

3 Piston Rod

Piston rods through 4" diameter have a minimum expected yield of 100,000 psi. They are case hardened to 50 Rockwell C to a depth of .030" for damage resistance. They are then hard chrome plated for wear and corrosion resistance. Larger diameter rods have an expected minimum yield of 50,000 to 60,000 psi depending on diameter and are hard chrome plated.

3A Studded Rod End

Offers much longer fatigue life through elimination of thread relief stress concentration point. Standard as Style 2 rod end on all rod sizes through 2 1/2" diameter. Studs are pretorqued and locked in to prevent loosening. They are machined from high tensile steel and the threads rolled.

4 Tube

The steel tube is honed to an 8 to 16 microinch finish for low friction and long seal and piston bearing life. Tube ends are machined on the O. D. concentric with the I. D. They are confined by the close tolerance machining of the head and cap which provides greater hoop strength.

5 Tie Rod Construction

Maximum strength is obtained through a prestressed tie rod assembly.

7 Wrench Flats

Four wrench flats are provided as standard for easy attachment. Spanner holes, in lieu of flats, are standard on large diameter rods.

9&18 Pistons & Piston Seals

All pistons are machined from a fine grain alloy cast iron. They are threaded directly onto the piston rod, torqued, sealed and locked in place with one or more set screws.

The *special piston seal* is an endless glass filled Teflon material with an O-ring expander. One or more (depending on bore size) bronze filled Teflon bearing strips are also employed on this type piston to eliminate metal-to-metal contact. This type piston offers long life, low friction, near zero leakage, and great tolerance for side loading. It can be used successfully on virtually any application.

16,22 Static Seals

Pressure activated O-ring seals are used at rod gland and tube ends. Located to eliminate extrusion and to provide positive leak tight seal.

21 Rod Bearing

High load bearing bronze piloted into the head. Located inboard of the seals to insure a well lubricated bearing for the fastest cycling applications. It need not be removed for rod seal replacement.

24 Rod Wiper

The polyurethane wiper is designed to wipe off abrasive dust and contaminants on the retract stroke to insure long life for packings, rod bearing, and piston rod. Where the rod will be exposed to gummy materials such as road tar, a metallic rod scraper is available.

25 Rod Seal

The polyurethane rod seal has a unique design which incorporates the optimum sealing properties of a **U** configuration with the elastomeric properties of a compression-type seal. The polyurethane material was selected for toughness, abrasion resistance, and the ability to resist extrusion under rough service conditions.

29 Cushions

Cushion pistons (**29**) are tapered to provide gradual deceleration and eliminate shock upon entrance. The **Adjusting Screw** with fine threads (**30**) provides a wide range of adjustment.

58 Air Bleeds (Optional)

When required, air bleeds are located where they can be employed most successfully – at the tube and head juncture. The straight thread plugs are equipped with metallic O-rings so they can be used repeatedly with a good seal every time.

70 Rod Gland

Easily removable for replacement of rod seal and wiper. In most cases it is not necessary to demount or disassemble the cylinder. Easier to service since on removal of the ductile iron gland, the piston rod remains supported by the separate rod bearing.

Parts List

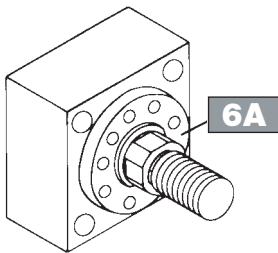
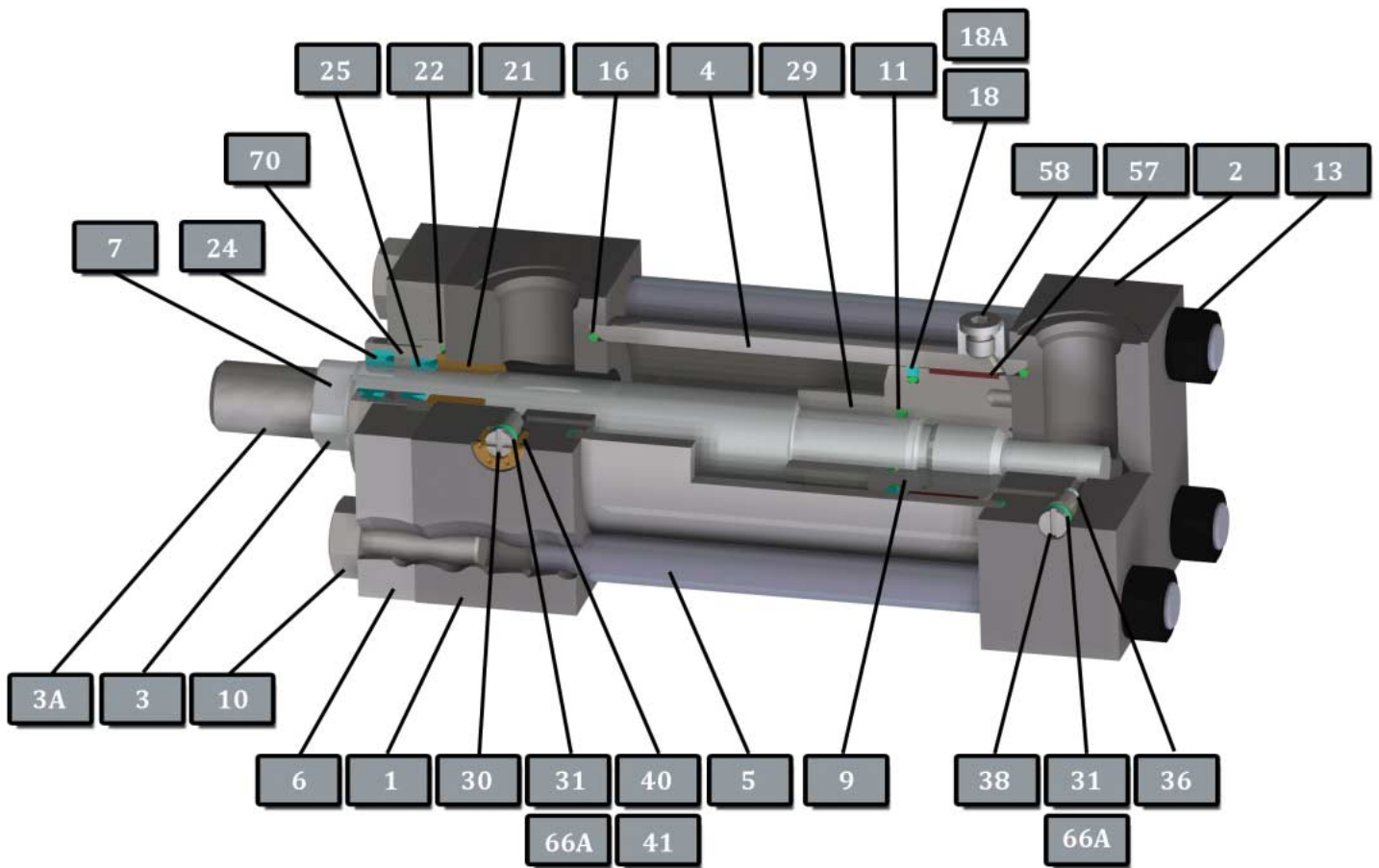
ITEM NUMBER	DESCRIPTION	QUANTITY REQUIRED
1	HEAD	1
2	CAP	1
3	PISTON ROD	1
3 A	"STUD - STYLE II THREAD THRU 2 1/2" ROD DIA."	1
4	TUBE	1
5	TIE ROD	4
6	ROD GLAND RETAINER	1
6 A	ROD GLAND & RETAINER - SINGLE PIECE	1
9	PISTON - SLIPPER SEAL TYPE	1
10	RETAINER SCREW	1
11	SEAL - PISTON I.D.	‡
13	TIE ROD NUT	4
16 †	TUBE SEAL	2
18 †	PISTON SEAL - SLIPPER SEAL TYPE	1
18 A †	EXPANDER - FOR SLIPPER SEAL	1
21 †	ROD BEARING	1
22 †	ROD GLAND SEAL	1
24 †	ROD WIPER	1
25 †	ROD SEAL	1
29	CUSHION PISTON - FRONT	**
30	CUSHION ADJ. SCREW - FRONT OR REAR (CROSS SLOT)	**
31	"SEAL - CUSHION ADJUSTING AND CUSHION CHECK - FRONT OR REAR"	**
36	CUSHION CHECK BALL - FRONT OR REAR	**
38	CUSHION CHECK PLUG - FRONT OR REAR	**
40	CUSHION ADJ. CAPTIVATOR - FRONT OR REAR	**
41	SEAL - CUSHION ADJ. CAPTIVATOR - FRONT OR REAR	**
57	PISTON BEARING STRIP	*
58	AIR BLEED PLUG	**
66 A	"BACK-UP WASHER - CUSHION ADJUST AND CUSHION CHECK - FRONT OR REAR"	**
70	ROD GLAND	1

‡Retainer Screws required varies by bore and mount

†Recommended Spare Parts

*One required thru 4" bore, 2 required 5" thru 8" bores, 3 required on 10" and 12" bores, 4 required on 14" bore.

**As required; specify if cushioned front, cushioned rear or cushioned both ends.



Round, single piece rod gland and retainer used on all but some of the smaller bore sizes. Consult pages on specific mounts.

Please Note:

Complete replacement packing kits are available. For purposes of economy and less down-time, it is recommended that replacement packing kits be stocked. They are described and priced in the current CylindersNow Replacement Parts Price List and on CD Rom. Contact your distributor or the factory for these lists.

Ordering Information:

Also see separate ordering information. When ordering parts, the Model No. and Serial No. must be specified. Give item no., name and quantity of part desired. The Model No. and Serial No. will be found on a metal plate that has been drive-screwed to either the head or the cartridge retainer.

Parts List

Parts List

ITEM NUMBER	DESCRIPTION	QTY. REQ'D
100	FRONT FLANGE	1
102	FRONT FLANGE EXTRA	1
103	REAR FLANGE	1
104	REAR FLANGE EXTRA	1
105 *	FOOT BRACKET - FRONT	1
106 *	FOOT BRACKET - SCREW	2
107 *	FOOT BRACKET - REAR	1
112	CLEVIS PIN	1
117	INTERMEDIATE TRUNNION	1
108 *	END LUG - FRONT	2
110 *	END LUG - REAR	2

*Not available on 10", and larger bore cylinders.

Tie Rod Torque for 1 1/8" through 6" Bores

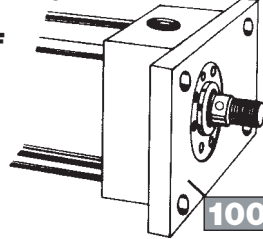
BORE	TORQUE IN FOOT POUNDS	BORE	TORQUE IN FOOT POUNDS
1 1/8	8	3 1/4	110
1 1/2	30	4	130
2	50	5	325
2 1/2	50	6	480

Tie Rod Torque for 7" Bore and Larger

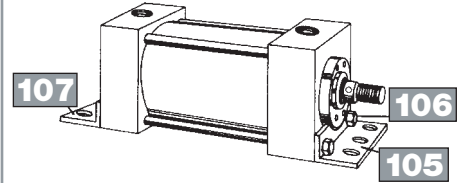
COLUMN 1 TURN (T) IN 12THS	L LENGTH	1 FULL TURN PLUS T L LENGTH	2 FULL TURNS PLUS T L LENGTH	3 FULL TURNS PLUS T L LENGTH
1	23/4	36 1/2	70	103 5/8
2	5 5/8	39 1/4	72 3/4	106 1/2
3	8 1/2	42	75 5/8	109 1/4
4	11 1/4	44 3/4	78 1/2	112
5	14	47 5/8	81 1/4	114 3/4
6	16 3/4	50 1/2	84	117 5/8
7	19 5/8	53 1/4	86 3/4	120 1/2
8	22 1/2	56	89 5/8	123 1/4
9	25 1/4	58 3/4	92 1/2	126
10	28	61 5/8	95 1/4	128 3/4
11	30 3/4	64 1/2	98	131 5/8
12	33 5/8	67 1/4	100 3/4	134 1/2

For 7" bore cylinders and larger, the tie rods are given an initial torque, the tie rods are heated, and then the tie rod nuts are turned a calculated amount. First torque all 4 tie rod nuts to 200-250 foot pounds. Measure the cylinder to obtain length L, consult the chart for the proper number of turns or fractions (in 12ths). The figures in Column 1 shown in 12ths corresponds to the points and flats of the hex nut (see illustration). The piston rod of the cylinder should be either fully retracted or fully extended prior to heating. Place an asbestos sheet between the tube and tie rod and heat to 800°F for as long a length as possible. When the distance between the cylinder heads is 18" or less, do not heat closer than 3" of either head. Tie rods should be heated and tightened in cross corner rotation and in steps up to full tension. Allow the tie rods to cool before testing or installation.

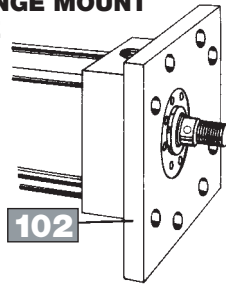
FRONT FLANGE MOUNT STYLE FF



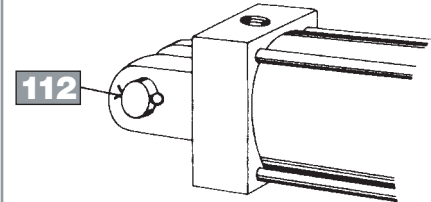
FOOT BRACKET MOUNT STYLE FB



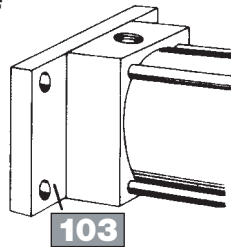
FRONT FLANGE MOUNT EXTRA SIZE STYLE FFX



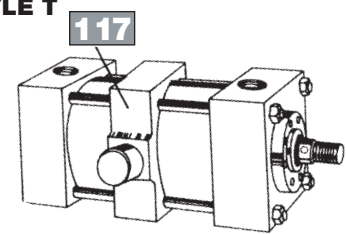
CLEVIS MOUNT STYLE C



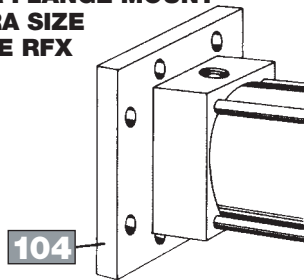
REAR FLANGE MOUNT STYLE RF



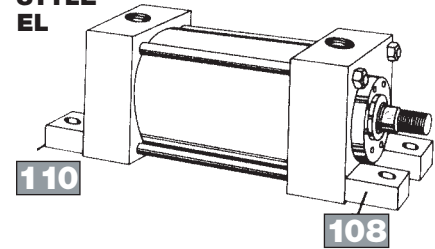
INTERMEDIATE TRUNNION MOUNT STYLE T



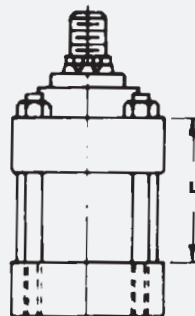
REAR FLANGE MOUNT EXTRA SIZE STYLE RFX



END LUG MOUNT STYLE EL



Scribe on Line Head



Screw Torque in Foot Pounds

BORE SIZE	PISTON ROD DIAMETER	HEX HEAD CAP SCREW	SOCKET HEAD CAP SCREW
1 1/8	5/8		8
1 1/2	ALL	13.6	
2	ALL		5
2 1/2	1, 1 3/8		5
2 1/2	1 3/4	33	
3 1/4	ALL		5
4	ALL		5
5	2, 2 1/2		5
5	3, 3 1/2		10
6	2 1/2		5
6	3, 3 1/2, 4		10
7	ALL		10
8	ALL		10
10	4 1/2, 5, 5 1/2		10
10	7		40
12	5 1/2		10
12	7		40
12	8		70
14	7		40
14	10		95

► Cushions and Pressure

Cushions

CylindersNow pioneered tapered cushions, designed to provide gradual deceleration and eliminate shock upon entrance of the cushion pistons, have now been considerably improved. The tapered cushion has been married with a fine thread, wide range, adjusting screw. This new combination offers a positive, low-shock deceleration and a method to adjust the cushioning effect for speeds and loads.

The adjusting screw is identified by a tag affixed to the head (or cap) and can be further distinguished by the fact that it is captivated with the CylindersNow exclusive captivator. This allows full open to close adjustment without concern for damaging seals.

The cushion check, which does not require adjustment, has a single slot in its head. It does not project beyond the surface of the head (or cap). The cushion check plus the tapered cushion piston provides rapid acceleration out of cushioning. There is no spring in the cushion check to fatigue, hence, no worry of mechanical failure.

Cushioning is designed to properly cushion the cylinder and is not intended to cushion large inertia loads. Cushions do not substitute for speed controls or deceleration valves on most installations.

As indicated on page HH-6, the standard positions for ports are 1 and 5. Where possible, the standard positions for cushion adjusting screws will be 2 and 6 and the standard positions for cushion checks will be 4 and 8. With some mounting styles, it is not possible to so locate the adjusting screws and checks. For example, a Trunnion Front Mount has the trunnion pins located in positions 2 and 4 on the head. With the port in position 1, the only side available for both adjusting screw and check is position 3. Since both will then be located on the same side, they will be located off-center. This example would hold true with the TR, CL, FHF and RHF mounts. See **Chart A** for standard positions that will be supplied unless otherwise specified. When requested, other positions can be supplied so long as there is no interference with mounting.

Where access to an adjusting screw or check could be made difficult because of proximity to a mount, the locations of the screws will be slightly off-center. An example of this would be a small bore cylinder with a side lug mount.

HH SERIES Cylinder Weight Chart

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5	6	7	8	10	12	14
ZERO STROKE	3	8	14	19	37	50	90	140	210	290	650	975	1600
ADD PER INCH OF STROKE	.25	.5	.8	1.3	1.8	2.5	4	5.8	6.5	9	16	25	35

Note: The above weights are based on an average value for cushioning, rod size, and the various types of mountings for uncrated cylinders to establish approximate shipping weights. Add 10% of cylinder weight to determine estimate weight of crated cylinder.

Chart A

MOUNT	CUSHION ADJUSTING SCREW	CUSHION CHECK
TF AND FHF	3 and 6	3 and 8
CL	3 and 7	3 and 7
TR AND RHF	2 and 7	4 and 7
ALL OTHER MOUNTS	2 and 6	4 and 8

Standard positions for cushion adjusting screws and cushion checks in relation to port positions by style of mounting.

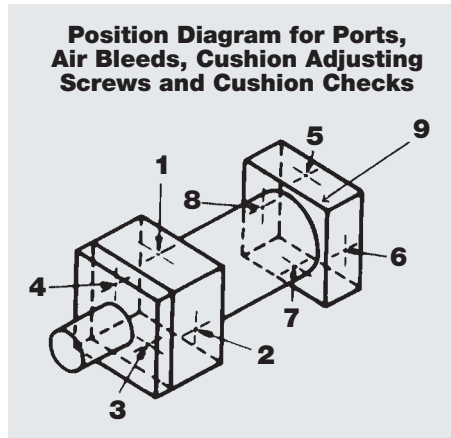


Chart B

Maximum Pressure Ratings

BORE SIZE	HEAVY DUTY SERVICE PSI	MAX. SHOCK SERVICE PSI	3:1 SAFETY FACTOR (YIELD) PSI
1 1/8	3,000	5,000	3,612
1 1/2	3,000	5,000	3,085
2	3,000	5,000	3,412
2 1/2	3,000	5,000	2,783
3 1/4	3,000	5,000	2,842
4	3,000	5,000	2,667
5	3,000	5,000	2,778
6	3,000	5,000	2,760
7	3,000	5,000	2,558
8	3,000	5,000	2,391
10	3,000	5,000	2,936
12	3,000	5,000	2,549
14	3,000	5,000	2,443

All above figures are based on the cylinder as a pressure vessel. Some styles of mountings will not withstand the thrust generated at these pressures. See information on specific mounts.

