

To boldly go where no cylinder has gone before ...



- ☑ N.F.P.A. Interchangeable.
- ☑ Heavy Duty Air Cylinders
- ☑ Flush Mount standard.
- ☑ 11 Bore sizes From 1.5" through 12"
- ☑ Strokes - available to any practical length
- ☑ 18 standard Mounting Styles
- ☑ Adjustable Air Cushion Standard
- ☑ 250 PSI AIR/OIL
- ☑ Two Year Warranty
- ☑ Economic Design

# STAR3 SERIES

[WWW.STARCYL.COM](http://WWW.STARCYL.COM)





# STAR3 CYLINDERS

## Light But Made For Heavy Duty Air Cylinder !

### Piston Rod

High Strength steel. STARNITE (R0) (Nitro-carburation) treatment on the rod gives better corrosion-resistant properties (out performs 12-micron, (.0005 in.) chromium electroplating by ratio up to 20:1.), Improved wear resistance, better lubrication retention, dent resistance without induction hardening (60Rc), environmentally friendly, no surface pitting, flaking, or hydrogen embrittlement. The finish created by the process is a lustrous black. (Available in Chromed Steel (R1) and Chromed Stainless Steel (S1))

### Tie rods

Corrosion resistant STARNITE (Nitro-carburation), stress proof steel maintains uniform compression on tube end seals. (Available in Stainless Steel)

### Solid Aluminum Head & Cap

Machined from solid aluminum bar stock (6061 T6) and black anodized for corrosion resistance. (Available in Stainless Steel)

### The New STARNITE Cast Iron

This bushing has been designed for tough application with side load. The STARNITE Technology improves bearing resistance against wear with an hardened Layer on both parts.

### Hard Anodized ID Aluminum Tube

(60 Rc) Provides superior wear resistance, and lower friction coefficient for maximum seal life. (Available in Stainless Steel)

### Piston

Machined from solid aluminum bar stock (6061-T6) Offers long bearing support

### Cushion Spud

Machined from Steel and STARNITE for hardness and corrosion resistance, to ensure min wear and constant dampening of the piston thru time.

### Check seal Cushion and Needle valves

Precision Cushion spuds combine with a new style of floating cushion seal provide smooth deceleration at end of the stroke. Needle valves make adjustments easy. (brass or stainless steel)

### O-ring Tube End Seals

Nitrile O-ring design is pressure compensating and reusable.

### Rod Gland

Starnite Cast iron gland is externally removable without cylinder disassembly for easy maintenance. Designed to provide maximum rod bearing. (Also available in White Acetal, Bronze)

### Wiper

The New Wiper wipes dirt out for less maintenance and longer life of the cylinder. (Urethane) (temperature: -50° to 230°F)

### Rod lips seal

Our New Design with a real rod u-cup is completely self compensating for zero leakage at all pressures (all seals can be used in a non lube application) (temperature: -50° to 230°F)

### Piston Seal

Lip-type low friction urethane piston seals are pressure energized and wear compensating for low friction and long life (temperature: -50° to 230°F) (Fluorocarbon also Available up to 400°F) (all seals can be used in a non lube application)

### Piston Wear Ring

Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

\*All Blue seals can withstand most chemical wash down, No Fluorocarbon Required

# STAR3 CYLINDERS

## STARNITE

THE ANSWER TO WEAR, CORROSION AND FATIGUE PROBLEMS

The STARNITE process improves component properties.

High wear resistance, as well as excellent sliding and running properties, is obtained through STARNITE treatment. The service life of cylinders parts is extended. The finish created by the STARNITE process is a lustrous black.

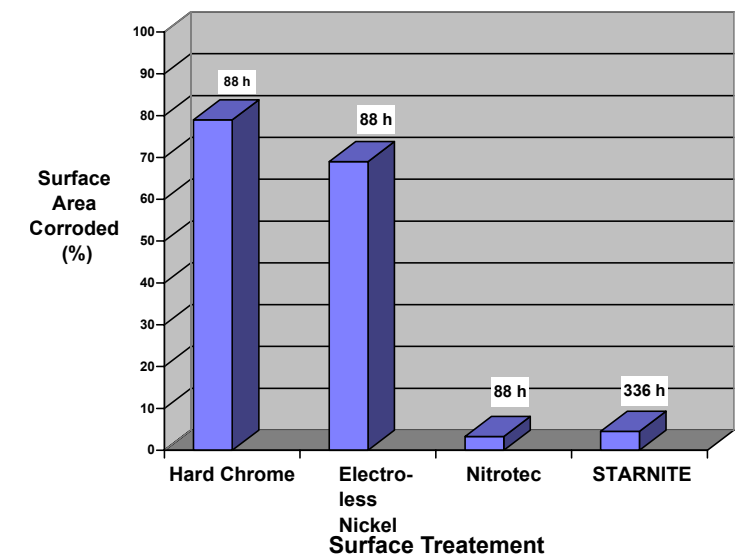
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitrite layer consisting of a mono-phase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating time. Hardness in the compound layer ranges from approximately HV 700 (60 Rc) to about HV 1600 for high alloyed tools steel. As part of the salt-bath nitriding and QPQP (Quench-Polish & Quench & Polish) sequence, finish-machine parts are polished and chemically processed to produce a highly corrosion-resistant surface with a finish suitable for bearing or seal-type applications.

## ENVIRONMENTALLY & ECONOMICALLY SAFE

Great concern exists in North America community regarding many critical materials because of North America's reliance on metals that are not native to this continent. Some 91% of the chromium used here is imported (9% balance from recycling). STARNITE process provides at least a partial solution to this problem and because it is not a plating or a coating but in the steel itself the process offers superior performance.

Corrosion resistance developed by the STARNITE technique out performs 12-micron (.0005 in.) chromium electroplating by ratio up to 20:1, and 20 micron (.0008 in.) nickel plating by a factor of 8:1.

Corrosion Resistance Evaluation  
Test conditions; Spool Shaft, ASTM B-117,  
(88h) test hours



## Chrome plated VS STARNITE

Chromed plated cylinders	STARNITE Process on cylinders
<ul style="list-style-type: none"> <li>• Chrome plate can flake and blister.</li> <li>• Flakes and slivers will destroy seals and glands.</li> <li>• Loose chrome will cause massive leaking and rapid system failure.</li> <li>• Chrome lacks dimensional uniformity.</li> </ul>	<ul style="list-style-type: none"> <li>• Superior corrosion resistance.</li> <li>• Improved wear resistance.</li> <li>• Better lubrication retention.</li> <li>• Dent resistance without induction hardening.</li> <li>• Environmentally Friendly</li> <li>• No surface pitting, flaking, or hydrogen embrittlement.</li> <li>• INCREASED SERVICE LIFE.</li> </ul>



### STARCYL CYLINDER CORP

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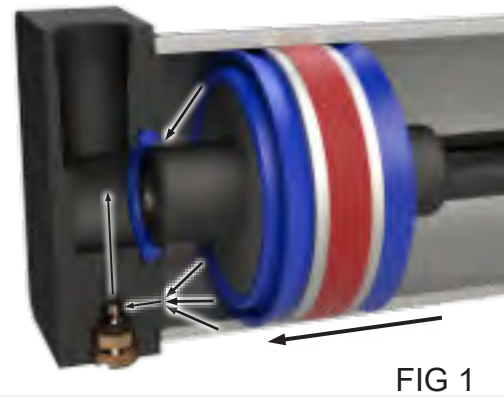


FIG 1

**Piston Bumper Seals - (Blue Hythane)**  
Option : -PBS in the Piston Seals selection

The cushioning process begins when the Cushion piston (Spud) enters the dynamic sealing lips (Fig 1.). The seal moves to the back of the groove creating a seal on the inside diameter and on the back of the cushion seal. The exhaust port is closed by the cushion seal. Pressure increases between the piston and the cushion seal due to the movement of the piston toward the end of the cylinder. Cushioning is adjusted by controlling the flow through a throttle port which is regulated by the needle valve.

In addition the Starcyl IMPACT REDUCTION PISTON design includes special lip seals u-cup containing a dampening ring (bumper) which absorbs the remaining kinetic shock vibration and noise created by the impact (Fig. 2) giving a softer and quieter impact. With this design the cycle time can be increased by opening the needle valve of the air cushioning and let the bumpers absorb the rest. The Option NAC "non adjustable cushion" can be also ordered which reduces the restriction of the needle valve.

The return pressure moves the cushion axially (Fig. 3) until the stop cams reach the front of the groove. The pressure is allowed to by-pass the outside diameter of the seal to allow constant acceleration. In the same time, the Bumper seal releases its compression energy to propel the piston away from the end cap, producing an immediate breakaway.

The spud on the other end of the piston enters the cushion seal on the head end and then the process starts over again.

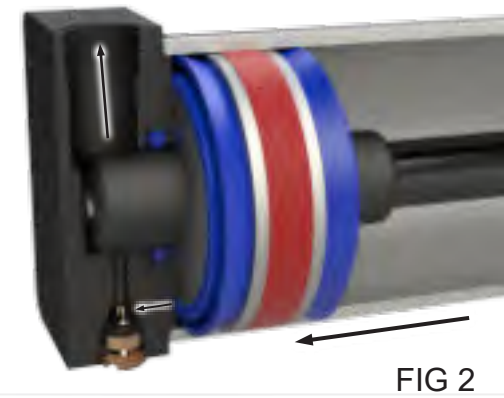


FIG 2

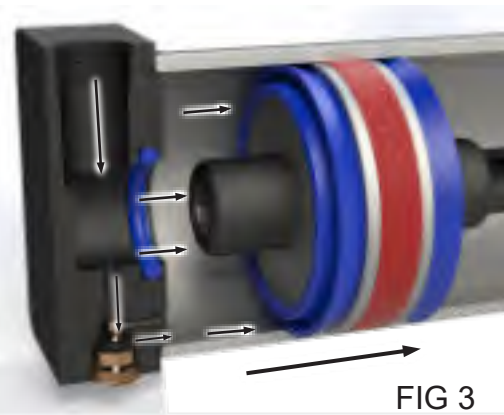


FIG 3

**Effect and Availability of Bumper Seal option**

Effect on Stroke based on Pressure	CYLINDERS BORE							
	1.5	2.0	2.5	3.25	4.0	5.0	6.0	8.0
0	0.14	0.15	0.17	0.19	0.22	0.25	0.25	0.25
20	0.10	0.10	0.12	0.14	0.16	0.18	0.18	0.18
40	0.07	0.07	0.08	0.09	0.10	0.12	0.12	0.12
60	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.07
80	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## SELECTING BORE SIZE

The following formula may be used in the selection of the proper bore size:

- Extended (push) force in pounds =  
(bore area in sq. in.) x (pressure in psi)

- Retract (pull) force in pounds =  
(bore area in sq. In.) - (Rod area in sq. In.) x (pressure in psi)

Example: 3¼ bore, standard rod size 1" & shop air pressure of 90 psi

Push force: 8.296 (sq. in.) x 90 (pound / sq. In.) = 746.64 pounds

Pull force: 8.296 (sq. In.) - 0.785 (sq. In.) x 90 (pound / sq. In.) = 675 pounds

BORE (IN.)	AREA (SQ. IN.)	ROD SIZE (IN.)	ROD AREA (SQ. IN.)
1.50	1.76	5/8	0.307
2.00	3.14	5/8	0.307
2.50	4.90	5/8	0.307
3.25	8.29	1	0.785
4.00	12.56	1	0.785
5.00	19.64	1	0.785
6.00	28.27	1 3/8	1.485
7.00	38.48	1 3/8	1.485
8.00	50.26	1 3/8	1.485
10.00	78.54	1 3/4	2.405
12.00	113.10	2	3.14
14.00	153.90	2 1/2	4.90



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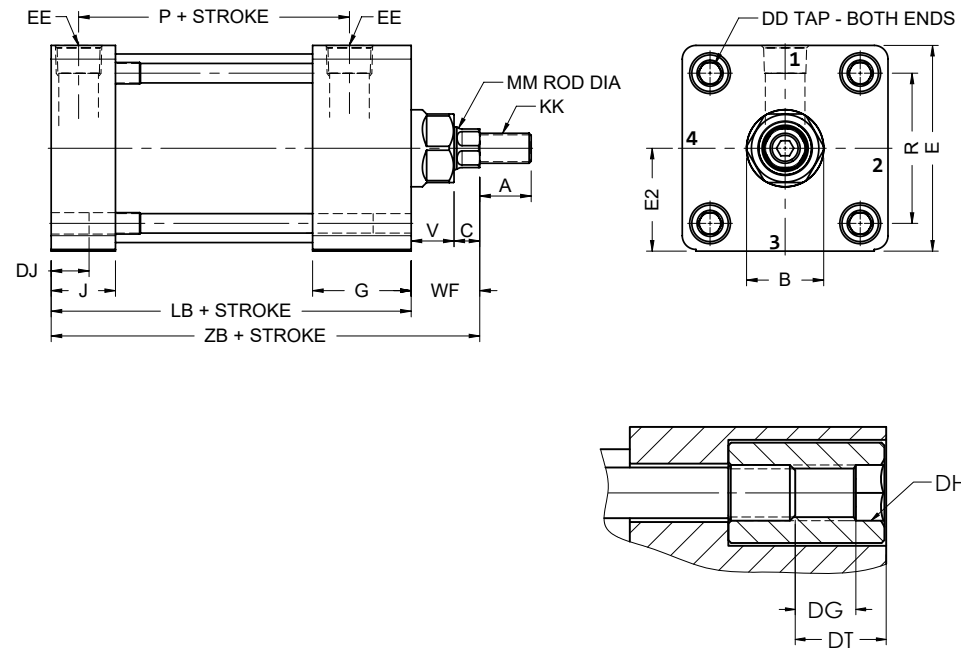
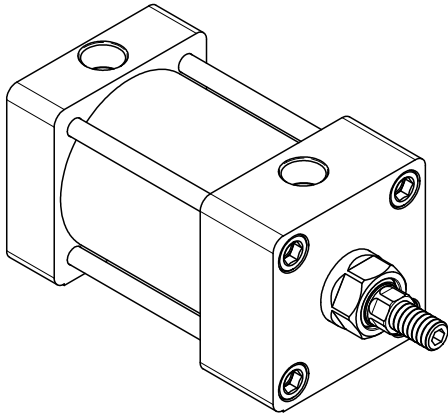
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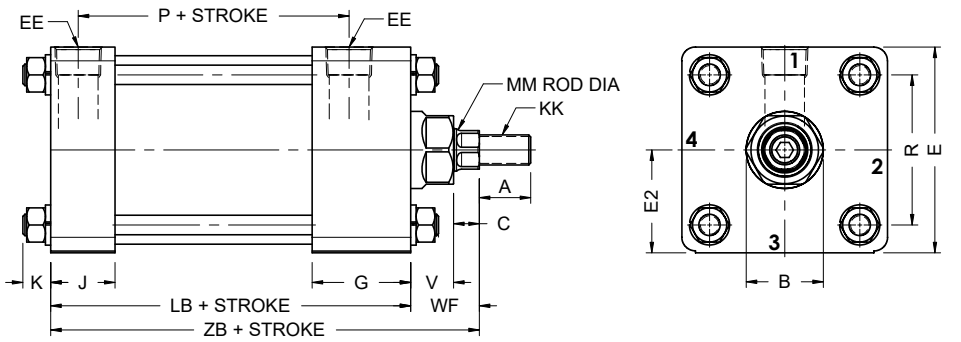
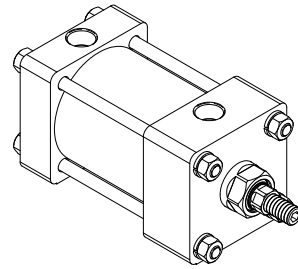
# STAR3 CYLINDERS

FACE & SIDE MOUNT  
MX0 - MX5 - MS4

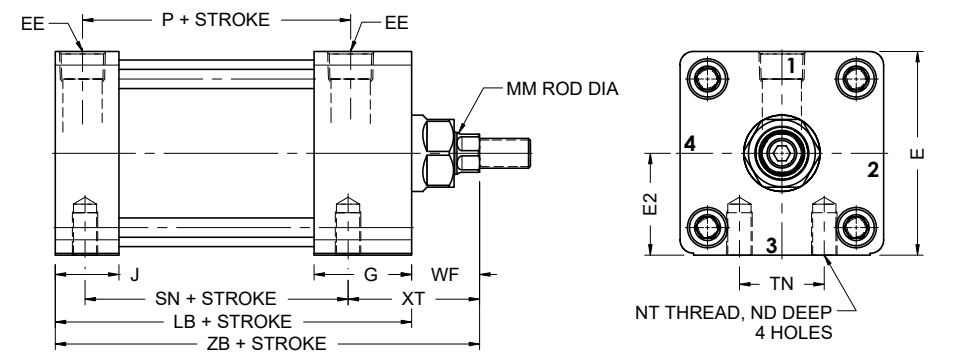
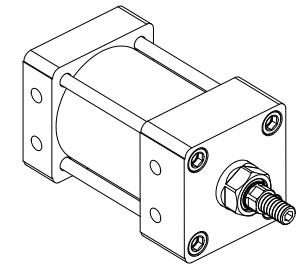
ST3X5 - Flush Mount - Standard  
NFPA MX5



ST3X0 - No Mount  
NFPA MX0

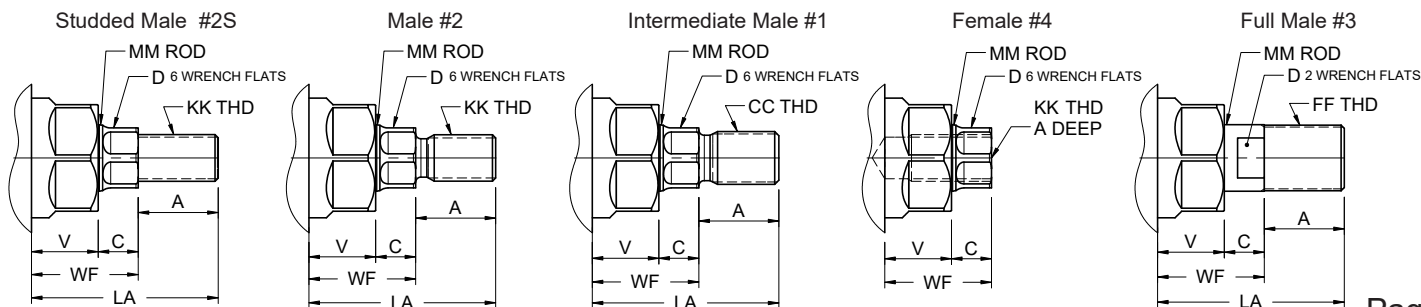


ST3S4 - Bottom Tap Mount  
NFPA MS4



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	DD	DH HEX	DT	DG	DJ	E	E2 +/- .002	EE NPTF	G	J	K	R	NT	TN	ND	ADD STROKE		
																LB	P	SN
1.5	1/4-28	1/4	0.50	13/32	7/16	2	1.000	3/8	1 7/16	15/16	1/4	1.43	1/4-20	5/8	3/8	3 5/8	2 21/64	2 1/4
2.0	5/16-24	5/16	0.50	7/16	7/16	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	5/16/18	7/8	1/2	3 5/8	2 21/64	2 1/4
2.5	5/16-24	5/16	0.50	7/16	7/16	3	1.500	3/8	1 7/16	15/16	5/16	2.19	3/8-16	1 1/4	5/8	3 3/4	2 29/64	2 3/8
3.25	3/8-24	3/8	0.63	9/16	9/16	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1/2-13	1 1/2	3/4	4 1/4	2 21/32	2 5/8
4.0	3/8-24	3/8	0.63	9/16	9/16	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1/2-13	2 1/16	3/4	4 1/4	2 21/32	2 5/8
5.0	1/2-20	1/2	0.75	19/32	19/32	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	5/8-11	2 11/16	1	4 1/2	2 29/32	2 7/8
6.0	1/2-20	1/2	0.75	13/32	19/32	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	3/4-10	3 1/4	1 1/8	5	3 3/32	3 1/8

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE	
											XT	ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	6 1/8
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 13/16	6 5/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	3 1/16	6 7/8



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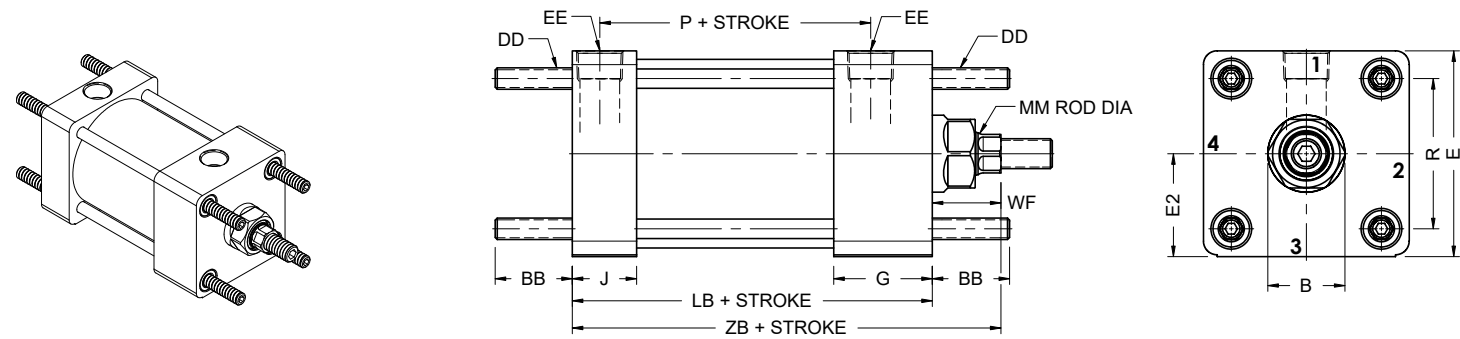
# STAR3 CYLINDERS

TIE ROD EXTEND MOUNT  
MX1 - MX2 - MX3

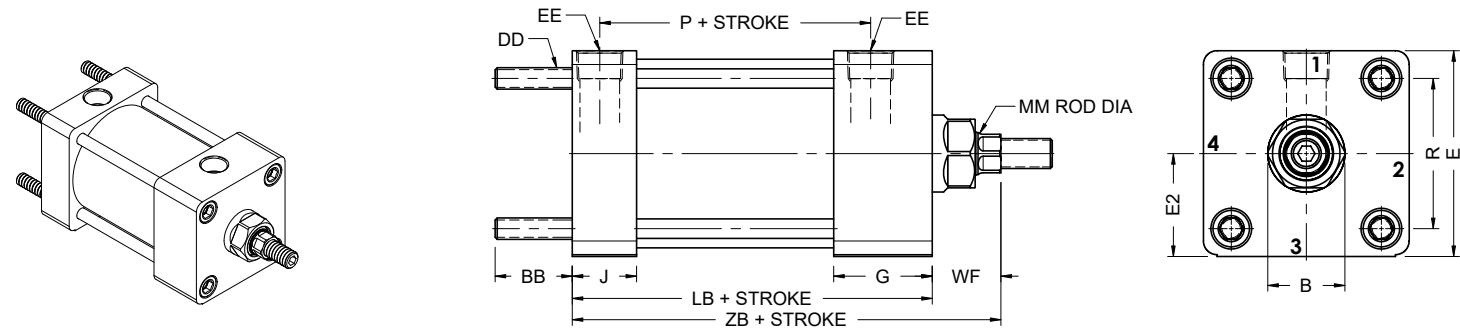
# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

## ST3X1 - Tie Rods Extended Both Ends NFFA MX1



## ST3X2 - Tie Rods Extended Cap Mount NFFA MX2



## ST3X3 - Tie Rods Extended Head Mount NFFA MX3

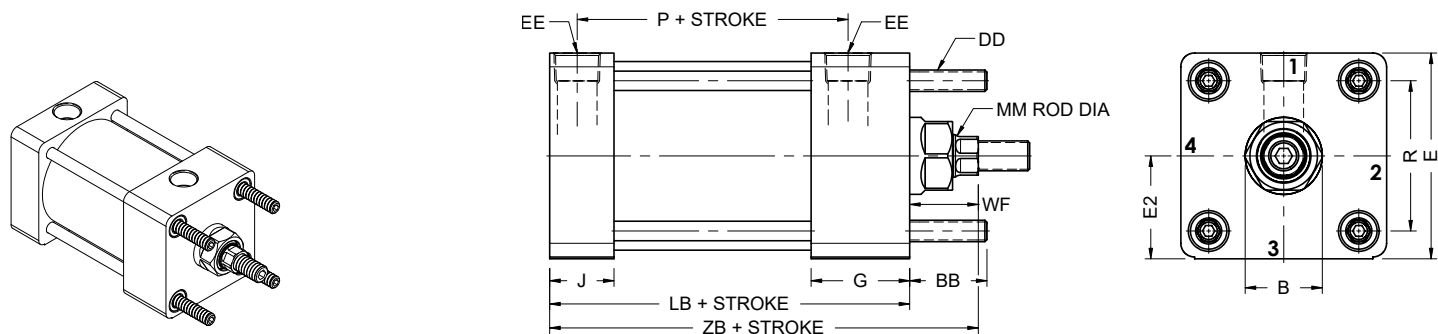


Table 1 - Envelope and Mounting Dimensions

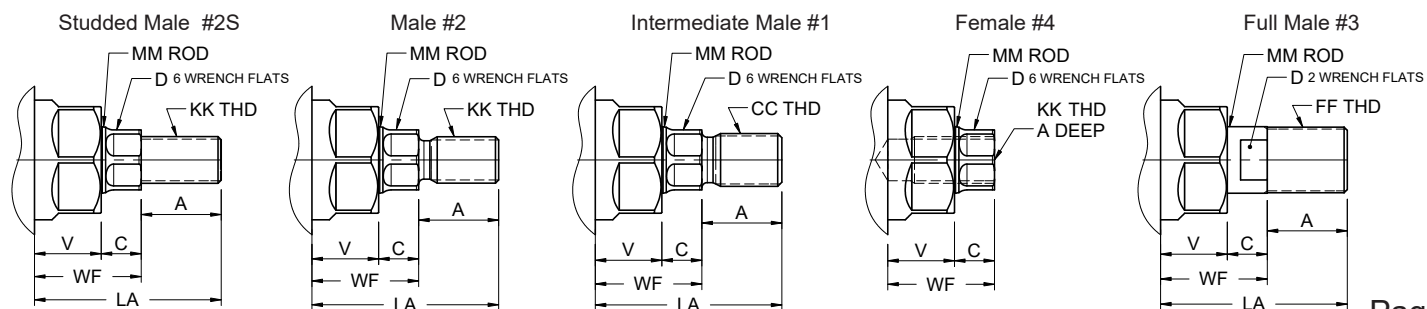
BORE	BB	DD	E	E2 +/- .002	EE NPTF	G	J	K	R	NT	TN	TK	ADD STROKE	
													LB	P
1.5	1	1/4-28	2	1.000	3/8	1 7/16	15/16	1/4	1.43	1/4-20	5/8	3/8	3 5/8	2 21/64
2.0	1 1/8	5/16-24	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	5/16-18	7/8	1/2	3 5/8	2 21/64
2.5	1 1/8	5/16-24	3	1.500	3/8	1 7/16	15/16	5/16	2.19	3/8-16	1 1/4	5/8	3 3/4	2 29/64
3.25	1 3/8	3/8-24	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1/2-13	1 1/2	3/4	4 1/4	2 21/32
4.0	1 3/8	3/8-24	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1/2-13	2 1/16	3/4	4 1/4	2 21/32
5.0	1 13/16	1/2-20	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	5/8-11	2 11/16	1	4 1/2	2 29/32
6.0	1 13/16	1/2-20	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	3/4-10	3 1/4	1 1/8	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	Add Stroke
											ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	6 1/8
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	6 5/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	6 7/8

## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



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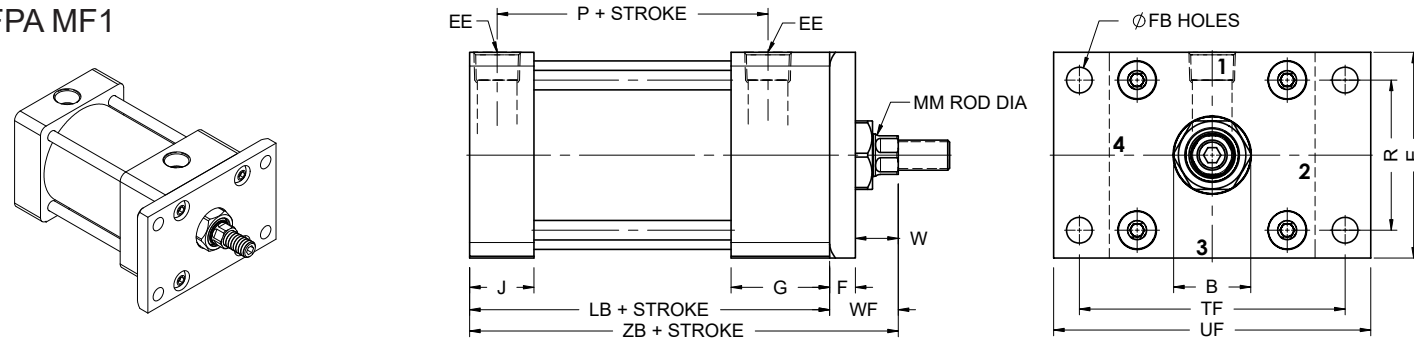
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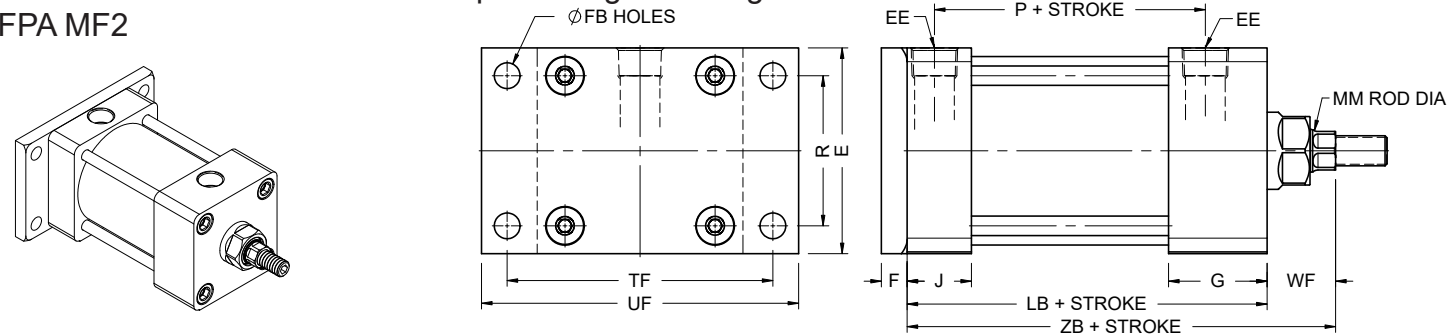
# STAR3 CYLINDERS

FLANGE MOUNT  
MF1 - MF2

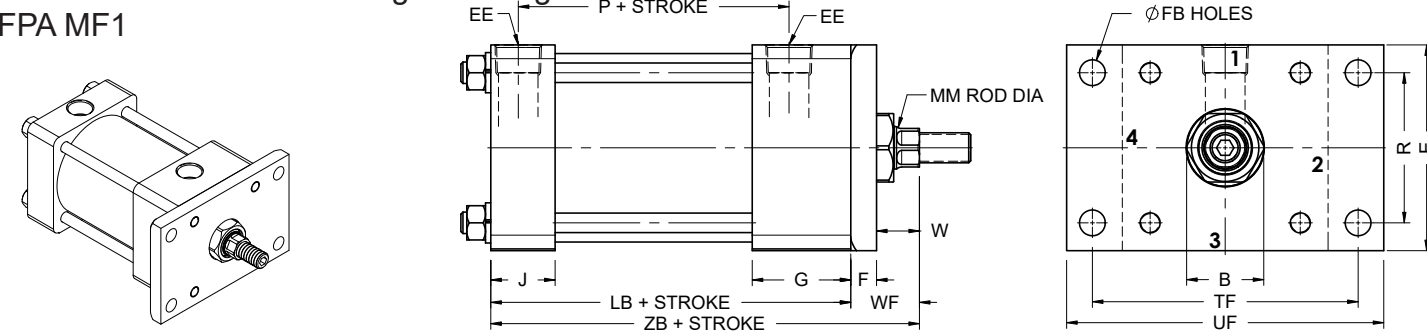
## ST3F1 - Detachable Aluminum Head Rectangular Flange NFFPA MF1



