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## Contents

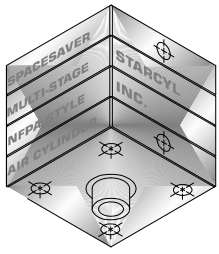
\* Each section may have a contents page for that specific section as this is a combined document.

### Air Cylinders

Star1 Series: Single / Multi-Stage (Upgradable)	.....	2
Additional Kit	.....	10
Star2 Series: Basic (NFPA Style Mount)	.....	11
Star3 Series: Heavy Duty (NFPA Interchangeable)	.....	20
NFPA Rod Lock Cylinder	.....	53

### Hydraulic & Pneumatic Cylinders

Star4 & Star5 Series: Heavy Duty	.....	55
Pneumatic & Medium Duty Hydraulic		
Star6 Series: Heavy Duty Hydraulic	.....	95

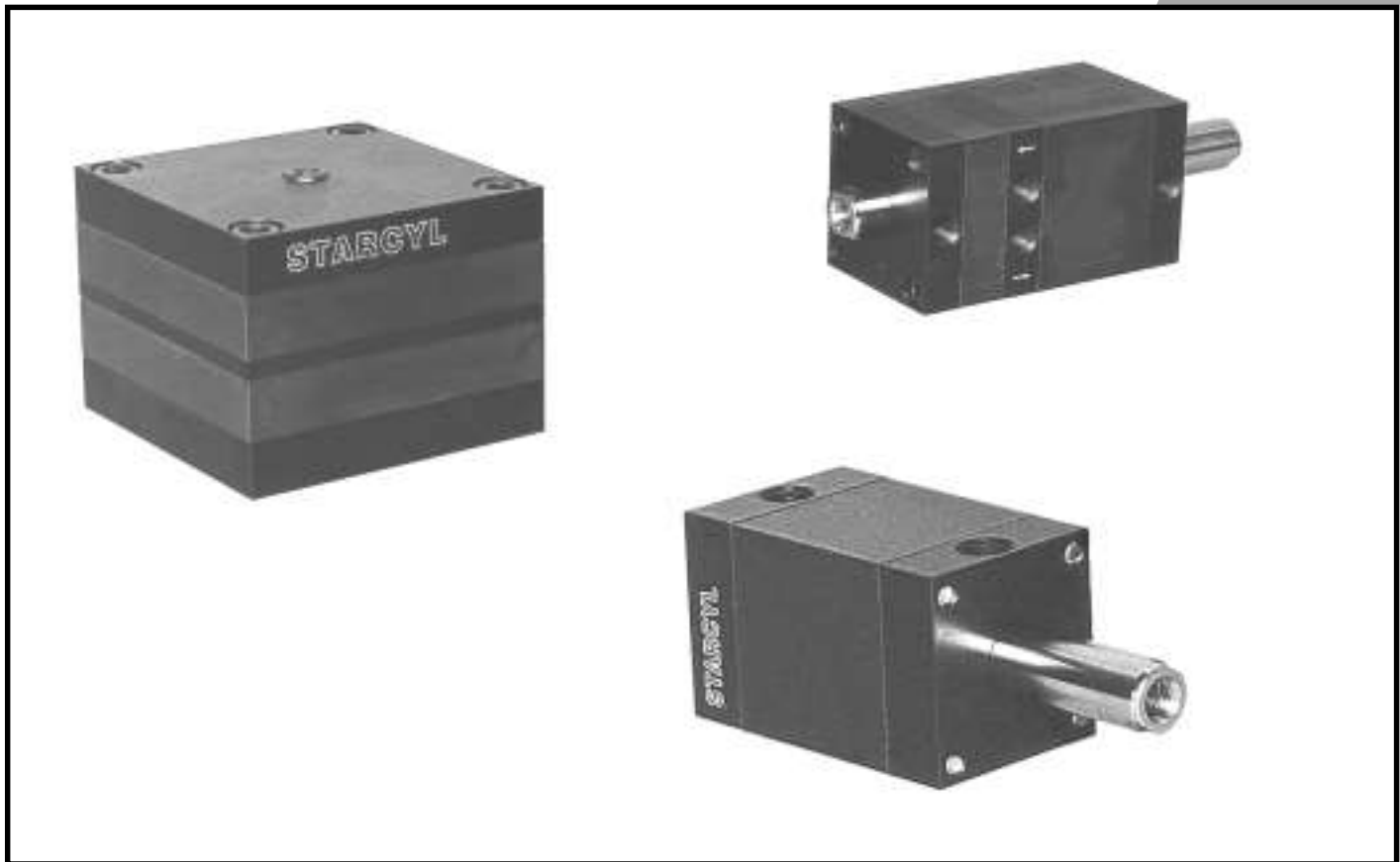


# STARCYL

## AIR CYLINDERS

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

## SPACE-SAVER



SINGLE OR MULTI-STAGE

**Not Enough Force  
Don't Change The Design  
Add A Stage !**

THE ONLY CYLINDER  
UPGRADABLE !

# STAR 1 SERIES

# QUALITY & PERFORMANCE ...

## THESE ARE SOME FEATURES OF STARCYL CYLINDERS ...

### Air inlet

The top and the front port are drilled with constant diameter to lower restriction and to ensure fast feed and fast stroke. Dual port are made standard for the cap.

### Piston and rod (lower & upper piston)

Made in one piece, in high strength steel, it prevents failure in hard working conditions.

### MELONITE

(Nitrocarburizing) gives better corrosion-resistant properties (out performs chrome plating by ratio up to 20:1. the finish created by the process is a lustrous black. (S.S. also can be used)

### Rod bushing

Oil-impregnated bronze rod bushing provides maximum support for the piston rod.

### Cap

Anodized aluminum alloy gives lightweight, high strength, corrosion resistance and great quality appearance.

Heavy duty cap is standard to ensure good performance in hard conditions.

### Cylinder bodies

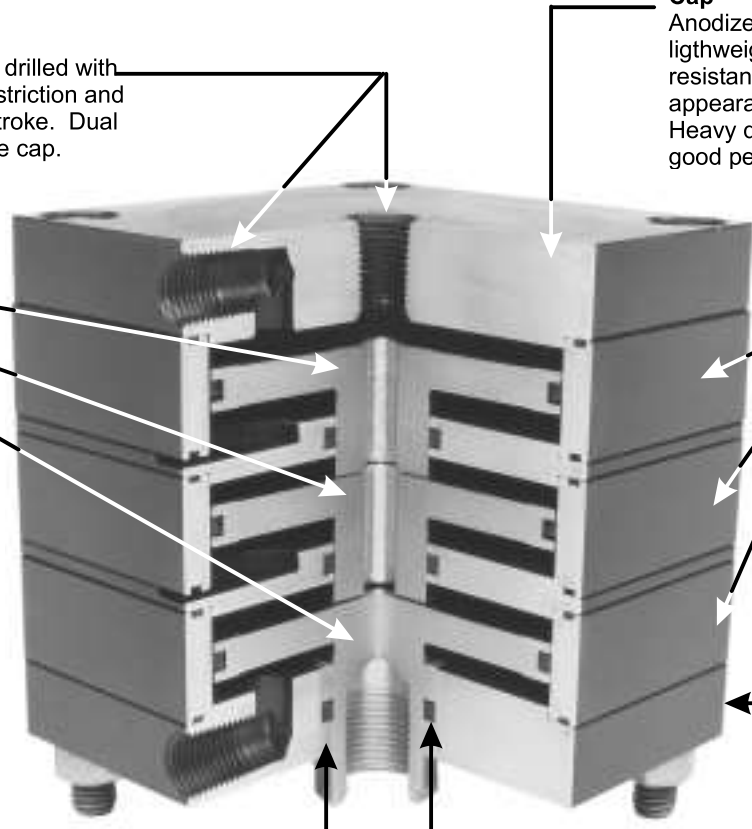
Hard anodized heavy wall aluminum alloy ensures maximum hardness and lowers the coefficient of friction.

### Head

Anodized aluminum alloy is lightweight, high strength, corrosion-resistant and offers great quality appearance.

### Piston rod seal

Quad ring gives the best seal and wipes dirt out for less maintenance and longer life of the



## MULTI-STAGE CYLINDERS HOW IT WORKS...

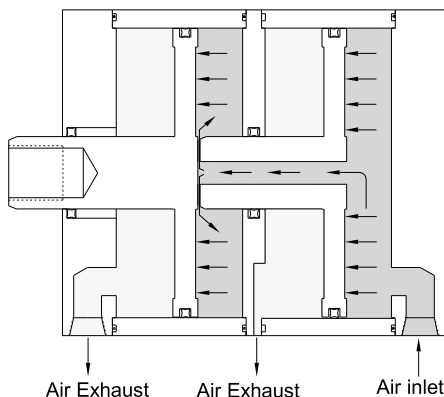
THE MULTI-STAGE CYLINDER IS A DOUBLE ACTING, SINGLE ROD END THAT MULTIPLY FORCE OUTPUT BY SUPPLYING AIR TO 2, 3, 4, ..., 8,... PISTONS ON EXTENSION.

IT SAVES SPACE AND ELIMINATES THE NEED FOR :

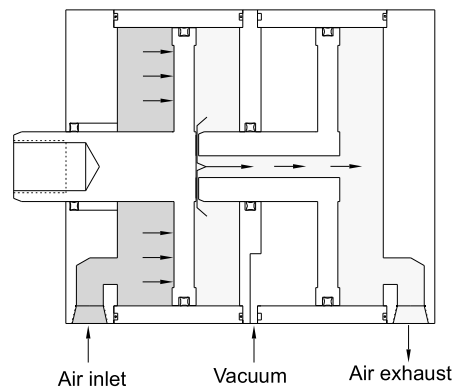
- HIGHER PRESSURE SYSTEM,
- AIR-OIL BOOSTER,
- BIGGER BORE CYLINDER,
- HYDRAULIC CYLINDERS.

ON THE RETURN STROKE, ONLY ONE PISTON IS POWERED, SAVING AIR VOLUME AND OPERATING COSTS; IT ALSO INCREASE WORKING SPEED.

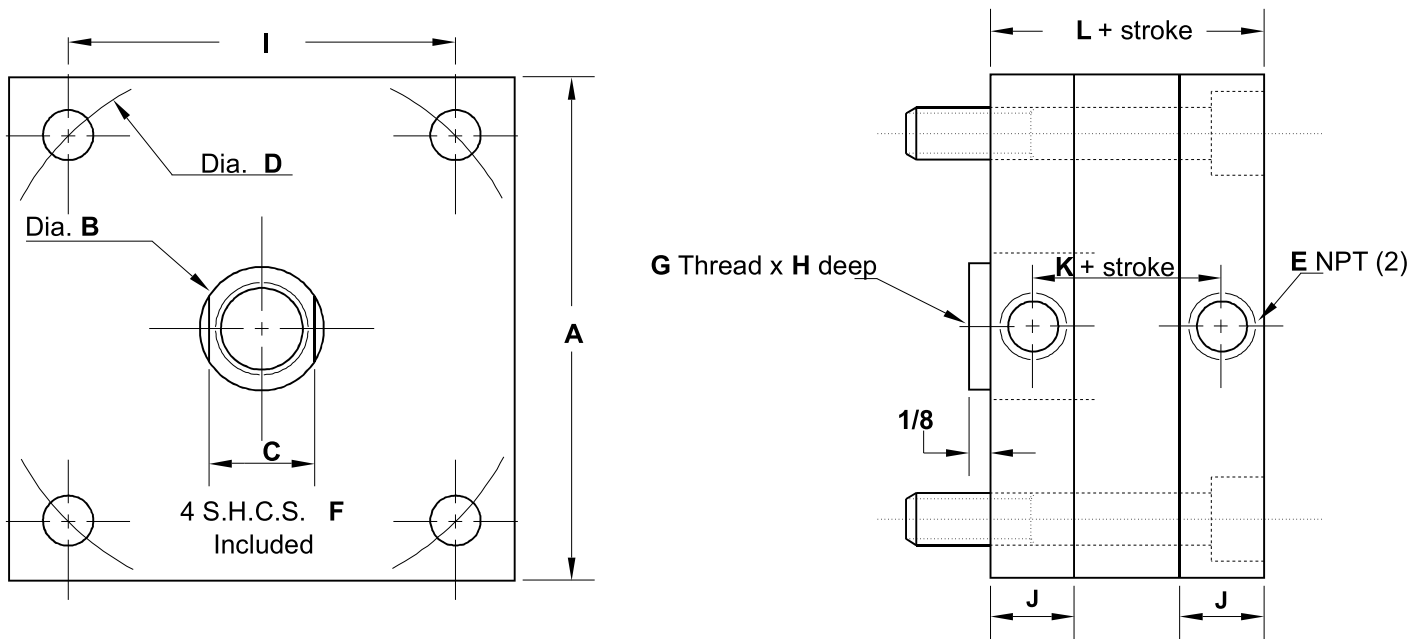
EXTENSION - AIR TO BOTH PISTONS



RETRACTION - AIR TO ONE PISTON ONLY



# STAR 1 DOUBLE ACTING (SINGLE OR MULTI STAGE)



STANDARD STROKE 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1½, 2

Bore dia.	A	B	C	D	E	F	G	H	I	J	K	L	adders for additional stage
9/16	1	1/4	7/32	0.875	#10-32	#4	#8-32	0.40	0.619	0.340	0.540	0.880	N/A
3/4	1 1/4	5/16	1/4	1.219	#10-32	#6	#10-32	0.44	0.862	0.340	0.540	0.880	N/A
1 1/16	1 1/2	1/2	7/16	1.687	1/8	#6	5/16-24	0.62	1.193	0.500	0.720	1.220	.350 + stroke
1 1/2	2	5/8	1/2	2.187	1/8	#10	3/8-24	0.62	1.547	0.500	0.720	1.220	.350 + stroke
2	2 1/2	3/4	5/8	2.687	1/8	#10	1/2-20	0.70	1.900	0.540	0.780	1.320	.390 + stroke
2 1/2	3	3/4	5/8	3.250	1/8	1/4	1/2-20	0.70	2.298	0.540	0.780	1.320	.390 + stroke
3	3 1/2	7/8	3/4	3.781	1/8	1/4	5/8-18	0.70	2.674	0.565	0.865	1.430	.450 + stroke
3 1/2	4	1	7/8	4.596	1/4	3/8*	3/4-16	0.70	3.250	0.690	1.040	1.730	.560 + stroke
4	4 1/2	1	7/8	4.937	1/4	3/8*	3/4-16	0.70	3.491	0.690	1.040	1.730	.560 + stroke

\* The standard bolt is 3/8, 5/16 bolt can be request for single stage. On some multi-stage cylinders, when the height of the bolts is greater than the standard, hex. Bolts or tie rods are used.

## HOW TO CALCULATE MULTI-STAGE CYLINDER HEIGHT ?

EX: 3 STAGES, 2" BORE, 1" STROKE

**BASIC STAGE** = L + STROKE - 1.320 + 1" = 2.320

**ADD STAGE** = .390 + STROKE = .390 + 1" = 1.390 X 2 (2 ADD STAGES) = 2.780

**TOTAL** = 2.320 + 2.780 = 5.100

BORE DIA.	PULL FORCE	PUSH FORCES (lbs) WITH MULTI-STAGES (100 PSI)							adders for add. stages
		1 stage	2 stages	3 stages	4 stages	5 stages	6 stages		
9/16	20	25	Not Available						
3/4	37	44	Not Available						
1/16	69	89	168	247	325	405	483	78	
1 1/2	146	177	336	495	654	813	971	158	
2	270	314	600	885	1171	1456	1742	285	
2 1/2	447	491	953	1415	1877	2340	2802	462	
3	647	707	1370	2034	2698	3361	4025	663	
3 1/2	884	962	1869	2776	3683	4590	5498	907	
4	1178	1257	2458	3660	4861	6063	7265	1201	

# STAR 1

## CYLINDERS TYPE

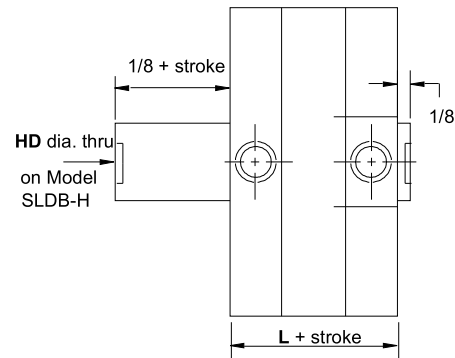
### SLDB DOUBLE ROD

(Not available in multi-stage cylinders)

CODE SLDB or SLDB-H (hollow rod)

Bore Dia.	HD (SLDB-H) hollow rod	L
9/16	†	1.240
3/4	9/64	1.240
1 1/16	7/32	1.580
1 1/2	9/32	1.580
2	3/8	1.660
2 1/2	3/8	1.660
3	7/16	1.735
3 1/2	1/2	2.230
4	1/2	2.230

†: Hollow rod not available

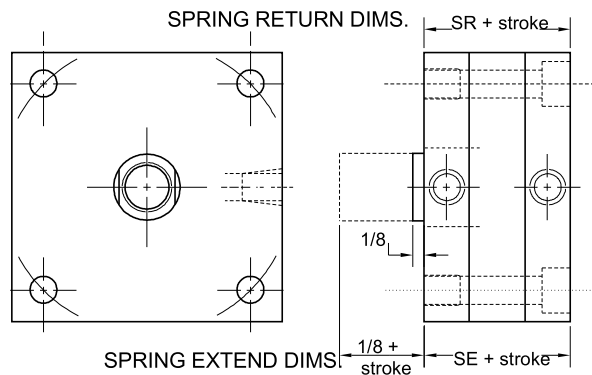


### SLSR SPRING RETURN

### SLSE SPRING EXTEND

MUST BE USED WITH MOUNTING OPTION. (SIDE TAPPED, ETC..)

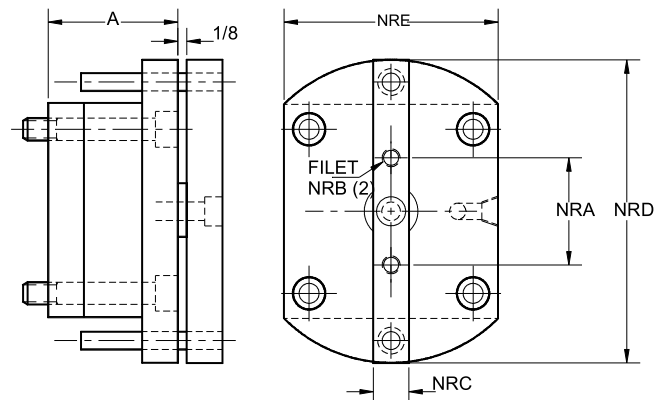
1/8" to 1" Stroke	
Bore dia.	SE or SR
9/16	1.13
3/4	1.13
1 1/16	1.47
1 1/2	1.47
2	1.57
2 1/2	1.57
3	1.68
3 1/2	1.98
4	1.98



1 1/8" to 2" Stroke	
Bore dia.	SE or SR
9/16	1.38
3/4	1.38
1 1/16	1.72
1 1/2	1.72
2	1.82
2 1/2	1.82
3	1.93
3 1/2	2.23
4	2.23

### SLNR NON-ROTATING

BORE DIA.	L	NRA	NRB	NRC	NRD	NRE
1 1/2	1.220	1 1/2	1/4 - 20	1/2	2 7/8	2
2	1.320	1 7/8	1/4 - 20	5/8	3 1/2	2 1/2
2 1/2	1.320	1 7/8	1/4 - 20	5/8	4 1/4	3
3	1.430	2	5/16 - 18	3/4	5	3 1/2
3 1/2	1.730	2	5/16 - 18	3/4	5 5/8	4
4	1.730	2	5/16 - 18	3/4	6 3/8	4 1/2

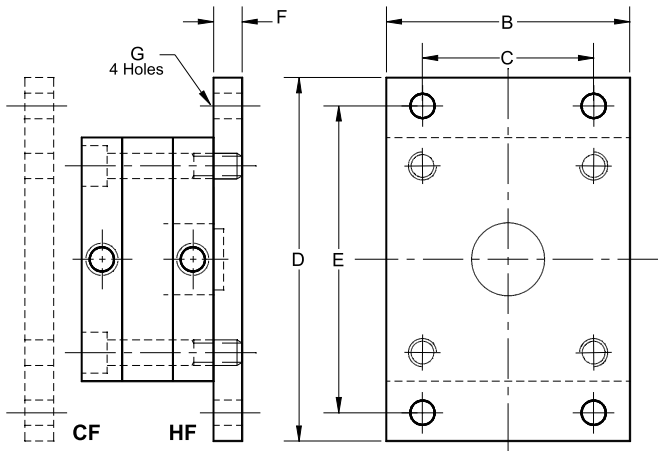


\* CAN BE USED WITH MULTI-STAGES AND OTHER MOUNTING OPTIONS.

# STAR 1

## CYLINDERS MOUNTING

### CF CM CAP & HEAD RECTANGULAR FLANGE

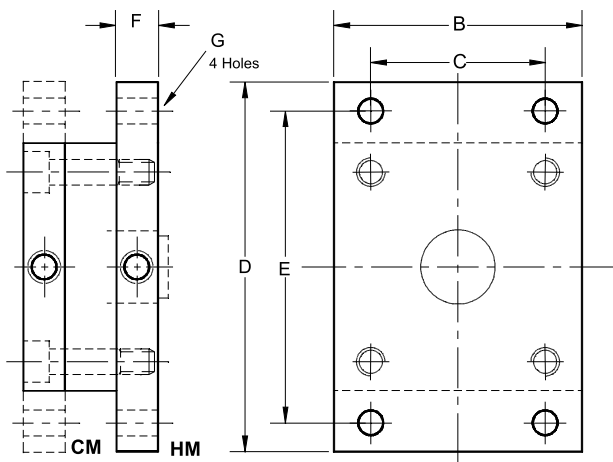


Bore Dia.	B	C	D	E	F	G
9/16	1	0.619	1 3/4	1 3/8	1/4	1/8
3/4	1 1/4	0.862	2	1 5/8	1/4	5/32
1 1/16	1 1/2	1.193	2 1/4	1 7/8	3/8	5/32
1 1/2	2	1.547	2 7/8	2 7/16	3/8	13/64
2	2 1/2	1.900	3 3/4	3 1/8	3/8	13/64
2 1/2	3	2.298	4 1/2	3 3/4	3/8	9/32
3	3 1/2	2.674	5	4 1/4	5/8	9/32
3 1/2	4	3.250	6	5	5/8	11/32
4	4 1/2	3.491	6 1/2	5 1/2	5/8	11/32

CF: Cap flange

HF: Head flange

### CM HM RECTANGULAR CAP & HEAD MOUNTING

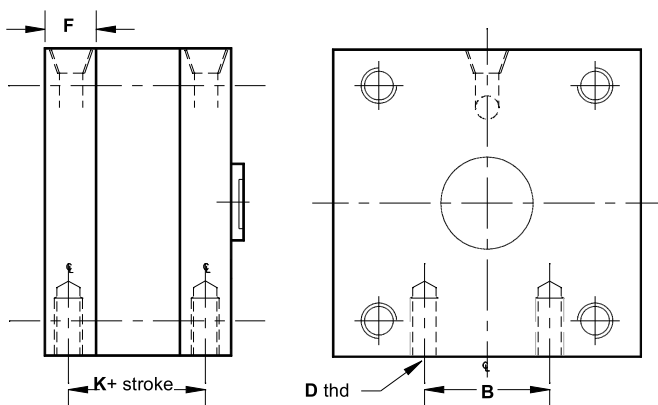


Bore Dia.	B	C	D	E	F	G
9/16	1	0.619	1 3/4	1 3/8	0.340	1/8
3/4	1 1/4	0.862	2	1 5/8	0.340	5/32
1 1/16	1 1/2	1.193	2 1/4	1 7/8	0.500	5/32
1 1/2	2	1.547	2 7/8	2 7/16	0.500	13/64
2	2 1/2	1.900	3 3/4	3 1/8	0.540	13/64
2 1/2	3	2.298	4 1/2	3 3/4	0.540	9/32
3	3 1/2	2.674	5	4 1/4	0.565	9/32
3 1/2	4	3.250	6	5	0.690	11/32
4	4 1/2	3.491	6 1/2	5 1/2	0.690	11/32

CM: Cap rectangular mounting

HM: Head rectangular mounting

### ST SIDE TAPPED



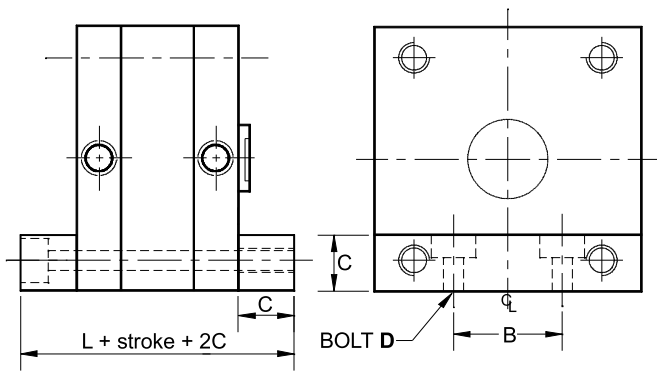
Bore Dia.	B	D	F	K
9/16	†	4-40	0.340	0.540
3/4	†	6-32	0.340	0.540
1 1/16	.800	6-32	0.500	0.720
1 1/2	1 1/8	10-24	0.500	0.720
2	1 3/8	10-24	0.540	0.780
2 1/2	1 5/8	1/4 - 20	0.540	0.780
3	2	1/4 - 20	0.565	0.865
3 1/2	2 3/8	5/16 - 18	0.690	1.040
4	2 5/8	5/16 - 18	0.690	1.040

† : 1 central bolt for 9/16 and 3/4 dia.

# STAR 1

## CYLINDERS MOUNTING

### SB SIDE BLOCK

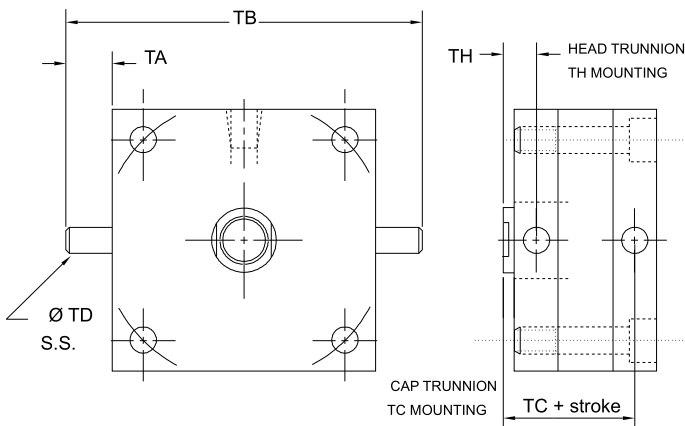


Bore Dia.	B	C	D	L
9/16	†	5/16	4-40	0.880
3/4	†	5/16	6-32	0.880
1 1/16	.675	5/16	6-32	1.220
1 1/2	7/8	1/2	10-24	1.220
2	1 1/4	5/8	10-24	1.320
2 1/2	1 3/8	5/8	¼ - 20	1.320
3	1 3/4	3/4	¼ - 20	1.430
3 1/2	2 3/8	1	5/16 - 18	1.730
4	2 5/8	1	5/16 - 18	1.730

† : 1 central bolt for 9/16 and 3/4 dia.

### TC or HC CAP OR HEAD TRUNNION

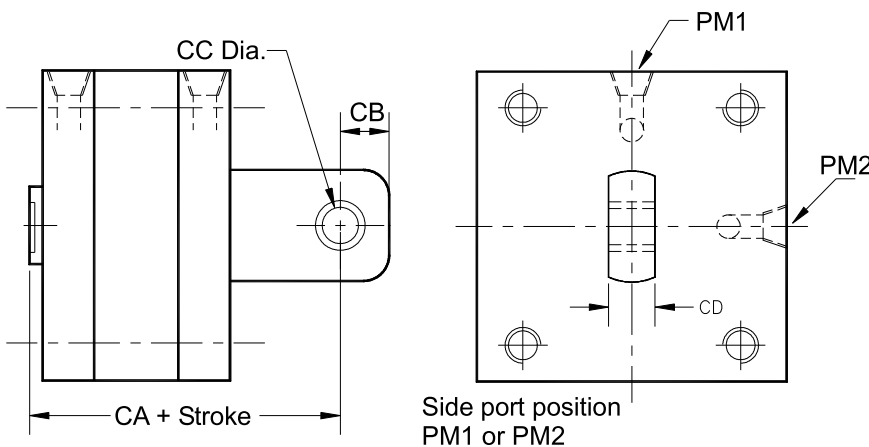
NOT AVAILABLE WITH MULTI-STAGE AS STANDARD



Bore dia.	TA	TB	TC	TD	TH
9/16 & 3/4	Not Available				
1 1/16	1/2	2 1/2	1.095	0.250	0.375
1 1/2	1/2	3	1.095	0.250	0.375
2	1/2	3 1/2	1.175	0.250	0.395
2 1/2	5/8	4 1/4	1.175	0.312	0.395
3	5/8	4 3/4	1.273	0.312	0.408
3 1/2	3/4	5 1/2	1.510	0.375	0.470
4	3/4	6	1.510	0.375	0.470

### PM1 or PM2 PIVOT MOUNT

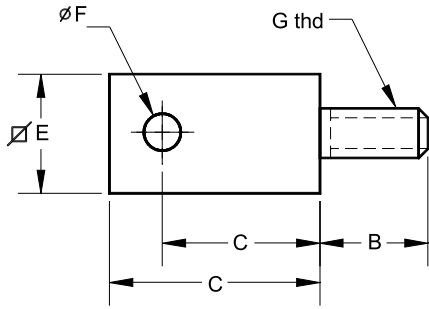
Available with multi-stage cylinders.



