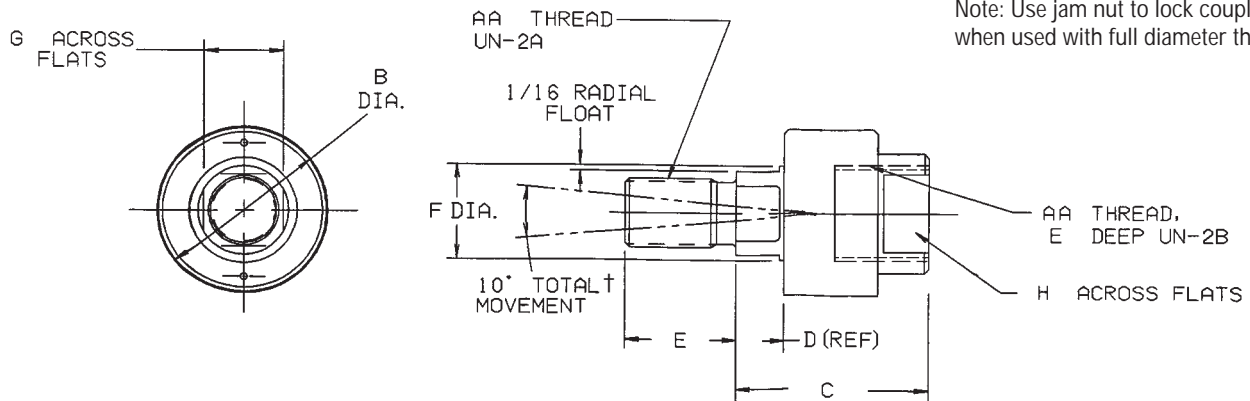
Miller H Series Hydraulic Cylinders

Rod End Couplers

Dimensions



Good machine design practice requires that proper alignment be maintained to avoid excessive bearing loads. The Miller linear alignment rod end coupler can reduce minor cylinder misalignment problems, within design limitations. These couplers can be used for both push and pull applications.



Note: Use jam nut to lock coupler to rod when used with full diameter threads.

Part Numbers and Sizes

Part Number	AA	B	C	D	E	F	G	H	Max. Pull (LBS)
057-RCU01-44-20	7/16-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	2500
057-RCU01-50-20	1/2-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	3500
057-RCU01-63-18	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1 1/8	3500
057-RCU01-75-16	3/4-16	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	8500
057-RCU01-88-14	7/8-14	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	8500
057-RCU01-100-14	1-14	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	16000
057-RCU01-125-12	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8**	1 3/8	1 1/4	2 1/4	16000
057-RCU01-150-12	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	33500
057-RCU01-175-12	1 3/4-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	33500
057-RCU01-188-12	1 7/8-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	60000
057-RCU01-200-12	2-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	60000
057-RCU02-225-12	2 1/4-12	6 3/4	6 3/8	1	3 1/2	2 3/4	2 3/8	2 7/8	99250
057-RCU02-250-12	2 1/2-12	7	6 1/2	1	3 1/2	3 1/4	2 7/8	3 3/8	123750
057-RCU02-275-12	2 3/4-12	7	6 1/2	1	3 1/2	3 1/4	2 7/8	3 3/8	150950
057-RCU02-300-12	3-12	7	6 1/2	1	3 1/2**	3 1/4	2 7/8	3 3/8	180850
057-RCU02-325-12	3 1/4-12	9 1/4	8 1/2	1	4 1/2	4	3 3/8	4 1/2	213450
057-RCU02-425-12	4 1/4-12	12 7/8	11 1/4	1	4 1/2	5 1/2	4 7/8	7	370850

** 'E' thread is not deep enough to accept rod end style #2 standard 'A' thread length. Piston Rod style #2 thread for these sizes must be this 'E' dimension or shorter to permit torquing of Rod End Coupler to piston rod shoulder.

* Load in pounds. 4.1 safety factor.

† 10° Total Movement on 2 1/4" -12 thread and larger.

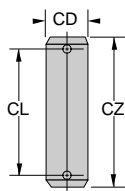
2° Total Movement on 7/16"-20 through 2"-12 thread.

On Long Stroke Horizontally Mounted Cylinder, see pages 74 and 75 for Stop Tube Requirements.

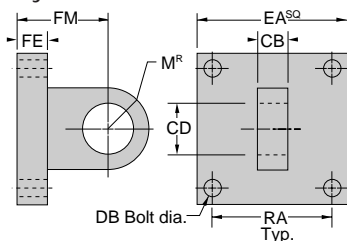
Miller H Series Hydraulic Cylinders

Selecting Rod End Accessories

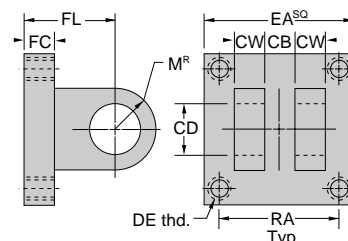
Pivot Pin



Eye Bracket



Clevis Bracket



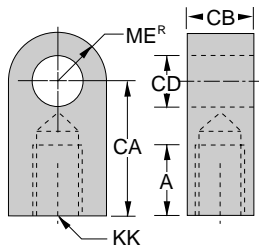
Pivot Pin Part No. Shear Load Capacity (lbs)	Eye Bracket Part No. Tensile Load Capacity (lbs)	Clevis Bracket Part No. Tensile Load Capacity (lbs)	Pin Dia	M	CB	CD	CL	CW	CZ	DB	DE	EA	FC	FE	FL	FM	RA
057-PP001-50 4,900	057-EB001-50 3,600	170-MB86A-150-50 5,000	1/2	1/2	3/4	1/2	1.94	1/2	2.28	3/8	3/8-24	2 1/2	3/8	3/8	1 1/8	1 1/8	1.63
057-PP001-75 11,000	— —	170-MB86A-200-75 11,000	3/4	3/4	1 1/4	3/4	2.72	5/8	3.09	—	1/2-20	3	5/8	—	1 7/8	—	2.05
— —	† 057-EB001-75 11,000	— —	3/4	3/4	1 1/4	3/4	2.72	—	3.09	1/2	—	3 1/2	—	5/8	—	1 7/8	2.55
057-PP001-75 11,000	— —	170-MB86A-250-75 11,000	3/4	3/4	1 1/4	3/4	2.72	5/8	3.09	1/2	1/2-20	3 1/2	5/8	5/8	1 7/8	1 7/8	2.55
057-PP001-100 19,600	057-EB001-100 17,000	170-MB86A-325-100 17,000	1	1	1 1/2	1	3.22	3/4	3.59	5/8	5/8-18	4 1/2	3/4	3/4	2 1/4	2 1/4	3.25
057-PP001-138 37,000	057-EB001-138 21,000	170-MB86A-400-138 30,000	1 3/8	1 3/8	2	1 3/8	4.25	1	4.66	5/8	5/8-18	5	7/8	7/8	3	3	3.82
057-PP001-175 60,000	057-EB002-175 51,000	170-MB86A-500-175 53,000	1 3/4	1 3/4	2 1/2	1 3/4	5.25	1 1/4	5.66	7/8	7/8-14	6 1/2	7/8	1	3 1/8	3 1/4	4.95
057-PP001-200 78,500	057-EB002-200 76,500	170-MB86A-600-200 75,000	2	2	2 1/2	2	5.28	1 1/4	5.72	1	1-14	7 1/2	1	1 1/2	3 1/2	4	5.73
057-PP001-250 122,700	057-EB002-250 94,500	170-MB86A-700-250 76,000	2 1/2	2 1/2	3	2 1/2	6.31	1 1/2	6.78	1 1/8	1 1/8-12	8 1/2	1	1 1/2	4	4 1/2	6.58
057-PP001-300 176,700	057-EB002-300 124,000	170-MB86A-800-300 114,000	3	2 3/4	3	3	6.34	1 1/2	6.84	1 1/4	1 1/4-12	9 1/2	1	2	4 1/4	5 1/4	7.50
057-PP001-350 240,500	057-EB002-350 140,000	170-MB86A-1000-350 152,700	3 1/2	3 1/2	4	3 1/2	8.41	2	8.97	1 3/4	1 3/4-12	12 5/8	1 1/16	2 7/8	5 11/16	6 7/8	9.62
057-PP001-400 314,000	057-EB002-400 180,000	170-MB86A-1200-400 225,000	4	4	4 1/2	4	9.41	2 1/4	9.97	2	2-12	15 1/8	1 5/16	3 3/8	6 7/16	7 7/8	11.45
057-PP001-500 491,000	057-EB002-500 292,700	—	5	5	6	5	12.47	—	13.09	2 1/4	—	17 1/2	—	4 3/8	—	10 1/8	13.25
057-PP001-600 707,000	057-EB002-600 390,000	—	6	6	6 1/2	6	13.50	—	14.09	2 1/2	—	20 1/2	—	4 7/8	—	11 5/8	15.5
057-PP001-700 962,000	057-EB002-700 454,600	—	7	7	7 1/2	7	15.47	—	16.09	3	—	23 1/4	—	5 3/8	—	13 1/8	17.25
057-PP001-800 1,256,000	057-EB002-800 572,700	—	8	8	8	8	16.53	—	17.16	3 1/2	—	25 1/2	—	5 7/8	—	14 5/8	18.5

† Dimensions apply to eye bracket only.

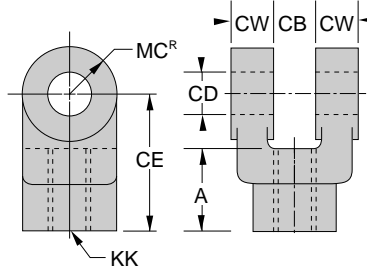
Note: Do not order clevis bracket to convert cylinders to 86 mounting. Contact factory.

Miller H Series Hydraulic Cylinders

Rod Eye



Rod Clevis



Rod Eye Part No. + Load Capacity (lbs)	Rod Clevis Part No. + Load Capacity (lbs)	Thd Size KK	A	MC	ME	CA	CB	CE	CD	CW
057-RE001-44-20 5,000	057-RC001-44-20 4,250	7/16-20	3/4	1/2	1/2	1 1/2	3/4	1 1/2	1/2	1/2
057-RE001-75-16 12,100	057-RC001-75-16 11,200	3/4-16	1 1/8	3/4	3/4	2 1/16	1 1/4	2 3/8	3/4	5/8
057-RE001-100-14 21,700	057-RC001-100-14 19,500	1-14	1 5/8	1	1	2 13/16	1 1/2	3 1/8	1	3/4
057-RE001-125-12 33,500	057-RC001-125-12 33,500	1 1/4-12	2	1 3/8	1 3/8	3 7/16	2	4 1/8	1 3/8	1
057-RE001-150-12 45,000	057-RC001-150-12 45,600	1 1/2-12	2 1/4	1 3/4	1 3/4	4	2 1/2	4 1/2	1 3/4	1 1/4
057-RE001-188-12 75,000	057-RC001-188-12 65,600	1 7/8-12	3	2	2	5	2 1/2	5 1/2	2	1 1/4
057-RE001-225-12 98,700	057-RC001-225-12 98,200	2 1/4-12	3 1/2	2 1/2	2 1/2	5 13/16	3	6 1/2	2 1/2	1 1/2
057-RE001-250-12 110,000	057-RC001-250-12 98,200	2 1/2-12	3 1/2	2 3/4	3	6 1/8	3	6 3/4	3	1 1/2
057-RE001-325-12 161,300	057-RC001-325-12 156,700	3 1/4-12	4 1/2	3 1/2	3 1/2	7 5/8	4	8 1/2	3 1/2	2
057-RE001-400-12 273,800	057-RC001-400-12 221,200	4-12	5 1/2	4	4	9 1/8	4 1/2	10	4	2 1/4
057-RE001-550-12 300,000	—	5 1/2-12	7	—	5	11 7/8	6	—	5	—
057-RE001-575-08 390,000	—	5 3/4-8	8	—	6	14 1/8	6 1/2	—	7	—
057-RE001-650-08 525,000	—	6 1/2-8	9	—	7	15 7/8	7 1/2	—	8	—

Miller H Series Hydraulic Cylinders

Cylinder Rod End Accessories

Cylinder Rod End Accessories are used to affix the piston rod to the load—most commonly when the cylinder pivots during operation.

