Series SS
Stainless Steel Cylinders

Series SS Stainless Steel NFPA interchangeable air cylinders — the only real solution to corrosive environments.

NORGREN

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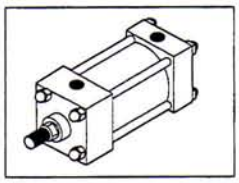
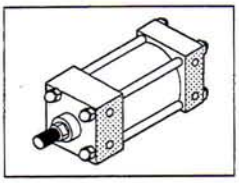
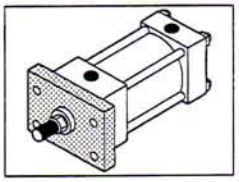


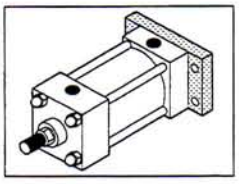
Page 6
Cylinder with 01 (MX0) Basic



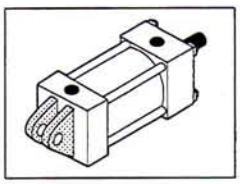
Page 8
Cylinder with 02 (MS4) Bottom Tap



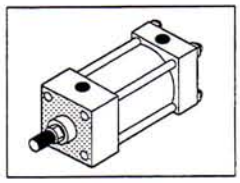
Page 10
Cylinder with 04 (MF1) Front Flange



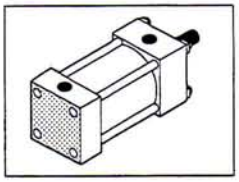
Page 12
Cylinder with 05 (MF2) Rear Flange



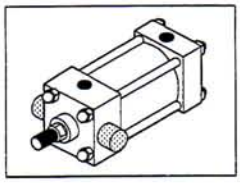
Page 14
Cylinder with 06 (MP1) Cap Fixed Clevis



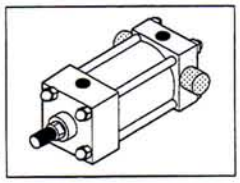
Page 16
8" Cylinder with 10 (ME3) Head Square



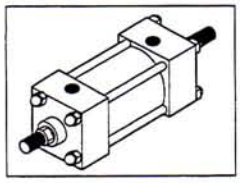
Page 16
8" Cylinder with 11 (ME4) Cap Square



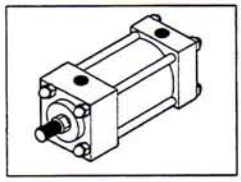
Page 18
Cylinder with 15 (MT1) Head Trunnion



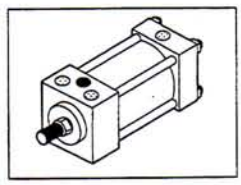
Page 20
Cylinder with 16 (MT2) Cap Trunnion



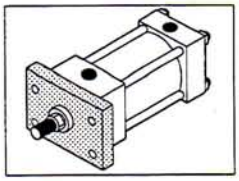
Page 22
Double Rod End Cylinder with 01 (MX0) Basic



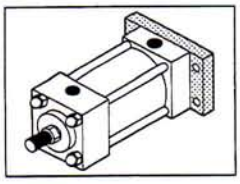
Page 28
1-1/8" Cylinder with 01 (MX0) Basic



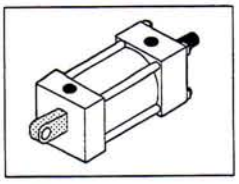
Page 28
1-1/8" Cylinder with 03 (MS8) Bolt Thru



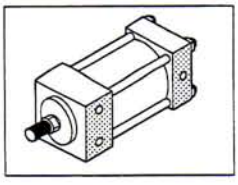
Page 28
1-1/8" Cylinder with 04 (MF7) Front Flange



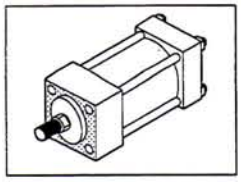
Page 28
1-1/8" Cylinder with 05 (MF2) Rear Flange



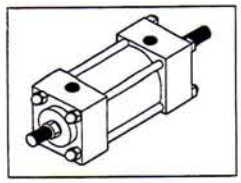
Page 30
1-1/8" Cylinder with 17 (MP3) Fixed Eye



Page 30
1-1/8" Cylinder with 22 (MS9) Side Tap



Page 30
1-1/8" Cylinder with 30 (MR1) Head Face



Page 30
1-1/8" Double Rod End Cylinder with 01 (MX0) Basic

The finest materials for each component!

1 Piston Seals: Lip-type nitrile seals are pressure energized and wear compensating. Their excellent lubrication retention characteristics lower seal friction and ensure long life.

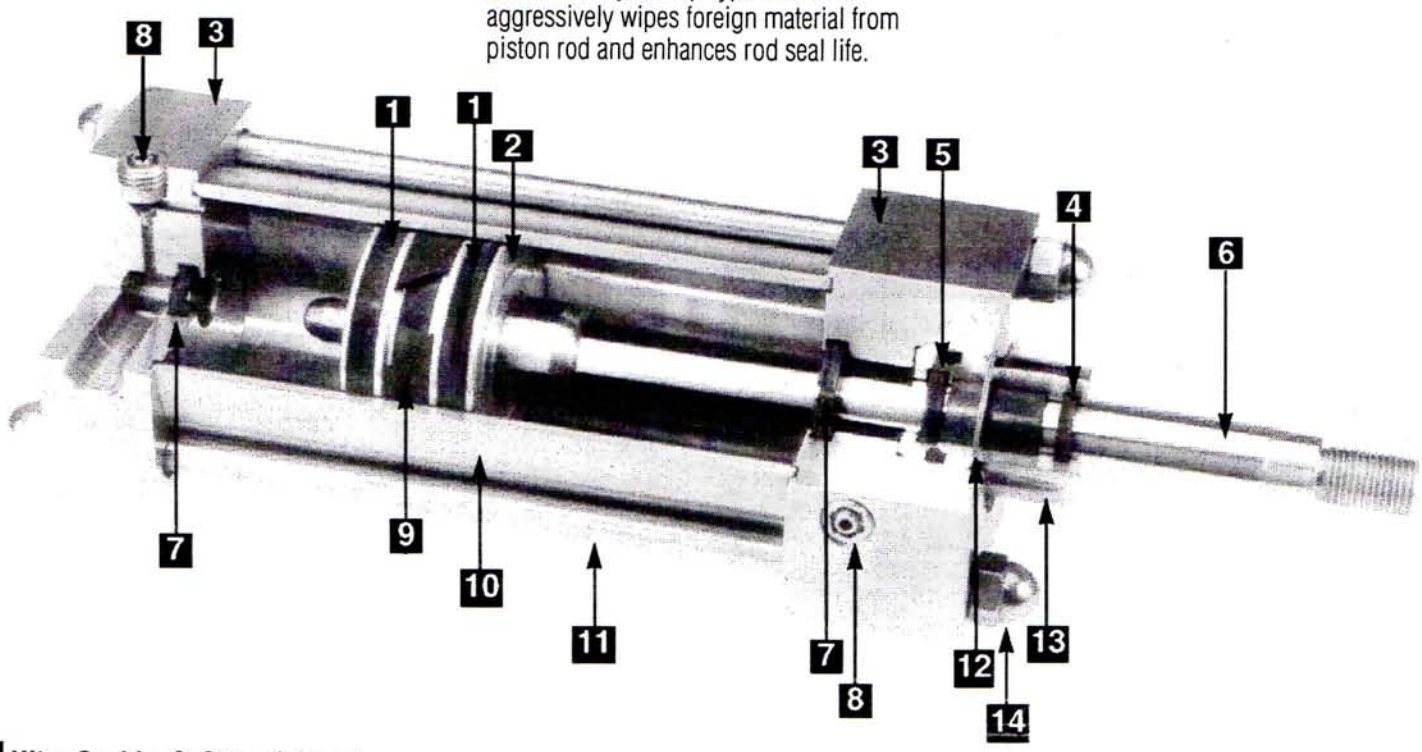
2 Piston: Solid aluminum alloy, light-weight for low inertia, yet strong.

3 Head/Cap: Precision machined from solid corrosion-resistant 304 stainless steel bar.

4 Rod Wiper: Lip-type urethane aggressively wipes foreign material from piston rod and enhances rod seal life.

5 Rod Seals: Rounded lip-type urethane is pressure energized and wear compensating.

6 Piston Rod: 303 stainless steel, 40,000 PSI minimum yield, hard chrome plated, ground and polished.



7 Ultra Cushion®: State-of-the-art design features a unique, one-piece, nitrile compound seal, captured within a precision machined groove. Linear and radial "float" of cushion seal eliminates misalignment. Ultra Cushions provide exceptionally fast "out of cushion" stroke reversal. (Head and Cap Cushions are optional.)

8 Adjustable Captive Cushion Needle Allows for safe and precise adjustment under pressure.

9 Wear Strip: Teflon® and graphite composition for minimum friction, maximum wear and side load resistance. (Magnetic band under wear strip optional.)

10 Tube: Corrosion-resistant 304 stainless steel.

11 Tie Rods: High-strength 303 stainless steel maintains compression on tube end seals.

12 Retainer: Stainless steel snap ring securely retains bushing in head.

13 Rod Bearings: Machined from 304 stainless steel, with a Teflon® composite wear band insert that eliminates metal-to-metal contact.

14 Acorn Nut: Tie rod threads are covered by stainless steel acorn nuts which eliminate another bacteria hiding place.

Series D

Series D cylinders are designed for extremely smooth stroke performance on applications requiring very slow extension and/or retraction speeds. They are identical to the Series SS in design, function and dimensions, but have "ELF" carboxylated nitrile piston seals, rod seals, and rod wipers.

"ELF" carboxylated nitrile is a blend of Teflon® and other low friction additives that are molded into the substrate of the base seal material. Incorporating this compound in the dynamic seals of the cylinder results in diminished friction, lower breakaway and superior stroke performance.

Features:

- Extra smooth performance throughout the entire stroke of the cylinder.
- Available in standard SS series bore sizes.
- NFPA interchangeable.
- Cylinders rated to 250 PSI air.

Ultra Cushion®

A Major Design and Performance Breakthrough in Air Cylinder Cushioning Systems!

Norgren's state-of-the-art cushion design features a unique, one-piece, nitrile compound seal that is captured within a precision machined groove. This allows both linear and radial "float" of the cushion seal which virtually eliminates problems associated with misalignment. Integral flow paths molded in the periphery of the seal provide exceptionally fast "out of cushion" stroke reversal without the use of ball checks.

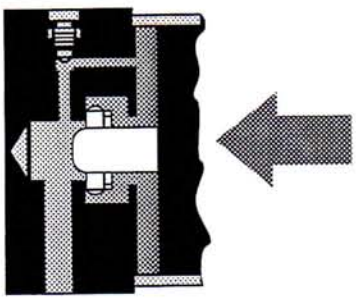


Figure 1

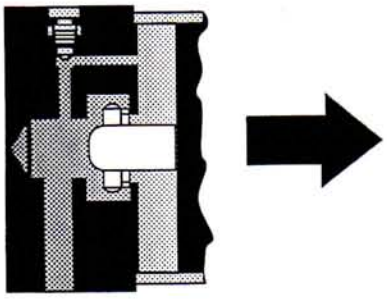


Figure 2 shows spear exiting cushion seal.

Soft Touch Bumper Seal

The solution for noise pollution!

Norgren's Low Friction Soft Touch Bumper Seal, in conjunction with our state-of-the-art cushion design, decelerates and reduces end-of-stroke noise.

Figure 1: Cylinder deceleration starts when the cushion spear enters the cushion seal, creating a chamber of compressed air metered by an optional Adjustable Cushion Needle or Fixed Cushion (orifice).

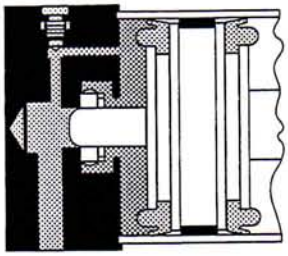
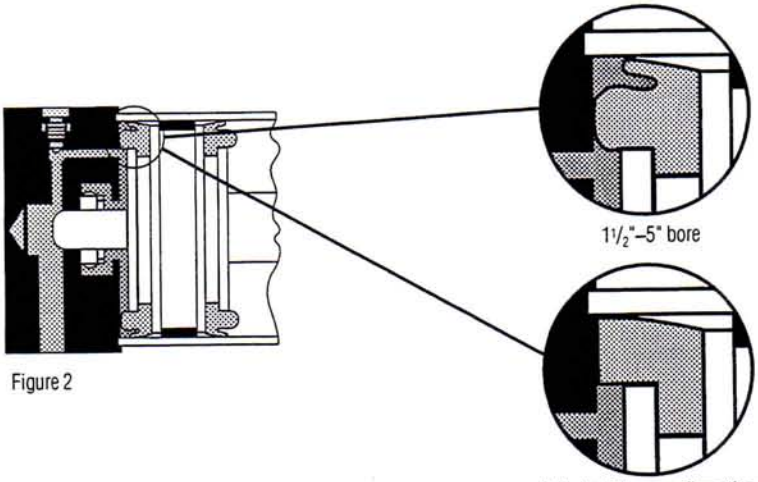


Figure 1

Figure 2: The final inertia load is absorbed by the Bumper, providing that final end-of-stroke "Soft Touch".



$1\frac{1}{2}$"–5" bore

Note: $1\frac{1}{8}$" bore configuration.

Figure 2

Operating PSI will control the reduction of total cylinder stroke. The chart shows the approximate average (new cylinder) stroke reductions in inches based on PSI.

Stroke length will vary based on PSI.

Not recommended for applications that require 100% repeatable stroke increment.

Available on 1-1/8" thru 5" bores.
(Not available in 1-1/2" bore with 1" diameter rod.)

Can be incorporated into cylinders with no cushions, fixed cushions or adjustable cushions.

Bore	0 PSI	20 PSI	40 PSI	60 PSI	80 PSI	100 PSI
$1\frac{1}{8}$"	.12	.08	.06	.03	.02	0
$1\frac{1}{2}$"	.12	.04	.03	.02	.01	0
2"	.12	.10	.06	.03	.02	0
$2\frac{1}{2}$"	.16	.10	.08	.04	.02	0
$3\frac{1}{4}$"	.18	.10	.08	.04	.02	0
4"	.20	.14	.10	.06	.02	0
5"	.22	.14	.10	.06	.02	0

Operating Temperature: -20°F to 200°F (-29°C to 93°C)

Operating Pressure: 150 PSI Air Maximum (10.4 Bar)

See page 26 for complete instructions on how to order cylinders.

Operating Temperatures:

Series SS	-40°F to 200°F (-40°C to 93°C)
Series D	-20°F to 250°F (-29°C to 121°C)
with Viton Seals	-20°F to 400°F (-29°C to 204°C)

Operating Pressure:

250 PSIG Air (17.2 Bar)
400 PSIG Hydraulic (27.6 Bar)
Bore Sizes: 1-1/8", 1-1/2", 2", 2-1/2", 3-1/4", 4", 5", 6", 8"

Supply:

Filtered compressed air to 250 PSI
Petroleum based hydraulic fluid to 400 PSI

Lubrication:

None required

Norgren Air Cylinders are rated for "no lube added" service. All internal components are lubricated at time of assembly with a Teflon® based grease.

Materials:

Head and End Caps: 304 stainless steel
Tube: 304 stainless steel
Piston Rod: hard chrome plated 303 stainless steel
Piston: 2011-T451 aluminum with Teflon® composite wearband
Rod Bearings: 304 stainless steel with Teflon® composite wearband
Seals: urethane rod seal and wiper, nitrile piston seals
Tie Rods: 303 stainless steel

Side Loading:

Cylinders are specifically designed to push and pull. Side loading of the piston rod should be avoided to ensure maximum operating performance and life.

Care should be taken during installation to properly align the load to be moved with the center line of the cylinder. The use of a rod alignment coupler (see pages 24 and 32) is strongly recommended whenever possible.