Bore dia.	CA	CB	CC	CD
9/16	1.505	1/4	3/16	3/8
3/4	1.505	1/4	3/16	3/8
1 1/16	1.845	1/4	3/16	3/8
1 1/2	2.155	7/16	3/8	3/4
2	2.312	7/16	3/8	3/4
2 1/2	2.312	7/16	3/8	3/4
3	2.830	9/16	5/8	1
3 1/2	3.135	9/16	5/8	1
4	3.135	9/16	5/8	1

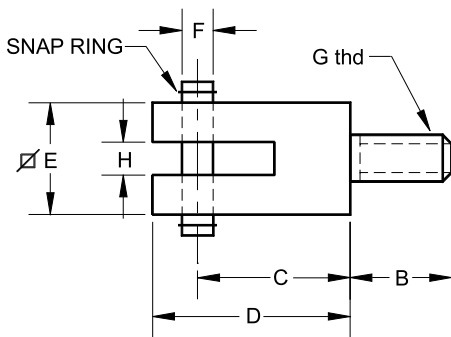
# STAR 1 CYLINDERS ACCESSORIES

## RP ROD PIVOT



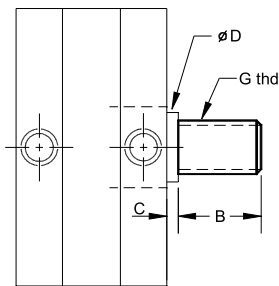
CODE	Bore dia.	B	C	D	E	F	G
RP-01	9/16	3/8	15/32	21/32	3/8	3/16	8 - 32
RP-02	3/4	3/8	15/32	21/32	3/8	3/16	10 - 32
RP-03	1 1/16	9/16	15/32	21/32	3/8	3/16	5/16-24
RP-04	1 1/2	5/8	23/32	1 1/8	3/4	3/8	3/8 - 24
RP-05	2	11/16	23/32	1 1/8	3/4	3/8	1/2 - 20
RP-06	3	3/4	1	1 1/2	1	1/2	5/8 - 18
RP-07	3 1/2	3/4	1	1 1/2	1	1/2	3/4 - 16
RP-07	4	3/4	1	1 1/2	1	1/2	3/4 - 16

## RC ROD CLEVIS



CODE	Bore dia.	B	C	D	E	F	G	H
RC-01	9/16	3/8	3/4	1	1/2	3/16	8 - 32	0.190
RC-02	3/4	3/8	3/4	1	1/2	3/16	10 - 32	0.190
RC-03	1 1/16	9/16	7/8	1 5/32	3/4	3/16	5/16-24	0.250
RC-04	1 1/2	5/8	1 1/4	1 5/8	1	3/8	3/8 - 24	0.320
RC-05	2	11/16	1 1/4	1 5/8	1	3/8	1/2 - 20	0.320
RC-06	2 1/2	11/16	1 1/4	1 5/8	1	3/8	1/2 - 20	0.320
RC-06	3	3/4	1 1/4	1 5/8	1	1/2	5/8 - 18	0.320
RC-07	3 1/2	3/4	1 5/8	2 1/8	1	1/2	3/4 - 16	0.500
RC-07	4	3/4	1 5/8	2 1/8	1	1/2	3/4 - 16	0.500

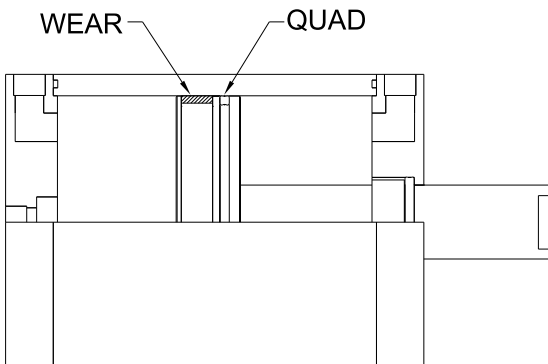
## MR MALE ROD END



CODE	Bore Dia.	B	C	D	G
MR-01	9/16	3/8	1/8	1/4	8 - 32
MR-02	3/4	3/8	1/8	5/16	10 - 32
MR-03	1 1/16	9/16	1/8	1/2	5/16-24
MR-04	1 1/2	5/8	1/8	5/8	3/8 - 24
MR-05	2	11/16	1/8	3/4	1/2 - 20
MR-05	2 1/2	11/16	1/8	3/4	1/2 - 20
MR-06	3	3/4	1/8	7/8	5/8 - 18
MR-07	3 1/2	3/4	1/8	1	3/4 - 16
MR-07	4	3/4	1/8	1	3/4 - 16

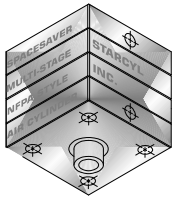
## W WEAR RING

( to avoid metal to metal contact)



Bore Dia.	Length addrs
9/16	N/a
3/4	N/a
1 1/16	0.360
1 1/2	0.360
2	0.340
2 1/2	0.340
3	0.305
3 1/2	0.500
4	0.500





# STARCYL

## AIR CYLINDERS

### HOW TO ORDER...

TYPE	
SL	DOUBLE ACTING, SINGLE END ROD
SLSR	SINGLE ACTION, SPRING RETURN
SLSE	SINGLE ACTION, SPRING EXTEND
SLDB	DOUBLE END ROD
SLNR	NON ROTATING
SLAS-x	ADDITIONAL STAGE KIT

BORE SIZE	
0560	9/16
1060	1 1/16
1500	1 1/2
2000	2
2500	2 1/2
3000	3
3500	3 1/2
4000	4

STROKE LENGTH	
02	1/8
06	3/8
08	1/2
12	3/4
16	1
32	2
...	Etc

SL - 4000 - 16 - S3 - CF - RP

STAGES	
NO CODE	1 STAGE
S2	2 STAGES
S3	3 STAGES
S4	4 STAGES
S5	5 STAGES
S6	6 STAGES
S7	Etc.

MOUNTING OPTIONS	
NO CODE	BASIC MODEL
CF	CAP FLANGE
HF	HEAD FLANGE
CM	CAP RECT. MOUNTING
HM	HEAD RECT. MOUNTING
ST	SIDE TAPPED
SB	SIDE BLOCK
TC	CAP TRUNNION
TH	HEAD TRUNNION
PMx	PIVOT MOUNT

OPTIONS	
NO CODE	BASIC MODEL
RPxx	ROD PIVOT
RCxx	ROD CLEVIS
MRxx	MALE ROD END
TBxx	TRUNNION BRACKET
CBxx	CLEVIS BRACKET
R	MULTI-STAGE RETRACT
B	BUMPER
RE	ROD EXTENSION 1/2"
W	WEAR RING †

† : Protect your cylinder against side load in adding a piston wear ring.

Number **SL-4000-16-S3-CF-RP** is a double acting cylinder, 4" bore, 1" stroke, 3 stages, cap flange with rod pivot.

For ordering additional stages, add the code of your cylinder after the kit code (SLAS-x). Ex. **SLAS-2-4000-16-S2**: is 2 additional stage kits for your cylinder 4" bore, 1" stroke, 2 stages. After assembly you will have a cylinder with 4 stages.

FOR SPECIAL ORDER, ADD PREFIX **SP** TO CYLINDER CODE. EX. **SP-SL-4000-03-S2**.

#### TWO-YEAR WARRANTY

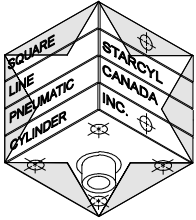
ALL STARCYL CYLINDERS ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIAL OR MANUFACTURE FOR TWO YEARS FROM DATE OF SHIPMENT. THIS WARRANTY DOES NOT COVER PRODUCTS WHICH HAVE BEEN SUBJECT TO MISUSE, NEGLIGENCE, ACCIDENTS, MISAPPLICATION OR TAMPERING IN A WAY SO AS TO AFFECT THEIR NORMAL PERFORMANCE.

YOUR STARCYL DISTRIBUTOR:

**STARCYL**  
USA 1-877-STARCYL

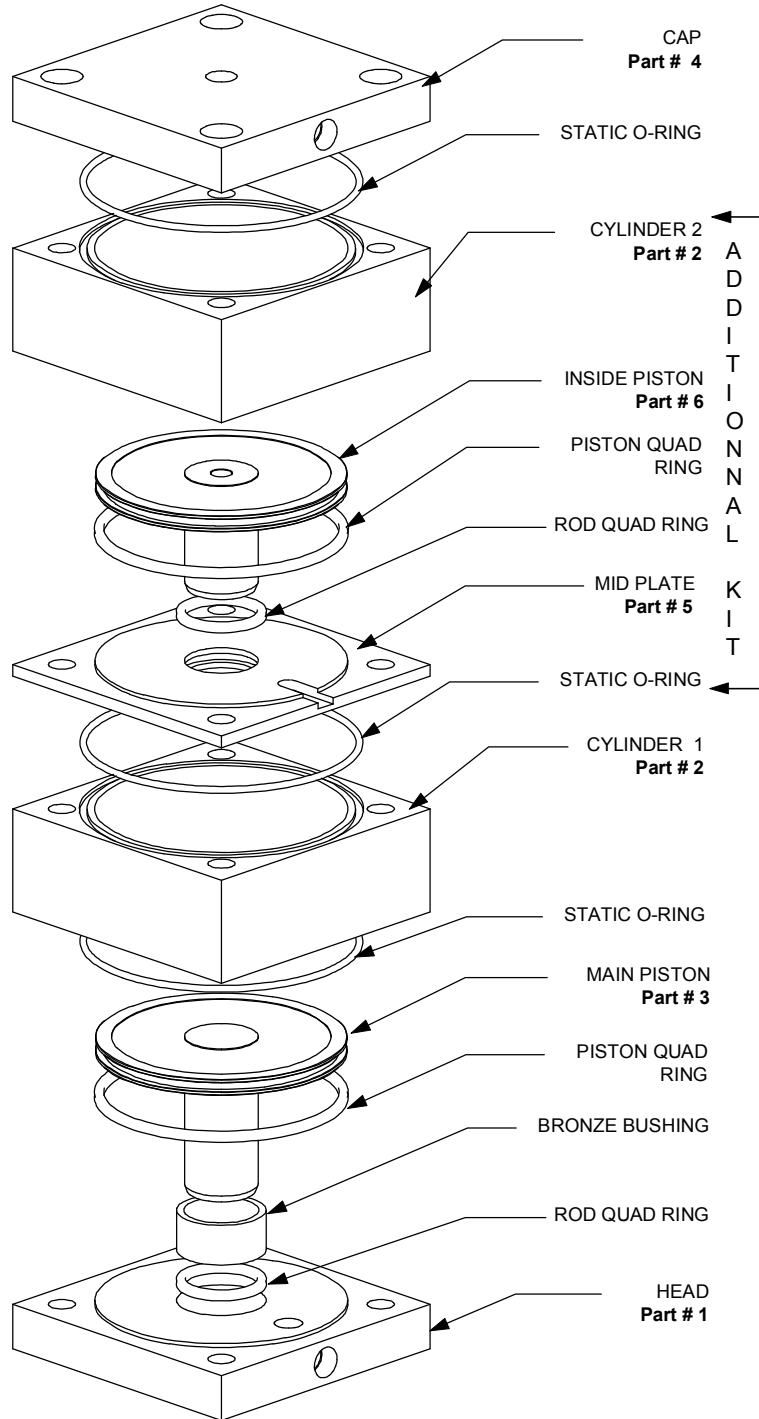
**WWW.STARCYL.COM**

TEL: 1-450-661-1212  
FAX: 1-450-661-0094



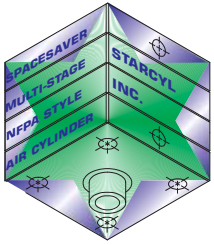
# STARCYL AIR CYLINDERS

ADDITIONAL KIT... EXPLODED VIEW OF A 2 STAGES CYLINDER



ADDITIONAL KIT  
KIT, CYLINDER, MID  
THEY ARE ALL ASSEMBLY AND READY TO ADD IN THE EXISTING CYLINDER.

INCLUDE: BOLTS, SEAL  
PLATE, INSIDE PISTON.



# STARCYL

## AIR CYLINDERS

### SPACE-SAVER



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

- ✓ Bore size from 1½" to 10"
- ✓ Stroke up to 40"
- ✓ Save Space up to 35% based on 4" Bore, 1" Stroke
- ✓ 250 PSI AIR, OIL
- ✓ Two-Year Warranty
- ✓ Economic design

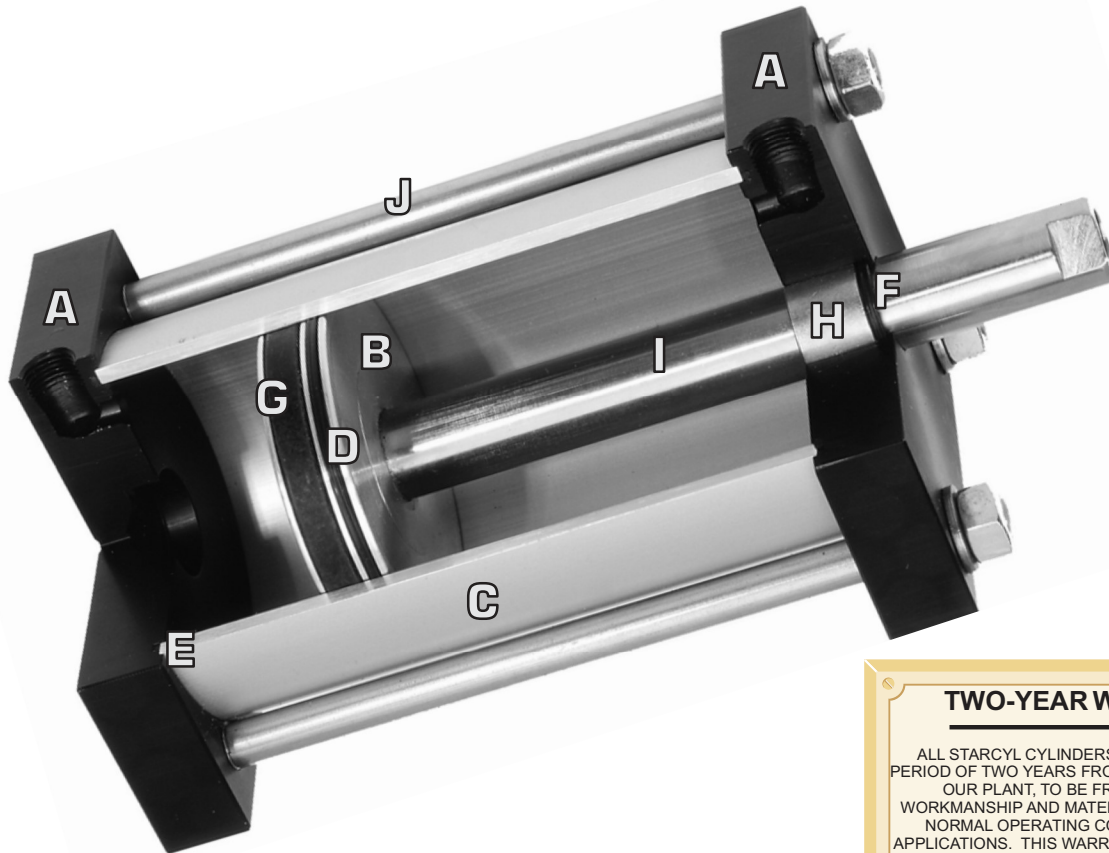
## STAR2 SERIES

### NFPA STYLE MOUNT

# STAR2 SPACESAVER DESIGN FEATURES

- A Solid Aluminum Head & Cap**  
Machined from solid aluminum bar stock (6061 T6) and black anodized for corrosion resistance. (Also available in Stainless Steel).
- B Piston**  
Machined from solid aluminum bar stock (6061-T6) thicker than the standard pancake.
- C Hard Anodized ID Aluminum Tube**  
(60 Rc) Provides superior wear resistance, and lower friction coefficient for maximum seal life. (Also available in Stainless Steel.)
- D Piston Seal**  
Nitrile Quad X seal provides better sealing with air and oil. (temperature: -5 to 104°C or 10 to 219°F). (U cup also Available)
- E O-ring Tube End Seals**  
Nitrile O-ring design is pressure compensating and reusable.

- F Rod Seal**  
Quad X gives the best seal and wipes dirt out for less maintenance and longer life of the cylinder.
- G Piston Wear Ring**  
Nylon material is designed for low friction, and to ensure maximum wear in the cylinder in side load application. Eliminates metal-to-metal contact.
- H Rod Bearing**  
Oil impregnated sintered bronze minimizes operating friction in non-lube applications and provides maximum support of the piston rod.
- I Piston Rod**  
High strength steel. NITROCARBURIZING for highly corrosion-resistant coating, reliable performance and long life rod seal. Less friction. (Also available in Stainless steel).
- J Tie rods**  
Corrosion resistant, stress proof steel maintains uniform compression on tube end seals. (Stainless may be used)



**STARCYL CYLINDER INC.**

PH : 1-877-STARCYL (782-7295)  
FAX (630) 282-7142

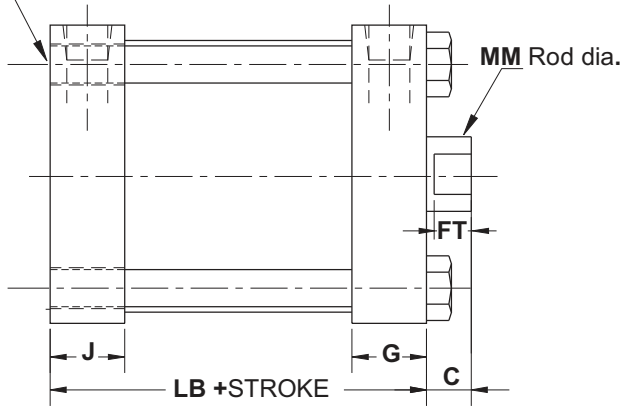
## TWO-YEAR WARRANTY

ALL STARCYL CYLINDERS ARE WARRANTED FOR A PERIOD OF TWO YEARS FROM DATE OF SHIPMENT FROM OUR PLANT, TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL UNDER CORRECT USE, NORMAL OPERATING CONDITIONS AND PROPER APPLICATIONS. THIS WARRANTY DOES NOT EXTEND TO GOODS DAMAGED, SUBJECTED TO ACCIDENT, ABUSE OR MISUSE AFTER SHIPMENT FROM OUR FACTORY, NOR TO GOODS ALTERED OR REPAIRED BY ANYONE OTHER THAN AUTHORIZED STARCYL REPRESENTATIVES.

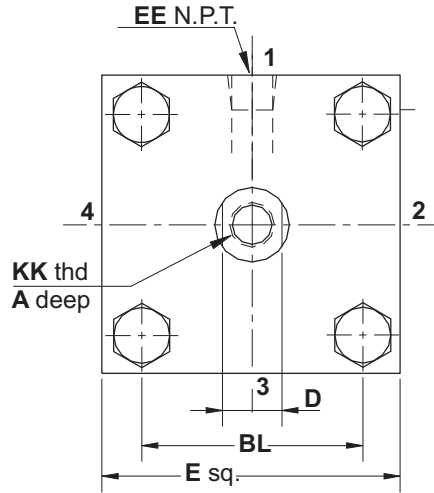
# STAR2 SPACESAVER BASIC CYLINDER

## ST2 BASIC MOUNT

DD tap x DP deep

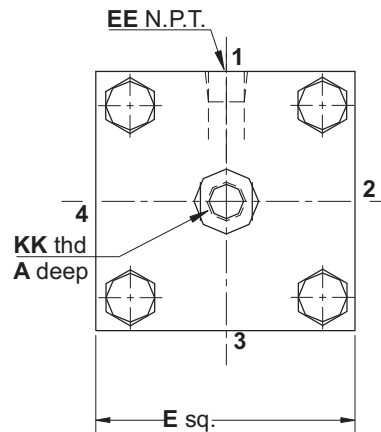
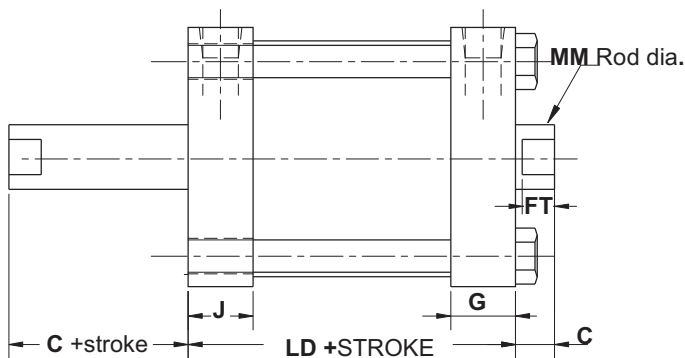


Basic cylinder has nuts at head end.  
Option NC for nuts at cap end.



BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
A	3/4	3/4	3/4	3/4	1 1/8	1 1/8	1 1/8
BL	1.19	1.43	1.84	2.19	2.78	3.32	4.12
C	3/8	3/8	3/8	3/8	1/2	1/2	1/2
D	3/8	1/2	1/2	1/2	7/8	7/8	7/8
DD	10-32	1/4-20	5/16-18	5/16-18	3/8-24	3/8-24	1/2-20
DP	5/16	5/16	5/16	5/16	7/16	7/16	7/16
E	1 1/2	2	2 1/2	3	3 3/4	4 1/2	5 1/2
EE	1/8	1/8	1/8	1/8	1/4	1/4	1/4
FT	1/4	5/16	5/16	5/16	7/16	7/16	7/16
G	5/8	5/8	5/8	5/8	31/32	31/32	31/32
J	5/8	5/8	5/8	5/8	31/32	31/32	31/32
KK	3/8-24	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16	3/4-16
LB	1 3/4	1 3/4	1 3/4	1 3/4	2 11/16	2 11/16	2 11/16
LD	1 3/4	1 3/4	1 3/4	1 3/4	2 11/16	2 11/16	2 11/16
MM	1/2	5/8	5/8	5/8	1	1	1

## ST2D Double rod end



# MOUNTING OPTIONS

NT Tap  
TK Deep (4 holes)

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
NT	#10-24	1/4-20	5/16-18	3/8-16	1/2-13	1/2-13	5/8-11
SN	1 7/8	1 7/8	1 7/8	1 7/8	1 23/32	1 23/32	1 23/32
TK	1/4	3/8	1/2	5/8	3/4	3/4	1
TN	1/2	5/8	7/8	1 1/4	1 1/2	2 1/16	2 11/16
XT	11/16	11/16	11/16	11/16	51/64	51/64	51/64

**ST2S4** Bottom tap mount

F2 CAP  
F1 Head  
J  
G  
LB + STROKE  
C  
R  
TF  
UF  
FB HOLES (4)

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
C	3/8	3/8	3/8	3/8	1/2	1/2	1/2
FB	5/16	5/16	3/8	3/8	7/16	7/16	9/16
G	5/8	5/8	5/8	5/8	31/32	31/32	31/32
J	5/8	5/8	5/8	5/8	31/32	31/32	31/32
LB	1 3/4	1 3/4	1 3/4	1 3/4	2 11/16	2 11/16	2 11/16
R	1.19	1.43	1.84	2.19	2.76	3.32	4.10
TF	2 3/8	2 3/4	3 3/8	3 7/8	4 11/16	5 7/16	6 5/8
UF	3	3 3/8	4 1/8	4 5/8	5 1/2	6 1/4	7 5/8

**ST2F1:** RECTANGULAR HEAD  
**ST2F2:** RECTANGULAR CAP

**ST2F1 & ST2F2** Rectangular mounts

CD dia  
CW  
CB  
M  
L Clearance radius  
XC

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
CB	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
CD	1/2	1/2	1/2	1/2	3/4	3/4	3/4
CW	3/8	3/8	1/2	1/2	3/4	3/4	3/4
L	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
M	5/8	5/8	5/8	5/8	7/8	7/8	7/8
XC	2 7/8	2 7/8	2 7/8	2 7/8	4 7/16	4 7/16	4 7/16

**ST2P1** Detachable short clevis mount

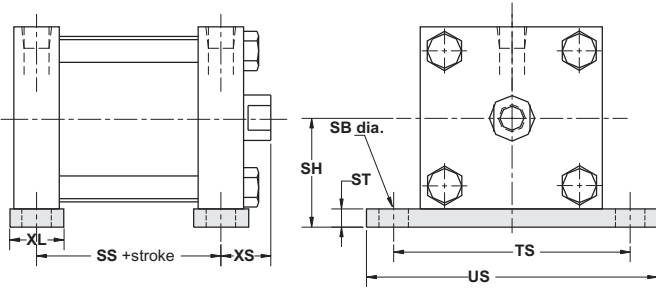
DD  
CAP  
HEAD  
BL  
BB  
ZB + course  
LB + course  
BB

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
BB	7/8	7/8	1	1	1 1/4	1 1/4	1 1/2
BL	1.19	1.43	1.43	1.84	2.19	2.78	3.32
DD	#10-32	1/4-28	5/16-24	5/16-24	3/8-24	3/8-24	1/2-20
LB	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	2 11/16	2 11/16
ZB	2 1/8	2 1/8	2 1/8	2 1/8	3	3	3

**ST2X1:** Both tie rods extended  
**ST2X2:** Cap end tie rods extended  
**ST2X3:** Head end tie rods extended

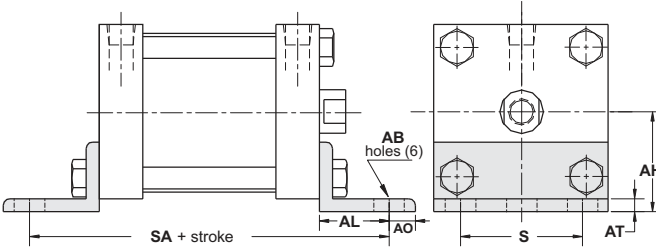
**ST2X** Tie rods extended mounts

# MOUNTING OPTIONS



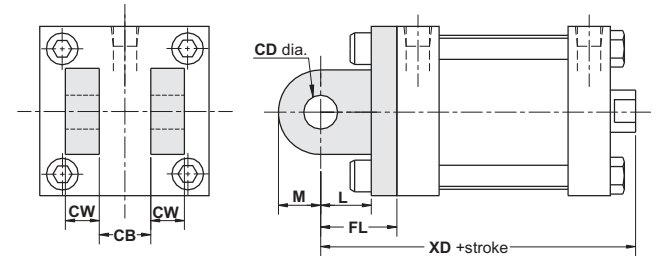
BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
SB	5/16	5/16	5/16	3/8	1/2	1/2	1/2
SH	1 1/16	1 1/4	1 1/2	1 13/16	2 3/8	2 3/4	3 1/4
SS	1 1/8	1 1/8	1 1/8	1 1/8	1 23/32	1 23/32	1 23/32
ST	1/4	1/4	1/4	1/4	1/2	1/2	1/2
TS	2 3/8	2 3/4	3 1/4	3 3/4	4 3/4	5 1/2	6 1/2
US	3 1/8	3 1/2	4	4 1/2	5 3/4	6 1/2	7 1/2
XL	3/4	3/4	3/4	3/4	1	1	1
XS	11/16	11/16	11/16	11/16	51/64	51/64	51/64

**ST2S2** Side lug mount



BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
AB	7/16	7/16	7/16	7/16	9/16	9/16	11/16
AH	1	1 3/16	1 7/16	1 5/8	1 15/16	2 1/4	2 3/4
AL	1	1	1	1	1 1/4	1 1/4	1 3/8
AO	1/2	1/2	1/2	1/2	1/2	1/2	5/8
AT	1/8	1/8	1/8	1/8	3/16	3/16	3/16
S	1 15/79	1 1/4	1 3/4	2 1/4	2 3/4	3 1/2	4 1/4
SA	3 3/4	3 3/4	3 3/4	3 3/4	5 3/16	5 3/16	5 7/16

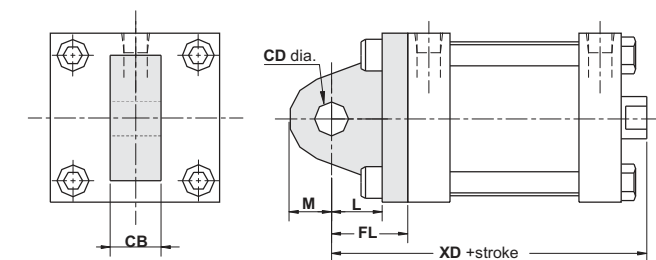
**ST2S1** Angle mount



(SUPPLIED WITH PIN & SNAP RING)

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
CB	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
CD	1/2	1/2	1/2	1/2	3/4	3/4	3/4
CW	3/8	3/8	1/2	1/2	3/4	3/4	3/4
FL	1 1/8	1 1/8	1 1/8	1 1/8	1 7/8	1 7/8	1 7/8
L	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
M	5/8	5/8	5/8	5/8	7/8	7/8	7/8
XD	3 1/4	3 1/4	3 1/4	3 1/4	5 1/16	5 1/16	5 1/16

**ST2P2** Detachable clevis mount



(SUPPLIED WITH PIN & SNAP RING)

BORE	1 1/8	1 1/2	2	2 1/2	3 1/4	4	5
CB	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
CD	1/2	1/2	1/2	1/2	3/4	3/4	3/4
FL	1 1/8	1 1/8	1 1/8	1 1/8	1 7/8	1 7/8	1 7/8
L	3/4	3/4	3/4	3/4	1 1/4	1 1/4	1 1/4
M	5/8	5/8	5/8	5/8	7/8	7/8	7/8
XD	3 1/4	3 1/4	3 1/4	3 1/4	5 1/16	5 1/16	5 1/16

**ST2P4** Detachable eye mount

# MOUNTING OPTIONS & NFPA ACCESSORIES

**STARCYL Standard Style 4 female thread**

**Option Style 2S (studded)**

**Option Style 2**

**Option Style 1 Large thread**

**Option Style 1F Full dia. thread**

ROD DIA.	A	C	D	CC	FF	KK
1/2	5/8	3/8	3/8	7/16-20	1/2-20	3/8-24
5/8	3/4	3/8	1/2	1/2-20	5/8-18	7/16-20
1	1 1/8	1/2	7/8	7/8-14	1-14	3/4-16

Labels in diagrams: MM rod, KK thread, A, C, CC thread STD FOR 1/2" ROD DIA., FF thread.

**Rod End Style**

PART #	CB	CD	CE	CH	CW	ER	KK	L
RC-05	0.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4

OTHER SIZE ARE AVAILABLE, ASK YOUR DISTRIBUTOR OR FACTORY.  
(RC-10 KK=1-14, RC-13 KK=1 1/4-12, RC-17 KK=1 1/2-12, ETC)

**NFPA rod clevis**

PART #	A	CA	CB	CD	ER	KK
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16

OTHER SIZE ARE AVAILABLE, ASK YOUR DISTRIBUTOR OR FACTORY.  
(RE-10 KK=1-14, RE-13 KK=1 1/4-12, RE-17 KK=1 1/2-12, ETC)

**NFPA rod eye**

PART #	CB	CD	CW	DD	E	FL	L	M	RE	USES ON BORE
CB-05	0.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	1 1/2 - 2 - 2 1/2"
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3/4 - 4 - 5"

**NFPA Clevis Bracket**

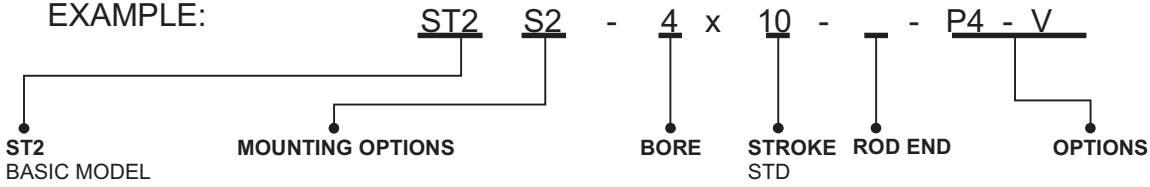
PART #	CB	CD	DD	E	FL	L	M	RE	USES ON BORE
CB-05	0.765	1/2	1/2	2 1/2	1 1/8	3/4	1/2	1 5/8	1 1/2 - 2 - 2 1/2"
CB-07	1.265	3/4	5/8	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3/4 - 4 - 5"

**NFPA Eye Bracket**



# HOW TO ORDER

EXAMPLE:



**ST2D**  
DOUBLE ROD

- F1 RECTANG. HEAD MOUNT
- F2 RECTANG. CAP MOUNT
- P1 CLEVIS MOUNT
- P2 DETACHABLE CLEVIS MOUNT
- P4 EYE MOUNT
- S1 ANGLE MOUNT
- S2 SIDE LUG MOUNT
- S4 BOTTOM TAP MOUNT
- X1 BOTH TIE RODS EXTENDED
- X2 CAP END TIE RODS EXTENDED
- X3 HEAD END TIE RODS EXTENDED

- 1 1/2
- 2
- 2 1/2
- 3 1/4
- 4
- 5
- 10
- 11
- 12
- ask for other strokes

- #1 MALE, large
- #1F MALE, full dia.
- #2 MALE, small
- #2S MALE, studded
- #4 FEMALE, STD

- NC NUTS AT CAP END
- PPx PORT POSITION (1,2,3,4)
- REx ROD EXTENSION
- UC U CUP SEALS
- V SEALS MADE OF Viton™
- W WIPER
- M MAGNETIC PISTON
- B BUMPER BOTH ENDS
- BH BUMPER HEAD END
- BC BUMPER CAP END
- NR NON-ROTATING (for Dick & place appl.)
- BB BACK TO BACK
- MP MULTI-POSITIONS
- MS MULTI-STAGES
- AS ADJUSTABLE STROKE

EXAMPLE ST2S2-4x10-PP4-V is a STAR2 series cylinder, 4" bore, 10" stroke, side lug mount, female rod thread, port position 4 with viton seals.