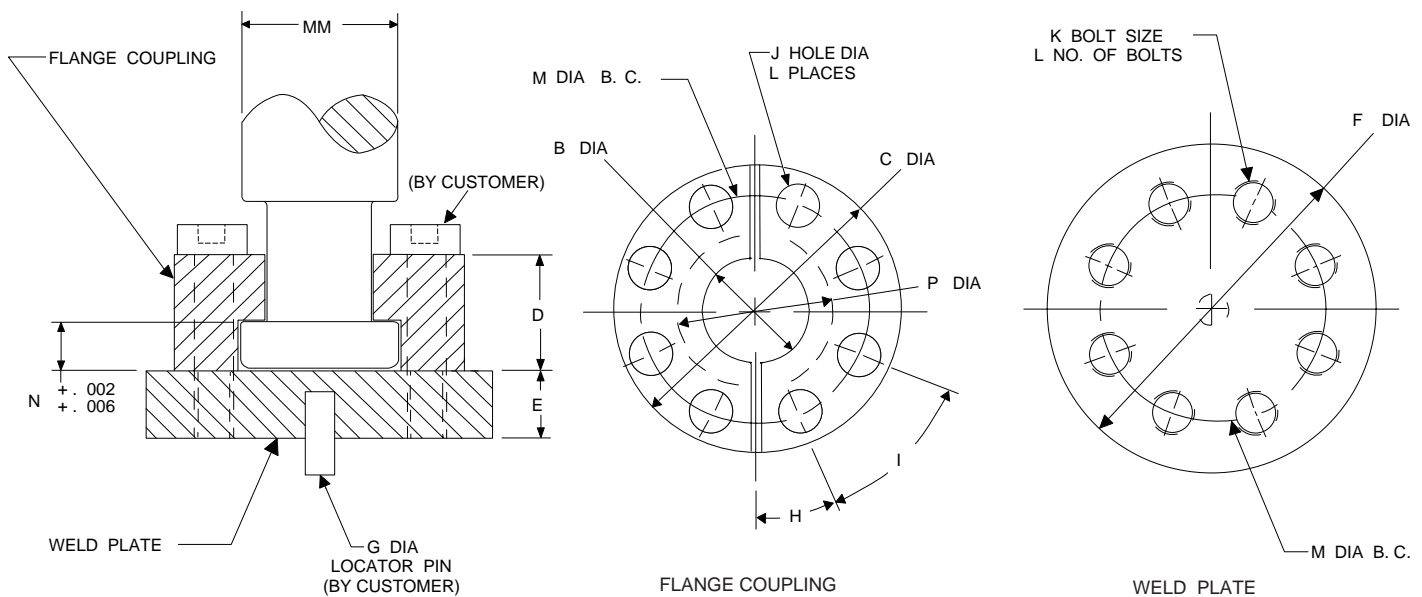
Piston Rod Attachments

In attaching machinery components or rod clevises, rod eyes, etc. to Miller Styles 2 & 6 (Threaded on Turndown Section) or Styles 3 & 4 (Internally Threaded Piston Rods), the attachments should be tightened to the torques given in the Table at right. This torque or pre-stress triples the fatigue strength of the rod's threaded section and makes a stronger assembly than attaching the machinery component to a maximum diameter threaded rod (Style 5) and torquing it against a lock nut. Miller recommends the Style 2 (Threaded on Turndown Section) Rod for most applications. It's square shoulder design helps proper alignment of cylinder to mechanism, eliminates need for a jam nut, provides fixed point for more accurate cylinder positioning, and simplifies piloting of full rod diameter into mating part.

Rod Dia	Thread Size	Torque ft lbs*
5/8	7/16-20	36
1	3/4-16	125
1 3/8	1-14	250
1 3/4	1 1/4-12	460
2	1 1/2-12	663
2 1/2	1 7/8-12	944
3	2 1/4-12	1315
3 1/2	2 1/2-12	5050
4	3-12	7070
4 1/2	3 1/4-12	7940
5	3 1/2-12	12760
5 1/2	4-12	12560

*Recommended Torques (ft. lbs.) with MoS2 Lubricant or Equivalent.

Flange Coupling (For Use with Style #9 Rod End)



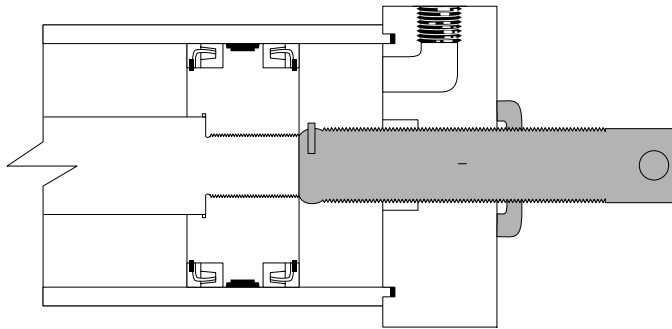
Flange Coupler Part No.	Weld Plate Part No.	MM	B	C	D	E	F	G	H	I	J	K	L	M	N	P
057-FC002-063	057-BA003-063	.625	.406	1.500	.562	.500	2.000	.250	45°	90°	.218	10-24	4	1.125	.250	.656
057-FC002-100	057-BA003-100	1.000	.750	2.000	.875	.500	2.500	.250	30°	60°	.281	1/4-20	6	1.500	.375	1.063
057-FC002-138	057-BA003-138	1.375	.938	2.500	1.000	.625	3.000	.250	30°	60°	.343	5/16-18	6	2.000	.375	1.438
057-FC002-175	057-BA003-175	1.750	1.187	3.000	1.250	.625	4.000	.250	22.5°	45°	.343	5/16-18	8	2.375	.500	1.813
057-FC002-200	057-BA003-200	2.000	1.438	3.500	1.625	.750	4.000	.375	15°	30°	.406	3/8-16	12	2.688	.625	2.063
057-FC002-250	057-BA003-250	2.500	1.875	4.250	1.875	.750	5.000	.375	15°	30°	.531	1/2-13	12	3.438	.750	2.625
057-FC002-300	057-BA003-300	3.000	2.375	5.000	2.375	1.000	5.500	.375	15°	30°	.531	1/2-13	12	4.000	.875	3.125
057-FC002-350	057-BA003-350	3.500	2.625	5.875	2.625	1.000	7.000	.375	15°	30°	.656	5/8-11	12	4.688	1.000	3.625
057-FC002-400	057-BA003-400	4.000	3.125	6.375	2.625	1.000	7.000	.375	15°	30°	.656	5/8-11	12	5.188	1.000	4.125
057-FC002-450	057-BA003-450	4.500	3.625	6.875	3.125	1.000	8.000	.375	15°	30°	.656	5/8-11	12	5.688	1.500	4.625
057-FC002-500	057-BA003-500	5.000	4.000	7.375	3.125	1.000	8.000	.375	15°	30°	.656	5/8-11	12	6.188	1.500	5.125
057-FC002-550	057-BA003-550	5.500	4.500	8.250	3.875	1.250	9.000	.375	15°	30°	.781	3/4-10	12	6.875	1.875	5.625

Miller H Series Hydraulic Cylinders

Cylinder Stroke Adjustment Options

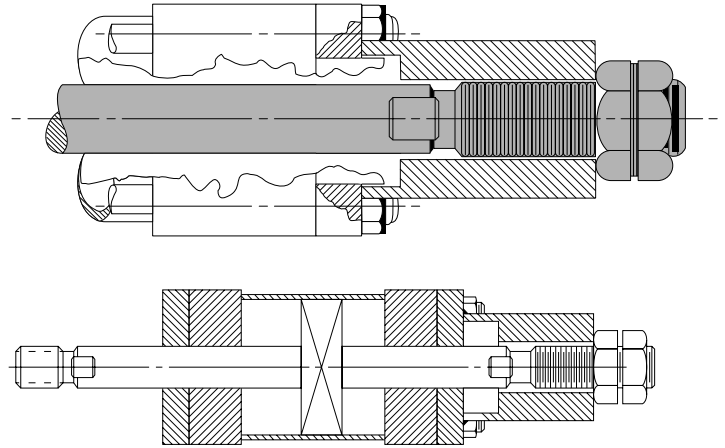
Adjustable on Retract Stroke

Available at additional cost. Stroke adjusting screw is furnished in cap end of cylinder. Turning it in or out limits the retract stroke to the precise length desired. Note: Stroke adjustments should be made at Zero fluid pressure only. Teflon Tru-Seal fitting provides positive seal against leakage, as well as providing adjustment lock. Cap end cushion not available with this option.



Adjustable on Extend Stroke

Available at additional cost. Using a double rod end cylinder, the extend stroke can be adjusted by repositioning the lock nuts on the threaded rod extension on the adjustment end.



Other Available Cylinder Modifications

Rod End Modifications

Miller can produce a wide variety of custom rod end styles such as special threads and non-standard size turndowns. For unusual modifications, involving more than just a change in dimensions, submit a sketch or drawing to Miller for a determination as to cost and feasibility.

Special Ports

Standard H cylinder ports are SAE. However, equivalent NPT or oversize SAE or NPT ports are available as options.

Air Bleeds

Miller cylinders can be ordered with optional self or manual air bleeds.

Heavy Chromed Tubes and Piston Rods

Miller can provide an optional 0.002 to 0.003 inch heavy chrome plating on cylinder tube I.D. and piston rods.

Stainless Steel Piston Rods

Miller can supply cylinders with 17-4 or other types of stainless steel piston rods. Contact Miller Fluid Power application engineering department regarding any special piston rod material.

More Options

Viton Seal Materials

Designs to meet specialized requirements: Nuclear, ASME, ABS, AWWA, SUB SEA, and Various Automotive Industry and Military Specifications.

Special Coatings and Painting

Grease Fitted Rod Bushing

External Drainback

End of Stroke Magnetic Principle Type Proximity Switch

Specify on Order:
Magnetic Principle Proximity Switch

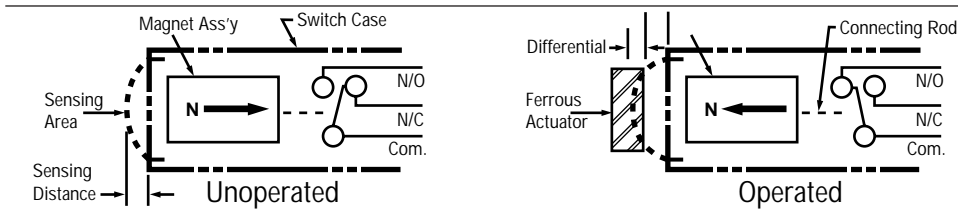
Reliable: Proximity type sensor never contacts cylinder moving parts; eliminating wear and adjustments.

Positive Action: Multiple magnet design provides "snap action". Eliminates creep and false signals.

Versatile: Sealed stainless steel switch body can be used with any operating fluid and is impervious to most environmental conditions.



OPERATING PRINCIPLE



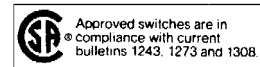
Switch Options
Pressure ratings to 5000 PSI.
Quick disconnect.
Explosion proof.
Sub sea, to 2000 feet depths.
Extra-long leads.

As shown in the sketches above, these switches are magnetically operated. Dual magnets provide a dependable "snap action" for positive position sensing.

In the "unoperated" position, the magnet assembly is attracted in the direction of the arrow, causing a finely ground stainless steel connecting rod to hold the contacts open.

In the "operated" position a ferrous part (cushion or piston) enters the sensing area and attracts the magnet assembly which causes the rod to draw the contacts closed.

Specifications

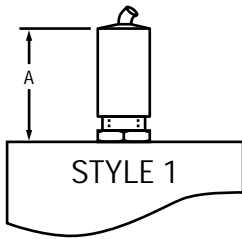


Switch Type:
Magnetic Principle
Contacts:
Single Pole-Double Throw (SPDT)
Contact Rating*:
2 Amp at 110-240 VAC (UL & CSA) 100 MA at 12 VDC 50 MA at 24 VDC (CSA)
Note: Check current draw of solenoid valves.
Connection: 18" long, 3 wire, potted in cable.
Can be wired Normally Open or Normally Closed. Leads are tagged (Com, N/O, N/C)
Pressure Rating: 3000 PSI Non Shock

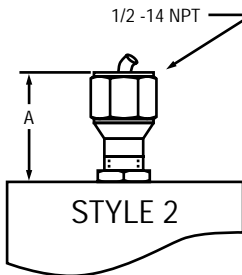
Temperature Range:
- 20°F. to + 200°F (UL 104°F. Max.)
Sensing Gap:
.030 to .060 inch
Trip Point: Factory Set with Piston Bottomed out
Release Point: Approximately 1/4" Piston Travel Min. Cyl. stroke 1/2" on 1 1/2" & 2" bore, 3/4" stroke on 2 1/2" and up.
*UL and CSA approved for industrial control, general purpose use. If Class I, Division 1 or 2 is required, please specify.

Miller H Series Hydraulic Cylinders

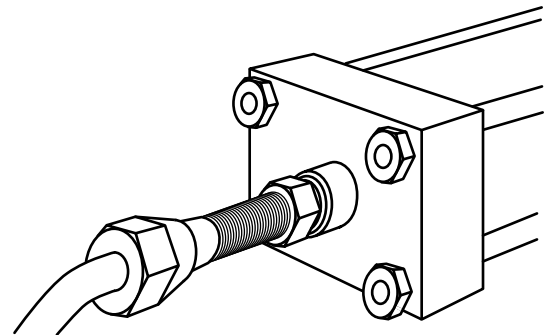
Switch Extension for Standard Side Position or Optional End Cap Position



Standard location for switch mounting is any available side position. Please specify side location (1, 2, 3 or 4) desired. Cylinders are standardized as cushioned. Models 67/68 in positions #2 & #4 require special machining.