Cylinder Weights

In pounds (kilograms)

Bore		Rod		Mounting Code											
				01, 02, 03, 10, 11, 22 & 30		04 & 05		*06 & 17		15 & 16		Add Per Inch of Stroke	
1 1/8"	(28.58)	3/8"	(9.53)	1.1	(.49)	1.5	(.68)	1.3	(.58)	–	–	.13	(.05)
		1/2"	(12.70)	1.2	(.54)	1.6	(.72)	1.4	(.63)	–	–	.15	(.06)
1 1/2"	(38.10)	5/8"	(15.88)	3.3	(1.49)	4.0	(1.81)	3.8	(1.72)	3.8	(1.72)	.3	(.13)
		1"	(25.40)	4.1	(1.85)	4.8	(2.17)	4.6	(2.08)	4.6	(2.08)	.4	(.18)
2"	(50.80)	5/8"	(15.88)	5.9	(2.67)	7.0	(3.17)	6.4	(2.90)	6.4	(2.90)	.5	(.22)
		1"	(25.40)	6.3	(2.85)	7.4	(3.35)	6.8	(2.94)	6.8	(3.08)	.6	(.27)
2 1/2"	(63.50)	5/8"	(15.88)	8.0	(3.62)	9.5	(4.30)	8.7	(3.94)	8.5	(3.85)	.6	(.27)
		1"	(25.40)	8.5	(3.85)	10.0	(4.53)	9.2	(4.17)	9.0	(4.08)	.7	(.31)
3 1/4"	(82.55)	1"	(25.40)	15.0	(6.80)	18.7	(8.48)	16.0	(7.25)	15.5	(7.03)	.8	(.36)
		1 3/8"	(34.93)	15.5	(7.03)	19.2	(8.70)	16.5	(7.48)	16.0	(7.25)	1.0	(.45)
4"	(101.60)	1"	(25.40)	23.0	(10.43)	28.0	(12.70)	27.0	(12.24)	23.5	(10.65)	1.0	(.45)
		1 3/8"	(34.93)	23.5	(10.65)	28.5	(12.92)	27.5	(12.47)	24.0	(10.88)	1.2	(.54)
5"	(127.00)	1"	(25.40)	34.5	(15.64)	42.0	(19.05)	41.0	(18.59)	35.0	(15.87)	1.1	(.49)
		1 3/8"	(34.93)	35.0	(15.87)	42.5	(19.27)	41.5	(18.82)	35.5	(16.10)	1.3	(.58)
6"	(152.40)	1 3/8"	(34.93)	60.0	(27.21)	71.9	(32.61)	69.0	(31.29)	61.2	(27.76)	1.5	(.68)
		1 3/4"	(44.45)	62.0	(28.12)	73.9	(33.52)	71.0	(32.20)	63.2	(28.66)	1.7	(.77)
8"	(203.20)	1 3/8"	(34.93)	79.0	(35.83)	–	–	88.0	(39.91)	80.2	(36.37)	2.0	(.90)
		1 3/4"	(44.45)	82.0	(37.19)	–	–	91.0	(41.27)	83.2	(37.73)	2.3	(1.04)

*Weight includes pivot pin

Listed are the average breakaway pressures in PSI for all Series SS and Series D cylinder bore sizes.

If your application requires a lower breakaway pressure than indicated for a particular bore size, consult the factory.

Breakaway Pressures in PSI

Bore	SS Series		D Series	
	Extend	Retract	Extend	Retract
1 1/8"	6	7	3	4
1 1/2", 2", 2 1/2"	5	6	3	4
3 1/4", 4"	4	5	2	3
5", 6", 8"	3	4	1	2

Note: Breakaway pressures were established with the cylinders mounted horizontally and no load on the piston rod.

Piston Rod Diameter Selection:

Applications requiring long extend (push) strokes may require oversize piston rod diameters to prevent buckling. To determine the correct rod diameter for your application follow these simple steps:

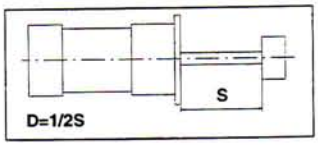
1. Select the thrust from the **Cylinder Force and Volume Chart** that is required for your application.
   Thrust = Piston Surface Area x Operating Pressure
2. From the **Cylinder Mounting Diagrams** select the mounting style being used.
3. With the piston rod fully extended, calculate the value of **D** (in inches) using the formula shown or the cylinder mounting diagram selected in step #2.
4. Locate the value of **D** (in inches) at the bottom of the **Selection Chart**. Enter the chart at this point and move vertically upward until intersecting with the horizontal line representing the required thrust which was selected in step #1. The band within which these lines intersect represents the minimum recommended piston rod diameter.

Stop Tube Selection:

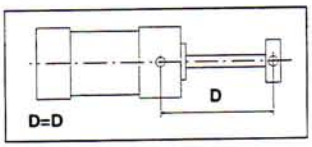
Stop tubes enhance the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and rod bearing at full extension. When the value of **D** (calculated from the piston rod diameter selection instructions above) is less than 40", a stop tube is **not** required. However, if **D** is 40" or more, 1" of stop tube is recommended for every 10" (or fraction thereof) over 40".

Cylinder Mounting Diagrams

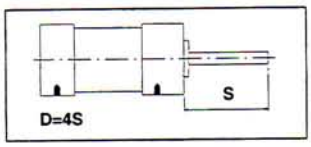
Firmly Guided Rod End



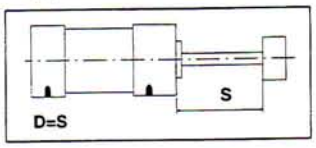
Head Trunnion



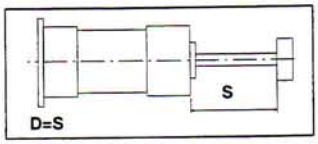
Unsupported Rod End



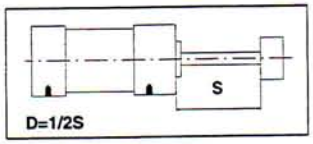
Supported Rod End



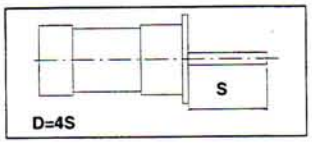
Supported Rod End



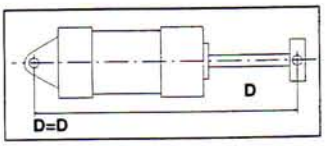
Firmly Guided Rod End



Unsupported Rod End



Cap Clevis or Cap Trunnion



Cylinder Force and Volume Charts

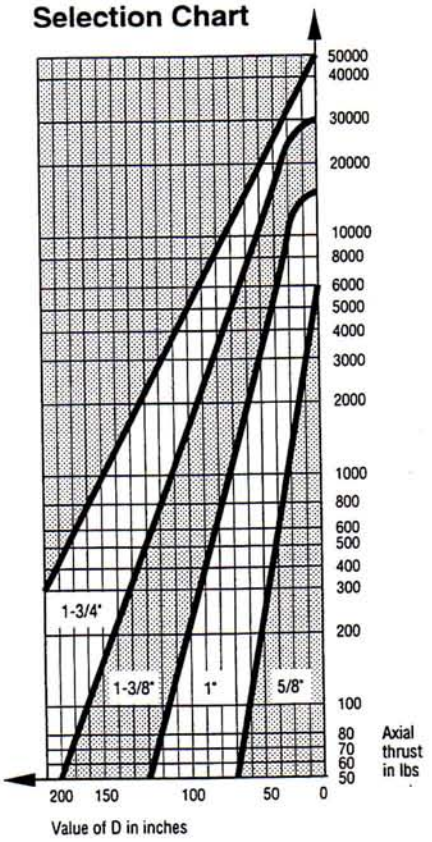
Extend Forces in pounds (newtons)

Bore	Piston Area	PSI (bar) 40 (3)	60 (4)	80 (6)	100 (7)	150 (10)	200 (14)	Volume Cu Ft (cm³) Displacement Per Inch
1 1/8"	.99 (6.41)	40 (177)	60 (265)	80 (354)	99 (442)	149 (664)	200 (890)	.00057 (16)
1 1/2"	1.77 (11.40)	71 (315)	106 (472)	142 (629)	177 (786)	266 (1179)	353 (1570)	.00102 (29)
2"	3.14 (20.27)	126 (559)	189 (839)	251 (1119)	314 (1398)	471 (2097)	628 (2793)	.00182 (52)
2 1/2"	4.91 (31.67)	196 (874)	295 (1311)	393 (1748)	491 (2185)	737 (3277)	982 (4368)	.00284 (80)
3 1/4"	8.30 (53.32)	332 (1477)	498 (2215)	664 (2953)	830 (3692)	1245 (5538)	1659 (7379)	.00480 (136)
4"	12.57 (81.07)	503 (2237)	754 (3355)	1005 (4473)	1257 (5592)	1886 (8388)	2513 (11178)	.00727 (206)
5"	19.64 (126.71)	785 (3491)	1178 (5240)	1571 (6988)	1964 (8736)	2946 (13104)	3928 (17472)	.01137 (322)
6"	28.27 (182.39)	1130 (5026)	1696 (7544)	2262 (10061)	2827 (12574)	4240 (18860)	5654 (25149)	.01837 (520)
8"	50.26 (324.26)	2010 (8940)	3015 (13411)	4020 (17881)	5026 (22356)	7539 (33533)	10052 (44711)	.02227 (631)

Deduct these Forces for Retract Strokes

Rod	Rod Area	PSI (bar) 40 (3)	60 (4)	80 (6)	100 (7)	150 (10)	200 (14)	Volume Cu Ft (cm³) Displacement Per Inch
3/8"	.112 (.72)	5 (20)	7 (30)	9 (40)	11 (50)	17 (75)	22 (100)	.00007 (2)
1/2"	.196 (1.26)	8 (35)	12 (52)	16 (70)	20 (87)	30 (131)	39 (174)	.00011 (3)
5/8"	.307 (1.98)	12 (53)	18 (80)	25 (111)	31 (138)	46 (205)	61 (271)	.00018 (5)
1"	.785 (5.06)	31 (138)	47 (209)	63 (280)	70 (351)	118 (525)	157 (698)	.00045 (13)
1 3/8"	1.485 (9.58)	59 (262)	89 (396)	119 (529)	149 (663)	222 (997)	297 (1321)	.00086 (24)
1 3/4"	2.404 (15.51)	95 (423)	144 (641)	192 (854)	240 (1068)	360 (1601)	480 (2135)	.00139 (39)

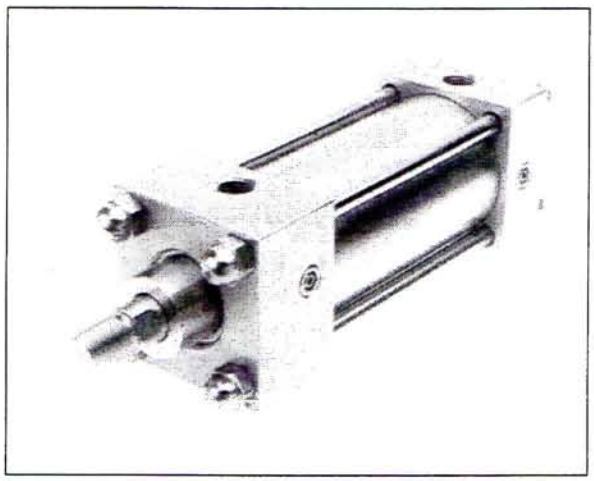
Selection Chart



Series SS Cylinders

Cylinder with 01 (MX0) Basic

- **NFPA (MX0) 01 Basic Mount available in 1-1/2" thru 8" bore sizes.**
- **Precision machined 300 Series stainless steel components.**
- **Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
- **Designed for non-lube service.**
- **Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)**



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 1 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1 1/2"	C
2"	D
2 1/2"	E
3 1/4"	F
4"	G
5"	L
6"	J
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special^	98

**See pages 34 & 35.

^For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

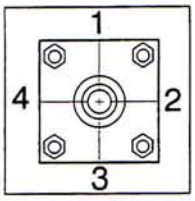
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	**Basic (MX0)**	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

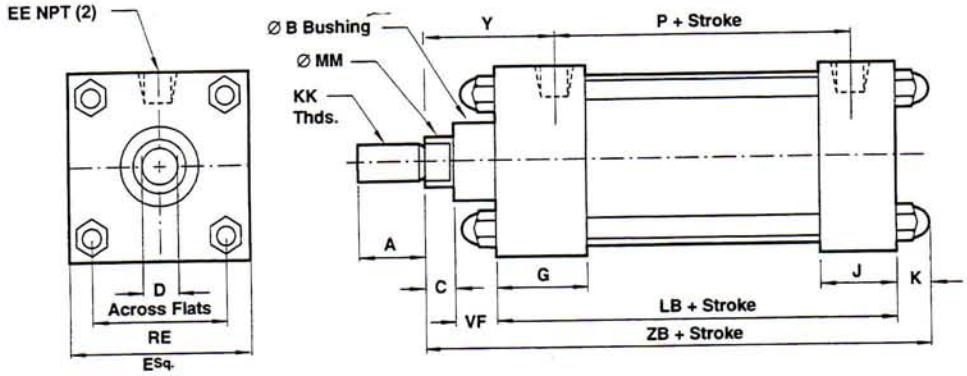
*8" Bores Only

Port and Cushion Needle Positions (As viewed from rod end)

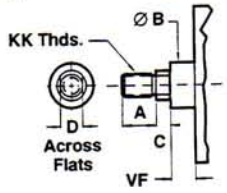


See page 26 for complete instructions on how to order cylinders.

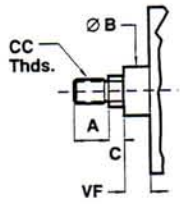
All Dimensions in Inches (mm)



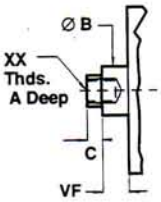
Standard & Optional Rod Ends



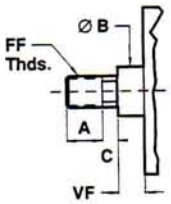
Style #1
(Standard Male)



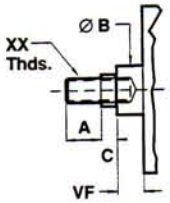
Style #2
(Optional Male)



Style #3
(Optional Female)



Style #4
(Optional Full Diameter Threads)

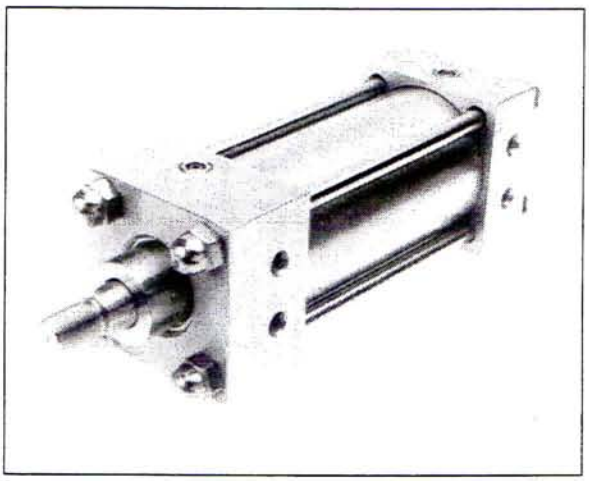


Style #5
(Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12	1 1/2 – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12	1 3/4 – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)	1.000 (25.40)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/2 – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)	5.125 (130.18)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
RE		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)	6.435 (163.45)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)
ZB	Std.	5.094 (129.39)	5.156 (130.96)	5.281 (134.14)	6.250 (158.75)	6.250 (158.75)	6.705 (170.31)	7.455 (189.36)	7.750 (196.85)
	O.S.	5.469 (138.91)	5.531 (140.49)	5.656 (143.66)	6.500 (165.10)	6.500 (165.10)	6.955 (176.66)	7.705 (195.71)	8.000 (203.20)

Cylinder with 02 (MS4) Bottom Tap

- **NFPA (MS4) 02 Bottom Tap Mount available in 1-1/2" thru 8" bore sizes.**
- **Precision machined 300 Series stainless steel components.**
- **Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
- **Designed for non-lube service.**
- **Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)**



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 2 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1 1/2"	C
2"	D
2 1/2"	E
3 1/4"	F
4"	G
5"	L
6"	J
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special^	98

**See pages 34 & 35.

^For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

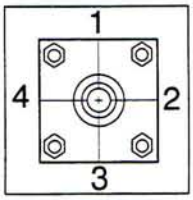
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	**Bottom Tap (MS4)**	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

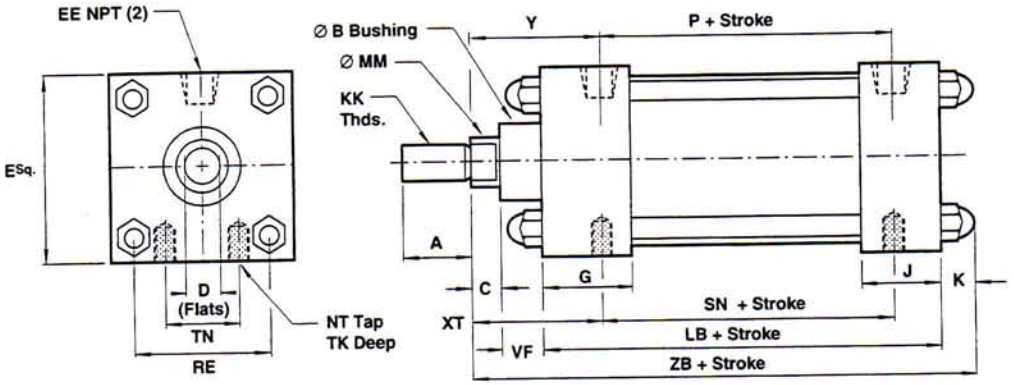
*8" Bores Only

Port and Cushion Needle Positions
(As viewed from rod end)