Note: Because of space limitations, neither cushion adjusting screws nor cushion ball checks can be put into 1 1/2" and 2" bore sizes for cushioned front when they are specified with 2:1 rod diameters.

Pressure and Shock

HH SERIES Cylinders are suitable for working pressures to 3,000 psi and maximum pressure including any shock to 5,000 psi. Refer to **Chart B** for the maximum operating pressure that can be used with a 3:1 safety factor based on yield. It is felt that this is an adequate safety factor for any well designed hydraulic system where shock conditions have been considered and reduced to an acceptable level. Not all mounting styles will take the thrust generated at these pressures. See separate Accessories Brochure.

The following factors in shock loading should be considered:

- n Relief valves in the circuit do not protect the components from shock because of the time lag.
- n Gauges do not necessarily register shock conditions, either because of their position in the circuit, or the short duration of shock.
- n The two general types of shock loading to be considered are pressure rise caused by quick stop of the flow in the circuit and quick pressure drop. Decompression shock is particularly important in large bore cylinders and can be as destructive as compression shock.
- n The magnitude of the pressure difference and the duration that the maximum pressure exists are the factors that determine the damage from shock.

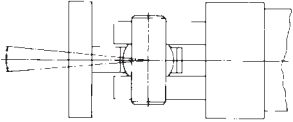
► Special Variations

CylindersNow manufactures many cylinders with variations to meet special customer needs. In addition to those illustrated below, some of the more popular variations are:

- Cylinders with Boots
- Combination Mount Cylinders
- Cylinders with Built-In Limit Switch Actuators
- Locking Cylinders
- Precision Stroke Cylinders
- Precision Mount Cylinders
- Electrically Insulated Cylinders

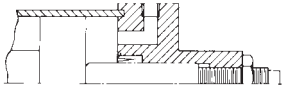
Spherical Bearings

Pivot mounting brackets and rod eyes can be provided with spherical bearings to compensate for misalignment on both ends of cylinders. Consider also the use of the CylindersNow Uni-Lign described in separate Accessories Brochure.



Adjustable Stroke

Shown is an integral stroke adjustment (externally adjusted) that is accomplished by the use of a bump rod threaded into the cylinder cap. Seals are incorporated to prevent external leakage and a lock nut is included.



Non-Rotating Piston Rod

Two methods of providing non-rotating piston rods are employed. The internal rod type (Figure A) is generally used since it requires less space and is neater. The type shown in Figure B must be used on small bore cylinders where internal space is limited.

FIGURE A

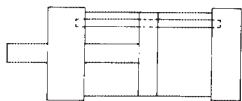
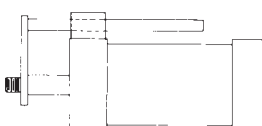


FIGURE B

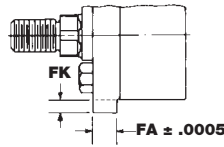


Stainless Steel Piston Rods

Many applications, especially those subjected to water spray, require the use of stainless steel piston rods. We stock AISI Type 304 hard chrome plated, stainless steel and will furnish that type unless otherwise specified. Type 304 is considered a good, corrosion resistant type of stainless steel, but the minimum expected yield is approximately 35,000 psi and that factor must be considered with respect to operating pressure, column loading, etc.

Thrust Key

All side mounted cylinders (SF, FB, EL and SL mounts) can be supplied with thrust keys. Thrust keys are available in bore sizes 1 1/8" thru 6". Extending the rod gland retainer, as shown, provides a key which fits into a milled slot in the mounting surface of the machine member. Combined with the mount this key assures that cylinder will not shift in severe service.

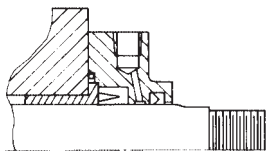


Thrust Key Bore Sizes

BORE	FA	FK
1 1/8	.3120	3/16
1 1/2	.3120	3/16
2	.5620	5/16
2 1/2	.5620	5/16
3 1/4	.6870	3/8
4	.8120	7/16
5	.8120	7/16
6	.9370	1/2

Rod Gland Drain Back

When not even a drop of external leakage can be tolerated, the rod gland drain back provides a signal that the rod seal set has worn to the point of replacement – without the danger of contamination from leakage.



Tandem Cylinders and Multi-stage Cylinders

The tandem cylinder (Figure A) has two pistons connected to a common rod, resulting in twice the force output of a single cylinder. Multi-stage cylinders (Figure B) offer multiple, positive strokes by pressurizing one cylinder, the other, or both. Contact the factory for other variations.

FIGURE A

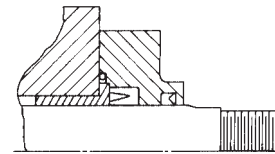


FIGURE B



External Rod Seal

When a cylinder is to be operated under water, provision is made to prevent the water from being drawn into the cylinder at the time of valve shift or pressure differential.



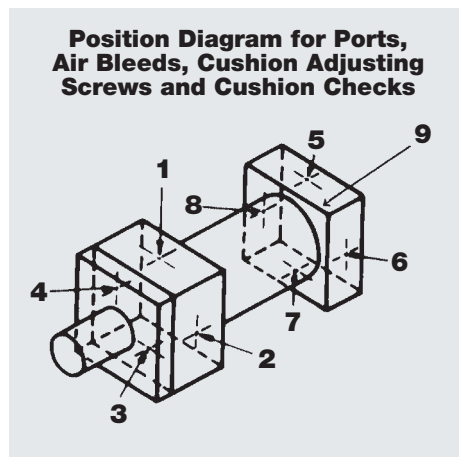
► Porting and Air Bleeds

1 1/8" THRU 14" BORES

Porting Dimensions

1	2	3	4		5	6		7
BORE	MM ROD DIA.	STD. NPT. PORT	MAX. NPT.PORT HEAD	CAP	STD. S.A.E. ST. THRD. PORT	MAX. S.A.E. THRD. PORT	CAP	MAX. S.A.E. FLG. PORT
1 1/8	5/8 STD.	1/4	3/8*	3/8*	-6	-6	-6	—
1 1/2	5/8 STD.	1/2	3/4	3/4	-10	-10	-10	—
	1 2:1	1/2	3/4	3/4	-10	-10	-10	—
2	1 STD.	1/2	3/4*	3/4*	-10	-12*	-12*	—
	1 3/8 2:1	1/2	3/4*	3/4*	-10	-12*	-12*	—
2 1/2	1 STD.	1/2	3/4*	3/4*	-10	-12	-12	3050
	1 3/8	1/2	3/4*	3/4*	-10	-12*	-12*	3050
	1 3/4 2:1	1/2	3/4*	3/4*	-10	-12*	-12*	3050
3 1/4	1 3/8 STD.	3/4	3/4	1*	-12	-12	-16*	3075
	1 3/4	3/4	3/4	1*	-12	-12	-16*	3075
	2 2:1	3/4	1*	1*	-12	-16*	-16*	3075
4	1 3/4 STD.	3/4	3/4	1*	-12	-14	-16*	3075
	2	3/4	3/4	1*	-12	-14	-16*	3075
	2 1/2 2:1	3/4	1*	1*	-12	-14	-16*	3075
5	2 STD.	3/4	3/4	1*	-12	-16*	-16*	3075
	2 1/2	3/4	1*	1*	-12	-16*	-16*	3075
	3	3/4	1*	1*	-12	-16*	-16*	3075
	3 1/2 2:1	3/4	1*	1*	-12	-16*	-16*	3075
6	2 1/2 STD.	1	1 1/4*	1 1/4*	-16	-20*	-20*	3125*
	3	1	1 1/4*	1 1/4*	-16	-20*	-20*	3125*
	3 1/2	1	1 1/4*	1 1/4*	-16	-20*	-20*	3125*
	4 2:1	1	1 1/4*	1 1/4*	-16	-20*	-20*	—
7	3 STD.	1 1/4	1 1/2	1 1/2	-20	-24	-24	3150
	3 1/2	1 1/4	1 1/2	1 1/2	-20	-24	-24	3150
	4	1 1/4	1 1/2	1 1/2	-20	-24	-24	3150
	4 1/2	1 1/4	1 1/2	1 1/2	-20	-24	-24	3150
	5 2:1	1 1/4	1 1/2	1 1/2	-20	-24	-24	3150
8	3 1/2 STD	1 1/2	2	2	-24	-32*	-32*	3200
	4	1 1/2	2	2	-24	-32*	-32*	3200
	4 1/2	1 1/2	2	2	-24	-32*	-32*	3200
	5	1 1/2	2	2	-24	-32*	-32*	3200
	5 1/2 2:1	1 1/2	2	2	-24	-32*	-32*	3200
10	4 1/2 STD.	2	2 1/2	2 1/2	-32	-32	-32	3250
	5	2	2 1/2	2 1/2	-32	-32	-32	3250
	5 1/2	2	2 1/2	2 1/2	-32	-32	-32	3250
	7 2:1	2	2 1/2	2 1/2	-32	-32	-32	3250
12	5 1/2 STD.	2 1/2	3	3	-32	-32	-32	3300
	7	2 1/2	3	3	-32	-32	-32	3300
	8 2:1	2 1/2	3	3	-32	-32	-32	3300
14	7 STD.	2 1/2	3	3	-32	-32	-32	3300
	10 2:1	2 1/2	3	3	-32	-32	-32	3300

*Y and P dimensions as shown on mounting dimensions pages must change to accommodate these port sizes.



Porting

S.A.E. Ports, located in positions 1 and 5 (See Position Diagram for Ports) are standard and will be furnished unless otherwise specified. Other types and sizes of ports are available on request, at slight additional cost.

Port Positions - Where mounting clearances permit, the ports can be in any of four positions in the head and in the cap at no extra cost. Indicate both port positions desired by position number. If no preference is stated, ports will be furnished in positions 1 and 5. NOTE: The head and cap can be rotated in relation to each other as long as mounting and porting are convenient for installation.

Port Sizes - Standard ports are S.A.E. and sizes as shown in Column 5 on the adjacent chart. Unless otherwise specified, those sizes are what will be furnished. Smaller than standard ports can be supplied at no extra cost. It is recommended that cylinders be ordered with ports no larger than needed so that the trouble and expense of obtaining and installing reducing fittings can be avoided. At a modest cost, larger than standard ports, as shown in COLUMN 6, can be furnished. While these larger ports can be put in a standard cylinder, it is necessary in some cases to slightly alter the Y and the P dimensions shown on our mounting dimension pages. Contact the factory for those dimensional changes.

S.A.E. Straight Thread Ports - This type of port offers positive seal with full thread engagement. It also eliminates the problem of faulty pipe threads since sealing takes place independently of the thread. No messy pipe dope to bother with or to contaminate the hydraulic system. No wedging, distortion, or breakage due to over-tightening. Alignment and full sealing are both assured since the fittings can be tightened after *lining up*. Straight thread fittings may be reused, indefinitely. COLUMN 6 shows the maximum size of S.A.E. port that can be furnished in a standard cylinder. Larger sizes accommodated with special heads and caps.

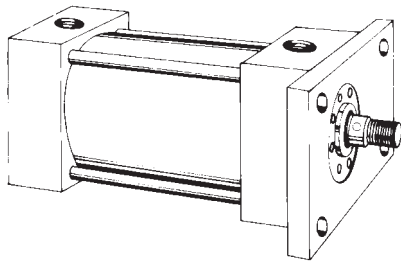
S.A.E. Flanged Ports - At a slight additional cost, flanged ports can be provided. COLUMN 7 shows the maximum standard S.A.E. flange sizes available.

Air Bleeds

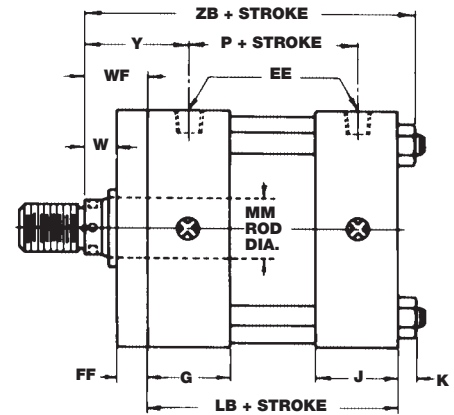
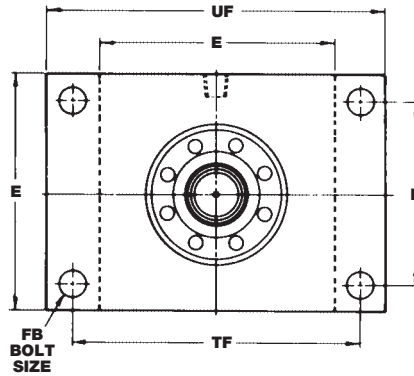
An air bleed may be ordered at either or both ends of the cylinder as an option. To provide for maximum bleeding of air from the cylinder, We place air bleeds in the tube to bleed air from the tube/head or tube/cap juncture. The air is bled from the cylinder by backing out the straight thread metallic seal plug to allow air to pass by the threads. When air bubbles stop and oil starts to flow, retighten plug. It is recommended that bleeding be done with pressure on the opposite end of the cylinder so that the bleed plug is not subjected to pump pressure when being backed out. Air bleeds should always be positioned at the highest point of the cylinder tube. Please specify positions of air bleeds by position number from the chart.

NOTE: Since CylindersNow puts air bleeds in the cylinder tube, position can be changed by loosening the tie rods and rotating the tube. Photos and Line Drawings show ports in positions 1 and 5.

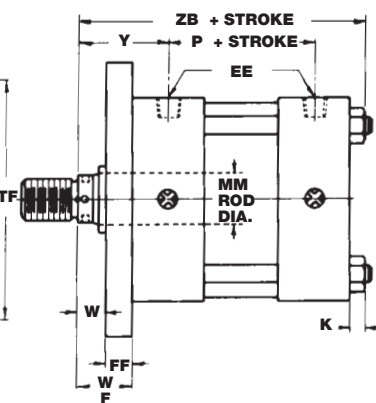
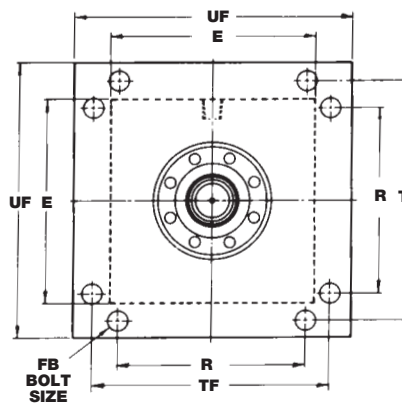
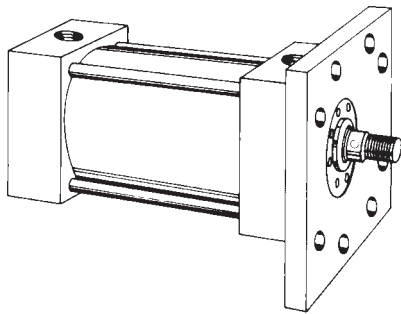
FRONT FLANGE MOUNT STYLE FF (MF1)*



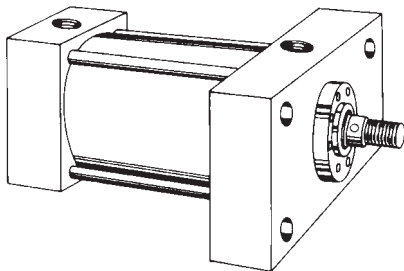
1000 PSI Rated



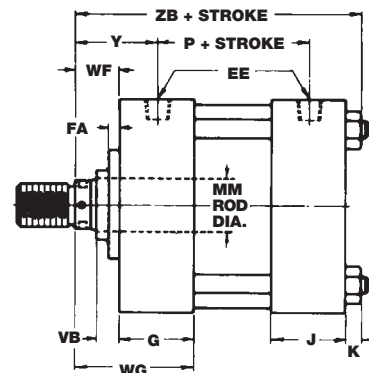
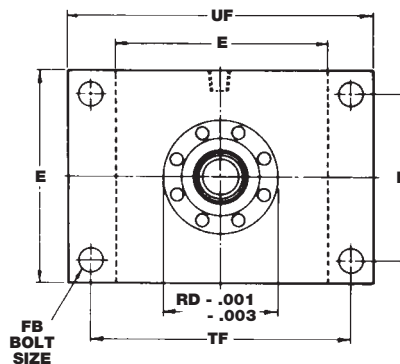
FRONT FLANGE MOUNT EXTRA SIZE STYLE FFX (MF5)*



FRONT HEAD FLANGE MOUNT STYLE FHF (ME5)*



*ANSI/B93.1-1964 Mounting Style Designation.



For assistance in establishing your mounting requirements, also see the separate Accessories Brochure.

IMPORTANT NOTICE

There is a construction variance in the 1¹/₈", 1¹/₂", 2" bores, the 2¹/₂" bore with a 1³/₈" or a 1³/₄" rod, and in the 3¹/₄" bore with a 2" diameter rod. On the Front Flange (FF) and Front Flange Extra (FFX) Mounts, in these sizes, the round retainer shown above is not used. The tie rods thread into the flange, and the flange serves as the rod gland retainer. Hence, in these sizes, the gland cannot be removed without loosening the tie rods. The basic cylinder dimensions shown above do not change.

On the Front Head Flange Mount (FHF), in the 1¹/₈", 1¹/₂", the 2¹/₂" bore with a 1³/₄" rod, and the 3¹/₄" bore with a 2" rod, the retainer is the same rectangular size as the head. Tie rods thread into the retainer and the retainer holds in the packing gland. Hence, in these sizes the gland cannot be removed without loosening the tie rods. Dimensions for these sizes of the FHF mount cylinders can be obtained from the Front Flange Mount (FF) charting. Mounting bolts will clear through both the flange (FF dimension) and the head (G dimension).

Good – Front Flange Mount

While this style of mount is a widely used one, its use should be restricted to pressures under 1000 psi, short strokes (under 36") and standard rod diameters. Note that the Front Head Flange mount has the same mounting hole pattern.

Better – Front Flange Extra Mount

Satisfactory for maximum operating pressure and long strokes if properly applied. See separate Accessories Brochure for detailed mounting data and separate Engineering Brochure for long stroke information.

Best – Front Head Flange Mount

Highly recommended. This is the best style of flange mounting. With this style, the cylinder can be mounted on the back face of the Head Flange if desired. This mounting style is used extensively on high tonnage presses and other heavy duty applications. To dimensionally interchange with the FF mount, see separate Accessories Brochure for Front Head Flange Spacer Bars.

We highly recommend that consideration be given to the use of a Style 6 rod end (see pages HH-21 and HH-22) and S.A.F.E. Coupling (see separate Accessories Brochure) to achieve good radial alignment.