BORE		ROD		SWITCH EXTENSION IN INCHES							
				EXCEPT MODEL 67/68 POS 2 OR 4				MODEL 67/68 POS 2 OR 4			
				HEAD		CAP		HEAD		CAP	
A	STYLE	A	STYLE	A	STYLE	A	STYLE	A	STYLE		
1½	.625	2.64	1	2.39	1	2.69	2	2.44	2		
	1.000	2.76	1	2.39	1	2.82	2	2.44	2		
2	1.000	2.57	1	2.26	1	2.44	2	2.13	2		
	1.375	2.70	1	2.26	1	2.57	2	2.13	2		
2½	1.000	3.25	2	2.94	2	2.19	2	1.88	2		
	1.375	3.44	2	2.94	2	2.38	2	1.88	2		
	1.750	3.57	2	2.94	2	2.50	2	1.88	2		
3¼	1.375	2.94	2	2.57	2	3.13	2	2.75	2		
	1.750	3.18	2	2.57	2	3.36	2	2.75	2		
	2.000	3.32	2	2.57	2	2.00	2	2.75	2		
4	1.750	2.93	2	2.32	2	3.11	2	2.50	2		
	2.000	3.07	2	2.32	2	3.25	2	2.50	2		
	2.500	3.38	2	2.32	2	2.07	2	2.50	2		
5	2.000	2.32	2	1.75	2	2.19	2	1.63	2		
	2.500	2.63	2	1.75	2	2.50	2	1.63	2		
	3.000	2.94	2	1.75	2	2.82	2	1.63	2		
	3.500	3.07	2	1.75	2	2.94	2	1.63	2		
6	2.500	2.13	2	2.75	2						
	3.000	2.44	2	2.75	2	N/A		N/A			
	3.500	2.57	2	2.75	2						
	4.000	2.75	2	2.75	2						
7	3.000	1.94	2	2.44	2						
	3.500	2.13	2	2.44	2	N/A		N/A			
	4.000	2.38	2	2.44	2						
	4.500	2.63	2	2.44	2						
8	5.000	2.88	2	2.44	2						
	3.500	1.63	2	2.13	2						
	4.000	1.88	2	2.13	2	N/A		N/A			
	4.500	2.13	2	2.13	2						
	5.000	2.38	2	2.13	2						
	5.500	2.63	2	2.13	2						



Optional mounting in rear face of cap does not require cushion.

TABLE SHOWING EXTENSION OF SWITCH FROM ENDCAP *

* NOTE: THE DEPTH TO WHICH A SWITCH IS INSTALLED MAY VARY AND STILL BE IN SENSING RANGE. THEREFORE, THE CALCULATED EXTENSION OF THE SWITCH IS APPROXIMATE.

End of Stroke Inductive Type Proximity Switch

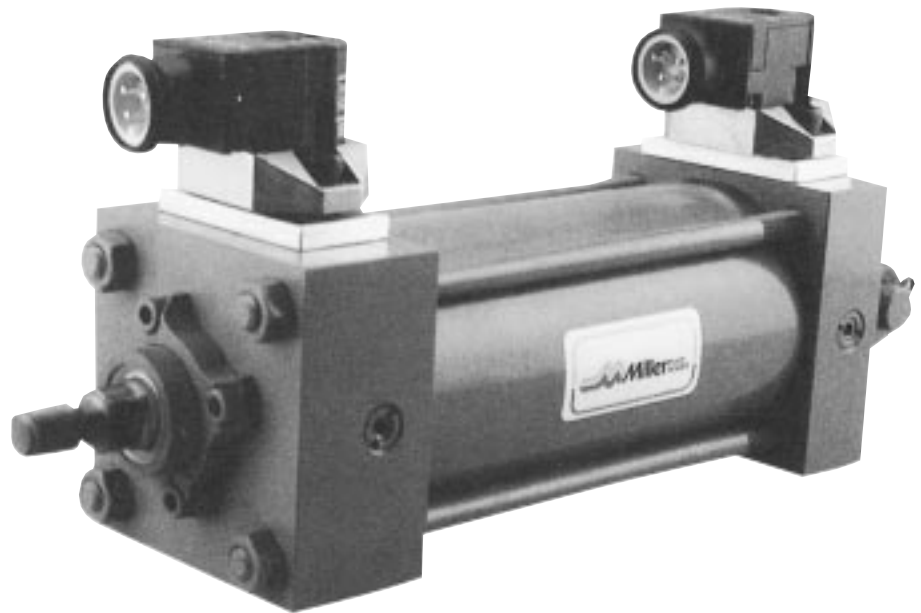
Specify on Order:
Inductive Type Proximity Switch

Proximity Sensor is weld field immune. Switch body may be rotated in 90° increments to position the quick disconnect. Housings meet NEMA 1, 4, & 13 requirements.

This solid state switch emits a small directional radio frequency field. When the cushion plunger enters the field, eddy current losses occur. When these losses exceed a set level, the switch output is energized.

The 2 wire circuit will operate on AC or DC. It operates reliably as a programmable controller input or with relay load. Off state current is factory set at 1.7 mA. The 1.7 mA type will generally allow direct connection to most P.C.'s without adding shunt resistors.

SHORT CIRCUIT PROTECTION is a standard feature on AC models. Unique Short Circuit Protection (SCP) protects the switch from shorts in the load or line. Upon sensing a short condition (5 Amp or greater current) the switch assumes a non-conducting mode. The fault condition must be removed and power turned off to reset, preventing automatic restarts. An SCP indicator LED illuminates to indicate a short condition. A second LED illuminates with power on and the switch non-conducting (no target present on N.O. outputs).



Specifications

EE230

Pressure
3000 PSI
Sensing Range
.040 ± 10%
Operating Temp. Range
-20° to 70°C (-4 to 158°F)
Repeatability
.001"
Switching Differential
10%
2-Wire AC
Supply Voltage (50/60 Hz)
20 - 220 VAC/DC

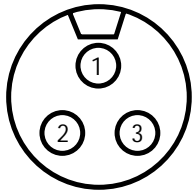
"On-State" Voltage Drop
10V @ 5 - 500 mA
Load Current
Max. 0.5 Amp
Min. 5 mA
Inrush Current (rms 1 cycle)
3 Amp
"Off-State" Current
1.7 mA
Short circuit protection:
standard (SCP)
Indicating LED's: standard
1) Power on/non-conducting
2) SCP mode

Miller H Series Hydraulic Cylinders

Wiring Diagrams

COLOR CODE

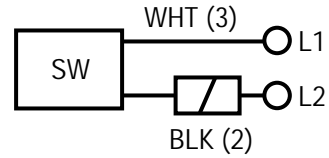
- 1. GREEN
- 2. BLACK
(RED)
- 3. WHITE
(RED)



(3) PIN RECEPTACLE (AC)

3 wire DC only with NPN on PNP output is available. DC versions are 10-30 VDC Sink or Source and are reverse polarity and short circuit protected.

2-WIRE AC/DC



INTERNALLY SHORT
CIRCUIT PROTECTED

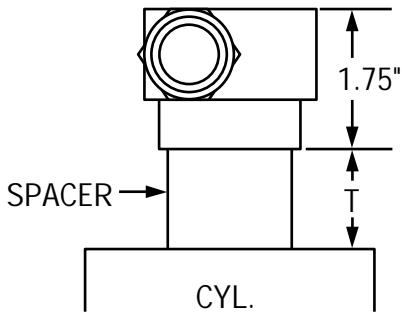
PIN #1 NOT USED.

The 2-wire AC versions are designed to work within one inch of AC resistance welder tips carrying 20,000 Amperes.

Switch and Spacer Heights

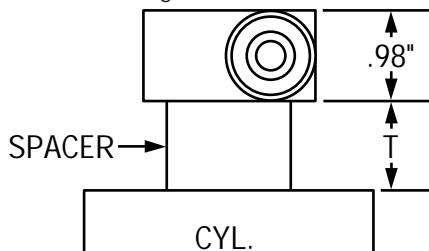
90° ROTATABLE SWITCH

Four mounting holes allow 90° rotation increments



LOW PROFILE SWITCH

Two mounting holes allow 180° rotation



Standard location for switch mounting is any available side location. Please specify side location (1, 2, 3, or 4) desired.

BORE	All Models Except 67/68 In Position 2 & 4		Model 67/68 In Position 2 & 4	
	ROD	T	ROD	T
1½	.625	1.088	.625	1.213
	1.000	.693	1.000	1.338
	CAP	.838	CAP	.963
2	1.000	1.025	1.000	.963
	1.375	1.150	1.375	1.088
	CAP	.713	CAP	.650
2½	1.000	.150	1.000	.713
	1.375	.338	1.375	.900
	CAP	.463	CAP	.401
3¼	1.375	.463	1.375	.150
	1.750	.177	1.750	.385
	CAP	.276	CAP	.677
4	1.750	.443	1.750	1.025
	2.000	.588	2.000	.276
	CAP	.838	CAP	.425
5	2.000	.838	2.000	.900
	2.500	.338	2.500	.425
	CAP	.276	CAP	.338
6	2.500	.650	2.500	.463
	3.000	.150	3.000	.775
	CAP	.677	CAP	**
7	3.000	.463	3.000	**
	3.500	.650	3.500	.276
	CAP	.365	CAP	**
8	3.500	.150	3.500	**
	4.000	.401	4.000	**
	CAP	.838	CAP	**

** Check with Miller Application Engineering.

Miller H Series Hydraulic Cylinders

LDT Cylinders



Description

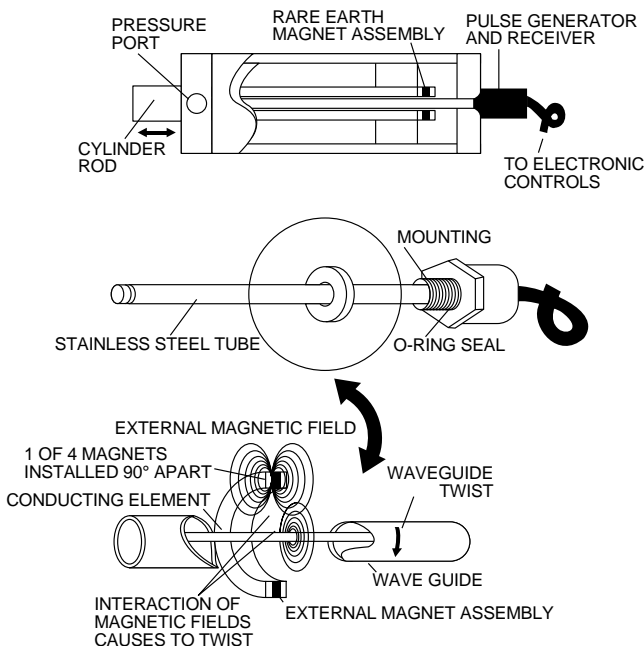
Miller Fluid Power Position Sensing Cylinders (PSC) with LDT magnetostrictive transducers provide versatile, high-response, and non-contacting position sensing.

The LDT consists of a conducting wire element in a waveguide internal to the cylinder rod. As the permanent magnet moves with the piston, an interaction of magnetic fields creates a waveguide twist which is converted from a strain pulse to an electrical output signal. The time interval from the pulse generator input to the conducting wire and the waveguide strain return pulse is the linear displacement measure. Position sensing is then determined by the digital or analog output voltage produced in the transducer electronics proportional to the magnet (piston) position.

Transducer Performance Specifications

Resolution.....	0.005 inches to 0.00005 inches dependent on electronics
Linearity.....	0.05% of full stroke
Repeatability.....	0.002% of full stroke
Maximum Hysteresis.....	0.0008 inches
Maximum Speed.....	20 inches/second
Frequency Response.....	50 to 200 Hz dependent on stroke and update time
Maximum Pressure.....	3000 PSI
Temperature Range.....	-40°F to 150°F

Design Features



Unique design and state-of-the-art electronics allows for the integration of non-contacting transducers in heavy duty hydraulic cylinders. Infinite resolution, superior linearity, excellent stability, and "wear-free" operation provides enhanced system performance, maximum application accuracy, and improved productivity.

Wide range of transducer output signals interface with electronic modules and motion controllers for versatile system capability, multiplexing control schemes, and special application requirements.

Robust transducer electronics head is sealed and hardened for high vibration and shock use. The waveguide and wire is protected from possible damage by a stainless steel tube enclosure. Integral transducer mounting design provides ease of maintenance and reduced down-time.

Absolute position measurement ensures output voltage dependent on magnet (piston) position, thus calibrations are not required for electrical power on/off start-ups.

Cost competitive position sensing in a NFPA hydraulic cylinder with excellent price to performance ratio.

Standard Specifications

Method of Position Sensing.....	Magnetostrictive Transducer LDT
Maximum Stroke.....	120 inches
Minimum Rod Diameter.....	1 inch
Bore Sizes.....	2 to 8 inches
Mounting.....	12 styles
Adapter Valve Manifolds.....	NFPA-D03, D05, Servo 0.875

Transducer Electrical Options

Input Voltage Requirements.....	±15VDC/24VDC
Analog Output Voltages.....	0 VDC to + 10 VDC (with additional electronic modules)
Digital Output Voltages.....	TTL level (with additional electronic modules)
	-10 VDC to + 10 VDC 4 to 20 MA optional 0 and + 5VDC, 0 to + 10VDC optional

Miller H Series Hydraulic Cylinders

LRT Cylinders



Description

Miller Fluid Power Position Sensing Cylinders (PSC) with LRT linear resistive transducers provide simple, reliable, and cost-effective position sensing.