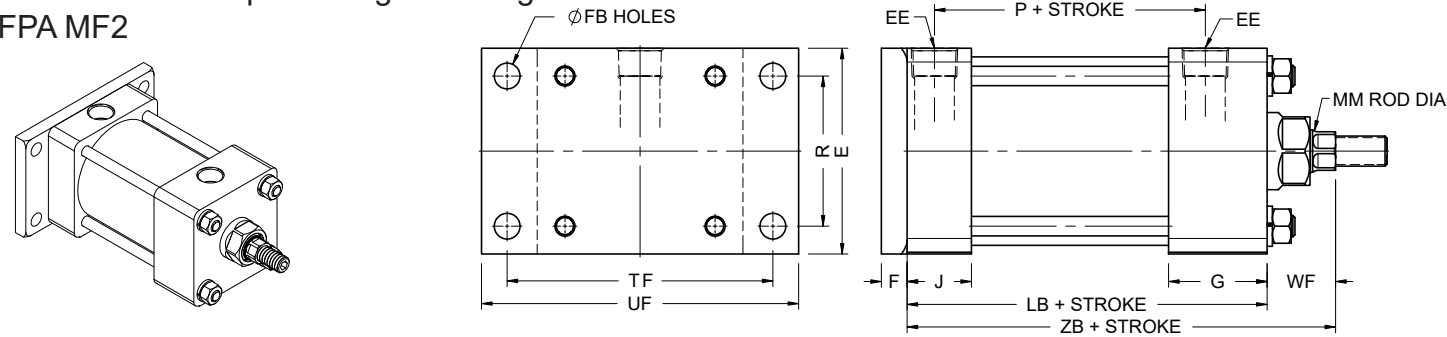
## ST3F2 - Detachable Aluminum Cap Rectangular Flange NFFPA MF2



## ST3F1X - Steel Head Rectangular Flange NFFPA MF1

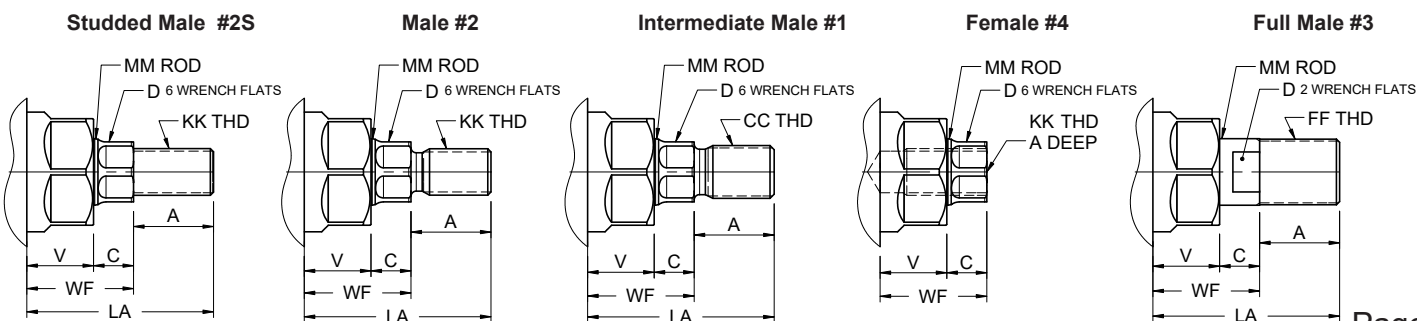


## ST3F2X - Steel Cap Rectangular Flange NFFPA MF2



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	F	FB	G	J	K	R	TF	UF	ADD STROKE	
												LB	P
1.5	2	1.000	3/8	3/8	5/16	1 7/16	15/16	1/4	1.43	2 3/4	3 3/8	3 5/8	2 21/64
2.0	2 1/2	1.250	3/8	3/8	3/8	1 7/16	15/16	5/16	1.84	3 3/8	4 1/8	3 5/8	2 21/64
2.5	3	1.500	3/8	3/8	3/8	1 7/16	15/16	5/16	2.19	3 7/8	4 5/8	3 3/4	2 29/64
3.25	3 3/4	1.875	1/2	5/8	7/16	1 11/16	1 3/16	3/8	2.76	4 11/16	5 1/2	4 1/4	2 21/32
4.0	4 1/2	2.250	1/2	5/8	7/16	1 11/16	1 3/16	3/8	3.32	5 7/16	6 1/4	4 1/4	2 21/32
5.0	5 1/2	2.750	1/2	5/8	9/16	1 11/16	1 3/16	7/16	4.10	6 5/8	7 5/8	4 1/2	2 29/32
6.0	6 1/2	3.250	3/4	3/4	9/16	1 15/16	1 7/16	7/16	4.88	7 5/8	8 5/8	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	W	WF	ADD STROKE	
												ZF	ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	1/4	5/8	1	5	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/2	1	1 3/8	5 3/8	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	1/4	5/8	1	5	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/2	1	1 3/8	5 3/8	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	1/4	5/8	1	5 1/8	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/2	1	1 3/8	5 1/2	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/4	5/8	1 3/8	6 1/4	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	3/8	1	1 5/8	6 1/2	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/4	5/8	1 3/8	6 1/4	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	3/8	1	1 5/8	6 1/2	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	1/4	3/4	1 3/8	6 1/2	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	3/8	1	1 5/8	7	6 1/8
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1/4	7/8	1 5/8	7 3/8	6 5/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	3/8	1 1/8	1 7/8	7 5/8	6 7/8



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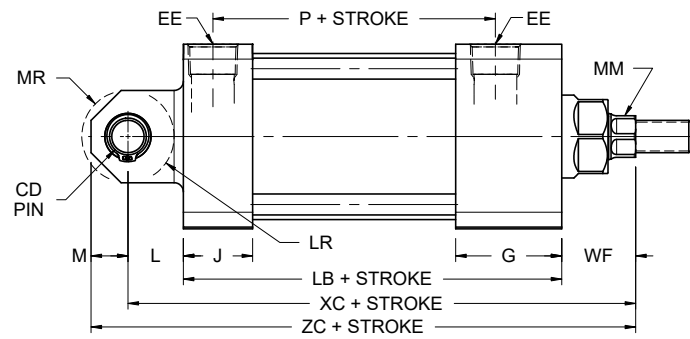
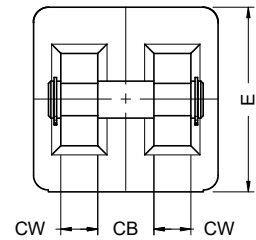
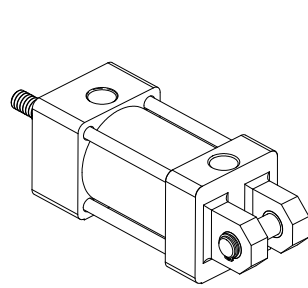
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# STAR3 CYLINDERS

FIXED PIVOT MOUNT  
MP1 - MP3

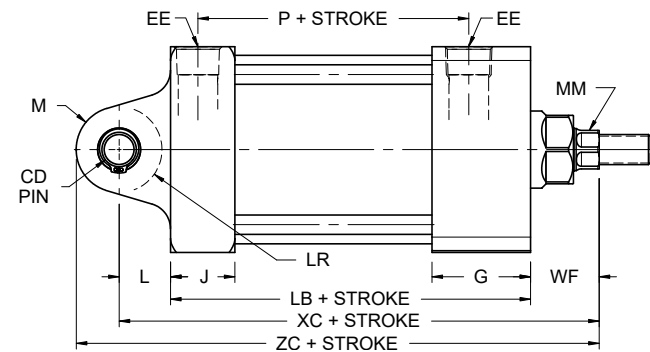
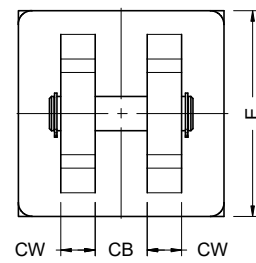
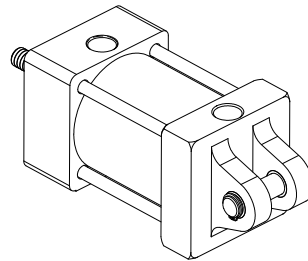
## ST3P1 - Aluminum Extrusion Fixed Clevis NFPA MP1

Design for 1.5" & 2" bore



Pin and Snap ring Included

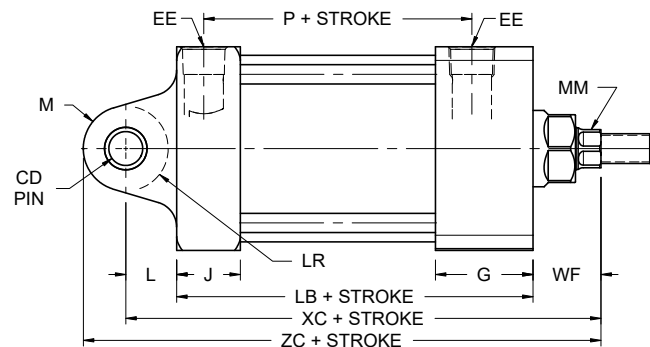
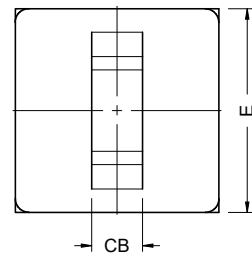
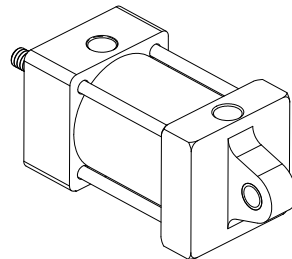
Design for 2 1/2" to 6" bore & 8" bore



Pin and Snap ring Included

## ST3P3 - Aluminum Extrusion Fixed Eye Mount NFPA MP3

Available for 1.5" to 6" and 8" Bore



Pin and Snap ring NOT Included

## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD

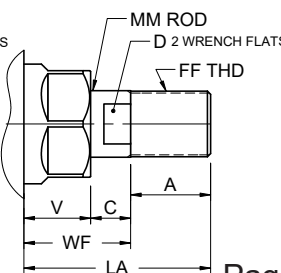
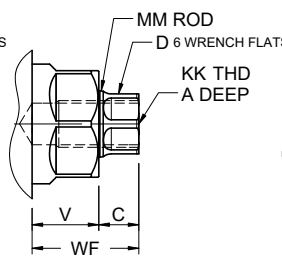
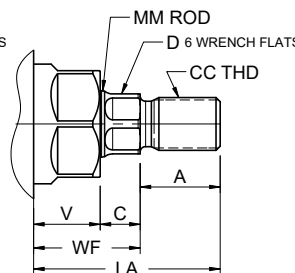
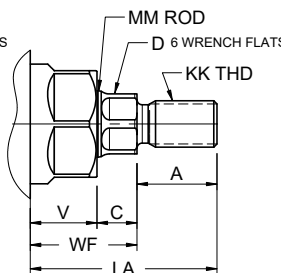
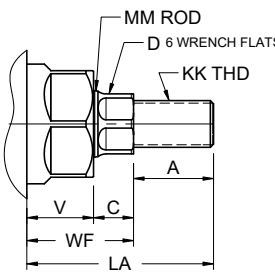
Studded Male #2S

Male #2

Intermediate Male #1

Female #4

Full Male #3



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	CB	CD +.000 -.002	CW	FL	L	LR	M	MR	ADD STROKE	
																LB	P
1.5	2	1.000	3/8	1 7/16	15/16	1/4	1.43	3/4	.501	1/2	1 1/8	3/4	5/8	1/2	5/8	3 5/8	2 21/64
2.0	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	3/4	.501	1/2	1 1/8	3/4	5/8	1/2	5/8	3 5/8	2 21/64
2.5	3	1.500	3/8	1 7/16	15/16	5/16	2.19	3/4	.501	1/2	1 1/8	3/4	5/8	5/8	5/8	3 3/4	2 29/64
3.25	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1 1/4	.751	5/8	1 7/8	1 1/4	1 1/8	7/8	7/8	4 1/4	2 21/32
4.0	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1 1/4	.751	5/8	1 7/8	1 1/4	1 1/8	7/8	7/8	4 1/4	2 21/32
5.0	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	1 1/4	.751	5/8	1 7/8	1 1/4	1 1/8	7/8	7/8	4 1/2	2 29/32
6.0	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	1 1/2	1.001	3/4	2 1/4	1 1/2	1 3/8	1 1/4	1 1/4	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XC	XD	ZC	ZD
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 3/8	5 3/4	5 4/8	6 1/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 3/4	6 1/8	6 1/4	6 5/8
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 3/8	5 3/4	5 4/8	6 1/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 3/4	6 1/8	6 1/4	6 5/8
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 1/2	5 7/8	6	6 3/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 7/8	6 1/4	6 3/8	6 3/4
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 7/8	7 1/2	7 5/8	8 1/4
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 1/8	7 3/4	7 7/8	8 1/2
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 7/8	7 1/2	7 5/8	8 1/4
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 1/8	7 3/4	7 7/8	8 1/2
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	7 1/8	7 3/4	7 7/8	8 1/2
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 3/8	8	8 1/8	8 3/4
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/8	8 7/8	9 1/8	9 7/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 3/8	9 1/8	9 3/8	10 1/8

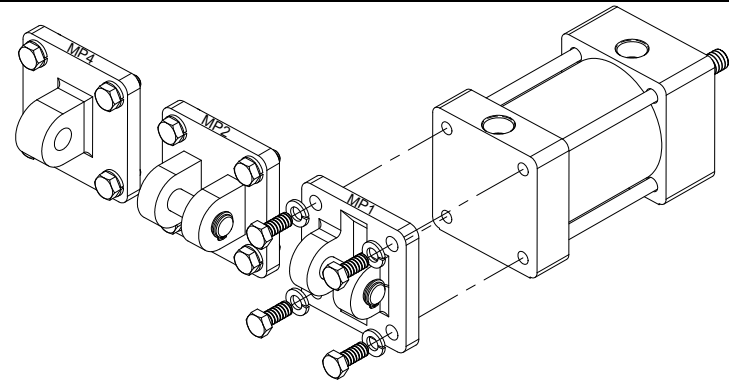


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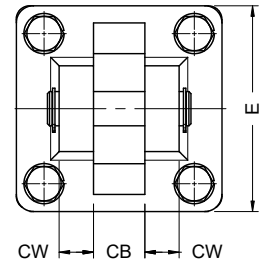
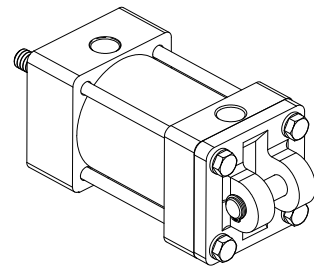
STARCYL CANADA INC

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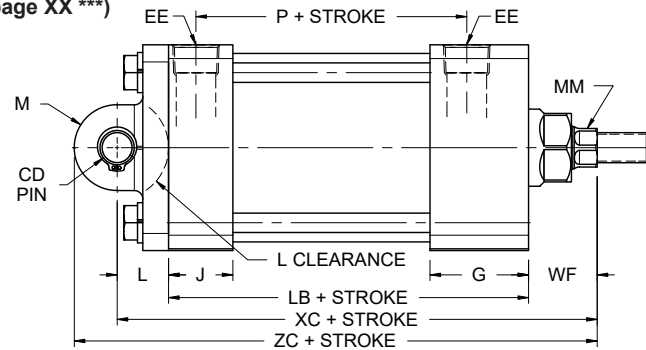


**ST3...FA-MP1 Detachable Short Clevis (\*\*\*)sold as Mounting Kit see page XX (\*\*\*)**

NFPA MP1

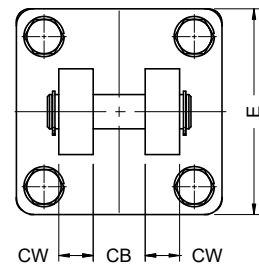
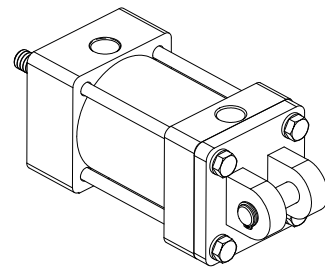


Pin and Snap ring Included

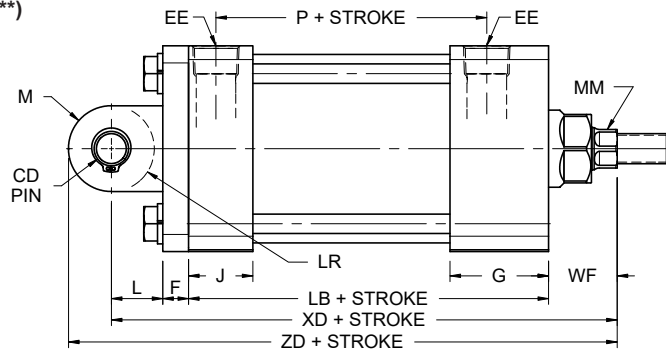


**ST3P2 - Detachable Clevis (\*\*\*)Also sold as Mounting Kit see page XX (\*\*\*)**

NFPA MP2

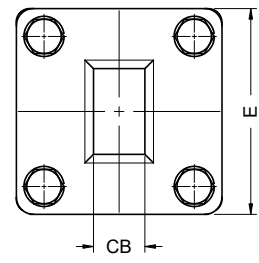
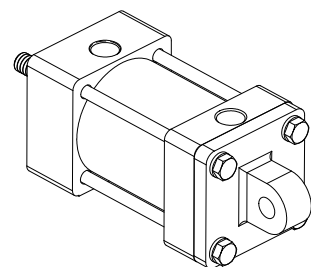


Pin and Snap ring Included

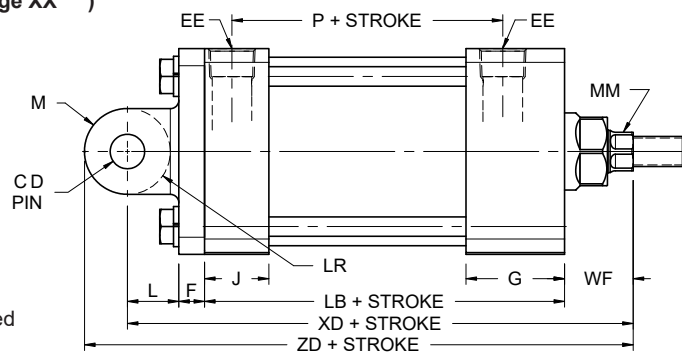


**ST3P4 - Detachable Eye Mount (\*\*\*)Also sold as Mounting Kit see page XX (\*\*\*)**

NFPA MP4 Available for 1.5" to 6"



Pin and Snap ring NOT Included



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD

**Studded Male #2S**

**Male #2**

**Intermediate Male #1**

**Female #4**

**Full Male #3**

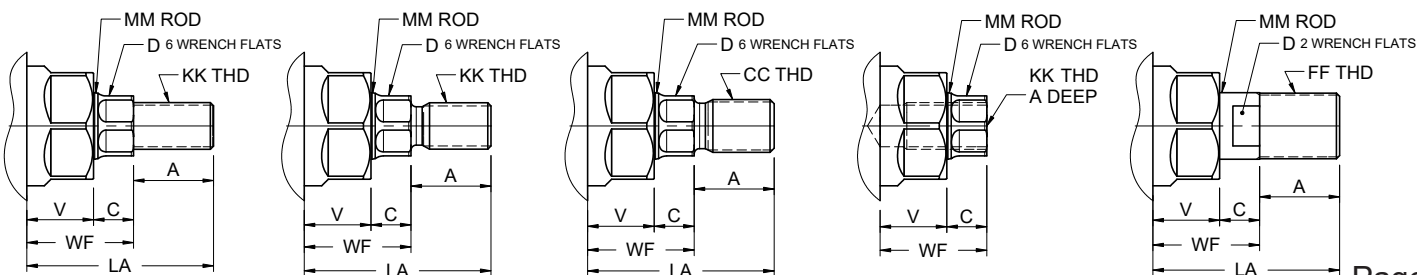


Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	CB	CD +.000 -.002	CW	FL	L	M	ADD STROKE	
														LB	P
1.5	2	1.000	3/8	1 7/16	15/16	1/4	1.43	3/4	.501	1/2	1 1/8	3/4	5/8	3 5/8	2 21/64
2.0	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	3/4	.501	1/2	1 1/8	3/4	5/8	3 5/8	2 21/64
2.5	3	1.500	3/8	1 7/16	15/16	5/16	2.19	3/4	.501	1/2	1 1/8	3/4	5/8	3 3/4	2 29/64
3.25	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1 1/4	.751	5/8	1 7/8	1 1/4	7/8	4 1/4	2 21/32
4.0	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1 1/4	.751	5/8	1 7/8	1 1/4	5/8	4 1/4	2 21/32
5.0	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	1 1/4	.751	5/8	1 7/8	1 1/4	5/8	4 1/2	2 29/32
6.0	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	1 1/2	1.001	3/4	2 1/4	1 1/2	1 1/4	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XC	XD	ZC	ZD
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 3/8	5 3/4	5 4/8	6 1/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 3/4	6 1/8	6 1/4	6 5/8
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 3/8	5 3/4	5 4/8	6 1/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 3/4	6 1/8	6 1/4	6 5/8
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 1/2	5 7/8	6	6 3/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 7/8	6 1/4	6 3/8	6 3/4
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 7/8	7 1/2	7 5/8	8 1/4
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 1/8	7 3/4	7 7/8	8 1/2
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	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 1/8	7 3/4	7 7/8	8 1/2
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	7 1/8	7 3/4	7 7/8	8 1/2
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 3/8	8	8 1/8	8 3/4
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/8	8 7/8	9 1/8	9 7/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 3/8	9 1/8	9 3/8	10 1/8

Table 3 - Bolts and Torque

BORE	Type	Size	Torque
1.5	SHCS	1/4-28	140 in-lbs
2.0	SHCS	5/16-24	280 in-lbs
2.5	SHCS	5/16-24	280 in-lbs
3.25	Hex bolt	3/8-24	30 ft-lbs
4.0	Hex bolt	3/8-24	30 ft-lbs
5.0	Hex bolt	1/2-20	75 ft-lbs
6.0	Hex bolt	1/2-20	75 ft-lbs



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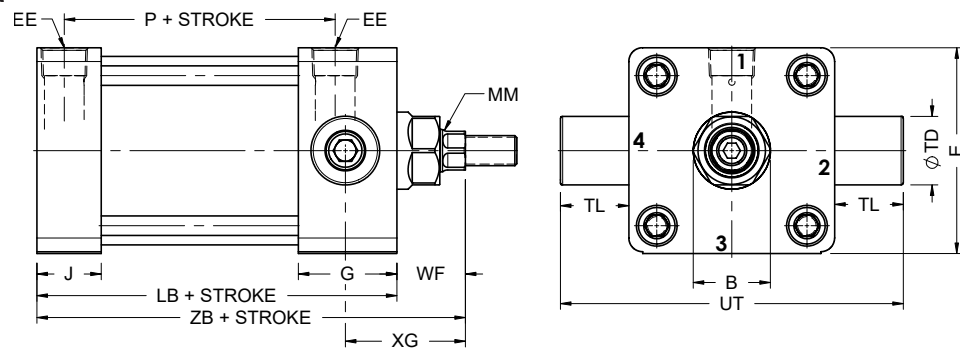
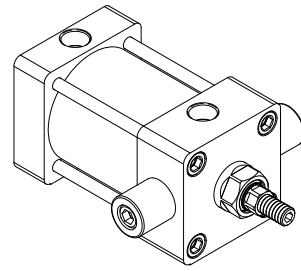
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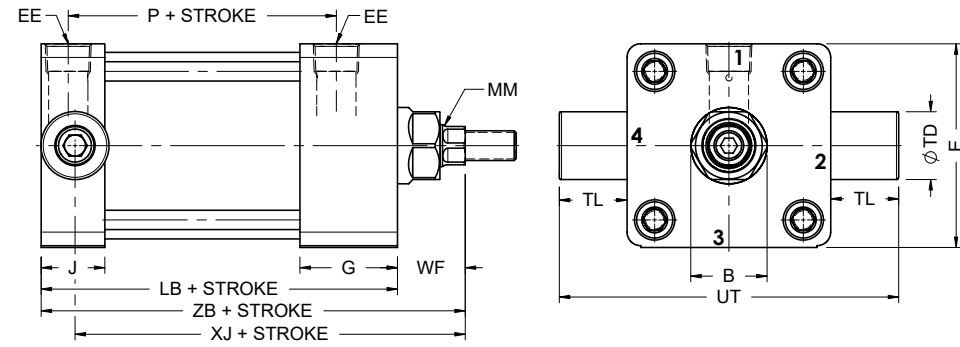
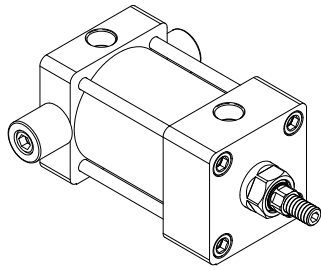
# STAR3 CYLINDERS

TRUNNION MOUNT  
MT1 - MT2 - MT4

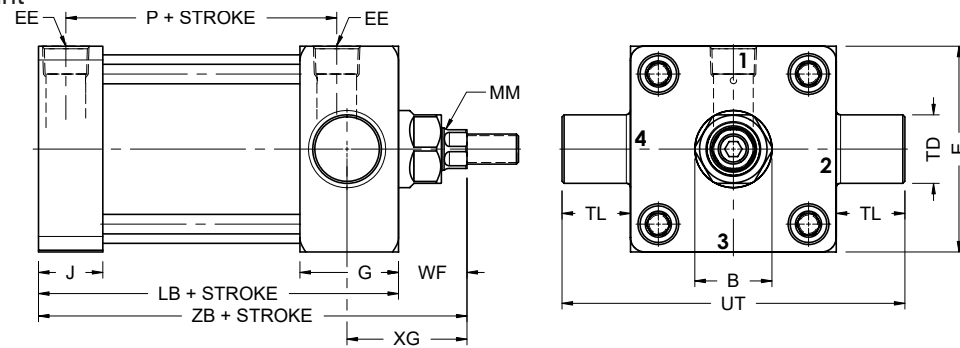
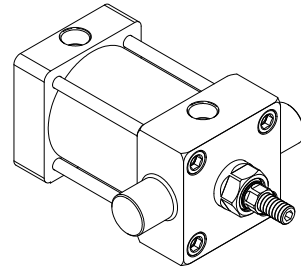
## ST3T1 - Detachable Head Trunnion Mount NFPA MT1



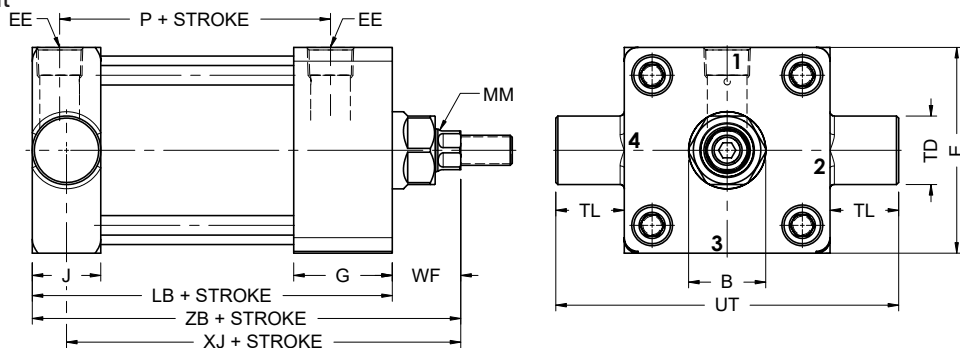
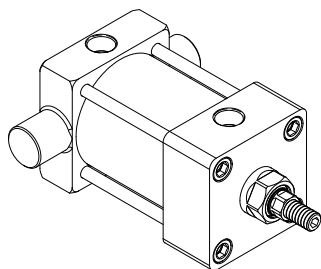
## ST3T2 - Detachable Cap Trunnion Mount NFPA MT2



## ST3T1X - Steel Fixed Head Trunnion Mount NFPA MT1

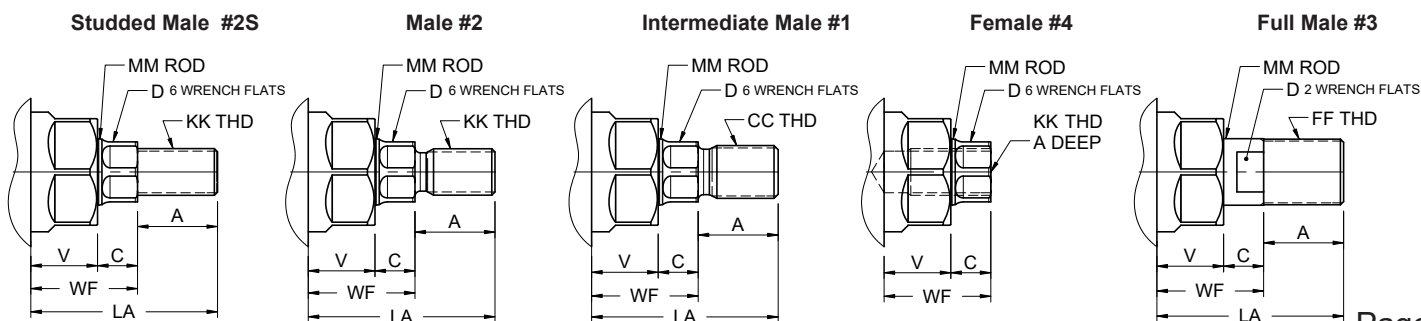


## ST3T2X - Steel Fixed Cap Trunnion Mount NFPA MT2



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

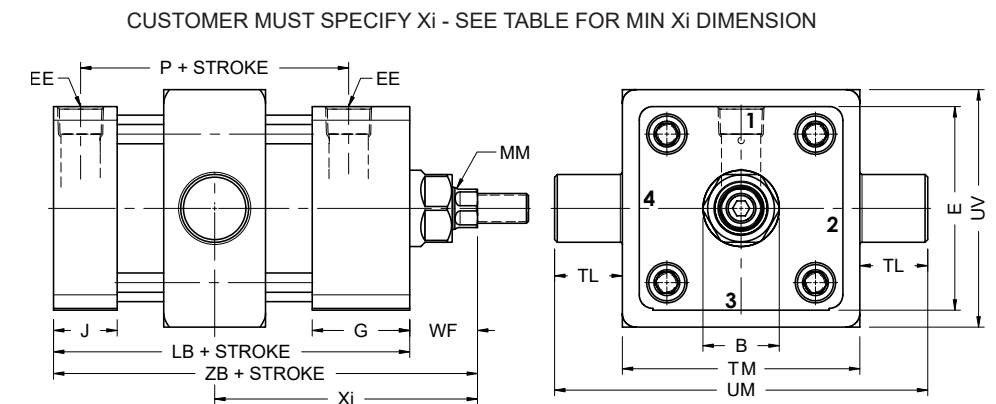
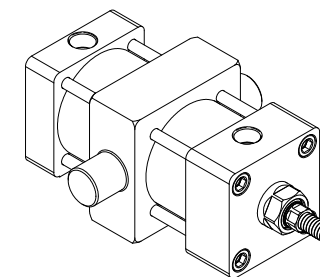
Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	TD +.00 -.001	TL	TM	UM	UT	UV	ADD STROKE	
														LB	P
1.5	2	1.000	3/8	1 7/16	15/16	1/4	1.43	1	1	2 1/2	4 1/2	4	2 1/2	3 5/8	2 21/64
2.0	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	1	1	3	5	4 1/2	3	3 5/8	2 21/64
2.5	3	1.500	3/8	1 7/16	15/16	5/16	2.19	1	1	3 1/2	5 1/2	5	3 1/2	3 3/4	2 29/64
3.25	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1	1	4 1/2	6 1/2	5 3/4	4 1/4	4 1/4	2 21/32
4.0	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1	1	5 1/4	7 1/4	6 1/2	5	4 1/4	2 21/32
5.0	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	1	1	6 1/4	8 1/4	7 1/2	6	4 1/2	2 29/32
6.0	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	1 3/8	1 3/8	7 5/8	10 3/8	9 1/4	7	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XG	XJ	Min Xi	ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 3/4	4 1/8	3 3/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/8	4 1/2	3 9/16	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 3/4	4 1/8	3 5/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/8	4 1/2	3 11/16	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 3/4	4 1/4	3 5/16	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/8	4 5/8	3 11/16	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/4	5	4 3/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 1/2	5 1/4	4 7/16	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/4	5	4 3/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	2 1/2	5 1/4	4 7/16	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 1/4	5 1/4	4 3/16	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	2 1/2	5 1/2	4 7/16	6 1/8
6.0	1 3/4													6 1/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 5/8	5 7/8	4 15/16	6 5/8
6.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	2 7/8	6 1/8	5 3/16	6 7/8
	2													7

