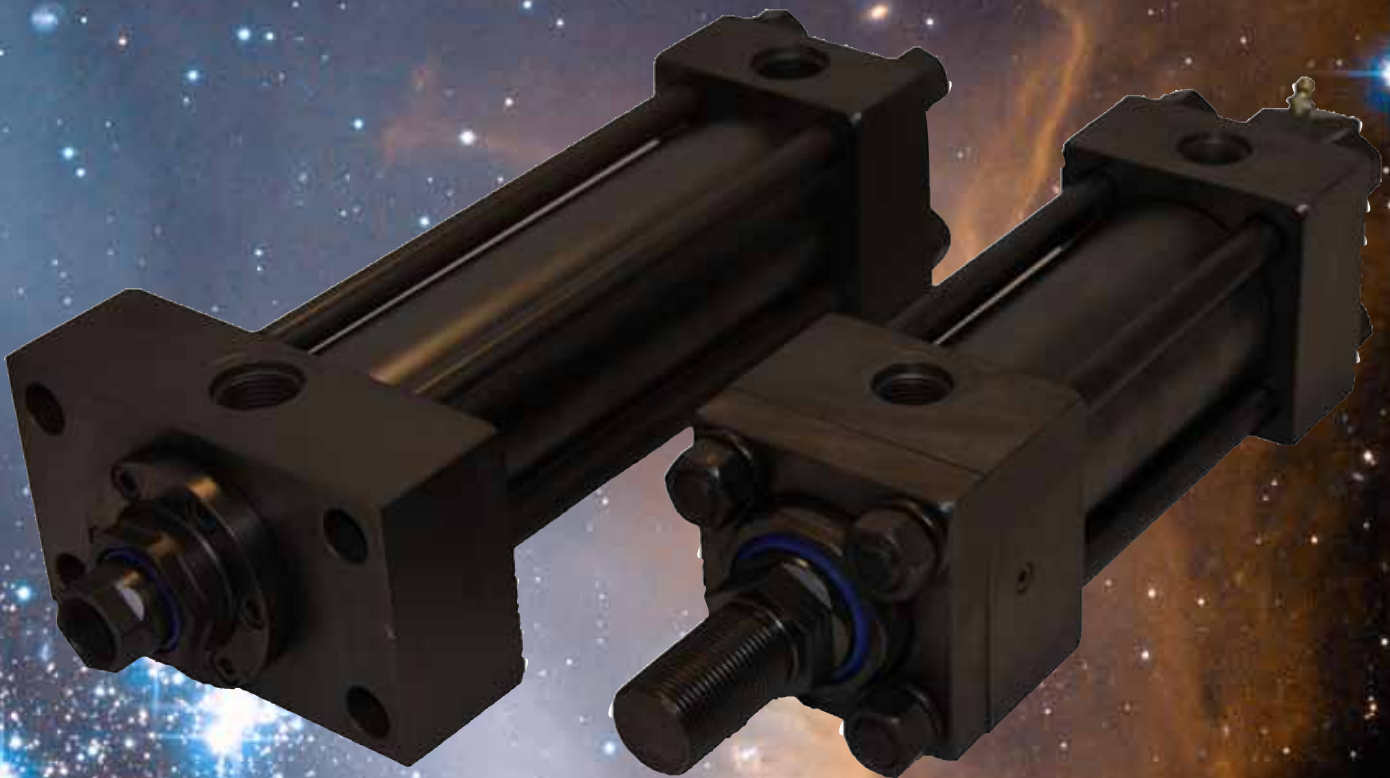




# HEAVY DUTY Hydraulic Cylinders



## STAR6 SERIES

**HEAVY DUTY SERVICE  
INDUSTRIAL TIE ROD CONSTRUCTION**

**NOMINAL PRESSURE - 3000 PSI**

**STANDARD BORE SIZES 1.5" THROUGH 20"**

**PISTON ROD DIAMETERS 5/8" THROUGH 10"**

**18 STANDARD MOUNTING STYLES**

**STARNITE™ AVAILABLE ON ALL STEEL PARTS**

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Cylinder Design Features,  
Standard Piston

### Piston Rod from 5/8" to 3" dia ●

High Strength Alloy Steel (SAE4140). **STARNITE™** (Nitrocarburation) 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 (65-70Rc), environmentally friendly, no surface pitting, flaking, or hydrogen embrittlement. The finish created by the process is a lustrous black. (available up to 6 ft of stroke) (Available in Stainless Steel)

### Piston Rod from 3.5" dia to 10" dia ●

Induction Hard Chromed Steel (100Ksi Min Yiled)

### Wiper ●

The Hythane wiper is designed to wipe off abrasive dust and contaminants on the retract stroke to ensure long life for the seals, rod bushing and piston rod. (temperature: -50° to 230°F)

### Rod lips seal ●

Our New Design with a real rod u-cup (Hythane) is completely self compensating for zero leakage at all pressures (temperature: -50° to 230°F)

### Self Centering Cushion Spud ●

Self centering design allows for close tolerance and min. wear. For faster cycle time and increased productivity, maximum performance, economical, flexible for even the most demanding applications, reduces shock and machine noise, lower maintenance costs, can be supplied at head, cap or both ends.

### One-Piece Iron Piston (U-cup Design) Std. ●

One piece design for maximum strength and bearing surface. Anaerobic adhesive is used to permanently lock and seal the piston to the rod. 3 different styles of piston available.

### Piston Lip Seal (std) ●

Lip-type low friction Hythane piston seals are pressure energized and wear compensating for low friction and long life (temperature: -50° to 230°F)

### \*\*\*Piston Wear Ring \*\*\* ●

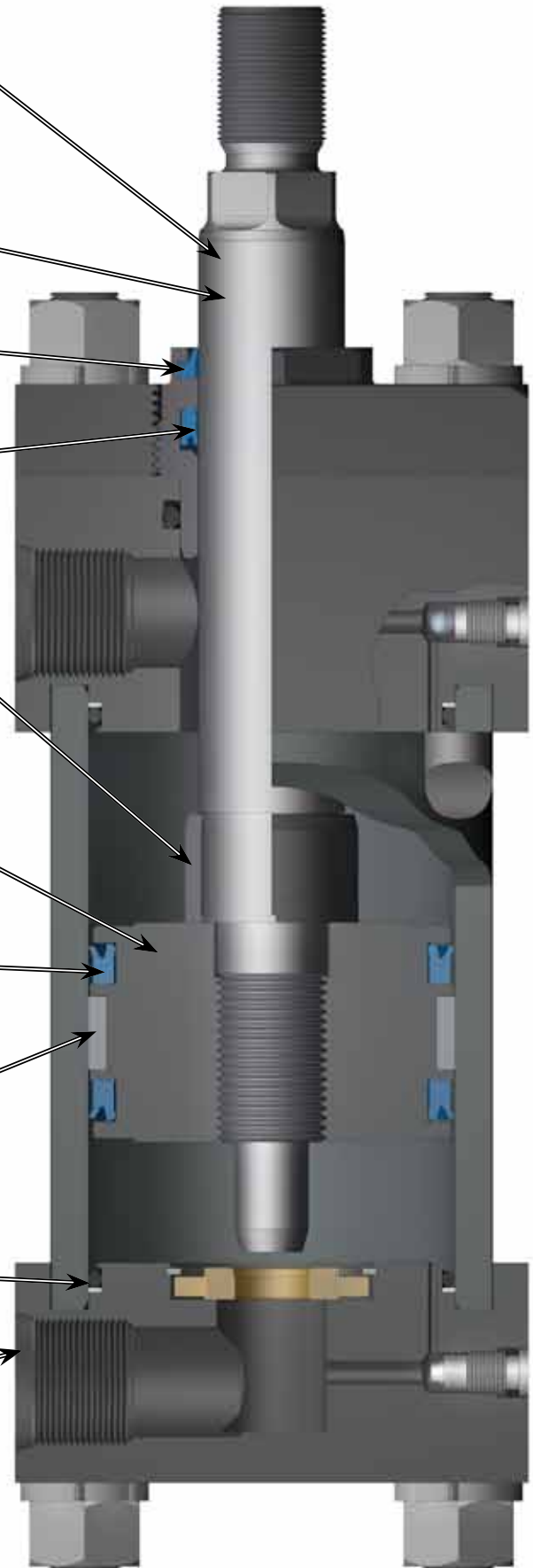
Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

### O-ring/Backup Tube End Seals ●

Nitrile O-ring design is pressure compensating and reusable. Pressure-actuated cylinder body-to-head and cap. Backup ring to prevent extrusion of the oring .

### Porting ●

SAE Straight thread "O"Ring Ports are standard. NPT ports are optional at no extra cost. Standard port position is number 1. Specify if another location is needed. SAE Code 61 ports are also available.

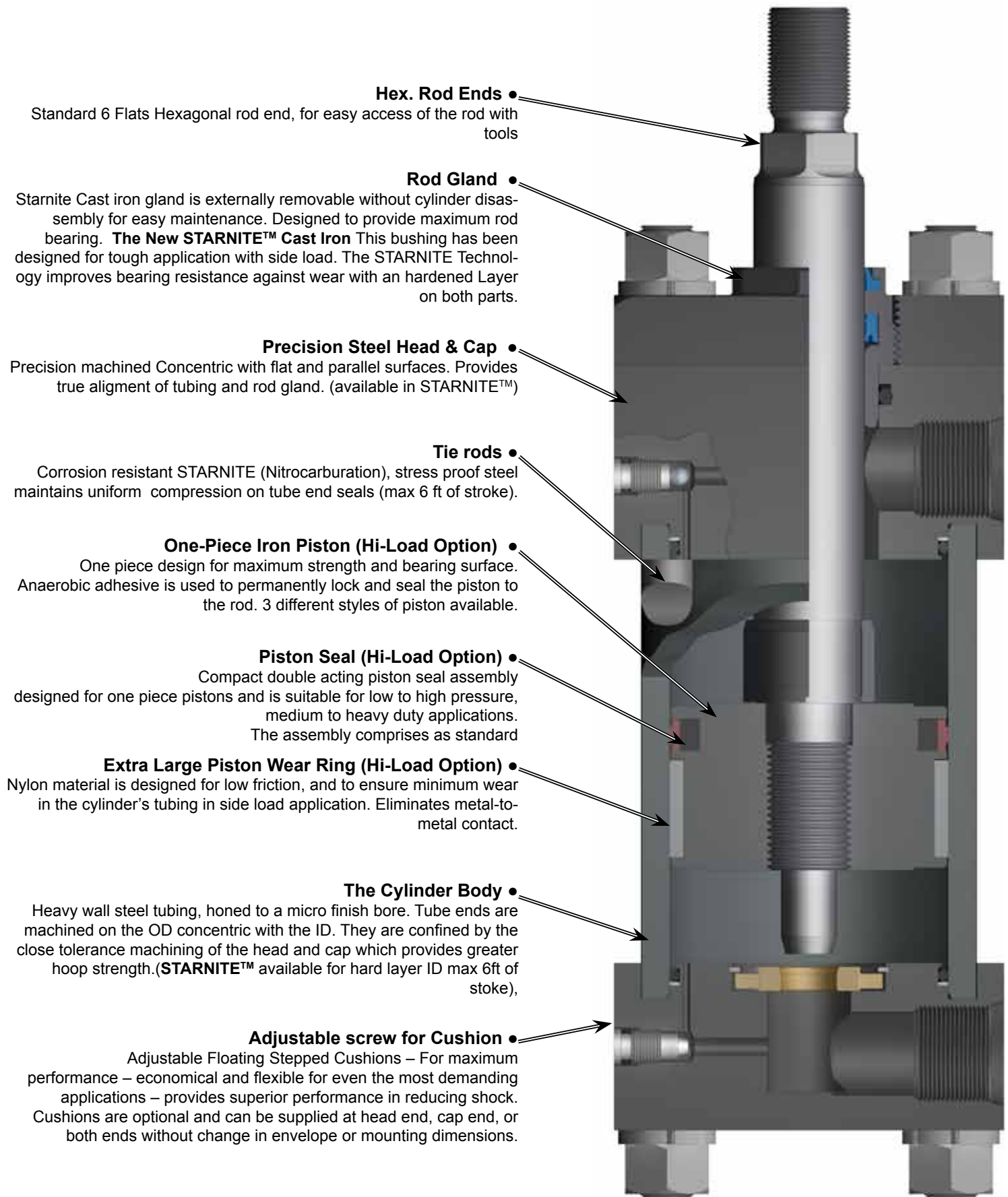


\*All Blue seals can withstand most chemical washdown, No Fluorocarbon Required

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Cylinder Design Features,  
Hi-load Piston



**Hex. Rod Ends •**

Standard 6 Flats Hexagonal rod end, for easy access of the rod with tools

**Rod Gland •**

Starnite Cast iron gland is externally removable without cylinder disassembly for easy maintenance. Designed to provide maximum rod bearing. **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.

**Precision Steel Head & Cap •**

Precision machined Concentric with flat and parallel surfaces. Provides true alignment of tubing and rod gland. (available in STARNITE™)

**Tie rods •**

Corrosion resistant STARNITE (Nitrocarburated), stress proof steel maintains uniform compression on tube end seals (max 6 ft of stroke).

**One-Piece Iron Piston (Hi-Load Option) •**

One piece design for maximum strength and bearing surface. Anaerobic adhesive is used to permanently lock and seal the piston to the rod. 3 different styles of piston available.

**Piston Seal (Hi-Load Option) •**

Compact double acting piston seal assembly designed for one piece pistons and is suitable for low to high pressure, medium to heavy duty applications. The assembly comprises as standard

**Extra Large Piston Wear Ring (Hi-Load Option) •**

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.

**The Cylinder Body •**

Heavy wall steel tubing, honed to a micro finish bore. Tube ends are machined on the OD concentric with the ID. They are confined by the close tolerance machining of the head and cap which provides greater hoop strength. (STARNITE™ available for hard layer ID max 6ft of stroke),

**Adjustable screw for Cushion •**

Adjustable Floating Stepped Cushions – For maximum performance – economical and flexible for even the most demanding applications – provides superior performance in reducing shock. Cushions are optional and can be supplied at head end, cap end, or both ends without change in envelope or mounting dimensions.

# 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.

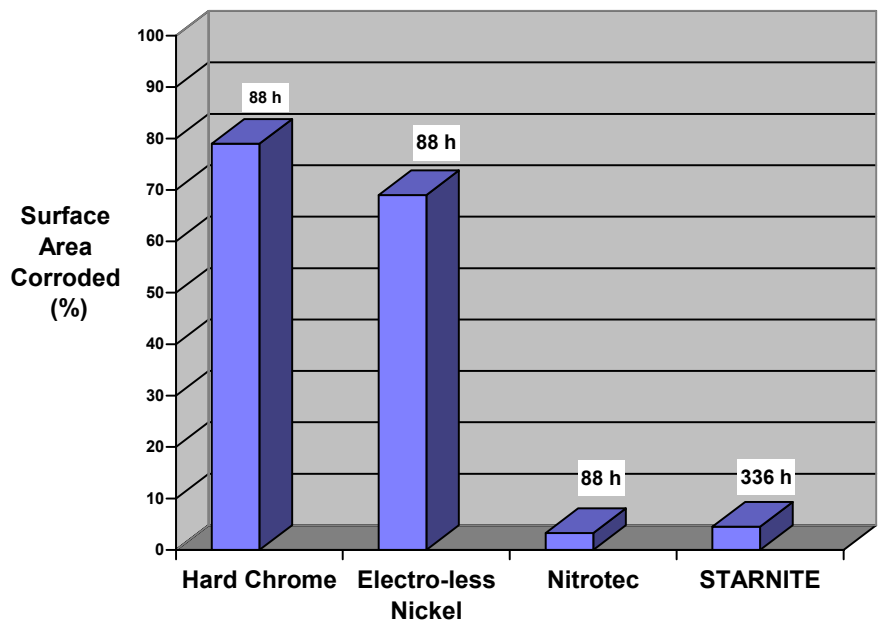
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitride layer consisting of a monophase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating 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>

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders














### Standard Specifications

HeavyDuty Service – ANSI/(NFPA) T3.6.7R2 - 1996  
 Specifications and Mounting Dimensions Standard  
 Standard Construction: Square Head, Tie Rod Design  
 Nominal Pressure : 3000 PSI\*  
 Standard Fluid: Hydraulic Oil  
 Standard Temperature :-40°F to +230°F\*\*  
 Bore Sizes from 1.5” through 6”  
 Piston Rod Diameter from 5/8” through 4”

Mounting Styles: 18 standard styles at various application ratings  
 Strokes : Available in any practical stroke length  
 Cushions : Optional at either end or both ends of stroke.  
 Float Check at cap end.  
 Rod Ends :Three Standard Choices – Specials to Order

See page 18, 19 and 20 For Spherical Bearing Mount Style ST6SB.

\* See page 63 for more details on Pressure rating per bore.  
 \*\* See page 64 Viton seals for higher temperature service.

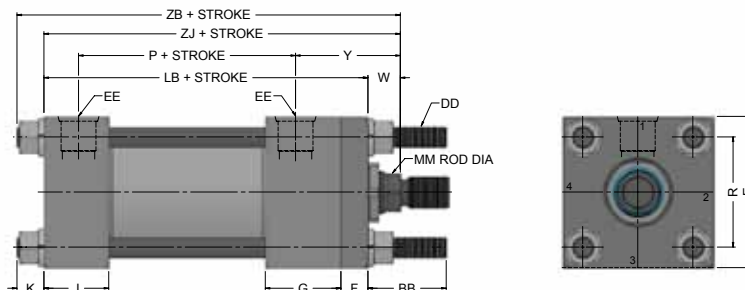
Tie rods Head end ST6X3  NFPA MX3 page 6	Tie rods Cap end ST6X2  NFPA MX2 page 6	Tie rods Extended Both ends ST6X1  NFPA MX1 page 6	Head Rectangular Flange ST6F1  NFPA MF1 page 8
Head Square Flange ST6F5  NFPA MF5 page 8	Head Rectangular Mount ST6E5  NFPA ME5 page 8	Cap Rectangular Flange ST6F2  NFPA MF2 page 10	Cap Square Flange ST6F6  NFPA MF6 page 10
Cap Rectangular Mount ST6E6  NFPA ME6 page 10	Side Lugs ST6S2  NFPA MS2 page 12	Center Lugs ST6S3  NFPA MS3 page 12	Side Tap ST6S4  NFPA MS4 page 12
End Angles ST6S1  NFPA MS1 page 14	End Lugs ST6S7  NFPA MS7 page 14	Cap Fixed Clevis ST6P1  NFPA MP1 page 14	Head Trunnion ST6T1  NFPA MT1 page 16
Cap Trunnion ST6T2  NFPA MT2 page 16	Intermediate Trunnion ST6T4  NFPA MT4 page 16	Spherical Bearing ST6SB  page 20	Double Rod Cylinders ST6D  page 23

# ST6 SERIES

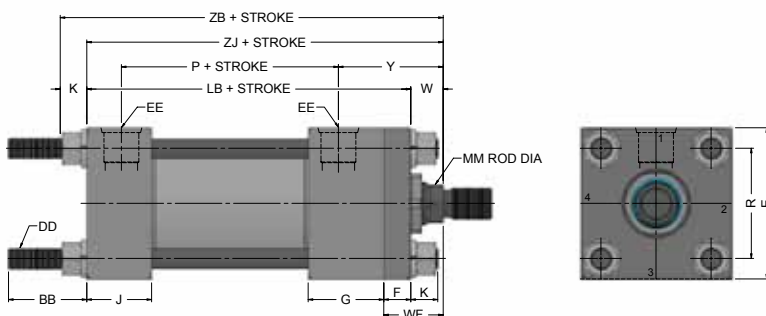
## Heavy Duty Hydraulic Cylinders

Tie rod Mountings  
1 1/2 to 6" Bore Sizes

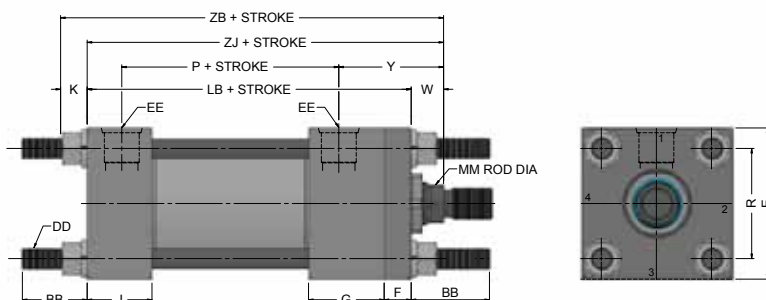
Tie Rods Extended Head End  
Style ST6X3  
(NFPA Style MX3)



Tie Rods Extended Cap End  
Style ST6X2  
(NFPA Style MX2)



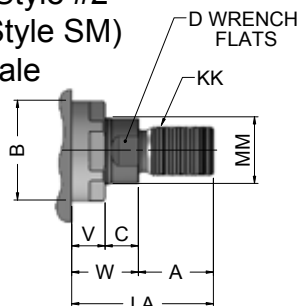
Tie Rods Extended Both End  
Style ST6X1  
(NFPA Style MX1)



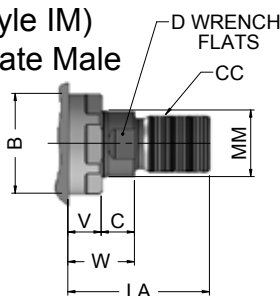
Basic Mounting ST6X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

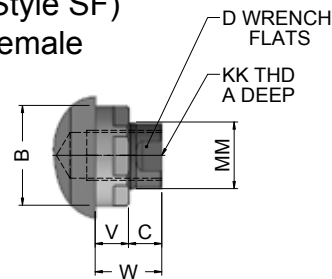
Thread Style #2  
(NFPA Style SM)  
Small Male



Thread Style #1  
(NFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Tie Rod Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE		F	G	J	K	R	ADD STROKE	
					NPTF*	SAE <sup>std</sup>						LB	P
1 1/2	2.3	1 3/8	3/8-24	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	1.63	5	2 7/8
2	2.9	1 13/16	1/2-20	3	1/2	10	5/8	1 3/4	1 1/2	7/16	2.05	5 1/4	2 7/8
2 1/2	3.6	1 13/16	1/2-20	3 1/2	1/2	10	5/8	1 3/4	1 1/2	7/16	2.55	5 3/8	3
3 1/4	4.6	2 5/16	5/8-18	4 1/2	3/4	12	3/4	2	1 3/4	9/16	3.25	6 1/4	3 1/2
4	5.4	2 5/16	5/8-18	5	3/4	12	7/8	2	1 3/4	9/16	3.82	6 5/8	3 3/4
5	7.0	3 3/16	7/8-14	6 1/2	3/4	12	7/8	2	1 3/4	13/16	4.95	7 1/8	4 1/4
6	8.1	3 5/8	1-14	7 1/2	1	16	1	2 1/4	2 1/4	7/8	5.73	8 3/8	4 7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions								Add Stroke		
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	ZB	ZJ
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	6	5 5/8
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	6 3/8	6
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	6 7/16	6
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	6 11/16	6 1/4
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	6 9/16	6 1/8
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	6 13/16	6 3/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	7 1/16	6 5/8
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	7 11/16	7 1/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	7 15/16	7 3/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	8 1/16	7 1/2
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	8 3/16	7 5/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	8 5/16	7 3/4
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	8 9/16	8
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	9 1/16	8 1/4
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8

Table 3—Envelope and Mounting Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

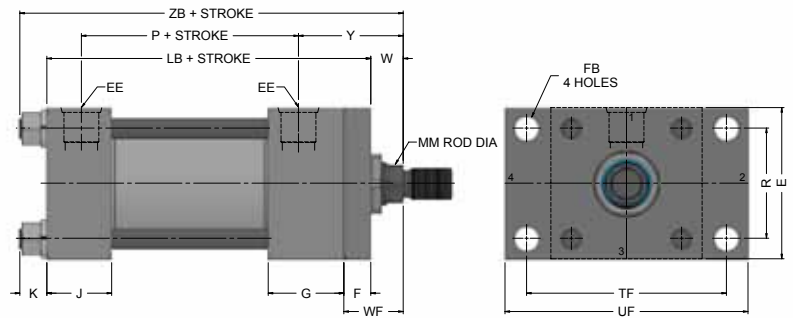
Rectangular Flange and Head Mountings  
1 1/2 to 6" Bore Sizes

### Head Rectangular Flange mounting Style ST6F1 (NFFA Style MF1)



Bore Size	Max PSI — Push*				
	Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	1500	1000	-	-	-
2	-	2000	1200	-	-
2 1/2	-	2000	1100	1500	-
3 1/4	-	-	1800	1300	1400
4	-	-	-	1800	1300
5	-	-	-	-	1300
Bore	Rod size				
	2 1/2	3	3 1/2	4	
4	1700	-	-	-	
5	800	1200	1000	-	
6	1200	800	1000	900	

For Pressures exceeding those shown please use mounting style ST6F5 or ST6E5

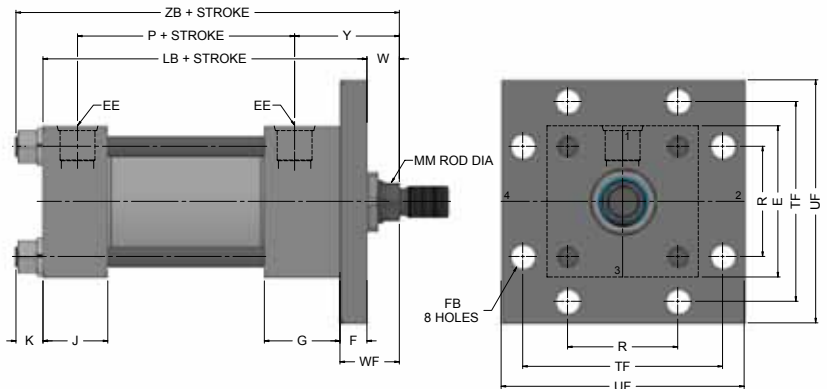


\* Maximum pressure rating — push application.

### Head Square Flange mounting Style ST6F5 (NFFA Style MF5)

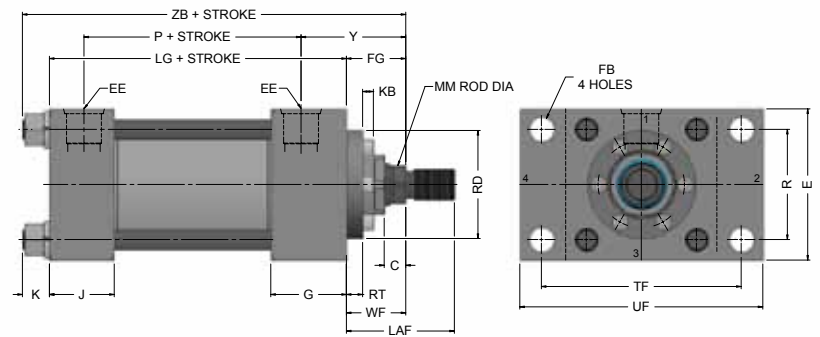


Bore Size	Max PSI — Push*				
	Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	3000	3000	-	-	-
2	-	3000	3200	-	-
2 1/2	-	3000	3000	3000	-
3 1/4	-	-	3000	3000	3000
4	-	-	-	3000	3000
5	-	-	-	-	3000
Bore	Rod size				
	2 1/2	3	3 1/2	4	
4	3000	-	-	-	
5	3000	3000	3000	-	
6	3000	2700	3000	2700	



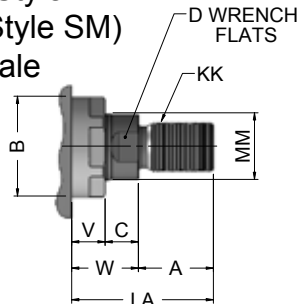
\* Maximum pressure rating — push application.