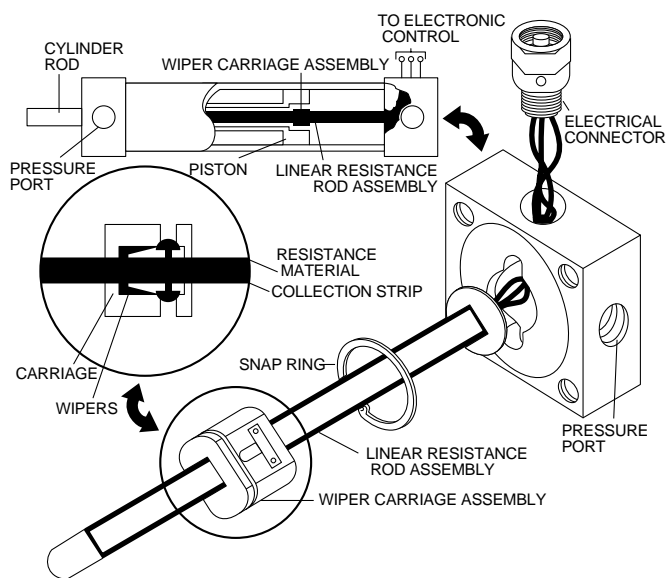
The LRT consists of a resistance element assembly internal to the cylinder rod with a wiper carriage installed in the piston head. As the wiper moves with the piston, an electrical circuit is created between the upper resistive element and the lower collector strip. Wiper voltage is directed from the collector through wiring to an electrical connector. Position sensing is then determined by the analog output voltage proportional to the wiper (piston) position on the resistive element.

Note: Standard LRT design not suitable for use with Phosphate Ester or high water content fluids.

Transducer Performance Specifications

Resolution.....	Infinite
Linearity.....	0.1% to 46 inches 1% to 120 inches
Repeatability	0.001 inch minimum
Maximum Speed.....	20 inches/second
Maximum Pressure.....	3000 PSI
Temperature Range.....	-40°F to 180°F 300°F Optional
Minimum Durability	500 million inches of stroke (for transducer)

Design Features



High performance, low cost design allows for the addition of a position sensing device to heavy duty hydraulic cylinders. Infinite resolution, excellent linearity, resistance stability, and long life, provides increased productivity, improved reliability, and repeatable tolerances.

Simple analog feedback signals interface with motion controllers without complex transducer signal conditioning, thus offering minimum start-up time and ease of use for engineers or operators.

Compact transducer design is protected in the cylinder from severe environments and possible damage. *Slide-off* wiper carriage allows for fast and economical cylinder seal retrofits including *snap-ring* replacement of the wiper carriage in the piston, if necessary.

Economical position sensing in a NFPA hydraulic cylinder with only an extension of one (1) inch overall length provides for standard mounting options in existing applications.

High pressure rating and solderless electrical connector are options offered as standard features for maximum package integrity and design flexibility. High temperature (300°F) versions are available.

Standard Specifications

Method of Position Sensing.....	Linear Resistive Transducer LRT
Maximum Stroke.....	120 inches
Minimum Rod Diameter.....	5/8 inch up to 20 inches stroke
Bore Sizes.....	1 1/2 to 8 inches
Mounting	All NFPA styles

Transducer Electrical Options

Input Voltage Requirements.....	5 to +50VDC maximum
Analog Output Voltages	0 VDC to + 10 VDC (with additional electronic controllers)
	-10 VDC to + 10 VDC 4 to 20 MA optional

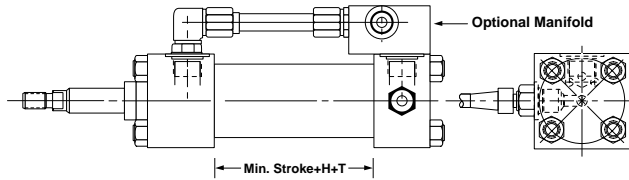
Miller H Series Hydraulic Cylinders

LDT Cylinders

LRT & LDT Mounting Configurations

Various types of transducers will affect the overall length of the cylinder. The length to be added to the cylinder is shown in the charts below for each of the designs and bore sizes. Pressure limitations apply for the different bore and rod combinations as shown below. If the particular mounting style you are using on the cylinder also has a pressure limitation, the lower of the two pressure limitations should be considered as the maximum rating of the cylinder. Optional manifolds are available for various circuits with proportional valves, etc. Contact Miller Systems Engineering for special circuit requirements.

LRT cylinders can be furnished with any of the mounting styles shown in this catalog that do not interfere with the electrical connector in the cap. Standard position of the electrical connection is position #2 in the cap. Optional positions are #1, #3, or #4 except where the pressure port is located.



BORE SIZE	T
1 1/2-4"	1"
5-8"	0"

PRESSURE LIMITATIONS

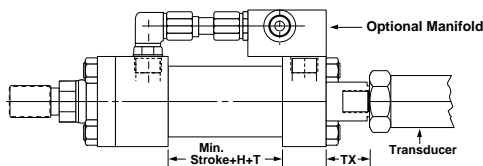
BORE	ROD	PRESSURE RATE (PSI)
1 1/2	1	3000
	O.S.	2600
2	1	1600
	O.S.	3000
2 1/2	1	1600
	O.S.	3000
3 1/4	1 3/8	2000
	O.S.	3000
4	1 3/4	2000
	O.S.	3000
5	2	2000
	O.S.	3000
6	2 1/2	2500
	O.S.	3000
7	3	2700
	O.S.	3000
8	3 1/2	2600
	O.S.	3000

NOTES:

- *Min stroke is required for piping installation. May use stop tube to compensate this stroke.
- Manifold block will extend beyond cap rear face in some bore sizes. Contact MFP application engineering for those sizes.

BORE SIZE	* MIN STROKE REQ'D			
	D03	D05	D08	SERVO-VALVE
2"	3			3
2 1/2	2 7/8			2 7/8
3 1/4		3 5/8	5 1/2	3 5/8
4		3 3/8	5 1/4	3 3/8
5		3 7/8	5 3/4	3 7/8
6		3 3/4	5 5/8	3 3/4
7		3 1/4	5 1/8	3 1/4
8		2 1/2	4 3/8	2 1/2

LDT cylinders have the transducer attached to the center rear face of the cap. Any mounting that does not interfere with the center face of the cap can be used with this standard design. The actual transducer length depends upon the manufacturer and can range between 3" and 4".



BORE SIZE	T
2-2 1/2"	1/4"
3 1/4-8"	0"

PRESSURE LIMITATIONS

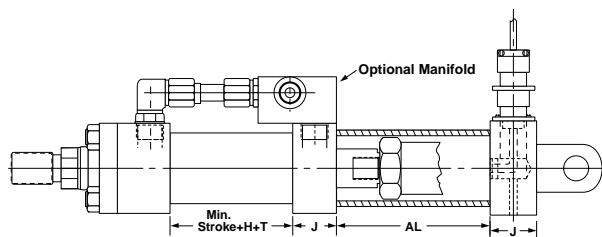
BORE	ROD	PRESSURE RATE (PSI)
2	1 3/8	3000
	O.S.	3000
2 1/2	1 3/8	2000
	O.S.	3000
3 1/4	1 3/8	2000
	O.S.	3000
4	1 3/4	2800
	O.S.	3000
5	2	2000
	O.S.	3000
6	2 1/2	2500
	O.S.	3000
7	3	2700
	O.S.	3000
8	3 1/2	2600
	O.S.	3000

NOTES:

- *Min stroke is required for piping installation. May use stop tube to compensate this stroke.
- Manifold block will extend beyond cap rear face in some bore sizes. Contact MFP application engineering for those sizes.

BORE SIZE	* MIN STROKE REQ'D				
	D03	D05	D08	SERVO-VALVE	TX
2"	4			4	1 29/64
2 1/2	3 7/8			3 7/8	1 29/64
3 1/4		4 5/8	6 1/2	4 5/8	1 29/64
4		4 3/8	6 1/4	4 3/8	1 29/64
5		3 7/8	5 3/4	3 7/8	1 29/64
6		3 3/4	5 5/8	3 3/4	6 1/64
7		3 1/4	5 1/8	3 1/4	0
8		2 1/2	4 3/8	3 1/4	0

LDT cylinders used with cap clevis type mountings can be furnished with the intrinsic mounting design shown. This design can also be specified for purposes of protecting the transducer. Dimensions H and J can be found on the mounting pages of this catalog.



BORE SIZE	T
2-2 1/2"	1/4"
3 1/4-8"	0"

PRESSURE LIMITATIONS

BORE	ROD	PRESSURE RATE (PSI)
2	1 3/8	3000
	O.S.	3000
2 1/2	1 3/8	2000
	O.S.	3000
3 1/4	1 3/8	2000
	O.S.	3000
4	1 3/4	2800
	O.S.	3000
5	2	2000
	O.S.	3000
6	2 1/2	2500
	O.S.	3000
7	3	2700
	O.S.	3000
8	3 1/2	2600
	O.S.	3000

NOTES:

- *Min stroke is required for piping installation. May use stop tube to compensate this stroke.
- Manifold block will extend beyond cap rear face in some bore sizes. Contact MFP application engineering for those sizes.

BORE SIZE	* MIN STROKE REQ'D				
	D03	D05	D08	SERVO-VALVE	AL
2"	4			4	7 7/8
2 1/2	3 7/8			3 7/8	7 7/8
3 1/4		4 5/8	6 1/2	4 5/8	7 7/8
4		4 3/8	6 1/4	4 3/8	7 7/8
5		3 7/8	5 3/4	3 7/8	7 7/8
6		3 3/4	5 5/8	3 3/4	7 7/8
7		3 1/4	5 1/8	3 1/4	6 1/2
8		2 1/2	4 3/8	2 1/2	6 1/2

Miller H Series Hydraulic Cylinders

Determining the Proper Bore Size

To find the proper bore size for your cylinder, follow these simple steps:

1. In the table below, locate the column headed by the pressure at which you plan to operate the system.
2. Move down that column and find the force or thrust value which is the same as (or next higher value) that which the cylinder will be required to deliver.
3. On the same line, move across the table to the first column. The number shown there is most likely the bore size best suited to delivering the push stroke forces you require. Later checks can confirm whether this bore size is, in fact, the one which best serves your particular application needs.

Bore Size Estimation Table

Cylinder Bores in Inches	Piston Area Square Inches	THEORETICAL PUSH STROKE FORCES IN POUNDS															Oil Consumption Per Inch of Stroke in One Direction (GPI) Gals. Displaced	
		PRESSURES OF OPERATING MEDIUM																
		50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	250 PSI	500 PSI	750 PSI	1000 PSI	1500 PSI	2000 PSI	3000 PSI	4000 PSI	5000 PSI	6000 PSI		
1½	1.767	88	106	141	177	353	442	884	1,325	1,767	2,651	3,534	5,301	7,068	8,835	10,602	.00765	
2	3.142	157	189	251	314	628	786	1,571	2,357	3,142	4,713	6,283	9,426	12,566	15,710	18,852	.01360	
2½	4.909	245	295	393	491	982	1,227	2,455	3,682	4,909	7,364	9,818	14,727	19,636	24,545	29,454	.0213	
3¼	8.296	415	498	664	830	1,659	2,074	4,148	6,222	8,296	12,444	16,592	24,888	33,184	41,480	49,776	.0359	
4	12.566	628	754	1,005	1,257	2,513	3,141	6,283	9,425	12,566	18,849	25,132	37,698	50,264	62,830	75,396	.0544	
5	19.635	982	1,178	1,571	1,964	3,927	4,909	9,818	14,726	19,635	29,453	39,270	58,905	78,540	98,175	117,810	.0850	
6	28.274	1,414	1,696	2,262	2,827	5,657	7,071	14,137	21,205	28,274	42,411	56,548	84,822	113,096	141,370	169,644	.1224	
7	38.485	1,924	2,309	3,079	3,849	7,697	9,621	19,242	28,864	38,485	57,728	76,970	115,455	153,940	192,425	230,910	.1666	
8	50.265	2,513	3,016	4,021	5,027	10,053	12,566	25,133	37,699	50,265	75,398	100,530	150,795	201,060	251,325	301,590	.2176	
10	78.54	3,927	4,712	6,283	7,854	15,710	19,635	39,270	58,905	78,540	117,810	157,080	235,620	314,160	392,700	471,240	.3400	
12	113.10	5,655	6,786	9,048	11,310	22,620	28,275	56,550	84,825	113,100	169,650	226,200	339,300	452,400	565,500	678,600	.4896	
14	153.94	7,697	9,236	12,315	15,394	30,790	38,485	76,970	115,455	153,940	230,910	307,880	461,820	615,760	769,700	923,640	.6664	
16	201.06	10,053	12,064	16,085	20,106	40,201	50,265	100,530	150,796	201,060	301,590	402,120	603,180	804,240	1,005M	1,206,360	.8704	
18	254.47	12,723	15,268	20,358	25,447	50,890	63,615	127,235	190,852	254,470	381,705	508,940	763,410	1,017M	1,272M	1,526,820	1.1016	
20	314.16	15,708	18,850	25,133	31,416	62,830	78,540	157,080	235,620	314,160	471,240	628,320	942,480	1,256M	1,570M	1,884,960	1.3600	

Thrusts for operating pressures not shown in the table may be calculated by multiplying the operating pressures by the piston areas.