## ST3T4 - Steel Mid Trunnion Mount NFPA MT4



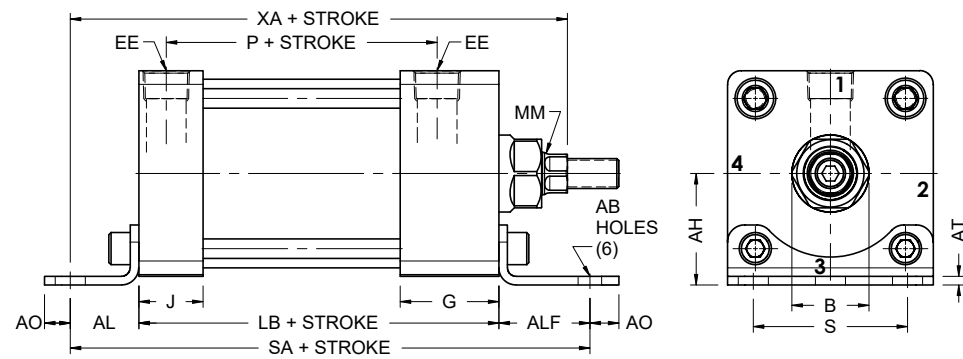
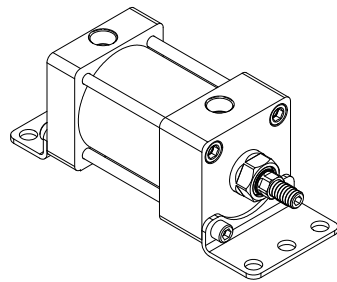
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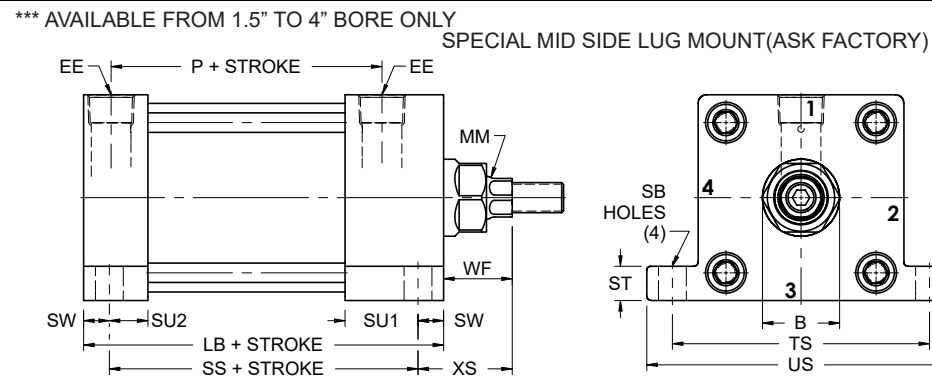
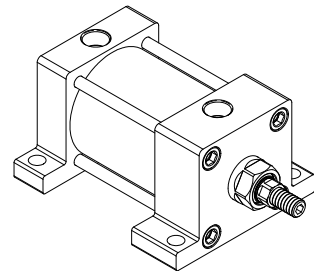
# STAR3 CYLINDERS

FOOT MOUNT  
MS1 - MS2- MS7

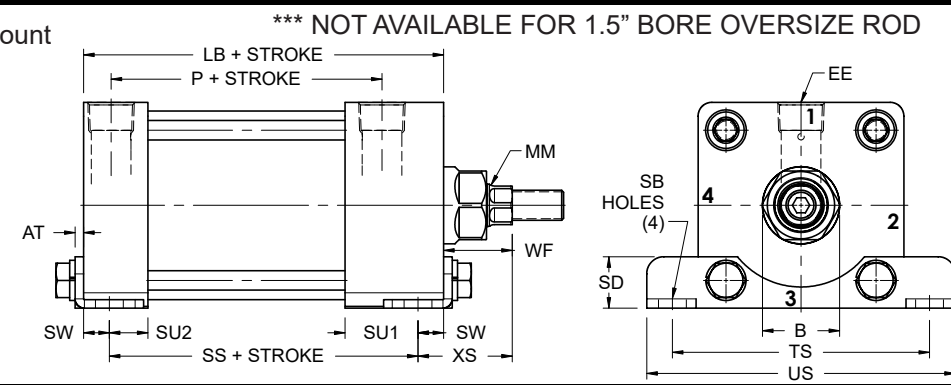
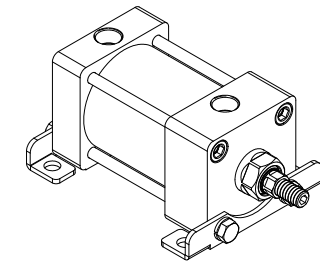
## ST3S1 - Angle Mount NFFPA MS1



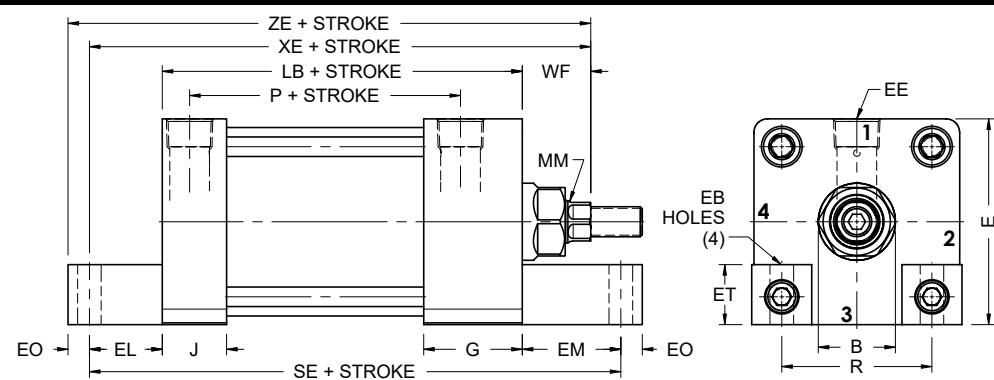
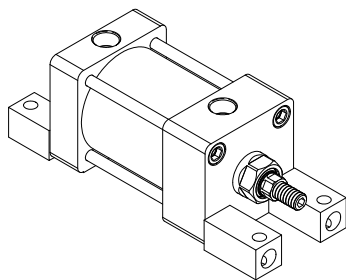
## ST3S2 - Fixed Side Lug Mount NFFPA MS2



## ST3...-FA-MS2 - Detachable Side Lug Mount NFFPA MS2 (\*\*\*)sold as mounting kit)

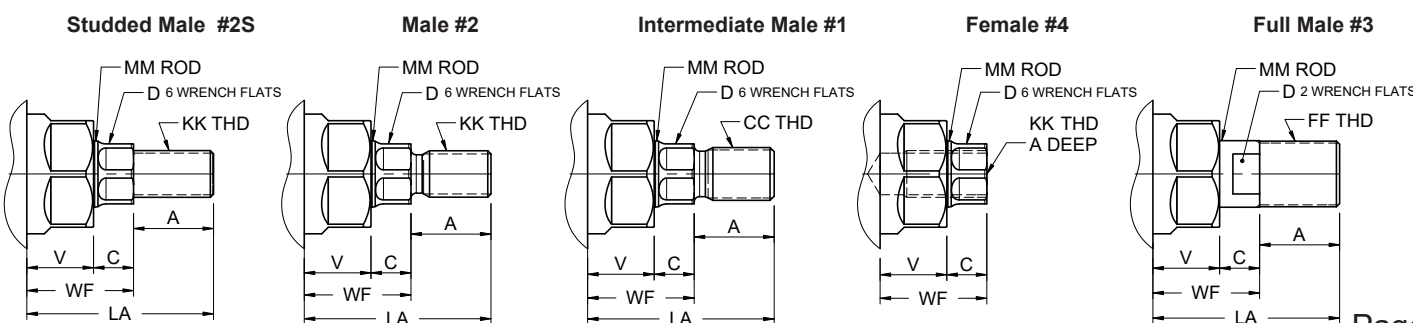


## ST3S7 - End Lug Mount NFFPA MS7



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	SB	ST	SU	SW	TS	US	XV	ADD STROKE		
															LB	P	SS
1.5	2	1.000	3/8	1 7/16	15/16	1/4	1.43	13/32	9/16	5/8	3/8	2 3/4	3 1/2	1/2	3 5/8	2 21/64	2 7/8
2.0	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	13/32	5/8	5/8	3/8	3 1/4	4	5/8	3 5/8	2 21/64	2 7/8
2.5	3	1.500	3/8	1 7/16	15/16	5/16	2.19	13/32	3/4	5/8	3/8	3 3/4	4 1/2	5/8	3 3/4	2 29/64	3
3.25	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	17/32	1	3/4	1/2	4 3/4	5 3/4	3/4	4 1/4	2 21/32	3 1/4
4.0	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	17/32	1	3/4	1/2	5 1/2	6 1/2	3/4	4 1/4	2 21/32	3 1/4
5.0	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	25/32	1 1/4	9/16	11/16	6 7/8	8 1/4	15/16	4 1/2	2 29/32	3 1/8
6.0	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	25/32	1 1/2	7/8	11/16	7 7/8	9 1/4	15/16	5	3 3/32	3 5/8

BORE	EB	EL	EM	EQ	ET	AB	AH	AL	ALF	AO	AT	S	ADD STROKE	
													SA	SE
1.5	9/32	3/4	1 1/8	1/4	9/16	7/16	1 3/16	1	1 3/8	3/8	1/8	1 1/4	6	5 1/2
2.0	11/32	15/16	1 5/16	5/16	5/8	7/16	1 7/16	1	1 3/8	3/8	1/8	1 3/4	6	5 7/8
2.5	11/32	1 1/16	1 7/16	5/16	3/4	7/16	1 5/8	1	1 3/8	3/8	1/8	2 1/4	6 1/8	6 1/4
3.25	13/32	7/8	1 1/2	3/8	1	9/16	1 15/16	1 1/4	1 7/8	1/2	3/16	2 3/4	7 3/8	6 5/8
4.0	13/32	1	1 5/8	3/8	1 13/16	9/16	2 1/4	1 1/4	1 7/8	1/2	3/16	3 1/2	7 3/8	6 7/8
5.0	17/32	1 1/16	1 11/16	9/16	1 3/8	11/16	2 3/4	1 3/8	2	1/2	3/16	4 1/4	7 7/8	7 1/4
6.0	17/32	1	1 3/4	5/8	1 5/8	11/16	3 1/4	1 3/8	2 1/8	5/8	1/4	5 1/4	8 1/2	7 3/4

Table 2 - Rod Dimensions

BORE	R o d Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XA	XS	XE	ZE
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 5/8	1 3/8	5 3/8	5 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6	1 3/4	5 3/4	6
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 5/8	1 3/8	5 9/16	5 7/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6	1 3/4	5 15/16	6 1/4
2.5	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	6 1/4	2	6 3/16	6 1/2
	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 3/4	1 3/8	5 13/16	6 1/8
2.5	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 1/8	1 3/4	6 3/16	6 1/2
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	6 3/8	2	6 7/16	6 3/4
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 7/8	1 7/8	6 1/2	6 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 1/8	2 1/8	6 3/4	7 1/8
3.25	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 3/8	2 3/8	7	7 3/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 7/8	1 7/8	6 5/8	7
4.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 1/8	2 1/8	6 7/8	7 1/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 3/8	2 3/8	7 1/8	7 1/2
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	7 1/4	2 1/16	6 15/16	7 7/16
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	1/2	1 3/16	1	1 5/8	7 1/2	2 5/16	7 3/16	7 11/16
5.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 3/4	2 9/16	7 7/16	7 15/16
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8	2 5/16	7 5/8	8 1/8
6.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 1/4	2 9/16	7 7/8	8 3/8
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 5/8	2 11/16	8	8 1/2



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## ST3SD - Detachable Spherical Mount

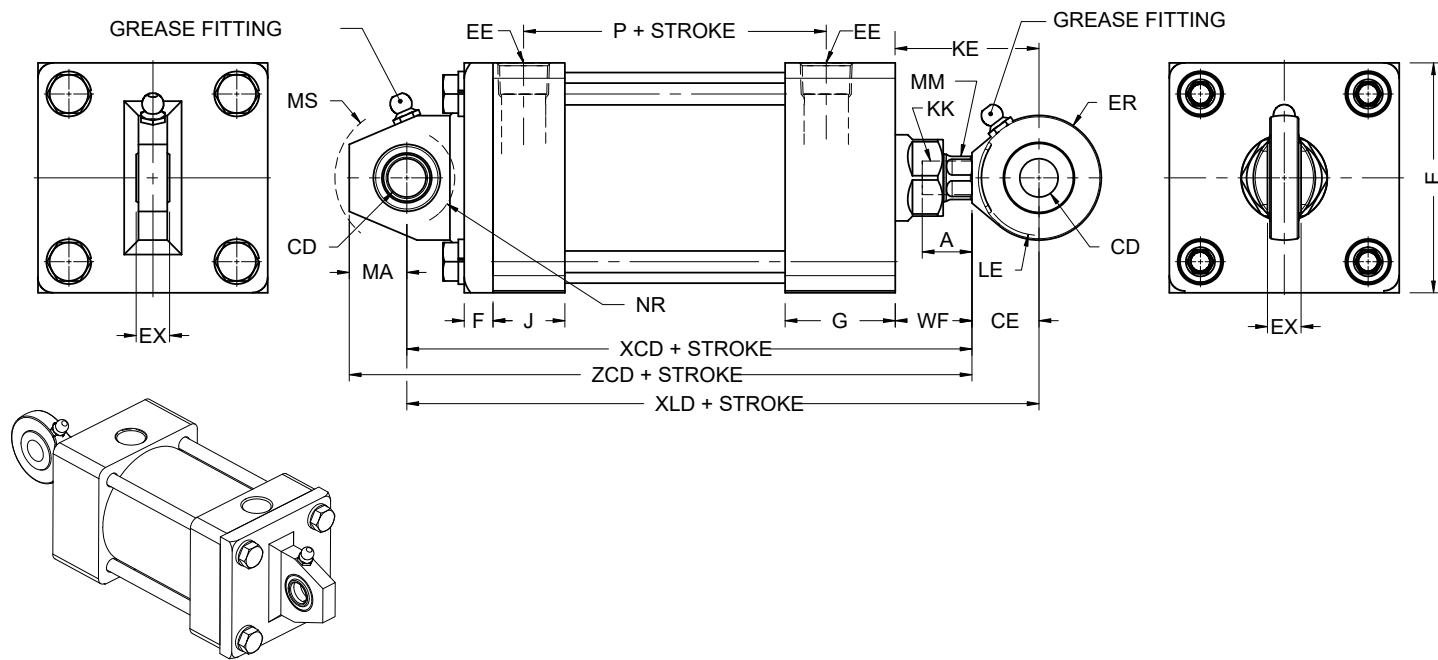


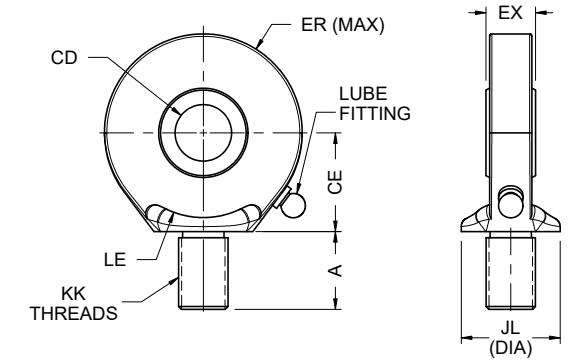
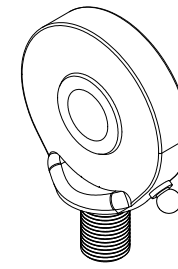
Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	F	CD +.000 -.001	CE	ER	EX	LE	MA	MS	NR	Add Stroke	
														LB	P
1.5	2	3/8	1 7/16	15/16	3/8	.500	7/8	13/16	7/16	3/4	3/4	15/16	5/8	3 5/8	2 21/64
2.0	2 1/2	3/8	1 7/16	15/16	3/8	.500	7/8	13/16	7/16	3/4	3/4	15/16	5/8	3 5/8	2 21/64
2.5	3	3/8	1 7/16	15/16	3/8	.500	7/8	13/16	7/16	3/4	3/4	15/16	5/8	3 3/4	2 29/64
3.25	3 3/4	1/2	1 11/16	1 3/16	5/8	.750	1 1/4	1 1/8	11/16	11/16	1	1 3/8	1	4 1/4	2 21/32
4.0	4 1/2	1/2	1 11/16	1 3/16	5/8	.750	1 1/4	1 1/8	11/16	11/16	1	1 3/8	1	4 1/4	2 21/32
5.0	5 1/2	1/2	1 11/16	1 3/16	5/8	.750	1 1/4	1 1/8	11/16	11/16	1	1 3/8	1	4 1/2	2 29/32
6.0	6 1/2	3/4	1 15/16	1 7/16	3/4	1.000	1 7/8	1 1/4	1 7/16	1 7/16	1 1/4	1 11/16	1 1/4	5	3 3/32

Table 2 - Rod Dimensions

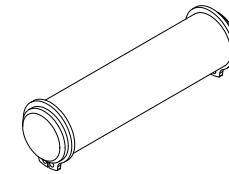
BORE	ROD SIZE	#4 KK	#7 KK	A	WF	KE	Add Stroke		
							XCD	XLD	ZCD
1 1/2	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
2	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
2.5	1 3/8	-	7/16-20	3/4	1 1/4	2 1/8	6 3/8	7 1/4	7 1/8
	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
3.25	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
	1 3/8	-	7/16-20	3/4	1 1/4	2 1/8	6 3/8	7 1/4	7 1/8
4	1	3/4-16	-	1 1/8	3/4	2	7 1/4	8 1/2	8 1/4
	1 3/8	-	3/4-16	1 1/8	1 1/4	2 1/2	7 3/4	9	8 3/4
5	1	3/4-16	-	1 1/8	5/8	2	7 1/4	8 1/2	8 1/4
	1 3/8	-	3/4-16	1 1/8	1	2 1/4	7 1/2	8 3/4	8 1/2
6	1 3/8	-	3/4-16	1 1/8	1 1/4	2 1/2	7 3/4	9	8 3/4
	1 3/4	-	3/4-16	1 1/8	1 1/4	2 1/2	7 3/4	9	8 3/4

## NFPA Spherical Rod Eye

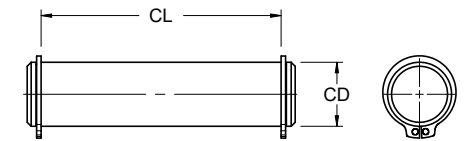


Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2, 2 & 2 1/2	RES-05	.5000 <sup>-0005</sup>	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
3 1/4, 4 & 5	RES-07	.7500 <sup>-0005</sup>	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
6 & 8	RES-10	1.0000 <sup>-0005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860

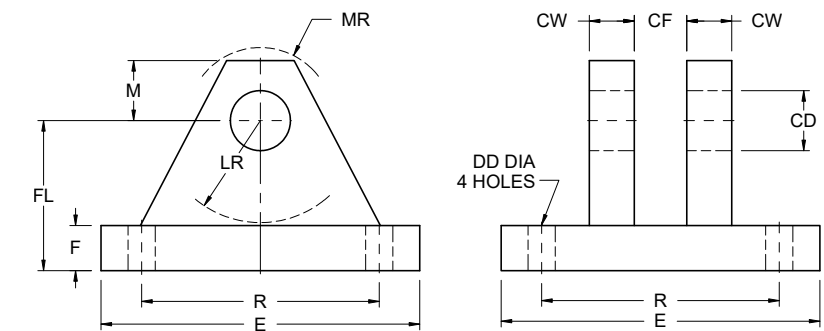
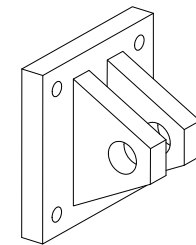
## NFPA Spherical Pivot Pin



Bore Size	Part #	CD	CL	LOAD
1 1/2, 2 & 2 1/2	PS-05	.5000 <sup>-0004</sup>	1 9/16	8600
3 1/4, 4 & 5	PS-07	.7500 <sup>-0005</sup>	2 1/32	19300
6 & 8	PS-10	1.0000 <sup>-0005</sup>	2 1/2	34300



## NFPA SPHERICAL CLEVIS BRACKET



Bore Size	Part #	CD	CF	CW	DD	E	F	FL	LR	M	MR	R	LOAD
1 1/2, 2 & 2 1/2	CBS-05	1/2 <sup>+004/-002</sup>	7/16	1/2	13/32	3	1/2	1 1/2	15/16	1/2	5/8	2.05	5770
3 1/4, 4 & 5	CBS-07	3/4 <sup>+004/-002</sup>	21/32	5/8	17/32	3 3/4	5/8	2	1 3/8	7/8	1	2.76	9450
6 & 8	CBS-10	1 <sup>+004/-002</sup>	7/8	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1	1 3/16	4.10	14300



## WHAT IS A PNEUMATIC ROD LOCK?

Rod locks have been developed as a solution to control problems inherent to pneumatics such as overtravel drifting, bouncing, and reverse-traveling. A significant design feature of the rod locks includes the patented intensifier, a mechanically-operated mechanism that helps to guarantee quick and secure locking. The pneumatic series rod locks consist of an anodized aluminum housing with special piston and collet locking mechanism actuated by a spring that mechanically locks the rod. The rod is then unlocked when air actuates the piston, compressing the spring and releasing the collet locking mechanism. It is because of this design that the unit will lock in a situation presenting a loss of air pressure.

### BENEFITS

- Precision holding (0.002-0.003 in)
- Consistent clamping force; holds loads during power/ Pressure loss
- High cycle rates and accuracy
- Compact unit, easy integration
- Works with a broad variety of applications
- Maximum operating pressure: 160 PSI Air (11bar)
- Required release pressure: 60 PSI Air (4 bar)
- Operating media: clean, dry, filtered, compressed air
- Operating temperatures:
  - Standard 10 deg F to 180 deg F (-12 deg C to 82 deg C)
  - Optional 10 deg F to 250 deg F (-12 deg C to 121deg C)
- Holding Force:
  - Axial holding forces were established after two million fatigue test cycles.
- Minimum linear movement may occur after clamp is fully engaged (0.002 in - 0.003 in)
- Holds with consistent force in both directions when rated values are not exceeded
- Can be mounted in any position
- Release pressure can range: 4-8 bar (60 PSI min - 120 PSI max)

Rod Lock are also designed with over-sized components to withstand the most severe applications, for example, the contact area of the clamping collet is considerably greater than represented on similar units. The increased contact area reduces the pressure per square inch on the rod, thereby extending service life. The mountings for pneumatic rod locks have been designed to be mounted to the NFPA (STAR3) mounting of your choice. Note: Rod locks are designed for locking reciprocating motions only, not for use on rotary motions.

\*\*\*If these units are to be used as safety or braking devices, please select our Rod Lock model "RLS" in the following pages or consult the factory.

### FEATURES:

- No rod displacement on engagement; extremely low backlash
- Contact area of clamping collet is considerably greater than average, extending service life
- Fast response time, 100m/sec, optimized circuit
- Mechanical design with spring-engaged units
- Profile matches NFPA mounting styles for cylinders
- One-piece, solid-body design
- 4 bar (60 PSI) release pressure

### OPTIONS:

- Stainless or electroless nickel-plated housing
- Viton seals
- Wiper/scrapper
- Sealed units for food, chemical, wash-down, or other applications

Note: Consult factory for extreme applications.

## ANATOMY OF A PNEUMATIC ROD LOCK

### SPRINGS

Heavy-duty springs designed for long life.

### TIE RODS

Alloy steel, pre-stressed for maximum fatigue strength. Roll- threaded for added strength on 1 1/2" - 6" bores.

### ROD BEARING

The phenolic bearing provides maximum piston rod support, reduces friction, and resists wear abrasion (galling and seizing). Factory preset for minimum backlash.

### ROD-WIPER

The wiper is designed to wipe off abrasive dust and contamination on the retract stroke to ensure long-life for the seals, bearing, and piston rod. The standard wiper is carboxylated nitrile and is internally lubricated to reduce friction and extended life.

### LIP-TYPE PISTON SEALS

Pressure-activated lip seal is wear-compensated for effective sealing at rated pressures. The seal is internally lubricated, reducing friction and extending life.

### BODY

Solid aluminum that is precision-machined for accurate alignment. Black anodized for appearance and corrosion resistance.

### HOUSING DESIGN

Provides for direct mounting or allows attaching of a choice of NFPA-style detachable mounts.

### LOCKING MECHANISM

Over-sized, hardened, and ground-locking with anti-friction amplification.

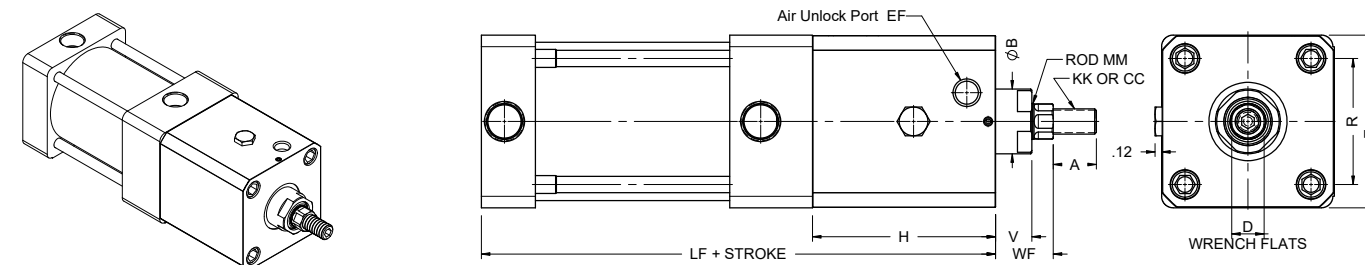
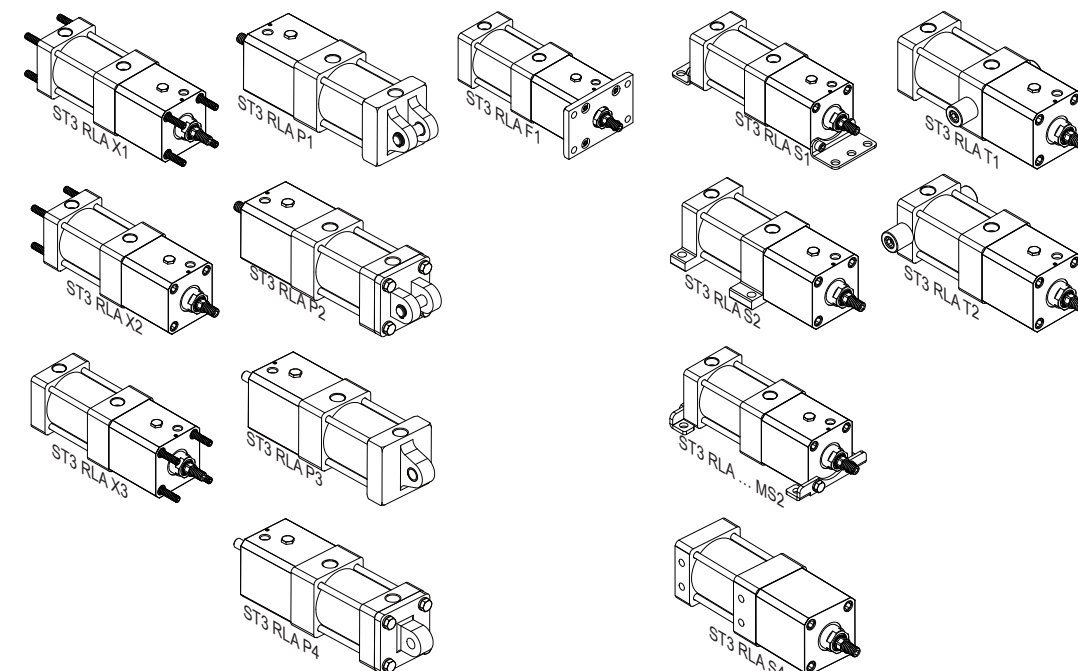


Table 1 - Envelope and Mounting Dimensions

BORE	Rod Size MM	Axial Holding Force	#1 CC	#2 & #4 KK	A	V	WF	B +/- .001	D	R	E	EF	H	ADD STROKE
														LF
1.5	5/8	200	1/2-20	7/16-20	3/4	5/8	1	1.123	1/2	1.43	2	1/8 NPT	3.050	6.675
	1	300	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	1.84	2 1/2	1/8 NPT	3.750	7.375
2	5/8	400	1/2-20	7/16-20	3/4	5/8	1	1.123	1/2	1.84	2 1/2	1/8 NPT	3.060	6.685
	1	300	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	1.84	2 1/2	1/8 NPT	3.750	7.375
2.5	5/8	650	1/2-20	7/16-20	3/4	5/8	1	1.123	1/2	2.19	3	1/8 NPT	3.180	6.930
	1	450	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	2.19	3	1/8 NPT	3.650	7.400
3.25	1	950	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	2.76	3 3/4	1/4 NPT	4.000	8.250
	1 3/8	950	1 1/4-12	1-14	1 5/8	1	1 5/8	1.998	1 3/16	2.76	3 3/4	1/4 NPT	4.000	8.250
4	1	1550	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	3.32	4 1/2	1/4 NPT	4.000	8.250
	1 3/8	1550	1 1/4-12	1-14	1 5/8	1	1 5/8	1.998	1 3/16	3.32	4 1/2	1/4 NPT	4.000	8.250
5	1	2150	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1.498	7/8	4.10	5 1/2	1/4 NPT	4.000	8.500
	1 3/8	1950	1 1/4-12	1-14	1 5/8	1	1 5/8	1.998	1 3/16	4.10	5 1/2	1/4 NPT	4.000	8.500
6	1 3/8	2556	1 1/4-12	1-14	1 5/8	1	1 5/8	1.998	1 3/16	4.88	6 1/2	1/4 NPT	4.500	9.500
	1 3/4	2450	1 1/2-12	1 1/4-12	2	1 1/8	1 7/8	2.373	1 1/2	4.88	6 1/2	1/4 NPT	4.500	9.500

If these units are to be used as "SAFETY" or braking devices, please select our Rod Lock model "RLS" in the following pages or consult the factory.

## OTHER MOUNTINGS AVAILABLE



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www.Starcyl.ca

## SAFETY PNEUMATIC ROD LOCK?

### Precision Operation Maintains Accurate Positioning

The RLS series of Rod Locks guarantees accurate positioning and provides precision holding while other operations are performed. The Rod Lock engages without causing any rod displacement, and also features low backlash making them ideal for precision applications.

### Large Clamping Surface Ensures Consistent Performance

The RLS line is designed with a large clamping surface that provides uniform force to the rod contact area on every engagement. The clamping mechanism utilizes numerous ball bearings to reduce friction.

### Spring-engaged Units Engage in Power-off Situations

Rod Locks are spring-engaged, so they operate even in power-off situations to promote safety for operators and machinery. Multiple springs ensure reliable performance and redundancy. The fast response time of these spring-engaged products also increases positioning accuracy. Rod Locks also feature locking mode sensing capability that allows engagement/ disengagement feedback with the use of up to two optional inductive sensors.