Selection of piston rod diameter can be determined by consulting the separate Engineering Brochure.

CAUTION

See separate Accessories Brochure for information concerning the application of Flange Mount Cylinders.

Front Flange Dimensions

BORE	MM ROD DIA.	FA	RD	VB	W	WF	WG	Y	ZB*
1 1/8	5/8 STD.	—	—	—	5/8	1 1/8	2 1/4	1 23/32	45/8*
1 1/2	5/8 STD.	—	—	—	5/8	1	2 3/4	2	5 15/16*
	1 2:1	—	—	—	1	1 3/8	3 1/8	2 3/8	6 5/16*
2	1 STD.	11/32	2.375	7/8	3/4	1 3/8	3 1/8	2 3/8	6 7/16*
	1 3/8 2:1	19/32	2.875	1	1	1 5/8	3 3/8	2 5/8	6 11/16*
2 1/2	1 STD.	11/32	2.375	7/8	3/4	1 3/8	3 1/8	2 3/8	6 9/16*
	1 3/8	19/32	2.875	1	1	1 5/8	3 3/8	2 5/8	6 13/16*
3 1/4	1 3/8 2:1	—	—	—	1 1/4	1 7/8	3 5/8	2 7/8	7 1/16*
	1 3/8 STD.	19/32	2.875	1	7/8	1 5/8	3 5/8	2 3/4	7 11/16*
4	1 3/4	19/32	3.250	1 1/8	1 1/8	1 7/8	3 7/8	3	7 15/16*
	2 2:1	—	—	—	1 1/4	2	4	3 1/8	8 1/16*
5	1 3/4 STD.	19/32	3.250	1 1/8	1	1 7/8	3 7/8	3	8 3/16*
	2	19/32	3.562	1 1/8	1 1/8	2	4	3 1/8	8 5/16*
6	2 1/2 2:1	19/32	4.000	1 1/4	1 3/8	2 1/4	4 1/4	3 3/8	8 9/16*
	2 STD.	19/32	3.562	1 1/8	1 1/8	2	4	3 1/8	9*
7	2 1/2	19/32	4.000	1 1/4	1 3/8	2 1/4	4 1/4	3 3/8	9 1/4*
	3	19/32	4.750	1 1/4	1 3/8	2 1/4	4 1/4	3 3/8	9 1/4*
8	3 1/2 2:1	23/32	5.187	1 1/4	1 3/8	2 1/4	4 1/4	3 3/8	9 1/4*
	2 1/2 STD.	19/32	4.000	1 1/4	1 1/4	2 1/4	4 5/8	3 1/2	10 1/2*
9	3	19/32	4.750	1 1/4	1 1/4	2 1/4	4 5/8	3 1/2	10 1/2*
	3 1/2	23/32	5.187	1 1/4	1 1/4	2 1/4	4 5/8	3 1/2	10 1/2*
10	4 2:1	23/32	5.750	1 1/4	1 1/4	2 1/4	4 5/8	3 1/2	10 1/2*
	3 STD.	19/32	4.750	1 1/4	1 1/4	2 1/4	5 1/8	3 13/16	11 15/16*
11	3 1/2	23/32	5.187	1 1/4	1 1/4	2 1/4	5 1/8	3 13/16	11 15/16*
	4	23/32	5.750	1 1/4	1 1/4	2 1/4	5 1/8	3 13/16	11 15/16*
12	4 1/2	3/4	6.250	1 1/4	1 1/4	2 1/4	5 1/8	3 13/16	11 15/16*
	5 2:1	3/4	6.750	1 1/4	1 1/4	2 1/4	5 1/8	3 13/16	11 15/16*
13	3 1/2 STD.	23/32	5.187	1 1/4	1 1/4	2 1/4	5 1/2	3 15/16	13*
	4	23/32	5.750	1 1/4	1 1/4	2 1/4	5 1/2	3 15/16	13*
14	4 1/2	3/4	6.250	1 1/4	1 1/4	2 1/4	5 1/2	3 15/16	13*
	5 1/2 2:1	3/4	7.250	1 1/4	1 1/4	2 1/4	5 1/2	3 15/16	13*
15	4 1/2 STD.	15/8	6.250	1 15/16	1 1/4	2 15/16	6 13/16	5	16 3/4*
	5	15/8	6.750	2 3/16	1 1/2	3 3/16	7 1/16	5 1/4	17*
16	5 1/2	15/8	7.250	2 3/16	1 1/2	3 3/16	7 1/16	5 1/4	17*
	7 2:1	15/8	9.750	2 3/16	2	3 11/16	7 9/16	5 3/4	17 1/2*
17	5 1/2 STD.	15/8	7.250	2 3/16	1 1/4	3 3/16	8 1/16	5 3/4	19 5/8*
	7	15/8	9.75	2 3/16	1 7/8	3 13/16	8 11/16	6 3/8	20 1/4*
18	8 2:1	1 7/8	10.875	2 7/16	2 7/16	4 3/8	9 1/4	6 15/16	20 13/16*
	7 STD.	2 3/8	9.75	2 13/16	1 7/8	4 5/16	9 11/16	7 7/16	23 15/32*
19	10 2:1	2 3/8	13.73	2 15/16	2 1/2	4 15/16	10 5/16	8 1/16	24 3/32*

*Be sure to add stroke to this dimension.

Front Flange Dimensions

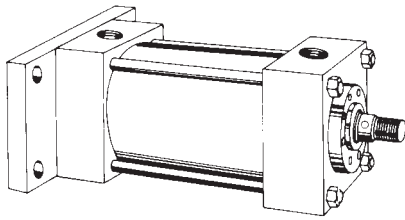
BORE	E	EE NPT†	EE SAE	FB**	FF	G	J	K	LB*	P*	R	TF	UF
1 1/8	1 3/4	1/4	-6	1/4	1/2	1 1/8	1	1/4	3 1/4*	2 3/16*	1.19	2 3/8	3
1 1/2	2 1/2	1/2	-10	3/8	3/8	1 3/4	1 1/2	5/16	4 5/8*	2 7/8*	1.63	3 7/16	4 1/4
2	3	1/2	-10	1/2	5/8	1 3/4	1 1/2	7/16	4 5/8*	2 7/8*	2.05	4 1/8	5 1/8
2 1/2	3 1/2	1/2	-10	1/2	5/8	1 3/4	1 1/2	7/16	4 3/4*	3*	2.55	4 5/8	5 5/8
3 1/4	4 1/2	3/4	-12	5/8	3/4	2	1 3/4	9/16	5 1/2*	3 1/2*	3.25	5 7/8	7 1/8
4	5	3/4	-12	5/8	7/8	2	1 3/4	9/16	5 3/4*	3 3/4*	3.82	6 3/8	7 5/8
5	6 1/2	3/4	-12	7/8	7/8	2	1 3/4	3/4	6 1/4*	4 1/4*	4.95	8 3/16	9 3/4
6	7 1/2	1	-16	1	1	2 3/8	2 3/8	7/8	7 3/8*	4 7/8*	5.73	9 7/16	11 1/4
7	8 1/2	1 1/4	-20	1 1/8	1	2 7/8	2 7/8	1 3/16	8 1/2*	5 3/8*	6.58	10 5/8	12 5/8
8	9 1/2	1 1/2	-24	1 1/4	1	3 1/4	3 1/4	1 1/4	9 1/2*	6 1/8*	7.50	11 13/16	14
10	12 5/8	2	-32	1 3/4	1 11/16	3 7/8	3 7/8	1 11/16	12 1/8*	8*	9.62	15 7/8	19
12	14 7/8	2 1/2	-32	2	1 15/16	4 7/8	4 7/8	1 15/16	14 1/2*	9 3/8*	11.45	18 1/2	22
14	17 1/4	2 1/2	-32	2 1/4	2 7/16	5 3/8	5 3/8	2 5/32	17*	10 3/4*	13.34	21 1/8	25 1/4

*Be sure to add stroke to this dimension.

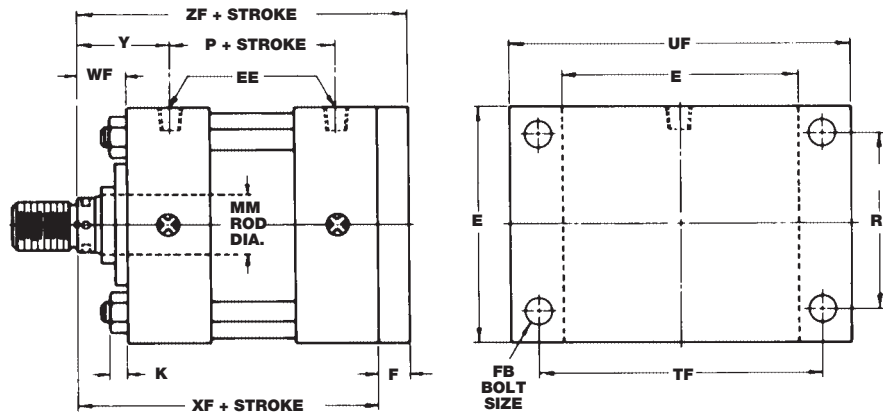
**Clearance holes for indicated bolt size.

†Alternate port at no extra charge. SAE port is standard.

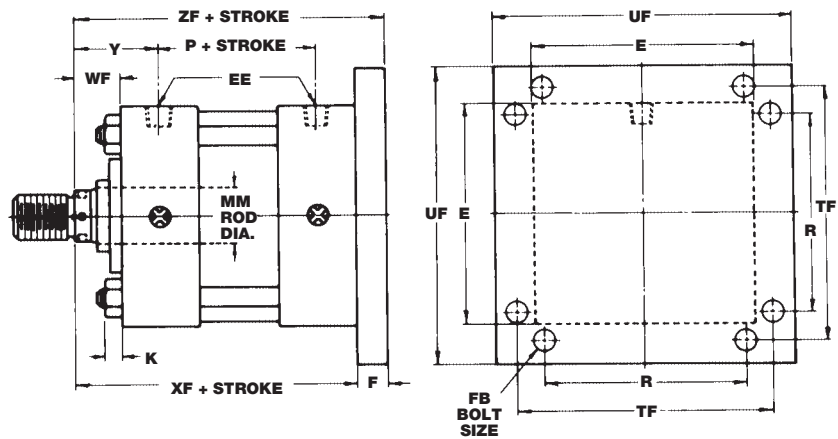
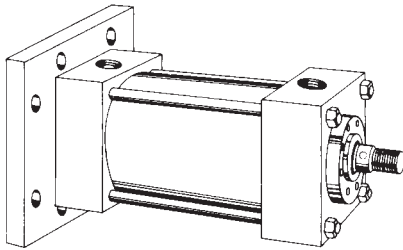
REAR FLANGE MOUNT STYLE RF (MF2)*



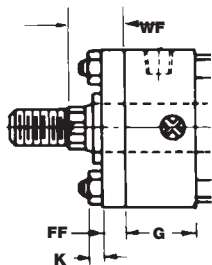
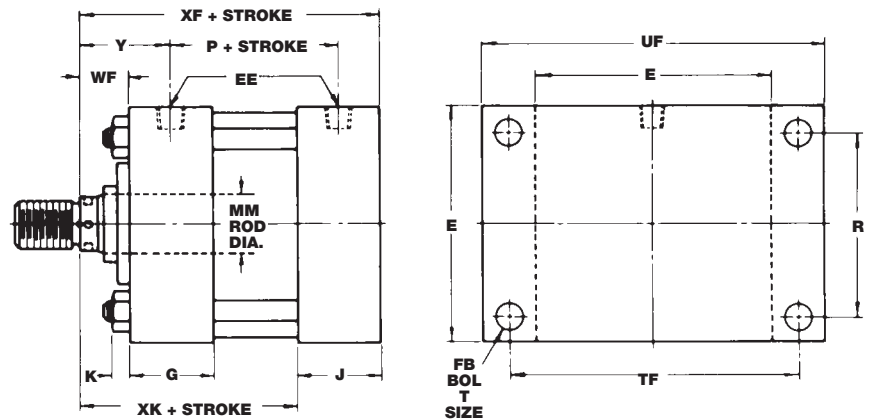
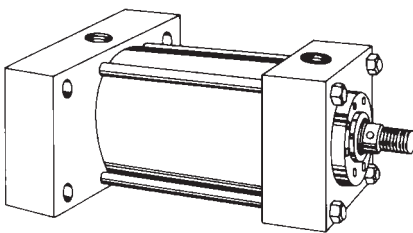
1000 PSI Rated



REAR FLANGE MOUNT EXTRA SIZE STYLE RFX (MF6)*



REAR HEAD FLANGE MOUNT STYLE RHF (ME6)*



*ANSI/B93.1-1964 Mounting Style Designation.

IMPORTANT NOTICE

There is a construction variance in 1¹/₈" , 1¹/₂" , 2" bores, the 2¹/₂" bore with a 1³/₈" and a 1³/₄" rod diameter, and the 3¹/₄" bore with a 2" diameter rod. The round retainer shown above is not used on these sizes. A square retainer, the same square size as the head is employed. The retainer is cleared for the tie rods and held in place with the tie rod nuts.

In these sizes, the rod gland cannot be removed without loosening the tie rods. Dimensions are shown on the adjacent drawing.

On all other sizes, a round rod gland retainer is used. It is held in place by retainer screws—independent of the tie rods, hence, the rod gland CAN BE removed without loosening the tie rods.

Good – Rear Flange Mount

While this style of mount is a widely used one, its use should be restricted to pressures under 1000 psi, short strokes (under 36") and standard rod diameters. Note that the Rear Head Flange mount has the same mounting hole pattern.

Better – Rear Flange Extra Mount

Satisfactory for maximum operating pressure and long strokes if properly applied. See separate Accessories Brochure for detailed mounting data and separate Engineering Brochure for long stroke information.

Best – Rear Head Flange Mount

Highly recommended. This is the best style of flange mounting. With this style, the cylinder can be mounted on the back face of the flange if desired. This mounting style is used extensively on high tonnage presses and other heavy duty applications.

We highly recommend that consideration be given to the use of a Style 6 rod end (see pages HH-21 and HH-22) and S.A.F.E. Coupling (separate Accessories Brochure) to achieve good radial alignment.

Selection of piston rod diameter can be determined by consulting separate Engineering Brochure.

CAUTION

See separate Accessories Brochure for information concerning the application of Flange Mount Cylinders.

Rear Flange Dimensions

BORE	MM ROD DIA.	WF	XF*	XK*	Y	ZF*
1 1/8	5/8 STD.	1 1/8	4 3/8*	3 3/8*	1 23/32	4 3/4*
1 1/2	5/8 STD.	1	5 5/8*	4 1/8*	2	6*
	1 2:1	1 3/8	6*	4 1/2*	2 3/8	6 3/8*
2	1 STD.	1 3/8	6*	4 1/2*	2 3/8	6 5/8*
	1 3/8 2:1	1 5/8	6 1/4*	4 3/4*	2 5/8	6 7/8*
2 1/2	1 STD.	1 3/8	6 1/8*	4 5/8*	2 3/8	6 3/4*
	1 3/8	1 5/8	6 3/8*	4 7/8*	2 5/8	7*
	1 3/4 2:1	1 7/8	6 5/8*	5 1/8*	2 7/8	7 1/4*
3 1/4	1 3/8 STD.	1 5/8	7 1/8*	5 3/8*	2 3/4	7 7/8*
	1 3/4	1 7/8	7 3/8*	5 5/8*	3	8 1/8*
	2 2:1	2	7 1/2*	5 3/4*	3 1/8	8 1/4*
4	1 3/4 STD.	1 7/8	7 5/8*	5 7/8*	3	8 1/2*
	2	2	7 3/4*	6*	3 1/8	8 5/8*
	2 1/2 2:1	2 1/4	8*	6 1/4*	3 3/8	8 7/8*
5	2 STD.	2	8 1/4*	6 1/2*	3 1/8	9 1/8*
	2 1/2	2 1/4	8 1/2*	6 3/4*	3 3/8	9 3/8*
	3	2 1/4	8 1/2*	6 3/4*	3 3/8	9 3/8*
6	3 1/2 2:1	2 1/4	8 1/2*	6 3/4*	3 3/8	9 3/8*
	2 1/2 STD.	2 1/4	9 5/8*	7 1/4*	3 1/2	10 5/8*
	3	2 1/4	9 5/8*	7 1/4*	3 1/2	10 5/8*
7	3 1/2	2 1/4	9 5/8*	7 1/4*	3 1/2	10 5/8*
	4 2:1	2 1/4	9 5/8*	7 1/4*	3 1/2	10 5/8*
	3 STD.	2 1/4	10 3/4*	7 7/8*	3 13/16	11 3/4*
	3 1/2	2 1/4	10 3/4*	7 7/8*	3 13/16	11 3/4*
8	4	2 1/4	10 3/4*	7 7/8*	3 13/16	11 3/4*
	4 1/2	2 1/4	10 3/4*	7 7/8*	3 13/16	11 3/4*
	5 2:1	2 1/4	10 3/4*	7 7/8*	3 13/16	11 3/4*
	3 1/2 STD.	2 1/4	11 3/4*	8 1/2*	3 15/16	12 3/4*
10	4 1/2	2 1/4	11 3/4*	8 1/2*	3 15/16	12 3/4*
	5	2 1/4	11 3/4*	8 1/2*	3 15/16	12 3/4*
	5 1/2 2:1	2 1/4	11 3/4*	8 1/2*	3 15/16	12 3/4*
	4 1/2 STD.	2 15/16	15 1/16*	11 3/16*	5	16 3/4*
12	5	3 3/16	15 5/16*	11 7/16*	5 1/4	17*
	5 1/2	3 3/16	15 5/16*	11 7/16*	5 1/4	17*
	7 2:1	3 11/16	15 13/16*	11 15/16*	5 3/4	17 1/2*
14	5 1/2 STD.	3 3/16	17 11/16*	12 13/16*	5 3/4	19 5/8*
	7	3 13/16	18 5/16*	13 7/16*	6 3/8	20 1/4*
	8 2:1	4 3/8	18 7/8*	14*	6 15/16	20 13/16*
14	7 STD.	4 5/16	21 5/16*	15 15/16*	7 7/16	23 3/4*
	10 2:1	4 15/16	21 15/16*	16 9/16*	8 1/16	24 3/8*

*Be sure to add stroke to this dimension.