### Head Rectangular mounting Style ST6E5 (NFFA Style ME5)

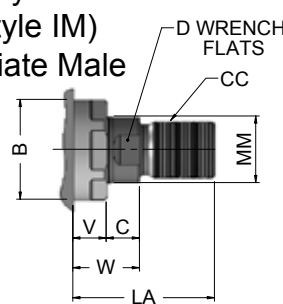


### Rod End Dimensions—see table 2

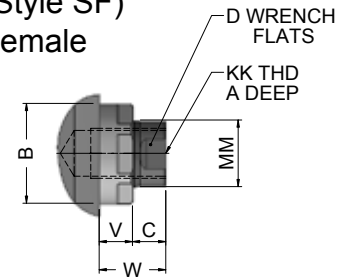
#### Thread Style #2 (NFFA Style SM) Small Male



#### Thread Style #1 (NFFA Style IM) Intermediate Male



#### Thread Style #4 (NFFA Style SF) Small Female



#### "Specials" Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Head Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE		
		NPTF*	SAE <sup>std</sup>									LB	LG	P
1 1/2	2 1/2	1/2	10	3/8	7/16	1 3/4	1 1/2	3/8	1.63	3 7/16	4 1/4	5	4 5/8	2 7/8
2	3	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.05	4 1/8	5 1/8	5 1/4	4 5/8	2 7/8
2 1/2	3 1/2	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.55	4 5/8	5 5/8	5 3/8	4 3/4	3
3 1/4	4 1/2	3/4	12	3/4	11/16	2	1 3/4	9/16	3.25	5 7/8	7 1/8	6 1/4	5 1/2	3 1/2
4	5	3/4	12	7/8	11/16	2	1 3/4	9/16	3.82	6 3/8	7 5/8	6 5/8	5 3/4	3 3/4
5	6 1/2	3/4	12	7/8	15/16	2	1 3/4	13/16	4.95	8 3/16	9 3/4	7 1/8	6 1/4	4 1/4
6	7 1/2	1	16	1	1 1/16	2 1/4	2 1/4	7/8	5.73	9 7/16	11 1/4	8 3/8	7 3/8	4 7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions												Y	WF	Add Stroke ZB
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LA	LAF	NA	V	W	RD	RT			
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	0	1 3/8	1 3/4	9/16	1/4	5/8	2 1/8	3/8	2	1	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	2 1/8	2 1/2	15/16	1/2	1	2 1/2	3/8	2 3/8	1 3/8	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	1 7/8	2 1/2	15/16	1/4	3/4	2 1/2	3/8	2 3/8	1 3/8	6 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	2 5/8	1 5/8	6 11/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	1 7/8	2 1/2	15/16	1/4	3/4	2 1/2	3/8	2 3/8	1 3/8	6 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	2 5/8	1 5/8	6 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3 1/4	3 7/8	1 11/16	1/2	1 1/4	3 1/2	3/8	2 7/8	1 7/8	7 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 1/2	3 1/4	1 5/16	1/4	7/8	3	3/8	2 3/4	1 5/8	7 11/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3 1/8	3 7/8	1 11/16	3/8	1 1/8	3 1/2	3/8	3	1 7/8	7 15/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 1/2	4 1/4	1 15/16	3/8	1 1/4	4	5/8	3 1/8	2	8 1/16
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3	3 7/8	1 11/16	1/4	1	3 1/2	3/8	3	1 7/8	8 3/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	3 1/8	2	8 5/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	3 3/8	2 1/4	8 9/16
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	3 1/8	2	9 1/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	3 3/8	2 1/4	9 5/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	1/4	4 7/8	5 3/4	2 7/8	3/8	1 3/8	5 1/4	5/8	3 3/8	2 1/4	9 5/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	4 7/8	5 3/4	3 3/8	3/8	1 3/8	5 3/4	5/8	3 3/8	2 1/4	9 5/16
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 1/4	5 1/4	2 3/8	1/4	1 1/4	4 1/2	5/8	3 1/2	2 1/4	10 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	1/4	4 3/4	5 3/4	2 7/8	1/4	1 1/4	5 1/4	5/8	3 1/2	2 1/4	10 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	4 3/4	5 3/4	3 3/8	1/4	1 1/4	5 3/4	5/8	3 1/2	2 1/4	10 1/2
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	5 1/4	6 1/4	3 7/8	1/4	1 1/4	6 1/2	5/8	3 1/2	2 1/4	10 1/2

Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange and Cap Mountings  
1 1/2 to 6" Bore Sizes

Cap Rectangular Flange mounting  
Style ST6F2  
(NFPA Style MF2)

For Pressures exceeding those shown please use mounting style ST6F6 or ST6E6

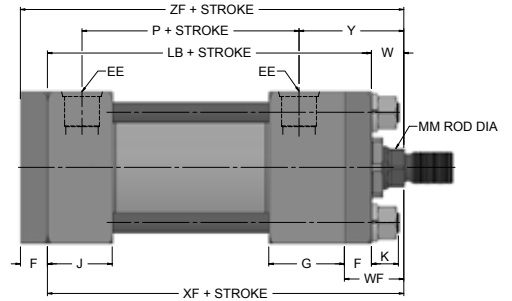
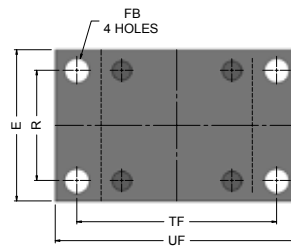


Bore Size	Max PSI — Pull*			
	Rod Size			
	5/8	1	1 3/8	1 3/4
1 1/2	2500	3000	-	-
2	-	3000	3000	-
2 1/2	-	3000	3000	3000
3 1/4	-	-	3000	3000
4	-	-	-	3000
5	-	-	-	2000

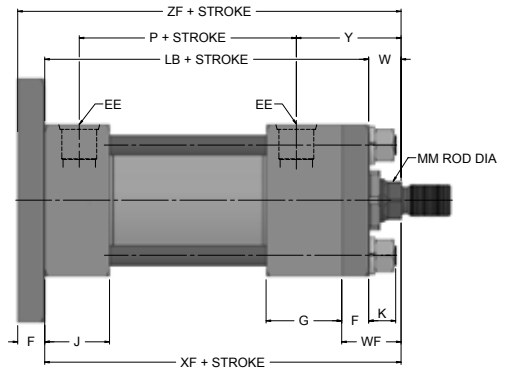
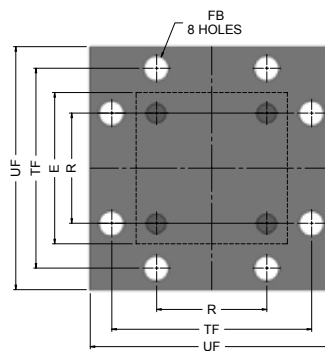
  

Bore	Rod size		
	2 1/2	3	3 1/2
4	3000	-	-
5	3000	2000	3000
6	1800	2500	2000

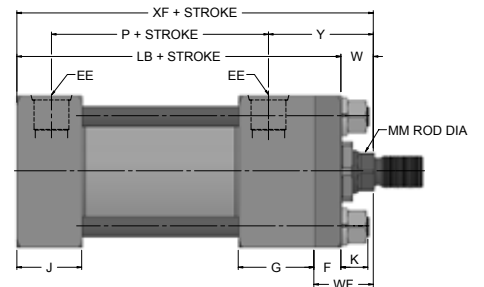
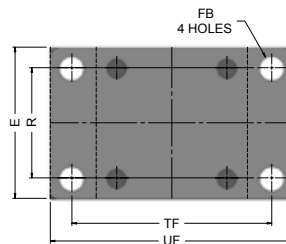
\* Maximum pressure rating — pull application.



Cap Square Flange mounting  
Style ST6F6  
(NFPA Style MF6)

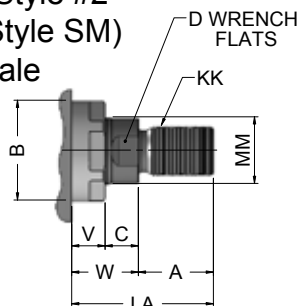


Cap Rectangular mounting  
Style ST6E6  
(NFPA Style ME6)

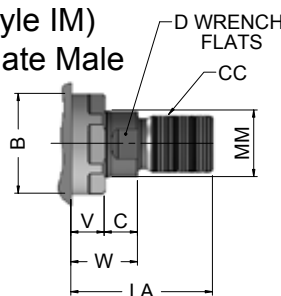


Rod End Dimensions—see table 2

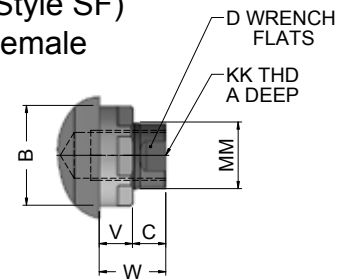
Thread Style #2  
(NFPA Style SM)  
Small Male



Thread Style #1  
(NFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Cap Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
		NPTF*	SAE <sup>std</sup>									LB	P
1 1/2	2 1/2	1/2	10	3/8	7/16	1 3/4	1 1/2	3/8	1.63	3 7/16	4 1/4	5	2 7/8
2	3	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.05	4 1/8	5 1/8	5 1/4	2 7/8
2 1/2	3 1/2	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.55	4 5/8	5 5/8	5 3/8	3
3 1/4	4 1/2	3/4	12	3/4	11/16	2	1 3/4	9/16	3.25	5 7/8	7 1/8	6 1/4	3 1/2
4	5	3/4	12	7/8	11/16	2	1 3/4	9/16	3.82	6 3/8	7 5/8	6 5/8	3 3/4
5	6 1/2	3/4	12	7/8	15/16	2	1 3/4	13/16	4.95	8 3/16	9 3/4	7 1/8	4 1/4
6	7 1/2	1	16	1	1 1/16	2 1/4	2 1/4	7/8	5.73	9 7/16	11 1/4	8 3/8	4 7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke				
		STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	WF	XF	ZF	
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	1	5 5/8	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	1 3/8	6	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	1 3/8	6	6 3/8
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	1 5/8	6 1/4	6 7/8
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	1 3/8	6 1/8	6 3/4
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	1 5/8	6 3/8	7
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	1 7/8	6 5/8	7 1/4
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	1 5/8	7 1/8	7 7/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	1 7/8	7 3/8	8 1/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	2	7 1/2	8 1/4
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	1 7/8	7 5/8	8 1/2
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	2	7 3/4	8 5/8
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	2 1/4	8	8 7/8
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	2	8 1/4	9 1/8
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8

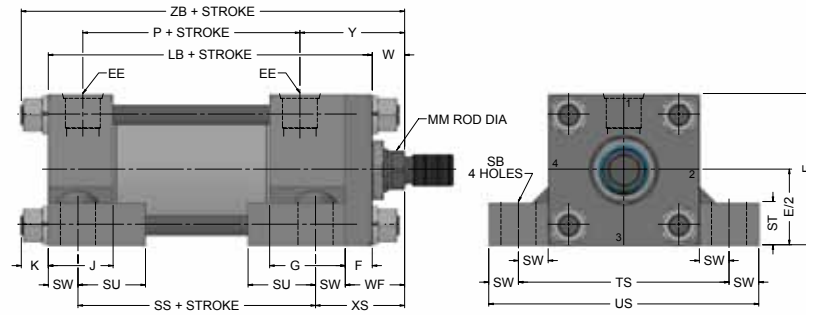
Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

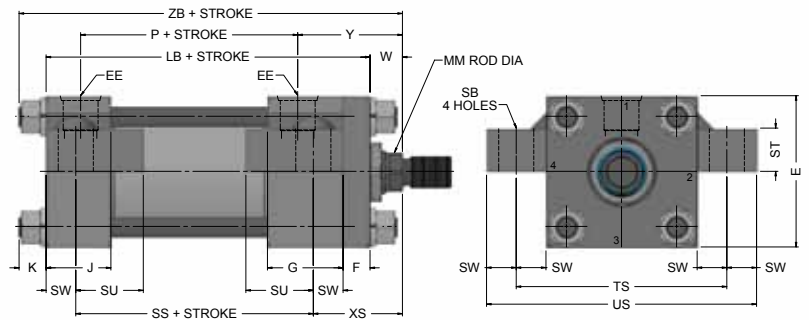
## Heavy Duty Hydraulic Cylinders

Side Lugs, Centerline Lugs  
and Side Tapped Mountings  
1 1/2 to 6" Bore Sizes

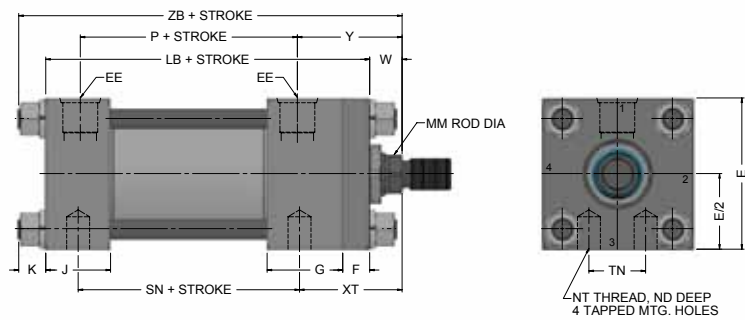
Side Lugs mounting  
Style ST6S2  
(NFFPA Style MS2)



Center Lugs mounting  
Style ST6S3  
(NFFPA Style MS3)

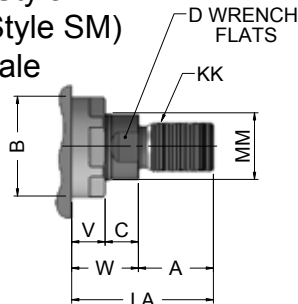


Side Tapped mounting  
Style ST6S4  
(NFFPA Style MS4)

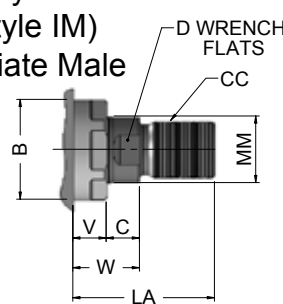


Rod End Dimensions—see table 2

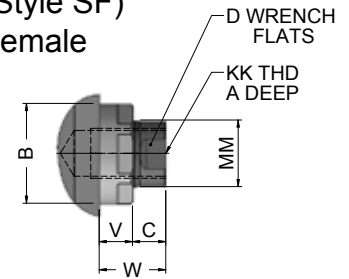
Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #1  
(NFFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style #4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Side Lugs, Centerline Lugs  
and Side Tapped Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	G	J	K	NT	SB <sup>1</sup>	ST	SU	SW	TN	TS	US	ADD STROKE			
		NPTF*	SAE <sup>std</sup>													LB	P	SN	SS
1 1/2	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	3/8-16	7/16	1/2	15/16	3/8	3/4	3 1/4	4	5	2 7/8	2 7/8	3 7/8
2	3	1/2	10	5/8	1 3/4	1 1/2	7/16	1/2-13	9/16	3/4	1 1/4	1/2	15/16	4	5	5 1/4	2 7/8	2 7/8	3 5/8
2 1/2	3 1/2	1/2	10	5/8	1 3/4	1 1/2	7/16	5/8-11	13/16	1	1 9/16	11/16	1 5/16	4 7/8	6 1/4	5 3/8	3	3	3 3/8
3 1/4	4 1/2	3/4	12	3/4	2	1 3/4	9/16	3/4-10	13/16	1	1 9/16	11/16	1 1/2	5 7/8	7 1/4	6 1/4	3 1/2	3 1/2	4 1/8
4	5	3/4	12	7/8	2	1 3/4	9/16	1-8	1 1/16	1 1/4	2	7/8	2 1/16	6 3/4	8 1/2	6 5/8	3 3/4	3 3/4	4
5	6 1/2	3/4	12	7/8	2	1 3/4	13/16	1-8	1 1/16	1 1/4	2	7/8	2 15/16	8 1/4	10	7 1/8	4 1/4	4 1/4	4 1/2
6	7 1/2	1	16	1	2 1/4	2 1/4	7/8	1 1/4-7	1 5/16	1 1/2	2 1/2	11/8	3 5/16	9 3/4	12	8 3/8	4 7/8	4 7/8	5 1/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

<sup>1</sup> Upper surface spotfaced for S.H.C.S.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								ND	XS	XT	Y	ZB	Add Stroke
		STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W						
1 1/2	std 5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	3/8	1 3/8	2	2	6	
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	3/8	1 3/4	2 3/8	2 3/8	6 3/8	
2	std 1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	7/16	1 7/8	2 3/8	2 3/8	6 7/16	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	7/16	2 1/8	2 5/8	2 5/8	6 11/16	
2 1/2	std 1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	1/2	2 1/16	2 3/8	2 3/8	9 9/16	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	1/2	2 5/16	2 5/8	2 5/8	6 13/16	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	1/2	2 9/16	2 7/8	2 7/8	7 1/16	
3 1/4	std 1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	11/16	2 5/16	2 3/4	2 3/4	7 11/16	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	11/16	2 9/16	3	3	7 15/16	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	11/16	2 11/16	3 1/8	3 1/8	8 1/16	
4	std 1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	11/16	2 3/4	3	3	8 3/16	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	11/16	2 7/8	3 1/8	3 1/8	8 5/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	11/16	3 1/8	3 3/8	3 3/8	8 9/16	
5	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	1	2 7/8	3 1/8	3 1/8	9 1/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16	
6	std 2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2	

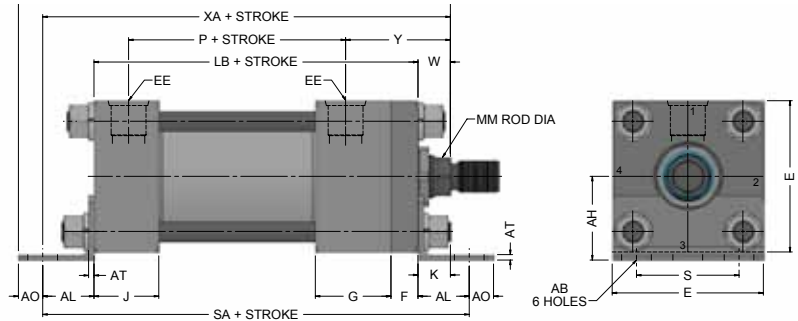
Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

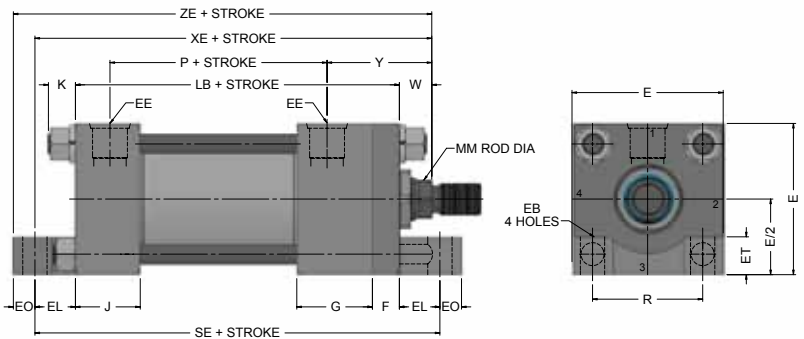
Side End Angles, Side End Lugs  
and Cap Fixed Clevis Mountings  
1 1/2 to 6" Bore Sizes

Side End Angles mounting  
Style ST6S1  
(NFFA Style MS1)



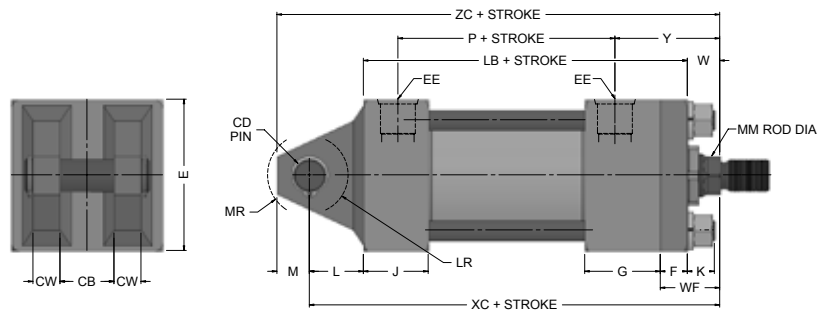
The maximum recommended operating pressure for Style ST6S1 (MS1) is 500 psi. The recommended minimum stroke length is two times the bore size.

Side End Lugs mounting  
Style ST6S7  
(NFFA Style MS7)



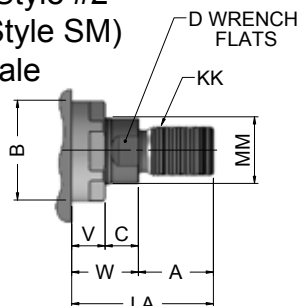
For this cylinder mounting style, both the mounting lugs and cylinder end caps must rest on a firm surface

Cap Fixed Clevis mounting  
Style ST6P1  
(NFFA Style MP1)

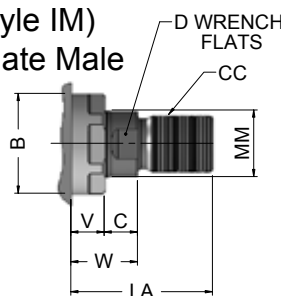


Rod End Dimensions—see table 2

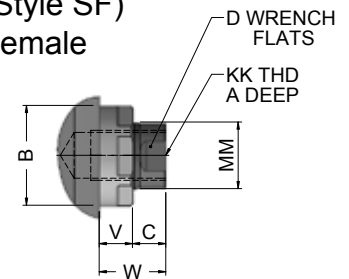
Thread Style #2  
(NFFA Style SM)  
Small Male



Thread Style #1  
(NFFA Style IM)  
Intermediate Male



Thread Style #4  
(NFFA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Side End Angles, Side End Lugs  
and Cap Fixed Clevis Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	AB	AH	AL	AO	AT	CB	PIN +.000 -.002 CD	CW	E	EB	EE		EL	EO	ES	ET	F	G	J	K	L	LR	M	MR	R	S	ADD STROKE			
											NPTF*	SAE <sup>std</sup>															LB	P	SA	SE
1 1/2	7/16	1 3/8	1	3/8	1/8	3/4	.501	1/2	2 1/2	7/16	1/2	10	7/8	3/8	7/8	3/4	3/8	1 3/4	1 1/2	3/8	3/4	9/16	1/2	5/8	1.63	1 3/4	5	2 7/8	7	6 3/4
2	9/16	1 11/16	1 1/4	1/2	1/8	1 1/4	.751	5/8	3	9/16	1/2	10	15/16	1/2	15/16	7/8	5/8	1 3/4	1 1/2	7/16	1 1/4	1	3/4	15/16	2.05	2	5 1/4	2 7/8	7 3/4	7 1/8
2 1/2	11/16	1 15/16	1 3/16	9/16	1/8	1 1/4	.751	5/8	3 1/2	9/16	1/2	10	15/16	1/2	15/16	7/8	5/8	1 3/4	1 1/2	7/16	1 1/4	15/16	3/4	15/16	2.55	2 3/8	5 3/8	3	7 3/4	7 1/4
3 1/4	13/16	2 9/16	1 13/16	11/16	1/4	1 1/2	1.001	3/4	4 1/2	11/16	3/4	12	1 1/8	5/8	1 1/4	1 1/4	3/4	2	1 3/4	9/16	1 1/2	1 1/4	1	1 3/16	3.25	3 1/8	6 1/4	3 1/2	9 7/8	8 1/2
4	1 1/16	2 13/16	2 1/8	7/8	1/4	2	1.376	1	5	11/16	3/4	12	1 1/8	5/8	1 1/4	1 1/4	7/8	2	1 3/4	9/16	2 1/8	1 3/4	1 3/8	1 5/8	3.82	3 1/4	6 5/8	3 3/4	10 7/8	8 7/8
5	1 1/16	3 11/16	2 1/8	7/8	5/16	2 1/2	1.751	1 1/4	6 1/2	15/16	3/4	12	1 1/2	3/4	1 1/2	1 1/2	7/8	2	1 3/4	13/16	2 1/4	2 1/16	1 3/4	2 1/8	4.95	4 3/4	7 1/8	4 1/4	11 3/8	10 1/8
6	1 5/16	4 1/4	2 7/16	1 1/16	3/8	2 1/2	2.001	1 1/4	7 1/2	1 1/16	1	16	1 11/16	7/8	1 3/4	1 3/4	1	2 1/4	2 1/4	7/8	2 1/2	5 5/16	2	2 3/8	5.73	5 3/8	8 3/8	4 7/8	13 1/4	11 3/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke							
		STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	XA	XC	XE	ZA	ZC	ZE	
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	6 5/8	6 3/8	6 1/2	7	6 7/8	6 7/8
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	7	6 3/4	6 7/8	7 3/8	7 1/4	7 1/4	
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	7 1/4	7 1/4	6 15/16	7 3/4	8	7 7/16
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	7 1/2	7 1/2	7 3/16	8	8 1/4		
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	7 5/16	7 3/8	7 1/16	7 7/8	8 1/8	7 9/16
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	7 9/16	7 5/8	7 5/16	8 1/8	8 3/8	7 13/16	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	7 13/16	7 7/8	7 9/16	8 3/8	8 5/8	8 1/16	
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	8 15/16	8 5/8	8 1/4	9 5/8	9 5/8	8 7/8
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	9 3/16	8 7/8	8 1/2	9 7/8	9 7/8	9 1/8	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	9 5/16	9	8 5/8	10	10	9 1/4	
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	9 3/4	9 3/4	8 3/4	10 5/8	11 1/8	9 3/8
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	9 7/8	9 7/8	8 7/8	10 3/4	11 1/4	9 1/2	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	10 1/8	10 1/8	9 1/8	11	11 1/2	9 3/4	
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	10 3/8	10 1/2	9 3/4	11 1/4	12 1/4	10 1/2
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4	
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16	

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

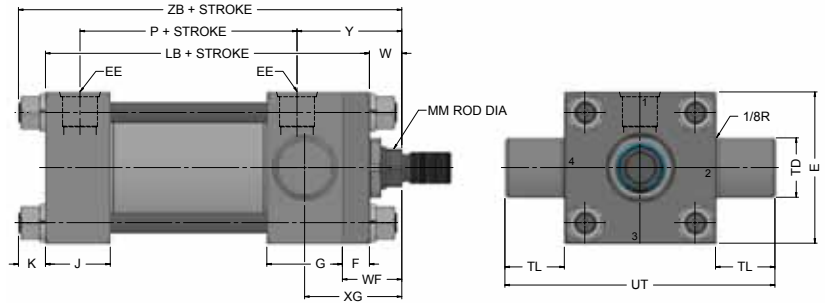
Trunnion Mountings  
1 1/2 to 6" Bore Sizes

### Head Trunnion Style ST6T1 (NFFA Style MT1)



For MT1 Head trunnion Style  
Mount Maximum Pressure Rating - PSI

Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000

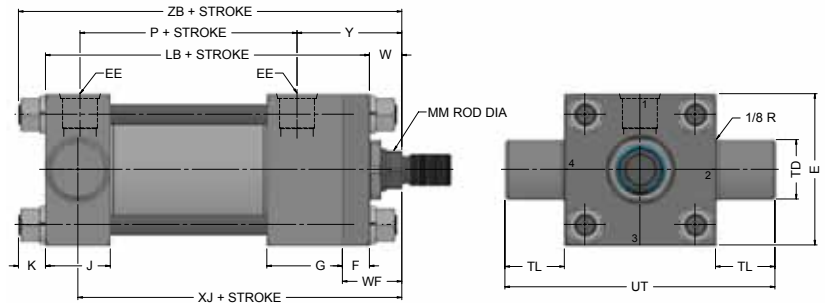


### Cap Trunnion Style ST6T2 (NFFA Style MT2)



For MT2 Cap trunnion Mount  
Maximum Pressure Rating - PSI

Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000

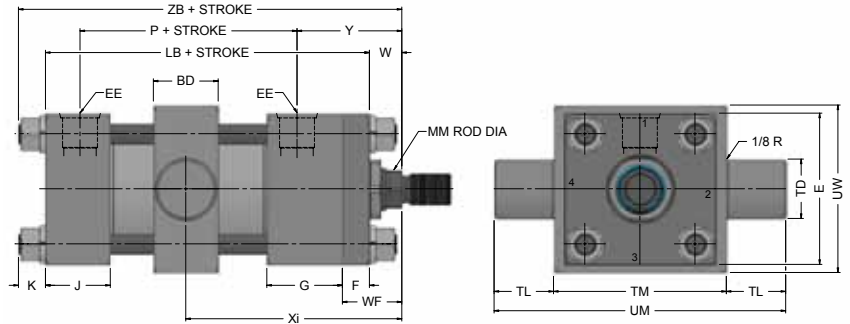


### Intermediate Fixed Trunnion Style ST6T4 (NFFA Style MT4)



For MT4 Center trunnion Mount  
Maximum Pressure Rating - PSI

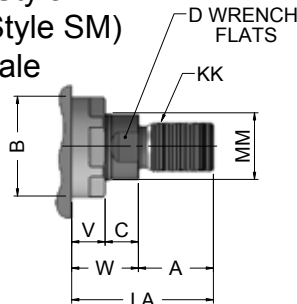
Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000



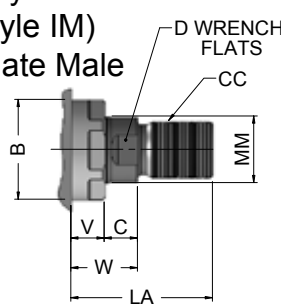
\*\*Dimension Xi to be specified by customer.

### Rod End Dimensions—see table 2

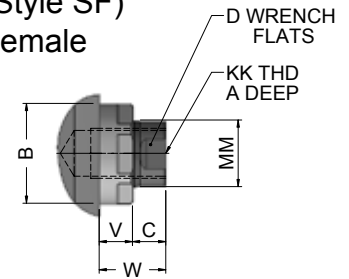
#### Thread Style #2 (NFFA Style SM) Small Male



#### Thread Style #1 (NFFA Style IM) Intermediate Male



#### Thread Style #4 (NFFA Style SF) Small Female



#### "Specials" Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	BD	E	EE		F	G	J	K	+.000 -.001 TD	TL	TM	UM	UT	UW	ADD STROKE		STYLE MT4 MIN STROKE
			NPTF*	SAE <sup>std</sup>											LB	P	
1 1/2	1 1/4	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	1.000	1	3	5	4 1/2	3 3/8	5	2 7/8	0
2	1 1/2	3	1/2	10	5/8	1 3/4	1 1/2	7/16	1.375	1 3/8	3 1/2	6 1/4	5 3/4	4 1/8	5 1/4	2 7/8	1/4
2 1/2	1 1/2	3 1/2	1/2	10	5/8	1 3/4	1 1/2	7/16	1.375	1 3/8	4	6 3/4	6 1/4	4 5/8	5 3/8	3	1/8
3 1/4	2	4 1/2	3/4	12	3/4	2	1 3/4	9/16	1.750	1 3/4	5	8 1/2	8	5 13/16	6 1/4	3 1/2	3/8
4	2	5	3/4	12	7/8	2	1 3/4	9/16	1.750	1 3/4	5 1/2	9	8 1/2	6 3/8	6 5/8	3 3/4	1/8
5	2	6 1/2	3/4	12	7/8	2	1 3/4	13/16	1.750	1 3/4	7	10 1/2	10	7 3/4	7 1/8	4 1/4	0
6	3	7 1/2	1	16	1	2 1/4	2 1/4	7/8	2	2	8 1/2	12 1/2	11 1/2	10 3/8	8 3/8	4 7/8	1/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions								Add Stroke				
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	XG	MIN XI*	Y	XJ	ZB
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	1 7/8	3 7/16	2	4 7/8	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 1/4	3 13/16	2 3/8	5 1/4	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 1/4	3 15/16	2 3/8	5 1/4	6 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	2 5/8	5 1/2	6 11/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 1/4	3 15/16	2 3/8	5 3/8	9 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	2 5/8	5 5/8	6 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 3/4	4 7/16	2 7/8	5 7/8	7 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 5/8	4 11/16	2 3/4	6 1/4	7 11/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	2 7/8	4 15/16	3	6 1/2	7 15/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3	4 15/16	3 1/8	6 5/8	8 1/16
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	2 7/8	4 15/16	3	6 3/4	8 3/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	3 1/8	6 7/8	8 5/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 1/8	8 9/16
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	3 1/8	7 3/8	9 1/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2

\*\*Dimension XI to be specified by customer.