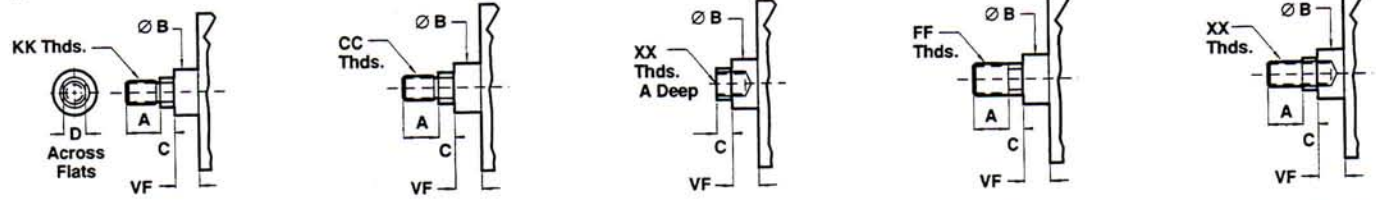


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

Style #4 (Optional Full Diameter Threads)

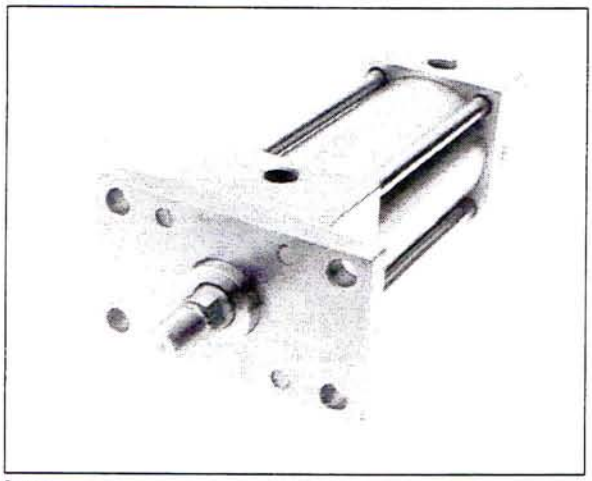
Style #5 (Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12	1 1/2 – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12	1 3/4 – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)	1.000 (25.40)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/2 – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)	5.125 (130.18)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
NT		1/4 – 20	5/16 – 18	3/8 – 16	1/2 – 13	1/2 – 13	5/8 – 11	3/4 – 10	3/4 – 10
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
RE		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)	6.435 (163.45)
SN		2.250 (57.15)	2.250 (57.15)	2.375 (60.33)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.125 (79.38)	3.250 (82.55)
TK		.375 (9.53)	.500 (12.70)	.625 (15.88)	.750 (19.05)	.750 (19.05)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
TN		.625 (15.88)	.875 (22.23)	1.250 (31.75)	1.500 (38.10)	2.062 (52.37)	2.687 (68.25)	3.250 (82.55)	4.500 (114.30)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XT	Std.	1.937 (49.20)	1.937 (49.20)	1.937 (49.20)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.812 (71.42)	2.812 (71.42)
	O.S.	2.312 (58.72)	2.312 (58.72)	2.312 (58.72)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.062 (77.77)	3.062 (77.77)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)
ZB	Std.	5.094 (129.39)	5.156 (130.96)	5.281 (134.14)	6.250 (158.75)	6.250 (158.75)	6.705 (170.31)	7.455 (189.36)	7.750 (196.85)
	O.S.	5.469 (138.91)	5.531 (140.49)	5.656 (143.66)	6.500 (165.10)	6.500 (165.10)	6.955 (176.66)	7.705 (195.71)	8.000 (203.20)

Series SS Cylinders

Cylinder with 04 (MF1) Front Flange

- NFPA (MF1) 04 Front Flange Mount available in 1-1/2" thru 6" bore sizes.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 4 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1 1/2"	C
2"	D
2 1/2"	E
3 1/4"	F
4"	G
5"	L
6"	J
8"	*

*See pages 16 & 17 for ME3 mount

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special▲	98

**See pages 34 & 35.
▲For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

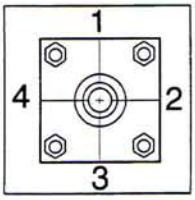
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	**Front Flange (MF1)**	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

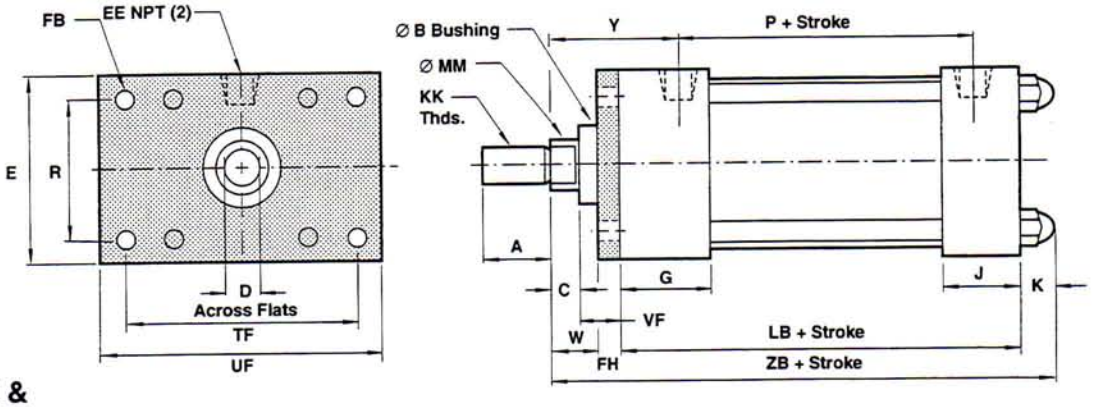
*8" Bores Only

Port and Cushion Needle Positions
(As viewed from rod end)

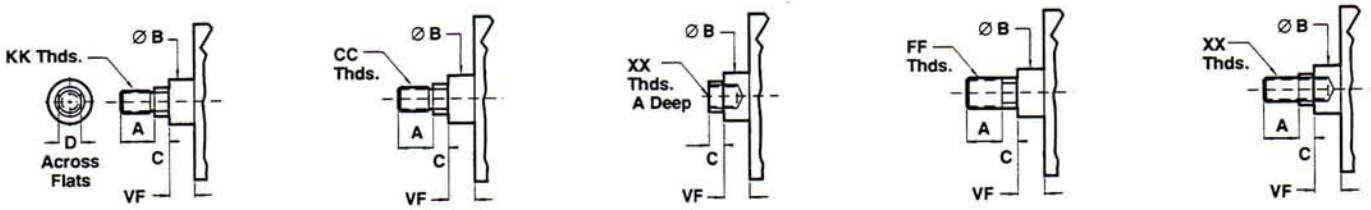


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

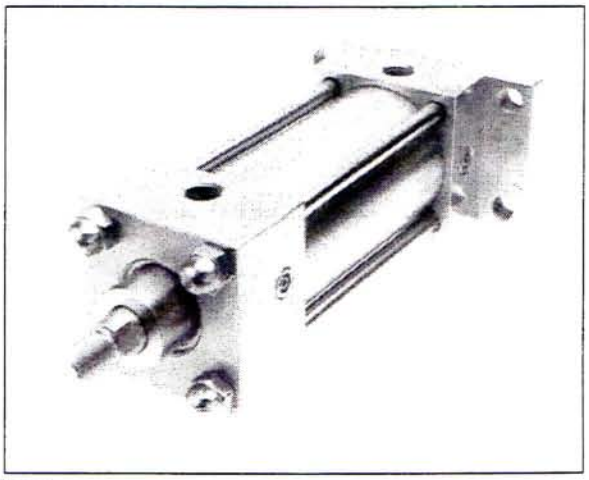
Style #4 (Optional Full Diameter Threads)

Style #5 (Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)
FB		.312 (7.92)	.375 (9.53)	.375 (9.53)	.437 (11.10)	.437 (11.10)	.562 (14.27)	.562 (14.27)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12
FH		.375 (9.53)	.375 (9.53)	.375 (9.53)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)
R		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)
TF		2.750 (69.85)	3.375 (85.73)	3.875 (98.43)	4.687 (119.08)	5.437 (138.10)	6.625 (168.28)	7.625 (193.68)
UF		3.375 (85.73)	4.125 (104.78)	4.625 (117.48)	5.500 (139.70)	6.250 (158.75)	7.625 (193.68)	8.625 (219.08)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)
W	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)	.750 (19.05)	.875 (22.23)
	O.S.	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)
ZB	Std.	5.094 (129.39)	5.156 (130.96)	5.281 (134.14)	6.250 (158.75)	6.250 (158.75)	6.705 (170.31)	7.455 (189.36)
	O.S.	5.469 (138.91)	5.531 (140.49)	5.656 (143.66)	6.500 (165.10)	6.500 (165.10)	6.955 (176.66)	7.705 (195.71)

Cylinder with 05 (MF2) Rear Flange

- NFPA (MF2) 05 Rear Flange Mount available in 1-1/2" thru 6" bore sizes.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 5 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1 1/2"	C
2"	D
2 1/2"	E
3 1/4"	F
4"	G
5"	L
6"	J
8"	*

*See pages 16 & 17 for ME4 mount

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special^	98

**See pages 34 & 35.
^For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

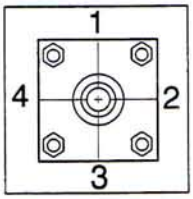
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	**Rear Flange (MF2)**	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

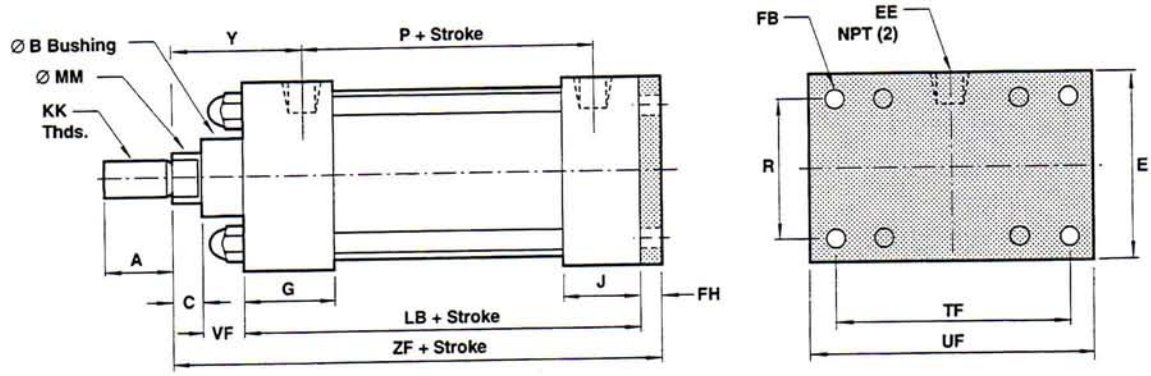
*8" Bores Only

Port and Cushion Needle Positions (As viewed from rod end)

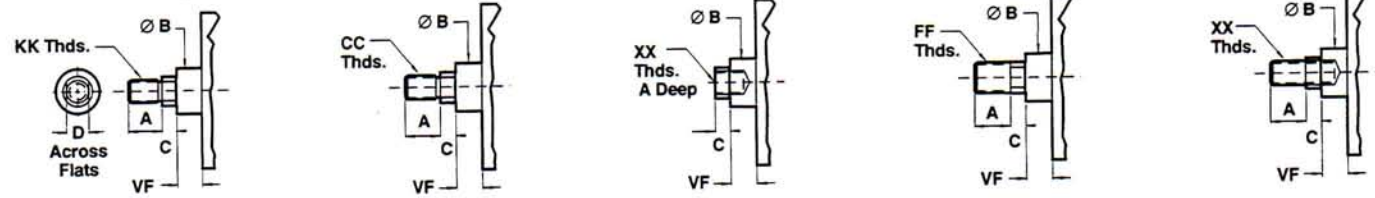


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

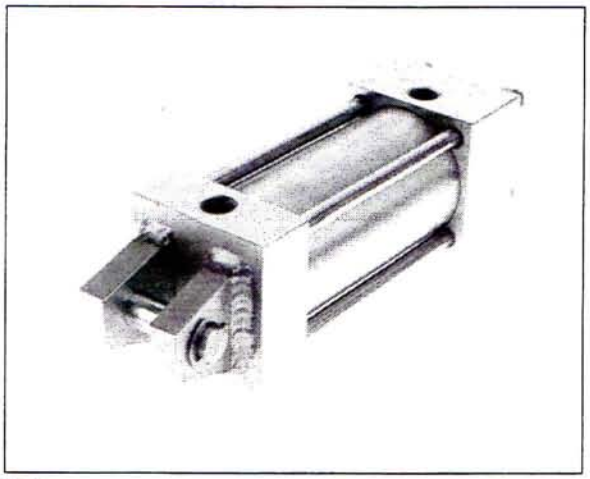
Style #4 (Optional Full Diameter Threads)

Style #5 (Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)
FB		.312 (7.92)	.375 (9.53)	.375 (9.53)	.437 (11.10)	.437 (11.10)	.562 (14.27)	.562 (14.27)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12
FH		.375 (9.53)	.375 (9.53)	.375 (9.53)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)
R		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)
TF		2.750 (69.85)	3.375 (85.73)	3.875 (98.43)	4.687 (119.08)	5.437 (138.10)	6.625 (168.28)	7.625 (193.68)
UF		3.375 (85.73)	4.125 (104.78)	4.625 (117.48)	5.500 (139.70)	6.250 (158.75)	7.625 (193.68)	8.625 (219.08)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)
XX	Std	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)
ZF	Std.	5.000 (127.00)	5.000 (127.00)	5.125 (130.18)	6.250 (158.75)	6.250 (158.75)	6.500 (165.10)	7.375 (187.33)
	O.S.	5.375 (136.53)	5.375 (136.53)	5.500 (139.70)	6.500 (165.10)	6.500 (165.10)	6.750 (171.45)	7.625 (193.68)

Cylinder with 06 (MP1) Cap Fixed Clevis

- NFPA (MP1) 06 Cap Fixed Clevis Mount available in 1-1/2" thru 8" bore sizes.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 6 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1½"	C
2"	D
2½"	E
3¼"	F
4"	G
5"	L
6"	J
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1½", 2" & 2½" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	**Cap Fixed Clevis (MP1)**	XX	Special

*8" Bores Only

Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

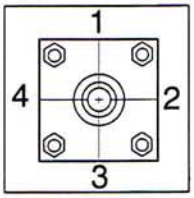
†Standard position

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

No Options	00
Magnetic Piston Only**	90
Special▲	98

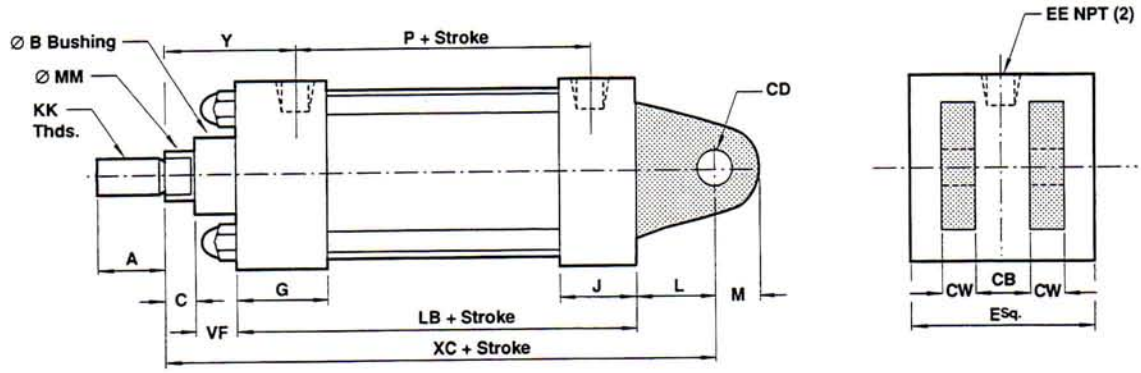
**See pages 34 & 35.
▲For any cylinder modifications not listed use "98" and please specify.

Port and Cushion Needle Positions
(As viewed from rod end)

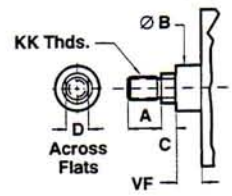


See page 26 for complete instructions on how to order cylinders.