### Sealed to Withstand Harsh Environments

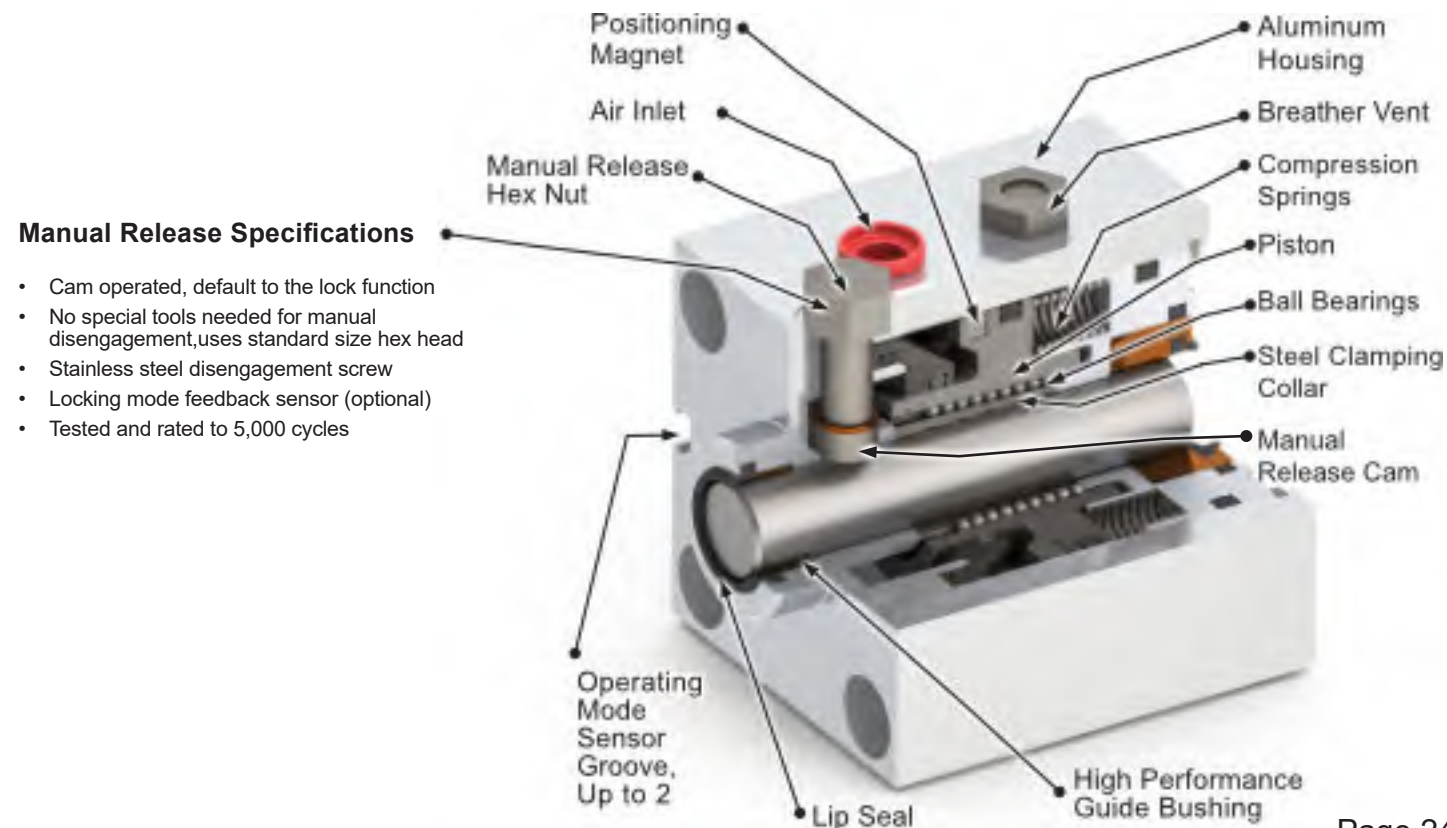
Every RLS Rod Lock is sealed to protect internal components. These seals are designed to withstand even harsh wash-down environments and are IP67 rated (anodized models exceed NEMA 4X rating). Consult Factory for use in wash-down of humid environment applications. Rod Locks are black anodized coating.

### Manual Release

The cam operated manual release feature mechanically disengages the rod lock with the simple turn of a hex screw using a standard wrench. The default-to-lock function springs back to the engaged position when released.



### ROD LOCK CUTAWAY (WITH MANUAL RELEASE)



#### Manual Release Specifications

- Cam operated, default to the lock function
- No special tools needed for manual disengagement, uses standard size hex head
- Stainless steel disengagement screw
- Locking mode feedback sensor (optional)
- Tested and rated to 5,000 cycles

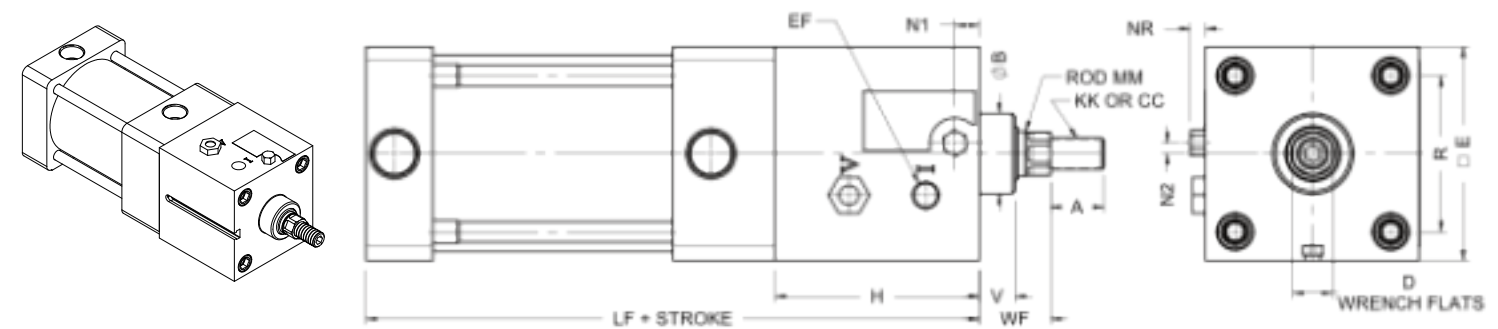


Table 1 - Envelope and Mounting Dimensions

BORE	Rod Size MM	Axial Holding Force	#1 CC	#2 & #4 KK	A	V	WF	B +/- .001	Rod Wrench Flat D	R	E	EF	N1	N2	NR	H	ADD
																	STROK E LF
1.5	5/8	200	1/2-20	7/16-20	3/4		1	1.123	1/2	1.43	2	1/8 NPT					
2	5/8	400	1/2-20	7/16-20	3/4		1	1.123	1/2	1.84	2 1/2	1/8 NPT					
	1	300	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	1.84	2 1/2	1/8 NPT					
2.5	5/8	650	1/2-20	7/16-20	3/4		1	1.123	1/2	2.19	3	1/8 NPT					
	1	450	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	2.19	3	1/8 NPT					
3.25	1	950	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	2.76	3 3/4	1/4 NPT					
	1 3/8	950	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 3/16	2.76	3 3/4	1/4 NPT					
4	1	1550	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	3.32	1/2	1/4 NPT					
	1 3/8	1550	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 3/16	3.32	1/2	1/4 NPT					
5	1	2150	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	4.10	5 1/2	1/4 NPT					
	1 3/8	1950	1 1/4-12	1-14	1 5/8		1 5/8	1.998	3/16	4.10	5 1/2	1/4 NPT					
6	1 3/8	2556	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 3/16	4.88	6 1/2	1/4 NPT					
	1 3/4	2450	1 1/2-12	1 1/4-12	1 5/8		1 7/8	1.998	1 1/2	4.88	6 1/2	1/4 NPT					

NOT READY YET



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## AIR CONTROLS AND PROGRAMMING

### CYLINDER MOUNTING

**NOTE:** Avoid repeated overlapping conditions when programming the Rod Lock into your system. (i.e.: forced motion during engagement or disengagement of the Rod Lock.) Shaft and/or collar wear will result. Design the control system to use the Rod Lock in static conditions.

Cylinder functioning is regulated by a 5/3 valve, center open on the central port and supplied by exhaust ports.

**NOTE:** Do not use a valve with a closed center. This will cause imbalance in the piston if any of the circuits leak.

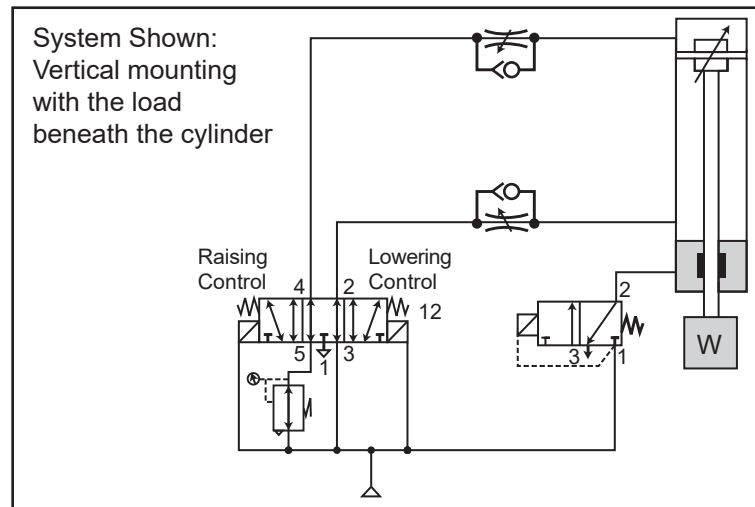
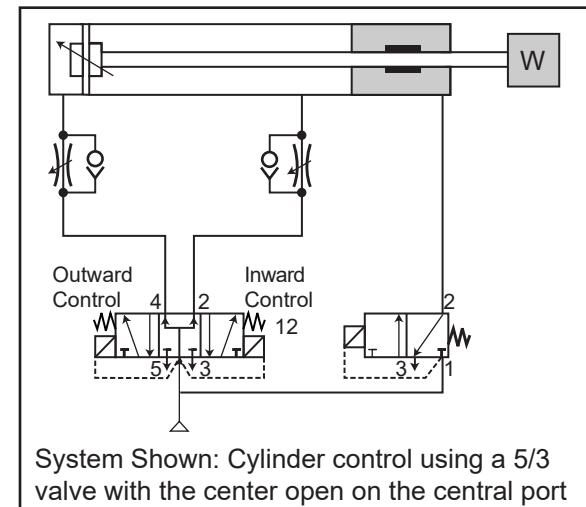
One-directional flow reducers can be used to control the speed of the cylinder rod. To ensure fast braking of the rod, a quick exhaust valve can be installed on or near the rod lock.

A normally closed (NC) solenoid valve directs air supply to the rod lock, keeping it disengaged until the electrical signal is interrupted.

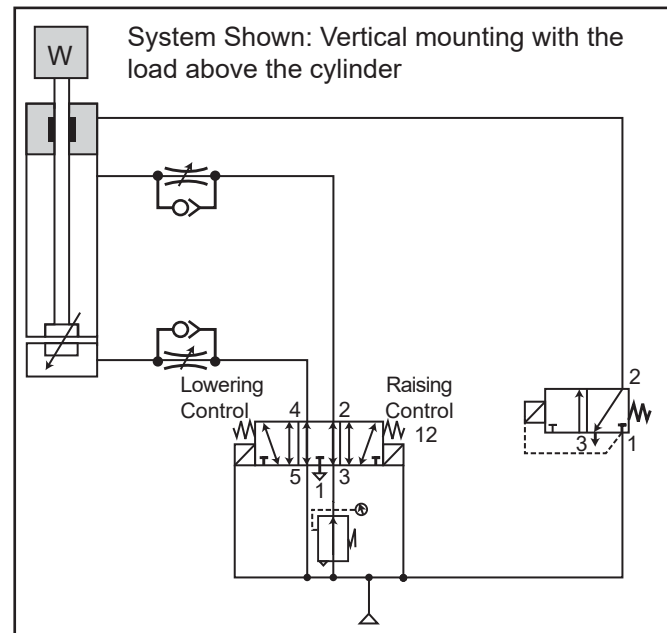
**Vertical Mounting:** The force on the piston must not exceed its locking capacity when it is combined with the force of the load.

Use of a 5/3 valve provides a braking effect and maintains accurate rod positioning. Stopping precision is determined by the rate of speed of the rod and loads in motion.

**Horizontal Mounting:** Pressure is maintained on both sides of the cylinder piston, keeping it balanced and preventing rod displacement upon release. Use exhaust ports 3 and 5 (see below).



Minimum release pressure = 60 psi  
Maximum pressure = 120 psi



### Standard Specifications

**NFPA interchangeable**  
 Bore Size: 7", 8", 10", 12" & 14"  
 Stroke: Any Practical Stroke  
 Rod Material: 050 75KSI min Hard Chromed  
 Cushion: optional adjustable cushion at both ends  
 \*\* Not Applicable with Hydraulic Option \*\*  
 Operating Pressure: Air: 250 PSI - Oil : 400 PSI  
 Standard Temperature Range: From -40°F to +230°F  
 Tubing Material : Aluminum For 7" to 10"  
 Composite for 7" to 14" bore  
 Steel for 7" to 14" bore

Mounting Style: Optional Flush Mount available.  
 Single or Double rod end.  
 Rod Diameters: 3 Rod size for every bore available  
 Rod End Style: 4 standard and Specials available.

Other Options: seals, Rod Materials, Tubing Materials,  
 Special Assembly, Manifold Mount,

Standard 6 Flats on Rod end  
 Standard 6 Flats on Rod Gland Bearing and Removable without  
 Disassembly of the cylinder.



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In accordance with Starcyl's established policy of constant product improvement, the specifications contained in this document are subject to change without notice. Technical data listed in this document are based on the latest information available at the time of printing and are also subject to change without notice. For current information, please consult [www.starcyl.com](http://www.starcyl.com)



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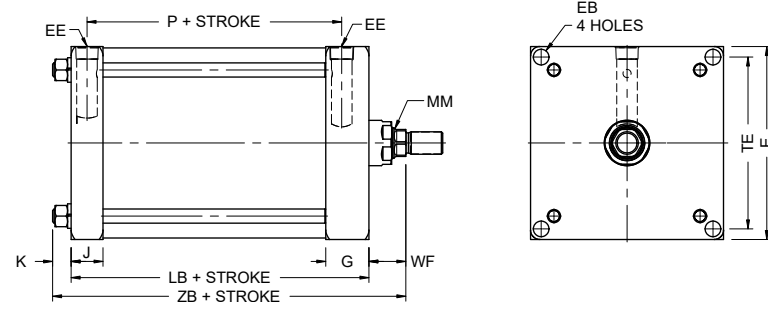
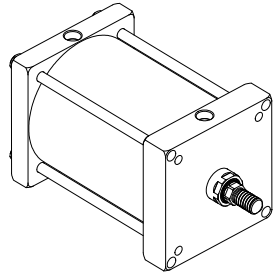
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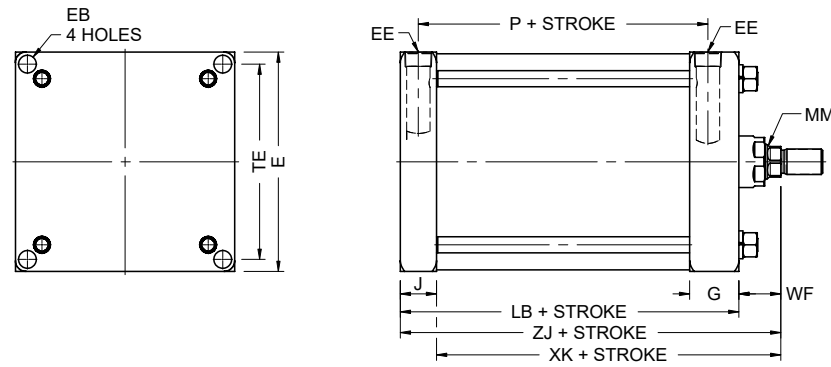
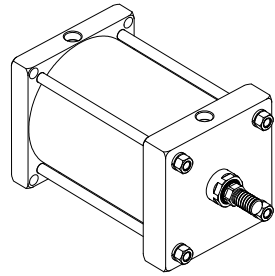
# STAR3 CYLINDERS

END MOUNT  
ME3 - ME4 - MX5

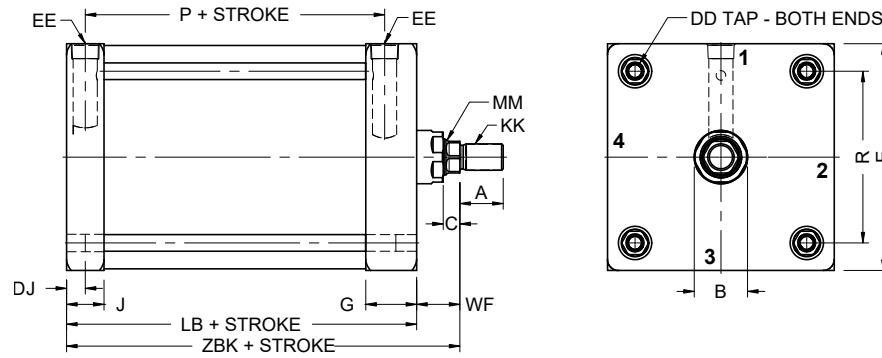
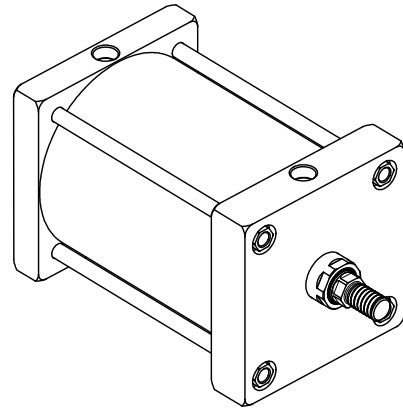
## ST3E3 Square Head Mount NFFA ME3



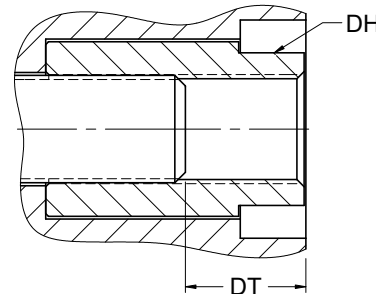
## ST3E4 Square Cap Mount NFFA ME4



## ST3X5 Flush Cap Mount NFFA MX5

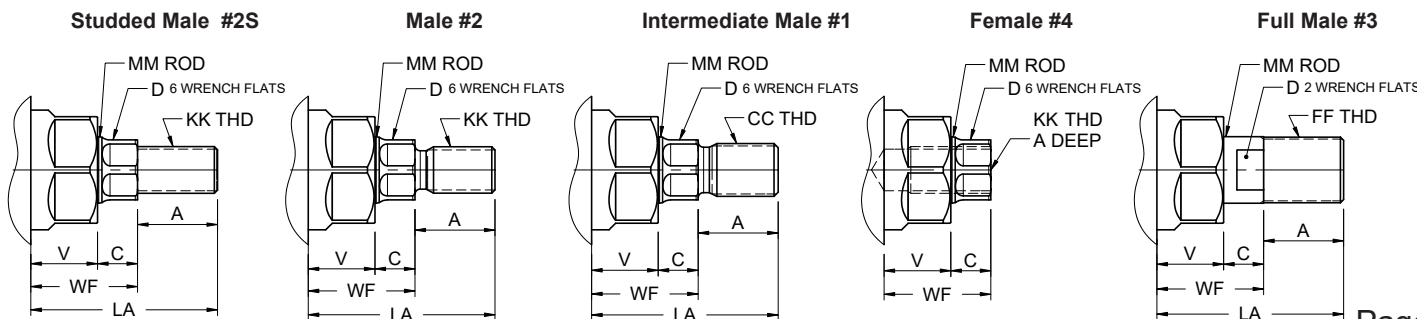


Front Sleeve Nut design and Dimensions



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	K	R	EB	DD	DH HEX	DT	DJ	TE	ADD STROKE	
													LB	P
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	11/16	5/8-18	7/8	45/64	45/64	6.75	5 1/8	3 7/32
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	11/16	5/8-18	7/8	45/64	45/64	7.57	5 1/8	3 7/32
10	10.63	1	2 1/8	1 7/8	11/16	7.97	13/16	3/4-16	1 1/4	15/16	15/16	9.41	6 3/8	4 1/8
12	12.63	1	2 1/8	1 7/8	11/16	9.41	13/16	3/4-16	1 1/4	15/16	15/16	11.11	6 7/8	4 5/8
14	14.63	1	2 3/8	2 1/8	3/4	10.90	15/16	7/8-14	1 1/2	1 1/16	1 1/16	12.87	8 1/8	5 1/2

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XK	ZB	ZBK	ZJ
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 1/4	7 7/16	6 3/4	6 3/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	5 1/2	7 9/16	7	7
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	5 5/8	7 11/16	7 1/8	7 1/8
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 1/4	7 7/16	6 3/4	6 3/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	5 1/2	7 9/16	7	7
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	5 5/8	7 11/16	7 1/8	7 1/8
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	6 1/4	8 15/16	8 1/4	8 1/4
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	6 3/8	9 1/16	8 3/8	8 3/8
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	6 5/8	9 5/16	8 5/8	8 5/8
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	6 7/8	9 1/8	8 7/8	8 7/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2 1/4	7 1/8	9 9/16	9 1/8	9 1/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	5 5/8	1 1/4	2 1/4	7 1/8	9 13/16	9 1/8	9 1/8
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8



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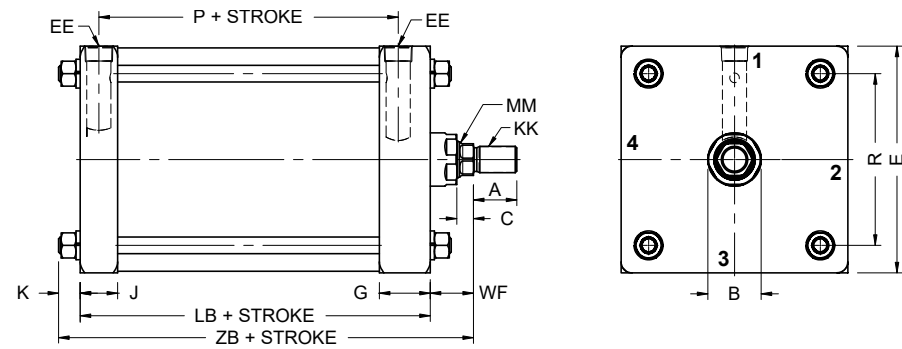
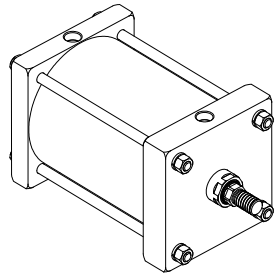
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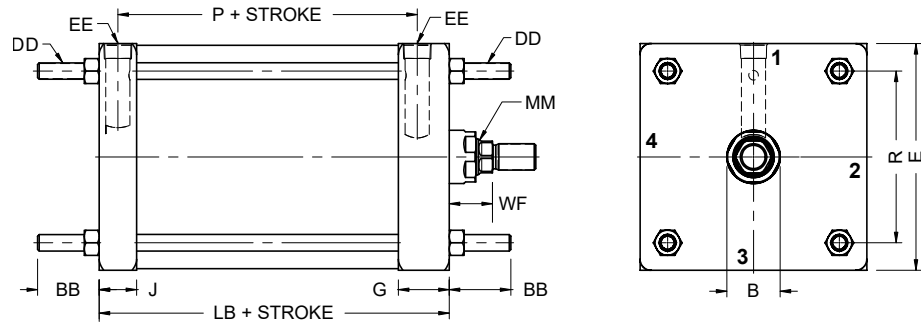
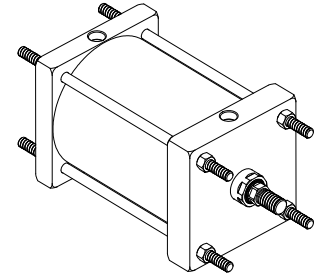
# STAR3 CYLINDERS

CENTER LINE MOUNT  
MX0 - MX1- MX2 - MX3

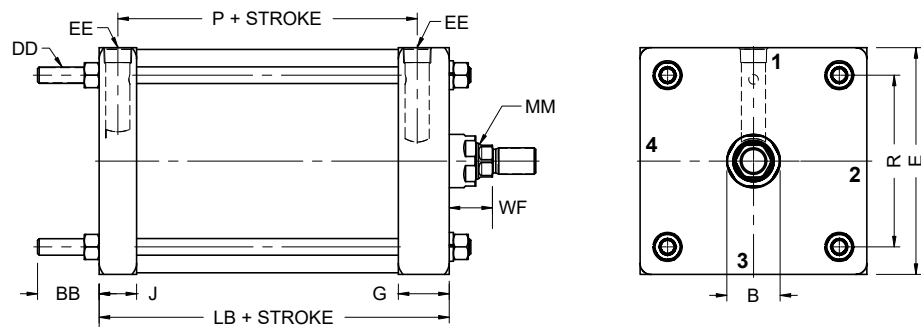
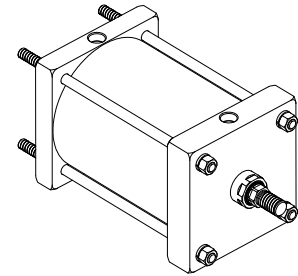
ST3X0 - No Mount  
NFPA MX0



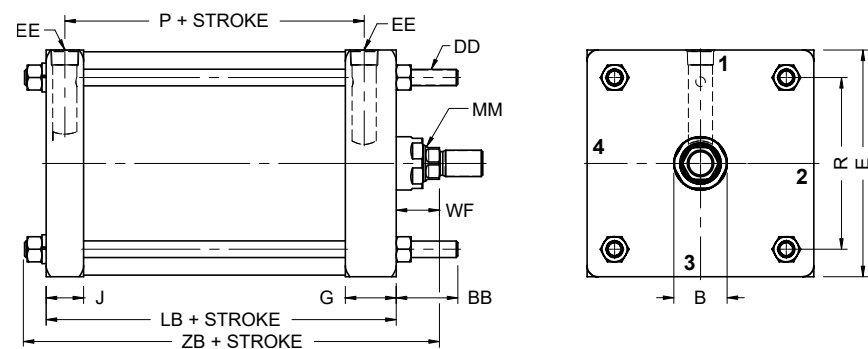
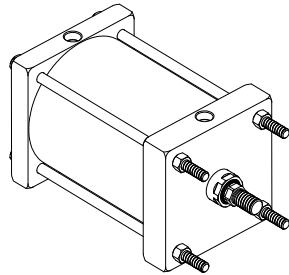
ST3X1 - Tie Rods Extended Both Ends  
NFPA MX1



ST3X2 - Tie Rods Extended Cap Mount  
NFPA MX2

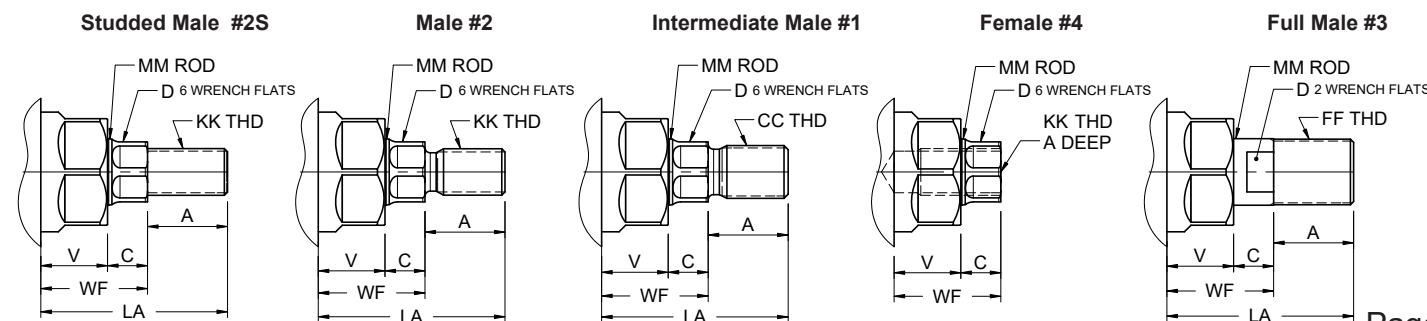


ST3X3 - Tie Rods Extended Head Mount  
NFPA MX3



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

BORE	BB	DD	E	EE NPTF	G	J	K	R	Mounting	
									LB	P
7	2 5/16	5/8-18	7.5	3/4	1 29/32	1 13/32	9/16	5.73	5 1/8	3 7/32
8	2 5/16	5/8-18	8.5	3/4	1 29/32	1 13/32	9/16	6.44	5 1/8	3 7/32
10	2 9/16	3/4-16	10.63	1	2 1/8	1 7/8	11/16	7.97	6 3/8	4 1/8
12	2 9/16	3/4-16	12.63	1	2 1/8	1 7/8	11/16	9.41	6 7/8	4 5/8
14	3 3/16	7/8-14	14.63	1	2 3/8	2 1/8	3/4	10.90	8 1/8	5 1/2

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.001	C	D	V	WF	Add Stroke
											ZB
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 9/16
	2	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	7 11/16
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 9/16
	2	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	7 11/16
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	8 15/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	9 5/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	9 1/8
12.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2 1/4	9 9/16
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	5 5/8	1 1/4	2 1/4	9 13/16
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/4	2 1/4	11 1/8
14.00	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	11 1/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	11 1/8



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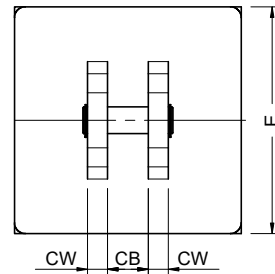
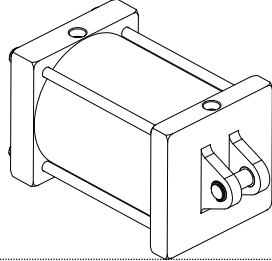
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# STAR3 CYLINDERS

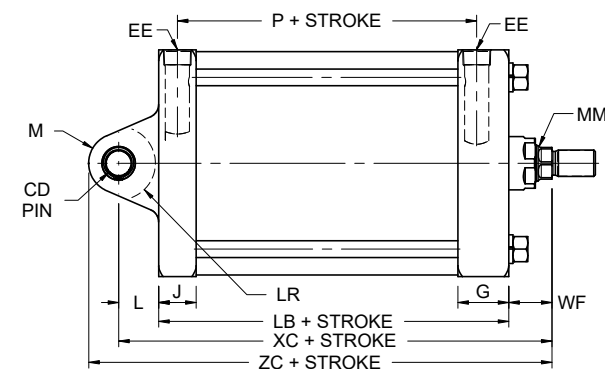
PIVOT MOUNT  
MP1 - MP2

## ST3P1 - Aluminum Extrusion Fixed Clevis NFPA MP1

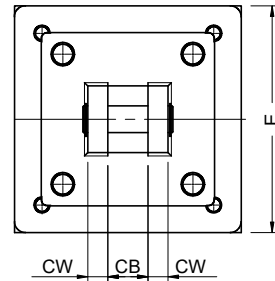
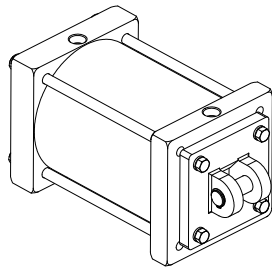
8" bore Style