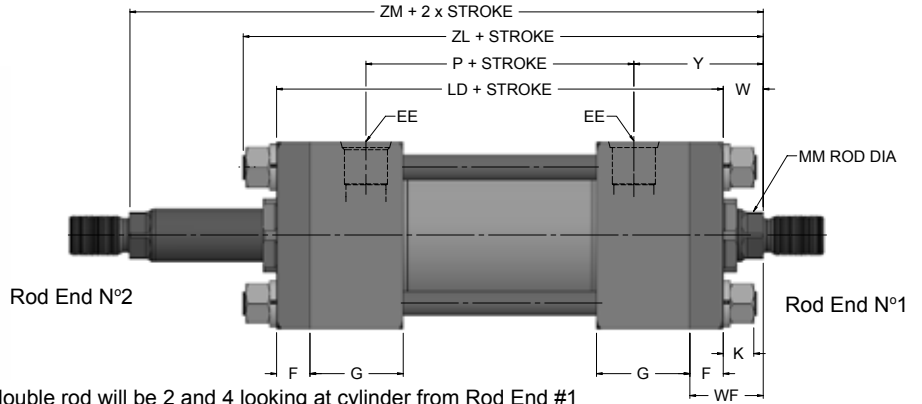
Table 3—Envelope and Mounting Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Double Rod End and  
1 1/2 to 6" Bore Sizes

Double Rod end  
Style ST6D



Standard Cushion position for double rod will be 2 and 4 looking at cylinder from Rod End #1

To determine dimensions for a double rod cylinder, first refer to the desired single rod mounting style cylinder shown on preceding pages of this catalog. After selecting necessary dimensions from that drawing, return to this page supplement the single rod dimensions with those shown on drawings above and dimension table below. Note that double rod cylinders have a head (Dim. G) at both ends and that dimension LD replaces LB and ZL replaces ZB, etc. The double rod dimensions differ from, or are in addition to those for single rod cylinders shown on preceding pages and provide the information needed to completely dimension a double rod cylinder. On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from rod end N°1 only. (See port position information in Page 29.)

BORE	ROD SIZE	Add Stroke										Add 2X Stroke	
		LD	ZL	SS <sub>D</sub>	SN <sub>D</sub>	SE <sub>D</sub>	XE <sub>D</sub>	ZE <sub>D</sub>	SA <sub>D</sub>	XA <sub>D</sub>	XA <sub>D</sub>		ZM
1 1/2	std	5/8	5 5/8	6 1/4	4 1/8	2 7/8	7 3/8	7 1/8	7 1/2	7 5/8	7 1/4	7 5/8	6 7/8
2	std	1	6 1/8	6 7/8	3 7/8	2 7/8	8	7 13/16	8 5/16	8 5/8	8 1/8	8 5/8	7 5/8
2 1/2	std	1	6 1/4	7	3 5/8	3	8 1/8	7 15/16	8 7/16	8 5/8	8 3/16	8 3/4	7 3/4
3 1/4	std	1 3/8	7 1/4	8 1/8	4 3/8	3 1/2	9 1/2	9 1/4	9 7/8	10 7/8	9 15/16	10 5/8	9
4	std	1 3/4	7 3/4	8 3/4	4 1/4	3 3/4	10	9 7/8	10 1/2	12	10 7/8	11 3/4	9 3/4
5	std	2	8 1/4	9 3/8	4 3/4	4 1/4	11 1/4	10 7/8	11 5/8	12 1/2	11 1/2	12 3/8	10 1/2
6	std	2 1/2	9 3/8	10 5/8	5 1/8	4 7/8	12 3/4	12 5/16	13 3/16	14 1/4	13 1/16	14 1/8	11 7/8
Replaces :		<b>LB</b>	<b>ZB</b>	<b>SS</b>	<b>SN</b>	<b>SE</b>	<b>XE</b>	<b>ZE</b>	<b>SA</b>	<b>XA</b>	<b>XA</b>	--	
On single rod mounting styles:		All Mtgs. Style		MS2, MS3	MS4	MS7			MS1			All Mtgs.	

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

BORE	E	EE		F	G	K
		NPTF*	SAE <sup>std</sup>			
1 1/2	2 1/2	1/2	10	3/8	1 1/2	3/8
2	3	1/2	10	5/8	1 1/2	7/16
2 1/2	3 3/4	1/2	10	5/8	1 1/2	7/16
3 1/4	4 1/2	3/4	12	3/4	1 3/4	9/16
4	5 1/2	3/4	12	7/8	1 3/4	9/16
5	6 1/2	3/4	12	7/8	1 3/4	13/16
6	7 1/2	1	16	1	2	7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.  
\*NPTF ports are available at no extra charge.

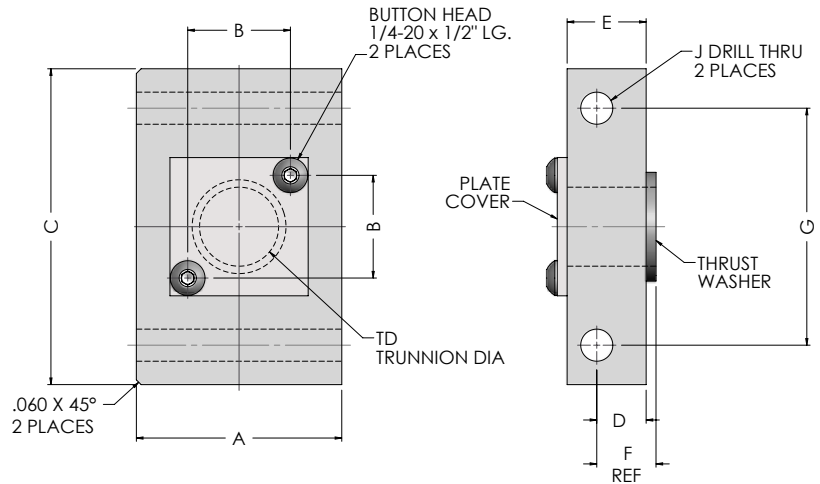


# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Block Accessories  
and Adjustable Stroke Option

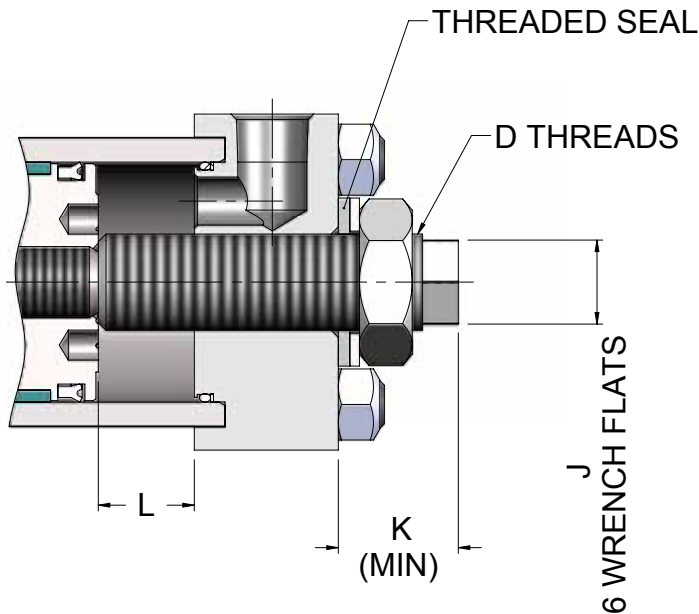
### TRUNNION BLOCK



BORE	Part Number	A	B	C	D	F	G	J	TD
1 1/2	6-1564-1000-FM	2.60	1.300	1.999	0.625	0.750	1.500	13/32	1.000
2, 2 1/2	6-2064-1375-FM	2.60	1.300	1.999	0.875	1.000	1.500	9/16	1.375
3 1/4, 4, 5	6-3264-1750-FM	3.40	1.700	2.499	1.000	1.125	1.750	11/16	1.750
6	6-6064-2000-FM	3.80	1.900	2.999	1.250	1.375	2.000	13/16	2.000

### ASU - ADJUSTABLE STROKE UP

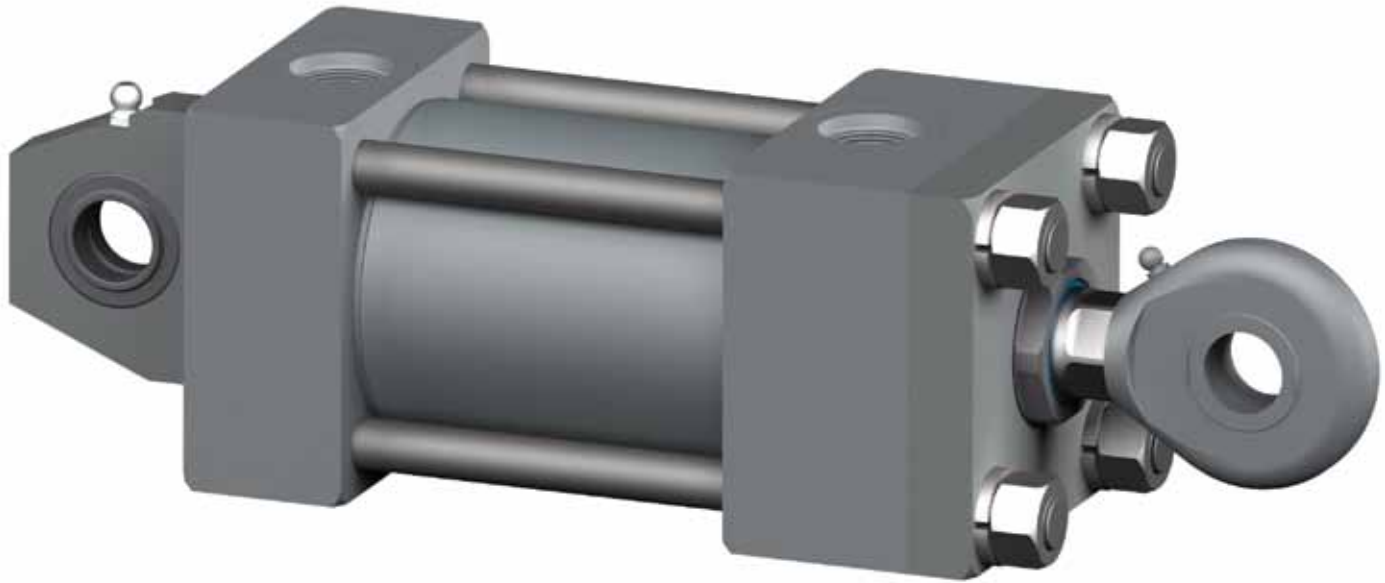
For the requirement where adjusting the stroke is specified. Starcyl has several design to offer, one of which is shown below. This is suitable for infrequent adjustment and is economical.



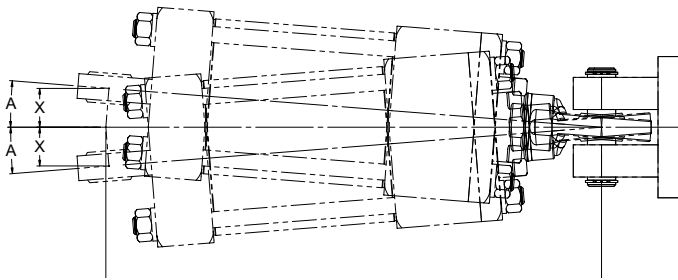
BORE	D	J	K	L (MAX)
1 1/2	1/2-20	5/16	15/16	5
2	3/4-16	7/16	1 1/4	8
2 1/2, 3 1/4	1-14	5/8	1 11/16	9
4	1 1/2-12	15/16	2 1/8	18
5	2-12	1 5/16	2 11/16	20
6	2 1/2-12	1 11/16	3 1/8	20
7	3-12	2	3 1/4	20
8	3 1/2-12	2 3/8	3 1/2	20

Here a "ASU" stroke adjustment stroke up (retracting stroke adjuster) must be called for in specification, and the length of the adjustment must be specified. (ex: -ASU6)

**Spherical Bearing Mount  
 Style SB**



**Mounting Information**  
 Head End Mounting



**Mounting Information**  
 Cap End Mounting

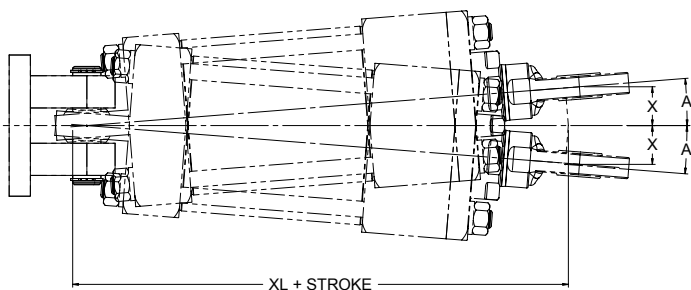


Table 1 — Dimensions

Recommended maximum swivel angle on each side of the cylinder centerline.

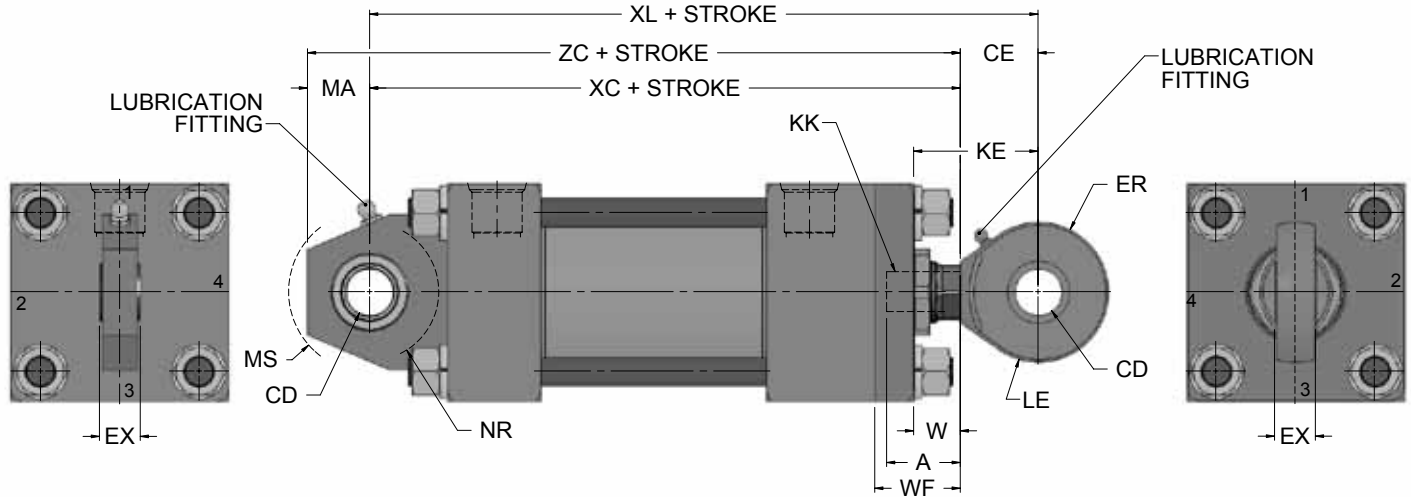
Bore	Head End Mount		Cap End Mount	
	Angle A	Tan. of A	Angle A	Tan. of A
1 1/2	2°	0.035	2°	0.035
2	2 1/2°	0.044	4 1/2°	0.079
2 1/2	2 1/2°	0.044	4 1/2°	0.079
3 1/4	3°	0.052	3°	0.052
4	2 1/2°	0.044	3°	0.052
5	3°	0.052	3°	0.052
6	3°	0.052	3°	0.052

Note: Dimension X is the maximum off center mounting of the cylinder. To Determine dimension X for various stroke lengths multiply the distance between pivot pin holes by tangent of angle A. For extended position use X = XL times 2X stroke.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Spherical Bearing Mount  
Style SB  
1 1/2 to 6" Bore Sizes



BORE	ROD SIZE	Thread Style		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max Oper. PSI **	
		STYLE #4 KK	STYLE #7 KK			XC	XL	ZC										ST6	
1.5	std	5/8	7/16-20	-	3/4	5/8	6 3/8	7 1/4	7 1/8	1 1/2	-.0005 .5000	7/8	13/16	7/16	3/4	3/4	15/16	5/8	1250
	1	-	7/16-20	3/4	1	6 3/4	7 5/8	7 1/2	1 7/8										
2	std	1	3/4-16	-	1 1/8	3/4	7 1/4	8 1/2	8 1/4	2	-.0005 .7500	1 1/4	1 1/8	21/32	11/16	1	1 3/8	1	2200
	1 3/8	-	3/4-16	1 1/8	1	7 1/2	8 3/4	8 1/2	2 1/4										
2.5	std	1	3/4-16	-	1 1/8	3/4	7 1/4	8 1/2	8 1/4	2	-.0005 .7500	1 1/4	1 1/8	21/32	11/16	1	1 3/8	1	1450
	1 3/8	-	3/4-16	1 1/8	1	7 1/2	8 3/4	8 1/2	2 1/4										
	1 3/4	-	3/4-16	1 1/8	1 1/4	7 7/8	9 1/8	8 7/8	2 1/2										
3.25	std	1 3/8	1-14	-	1 5/8	7/8	8 5/8	10 1/2	9 7/8	2 3/4	-.0005 1.0000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	1500
	1 3/4	-	1-14	1 5/8	1 1/8	8 7/8	10 3/4	10 1/8	3										
	2	-	1-14	1 5/8	1 1/4	9	10 7/8	10 1/4	3 1/8										
4	std	1 3/4	1 1/4-12	-	2	1	9 3/4	11 7/8	11 5/8	3 1/8	-.0005 1.3750	2 1/8	1 11/16	1 3/16	1 7/8	1 7/8	2 7/16	1 5/8	1850
	2	-	1 1/4-12	2	1 1/8	9 7/8	12	11 3/4	3 1/4										
	2 1/2	-	1 1/4-12	2	1 3/8	10 1/8	12 1/4	12	3 1/2										
5	std	2	1 1/2-12	-	2 1/4	1 1/8	10 1/2	13	13	3 5/8	-.0005 1.7500	2 1/2	2 1/16	1 17/32	2 1/8	2 1/2	2 7/8	2 1/16	2000
	2 1/2	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8										
	3	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8										
	3 1/2	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8										
6	std	2 1/2	1 7/8-12	-	3	1 1/4	12 1/8	14 7/8	14 5/8	4	-.0005 2.0000	2 3/4	2 1/2	1 3/4	2 1/2	2 1/2	3 5/16	2 3/8	1800
	3	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4										
	3 1/2	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4										
	4	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4										

\* Dimension "CD" is hole diameter

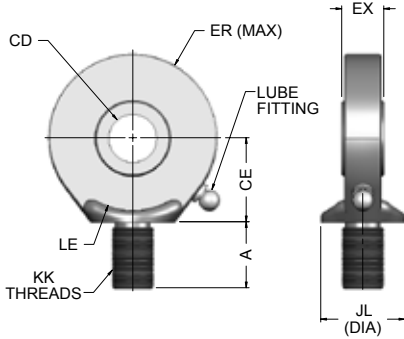
\*\* Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

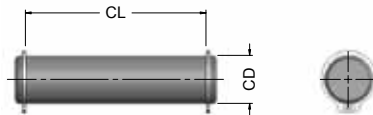
Cylinder accessories  
Spherical Bearing Mounting

### NFPA SPHERICAL ROD EYE



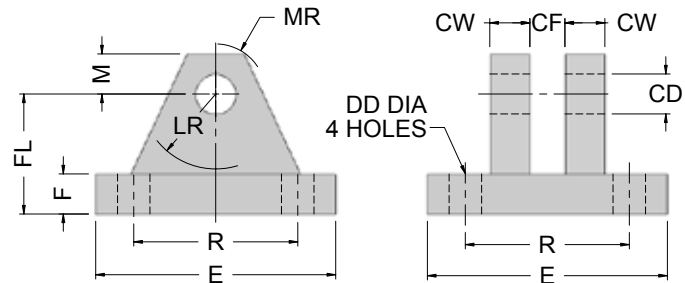
Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2	RES-05	.5000 <sup>-0005</sup>	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
2 & 2.5	RES-07	.7500 <sup>-0005</sup>	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
3.25	RES-10	1.0000 <sup>-0005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860
4	RES-13	1.3750 <sup>-0005</sup>	2	2 1/8	1 3/16	1 11/16	1 7/8	1 1/4-12	2	28562
5	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
6	RES-20	2.000 <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
1 1/2	PS-05	.5000 <sup>-0004</sup>	1 9/16	8600
2 & 2.5	PS-07	.7500 <sup>-0005</sup>	2 1/32	19300
3.25	PS-10	1.0000 <sup>-0005</sup>	2 1/2	34300
4	PS-13	1.3750 <sup>-0006</sup>	3 5/16	65000
5	PS-17	1.7500 <sup>-0006</sup>	4 7/32	105200
6	PS-20	2.000 <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
1 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
2 & 2.5	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
3.25	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
4	CBS-13	1 3/8 <sup>+004/+002</sup>	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
5	CBS-17	1 3/4 <sup>+004/+002</sup>	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
6	CBS-20	2 <sup>+004/+002</sup>	1 3/4	1 1/2	29/32	10 5/8	1 1/2	5	3 5/16	2	2 3/8	7.92	50375



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

### BOLT-ON MANIFOLDS

Starcyl cylinders are available with bolt-on Manifolds. Manifolds can be mounted on the head or cap end of Starcyl STAR6 series

High Strength Anodized Aluminum 3000 psi Bolt-on Valve Manifold - 3 std Paterns D03, D05 and D06, Others can be manufactured per request like DO7, DO8 and servo valve.

Pre-Plumbed Assembly Simplifies Installation, on Standard Star6 Cylinders.

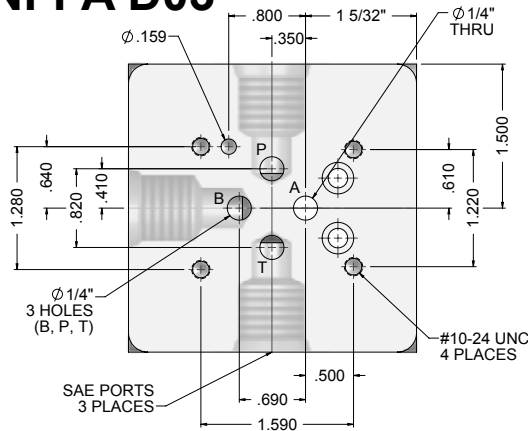
No Leak plumbing assembly



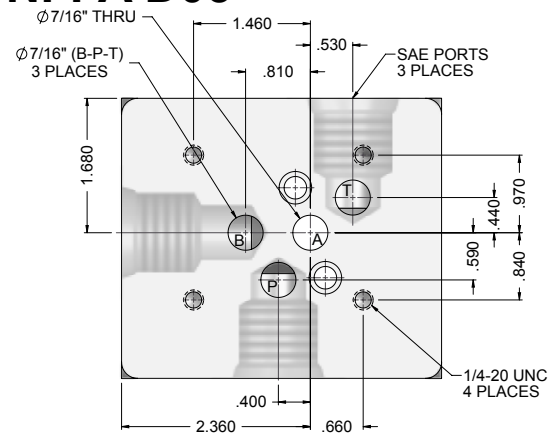
### Features and Benefits

- Minimum hydraulic line runs with closed cylinder and valve coupling
- Simplified machine design with integrated components
- Minimum interference with standard mounting dimensions
- Manifold may be mounted on head or cap end at any position not occupied by a mount
- 3 standard valve patterns, Others available
- Integral mounted valve eliminates assembly time and fittings.
- Custom manifolds available – consult factory

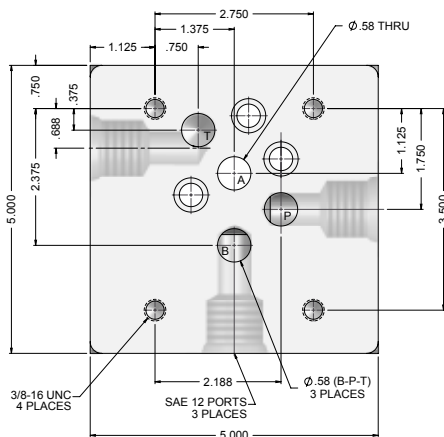
### NFPA D03



### NFPA D05



### NFPA D06



### HOW TO ORDER

ST6 D' F1 - 3.25 X 22.22 X 1.38 - #2 - S121 S121 C00 - LU - FP

ST6 D' F1 - 3.25 X 22.22 X 1.38 - #2 - D031 D031 C00 - LU - FP

Replace port type and size by Manifold Number like D03, D05 or D06

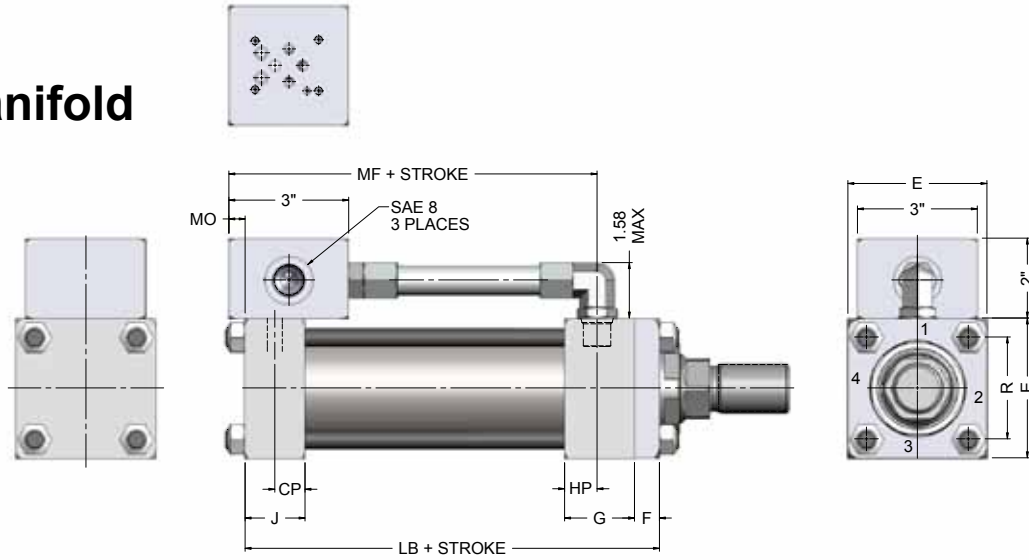


# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

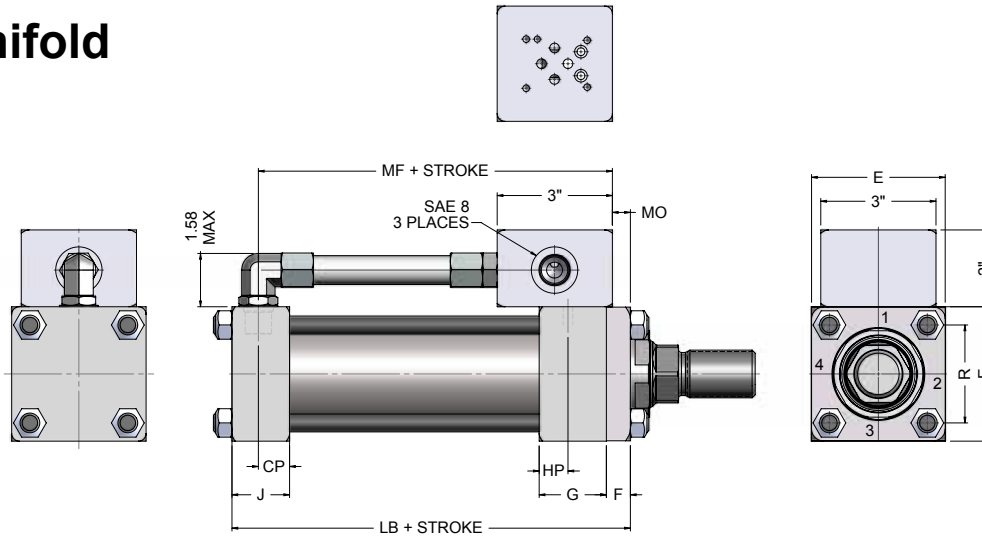
Bolt-On Manifold  
DO3 Dimensions

### NFPA D03 Bolt-on Manifold Cap End



BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
1 1/2	2 1/2	1.63	25/32	3/4	4 1/16	.406	1.75	1.50	5.000	1.750
2	3	2.05	25/32	3/4	4 1/16	.406	1.75	1.50	5.250	1.750
2 1/2	3 1/2	2.55	13/16	3/4	4 7/32	.406	1.75	1.50	5.375	1.625
3 1/4	4 1/2	3.25	29/32	29/32	4 23/32	.312	2.00	1.75	6.250	1.000
4	5 1/2	3.82	29/32	29/32	4 31/32	.312	2.00	1.75	6.625	.750
5	6 1/2	4.95	29/32	29/32	5 15/32	.312	2.00	1.75	7.125	.250
6	7 1/2	5.73	1 1/32	1	6 1/16	N/A	2.25	2.25	8.375	0