To order seal kits, add the prefix **ST2SK** to the bore diameter ex: **ST2SK-4**

## Switch specifications

Switch part Number	LRS-004	LHS-31	LHS-32
Spec.	Reed Switch, MOV, LED	Electronic Sensor, LED, Sourcing	Electronic Sensor, LED, Sinking
Cable length	9ft PVC Cable		
Switching Voltage	5-120 VDC/VAC 50/60 Hz	6-24 VDC	6-24 VDC
Switching Current	0.5 Amp Max 0.005 Amp Min.	0.5 Amp Max.	0.5 Amp Max.
Switching power	10 Watts Max.	12 watts Max.	12 watts Max.
Switching Speed	0.5 mS operate 0.1 mS release	1.5µs operate 0.5µs release	1.5µs operate 0.5µs release
Voltage Drop	3.5 Volts	1.0 Volts	1.0 Volts
Temperature range	-20° to 80°C		-4° to 176°F
Switch Function	SPST Normally Open	Normally open PNP output	Normally open NPN output
Shock	up to 30G (11msec.)	-	-
Vibration	up to 20G (10-55 Hz)	-	-

## How To Order

Place Clamp code after switch Part Number.

**Example: LRS-004-A**

Reed switch for 1.5" Bore.

**Bracket code Suffix**

A = 1-1/8", 1 1/2", 2" & 2 1/2" bore

B = 3 1/4" & 4" bore

C = 5", 6" & 8" bore

NOTE : Add 1/4" to total length for 1-1/8 to 2 1/2" bore when using magnetic piston.

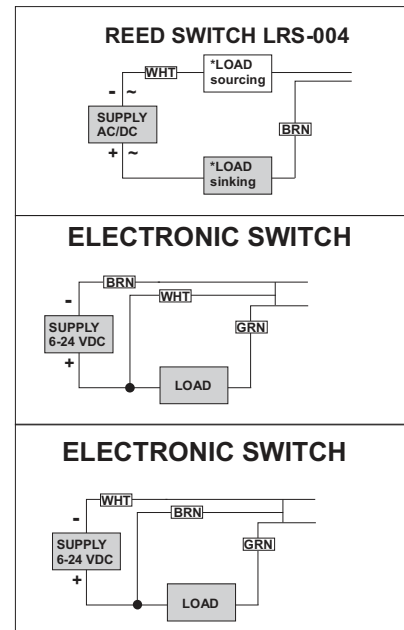
## SELECTING BORE SIZE

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

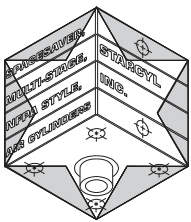
- Extended (push) force in pounds =  
(bore area in sq. in.) x (pressure in psi)

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

## Wiring Diagrams



BORE (IN.)	AREA (SQ. IN.)	ROD SIZE (IN.)	ROD AREA (SQ. IN.)
1.125	0.994	0.500	0.196
1.5	1.767	0.625	0.307
2	2.142	0.625	0.307
2.5	4.909	0.625	0.307
3.25	8.296	1.000	0.785
4	12.566	1.000	0.785
5	19.635	1.000	0.785



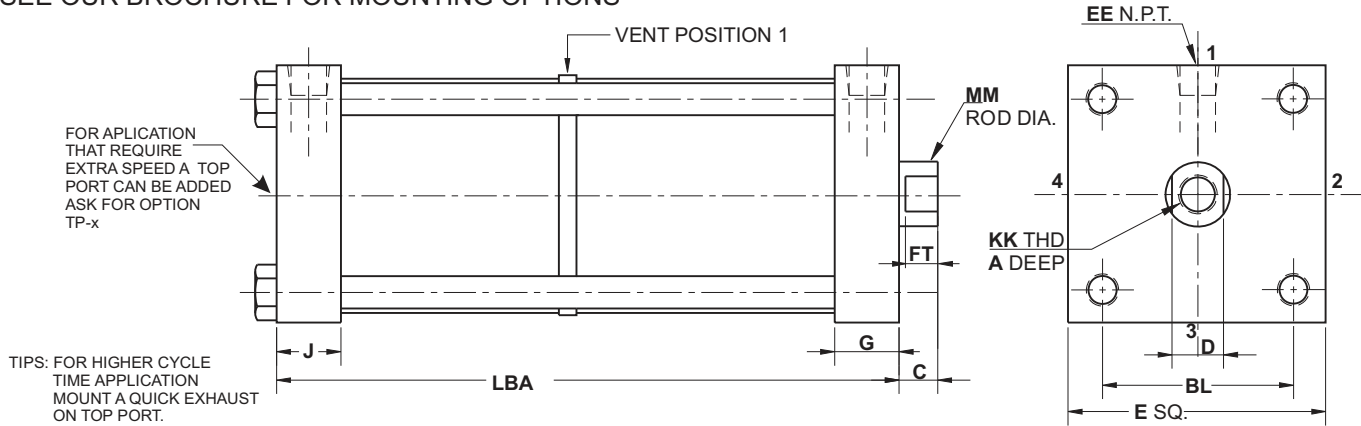
# STARCYL

THE ONLY  
UPGRADABLE

## MS: MULTI-STAGES AIR CYLINDER

### STAR2 SERIES NFPA STYLE MOUNT

SEE OUR BROCHURE FOR MOUNTING OPTIONS



BORE	1.5	2	2.5	3.25	4	5	6	8
A	3/4	3/4	3/4	1 1/8	1 1/8	1 1/8	1 5/8	1 5/8
BL	1.43	1.84	2.19	2.78	3.32	4.12	4.88	6.44
C	3/8	3/8	3/8	1/2	1/2	1/2	5/8	5/8
D	1/2	1/2	1/2	7/8	7/8	7/8	1 3/16	1 3/16
E	2	2.5	3	3.75	4.5	5.5	6.5	8.5
EE	1/8	1/8	1/8	1/4	1/4	1/4	3/8	3/8
FT	5/16	5/16	5/16	7/16	7/16	7/16	1/2	1/2
G	5/8	5/8	5/8	31/32	31/32	31/32	1 7/16	1 7/16
J	5/8	5/8	5/8	31/32	31/32	31/32	31/32	1 7/16
KK	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16	3/4-16	1-14	1-14
LBA	DIMENSION LBA EQUALS NUMBER OF STAGES TIMES STROKE PLUS YY							
MM	5/8	5/8	5/8	1	1	1	1 3/8	1 3/8

THE YY VALUE IS FOR STANDARD MULTI-STAGES EXTEND (MSE<sub>x</sub>) OR RETRACT (MSR<sub>x</sub>) MODELS. OPTIONAL MULTI-STAGES RETRACT-EXTEND (MSE<sub>x</sub>R<sub>x</sub>) REQUIRE ADDITIONAL LENGTH.

FORCES ARE GIVEN IN POUNDS AT 100 PSI

BORE	YY	YY	YY	PUSH FORCE	PUSH FORCE	PUSH FORCE	PUSH FORCE
	2 STAGES	3 STAGES	4 STAGES	2 STAGES	3 STAGES	4 STAGES	ADDER FOR ADD. STAGES
1 1/2	2 1/4	2 3/4	3 1/4	321	480	639	159
2	2 1/4	2 3/4	3 1/4	595	892	1188	296
2 1/2	2 1/4	2 3/4	3 1/4	949	1422	1895	473
3 1/4	3 3/8	4 1/16	4 3/4	1557	2331	3106	775
4	3 3/8	4 1/16	4 3/4	2411	3612	4814	1202
5	3 3/8	4 1/16	4 3/4	3825	5733	7642	1908
6	4 17/32	5 21/32	6 25/32	5467	8195	10923	2728
8	5 1/4	6 5/8	8	9865	14792	19719	4927

WE DO MORE THAN 4 STAGES ASK THE FACTORY FOR DIMENSIONS, DESIGN MAY CHANGE

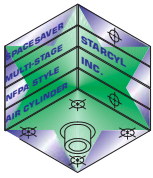
- STANDARD STROKES: 1/2 - 1 - 1 1/2 - 2 - 2 1/2 - 3 - 4 - 5 - 6 inches
- OPTIONAL STROKES ANY OTHER STROKE THROUGH 12 inches

OTHER OPTIONS ARE AVAILABLE :

- PORTED BAFFLE
- ONE SIZE LARGER PORT
- TOP PORT (for higher cycle times)
- ADJUSTABLE EXTEND OR RETRACT STROKE
- HYDRAULIC CENTER-BALANCE

Available Mounting: Rectangular Head and cap Flange (MF1 MF2)  
Tie rods Extended (MX1 MX2 MX3)  
Angle Mount (MS1), Clevis Mount (MP1, MP2, MP4)

ADD ON MS-0397 FOR CATALOG STAR2-0397



# STARCYL

## AIR CYLINDERS

### OTHER PRODUCTS:

**STARCYL AIR CYLINDERS**  
...To boldly go where no cylinder has gone before...

WWW.STARCYL.COM

**STAR3 SERIES**

- N.F.P.A. Interchangeable
- Flush mount std.
- 9 Bore sizes 1/4" through 1 1/2"
- Strokes - available to any practical length
- 18 standard Mounting Styles
- Check Seal Cushions
- 250 PSI AIR
- Two Year Warranty
- Economic design

**NFPA**  
Solutions through motion technology  
MEMBER

STAR3 SERIES - N.F.P.A. INTERCHANGEABLE CYLINDERS  
BORE SIZES 1/4" - 1 1/2"

**STARCYL SPACESAVER AIR CYLINDERS**

**SINGLE OR MULTI-STAGE**

**Not Enough Force  
Don't Change The Design  
Add A Stage !**

THE ONLY CYLINDER UPGRADABLE !

SL & RL LINE

MA-1095 UPGRADABLE SPACESAVER CYLINDERS

**STARCYL SPACESAVER AIR CYLINDERS**

**ROUND LINE**

- Buna N Quad ring rod and piston seal
- Hard anodized heavy wall aluminum alloy
- Heavy duty cap for hard conditions
- Rod bushing in oil-impregnated bronze
- All air cylinders are permanently lubricated
- Their design allows easy cleaning
- 250 psi, air or oil

RL-1095 ROUND LINE SPACESAVER CYLINDERS

**PRESS-TOOL AIR PRESSES**

**1/2 TO 8 TONS**

PNEUMATIC CYLINDER WITH MULTI-STAGES GIVES INCREDIBLE FORCE AND SPEED

AIR PILOTED CONTROL VALVE

HYDRAULIC CENTER-BALANCE OR SPEED CONTROL (OPTION)

FILTER REGULATOR LUBRICATOR (OPTION)

T-SLOTTED RAM FOR BETTER ATTACHMENT OF DIES

STANDARD T-SLOTTED PRESSURE PLATE

ONE PIECE FRAME IN HIGH STRENGTH CAST IRON

WIDE OPENING IN BED (3x3)

**ENTIRELY AIR OPERATED !  
NO ELECTRICS, NO MECHANICS  
NO HYDRAULICS.**

TP & SP SERIES - AIR PRESSES 1/2 TO 8 TONS

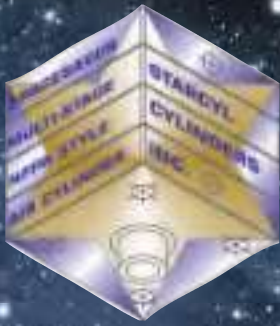
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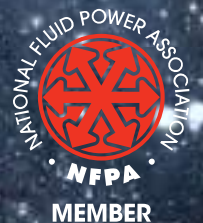
To boldly go where no cylinder has gone before ...



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

## STAR3 SERIES

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# STAR3 CYLINDERS

## Light But Made For Heavy Duty Air Cylinder !

### Piston Rod

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

### Tie rods

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

### Solid Aluminum Head & Cap

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

### The New STARNITE Cast Iron

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

### Hard Anodized ID Aluminum Tube

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

### Piston

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

### Cushion Spud

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

### Check seal Cushion and Needle valves

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

### O-ring Tube End Seals

Nitrile O-ring design is pressure compensating and reusable.

### Rod Gland

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

### Wiper

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

### Rod lips seal

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

### Piston Seal

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

### Piston Wear Ring

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

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

# STAR3 CYLINDERS

## STARNITE THE ANSWER TO WEAR, CORROSION AND FATIGUE PROBLEMS

The STARNITE process improves component properties.

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

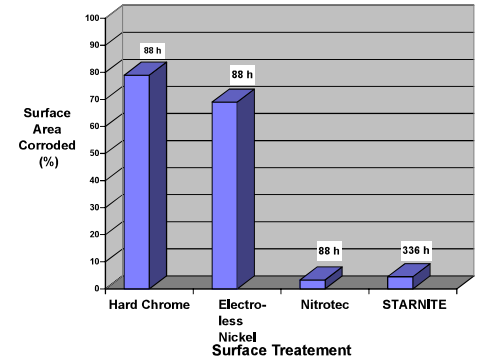
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitride layer consisting of a mono-phase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating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

## ENVIRONMENTALLY & ECONOMICALLY SAFE

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

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

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



## Chrome plated VS STARNITE

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



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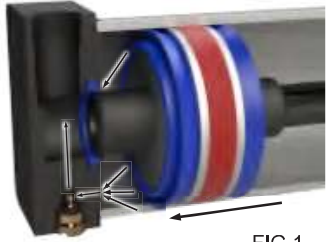


FIG 1

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

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

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

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

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



FIG 2

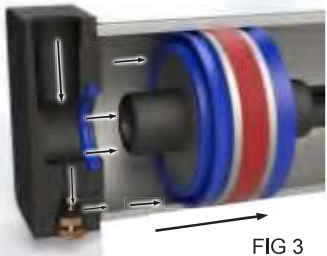


FIG 3

**Effect and Availability of Bumper Seal option**

Effect on Stroke based on Pressure	CYLINDERS BORE							
	1,5	2,0	2,5	3,25	4,0	5,0	6,0	8,0
0	0,14	0,15	0,17	0,19	0,22	0,25	0,25	0,25
20	0,10	0,10	0,12	0,14	0,16	0,18	0,18	0,18
40	0,07	0,07	0,08	0,09	0,10	0,12	0,12	0,12
60	0,04	0,04	0,05	0,05	0,06	0,07	0,07	0,07
80	0,02	0,02	0,02	0,02	0,03	0,03	0,03	0,03
100	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

## SELECTING BORE SIZE

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

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

Example: 3/4 bore, standard rod size 1" & shop air pressure of 90 psi

Push force: 8.296 (sq. in.) x 90 (pound / sq. In.) = 746.64 pounds  
Pull force: 8.296 (sq. In.) - 0.785 (sq. In.) x 90 (pound / sq. In.) = 675 pounds

BORE (IN.)	AREA (SQ. IN.)	ROD SIZE (IN.)	ROD AREA (SQ.IN.)
1,50	1,76	5/8	0,307
2,00	3,14	5/8	0,307
2,50	4,90	5/8	0,307
3,25	8,29	1	0,785
4,00	12,56	1	0,785
5,00	19,64	1	0,785
6,00	28,27	1 3/8	1,485
7,00	38,48	1 3/8	1,485
8,00	50,26	1 3/8	1,485
10,00	78,54	1 3/4	2,405
12,00	113,10	2	3,14
14,00	153,90	2 1/2	4,90



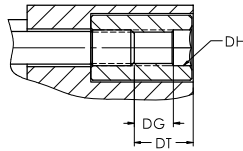
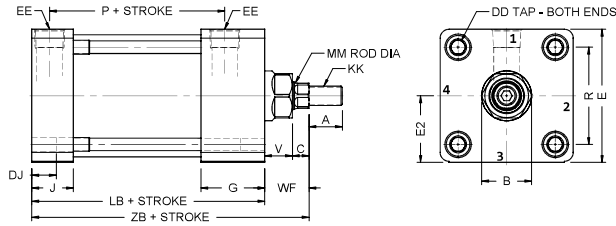
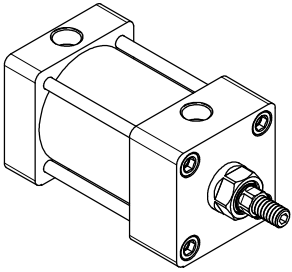
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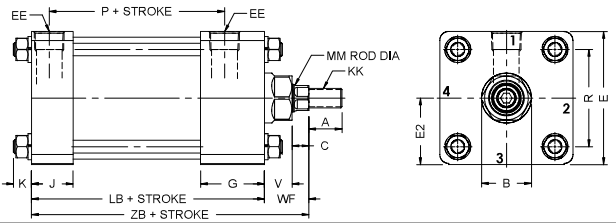
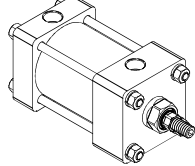
# STAR3 CYLINDERS

FACE & SIDE MOUNT  
MX0 - MX5 - MS4

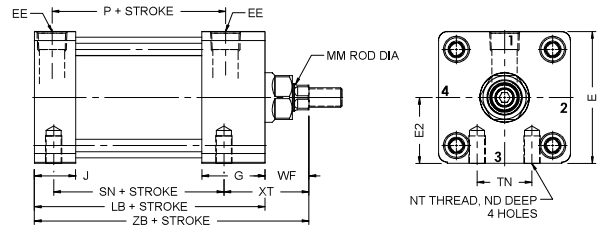
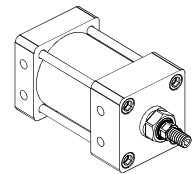
ST3X5 - Flush Mount - Standard  
NFFPA MX5



ST3X0 - No Mount  
NFFPA MX0

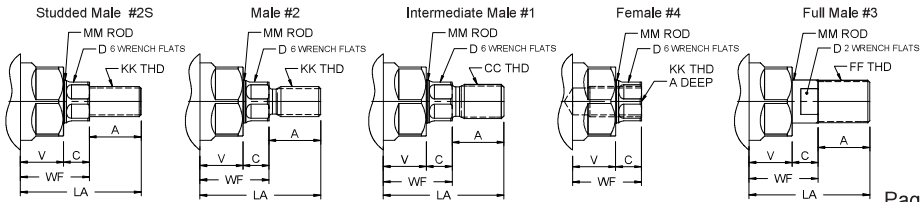


ST3S4 - Bottom Tap Mount  
NFFPA MS4



## ROD END STYLE

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



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	DD	DH HEX	DT	DG	DJ	E	E2 +/-0.02	EE NPTF	G	J	K	R	NT	TN	ND	ADD STROKE		
																LB	P	SN
1.5	1/4-28	1/4	0.50	13/32	7/16	2	1.000	3/8	1 7/16	15/16	1/4	1.43	1/4-20	5/8	3/8	3 5/8	2 21/64	2 1/4
2.0	5/16-24	5/16	0.50	7/16	7/16	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	5/16-18	7/8	1/2	3 5/8	2 21/64	2 1/4
2.5	5/16-24	5/16	0.50	7/16	7/16	3	1.500	3/8	1 7/16	15/16	5/16	2.19	3/8-16	1 1/4	5/8	3 3/4	2 29/64	2 3/8
3.25	3/8-24	3/8	0.63	9/16	9/16	3 3/4	1.875	1/2	1 11/16	1 3/16	3/8	2.76	1/2-13	1 1/2	3/4	4 1/4	2 21/32	2 5/8
4.0	3/8-24	3/8	0.63	9/16	9/16	4 1/2	2.250	1/2	1 11/16	1 3/16	3/8	3.32	1/2-13	2 1/16	3/4	4 1/4	2 21/32	2 5/8
5.0	1/2-20	1/2	0.75	19/32	19/32	5 1/2	2.750	1/2	1 11/16	1 3/16	7/16	4.10	5/8-11	2 11/16	1	4 1/2	2 29/32	2 7/8
6.0	1/2-20	1/2	0.75	13/32	19/32	6 1/2	3.250	3/4	1 15/16	1 7/16	7/16	4.88	3/4-10	3 1/4	1 1/8	5	3 3/32	3 1/8

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.001	C	D	V	WF	ADD STROKE	
											XT	ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1.123	3/8	1/2	5/8	1	1 15/16	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 5/16	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1.498	1/2	7/8	7/8	1 3/8	2 7/16	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 11/16	6 1/8
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	2 13/16	6 5/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	3 1/16	6 7/8



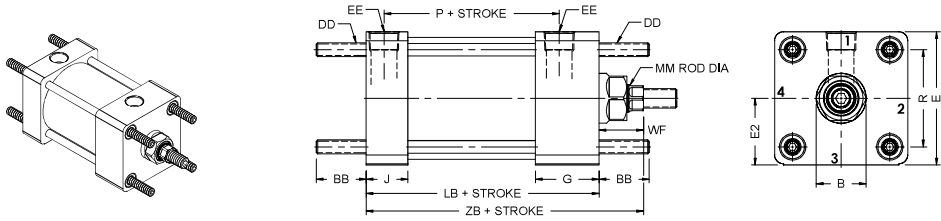
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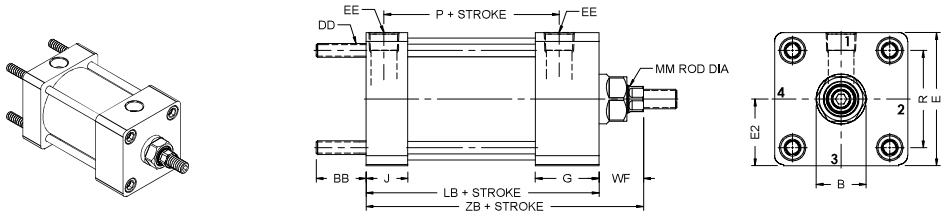
# STAR3 CYLINDERS

## TIE ROD EXTEND MOUNT MX1 - MX2 - MX3

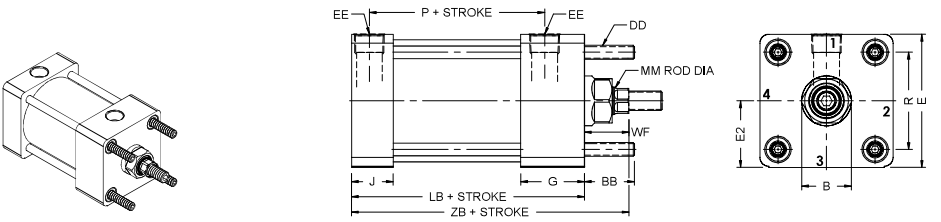
### ST3X1 - Tie Rods Extended Both Ends NFFPA MX1



### ST3X2 - Tie Rods Extended Cap Mount NFFPA MX2

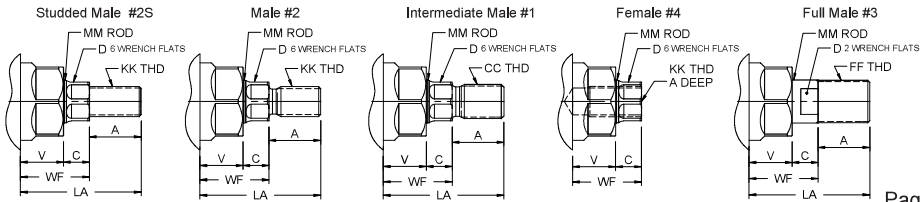


### ST3X3 - Tie Rods Extended Head Mount NFFPA MX3



## ROD END STYLE

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



# STAR3 CYLINDERS

## 1.5 TO 6" BORE SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	BB	DD	E	E2 +/- .002	EE NPTF	G	J	K	R	NT	TN	TK	ADD STROKE	
													LB	P
1.5	1	1/4-28	2	1,000	3/8	1 7/16	15/16	1/4	1.43	1/4-20	5/8	3/8	3 5/8	2 21/64
2.0	1 1/8	5/16-24	2 1/2	1,250	3/8	1 7/16	15/16	5/16	1.84	5/16/18	7/8	1/2	3 5/8	2 21/64
2.5	1 1/8	5/16-24	3	1,500	3/8	1 7/16	15/16	5/16	2.19	3/8-16	1 1/4	5/8	3 3/4	2 29/64
3.25	1 3/8	3/8-24	3 3/4	1,875	1/2	1 11/16	1 3/16	3/8	2.76	1/2-13	1 1/2	3/4	4 1/4	2 21/32
4.0	1 3/8	3/8-24	4 1/2	2,250	1/2	1 11/16	1 3/16	3/8	3.32	1/2-13	2 1/16	3/4	4 1/4	2 21/32
5.0	1 13/16	1/2-20	5 1/2	2,750	1/2	1 11/16	1 3/16	7/16	4.10	5/8-11	2 11/16	1	4 1/2	2 29/32
6.0	1 13/16	1/2-20	6 1/2	3,250	3/4	1 15/16	1 7/16	7/16	4.88	3/4-10	3 1/4	1 1/8	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	Add Stroke ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5
2.0	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5
2.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	4 3/4
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5 1/8
3.25	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	5 7/8
4.0	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5 5/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	1/2	1 3/16	1	1 5/8	5 7/8
5.0	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	5 7/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	1/2	1 3/16	1	1 5/8	6 1/8
6.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	6 5/8
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2,373	5/8	1 1/2	1 1/8	1 7/8	6 7/8



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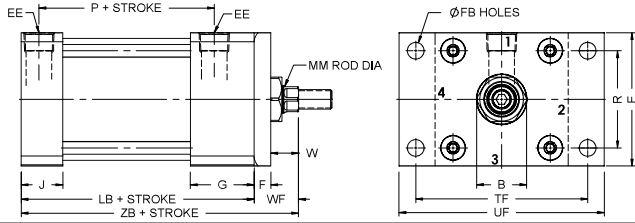
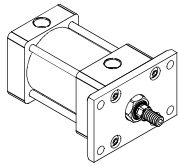
STARCYL CANADA INC  
2340 Michelin Street, Laval  
Quebec, Canada, H7L 5C3  
1-877-STARCYL (782-7295)  
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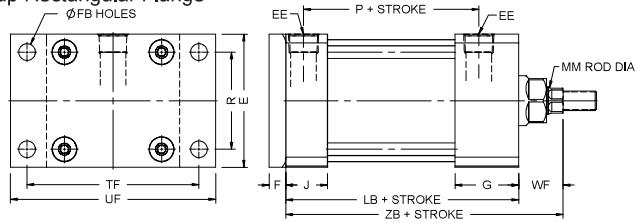
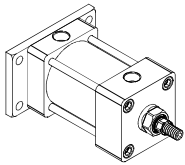
# STAR3 CYLINDERS

FLANGE MOUNT  
MF1 - MF2

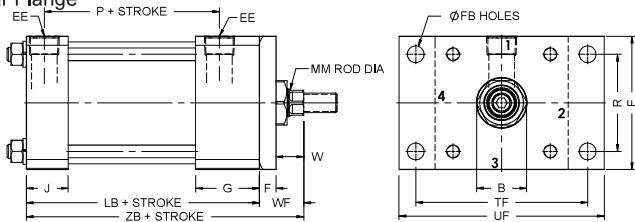
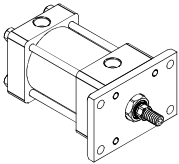
## ST3F1 - Detachable Aluminum Head Rectangular Flange NFFPA MF1



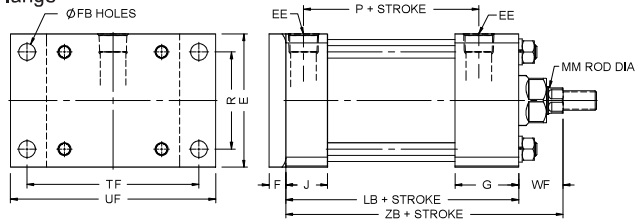
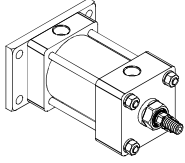
## ST3F2 - Detachable Aluminum Cap Rectangular Flange NFFPA MF2



## ST3F1X - Steel Head Rectangular Flange NFFPA MF1

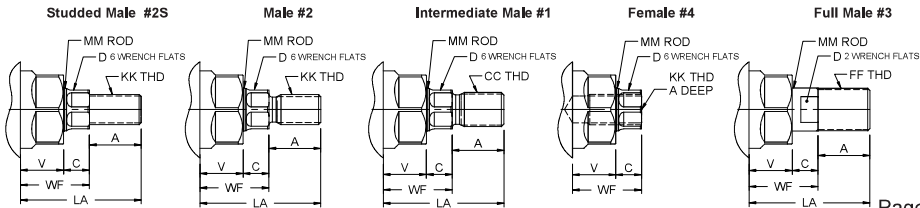


## ST3F2X - Steel Cap Rectangular Flange NFFPA MF2



## ROD END STYLE

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



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	F	FB	G	J	K	R	TF	UF	ADD STROKE	
												LB	P
1.5	2	1,000	3/8	3/8	5/16	1 7/16	15/16	1/4	1.43	2 3/4	3 3/8	3 5/8	2 21/64
2.0	2 1/2	1,250	3/8	3/8	3/8	1 7/16	15/16	5/16	1.84	3 3/8	4 1/8	3 5/8	2 21/64
2.5	3	1,500	3/8	3/8	3/8	1 7/16	15/16	5/16	2.19	3 7/8	4 5/8	3 3/4	2 29/64
3.25	3 3/4	1,875	1/2	5/8	7/16	1 11/16	1 3/16	3/8	2.76	4 11/16	5 1/2	4 1/4	2 21/32
4.0	4 1/2	2,250	1/2	5/8	7/16	1 11/16	1 3/16	3/8	3.32	5 7/16	6 1/4	4 1/4	2 21/32
5.0	5 1/2	2,750	1/2	5/8	9/16	1 11/16	1 3/16	7/16	4.10	6 5/8	7 5/8	4 1/2	2 29/32
6.0	6 1/2	3,250	3/4	3/4	9/16	1 15/16	1 7/16	7/16	4.88	7 5/8	8 5/8	5	3 3/32