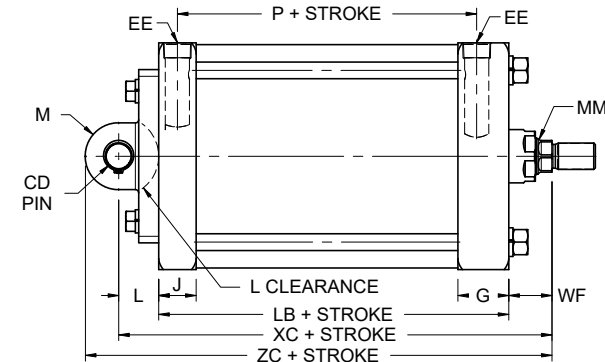
Pin and Snap ring Included



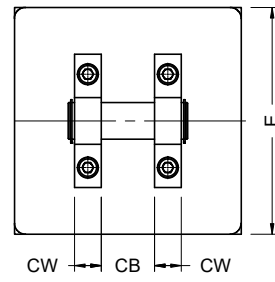
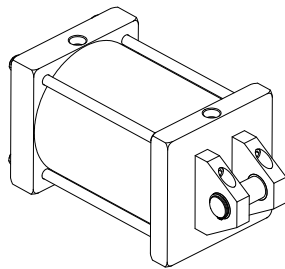
7" bore Style



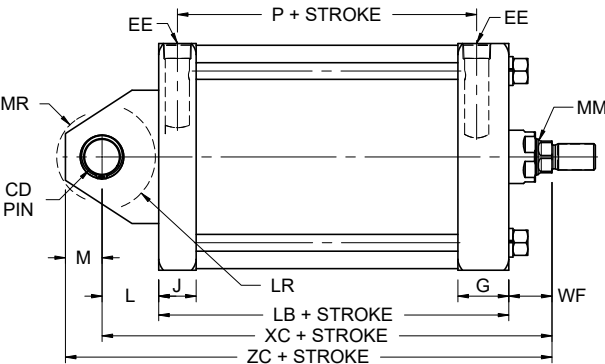
Pin and Snap ring Included



10" to 14" bore Style

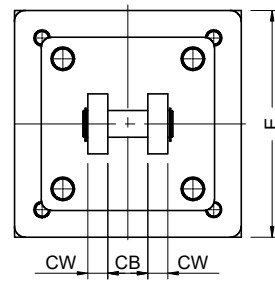
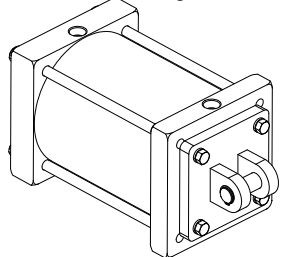


Pin and Snap ring Included

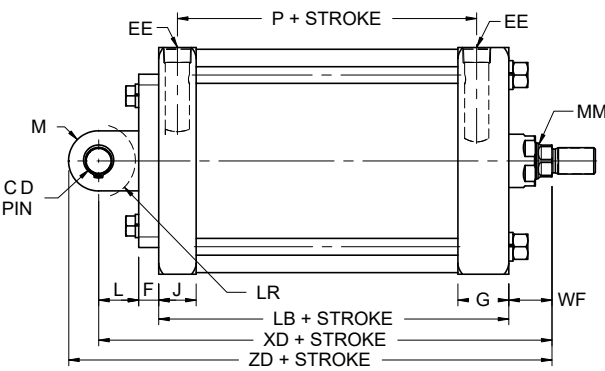


## ST3P2 - Steel Detachable Clevis NFPA MP2

7 & 8" bore Style



Pin and Snap ring Included



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD

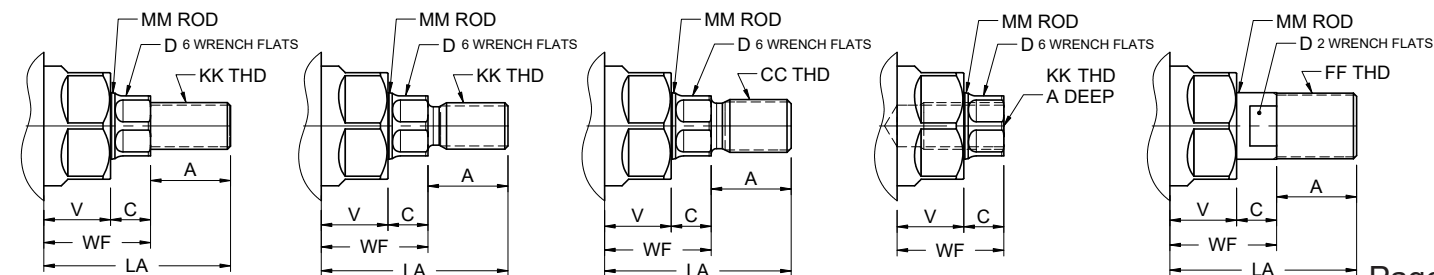
Studded Male #2S

Male #2

Intermediate Male #1

Female #4

Full Male #3



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

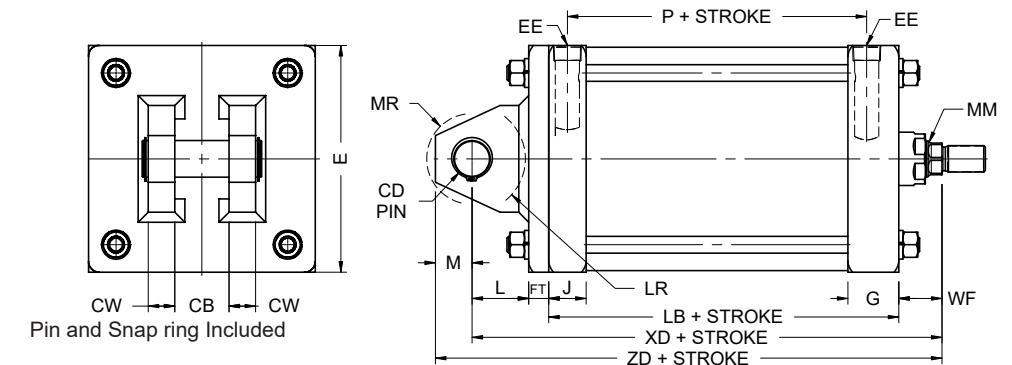
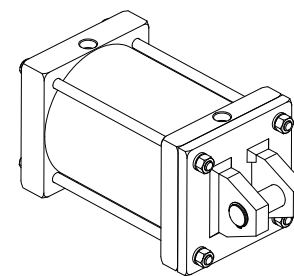
BORE	E	EE NPTF	F	FT	G	J	K	R	CB	CD +0.000 -0.002	CW	FL	L	LR	M	MR	Add Stroke	
																	LB	P
7.0	7.5	3/4	3/4	3/4	1 29/32	1 13/32	9/16	5.73	1 1/2	1	3/4	2 1/4	1 1/2	1 1/4	1	1 3/16	5 1/8	3 7/32
8.0	8.5	3/4	3/4	3/4	1 29/32	1 13/32	9/16	6.44	1 1/2	1	3/4	2 1/4	1 1/2	1 1/4	1	1 3/16	5 1/8	3 7/32
10	10.63	1	3/4	1	2 1/8	1 7/8	11/16	7.97	2	1 3/8	1	3 1/8	2 1/8	1 7/8	1 3/8	1 5/8	6 3/8	4 1/8
12	12.75	1-1/4	3/4	1	2 1/8	1 7/8	11/16	9.41	2 1/2	1 3/4	1 1/4	3 1/4	2 1/4	2 1/8	1 3/4	2 1/8	7 7/8	4 5/8
14	14.75	1-1/4	3/4	1	2 3/8	2 1/8	3/4	10.9	2 1/2	2	1 1/4	3 1/2	2 1/2	2 3/8	2	2 3/8	8 1/8	5 1/2

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.001	C	D	V	WF	ADD STROKE			
											XC	XD	ZC	ZD
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/4	9	9 1/4	10 1/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 1/2	9 1/4	9 1/2	10 1/2
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 5/8	9 3/8	9 5/8	10 5/8
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/4	9	9 1/4	10 1/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 1/2	9 1/4	9 1/2	10 1/2
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 5/8	9 3/8	9 5/8	10 5/8
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	10 3/8	11 3/8	11 3/4	11 3/8
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/8	1 7/8	10 1/2	11 1/2	11 7/8	11 1/2
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	10 3/4	11 3/4	12 1/8	11 3/4
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	11 1/8	12 1/8	12 7/8	12 1/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2	11 3/8	12 1/8	13 1/8	12 3/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	11 3/8	12 1/8	13 1/8	12 3/8
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8

## ST3P2 - Steel Detachable Clevis NFPA MP2

10" to 14" bore Style



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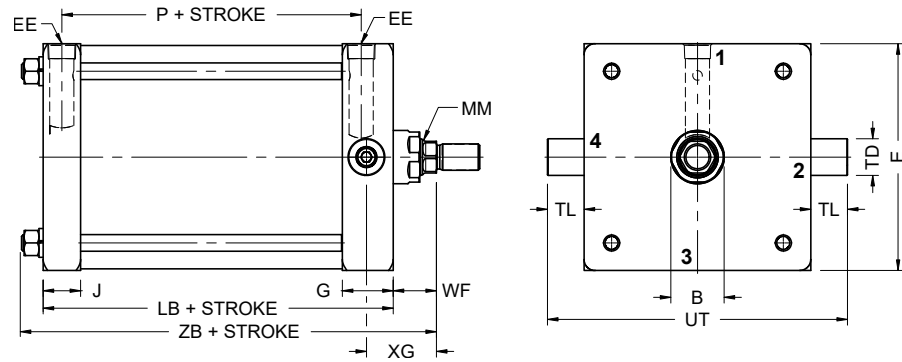
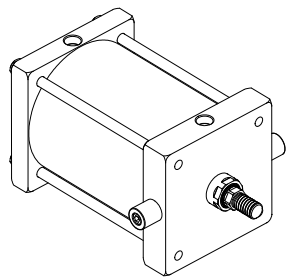
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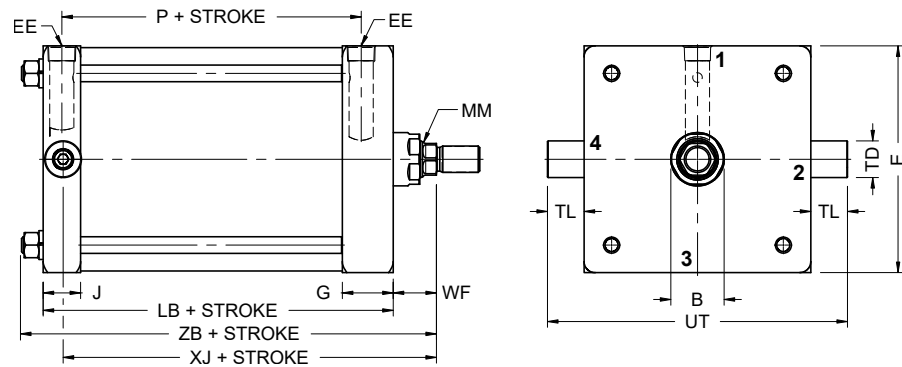
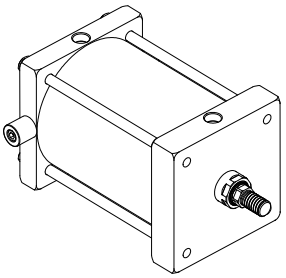
# STAR3 CYLINDERS

PIVOT MOUNT  
MT1 - MT2 - MT4

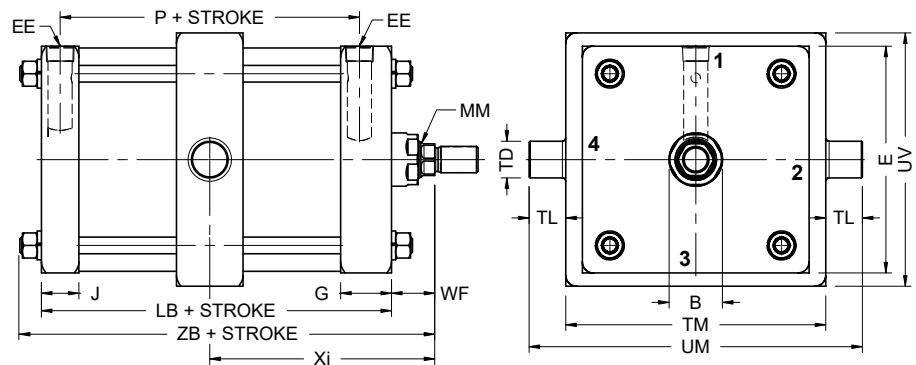
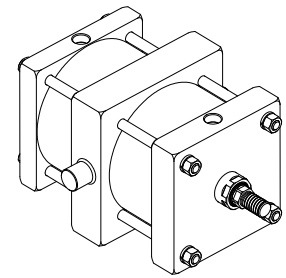
## ST3T1 - Detachable Head Trunnion Mount NFPA MT1



## ST3T2 - Detachable Cap Trunnion Mount NFPA MT2



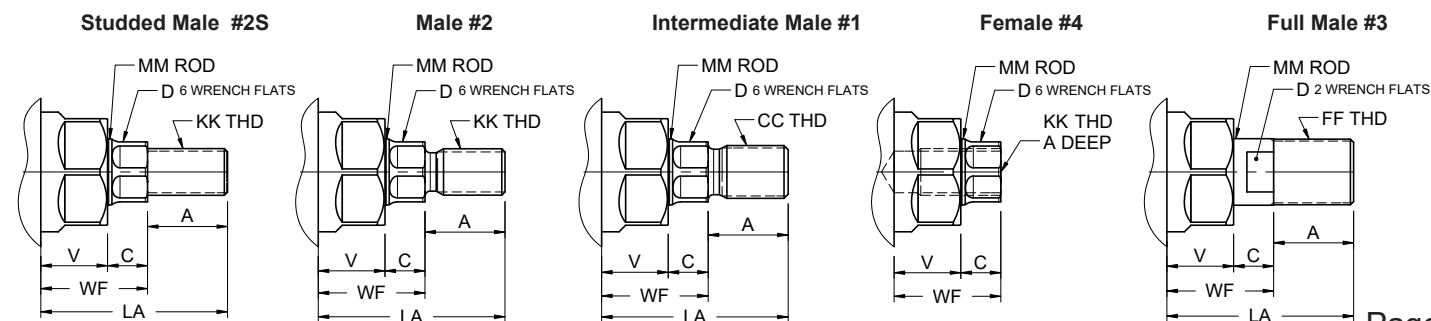
## ST3T4 - Intermediate Mid Trunnion Mount NFPA MT4



CUSTOMER MUST SPECIFY Xi - SEE TABLE FOR MIN Xi DIMENSION

## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	K	R	TD +0.000 -0.001	TL	TM	UM	UT	UV	Add Stroke		
													LB	P	MT4 (min stroke)
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	1.375	1 3/8	8 3/4	11 1/2	10 1/4	8 1/2	5 1/8	3 7/32	1
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	1.375	1 3/8	9 3/4	12 1/8	11 1/4	9 1/2	5 1/8	3 7/32	1
10	10.63	1	2 1/8	1 7/8	11/16	7.97	1.750	1 3/4	12	15 1/2	14 1/8	11 3/4	6 3/8	4 1/8	1
12	12.75	1-1/4	2 1/8	1 7/8	11/16	9.41	1.750	1 3/4	14	17 1/2	16 1/4	13 3/4	7 7/8	4 5/8	1
14	14.75	1-1/4	2 3/8	2 1/8	3/4	10.9	2.000	2	16 1/4	20 1/4	18 3/4	16	8 1/8	5 1/2	1

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.001	C	D	V	Min Xi	WF	Add Stroke		
												XJ	XG	ZB
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1		1 5/8	8 1/4	2 5/8	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8		1 7/8	8 1/2	2 7/8	7 9/16
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8		2	8 5/8	3	7 11/16
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	5 1/16	1 5/8	8 1/4	2 5/8	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	5 5/16	1 7/8	8 1/2	2 7/8	7 9/16
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	5 7/16	2	8 5/8	3	7 11/16
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	5 13/16	1 7/8	10 3/8	3	8 15/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/8	5 15/16	1 7/8	10 1/2	3 1/8	9 1/16
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	6 3/16	2 1/4	10 3/4	3 3/8	9 5/16
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	6 7/16	2	11 1/8	3 1/8	9 1/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	6 11/16	2	11 3/8	3 3/8	9 9/16
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	6 11/16	2 1/4	11 3/8	3 3/8	9 13/16
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	7 7/16	2 1/4	12 7/8	3 5/8	11 1/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	7 7/16	2 1/4	12 7/8	3 5/8	11 1/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	7 7/16	2 1/4	12 7/8	3 5/8	11 1/8



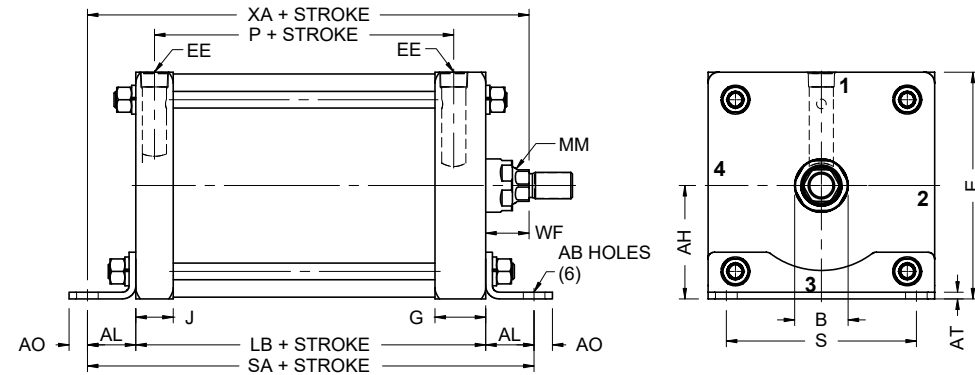
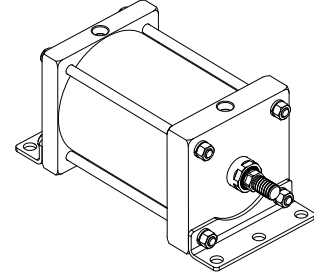
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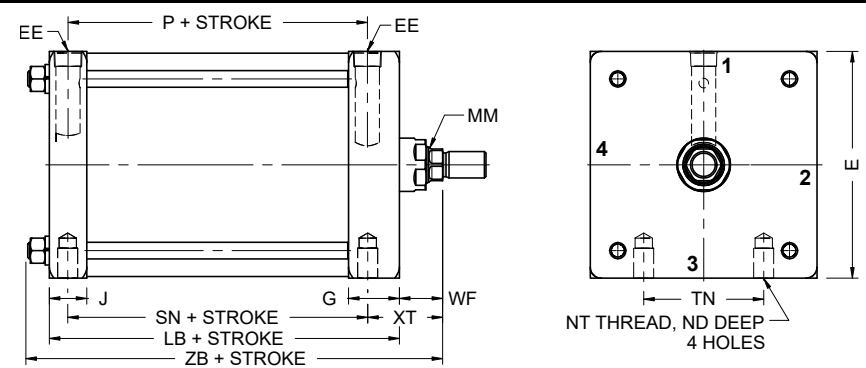
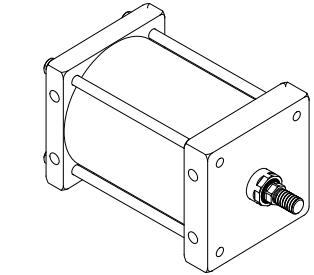
# STAR3 CYLINDERS

FOOT MOUNT  
MS1 - MS2 - MS4 - MS7

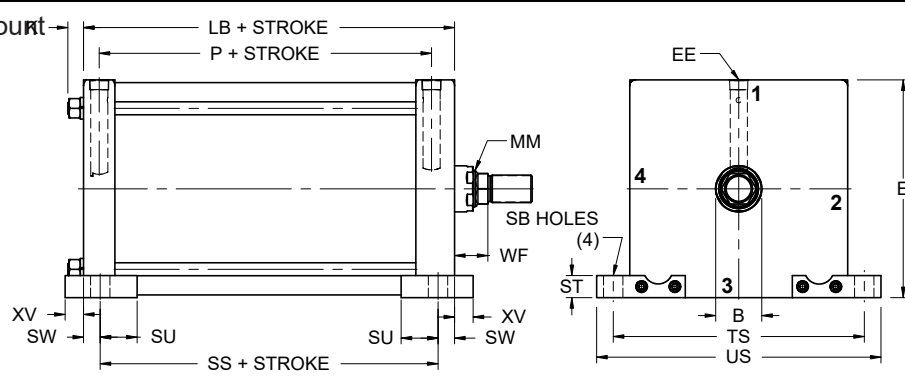
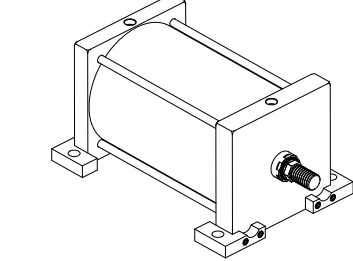
## ST3S1 - Detachable Angle Mount NFFPA MS1



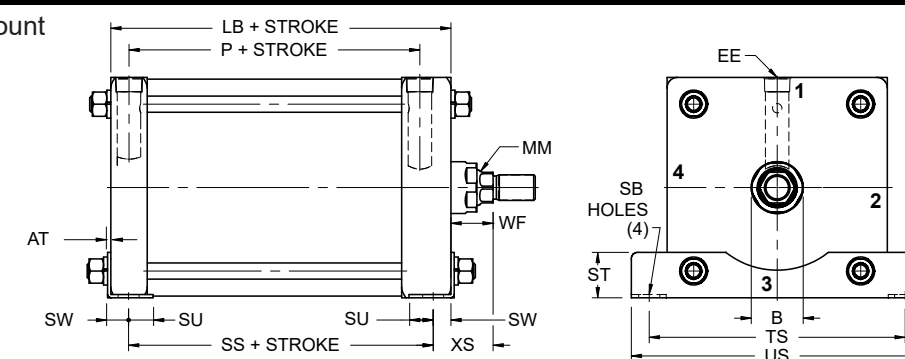
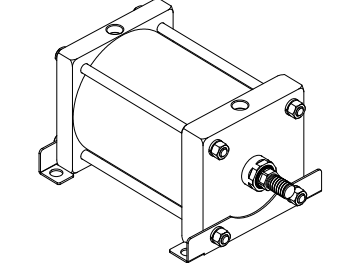
## ST3S4 Side Tapped Mount NFFPA MS4



## ST3X0....FA-MS2 - Detachable Side Lug Mount NFFPA MS2 compatible 10" to 14" bore

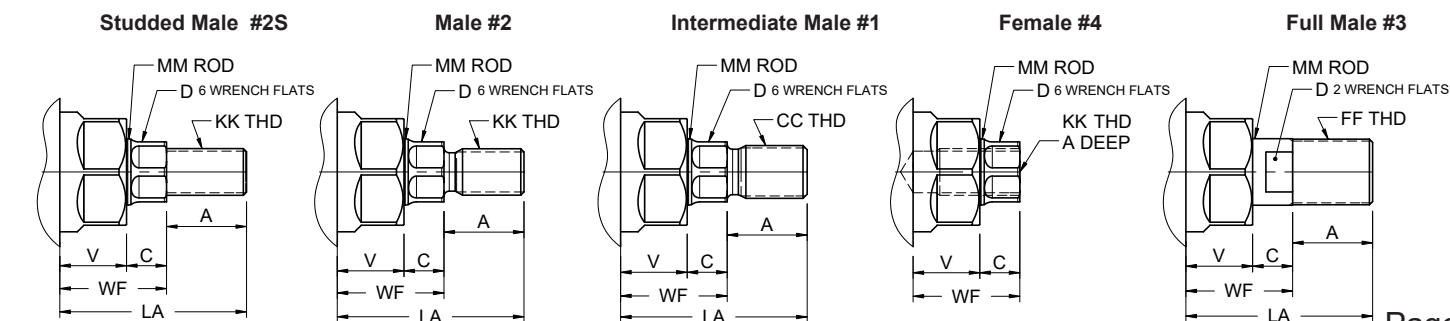


## ST3X0....FA-MS2 - Detachable Side Lug Mount NFFPA MS2 compatible 8" bore Only



## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	K	R	SB*	ST	SU	SW	TS	US	XV	ADD STROKE		
														LB	P	SS
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	AF	AF	AF	AF	AF	AF	AF	5 1/8	3 7/32	AF4
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	13/16	1 3/4	1 1/2	11/16	9 7/8	11 1/4	15/16	5 1/8	3 7/32	3 3/4
10	10.63	1	2 1/8	1 7/8	11/16	7.97	1 1/16		2	7/8	12 3/8	14 1/8		6 3/8	4 1/8	4 5/8
12	12.63	1	2 1/8	1 7/8	11/16	9.41	1 1/16		2	7/8	14 1/2	16 1/4		6 7/8	4 5/8	5 1/8
14	14.63	1	2 3/8	2 1/8	3/4		1 5/16		2 1/2	1 1/8	17	19 1/4		8 1/8	5 1/2	5 7/8

\* Upper surface spot faced for socket head screws

BORE	EB	NT	TN	ND	AB	AH	AL	AO	AT	S	ADD STROKE	
											SA	SN
7.0	11/16	3/4-10	3 1/2	1 1/8	13/16	3 3/4	1 13/16	11/16	1/8		8 3/4	3 1/4
8.0	11/16	3/4-10	4 1/2	1 1/8	13/16	4 1/4	1 13/16	11/16	1/8	7 1/8	8 3/4	3 1/4
10	13/16	1-8	5 1/2	1 1/2	1 1/16	5 5/16	2 1/8	7/8	1/4	8 7/8	10 5/8	4 1/8
12	13/16	1-8	7 1/4	1 1/2	1 1/16	6 3/8	2 1/8	7/8	3/8	11	11 1/8	4 5/8
14	15/16	1 1/4-7	8 3/8	1 7/8	1 5/16	7 3/8	2 7/16	1 1/16	3/8	12 5/8	13	5 1/2

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	XA	XS	XT	ADD STROKE
														ZB
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/4	2 5/16	2 13/16	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 1/2	2 9/16	3 1/16	7 9/16
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 5/8	2 11/16	3 3/16	7 11/16
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 9/16	2 5/16	2 13/16	7 7/16
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 13/16	2 9/16	3 1/16	7 9/16
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 15/16	2 11/16	3 3/16	7 11/16
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	10 3/8	2 3/4	3 1/8	8 15/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/8	1 7/8	10 1/2	2 7/8	3 1/4	9 1/16
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	10 3/4	3 1/8	3 1/2	9 5/16
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	11	2 7/8	3 1/4	9 1/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2	11 1/4	3 1/8	3 1/2	9 9/16
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	11 1/4	3 1/8	3 1/2	9 13/16
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	12 13/16	3 3/8	3 13/16	11 1/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	12 13/16	3 3/8	3 13/16	11 1/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	12 13/16	3 3/8	3 13/16	11 1/8



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# STAR3 CYLINDERS

7 TO 14" BORE

FOOT MOUNT  
MS7

# STAR3 CYLINDERS

ST3S7 - End Lug Mount  
NFFPA MS7

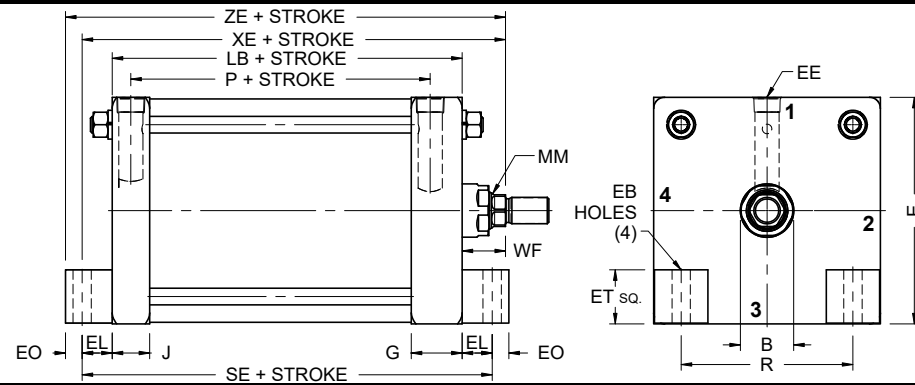
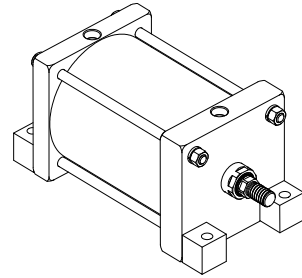


Table 1 - Envelope and Mounting Dimensions

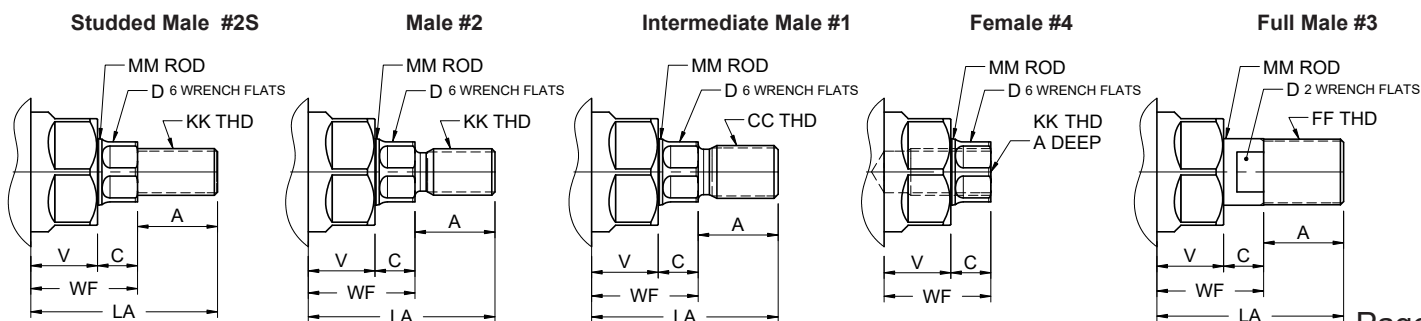
BORE	E	EE NPTF	G	J	K	R	EB	EL	EO	ET	Add Stroke		
											LB	P	SE
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	11/16	1 1/8	5/8	2	5 1/8	3 7/32	7 3/8
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	11/16	1 1/8	5/8	2	5 1/8	3 7/32	7 3/8
10	10.63	1	2 1/8	1 7/8	11/16	7.97	13/16	1 5/16	5/8	2 3/4	6 3/8	4 1/8	9
12	12.63	1	2 1/8	1 7/8	11/16	9.41	13/16	1 5/16	5/8	3 1/2	6 7/8	4 5/8	9 1/2
14	14.63	1	2 3/8	2 1/8	3/4	10.90	15/16	1 1/2	3/4	4	8 1/8	5 1/2	11 1/8

Table 2 - Rod Dimensions

BORE	Rod Size	#1	#2 & #4	#3	A	B +/- .001	C	D	V	WF	Add Stroke	
											ZE	XE
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/2	7 7/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 3/4	8 1/8
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 7/8	8 1/4
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	8 1/2	7 7/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 3/4	8 1/8
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 7/8	8 1/4
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	10 3/16	9 9/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/8	1 7/8	10 5/16	9 11/16
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	10 9/16	9 15/16
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	10 13/16	10 3/16
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2	11 1/16	10 7/16
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	11 1/16	10 7/16
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	12 5/8	11 7/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	12 5/8	11 7/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	12 5/8	11 7/8

## ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



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### ST3SB - Fixed Spherical Mount