### NFPA D03 Bolt-on Manifold Head End



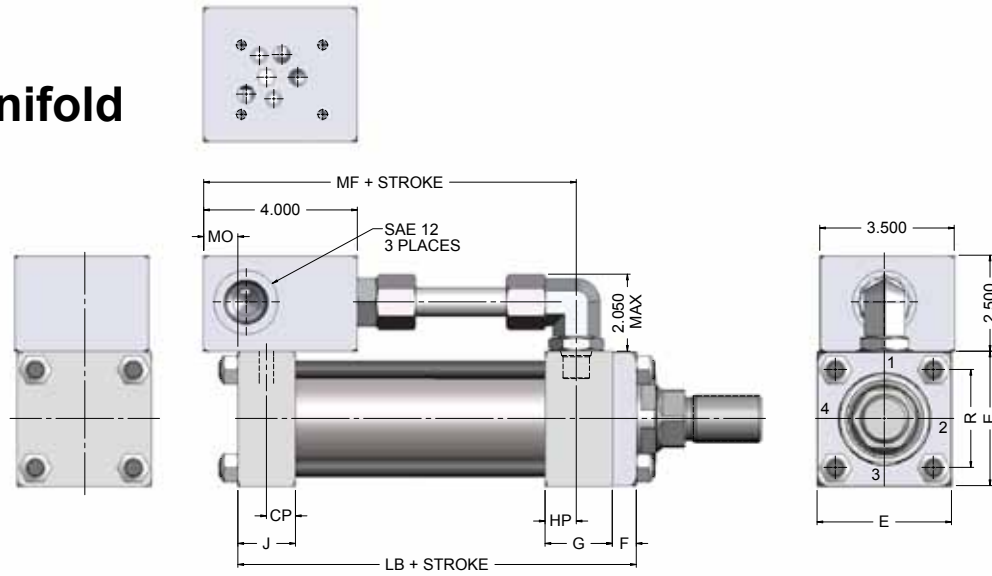
BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
1 1/2	2 1/2	1.63	3/4	25/32	4 1/16	.406	1.75	1.50	5.000	1.750
2	3	2.05	3/4	25/32	4 1/16	.406	1.75	1.50	5.250	1.750
2 1/2	3 1/2	2.55	3/4	13/16	4 7/32	.406	1.75	1.50	5.375	1.625
3 1/4	4 1/2	3.25	29/32	29/32	4 23/32	.312	2.00	1.75	6.250	1.000
4	5 1/2	3.82	29/32	29/32	4 31/32	.312	2.00	1.75	6.625	.750
5	6 1/2	4.95	29/32	29/32	5 15/32	.312	2.00	1.75	7.125	.250
6	7 1/2	5.73	1	1 1/32	6 1/16	N/A	2.25	2.25	8.375	0

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

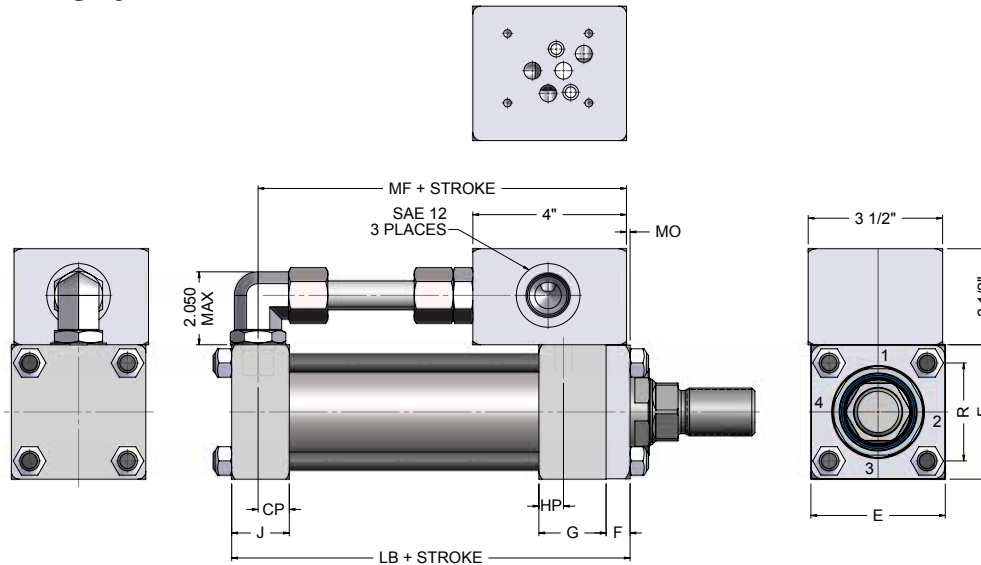
Bolt-On Manifold  
D05 Dimensions

### NFPA D05 Bolt-on Manifold Cap End



BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
2	3	2.05	25/32	3/4	4.547	.891	1.75	1.50	5.250	1.750
2 1/2	3 1/2	2.55	13/16	3/4	4.704	.891	1.75	1.50	5.375	1.625
3 1/4	4 1/2	3.25	29/32	29/32	5.203	.797	2.00	1.75	6.250	1.125
4	5 1/2	3.82	29/32	29/32	5.453	.797	2.00	1.75	6.625	.875
5	6 1/2	4.95	29/32	29/32	5.953	.797	2.00	1.75	7.125	.375
6	7 1/2	5.73	1 1/32	1	6.547	.391	2.25	2.25	8.375	0

### NFPA D05 Bolt-on Manifold Head End



BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
2	3	2.05	3/4	25/32	4.547	.891	1.75	1.50	5.250	1.750
2 1/2	3 1/2	2.55	3/4	13/16	4.704	.891	1.75	1.50	5.375	1.625
3 1/4	4 1/2	3.25	29/32	29/32	5.203	.797	2.00	1.75	6.250	1.125
4	5 1/2	3.82	29/32	29/32	5.453	.797	2.00	1.75	6.625	.875
5	6 1/2	4.95	29/32	29/32	5.953	.797	2.00	1.75	7.125	.375
6	7 1/2	5.73	1	1 1/32	6.547	.391	2.25	2.25	8.375	0

# ST6 SERIES

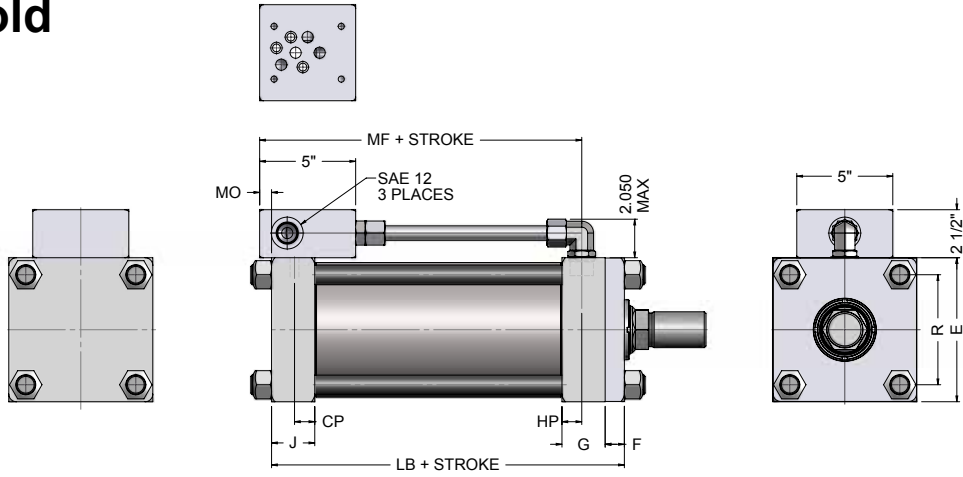
## Heavy Duty Hydraulic Cylinders

Bolt-On Manifold  
DO6 Dimensions

### NFPA D06

#### Bolt-on Manifold

#### Cap End

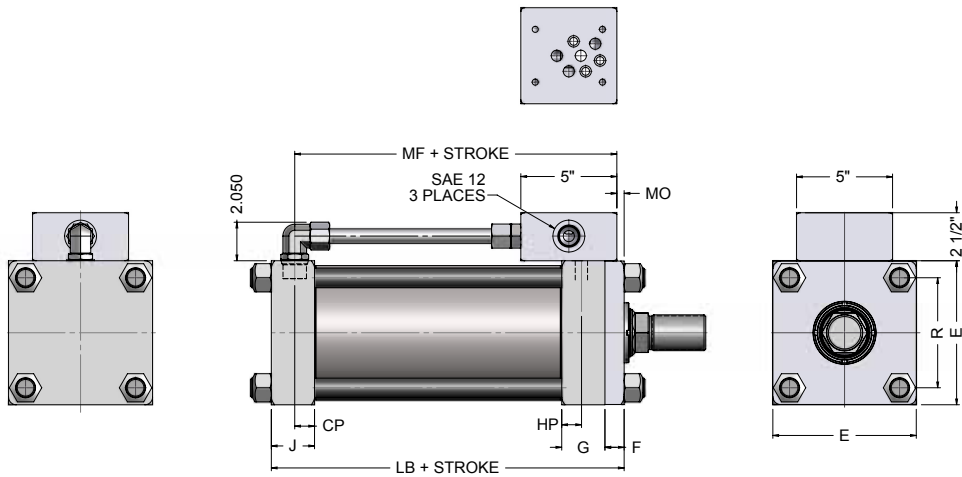


BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
6	7 1/2	5.73	1.000	1.000	6.745	.620	2.25	2.25	8.375	1.750

### NFPA D06

#### Bolt-on Manifold

#### Head End



BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
6	7 1/2	5.73	1.000	1.000	6.745	.380	2.25	2.25	8.375	1.750

# ST6 SERIES

Heavy Duty Hydraulic Cylinders

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# 7" & 8" BORE HEAVY DUTY HIGH PRESSURE HYDRAULIC CYLINDERS

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

7 & 8" Bore Specification & Mountings

### Standard Specifications

HeavyDuty Service – ANSI/(NFPA) T3.6.7R2 - 1996  
 Specifications and Mounting Dimensions Standard  
 Standard Construction: Square Head, Tie Rod Design  
 Nominal Pressure : 3000 PSI\*  
 Standard Fluid: Hydraulic Oil  
 Standard Temperature :-40°F to +230°F\*\*  
 Bore Sizes from 7" and 8"  
 Piston Rod Diameter from 3" through 5 1/2"

Mounting Styles: 16 standard styles at various application ratings  
 Strokes : Available in any practical stroke length  
 Cushions : Optional at either end or both ends of stroke.  
 Float Check at cap end.  
 Rod Ends :Three Standard Choices – Specials to Order

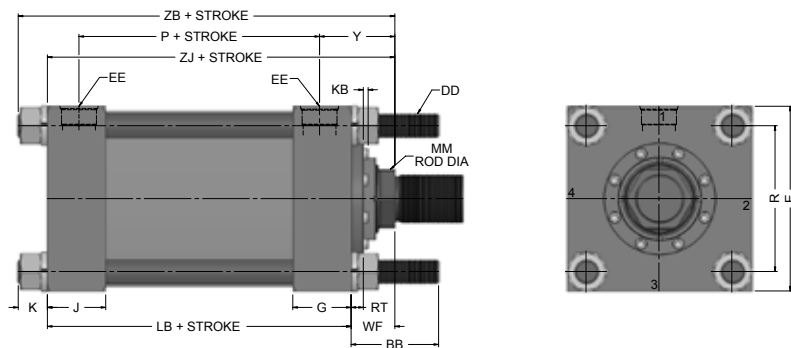
Tie rods Head end ST6X3  NFPA MX3 page 30	Tie rods Cap end ST6X2  NFPA MX2 page 30	Tie rods Extended Both ends ST6X1  NFPA MX1 page 30	Head Rectangular Flange ST6F1  NFPA MF1 page 32
Head Square Flange ST6F5  NFPA MF5 page 32	Head Rectangular Mount ST6E5  NFPA ME5 page 32	Cap Rectangular Flange ST6F2  NFPA MF2 page 34	Cap Square Flange ST6F6  NFPA MF6 page 34
Cap Rectangular Mount ST6E6  NFPA ME6 page 34	Side Lugs ST6S2  NFPA MS2 page 36	Cap Fixed Clevis ST6P1  NFPA MP1 page 36	Side Tap ST6S4  NFPA MS4 page 36
Cap Trunnion ST6T2  NFPA MT2 page 38	End Lugs ST6S7  NFPA MS7 page 38	Intermediate Trunnion ST6T4  NFPA MT4 page 38	Double Rod Cylinders ST6D  page 40

# ST6 SERIES

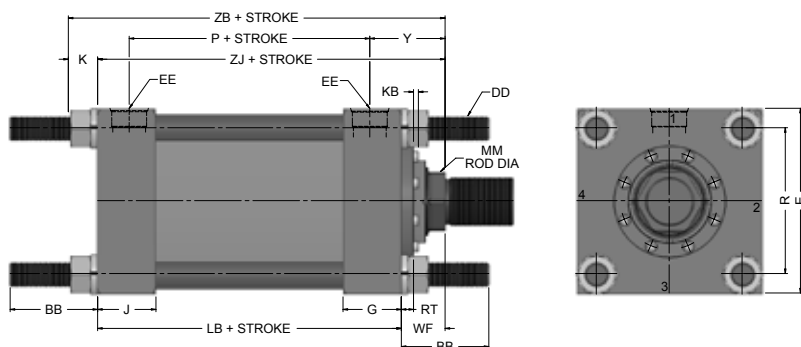
## Heavy Duty Hydraulic Cylinders

Tie rod Mountings  
7 to 8" Bore Sizes

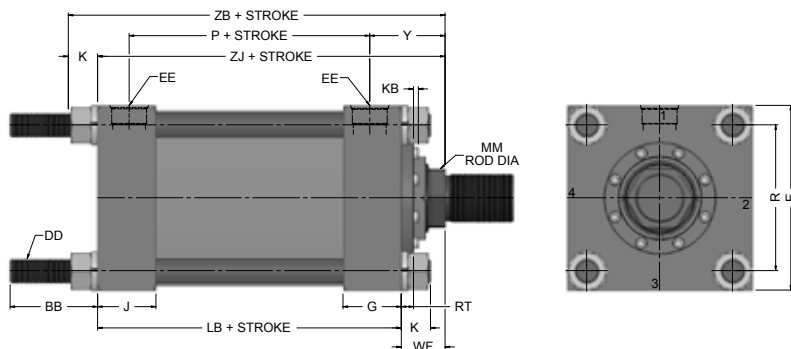
Tie Rods Extended Head End  
Style ST6X3  
(NFFA Style MX3)



Tie Rods Extended Cap End  
Style ST6X2  
(NFFA Style MX2)



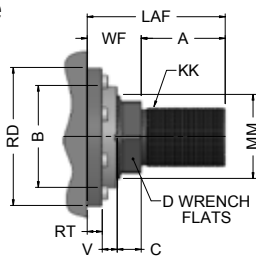
Tie Rods Extended Both End  
Style ST6X1  
(NFFA Style MX1)



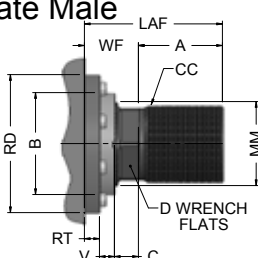
Basic Mounting ST6X0 — NFFA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

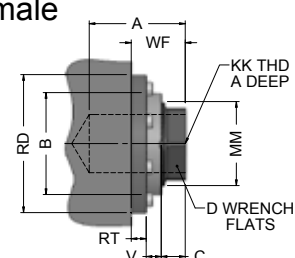
Thread Style #2  
(NFFA Style SM)  
Small Male



Thread Style #1  
(NFFA Style IM)  
Intermediate Male



Thread Style #4  
(NFFA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied. On 4 1/2" rod and above, 4 .515 spanner Wrench holes will be provided instead of wrench flats

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Tie Rod Mountings  
7 to 8" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE		G	J	K	R	ADD STROKE	
					NPTF*	SAE <sup>std</sup>					LB	P
7	9.3	4 1/8	1 1/8-12	8 1/2	1 1/4	20	2 3/4	2 3/4	1 1/4	6.58	8 1/2	5 1/2
8	10.6	4 1/2	1 1/4-12	9 1/2	1 1/2	24	3	3	1 1/2	7.50	9 1/2	6 1/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions											Add Stroke		
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	Y	ZB	ZJ
7	std	3	2 3/4-12	2 1/4-12	3	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4	3 3/4	12	10 3/4
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	12	10 3/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	12	10 3/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	12	10 3/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	12	10 3/4
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 7/8	13 1/4	11 3/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 7/8	13 1/4	11 3/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 7/8	13 1/4	11 3/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 7/8	13 1/4	11 3/4
		5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 7/8	13 1/4	11 3/4

Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Head Mountings  
7 to 8" Bore Sizes

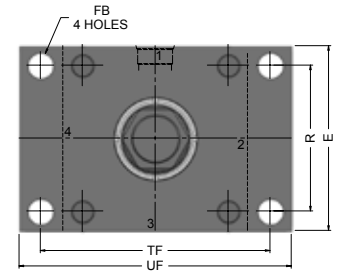
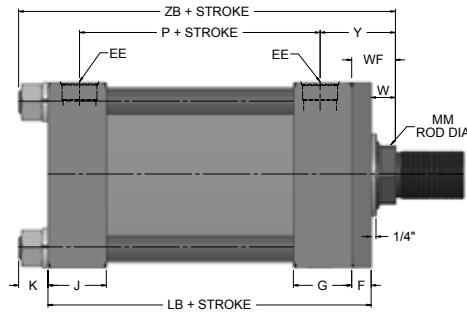
### Head Rectangular Flange mounting Style ST6F1 (NFPA Style MF1)



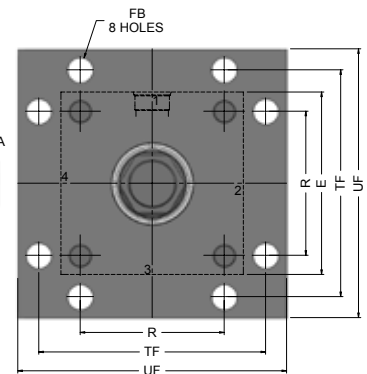
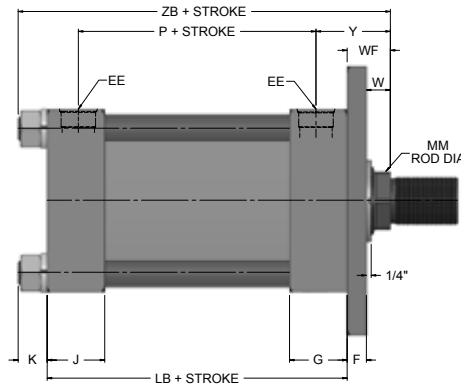
Bore Size	Max PSI — Push*					
	Rod Size					
7	1500	1250	1000	800	500	-
8	-	900	800	700	600	500

\* Maximum pressure rating — push application.

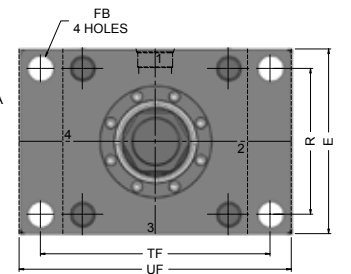
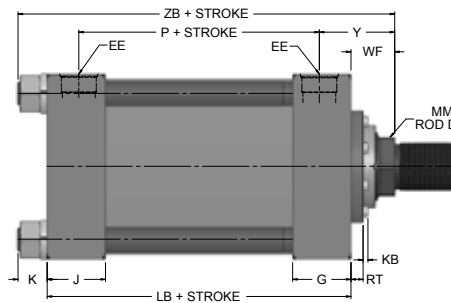
\*For Pressures exceeding those shown please use mounting style ST6F5 or ST6E5



### Head Square Flange mounting Style ST6F5 (NFPA Style MF5)

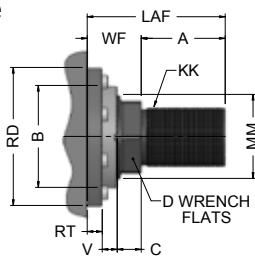


### Head Rectangular mounting Style ST6E5 (NFPA Style ME5)

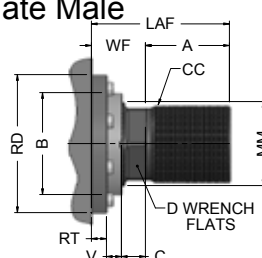


### Rod End Dimensions—see table 2

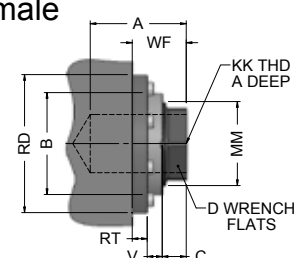
#### Thread Style #2 (NFPA Style SM) Small Male



#### Thread Style #1 (NFPA Style IM) Intermediate Male



#### Thread Style #4 (NFPA Style SF) Small Female



#### "Specials" Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied. On 4 1/2" rod and above, 4 .515 spanner Wrench holes will be provided instead of wrench flats



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Head Mountings  
7 to 8" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
		NPTF*	SAE <sup>std</sup>									LB	P
7	8 1/2	1 1/4	20	1	1 3/16	2 3/4	2 3/4	1 1/4	6.58	10 5/8	12 5/8	8 1/2	5 1/2
8	9 1/2	1 1/2	24	1	1 3/16	3	3	1 1/2	7.5	11 13/16	14	9 1/2	6 1/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions											Add Stroke	
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	Y	ZB
7	std	3	2 3/4-12	2 1/4-12	3	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4	3 3/4	12
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	12
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	12
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	12
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	12
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 7/8	11 3/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 7/8	11 3/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 7/8	11 3/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 7/8	11 3/4
		5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 7/8	11 3/4

Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

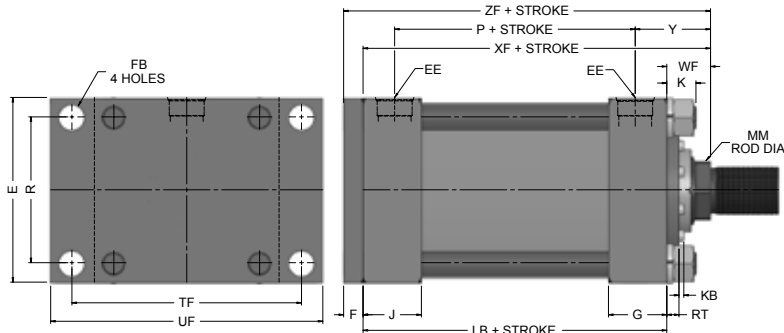
Rectangular Flange  
and Cap Mountings  
7 to 8" Bore Sizes

Cap Rectangular Flange mounting  
Style ST6F2  
(NFFPA Style MF2 )

For Pressures exceeding those shown please use mounting style ST6F6 or ST6E6

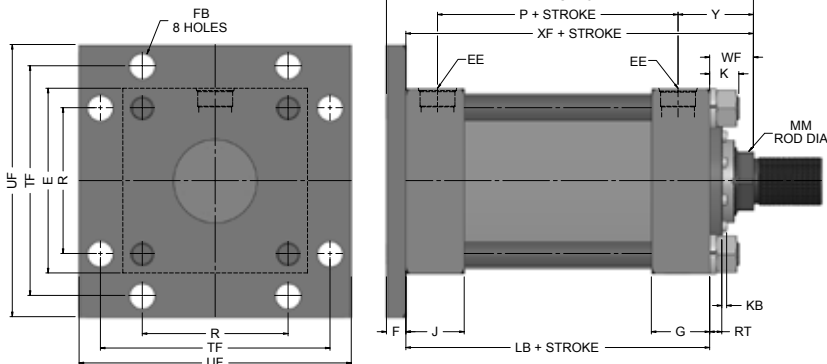


Bore Size	Max PSI — Pull*					
	Rod Size					
7	3	3 1/2	4	4 1/2	5	5 1/2
8	-	1500	1700	1800	1900	2000

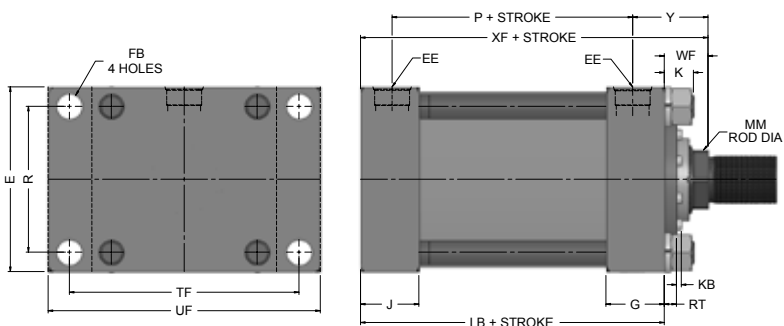


\* Maximum pressure rating — pull application.

Cap Square Flange mounting  
Style ST6F6  
(NFFPA Style MF6)

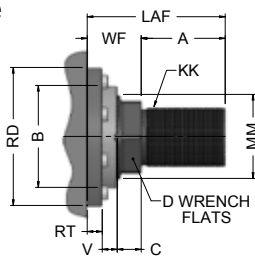


Cap Rectangular mounting  
Style ST6E6  
(NFFPA Style ME6)

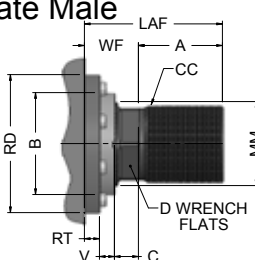


Rod End Dimensions—see table 2

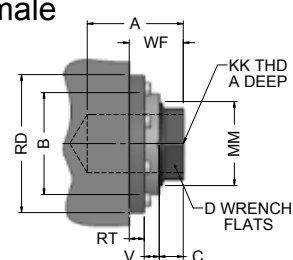
Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #1  
(NFFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied. On 4 1/2" rod and above, 4 .515 spanner Wrench holes will be provided instead of wrench flats

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Cap Mountings  
7 to 8" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
		NPTF*	SAE <sup>std</sup>									LB	P
7	8 1/2	1 1/4	20	1	1 3/16	2 3/4	2 3/4	1 1/4	6.58	10 5/8	12 5/8	8 1/2	5 1/2
8	9 1/2	1 1/2	24	1	1 3/16	3	3	1 1/2	7.5	11 13/16	14	9 1/2	6 1/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions											Add Stroke			
		STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	Y	XF	ZF	
7	std	3	2 3/4-12	2 1/4-12	3	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4	3 3/4	10 3/4	11 3/4
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	10 3/4	11 3/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	10 3/4	11 3/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	10 3/4	11 3/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	10 3/4	11 3/4
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 7/8	11 3/4	12 3/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 7/8	11 3/4	12 3/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 7/8	11 3/4	12 3/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 7/8	11 3/4	12 3/4
		5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 7/8	11 3/4	12 3/4

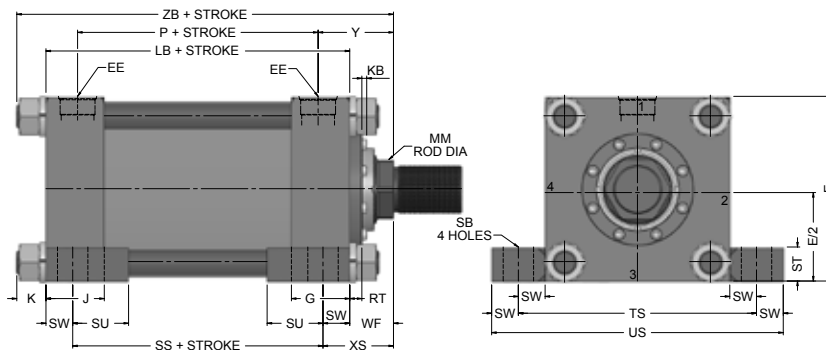
Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

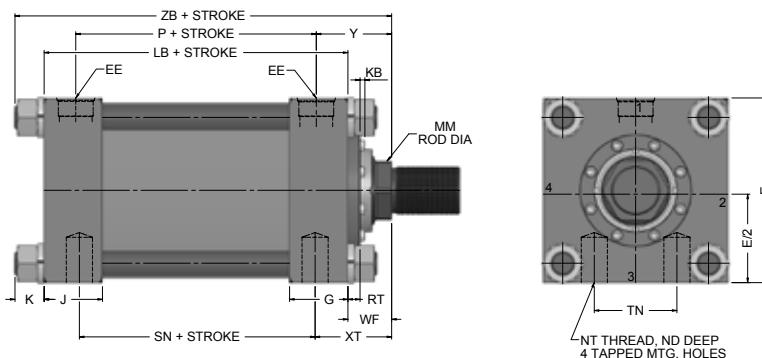
## Heavy Duty Hydraulic Cylinders

Side Lugs, Side Tapped Mountings  
& Cap Fixed Clevis  
7 to 8" Bore Sizes

Side Lugs mounting  
Style ST6S2  
(NFFPA Style MS2)

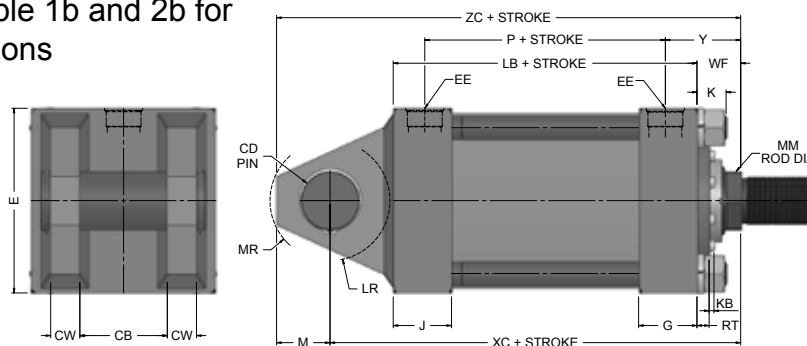


Side Tapped mounting  
Style ST6S4  
(NFFPA Style MS4)



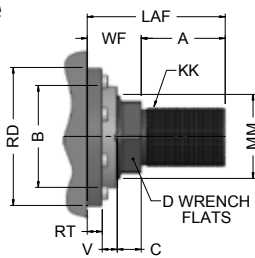
Cap Fixed Clevis mounting  
Style ST6P1  
(NFFPA Style MP1)

refer table 1b and 2b for dimensions

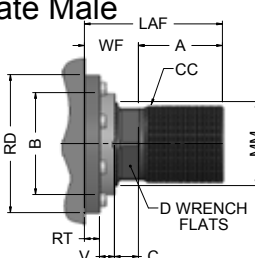


Rod End Dimensions—see table 2

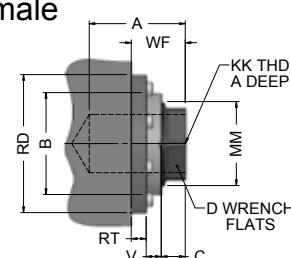
Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #1  
(NFFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied. On 4 1/2" rod and above, 4 .515 spanner Wrench holes will be provided instead of wrench flats

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Side Lugs, Side Tapped Mountings  
& Cap Fixed Clevis  
7 to 8" Bore Sizes

Table 1a—Envelope and Mounting Dimensions

BORE	E	EE		G	J	K	NT	SB <sup>1</sup>	ST	SU	SW	TN	TS	US	ADD STROKE			
		NPTF*	SAE <sup>std</sup>												LB	P	SN	SS
7	8 1/2	1 1/4	20	2 3/4	2 3/4	1 1/4	1 1/2-6	1 9/16	1 3/4	2 7/8	1 3/8	3 3/4	11 1/4	14	8 1/2	5 1/2	5 7/8	5 3/4
8	9 1/2	1 1/2	24	3	3	1 1/2	1 1/2-6	1 9/16	1 3/4	2 7/8	1 3/8	4 1/4	12 1/4	25	9 1/2	6 1/4	6 5/8	6 3/4

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

<sup>1</sup> Upper surface spotfaced for S.H.C.S.