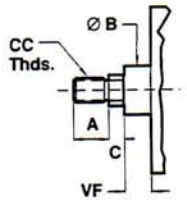
All Dimensions in Inches (mm)



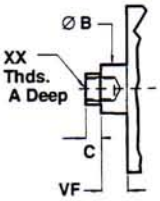
Standard & Optional Rod Ends



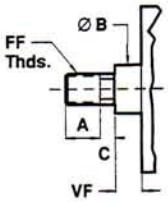
Style #1
(Standard Male)



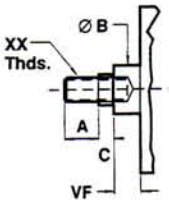
Style #2
(Optional Male)



Style #3
(Optional Female)



Style #4
(Optional Full Diameter Threads)

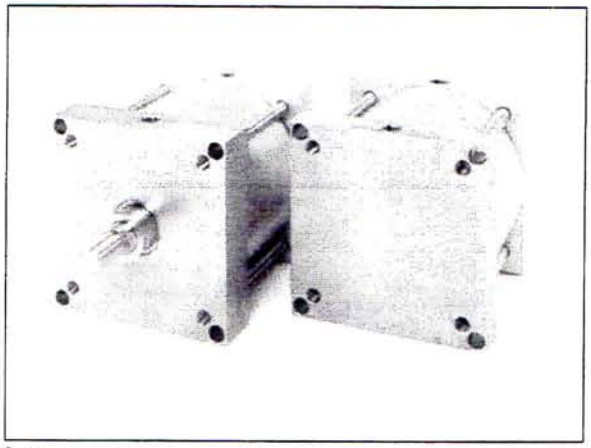


Style #5
(Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
⌀ Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CB		.750 (19.05)	.750 (19.05)	.750 (19.05)	1.250 (31.75)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12	1 1/2 – 12
CD		.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.000 (25.40)	1.000 (25.40)
CW		.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (112.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12	1 3/4 – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/2 – 12
L		.750 (19.05)	.750 (19.05)	.750 (19.05)	1.250 (31.75)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)	5.125 (130.18)
M		.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XC	Std.	5.375 (136.53)	5.375 (136.53)	5.500 (139.70)	6.875 (174.63)	6.875 (174.63)	7.125 (180.98)	8.125 (206.38)	8.250 (209.55)
	O.S.	5.750 (146.05)	5.750 (146.05)	5.875 (149.23)	7.125 (180.98)	7.125 (180.98)	7.375 (187.33)	8.375 (212.73)	8.500 (215.90)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)

- NFPA (ME3) 10 Head Square Mount and NFPA (ME4) 11 Cap Square Mount available in 8" bore size only.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)

Cylinder with 10 (ME3) Head Square and Cylinder with 11 (ME4) Cap Square



Cylinder Order Information

■	M	■	■	■	-	■	1	0	-	■	■	■	■	■
1	2	3	4	5		6	1	1		9	10	11	12	13
							7	8						

S	Series SS
D	Series D

Bore	Single Rod End
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1½", 2" & 2½" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special▵	98

**See pages 34 & 35.
▵For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

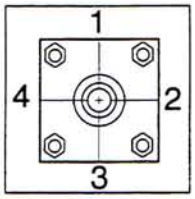
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	Basic (MX0)	**10**	**Head Square (ME3)***
02	Bottom Tap (MS4)	**11**	**Cap Square (ME4)***
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

*8" Bores Only

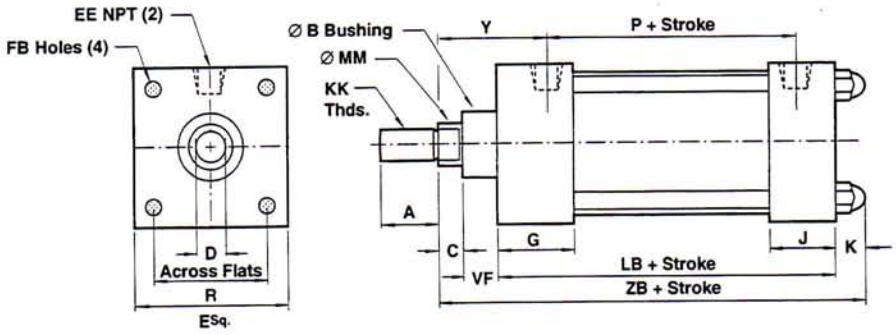
Port and Cushion Needle Positions
(As viewed from rod end)



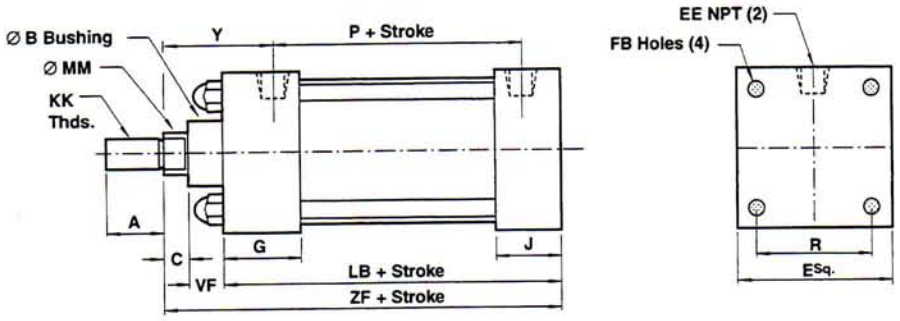
See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)

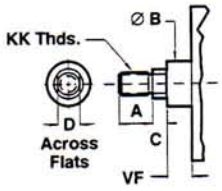
10 (ME3)



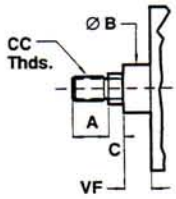
11 (ME4)



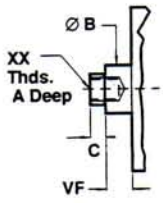
Standard & Optional Rod Ends



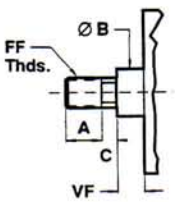
Style #1
(Standard Male)



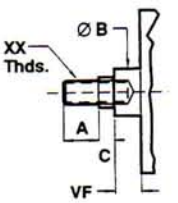
Style #2
(Optional Male)



Style #3
(Optional Female)



Style #4
(Optional Full Diameter Threads)



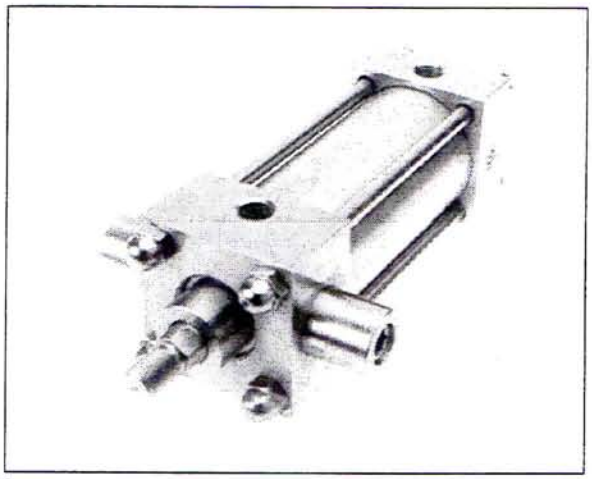
Style #5
(Optional Studded)

Dimension		10 (ME3) Head Square		11 (ME4) Cap Square	
		8" Bore (203.20)			
ø Rod	Std.	1 3/8"	(34.93)	1 3/8"	(34.93)
	O.S.	1 3/4"	(44.45)	1 3/4"	(44.45)
A	Std.	1.625	(41.28)	1.625	(41.28)
	O.S.	2.000	(50.80)	2.000	(50.80)
B	Std.	2.000	(50.80)	2.000	(50.80)
	O.S.	2.375	(60.33)	2.375	(60.33)
C	Std.	.625	(15.88)	.625	(15.88)
	O.S.	.750	(19.05)	.750	(19.05)
CC	Std.	1¼ – 12		1¼ – 12	
	O.S.	1½ – 12		1½ – 12	
D	Std.	1.125	(28.58)	1.125	(28.58)
	O.S.	1.500	(38.10)	1.500	(38.10)
E		8.500	(215.90)	8.500	(215.90)
EE	Std.	.500	(12.70)	.500	(12.70)
	O.S.	.750	(19.05)	.750	(19.05)
FB		.687	(17.45)	.687	(17.45)
FF	Std.	1⅜ – 12		1⅜ – 12	
	O.S.	1¾ – 12		1¾ – 12	
G		2.000	(50.80)	2.000	(50.80)
J		1.750	(44.45)	1.750	(44.45)
K		1.000	(25.40)	1.000	(25.40)
KK	Std.	1 – 14		1 – 14	
	O.S.	1½ – 12		1½ – 12	
LB		5.125	(130.18)	5.125	(130.18)
MM	Std.	1.355	(34.42)	1.355	(34.42)
	O.S.	1.730	(43.94)	1.730	(43.94)
P		3.125	(79.38)	3.125	(79.38)
R		7.570	(192.28)	7.570	(192.28)
VF	Std.	1.000	(25.40)	1.000	(25.40)
	O.S.	1.125	(28.58)	1.125	(28.58)
XX	Std.	1 – 14		1 – 14	
	O.S.	1¼ – 12		1¼ – 12	
Y	Std.	2.875	(73.03)	2.875	(73.03)
	O.S.	3.125	(79.38)	3.125	(79.38)
ZB	Std.	7.750	(196.85)	–	
	O.S.	8.000	(203.30)	–	
ZF	Std.	–		6.750	(171.45)
	O.S.	–		7.000	(177.80)

Series SS Cylinders

Cylinder with 15 (MT1) Head Trunnion

- NFPA (MT1) 15 Head Trunnion Mount available in 1-1/2" thru 8" bore sizes.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 1 5 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1½"	C
2"	D
2½"	E
3¼"	F
4"	G
5"	L
6"	J
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1½", 2" & 2½" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special[Δ]	98

**See pages 34 & 35.

[Δ]For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2	3†	4
No Cushions	A			
Head Only	B	N/A	D	N/A
Cap Only	G	H	J	K
Head and Cap	N	N/A	P	N/A
Fixed	U			
Special	X			

†Standard position

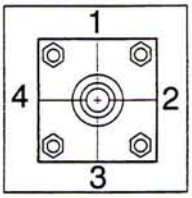
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	**15**	**Head Trunnion (MT1)**
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

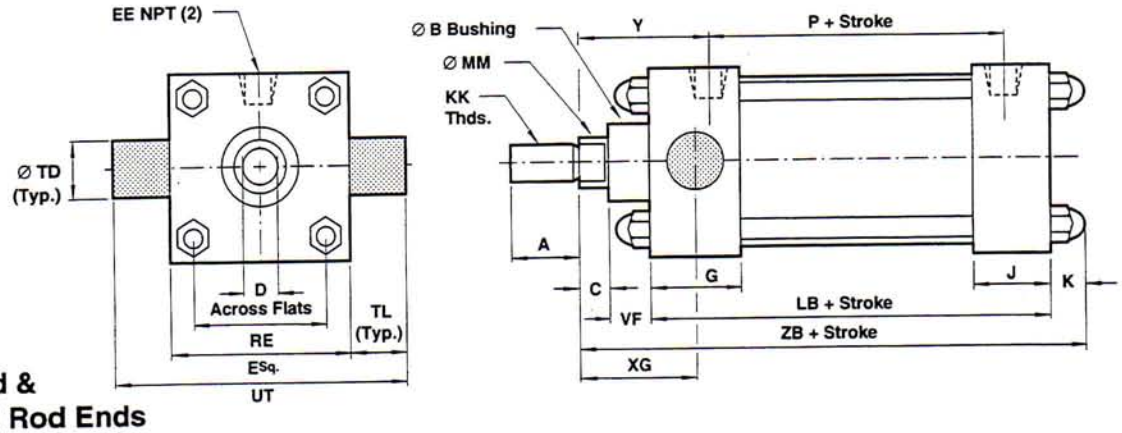
*8" Bores Only

Port and Cushion Needle Positions
(As viewed from rod end)

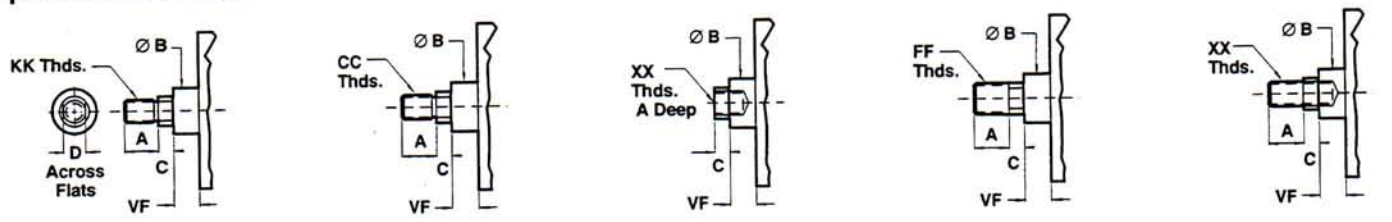


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

Style #4 (Optional Full Diameter Threads)

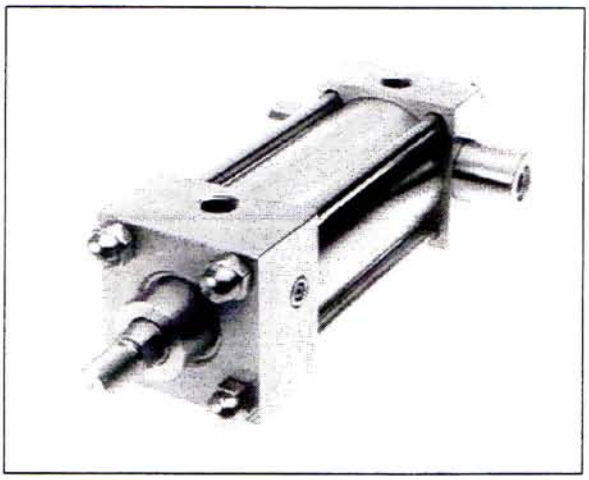
Style #5 (Optional Studded)

Dimension		1 1/2" Bore (38.10)	2" Bore (50.80)	2 1/2" Bore (63.50)	3 1/4" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1 1/4 – 12	1 1/4 – 12	1 1/4 – 12	1 1/2 – 12	1 1/2 – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12
	O.S.	1 –14	1 –14	1 –14	1 3/8 – 12	1 3/8 – 12	1 3/8 – 12	1 3/4 – 12	1 3/4 – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)	1.000 (25.40)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/2 – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)	5.125 (130.18)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
RE		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)	6.435 (163.45)
TD		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.375 (34.93)	1.375 (34.93)
TL		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.375 (34.93)	1.375 (34.93)
UT		4.000 (101.60)	4.500 (114.30)	5.000 (127.00)	5.750 (146.05)	6.500 (165.10)	7.500 (190.50)	9.250 (234.95)	11.250 (285.75)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (22.23)	1.000 (22.23)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XG	Std.	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.250 (57.15)	2.250 (57.15)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)
	O.S.	2.125 (53.98)	2.125 (53.98)	2.125 (53.98)	2.500 (63.50)	2.500 (63.50)	2.500 (63.50)	2.875 (73.03)	2.875 (73.03)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1 1/4 – 12	1 1/4 – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)
ZB	Std.	5.094 (129.39)	5.156 (130.96)	5.281 (134.14)	6.250 (158.75)	6.250 (158.75)	6.705 (170.31)	7.455 (189.36)	7.750 (196.85)
	O.S.	5.469 (138.91)	5.531 (140.49)	5.656 (143.66)	6.500 (165.10)	6.500 (165.10)	6.955 (176.66)	7.705 (195.71)	8.000 (203.20)

Series SS Cylinders

Cylinder with 16 (MT2) Cap Trunnion

- NFPA (MT2) 16 Cap Trunnion Mount available in 1-1/2" thru 8" bore sizes.
- Precision machined 300 Series stainless steel components.
- Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 1 6 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Single Rod End
1 1/2"	C
2"	D
2 1/2"	E
3 1/4"	F
4"	G
5"	L
6"	J
8"	M

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	**16**	**Cap Trunnion (MT2)**
06	Cap Fixed Clevis (MP1)	XX	Special

*8" Bores Only

Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Cushions				
Needle Position	1	2	3†	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	N/A	J	N/A
Head and Cap	N	N/A	P	N/A
Fixed	U			
Special	X			

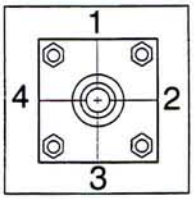
†Standard position

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

No Options	00
Magnetic Piston Only**	90
Special^	98

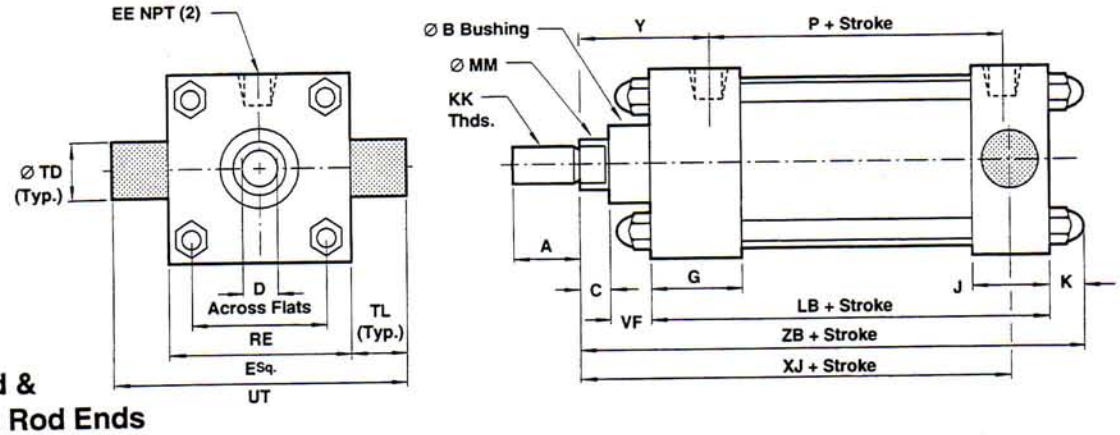
**See pages 34 & 35.
^For any cylinder modifications not listed use "98" and please specify.