Table 2 - Rod Dimensions

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



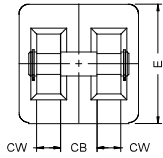
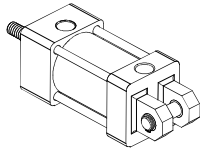
STARCYL CYLINDER CORP  
20 Ron Joye Road, Hemingway  
South Carolina, 29554  
1-877-STARCYL (782-7295)  
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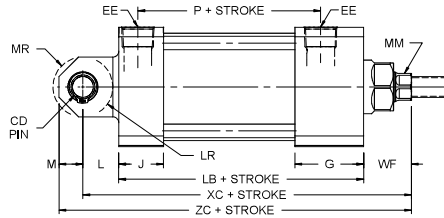
# STAR3 CYLINDERS

FIXED PIVOT MOUNT  
MP1 - MP3

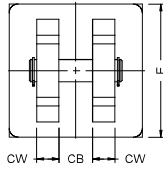
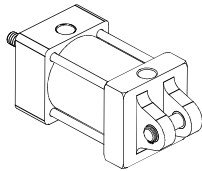
ST3P1 - Aluminum Extrusion Fixed Clevis  
NFPA MP1  
Design for 1.5" & 2" bore



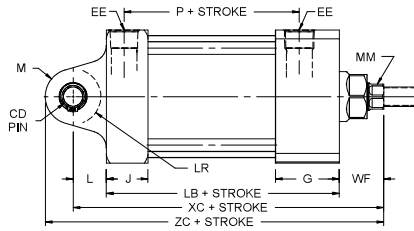
Pin and Snap ring Included



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

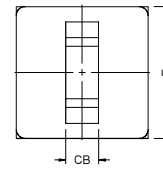
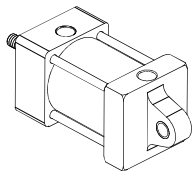


Pin and Snap ring Included

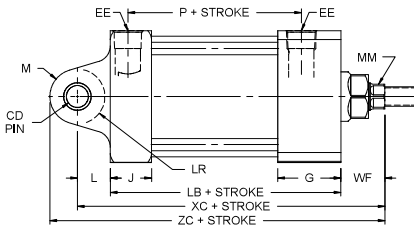


ST3P3 - Aluminum Extrusion Fixed Eye Mount  
NFPA MP3

Available for 1.5" to 6" and 8" Bore



Pin and Snap ring NOT Included



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

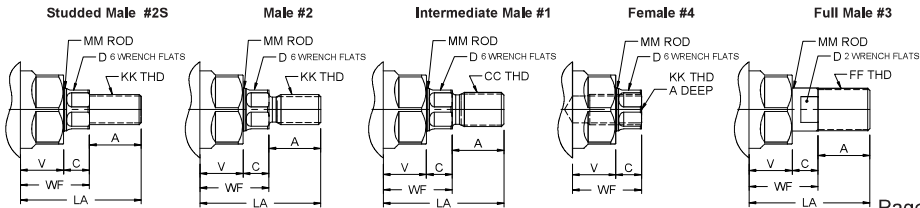
BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	CB	CD + .000 - .002	CW	FL	L	LR	M	MR	ADD STROKE	
																LB	P
1.5	2	1.000	3/8	1 7/16	15/16	1/4	1.43	3/4	.501	1/2	1 1/8	3/4	5/8	1/2	5/8	3 5/8	2 21/64
2.0	2 1/2	1.250	3/8	1 7/16	15/16	5/16	1.84	3/4	.501	1/2	1 1/8	3/4	5/8	1/2	5/8	3 5/8	2 21/64
2.5	3	1.500	3/8	1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

Table 2 - Rod Dimensions

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

## ROD END STYLE

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

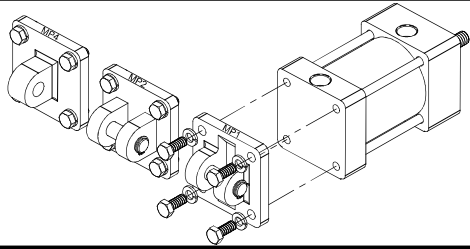


STARCYL CYLINDER CORP  
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South Carolina, 29554  
1-877-STARCYL (782-7295)  
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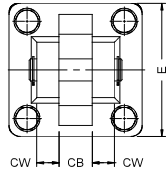
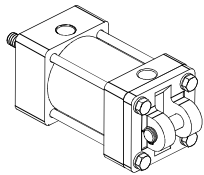
STARCYL CANADA INC  
2340 Michelin Street, Laval  
Quebec, Canada, H7L 5C3  
1-877-STARCYL (782-7295)  
www.StarCyl.ca

# STAR3 CYLINDERS

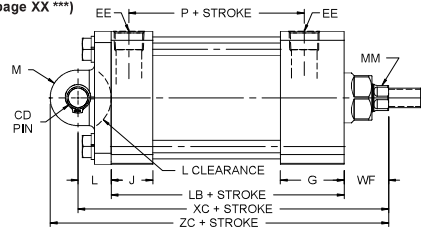
DETACHABLE PIVOT MOUNT  
MP1 - MP2- MP4



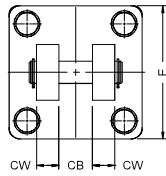
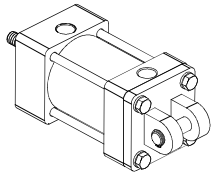
ST3...FA-MP1 Detachable Short Clevis (\*\*\*)sold as Mounting Kit see page XX (\*\*\*)  
NFPA MP1



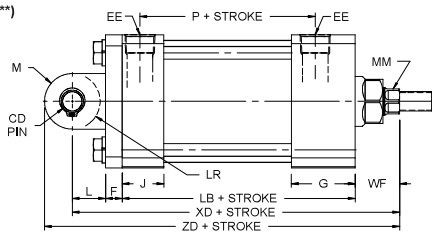
Pin and Snap ring Included



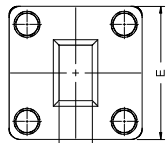
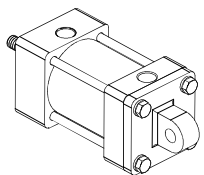
ST3P2 - Detachable Clevis (\*\*\*)Also sold as Mounting Kit see page XX (\*\*\*)  
NFPA MP2



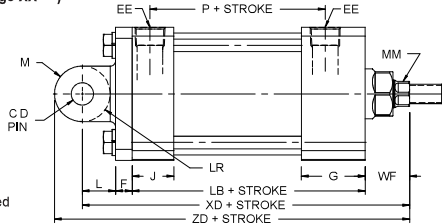
Pin and Snap ring Included



ST3P4 - Detachable Eye Mount (\*\*\*)Also sold as Mounting Kit see page XX (\*\*\*)  
NFPA MP4 Available for 1.5" to 6"



Pin and Snap ring NOT Included



## ROD END STYLE

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

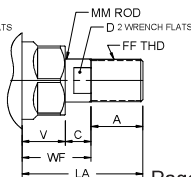
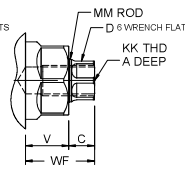
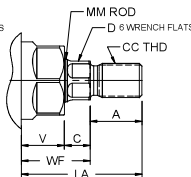
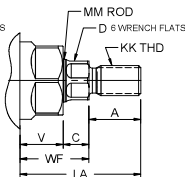
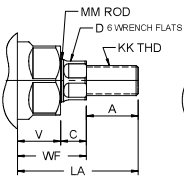
Studded Male #2S

Male #2

Intermediate Male #1

Female #4

Full Male #3



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	CB	CD + .000 - .002	CW	FL	L	M	ADD STROKE	
														LB	P
1.5	2	1,000	3/8	1 7/16	15/16	1/4	1.43	3/4	.501	1/2	1 1/8	3/4	5/8	3 5/8	2 21/64
2.0	2 1/2	1,250	3/8	1 7/16	15/16	5/16	1.84	3/4	.501	1/2	1 1/8	3/4	5/8	3 5/8	2 21/64
2.5	3	1,500	3/8	1 7/16	15/16	5/16	2.19	3/4	.501	1/2	1 1/8	3/4	5/8	3 3/4	2 29/64
3.25	3 3/4	1,875	1/2	1 11/16	1 3/16	3/8	2.76	1 1/4	.751	5/8	1 7/8	1 1/4	7/8	4 1/4	2 21/32
4.0	4 1/2	2,250	1/2	1 11/16	1 3/16	3/8	3.32	1 1/4	.751	5/8	1 7/8	1 1/4	5/8	4 1/4	2 21/32
5.0	5 1/2	2,750	1/2	1 11/16	1 3/16	7/16	4.10	1 1/4	.751	5/8	1 7/8	1 1/4	5/8	4 1/2	2 29/32
6.0	6 1/2	3,250	3/4	1 15/16	1 7/16	7/16	4.88	1 1/2	1.001	3/4	2 1/4	1 1/2	1 1/4	5	3 3/32

Table 2 - Rod Dimensions

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

Table 3 - Bolts and Torque

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



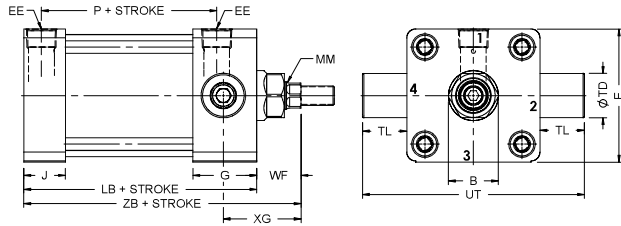
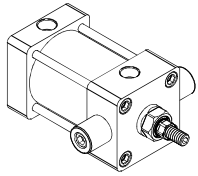
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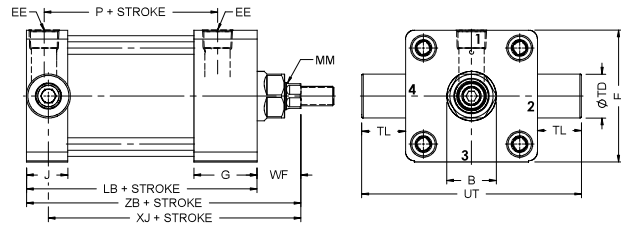
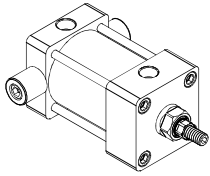
# STAR3 CYLINDERS

TRUNNION MOUNT  
MT1 - MT2 - MT4

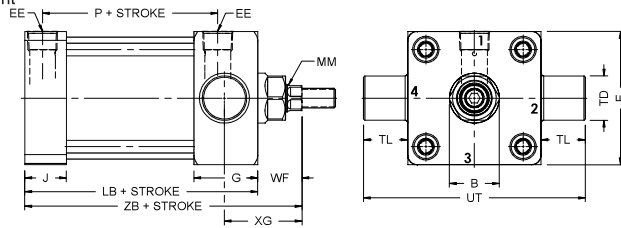
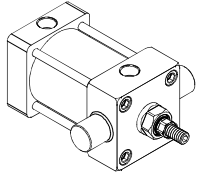
## ST3T1 - Detachable Head Trunnion Mount NFFPA MT1



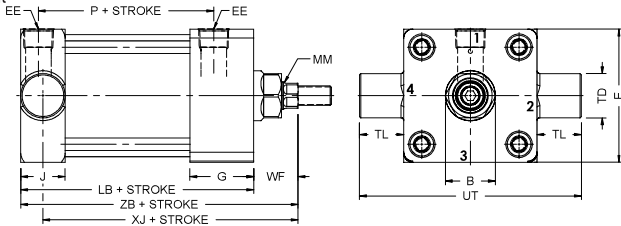
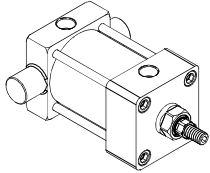
## ST3T2 - Detachable Cap Trunnion Mount NFFPA MT2



## ST3T1X - Steel Fixed Head Trunnion Mount NFFPA MT1

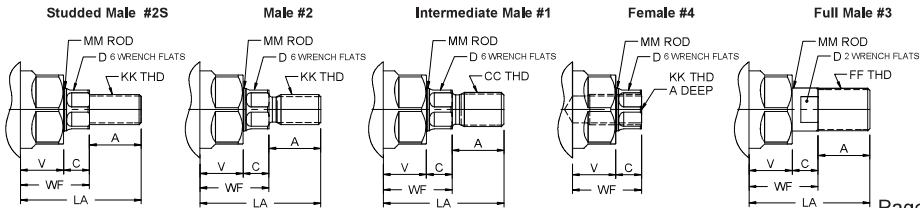


## ST3T2X - Steel Fixed Cap Trunnion Mount NFFPA MT2



## ROD END STYLE

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



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

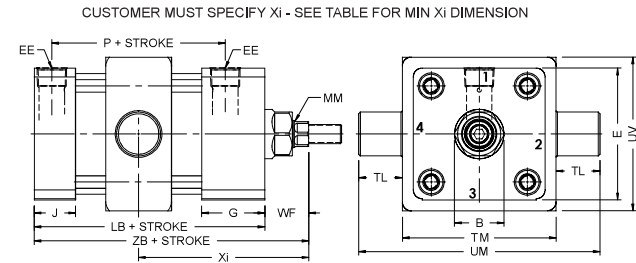
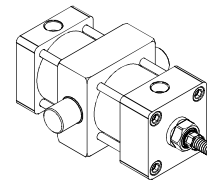
Table 1 - Envelope and Mounting Dimensions

BORE	E	E2 +/- .002	EE NPTF	G	J	K	R	TD + .00 - .001	TL	TM	UM	UT	UV	ADD STROKE	
														LB	P
1.5	2	1,000	3/8	1 7/16	15/16	1/4	1.43	1	1	2 1/2	4 1/2	4	2 1/2	3 5/8	2 21/64
2.0	2 1/2	1,250	3/8	1 7/16	15/16	5/16	1.84	1	1	3	5	4 1/2	3	3 5/8	2 21/64
2.5	3	1,500	3/8	1 7/16	15/16	5/16	2.19	1	1	3 1/2	5 1/2	5	3 1/2	3 3/4	2 29/64
3.25	3 3/4	1,875	1/2	1 11/16	1 3/16	3/8	2.76	1	1	4 1/2	6 1/2	5 3/4	4 1/4	4 1/4	2 21/32
4.0	4 1/2	2,250	1/2	1 11/16	1 3/16	3/8	3.32	1	1	5 1/4	7 1/4	6 1/2	5	4 1/4	2 21/32
5.0	5 1/2	2,750	1/2	1 11/16	1 3/16	7/16	4.10	1	1	6 1/4	8 1/4	7 1/2	6	4 1/2	2 29/32
6.0	6 1/2	3,250	3/4	1 15/16	1 7/16	7/16	4.88	1 3/8	1 3/8	7 5/8	10 3/8	9 1/4	7	5	3 3/32

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/- .001	C	D	V	WF	ADD STROKE			
											XG	XJ	Min Xi	ZB
1.5	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	1 3/4	4 1/8	3 3/16	4 5/8
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	2 1/8	4 1/2	3 9/16	5
	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	1 3/4	4 1/8	3 5/16	4 5/8
2.0	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	2 1/8	4 1/2	3 11/16	5
	1 3/8													5 1/4
	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	1 3/4	4 1/4	3 5/16	4 3/4
2.5	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	2 1/8	4 5/8	3 11/16	5 1/8
	1 3/8													5 3/8
	5/8	1/2-20	7/16-20	5/8-18	3/4	1,123	3/8	1/2	5/8	1	1 3/4	4 1/4	3 5/16	4 3/4
3.25	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	2 1/2	5 1/4	4 7/16	5 7/8
	1 3/4													6 1/8
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	2 1/4	5	4 3/16	5 5/8
4.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	1/2	1 3/16	1	1 5/8	2 1/2	5 1/4	4 7/16	5 7/8
	1 3/4													6 1/8
	1	7/8-14	3/4-16	1-14	1 1/8	1,498	1/2	7/8	7/8	1 3/8	2 1/4	5 1/4	4 3/16	5 7/8
5.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	1/2	1 3/16	1	1 5/8	2 1/2	5 1/2	4 7/16	6 1/8
	1 3/4													6 3/8
	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	2 5/8	5 7/8	4 15/16	6 5/8
6.0	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2,373	5/8	1 1/2	1 1/8	1 7/8	2 7/8	6 1/8	5 3/16	6 7/8
	2													7

## ST3T4 - Steel Mid Trunnion Mount NFFPA MT4



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# STAR3 CYLINDERS

## SPHERICAL BEARING MOUNT DETACHABLE ST3SD

ST3SD - Detachable Spherical Mount

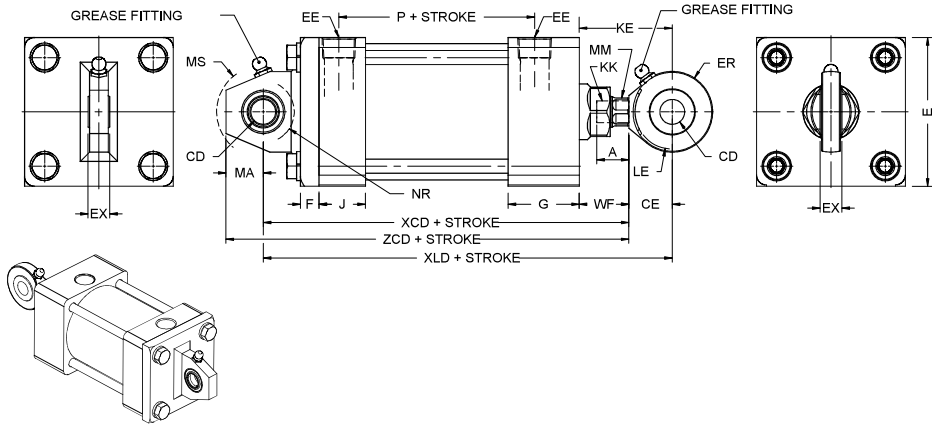


Table 1 - Envelope and Mounting Dimensions

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

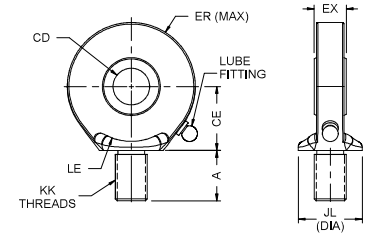
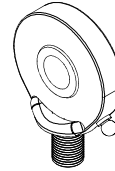
Table 2 - Rod Dimensions

BORE	ROD SIZE	#4 KK	#7 KK	A	WF	KE	Add Stroke		
							XCD	XLD	ZCD
1 1/2	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
2	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
2.5	1 3/8	-	7/16-20	3/4	1 1/4	2 1/8	6 3/8	7 1/4	7 1/8
	5/8	7/16-20	-	3/4	5/8	1 1/2	5 3/4	6 5/8	6 1/2
3.25	1	-	7/16-20	3/4	1	1 7/8	6 1/8	7	6 7/8
	1 3/8	-	7/16-20	3/4	1 1/4	2 1/8	6 3/8	7 1/4	7 1/8
4	1	3/4-16	-	1 1/8	3/4	2	7 1/4	8 1/2	8 1/4
	1 3/8	-	3/4-16	1 1/8	1	2 1/4	7 1/2	8 3/4	8 1/2
5	1 3/4	-	3/4-16	1 1/8	1 1/4	2 1/2	7 3/4	9	8 3/4
	1	3/4-16	-	1 1/8	3/4	2	7 1/2	8 3/4	8 1/2
6	1 3/8	-	3/4-16	1 1/8	1	2 1/4	7 3/4	9	8 3/4
	1 3/4	-	3/4-16	1 1/8	1 1/4	2 1/2	8	9 1/4	9
6	1 3/8	1-14	-	1 5/8	7/8	2 3/4	8 1/2	10 3/8	9 3/4
	1 3/4	-	1-14	1 5/8	1 1/8	3	8 3/4	10 5/8	10
	2	-	1-14	1 5/8	1 1/4	3 1/8	8 7/8	10 3/4	10 1/8

# STAR3 CYLINDERS

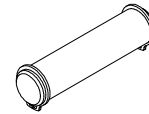
## CYLINDER ACCESSORIES SPHERICAL BEARING MOUNT-

NFPA Spherical Rod Eye

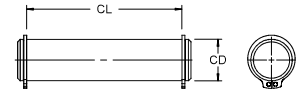


Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2, 2 & 2 1/2	RES-05	.5000 <sup>±005</sup>	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
3 1/4, 4 & 5	RES-07	.7500 <sup>±005</sup>	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
6 & 8	RES-10	1.0000 <sup>±005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860

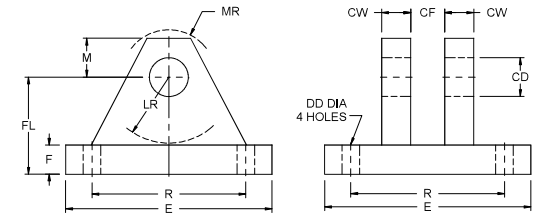
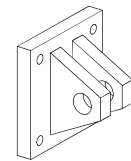
NFPA Spherical Pivot Pin



Bore Size	Part #	CD	CL	LOAD
1 1/2, 2 & 2 1/2	PS-05	.5000 <sup>±004</sup>	1 9/16	8600
3 1/4, 4 & 5	PS-07	.7500 <sup>±006</sup>	2 1/32	19300
6 & 8	PS-10	1.0000 <sup>±005</sup>	2 1/2	34300



NFPA SPHERICAL CLEVIS BRACKET



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



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# STAR3 CYLINDERS

ROD LOCK - LOCKING MECHANISM  
MODEL RLA

## WHAT IS A PNEUMATIC ROD LOCK?

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

### BENEFITS

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

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

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

### FEATURES:

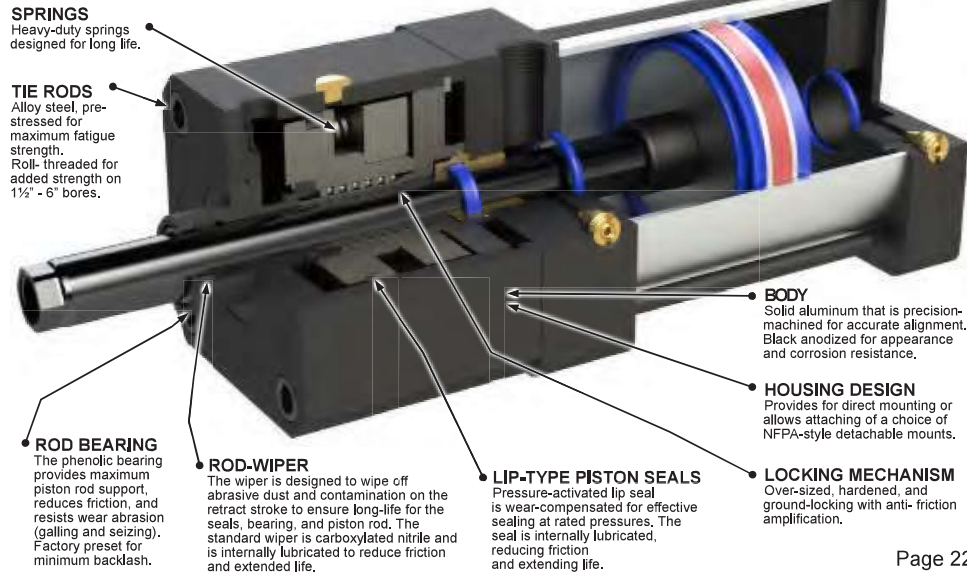
- No rod displacement on engagement; extremely low backlash
- Contact area of clamping collet is considerably greater than average, extending service life
- Fast response time, 100m/sec, optimized circuit
- Mechanical design with spring-engaged units
- Profile matches NFPA mounting styles for cylinders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

### OPTIONS:

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

Note: Consult factory for extreme applications.

## ANATOMY OF A PNEUMATIC ROD LOCK



# STAR3 CYLINDERS

1.5 TO 6" BORE  
SINGLE ROD

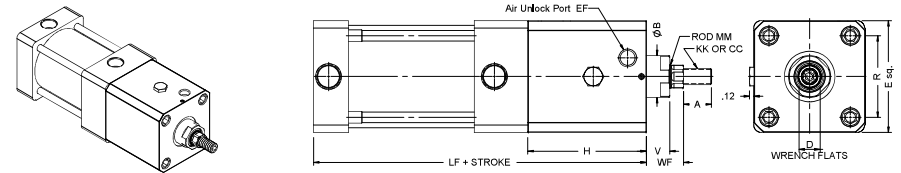
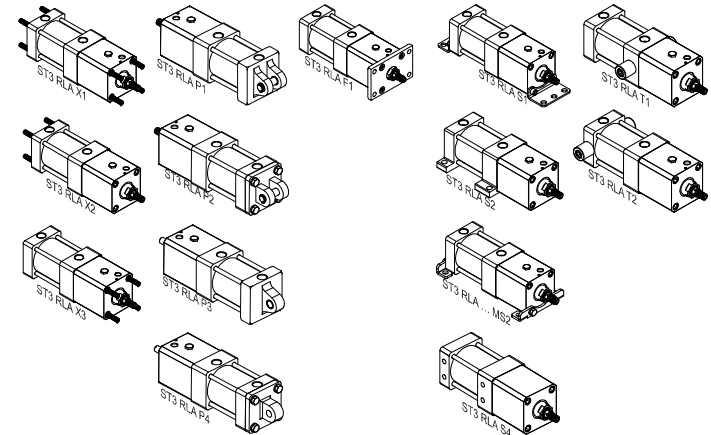


Table 1 - Envelope and Mounting Dimensions

BORE	Rod Size MM	Axial Holding Force	#1 CC	#2 & #4 KK	A	V	WF	B +/- .001	D	R	E	EF	H	ADD STROKE LF
1.5	5/8	200	1/2-20	7/16-20	3/4	5/8	1	1,123	1/2	1.43	2	1/8 NPT	3,050	6,675
	5/8	400	1/2-20	7/16-20	3/4	5/8	1	1,123	1/2	1.84	2 1/2	1/8 NPT	3,060	6,685
2	1	300	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1,498	7/8	1.84	2 1/2	1/8 NPT	3,750	7,375
	5/8	650	1/2-20	7/16-20	3/4	5/8	1	1,123	1/2	2.19	3	1/8 NPT	3,180	6,930
2.5	1	450	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1,498	7/8	2.19	3	1/8 NPT	3,650	7,400
	1	950	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1,498	7/8	2.76	3 3/4	1/4 NPT	4,000	8,250
3.25	1 3/8	950	1 1/4-12	1-14	1 5/8	1	1 5/8	1,998	1 3/16	2.76	3 3/4	1/4 NPT	4,000	8,250
	1	1550	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1,498	7/8	3.32	4 1/2	1/4 NPT	4,000	8,250
4	1 3/8	1550	1 1/4-12	1-14	1 5/8	1	1 5/8	1,998	1 3/16	3.32	4 1/2	1/4 NPT	4,000	8,250
	1	2150	7/8-14	3/4-16	1 1/8	7/8	1 3/8	1,498	7/8	4.10	5 1/2	1/4 NPT	4,000	8,500
5	1 3/8	1950	1 1/4-12	1-14	1 5/8	1	1 5/8	1,998	1 3/16	4.10	5 1/2	1/4 NPT	4,000	8,500
	1 3/8	2556	1 1/4-12	1-14	1 5/8	1	1 5/8	1,998	1 3/16	4.88	6 1/2	1/4 NPT	4,500	9,500
6	1 3/4	2450	1 1/2-12	1 1/4-12	2	1 1/8	1 7/8	2,373	1 1/2	4.88	6 1/2	1/4 NPT	4,500	9,500

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

## OTHER MOUNTINGS AVAILABLE



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www.StarCyl.ca

# STAR3 CYLINDERS

**SAFETY ROD LOCK WITH MANUAL RELEASE MODEL RLS**

## SAFETY PNEUMATIC ROD LOCK?

### Precision Operation Maintains Accurate Positioning

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

### Large Clamping Surface Ensures Consistent Performance

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

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

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

### Sealed to Withstand Harsh Environments

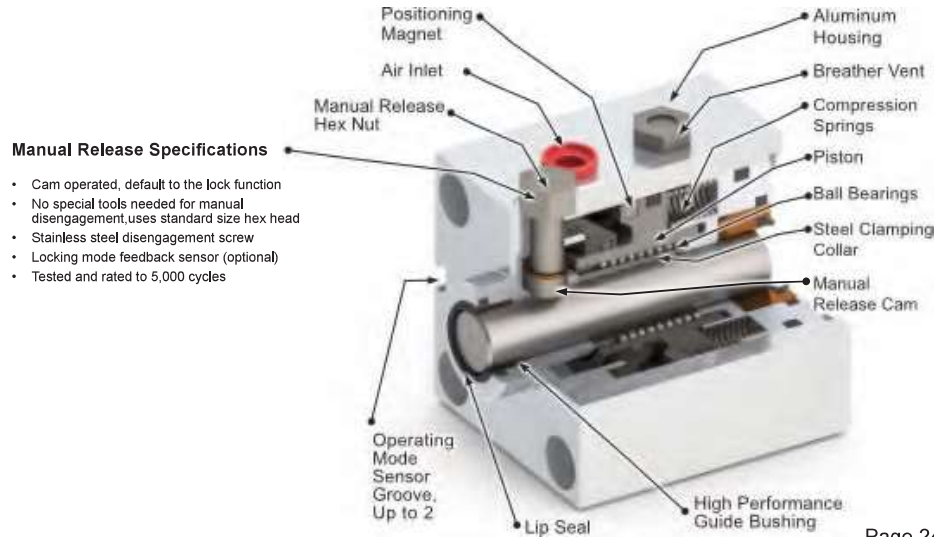
Every RLS Rod Lock is sealed to protect internal components. These seals are designed to withstand even harsh wash-down environments and are IP67 rated (anodized models exceed NEMA 4X rating). Consult Factory for use in wash-down of humid environment applications. Rod Locks are black anodized coating.