Table 1b—Envelope and Mounting Dimensions

BORE	CB	+.000 -.002 CD*	CW	E	EE		G	J	K	L	LR	M	MR	ADD STROKE	
					NPTF*	SAE <sup>std</sup>								LB	P
7	3	2.501	1 1/2	8 1/2	1 1/4	20	2 3/4	2 3/4	1 1/4	3	2 3/4	2 1/2	2 7/8	8 1/2	5 1/2
8	3	3.001	1 1/2	9 1/2	1 1/2	24	3	3	1 1/2	3 1/4	3 1/4	2 3/4	3 1/8	9 1/2	6 1/4

Table 2a—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions											Y	ND	XS	XT	ZB	Add Stroke
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF						
7	std	3	2 3/4-12	2 1/4-12	3	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4				3 13/16	12	
			3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	1 1/8	3 5/8	3 13/16	12
			4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	1 1/8	3 5/8	3 13/16	12
			4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	1 1/8	3 5/8	3 13/16	12
			5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	1 1/8	3 5/8	3 13/16	12
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	1 1/8	3 5/8	3 15/16	11 3/4	
			4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 7/8	1 1/8	3 5/8	3 15/16	11 3/4
			4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 7/8	1 1/8	3 5/8	3 15/16	11 3/4
			5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 7/8	1 1/8	3 5/8	3 15/16	11 3/4
			5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 7/8	1 1/8	3 5/8	3 15/16	11 3/4

Table 3a—  
Envelope and Mounting  
Dimensions

Table 2b—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions											Add Stroke			
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	Y	XC	ZC	
7	std	3	2 3/4-12	2 1/4-12	3	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4	3 3/4	13 3/4	16 1/4	
			3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	13 3/4	16 1/4
			4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	13 3/4	16 1/4
			4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	13 3/4	16 1/4
			5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	13 3/4	16 1/4
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	3 7/8	17 3/4	
			4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 7/8	3 7/8	17 3/7
			4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 7/8	3 7/8	17 3/7
			5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 7/8	3 7/8	17 3/7
			5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 7/8	3 7/8	17 3/7

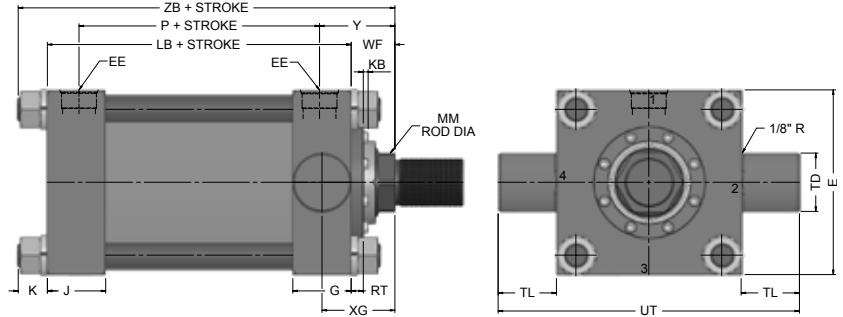
Table 3b—  
Envelope and Mounting  
Dimensions

# ST6 SERIES

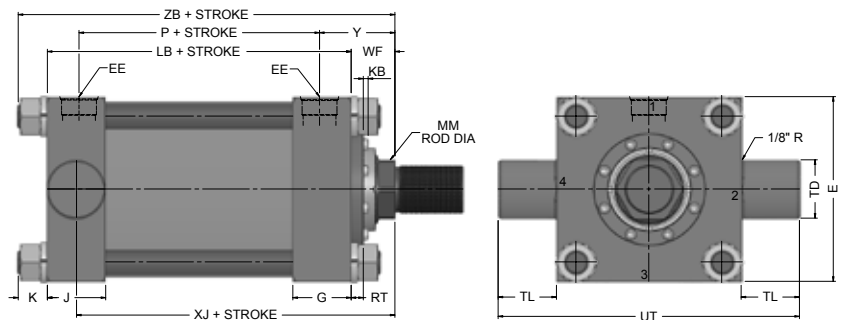
## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
7 to 8" Bore Sizes

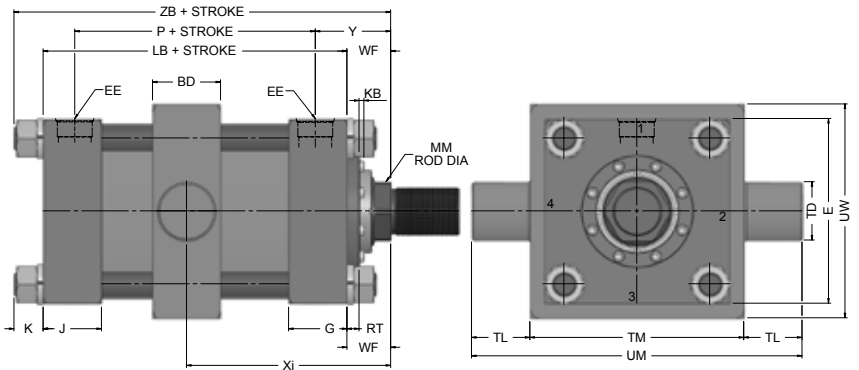
Head Trunnion  
Style ST6T1  
(NFFPA Style MT1)



Cap Trunnion  
Style ST6T2  
(NFFPA Style MT2)



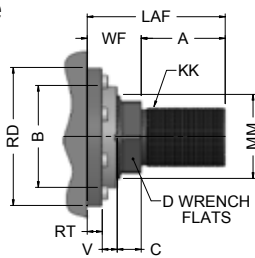
Intermediate Fixed Trunnion  
Style ST6T4  
(NFFPA Style MT4)



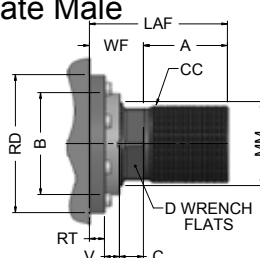
\*\*Dimension XI to be specified by customer.

Rod End Dimensions—see table 2

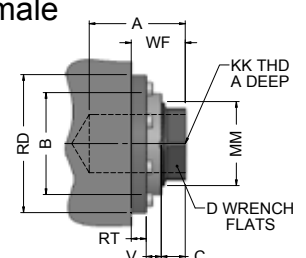
Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #1  
(NFFPA Style IM)  
Intermediate Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



“Specials” Thread Style #X

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

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied. On 1 1/2" rod and above, 4.515 spanner Wrench holes will be provided instead of wrench flats

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
7 to 8" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	BD	E	EE		F	G	J	K	+0.002 -0.002 TD	TL	TM	UM	UT	UW	ADD STROKE		Style DD Minimum Stroke
			NPTF*	SAE <sup>std</sup>											LB	P	
7	3	8 1/2	1 1/4	20	1	2 3/4	2 3/4	1 1/4	2.500	2 1/2	9 3/4	14 3/4	13 1/2	11 1/2	8 1/2	5 1/2	1/8"
8	3 1/2	9 1/2	1 1/2	24	1	3	3	1 1/2	3.000	3	11	17	15 1/2	13 3/8	9 1/2	6 1/4	1/8"

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

Table 3—Envelope and  
Mounting Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions											Add Stroke				
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	XG	MIN. Xi	Y	XJ	ZB
7	std	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	1/4	5 3/4	2 7/8	5/8	5 1/4	5/8	2 1/4	3 5/8	6 9/16	3 3/4	9 3/8	12
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 5/8	6 9/16	3 3/4	9 3/8	12
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 5/8	6 9/16	3 3/4	9 3/8	12
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 5/8	6 9/16	3 3/4	9 3/8	12
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 5/8	6 9/16	3 3/4	9 3/8	12
8	std	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	5 3/4	3 3/8	5/8	5 3/4	5/8	2 1/4	3 3/4	7 1/16	3 7/8	10 1/4	13 1/4
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	6 1/4	3 7/8	1/2	6 1/2	3/4	2 1/4	3 3/4	7 1/16	3 7/8	10 1/4	13 1/4
		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	-	1/4	6 3/4	4 3/8	1/2	7	3/4	2 1/4	3 3/4	7 1/16	3 7/8	10 1/4	13 1/4
		5	4 3/4-12	3 1/2-12	5	5.748	1	-	0	7 1/4	4 7/8	1/4	7 1/4	1	2 1/4	3 3/4	7 1/16	3 7/8	10 1/4	13 1/4
		5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	-	0	7 3/4	5 3/8	1/4	8 1/4	1	2 1/4	3 3/4	7 1/16	3 7/8	10 1/4	13 1/4

\*\*Dimension XI to be specified by customer.

# ST6 SERIES

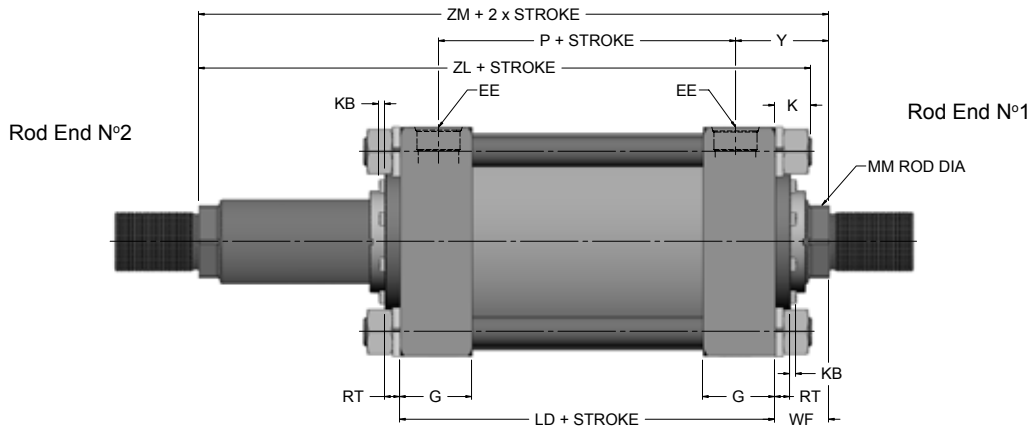
## Heavy Duty Hydraulic Cylinders

Double Rod End and  
1 1/2 to 6" Bore Sizes

Double Rod end  
Style ST6D



Standard Cushion position for double rod will be 2 and 4 looking at cylinder from Rod End #1



To determine dimensions for a double rod cylinder, first refer to the desired single rod mounting style cylinder shown on preceding pages of this catalog. After selecting necessary dimensions from that drawing, return to this page supplement the single rod dimensions with those shown on drawings above and dimension table below. Note that double rod cylinders have a head (Dim. G) at both ends and that dimension LD replaces LB and ZL replaces ZB, etc. The double rod dimensions differ from, or are in addition to those for single rod cylinders shown on preceding pages and provide the information needed to completely dimension a double rod cylinder. On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from rod end N°1 only. (See port position information in Page 29.)

BORE	ROD SIZE	Add Stroke				Add 2X Stroke	
		LD	ZL	SS <sub>D</sub>	SN <sub>D</sub>	ZM	
7	std	3	8 1/2	11 3/4	5 3/4	5 3/8	13
8	std	3 1/2	9 1/2	12 13/16	6 3/4	6 1/8	14
Replaces :		<b>LB</b>	<b>ZB</b>	<b>SS</b>	<b>SN</b>	--	
On single rod mounting styles:		All Mtgs. Style		MS2	MS4	All Mtgs.	

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





# ST6 SERIES

Heavy Duty Hydraulic Cylinders

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# LARGE BORE HIGH PRESSURE HYDRAULIC CYLINDERS

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Large Bore Specification & Mountings

### Standard Specifications

HeavyDuty Service –  
 Specifications and Mounting Dimensions Standard  
 Standard Construction: Square Head, Tie Rod Design  
 Nominal Pressure : 3000 PSI\*  
 Standard Fluid: Hydraulic Oil  
 Standard Temperature :-40°F to +230°F\*\*  
 Bore Sizes from 10” through 20”  
 Piston Rod Diameter from 4 1/2” through 10”

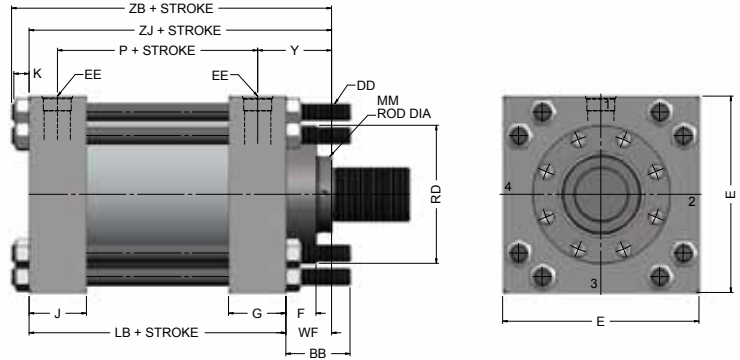
Mounting Styles: 10 standard styles at various application ratings  
 Strokes : Available in any practical stroke length  
 Cushions : Optional at either end or both ends of stroke.  
 Float Check at cap end.  
 Rod Ends :Two Standard Choices – Specials to Order

Tie rods Head end ST6X3  NFPA MX3 page 44	Tie rods Cap end ST6X2  NFPA MX2 page 44	Tie rods Extended Both ends ST6X1  NFPA MX1 page 44	Head Rectangular ST6E5  NFPA ME5 page 46
Head Square Flange ST6F5  NFPA MF5 page 46	Cap Rectangular Mount ST6E6  NFPA ME6 page 48	Cap Square Flange ST6F6  NFPA MF6 page 48	Side Lugs ST6S2  NFPA MS2 page 50
Center Lugs ST6S3  NFPA MS2 page 50	Cap Fixed Clevis ST6P1  NFPA MP1 page 50	Head Trunnion ST6T1  NFPA MT1 page 52	Cap Trunnion ST6T2  NFPA MT2 page 52
Intermediate Trunnion ST6T4  NFPA MT4 page 52	Double Rod Cylinders ST6D  page 54		

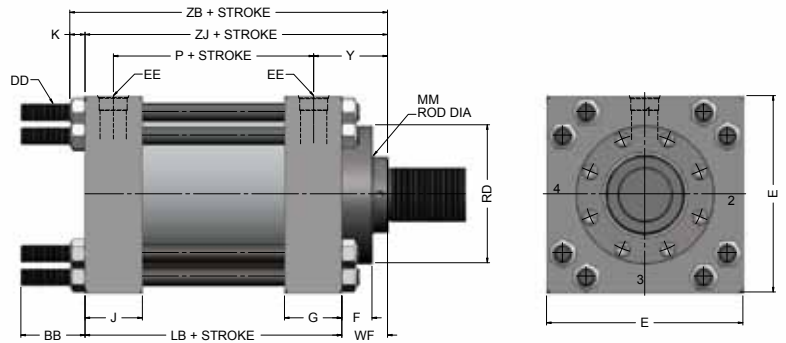
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Tie rod Mountings  
Large Bore Sizes

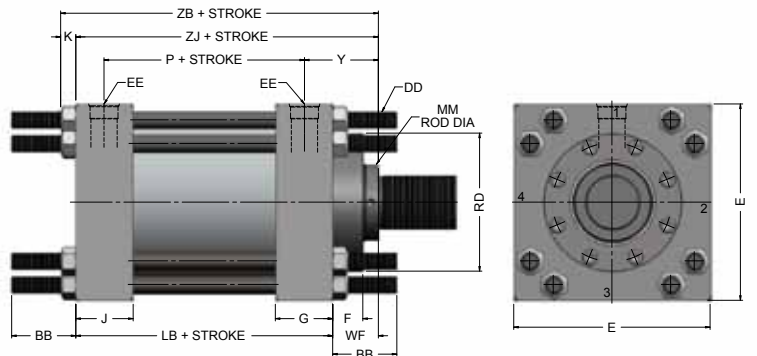
Tie Rods Extended Head End  
Style ST6X3  
(NFPA Style MX3)



Tie Rods Extended Cap End  
Style ST6X2  
(NFPA Style MX2)



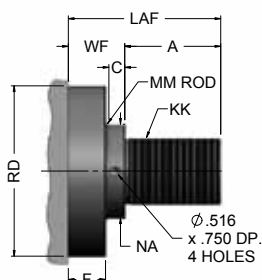
Tie Rods Extended Both End  
Style ST6X1  
(NFPA Style MX1)



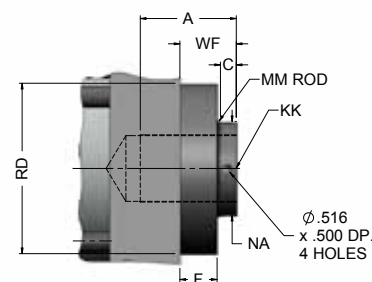
Basic Mounting ST6X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

Thread Style #2  
(NFPA Style SM)  
Small Male



Thread Style #4  
(NFPA Style SF)  
Small Female



“Specials” Thread  
Style #X

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

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Tie Rod Mountings  
Large Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	BB	DD	E	EE			G	J	K	ADD STROKE	
				NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread				LB	P
10	4 1/8	1 1/8-12	12 5/8	2	2	24	3 11/16	3 11/16	1 9/32	12 1/8	8 1/2
12	4 1/2	1 1/4-12	14 7/8	2 1/2	2 1/2	24	4 7/16	4 7/16	1 13/32	14 1/2	10 1/8
14	4 1/2	1 1/4-12	17 1/8	2 1/2	2 1/2	24	4 7/8	4 7/8	1 13/32	15 5/8	10 7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\* Optional SAE Flange ports may be specified - flange to be supplied by customer. see Table 4 for flange port pattern dimensions

\*\*NPTF ports are available at extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread		Rod Extensions and pilot dimensions								Add Stroke				
		STYLE #2 & #4 KK	STYLE #2 & #4 KK	A	+0.000 -0.005 B	C	F	LAF	NA	RR	V	WF	Y	ZB	ZJ	
10	std	4 1/2	3 1/4-12	4 1/2	5.249	1	1 15/16	7 7/16	4 3/8	2 1/8	1/4	2 15/16	4 3/4	16 11/32	15 1/16	
		5	3 1/2-12	5	5.749	1	1 15/16	8 3/16	4 7/8		1/4	3 3/16		5	16 19/32	15 5/16
		5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8		1/4	3 3/16		5	16 19/32	15 5/16
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8		3/8	3 1/2		5 5/16	16 29/32	15 5/8
12	std	5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	2 3/8	1/4	3 3/16	5 3/8	19 3/32	17 11/16	
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8		3/8	3 1/2		5 11/16	19 13/32	18
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8		3/8	4		6 3/16	19 29/32	18 1/2
14	std	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	2 3/8	3/8	3 1/2	5 7/8	20 17/32	19 1/8	
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8		3/8	4		6 3/8	21 1/32	19 5/8
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8		3/8	4 1/2		6 7/8	21 17/32	20 1/8

Table 3—  
Envelope and  
Mounting  
Dimensions

Table 4— Optional SAE  
Flange port pattern

Nom. Flange Size	A	Q	GG	W	X	Z Thread UNC 2B	AA min.	SAE
1 1/2	1.50	2.750	1.406	1.38	0.70	1/2-13	1.06	24
2	2.00	3.062	1.688	1.53	0.84	1/2-13	1.06	32
2 1/2	2.50	3.500	2.000	1.75	1.00	1/2-13	1.19	40
3	3.00	4.188	2.438	2.09	1.22	5/8-11	1.19	48

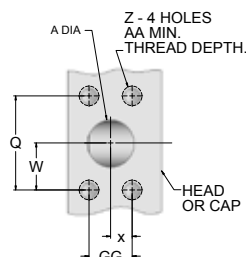
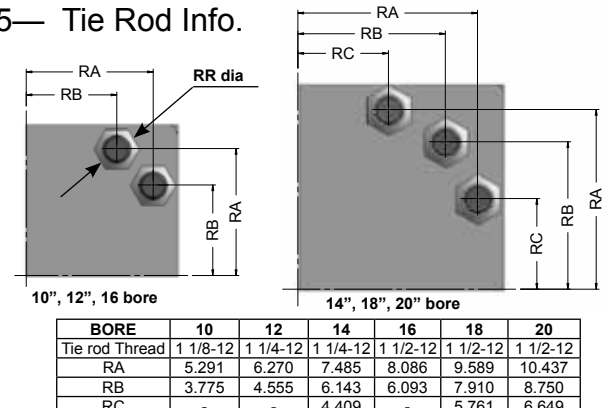


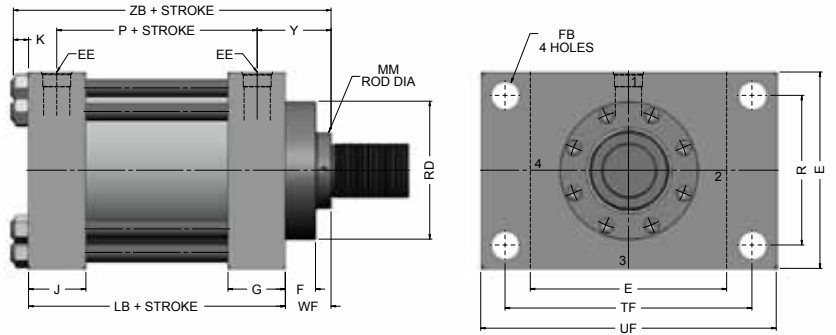
Table 5— Tie Rod Info.



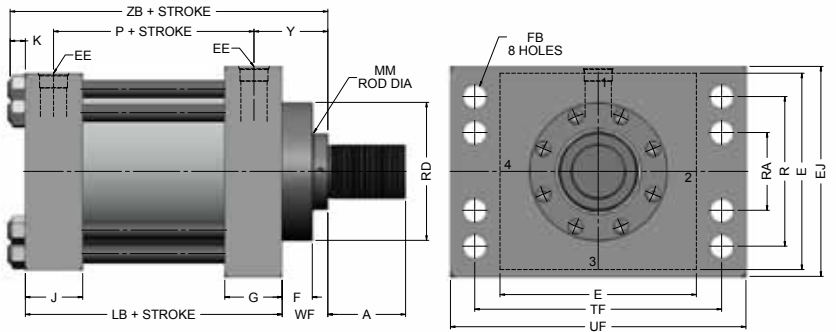
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Head Rectangular Flange  
and Square Mountings  
Large Bore Sizes

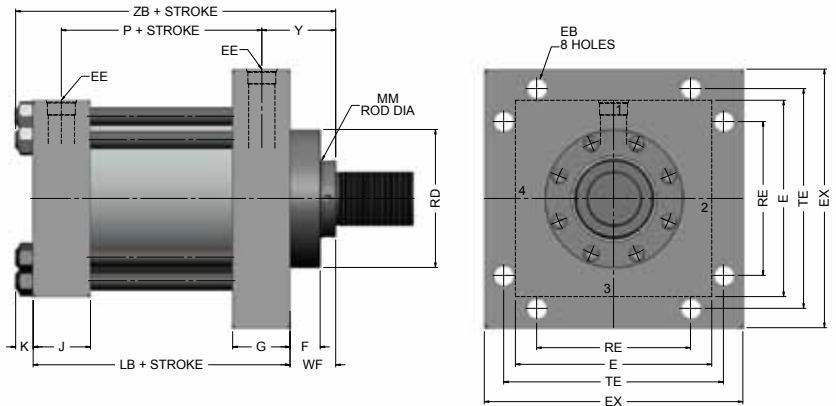
Head Rectangular Mounting (10"-14" Bore)  
Style ST6E5  
(NFFPA Style ME5)



Head Rectangular Mounting (16"-20" Bore)  
Style ST6E5  
(NFFPA Style ME5)

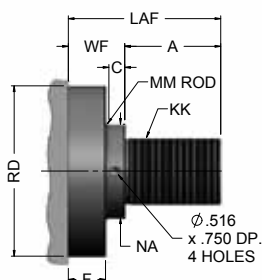


Head Square Flange Mounting  
Style ST6F5  
(NFFPA Style MF5)

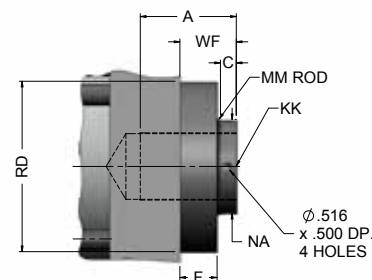


Rod End Dimensions—see table 2

Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



**"Specials" Thread Style #X**  
To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Head Rectangular Flange  
and Square Mountings  
Large Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EB	EE			EX	FB	G	J	K	R	RE	TE	TF	UF	ADD STROKE	
			NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread											LB	P
10	12 5/8	1 5/16	2	2	24	16 5/8	1 13/16	3 11/16	3 11/16	1 9/32	9.62	9.89	14.13	15 7/8	19	12 1/8	8 1/2
12	14 7/8	1 9/16	2 1/2	2 1/2	24	19 3/4	2 1/16	4 7/16	4 7/16	1 13/32	11.45	11.75	16.79	18 1/2	22	14 1/2	10 1/8
14	17 1/8	1 13/16	2 1/2	2 1/2	24	21 3/4	2 5/16	4 7/8	4 7/8	1 13/32	13.26	12.90	18.43	21	25	15 5/8	10 7/8

Table 1A—Envelope and Mounting Dimensions

BORE	E	EB	EE			EX	EJ	FB	G	J	K	R	RA	RE	TE	TF	UF	ADD STROKE	
			NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread													LB	P
16	19	1 13/16	2 1/2	24	3	24 1/2	20	1 13/16	5 7/8	5 7/8	1 29/32	15 1/2	8	15.28	21.03	21	24 1/2	18 1/8	12 1/8
18	22	2 1/16	2 1/2	24	3	26 1/2	23	2 1/16	6 7/8	6 7/8	1 29/32	18	7 1/4	16.45	22.65	24 1/4	28 1/4	21 1/8	15 1/8
20	24	2 1/16	2 1/2	24	3	29	25	2 1/16	7 7/8	7 7/8	1 29/32	20	8	18.07	24.87	16 1/2	26 1/2	23 5/8	17 5/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.  
\* Optional SAE Flange ports may be specified - flange to be supplied by customer. see Table 4 for flange port pattern dimensions  
\*\*NPTF ports are available at extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread STYLE #2 & #4 KK	Rod Extensions and pilot dimensions									Y	Add Stroke ZB
				A	+0.000 -0.005 B	C	F	LAF	NA	RD	V	WF		
10	std	4 1/2	3 1/4-12	4 1/2	5.249	1	1 15/16	7 7/16	4 3/8	8 1/4	1/4	2 15/16	4 3/4	16 11/32
		5	3 1/2-12	5	5.749	1	1 15/16	8 3/16	4 7/8	8 7/8	1/4	3 3/16	5	16 19/32
		5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	5	16 19/32
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 5/16	16 29/32
12	std	5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	5 3/8	19 3/32
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 11/16	19 13/32
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6 3/16	19 29/32
14	std	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 7/8	20 17/32
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6 3/8	21 1/32
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	6 7/8	21 17/32
16	std	8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	7	24 1/32
		9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	7 1/4	24 9/32
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	24 17/32
18	std	9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	7 1/4	27 9/32
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	27 17/32
20	std	10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	30 1/32

Table 3—Envelope and Mounting Dimensions

Table 4—Optional SAE Flange port pattern

Nom. Flange Size	A	Q	GG	W	X	Z Thread UNC 2B	AA min.	SAE
1 1/2	1.50	2.750	1.406	1.38	0.70	1/2-13	1.06	24
2	2.00	3.062	1.688	1.53	0.84	1/2-13	1.06	32
2 1/2	2.50	3.500	2.000	1.75	1.00	1/2-13	1.19	40
3	3.00	4.188	2.438	2.09	1.22	5/8-11	1.19	48

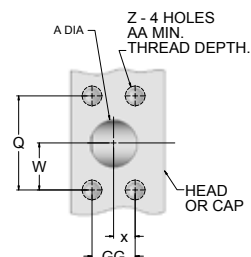


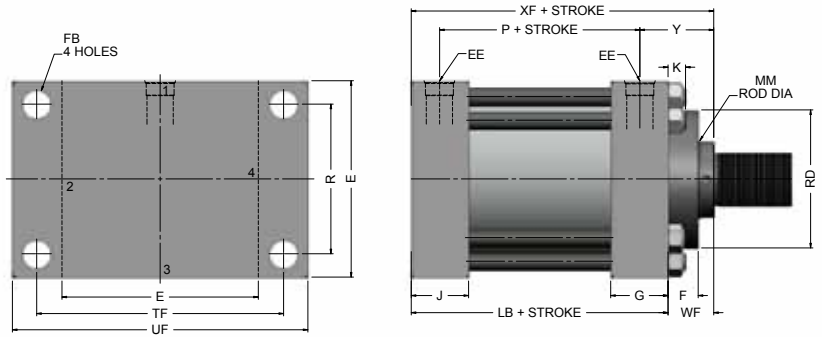
Table 5—Tie Rod Info.