Port and Cushion Needle Positions
(As viewed from rod end)

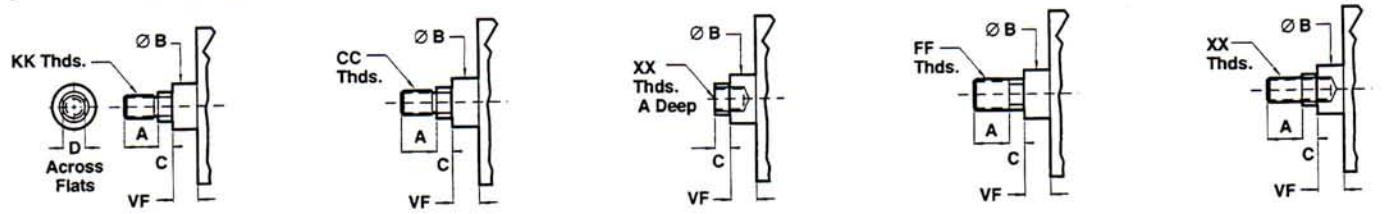


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

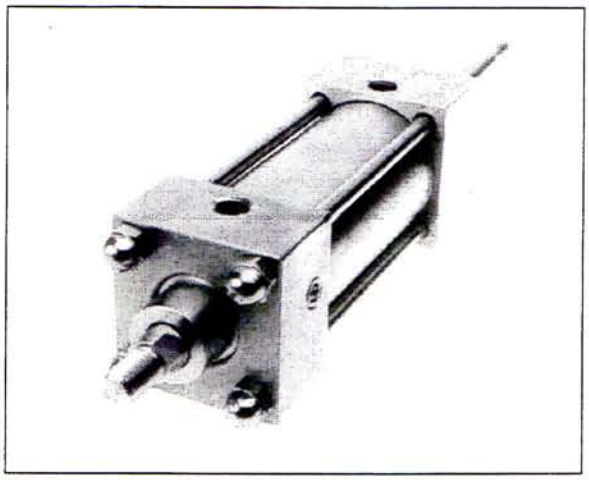
Style #4 (Optional Full Diameter Threads)

Style #5 (Optional Studded)

Dimension		1½" Bore (38.10)	2" Bore (50.80)	2½" Bore (63.50)	3¼" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1¼ – 12	1¼ – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1¼ – 12	1¼ – 12	1¼ – 12	1½ – 12	1½ – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1⅜ – 12	1⅜ – 12
	O.S.	1 –14	1 –14	1 –14	1⅜ – 12	1⅜ – 12	1⅜ – 12	1¾ – 12	1¾ – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
J		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.250 (31.75)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)	1.000 (25.40)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1¼ – 12	1½ – 12
LB		3.625 (92.08)	3.625 (92.08)	3.750 (95.25)	4.250 (107.95)	4.250 (107.95)	4.500 (114.30)	5.000 (127.00)	5.125 (130.18)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
RE		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)	6.435 (163.45)
TD		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.375 (34.93)	1.375 (34.93)
TL		1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.375 (34.93)	1.375 (34.93)
UT		4.000 (101.60)	4.500 (114.30)	5.000 (127.00)	5.750 (146.05)	6.500 (165.10)	7.500 (190.50)	9.250 (234.95)	11.250 (285.75)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (22.23)	1.000 (22.23)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XJ	Std.	4.125 (104.78)	4.125 (104.78)	4.250 (107.95)	5.000 (127.00)	5.000 (127.00)	5.250 (133.35)	5.875 (149.23)	6.000 (152.40)
	O.S.	4.500 (114.30)	4.500 (114.30)	4.625 (117.48)	5.250 (133.35)	5.250 (133.35)	5.500 (139.70)	6.125 (155.58)	6.250 (158.75)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1¼ – 12	1¼ – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)
ZB	Std.	5.094 (129.39)	5.156 (130.96)	5.281 (134.14)	6.250 (158.75)	6.250 (158.75)	6.705 (170.31)	7.455 (189.36)	7.750 (196.85)
	O.S.	5.469 (138.91)	5.531 (140.49)	5.656 (143.66)	6.500 (165.10)	6.500 (165.10)	6.955 (176.66)	7.705 (195.71)	8.000 (203.20)

Double Rod End Cylinder with 01 (MX0) Basic

- **NFPA (MX0) 01 Basic Double Rod End Cylinder available in 1-1/2" thru 8" bore size.**
- **Precision machined 300 Series stainless steel components.**
- **Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
- **Designed for non-lube service.**
- **Switches available on all bore sizes. (See pages 34 & 35 for ordering information.)**



Cylinder Order Information

■ ■ ■ ■ ■ - ■ 0 1 - ■ ■ ■ ■ ■

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

S	Series SS
D	Series D

Bore	Double Rod End
1½"	Q
2"	R
2½"	S
3¼"	T
4"	U
5"	Y
6"	W
8"	Z

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
xx	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia.Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1½", 2" & 2½" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

No Options	00
Magnetic Piston Only**	90
Special▲	98

**See pages 34 & 35.
▲For any cylinder modifications not listed use "98" and please specify.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

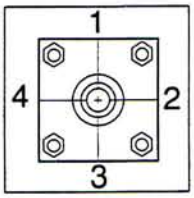
Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Mounting Options			
01	**Basic (MX0)**	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

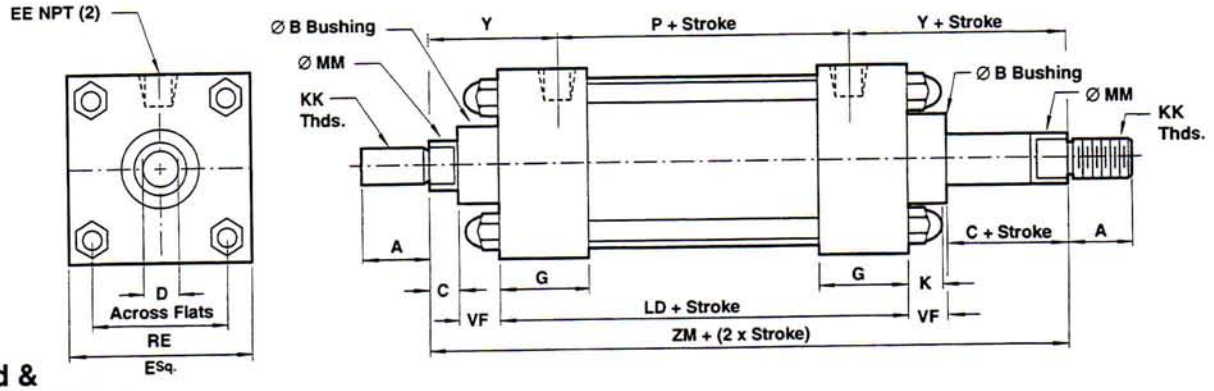
*8" Bores Only

Port and Cushion Needle Positions
(As viewed from rod end)

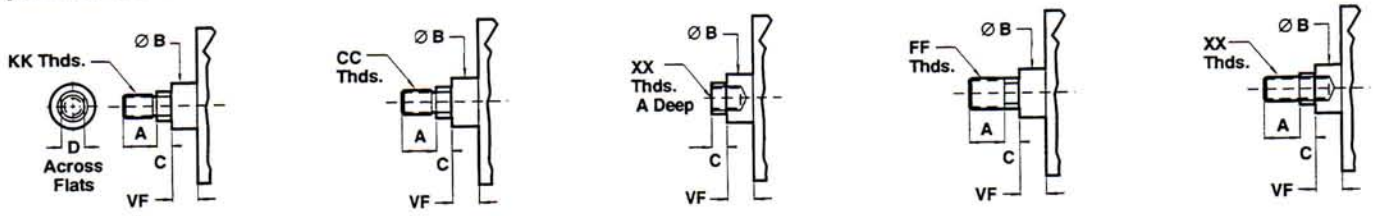


See page 26 for complete instructions on how to order cylinders.

All Dimensions in Inches (mm)



Standard & Optional Rod Ends



Style #1 (Standard Male)

Style #2 (Optional Male)

Style #3 (Optional Female)

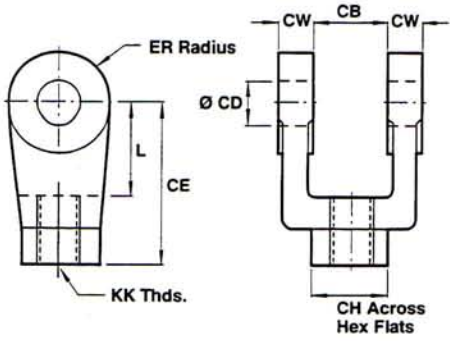
Style #4 (Optional Full Diameter Threads)

Style #5 (Optional Studded)

Dimension		1½" Bore (38.10)	2" Bore (50.80)	2½" Bore (63.50)	3¼" Bore (82.55)	4" Bore (101.60)	5" Bore (127.00)	6" Bore (152.40)	8" Bore (203.20)
ø Rod	Std.	5/8" (15.88)	5/8" (15.88)	5/8" (15.88)	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)
	O.S.	1" (25.40)	1" (25.40)	1" (25.40)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/8" (34.93)	1 3/4" (44.45)	1 3/4" (44.45)
A	Std.	.750 (19.05)	.750 (19.05)	.750 (19.05)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)
	O.S.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.625 (41.28)	1.625 (41.28)	1.625 (41.28)	2.000 (50.80)	2.000 (50.80)
B	Std.	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)
	O.S.	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.375 (60.33)	2.375 (60.33)
C	Std.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)
	O.S.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.625 (15.88)	.625 (15.88)	.625 (15.88)	.750 (19.05)	.750 (19.05)
CC	Std.	7/16 – 20	7/16 – 20	7/16 – 20	7/8 –14	7/8 –14	7/8 –14	1¼ – 12	1¼ – 12
	O.S.	7/8 –14	7/8 –14	7/8 –14	1¼ – 12	1¼ – 12	1¼ – 12	1½ – 12	1½ – 12
D	Std.	.500 (12.70)	.500 (12.70)	.500 (12.70)	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)
	O.S.	.812 (20.62)	.812 (20.62)	.812 (20.62)	1.125 (28.58)	1.125 (28.58)	1.125 (28.58)	1.500 (38.10)	1.500 (38.10)
E		2.000 (50.80)	2.500 (63.50)	3.000 (76.20)	3.750 (95.25)	4.500 (114.30)	5.500 (139.70)	6.500 (165.10)	8.500 (215.90)
EE	Std.	.250 (6.35)	.250 (6.35)	.250 (6.35)	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)
	O.S.	.375 (9.53)	.375 (9.53)	.375 (9.53)	.500 (12.70)	.500 (12.70)	.500 (12.70)	.750 (19.05)	.750 (19.05)
FF	Std.	5/8 –18	5/8 –18	5/8 –18	1 –14	1 –14	1 –14	1⅜ – 12	1⅜ – 12
	O.S.	1 –14	1 –14	1 –14	1⅜ – 12	1⅜ – 12	1⅜ – 12	1¾ – 12	1¾ – 12
G		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)	1.750 (44.45)	1.750 (44.45)	2.000 (50.80)	2.000 (50.80)
K		.469 (11.91)	.531 (13.49)	.531 (13.49)	.625 (15.88)	.625 (15.88)	.830 (21.08)	.830 (21.08)	1.000 (25.40)
KK	Std.	1/2 – 20	1/2 – 20	1/2 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1¼ – 12	1½ – 12
LD		4.125 (104.78)	4.125 (104.78)	4.250 (107.95)	4.750 (120.65)	4.750 (120.65)	5.000 (127.00)	5.500 (139.70)	5.500 (139.70)
MM	Std.	.605 (15.37)	.605 (15.37)	.605 (15.37)	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)
	O.S.	.980 (24.89)	.980 (24.89)	.980 (24.89)	1.355 (34.42)	1.355 (34.42)	1.355 (34.42)	1.730 (43.94)	1.730 (43.94)
P		2.125 (53.98)	2.125 (53.98)	2.250 (57.15)	2.625 (66.68)	2.625 (66.68)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)
RE		1.430 (36.32)	1.840 (46.74)	2.190 (55.63)	2.760 (70.10)	3.320 (84.33)	4.100 (104.14)	4.880 (123.95)	6.435 (163.45)
VF	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (22.23)	1.000 (22.23)
	O.S.	.875 (22.23)	.875 (22.23)	.875 (22.23)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.125 (28.58)
XX	Std.	7/16 – 20	7/16 – 20	7/16 – 20	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14
	O.S.	3/4 – 16	3/4 – 16	3/4 – 16	1 – 14	1 – 14	1 – 14	1¼ – 12	1¼ – 12
Y	Std.	2.000 (50.80)	2.000 (50.80)	2.000 (50.80)	2.437 (61.90)	2.437 (61.90)	2.437 (61.90)	2.875 (73.03)	2.875 (73.03)
	O.S.	2.375 (60.33)	2.375 (60.33)	2.375 (60.33)	2.687 (68.25)	2.687 (68.25)	2.687 (68.25)	3.125 (79.38)	3.125 (79.38)
ZM	Std.	6.125 (155.58)	6.125 (155.58)	6.250 (158.75)	7.500 (190.50)	7.500 (190.50)	7.750 (196.85)	8.750 (222.25)	8.750 (222.25)
	O.S.	6.875 (174.63)	6.875 (174.63)	7.000 (177.80)	8.000 (203.20)	8.000 (203.20)	8.250 (209.55)	9.250 (234.95)	9.250 (234.95)

All Dimensions in Inches (mm)

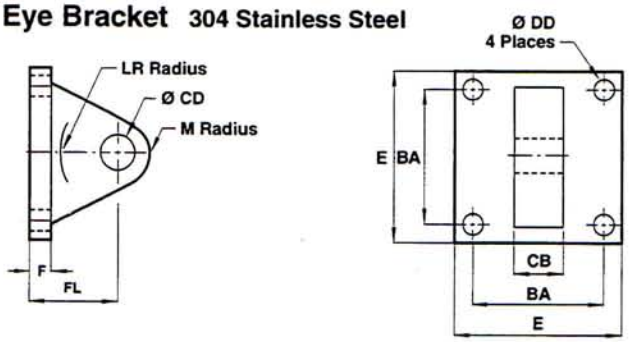
Rod Clevis 303 Stainless Steel



Rod Clevis Dimensions

	S-92-03	S-92-065	S-92-12	S-92-16
CB	.750 (19.05)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)
CD	.500 (12.70)	.750 (19.05)	1.000 (25.40)	1.375 (34.93)
CE	1.500 (38.10)	2.375 (60.33)	3.125 (79.38)	4.125 (104.78)
CH	1.000 (25.40)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)
CW	.500 (12.70)	.625 (15.88)	.750 (19.05)	1.000 (25.40)
ER	.500 (12.70)	.750 (19.05)	1.000 (25.40)	1.375 (34.93)
KK	1/2-20	3/4-16	1-14	1¼-12
L	.750 (19.05)	1.250 (31.75)	1.500 (38.10)	2.125 (53.98)

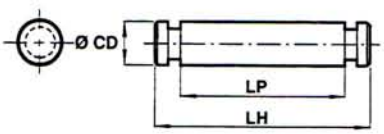
Eye Bracket 304 Stainless Steel



NFPA Eye Bracket Dimensions

	S-89-03A	S-89-065A	S-89-12A
BA	1.625 (41.28)	2.562 (65.07)	3.250 (82.55)
CB	.750 (19.05)	1.250 (31.75)	1.500 (38.10)
CD	.500 (12.70)	.750 (19.05)	1.000 (25.40)
DD	.406 (10.31)	.531 (13.49)	.656 (16.66)
E	2.500 (63.50)	3.500 (88.90)	4.500 (114.30)
F	.375 (9.53)	.625 (15.88)	.750 (19.05)
FL	1.125 (28.58)	1.875 (47.63)	2.250 (57.15)
LR	.750 (19.05)	1.250 (31.75)	1.500 (38.10)
M	.500 (12.70)	.750 (19.05)	1.000 (25.40)

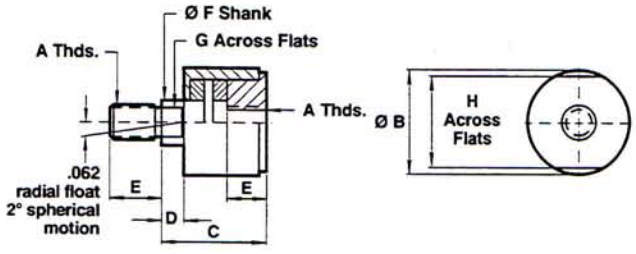
NFPA Pin 303 Stainless Steel



NFPA Pin Dimensions

	S-96-03A	S-96-065A	S-96-12A	S-96-16A
CD	.500 (12.70)	.750 (19.05)	1.000 (25.40)	1.375 (34.93)
LH	2.219 (56.36)	3.125 (79.38)	3.750 (95.25)	5.625 (144.88)
LP	1.875 (47.63)	2.750 (69.85)	3.250 (82.55)	4.375 (111.13)

Rod Alignment Coupler



NFPA Rod Alignment Coupler Dimensions

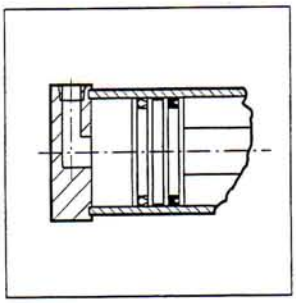
	SC-1-08	SC-1-12	SC-1-16
A	1/2 – 20	3/4 – 16	1-14
B	1.250 (31.75)	1.750 (44.45)	2.500 (63.50)
C	2.000 (50.80)	2.312 (58.72)	2.937 (74.60)
D	.500 (12.70)	.500 (12.70)	.500 (12.70)
E	.750 (19.05)	1.125 (25.58)	1.625 (41.28)
F	.625 (15.88)	.969 (24.61)	1.375 (34.93)
G	.500 (12.70)	.812 (20.62)	1.156 (29.36)
H	1.125 (28.58)	1.500 (38.10)	2.250 (57.15)
Maximum Pull (lbs.)	3,150	7,750	12,250

Made of 303 Stainless Steel, the Rod Alignment Coupler allows 1/16" of radial float and 2° of spherical movement. This prevents cylinder binding due to misalignment thus extending bearing and seal life, and permits greater tolerance between the center line of the cylinder and mating part for simplified installation.