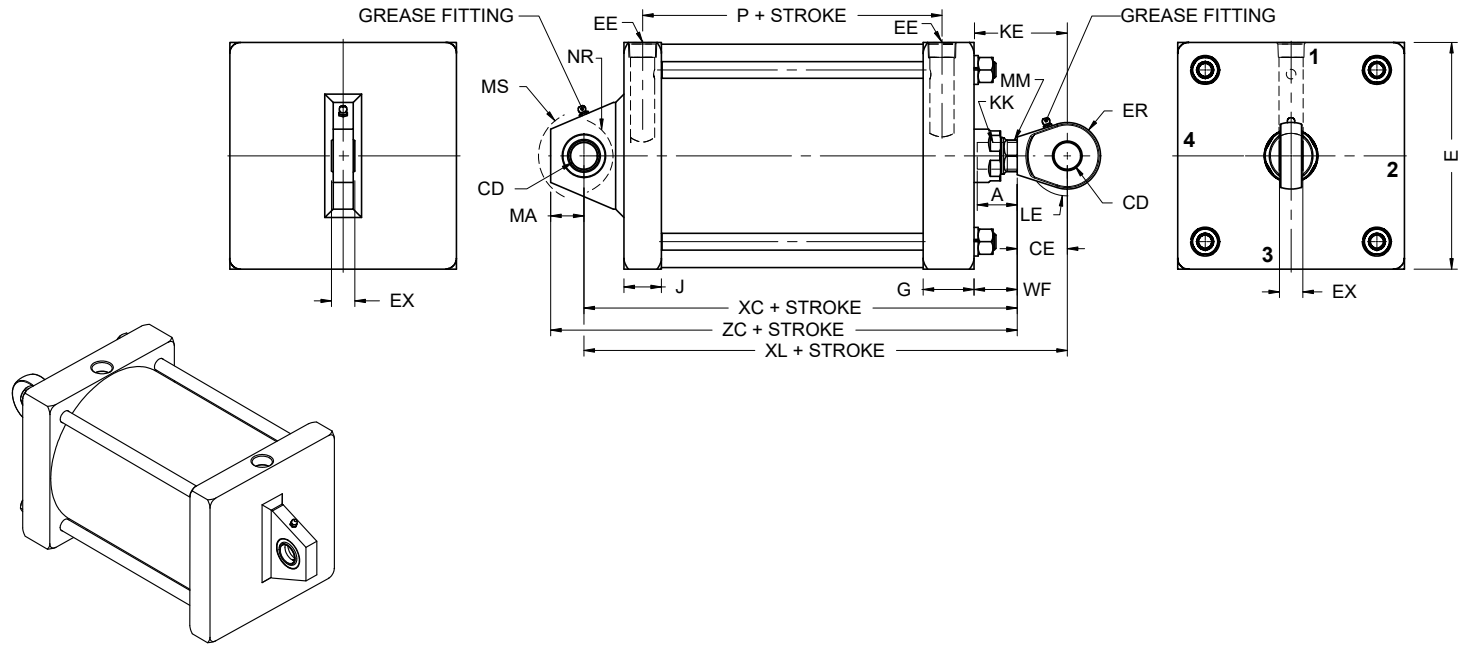


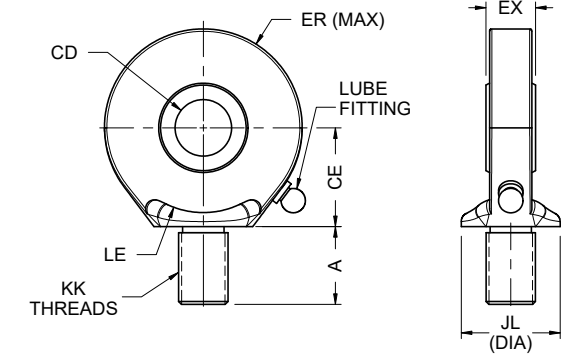
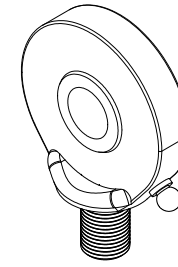
Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	CD +0.000 -0.001	CE	ER	EX	LE	MA	MS	NR	Add Stroke	
													LB	P
8	8.5	3/4	1 29/32	1 13/32	1.000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	5 1/8	3 7/32
10	10.63	1	2 1/8	1 7/8	1.375	2 1/8	1 11/16	1 3/16	1 7/8	1 7/8	2 7/16	1 5/8	6 3/8	4 1/8
12	12.63	1	2 1/8	1 7/8	1.750	2 1/2	2 1/16	1 17/32	2 1/8	2 1/2	2 7/8	2 1/16	6 7/8	4 5/8
14	14.63	1	2 3/8	2 1/8	2.000	2 3/4	2 1/2	1 3/4	2 1/2	2 1/2	3 5/16	2 3/8	8 1/8	5 1/2

Table 2 - Rod Dimensions

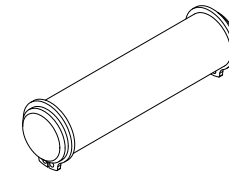
BORE	ROD SIZE	#4 KK	#7 KK	A	WF	KE	Add Stroke		
							XC	XL	ZC
8.0	1 3/8	1-14	-	1 5/8	1 5/8	2 3/4	8 1/4	10 1/8	9 1/2
	1 3/4	-	1-14	2	1 7/8	3	8 1/2	10 3/8	9 3/4
	2	-	1-14	2 1/4	2	3 1/8	8 5/8	10 1/2	9 7/8
10.00	1 3/4	1 1/4-12	-	2	1 7/8	3 1/4	10 3/8	12 1/2	12 1/4
	2	-	1 1/4-12	2 1/4	2	3 3/8	10 1/2	12 5/8	12 3/8
	2	-	1 1/4-12	2 1/4	2	3 5/8	10 3/4	12 7/8	12 5/8
12.00	2	1 1/2-12	-	2 1/4	2	3 3/4	11 1/8	13 5/8	13 5/8
	2 1/2	-	1 1/4-12	3	2 1/4	4	11 3/8	13 7/8	13 7/8
	3	-	1 1/4-12	3 1/2	2 1/4	4	11 3/8	13 7/8	13 7/8
14.00	2 1/2	1 1/4-12	-	3	2 1/4	4 1/4	12 7/8	15 5/8	15 5/8
	3	-	1 1/4-12	3 1/2	2 1/4	4 1/4	12 7/8	15 5/8	15 5/8
	3 1/2	-	1 1/4-12	3 1/2	2 1/4	4 1/4	12 7/8	15 5/8	15 5/8

### NFPA Spherical Rod Eye

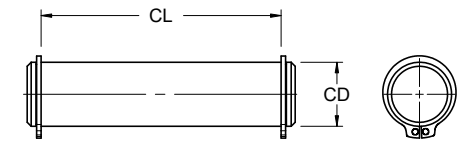


Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
6 & 8	RES-10	1.0000 <sup>-0005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860
10	RES-13	1.3750 <sup>-0005</sup>	2	2 1/8	1 3/16	1 11/16	1 7/8	1 1/4-12	2	28562
12	RES-17	1.7500 <sup>-0005</sup>	2 1/8	2 1/2	1 17/32	2 1/16	2 1/8	1 1/2-12	2 1/4	43005
14	RES-20	2.0000 <sup>-0005</sup>	2 7/8	2 3/4	1 3/4	2 1/2	2 1/2	1 7/8-12	2 3/4	70193

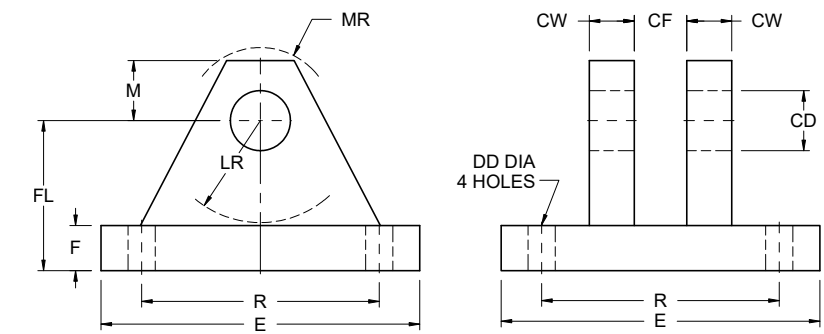
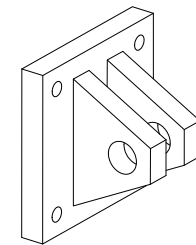
### NFPA Spherical Pivot Pin



Bore Size	Part #	CD	CL	LOAD
6 & 8	PS-10	1.0000 <sup>-0005</sup>	2 1/2	34300
10	PS-13	1.3750 <sup>-0006</sup>	3 5/16	65000
12	PS-17	1.7500 <sup>-0006</sup>	4 7/32	105200
14	PS-20	2.0000 <sup>-0007</sup>	4 15/16	137400



### NFPA SPHERICAL CLEVIS BRACKET



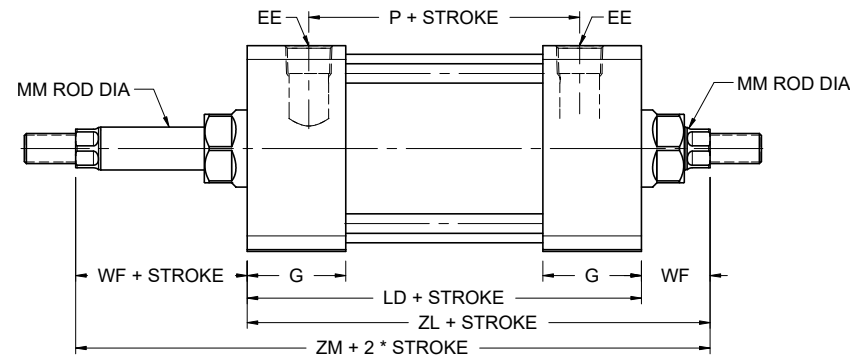
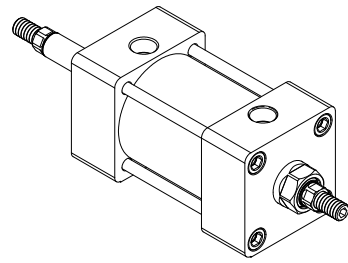
Bore Size	Part #	CD	CF	CW	DD	E	F	FL	LR	M	MR	R	LOAD
6 & 8	CBS-10	1 <sup>+0.004</sup> -0.002	7/8	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1	1 3/16	4.10	14300
10	CBS-13	1 3/8 <sup>+0.004</sup> -0.002	1 3/16	1	21/32	6 1/2	7/8	3 1/2	2 7/16	1 3/8	1 5/8	4.95	20322
12	CBS-17	1 3/4 <sup>+0.004</sup> -0.002	1 17/32	1 1/4	29/32	8 1/2	1 1/4	4 1/2	2 7/8	1 3/4	2 1/16	6.58	37800
14	CBS-20	2 <sup>+0.004</sup> -0.002	1 3/4	1 1/2	29/32	10 5/8	1 1/2	5 1/2	3 5/16	2	2 3/8	7.92	50375

# STAR3 CYLINDERS

## DOUBLE ROD CYLINDER

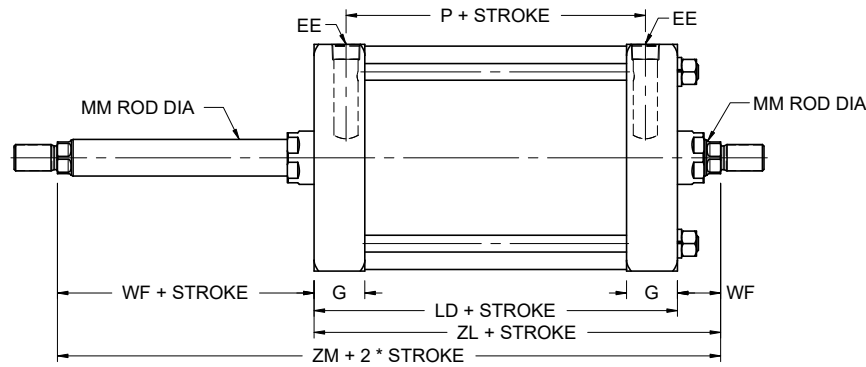
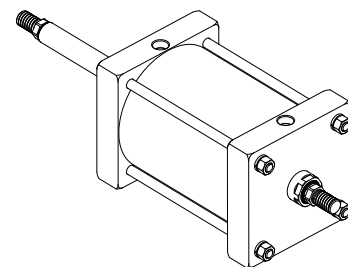
ST3DR - Double rod End Cylinder

1.5 to 6" bore



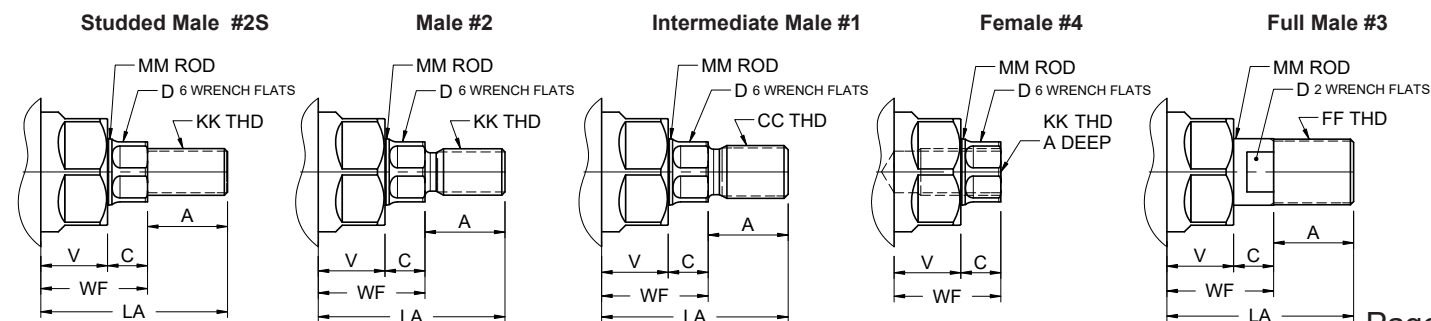
ST3DR - Double rod End Cylinder

7 to 14" bore



### ROD END STYLE

\* FOR 5/8 & 1" ROD, THE ROD END WILL BE STUDED #2S STANDARD



# STAR3 CYLINDERS

## 1.5 TO 14" BORE DOUBLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	K	R	ADD STROKE					
						SS <sub>D</sub>	SN <sub>D</sub>	SE <sub>D</sub>	SA <sub>D</sub>	LD	P
						MS2	MS4	MS7	MS1		
1.5	2	3/8	1 7/16	1/4	1.43	3 3/8	2 3/4	6	6.5	4 1/8	
2.0	2 1/2	3/8	1 7/16	5/16	1.84	3 3/8	2 3/4	6 3/8	6.5	4 1/8	
2.5	3	3/8	1 7/16	5/16	2.19	3 1/2	2 7/8	6 3/4	6.625	4 1/4	
3.25	3 3/4	1/2	1 13/16	3/8	2.76	3 3/4	3 1/8	7 1/8	7.875	4 3/4	
4.0	4 1/2	1/2	1 13/16	3/8	3.32	3 3/4	3 1/8	7 3/8	7.875	4 3/4	
5.0	5 1/2	1/2	1 13/16	7/16	4.10	3 5/8	3 3/8	7 3/4	8.375	5	
6.0	6 1/2	3/4	1 15/16	7/16	4.88	4 1/8	3 5/8	8 1/4	9	5 1/2	
7.00	7.5	3/4	1 29/32	9/16	5.73	4 1/4	3 3/4	7 7/8	9 1/4	5 5/8	
8.00	8.5	3/4	1 29/32	9/16	6.44	4 1/4	3 3/4	7 7/8	9 1/4	5 5/8	
10.00	10.63	1	2 1/8	11/16	7.97	4 7/8	4 3/8	9 1/4	10 7/8	6 5/8	
12.00	12.63	1	2 1/8	11/16	9.41	5 3/8	4 7/8	9 3/4	11 3/8	7 1/8	
14.00	14.63	1	2 3/8	3/4	10.90	6 1/8	5 3/4	11 3/8	13 1/4	8 3/8	

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	Add Stroke			Add 2X Stroke
											ALL MOUNTING STYLE	MS7	MS7	ALL MOUNTING STYLE
											ZL	XE <sub>D</sub>	ZE <sub>D</sub>	ZM
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 1/8	5 7/8	6 1/8	6 1/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 1/2	6 1/4	6 1/2	6 7/8
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 1/8	6 1/16	6 3/8	6 1/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	5 1/2	6 7/16	6 3/4	6 7/8
2.5	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 3/4	6 11/16	7	7 3/8
	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	5 1/4	6 5/16	6 5/8	6 1/4
3.25	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 7/8	6 15/16	7 1/4	7 1/2
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 1/8	7	7 3/8	7 1/2
4.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	6 3/8	7 1/4	7 5/8	8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	6 5/8	7 1/2	7 7/8	8 1/2
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	6 1/8	7 1/8	7 1/2	7 1/2
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	6 5/8	7 11/16	8 3/16	8 1/4
6.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	6 7/8	7 15/16	8 7/16	8 3/4
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 1/8	8 1/8	8 5/8	8 3/4
7.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	7 3/8	8 3/8	8 7/8	9 1/4
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	7 15/16	9	8 3/8	9 9/16
8.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	8 1/16	9 1/4	8 5/8	9 15/16
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2.623	7/8	1 11/16	1 1/8	2	8 3/16	9 3/8	8 3/4	10 3/16
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	9 3/16	10 7/16	9 13/16	11 1/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/8	1 7/8	9 5/16	10 9/16	9 15/16	11 3/16
12.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	9 9/16	10 13/16	10 3/16	11 13/16
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	9 3/8	11 1/16	10 7/16	11 3/8
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2	9 13/16	11 5/16	10 11/16	11 13/16
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	10 11/16	11 5/16	10 11/16	12 5/16
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	1	2 1/16	1 1/4	2 1/4	11 3/8	12 7/8	12 1/8	13 5/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	11 3/8	12 7/8	12 1/8	13 5/8
14.00	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	11 3/8	12 7/8	12 1/8	13 5/8



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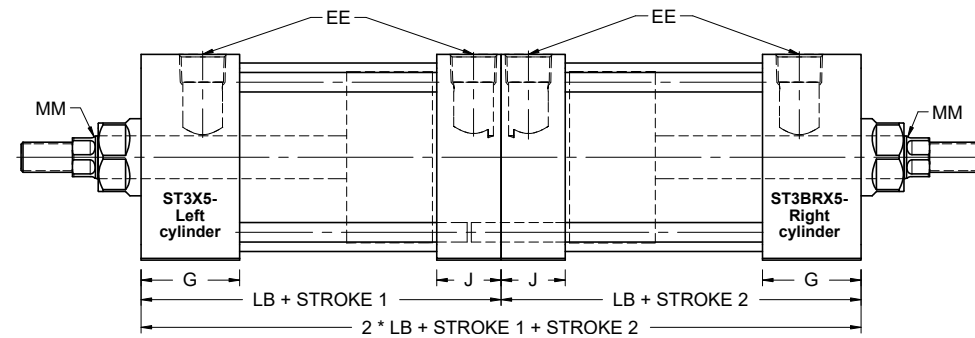
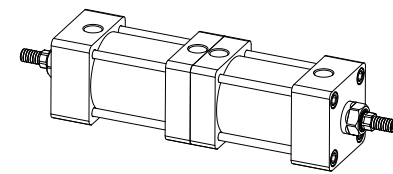
STARCYL CANADA INC  
2340 Michelin Street, Laval  
Quebec, Canada, H7L 5C3  
1-877-STARCYL (782-7295)  
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This Model is two cylinders mounted back to back. Each cylinder can be operated independently. The cylinders can have the same stroke or different strokes. This configuration enables you to have four positions of rods extended or retracted.

Unlike a three-position cylinder (Multi position page **XX**), a back-to-back cylinder provides "Hard" stop positioning.

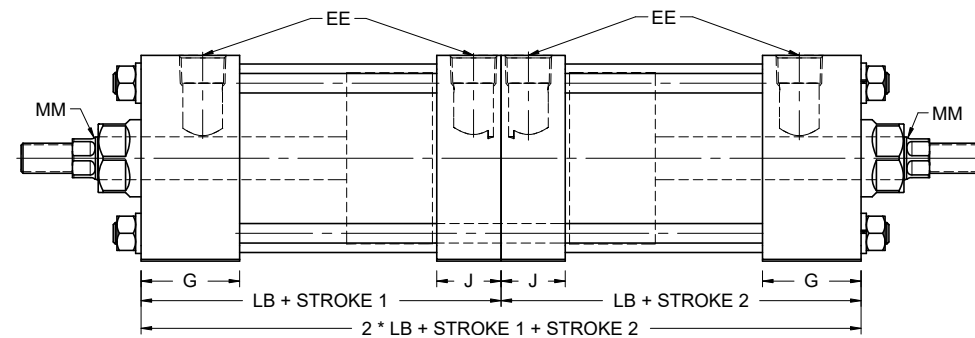
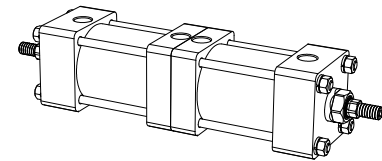
### ST3BBX5 Back To Back

Right cylinder Tie rods bolted in  
Left cylinder Cap end



### ST3BBX0 Back To Back

Single Tie rods design



### ST3BBX5F2 Back To Back

2 Cylinders bolted by rear Flange

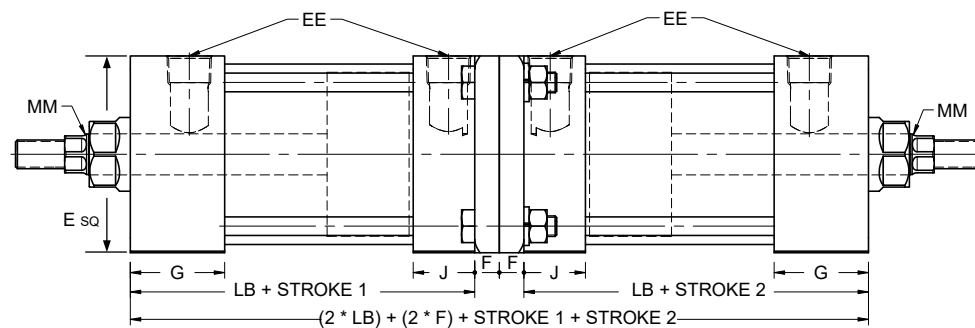
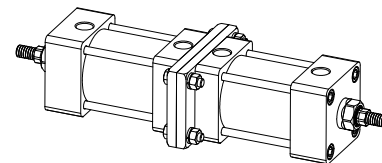


Table 1 - Envelope and Mounting Dimensions

BORE	MM	E	EE	G	J	LB	R
1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	3 5/8	1.430
2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	3 5/8	1.840
2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	3 3/4	2.190
3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	4 1/4	2.760
4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	4 1/4	3.320
5	1 & 1 3/8"	5 1/2	1/2	1 11/16	1 3/16	4 1/2	4.120
6	1 3/8 & 1 3/4"	6 1/2	3/4	1 15/16	1 7/16	5	4.880

Also available in 7", 8", 10 & 12" bore

This model consists of multiple cylinders built as one unit having only one exposed working rod end, capable of delivering at least 3 positions. (Piston rod not attached) Three-Position cylinders rely on the back of the piston rod to push against the front piston rod to create the intermediate position, Care must be used to prevent the front piston rod from extending in the intermediate position.

Position I : Pressure to port "A" fully retracts cylinder

Position II : Pressure to port "D" advances cylinder to mid-stroke positions

Position III : Pressure to port "C" fully extends cylinder.

B : Breather/Vent

How to make the part number :

Application calls for a 1.5" bore with stroke position of 0", 2" and 4", with front flange mount.

The part number will be : ST3MPF1-1.50X02.00&04.00X0.63-#2-...

### ST3MPX5 Multi-position

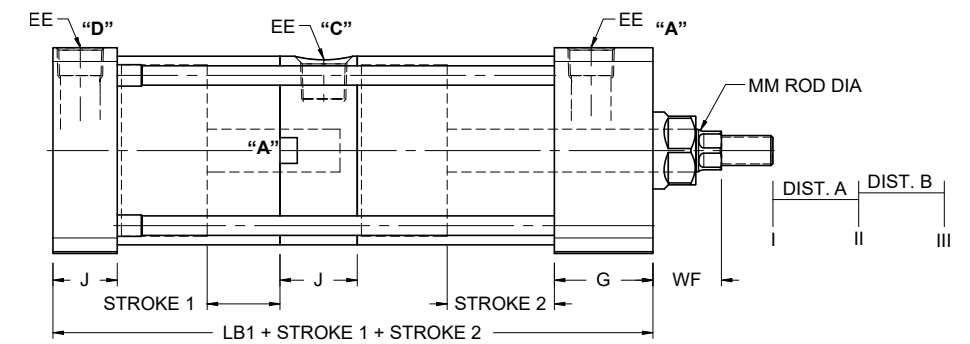
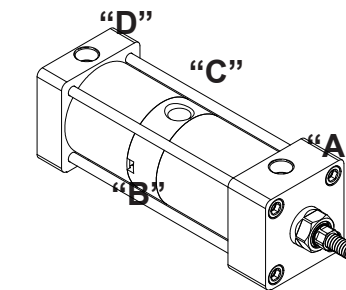


Table 1 - Envelope and Mounting Dimensions

BORE	MM	E	EE	G	J	LB1	R
1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	5 3/4	1.430
2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	5 3/4	1.840
2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	6	2.190
3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	6 3/4	2.760
4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	6 3/4	3.320
5	1 & 1 3/8"	5 1/2	1/2	1 11/16	1 3/16	7 1/4	4.120
6	1 3/8 & 1 3/4"	6 1/2	3/4	1 15/16	1 7/16	8	4.880



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# STAR3 CYLINDERS

## TANDEM CYLINDER

### TANDEM CYLINDER

The Air over Oil design is the most use of tandem cylinders today. You can use any combination of mounts available.

Air provides the force to extend and retract the cylinder in the first part while the second part filled with oil provides the precise control of the stroke.

By metering the flow of the hydraulic side of the cylinder, a constant velocity is achieved throughout the stroke, even at very slow speed that air cylinder typically chatter.

Other Application is to double the force in Extend or Retract, by supplying air Pressure to both ports in Extend A 1&2 or Retract. B 1&2

### ST3TDE5 Tandem Cylinder

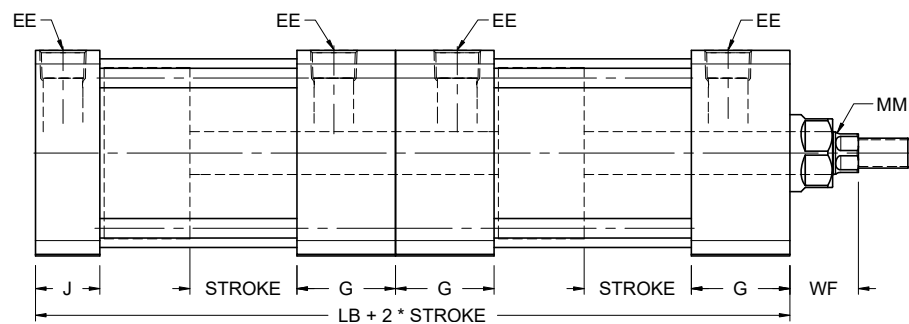
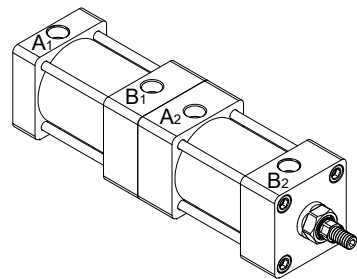


Table 1 - Envelope and Mounting Dimensions

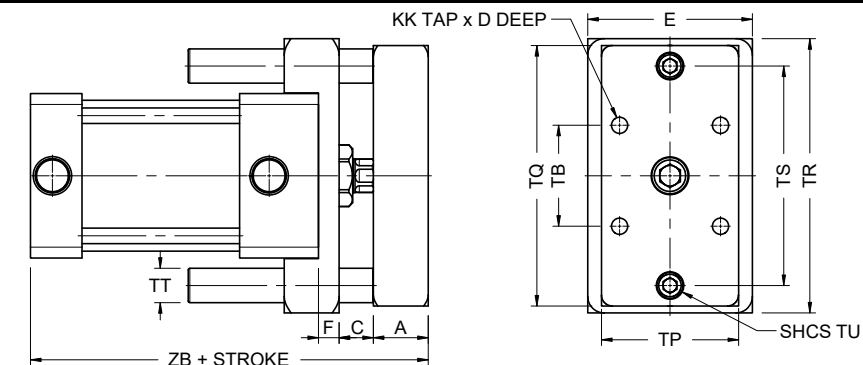
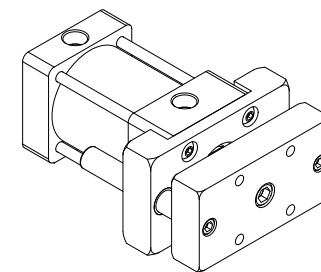
MODEL	BORE	MM	E	EE	G	J	LB	BL
ST3TD & ST3OTD	1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	3 5/8	1.430
	2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	3 5/8	1.840
	2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	3 3/4	2.190
	3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	4 1/4	2.760
	4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	4 1/4	3.320
	5	1 & 1 3/8"	5 1/2	1/2	1 11/16	1 3/16	4 1/2	4.120
6	1 3/8 & 1 3/4"	6 1/2	3/4	1 15/16	1 7/16	5	4.880	

Also available in 7", 8", 10 & 12" bore

# STAR3 CYLINDERS

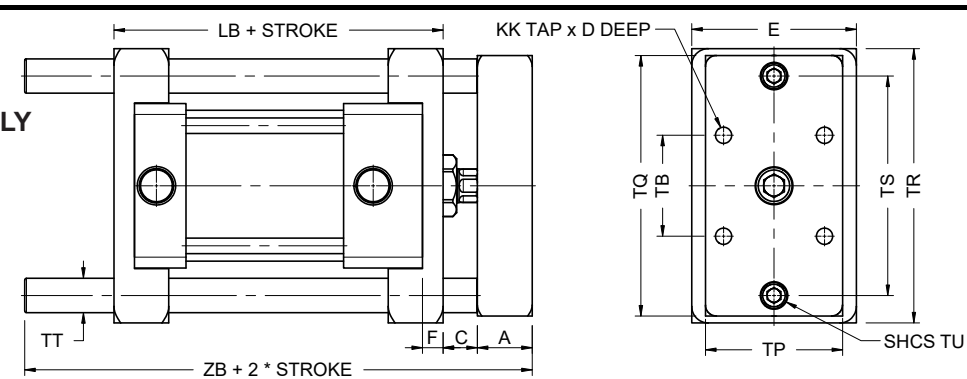
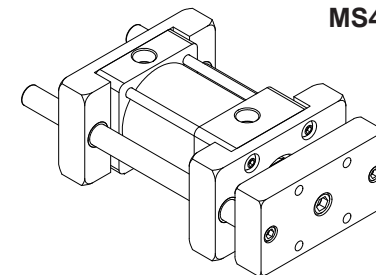
## NON ROTATING EXTERNAL

### -NRE Non Rotating External Single

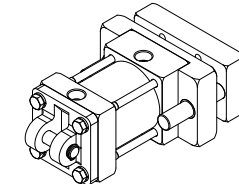


### -NRED Non Rotating External Double

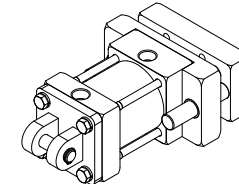
MS4 MOUNT ONLY



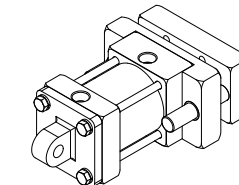
### MP2 MOUNT



### MP1 MOUNT

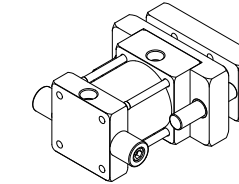


### MP4 MOUNT

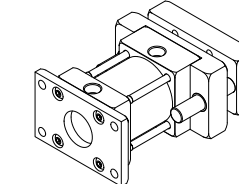


-NRE AND -NRED DIMENSIONS								
Bore	1.5	2	2.5	3.25	4	5	6	
A	1	1	1	1 1/4	1 1/4	1 1/4	1 1/2	
C	5/8	5/8	5/8	3/4	3/4	3/4	7/8	
D	3/4	3/4	1	1	1	1 1/4	1 1/2	
E	2	2 1/2	3	3 3/4	4 1/2	5 1/2	6 1/2	
F	3/8	3/8	3/8	5/8	5/8	5/8	3/4	
KK	10-32	1/4-28	5/16-24	3/8-24	3/8-24	1/2-20	1/2-20	
TB	1.12	1.43	1.84	2.19	2.78	3.32	4.12	
TP	1 1/2	2	2 1/2	3	3 3/4	4 1/2	5 1/2	
TQ	3 3/4	4 1/4	4 3/4	6 1/2	7 1/4	8 1/4	10	
TR	4	4 1/2	5	6 3/4	7 1/2	8 1/2	10 1/2	
TS	3	3 1/2	4	5 1/4	6	7	8 1/2	
TT	5/8	5/8	5/8	1	1	1	1 3/8	
TU	5/16-24	5/16-24	5/16-24	1/2-20	1/2-20	1/2-20	5/8-18	
ZB	5 5/8	5 5/8	5 3/4	6 7/8	6 7/8	7 1/8	8 1/8	