BORE	10	12	14	16	18	20
Tie rod Thread	1 1/8-12	1 1/4-12	1 1/4-12	1 1/2-12	1 1/2-12	1 1/2-12
RA	5.291	6.270	7.485	8.086	9.589	10.437
RB	3.775	4.555	6.143	6.093	7.910	8.750
RC	-	-	4.409	-	5.761	6.649

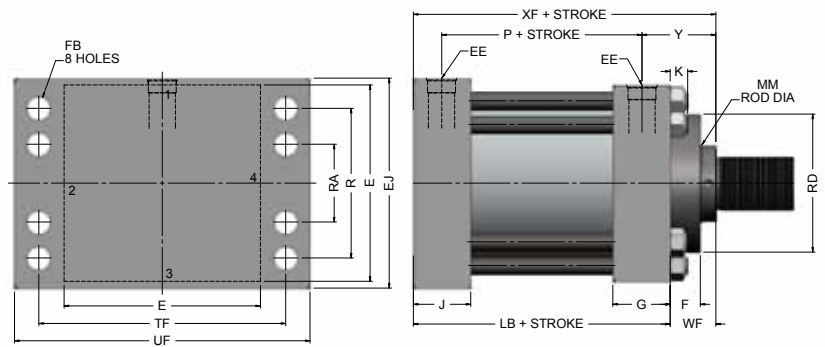
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Cap Mountings  
Large Bore Sizes

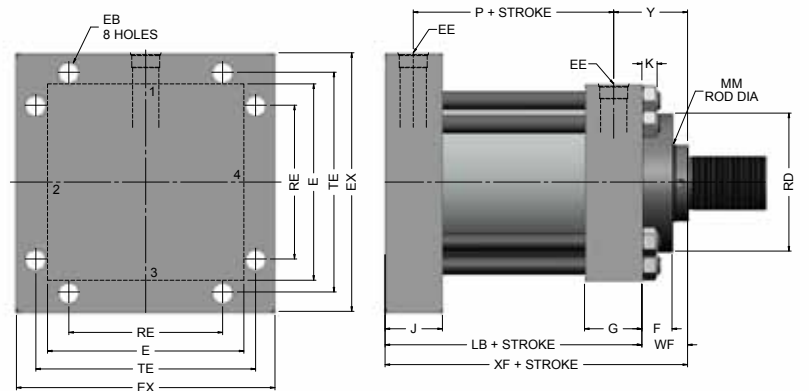
Cap Rectangular Mounting (10"-14" Bore)  
Style ST6E6  
(NFPA Style ME6)



Cap Rectangular Mounting (16"-20" Bore)  
Style ST6E6  
(NFPA Style ME6)

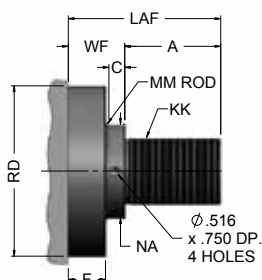


Cap Square Flange Mounting  
Style ST6F6  
(NFPA Style MF6)

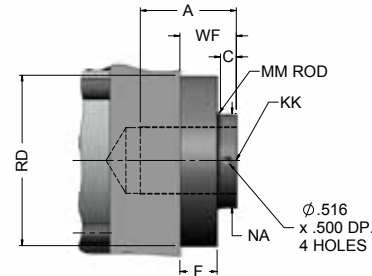


Rod End Dimensions—see table 2

Thread Style #2  
(NFPA Style SM)  
Small Male



Thread Style #4  
(NFPA Style SF)  
Small Female



**"Specials" Thread Style #X**  
To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Cap Mountings  
Large Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	EB	EE			EX	FB	G	J	K	R	RE	TE	TF	UF	ADD STROKE	
			NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread											LB	P
10	12 5/8	1 5/16	2	2	24	16 5/8	1 13/16	3 11/16	3 11/16	1 9/32	9.62	9.89	14.13	15 7/8	19	12 1/8	8 1/2
12	14 7/8	1 9/16	2 1/2	2 1/2	24	19 3/4	2 1/16	4 7/16	4 7/16	1 13/32	11.45	11.75	16.79	18 1/2	22	14 1/2	10 1/8
14	17 1/8	1 13/16	2 1/2	2 1/2	24	21 3/4	2 5/16	4 7/8	4 7/8	1 13/32	13.26	12.90	18.43	21	25	15 5/8	10 7/8

Table 1A—Envelope and Mounting Dimensions

BORE	E	EB	EE			EJ	EX	FB	G	J	K	R	RA	RE	TE	TF	UF	ADD STROKE	
			NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread													LB	P
16	19	1 13/16	2 1/2	24	3	20	24 1/2	1 13/16	5 7/8	5 7/8	1 29/32	15 1/2	8	15.28	21.03	21	24 1/2	18 1/8	12 1/8
18	22	2 1/16	2 1/2	24	3	23	26 1/2	2 1/16	6 7/8	6 7/8	1 29/32	18	7 1/4	16.45	22.65	24 1/4	28 1/4	21 1/8	15 1/8
20	24	2 1/16	2 1/2	24	3	25	29	2 1/16	7 7/8	7 7/8	1 29/32	20	8	18.07	24.87	16 1/2	26 1/2	23 5/8	17 5/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\* Optional SAE Flange ports may be specified - flange to be supplied by customer. see Table 4 for flange port pattern dimensions

\*\*NPTF ports are available at extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread STYLE #2 & #4 KK	Rod Extensions and pilot dimensions										Y	XF	Add Stroke
				A	+0.000 -0.005 B	C	F	LAF	NA	RD	V	WF				
10	std	4 1/2	3 1/4-12	4 1/2	5.249	1	1 15/16	7 7/16	4 3/8	8 1/4	1/4	2 15/16	4 3/4	15 1/16		
		5	3 1/2-12	5	5.749	1	1 15/16	8 3/16	4 7/8	8 7/8	1/4	3 3/16	5	15 5/16		
		5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	5	15 5/16		
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 5/16	15 5/8		
12	std	5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	5 3/8	17 11/16		
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 11/16	18		
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6 3/16	18 1/2		
14	std	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 7/8	19 1/8		
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6 3/8	19 5/8		
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	6 7/8	20 1/8		
16	std	8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	7	22 1/8		
		9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	7 1/4	22 3/8		
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	22 5/8		
18	std	9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	7 1/4	25 3/8		
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	25 5/8		
20	std	10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	7 1/2	28 1/8		

Table 3—Envelope and Mounting Dimensions

Table 4—Optional SAE Flange port pattern

Nom. Flange Size	A	Q	GG	W	X	Z Thread UNC 2B	AA min.	SAE
1 1/2	1.50	2.750	1.406	1.38	0.70	1/2-13	1.06	24
2	2.00	3.062	1.688	1.53	0.84	1/2-13	1.06	32
2 1/2	2.50	3.500	2.000	1.75	1.00	1/2-13	1.19	40
3	3.00	4.188	2.438	2.09	1.22	5/8-11	1.19	48

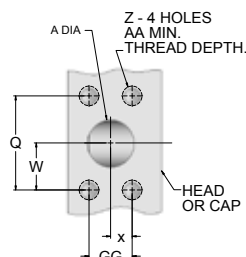
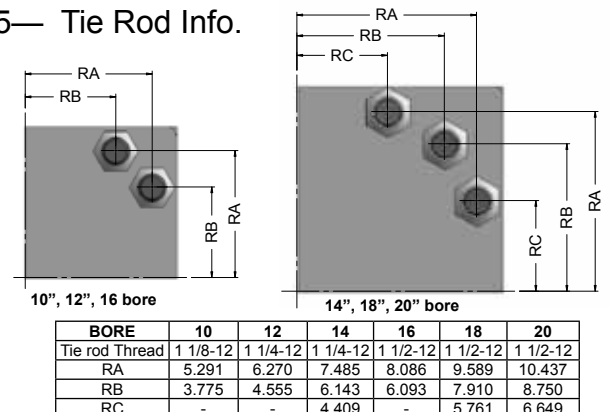


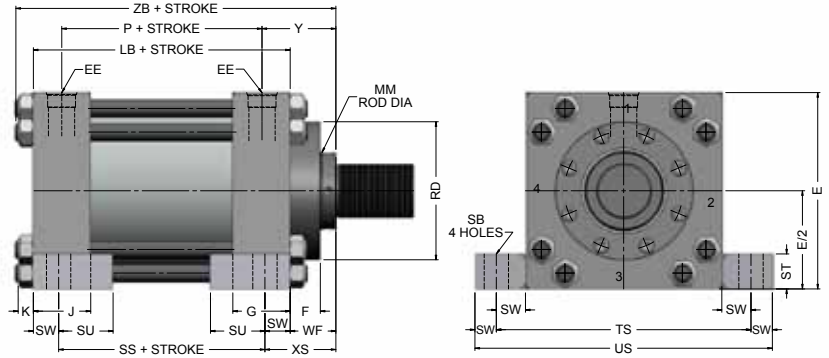
Table 5—Tie Rod Info.



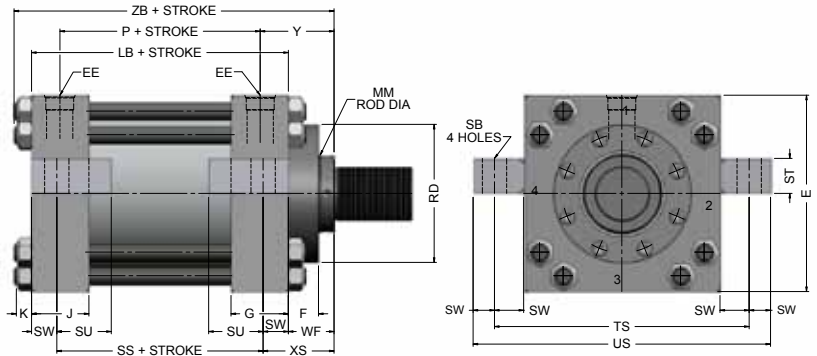
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Side and Centerline Lug Mountings  
& Cap Fixed Clevis Large Bore Sizes

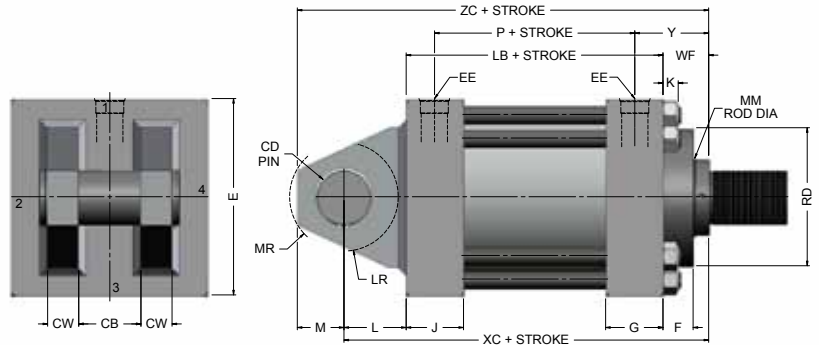
Side Lugs mounting  
Style ST6S2  
(NFFPA Style MS2)



Centerline Lugs Mounting  
Style ST6S3  
(NFFPA Style MS3)

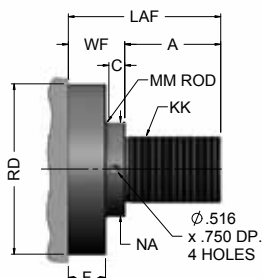


Cap Fixed Clevis mounting  
Style ST6P1  
(NFFPA Style MP1)

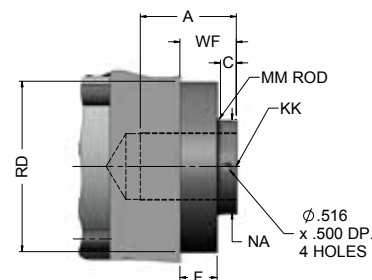


Rod End Dimensions—see table 2

Thread Style #2  
(NFFPA Style SM)  
Small Male



Thread Style #4  
(NFFPA Style SF)  
Small Female



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

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Side and Centerline Lug Mountings  
& Cap Fixed Clevis Large Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	E	CB	+.001 -.003 CD	CW	EE			G	J	SB	ST	SU	L	LR	M	MR	SW	TS	US	ADD STROKE		
					NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread													LB	P	SS
10	12 5/8	4	3.500	2	2	2	24	3 11/16	3 11/16	1 9/16	2 1/4	3 1/2	4	3 3/8	3 1/2	3 1/2	1 5/8	15 7/8	19 1/8	12 1/8	8 1/2	8 7/8
12	14 7/8	4 1/2	4.000	2 1/4	2 1/2	2 1/2	24	4 7/16	4 7/16	1 9/16	3	4 1/4	4 1/2	3 7/8	4	4	2	18 7/8	22 7/8	14 1/2	10 1/8	10 1/2
14	17 1/8	6	5.000	3	2 1/2	2 1/2	24	4 7/8	4 7/8	5 5/16	4	4 3/4	5 3/4	4 3/16	5	5	2 1/4	21 5/8	26 1/8	15 5/8	10 7/8	11 1/8

Table 1A—Envelope and Mounting Dimensions

BORE	E	EE			CB	CD	CW	G	J	K	L	LR	M	MR	ADD STROKE	
		NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread											LB	P
16	19	2 1/2	24	3	7	6	3 1/2	5 7/8	5 7/8	1 29/32	7	6 1/4	16	6	18 1/8	12 1/8
18	22	2 1/2	24	3	8	6 1/2	4	6 7/8	6 7/8	1 29/32	7 5/8	6 3/4	18	6 1/2	21 1/8	15 1/8
20	24	2 1/2	24	3	9	7 1/2	4 1/2	7 7/8	7 7/8	1 29/32	8 3/4	7 3/4	20	7 1/2	23 5/8	17 5/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.  
\* Optional SAE Flange ports may be specified - flange to be supplied by customer. see Table 4 for flange port pattern dimensions  
\*\*NPTF ports are available at extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread		Rod Extensions and pilot dimensions										XS	XC	Add Stroke	ZB	ZC
		STYLE #2 & #4 KK	A	+.000 -.005 B	C	F	LAF	NA	RD	V	WF							
10	std 4 1/2	3 1/4-12	4 1/2	5.249	1	1 15/16	7 7/16	4 3/8	8 1/4	1/4	2 15/16	4 9/16	19 1/16	16 11/32	22 9/16			
	5	3 1/2-12	5	5.749	1	1 15/16	8 3/16	4 7/8	8 7/8	1/4	3 3/16	4 13/16	19 5/16	16 19/32	22 13/16			
	5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	4 13/16	19 5/16	16 19/32	22 13/16			
	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 1/8	19 5/8	16 29/32	23 1/8			
12	std 5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	9 3/8	1/4	3 3/16	5 3/16	23 3/16	19 3/32	26 3/16			
	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 1/2	22 1/2	19 13/32	26 1/2			
	8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6	23	19 29/32	27			
14	std 7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	10 1/2	3/8	3 1/2	5 3/4	24 7/8	20 17/32	29 7/8			
	8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	6 1/4	25 3/8	21 1/32	30 3/8			
	10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	6 3/4	25 7/8	21 17/32	30 7/8			
16	std 8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	12 1/2	3/8	4	CF	29 1/8	CF	35 1/8			
	9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	CF	29 3/8	CF	35 3/8			
	10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	CF	29 5/8	CF	35 5/8			
18	std 9	6 1/2-12	9	9.999	1	1 15/16	13 1/4	8 7/8	13 1/2	3/8	4 1/4	CF	33	CF	39 1/2			
	10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	CF	33 1/4	CF	39 3/4			
20	std 10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	14 1/2	3/8	4 1/2	CF	36 7/8	CF	44 3/8			

Table 3— Envelope and Mounting Dimensions

Table 4— Optional SAE Flange port pattern

Nom. Flange Size	A	Q	GG	W	X	Z Thread UNC 2B	AA min.	SAE
1 1/2	1.50	2.750	1.406	1.38	0.70	1/2-13	1.06	24
2	2.00	3.062	1.688	1.53	0.84	1/2-13	1.06	32
2 1/2	2.50	3.500	2.000	1.75	1.00	1/2-13	1.19	40
3	3.00	4.188	2.438	2.09	1.22	5/8-11	1.19	48

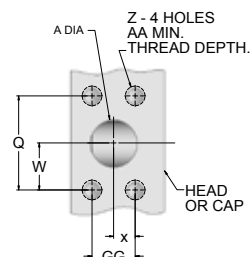
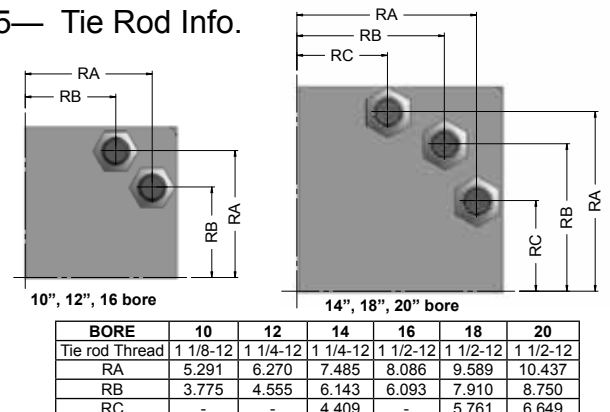


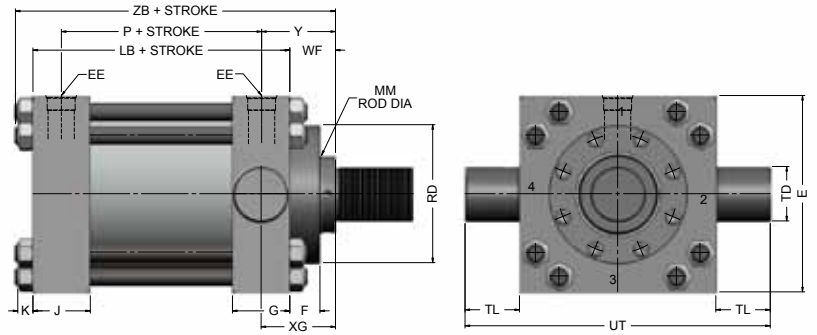
Table 5— Tie Rod Info.



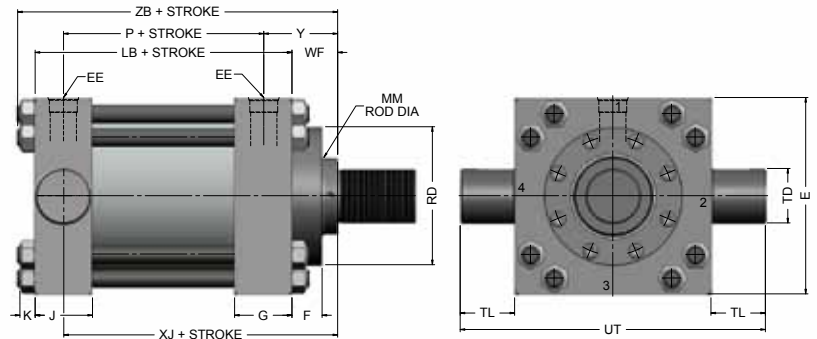
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
Large Bore Sizes

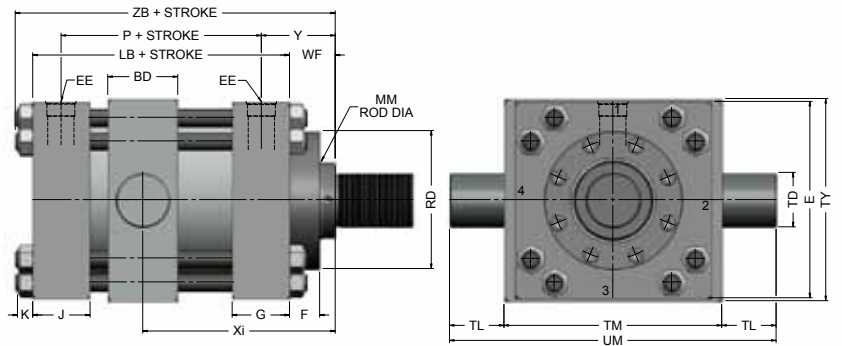
Head Trunnion (10" to 14" bore)  
Style ST6T1  
(NFFA Style MT1)



Cap Trunnion (10" to 14" bore)  
Style ST6T2  
(NFFA Style MT2)



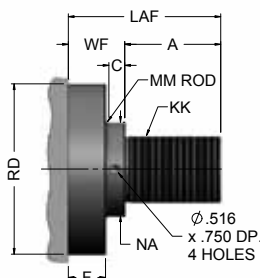
Intermediate Fixed Trunnion  
Style ST6T4  
(NFFA Style MT4)



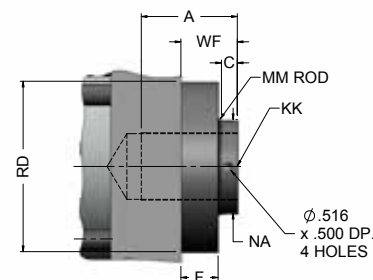
\*\*Dimension XI to be specified by customer.

Rod End Dimensions—see table 2

Thread Style #2  
(NFFA Style SM)  
Small Male



Thread Style #4  
(NFFA Style SF)  
Small Female



**"Specials" Thread Style #X**  
To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
Large Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	BD	E	EE			G	J	+.000 -.001 TD	TL	TM	TY	UM	UT	UW	K	ADD STROKE	
			NPTF**	SAE flange port	SAE <sup>std</sup> Straight Thread											LB	P
10	4 1/2	12 5/8	2	2	24	3 11/16	3 11/16	3.500	3 1/2	14	13	21	19 5/8	17 1/2	1 9/32	12 1/8	8 1/2
12	5 1/2	14 7/8	2 1/2	2 1/2	24	4 7/16	4 7/16	4.000	4	16 1/2	15 1/2	24 1/2	22 7/8	20 3/4	1 13/32	14 1/2	10 1/8
14	5 1/2	17 1/8	2 1/2	2 1/2	24	4 7/8	4 7/8	4.500	4 1/2	19 1/2	19 1/4	28 1/2	26 1/8	24 3/4	1 13/32	15 5/8	10 7/8

<sup>std</sup> SAE straight thread ports will be furnished as standard and are indicated by port number.

\* Optional SAE Flange ports may be specified - flange to be supplied by customer. see Table 4 for flange port pattern dimensions

\*\*NPTF ports are available at extra charge.

Table 3—  
Envelope and  
Mounting  
Dimensions

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread	Rod Extensions and pilot dimensions									Add Stroke			
			STYLE #2 & #4 KK	A	+ .000 -.005 B	C	F	LAF	NA	V	WF	Y	XG	MIN. Xi*	ZB	XJ
10	std	4 1/2	3 1/4-12	4 1/2	5.249	1	1 15/16	7 7/16	4 3/8	1/4	2 15/16	4 3/4	4 3/4	9 1/16	16 11/32	13 3/8
		5	3 1/2-12	5	5.749	1	1 15/16	8 3/16	4 7/8	1/4	3 3/16	5	5	9 5/16	16 19/32	13 5/8
		5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	1/4	3 3/16	5	5	9 5/16	16 19/32	13 5/8
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	3/8	3 1/2	5 5/16	5 5/16	5 5/8	16 29/32	13 15/16
12	std	5 1/2	4-12	5 1/2	6.249	1	1 15/16	8 11/16	5 3/8	1/4	3 3/16	5 3/8	5 3/8	10 5/8	19 3/32	15 1/2
		7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	3/8	3 1/2	5 11/16	5 11/16	10 15/16	19 13/32	15 13/16
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	3/8	4	6 3/16	6 3/16	11 1/2	19 29/32	16 5/16
14	std	7	5-12	7	7.999	1	1 15/16	10 1/2	6 7/8	3/8	3 1/2	5 7/8	5 11/16	11 7/16	20 17/32	16 11/16
		8	5 3/4-12	8	8.999	1	1 15/16	12	7 7/8	3/8	4	6 3/8	6 7/16	11 15/16	21 1/32	17 3/16
		10	7 1/4-12	10	10.999	1	1 15/16	14 1/2	9 7/8	3/8	4 1/2	6 7/8	6 15/16	12 7/16	21 17/32	17 11/16

Table 4— Optional SAE  
Flange port pattern

Nom. Flange Size	A	Q	GG	W	X	Z Thread UNC 2B	AA min.	SAE
1 1/2	1.50	2.750	1.406	1.38	0.70	1/2-13	1.06	24
2	2.00	3.062	1.688	1.53	0.84	1/2-13	1.06	32
2 1/2	2.50	3.500	2.000	1.75	1.00	1/2-13	1.19	40
3	3.00	4.188	2.438	2.09	1.22	5/8-11	1.19	48

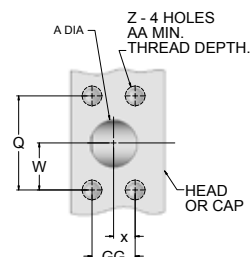
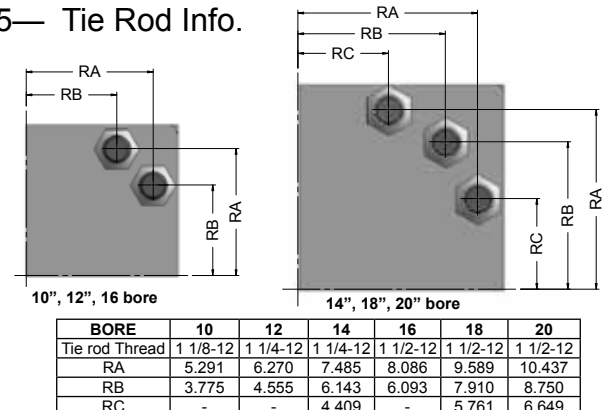


Table 5— Tie Rod Info.



# ST6 SERIES

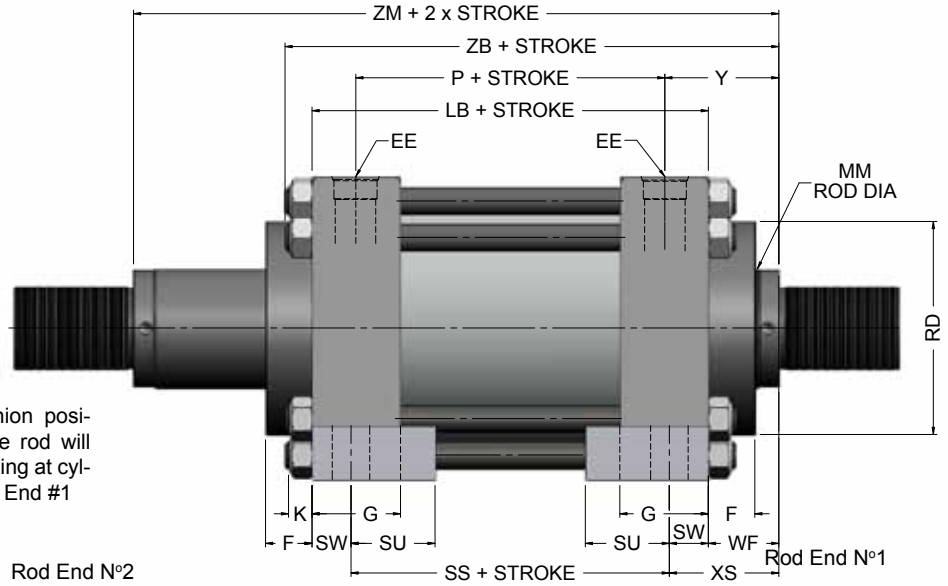
## Heavy Duty Hydraulic Cylinders

Double Rod End  
Large Bore Sizes

Double Rod end  
Style ST6D



Standard Cushion position for double rod will be 2 and 4 looking at cylinder from Rod End #1



Mounting Styles for Single Rod Models	Mounting Styles for Corresponding Double Rod Models*	Dimension Shown on This Page Supplement Dimensions on Pages Listed Below
MX0	DX0	38
MX1	DX1	38
MX2	DX2	38
MX3	DX3	38
ME5	DE5	42
MF5	DF5	42
MS2	DS2	44
MS3	DS3	44
MT1	DT1	46
MT4	DT4	46

To obtain dimensioning information on a double rod cylinder, first select the desired mounting style and refer to the corresponding single rod cylinder model shown on the preceding pages. (See table at left.) After you have determined all necessary dimensions from that drawing, turn back to this page and supplement those dimensions with additional ones from the drawing above and table at right. These added dimensions differ from, or are in addition to, those shown on the preceding pages and provide the additional information needed to completely dimension a double rod cylinder model. On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from rod end #1 only. See port position information in page 69

BORE	ROD SIZE	Thread		ZM
		STYLE #2 & #4 KK	Add 2X stroke	
10	std	4 1/2	3 1/4-12	18
		5	3 1/2-12	18 1/2
		5 1/2	4-12	18 1/2
		7	5-12	19 1/8
12	std	5 1/2	4-12	20 7/8
		7	5-12	21 1/2
		8	5 3/4-12	22 1/2
14	std	7	5-12	22 5/8
		8	5 3/4-12	23 5/8
		10	7 1/4-12	24 5/8
16	std	8	5 3/4-12	26 1/8
		9	6 1/2-12	26 5/8
		10	7 1/4-12	27 1/8
18	std	9	6 1/2-12	29 5/8
		10	7 1/4-12	30 1/8
20	std	10	7 1/4-12	32 5/8

### Mounting Recommendations and Other Mountings

In addition to the standard mountings dimensioned on the preceding pages, the following information covers mounting ideas that may prove helpful in your applications. When needed, special heads, caps, and flanges can be provided. Sketches of your requirements, together with specifications relative to the application and forces involved should be submitted.

**Mounting Bolts** — High tensile socket head screws are recommended for all mounting styles. Use 1/16" smaller than hole size.

**Flange Mountings** — Cylinders can be properly centered by measuring from piston rod diameter. After mounting the flange may be drilled for pins or dowels to prevent shifting.

**Side Lug Mountings** — Caution, cylinders which do not absorb force on their centerline (Group 3) tend to sway when under load. Short stroke, non-centerline mounted cylinders can subject mounting bolts to large tension forces which when combined with shear forces can overstress standard mounting bolts. Side lug mounted cylinders should always be prevented from shifting through use of shear keys so located as to resist the major load, whether push or pull.