Optional Features

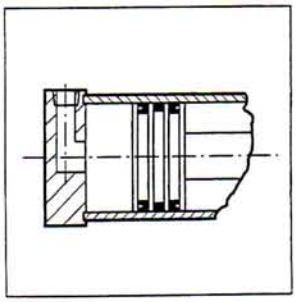
Air/Oil Piston Seal

Prevents leakage past the seal in air/oil applications. This added protection is accomplished by using one loaded lip-type piston seal.
TO ORDER: enter 3 in position 11 of the model number.



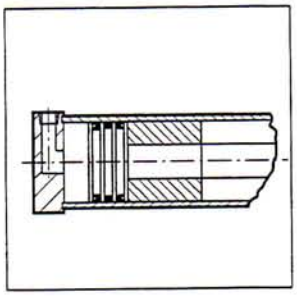
303 Stainless Steel Piston

When internal corrosion is a concern, specify the 303 Stainless Steel Piston.



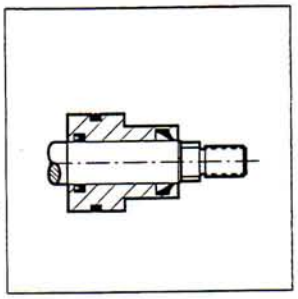
Stop Tube

Provides increased stability to long stroke cylinders.
TO ORDER: Indicate full working stroke in positions 3, 4 & 5 of the model number. Enter 98 in positions 12 & 13 of the model number and specify: 98 = _____inches of stop tube.



Metallic Rod Scraper

Aggressively scrapes foreign materials from the exposed portion of the piston rod during retract, thereby protecting the rod seal.
TO ORDER: enter 5 in position 11 of the model number.

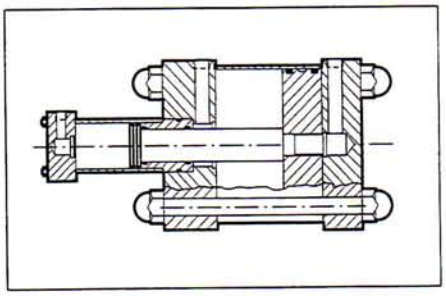


Optional features should be specified at the time of cylinder order. Enter 98 in positions 12 & 13 of the model number and specify: Example 98 = 303 stainless steel piston.

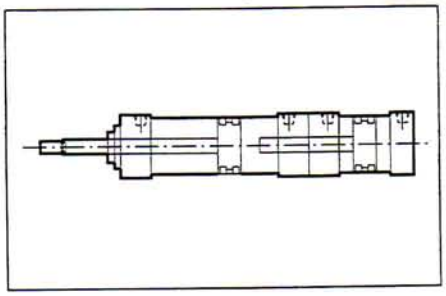
Custom Cylinders

- **Extra long cushions.**
- **Extremely low breakaway.**
- **High temperature.**
- **Stop tube.**
- **Spring extend/retract.**
- **Non-rotating rod.**
- **Oversized piston rods.**

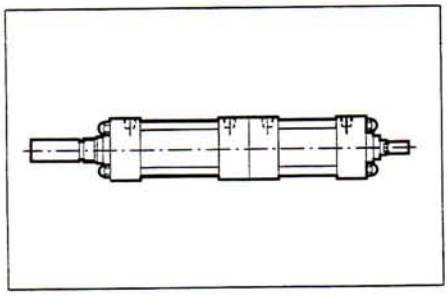
Air-to-Air Booster/Pump



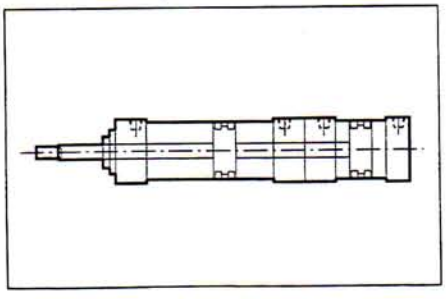
Multi-Position Duplex



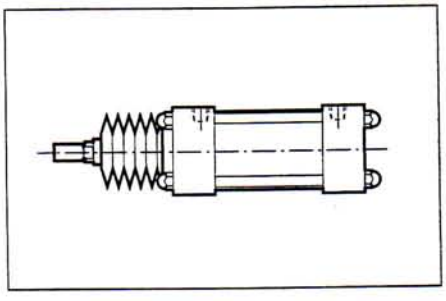
Multi-Position Back-to-Back



Force Multiplication Tandem



Protective Rod Boot



Norgren designs and manufactures literally hundreds of specialty cylinders. We welcome the opportunity to provide you with a customized cylinder that meets the specific requirements of your application. For more information on how to order custom cylinders consult factory.

Cylinder Order Information

S	C	0	4	J	-	A	0	1	-	A	A	6	0	0
1	2	3	4	5		6	7	8		9	10	11	12	13

S	Series SS
D	Series D

Single Rod End	Bore	Double Rod End
C	1 1/2"	Q
D	2"	R
E	2 1/2"	S
F	3 1/4"	T
G	4"	U
L	5"	Y
J	6"	W
M	8"	Z

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
XX	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
C	Full Dia. Thd.	K	Full Dia. Thd.
D	Female XX	M	Female XX
E	Studded	N	Studded
X	Special		

*On 1 1/2", 2" & 2 1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

Mounting Options			
01	Basic (MX0)	10	Head Square (ME3)*
02	Bottom Tap (MS4)	11	Cap Square (ME4)*
04	Front Flange (MF1)	15	Head Trunnion (MT1)
05	Rear Flange (MF2)	16	Cap Trunnion (MT2)
06	Cap Fixed Clevis (MP1)	XX	Special

*8" Bores only

Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Oversized*	E	G	H	J
Special	X			

†Standard position
*NFPA

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

No Options	00
Magnetic Piston Only**	90
Special▲	98

**See pages 34 & 35.
▲For any cylinder modifications not listed use "98" and please specify.

EXAMPLE: Series SS – 1 1/2" bore – 4 1/2" stroke – standard rod end – MX0 Basic mount – standard ports at position #1 – no cushions – Soft Touch Bumper Seal – no options.

IMPORTANT: When using X, XX, or 98 in a model number, please be specific! X = (Description).

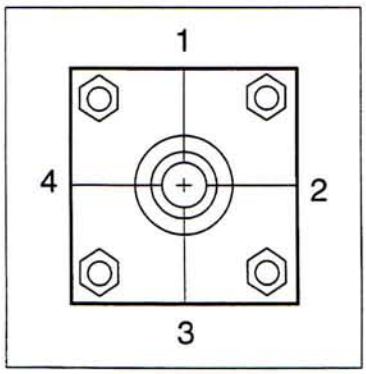
Reed & Hall Effect Switches

Available on all bore sizes – order separately. See pages 34 and 35 for specifications.

NOTE: Consult factory when using **competitive** position sensing devices.

Port and Cushion Needle Positions

(As viewed from rod end)



Superior operating performance in a 1-1/8" bore size!

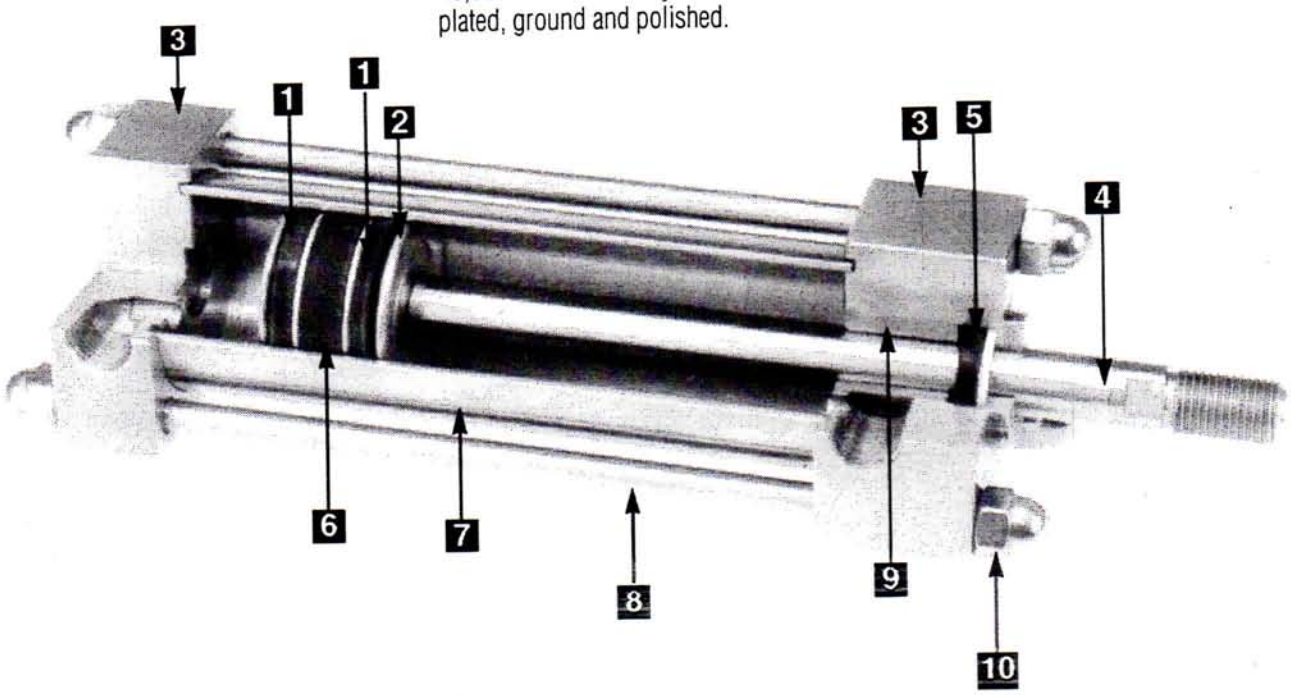
1 Piston Seals: Lip-type nitrile seals are pressure energized and wear compensating. Their excellent lubrication retention characteristics lower seal friction and ensure long life.

2 Piston: Solid aluminum alloy, light-weight for low inertia, yet strong.

3 Head/Cap: Precision machined from solid corrosion-resistant 304 stainless steel bar.

4 Piston Rods: 303 stainless steel, 40,000 PSI minimum yield, hard chrome plated, ground and polished.

5 Bearing Seal: Teflon® rod wiper provides positive wiping action and low friction. Lip-type nitrile seal is pressure energized and wear compensating for long life.



6 Wear Strip: Teflon® and graphite composition for minimum friction, maximum wear and side load resistance. (Magnetic band under wear strip optional.)

7 Tube: Corrosion-resistant 304 stainless steel.

8 Tie Rods: High-strength 303 stainless steel maintains compression on tube and seals.

9 Rod Bearing: Incorporates a sintered bronze rod bearing which is pressed into the cylinder head.

10 Acorn Nut: Tie rod threads are covered by stainless steel acorn nuts which eliminate another bacteria hiding place.

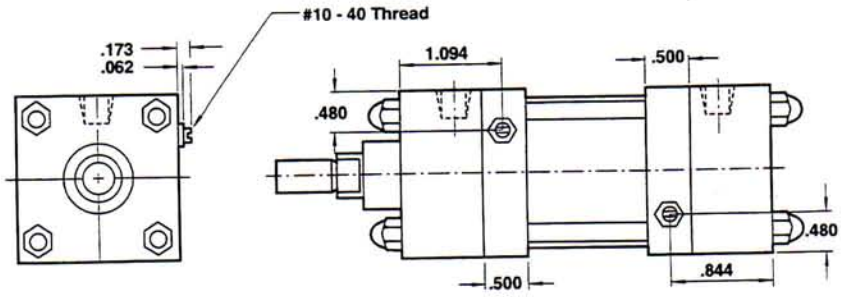
Optional Features

Norgren's state-of-the-art Ultra Cushion® design and Soft Touch Bumper Seal are also available on our 1⅛" bore. (See page 3.)

Cushions permit the trapping of cylinder exhaust volume prior to the completion of full rod extension or retraction. This volume is then metered through a finely tapered needle to deliver smooth, adjustable deceleration of the cylinder load.

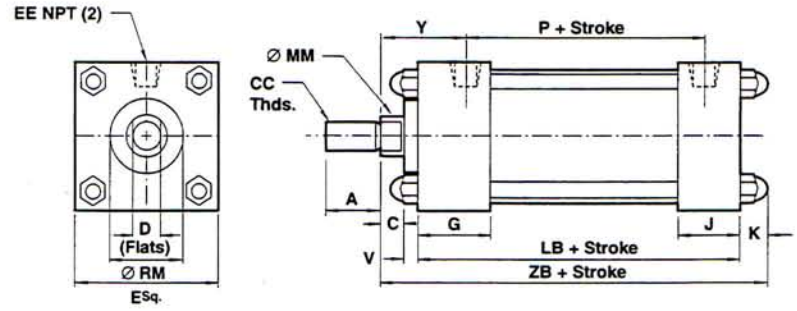
Note: Cushion block increases stroke related dimensions by .500 per end.

Cushions are not available on 1⅛" bore with 1/2" diameter rod.