Miller cylinders have efficiencies greater than 98% at 80 or more PSI on 4" or larger bores. As a result, power losses due to friction are usually negligible and need not be allowed for.

Pull Stroke Cylinder Bores and Forces

To find the force on the pull stroke, you need to know that: "the area on the rod end of the cylinder is less than the cylinder bore by the area of the rod."

To find the force on the pull stroke, you need to know the area of the rod. Example: For a five inch bore cylinder, the standard rod diameter is two inches.

Find two inches in the left most column in the chart below, move along to the right until you find the column headed by the pressure you will be working at. The number shown, is the value you deduct from the push stroke thrust in the chart above. The resultant is the force available for the pull stroke.

Should your pressure be different from those shown in the table, then use the following formula to calculate the pull force.

$$\text{Pull force} = (\text{Bore Area} - \text{Rod Area}) \times \text{Working Pressure.}$$

Piston Rod Diameter in Inches	Piston Rod Area Square Inches	THEORETICAL PULL STROKE FORCES IN POUNDS															Oil Consumption Per Inch of Stroke in One Direction (GPI) Gals. Displaced	
		Deduct the following thrusts or consumptions corresponding to rod size from push stroke pressures or consumptions to determine pull stroke pressure or consumptions																
		PRESSURES OF OPERATING MEDIUM																
		50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	250 PSI	500 PSI	750 PSI	1000 PSI	1500 PSI	2000 PSI	3000 PSI	4000 PSI	5000 PSI	6000 PSI		
5/8	.307	15	18	25	31	61	77	154	230	307	461	614	921	1,228	1,535	1,842	.00133	
1	.785	39	47	63	79	157	196	393	589	785	1,176	1,570	2,355	3,140	3,925	4,710	.0034	
1¼	1.485	74	89	119	149	297	371	743	1,114	1,485	2,228	2,970	4,455	5,940	7,425	8,910	.00673	
1¾	2.405	120	144	192	241	481	601	1,203	1,804	2,405	3,608	4,810	7,215	9,620	12,025	14,450	.01041	
2	3.142	157	189	251	314	628	786	1,571	2,357	3,142	4,713	6,284	9,426	12,568	15,710	18,852	.01360	
2½	4.900	245	294	392	491	980	1,225	2,450	3,675	4,900	7,350	9,800	14,700	19,600	24,500	29,400	.0213	
3	7.069	353	424	566	707	1,414	1,767	3,535	5,302	7,069	10,604	14,138	21,207	28,276	35,345	42,414	.0306	
3½	9.621	481	577	770	962	1,924	2,405	4,811	7,216	9,621	14,432	19,242	28,863	38,484	48,105	57,726	.0417	
4	12.566	628	754	1,005	1,257	2,513	3,142	6,283	9,425	12,566	18,849	25,132	37,698	50,264	62,830	75,396	.0544	
4½	15.904	795	954	1,272	1,590	3,181	3,976	7,952	11,928	15,904	23,856	31,808	47,712	63,616	79,520	95,424	.0688	
5	19.635	982	1,178	1,571	1,964	3,927	4,909	9,818	14,726	19,635	29,452	39,270	58,905	78,540	98,175	117,810	.0850	
5½	23.758	1,188	1,425	1,901	2,376	4,752	5,940	11,879	17,819	23,758	35,657	47,516	71,274	95,032	118,790	142,548	.1028	
7	38.485	1,924	2,309	3,079	3,849	7,697	9,621	19,242	28,864	38,485	57,728	76,970	115,455	153,940	192,425	230,910	.1666	
8	50.265	2,513	3,016	4,021	5,027	10,053	12,566	25,133	37,699	50,265	75,398	100,530	150,795	201,060	251,325	301,590	.2176	
9	63.617	3,180	3,817	5,089	6,361	12,722	15,900	31,800	47,712	63,617	95,400	127,234	190,850	254,468	318,085	381,700	.2754	
10	78.54	3,927	4,712	6,283	7,854	15,710	19,635	39,270	58,905	78,540	117,810	157,080	235,620	314,160	392,700	471,240	.3400	

Having chosen your bore size, you are now ready to verify whether the standard port size will provide the cylinder speed you require. Follow these simple steps to find out:

1. Divide your cylinder stroke length (in inches) by the length of time (in seconds) permitted for the stroke to take place. Multiply the result by 60 to obtain the stroke speed in inches per minute.

Example: 20-inch stroke, 2 seconds
 $20 \div 2 = 10$ inches/second
 $10 \times 60 = 600$ inches/minute

2. In the Bore Size Estimation Table on Page 71, right hand column of chart, find the oil consumption per inch of stroke for the cylinder bore you have chosen. Multiply the stroke speed calculated in Step 1 by the oil consumption per inch of stroke. This will give you the oil consumption per minute.

Example: $3\frac{1}{4}$ -inch bore, push stroke cylinder
 $600 \times 0.0359 = 21.54$ gallons/minute

3. Find the standard port size for the cylinder you have chosen by returning to the appropriate series section and locating dimension "EE" for your bore size in the table of common dimensions.

Example: $3\frac{1}{4}$ -inch bore Cylinder
 Dimensional Table shows -12 SAE Port or $\frac{3}{4}$ -14 NPT, which means the standard port size is $\frac{3}{4}$ inch (and has 14 NPT threads per inch of length).

4. In the Pipe and Port Size Table on Page 73 find the value for oil flow (in gallons per minute) which is in the "15 feet per second" column and the row corresponding to your standard port size.

Example: $\frac{3}{4}$ inch port
 Table row " $\frac{3}{4}$ S", column "15 ft. per sec."
 shows 25.17 gallons per minute

5. If the flow rate found in Step 4 is greater than or equal to that calculated in Step 2, then the standard size port is adequate, and you should proceed to the next step. If the Step 4 rate is less than the Step 2 rate, then return to the Pipe and Port Size Table and find the flow rate value in the "15 ft. per sec." column which is equal to (or larger than but closest to) the Step 2 flow rate. In the same row, move across the table to the first column and find the proper oversize port dimension.

Example: 25.17 is the number shown in the "15 ft. per second column" which is larger than but closest to 21.54. Looking across to the first column $\frac{3}{4}$ S, which means $\frac{3}{4}$ inch NPT or -12 SAE standard port would be adequate.

Calculating System Pressure Drop

To insure that your hydraulic pump will maintain the desired operating pressure, calculate the pressure drop of the system by following these steps:

1. Write down each of the following for your system:

- Length of straight pipe from pump to cylinder
- Number of elbow fittings
- Number of tee fittings
- Number of 2- and 3-way valves
- Number of 4-way valves

2. Refer to the right hand columns in the Pipe and Port Size Table on Page 73, and in the row which corresponds to your pipe (port) size, find and note the equivalent per foot pipe length for your fittings and valves ("b" through "e" above). Multiply the equivalent lengths by the number of each type of valve or fitting you have.

Example: $\frac{3}{4}$ -inch ports and pipe
 3 elbows $3 \times 2.2 = 6.6$
 1 tee $1 \times 4.6 = 4.6$
 1 2-way valve $1 \times 30^* = 30.0$
 * 30 is midway between 10 and 50

3. Add up the equivalents in Step 4 and the length of straight pipe in the system.

Example: 18 feet of straight pipe
 $6.6 + 4.6 + 30.0 + 18.0 = 59.2$ ft.

4. Return to the Pipe and Port Size Table on Page 73 and in the "15 ft. per sec. column" and row which corresponds to your pipe (port) size, find the per foot pressure drop. Multiply this value by the system length calculated in Step 3.

Example: $\frac{3}{4}$ -inch pipe
 1.17×59.2
 $= 69.3$ PSI of pressure drop

5. Subtract the pressure drop arrived at in Step 4 from the rated pressure for your hydraulic pump to determine the actual available pressure. If the available pressure is equal to or greater than the operating pressure you had been planning to use, then there is no problem and you may proceed to the next page. But if it is less, you should consider reducing the pressure drop by going to oversize ports and pipe, if you have not already done so.

Miller H Series Hydraulic Cylinders

Pipe and Port Size Table

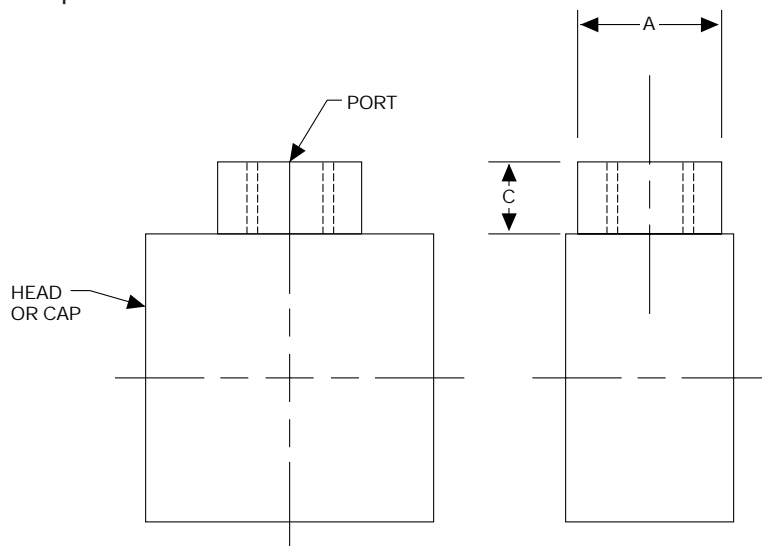
Butt Welded Steel Clean Pipe				Oil Flow (Gallons per Minute) and Friction Pressure Drop (Pounds per Square inch) Per Foot Length Pipe												Equivalent Length of Straight Pipe in Feet for Various Fittings				
				Velocity = 5 ft. per sec.		Velocity = 10 ft. per sec.		Velocity = 15 ft. per sec.		Velocity = 20 ft. per sec.		Velocity = 25 ft. per sec.		Velocity = 30 ft. per sec.						
* Pipe Size	Burst Press PSI	In-ternal Dia. Inches	In-ternal Area Sq. in.	Gals. per Min.	Pres-sure Drop in PSI	Gals. per Min.	Pres-sure Drop in PSI	Gals. per Min.	Pres-sure Drop in PSI	Gals. per Min.	Pres-sure Drop in PSI	Gals. per Min.	Pres-sure Drop in PSI	Gals. per Min.	Pres-sure Drop in PSI	Pipe Size	Elbow	Tee	Cyl. and 2&3 Way Valves	4 Way Valve
3/8 S	10,754	.493	.191	2.99	.58	5.98	1.99	8.97	2.35	11.96	3.71	14.95	5.44	17.94	7.31	3/8	1.3	3.0	5 to 25	10 to 50
1/2 S	10,784	.622	.304	4.74	.39	9.48	.82	14.31	1.65	18.96	2.75	23.70	4.00	28.44	5.36	1/2	1.5	3.3	6 to 30	12 to 60
3/4 X	11,728	.742	.433	6.76	.27	13.52	.69	20.28	1.38	27.04	2.15	33.80	3.12	40.56	4.15					
3/4 S	8,608	.824	.533	8.39	.22	16.78	.59	25.17	1.17	33.56	1.80	41.95	2.60	50.34	3.44	3/4	2.2	4.6	10 to 50	20 to 100
1 1/4 XX	18,408	.896	.630	9.83	.18	19.66	.54	29.49	1.07	39.32	1.64	49.15	2.37	58.98	3.13					
1 X	10,888	.957	.719	11.21	.16	22.42	.49	33.63	.97	44.84	1.54	56.05	2.22	67.26	2.93					
1 S	8,088	1.049	.864	13.59	.14	27.18	.43	40.77	.85	54.36	1.40	67.95	1.94	81.54	2.67	1	2.8	5.7	13 to 65	25 to 125
1 1/2 XX	16,840	1.100	.950	14.81	.13	29.62	.41	44.43	.81	59.24	1.34	74.05	1.86	88.86	2.44					
1 1/4 X	9,200	1.278	1.283	20.15	.11	40.30	.33	60.45	.65	80.60	1.07	100.75	1.53	120.90	2.00					
1 1/4 S	6,744	1.380	1.495	23.48	.10	46.96	.31	70.44	.60	93.92	.91	117.40	1.29	140.88	1.76	1 1/4	3.7	7.8	15 to 75	30 to 150
1 1/2 X	8,416	1.500	1.767	27.49	.09	54.98	.28	82.47	.53	109.96	.84	137.45	1.19	164.94	1.62					
2 XX	15,360	1.503	1.774	27.59	.09	55.18	.28	82.77	.53	110.36	.84	137.95	1.19	165.54	1.62					
1 1/2 S	6,104	1.610	2.036	31.68	.08	63.36	.25	95.04	.48	126.72	.71	158.40	1.05	190.08	1.43	1 1/2	4.4	9.2	20 to 100	40 to 200
2 1/2 XX	14,680	1.771	2.464	38.32	.07	76.64	.22	114.96	.40	153.28	.64	191.60	.94	229.92	1.30					
2 X	7,336	1.939	2.953	45.98	.06	91.96	.19	137.94	.36	183.92	.59	229.90	.87	275.88	1.11					
2 S	5,184	2.067	3.355	52.36	.05	104.72	.17	157.08	.32	209.44	.53	261.80	.77	314.16	1.05	2	5.5	12.0	25 to 125	50 to 250
3XX	13,714	2.300	4.155	64.87	.05	129.74	.15	194.61	.28	259.48	.47	324.35	.70	389.22	1.00					
2 1/2 X	7,680	2.323	4.238	66.55	.05	133.10	.15	199.65	.28	266.20	.47	332.75	.69	399.30	.97					
2 1/2 S	5,648	2.469	4.788	74.75	.04	149.50	.14	224.25	.26	299.00	.44	373.75	.65	448.50	.88	2 1/2	6.7	14.0	30 to 150	60 to 300
3 X	6,856	2.900	6.605	103.34	.04	206.68	.11	310.02	.21	413.36	.35	516.70	.52	620.04	.72					
3 S	4,936	3.068	7.393	114.89	.03	229.78	.10	344.67	.19	459.56	.33	574.45	.49	689.34	.66	3	8.3	17.5	35 to 175	70 to 350

S = Standard weight pipe X = Extra strong XX = Double extra strong

The pressure drop shown in the above table is for butt welded clean steel pipe. Pressure drop is the same regardless of operating pressure. Avoid large pressure drops in LOW PRESSURE SYSTEMS. Note that oil flows at high velocity (up to 30 ft. per sec.) with small pressure drop loss through large pipes but results in prohibitive loss in small pipes at this speed. Pipe line velocities in excess of 15ft./sec. might result in excessive shock loading. Hydraulic oil shown is approximately 225 S.S.U. at 100° F.— .88 specific gravity at 60° F, relative to water at 60° F. Approximate specific gravity at 100° F — .865. For water, the above figures are conservative (write to Miller for detailed calculations).