**Trunnion Mountings** — Cylinders require lubricated pillow blocks with minimum bearing clearances. Pillow blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end connection should also be pivoted, with the customer's pin in the piston rod knuckle parallel to the trunnions.

**Clevis Mountings** — Cylinders should be pivoted at both ends, with the customer's pin in the piston rod knuckle parallel to the pivot pin supplied with the clevis.

### Metallic Rod Wiper

When specified, metallic rod wipers can be supplied at extra cost, instead of the standard synthetic rubber wiperseal. Recommended in applications where atmospheric particles or splashing tend to cling to the extended piston rod and otherwise damage the synthetic rubber wiperseal. Installation of metallic rod wiper does not affect cylinder dimensions.



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

# Cylinder End-of-Stroke Proximity Sensors



Flexible solutions for an often inflexible world Balluff's Strokemaster® cylinder-position sensors provide precision end-of-stroke sensing for hydraulic/ pneumatic cylinders. They also eliminate post-installation cable management problems with 304o of rotational freedom on the connector.

Strokemaster® sensors allow infinitely adjustable and lockable cable positioning anytime after mounting to the cylinder. Without breaking the seal, Strokemaster® enables quicker installation of the sensor and neat cable runs.

A high-pressure, inductive proximity sensor, the Strokemaster® provides a 2mm (0.8") sensing range to pick up the "spud" of hydraulic/pneumatic cylinders and indicate fully retracted or extended position. It mounts with just two screws, and seals with an O-ring. Withstanding cylinder pressures to 3000psi (207 BAR), the embeddable design keeps most of the switch protected within the cylinder, with only a 0.62" (16 mm) high housing exposed outside. The rotating housing can be locked in any desired position with either one of two set screws.

Strokemaster® sensors are available in 3-wire DC and 2-wire AC/DC versions, both with mini or micro connectors. Switching frequency is 50 Hz in the AC/DC versions. All units are weld-field immune, short-circuit and reverse-polarity protected. They fit all popular cylinder designs, with standard probe lengths of 1.025" - 4.560" (26mm - 115.8mm), along with available custom probe lengths and spacers. Probes are made of stainless steel with a ceramic face. Both DC and AC/DC sensors have all metal housings.

Strokemaster is CE-certified, and its housing is sealed to IP67 requirements.

### CYLINDER READY FOR END OF STROKE SENSOR

Option Code **H1**(\_)

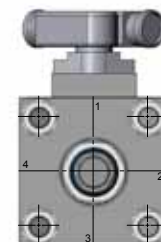
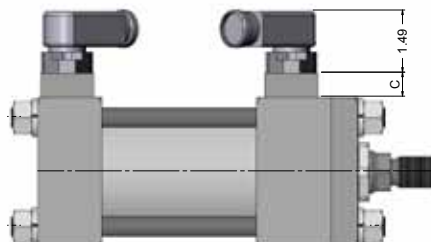
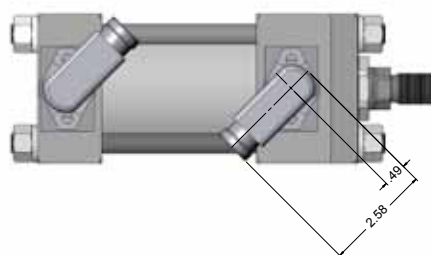
Option Code **H1**

GO Switches 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 : H33 switch will be in position 3 head and cap

Options Available

- Explosion Proof
- SPDT or DPDT
- HiTemp™ to 400°F
- SubSea™ Submersible
- Hermetically Sealed
- High Pressure to 10,000 psi
- English or metric threads



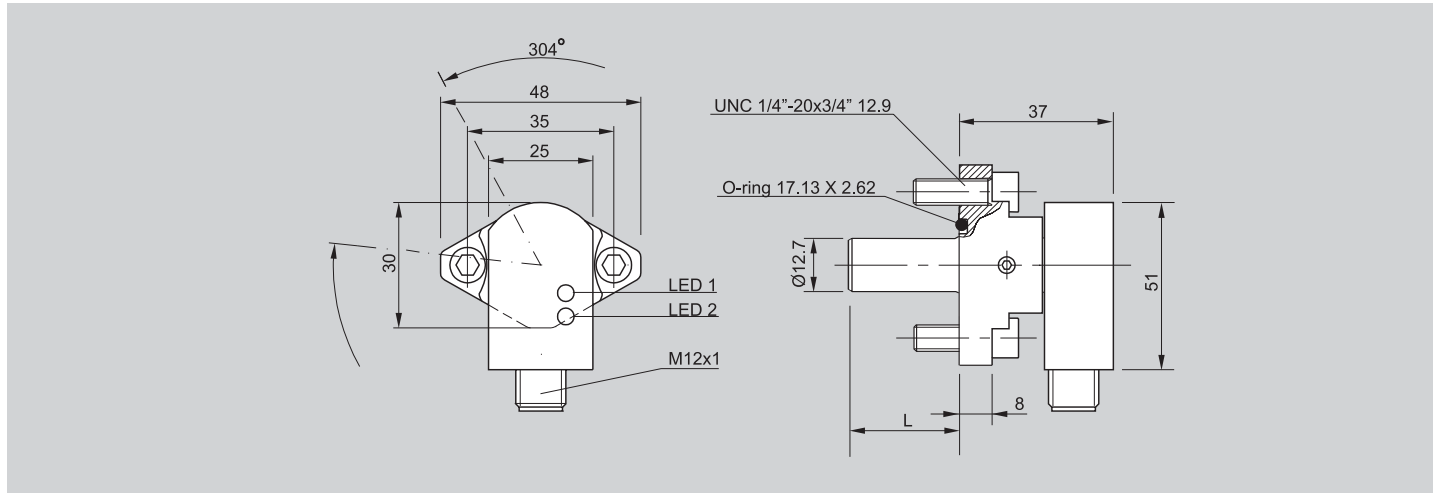


# ST6 SERIES

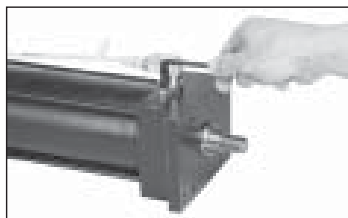
## Heavy Duty Hydraulic Cylinders

Sensors for Cylinders  
Strokemaster DC

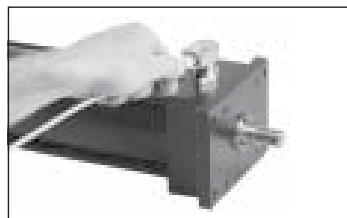
Mounting	Flush
Rated operating distance $s_n$	<b>2 mm</b>
Assured operating distance $s_a$	0...1.6 mm



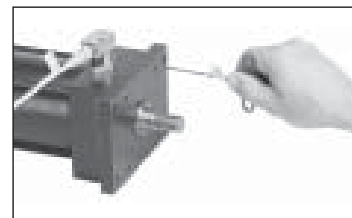
PNP	Normally-open $\odot$	BES 516-300-S 295/0.912"...4.560"-S4
Rated operational voltage $U_e$		24 Vdc
Supply voltage $U_B$		10...30 Vdc
Voltage drop $U_d$ at $I_e$		$\leq 2.5$ V
Rated insulation voltage $U_i$		75 Vdc
Rated operational current $I_e$		200 mA
No-load supply current $I_0$ damped/undamped		$\leq 18$ mA/ $\leq 10$ mA
Off-state current $I_r$		$\leq 80$ $\mu$ A
Protected against polarity reversal		yes
Short circuit/overload protected		yes/yes
Load capacitance		$\leq 1.0$ $\mu$ F
Repeat accuracy R		$\leq 5$ %
Ambient temperature range $T_a$		-25...+70 °C
Operating frequency f		10 Hz
Utilization categories		DC 13
Function/Operating voltage indication		yes/yes
Degree of protection per IEC 529		IP 67
Housing material		stainless steel/aluminum
Material of sensing face		ceramic
Connection		micro connector
Approvals		cULus
High pressure rated up to		<b>207 bar (3000 psi)</b>
Standard lengths (L)		see chart on page 4.42
Recommended connector		C04 AEL-00-VY-050M



Bolt sensor to cylinder.



Position cable to desired orientation (even over mounting bolts).



Lock chosen position with one or both of the two integral set screws.

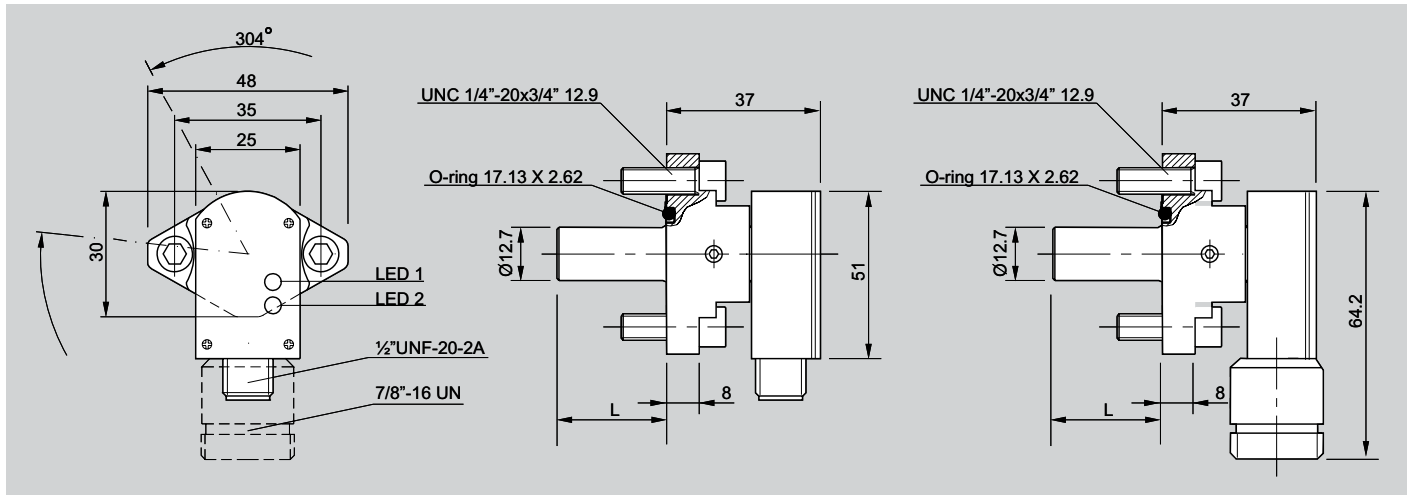
Note: Some DC units are also available with S5 Mini connector. Consult factory for sensor and cable part numbers.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

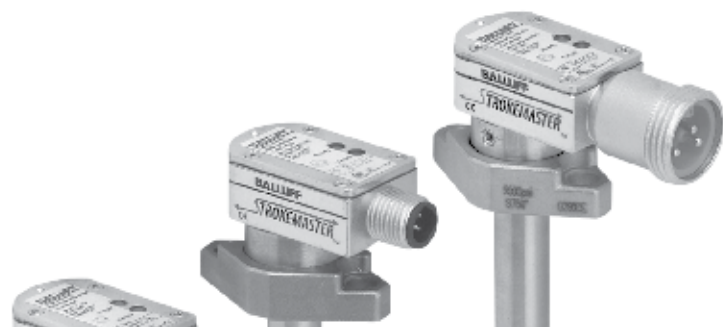
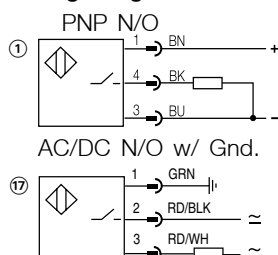
Sensors for Cylinders  
Strokemaster AC/DC

Mounting	Flush	Flush
Rated operating distance $s_n$	<b>2 mm</b>	<b>2 mm</b>
Assured operating distance $s_a$	0...1.6 mm	0...1.6 mm



AC/DC	Normally-open	BES 516-200-S 2/0.912"...4.560"-S 21	BES 516-200-S 2/0.912"...4.560"-S5
Rated operational voltage $U_e$		110 Vac	110 Vac
Supply voltage $U_B$		20...250 Vac/Vdc	20...250 Vac/Vdc
Voltage drop $U_d$ at $I_e$		≤ 6 V	≤ 6 V
Rated insulation voltage $U_i$		250 Vac	250 Vac
Rated operational current $I_e$		500 mA	500 mA
Minimum operational current $I_m$		5 mA	5 mA
Off-state current $I_r$		≤ 1.7 mA at 110 Vac	≤ 1.7 mA at 110 Vac
Inrush current $I_k$ (t = 20 ms)		3 A max./1 Hz	3 A max./1 Hz
Protected against polarity reversal		yes	yes
Short circuit protected		yes	yes
Repeat accuracy R		≤ 5 %	≤ 5 %
Ambient temperature range $T_a$		-25...+70 °C	-25...+70 °C
Operating frequency f		≤ 50 Hz	≤ 50 Hz
Utilization categories		AC 140/DC 13	AC 140/DC 13
Function/Operating voltage indication		yes/yes	yes/yes
Degree of protection per IEC 60529		IP 67	IP 67
Insulation class		1	1
Housing material		stainless steel/aluminum	stainless steel/aluminum
Material of sensing face		ceramic	ceramic
Connection		micro connector	mini connector
Approvals		cULus	cULus
High pressure rated up to		<b>207 bar (3000 psi)</b>	<b>207 bar (3000 psi)</b>
Standard lengths (L)		see table on page 5.44	see table on page 5.44
Recommended connector		C21 AE3-00-VY-150F	C05 AE1-00-VY-150F

### Wiring Diagrams

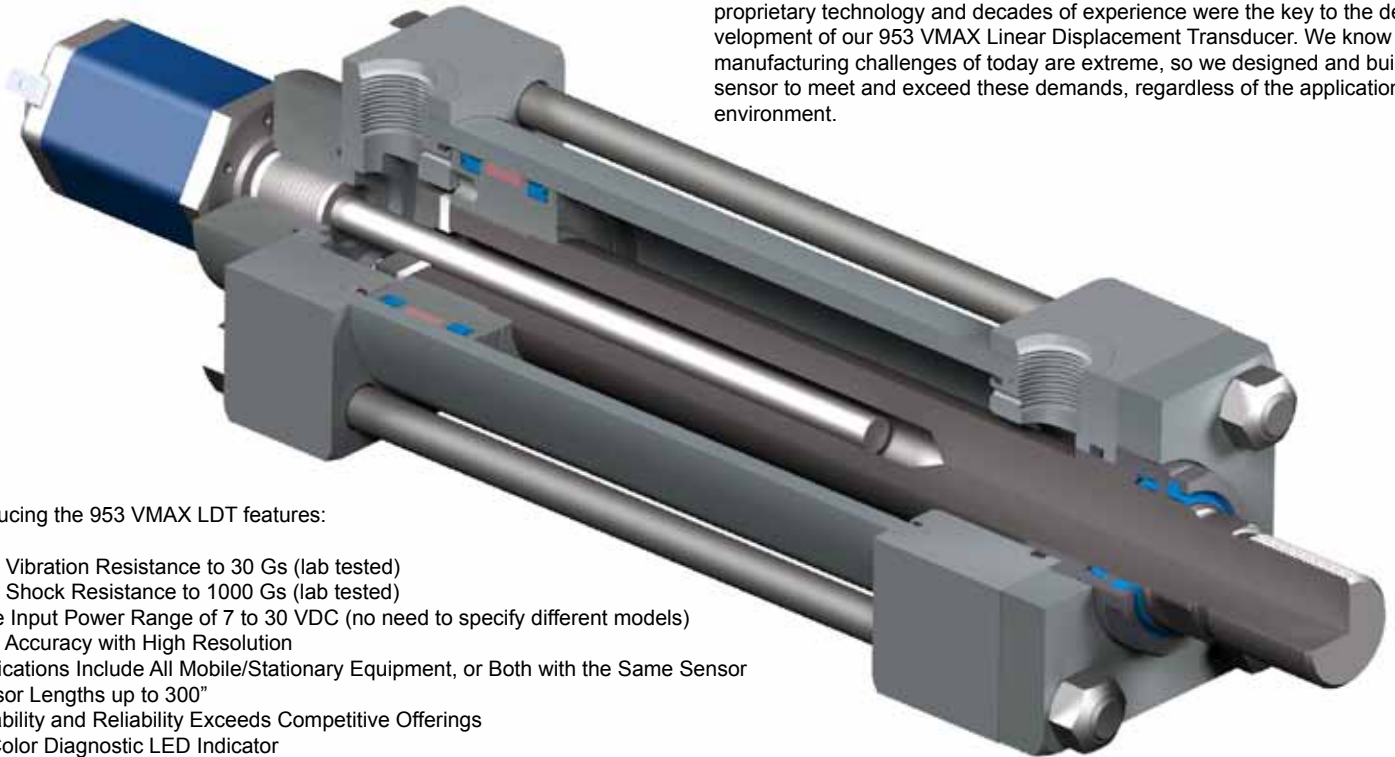


# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

### ST6X Linear Displacement Transducer for Cylinders

Mobile Equipment and Stationary Processing Systems demand absolute accuracy and reliability in linear position feedback . . . Regardless. Innovation, proprietary technology and decades of experience were the key to the development of our 953 VMAX Linear Displacement Transducer. We know the manufacturing challenges of today are extreme, so we designed and built a sensor to meet and exceed these demands, regardless of the application or environment.



Introducing the 953 VMAX LDT features:

- High Vibration Resistance to 30 Gs (lab tested)
- High Shock Resistance to 1000 Gs (lab tested)
- Wide Input Power Range of 7 to 30 VDC (no need to specify different models)
- High Accuracy with High Resolution
- Applications Include All Mobile/Stationary Equipment, or Both with the Same Sensor
- Sensor Lengths up to 300"
- Durability and Reliability Exceeds Competitive Offerings
- Tri-Color Diagnostic LED Indicator
- Gives Quick Indication on the Status of the LDT
- Very Low Power Consumption, 1 Watt Typical, Allows Direct Connection to Display and Control Interface Modules
- Removable Cartridge for Hydraulic Applications
- Digital Output, Start/Stop, Variable Pulse (PWM), Control Pulse
- SSI (Synchronous Serial Interface), 24, 25 or 26 Bit, Binary or Gray Code, Position Update
- Analog Output, 0-10 VDC, +/-10 VDC, 0-5 VDC, +/-5 VDC, 4-20mA
- Contaminant Resistant
- IP68 Rated
- Optional Stainless Steel Cover and Connector

Applications Include Absolute linear position feedback for equipment and process automation in extreme applications.

- Process Automation
- Steel Mills, Primary and Secondary Metals Processing that includes Stamping, Roll Forming and Die-Casting
  - Mobile Equipment
  - Lumber and Forest Products Processing
  - Refuse Collection, Vehicles, Recycling and Compaction
  - Off Road
- Stationary Machines
- Sawmill, Plastic, Rubber, Injection Molding, Extrusion Equipment, Material Handling, Nonwoven, Dancers and Accumulators

953A - V0 - 0150 - S - X

Output	
V0	0 to 10 VDC
V1	10 to 0 VDC
V2	-10 to 10 VDC
V3	10 to -10 VDC
V4	0 to 5 VDC
V5	5 to 0 VDC
V6	-5 to 5 VDC
V7	5 to -5 VDC
C4	4 to 20mA
C2	20 to 4mA

Stroke Length	
Insert stroke length to 0.1 inch. Enter as a four-place number. Example: A 12.0" stroke enters as 0120.	
OR	
Insert stroke in millimeters to 1mm. Enter as a four-place number. Example: 305mm stroke entered as 0305M. Metric length includes metric mounting, M18x1.5.	

Connector Option	
S	Standard 5 Pin, 12mm Euro
C <sub>1</sub>	Integral Cable Assembly. Insert length in feet. Example: C6 = 6 foot cable.
M	6 Pin DIN, MTS Style D60
B	8 Pin DIN, Balluff S32
E	Environmental 10 Pin MS Connector compatible w/951 & 952 LDTs w/connector option "E".
H <sub>1</sub>	High Temp., Integral cable assembly 200° C Teflon Cable. Insert length in feet. Example: H6 = 6 foot High Temp Teflon Cable.

Options	
X	None
S	Stainless Steel cover and connector. Only available with connector options S and C.

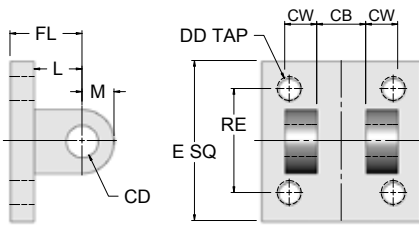


# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

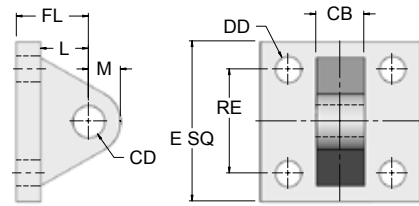
Cylinder  
Accessories

### NFPA CLEVIS BRACKET



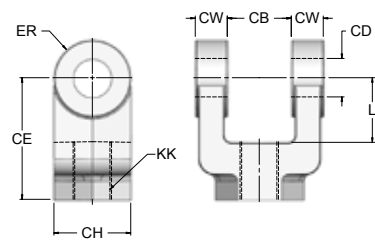
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE	load capacity (lbs)
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	7300
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	14000
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4	19200
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16	36900
CB-17	2.531	1 3/4	1 1/4	7/8-14	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16	34000
CB-20	2.531	2	1 1/4	1-14	7 1/2	3 1/2	2 1/2	2	5 3/4	33000
CB-25	3.032	2 1/2	1 1/2	1 1/8-12	8 1/2	4	3	2 1/2	6 19/32	34900
CB-30	3.032	3	1 1/2	1 1/4-12	9 1/2	4 1/4	3 1/4	2 3/4	7 1/2	33800
CB-35	4.032	3 1/2	2	1 3/4-12	12 5/8	5 11/16	4	3 1/2	9 5/8	83500
CB-40	4.532	4	2 1/4	2-12	14 7/8	6 7/16	4 1/2	4	11 1/2	102600

### NFPA EYE BRACKET



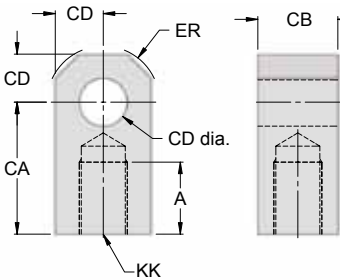
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE	load capacity (lbs)
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8	4100
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16	10500
EB-10	1.50	1	21/32	4 1/2	2 1/4	1 1/2	1	3 1/4	17500
EB-10H	1.50	1	21/32	4 1/2	2 3/8	1 1/2	1	3 1/4	20400
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	1 3/8	3 13/16	21200
EB-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	45000
EB-17H	2.50	1 3/4	29/32	6 1/2	3 3/8	2 1/4	1 3/4	4 15/16	49480
EB-20	2.50	2	1 1/16	7 1/2	3 1/2	2 1/2	2	5 3/4	65000
EB-20H	2.50	2	1 1/16	7 1/2	4	2 1/2	2	5 3/4	70000
EB-25	3.00	2 1/2	1 3/16	8 1/2	4	3	2 1/2	6 19/32	90000
EB-25H	3.00	2 1/2	1 3/16	8 1/2	4 3/4	3	2 1/2	6 19/32	94200
EB-30H	3.00	3	1 5/16	9 1/2	5 1/4	3 1/4	3	7 1/2	121900
EB-35	4.00	3 1/2	1 13/16	12 5/8	5 11/16	4	3 1/2	9 5/8	57400

### NFPA ROD CLEVIS



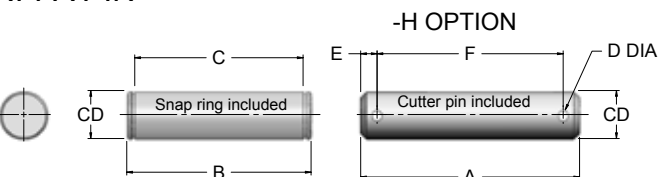
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L	load capacity (lbs)
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4	4250
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4	11200
RC-07H	1.265	3/4	2 1/8	1 3/8	5/8	3/4	3/4-16	1	11200
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2	19500
RC-10H	1.515	1	2 15/16	1 1/2	3/4	1	1-14	1 5/16	19500
RC-13	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8	33500
RC-13H	2.032	1 3/8	3 3/4	2	1	1 3/8	1 1/4-12	1 3/4	33500
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	45600
RC-17-1.75	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 3/4-12	2 1/4	45600
RC-20	2.531	2	5 1/2	2 15/16	1 1/4	2	1 7/8-12	2 1/2	65600
RC-25	3.032	2 1/2	6 1/2	3 1/2	1 1/2	2 1/2	2 1/4-12	3	98200
RC-30	3.032	3	6 3/4	3 7/8	1 1/2	2 3/4	2 1/2-12	3 1/4	98200
RC-30H	3.032	3	6 3/4	3 7/8	1 1/2	3	2 1/2-12	3 1/4	98200
RC-35	4.032	3 1/2	8 1/2	5	2	3 1/2	3 1/4-12	4	156700
RC-35H	4.032	3 1/2	7 3/4	5	2	3 1/2	3 1/4-12	4 1/4	156700
RC-40	4.532	4	10	6 1/8	2 1/4	4	4-12	4 1/2	221200

### NFPA ROD EYE



Part #	A	CA	CB	CD PIN DIA.	ER	KK	load capacity (lbs)
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20	5000
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16	12100
RE-10	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14	21700
RE-10H	1 1/8	2 3/8	1 1/2	1	1 7/16	1-14	21700
RE-13	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12	33500
RE-17	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12	45000
RE-20	3	5	2 1/2	2	2 1/2	1 7/8-12	53500
RE-20H	2 1/4	4 3/8	2 1/2	2	2 7/8	1 3/4-12	75000
RE-25	3 1/2	6 13/16	3	2 1/2	2 13/16	2 1/4-12	98700
RE-30	3 1/2	6 1/8	3	3	3 1/4	2 1/2-12	110000
RE-30H	3 5/8	6 1/2	3 1/2	3	3 1/4	2 3/4-12	123300
RE-35	4 1/2	7 5/8	4	3 1/2	3 7/8	3 1/4-12	161300
RE-35H	5	7 5/8	4	3 1/2	3 7/8	3 1/2-12	217300
RE-40	5 1/2	9 1/8	4 1/2	4	4 7/16	4-12	273800
RE-40H	5 3/4	9 1/8	5	4	4 7/16	4 1/2-12	308500

### 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
P-25	2 1/2	2.360	6.625	6.188	0.219	0.219	6.313
P-30	3	2.838	6.780	6.250	0.250	0.250	6.344
P-35	3 1/2	3.316	8.845	8.125	0.312	0.282	8.406
P-40	4	3.792	9.845	9.125	0.312	0.282	9.969

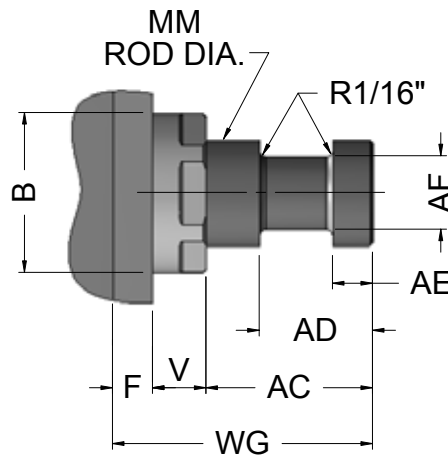
# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

### Style #5 Piston Rod End Flange

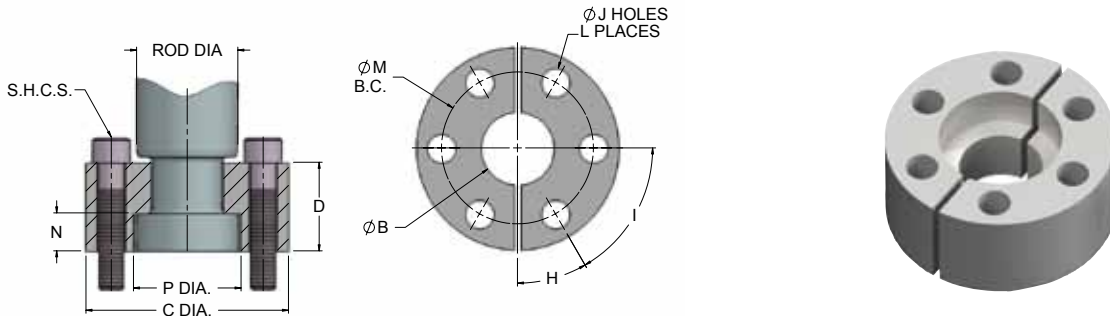
Rod End Flange Coupling  
For series ST6 Hydraulic

- Simplifies alignment
- Reduces assembly time
- Allows full rated hydraulic pressure in push and pull directions
- Available in 5/8" through 10" piston rod diameters



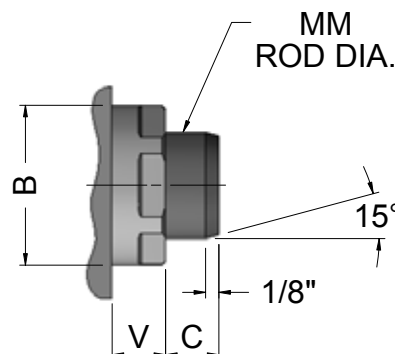
ROD SIZE MM	Dimensions Style #5 Rod End				
	AM	AD	AE	AF	WG
5/8	0.57	5/8	1/4	3/8	1 3/4
1	0.95	15/16	3/8	11/16	2 3/8
1 3/8	1.32	1 1/16	3/8	7/8	2 3/4
1 3/4	1.70	1 5/16	1/2	1 1/8	3 1/8
2	1.95	1 11/16	5/8	1 3/8	3 3/4
2 1/2	2.45	1 15/16	3/4	1 3/4	4 1/2
3	2.95	2 7/16	7/8	2 1/4	4 7/8
3 1/2	3.45	2 11/16	1	2 1/2	5 5/8
4	3.95	2 11/16	1	3	5 3/4
4 1/2	4.45	3 3/16	1 1/2	3 1/2	6 1/2
5	4.95	3 3/16	1 1/2	3 7/8	6 5/8
5 1/2	5.45	3 15/16	1 7/8	4 3/8	7 1/2
7	6.95	4 1/16	2	5 3/4	8 7/16
8	7.95	4 1/16	2	6 1/2	8 11/16
9	8.95	4 5/8	2 3/8	7 1/4	8 3/4
10	9.95	4 5/8	2 3/8	8	9 3/4