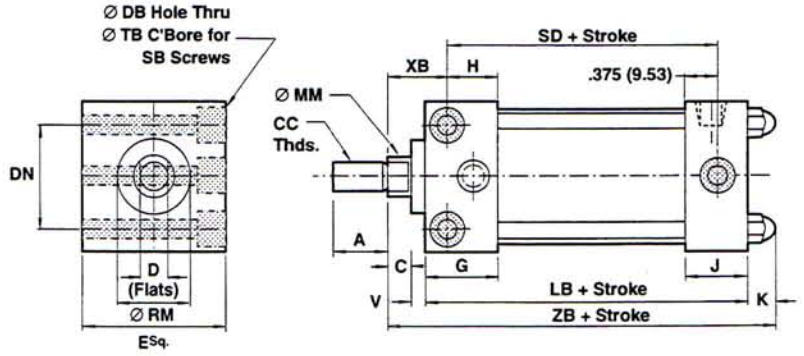


Cylinder with 01 (MX0) Basic
Cylinder with 03 (MS8) Bolt Thru
Cylinder with 04 (MF7) Front Flange
Cylinder with 05 (MF2) Rear Flange

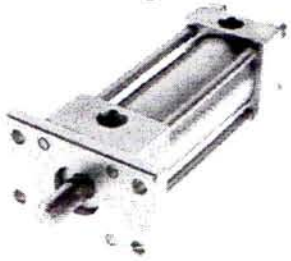
1-1/8" Cylinder with 01 (MX0) Basic

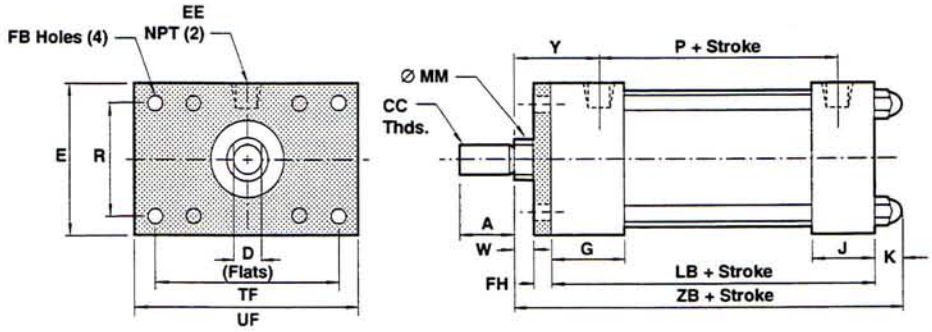


1-1/8" Cylinder with 03 (MS8) Bolt Thru

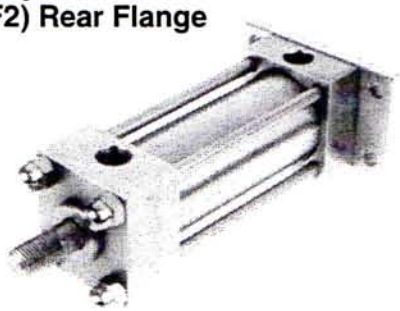


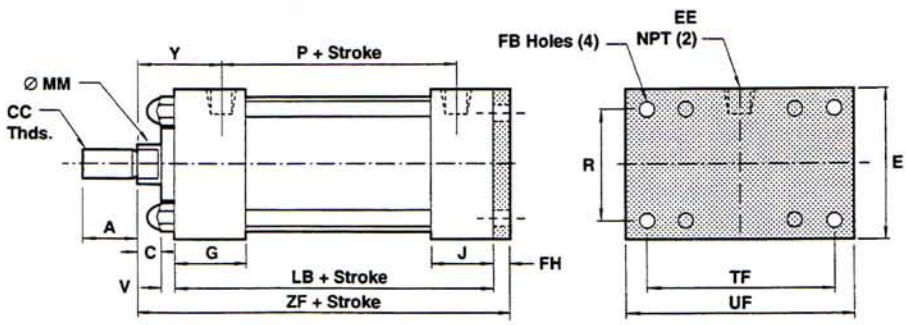
1-1/8" Cylinder with 04 (MF7) Front Flange





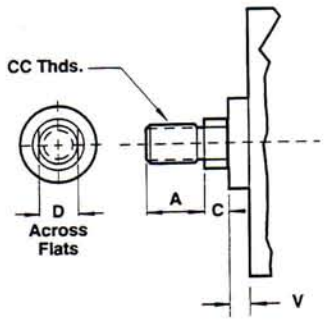
1-1/8" Cylinder with 05 (MF2) Rear Flange



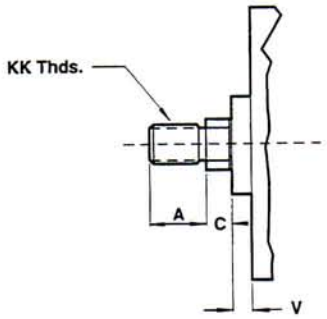


See page 33 for complete instructions on how to order cylinders.

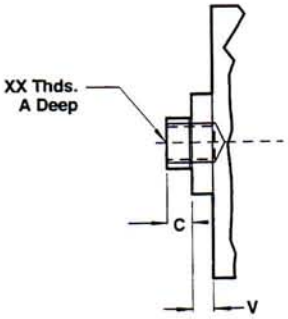
Standard & Optional Rod Ends



Style #1
(Standard Male)



Style #2
(Optional Male)

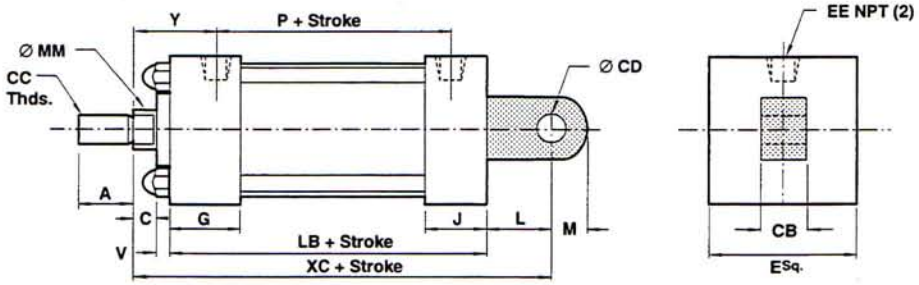


Style #3
(Optional Female)

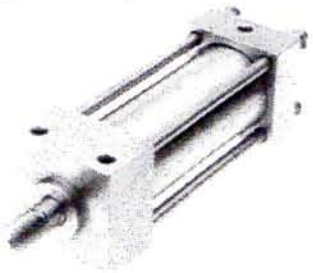
Dimension		Cylinder with 01 (MX0) Basic	Cylinder with 03 (MS8) Bolt Thru	Cylinder with 04 (MF7) Front Flange	Cylinder with 05 (MF2) Rear Flange
ø Rod	Std.	3/8" (9.53)	3/8" (9.53)	3/8" (9.53)	3/8" (9.53)
	O.S.	1/2" (12.70)	1/2" (12.70)	1/2" (12.70)	1/2" (12.70)
A	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.625 (15.88)
	O.S.	.750 (19.05)	.750 (19.05)	.750 (19.05)	.750 (19.05)
C		.250 (6.35)	.250 (6.35)	.250 (6.35)	.250 (6.35)
CC	Std.	3/8 - 24	3/8 - 24	3/8 - 24	3/8 - 24
	O.S.	1/2 - 20	1/2 - 20	1/2 - 20	1/2 - 20
D	Std.	.312 (7.92)	.312 (7.92)	.312 (7.92)	.312 (7.92)
	O.S.	.437 (11.10)	.437 (11.10)	.437 (11.10)	.437 (11.10)
DB		–	.203 (5.16)	–	–
DN		–	1.000 (25.40)	–	–
E		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)
EE		.125 (3.18)	.125 (3.18)	.125 (3.18)	.125 (3.18)
FB		–	–	.219 (5.56)	.219 (5.56)
FH		–	–	.250 (6.35)	.250 (6.35)
G		.875 (22.23)	.875 (22.23)	.875 (22.23)	.875 (22.23)
H		–	.625 (15.88)	–	–
J		.625 (15.88)	.625 (15.88)	.625 (15.88)	.625 (15.88)
K		.400 (10.16)	.400 (10.16)	.400 (10.16)	–
KK	Std.	5/16 - 24	5/16 - 24	5/16 - 24	5/16 - 24
	O.S.	7/16 - 20	7/16 - 20	7/16 - 20	7/16 - 20
LB		2.250 (57.15)	2.250 (57.15)	2.250 (57.15)	2.250 (57.15)
MM	Std.	.370 (9.40)	.370 (9.40)	.370 (9.40)	.370 (9.40)
	O.S.	.495 (12.57)	.495 (12.57)	.495 (12.57)	.495 (12.57)
P		1.375 (34.93)	–	1.375 (34.93)	1.375 (34.93)
R		–	–	1.000 (25.40)	1.000 (25.40)
RM	Std.	.750 (19.05)	.750 (19.05)	–	–
	O.S.	1.000 (25.40)	1.000 (25.40)	–	–
SB	Std.	–	#10	–	–
	O.S.	–	#10	–	–
SD		–	1.750 (44.45)	–	–
TB		–	.328 (8.33)	–	–
TF		–	–	2.000 (50.80)	2.000 (50.80)
UF		–	–	2.500 (63.50)	2.500 (63.50)
V		.125 (3.18)	125 (3.18)	.125 (3.18)	.125 (3.18)
W		–	–	.125 (3.18)	–
XB		–	.625 (15.88)	–	–
XX	Std.	1/4 - 28	1/4 - 28	1/4 - 28	1/4 - 28
	O.S.	3/8 - 24	3/8 - 24	3/8 - 24	3/8 - 24
Y		.938 (23.82)	–	.938 (23.82)	.938 (23.82)
ZB		2.625 (66.68)	2.625 (66.68)	2.625 (66.68)	–
ZF		–	–	–	2.875 (73.03)

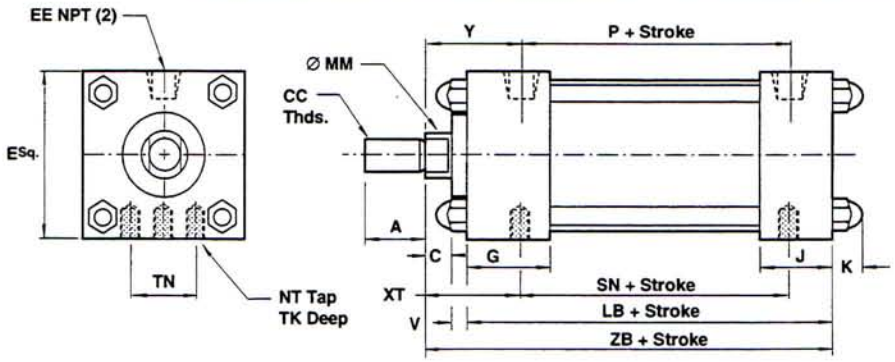
Cylinder with 17 (MP3) Fixed Eye
Cylinder with 22 (MS9) Side Tap
Cylinder with 30 (MR1) Head Face
Double Rod End Cylinder with 01 (MX0) Basic

1-1/8" Cylinder with 17 (MP3) Fixed Eye

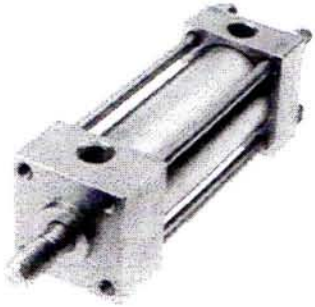


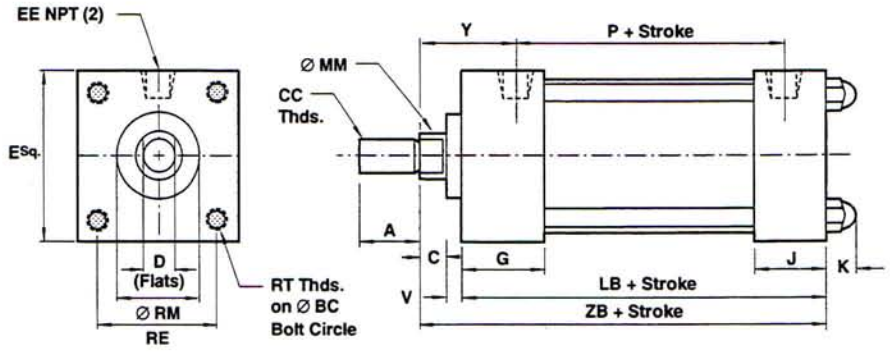
1-1/8" Cylinder with 22 (MS9) Side Tap



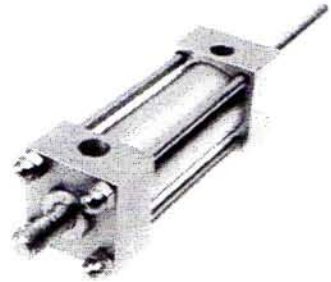


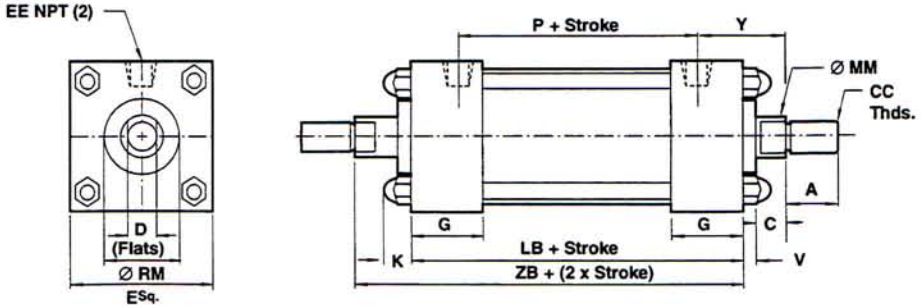
1-1/8" Cylinder with 30 (MR1) Head Face





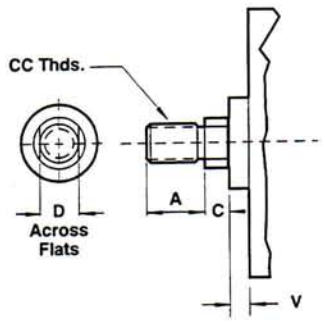
1-1/8" Double Rod End Cylinder with 01 (MX0) Basic



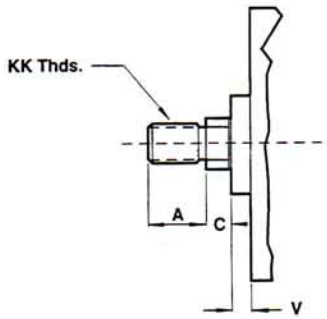


See page 33 for complete instructions on how to order cylinders.

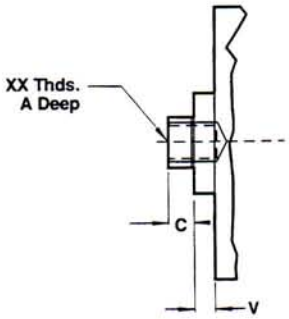
Standard & Optional Rod Ends



Style #1
(Standard Male)



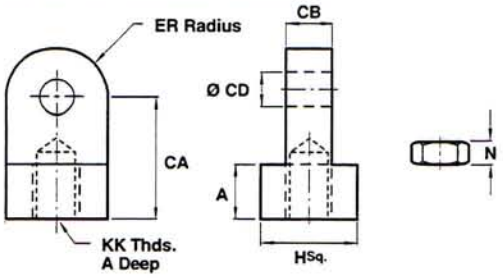
Style #2
(Optional Male)



Style #3
(Optional Female)

Dimension		Cylinder with 17 (MP3) Fixed Eye	Cylinder with 22 (MS9) Side Tap	Cylinder with 30 (MR1) Head Face	Double Rod End Cylinder with 01 (MX0)
ø Rod	Std.	3/8" (9.53)	3/8" (9.53)	3/8" (9.53)	3/8" (9.53)
	O.S.	1/2" (12.70)	1/2" (12.70)	1/2" (12.70)	1/2" (12.70)
A	Std.	.625 (15.88)	.625 (15.88)	.625 (15.88)	.625 (15.88)
	O.S.	.750 (19.05)	.750 (19.05)	.750 (19.05)	.750 (19.05)
BC		–	–	1.593 (40.46)	–
C		.250 (6.35)	.250 (6.35)	.250 (6.35)	.250 (6.35)
CB		.375 (9.53)	–	–	–
CC	Std.	3/8 - 24	3/8 - 24	3/8 - 24	3/8 - 24
	O.S.	1/2 - 20	1/2 - 20	1/2 - 20	1/2 - 20
CD		.375 (9.53)	–	–	–
D	Std.	.312 (7.92)	.312 (7.92)	.312 (7.92)	.312 (7.92)
	O.S.	.437 (11.10)	.437 (11.10)	.437 (11.10)	.437 (11.10)
E		1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)
EE		.125 (3.18)	.125 (3.18)	.125 (3.18)	.125 (3.18)
G		.875 (22.23)	.875 (22.23)	.875 (22.23)	.875 (22.23)
J		.625. (15.88)	.625 (15.88)	.625 (15.88)	.625 (15.88)
K		–	.400 (10.16)	.400 (10.16)	.400 – (10.16)
KK	Std.	5/16 - 24	5/16 - 24	5/16 - 24	5/16 - 24
	O.S.	7/16 - 20	7/16 - 20	7/16 - 20	7/16 - 20
L		.437 (11.10)	–	–	–
LB		2.250 (57.15)	2.250 (57.15)	2.250 (57.15)	2.250 (57.15)
M		.375 (9.53)	–	–	–
MM	Std.	.370 (9.40)	.370 (9.40)	.370 (9.40)	.370 (9.40)
	O.S.	.495 (12.57)	.495 (12.57)	.495 (12.57)	.495 (12.57)
NT		–	10 - 32	–	–
P		1.375 (34.93)	1.375 (34.93)	1.375 (34.93)	1.375 (34.93)
RE		–	–	1.125 (28.58)	–
RM	Std.	–	–	.750 (19.05)	.750 (19.05)
	O.S.	–	–	1.000 (25.40)	1.000 (25.40)
RT		–	–	10 - 32	–
SN		–	1.750 (44.45)	–	–
TK		–	.250 (6.35)	–	–
TN		–	1.000 (25.40)	–	–
V		.125 (3.18)	.125 (3.18)	.125 (3.18)	.125 (3.18)
XC		3.062 (77.77)	–	–	–
XT		–	.625 (15.88)	–	–
XX	Std.	1/4 - 28	1/4 - 28	1/4 - 28	1/4 - 28
	O.S.	3/8 - 24	3/8 - 24	3/8 - 24	3/8 - 24
Y		.938 (23.83)	.938 (23.83)	.938 (23.83)	.938 (23.83)
ZB		–	2.625 (66.68)	2.625 (66.68)	3.250 (82.55)