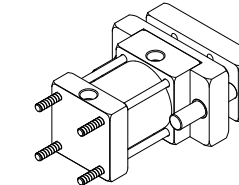
### MT2 MOUNT



### MF2 MOUNT



### MX2 MOUNT



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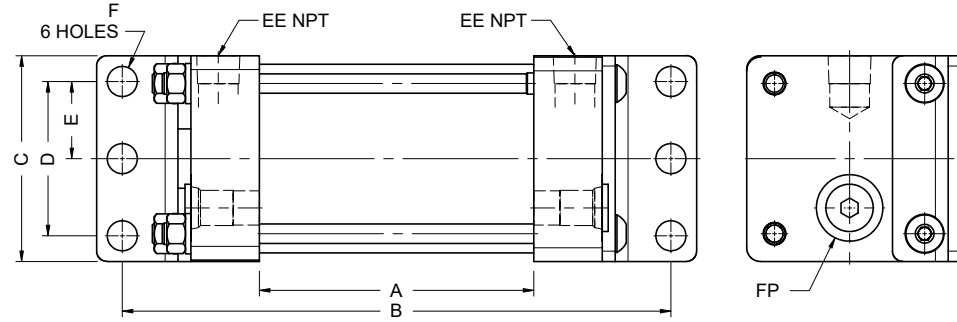
### STARCYL CANADA INC

2340 Michelin Street, Laval  
Quebec, Canada, H7L 5C3  
1-877-STARCYL (782-7295)  
www.Starcyl.ca

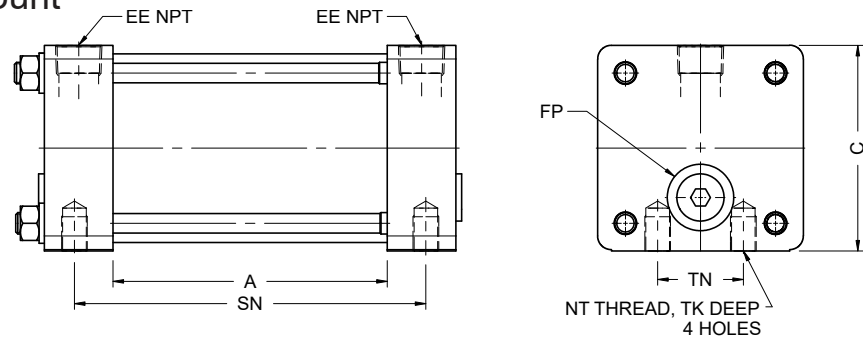
# STAR3 CYLINDERS

## AIR/OIL & AIR TANK

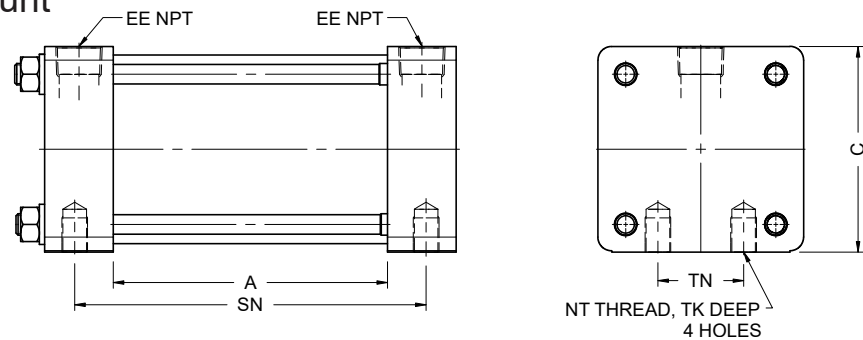
### ST3TKS1 Air/Oil Tank Angle Mount



### ST3TKS4 Air/Oil Tank Side Taped Mount



### ST3TKS4-A Air Tank Side Taped Mount



### ST3TKS1-A Air Tank Angle Mount

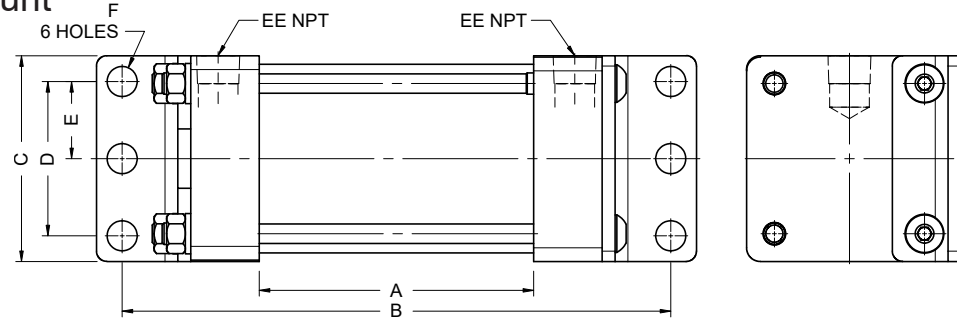


Table 1 - Envelope and Mounting Dimensions

BORE	AREA	VOLUME GALS PER INCH OF TANK	ADD LENGTH			TANK DIMENSIONS							
			A	B	SN	C	D	E	F	EE	TN	NT	TK
2.50	4.90	0.0213	0	4	1 1/8	3	2 1/4	1 1/8	7/16	3/8	1 1/4	3/8-16	5/8
3.25	8.29	0.0359	0	5	1 3/8	3 3/4	2 3/4	1 3/8	9/16	1/2	1 1/2	1/2-13	3/4
4.00	12.56	0.0544	0	5	1 3/8	4 1/2	3 1/2	1 3/4	9/16	1/2	2 1/16	1/2-13	3/4
5.00	19.64	0.0850	0	5 1/4	1 3/8	5 1/2	4 1/4	2 1/8	11/16	1/2	2 11/16	5/8-11	1
6.00	28.00	0.1224	0	5 3/4	1 5/8	6 1/2	5 1/4	2 5/8	13/16	3/4	3 1/4	3/4-10	1 1/8
8.00	50.26	0.2175	0	6 5/8	1 5/8	8 1/2	7 1/8	3 9/16	13/16	3/4	4 1/2	3/4-10	1 1/8

HOW TO ORDER : Just use the internal length as suffix to the part number

Ex: ST3TKS1-2.5X10. Min Internal length (A) with Baffles: 3" Page 48

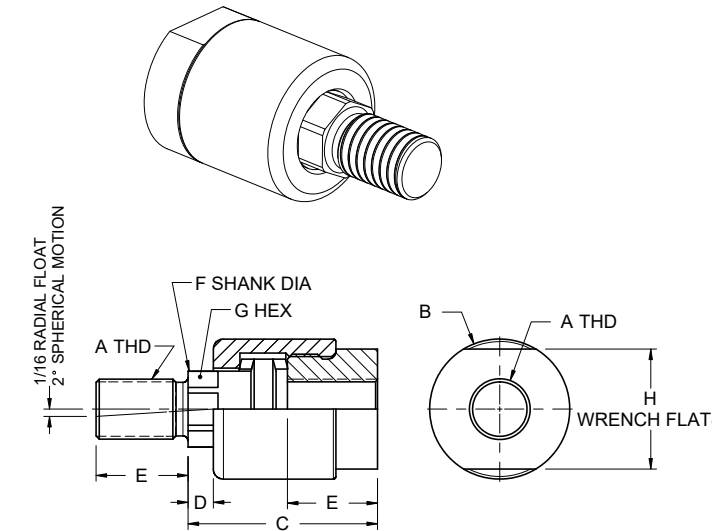
# STAR3 CYLINDERS

## ALIGNMENT COUPLER

### Linear Alignment Couplers

Starcyl's linear alignment couplers extend the bearing and seal life of your cylinders. Our couplers prevent binding and erratic movement that misalignment causes, which eventually wears down your cylinders. Not only do Starcyl couplers work equally well in "push" and "pull" applications, but they allow a greater tolerance between the cylinder center line and the mating member.

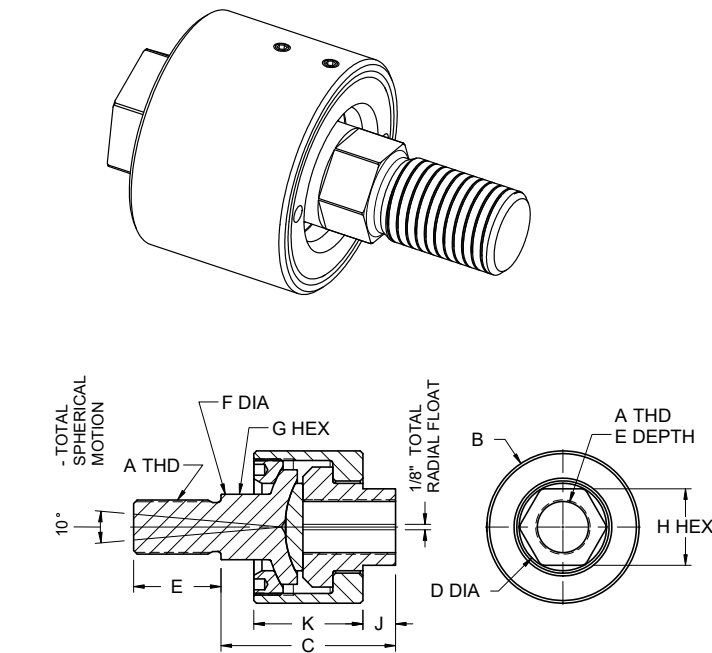
#### AC Alignment coupler - regular



\* Use jam nut to lock coupler to rod when used with full diameter threads.

Part #	A	B	C	D	E	F	G	H	MAX PULL AT YIELD
AC-0250F	1/4-28	7/8	1 1/4	1/4	5/8	0.245	3/16	13/16	6000
AC-0312F	5/16-24	7/8	1 1/4	1/4	5/8	0.308	1/4	13/16	8300
AC-0375C	3/8-16	7/8	1 1/4	1/4	5/8	0.369	5/16	13/16	5000
AC-0375F	3/8-24	7/8	1 1/4	1/4	5/8	0.370	5/16	13/16	8300
AC-0437F	7/16-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	10000
AC-0500C	1/2-13	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-0500F	1/2-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-0625F	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1 1/8	14000
AC-0750C	3/4-10	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-0750F	3/4-16	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-0875F	7/8-14	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-1000C	1-8	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1000F	1-14	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1250F	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1375F	1 3/8-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1500F	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	134000
AC-1750F	1 3/4-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	134000
AC-1875F	1 7/8-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	240000
AC-200F	2-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	240000

#### AC Alignment coupler - Heavy Duty



Part #	A	B	C	D	E	F	G	H	MAX PULL AT YIELD
	Rod Thread	Outside diameter	Body dim	Female diameter	Thread length	Male rod diameter	hex rod end	Hex Female	
AC-1250HD	1 1/4-12	3 1/2	4	1 1/2	2	1 1/2	1 1/4	2 1/4	123300
AC-1500HD	1 1/2-12	4	4 3/8	2	2 1/4	1 3/4	1 1/2	3	183000
AC-1750HD	1 3/4-12	4	4 3/8	2	2 1/4	2	1 1/2	3	233400
AC-1875HD	1 7/8-12	5	5 7/8	3	3	2 1/4	2	3 1/2	270200
AC-2000HD	2-12	5	5 7/8	3	3	2 1/4	2	3 1/2	309800
AC-2250HD	2 1/4-12	6 3/4	6 3/8	3 1/4	3 1/2	2 3/4	2 3/8		397000
AC-2500HD	2 1/2-12	7	6 1/2	4	3 1/2	3 1/4	2 7/8		495000
AC-2750HD	2 3/4-12	7	6 1/2	4	3 1/2	3 1/4	2 7/8		603800
AC-3000HD	3-12	7	6 1/2	4	3 1/2	3 1/4	2 7/8		723400
AC-3250HD	3 1/4-12	9 1/4	8 1/2	5 1/4	4 1/2	4	3 3/8		853800
AC-4500HD	4 1/2-12	12 7/8	11 1/4	7 3/4	4 1/2	5 1/2	4 7/8		1483400



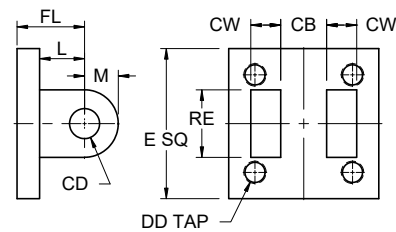
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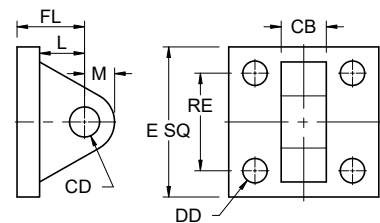
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Quebec, Canada, H7L 5C3  
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www.Starcyl.ca

### NFPA CLEVIS BRACKET



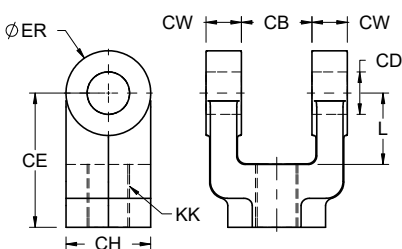
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE	USED WITH MP4
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	1.5, 2 & 2.5
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3.25, 4 & 5
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4	6, 7 & 8
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16	8, 10 & 12
CB-17	2.531	1 3/4	1 1/4	7/8-14	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16	10 & 12

### NFPA EYE BRACKET



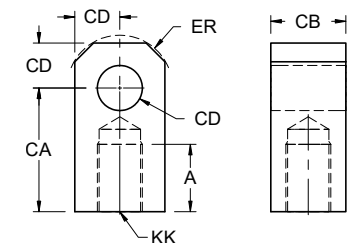
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE	USED WITH MP1 & MP2
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8	1.5, 2 & 2.5
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3.25, 4 & 5
EB-10	1.50	1	21/32	4 1/2	2 1/4	1 1/2	1	3 1/4	6, 7 & 8
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	1 3/8	3 13/16	8, 10 & 12
EB-17	2.50	1 3/4	29/32	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16	10 & 12

### NFPA ROD CLEVIS



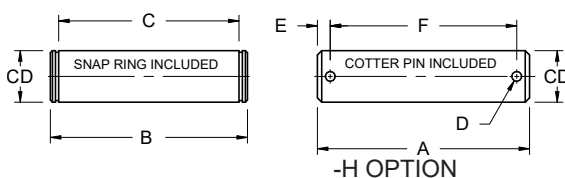
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2
RC-13	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8
RC-17	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 1/2-12	2 1/4
RC-20	2.531	2	5 1/2	2 15/16	1 1/4	2	1 7/8-12	2 1/2

### NFPA ROD EYE



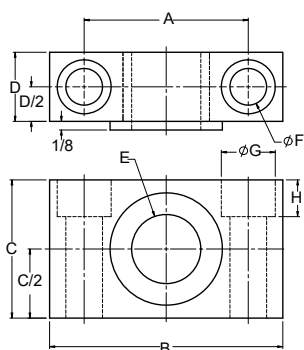
Part #	A	CA	CB	CD PIN DIA.	ER	KK
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16
RE-10	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14
RE-13	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12
RE-17	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12
RE-20	3	5	2 1/2	2	2 1/2	1 7/8-12

### NFPA PIN



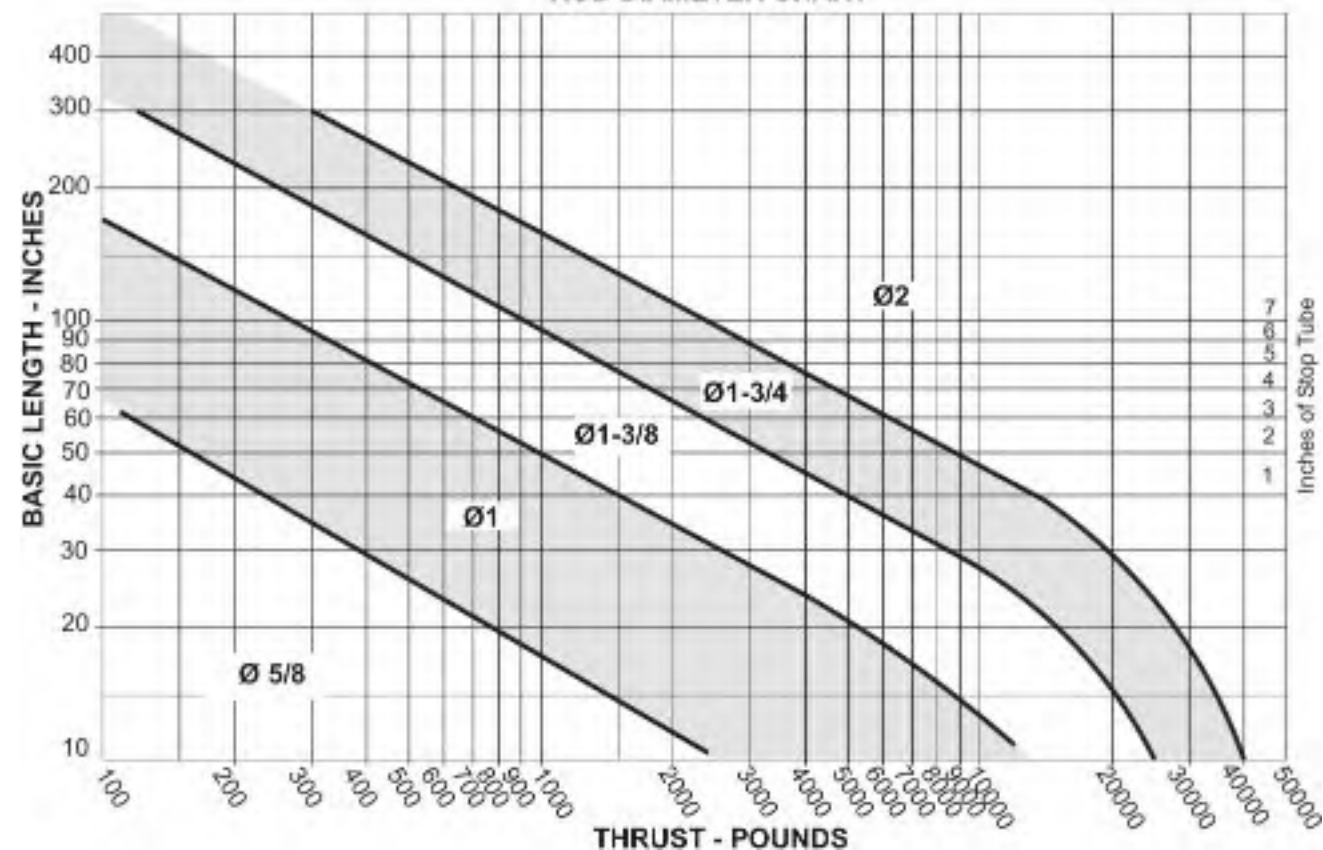
Part #	CD	A	B	C	D	E	F
P-05	1/2	2.281	2.094	1.875	0.106	0.172	1.938
P-07	3/4	3.094	2.875	2.625	0.140	0.188	2.719
P-10	1	3.594	3.375	3.125	0.140	0.188	3.219
P-13	1 3/8	4.656	4.485	4.187	0.173	0.203	4.25
P-17	1 3/4	5.656	5.547	5.188	0.173	0.219	5.250
P-20	2	5.719	5.547	5.188	0.204	0.234	5.281

### TRUNNION BRACKET



Part #	A	B	C	D	E	F	G	H
ST3TB-1000-D	2.375	3.375	2.0	1.0	1.000	17/32	25/32	17/32
ST3TB-1375-D	4.000	5.500	3.0	2.0	1.375	25/32	1 3/16	25/32
ST3TB-1750-D								

### ROD DIAMETER CHART



### ROD SIZE SELECTION

- To determine the minimum recommended piston rod dia for your application:  
1) Determine the cylinder thrust using the force volume chart. (Page 4) (Thrust equals bore area multiplied by the operating pressure.)
- Select from the diagram beside the type of mounting you will use.
- Determine the basic length by multiplying the real stroke by the stroke factor.
- Enter the graph along the values of "basic length" and "Thrust".

The stripe within which these lines intersect represents the minimum recommended piston rod diameter.

### STOP TUBE SELECTION

Stop tubes are installed between the piston and the head on long stroke cylinders to reduce the load on the bearing. That, in turn, reduces bearing wear and tendency to buckle.

To determine if a stop tube is required and, if so, its length, first determine the "basic length" from the diagram. Step 1, 2 & 3 of The Rod Selection.

If the "basic length" is less than 40", no stop tube is needed. If its over than 40", a one-inch stop tube is recommended for every 10" (or fraction thereof) over 40"

See Page 30 on Stop Tube Option and how to Order

MOUNTING STYLE	ROD END CONNECTION	STROKE FACTOR
<b>Center line Mounting</b> Centerline mounting places the mounting bolts in simple shear or simple tension so that the mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and this requires accurate cylinder alignment to prevent damage to the cylinder working parts. Mountings are : MX1, MX2, MX3, MF1, MF2, ME3, ME4.	 Fixed & Rigidly Guided	0.50
	 Pivoted & Rigidly Guided	0.70
	 Supported but not Rigidly Guided	2.00
	 Unsupported	4.00
<b>Pivot Mounting</b> Pivot mounting is used when the cylinder must pivot during piston motion. Clevis and Trunnion mounts are two methods used to allow this motion. The Clevis end design locates the pivot point at the cap end of the cylinder. Trunnion mounting uses the head or the cap of the cylinder to allow it to pivot at any of the two locations. The Mountings are: MP1, MP2, MP4, MT1, MT2, MT4.	 Pivoted & Rigidly Guided	1.00
	 Pivoted & Rigidly Guided	1.50
	 Pivoted & Rigidly Guided	2.00
	 Pivoted & Rigidly Guided	2.00



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# STAR3 CYLINDERS

## OPTIONS

### Stop Tube Design

**Stop Tube**  
Option Code **ST( )** or **STD( )**  
Enhances the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and the rod bearing at full extension when placed on head end. Ideal for applications requiring longer strokes or where additional rod stability is desired. Specify stop tube length when ordering.

Starcyl supplies two types of stop tubes for air cylinders:

### Stx.xx Option

A cylinder requiring a stop tube under two inches uses a spacer only and only non cushion **STxx** Option.

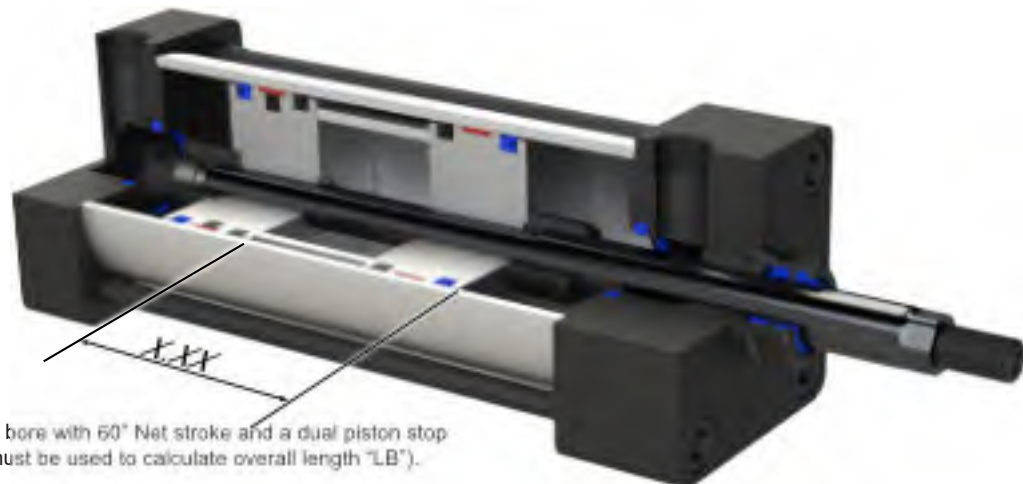
For This Stop tube use **ST** and replace **XX** by the value

EX: ST1 meaning 1" stop tube  
The Net stroke of the cylinder will always the Actual distance the rod travel. Gross stroke will be the envelope stroke.



### STDx.xx Option

A cylinder with over two inches of stop tube, cushioned or not, utilizes dual piston construction **STD( )** option for added bearing surface as well increasing distance between bearings.

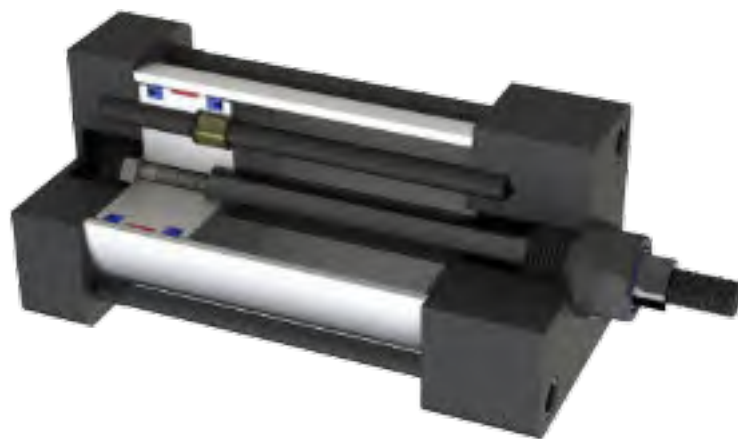


**How To Order Stop Tube option**  
ex: ST3X5-3.25x60.00X1.00-...-STD4 is a 3.25" bore with 60" Net stroke and a dual piston stop tube of 4" long, for a total gross stroke of 64" (must be used to calculate overall length "LB").

### Non Rotating Internal

Option code **NRI**

Available from 2" through 12" bore.  
Design with one or two Guide Rods internally, keeps all external dimensions the same.  
Application like Pick and place, Clamping, Marking, Pressing.  
(IR option not available with this option)



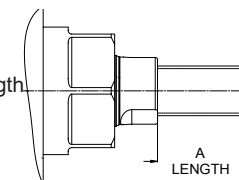
NRI GUIDE ROD SIZES AND MAX STROKE				
BORE	ROD DIA.	CUSHIONS	GUIDE ROD DIA	MAX STROKE
2	5/8 standard	N/A	.250	10"
	1" oversize	N/A	.312	12"
2.5	5/8 standard	N/A	.312	12"
	1" Standard	Available	.375	18"
3.25	1 3/8" Oversize	Cap Only	.375	18"
	1" Standard	Available	.625	30"
4	1 3/8" Oversize	Available	.625	30"
	1" Standard	Available	.625	30"
5	1 3/8" Oversize	Available	.625	30"
	1 3/8" Standard	Available	.625	30"
6	1 3/4" Oversize	Available	.625	30"
	1 3/8" Standard	Available	1.000	40"
8	1 3/4" Oversize	Available	1.000	40"
	1 3/4" Standard	Available	1.000	40"
10	2" Oversize	Available	1.000	40"
	2" Standard	Available	1.000	40"
12	2 1/2" Oversize	Available	1.000	40"

# STAR3 CYLINDERS

## OPTIONS

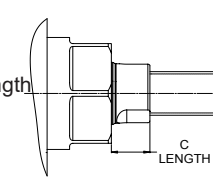
### Thread Extension

Option code **Ax.xx**  
Piston Rod Thread Extension can be ordered over standard.  
To order add option code **A=( )** and specify "A" length.  
Ex: ST3-3.25X4-A=2 will have an additional 7/8" to the standard 1-1/8" thread length.



### Rod Extension

Option code **Cx.xx**  
Piston Rod Extension can be order over standard.  
To order add option code **C=( )** and specify "C" length.  
Ex: ST3-3.25X4-C=1.5 will have an additional 1" to the standard C=1/2".

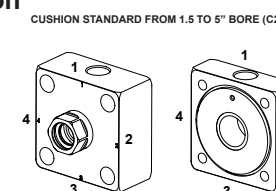


### Port & Adjustable Cushion Location

Option code **N081N081C22**

Specify size for Head and Cap **N** for NPT 08 for 1/2" and location, **Nxx1Nxx1C22** default,

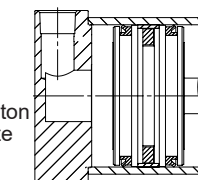
Non Cushion use **C00**



### Magnetic Piston

Option Code **M**

When position sensing of the cylinder is required, a Magnetic Ring Must be added.  
The Magnetic ring is placed at the center of the piston under the wear band. The magnetic band will create a magnetic field which will actuate the sensor.  
Option code **M**



### Non Adjustable Cushion

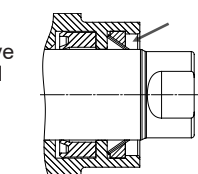
Option Code **CNN**

Mostly use with the "PBS" Bumper seals option, this option consist of removing the two needle valves and a bigger orifice for air escaping by the port when piston spud is sealing the cushion seal.  
Use this option also to avoid people to play with adjustment of the needle valve cushion that can change the cycle of the machine.

### Metallic Rod Scraper

Option **RSB** or **RSV**

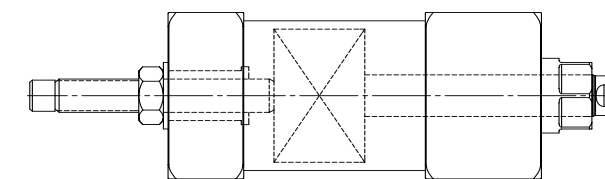
Aggressively Scrapes the exposed portion of the piston rod free of weld splatter, paint spray, abrasive powders or many other foreign materials that could damage the rod seal.  
**RSB** = Rod Scraper with Buna Expander  
**RSV** = Rod Scraper with Fluorocarbon Expander



### Adjustable Stroke

Option Code **ASU( )**

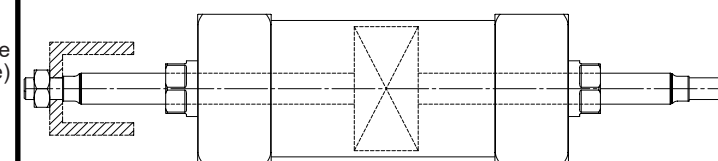
Provides variable reduction of the retract stroke and serves as a positive stop for the cylinder piston. Consist of a threaded stud located in the cap end of the cylinder. Socket head cap screw Loctite at the end of the adjustment stud allow simple yet precise positioning to accommodate varying retract stroke requirements. Must specify adjustment stroke length. Ex: -ASU1.5



### Double rod Adjustable Stroke (Extend)

Option Code **ASE( )**

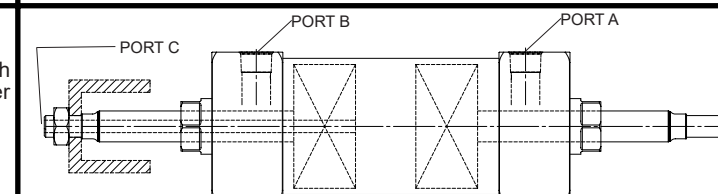
Consist of a double rod cylinder and a adjustable stop collar. Used to adjust the extend cylinder stroke. Stroke up to 120" available. (Adjustments to 12" available)  
To order, Specify ASE and length adjustment.  
Ex: ASE4 = 4" of adjustment



### Adjustable Mid Stroke

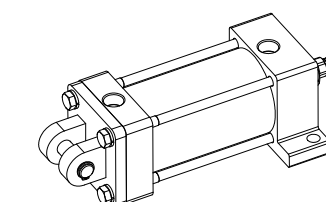
Option Code **ASM( )**

Design similar to the option ASE, this option consist of a 3 position cylinder with a double piston design that allow adjustment of the mid stroke position. Cylinder with three port and an adjustable collar.  
To order, Specify ASM and length adjustment.  
Ex: ASM4 = 4" of adjustment



### Combination of Mounting

Combination mount part numbers can be constructed by adding a Slash (/) between the desired mounts in the part number.  
Example: 5" Bore with 12" Stroke, Head and Cap Cushions, Magnetic Piston and having an MS2E and MP2 Mount:  
Part Number: ST3S2E/P2-5.00X12.00X1.00-.....