### Rod End Flange Safety Couplers



Part #	ROD DIA	B	C	d	H	I	J	L	M	N	P	MAT'L
FC-063	0.625	0.406	1 1/2	9/16	45°	90°	7/32	4	1 1/8	1/4	9/16	1144 CD
FC-100	1.000	0.750	2	7/8	30°	60°	9/32	6	1 1/2	3/8	1 1/16	1144 CD
FC-138	1.375	0.938	2 1/2	1	30°	60°	11/32	6	2	3/8	1 7/16	1018 CD
FC-175	1.750	1.187	3	1 1/4	22.5°	45°	11/32	8	2 3/8	1/2	1 13/16	1018 CD
FC-200	2.000	1.438	3 1/2	1 5/8	15°	30°	13/32	12	2 11/16	5/8	2 1/16	1018 CD
FC-250	2.500	1.875	4	1 7/8	15°	30°	13/32	12	3 3/16	3/4	2 5/8	1018 CD
FC-300	3.000	2.375	5	2 3/8	15°	30°	17/32	12	4	7/8	3 1/8	1018 CD
FC-350	3.500	2.625	5 7/8	2 5/8	15°	30°	21/32	12	4 11/16	1	3 5/8	C1119 MOD
FC-400	4.000	3.125	6 3/8	2 5/8	15°	30°	21/32	12	5 3/16	1	4 1/8	C1119 MOD
FC-450	4.500	3.625	6 7/8	3 1/8	15°	30°	21/32	12	5 11/16	1 1/2	4 5/8	C1119 MOD
FC-500	5.000	4.000	7 3/8	3 1/8	15°	30°	21/32	12	6 3/16	1 1/2	5 1/8	C1119 MOD
FC-550	5.500	4.500	8 1/4	3 7/8	15°	30°	25/32	12	6 7/8	1 7/8	5 5/8	C1119 MOD
FC-700	7.000		10 3/8	4	15°	30°	1-1/32	12	8.750			C1119 MOD
FC-800	8.000		11 3/8	4	15°	30°	1 1/32	16	9.750			C1119 MOD
FC-900	9.000		13 1/8	4	15°	30°	1 9/32	12	-			C1119 MOD
FC-1000	10.000		14 1/8	4 1/2	15°	30°	1 9/32	16	12.125			C1119 MOD

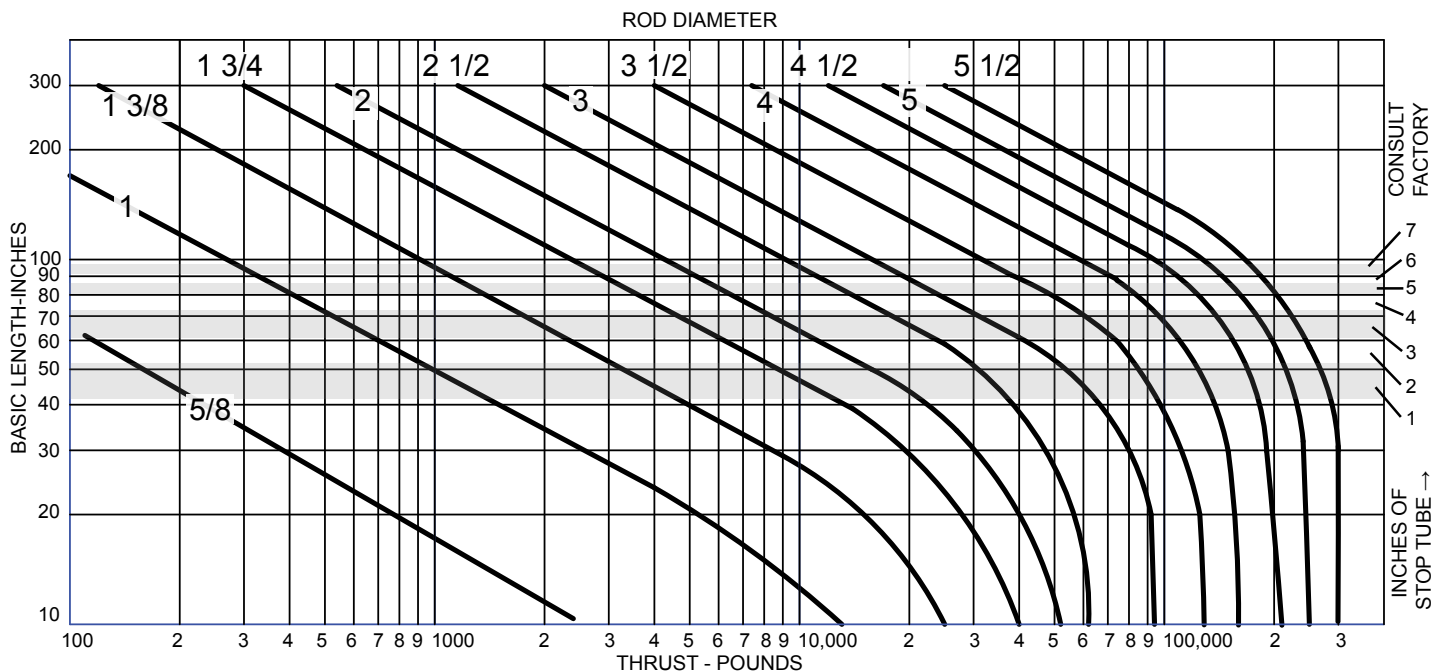
### Style #6 Piston Rod End Plain



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Rod Size and  
Stop Tube Selection



### 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 25) (Thrust equals bore area multiplied by the operating pressure.)
- 2) Select from the diagram beside the type of mounting you will use.
- 3) Determine the basic length by multiplying the real stroke by the stroke factor.
- 4) 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 Size Selection.

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

**See Page 27 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.		<p>Fixed &amp; Rigidly Guided</p>	0.50
		<p>Pivoted &amp; Rigidly Guided</p>	0.70
		<p>Supported but not Rigidly Guided</p>	2.00
		<p>Unsupported</p>	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.	MT1 TRUNNION ON HEAD END	<p>Pivoted &amp; Rigidly Guided</p>	1.00
	MT4 INTERMEDIATE TRUNNION	<p>Pivoted &amp; Rigidly Guided</p>	1.50
	MT2 TRUNNION ON CAP END	<p>Pivoted &amp; Rigidly Guided</p>	2.00
	MP1, MP2, MP4 CLEVIS ON CAP	<p>Pivoted &amp; Rigidly Guided</p>	2.00

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

ST6 series hydraulic cylinders are recommended for pressures to 3000 PSI for heavy duty services with hydraulic oil. The 4:1 design factor ratings shown here are based on tensile strength of the material and for the rod size shown below only. The rating is conservative for continuous severe applications. Design factors at other pressures can be calculated from those values. In addition please refer to mounting pages for additional ratings based per mount.

Bore Size	Rod Size	Pressure Rating at 4:1 Design Factor (on Tensile)
1 1/2	5/8	2530
2	1	2950
2.5	1	2340
3.25	1 3/8	2250
4	1 3/4	2130
5	2	2171
6	2 1/2	2270
7	3 1/2	2040
8	3 1/2	2040

### Push Force and Displacement

Bore Size	piston Area	Cylinder Push Force in pounds at various Pressures					Displacement Per inch of stroke (Gallons)
		1000	1500	2000	2500	3000	
1 1/2	1.767	1770	2655	3540	4417	5310	.00765
2	3.14	3140	4710	6280	7850	9420	.0136
2 1/2	4.91	4910	7365	9820	12275	14730	.0213
3 1/4	8.30	8300	12450	16600	20750	24900	.0359
4	12.57	12570	18855	25140	31425	37710	.0544
5	19.64	19640	29460	39280	49100	58920	.0850
6	28.27	28270	42405	56540	70675	84810	.1224
8	50.27	50270	75405	100540	125675	150810	.2176

### Deductions for Pull Force or Displacement

To determine Cylinder Pull Force or displacement, deduct the following force or displacement corresponding to rod size, from selected push Force or displacement corresponding to Bore size in table above

Rod Size	Rod Area	Piston Rod Diameter Force in pounds at various Pressures					Displacement Per inch of stroke (Gallons)
		1000	1500	2000	2500	3000	
5/8	0.307	307	460	614	767	921	.0013
1	0.785	785	1177	1570	1962	2355	.0034
1 3/8	1.490	1490	2235	2980	3725	4470	.0065
1 3/4	2.410	2410	3615	4820	6025	7230	.0104
2	3.141	3141	4711	6280	7854	9420	.0136
2 1/2	4.910	4910	7365	9820	12275	14730	.0213
3	7.070	7070	10605	14140	17675	21210	.0306
3 1/2	9.620	9620	14430	19240	24050	28860	.0416
4	12.57	12570	23355	25140	31425	37710	.0544
4 1/2	15.90	15900	23850	31800	39750	47708	.0688
5	19.64	19640	23460	39280	49100	58920	.0850
5 1/2	23.76	23760	35640	47520	59400	71280	.1028

Area Extended stroke Push :  $AE = .7854 BD^2$   
 Area Retracted stroke Pull :  $AR = (.7854 BD^2 - .7854 RD^2)$   
 Cylinder Push Force Formula :  $FE = P \times AE$   
 Cylinder Pull Force Formula :  $FR = P \times AR$   
 Cylinder Volume (Gallons) :  $G = \frac{\text{Net area (in}^2\text{)} \times \text{Stroke (in)}}{231}$

231

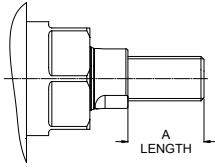
FE= Force Extended Stroke  
 FR= Force Retracted Stroke  
 P= Working Pressure  
 BD= Bore Diameter  
 RD= Rod Diameter

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Cylinder  
Options

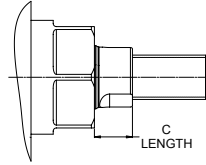
### Thread Extension



#### Option code A

Piston Rod Thread Extension can be ordered over standard. To order add option code **A=( )** and specify "A" length.

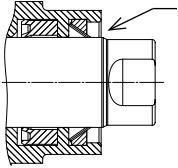
### Rod Extension



#### Option code C

Piston Rod Extension can be ordered over standard. To order add option code **C=( )** and specify "C" length

### Metallic Rod Scraper



#### Option A1

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.

### Chrome Rod

#### Option Code R2

Induction Hard Chrome Rod (R2), standard for stroke over 60" and rods over 2.5" diameter.

### Electroless Nickel

#### Option Code FN

The properties of Electroless nickel contribute to the multitude of uses. The coating provides an attractive finish, while exhibiting high abrasion and corrosion resistance. Its ability to uniform coat blind holes, threads, internal surfaces and sharp edges contributes to its effectiveness. It has a very high bonding strength to the base metal. Coating can be done on aluminum, steel, cast iron, etc

### StarNite Head, Cap, Rod, Tubing and tie rods

#### Option Code FM

This option will give you a black finish resistant to corrosion for outside applications or caustic washdown, and really hard to scratch due to the hardness of the part after the chemical process of the StarNite. See page 4 for more detail. Tubing, tie rods and rod are already process with StarNite.

### Viton Seals

#### Option code LV & PV

Fluorocarbon will be chosen for higher temperature range from 200°F to 400°F (200°C)

For Chemical resistance our standard Blue Seals will Outstand Viton by far in most chemical Application and wear resistance. Resists most wash down application.

LV : U-cup Seals in Fluorocarbon With Teflon Backup

PV : Polypack Ucup/oring loaded in Fluorocarbon

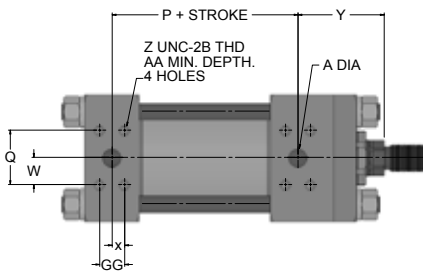
### Air Bleeder

#### Option Code Ba, BB and BC

An air bleed may be ordered at either or both ends of the cylinder as an option. To provide for maximum bleeding of air from the cylinder, STARCYL places its air bleeds in the end caps to bleed air from the tube/head or tube/cap juncture. The air is bled from the cylinder by backing out the straight thread metallic seal plug to allow air to pass by the threads. When air bubbles stop and oil starts to flow, retighten plug. It is recommended that bleeding be done with pressure on the opposite end of the cylinder so that the bleed plug is not subjected to pump pressure when being backed out. Air bleeds should always be positioned at the highest point of the cylinder tube. Please specify positions of air bleeds by position number. (Ba11)

### Flange Ports (Code 61, 3000 psi)

#### Option code F



Bore	Rod	SAE #	Y	A	P	Q	W	X	Z	AA	GG
2.50	1	8	2.39	.5	2.97	1.5	.75	.34	5/16-18	.81	.69
	1 3/8		2.80								
3.25	1 3/4	12	3.17	.75	3.41	1.87	.94	.44	3/8-16	.75	.87
	2		3.05								
	1 3/4		3.05								
4.00	2	12	3.39	.75	3.72	1.87	.94	.44	3/8-16	.75	.87
	2 1/2		3.17								
	2		3.17								
	2 1/2		3.39								
5.00	3	12	3.39	.75	4.22	1.87	.94	.44	3/8-16	.75	.87
	3 1/2		3.39								
	2		3.17								
	3 1/2		3.39								
6.00	ALL	16	3.52	1.00	4.85	2.06	1.03	.52	3/8-16	.87	1.03
7.00	ALL	20	3.7	1.25	5.59	2.31	1.16	.59	7/16-14	1.00	1.19
8.00	ALL	24	3.84	1.5	6.31	2.75	1.37	.70	1/2-13	1.06	1.41

### ROD END BOOTS

LF	.13	.13	.13	.13	.13	.13	.10	.10	.10	.10	.10
OD	2 1/4	2 5/8	3	3 3/8	3 3/4	4 3/8	5 1/8	5 5/8	6 1/4	7	7 1/2
Rod	5/8	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4	5	5 1/2

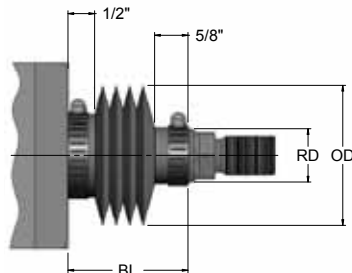
To determine extra length of piston rod required to accommodate boot, calculate:

$BL = \text{Stroke} \times LF + 1 \frac{1}{8}"$

$BL + \text{Std LA} = \text{length of piston rod to extend beyond the retainer.}$

Use  $BL + \text{std C} = \text{New C}$  in the part number for the Rod extension required.

**NOTE:** Check all boot O.D.'s against std "E" dimension from catalog. This can be critical on foot mount cylinders



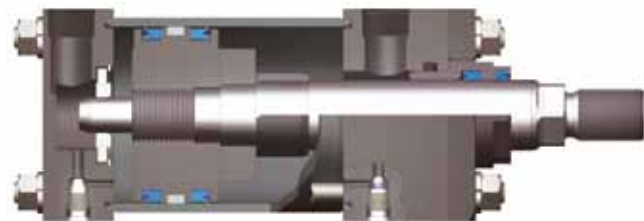


# ST6 SERIES Heavy Duty Hydraulic Cylinders

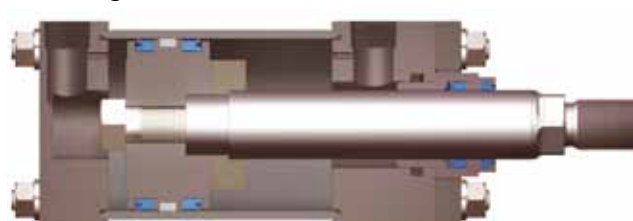
Stop Tube Design and  
Alignment couplers

## Stop Tube Design

Drawing A - Cushion design



Drawing B - Non Cushion design



### Stop Tube

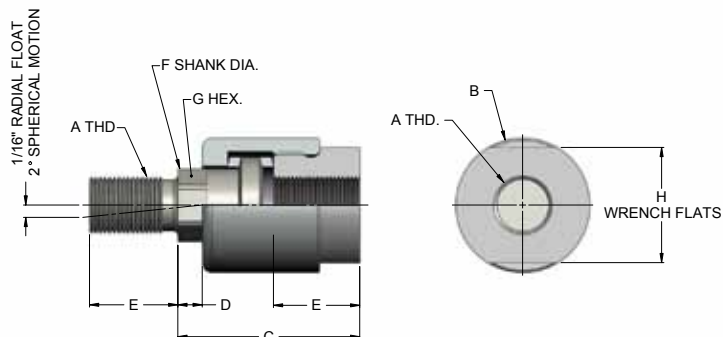
Option Code **ST( )** Enhances the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and the rod bearing at full extension when placed on head end. Ideal for applications requiring longer strokes or where additional rod stability is desired. Specify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

### How To Order Stop Tube option

ex: ST6-3.25x60.00x1.38-S161S161C00-ST4 is a 3.25" bore with 60" Net stroke and a piston stop tube of 4" long, for a total gross stroke of 64" (must be used to calculate overall length "LB").

## 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.

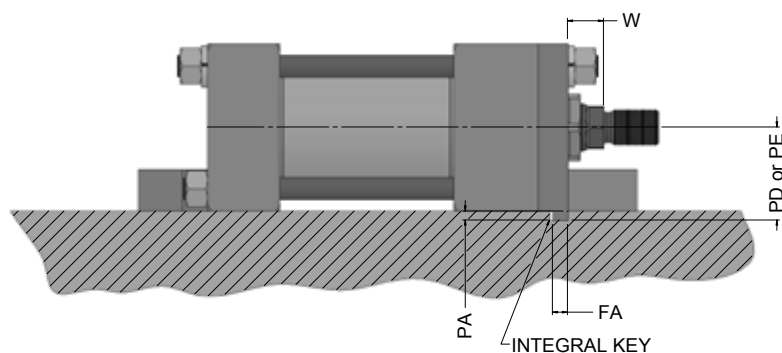


\* Use jam nut to lock coupler to rod when used with full diameter threads.

Part #	A	B	C	D	E	F	G	H	MAX PULL AT YIELD
AC-250F	1/4-28	7/8	1 1/4	1/4	5/8	0.245	3/16	13/16	6000
AC-312F	5/16-24	7/8	1 1/4	1/4	5/8	0.308	1/4	13/16	8300
AC-375C	3/8-16	7/8	1 1/4	1/4	5/8	0.369	5/16	13/16	5000
AC-375F	3/8-24	7/8	1 1/4	1/4	5/8	0.370	5/16	13/16	8300
AC-437F	7/16-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	10000
AC-500C	1/2-13	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-500F	1/2-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-625F	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1 1/8	14000
AC-750C	3/4-10	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-750F	3/4-16	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-875F	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-2000F	2-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	240000

## Thrust Key Mounting - Option code P

Thrust key mountings eliminate the need of using fitted bolts or external keys on side mounted cylinders. Starcyl Cylinders can provide on mounting styles such as ST6S1, ST6S2, ST6S4 and ST6S7 with the gland retainer plate extended below the mounting side of the cylinder (see drawing below). This extended retainer plate can then be fitted into a keyway milled into the mounting surface of the machine.



Bore	Dim FA	Dim PA	Dim PD Mounting style MS2, MS4, MS7	Dim PD Mounting style MS1
1.5	.312 <sup>+0.000</sup> / <sub>-.002</sub>	3/16	1 7/16	1 9/16
2.0	.562 <sup>+0.000</sup> / <sub>-.002</sub>	5/16	1 13/16	2
2.5	.562 <sup>+0.000</sup> / <sub>-.003</sub>	5/16	2 1/16	2 1/4
3.25	.687 <sup>+0.000</sup> / <sub>-.003</sub>	3/8	2 5/8	2 15/16
4.0	.812 <sup>+0.000</sup> / <sub>-.003</sub>	7/16	2 15/16	3 1/4
5.0	.812 <sup>+0.000</sup> / <sub>-.003</sub>	7/16	3 11/16	4 1/8
6.0	.937 <sup>+0.000</sup> / <sub>-.003</sub>	1/2	4 1/4	4 3/4
8.0	.937 <sup>+0.000</sup> / <sub>-.003</sub>	1/2	5 1/4	6



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

STAR6 weight Chart

Bore Size	Rod Dia.	Rod Code	Single Rod Cylinders Basic Wt. Zero Stroke		Add Per Inch of stroke	Double Rod Cylinders Basic Wt. Zero Stroke		Add Per Inch of Stroke
			MS4, MF2, MF6, MF1, MF5	MP1, MS2, MS1, MT1, MT2				
			MX0, MX3, MX2, MX1	MT4, MS3, MS7, ME6, ME5				
1 1/2"	5/8	1	7.8	9.0	0.5	9.7	10.8	0.6
	1"	2	8.4	9.3	0.6	9.1	10.7	0.8
2"	1"	1	11.6	13.2	0.8	14.6	16.8	1.0
	1 3/8	2	13.5	17.1	1.0	19.4	20.6	1.4
2 1/2"	1"	1	17.0	19.5	1.1	21.0	24.5	1.3
	1 3/4	2	22.5	25.5	1.5	27.0	30.0	2.2
3 1/4"	1 3/8	1	32.0	41.0	1.8	43.0	52.0	2.2
	2"	2	37.0	46.0	2.2	48.0	57.0	3.1
4"	1 3/4	1	48.0	53.0	2.5	59.0	63.0	3.2
	2 1/2	2	52.0	58.0	3.2	92.0	97.0	4.6
5"	2"	1	76.0	82.0	3.4	96.0	102.0	4.8
	3 1/2	2	88.0	86.0	5.2	117.0	123.0	7.9
6"	2 1/2	1	125.0	133.0	5.2	153.0	159.0	6.6
	4"	2	133.0	140.0	7.3	182.0	190.0	10.9
7"	3"	1	233.0	242.0	6.7	320.0	339.0	8.7
	5"	2	240.0	253.0	10.3	341.0	360.0	15.9
8"	3 1/2	1	262.0	276.0	9.0	323.0	331.0	11.7
	5 1/2	2	300.0	309.0	13.0	390.0	411.0	19.7

Rod Extension per rod diameter

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

Bore Size	Rod Dia.	Single Rod Cylinders Basic Wt. Zero Stroke				Add Per Inch of stroke	Double Rod Cylinders Basic Wt. Zero Stroke	
		MT1 MT2	MT4, ME5, ME6	MF5, MF6	MP1, MS2, MS3		Basic Wt. Zero Stroke add to all mtg. Styles	Add Per Inch of Stroke
10	4 1/2	562.0	646.0	684.0	607.0	15.0	43.0	20.0
	5	574.0	656.0	695.0	619.0	16.0	50.0	21.0
	5 1/2	583.0	667.0	705.0	628.0	17.0	64.0	24.0
	7	620.0	704.0	742.0	665.0	21.0	101.0	32.0
12	5 1/2	924.0	1057.0	1136.0	1000.0	22.0	64.0	29.0
	7	961.0	1094.0	1173.0	1036.0	26.0	101.0	37.0
	8	1022.0	1155.0	1234.0	1097.0	29.0	162.0	43.0
14	7	1335.0	1520.0	1582.0	1485.0	28.0	101.0	39.0
	8	1398.0	1581.0	1683.0	1546.0	31.0	162.0	45.0
	10	1496.0	1681.0	14743.0	1646.0	39.0	262.0	61.0
16	8		ME5, ME6	MF5, MF6	MP1			
	9		2073	2257	2226	35.0	149.0	50.0
	10		2122.0	2305.0	2275.0	39.0	198.0	57.0
	10		2181.0	2364.0	2334.0	43.0	258.0	65.0
18	9		3165.0	3256.0	3330.0	45.0	199.0	63.0
	10		3224.0	3315.0	3390.0	50.0	258.0	72.0
20	10		4231.0	4406.0	4551.0	57.0	258.0	79.0

Rod Extension per rod diameter

Rod Dia.	Piston Rod Wt. Per Inch
4 1/2	4.51
5"	5.56
5 1/2	6.72
7	10.89
8	14.22
9	18.13
10	22.38

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

# HOW TO ORDER

**ST6 D\* F1 - 3.25 X 22.22 X 1.38 - #2**

**Bore\***
**Stroke\***
**Rod Dia\***

FEATURE	DESCRIPTION	SYMBOL
SERIES	Used in All ST6 part number	ST6

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Double rod End	Used only if double rod cylinder is required	19	D
Back-to-Back	(must request drawing)		B
Position Sensor	LDT Ready ***	59	X
Thrust Key	Thrust key mount (MS1, MS2, MS4 & MS7)	27	P

FEATURE	DESCRIPTION	1.5" to 6" Bore	7 & 8" Bore	10 to 20" Bore	SYMBOL
		PAGE NO.	PAGE NO.	PAGE NO.	
Mounting Style	Head End Tie Rod Extended	6	30	44	X3
	Cap End Tie Rods Extended	6	30	44	X2
	Both End Tie Rod Extended	6	30	44	X1
	Head Rectangular Flange	8	32	-	F1
	Head Square Flange	8	32	46	F5
	Head Rectangular Mount	8	32	46	E5
	Cap Rectangular Flange	10	34	-	F2
	Cap Square Flange	10	34	48	F6
	Cap Rectangular Mount	10	34	48	E6
	Side Lugs	12	36	50	S2
	Centerline Lugs	12	-	50	S3
	Side Tapped	12	36	-	S4
	End Angles	14	-	-	S1
	Side End Lugs	14	-	-	S7
	Cap Fixed Clevis	14	36	50	P1
	Head Trunnion	16	38	52	T1
	Cap Trunnion	16	38	52	T2
	Intermediate Fixed Trunnion Xi=( )	16	38	52	T4
	Spherical Bearing Mount	18			SB

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Piston Rod End	Select :		
	Style #1 Intermediate Male	6 to 16	#1
	<b>Style #2 Small Male</b>		#2
	Style #3 Full Male		#3
	Style #4 Short Female		#4
	Style #5 Flange Coupling	61	#5
	Style #6 Plain	61	#6
	Style #7 Spherical female	20	#7
Style #X Special (Specify)		#X	

**\* SEE CATALOG PAGES FOR SELECTION OF BORE AND ROD SIZES COMBINATIONS**

**\*\*\* AVAILABLE STARTING AT 1.5" BORE, 1" ROD**

# -S121 S101‡ C00 - LU - A1 - FP\*

FEATURE	DESCRIPTION	SYMBOL
Head Port	NPT Port <b>SAE Straight Thread O-ring Port</b> Flange Port (C.61) British Parallel British Tapered	N S F 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> Flange Port (C.61) British Parallel British Tapered	N S F 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) Cushion both ends (where x = position 1,2,3,4)	<b>C00</b> CX0 C0X CXX

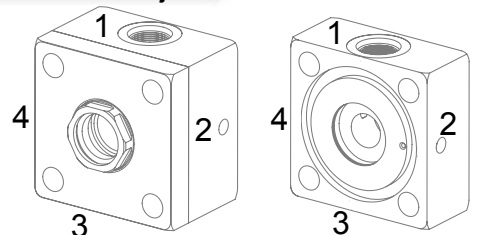
Piston seals Option	Description	Quantity	Symbol
	Buna U-cup With Backup		LB
	Viton U-cup With Teflon Backup		LV
	<b>Blue Hythane asymmetric U-cup seals (std)</b>		<b>LU</b>
	Polypack Urethane U-cup		PU
	Polypack Viton U-cup		PV
	Hi-Load Piston	3	LH
	Ring Packed		RP

Options	Description	Quantity	Symbol
	Rod Extension C=	64	C=( )
	Thread Extension A=	64	A=( )
	Rod Scraper	64	A1
	Bleeder (Captive Ball Bearing/Set screw) pos.1,2,3,4	64	BA( )*
	Bleeder (philips screw type ) pos.1,2,3,4	64	BB( )*
	Bleeder (standard Sae Port) pos.1,2,3,4	64	BC( )*
	Go Switches Cylindicator, Pos, 1 2 3 4	56	H1
	Stop Tube (length)	65	ST( )
	Rod Boot	64	RB
	Chomed Rod (Induction Hard Chromed)	64	R2
	Stainless Steel Rod 17-4 PH chrome plated	64	S2
	Tie rods Support ( for stroke from 60" & +)		TS
	Adjustable Stroke Up ( specify lenght )	19	ASU=( )

FP = Finish Paint\*  
FM = Finish Starnite™  
FN = Finish Nickel

\*Supplied as Standard Finish

Port & Adjustable Cushion Location



BORE	STD PORT PER BORE				STD PORT LOCATION HEAD, CAP
	NPTF	CODE	SAE	CODE	
1 1/2	1/2	08	10	10	1,1
2	1/2	08	10	10	1,1
2 1/2	1/2	08	10	10	1,1
3 1/4	3/4	12	12	12	1,1
4	3/4	12	12	12	1,1
5	3/4	12	12	12	1,1
6	1	16	16	16	1,1

‡: for Bolt on Manifold, refer to page 24 on how to order and for more details.



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Offer of sales and  
Warranty

### Offer of Sale

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

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

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

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- Economic design

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- Two Year Warranty
- Economic Design

**STAR3 - Heavy Duty NFPA interchangeable air cylinders Aluminum construction**



**ST3RL 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-Reliability
Extremely Low Backlash	Position Holding
Spring Engaged Units	Holds Load During Power/Pressure Loss
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4 bar (60 psi) Release Pressure	Compact Unit, Easy Integration
	Broad Application

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**SPACE ONE**

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