In order to accommodate large pump volumes without severe pressure drops, Miller hydraulic cylinders are available in most models with oversize ports with welded half pipe couplings or flange fittings. For tubing use I.D. in table closest to your tubing I.D.

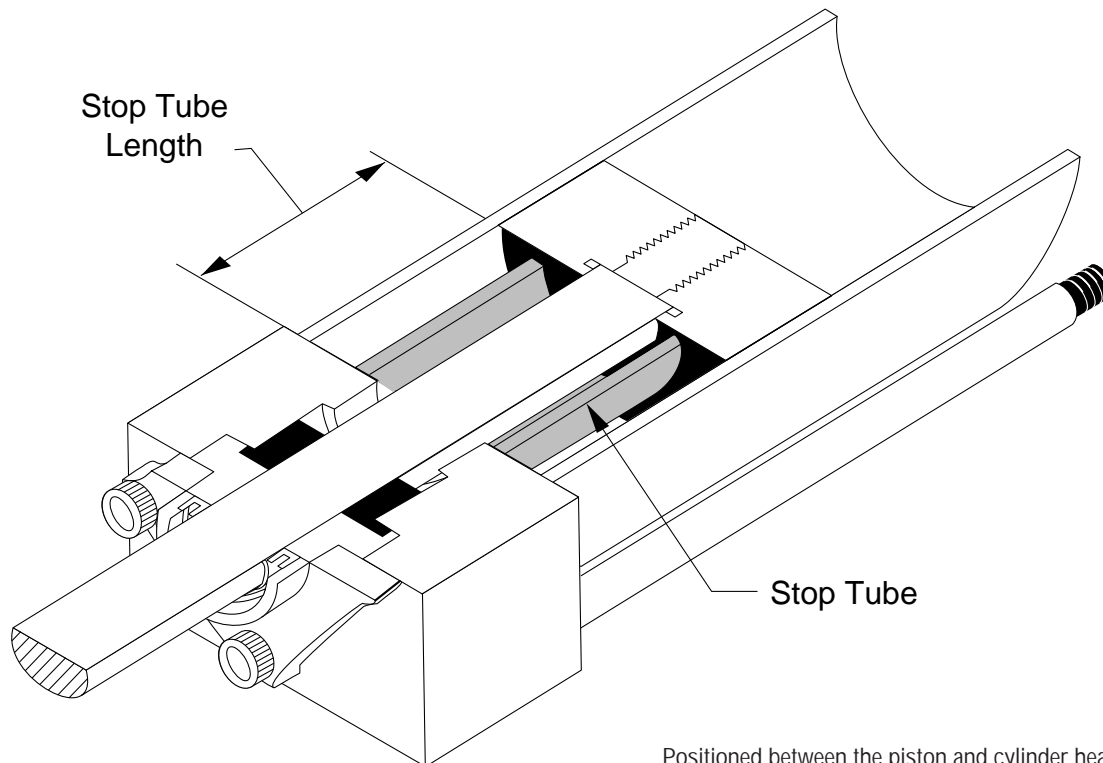
Welded Oversize Ports 3000 psi Maximum Service



NPT PORT	A	C
3/4-14	1 3/8	1
1-11 1/2	1 3/4	1 3/16
1 1/4-11 1/2	2 1/4	1 5/16
1 1/2-11 1/2	2 1/2	1 9/16
2-11 1/2	3	1 11/16
2 1/2-8	3 5/8	1 13/16
3-8	4 1/4	2 1/8
3 1/2-8	4 3/4	2 1/4

SAE Port Dash #	Thread	A	C
(-6)	9/16-18	.875	.700
(-8)	3/4-16	1.125	.850
(-10)	7/8-14	1.375	.950
(-12)	1 1/16-12	1.375	.950
(-14)	1 3/16-12	1.625	1.100
(-16)	1 5/16-12	1.625	1.100
(-20)	1 5/8-12	2.125	1.100
(-24)	1 7/8-12	2.500	1.100
(-32)	2 1/2-12	3.000	1.200

The use of a stop tube is a generally accepted and preferred method for reducing piston and bearing loads on long push stroke cylinders and, additionally, for preventing jack-knifing or buckling of horizontally mounted, long stroke cylinders on push stroke. Stop tubes are more effective, less costly, and lighter in weight than oversize piston rods.



Positioned between the piston and cylinder head, a stop tube restricts the extended position of the rod so that the added distance between the piston and bushing results in less strain, wear, and bearing load.

Determining the Length and Need For Stop Tube

Follow these simple steps to determine whether your cylinder requires a stop tube, and, if so, how long it should be.

1. Examine the groups of cylinders illustrated on Page 75 and determine which, if any, of the mounting configurations corresponds to your cylinder application and model number.

2. If your cylinder mounting style corresponds to any of those in Group A, then no stop tube is required. But, if cylinder operates on push stroke, an oversize rod may be required and you should check the following page. If your cylinder is like one of those in Group B, then a stop tube is

recommended and you should proceed to Step 3. If your cylinder is similar to one of the Group C illustrations, then you should calculate the turning moments and loads between piston and rod bushing to insure that they are not excessive. Weight of fluid must be included on large dia. or long stroke cylinders. For assistance on this, contact Miller Fluid Power Application Engineering Dept. Next, continue on to Step 3 to determine the length of stop tube needed.

Miller H Series Hydraulic Cylinders

3. Referring to the illustration which corresponds to your cylinder application, determine the value of "L". Be certain to include the thickness of the cylinder head, cap and piston assembly plus twice the length of the cylinder stroke. Then go down the first column of the Stop Tube Table and find the range which encompasses that value of "L". The number shown to the right in the second column is the length of stop tube your cylinder requires.

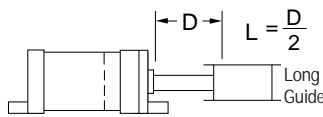
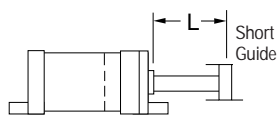
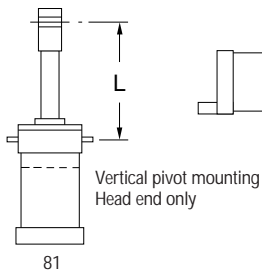
4. Add the stop tube length to your "L" dimension to obtain an "Adjusted L Dimension". This dimension will be used in the procedures on the following page to determine whether your cylinder requires an oversize piston rod in addition to the stop tube except models 53, 61, 63, 65, 67, 81 & 89.

Stop Tube Table

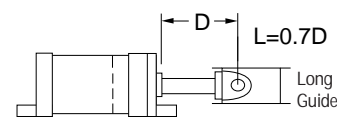
"L" (inches)	Stop Tube Length (inches)	"L" (inches)	Stop Tube Length (inches)
0-40	0	171-180	14
41-50	1	181-190	15
51-60	2	191-200	16
61-70	3	201-210	17
71-80	4	211-220	18
81-90	5	221-230	19
91-100	6	231-240	20
101-110	7	241-250	21
111-120	8	251-260	22
121-130	9	261-270	23
131-140	10	271-280	24
141-150	11	281-290	25
151-160	12	291-300	26
161-170	13	301-310	27

Group A

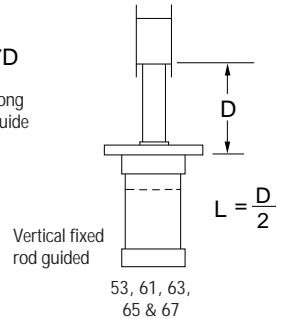
With piston rod extended. To be checked for rod diameter only. Stop tube not required.



For any horizontal or vertical fixed mounting at head and cap end with the load supported & guided
51,54,71,72,73,74,77 and mixed mounts



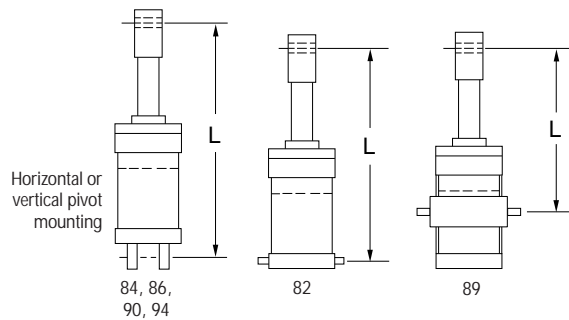
Load Pivot Mtg. Supported & Guided



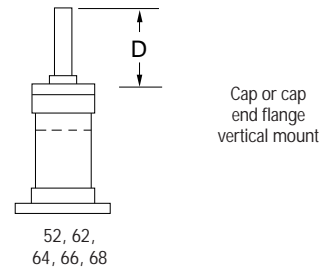
Note: 'L' or 'D' are calculated from mounting point with rod extended.

Group B

To avoid rod buckling or cylinder jackknifing, check for stop tube and rod diameter requirements with piston rod extended. Use cylinder dimensional charts. No stop tube required if cylinder operates on pull stroke only.

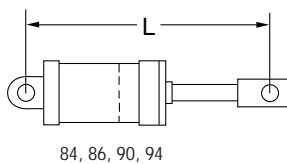


Piston rod guided: $L = 2D$
Piston rod unguided $L = 4D$

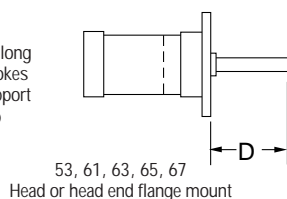


Group C

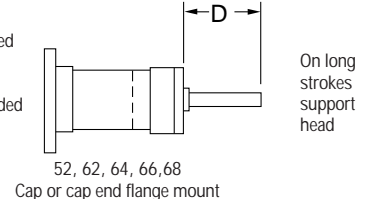
To be checked for Stop tube length and piston rod diameter to eliminate buckling or jackknifing with piston rod extended.



On long strokes support cap



Piston rod guided $L = 2D$
Piston rod unguided $L = 4D$



Miller H Series Hydraulic Cylinders

Oversize Piston Rods for Column Strength on Long Push Stroke Cylinders

Cylinder applications requiring column strength or long cylinder push strokes may need oversize piston rods.

However, Miller Fluid Power cautions against depending upon the higher rigidity of oversize rods to absorb or reduce side loading. Actually, the greater flexibility of a smaller standard diameter rod transmits less side loading back to the piston rod bushing. It is important to use the correct rod diameter based on the various factors involved in your application. Oversize rods, when not needed, merely add to the cylinder price and require longer delivery.

Standard rod diameters are recommended for all pull stroke cylinders. To determine the correct rod diameter for a push stroke application, follow these simple steps.

1. Referring to the Group A through C illustrations on the previous page, determine the value of "L" for your cylinder, or use the "Adjusted L Dimension" calculated in Step 4 on that page.
2. In the Oversize Piston Rod Table, find in the first column your cylinder thrust value which was previously determined.
3. Move across the table to the right end and in the same row locate your "L" or "Adjusted L Dimension". If the exact value is not shown, continue to the next larger number.
4. Go to the top of the column and you will find the correct rod diameter for your cylinder application.