Rear Flange Dimensions

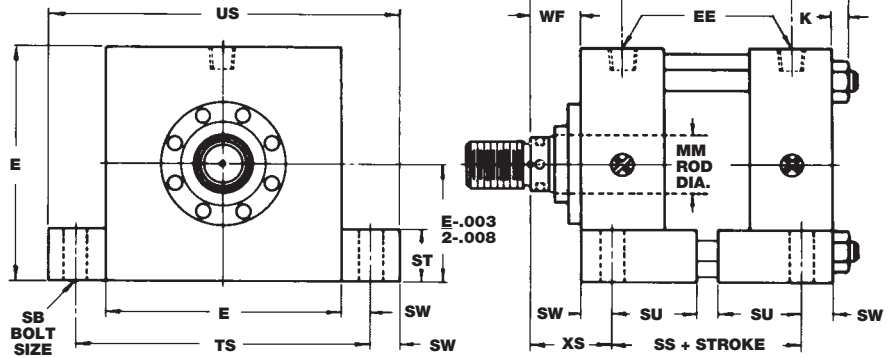
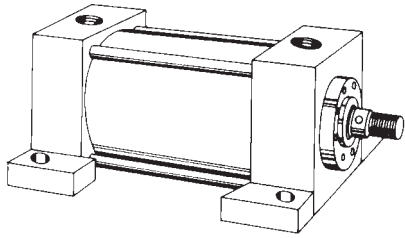
BORE	E	EE NPT†	EE SAE	F	FB**	FF	G	J	K	P*	R	TF	UF
1 1/8	1 3/4	1/4	-6	3/8	1/4	1/2	1 1/8	1	1/4	2 3/16*	1.19	2 3/8	3
1 1/2	2 1/2	1/2	-10	3/8	3/8	3/8	1 3/4	1 1/2	5/16	2 7/8*	1.63	3 7/16	4 1/4
2	3	1/2	-10	5/8	1/2	5/8	1 3/4	1 1/2	7/16	2 7/8*	2.05	4 1/8	5 1/8
2 1/2	3 1/2	1/2	-10	5/8	1/2	5/8	1 3/4	1 1/2	7/16	3*	2.55	4 5/8	5 5/8
3 1/4	4 1/2	3/4	-12	3/4	5/8	3/4	2	1 3/4	9/16	3 1/2*	3.25	5 7/8	7 1/8
4	5	3/4	-12	7/8	5/8	—	2	1 3/4	9/16	3 3/4*	3.82	6 3/8	7 5/8
5	6 1/2	3/4	-12	7/8	7/8	—	2	1 3/4	3/4	4 1/4*	4.95	8 3/16	9 3/4
6	7 1/2	1	-16	1	1	—	2 3/8	2 3/8	7/8	4 7/8*	5.73	9 7/16	11 1/4
7	8 1/2	1 1/4	-20	1	1 1/8	—	2 7/8	2 7/8	1 3/16	5 3/8*	6.58	10 5/8	12 5/8
8	9 1/2	1 1/2	-24	1	1 1/4	—	3 1/4	3 1/4	1 1/4	6 1/8*	7.50	11 13/16	14
10	12 5/8	2	-32	1 11/16	1 3/4	—	3 7/8	3 7/8	1 11/16	8*	9.62	15 7/8	19
12	14 7/8	2 1/2	-32	1 15/16	2	—	4 7/8	4 7/8	1 15/16	9 3/8*	11.45	18 1/2	22
14	17 1/4	2 1/2	-32	2 7/16	2 1/4	—	5 3/8	5 3/8	2 5/32	10 3/4*	13.34	21 1/8	25 1/4

*Be sure to add stroke to this dimension.

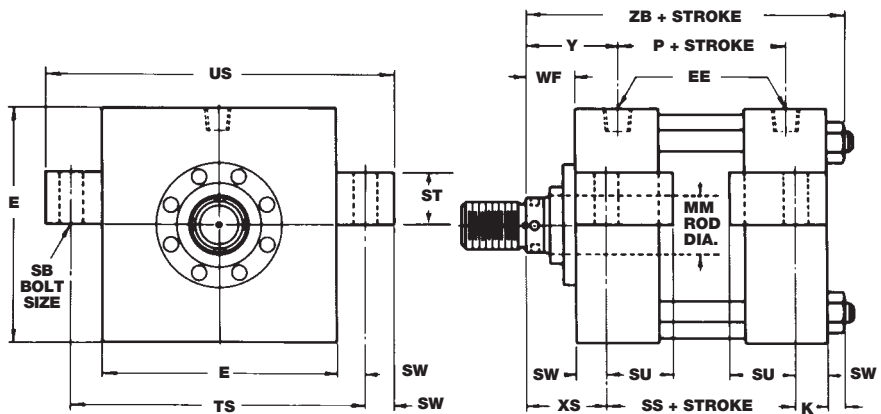
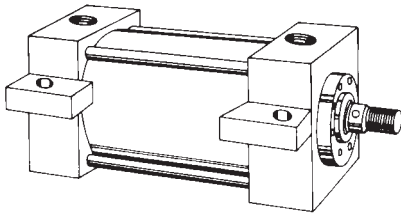
**Clearance holes for indicated bolt size.

†Alternate port at no extra charge. SAE port is standard.

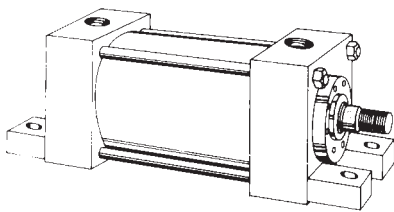
SIDE LUG MOUNT STYLE SL (MS2)*



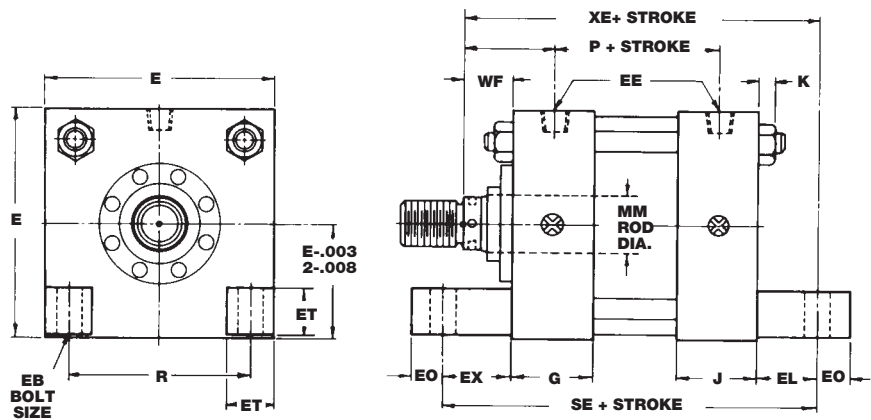
CENTER LINE LUG MOUNT STYLE CL (MS3)*



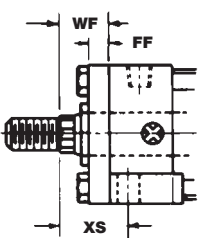
END LUG MOUNT STYLE EL (MS7)*



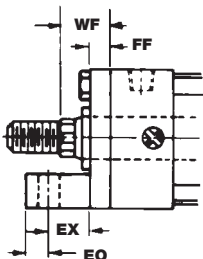
Available 1 1/8" thru 8" Bore only



DRAWING A



DRAWING B



*ANSI/B93.1-1964 Mounting Style Designation.

IMPORTANT NOTICE

SL and CL MOUNTS – The round gland retainer shown above is not used on the 1 1/8" bore, 1 1/2" bore, or the 2 1/2" bore with a 1 3/4" rod diameter and the 3 1/4" bore with a 2" rod diameter.

A square retainer, the same square size as the head is employed on these sizes. The retainer is held in place with retainer screws that thread into the head. The rod gland can be removed without loosening the tie rods in all sizes. See adjacent **Drawing A**.

EL MOUNT – The round gland retainer shown above is not used on the 1 1/8" bore, 1 1/2" bore, 2" bore, the 2 1/2" bore with 1 3/8" and 1 3/4" rod diameters, and the 3 1/4" bore with a 2" rod diameter. A square retainer, the same square size as the head, is employed on these sizes. The lugs serve as nuts on the bottom two tie rods, and the top two tie rods use tie rod nuts. The rod gland cannot be removed without loosening the tie rods in these sizes. See adjacent **Drawing B**.

Lug Mount Cylinder Dimensions

BORE	MM ROD DIA.	EX	WF	XE*	XS	Y	ZB*
1 1/8	5/8 STD.	3/4	1 1/8	5 1/8*	1 3/8	1 23/32	4 5/8*
1 1/2	5/8 STD.	7/8	1	6 1/2*	1 3/8	2	5 15/16*
	1 2:1	7/8	1 3/8	6 7/8*	1 3/4	2 3/8	6 5/16*
2	1 STD.	15/16	1 3/8	6 15/16*	1 7/8	2 3/8	6 7/16*
	1 3/8 2:1	15/16	1 5/8	7 3/16*	2 1/8	2 5/8	6 11/16*
2 1/2	1 STD.	1 9/16	1 3/8	7 1/16*	2 1/16	2 3/8	6 9/16*
	1 3/8	15/16	1 5/8	7 5/16*	2 5/16	2 5/8	6 13/16*
	1 3/4 2:1	15/16	1 7/8	7 9/16*	2 9/16	2 7/8	7 1/16*
3 1/4	1 3/8 STD.	1 7/8	1 5/8	8 1/4*	2 5/16	2 3/4	7 11/16*
	1 3/4	1 7/8	1 7/8	8 1/2*	2 9/16	3	7 15/16*
	2 2:1	1 1/8	2	8 5/8*	2 11/16	3 1/8	8 1/16*
4	1 3/4 STD.	2	1 7/8	8 3/4*	2 3/4	3	8 3/16*
	2	2	2	8 7/8*	2 7/8	3 1/8	8 5/16*
	2 1/2 2:1	2	2 1/4	9 1/8*	3 1/8	3 3/8	8 9/16*
5	2 STD.	2 3/8	2	9 3/4*	2 7/8	3 1/8	9*
	2 1/2	2 3/8	2 1/4	10*	3 1/8	3 3/8	9 1/4*
	3	2 3/8	2 1/4	10*	3 1/8	3 3/8	9 1/4*
	3 1/2 2:1	2 3/8	2 1/4	10*	3 1/8	3 3/8	9 1/4*
6	2 1/2 STD.	2 11/16	2 1/4	11 5/16*	3 3/8	3 1/2	10 1/2*
	3	2 11/16	2 1/4	11 5/16*	3 3/8	3 1/2	10 1/2*
	3 1/2	2 11/16	2 1/4	11 5/16*	3 3/8	3 1/2	10 1/2*
	4 2:1	2 11/16	2 1/4	11 5/16*	3 3/8	3 1/2	10 1/2*
7	3 STD.	2 13/16	2 1/4	12 9/16*	3 5/8	3 13/16	11 15/16*
	3 1/2	2 13/16	2 1/4	12 9/16*	3 5/8	3 13/16	11 15/16*
	4	2 13/16	2 1/4	12 9/16*	3 5/8	3 13/16	11 15/16*
	4 1/2	2 13/16	2 1/4	12 9/16*	3 5/8	3 13/16	11 15/16*
	5 2:1	2 13/16	2 1/4	12 9/16*	3 5/8	3 13/16	11 15/16*
8	3 1/2 STD.	3	2 1/4	13 3/4*	3 5/8	3 15/16	13*
	4	3	2 1/4	13 3/4*	3 5/8	3 15/16	13*
	4 1/2	3	2 1/4	13 3/4*	3 5/8	3 15/16	13*
	5	3	2 1/4	13 3/4*	3 5/8	3 15/16	13*
	5 1/2 2:1	3	2 1/4	13 3/4*	3 5/8	3 15/16	13*
10	4 1/2 STD.	—	2 15/16	—	4 9/16	5	16 3/4*
	5	—	3 3/16	—	4 13/16	5 1/4	17*
	5 1/2	—	3 3/16	—	4 13/16	5 1/4	17*
	7 2:1	—	3 11/16	—	5 5/16	5 3/4	17 1/2*
12	5 1/2 STD.	—	3 3/16	—	5 3/16	5 3/4	19 5/8*
	7	—	3 13/16	—	5 13/16	6 3/8	20 1/4*
	8 2:1	—	4 3/8	—	6 3/8	6 15/16	20 13/16*
14	7 STD.	—	4 5/16	—	6 9/16	7 7/16	23 15/32*
	10 2:1	—	4 15/16	—	7 3/16	8 1/16	24 3/32*

*Be sure to add stroke to this dimension.

Lug Mount Cylinder Dimensions

BORE	E	EB**	EE NPT†	EE SAE	EL	EO	ET	FF	G	J	K	P*	R	SB**	SE*	SS*	ST	SU	SW	TS	US
1 1/8	1 3/4	1/4	1/4	-6	3/4	1/4	1/2	1/2	1 1/8	1	1/4	2 3/16*	1.19	5/16	5 1/4*	2 5/8*	1/2	15/16	3/8	2 1/2	3 1/4
1 1/2	2 1/2	3/8	1/2	-10	7/8	3/8	13/16	3/8	1 3/4	1 1/2	5/16	2 7/8*	1.63	3/8	6 3/4*	3 7/8*	1/2	15/16	3/8	3 1/4	4
2	3	1/2	1/2	-10	15/16	1/2	7/8	5/8	1 3/4	1 1/2	7/16	2 7/8*	2.05	1/2	7 1/8*	3 5/8*	3/4	1 1/4	1/2	4	5
2 1/2	3 1/2	1/2	1/2	-10	15/16	1/2	7/8	5/8	1 3/4	1 1/2	7/16	3*	2.55	3/4	7 1/4*	3 3/8*	1	1 9/16	11/16	4 7/8	6 1/4
3 1/4	4 1/2	5/8	3/4	-12	1 1/8	5/8	13/16	3/4	2	1 3/4	9/16	3 1/2*	3.25	3/4	8 1/2*	4 1/8*	1	1 9/16	11/16	5 7/8	7 1/4
4	5	5/8	3/4	-12	1 1/8	5/8	1 1/16	—	2	1 3/4	9/16	3 3/4*	3.82	1	8 7/8*	4*	1 1/4	2	7/8	6 3/4	8 1/2
5	6 1/2	7/8	3/4	-12	1 1/2	3/4	1 7/16	—	2	1 3/4	3/4	4 1/4*	4.95	1	10 1/8*	4 1/2*	1 1/4	2	7/8	8 1/4	10
6	7 1/2	1	1	-16	1 11/16	7/8	1 5/8	—	2 3/8	2 3/8	7/8	4 7/8*	5.73	1 1/4	11 3/4*	5 1/8*	1 1/2	2 1/2	1 1/8	9 3/4	12
7	8 1/2	1 1/8	1 1/4	-20	1 13/16	1	1 3/4	—	2 7/8	2 7/8	1 3/16	5 3/8*	6.58	1 1/2	13 1/8*	5 3/4*	1 3/4	2 7/8	1 3/8	11 1/4	14
8	9 1/2	1 1/4	1 1/2	-24	2	1 1/8	1 7/8	—	3 1/4	3 1/4	1 1/4	6 1/8*	7.50	1 1/2	14 1/2*	6 3/4*	1 3/4	2 7/8	1 3/8	12 1/4	15
10	12 5/8	—	2	-32	—	—	—	—	3 7/8	3 7/8	1 11/16	8*	—	1 1/2	—	8 7/8*	2 1/4	3 1/2	1 5/8	15 7/8	19 1/8
12	14 7/8	—	2 1/2	-32	—	—	—	—	4 7/8	4 7/8	1 15/16	9 3/8*	—	1 1/2	—	10 1/2*	3	4 1/4	2	18 7/8	22 7/8
14	17 1/4	—	2 1/2	-32	—	—	—	—	5 3/8	5 3/8	2 5/32	10 3/4*	—	2 1/4	—	12 1/2*	3 1/2	4 3/4	2 1/4	21 3/4	26 1/4

*Be sure to add stroke to this dimension.

**Clearance holes for indicated bolt size.

†Alternate port at no extra charge. SAE port is standard.

CAUTION

When specifying a Side Lug Mount with ports on the side (port positions 2, 4, 6 or 8), be sure that there will be enough clearance between the port fitting and the lug to insert a bolt or cap-screw into the lug. In small bore sizes, it may even be necessary to employ a pipe nipple to easily pipe the port.

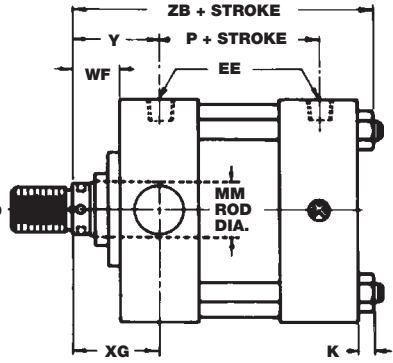
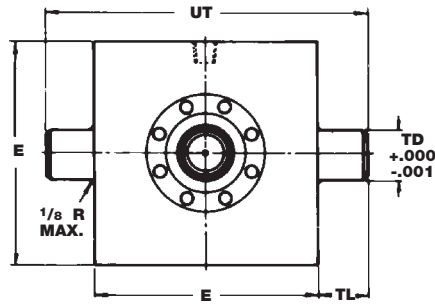
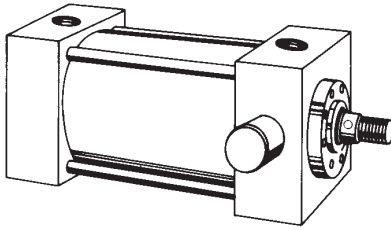
When specifying an End Lug Mount, carefully check the distance between the rod end and the lug to determine sufficient clearance for rod end attachment. It may be necessary to add extra plain rod extension to move the threaded rod end out beyond the lug. When using a rod eye or rod clevis, we recommend the extra plain rod extensions in **Chart A** below be specified.

Consult separate Accessories Brochure for information concerning the selection and application of lug mount cylinders. See separate Engineering Brochure for long stroke cylinder data. Selection of piston rod diameter can be determined from information in separate Engineering Brochure.

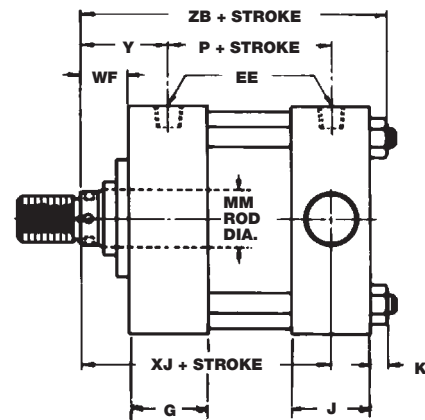
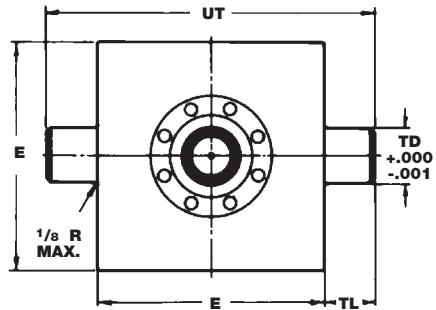
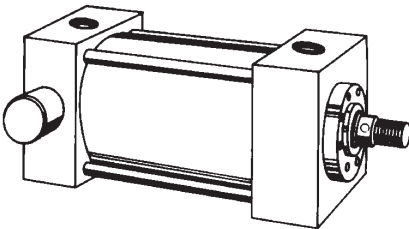
Rod Extensions - Chart A

BORE	ROD DIAMETER	EXTRA PLAIN ROD EXT.
1 1/8	5/8	1/2
	1	3/4
1 1/2	1	3/8
	1 3/8	13/16
2	1	13/16
	1 3/8	9/16
2 1/2	1	13/16
	1 3/8	9/16
	1 3/4	5/16
3 1/4	1 3/8	1
	1 3/4	3/4
	2	5/8
4	1 3/4	7/8
	2	3/4
	2 1/2	1/2
5	2	1 1/4
	2 1/2	1
	3	1
6	3 1/2	1
	ALL	1 7/16
7	ALL	1 11/16
	ALL	2

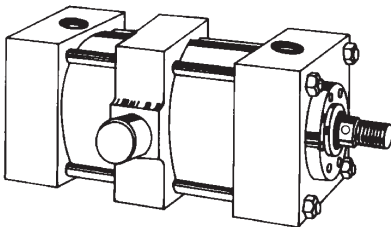
TRUNNION FRONT MOUNT STYLE TF (MT1)*



TRUNNION REAR MOUNT STYLE TR (MT2)*

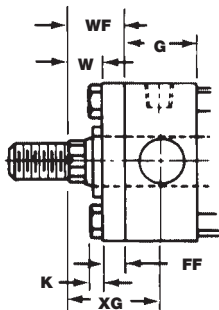
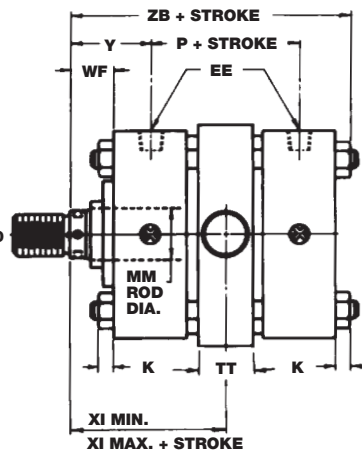
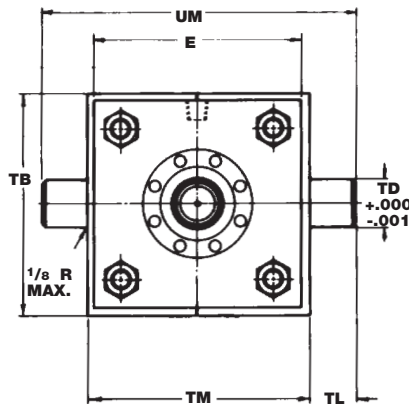


TRUNNION MOUNT STYLE T (MT4)*



(Intermediate - Between Heads)
Position NOT adjustable.