### Manual Release

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



### ROD LOCK CUTAWAY(WITH MANUAL RELEASE)



# STAR3 CYLINDERS

**1.5 TO 8" BORE SAFETY ROD LOCK - RLS**

## RLS

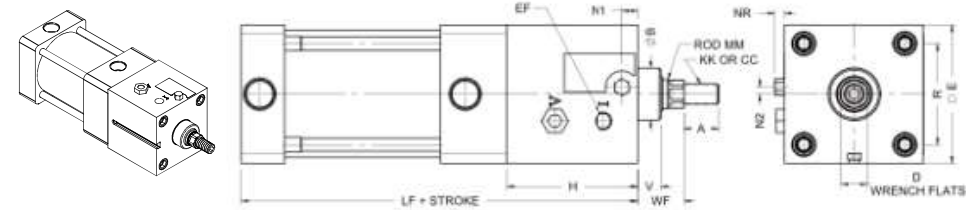


Table 1 - Envelope and Mounting Dimensions

BORE	Rod Size MM	Axial Holding Force	#1 CC	#2 & #4 KK	A	V	WF	B +/- .001	Rod Wrench Flat D	R	E	EF	N1	N2	NR	H	ADD STROKE		
																	E	LF	
1.5	5/8	200	1/2-20	7/16-20	3/4		1	1.123	1/2	1.43	2	1/8 NPT							
	5/8	400	1/2-20	7/16-20	3/4		1	1.123	1/2	1.84	2 1/2	1/8 NPT							
2	1	300	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	1.84	2 1/2	1/8 NPT							
	5/8	650	1/2-20	7/16-20	3/4		1	1.123	1/2	2.19	3	1/8 NPT							
2.5	1	450	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	2.19	3	1/8 NPT							
	1	950	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	2.76	3 3/4	1/4 NPT							
3.25	1 3/8	950	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 3/16	2.76	3 3/4	1/4 NPT							
	1	1550	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	3.32	1/2	1/8 NPT							
4	1 3/8	1550	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 3/16	4.00	1/2	1/8 NPT							
	1	2150	7/8-14	3/4-16	1 1/8		1 3/8	1.498	7/8	4.00	1/2	1/4 NPT							
5	1 3/8	1950	1 1/4-12	1-14	1 5/8		1 5/8	1.998	3/16	4.00	5/2	1/4 NPT							
	1 3/8	2556	1 1/4-12	1-14	1 5/8		1 5/8	1.998	1 1/2	4.88	6 1/2	1/4 NPT							
6	1 3/4	2450	1 1/2-12	1 1/4-12	1 5/8		1 7/8	1.973	1 1/2	4.88	6 1/2	1/4 NPT							

NOT READY YET



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# STAR3 CYLINDERS

## AIR CONTROLS AND PROGRAMMING

### CYLINDER MOUNTING

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

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

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

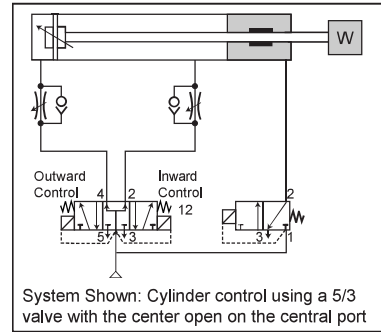
One-directional flow reducers can be used to control the speed of the cylinder rod. To ensure fast braking of the rod, a quick exhaust valve can be installed on or near the rod lock.

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

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

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

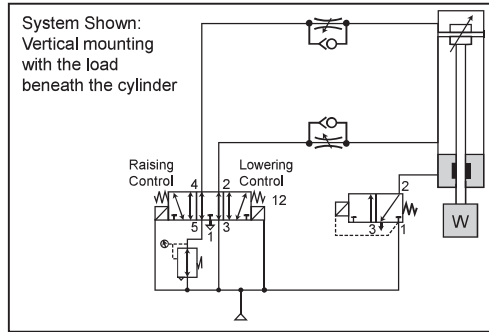
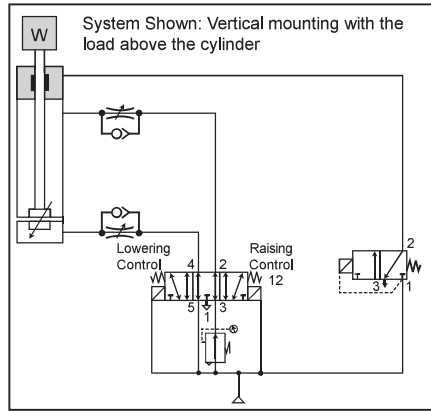
**Horizontal Mounting:** Pressure is maintained on both sides of the cylinder piston, keeping it balanced and preventing rod displacement upon release. Use exhaust ports 3 and 5 (see below).



## WWW.STARCYL.COM

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

Minimum release pressure = 60 psi  
Maximum pressure = 120 psi



# STAR3 CYLINDERS

7 TO 14" BORE

## Standard Specifications

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

Mounting Style: Optional Flush Mount available.  
 Single or Double rod end.  
 Rod Diameters: 3 Rod size for every bore available  
 Rod End Style: 4 standard and Specials available.  
 Other Options: seals, Rod Materials, Tubing Materials,  
 Special Assembly, Manifold Mount,

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



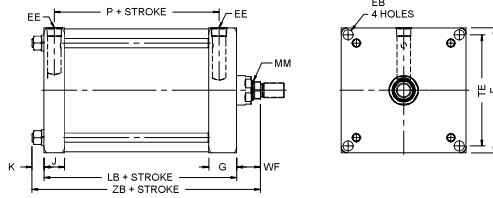
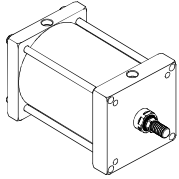
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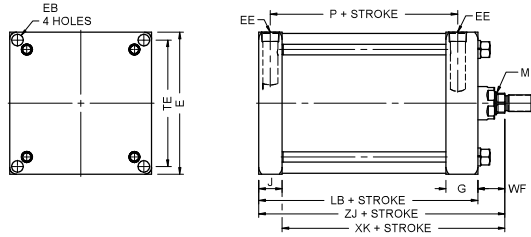
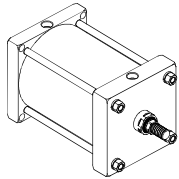
# STAR3 CYLINDERS

END MOUNT  
ME3 - ME4 - MX5

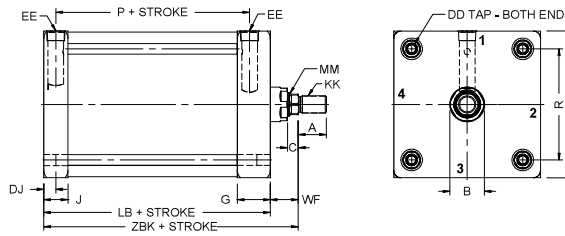
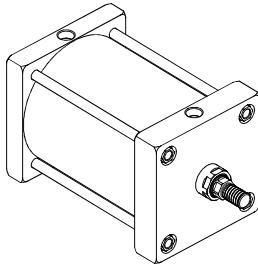
## ST3E3 Square Head Mount NFFPA ME3



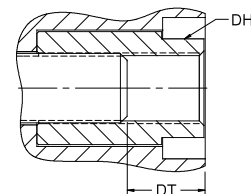
## ST3E4 Square Cap Mount NFFPA ME4



## ST3X5 Flush Cap Mount NFFPA MX5



Front Sleeve Nut design and Dimensions



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

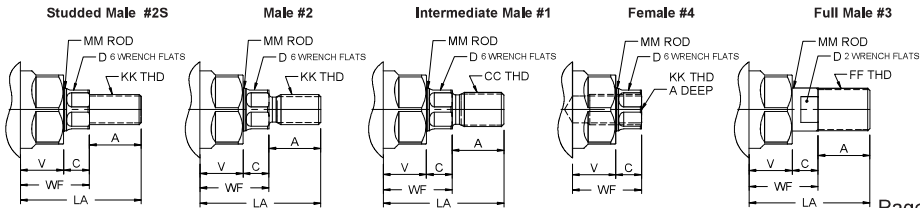
BORE	E	EE NPTF	G	J	K	R	EB	DD	DH HEX	DT	DJ	TE	ADD STROKE	
													LB	P
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	11/16	5/8-18	7/8	45/64	45/64	6.75	5 1/8	3 7/32
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	11/16	5/8-18	7/8	45/64	45/64	7.57	5 1/8	3 7/32
10	10.63	1	2 1/8	1 7/8	11/16	7.97	13/16	3/4-16	1 1/4	15/16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

Table 2 - Rod Dimensions

BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.01	C	D	V	WF	ADD STROKE			
											XK	ZB	ZBK	ZJ
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 1/4	7 7/16	6 3/4	6 3/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	5 1/2	7 9/16	7	7
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	5 5/8	7 11/16	7 1/8	7 1/8
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1.998	5/8	1 3/16	1	1 5/8	5 1/4	7 7/16	6 3/4	6 3/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	5/8	1 1/2	1 1/8	1 7/8	5 1/2	7 9/16	7	7
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	5 5/8	7 11/16	7 1/8	7 1/8
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2.373	3/4	1 1/2	1 1/8	1 7/8	6 1/4	8 15/16	8 1/4	8 1/4
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	6 3/8	9 1/16	8 3/8	8 3/8
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	3/4	1 3/4	1 1/4	2	6 5/8	9 5/16	8 5/8	8 5/8
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2.623	7/8	1 3/4	1 1/8	2	6 7/8	9 1/8	8 7/8	8 7/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/8	2 1/4	7 1/8	9 9/16	9 1/8	9 1/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	5 5/8	1 1/4	2 1/4	7 1/8	9 13/16	9 1/8	9 1/8
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3.123	7/8	2 1/16	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3.748	1	2 5/8	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4.248	1	3	1 1/4	2 1/4	8 1/8	11 1/8	10 3/8	10 3/8

## ROD END STYLE

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



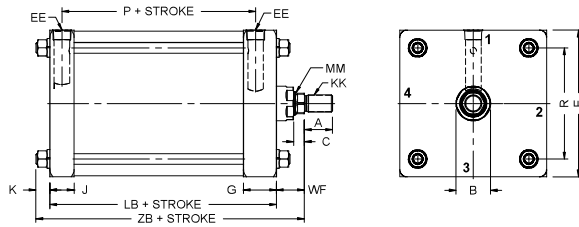
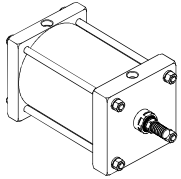
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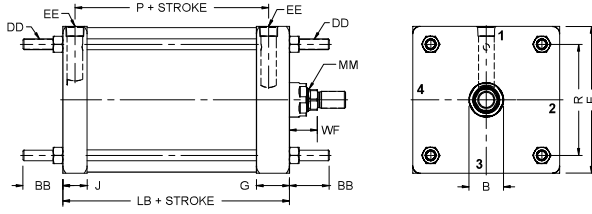
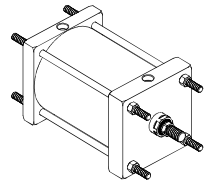
# STAR3 CYLINDERS

CENTER LINE MOUNT  
MX0 - MX1 - MX2 - MX3

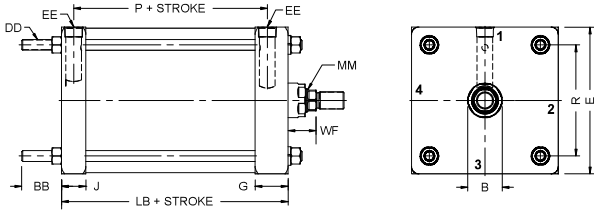
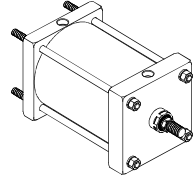
ST3X0 - No Mount  
NFPA MX0



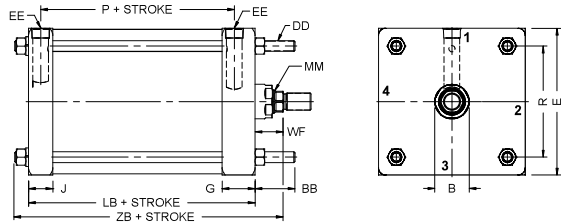
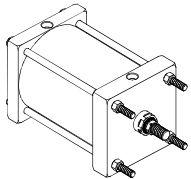
ST3X1 - Tie Rods Extended Both Ends  
NFPA MX1



ST3X2 - Tie Rods Extended Cap Mount  
NFPA MX2



ST3X3 - Tie Rods Extended Head Mount  
NFPA MX3



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

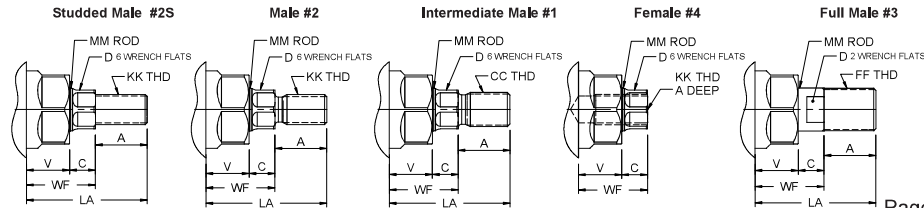
BORE	BB	DD	E	EE NPTF	G	J	K	R	Mounting	
									LB	P
7	2 5/16	5/8-18	7.5	3/4	1 29/32	1 13/32	9/16	5.73	5 1/8	3 7/32
8	2 5/16	5/8-18	8.5	3/4	1 29/32	1 13/32	9/16	6.44	5 1/8	3 7/32
10	2 9/16	3/4-16	10.63	1	2 1/8	1 7/8	11/16	7.97	6 3/8	4 1/8
12	2 9/16	3/4-16	12.63	1	2 1/8	1 7/8	11/16	9.41	6 7/8	4 5/8
14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

Table 2 - Rod Dimensions

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

## ROD END STYLE

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



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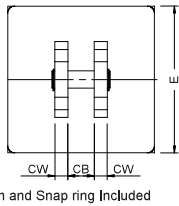
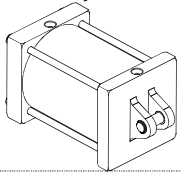
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# STAR3 CYLINDERS

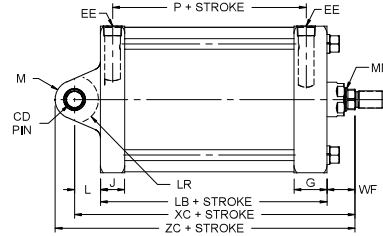
PIVOT MOUNT  
MP1 - MP2

ST3P1 - Aluminum Extrusion Fixed Clevis  
NFPA MP1

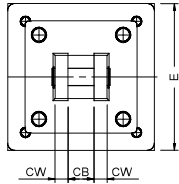
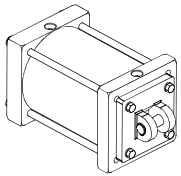
8" bore Style



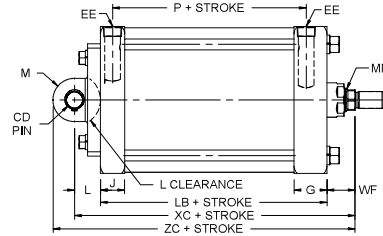
Pin and Snap ring Included



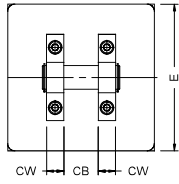
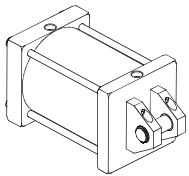
7" bore Style



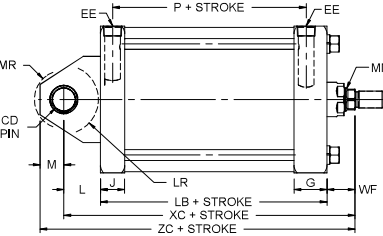
Pin and Snap ring Included



10" to 14" bore Style

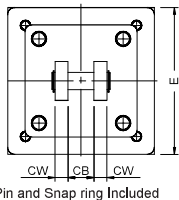
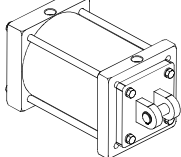


Pin and Snap ring Included

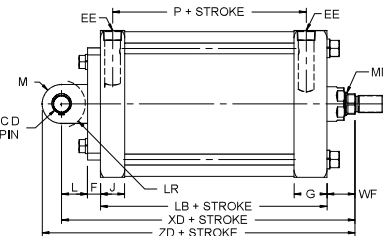


ST3P2 - Steel Detachable Clevis  
NFPA MP2

7 & 8" bore Style



Pin and Snap ring Included



## ROD END STYLE

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

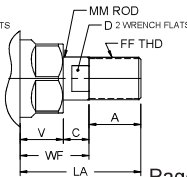
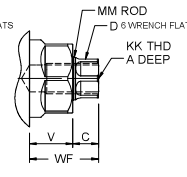
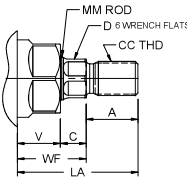
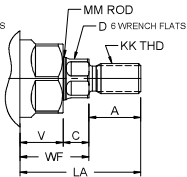
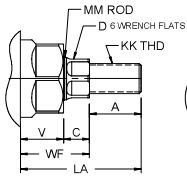
Studded Male #2S

Male #2

Intermediate Male #1

Female #4

Full Male #3



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

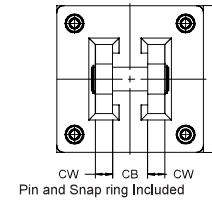
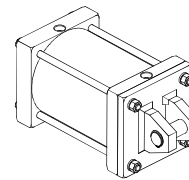
BORE	E	EE NPTF	F	FT	G	J	K	R	CB	CD +0.000 -0.002	CW	FL	L	LR	M	MR	Add Stroke	
																	LB	P
7.0	7.5	3/4	3/4	3/4	1 29/32	1 13/32	9/16	5.73	1 1/2	1	3/4	2 1/4	1 1/2	1 1/4	1	1 3/16	5 1/8	3 7/32
8.0	8.5	3/4	3/4	3/4	1 29/32	1 13/32	9/16	6.44	1 1/2	1	3/4	2 1/4	1 1/2	1 1/4	1	1 3/16	5 1/8	3 7/32
10	10.63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

Table 2 - Rod Dimensions

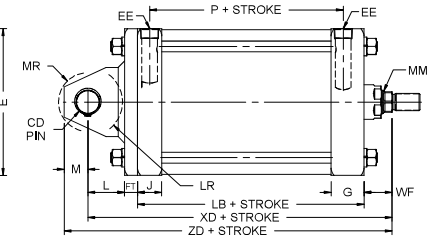
BORE	Rod Size MM	#1 CC	#2 & #4 KK	#3 FF	A	B +/-0.001	C	D	V	WF	ADD STROKE			
											XC	XD	ZC	ZD
7.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	8 1/4	9	9 1/4	10 1/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2,373	5/8	1 1/2	1 1/8	1 7/8	8 1/2	9 1/4	9 1/2	10 1/2
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2,623	7/8	1 11/16	1 1/8	2	8 5/8	9 3/8	9 5/8	10 5/8
8.0	1 3/8	1 1/4-12	1-14	1 3/8-12	1 5/8	1,998	5/8	1 3/16	1	1 5/8	8 1/4	9	9 1/4	10 1/4
	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2,373	5/8	1 1/2	1 1/8	1 7/8	8 1/2	9 1/4	9 1/2	10 1/2
	2	1 3/4-12	1 1/4-12	2-12	2 1/4	2,623	7/8	1 11/16	1 1/8	2	8 5/8	9 3/8	9 5/8	10 5/8
10.00	1 3/4	1 1/2-12	1 1/4-12	1 3/4-12	2	2,373	3/4	1 1/2	1 1/8	1 7/8	10 3/8	11 3/8	11 3/4	11 3/8
	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2,623	3/4	1 3/4	1 1/8	1 7/8	10 1/2	11 1/2	11 7/8	11 1/2
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3,123	1	2 1/16	1 1/4	2 1/4	10 3/4	11 3/4	12 1/8	11 3/4
12.00	2	1 3/4-12	1 1/2-12	2-12	2 1/4	2,623	7/8	1 3/4	1 1/8	2	11 1/8	12 1/8	12 7/8	12 1/8
	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3,123	7/8	2 1/16	1 1/8	2	11 3/8	12 1/8	13 1/8	12 3/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3,748	1	2 5/8	1 1/4	2 1/4	11 3/8	12 1/8	13 1/8	12 3/8
14.00	2 1/2	2 1/4-12	1 7/8-12	2 1/2-12	3	3,123	1	2 1/16	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8
	3	2 3/4-12	2 1/4-12	3-12	3 1/2	3,748	1	2 5/8	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2-12	3 1/2	4,248	1	3	1 1/4	2 1/4	12 7/8	13 7/8	14 7/8	13 7/8

ST3P2 - Steel Detachable Clevis  
NFPA MP2

10" to 14" bore Style



Pin and Snap ring Included



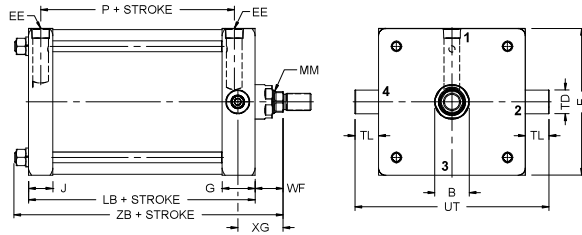
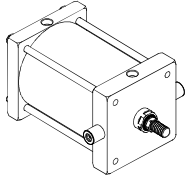
STARCYL CYLINDER CORP  
20 Ron Joye Road, Hemingway  
South Carolina, 29554  
1-877-STARCYL (782-7295)  
www.Starcyl.com

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

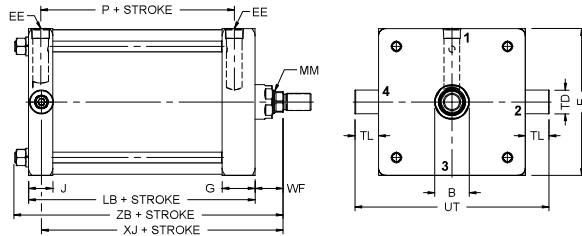
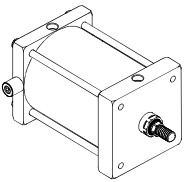
# STAR3 CYLINDERS

PIVOT MOUNT  
MT1 - MT2 - MT4

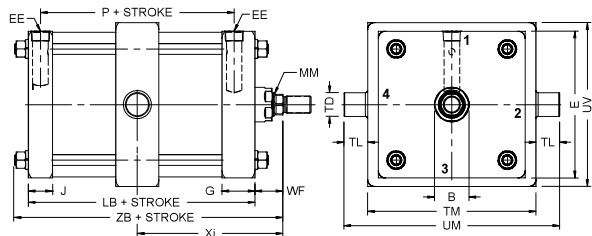
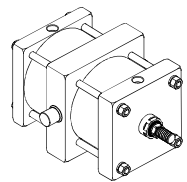
ST3T1 - Detachable Head Trunnion Mount  
NFPA MT1



ST3T2 - Detachable Cap Trunnion Mount  
NFPA MT2



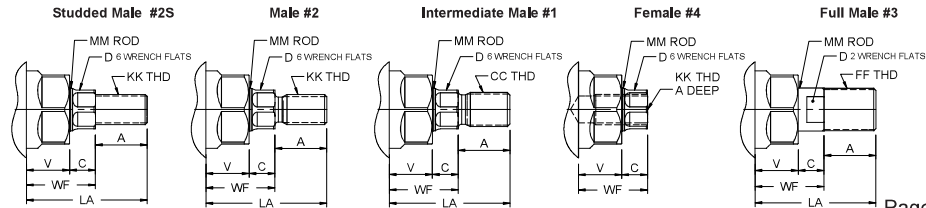
ST3T4 - Intermediate Mid Trunnion Mount  
NFPA MT4



CUSTOMER MUST SPECIFY Xi - SEE TABLE FOR MIN Xi DIMENSION

## ROD END STYLE

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



# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

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

Table 2 - Rod Dimensions

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



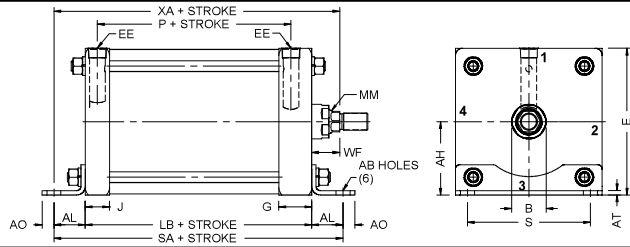
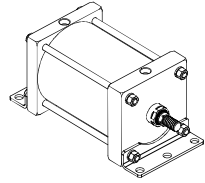
STARCYL CYLINDER CORP  
20 Ron Joye Road, Hemingway  
South Carolina, 29554  
1-877-STARCYL (782-7295)  
www.StarCyl.com

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

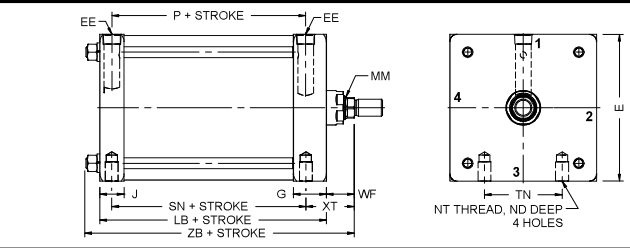
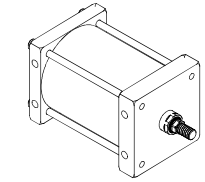
# STAR3 CYLINDERS

FOOT MOUNT  
MS1 - MS2 - MS4 - MS7

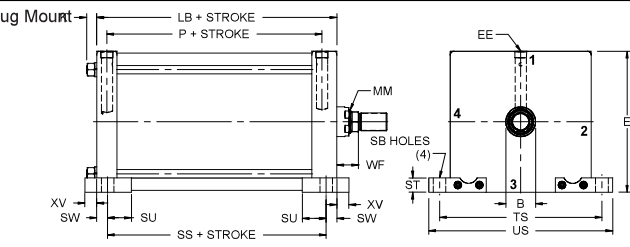
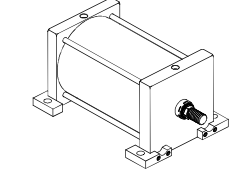
ST3S1 - Detachable Angle Mount  
NFPA MS1



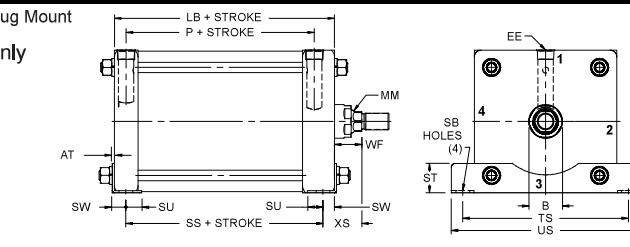
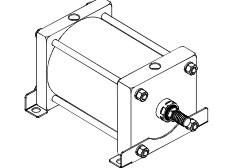
ST3S4 Side Tapped Mount  
NFPA MS4



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

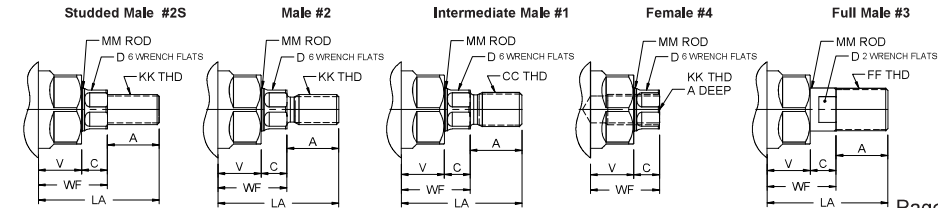


ST3X0...FA-MS2 - Detachable Side Lug Mount  
NFPA MS2 compatible  
8" bore Only



## ROD END STYLE

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



Page 36

# STAR3 CYLINDERS

7 TO 14" BORE

Table 1 - Envelope and Mounting Dimensions

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

\* Upper surface spot faced for socket head screws

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

Table 2 - Rod Dimensions

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



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Page 37

# STAR3 CYLINDERS

7 TO 14" BORE

FOOT MOUNT  
MS7

ST3S7 - End Lug Mount  
NFPA MS7

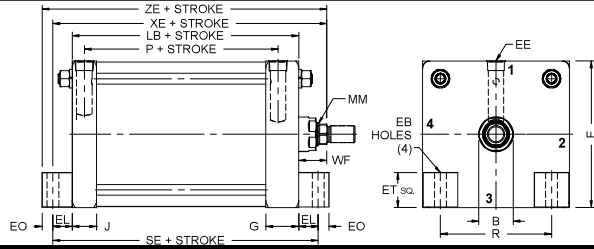
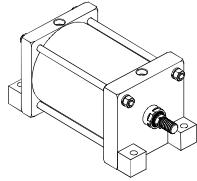


Table 1 - Envelope and Mounting Dimensions

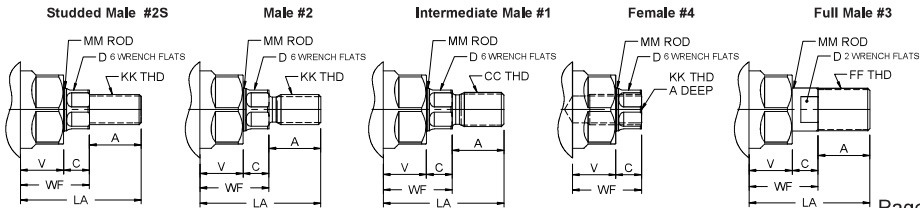
BORE	E	EE NPTF	G	J	K	R	EB	EL	EO	ET	Add Stroke		
											LB	P	SE
7.0	7.5	3/4	1 29/32	1 13/32	9/16	5.73	11/16	1 1/8	5/8	2	5 1/8	3 7/32	7 3/8
8.0	8.5	3/4	1 29/32	1 13/32	9/16	6.44	11/16	1 1/8	5/8	2	5 1/8	3 7/32	7 3/8
10	10.63	1	2 1/8	1 7/8	11/16	7.97	13/16	1 5/16	5/8	2 3/4	6 3/8	4 1/8	9
12	12.63	1	2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

Table 2 - Rod Dimensions

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

## ROD END STYLE

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



# STAR3 CYLINDERS



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# STAR3 CYLINDERS

## SPHERICAL BEARING MOUNT ST3SB - 8" to 14" Bore

### ST3SB - Fixed Spherical Mount

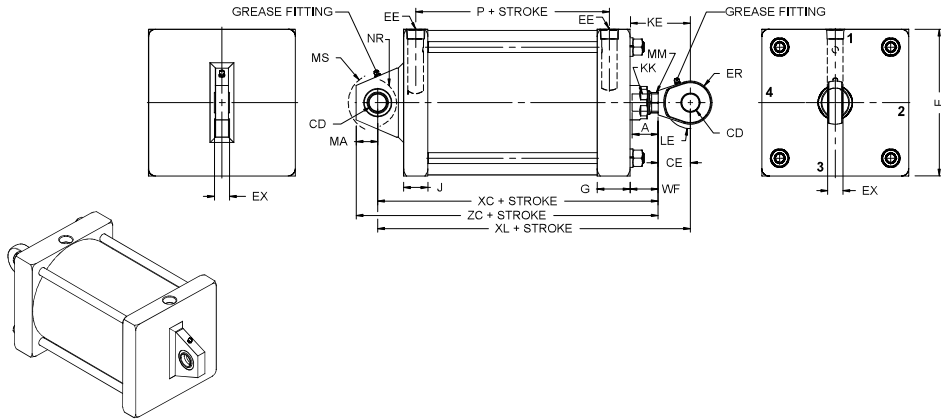


Table 1 - Envelope and Mounting Dimensions

BORE	E	EE NPTF	G	J	CD +0.00 -0.01	CE	ER	EX	LE	MA	MS	NR	Add Stroke	
													LB	P
8	8.5	3/4	1 29/32	1 13/32	1,000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	5 1/8	3 7/32
10	10.63	1	2 1/8	1 7/8	1,375	2 1/8	1 11/16	1 3/16	1 7/8	1 7/8	2 7/16	1 5/8	6 3/8	4 1/8
12	12.63	1	2 1/8	1 7/8	1,750	2 1/2	2 1/16	1 17/32	2 1/8	2 1/2	2 7/8	2 1/16	6 7/8	4 5/8
14	14.63	1	2 3/8	2 1/8	2,000	2 3/4	2 1/2	1 3/4	2 1/2	2 1/2	3 5/16	2 3/8	8 1/8	5 1/2