Oversize Piston Rod Table

Thrust in lbs.	PISTON ROD DIAMETER																		
	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"	7"	8"	9"	10"			
250	43	94	146																
400	37	83	134	186															
700	30	68	118	168	202	275													
1,000	27	60	105	155	190	257	330												
1,400	24	53	92	142	174	244	308	385											
1,800	23	48	82	127	160	230	296	366	440										
2,400	19	45	75	114	145	213	281	347	415	488									
3,200	16	41	67	103	130	194	261	329	400	461									
4,000	13	38	63	94	119	175	240	310	378	446									
5,000	9	34	60	87	110	163	225	289	360	426	494								
6,000	5	30	56	82	102	152	208	274	342	410	476								
8,000	5	26	50	76	93	137	188	245	310	375	447								
10,000	4	21	45	70	89	125	172	222	279	349	412	482							
12,000	3	17	41	65	84	118	155	210	269	326	388	454							
16,000		9	34	57	75	110	142	188	235	292	350	420							
20,000		8	28	52	68	103	136	172	218	270	326	385							
30,000		6	12	39	55	87	120	156	189	230	285	330							
40,000			11	22	43	74	108	142	177	210	248	294							
50,000			9	15	30	66	96	130	165	200	234	269	408						
60,000				14	18	57	88	119	154	190	225	256	384						
80,000				12	16	36	71	104	137	170	204	240	336						
100,000					14	22	57	90	120	154	189	222	324	400					
120,000					12	21	45	77	108	140	175	207	313	377					
140,000						19	27	64	98	128	160	194	301	365					
160,000							17	26	47	86	118	148	182	279	350	421			
200,000						14	23	31	67	98	131	161	260	330	402				
250,000								19	28	36	72	109	141	236	301	375			
300,000									25	34	42	86	120	212	281	351	420		
350,000									22	31	39	52	100	195	261	328	396		
400,000										19		37	45	77	182	241	309	374	
500,000												32	41	49	152	212	274	341	
600,000													37	45	114	183	247	310	
700,000														32	41	70	162	221	280
800,000															37	63	118	197	260
900,000																60	82	168	237
1,000,000																57	73	115	212
1,200,000																51	68	84	170
1,400,000																45	62	79	105
1,600,000																	57	74	91
1,800,000																		70	86
2,000,000																		65	82

Values of (L) for slenderness ratios (slenderness ratio = length ÷ radius of gyration = 4 x length ÷ piston rod diameter) greater than 50 have a safety factor of 5 to 1. Values of (L) for slenderness ratios less than 50 are based on compressive strength only (S = thrust ÷ rod area) and have safety factors between 2.4-1 and 5-1 which are directly proportional to (L). (i.e. the greater the value of (L) the greater the safety factor).

Miller H Series Hydraulic Cylinders

Non-Sag Piston Rods for Long Stroke, Horizontally Mounted Cylinders

Miller patented non-sag piston rods reduce bushing wear on long stroke, horizontally mounted cylinders. Keyed in your machinery in their pre-stressed position, to prevent rotation non-sag piston rods remain

straight without the deflections or sag of ordinary rods. Using non-sag piston rods on long stroke cylinders prevents overloading of rod bushing and piston and the resulting costly damage.

Determining If Your Cylinder Requires A Non-Sag Rod

Miller cylinders have a commercial straightness of 0.002 inches per foot of length. The gravity-induced rod sag for horizontally mounted cylinders is given in the Rod Deflection Table. To determine if this sag is excessive, follow these simple directions.

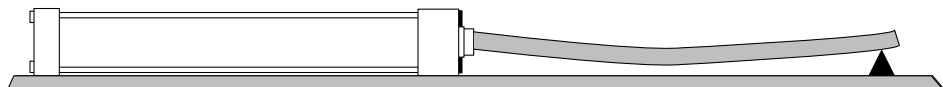
1. After having checked the rod for column strength on the previous page, find your rod diameter in the first column of the table.
2. Read across the table to the column headed by the length of the rod between supports when rod is fully extended, and find the sag in inches which can be expected with a standard rod.
3. If this figure lies within the shaded area of the table, you should specify a non-sag rod.

Rod Deflection Table

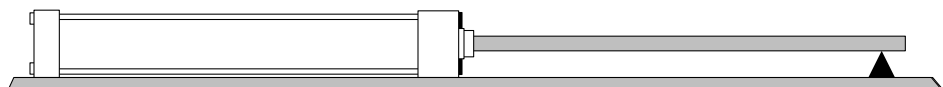
This table shows the deflections in inches of ordinary piston rods at center of span. Length of piston rod between supports is in feet. Rod diameter and sag are in inches.

Dia. Piston Rod	Weight In Lbs. PER FT.	LENGTH OF PISTON RODS (IN FEET) BETWEEN SUPPORTS WITH RODS EITHER EXTENDED OR RETRACTED																							
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
$\frac{5}{8}$	1.043	.065	.134	.255	.425	.675	1.020	1.500	$\frac{5}{8}$ " rod not available in non-sag																
1	2.670	.030	.053	.099	.166	.265	.385	.580	.850	1.160	1.570														
$1\frac{3}{8}$	5.049	.013	.028	.053	.088	.136	.212	.310	.450	.617	.830	1.100	1.418												
$1\frac{3}{4}$	8.178	.008	.017	.033	.054	.086	.130	.192	.278	.380	.515	.680	.870	1.115	1.400										
2	10.680	.006	.013	.025	.042	.066	.101	.148	.212	.290	.390	.525	.670	.850	1.072	1.330									
$2\frac{1}{2}$	16.690	.004	.0085	.016	.027	.042	.064	.094	.136	.186	.240	.335	.430	.545	.685	.856	1.040	1.286	1.520						
3	24.030		.006	.011	.018	.029	.045	.065	.094	.129	.175	.231	.296	.380	.475	.590	.722	.884	1.060	1.270	1.500				
$3\frac{1}{2}$	32.710		.0043	.008	.014	.022	.033	.048	.069	.095	.128	.170	.218	.278	.350	.435	.530	.650	.780	.930	1.100				
4	42.730			.006	.010	.016	.025	.037	.053	.073	.098	.130	.166	.213	.267	.333	.405	.500	.595	.715	.844				
$4\frac{1}{2}$	54.070			.005	.0082	.013	.020	.029	.043	.057	.078	.103	.132	.168	.212	.262	.320	.395	.470	.565	.670				
5	66.760				.0066	.0106	.016	.023	.034	.046	.063	.083	.107	.136	.171	.213	.260	.320	.380	.460	.545				
$5\frac{1}{2}$	80.780				.0055	.0087	.013	.019	.028	.038	.052	.068	.088	.122	.142	.176	.215	.263	.315	.390	.450				
7	130.8					.054	.0083	.0121	.172	.0237	.0319	.0421	.0545	.0695	.0873	.1084	.1331	.1618	.1949	.2329	.2761				
8	170.9						.0063	.0093	.0132	.0182	.0244	.0322	.0417	.0532	.0669	.0830	.1019	.1239	.1493	.1783	.2114				
9	216.3						.0050	.0073	.0104	.0143	.0193	.0254	.0330	.0420	.0528	.656	.0805	.0979	.1179	.1409	.1670				
10	267.0							.0059	.0084	.0116	.0156	.0206	.0267	.0340	.0428	.0531	.0652	.0793	.0955	.1141	.1353				

Standard Cylinder



Non-Sag Rod Miller Cylinder



Miller H Series Hydraulic Cylinders

Keying and Pinning Foot Mounting Cylinders

Foot mount cylinders should be keyed or pinned on the appropriate end to eliminate shearing loads on mounting bolts.

Cylinders with integral key mounts may be used where keyways can be cut in a machine member. This type of mounting accommodates shear loads, provides accurate alignment of the cylinder, and simplifies installation and servicing.

Only one end of a cylinder should be keyed to the machine. If both ends are keyed, there will be no cylinder elasticity to assist in absorbing shocks.

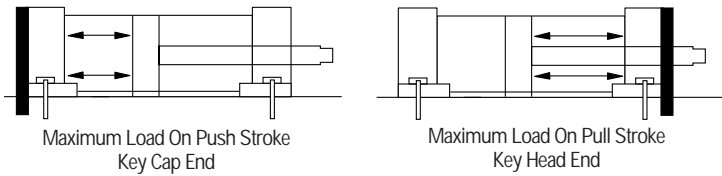
Locating pins may be used instead of shear keys to help take shear loads and to assure proper cylinder alignment. As with keys, cylinders

should be pinned at either end (but not both ends). Contrary to common die design practices, cylinders should never be pinned across corners. To do so can result in severe warping under operating pressures and temperatures.

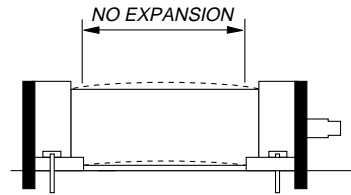
Pivoted mounts should have the same type of pivots at both the cylinder body and rod end. If a simple pivot pin mount is used, the pivot pin axes at each end should be parallel. Trunnion mounts are generally designed to resist only shear loads. Therefore, self-aligning mounts should not be used to support the trunnions, otherwise bending forces can also be set up.

Keying a Cylinder

RIGHT

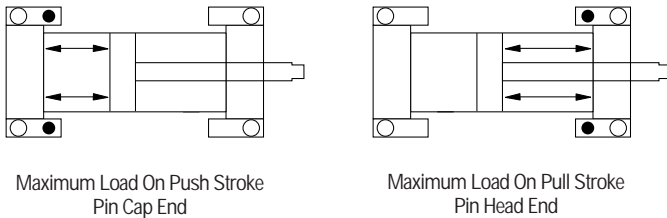


WRONG

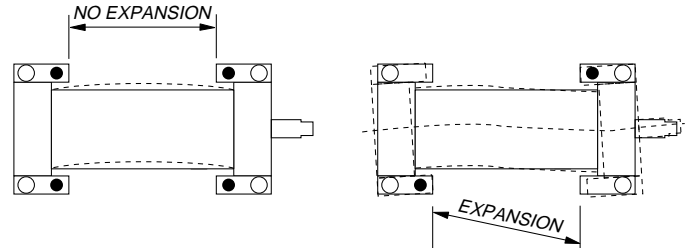


Pinning a Cylinder

RIGHT



WRONG

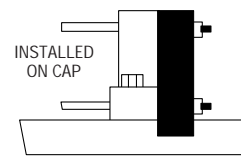
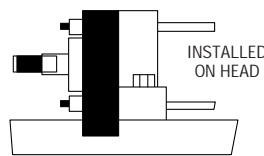
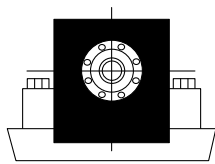


"K" Retainer-Key Extension

Provides Models 71, 72, 74, and 77 with Max. Mounting Rigidity Without Pins or Welded Keys

For a rugged mounting that cannot shift under maximum loads, the "K" retainer-key extension extends the rod retainer plate so that it slips into a slot milled in

machine's mounting surface. "K" retainer thickness is dimension "F*" $\begin{matrix} -0.0140 \\ -0.0145 \end{matrix}$. Extension = $\frac{E}{2}$. Available as option at additional cost.



*See respective mounting pages for dimensions — Square Retainer Section

Installation:

For long, trouble free, safe operation of your cylinders, extra care should be taken in the following areas:

1. Fasteners:

Be sure to select fasteners suitable for the forces involved. The use of Grade 8 or better nuts & bolts is recommended. Due to the wide variety available, contact your bearing supplier for bearing recommendations.

2. Piston Rod Attachment & Rod Accessories:

In attaching machinery components or rod clevises, rod eyes, etc. to Miller Style 2 (Threaded or Turndown Section) or Style 4 (Internally Threaded) Piston Rods, the attachments should be tightened to the torques given in chart 1. This torque or prestress triples the fatigue strength of the rod's threaded section and makes a stronger assembly than attaching the machinery component to a full diameter threaded rod (Style 1) and torquing it against a lock nut. Miller recommends the Style 2 (Threaded on Turndown Section) Rod for most applications. Its square shoulder design helps assure proper alignment of cylinder to mechanism, eliminates need for a jam nut, provides fixed point for more accurate cylinder positioning, simplifies piloting to full rod diameter into mating part.

3. Cylinder Mounting:

Fluid Power Cylinders are designed to be linear actuators. They are intended to provide motion and force along the centerline of the rod. Since they have limited capacity to withstand eccentric or radial loads, they should not be employed as linear bearings. The ideal method of mounting a cylinder to the machine is to have the point of mounting on the equipment machined to the exact dimensions with proper alignment, so that bolting the cylinder in place ensures perfect alignment. In many cases this is not practical from a cost and design standpoint. Therefore, alignment must be secured at the time of installation. Whenever the piston rod is fastened to the machine which confines the cylinder in one position, it is best to bolt the cylinder down as a last operation of assembly. Alignment can be secured in other ways, but the following sequence of installation steps is quite effective:

- A. Assemble the piston rod to the machinery. The piston rod must be fastened and held squarely so its centerline is parallel to the guides of the attached machinery (or parallel to the line of movement of the attached machinery in cases of fixed mounted cylinders.) Torque piston rod to attachment per chart 1.
- B. Insert mounting bolts but do not tighten them.
- C. In the case of horizontally mounted cylinders, it is necessary to support the weight of the cylinder body so as to eliminate strain on the piston rod.
- D. Use feeler gauges under the mounting and shim at these points equal to the space indicated by the feeler gauges.
- E. Finally, tighten the mounting bolts.
- F. If possible, the machine operation should be tested with low pressure air to insure that cylinder and attached parts are operating freely. This should be done with the machine operating under a no load condition.
- G. Insure that all pipes and fittings are clean before connecting them to the cylinder.
- H. Hydraulic filtration should be in accordance with the hydraulic power unit manufacturer's recommendation.