NOTE: XI Dimensions must be supplied
by customer on all correspondence



*ANSI/B93.1-1964 Mounting Style
Designation.

IMPORTANT NOTICE

TF and TR MOUNTS-The round gland retainer shown above is not used on the 1¹/₈" bore, 1¹/₂" bore, or the 2¹/₂" bore with a 1³/₄" rod diameter and the 3¹/₄" bore with a 2" rod diameter.

A square gland retainer, the same square size as the head is employed on these sizes. The square retainer is held in place by retainer screws that thread into the head. The rod gland can be removed without loosening the tie rods in all bore sizes. See adjacent drawing for construction details.

T MOUNT-The round gland retainer shown above is not used on the 1¹/₈" bore, 1¹/₂" bore, 2" bore, the 2¹/₂" bore with a 1³/₈" or 1³/₄" rod diameter, or the 3¹/₄" bore with a 2" rod diameter. A square gland retainer, the same square size as the head is employed on these sizes. The square retainer is held in place with tie rod nuts and the rod gland cannot be removed without loosening the tie rods.

See adjacent drawing for retainer details.

CAUTION

TF mount cylinders in bore sizes 5" through 8" with oversize piston rods and bore sizes 10", 12" and 14" with all piston rod diameters should not be used over 2,000 psi. If your application demands higher pressure, consult the factory.

CylindersNow trunnion pins are an integral part of the head (TF Mount), the cap (TR Mount), or the ring on the intermediate trunnion mount (T). Even though machining the pins as an integral part is the strongest, and most fatigue-resistant method, some attention should be given to proper mounting of trunnion cylinders.

Pillow blocks of ample size and rigidity should be provided and should be mounted as close to the head or cap as possible. Bearing should be provided for the full length of the trunnion pin. Pins are designed for shear loads only, not bending loads. Lubrication should be provided to the pins.

All trunnion cylinders need provision on both ends for pivoting in one direction. Alignment in the other direction is essential in order to avoid excessive side loading. Where two-direction pivoting is necessary, contact our distributor for specific recommendations.

Selection of piston rod diameter can be determined by consulting separate Engineering Brochure.

See Engineering Brochure for information concerning the application of long stroke cylinders.

See separate Accessories Brochure for additional data on cylinder mounting.

Trunnion Dimensions

BORE	MM ROD DIA.	W	WF	XI MIN.	XI MAX.*	XG	XJ*	Y	ZB*
1 1/8	5/8 STD.	5/8	1 1/8	2 3/4	2 7/8*	1 23/32	3 29/32*	1 23/32	4 5/8*
1 1/2	5/8 STD.	5/8	1	3 3/8	3 1/2*	1 7/8	4 7/8*	2	5 15/16*
	1 2:1	1	1 3/8	3 3/4	3 7/8*	2 1/4	5 1/4*	2 3/8	6 5/16*
2	1 STD.	3/4	1 3/8	3 7/8	3 3/4*	2 1/4	5 1/4*	2 3/8	6 7/16*
	1 3/8 2:1	1	1 5/8	4 1/8	4*	2 1/2	5 1/2*	2 5/8	6 11/16*
2 1/2	1 STD.	3/4	1 3/8	3 7/8	3 7/8*	2 1/4	5 3/8*	2 3/8	6 9/16*
	1 3/8	1	1 5/8	4 1/8	4 1/8*	2 1/2	5 5/8*	2 5/8	6 13/16*
	1 3/4 2:1	1 1/4	1 7/8	4 3/8	4 3/8*	2 3/4	5 7/8*	2 7/8	7 1/16*
3 1/4	1 3/8	—	1 5/8	4 5/8	4 3/8*	2 5/8	6 1/4*	2 3/4	7 1/16*
	1 3/4	—	1 7/8	4 7/8	4 5/8*	2 7/8	6 1/2*	3	7 15/16*
	2 2:1	1 1/4	2	5	4 3/4*	3	6 5/8*	3 1/8	8 1/16*
4	1 3/4 STD.	—	1 7/8	5	4 3/4*	2 7/8	6 3/4*	3	8 3/16*
	2	—	2	5 1/8	4 7/8*	3	6 7/8*	3 1/8	8 5/16*
	2 1/2 2:1	—	2 1/4	5 3/8	5 1/8*	3 1/4	7 1/8*	3 3/8	8 9/16*
5	2 STD.	—	2	5 1/8	5 3/8*	3	7 3/8*	3 1/8	9*
	2 1/2	—	2 1/4	5 3/8	5 5/8*	3 1/4	7 5/8*	3 3/8	9 1/4*
	3	—	2 1/4	5 3/8	5 5/8*	3 1/4	7 5/8*	3 3/8	9 1/4*
	3 1/2 2:1	—	2 1/4	5 3/8	5 5/8*	3 1/4	7 5/8*	3 3/8	9 1/4*
6	2 1/2 STD.	—	2 1/4	6 1/8	5 3/4*	3 3/8	8 3/8*	3 1/2	10 1/2*
	3	—	2 1/4	6 1/8	5 3/4*	3 3/8	8 3/8*	3 1/2	10 1/2*
	3 1/2	—	2 1/4	6 1/8	5 3/4*	3 3/8	8 3/8*	3 1/2	10 1/2*
	4 2:1	—	2 1/4	6 1/8	5 3/4*	3 3/8	8 3/8*	3 1/2	10 1/2*
7	3 STD.	—	2 1/4	6 5/8	6 3/8*	3 5/8	9 3/8*	3 13/16	11 15/16*
	3 1/2	—	2 1/4	6 5/8	6 3/8*	3 5/8	9 3/8*	3 13/16	11 15/16*
	4	—	2 1/4	6 5/8	6 3/8*	3 5/8	9 3/8*	3 13/16	11 15/16*
	4 1/2	—	2 1/4	6 5/8	6 3/8*	3 5/8	9 3/8*	3 13/16	11 15/16*
	5 2:1	—	2 1/4	6 5/8	6 3/8*	3 5/8	9 3/8*	3 13/16	11 15/16*
8	3 1/2 STD.	—	2 1/4	7 1/4	6 3/4*	3 3/4	10 1/4*	3 15/16	13*
	4	—	2 1/4	7 1/4	6 3/4*	3 3/4	10 1/4*	3 15/16	13*
	4 1/2	—	2 1/4	7 1/4	6 3/4*	3 3/4	10 1/4*	3 15/16	13*
	5	—	2 1/4	7 1/4	6 3/4*	3 3/4	10 1/4*	3 15/16	13*
	5 1/2 2:1	—	2 1/4	7 1/4	6 3/4*	3 3/4	10 1/4*	3 15/16	13*
10	4 1/2	—	2 15/16	9 1/16	8 15/16*	4 3/4	13 1/4*	5	16 3/4*
	5	—	3 3/16	9 5/16	9 3/16*	5	13 1/2*	5 1/4	17*
	5 1/2	—	3 3/16	9 5/16	9 3/16*	5	13 1/2*	5 1/4	17*
	7 2:1	—	3 11/16	9 13/16	9 11/16*	5 1/2	14*	5 3/4	17 1/2*
12	5 1/2 STD.	—	3 3/16	10 13/16	10 1/16*	5 3/8	15 1/2*	5 3/4	19 5/8*
	7	—	3 13/16	11 7/16	10 11/16*	6	16 1/8*	6 3/8	20 1/4*
	8 2:1	—	4 3/8	12	11 1/4*	6 9/16	16 11/16*	6 15/16	20 3/16*
14	7 STD.	—	4 5/16	12 11/16	12 15/16*	6 27/32	18 25/32*	7 7/16	23 15/32*
	10 2:1	—	4 15/16	13 5/16	13 9/16*	7 15/32	19 13/32*	8 1/16	24 3/32*

*Be sure to add stroke to this dimension.

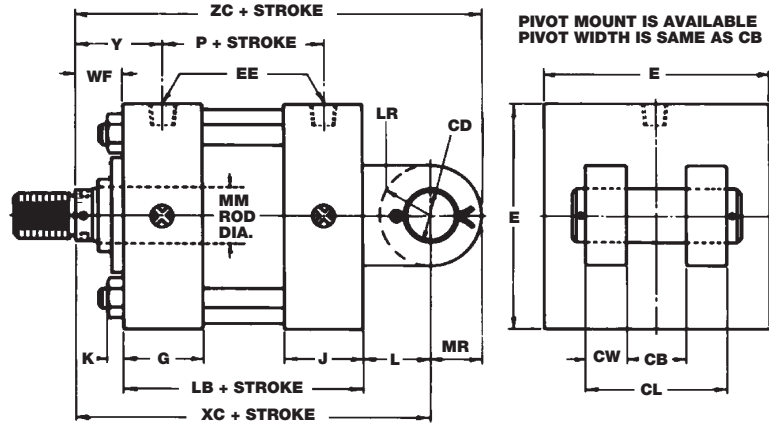
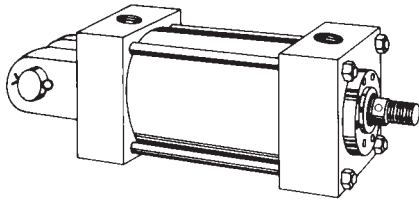
Trunnion Dimensions

BORE	E	EE NPT†	EE SAE	FF	G	J	K	P*	TB	TD	TL	TM	TT	UM	UT
1 1/8	1 3/4	1/4	-6	1/2	1 1/8	1	1/4	2 3/16*	1 3/4	3/4	3/4	1 3/4	1	3 1/4	3 1/4
1 1/2	2 1/2	1/2	-10	3/8	1 3/4	1 1/2	5/16	2 7/8*	3	1	1	3	1 1/4	5	4 1/2
2	3	1/2	-10	5/8	1 3/4	1 1/2	7/16	2 7/8*	3 1/2	1 3/8	1 3/8	3 1/2	1 1/2	6 1/4	5 3/4
2 1/2	3 1/2	1/2	-10	5/8	1 3/4	1 1/2	7/16	3*	4	1 3/8	1 3/8	4	1 1/2	6 3/4	6 1/4
3 1/4	4 1/2	3/4	-12	3/4	2	1 3/4	9/16	3 1/2*	5	1 3/4	1 3/4	5	2	8 1/2	8
4	5	3/4	-12	—	2	1 3/4	9/16	3 3/4*	5 1/2	1 3/4	1 3/4	5 1/2	2 1/4	9	8 1/2
5	6 1/2	3/4	-12	—	2	1 3/4	3/4	4 1/4*	7 1/4	1 3/4	1 3/4	7	2 1/4	10 1/2	10
6	7 1/2	1	-16	—	2 3/8	2 3/8	7/8	4 7/8*	8 3/4	2	2	8 1/2	3	12 1/2	11 1/2
7	8 1/2	1 1/4	-20	—	2 7/8	2 7/8	1 3/16	5 3/8*	10	2 1/2	2 1/2	9 3/4	3	14 3/4	13 1/2
8	9 1/2	1 1/2	-24	—	3 1/4	3 1/4	1 1/4	6 1/8*	11 3/4	3	3	11	3 1/2	17	15 1/2
10	12 5/8	2	-32	—	3 7/8	3 7/8	1 11/16	8*	14 1/2	3 1/2	3 1/2	14	4 1/2	21	19 5/8
12	14 7/8	2 1/2	-32	—	4 7/8	4 7/8	1 15/16	9 3/8*	17 1/4	4	4	16 1/2	5 1/2	24 1/2	22 7/8
14	17 1/4	2 1/2	-32	—	5 3/8	5 3/8	2 5/32	10 3/4*	20 1/2	5	5	19 5/8	6	29 5/8	27 1/4

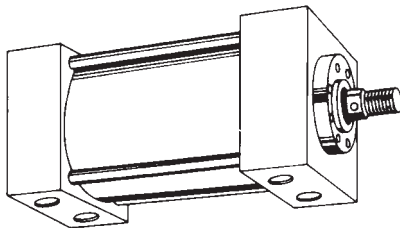
*Be sure to add stroke to this dimension.

†Alternate port at no extra charge. SAE port is standard.

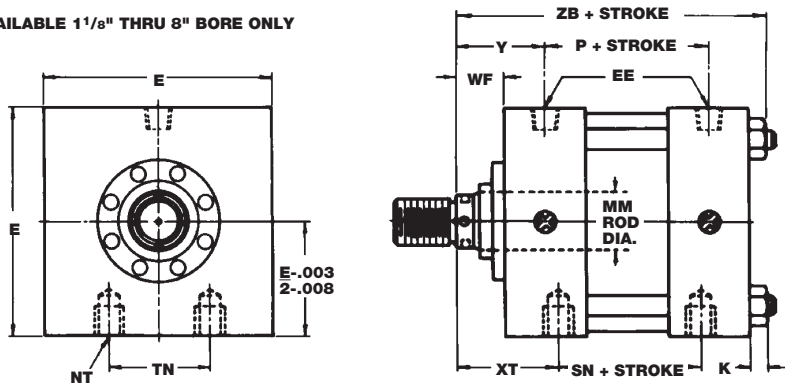
CLEVIS MOUNT STYLE C (MP1)*



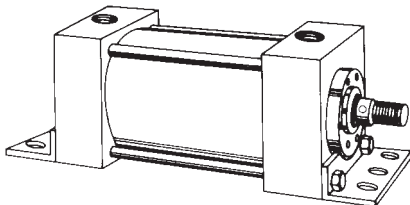
SIDE FLUSH MOUNT STYLE SF (MS4)*



AVAILABLE 1 1/8" THRU 8" BORE ONLY

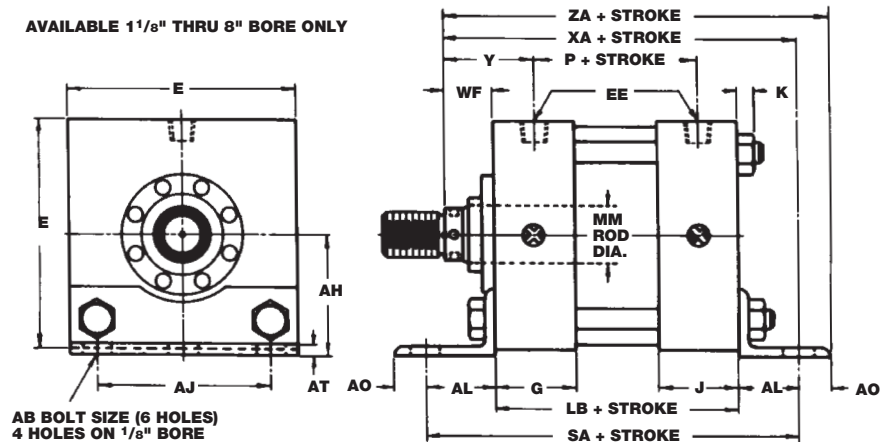


FOOT BRACKET MOUNT STYLE FB (MS1)*



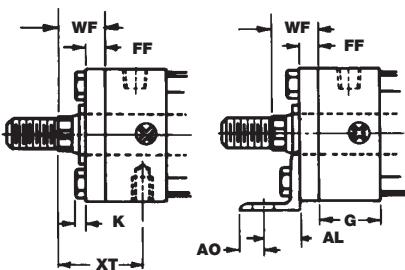
1000 PSI Rated

AVAILABLE 1 1/8" THRU 8" BORE ONLY



DRAWING A

DRAWING B



*ANSI/B93.1-1964 Mounting Style Designation.

IMPORTANT NOTICE

C MOUNT - The round gland retainer shown above is not used on the 1 1/8", 1 1/2", 2" bores, the 2 1/2" bore with a 1 3/8" or 1 3/4" rod diameter, or the 3 1/4" bore with a 2" diameter rod. A square retainer, the same size as the head, is employed on these sizes. The square retainer is held in place with tie rod nuts and the rod gland cannot be removed without loosening the tie rods. The retainer thickness is shown on adjacent **Drawing A**.

SF MOUNT - The round gland retainer is not used on the 1 1/8" bore, 1 1/2" bore, or the 2 1/2" bore with a 1 3/4" rod diameter and the 3 1/4" bore with a 2" rod diameter.

As in the C mount, a square retainer is employed but it is held in place with retainer screws that thread into the head and the rod gland can be removed without loosening the tie rods. See adjacent **Drawing A**.

FB MOUNT - The square retainer is used on 1 1/8" bore, 1 1/2" bore, 2" bore, 2 1/2" bore with 1 3/8" and 1 3/4" rod diameters, and 3 1/4" bore with a 2" rod diameter. The retainer is held in place with retainer screws that thread into the head. The rod gland can be removed without loosening the tie rods, but the front bracket must also be removed. See adjacent **Drawing B**.

Side Flush Mount – Notes

- Available 1 1/2" through 8" bore sizes only.
- Some bore and rod combinations are not available in this mount.
- NA means not available.
- The 1 1/8" bore has only one tapped hole in the head and in the cap.

Foot Bracket Mount – Notes

- Available 1 1/2" through 8" bore sizes only.
- This style of mount is not recommended for pressures in excess of 1000 psi or strokes over 36 inches. Consider the use of an End Lug mount or a Side Lug mount shown on Page HH-11.

Selection of Piston Rod Diameter can be determined by consulting separate Engineering Brochure.

See Engineering Brochure for long stroke cylinder data.

CAUTION

Refer to separate Accessories Brochure for information concerning the mounting of cylinders.