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# STAR3 CYLINDERS

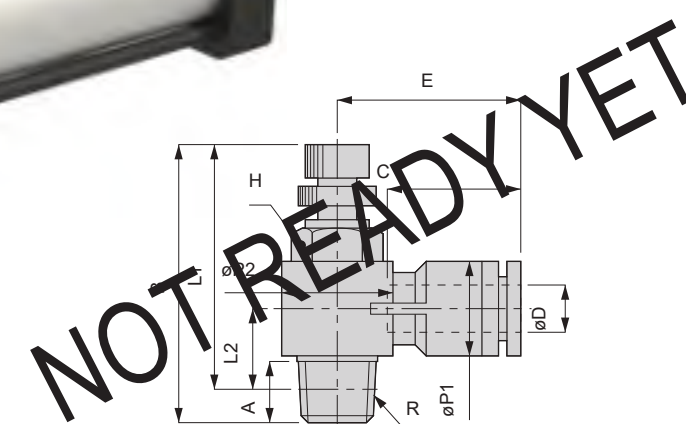
## OPTIONS

<p><b>Fluorocarbon Piston Seals</b> Option code PLV</p> <p>Fluorocarbon will be chosen for higher temperature range from 200°F to 400°F (200°C) For Chemical resistance our standard Blue Seals will Out-stand Fluorocarbon by far in most chemical Application and wear resistance. Resists most wash down application.</p>	<p><b>Fluorocarbon Rod Seal</b> Option code RLV</p> <p>Fluorocarbon will be chosen for higher temperature range from 200°F to 400°F (200°C) For Chemical resistance our standard Blue Seals will Out-stand Fluorocarbon by far in most chemical Application and wear resistance. Resists most wash down application.</p>
<p><b>Aluminum Tubing 6063-T5</b> Option code -T1 Default do not need to add on part Number</p>	<p><b>Starnite Steel Tubing</b> Option code -T0 For applications requiring a cylinder that can withstand higher side loading, resistance to denting. Starcyl has offered Steel Tubing for years in the Lumber, Mine and other industries that typically used 100% all steel Cylinders. (Hydraulic grade steel tubing honed with StarNite ID and OD Corrosion Resistant with a hard layer on the ID and OD for wear resistance. ( magnet option not available)</p>
<p><b>Stainless Steel Tubing ( SS316)</b> Option code -T7 For applications requiring a Corrosion proof to chemical. (magnet still available)</p> <p><b>Composite Tubing</b> Option code -T3 For applications requiring a light weight and still resistant Tubing. And cost effective in bigger bore (magnet still available)</p>	<p><b>Steel Tubing Chromed ID</b> Option code -T8 For applications requiring a standard steel tube cylinder with a Chromed layer inside the tubing to avoid corrosion. ( magnet option not available)</p>
<p><b>Hard Chrome Steed Rod</b> Option Code R1 For Quick delivery, and price competitiveness.</p>	<p><b>Stainless Steel Rod Chromed plated 303/304</b> Option Code S1 For applications requiring an Extreme Corrosion proof to chemical.</p>
<p><b>Induction Hard Chrome Steed Rod</b> Option Code R2 To use with Rod Lock Applications</p>	<p><b>Stainless Steel Rod Chromed plated 17-4 PH</b> Option Code S2 For applications requiring a Corrosion proof to chemical and Hardness for Rod Lock applications.</p>
<p><b>Under Size Port</b> Option code N02, N04, N06, N08, N12, N16</p> <p>N02 = 1/8 NPT, N04 = 1/4 NPT, N06 = 3/8 NPT, N08 = 1/2 NPT, N12 = 3/4 NPT/</p> <p>You can order cylinder with undersized port, require longer lead time if not in stock.</p>	<p><b>Stainless Steel Rod Chromed plated 316</b> Option Code S3 For applications requiring an Extreme Corrosion proof to chemical.</p> <p><b>Stainless Steel Tie rods</b> Option Code SST Stainless Tie rods, Available in stainless 303/304</p>
<p><b>Tie Rods Support</b> Option code TS</p> <p>To Avoid rods waving on long stroke, we add a tie rods support to keep them straight and easier to Torque. Usually from 1.5 to 6" bore, starting at 60" stroke +</p>	<p><b>Hydraulic 400 PSI Non shock</b> Model Code ST3.....PLBRHU Select those seals to make it hydraulic</p> <p>By changing some of the seals the Aluminum Construction cylinder will be able to operate in hydraulic low pressure. (Non Cushion Only)</p>

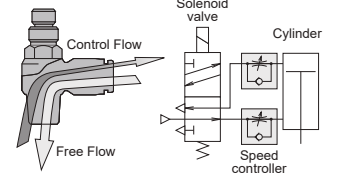
# STAR3 CYLINDERS

## OPTIONS - Flow Control STFC

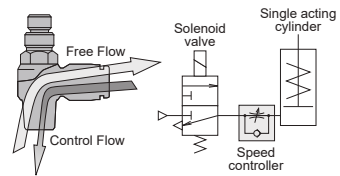
### STFC - Flow Control Elbow Fittings



**A Meter-out (Exhaust)**  
■ Air from thread side is controlled. Air from tube side is not controlled and flows out from thread side.



**B Meter-in (Supply)**  
■ Air from tube side is controlled. Air from threadside is not controlled and flows out from tube side.



Model Code	tube OD	EE	A	B		L1		L2	P1	P2	TUBE END C	E	HEX	X	Weight OZ
				MAX	MIN	MAX	MIN								
STFC3/8-N06A	3/8	3/8NPT	.52	2.14	1.85	1.90	1.61	0.57	0.69	0.87	0.79	1.23	3/4	0.66	2.43
STFC1/2-N08A	1/2	1/2NPT	.63	2.35	2.06	2.03	1.74	0.78	0.83	1.10	0.93	1.44	1	0.78	4.27

## Your Special Option

Starcyl is well known for their fast response to custom application, so let us quote your special requirements in cylinders. Model Code **SPxxxx**



Cylinder with Manifold Cap Mount for the valve and including pipe to the head end with a small manifold. (Explosion Proof Valve Shown)



High Speed Cycling Cylinder with a single Manifold porting the cap as well as the head. (Narrow Namur Valve Shown)



**Lifter 4 Post.** Ex: 5" bore, 4" stroke, main rod 1.75" dia and the 4 post at 1" dia. The post are guarded by thin wall tubing.



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### END OF STROKE SENSOR PREP

#### How it Works

When the ferrous cushion of a cylinder enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod forward. As a result, the common contact snaps to its operated position, closing the other contact circuit. When the target is removed the common contact automatically returns to its original un-operated position.

#### Option Code H(xx) & GS(xx)

End of Stroke Sensors are simple and built to last. With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!

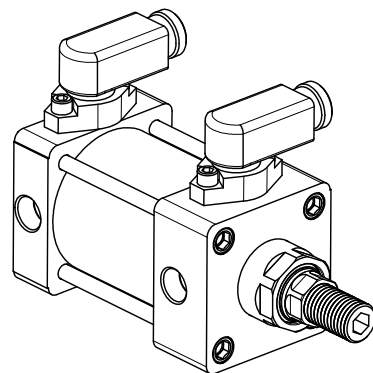
Must Indicate Position.

Ex : H32 1<sup>st</sup> switch, Head end, will be in position 3. And 2<sup>nd</sup> switch, Cap end, will be in position 2

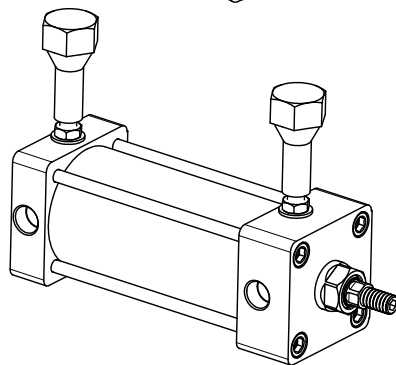
#### Options Available

- Explosion Proof
- SPDT or DPDT
- Hi Temp™ to 400°F
- Sub Sea™ Submersible
- Hermetically Sealed
- High Pressure to 10,000 psi
- English or metric threads

Option Code H



Option Code G



**Reed switches** are constructed of two overlapping ferromagnetic reeds which are sealed in a glass tube with the ends aligned and a small gap between them. When an external magnetic force is applied, the reed assumes opposite polarity, the ends of the reeds attract each other and make contact, completing the circuit. Reed switches are not recommended in sensitive areas since they can introduce electrical noise into the circuit due to bounce and vibration from mechanical closing of the reeds.

**Hall Effect switches** are solid state switches with no moving parts. The solid state switches is activated when the silicon chip (Hall) senses a magnetic field. Since there are no moving parts, Hall effect switches can operate in sensitive areas without sending interference or noise into the circuit.

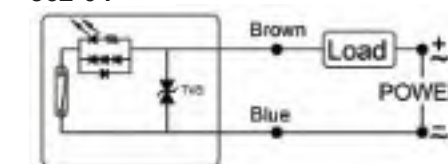
### Switch specifications

Switch part Number	862-004	862-33	862-33
Spec	Reed switch, MOV, LED	Electronic Sensor, LED, Sourcing - Load dependent	Electronic Sensor, LED, Sinking - Load dependent
Cable Length	9 ft PVC Cable		
Max operating Voltage	120 AC/DC	5-30 VDC	5-30 VDC
Switching Current	5 to 500 mA	100 mA Max	0.5 Amp Max
Switching Power	10 Watts Max.	3 Watts Max.	12 Watts Max.
Switching Speed	0.5 µs operate 0.1 µs release	1.5 µs operate 0.5 µs release	0.5 µs operate 0.1 µs release
Voltage Drop	3.5 Volts	0.6 Volts	1.0 Volts
Operating Temperature Range	-10° to 70°C (14° to 158°F)		
Switch Function	Normally Open	Normally Open PNP output	Normally Open NPN output
Shock	Up to 30G (300 m/s <sup>2</sup> )	Up to 50G (500 m/s <sup>2</sup> )	Up to 50G (500 m/s <sup>2</sup> )
Vibration	90 m/s <sup>2</sup> (9G) Double Amplitude 1.5mm	90 m/s <sup>2</sup> (9G) Double Amplitude 1.5mm	90 m/s <sup>2</sup> (9G) Double Amplitude 1.5mm
Ingress Protection***	IP 69 K		

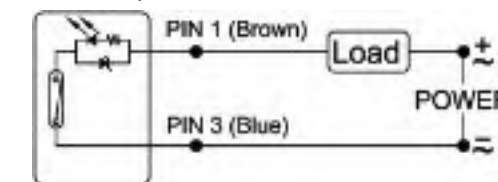
\*\*\*IP Scale : Rating based on their ability to withstand the intrusion of solids and liquids, first number indicates how dustproof a product is, ranging from 0 to 6. The second number indicates how watertight a product is, ranging from 0 to 9. The addition of a 'K' after the second digit signifies specific protection from high-pressure jets. **IP69K means a product is completely dustproof and can withstand washdown at pressures of 80 to 100 bar/1,160 to 1,450 PSI, in phases of 14 to 16 l/min, and at temperatures up to 176°F/80°C.**

### Circuit & Connect Diagram Reed

#### 862-04



#### 862-04-Q08



### Circuit & Connect Diagram Hall Effect

#### 862-33 and 862-33-Q08



The Brown Wire to the + and the Blue Wire to the - from the DC Power  
The Black wire have to be connect to the load

### External Protect Circuit



Applicable to Conductive Load  
Attach an external diode between Brown + and Black (out) when NPN Connection  
Attach an external diode between Blue - and Black (out) when PNP Connection

### How To Order

Order Clamp Separately see below

#### 862 - 04 - Q08

Series	Type Code	Connections
862	04 - Reed switches	9ft PCV wire
	33 - Hall Effect PNP / NPN	Q08 - 8 mm Quick Connect with Pigtail (std)

#### Clamp

- 862-ABC Tie Rod Clamp - Valid for 1.5" to 8" bore
- 862-AB0 Tie rod clamp valid for 1.5" to 4" bore only

#### 862-ABC Clamp Style



#### 862-AB0 Clamp Style



### Other Style Available



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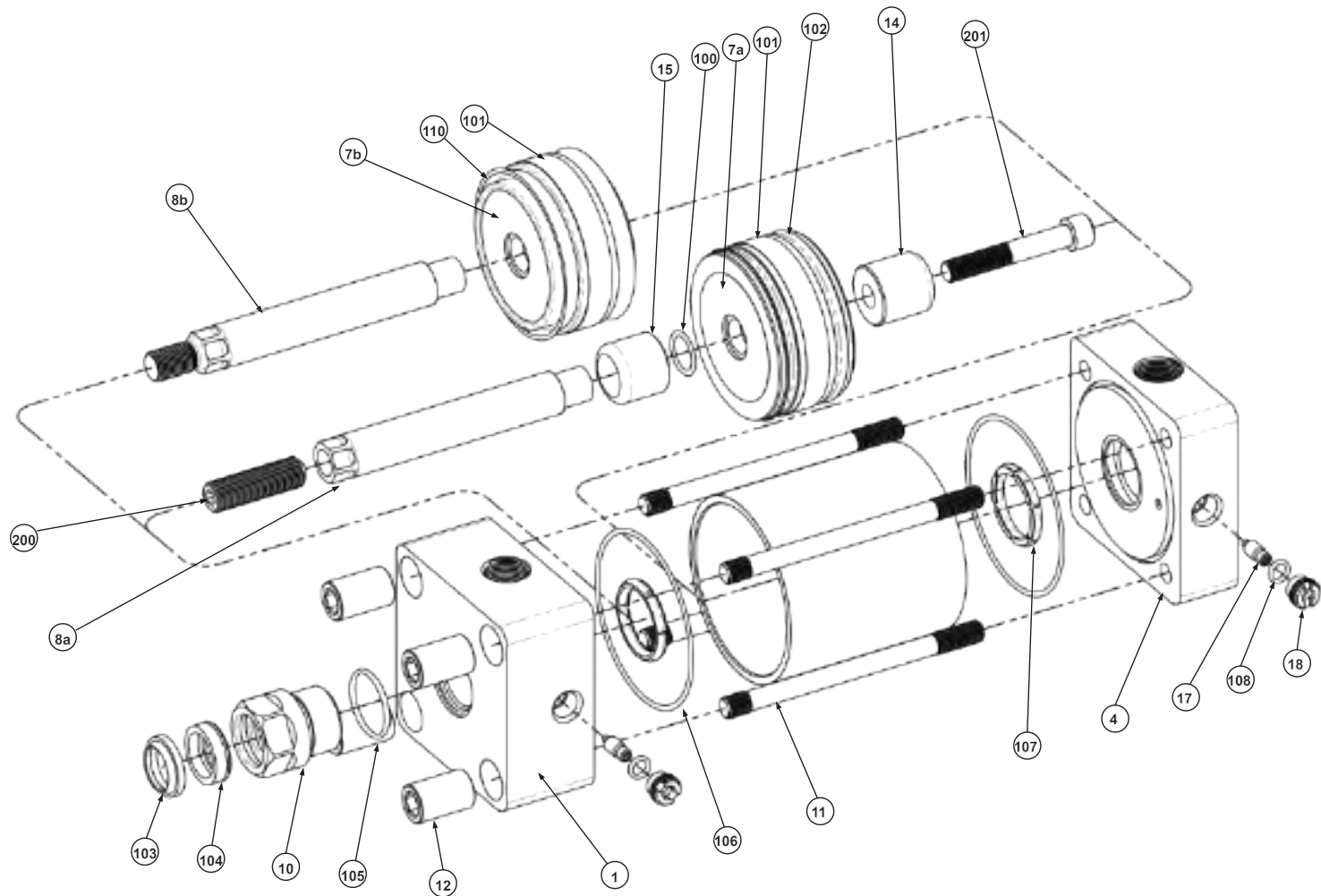


BORE SIZE	MOUNTING KIT WEIGHT								
	ST3MK P1-	ST3MK P2-	ST3MK P4-	ST3MK S1-	ST3MK S2-	ST3MK SD-	ST3MK X1-	ST3MK X2- / X3	ST3MK F1- / F2
1 1/2	0.73	0.91	0.91	0.31	0.16	0.45	0.45	0.09	0.21
2	1.03	1.26	1.26	0.43	0.21	0.58	0.58	0.14	0.36
2 1/2	1.30	1.55	1.55	0.51	0.16	0.68	0.68	0.14	0.49
3 1/4	3.41	4.08	4.08	0.85	0.38	1.87	1.87	0.25	1.17
4	4.58	5.18	5.18	1.01	0.38	2.25	2.25	0.25	1.64
5	6.64	7.17	7.17	2.06	2.68	3.11	3.11	0.56	2.58
6	11.65	12.12	12.12	2.52	3.85	5.46	5.46	1.41	3.99

NOT READY YET

NOT READY YET





SYMBOL	DESCRIPTION	QTY	PART NUMBER	ASSEMBLY PART NUMBER	In the assembly
1	Head	1	3-bb01 X r.r-NxxCxx		
2	Tubing	1	3-bb02 X ss.ss		
4	Cap	1	3-bb04 - NxxCxx		
7a	Piston PLU with Cushions	1	3-bb07 X ss.ss -C22-PLU		
7b	Piston PBS with Cushions		3-bb07 X ss.ss -C22-PBS		
7c	Piston PLU Non Cushion		3-bb07 X ss.ss -C00-PBS		
8a	Rod female for cushions	1	3-bb08-ss.ss-#4-C22		
8b	Rod Male for cushions		3-bb08-ss.ss-#2-C22		
8c	Rod female Non-cushion		3-bb08-ss.ss-#-C00		
10	Gland for RLU (cast iron starnite)	1	3-bb10		
11	Tie Rod	4	3-bb11		
12	Sleeve Nut	4	3-bb12		
14	Front spud	1	3-bb14		
15	Rear Spud	1	3-bb15		
	Needle Valve Assembly	2		3-bb17-00	17 + 18 + 108
17	Needle		3-bb17		
18	Retainer		3-bb18		
100	O-ring Piston	1			
102	Wear Ring	1			
102	Piston Lip Type u-cup (urethane) PLU	2			
103	Wiper (urethane)	1			
104	Rod Lip Type (urethane) RLU	1			
105	O-ring gland	1			
106	O-ring end tube	2			
107	Cushion check seal	2			
108	O-ring Needle Valve	2			
200	Piston/rod S.H.C. Screw	1			
201					
202					

### WEIGHT CHART - SINGLE ROD END

BORE SIZE	ROD DIAM	ADD PER INCH OF STROKE	FIX MOUNTING BASE WEIGHT													DETACHABLE MOUNT				
			X5 S4	X1	X2 X3	F1 F2	P1	P3	SB	S1	S2	S7	T1 T2	T4	P2	P4	SD	MP1	MS2	
1 1/2	5/8	0.20	1.82	1.99	1.91	2.03	2.09	1.91	2.44	2.13	1.98	2.30	2.27	3.65	2.73	2.59	2.27	2.55	2.11	
	1	0.33	2.24	2.41	2.33	2.45	2.51	2.33	2.86	2.55	2.40	2.72	2.70	4.07	3.15	3.01	2.69	2.97	2.53	
2	5/8	0.25	2.48	2.76	2.62	2.84	2.75	2.59	3.62	2.91	2.69	3.19	2.94	4.94	3.74	3.51	3.06	3.51	2.82	
	1	0.38	3.20	3.47	3.34	3.56	3.46	3.31	4.34	3.63	3.40	3.90	3.65	5.66	4.46	4.23	3.78	4.23	3.54	
2 1/2	5/8	0.26	3.43	3.70	3.56	3.92	3.73	3.57	5.05	3.93	3.59	4.70	3.88	6.51	4.98	4.76	4.11	4.72	3.80	
	1	0.40	4.15	4.42	4.29	4.64	4.46	4.29	5.77	4.66	4.31	5.42	4.61	7.24	5.70	5.49	4.83	5.45	4.52	
3 1/4	1	0.46	6.42	6.93	6.67	7.59	7.29	6.87	9.92	7.27	6.80	7.98	6.87	12.18	10.50	10.11	8.29	9.83	7.29	
	1 3/8	0.66	7.97	8.48	8.23	9.14	8.85	8.42	11.48	8.82	8.35	9.54	8.43	13.73	12.06	11.66	9.84	11.39	8.85	
4	1	0.49	11.06	11.57	11.32	12.70	11.94	11.62	15.96	12.07	11.44	13.60	11.56	18.28	16.25	15.85	13.31	15.65	12.15	
	1 3/8	0.69	12.45	12.96	12.70	14.09	13.32	13.00	17.35	13.46	12.83	14.98	12.95	19.67	17.63	17.24	14.70	17.03	13.53	
5	1	0.61	13.32	14.44	13.88	15.90	14.18	13.83	20.41	15.38	15.99	17.08	13.82	22.65	20.49	20.10	16.43	19.96	14.96	
	1 3/8	0.81	14.84	15.96	15.40	17.42	15.71	15.36	21.94	16.90	17.52	18.60	15.34	24.17	22.01	21.62	17.95	21.48	16.48	
6	1 3/8	0.85	21.08	23.05	22.48	25.07	23.63	22.87	34.15	23.60	24.93	27.51	22.29	37.82	33.20	33.18	26.54	32.73	23.12	
	1 3/4	1.113	23.82	25.79	25.22	27.81	26.37	25.61	36.89	26.34	27.67	30.25	25.03	40.56	35.94	35.92	29.28	35.47	25.86	



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### ST3 D\* F1 - 3.25 X 22.22 X 1.38 - #2

Bore\*

Stroke\*

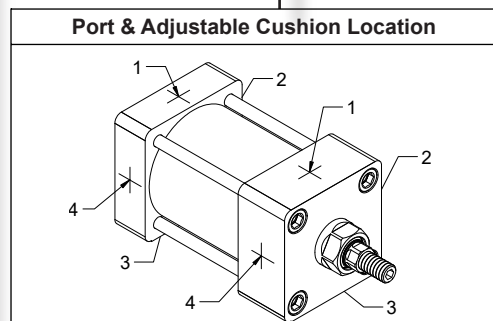
Rod Dia\*

FEATURE	DESCRIPTION	SYMBOL
SERIES	Used in All ST3 part number	ST3

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Double rod End	Used only if double rod cylinder is required	38	DR
Position Sensor	LVDT Ready ***	TBA	XB
Rod Lock	<b>RLA</b> Rod Lock Mechanism - Not for SAFETY	TBA	RA
Rod Lock	<b>RLS</b> Rod Lock Mechanism - Not for SAFETY	TBA	RS
Back-To-Back	Back To back Cylinders	40	BB
Multi-position	Multi-position cylinders	41	MP
Tandem	Tandem Cylinders (Force and Control )	42	TD

FEATURE	DESCRIPTION	1.5" to 6" Bore	7 to 14" Bore	SYMBOL
		PAGE NO.	PAGE NO.	
Mounting Style	Flush Mount - Basic Mount	6	24	X5
	Side Tapped	6	36	S4
	No Mount	6	26	X0
	Head End Tie Rod Extended	8	26	X3
	Cap End Tie Rods Extended	8	26	X2
	Both End Tie Rod Extended	8	26	X1
	Head Rectangular Flange Aluminum	10	-	F1
	Cap Rectangular Flange Aluminum	10	-	F2
	Head Rectangular Flange Steel	10	-	F1X
	Cap Rectangular Flange Steel	10	-	F2X
	Cap Pivot 1 Fixed Clevis	12	28	P1
	Cap fixed Eye	12	28	P3
	Cap Pivot 2 Detachable Clevis	14	28	P2
	Cap Pivot 4 Detachable Eye	14	-	P4
	Head Trunnion detachable	16	30	T1
	Cap Trunnion detachable	16	30	T2
	Head Trunnion all in one piece steel	16	-	T1X
	Cap Trunnion all in one piece steel	16	-	T2X
	Intermediate Fixed Trunnion Xlx.xx	17	30	T4
	Angle Mount	18	32	S1
Fixed Side Lug Mount	18	-	S2	
Side End Lugs	18	34	S7	
Cap Detachable Spherical Mount	20	36	SD	
Square Head Mount	-	24	E3	
Square Cap Mount	-	24	E4	

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL	
Piston Rod End	Style #1 Intermediate Male	6 to 32	#1	
	Style #2 Small Male		#2	
	Style #3 Full Male		#3	
	Style #4 Short Female		#2S	
	Style #2S Male Studded ( standard on R0 rod 5/8 and 1")		#4	
	Style #5 Flange Coupling		TBA	#5
	Style #6 Plain		TBA	#6
	Style #7 Spherical female		20	#7
	Style #X Special (Specify)			#X
	Style #M2 male metric and #M4 female metric			#M2 / #M4



BORE	STD PORT PER BORE		STD PORT LOCATION HEAD, CAP	STD CUSHION LOCATION HEAD, CAP
	NPTF	CODE		
1 1/2	3/8	06	1,1	2,2
2	3/8	06	1,1	2,2
2 1/2	3/8	06	1,1	2,2
3 1/4	1/2	08	1,1	2,2
4	1/2	08	1,1	2,2
5	1/2	08	1,1	2,2
6, 7, 8	3/4	12	1,1	2,2
10, 12	1	16	1,1	2,2
14	1	16	1,1	2,2

### -N081 N081‡ C00 - PLURLU-R1-A1-FA - MP1

FEATURE	DESCRIPTION	SYMBOL
Head Port	NPT Port <b>SAE Straight Thread O-ring Port</b> British Parallel British Tapered	N S G R
Head Port Size	NPT use 1/4=04,3/8=06,...,1-1/4=20 SAE use 04, 06, 08, 10, 12, 16 look at catalog for std port size	
Head Ports Location	Head Location Std 1 (2,3,4)	1

FEATURE	DESCRIPTION	SYMBOL
Cap Port	NPT Port <b>SAE Straight Thread O-ring Port</b> British Parallel British Tapered	N S G R
Cap Port Size	NPT use 1/4=04,3/8=06,...,1-1/4=20 SAE use 04, 06, 08, 10, 12, 16 look at catalog for std port size	
Cap Ports Location	Cap Location Std 1 (2,3,4 & 5*) * Backside	1

FEATURE	DESCRIPTION	SYMBOL
Cushion & Location	<b>Head Non Cushion, Cap Non Cushion</b> Head Cushion Only (where x = position 1,2,3,4) Cap Cushion Only (where x = position 1,2,3,4) Non Adjustable Cushion Cushion both ends (where x = position 1,2,3,4)	<b>C00</b> Cx0 C0x CNN Cxx

FEATURE	DESCRIPTION	SYMBOL
Piston seals Option	Buna U-cup	PLB
	Fluorocarbon U-cup	PLV
	<u>Blue Hythane asymmetric U-cup seals (std)</u>	<b>PLU</b>
	Energized Urethane U-cup	PPU
	Energize Fluorocarbon U-cup	PPV
	<b>Bumper Seals Piston (former IR)</b>	<b>PBS</b>

FEATURE	DESCRIPTION	SYMBOL
Rod Seal Option	Buna U-cup	RLB
	Fluorocarbon U-Cup	RLV
	<u>Blue Hythane asymmetric U-cup seals (std)</u>	<b>RLU</b>
	Energized Urethane U-cup	RPU
	Heavy Duty Urethane U-cup	RHU
	Energized Fluorocarbon U-cup	RPV

Detachable Mounting Kit assembled to Cylinder		page
Short Clevis MP1	MP1	14, 28
Side Lug MS2	MS2	18, 32

Since Short Clevis and Side Lug exist in a Fix Mount those one can be order as assemble to existing MX5 flush Mount.

Finish Anodized Black	FA

DESCRIPTION	PAGE	SYMBOL
Rod Extension C (length x.xx)	53	Cx.xx
Rod Extension WG (length x.xx) #5 ROD END	53	Wgx.xx
Thread Extension A (length x.xx)	53	Ax.xx
Magnetic Piston	53	M
Rod Scraper (Brass/Buna expander)	53	RSB
Rod Scraper (Brass/Fluorocarbon expander)	53	RSV
Go Round sensors, Pos, 1 2 3 4	53	G11
EOS End of Stroke Sensors Prep only	53	H11
Stop Tube (length x.xx)	53	STx.xx
Rod Boot prep only	TBA	RB
StarNite Rod up to 48" stroke	-	R0
Chromed Rod	54	R1
Chromed Rod (Induction Hard )	54	R2
Stainless Steel Rod 303 chrome plated	54	S1
Stainless Steel Rod 17-4 PH chrome plated	54	S2
Stainless Steel Rod 316 chrome plated	54	S3
Tie rods in Stainless 303/304	54	TS1
Tie rods Support ( for stroke from 60" & +)	TBA	TS
Adjustable Stroke Up (specify length x.xx)	54	ASUx.xx
Non Rotating Internal		NRI
Non Rotating External		NRE
Mid Trunnion Location		Xlx.xx



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**SPACE SAVING MULTI-STAGES AIR CYLINDER**

**STAR 1 SERIES**

STAR1 - Multistage Upgradable air cylinders

**STARCYL CYLINDERS**

**SPACE-SAVER**

**STAR2 SERIES**

**NFPA STYLE MOUNT**

- Bore size from 1 1/2" to 10"
- Stroke up to 47"
- Save Space up to 35% (vs. standard 7" bore)
- 250 PSI AIR, OIL
- Two Year Warranty
- Economic design

STAR2 - NFPA style Mount spacesaver air cylinders

**STARCYL AIR CYLINDERS**

**SPACE ONE**

**Space-Saver Air Cylinders**

SO - Space One, Spacesaver Air Cylinder

**STARCYL AIR CYLINDERS**

**NFPA ROD LOCK CYLINDER**

**STAR3RL option**

FEATURES	BENEFITS
No Rod Displacement on Engagement	Maintains Accurate Positioning
Large Clamping Surface	Consistent Clamping Force
IP67 Rated (exceeds NEMA 4X)	Suitable for Wash-Down Areas
Fast Response Time	High Cycle Rate, Accuracy
Extremely Low Backlash	Precision Holding
Spring-Engaged Units	Holds Load During Power/Pressure Loss
Rated for 2,750,000 Cycles	Long Maintenance-Free Life
4 bar (60 psi) Release Pressure	Compact Unit, Easy Integration
	Broad Application

STAR3RL - NFPA Rod Lock for STAR3 air cylinders

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**STAR4 AIR SERIES**  
**STAR5 OIL SERIES**

510 HYDRAULIC MEDIUM DUTY SERVICES  
514 PNEUMATIC HEAVY DUTY SERVICES  
515 HEAVY DUTY PNEUMATIC SERVICES

STANDARD BORE SIZES 1.5" THROUGH 6"  
PISTON ROD DIAMETERS 0.5" THROUGH 5.12"  
20 STANDARD MOUNTING STYLE

STAR4/5 AVAILABLE ON EVERY STEEL PARTS

STAR4 - Heavy Duty NFPA interchangeable air cylinders Steel Construction  
STAR5 - Medium Duty NFPA interchangeable Hydraulic cylinders Steel Construction

**STARCYL CYLINDERS**  
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**STAR6 SERIES**

**HEAVY DUTY SERVICE INDUSTRIAL TIE ROD CONSTRUCTION**

NOMINAL PRESSURE - 5000 PSI

STANDARD BORE SIZES 1.5" THROUGH 20"  
PISTON ROD DIAMETERS 0.5" THROUGH 10"  
18 STANDARD MOUNTING STYLES

STAR6™ AVAILABLE ON ALL STEEL PARTS

STAR6 - Heavy Duty NFPA interchangeable Hydraulic cylinders, 3000 psi

**STARCYL AIR CYLINDERS**

**MULTI-STAGES**

**M3 SERIES**

MULTI-STAGES NFPA STYLE MOUNT  
HEAVY DUTY - HIGH FLOW

NOMINAL PRESSURE - AIR 250 PSI  
STANDARD BORE SIZES 1.5" THROUGH 10"  
STROKE UP TO 12"  
NFPA STYLE MOUNT  
TWO-YEAR WARRANTY

M3 - Heavy Duty NFPA Multi-stages air cylinders High Flow

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**STARMM SERIES**

AIR CYLINDER ISO 6032 & 15552

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