Rod Eye 303 Stainless Steel

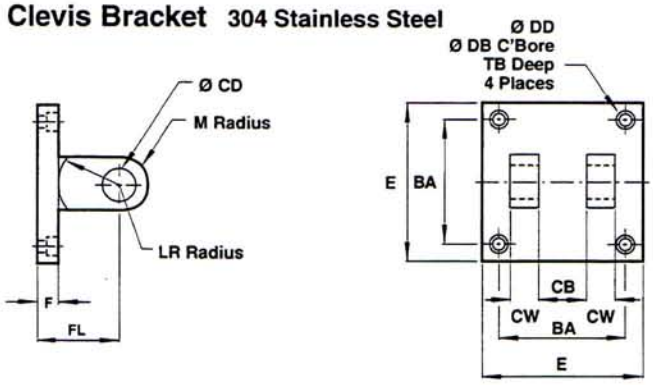


Rod Eye Dimensions

	S-97-225*	S-97-225A*
A	.437 (11.10)	.437 (11.10)
CA	.875 (22.23)	.875 (22.23)
CB	.375 (9.53)	.375 (9.53)
CD	.375 (9.53)	.375 (9.53)
ER	.375 (9.53)	.375 (9.53)
H	.750 (19.05)	.750 (19.05)
KK	3/8-24	1/2-20
N	.219 (5.56)	.312 (7.92)

*Includes Jam Nut

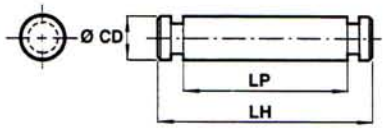
Clevis Bracket 304 Stainless Steel



Clevis Bracket Dimensions

	S-91-225
BA	1.125 (28.58)
CB	.375 (9.53)
CD	.375 (9.53)
CW	.250 (6.35)
DB	.328 (8.33)
DD	.203 (5.16)
E	.500 (12.70)
F	.500 (12.70)
FL	1.125 (28.58)
LR	.625 (15.88)
M	.375 (9.53)
TB	.312 (7.92)

Pivot Pin 303 Stainless Steel

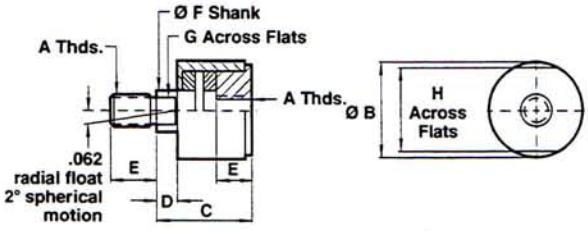


Pivot Pin Dimensions

	S-96-225A**
CD	.375 (9.53)
LH	1.250 (31.75)
LP	1.032 (26.21)

**Use with S-91-225, S-97-225

Rod Alignment Coupler



NFPA Rod Alignment Coupler Dimensions

	SC-1-06
A	3/8 – 24
B	.875 (22.23)
C	1.250 (31.75)
D	.250 (6.35)
E	.625 (15.88)
F	.375 (9.53)
G	.312 (7.92)
H	.750 (19.05)
Maximum Pull (lbs.)	1,375

Made of 303 Stainless Steel, the Rod Alignment Coupler allows 1/16" of radial float and 2° of spherical movement. This prevents cylinder binding due to misalignment thus extending bearing and seal life, and permits greater tolerance between the center line of the cylinder and mating part for simplified installation.

Cylinder Order Information

S	B	0	4	J	-	B	0	1	-	A	A	6	0	0
1	2	3	4	5		6	7	8		9	10	11	12	13

S	Series SS
D	Series D

Single Rod End	Bore	Double Rod End
B	1 1/8"	P

Full Inches in Strokes	
00	0" Stroke
01	1" Stroke
02	2" Stroke
03	3" Stroke
04	4" Stroke
05	5" Stroke
06	6" Stroke
. . .	. . .
99	99" Stroke
XX	Special

Fractional Increments of Stroke			
A	0"	J	1/2"
B	1/16"	K	9/16"
C	1/8"	M	5/8"
D	3/16"	N	11/16"
E	1/4"	P	3/4"
F	5/16"	R	13/16"
G	3/8"	S	7/8"
H	7/16"	T	15/16"
X	Special		

Rod Size & Style			
Standard		Oversized	
A	Male KK	H	Male KK
B	Male CC*	J	Male CC
D	Female XX	M	Female XX
X	Special		

*Standard Rod End 1 1/8" Bore (3/8 - 24)

Mounting Options			
01	Basic (MX0)	17	Fixed Eye (MP3)
03	Bolt Thru (MS8)	22	Side Tap (MS9)
04	Front Flange (MF7)	30	Head Face (MR1)
05	Rear Flange (MF2)	XX	Special

Ports				
Position	1†	2	3	4
Standard	A	B	C	D
Special	X			

†Standard position

Cushions				
Needle Position	1	2†	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Fixed	U			
Special	X			

†Standard position
Note: Cushions are not available on 1 1/8" bore with 1/2" diameter rod.

Optional Seals	
No Option	A
Viton Seals	1
Air/Oil Seal	3
Metallic Rod Scraper	5
Soft Touch	6
Special	X

No Options	00
Magnetic Piston Only**	90
Special^	98

**See pages 34 & 35.
^For any cylinder modifications not listed use "98" and please specify.

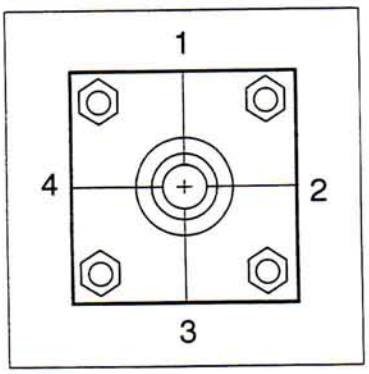
EXAMPLE: Series SS – 1 1/8" bore – 4 1/2" stroke – standard rod end – MX0 Basic mount – standard ports at position #1 – no cushions – Soft Touch Bumper Seal – no options.

IMPORTANT: When using X, XX, or 98 in a model number, please be specific! X = (Description).

Reed & Hall Effect Switches
Available on all bore sizes – order separately. See pages 34 and 35 for specifications.

NOTE: Consult factory when using **competitive** position sensing devices.

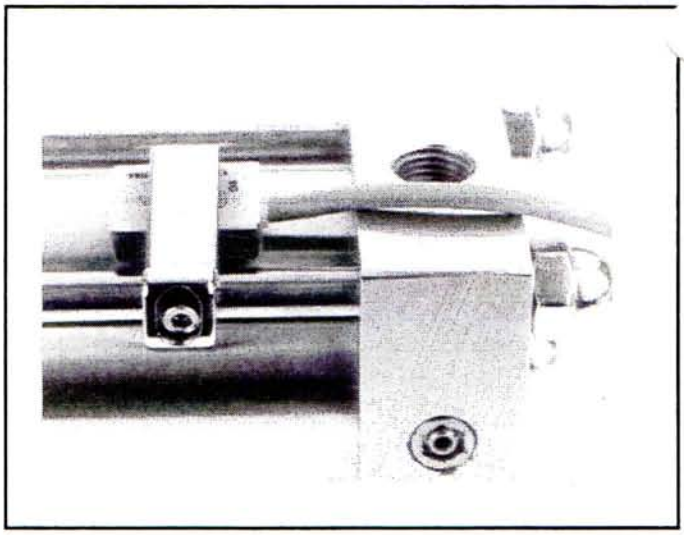
Port and Cushion Needle Positions
(As viewed from rod end)



Series SS Cylinders

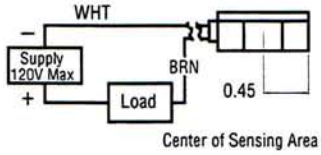
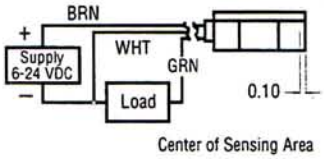
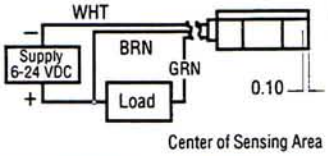
Switches for 1-1/8" to 2-1/2" Cylinders

- Magnetically operated, non-contact sensing system.
- Consists of a magnet in the piston, and a sensing switch clamped on the cylinder tie rod.
- One or more switches may be mounted to provide an indication of piston position.
- Switches are provided with vinyl molded cable.
- Adjustable mounting brackets allow for switches to be securely positioned anywhere along the range of piston travel.
- Indicator light facilitates installation and troubleshooting.
- Several switches may be mounted to control or initiate any sequence function.
- Mounting brackets standard with switches.



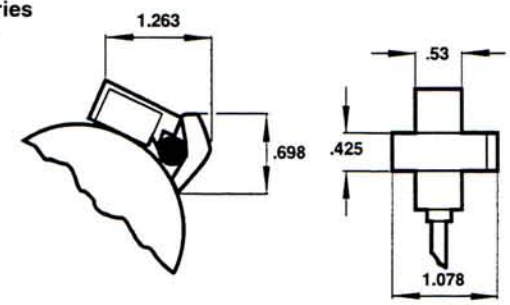
Specifications

*Metal Oxide Varsitor Surge Suppression. **NOTE:** All CS7 and CS8 Series Switches are supplied with 9 foot leads.

Switch Model	CS8-2-04 Reed	CS8-2-31 Hall	CS8-2-32 Hall
Bore Sizes	1⅛" thru 2½"	1⅛" thru 2½"	1⅛" thru 2½"
Switch Type	Reed Switch *MOV & Light	Hall Effect & Light, Sourcing PNP	Hall Effect & Light, Sinking NPN
Function	SPST Normally Open	Normally Open	Normally Open
Switching Voltage	5-120 VDC/VAC 50/60 Hz	6-24 VDC	6-24 VDC
Switching Current	.5 Amp Max .005 Amp Min	.5 Amp Max	.5 Amp Max
Switching Power	10 VA	12 Watts Max	12 Watts Max
Max Voltage Drop	3.5 Volts	.5 Volts	.5 Volts
Magnetic Sensitivity	85 Gauss	85 Gauss	85 Gauss
Enclosure Classification	NEMA 6 & CSA Approved	NEMA 6 & CSA Approved	NEMA 6 & CSA Approved
Temperature Range	-22°F to +176°F	-22°F to +176°F	-22°F to +176°F
Wiring Diagrams			

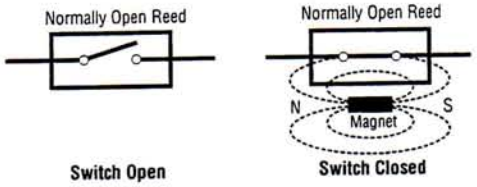
Switch & Mounting Bracket Dimensions

CS8-2 Series



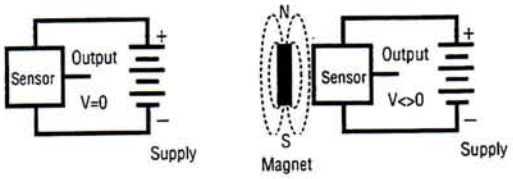
Reed Switch Working Principle

Reed switch sensors contain hermetically sealed reed elements (mechanical contacts) which are open in their normal state. When a magnetic field moves within proximity of the switch, magnetism is induced into the leads and forces the contacts to close.



Hall Effect/Magnetoresistive Working Principle

The solid state (no moving parts) magnetoresistive sensor responds to a north or south magnetic pole by providing a digital signal to the output control circuit. This technique enables the sensing of weak magnetic fields, with no limit to the maximum strength of the magnetic field.



Application Recommendations and Precautions

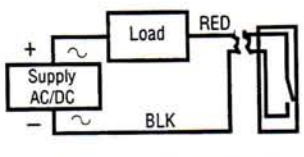
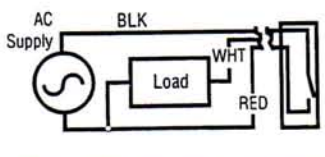
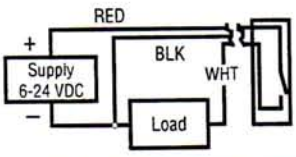
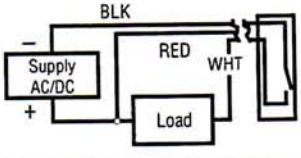
To provide maximum reliability.

1. Always stay within the specifications and power rating limitations of the unit installed.
2. Primary and control circuit wiring should not be mixed in the same conduit. Motors will produce high pulses that will be introduced into the control wiring if the wiring is carried in the same conduit.
3. Never connect the switch without a load present. The switch will be destroyed.
4. Some electrical loads may be capacitive. Capacitive loading may occur due to distributed capacity in cable runs over 25 feet. Use switch Model CS7-24 whenever capacitive loading may occur.

In order to obtain optimum performance and long life, magnetically operated limit switches should not be subjected to: (1) strong magnetic fields, (2) extreme temperature, and (3) excessive ferrous filing or chip buildup.

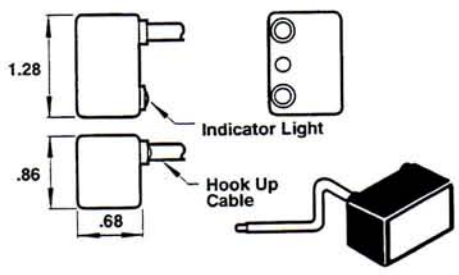
Improper wiring may damage or destroy the switch. The wiring diagram, along with the listed power ratings, must be carefully observed before connecting power to the switch.

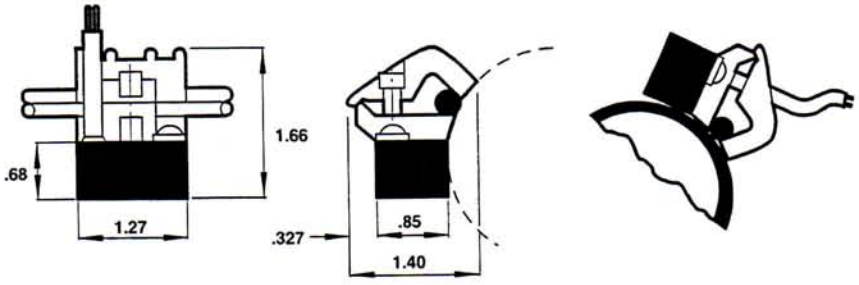
Lower power switches are designed for signaling electronic circuits. Do not use on relay loads or with incandescent bulbs. Resistive loads only.

CS7-04 Reed	CS7-24 Reed	CS7-31 Hall	CS7-32 Hall
2" thru 8"*	2" thru 8"*	2" thru 8"*	2" thru 8"*
Reed Switch *MOV & Light	Reed Switch *MOV & Light, 3 Wire	Hall Effect & Light, Sourcing PNP	Hall Effect & Light, Sinking NPN
Normally Open	Normally Open	Normally Open	Normally Open
5-240 VDC/VAC 50/60 Hz	24-240 VAC 50/60 Hz	6-24 VDC	6-24 VDC
1 Amp Max	4 Amp Max 50 Amp Inrush	1 Amp Max	1 Amp Max
30 Watts Max	100 Watts Max	24 Watts Max	24 Watts Max
3 Volts	N/A	.5 Volts	.5 Volts
85 Gauss Parallel	85 Gauss Parallel	85 Gauss Parallel	85 Gauss Parallel
NEMA 6 & CSA Approved	NEMA 6 & CSA Approved	NEMA 6 & CSA Approved	NEMA 6 & CSA Approved
-22°F to +176°F	-22°F to +176°F	-22°F to +176°F	-22°F to +176°F
			

*Note: for 8" bore add 9 to part number. Example: CS7-9-04

CS7 Series





WARNING

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under **Technical Information.**

Before using these products with fluids other than those specified, for nonindustrial applications, life-support systems, or other applications not within published specifications, consult NORGREN.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes. The system designer is warned to consider the failure modes of all component parts used in fluid power systems and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure modes. **System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided.**

System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with these products. System designers should also provide for all OSHA requirements including Title 29 CFR 1910.147 Lockout/Tagout.

It should be recognized that warnings are valid for any product, regardless of manufacturer, and are not restricted to products manufactured by NORGREN. NORGREN's reputation for product quality and performance is well established. We feel we have the additional obligation to provide information or warnings to customers to assist them in applying our products in a reasonable and safe manner.

WARRANTY

Limited Warranty, Disclaimer & Limitation of Remedies

Items sold by NORGREN are warranted to be free from defects in materials and workmanship for a period of two years from the date of manufacture, provided said items are used according to NORGREN's recommended usages. NORGREN's liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of, at NORGREN's sole option, any items proved defective, provided the allegedly defective items are returned to NORGREN prepaid. The warranties expressed above are in lieu of and exclusive of all other warranties.

There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability or fitness for a particular purpose, which are specifically disclaimed. NORGREN's liability for breach of warranty as herein stated is the exclusive remedy, and in no event shall NORGREN be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages has been made known to NORGREN.

NORGREN reserves the right to discontinue manufacture of any product or change product materials, design, or specifications without notice.

ISO-9001

DNV

CERTIFICATED FIRM

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Certificate No. OSC-4385

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Valves

Fittings

Air Line

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