Clevis, Side Flush and Foot Bracket Dimensions

BORE	MM ROD DIA.	SA*	WF	XA	XC*	XT	Y	ZA*	ZB*	ZC*	SIDE FLUSH THREAD DEPTH
1 1/8	5/8 STD.	5 3/4"	1 1/8	5 3/8	5 5/16"	1 23/32	1 23/32	5 3/4"	4 5/8"	5 11/16"	3/8
1 1/2	5/8 STD.	7"	1	6 5/8	6 3/8"	2	2	7"	5 15/16"	6 7/8"	7/16
	1 2:1	7"	1 3/8	7	6 3/4"	2 3/8	2 3/8	7 3/8"	6 5/16"	7 1/4"	7/16
2	1 STD.	7 3/4"	1 3/8	7 1/4	7 1/4"	2 3/8	2 3/8	7 3/4"	6 7/16"	8"	7/16
	1 3/8 2:1	7 3/4"	1 5/8	7 1/2	7 1/2"	2 5/8	2 5/8	8"	6 11/16"	8 1/4"	7/16
2 1/2	1 STD.	7 1/8"	1 3/8	7 5/16	7 3/8"	2 3/8	2 3/8	7 7/8"	6 9/16"	8 1/8"	3/4
	1 3/8	7 3/4"	1 5/8	7 9/16	7 5/8"	2 5/8	2 5/8	8 1/8"	6 13/16"	8 3/8"	3/4
	1 3/4 2:1	7 3/4"	1 7/8	7 13/16	7 7/8"	2 7/8	2 7/8	8 3/8"	7 1/16"	8 5/8"	N.A.
3 1/4	1 3/8 STD.	9 1/8"	1 5/8	8 15/16	8 5/8"	2 3/4	2 3/4	9 5/8"	7 11/16"	9 5/8"	1
	1 3/4	9 1/8"	1 7/8	9 3/16	8 7/8"	3	3	9 7/8"	7 15/16"	9 7/8"	7/8
	2 2:1	9 7/8"	2	9 5/16	9"	3 1/8	3 1/8	10"	8 1/16"	10"	3/4
4	1 3/4 STD.	10"	1 7/8	9 3/4	9 3/4"	3	3	10 5/8"	8 3/16"	11 1/8"	1 1/8
	2	10"	2	9 7/8	9 7/8"	3 1/8	3 1/8	10 3/4"	8 5/16"	11 1/4"	1
	2 1/2 2:1	10"	2 1/4	10 1/8	10 1/8"	3 3/8	3 3/8	11"	8 9/16"	11 1/2"	N.A.
5	2 STD.	10 1/2"	2	10 3/8	10 1/2"	3 1/8	3 1/8	11 1/4"	9"	12 1/4"	1 3/8
	2 1/2	10 1/2"	2 1/4	10 5/8	10 3/4"	3 3/8	3 3/8	11 1/2"	9 1/4"	12 1/2"	1 3/8
	3	10 1/2"	2 1/4	10 5/8	10 3/4"	3 3/8	3 3/8	11 1/2"	9 1/4"	12 1/2"	1 1/4
	3 1/2 2:1	10 1/2"	2 1/4	10 5/8	10 3/4"	3 3/8	3 3/8	11 1/2"	9 1/4"	12 1/2"	1
6	2 1/2 STD.	12 1/4"	2 1/4	12 1/16	12 1/8"	3 1/2	3 1/2	13 1/8"	10 1/2"	14 1/8"	1 3/4
	3	12 1/4"	2 1/4	12 1/16	12 1/8"	3 1/2	3 1/2	13 1/8"	10 1/2"	14 1/8"	1 3/4
	3 1/2	12 1/4"	2 1/4	12 1/16	12 1/8"	3 1/2	3 1/2	13 1/8"	10 1/2"	14 1/8"	1 1/2
	4 2:1	12 1/4"	2 1/4	12 1/16	12 1/8"	3 1/2	3 1/2	13 1/8"	10 1/2"	14 1/8"	1 1/8
7	3 STD.	14 7/8"	2 1/4	13 15/16	13 3/4"	3 13/16	3 13/16	15 1/4"	11 15/16"	16 1/4"	2
	3 1/2	14 7/8"	2 1/4	13 15/16	13 3/4"	3 13/16	3 13/16	15 1/4"	11 15/16"	16 1/4"	2
	4	14 7/8"	2 1/4	13 15/16	13 3/4"	3 13/16	3 13/16	15 1/4"	11 15/16"	16 1/4"	1 5/8
	4 1/2	14 7/8"	2 1/4	13 15/16	13 3/4"	3 13/16	3 13/16	15 1/4"	11 15/16"	16 1/4"	1 1/4
	5 2:1	14 7/8"	2 1/4	13 15/16	13 3/4"	3 13/16	3 13/16	16 1/4"	11 15/16"	16 1/4"	N.A.
8	3 1/2 STD.	15 7/8"	2 1/4	14 15/16	15"	3 15/16	3 15/16	16 1/4"	13"	17 3/4"	2 1/4
	4	15 7/8"	2 1/4	14 15/16	15"	3 15/16	3 15/16	16 1/4"	13"	17 3/4"	1 3/4
	4 1/2	15 7/8"	2 1/4	14 15/16	15"	3 15/16	3 15/16	16 1/4"	13"	17 3/4"	1 3/4
	5	15 7/8"	2 1/4	14 15/16	15"	3 15/16	3 15/16	16 1/4"	13"	17 3/4"	1 5/8
	5 1/2 2:1	15 7/8"	2 1/4	14 15/16	15"	3 15/16	3 15/16	16 1/4"	13"	17 3/4"	1 1/2
10	4 1/2 STD.	—	2 15/16	—	19 1/16"	—	5	—	—	22 9/16"	—
	5	—	3 3/16	—	19 5/16"	—	5 1/4	—	—	22 13/16"	—
	5 1/2	—	3 3/16	—	19 5/16"	—	5 1/4	—	—	22 13/16"	—
	7 2:1	—	3 11/16	—	19 13/16"	—	5 3/4	—	—	23 5/16"	—
12	5 1/2 STD.	—	3 3/16	—	22 3/16"	—	5 3/4	—	—	26 3/16"	—
	7	—	3 13/16	—	22 13/16"	—	6 3/8	—	—	26 13/16"	—
	8 2:1	—	4 3/8	—	23 3/8"	—	6 15/16	—	—	27 3/8"	—
14	7 STD.	—	4 5/16	—	27 13/16"	—	7 7/16	—	—	32 13/16"	—
	10 2:1	—	4 15/16	—	28 7/16"	—	8 1/16	—	—	33 7/16"	—

*Be sure to add stroke to this dimension.

Clevis, Side Flush and Foot Bracket Dimensions

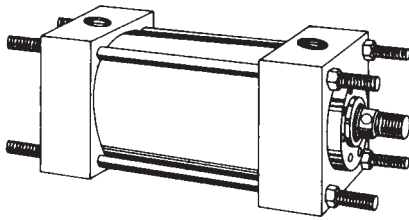
BORE	AB**	AH	AJ	AL	AO	AT	CB	CD	CL	CW	E	NPT†	EE SAE	FF	G	J	K	L	LB	LR	MR	NT	P*	SN*	TN
1 1/8	5/16	1 1/16	1 1/8	1	3/8	1/8	5/8	3/8	1 1/4	5/16	1 3/4	1/4	-6	1/2	1 1/8	1	1/4	1 5/16	3 1/4	9/16	3/8	5/16-18	2 9/16"	2 1/16"	—
1 1/2	3/8	1 3/8	1 3/4	1	3/8	1/8	3/4	1/2	1 3/4	1/2	2 1/2	1/2	-10	3/8	1 3/4	1 1/2	5/16	3/4	4 5/8	1/2	1/2	3/8-16	2 7/8"	2 7/8"	3/4
2	1/2	1 11/16	2	1 1/4	1/2	1/8	1 1/4	3/4	2 1/2	5/8	3	1/2	-10	5/8	1 3/4	1 1/2	7/16	1 1/4	4 5/8	3/4	3/4	1/2-13	2 7/8"	2 7/8"	1 5/16
2 1/2	5/8	1 15/16	2 3/8	1 3/16	9/16	1/8	1 1/4	3/4	2 1/2	5/8	3 1/2	1/2	-10	5/8	1 3/4	1 1/2	7/16	1 1/4	4 3/4	3/4	3/4	5/8-11	3"	3"	1 5/16
3 1/4	3/4	2 9/16	3 1/8	1 13/16	1 1/16	1/4	1 1/2	1	3	3/4	4 1/2	3/4	-12	3/4	2	1 3/4	9/16	1 1/2	5 1/2	1	1	3/4-10	3 1/2"	3 1/2"	1 1/2
4	1	2 13/16	3 1/4	2 1/8	7/8	1/4	2	1 3/8	4	1	5	3/4	-12	—	2	1 3/4	9/16	2 1/8	5 3/4	1 3/8	1 3/8	1-8	3 3/4"	3 3/4"	2 1/16
5	1	3 11/16	4 3/4	2 1/8	7/8	5/16	2 1/2	1 3/4	5	1 1/4	6 1/2	3/4	-12	—	2	1 3/4	3/4	2 1/4	6 1/4	1 3/4	1 3/4	1-8	4 1/4"	4 1/4"	2 15/16
6	1 1/4	4 1/4	5 3/8	2 7/16	1 1/16	3/8	2 1/2	2	5	1 1/4	7 1/2	1	-16	—	2 3/8	2 3/8	7/8	2 1/2	7 3/8	2	2	1 1/4-7	4 7/8"	5 1/8"	3 5/16
7	1 1/2	4 15/16	5 7/8	3 3/16	1 5/16	1/2	3	2 1/2	6	1 1/2	8 1/2	1 1/4	-20	—	2 7/8	2 7/8	1 3/16	3	8 1/2	2 1/2	2 1/2	1 1/2-6	5 3/8"	5 7/8"	3 3/4
8	1 1/2	5 1/2	6 7/8	3 3/16	1 5/16	1/2	3	3	6	1 1/2	9 1/2	1 1/2	-24	—	3 1/4	3 1/4	1 1/4	3 1/4	9 1/2	2 3/4	2 3/4	1 1/2-6	6 1/8"	6 5/8"	4 1/4
10	—	—	—	—	—	—	4	3 1/2	8	2	12 5/8	2	-32	—	3 7/8	3 7/8	1 11/16	4	12 1/8	3 1/2	3 1/2	—	8"	—	—
12	—	—	—	—	—	—	4 1/2	4	9	2 1/4	14 7/8	2 1/2	-32	—	4 7/8	4 7/8	1 15/16	4 1/2	14 1/2	4	4	—	9 3/8"	—	—
14	—	—	—	—	—	—	6	5	12	3	17 1/4	2 1/2	-32	—	5 3/8	5 3/8	2 5/32	6 1/2	17	5	5	—	10 3/4"	—	—

*Be sure to add stroke to this dimension.

**Clearance holes for indicated bolt size.

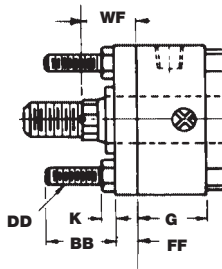
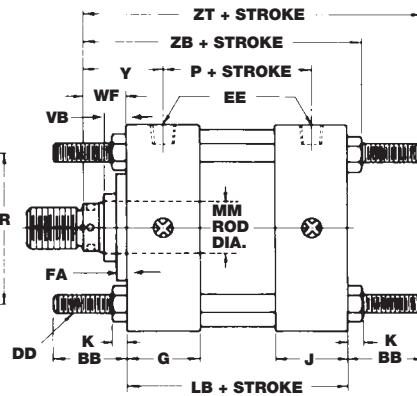
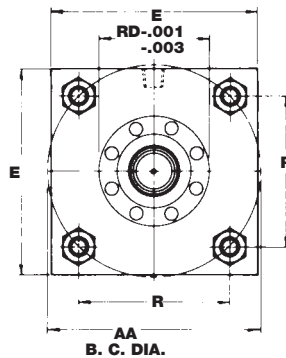
†Alternate port at no extra charge. SAE port is standard.

TIE RODS EXTENDED



NX - Neither (MXO)*
 BX - Both (MX1)*
 RX - Rear (MX2)*
 FX - Front (MX3)*

*ANSI/B93.1-1964 Mounting Style Designation.



IMPORTANT NOTICE

Reference adjacent drawing.

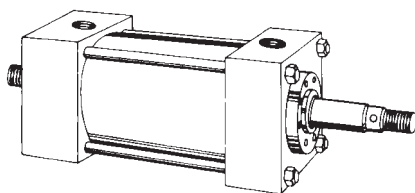
RX MOUNT - The round gland retainer shown above is not used on the 1 1/8" bore, 1 1/2" bore, or the 2 1/2" bore with a 1 3/4" rod diameter or the 3 1/4" bore with a 2" rod diameter. A square retainer, the same square size as the head, is employed in these sizes. The retainer is held in place with retainer screws and the gland can be removed without loosening the tie rods.

FX and BX MOUNTS - The square retainer is used on the 1 1/8" bore, 1 1/2" bore, 2" bore, the 2 1/2" bore

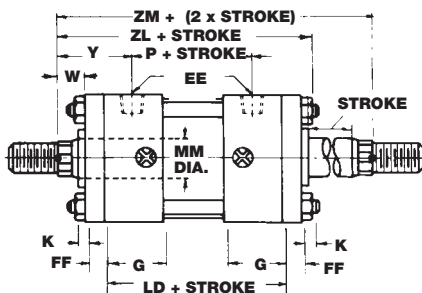
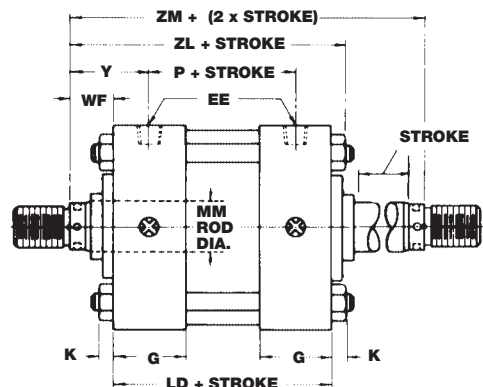
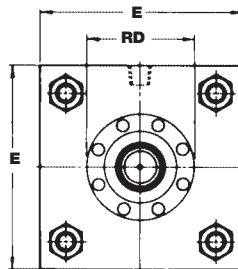
with a 1 3/8" and 1 3/4" rod diameter, and the 3 1/4" bore with a 2" rod diameter. The retainer is held in place by the tie rod nuts, hence, the gland cannot be removed without loosening the tie rods.

NX MOUNT - The square retainer is used on the 1 1/8" bore, 1 1/2" bore, and the 2" bore with a 1 3/4" diameter rod and the 3 1/4" bore with a 2" rod diameter. The retainer is held in place with retainer screws that thread into the head and the rod gland can be removed without loosening the tie rods.

BASIC DOUBLE ROD CYLINDERS



Available in all except C mounts.



IMPORTANT NOTICE

There is a construction variance in the 1 1/8" bore, 1 1/2" bore, 2" bore, the 2 1/2" bore with a 1 3/8" and 1 3/4" rod diameter, and the 3 1/4" bore with a 2" rod diameter. The round gland retainers shown above are not used in these sizes. A square retainer, the same square size as the head, is employed on each end. The retainers are held in place by the tie rod nuts and therefore cannot be removed without loosening the tie rods.

See adjacent drawing for dimension details.

For dimensions on specific mounting styles, consult other pages in this brochure and separate Accessories Brochure. Dimensions shown on the above and adjacent drawings are for the BASIC CYLINDER ONLY.

Double rod extension cylinders are available in every mounting style except clevis.

Double Rod End Cylinders

Double Rod End cylinders are specified for many reasons, some of which are as follows:

1. A simultaneous push and pull requirement.
2. Both rod ends are fixed and the cylinder moves — such as on a machine slide.
3. One rod does the work and the other serves to indicate position or to trip switches.
4. A double rod end cylinder has rod bearings at each end and therefore offers more resistance to deflection and side loading.

When the rod ends of a double rod end cylinder are not to be the same, such as a style 2 on one end and a style 4 on the other, be sure to so specify and to identify which end is which in relation to the mount. For example, on a Front Head Flange mount double rod end cylinder, specify style 2 rod end on flange end of cylinder and style 4 on opposite end.

Refer to Pages HH-21 and HH-22 for Rod End Information.

Tie Rod and Double Rod Dimensions

BORE	MM ROD DIA.	FA	VB	RD	W	WF	Y	ZB	ZL*	ZM*	ZT*
1 1/8	5/8 STD.	—	—	—	5/8	1 1/8	1 23/32	45/8	5 1/4*	5 5/8*	5 3/8*
1 1/2	5/8 STD.	—	—	—	5/8	1	2	5 15/16	6 9/16*	6 7/8*	7*
	1 2:1	—	—	—	1	1 3/8	2 3/8	6 5/16	6 15/16*	7 5/8*	7 3/8*
2	1 STD.	1 1/32	7/8	2.375	3/4	1 3/8	2 3/8	6 7/16	7 5/16*	7 5/8*	7 13/16*
	1 3/8 2:1	1 1/32	1	2.875	1	1 5/8	2 5/8	6 1 1/16	7 9/16*	8 1/8*	8 1/16*
2 1/2	1 STD.	1 1/32	7/8	2.375	3/4	1 3/8	2 3/8	6 9/16	6 13/16*	7 3/4*	7 15/16*
	1 3/8	1 1/32	1	2.875	1	1 5/8	2 5/8	6 13/16	7 1 1/16*	8 1/4*	8 3/16*
	1 3/4 2:1	—	—	—	1 1/4	1 7/8	2 7/8	7 1/16	7 15/16*	8 3/4*	8 7/16*
3 1/4	1 3/8 STD.	1 1/32	1	2.875	—	1 5/8	2 3/4	7 1 1/16	7 5/16*	9*	9 7/16*
	1 3/4	1 1/32	1 1/8	3.250	—	1 7/8	3	7 15/16	8 13/16*	9 1/2*	9 1 1/16*
	2 2:1	—	—	—	1 1/4	2	3 1/8	8 1/16	9 1/16*	9 3/4*	9 13/16*
4	1 3/4 STD.	1 1/32	1 1/8	3.250	—	1 7/8	3	8 3/16	8 7/16*	9 3/4*	9 15/16*
	2	1 1/32	1 1/8	3.562	—	2	3 1/8	8 5/16	8 9/16*	10*	10 1/16*
	2 1/2 2:1	1 1/32	1 1/4	4.000	—	2 1/4	3 3/8	8 9/16	8 13/16*	10 1/2*	10 5/16*
5	2 STD.	1 1/32	1 1/8	3.562	—	2	3 1/8	9	9 1/4*	10 1/2*	11 7/16*
	2 1/2	1 1/32	1 1/4	4.000	—	2 1/4	3 3/8	9 1/4	9 1/2*	11*	11 11/16*
	3	1 1/32	1 1/4	4.750	—	2 1/4	3 3/8	9 1/4	9 1/2*	11*	11 11/16*
	3 1/2 2:1	23/32	1 1/4	5.187	—	2 1/4	3 3/8	9 1/4	9 1/2*	11*	11 11/16*
6	2 1/2 STD.	1 1/32	1 1/4	4.000	—	2 1/4	3 1/2	10 1/2	10 1/2*	11 7/8*	13 1/4*
	3	1 1/32	1 1/4	4.750	—	2 1/4	3 1/2	10 1/2	10 1/2*	11 7/8*	13 1/4*
	3 1/2	23/32	1 1/4	5.187	—	2 1/4	3 1/2	10 1/2	10 1/2*	11 7/8*	13 1/4*
	4 2:1	23/32	1 1/4	5.750	—	2 1/4	3 1/2	10 1/2	10 1/2*	11 7/8*	13 1/4*
7	3 STD.	1 1/32	1 1/4	4.750	—	2 1/4	3 13/16	11 15/16	11 15/16*	13*	14 7/8*
	3 1/2	23/32	1 1/4	5.187	—	2 1/4	3 13/16	11 15/16	11 15/16*	13*	14 7/8*
	4	23/32	1 1/4	5.750	—	2 1/4	3 13/16	11 15/16	11 15/16*	13*	14 7/8*
	4 1/2	3/4	1 1/4	6.250	—	2 1/4	3 13/16	11 15/16	11 15/16*	13*	14 7/8*
	5 2:1	3/4	1 1/4	6.750	—	2 1/4	3 13/16	11 15/16	11 15/16*	13*	14 7/8*
8	3 1/2 STD.	23/32	1 1/4	5.187	—	2 1/4	3 15/16	13	13*	14*	16 1/4*
	4	23/32	1 1/4	5.750	—	2 1/4	3 15/16	13	13*	14*	16 1/4*
	4 1/2	3/4	1 1/4	6.250	—	2 1/4	3 15/16	13	13*	14*	16 1/4*
	5	3/4	1 1/4	6.750	—	2 1/4	3 15/16	13	13*	14*	16 1/4*
	5 1/2 2:1	3/4	1 1/4	7.250	—	2 1/4	3 15/16	13	13*	14*	16 1/4*
10	4 1/2 STD.	1 5/8	1 15/16	6.250	—	2 15/16	5	16 3/4	16 3/4*	18*	21 1/16*
	5	1 5/8	2 3/16	6.750	—	3 3/16	5 1/4	17	17*	18 1/2*	21 5/16*
	5 1/2	1 5/8	2 3/16	7.250	—	3 3/16	5 1/4	17	17*	18 1/2*	21 5/16*
	7 2:1	1 5/8	2 3/16	9.75	—	3 1 1/16	5 3/4	17 1/2	17 1/2*	19 1/2*	21 13/16*
12	5 1/2 STD.	1 5/8	2 3/16	7.250	—	3 3/16	5 3/4	19 5/8	19 5/8*	20 7/8*	24 1 1/16*
	7	1 5/8	2 3/16	9.75	—	3 13/16	6 3/8	20 1/4	20 1/4*	22 1/8*	25 5/16*
	8 2:1	1 7/8	2 7/16	10.875	—	4 3/8	6 15/16	20 13/16	20 13/16*	23 1/4*	25 7/8*
14	7 STD.	2 3/8	2 13/16	9.75	—	4 5/16	7 7/16	23 15/16	23 15/16*	25 5/8*	29 5/16*
	10 2:1	2 3/8	2 15/16	13.75	—	4 15/16	8 1/16	24 3/32	24 3/32*	26 7/8*	29 15/16*