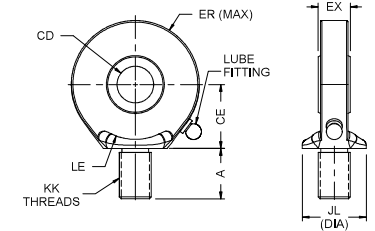
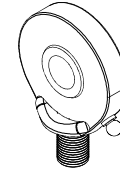
Table 2 - Rod Dimensions

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

# STAR3 CYLINDERS

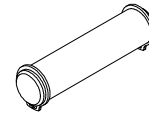
## CYLINDER ACCESSORIES SPHERICAL BEARING

### NFPA Spherical Rod Eye

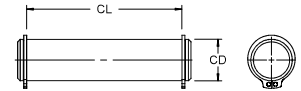


Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
6 & 8	RES-10	1,000 <sup>-0.005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	18860
10	RES-13	1,375 <sup>-0.005</sup>	2	2 1/8	1 3/16	1 11/16	1 7/8	1 1/4-12	2	28562
12	RES-17	1,750 <sup>-0.005</sup>	2 1/8	2 1/2	1 17/32	2 1/16	2 1/8	1 1/2-12	2 1/4	43005
14	RES-20	2,000 <sup>-0.005</sup>	2 7/8	2 3/4	1 3/4	2 1/2	2 1/2	1 7/8-12	2 3/4	70193

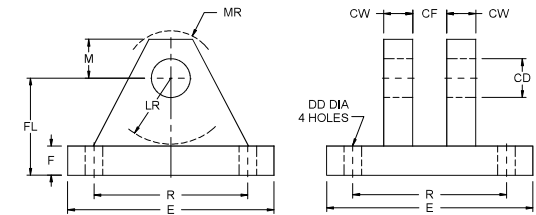
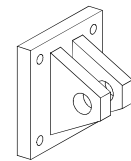
### NFPA Spherical Pivot Pin



Bore Size	Part #	CD	CL	LOAD
6 & 8	PS-10	1,000 <sup>-0.005</sup>	2 1/2	34300
10	PS-13	1,375 <sup>-0.005</sup>	3 5/16	65000
12	PS-17	1,750 <sup>-0.005</sup>	4 7/32	105200
14	PS-20	2,000 <sup>-0.007</sup>	4 15/16	137400



### NFPA SPHERICAL CLEVIS BRACKET



Bore Size	Part #	CD	CF	CW	DD	E	F	FL	LR	M	MR	R	LOAD
6 & 8	CBS-10	1-0040-002	7/8	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1	1 3/16	4,10	14300
10	CBS-13	1 3/8-0040-002	1 3/16	1	21/32	6 1/2	7/8	3 1/2	2 7/16	1 3/8	1 5/8	4,95	20322
12	CBS-17	1 3/4-0040-002	1 17/32	1 1/4	29/32	8 1/2	1 1/4	4 1/2	2 7/8	1 3/4	2 1/16	6,58	37800
14	CBS-20	2-0040-002	1 3/4	1 1/2	29/32	10 5/8	1 1/2	5 1/2	3 5/16	2	2 3/8	7,92	50375



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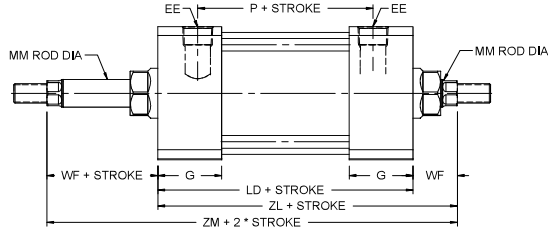
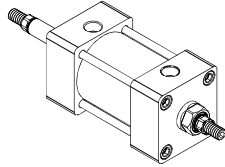


# STAR3 CYLINDERS

## DOUBLE ROD CYLINDER

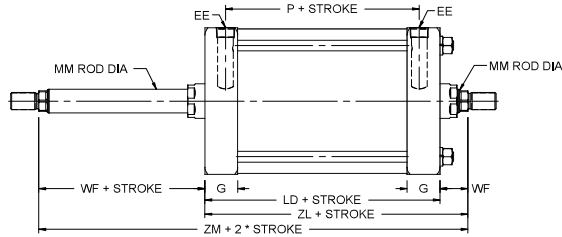
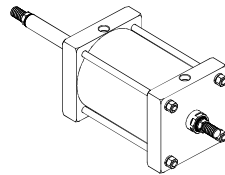
ST3DR - Double rod End Cylinder

1.5 to 6" bore



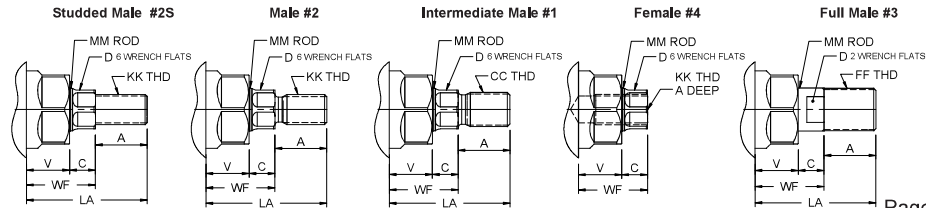
ST3DR - Double rod End Cylinder

7 to 14" bore



### ROD END STYLE

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



# STAR3 CYLINDERS

## 1.5 TO 14" BORE DOUBLE ROD

Table 1 - Envelope and Mounting Dimensions

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

Table 2 - Rod Dimensions

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



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# STAR3 CYLINDERS

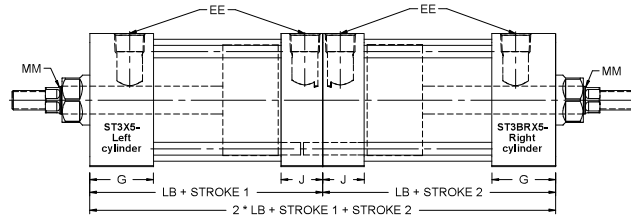
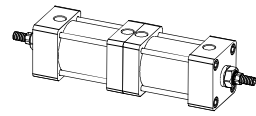
## BACK TO BACK

This Model is two cylinders mounted back to back. Each cylinder can be operated independently. The cylinders can have the same stroke or different strokes. This configuration enables you to have four positions of rods extended or retracted.

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

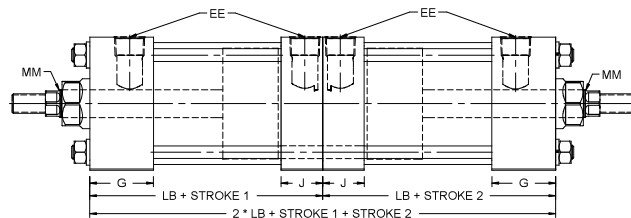
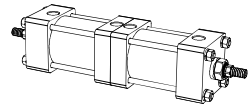
### ST3BBX5 Back To Back

Right cylinder Tie rods bolted in  
Left cylinder Cap end



### ST3BBX0 Back To Back

Single Tie rods design



### ST3BBX5F2 Back To Back

2 Cylinders bolted by rear Flange

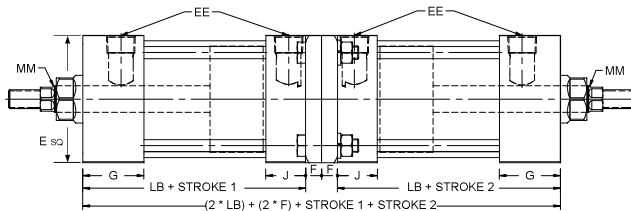
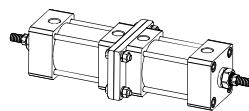


Table 1 - Envelope and Mounting Dimensions

BORE	MM	E	EE	G	J	LB	R
1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	3 5/8	1,430
2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	3 5/8	1,840
2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	3 3/4	2,190
3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	4 1/4	2,760
4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	4 1/4	3,320
5	1 & 1 3/8"	5 1/2	1/2	1 11/16	1 3/16	4 1/2	4,120
6	1 3/8 & 1 3/4"	6 1/2	3/4	1 15/16	1 7/16	5	4,880

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

# STAR3 CYLINDERS

## MULTI-POSITION

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

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

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

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

B : Breather/Vent

How to make the part number :

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

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

### ST3MPX5 Multi-position

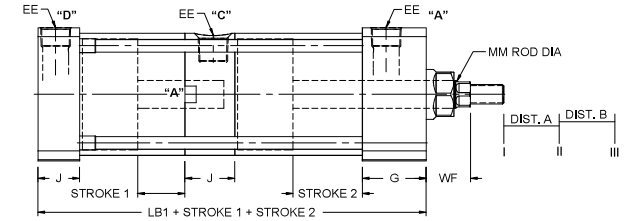
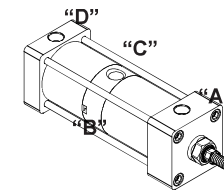


Table 1 - Envelope and Mounting Dimensions

BORE	MM	E	EE	G	J	LB1	R
1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	5 3/4	1,430
2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	5 3/4	1,840
2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	6	2,190
3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	6 3/4	2,760
4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	6 3/4	3,320
5	1 & 1 3/8"	5 1/2	1/2	1 11/16	1 3/16	7 1/4	4,120
6	1 3/8 & 1 3/4"	6 1/2	3/4	1 15/16	1 7/16	8	4,880



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# STAR3 CYLINDERS

## TANDEM CYLINDER

### TANDEM CYLINDER

The Air over Oil design is the most use of tandem cylinders today. You can use any combination of mounts available. Air provides the force to extend and retract the cylinder in the first part while the second part filled with oil provides the precise control of the stroke. By metering the flow of the hydraulic side of the cylinder, a constant velocity is achieved throughout the stroke, even at very slow speed that air cylinder typically chatter. Other Application is to double the force in Extend or Retract, by supplying air Pressure to both ports in Extend A 1&2 or Retract. B 1&2

### ST3TDE5 Tandem Cylinder

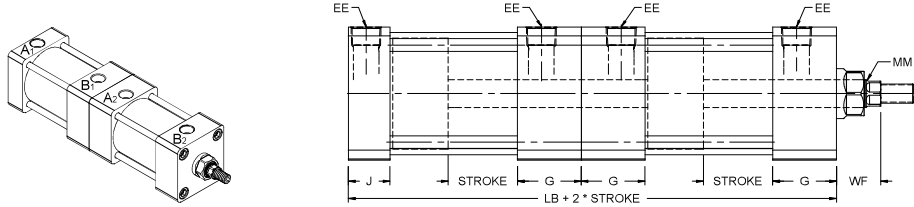


Table 1 - Envelope and Mounting Dimensions

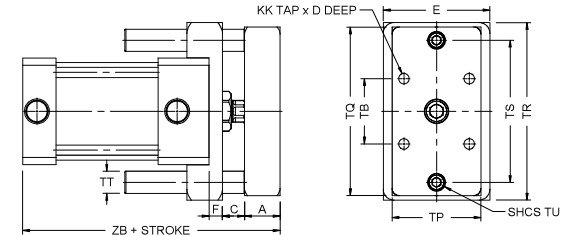
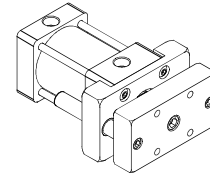
MODEL	BORE	MM	E	EE	G	J	LB	BL
ST3TD & ST3OTD	1 1/2	5/8 & 1"	2	3/8	1 7/16	15/16	3 5/8	1.430
	2	5/8 & 1"	2 1/2	3/8	1 7/16	15/16	3 5/8	1.840
	2 1/2	5/8 & 1"	3	3/8	1 7/16	15/16	3 3/4	2.190
	3 1/4	1 & 1 3/8"	3 3/4	1/2	1 11/16	1 3/16	4 1/4	2.760
	4	1 & 1 3/8"	4 1/2	1/2	1 11/16	1 3/16	4 1/4	3.320
	5	1 & 1 3/8"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

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

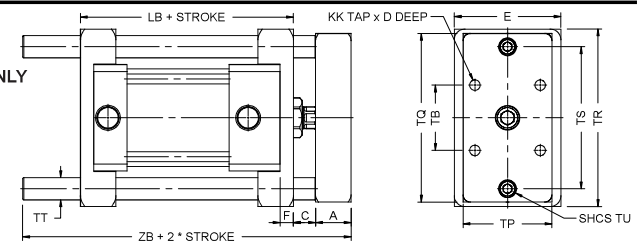
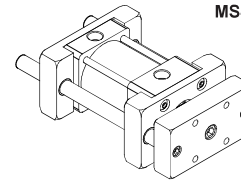
# STAR3 CYLINDERS

## NON ROTATING EXTERNAL

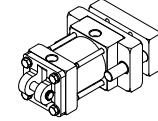
### -NRE Non Rotating External Single



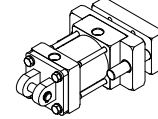
### -NRED Non Rotating External Double MS4 MOUNT ONLY



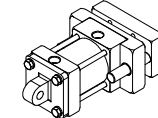
### MP2 MOUNT



### MP1 MOUNT

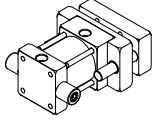


### MP4 MOUNT

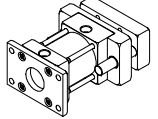


Bore	-NRE AND -NRED DIMENSIONS						
	1,5	2	2,5	3,25	4	5	6
A	1	1	1	1 1/4	1 1/4	1 1/4	1 1/2
C	5/8	5/8	5/8	3/4	3/4	3/4	7/8
D	3/4	3/4	1	1	1	1 1/4	1 1/2
E	2	2 1/2	3	3 3/4	4 1/2	5 1/2	6 1/2
F	3/8	3/8	3/8	5/8	5/8	5/8	3/4
KK	10-32	1/4-28	5/16-24	3/8-24	3/8-24	1/2-20	1/2-20
TB	1,12	1,43	1,84	2,19	2,78	3,32	4,12
TP	1 1/2	2	2 1/2	3	3 3/4	4 1/2	5 1/2
TQ	3 3/4	4 1/4	4 3/4	6 1/2	7 1/4	8 1/4	10
TR	4	4 1/2	5	6 3/4	7 1/2	8 1/2	10 1/2
TS	3	3 1/2	4	5 1/4	6	7	8 1/2
TT	5/8	5/8	5/8	1	1	1	1 3/8
TU	5/16-24	5/16-24	5/16-24	1/2-20	1/2-20	1/2-20	5/8-18
ZB	5 5/8	5 5/8	5 3/4	6 7/8	6 7/8	7 1/8	8 1/8

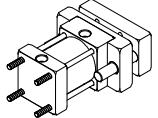
### MT2 MOUNT



### MF2 MOUNT



### MX2 MOUNT



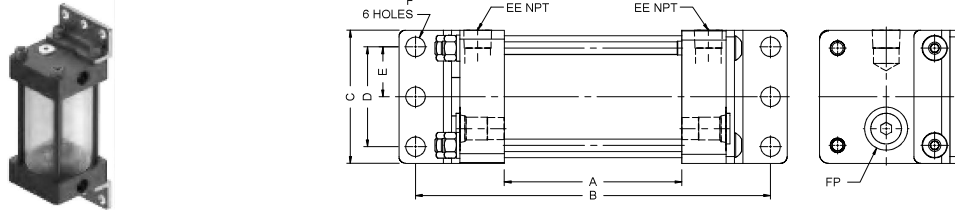
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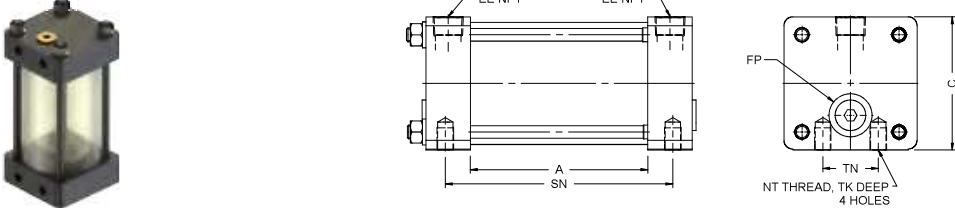
# STAR3 CYLINDERS

## AIR/OIL & AIR TANK

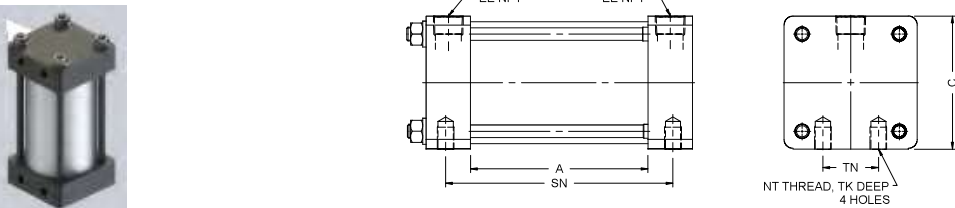
### ST3TKS1 Air/Oil Tank Angle Mount



### ST3TKS4 Air/Oil Tank Side Taped Mount



### ST3TKS4-A Air Tank Side Taped Mount



### ST3TKS1-A Air Tank Angle Mount

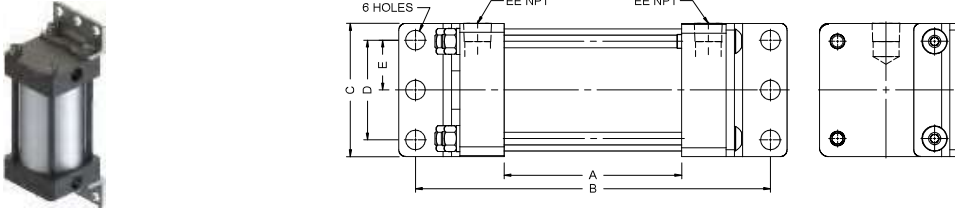


Table 1 - Envelope and Mounting Dimensions

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

HOW TO ORDER : Just use the internal length as suffix to the part number Ex: ST3TKS1-2.5X10. Min Internal length (A) with Baffles: 3" Page 48

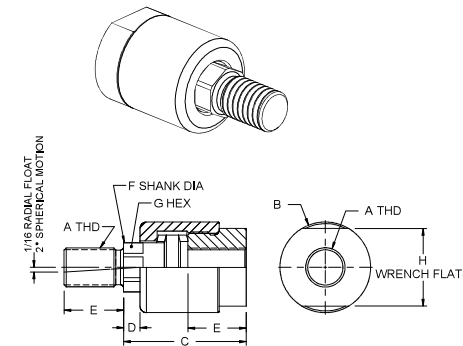
# STAR3 CYLINDERS

## ALIGNMENT COUPLER

### Linear Alignment Couplers

Star cyl'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 Star cyl couplers work equally well in "push" and "pull" applications, but they allow a greater tolerance between the cylinder center line and the mating member.

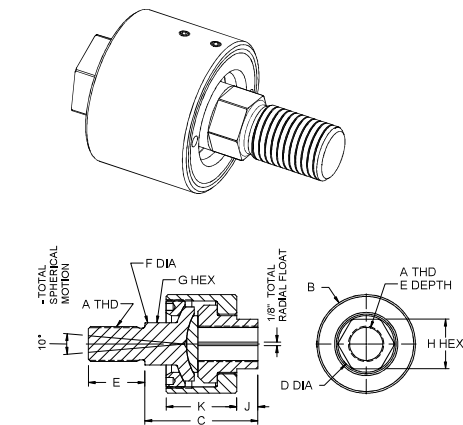
#### AC Alignment coupler - regular



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

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

#### AC Alignment coupler - Heavy Duty



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



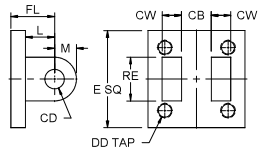
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# STAR3 CYLINDERS

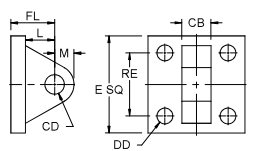
## ACCESSORIES

### NFPA CLEVIS BRACKET



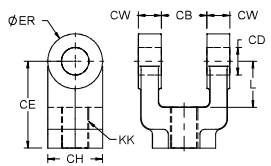
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE	USED WITH MP4
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	1.5, 2 & 2.5
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3.25, 4 & 5
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4	6, 7 & 8
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16	8,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

### NFPA EYE BRACKET



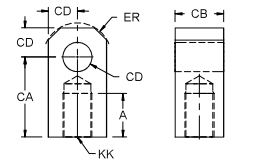
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE	USED WITH MP1 & MP2
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8	1.5, 2 & 2.5
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16	3.25, 4 & 5
EB-10	1.50	1	21/32	4 1/2	2 1/4	1 1/2	1	3 1/4	6, 7 & 8
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	1 3/8	3 13/16	8, 10 & 12
EB-17	2.50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

### NFPA ROD CLEVIS



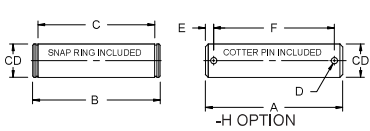
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2
RC-13	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8
RC-17	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 1/2-12	2 1/4
RC-20	2.531	2	5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

### NFPA ROD EYE



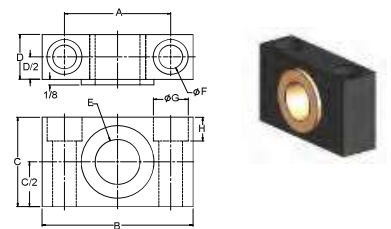
Part #	A	CA	CB	CD PIN DIA.	ER	KK
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16
RE-10	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14
RE-13	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12
RE-17	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12
RE-20	3	5	2 1/2	2	2 1/2	1 7/8-12

### NFPA PIN



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

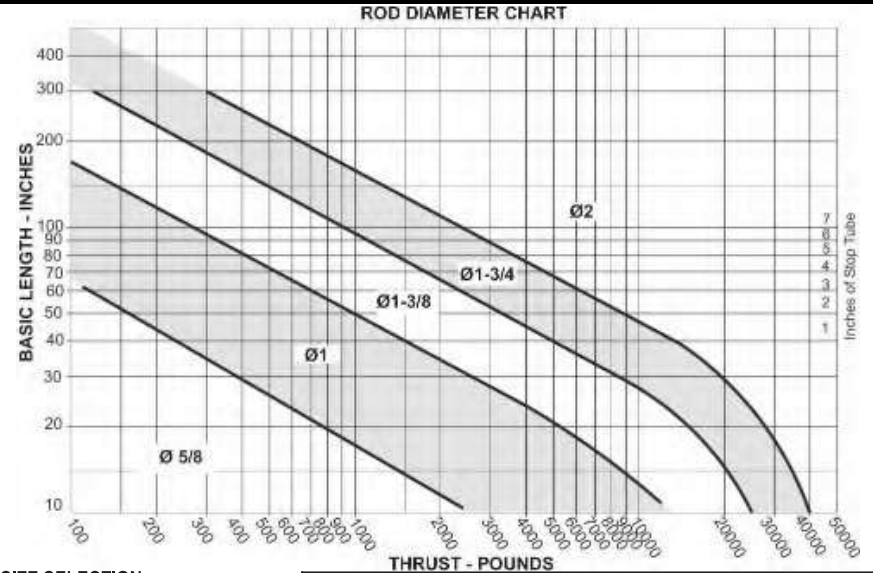
### TRUNNION BRACKET



Part #	A	B	C	D	E	F	G	H
ST3TB-1000-D	2,375	3,375	2,0	1,0	1,000	17/32	25/32	17/32
ST3TB-1375-D	4,000	5,500	3,0	2,0	1,375	25/32	1 3/16	25/32
ST3TB-1750-D								

# STAR3 CYLINDERS

## ROD 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 4) (Thrust equals bore area multiplied by the operating pressure.)
  - Select from the diagram beside the type of mounting you will use.
  - Determine the basic length by multiplying the real stroke by the stroke factor.
  - Enter the graph along the values of "basic length" and "Thrust".
- The stripe within which these lines intersect represents the minimum recommended piston rod diameter.

### STOP TUBE SELECTION

- Stop tubes are installed between the piston and the head on long stroke cylinders to reduce the load on the bearing. That, in turn, reduces bearing wear and tendency to buckle.
- To determine if a stop tube is required and, if so, its length, first determine the "basic length" from the diagram. Step 1, 2 & 3 of The Rod Selection.

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

**See Page 30 on Stop Tube Option and how to Order**

MOUNTING STYLE	ROD END CONNECTION	STROKE FACTOR
<b>Center line Mounting</b> Centerline mounting places the mounting bolts in simple shear or simple tension so that the mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and this requires accurate cylinder alignment to prevent damage to the cylinder working parts. Mountings are : MX1, MX2, MX3, MF1, MF2, ME3, ME4.	 Fixed & Rigidly Guided	0.50
	 Pivoted & Rigidly Guided	0.70
	 Supported but not Rigidly Guided	2.00
	 Unsupported	4.00
<b>Foot Mounting</b> Foot mounting secures the cylinder along its side. Since the mounting surface plane is thus not centered directly on the line of force, the mounting bolts are subjected to a significant amount of shear stress. Because foot mounts are rigid, they require accurate cylinder alignment. Mountings are : MS1, MS2, MS4, MS7.	 MT1 TRUNNION ON HEAD END Pivoted & Rigidly Guided	1.00
	 MT4 INTERMEDIATE TRUNNION Pivoted & Rigidly Guided	1.50
	 MT2 TRUNNION ON CAP END Pivoted & Rigidly Guided	2.00
	 MP1, MP2, MP4 CLEVIS ON CAP Pivoted & Rigidly Guided	2.00



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# STAR3 CYLINDERS

## OPTIONS

### Stop Tube Design

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

Star cyl supplies two types of stop tubes for air cylinders:

### Stx.xx Option

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

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

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



### STDx.xx Option

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



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

### Non Rotating Internal

Option code **NRI**

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



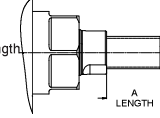
NRI GUIDE ROD SIZES AND MAX STROKE				
BORE	ROD DIA.	CUSHIONS	GUIDE ROD DIA	MAX STROKE
2	5/8 standard	N/A	.250	10"
	5/8 standard	N/A	.312	12"
2.5	1" standard	N/A	.312	12"
	1" Standard	Available	.375	18"
3.25	1 3/8" Oversize	Cap Only	.375	18"
	1" Standard	Available	.625	30"
4	1 3/8" Oversize	Available	.625	30"
	1" Standard	Available	.625	30"
5	1 3/8" Oversize	Available	.625	30"
	1 3/8" Standard	Available	.625	30"
6	1 3/4" Oversize	Available	.625	30"
	1 3/8" Standard	Available	1,000	40"
8	1 3/4" Oversize	Available	1,000	40"
	1 3/4" Standard	Available	1,000	40"
10	2" Oversize	Available	1,000	40"
	2" Standard	Available	1,000	40"
12	2 1/2" Oversize	Available	1,000	40"

# STAR3 CYLINDERS

## OPTIONS

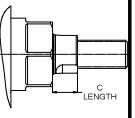
### Thread Extension

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



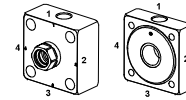
### Rod Extension

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



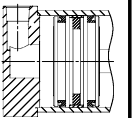
### Port & Adjustable Cushion Location

Option code **N081N081C22**  
Specify size for Head and Cap N for NPT 08 for 1/2" and location, Nxx1Nxx1C22 default,  
Non Cushion use **C00**



### Magnetic Piston

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

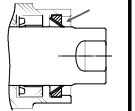


### Non Adjustable Cushion

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

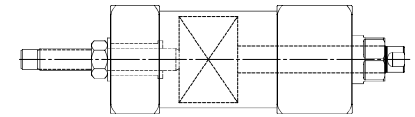
### Metallic Rod Scraper

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



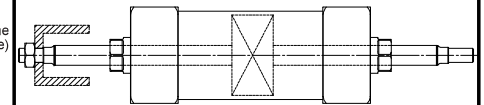
### Adjustable Stroke

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



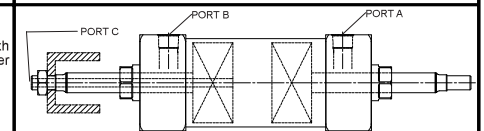
### Double rod Adjustable Stroke (Extend)

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



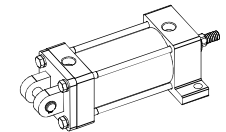
### Adjustable Mid Stroke

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



### Combination of Mounting

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



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# STAR3 CYLINDERS

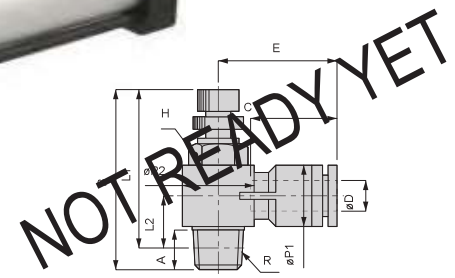
## OPTIONS

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

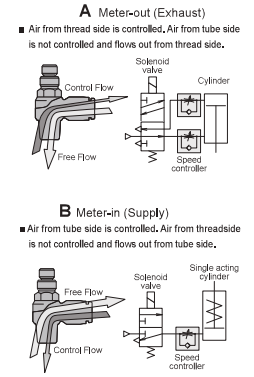
# STAR3 CYLINDERS

## OPTIONS - Flow Control STFC

### STFC - Flow Control Elbow Fittings



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



## Your Special Option

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



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



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



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



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# STAR3 CYLINDERS

## END OF STROKE SENSOR READY

### END OF STROKE SENSOR PREP

#### How it Works

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

Option Code H(xx) & GS(xx)

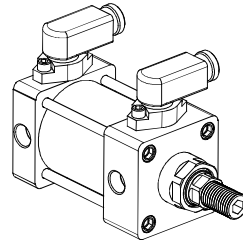
End of Stroke Sensors are simple and built to last. With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!