Cylinder Component Torque Values

Chart 1

Piston Rod Torque (ft./lbs.)		
Bores	Thread Size	Torque ft./lbs. *
1½	7/16-20	36
2, 2½	¾-16	125
3¼	1-14	250
4	1¼-12	460
5	1½-12	663
6	1 7/8-12	944
7	2¼-12	1315
8	2½-12	5050
-	3"-12	7070
10	3¼"-12	7940
-	3½"-12	12760
12	4"-12	12560
14	5½"-12	16275
16	6"-8	21600
18	7"-8	30850
20	8"-6	37700

Chart 2

Tie Rod Torque (ft./lbs.)				
Bore	Except Models 61, 62, 65, 66		Models 61, 62, 65, 66	
	Dry	Moly	Dry	Moly
1½	16		13	
2		32		27
2½		50		42
3¼		90		75
4		145		97
5		270		180
6		375		188
7		590		295
8		900		450
10		410		342
12		410		342
14		410		342
16		410		N/A
18		550		N/A
20		560		N/A

Chart 3

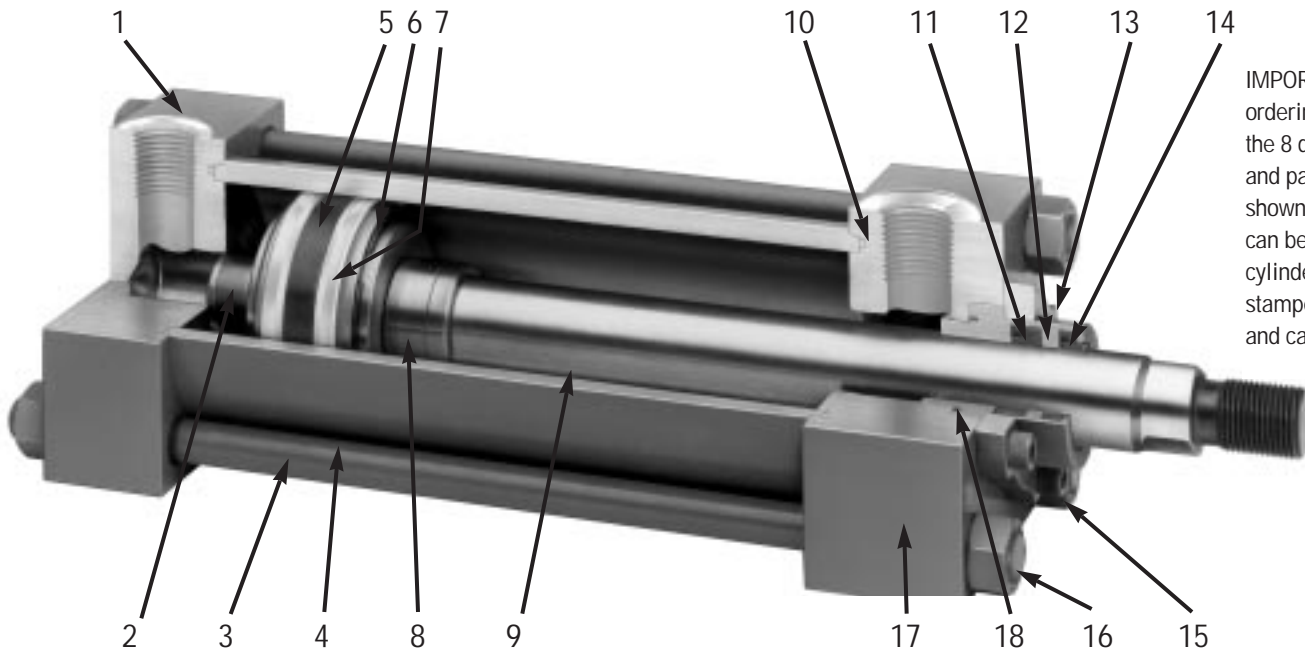
Bolted Bushing Mounting Screw Torque		
Piston Rod Diameter	Cap Screw Size	** Torque
5/8	10-32 x 3/8	76 in./lbs.
1 thru 3½	¼-28 x 5/8	180 in./lbs.
4 thru 10	5/16-24 x 1	360 in./lbs.

** Reduce torque by 25% if bushing is cadmium plated.

* Recommended Torques (ft. lbs) with MoS2 lubricant or equivalent.

Miller H Series Hydraulic Cylinders

Parts List and Seal Kits



IMPORTANT: When ordering parts, specify the 8 digit serial number and part name as shown. Serial number can be found on the cylinder name tag or stamped on the head and cap near the ports.

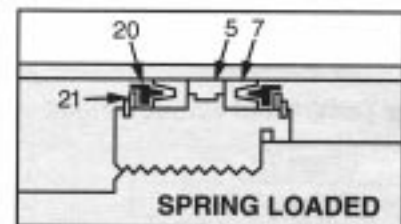
Rod Diameter	Bolted Bushing Rod Seal Kit Part # 11, 12, 13, 14, 18	Retainer Bushing Rod Seal Kit Part # 11, 12, 14, 18
5/8	051-KR075-63	051-KR074-63
1	051-KR075-100	051-KR074-100
1 3/8	051-KR075-138	051-KR074-138
1 3/4	051-KR075-175	051-KR074-175
2	051-KR075-200	051-KR074-200
2 1/2	051-KR075-250	051-KR074-250
3	051-KR075-300	051-KR074-300
3 1/2	051-KR075-350	051-KR074-350
4	051-KR075-400	051-KR074-400
4 1/2	051-KR075-450	051-KR074-450
5	051-KR075-500	051-KR074-500
5 1/2	051-KR075-550	051-KR074-550
7	051-KR075-700	
8	051-KR075-800	
9	051-KR075-900	
10	051-KR075-1000	

- 1. Cap
- 2. Cap End Cushion Plunger
- 3. Tie Rod (4)
- 4. Tube
- 5. Wear Ring
- 6. Piston
- 7. Piston Seal (2)
- 8. Rod End Cushion Plunger
- 9. Piston Rod
- 10. Tube End Seal (2)
- 11. Rod Seal
- 12. Bushing
- 13. Bushing Retainer
- 14. Rod Wiper
- 15. Socket Head Cap Screws
- 16. Tie Rod Nuts
- 17. Head
- 18. Bushing O-Ring
- 19. Piston Rings (4 Required)
- 20. Pressure Ring for Piston Seal (2 Req'd)
- 21. Wave Spring for Piston Seal (2 Req'd)

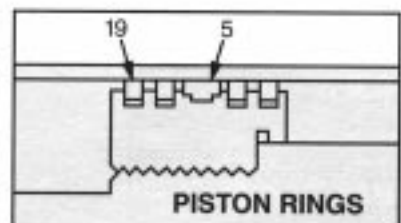
Bore	Bore Kit Part # 5, 7, 10
1 1/2	181-KB001-0150
2	181-KB001-0200
2 1/2	181-KB001-0250
3 1/4	181-KB001-0325
4	181-KB001-0400
5	181-KB001-0500
6	181-KB001-0600
7	181-KB001-0700
8	181-KB001-0800
10	181-KB001-1000
12	181-KB001-1200
14	181-KB001-1400
16	181-KB001-1600
18	181-KB001-1800
20	181-KB001-2000

Note: The most popular sizes are shown. The larger bore and rod sizes are in stock, please call. For complete installation & maintenance request File No. 8535.

PISTON RINGS	
Bore	#19 (4 Required)
1 1/2	052-PS027-150
2	052-PS027-200
2 1/2	052-PS027-250



Spring Loaded Teflon Cup Seals required for temperatures in excess of 160°F or below -20°F.



Piston ring construction is standard on the following small bore, max. oversize rod cylinders. 1 1/2" bore 1" rod, 2" bore 1 3/8" rod & 2 1/2" bore 1 3/4" rod.

Miller H Series Hydraulic Cylinders

Warranty

Miller Warranty

Subject to the conditions below, Miller Fluid Power Corporation ("Miller") warrants to the first end user (the "Buyer") that Miller's products are free from defects in material and workmanship.

Miller will either repair or replace a defective product, including lowest transportation costs but not including installation or any other similar charges, provided that (1) the buyer notifies Miller in writing of the claimed defect within three years from shipment from Miller's factory (2) provides a complete explanation of the defect, the application of the product, and such other information concerning use of the product as Miller may request, and (3) returns the product to Miller in accordance with Miller's specific written instructions and authorization obtained from Miller prior to return of the product, and Miller's inspection confirms that the product was defective.

This warranty applies only if the product was used and applied correctly under normal operating conditions and good engineering practice; was installed, operated and maintained in accordance with all instructions issued or published by Miller; was used within stated pressure, media and operating limitations published by Miller and in effect on the date of shipment; and was not subject to abuse, misuse or unauthorized modification.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, notwithstanding any disclosure to Miller of the use to which the product is to be put. The Buyer's SOLE AND EXCLUSIVE REMEDY on any claim of any kind for any loss or damage arising out of the manufacturer, sale, delivery or use of Miller's products shall be for the repair or replacement of any defective products as provided herein.

IN NO EVENT SHALL MILLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. There are no warranties, express or implied, made by Miller other than the warranty against defects in material and workmanship set forth above, and Miller neither assumes nor authorizes any other person or firm to assume for it any other obligations or liability.

Miller H Series Hydraulic Cylinders

How To Order

How To Order

Example: H-72B2N-00400-00800-0175-S119

H - 72 B 2 N - 0 04.00 - 008.00 - 01.75 - S 1 1 9

Series	Mounting Style	Bushing	Rod End Style	Cushions	Bore Dia.	Stroke	Rod Dia.	Port Type	Port Location		Modified
H DH (D= Dbl. Rod End)		B= Bolted Bushing R= Retainer Held Bushing	#0 #1 ‡ #2 (Std) #3 #4 #5 #6 #7 #8 #9	R= Rod End Cushioned C= Cap End Cushioned B= Both Ends Cushioned N= Non-Cushioned				S= SAE N= NPT	Head End 1 (Std.) 2 3 4	Cap End 1 2 3 4	0= Standard 9= Modified (See * Below)

Note: The Standard (#1) port location is at the top of the cylinder in relation to the mountings as shown on the mounting dimensional pages in this catalog. These numbered locations are shown within the end views of the cylinders for each of the mountings indicated.

* The number 9 refers to any modifications from standard design. Non-Standard Modifications and options not identified in the part number identification above must be included on all orders.

‡ Style #1 Rod End available only with optional Caged Teflon Rod Seal Design.

Examples of Other Modifications and Options Include:

- Tie Rod Extensions
- Air Bleeds
- Rod End Modifications
- Special or Oversize Ports
- Keyways
- Key Retainers
- Stainless Steel Piston Rods
- Extra Heavy Chrome Plated Piston Rods
- Chrome Plated Tube I.D.
- Stop Tube
- External Drainback Rod Bushing
- Grease Fitted Rod Bushing
- Bronze Bushings
- Position Sensing Cylinder
- Special Materials
- Viton Seals
- Non-Sag Piston Rods
- Adjustable Retract Stroke
- Adjustable Advance Stroke
- Metallic Rod Scrapers
- Drilling and Tapping Modifications
- Flush Tie Rod Nuts
- Heavy Duty Rod Bushing
- Epoxy or Special Paint
- Mixed Mounting Styles
- Piston Ring Construction
- Proximity Switches
- Modifications for Special Environments
- Close Stroke Tolerances
- Port in Rear Face of Cap

For other Non-Standard Modifications, contact Miller Fluid Power Application Engineering Dept.

Miller Fluid Power
Main Plant
800 North York Road
Bensenville, IL 60106
(630) 766-3400—Local
(800) 323-2520—Elsewhere
(630) 350-0294—FAX

Miller Fluid Power
33067 Industrial Road
Livonia, MI 48150
(800) 323-2520

Miller Fluid Power
2050 Del Rio
Ontario, CA 91761
(800) 323-2520

Miller Fluid Power Canada Ltd.
1214 Kamato
Mississauga, Ontario, Canada L4W 1Y1
(800) 268-0205—Ontario & Quebec
(905) 625-2780—Elsewhere
(905) 625-8724—FAX

Miller Potencia Fluida, S.A. de C.V.
Israel No. 301 Esq. Damasco
Col. Ricardo B. Anaya 2A. SECC
Apartado Postal F-1241
78090 San Luis Potosi, S.L.P. Mexico
(48) 21-19-21, 22, 37
(48) 21-21-60—FAX

Miller Potencia Fluida, S.A. de C.V.

Nogal No. 45—Despacho 202
Col. Sant Maria La Ribera
Delegacion: Cuauhtemoc
Mexico, D.F. 06400
(5) 547-2474
(5) 541-1123—FAX

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South Yorkshire, England S31 8HB
(441)-462-438303
(441)-462-420901—FAX

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