*Add stroke to these dimensions. Add 2X stroke to ZM dimensions.

Tie Rod and Double Rod Dimensions

BORE	AA	BB	DD	E	EE NPT†	EE SAE	FF	G	J	K	LB*	LD*	P*	R
1 1/8	1.68	1	1/4-28	1 3/4	1/4	-6	1/2	1 1/8	1	1/4	3 1/4*	3 3/8*	2 3/16*	1.19
1 1/2	2.3	1 3/8	3/8-24	2 1/2	1/2	-10	3/8	1 3/4	1 1/2	5/16	4 5/8*	4 7/8*	2 7/8*	1.63
2	2.9	1 13/16	1/2-20	3	1/2	-10	5/8	1 3/4	1 1/2	7/16	4 5/8*	4 7/8*	2 7/8*	2.05
2 1/2	3.6	1 13/16	1/2-20	3 1/2	1/2	-10	5/8	1 3/4	1 1/2	7/16	4 3/4*	5*	3*	2.55
3 1/4	4.6	2 5/16	5/8-18	4 1/2	3/4	-12	3/4	2	1 3/4	9/16	5 1/2*	5 3/4*	3 1/2*	3.25
4	5.4	2 5/16	5/8-18	5	3/4	-12	—	2	1 3/4	9/16	5 3/4*	6*	3 3/4*	3.82
5	7.0	3 3/16	7/8-14	6 1/2	3/4	-12	—	2	1 3/4	3/4	6 1/4*	6 1/2*	4 1/4*	4.95
6	8.1	3 5/8	1-14	7 1/2	1	-16	—	2 3/8	2 3/8	7/8	7 3/8*	7 3/8*	4 7/8*	5.73
7	9.3	4 1/8	1 1/8-12	8 1/2	1 1/4	-20	—	2 7/8	2 7/8	1 3/16	8 1/2*	8 1/2*	5 3/8*	6.58
8	10.6	4 1/2	1 1/4-12	9 1/2	1 1/2	-24	—	3 1/4	3 1/4	1 1/4	9 1/2*	9 1/2*	6 1/8*	7.50
10	13.6	6	1 3/4-12	12 5/8	2	-32	—	3 7/8	3 7/8	1 11/16	12 1/8*	12 1/8*	8*	9.62
12	16.2	7	2-12	14 7/8	2 1/2	-32	—	4 7/8	4 7/8	1 15/16	14 1/2*	14 1/2*	9 3/8*	11.45
14	18.9	8	2 1/4-12	17 1/4	2 1/2	-32	—	5 3/8	5 3/8	2 5/32	17*	17*	10 3/4*	13.34

†Alternate port at no extra charge. SAE port is standard.

*Add stroke to these dimensions.

Large Bore Cylinders

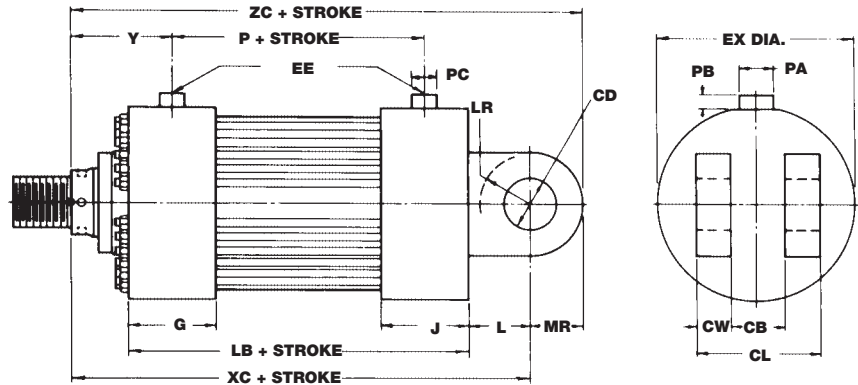
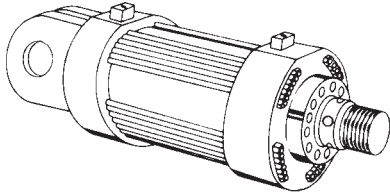
Cylinders of these very large bore sizes, are frequently custom made to suit specific customer requirements. Even though these sizes are not production run products (expect longer delivery time than experienced with smaller bore sizes), basic design criteria and

dimensions have been established by CylindersNow for the three most popular mounting styles.

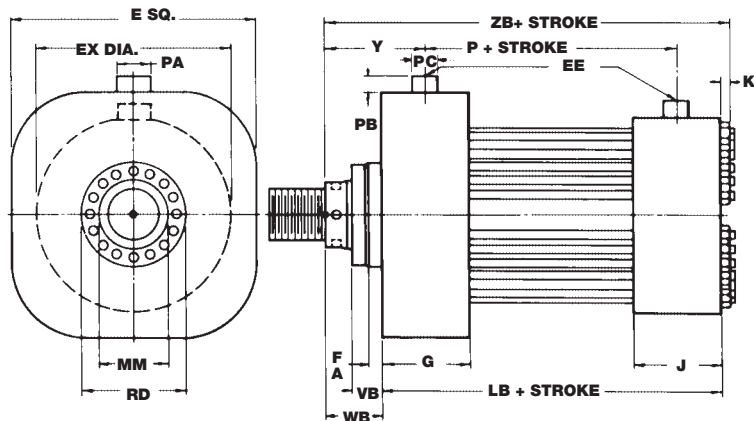
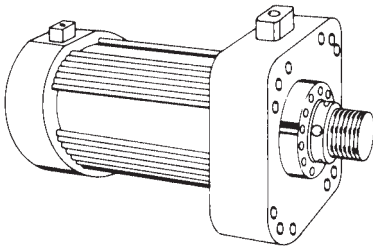
costs and delivery time, whenever possible design to the standard mounts and dimensions shown.

We will be happy to quote you on variations of these mounts or on mounting styles not shown. To reduce

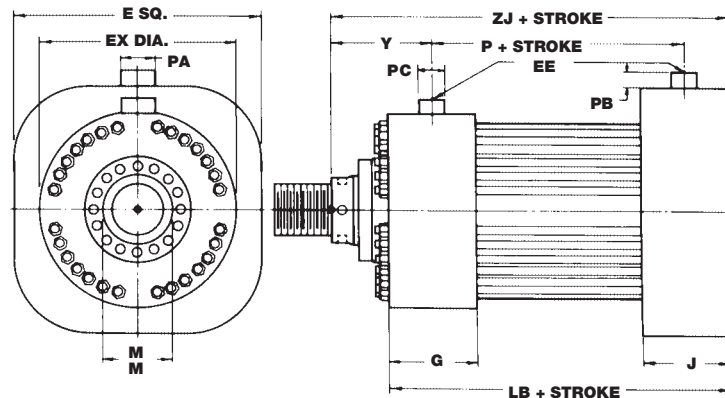
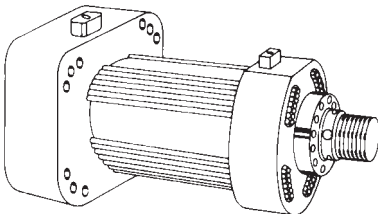
CLEVIS MOUNT STYLE C



FRONT HEAD MOUNT STYLE FH

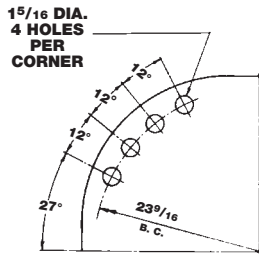


REAR HEAD MOUNT STYLE RH

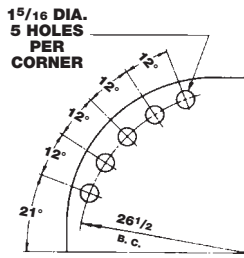


Details of Placement of Mounting Holes in Each Corner

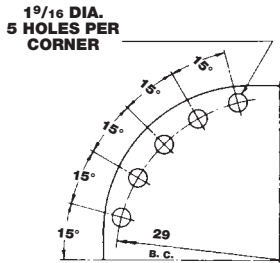
16" BORE



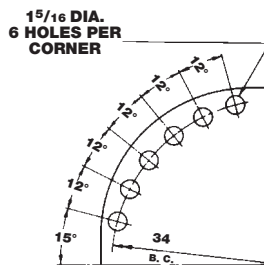
18" BORE



20" BORE



24" BORE

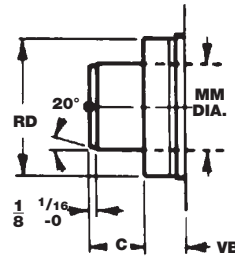


Rod End Dimensions

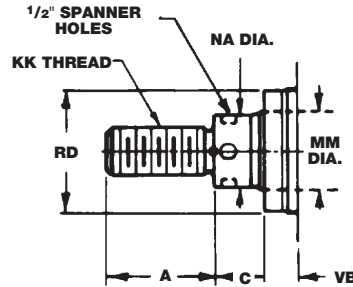
BORE	16	16	16	18	18	20	24
MM ROD DIA.	8	9	10	9	10	10	12
A	8	9	10	9	10	10	12
C	1	1	1	1	1	1	1
CC	7 ³ / ₄ -12	8 ³ / ₄ -12	9 ³ / ₄ -12	8 ³ / ₄ -12	9 ³ / ₄ -12	9 ³ / ₄ -12	11 ³ / ₄ -12
KK	5 ³ / ₄ -12	6 ¹ / ₂ -12	7 ¹ / ₄ -12	6 ¹ / ₂ -12	7 ¹ / ₄ -12	7 ¹ / ₄ -12	8 ³ / ₄ -12
NA ±.002	7.875	8.875	9.875	8.875	9.875	9.875	11.875
RD -.001 -.003	10.875	12.500	13.750	12.500	13.750	13.750	16.500
VB	2 ³ / ₈	2 ³ / ₈	2 ³ / ₈	2 ³ / ₈	2 ³ / ₈	2 ³ / ₈	3

Large Bore Rod End

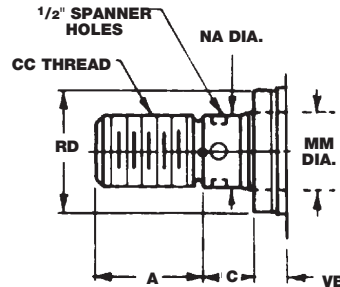
Style 1



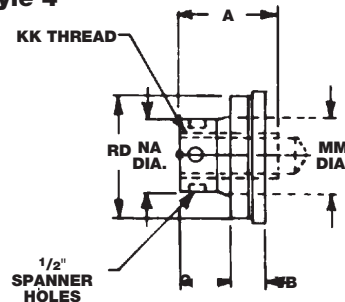
STYLE 2 STANDARD



Style 3



Style 4



Large Bore Dimensions

BORE	16	18	20	24
CB	6 ¹ / ₂	7 ¹ / ₂	8	9
CD	6	7	8	9
CL	13	15	16	18
CW	3 ¹ / ₄	3 ³ / ₄	4	4 ¹ / ₂
E	23 ¹ / ₂	27 ¹ / ₄	31	36 ¹ / ₂
EE MAX. PIPE	3"	3"	3"	3 ¹ / ₂ "
EX DIA.	21 ³ / ₈	24 ¹ / ₄	26 ¹ / ₂	32
FA	1	1	1	1
G	5 ⁷ / ₈	6 ³ / ₈	7 ³ / ₈	7 ⁷ / ₈
J	5 ⁷ / ₈	6 ³ / ₈	7 ³ / ₈	7 ⁷ / ₈
K	3/4	7/8	7/8	1 ¹ / ₁₆
L	7	8	9	11
LB	18	20	23	25 ³ / ₄
LR	6	7	8	9
MR	6	7	8	9
P	12 ¹ / ₄	13 ¹ / ₄	14 ¹ / ₄	16 ³ / ₄
PA MAX.	5 ⁵ / ₁₆	5 ⁵ / ₁₆	5 ⁵ / ₁₆	6
PB MAX.	2 ³ / ₄	2 ³ / ₄	2 ³ / ₄	3 ¹ / ₂
PC MAX.	4 ¹ / ₄	4 ¹ / ₄	4 ¹ / ₄	5
WB	3 ³ / ₈	3 ³ / ₈	3 ³ / ₈	4
XC	28 ³ / ₈	31 ³ / ₈	35 ³ / ₈	40 ³ / ₄
Y	6 ¹ / ₄	6 ³ / ₄	7 ³ / ₄	8 ¹ / ₂
ZB	22 ¹ / ₈	24 ¹ / ₄	27 ¹ / ₄	30 ¹³ / ₁₆
ZC	34 ³ / ₈	38 ³ / ₈	43 ³ / ₈	49 ³ / ₄
ZJ	21 ³ / ₈	23 ³ / ₈	26 ³ / ₈	29 ³ / ₄

IMPORTANT NOTE:

All figures in the chart below are based on the cylinders as a pressure vessel. Some styles of mounting will not withstand the thrust generated at these pressures. Contact the factory for specific data.

Maximum Pressure Ratings

BORE SIZE	HEAVY DUTY SERVICE PSI	MAX. SHOCK SERVICE PSI	3:1 SAFETY FACTOR (YIELD) PSI
16	3,000	5,000	2380
18	3,000	5,000	2417
20	3,000	5,000	2447
24	3,000	5,000	2323