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

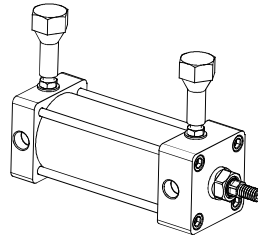
#### Options Available

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

Option Code H



Option Code G



# STAR3 CYLINDERS

## SWITCHES

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

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

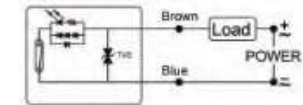
### Switch specifications

Switch part Number	862-004	862-33	862-33
Spec	Reed switch, MOV, LED	Electronic Sensor, LED, Sourcing - Load dependent	Electronic Sensor, LED, Sinking - Load dependent
Cable Length	9 ft PVC Cable		
Max operating Voltage	120 AC/DC	5-30 VDC	5-30 VDC
Switching Current	5 to 500 mA	100 mA Max	0,5 Amp Max
Switching Power	10 Watts Max.	3 Watts Max.	12 Watts Max.
Switching Speed	0,5 µs operate 0,1 µs release	1,5 µs operate 0,5 µs release	0,5 µs operate 0,1 µs release
Voltage Drop	3,5 Volts	0,6 Volts	1,0 Volts
Operating Temperature Range	+10° to 70° C (14° to 158° F)		
Switch Function	Normally Open	Normally Open PNP output	Normally Open NPN output
Shock	Up to 30G (300 m/s <sup>2</sup> )	Up to 50G (500 m/s <sup>2</sup> )	Up to 50G (500 m/s <sup>2</sup> )
Vibration	90 m/s <sup>2</sup> (9G) Double Amplitude 1,5mm	90 m/s <sup>2</sup> (9G) Double Amplitude 1,5mm	90 m/s <sup>2</sup> (9G) Double Amplitude 1,5mm
Ingress Protection***	IP 69 K		

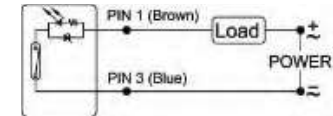
\*\*\*IP Scale : Rating based on their ability to withstand the intrusion of solids and liquids, first number indicates how dustproof a product is, ranging from 0 to 6. The second number indicates how watertight a product is, ranging from 0 to 9. The addition of a 'K' after the second digit signifies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

### Circuit & Connect Diagram Reed

862-04



862-04-Q08



### Circuit & Connect Diagram Hall Effect

862-33 and 862-33-Q08



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

### External Protect Circuit



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

### How To Order

Order Clamp Separately see below

#### 862 - 04 - Q08

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

#### Clamp

862-ABC	Tie Rod Clamp - Valid for 1.5" to 8" bore
862-AB0	Tie rod clamp valid for 1,5" to 4" bore only

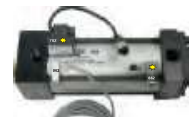
#### 862-ABC Clamp Style



#### 862-AB0 Clamp Style



### Other Style Available



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# STAR3 CYLINDERS

## STAR3 PARTS AND ASSEMBLY

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

NOT READY YET

# STAR3 CYLINDERS

## STAR3 WEIGHT CHART

NOT READY YET

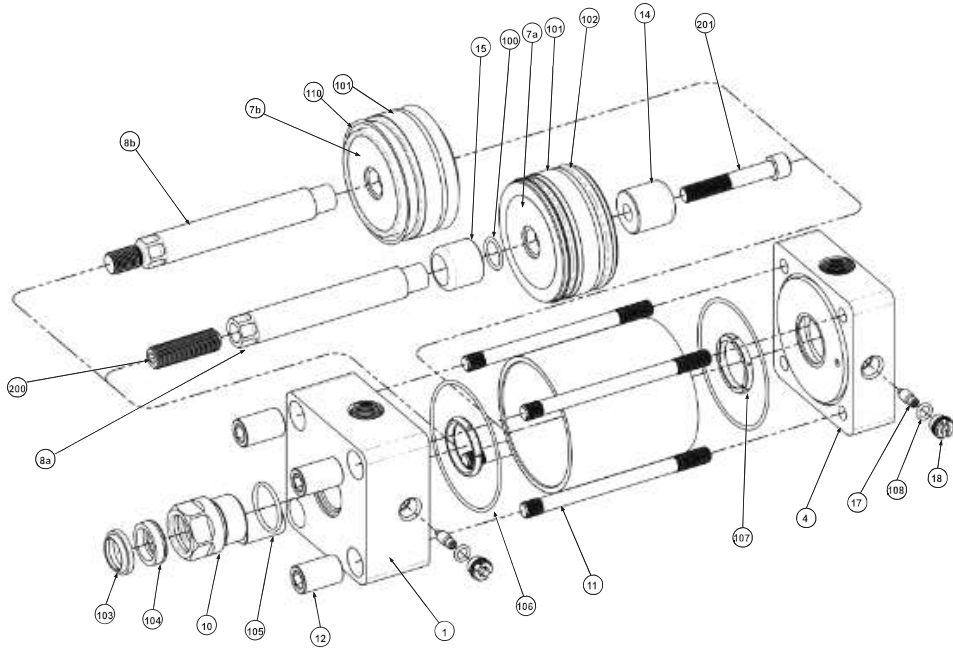


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STARCYL CANADA INC  
 2340 Michelin Street, Laval  
 Quebec, Canada, H7L 5C3  
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# STAR3 CYLINDERS

## STAR3 PARTS AND ASSEMBLY



SYMBOL	DESCRIPTION	QTY	PART NUMBER	ASSEMBLY PART NUMBER	In the assembly
1	Head	1	3-bb01 X 6m-NxxCxx		
2	Tubing	1	3-bb02 X ss,ss		
4	Cap	1	3-bb04 - NxxCxx		
7a	Piston PLU with Cushions	1	3-bb07 X ss,ss -C22-PLU		
7b	Piston PBS with Cushions		3-bb07 X ss,ss -C22-PBS		
7c	Piston PLU Non Cushion		3-bb07 X ss,ss -C00-PBS		
8a	Rod female for cushions	1	3-bb09-ss,ss-#4-C22		
8b	Rod Male for cushions		3-bb09-ss,ss-#2-C22		
8c	Rod female Non-cushion		3-bb09-ss,ss-#-C00		
10	Gland for RLU (cast iron starlite)	1	3-bb10		
11	The Rod	4	3-bb11		
12	Sleeve Nut	4	3-bb12		
14	Front spud	1	3-bb14		
15	Rear Spud	1	3-bb15		
	Needle Valve Assembly	2		3-bb17-00	17 + 18 + 108
17	Needle		3-bb17		
18	Retainer		3-bb18		
100	O-ring Piston	1			
102	Wear Ring	1			
102	Piston Lip Type u-cup (urethane) PLU	2			
103	Wiper (urethane)	1			
104	Rod Lip Type (urethane) RLU	1			
105	O-ring gland	1			
106	O-ring end tube	2			
107	Cushion check seal	2			
108	O-ring Needle Valve	2			
200	Piston/rod S.H.C. Screw	1			
201					
202					

# STAR3 CYLINDERS

## STAR3 WEIGHT CHART

### WEIGHT CHART - SINGLE ROD END

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



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# STAR3 CYLINDERS

## HOW TO ORDER

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

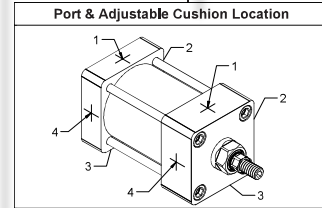
Bore\* Stroke\* Rod Dia\*

FEATURE	DESCRIPTION	SYMBOL
SERIES	Used in All ST3 part number	ST3

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

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

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



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

# STAR3 CYLINDERS

## HOW TO ORDER

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

FEATURE	DESCRIPTION	SYMBOL
Head Port	NPT Port	N
	SAE Straight Thread O-ring Port	S
	British Parallel	G
	British Tapered	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	N
	SAE Straight Thread O-ring Port	S
	British Parallel	G
	British Tapered	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	Head Non Cushion, Cap Non Cushion	C00
	Head Cushion Only (where x = position 1,2,3,4)	Cx0
	Cap Cushion Only (where x = position 1,2,3,4)	C0x
	Non Adjustable Cushion	CNN
	Cushion both ends (where x = position 1,2,3,4)	Cxx

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

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

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

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

Finish Anodized Black	FA

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



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**STAR 1 SERIES**

SPACE SAVING MULTI-STAGES AIR CYLINDER

MAY THE FORCE BE WITH YOU!

**STAR1 - Multistage Upgradable air cylinders**

**STAR2 SERIES**

SPACE SAVER NIFPA STYLE MOUNT

- Bore size from 1 1/2" to 10"
- Stroke up to 47"
- Save Space up to 30% over other brands
- 250 PSI AIR OIL
- Two Year Warranty
- Economic design

**STAR2 - NIFPA style Mount spacesaver air cylinders**

**SO - Space One, Spacesaver Air Cylinder**

**SO - Space One, Spacesaver Air Cylinder**

**ST3RL option**

NIFPA ROD LOCK CYLINDER

FEATURES	BENEFITS
No Rod Displacement on Engagement	Maintains Accurate Positioning
Large Clamping Surface	Consistent Clamping Force
IP67 Rated (exceeds NEMA 4X)	Suitable for Wash-Down Areas
Fast Response Time	High Cycle Rate, Accuracy
Extremely Low Backlash	Precision Holding
Spring-Engaged Units	Holds Load During Power/Pressure Loss
Rated for 2,750,000 Cycles	Long Maintenance-Free Life
4 bar (50 psi) Release Pressure	Compact Unit, Easy Integration
	Broad Application

**ST3RL - NIFPA Rod Lock for STAR3 air cylinders**

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

MEDIUM DUTY HYDRAULIC & HEAVY DUTY PNEUMATIC

STEEL CONSTRUCTION

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

**STAR6 SERIES**

HEAVY DUTY Hydraulic Cylinders

HEAVY DUTY SERVICE INDUSTRIAL TIE ROD CONSTRUCTION

NOMINAL PRESSURE: 3000 PSI

STANDARD BORE SIZES 1.5" THROUGH 8"

PISTON ROD DIAMETERS 3/8" THROUGH 1.125"

18 STANDARD MOUNTING STYLES

STARITE™ AVAILABLE ON ALL STEEL PARTS

**STAR6 - Heavy Duty NIFPA interchangeable Hydraulic cylinders, 3000 psi**

**M3 SERIES**

MULTI-STAGES

MULTI-STAGES NIFPA STYLE MOUNT HEAVY DUTY - HIGH FLOW

NOMINAL PRESSURE: AIR 250 PSI

STANDARD BORE SIZES 1.5" THROUGH 10"

STROKE UP TO 12"

NIFPA STYLE MOUNT

TWO-YEAR WARRANTY

**M3 - Heavy Duty NIFPA Multi-stages air cylinders High Flow**

**STMM**

ISOMETRIC SERIES

AIR CYLINDER ISO 6032 & 15552

ISO 6032 & 15552

**STMM - Isometric series ISO 6432 & 15552 Air Cylinder**

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YOUR STARCYL DISTRIBUTOR:

**877-STARCYL**

Catalog Version: **STAR3-R04**  
Mar 15, 2023

## AIR CONTROLS AND PROGRAMMING



# NFPA ROD LOCK CYLINDER

### CYLINDER MOUNTING

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

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

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

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

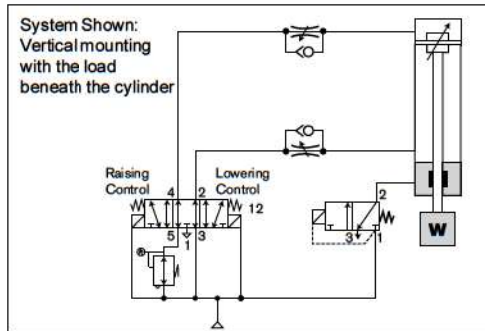
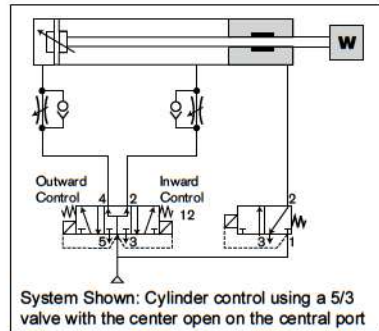
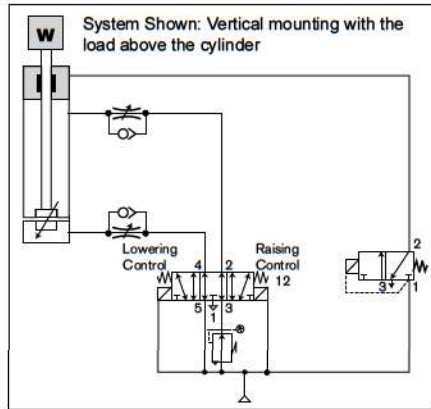
A normally closed (NC) solenoid valve directs air supply to the rod lock, keeping it disengaged until the electrical signal is interrupted.

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

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

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

Minimum release pressure = 60 psi  
Maximum pressure = 120 psi



## ST3RL option



### FEATURES

- No Rod Displacement on Engagement
- Large Clamping Surface
- IP67 Rated [exceeds NEMA 4X]
- Fast Response Time
- Extremely Low Backlash
- Spring-Engaged Units
- Rated for 2,750,000 Cycles
- 4 bar [60 psi] Release Pressure

### BENEFITS

- Maintains Accurate Positioning
- Consistent Clamping Force
- Suitable for Wash-Down Areas
- High Cycle Rates, Accuracy
- Precision Holding
- Holds Load During Power/Pressure Loss
- Long, Maintenance-Free Life
- Compact Unit, Easy Integration
- Broad Application

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

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

ST3RL-MA05

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CHAMPLAIN, NY  
PH: 877-STARCYL (782-7295)  
FAX: 630-282-7142

### Precision Operation Maintains Accurate Positioning

The ST3RL series of Rod Locks guarantees accurate positioning and provides precision holding while other operations are performed. The Rod Lock engages without causing any rod displacement, and also features extremely low backlash during operation, making them ideal for precision applications.

### Large Clamping Surface Ensures Consistent Performance

The ST3RL line is designed with a large clamping surface that provides uniform force to the rod contact area on every engagement. The clamping mechanism utilizes numerous ball bearings to reduce friction and has close to a 3,000,000 cycle life.

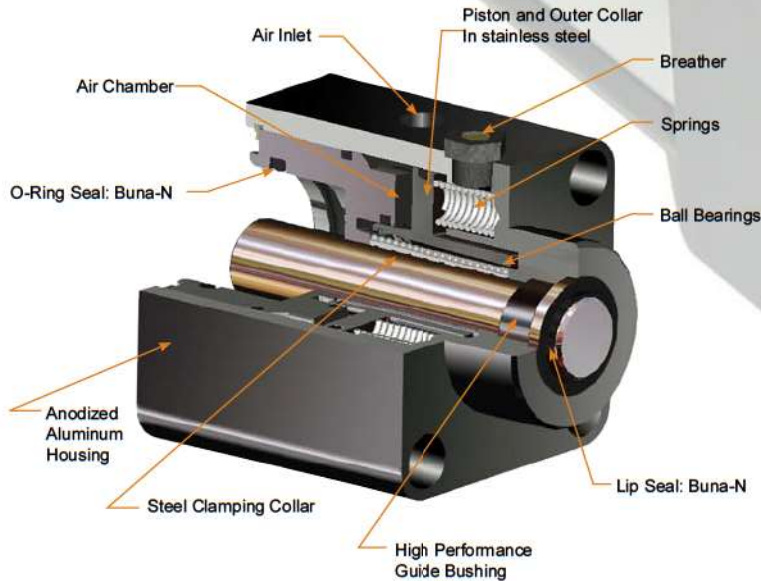
### Spring-engaged Units Engage in Power-off Situations

Starcy's Cylinder Rod Locks are spring-engaged, so they operate even in power-off situations to promote safety for operators and machinery. The fast response time of these spring-engaged products also increases positioning accuracy.

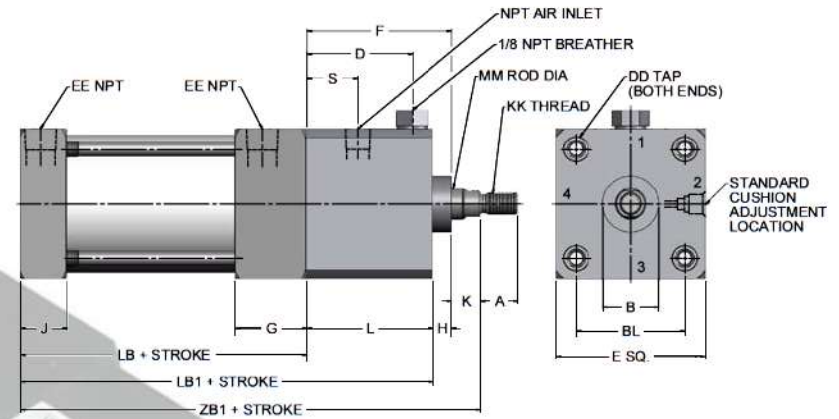
### Sealed to Withstand Harsh Environments

Every ST3RL Rod Lock is sealed to protect internal components. These seals are designed to withstand even harsh wash-down environments and are IP67 rated (exceed NEMA 4X rating).

## ROD LOCK CUTAWAY



## CYLINDER ROD LOCK BASIC DIMENSIONS



EXAMPLE : ST3 RL F1-1.5X4-#2 is a 1.5" bore, 4" stroke Front Flange Mount, 5/8" rod, 7/16-20 Male rod end, Both ends cushion.  
(see STAR 3 - NFPA air cylinders series catalog for more details)

BORE	1.5"	2"	2.5"	3.25"	4	5	6
<b>Holding Force</b>	180 lbs	314 lbs	491 lbs	830 lbs	1300 lbs	2000 lbs	2850 lbs
A	3/4	3/4	3/4	1-1/8	1-1/8	1-1/8	1-5/8
B	1.123 <sup>+0.001</sup>	1.123 <sup>+0.001</sup>	1.123 <sup>+0.001</sup>	1.498 <sup>+0.001</sup>	1.498 <sup>+0.001</sup>	1.498 <sup>+0.001</sup>	1.998 <sup>+0.001</sup>
BL	1.43	1.84	2.19	2.78	3.32	4.12	4.88
DD (thread x depth)	1/4-28 x 3/8	5/16-24 x 3/8	5/16-24 x 3/8	3/8-24 x 1/2	3/8-24 x 1/2	1/2-20 x 5/8	1/2-20 x 3/4
E	2.00	2.50	3.00	3.75	4.50	5.50	6.50
EE	3/8	3/8	3/8	1/2	1/2	1/2	3/4
G	1-1/2	1-1/2	1-1/2	1-3/4	1-3/4	2	2
J	1	1	1	1-1/4	1-1/4	1-1/2	1-1/2
KK	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16	3/4-16	1-14
LB	3-5/8	3-5/8	3-5/8	4-1/4	4-1/4	4-1/2	5
MM	5/8	5/8	5/8	1	1	1	1-3/8
V	5/8	5/8	5/8	7/8	7/8	7/8	1
D	1.95	2.08	2.13	2.99	2.99	2.99	3.54
F	2.77	2.80	2.91	4.48	4.48	4.69	5.36
H	0.375	0.375	0.375	0.500	0.500	0.500	0.625
K	0.788	0.703	0.585	0.899	0.899	0.686	0.760
L	2.337	2.422	2.540	3.976	3.976	4.189	4.740
S	0.91	1.02	1.02	1.56	1.56	1.56	1.68
NPT	1/8	1/8	1/8	1/4	1/4	1/4	3/8
LB1	5.962	6.047	6.290	8.226	8.226	8.689	9.740
ZB1	7.125	7.125	7.250	9.625	9.625	9.875	11.125

oversize rods are also available ask factory

## OTHER MOUNTINGS AVAILABLE (SEE STAR3 CATALOG)





**MEDIUM DUTY HYDRAULIC  
&  
HEAVY DUTY PNEUMATIC**



**ST5 - HYDRAULIC MEDIUM DUTY SERVICES  
ST4 - PNEUMATIC HEAVY DUTY SERVICES  
INDUSTRIAL TIE ROD CONSTRUCTION**

**ST4 AIR SERIES  
ST5 OIL SERIES**

**STANDARD BORE SIZES 1.5" THROUGH 8"  
PISTON ROD DIAMETERS 5/8" THROUGH 5-1/2"  
20 STANDARD MOUNTING STYLE  
STARNITE AVAILABLE ON EVERY STEEL PARTS**

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

### Cylinder Design Features

#### Piston Rod ●

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)

#### Wiper ●

The Urethane 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 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. Optional at extra charge. 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 urethane piston seals are pressure energized and wear compensating for low friction and long life (temperature: -50° to 230°F)

#### Piston Wear Ring ●

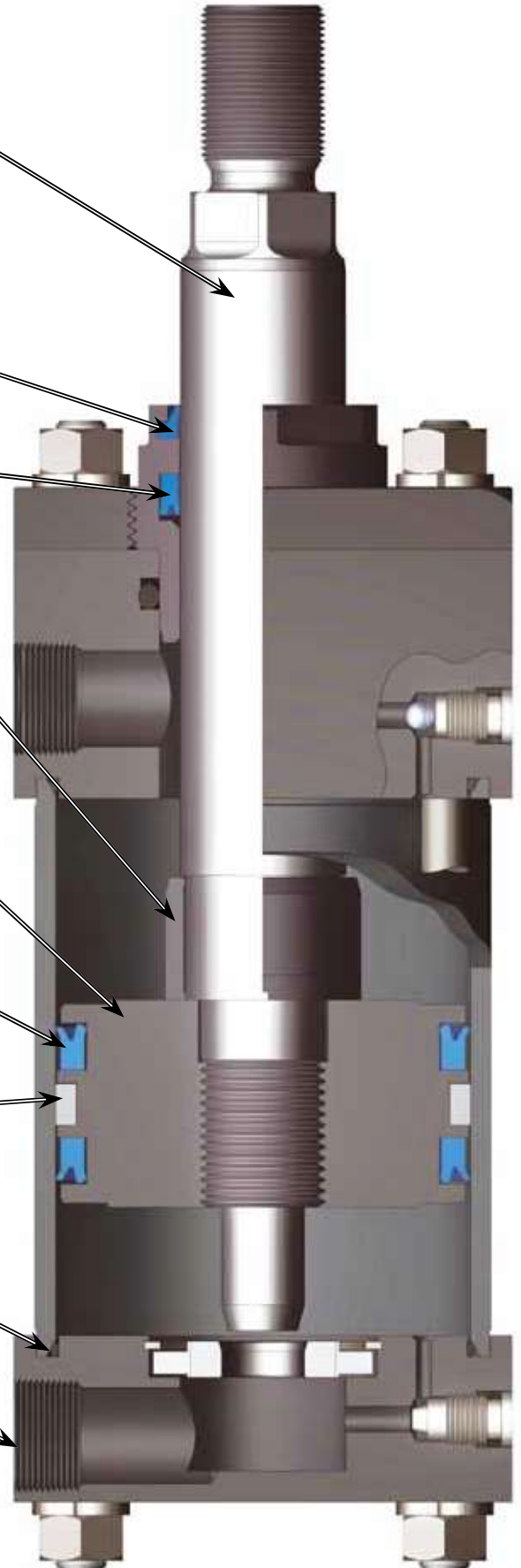
Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

#### O-ring Tube End Seals ●

Nitrile O-ring design is pressure compensating and reusable. Pressure-actuated cylinder body-to-head and cap

#### Porting ●

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

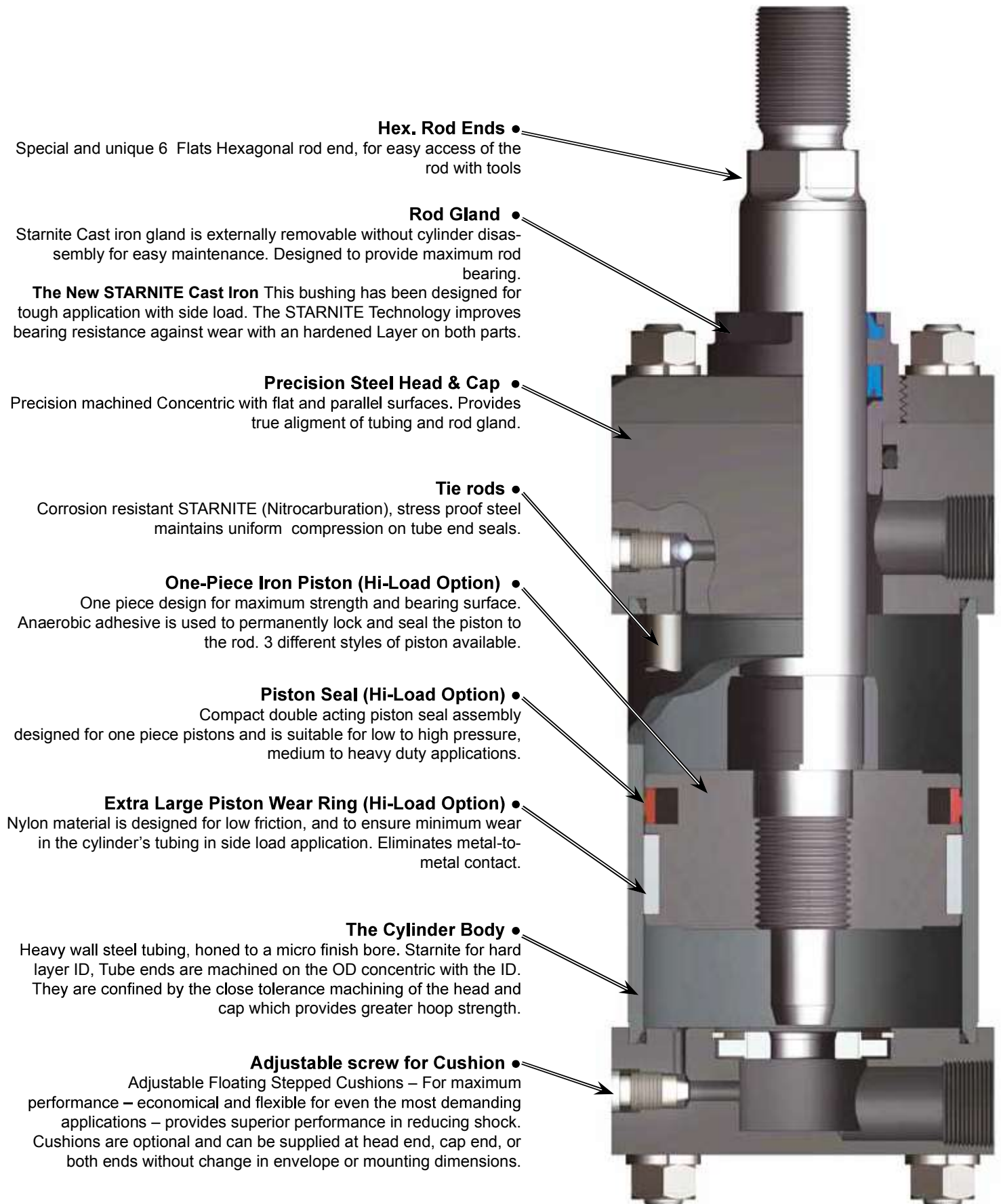


\*All Blue seals can withstand most chemical washdown, No Fluorocarbon Required



# ST5 SERIES

## Medium Duty Hydraulic Cylinders



**Hex. Rod Ends ●**

Special and unique 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.

**Tie rods ●**

Corrosion resistant STARNITE (Nitrocarburation), stress proof steel maintains uniform compression on tube end seals.

**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.

**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. Starnite for hard layer ID, 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.

**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.

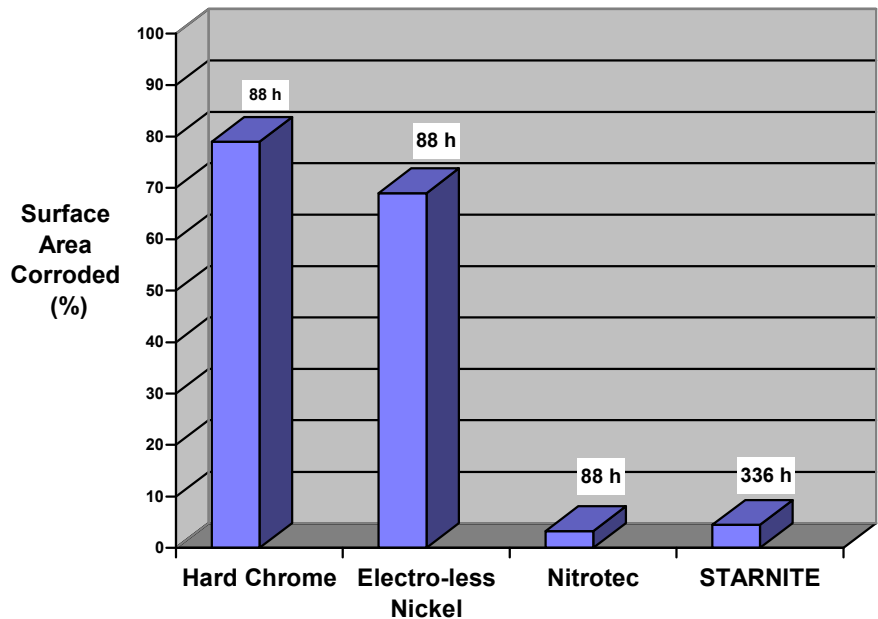
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitride layer consisting of a monophase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating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

- Chrome plate can flake and blister.
- Flakes and slivers will destroy seals and glands.
- Loose chrome will cause massive leaking and rapid system failure.
- Chrome lacks dimensional uniformity.

### STARNITE Process on cylinders

- Superior corrosion resistance.
- Improved wear resistance.
- Better lubrication retention.
- Dent resistance without induction hardening.
- Environmentally Friendly
- No surface pitting, flaking, or hydrogen embrittlement.
- INCREASED SERVICE LIFE.

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Specification & Mountings

### Standard Specifications

Medium Duty Service – ANSI/(NFPA) T3.6.7R2 - 1996  
 Specifications and Mounting Dimension Standards  
 Standard Construction: Square Head, Tie Rod Design  
 Nominal Pressure : 1000 PSI Dependent on Bore Size\*  
 Standard Fluid: Hydraulic Oil  
 Standard Temperature :-40°F to +230°F\*\*  
 Bore Sizes from 1.5" through 8"  
 Piston Rod Diameter from 5/8" through 5-1/2"

Mounting Styles: 20 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 32, 33 and 34 For Spherical Bearing Mount Style ST5SB.

\* See page 29 for recommended operating pressure.  
 \*\* See page 35 Viton seals for higher temperature service.