Rod End Dimensions

1 1/8" THRU 14" BORES

Rod End Dimensions

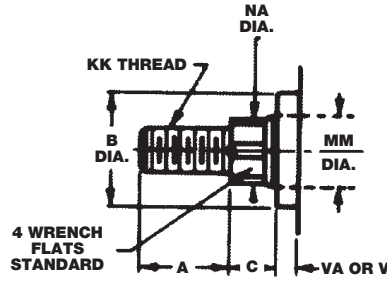
BORE	MM ROD DIA.	A	AC	AD	AE	AF DIA.	B DIA. -.001 -.003	C	CC	D	KK	NA DIA. ±.002	V	VA*	WRENCH FLATS OR SPANNER HOLES	
															MALE THREAD ROD ENDS	STYLE 4 ROD END
1 1/8	5/8 STD.	3/4	1 1/8	5/8	1/4	3/8	1 1/8	3/8	1/2-20	1/2	7/16-20	.594	1/4	—	W.F.	W.F.
1 1/2	5/8 STD.	3/4	1 1/8	5/8	1/4	3/8	1 1/8	3/8	1/2-20	1/2	7/16-20	.594	1/4	—	W.F.	W.F.
	1 2:1	1 1/8	1 1/2	15/16	3/8	11/16	1 1/2	1/2	7/8-14	13/16	3/4-16	.968	1/2	—	W.F.	W.F.
2	1 STD.	1 1/8	1 1/2	15/16	3/8	11/16	1 1/2	1/2	7/8-14	13/16	3/4-16	.968	1/4	17/32	W.F.	W.F.
	1 3/4 2:1	15/8	1 3/4	1 1/16	3/8	7/8	2	5/8	1 1/4-12	1 1/8	1-14	1.343	3/8	13/32	W.F.	W.F.
2 1/2	1 STD.	1 1/8	1 1/2	15/16	3/8	11/16	1 1/2	1/2	7/8-14	13/16	3/4-16	.968	1/4	17/32	W.F.	W.F.
	1 3/8	15/8	1 3/4	1 1/16	3/8	7/8	2	5/8	1 1/4-12	1 1/8	1-14	1.343	3/8	13/32	W.F.	W.F.
	1 3/4 2:1	2	2	15/16	1/2	1 1/8	2 3/8	3/4	1 1/2-12	1 1/2	1 1/4-12	1.703	1/2	—	W.F.	W.F.
3 1/4	1 3/8 STD.	15/8	1 3/4	1 1/16	3/8	7/8	2	5/8	1 1/4-12	1 1/8	1-14	1.343	1/4 ‡	13/32	W.F.	W.F.
	1 3/4	2	2	15/16	1/2	1 1/8	2 3/8	3/4	1 1/2-12	1 1/2	1 1/4-12	1.703	3/8 ‡	17/32	W.F.	W.F.
	2 2:1	2 1/4	2 5/8	1 11/16	5/8	1 3/8	2 5/8	7/8	1 3/4-12	1 5/8	1 1/2-12	1.953	3/8	—	W.F.	W.F.
4	1 3/4 STD.	2	2	15/16	1/2	1 1/8	2 3/8	3/4	1 1/2-12	1 1/2	1 1/4-12	1.703	1/4 ‡	17/32	W.F.	W.F.
	2	2 1/4	2 5/8	1 11/16	5/8	1 3/8	2 5/8	7/8	1 3/4-12	1 5/8	1 1/2-12	1.953	1/4 ‡	17/32	W.F.	W.F.
	2 1/2 2:1	3	3 1/4	1 15/16	3/4	1 3/4	3 1/8	1	2 1/4-12	2 1/16	1 7/8-12	2.453	3/8 ‡	21/32	W.F.	W.F.
5	2 STD.	2 1/4	2 5/8	1 11/16	5/8	1 3/8	2 5/8	7/8	1 3/4-12	1 5/8	1 1/2-12	1.953	1/4 ‡	17/32	W.F.	W.F.
	2 1/2	3	3 1/4	1 15/16	3/4	1 3/4	3 1/8	1	2 1/4-12	2 1/16	1 7/8-12	2.453	3/8 ‡	21/32	W.F.	W.F.
	3	3 1/2	3 5/8	2 7/16	7/8	2 1/4	3 3/4	1	2 3/4-12	2 9/16	2 1/4-12	2.937	3/8 ‡	21/32	S.H.	W.F.
	3 1/2 2:1	3 1/2	4 3/8	2 11/16	1	2 1/2	4 1/4	1	3 1/4-12	3	2 1/2-12	3.437	3/8 ‡	17/32	S.H.	W.F.
6	2 1/2 STD.	3	3 1/4	1 15/16	3/4	1 3/4	3 1/8	1	2 1/4-12	2 1/16	1 7/8-12	2.453	1/4 ‡	21/32	W.F.	W.F.
	3	3 1/2	3 3/4	2 7/16	7/8	2 1/4	3 3/4	1	2 3/4-12	2 9/16	2 1/4-12	2.937	1/4 ‡	21/32	S.H.	W.F.
	3 1/2	3 1/2	4 3/8	2 11/16	1	2 1/2	4 1/4	1	3 1/4-12	3	2 1/2-12	3.437	1/4 ‡	17/32	S.H.	W.F.
	4 2:1	4	4 1/2	2 11/16	1	3	4 3/4	1	3 3/4-12	3 7/16	3-12	3.937	1/4 ‡	17/32	S.H.	W.F.
7	3 STD.	3 1/2	3 3/4	2 7/16	7/8	2 1/4	3 3/4	1	2 3/4-12	2 9/16	2 1/4-12	2.937	1/4 ‡	21/32	S.H.	W.F.
	3 1/2	3 1/2	4 3/8	2 11/16	1	2 1/2	4 1/4	1	3 1/4-12	3	2 1/2-12	3.437	1/4 ‡	17/32	S.H.	W.F.
	4	4	4 1/2	2 11/16	1	3	4 3/4	1	3 3/4-12	3 7/16	3-12	3.937	1/4 ‡	17/32	S.H.	W.F.
	4 1/2	4 1/2	5 1/4	3 3/16	1 1/2	3 1/2	5 1/4	1	4 1/4-12	—	3 1/4-12	4.421	1/4 ‡	1/2	S.H.	S.H.
	5 2:1	5	5 3/8	3 3/16	1 1/2	3 7/8	5 3/4	1	4 3/4-12	—	3 1/2-12	4.921	1/4 ‡	1/2	S.H.	S.H.
8	3 1/2 STD.	3 1/2	4 3/8	2 11/16	1	2 1/2	4 1/4	1	3 1/4-12	3	2 1/2-12	3.437	1/4 ‡	17/32	S.H.	W.F.
	4	4	4 1/2	2 11/16	1	3	4 3/4	1	3 3/4-12	3 7/16	3-12	3.937	1/4 ‡	17/32	S.H.	W.F.
	4 1/2	4 1/2	5 1/4	3 3/16	1 1/2	3 1/2	5 1/4	1	4 1/4-12	—	3 1/4-12	4.421	1/4 ‡	1/2	S.H.	S.H.
	5	5	5 3/8	3 3/16	1 1/2	3 7/8	5 3/4	1	4 3/4-12	—	3 1/2-12	4.921	1/4 ‡	1/2	S.H.	S.H.
	5 1/2 2:1	5 1/2	6 1/4	3 15/16	1 7/8	4 3/8	6 1/4	1	5 1/4-12	—	4-12	5.421	1/4 ‡	1/2	S.H.	S.H.
10	4 1/2 STD.	4 1/2	5 1/4	3 3/16	1 1/2	3 1/2	5 1/4	1	4 1/4-12	—	3 1/4-12	4.421	1/4 ‡	5/16	S.H.	S.H.
	5	5	5 3/8	3 3/16	1 1/2	3 7/8	5 3/4	1	4 3/4-12	—	3 1/2-12	4.921	1/2 ‡	9/16	S.H.	S.H.
	5 1/2	5 1/2	6 1/4	3 15/16	1 7/8	4 3/8	6 1/4	1	5 1/4-12	—	4-12	5.421	1/2 ‡	9/16	S.H.	S.H.
	7 2:1	7	6 7/8	4 5/16	1 7/8	5 3/4	8	1 1/2	6 3/4-12	—	5 1/4-12	6.906	1/2 ‡	9/16	S.H.	S.H.
12	5 1/2 STD.	5 1/2	6 1/4	3 15/16	1 7/8	4 3/8	6 1/4	1	5 1/4-12	—	4-12	5.421	1/4 ‡	9/16	S.H.	S.H.
	7	7	7	4 5/16	1 7/8	5 3/4	8	1 5/8	6 3/4-12	—	5 1/4-12	6.906	1/4 ‡	9/16	S.H.	S.H.
	8 2:1	8	5 3/4	3 3/16	1 1/2	6 3/8	9	1 15/16	7 3/4-12	—	5 3/4-12	7.875	1/2 ‡	9/16	S.H.	S.H.
14	7 STD.	7	6 7/8	4 5/16	1 7/8	5 3/4	8	1 1/2	6 3/4-12	—	5 1/4-12	6.906	3/8 ‡	7/16	S.H.	S.H.
	10 2:1	10	4 3/8	2 1/16	1	8 1/2	11	2	9 3/4-12	—	7-12	9.875	1/2 ‡	9/16	S.H.	S.H.

‡These dimensions for FF and FFX mounts only. For other mounts, use VA dimensions.

*On FF and FFX mounts, use V dimensions.

▶ Rod End Information

STANDARD - STYLE 2

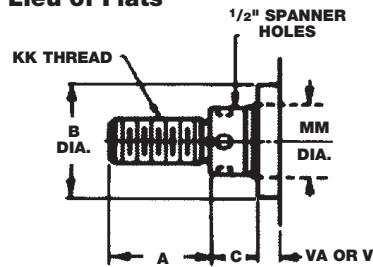


Male thread with adequate shoulder for locking accessory. High tensile, rolled thread stud used on all Rods thru 2 1/2" in diameter.

IMPORTANT NOTE:

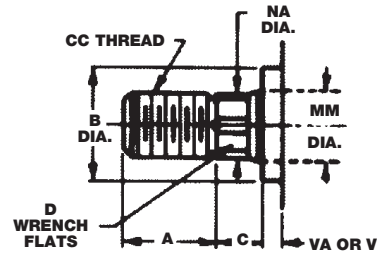
Style 2 Rod End is standard and will be furnished unless otherwise specified. Alternate Rod End styles 1, 3, 4 and 6 are available at no extra charge. Style 2X and other special Rod End styles are available for a nominal extra charge. A wide selection of Rod End accessories is shown in separate Accessories Brochure.

Spanner Wrench Holes in Lieu of Flats



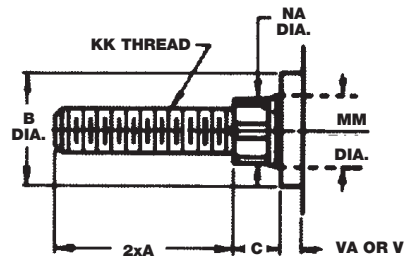
Spanner Wrench Holes are provided in lieu of Wrench Flats on larger Rod sizes. See Rod End Dimensions on opposite page.

Alternate - Style 3



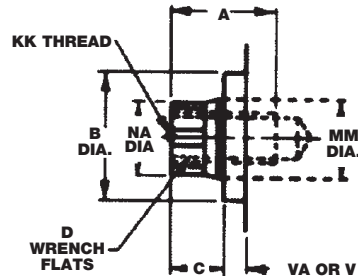
Male thread larger in diameter than style 2. No shoulder for locking. Stud not used.

Optional - Style 2X



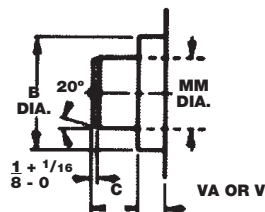
High Tensile, rolled thread stud with two times A length is available on Rods thru 2" in diameter.

Alternate - Style 4



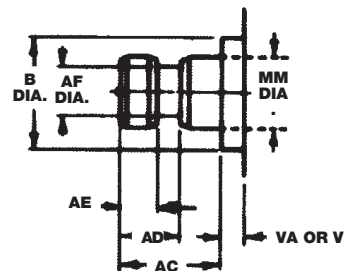
Female thread, used with male accessories for shorter overall cylinder length.

Alternate - Style 1



Plain male Rod End with no threads. Used for pushing, holding, knock-outs, etc.

Alternate - Style 6



Used with S.A.F.E. accessory (see separate Accessories Brochure) for fast, close radial alignment.

2 1/2 HH FF 25 CC W

Bore	Cylinder Series	Mounting	Stroke	Cushion	Modification
As Required <hr/> Use Fractions Where Required	A Heavy Duty Pneumatic AA 200 PSI Pneumatic CLA Heavy Duty Pneumatic CLH Heavy Duty, 250 Pneumatic/1500 Hydraulic C20 Heavy Duty Pneumatic, Cast Iron HH Heavy Duty Hydraulic MA Medium Duty Pneumatic MH Medium Pressure Hydraulic	Listed Below	As Required <hr/> Use Fractions Where Required <hr/> Shown as Gross Stroke Including Dual Piston or Stop Tube Length	CF – Cushion Front CR – Cushion Rear CC – Cushion Both Ends	A – Variation in Ports D – Double Rod Extension K – Any Variation in Rod from Standard. Any Variation from Standard Style 2 Rod End. M – Variation in Mounting P – NPT Ports S – Spring Return V – Viton Seals W – Water Fitted Y – Variation in Construction

Mounting Styles

BX – Basic Cylinder, Tie Rods Extended, Both Ends	FHF – Front Head Flange	RHF – Rear Head Flange
C – Clevis	FX – Basic Cylinder, Tie Rods Extended, Front End	RX – Basic Cylinder, Tie Rods Extended, Rear End
CL – Center Line Lug	NX – Basic Cylinder, No Tie Rod Extension	SF – Side Flush
EL – End Lug	P – Pivot	SL – Side Lug
FB – Foot Bracket	RF – Rear Flange	SP – Sub Plate
FF – Front Flange	RFX – Rear Flange, Extra Size	T – Trunnion, Between Heads
FFX – Front Flange, Extra Size	RH – Rear Head (7" thru 14" A and MH - 16" thru 24" HH)	TF – Trunnion, Front
FH – Front Head (7" thru 14" A and MH - 16" thru 24" HH)		TR – Trunnion, Rear

Order Information

To insure prompt delivery, please BE SURE TO INCLUDE THIS INFORMATION WHEN ORDERING:

- | | | |
|--|---|---|
| 1. Quantity | 8. Rod End Style (if other than Style 2 standard) | 14. Medium (air, oil, water or other) |
| 2. Series | 9. Rod Size (standard, oversize or 2:1) | 15. Type of fluid |
| 3. Bore | 10. Extra Rod Extension (where required) | 16. Operating Pressure and Maximum Shock Pressure |
| 4. Stroke - Gross Stroke always shown in Model Number | 11. Port Size (if other than standard) | 17. Temperature |
| 5. Dual Piston or Stop Tube when necessary - always give Gross and Net Strokes | 12. Port Positions other than standard positions 1 and 5. | 18. Double rod extension (when required) |
| 6. Mounting Style | 13. Cushion check, adjusting screw, and bleed positions (when required) if other than standard positions. | 19. XI dimension on all Trunnion (between head) cylinders |
| 7. Cushion (front, rear, both or none) | | 20. Delivery required, or scheduling |

Complete and correct ordering information will eliminate untimely delays. When in doubt, always contact local distributor or factory. Contact distributor for helpful order or inquiry form.

Policy:

The policy of CylindersNow is one of continual improvement in design and manufacture to assure still finer products, hence, specifications are subject to change without notice.

Limited Warranty:

CylindersNow warrants its products to be free from defects in material and workmanship for a period of one year from the date of shipment. This warranty does not cover field labor charges for parts removal and replacement, adjustments, repairs or other work, corrosion, electrolysis, mineral deposits or normal deterioration, misapplication, modification, or change in original operating conditions; components supplied by others; defects in parts resulting from abuse, negligence, neglect, accident, fire or explosion, or seals and other components subject to normal wear.

The sole and exclusive remedy against CylindersNow shall be for the repair or replacement of parts returned transportation prepaid to Sheffer's factory and found by CylindersNow to be defective. Replacement parts provided shall not extend the warranty period for said parts or for the total unit.

IN CONSIDERATION OF THIS EXPRESS WARRANTY NO OTHER REMEDY (INCLUDING BUT NOT LIMITED TO INCIDENTAL OR CONSEQUENTIAL DAMAGES) SHALL BE AVAILABLE. THIS WARRANTY SHALL BE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ALL OTHER OBLIGATIONS ON THE PART OF CylindersNow.

CylindersNow neither assumes, nor authorizes any person to assume for it, any other obligation or warranty.

► Conversions

Fraction Equivalents

Fraction (inches)	Decimal (inches)	Metric (mm) (x 25.4)
1/64	.016	.4
1/32	.031	.8
3/64	.047	1.2
1/16	.062	1.6
5/64	.078	2.0
3/32	.094	2.4
7/64	.109	2.8
1/8	.125	3.2
9/64	.141	3.6
5/32	.156	4.0
11/64	.172	4.4
3/16	.187	4.7
13/64	.203	5.2
7/32	.219	5.6
15/64	.234	5.9
1/4	.250	6.3
17/64	.266	6.8
9/32	.281	7.1
19/64	.297	7.5
5/16	.312	7.9
21/64	.328	8.3
11/32	.344	8.7
23/64	.359	9.1
3/8	.375	9.5
25/64	.391	9.9
13/32	.406	10.3
27/64	.422	10.7
7/16	.437	11.1
29/64	.453	11.5
15/32	.469	11.9
31/64	.484	12.3
1/2	.500	12.7

Fraction (inches)	Decimal (inches)	Metric (mm) (x 25.4)
33/64	.516	13.1
17/32	.531	13.5
35/64	.547	13.9
9/16	.562	14.3
37/64	.578	14.7
19/32	.594	15.1
39/64	.609	15.5
5/8	.625	15.9
41/64	.641	16.3
21/32	.656	16.7
43/64	.672	17.1
11/16	.687	17.4
45/64	.703	17.9
23/32	.719	18.3
47/64	.734	18.6
3/4	.750	19.0
49/64	.766	19.5
25/32	.781	19.8
51/64	.797	20.2
13/16	.812	20.6
53/64	.828	21.0
27/32	.844	21.4
55/64	.859	21.8
7/8	.875	22.2
57/64	.891	22.6
29/32	.906	23.0
59/64	.922	23.4
15/16	.937	23.8
61/64	.953	24.2
31/32	.969	24.6
63/64	.984	25.0
1	1.000	25.4

Temperature Equivalents

F°	C°
-30	-34.4
-20	-28.9
-10	-23.3
0	-17.8
10	-12.2
20	-6.7
30	-1.1
40	4.4
50	10.0
60	15.6
70	21.1
80	26.7
90	32.2
100	37.8
110	43.3
120	48.9
130	54.4
140	60.0
150	65.6
160	71.1
170	76.7
180	82.2
190	87.8
200	93.3
210	98.9
220	104.4
230	110.0
240	115.6
250	121.1
260	126.7

$$C^{\circ} = (F^{\circ} - 32) \div 1.8$$

C°	F°
-30	-22
-20	-4
-10	14
0	32
5	41
10	50
15	59
20	68
25	77
30	86
35	95
40	104
45	113
50	122
55	131
60	140
65	149
70	158
75	167
80	176
85	185
90	194
95	203
100	212
105	221
110	230
115	239
120	248
125	257
130	266

$$F^{\circ} = C^{\circ} \times 1.8 + 32$$

▶ Conversions

Pressure Conversions

PSI	Kg/cm ²	Bars
60	4.2	4.1
70	4.9	4.8
80	5.6	5.5
90	6.3	6.2
100	7.0	6.9
150	10.5	10.3
200	14.0	13.8
250	17.6	17.2
300	21.1	20.7
350	24.6	24.1
400	28.1	27.6
450	31.6	31.0
500	35.1	34.4
550	38.7	37.9
600	42.2	41.3
650	45.7	44.8
700	49.2	48.2
750	52.7	51.7
800	56.2	55.1
850	59.8	58.6
900	63.3	62.0
950	66.8	65.5
1000	70.3	68.9
1500	105.5	103.4
2000	140.6	137.8
2500	175.8	172.3
3000	210.9	206.7
3500	246.1	241.2
4000	281.2	275.6
4500	316.4	310.1
5000	351.5	344.5

Kg/cm² = PSI x .0703
 Bars = PSI x .0689

Kg/cm ²	PSI	Bars
4	56.9	3.9
5	71.1	4.9
6	85.3	5.9
7	99.5	6.9
8	113.8	7.8
9	128.0	8.8
10	142.2	9.8
20	284.4	19.6
30	426.6	29.4
40	568.8	39.2
50	711.0	49.0
60	853.2	58.8
70	995.4	68.6
80	1137.6	78.4
90	1279.8	88.2
100	1422.0	98.0
150	2133.0	147.0
200	2844.0	196.0
250	3555.0	245.0
300	4266.0	294.0
350	4977.0	343.0
400	5688.0	392.0

PSI = Kg/cm² x 14.22
 Bars = Kg/cm² x .98

Distance Conversions

Inches	cm	mm
1	2.5	25.4
2	5.1	50.8
3	7.6	76.2
4	10.2	101.6
5	12.7	127.0
6	15.2	152.4
7	17.8	177.8
8	20.3	203.2
9	22.9	228.6
10	25.4	254.0
15	38.1	381.0
20	50.8	508.0
25	63.5	635.0
30	76.2	762.0
35	88.9	889.0
40	101.6	1016.0
45	114.3	1143.0
50	127.0	1270.0
55	139.7	1397.0
60	152.4	1524.0
65	165.1	1651.0
70	177.8	1778.0
75	190.5	1905.0
80	203.2	2032.0
85	215.9	2159.0
90	228.6	2286.0
95	241.3	2413.0
100	254.0	2540.0

cm = in. x 2.54
 mm = in. x 25.4

cm	Inches
1	.4
2	.8
3	1.2
4	1.6
5	2.0
6	2.4
7	2.8
8	3.1
9	3.5
10	3.9
20	7.9
30	11.8
40	15.8
50	19.7
60	23.6
70	27.6
80	31.5
90	35.5
100	39.4
110	43.3
120	47.3
130	51.2
140	55.2
150	59.1
160	63.0
170	67.0
180	70.9
190	74.9
200	78.8
210	82.7
220	86.7
230	90.6
240	94.6
250	98.5
260	102.4

in. = cm x .394