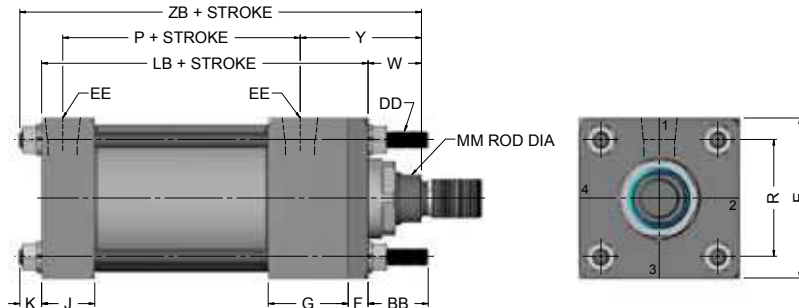
Tie rods Head end ST5X3  NFPA MX3 page 6 & 20	Tie rods Cap end ST5X2  NFPA MX2 page 6 & 20	Tie rods Extended Both ends ST5X1  NFPA MX1 page 6 & 20	Head Rectangular Flange ST5F1  NFPA MF1 page 6
Head Square Flange ST5F5  NFPA MF5 page 8	Cap Rectangular Flange ST5F2  NFPA MF2 page 6	Cap Square Flange ST5F6  NFPA MF6 page 8	Side Lug ST5S2  NFPA MS2 page 10 & 22
Centerline Lugs ST5S3  NFPA MS3 page 10 & 22	Side Tap ST5S4  NFPA MS4 page 12 & 22	Side End Lugs ST5S7  NFPA MS7 page 12 & 24	Head Trunnion ST5T1  NFPA MT1 page 14 & 26
Cap Trunnion ST5T2  NFPA MT2 page 14 & 26	Intermediate Fixed Trunnion ST5T4  NFPA MT4 page 14 & 26	Cap Fixed Clevis ST5P1  NFPA MP1 page 16 & 24	Cap Detachable Clevis ST5P2  NFPA MP2 page 16
Head Rectangular Mount ST5E5  NFPA ME5 page 18	Head Square FLange ST5E3  NFPA ME3 page 20	Cap Square FLange ST5E4  NFPA ME4 page 20	Double Rod Cylinders ST5D  page 18

**Tie Rod and Rectangular Flange Mountings**  
1 1/2 to 6" Bore Sizes

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

**Tie Rods Extended**  
Style ST5X3  
(NFFA Style MX3)



Style ST5X3 (NFFA MX3) Head Tie Rods Extended, illustrated: Style ST5X2 (NFFA MX2), Cap Tie Rods Extended; and Style ST5X1 (NFFA MX1), Both Ends Tie Rods Extended are also available. All "ST5X" styles can be dimensioned from Style ST5X3 drawing at right. Basic Mounting ST5X0 — NFFA MX0 — no tie rods extended can be supplied upon request.

**Head Rectangular Flange**  
Style ST5F1  
(NFFA Style MF1)

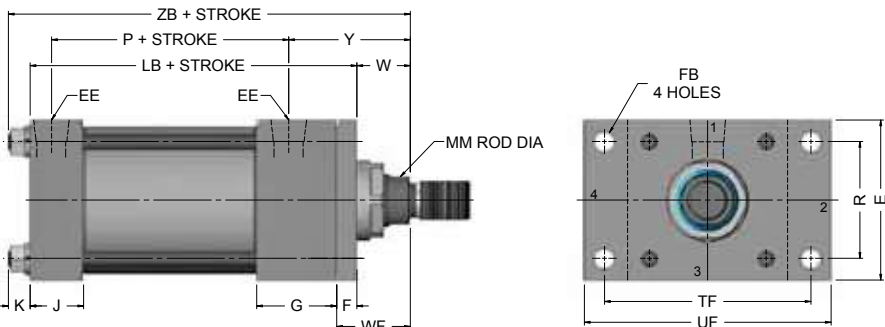


Bore Size	Max PSI — Push*				
	Rod Size				
1 1/2	1400	850	-	-	-
2	850	1050	450	-	-
2 1/2	700	700	500	350	-
3 1/4	-	1300	1300	1000	900
4	-	900	900	900	900
5	-	600	800	600	700
6	-	-	700	700	700

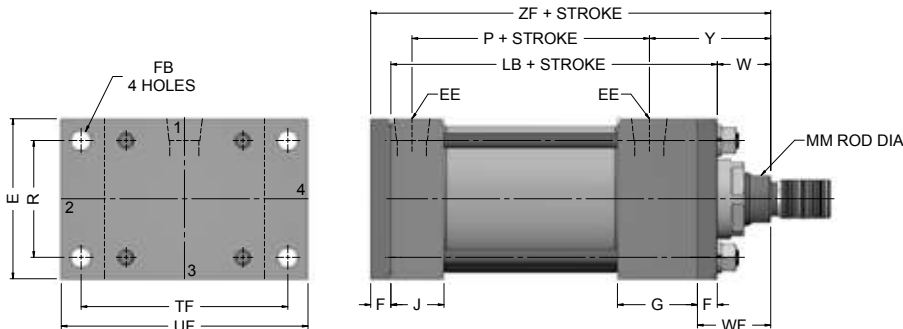
  

Bore	Rod size			
	2 1/2	3	3 1/2	4
4	700	-	-	-
5	600	450	400	-
6	700	650	600	450

\* Maximum pressure rating — push application.

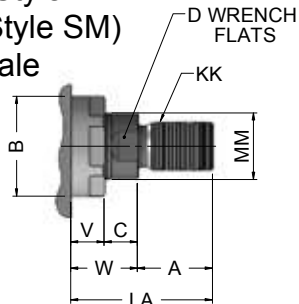


**Cap Rectangular Flange**  
Style ST5F2  
(NFFA Style MF2)

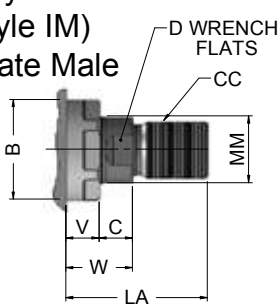


**Rod End Dimensions—see table 2**

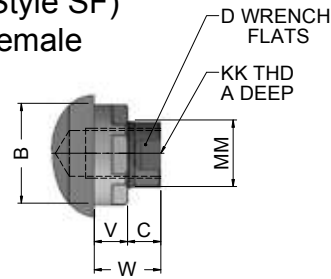
**Thread Style #2**  
(NFFA Style SM)  
Small Male



**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.

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

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

Table 1—Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
					NPTF*	SAE**									LB	P
1 1/2	2.02	1	1/4-28	2	3/8	6	3/8	5/16	1 1/2	1	1/4	1.43	2 3/4	3 3/8	4	2 1/4
2	2.60	1 1/8	5/16-24	2 1/2	3/8	6	3/8	3/8	1 1/2	1	5/16	1.84	3 3/8	4 1/8	4	2 1/4
2 1/2	3.10	1 1/8	5/16-24	3	3/8	6	3/8	3/8	1 1/2	1	5/16	2.19	3 7/8	4 5/8	4 1/8	2 3/8
3 1/4	3.90	1 3/8	3/8-16	3 3/4	1/2	10	5/8	7/16	1 3/4	1 1/4	3/8	2.76	4 11/16	5 1/2	4 7/8	2 5/8
4	4.70	1 3/8	3/8-16	4 1/2	1/2	10	5/8	7/16	1 3/4	1 1/4	3/8	3.32	5 7/16	6 1/4	4 7/8	2 5/8
5	5.80	1 13/16	1/2-20	5 1/2	1/2	10	5/8	9/16	1 3/4	1 1/4	7/16	4.10	6 5/8	7 5/8	5 1/8	2 7/8
6	6.90	1 13/16	1/2-20	6 1/2	3/4	12	3/4	9/16	2	1 1/2	7/16	4.88	7 5/8	8 5/8	5 3/4	3 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke					
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	WF	Y	XF	ZB	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	1	1 15/16	4 5/8	4 7/8	5
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5	5 1/4	5 3/8	
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	1 15/16	4 5/8	4 15/16	5
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5	5 5/16	5 3/8	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	1 5/8	2 9/16	5 1/4	5 9/16	5 5/8	
2.5		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	1 15/16	4 3/4	5 1/16	5 1/8
	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5 1/8	5 7/16	5 1/2
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	1 5/8	2 9/16	5 3/8	5 11/16	5 3/4	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	1 7/8	2 13/16	5 5/8	5 15/16	6	
3.25	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1	1 15/16	4 3/4	5 1/16	5 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	1 5/8	2 11/16	5 7/8	5 1/4	6 1/2	
	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 7/8	2 15/16	6 1/8	6 1/2	6 3/4	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/4	6 5/8	6 7/8	
4		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1	1 15/16	4 3/4	5 1/16	5 1/8
	std	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 5/8	2 11/16	5 7/8	5 1/4	6 1/2
	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 7/8	2 15/16	6 1/8	6 1/2	6 3/4	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/4	6 5/8	6 7/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 1/4	3 5/16	6 1/2	6 7/8	7 1/8	
5		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 3/8	2 7/16	5 7/8	6 5/16	6 1/2
		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 5/8	2 11/16	6 1/8	6 9/16	6 3/4
	std	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 7/8	2 15/16	6 3/8	6 13/16	7
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/2	6 15/16	7 1/8
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8
6		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	1 5/8	2 11/16	6 5/8	7 1/16	7 3/8
	std	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	1 7/8	3 1/16	6 7/8	7 5/16	7 5/8
		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	2	3 1/16	7	7 7/16	7 3/4
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8

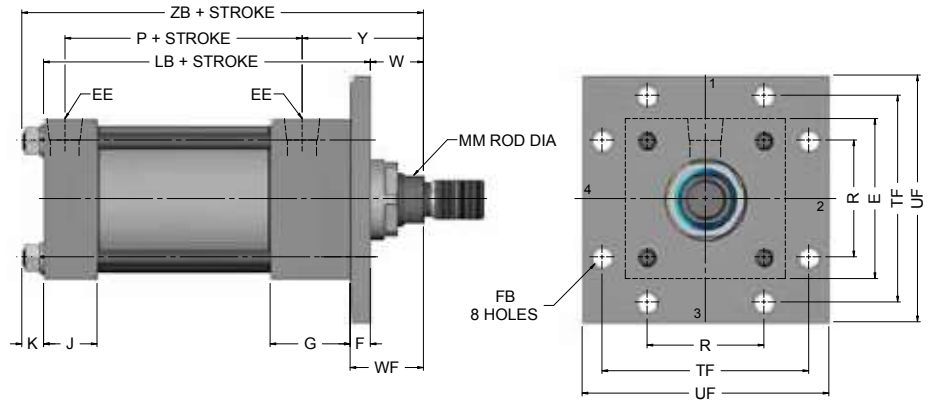
Table 3—Envelope and Mounting Dimensions

Square Flange Mountings  
1 1/2 to 6" Bore Sizes

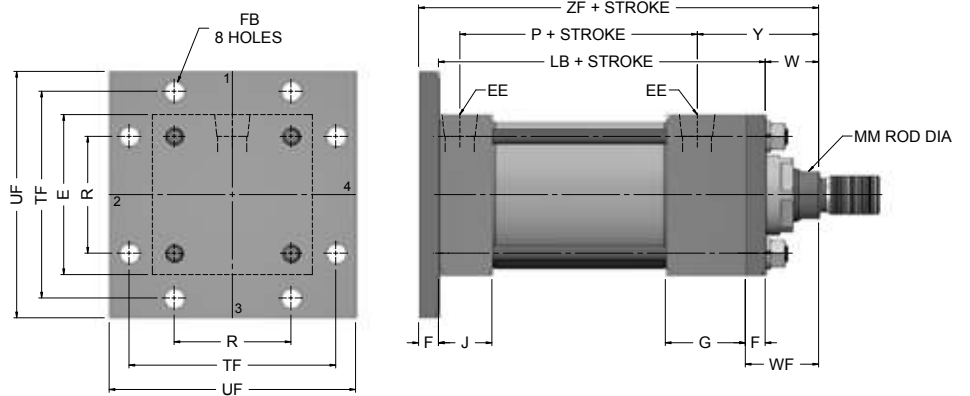
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Head Square Flange  
Style ST5F5  
(NFPA Style MF5)

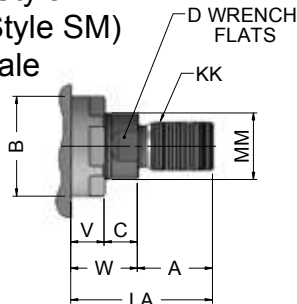


Cap Square Flange  
Style ST5F6  
(NFPA Style MF6)

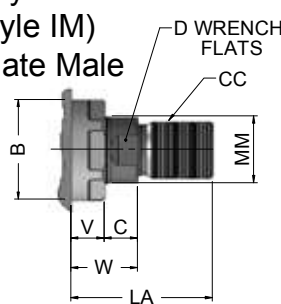


Rod End Dimensions—see table 2

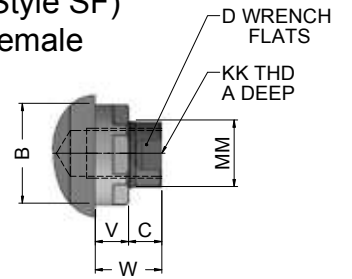
Thread Style #2  
(NFPA Style SM)  
Small Male



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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Square Flange Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
					NPTF*	SAE**									LB	P
1 1/2	2.02	1	1/4-28	2	3/8	6	3/8	5/16	1 1/2	1	1/4	1.43	2 3/4	3 3/8	4	2 1/4
2	2.60	1 1/8	5/16-24	2 1/2	3/8	6	3/8	3/8	1 1/2	1	5/16	1.84	3 3/8	4 1/8	4	2 1/4
2 1/2	3.10	1 1/8	5/16-24	3	3/8	6	3/8	3/8	1 1/2	1	5/16	2.19	3 7/8	4 5/8	4 1/8	2 3/8
3 1/4	3.90	1 3/8	3/8-16	3 3/4	1/2	10	5/8	7/16	1 3/4	1 1/4	3/8	2.76	4 11/16	5 1/2	4 7/8	2 5/8
4	4.70	1 3/8	3/8-16	4 1/2	1/2	10	5/8	7/16	1 3/4	1 1/4	3/8	3.32	5 7/16	6 1/4	4 7/8	2 5/8
5	5.80	1 13/16	1/2-20	5 1/2	1/2	10	5/8	9/16	1 3/4	1 1/4	7/16	4.10	6 5/8	7 5/8	5 1/8	2 7/8
6	6.90	1 13/16	1/2-20	6 1/2	3/4	12	3/4	9/16	2	1 1/2	7/16	4.88	7 5/8	8 5/8	5 3/4	3 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions									Add Stroke				
		STYLE #1	STYLE #2 & #4 KK	A	±0.01 B	C	D	LA	NA	V	W	WF	Y	XF	ZB	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	1	1 15/16	4 5/8	4 7/8	5
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5	5 1/4	5 3/8	
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	1 15/16	4 5/8	4 15/16	5
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5	5 5/16	5 3/8	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	1 5/8	2 9/16	5 1/4	5 9/16	5 5/8	
2.5		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	1 15/16	4 3/4	5 1/16	5 1/8
	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/8	2 5/16	5 1/8	5 7/16	5 1/2
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	1 5/8	2 9/16	5 3/8	5 11/16	5 3/4	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	1 7/8	2 13/16	5 5/8	5 15/16	6	
3.25	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1	1 15/16	4 3/4	5 1/16	5 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	1 5/8	2 11/16	5 7/8	5 1/4	6 1/2	
	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 7/8	2 15/16	6 1/8	6 1/2	6 3/4	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/4	6 5/8	6 7/8	
4		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1	1 15/16	4 3/4	5 1/16	5 1/8
	std	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 5/8	2 11/16	5 7/8	5 1/4	6 1/2
	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 7/8	2 15/16	6 1/8	6 1/2	6 3/4	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/4	6 5/8	6 7/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 1/4	3 5/16	6 1/2	6 7/8	7 1/8	
5		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 3/8	2 7/16	5 7/8	6 5/16	6 1/2
	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 5/8	2 11/16	6 1/8	6 9/16	6 3/4	
	std	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 7/8	2 15/16	6 3/8	6 13/16	7
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2	3 1/16	6 1/2	6 15/16	7 1/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	2 1/4	3 5/16	6 3/4	7 3/16	7 3/8	
6		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	1 5/8	2 11/16	6 5/8	7 1/16	7 3/8
	std	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	1 7/8	3 1/16	6 7/8	7 5/16	7 5/8
	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	2	3 1/16	7	7 7/16	7 3/4	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	2 1/4	3 7/16	7 1/4	7 11/16	8	

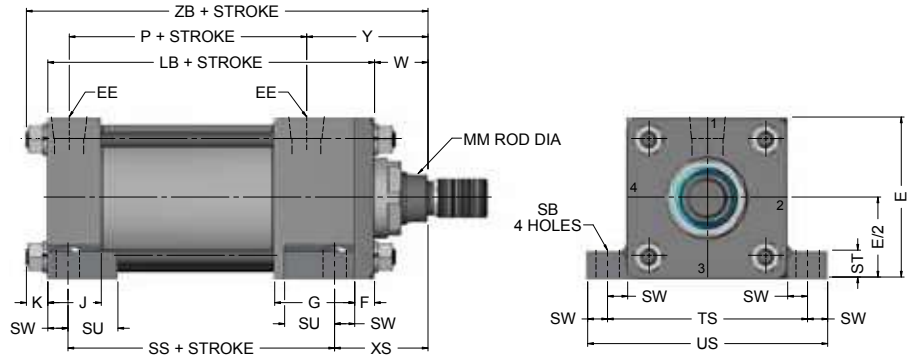
Table 3—Envelope and Mounting Dimensions

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

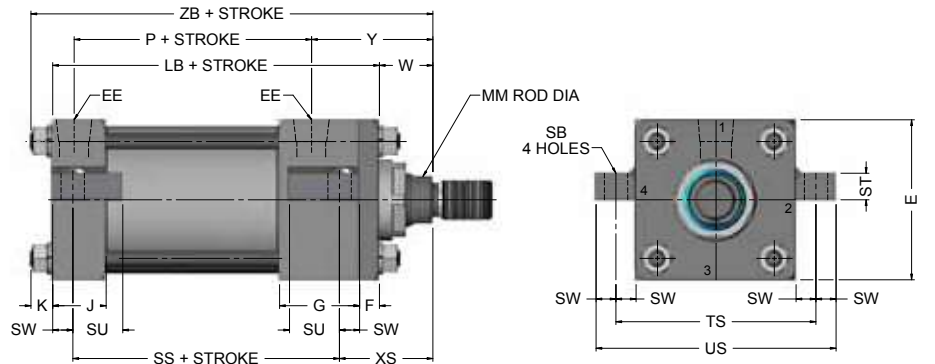
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Side Lug  
Style ST5S2  
(NFPA Style MS2)

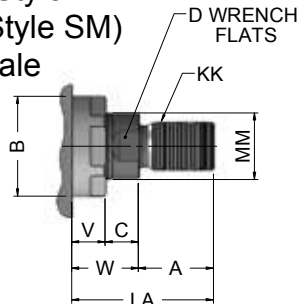


Centerline Lugs  
Style ST5S3  
(NFPA Style MS3)

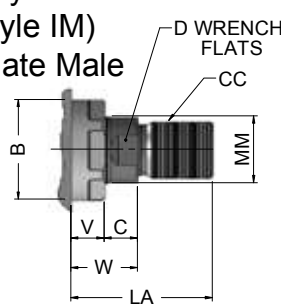


Rod End Dimensions—see table 2

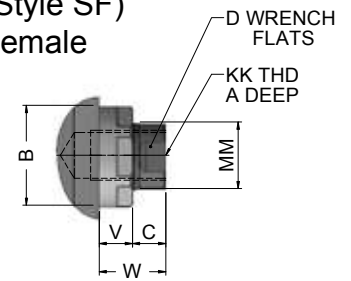
Thread Style #2  
(NFPA Style SM)  
Small Male



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



# ST5 SERIES

## Medium Duty Hydraulic Cylinders

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

Table 1—Envelope and Mounting Dimensions

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

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions									XS	Y	Add Stroke ZB
		STYLE #1	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	1 3/8	1 15/16	4 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	1 3/4	2 5/16	5 1/4	
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 3/8	1 15/16	4 15/16
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/4	2 5/16	5 5/16	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2	2 9/16	5 7/16	
2.5		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 3/8	1 15/16	5 1/16
	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	1 3/4	2 5/16	5 7/16
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2	2 9/16	5 11/16	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	2 1/4	2 13/16	5 15/16	
3.25	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1 7/8	1 15/16	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 1/8	2 11/16	6 1/4	
	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 3/8	2 15/16	6 1/2	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 1/2	3 1/16	6 5/8	
4		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1 7/8	1 15/16	6
	std	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 1/8	2 11/16	6 1/4
	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 3/8	2 15/16	6 1/2	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 1/2	3 1/16	6 5/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 3/4	3 5/16	6 7/8	
		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 1/16	2 7/16	6 5/16
5		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 5/16	2 11/16	6 9/16
	std	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 9/16	2 15/16	6 13/16
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 11/16	3 1/16	6 15/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	2 15/16	3 5/16	7 3/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	2 15/16	3 5/16	7 3/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	2 15/16	3 5/16	7 3/16	
		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 5/16	2 11/16	7 1/16
	std	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 9/16	3 1/16	7 5/16
6		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	2 11/16	3 1/16	7 7/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	2 15/16	3 7/16	7 11/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	2 15/16	3 7/16	7 11/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	2 15/16	3 7/16	7 11/16	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	2 15/16	3 7/16	7 11/16	
		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 5/16	2 11/16	7 1/16
	std	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 9/16	3 1/16	7 5/16

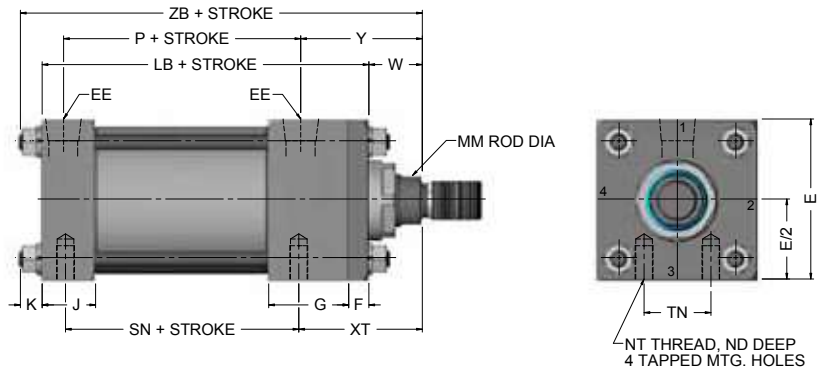
Table 3—Envelope and Mounting Dimensions

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

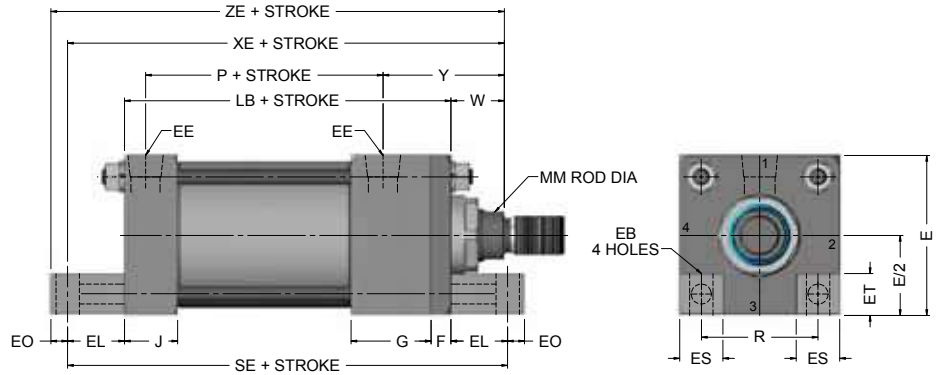
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Side Tapped  
Style ST5S4  
(NFFA Style MS4)

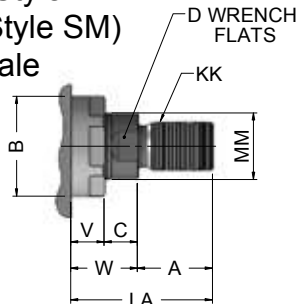


Side End Lug  
Style ST5S7  
(NFFA Style MS7)

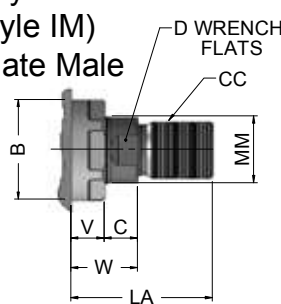


Rod End Dimensions—see table 2

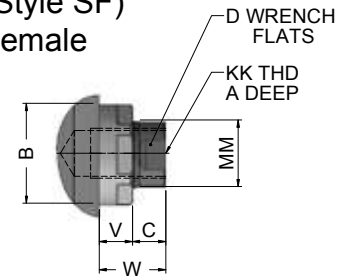
Thread Style #2  
(NFFA Style SM)  
Small Male



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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

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

Table 1—Envelope and Mounting Dimensions

BORE	E	EB	EE		EL	EO	ES	ET	F	G	J	K	NT	TN	R	ADD STROKE			
			NPTF*	SAE**												LB	P	SE	SN
1 1/2	2	5/16	3/8	6	3/4	1/4	9/16	17/32	3/8	1 1/2	1	1/4	1/4-20	5/8	1.43	4	2 1/4	5 1/2	2 1/4
2	2 1/2	3/8	3/8	6	15/16	5/16	5/8	5/8	3/8	1 1/2	1	5/16	5/16-18	7/8	1.84	4	2 1/4	5 7/8	2 1/4
2 1/2	3	3/8	3/8	6	1 1/16	5/16	13/16	15/32	3/8	1 1/2	1	5/16	3/8-16	1 1/4	2.19	4 1/8	2 3/8	6 1/4	2 3/8
3 1/4	3 3/4	7/16	1/2	10	7/8	3/8	1	15/16	5/8	1 3/4	1 1/4	3/8	1/2-13	1 1/2	2.76	4 7/8	2 5/8	6 5/8	2 5/8
4	4 1/2	7/16	1/2	10	1	3/8	1 1/4	1 5/32	5/8	1 3/4	1 1/4	3/8	1/2-13	2 1/16	3.32	4 7/8	2 5/8	6 7/8	2 5/8
5	5 1/2	9/16	1/2	10	1 1/16	1/2	1 3/8	1 3/8	5/8	1 3/4	1 1/4	7/16	5/8-11	2 11/16	4.10	5 1/8	2 7/8	7 1/4	2 7/8
6	6 1/2	9/16	3/4	12	1	1/2	1 3/4	1 19/32	3/4	2	1 1/2	7/16	3/4-10	3 1/4	4.88	5 3/4	3 1/8	7 3/4	3 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions									Add Stroke					
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	ND	XT	Y	XE	ZB	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	3/16	1 15/16	1 15/16	5 3/8	4 7/8	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	3/16	2 5/16	2 5/16	5 3/4	5 1/4	6	
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	11/32	1 15/16	1 15/16	5 9/16	4 15/16	5 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	11/32	2 5/16	2 5/16	5 15/16	5 5/16	6 1/4	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	11/32	2 9/16	2 9/16	6 3/16	5 7/16	6 1/2	
2 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	7/16	1 15/16	1 15/16	5 13/16	5 1/16	6 1/8
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	7/16	2 5/16	2 5/16	6 3/16	5 7/16	6 1/2	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	7/16	2 9/16	2 9/16	6 7/16	5 11/16	6 3/4	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	7/16	2 13/16	2 13/16	6 11/16	5 15/16	7	
3 1/4	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1/2	1 15/16	1 15/16	6 1/2	6	6 7/8
	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	1/2	2 11/16	2 11/16	6 3/4	6 1/4	7 1/8	
	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	1/2	2 15/16	2 15/16	7	6 1/2	7 3/8	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	1/2	3 1/16	3 1/16	7 1/8	6 5/8	7 1/2	
4	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	5/8	1 15/16	1 15/16	6 5/8	6	7	
	std	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	5/8	2 11/16	2 11/16	6 7/8	6 1/4	7 1/4
	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	5/8	2 15/16	2 15/16	7 1/8	6 1/2	7 1/2	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	5/8	3 1/16	3 1/16	7 1/4	6 5/8	7 5/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	5/8	3 5/16	3 5/16	7 1/2	6 7/8	7 7/8	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	3/4	3 5/16	3 5/16	7 13/16	7 3/16	8 5/16	
5	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	3/4	2 7/16	2 7/16	6 15/16	6 5/16	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	3/4	2 11/16	2 11/16	7 3/16	6 9/16	7 11/16	
	std	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	3/4	2 15/16	2 15/16	7 7/16	6 13/16	7 15/16
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	3/4	3 1/16	3 1/16	7 9/16	6 15/16	8 1/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	3/4	3 5/16	3 5/16	7 13/16	7 3/16	8 5/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	3/4	3 5/16	3 5/16	7 13/16	7 3/16	8 5/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	3/4	3 5/16	3 5/16	7 13/16	7 3/16	8 5/16	
6	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	7/8	2 13/16	2 11/16	7 5/8	7 1/16	8 1/8	
	std	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	7/8	3 1/16	3 1/16	7 7/8	7 5/16	8 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	7/8	3 1/16	3 1/16	8	7 7/16	8 1/2	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	7/8	3 7/16	3 7/16	8 1/4	7 11/16	8 3/4	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	7/8	3 7/16	3 7/16	8 1/4	7 11/16	8 3/4	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	7/8	3 7/16	3 7/16	8 1/4	7 11/16	8 3/4	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	7/8	3 7/16	3 7/16	8 1/4	7 11/16	8 3/4	

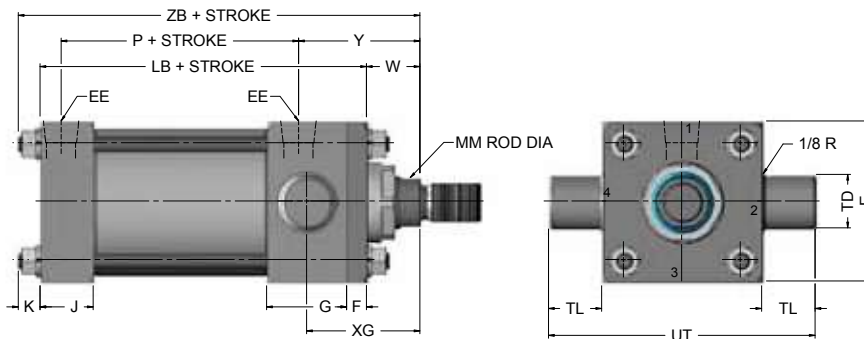
Caution: When using mounting styles ST3S7, check clearance between mounting members and rod attachment or accessory. If necessary, specify longer rod extension to avoid interference with mounting members.

# ST5 SERIES

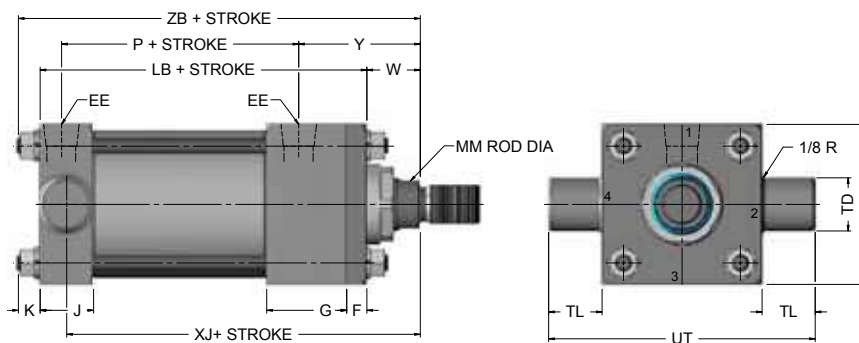
## Medium Duty Hydraulic Cylinders

Trunnion Mountings  
1 1/2 to 6" Bore Sizes

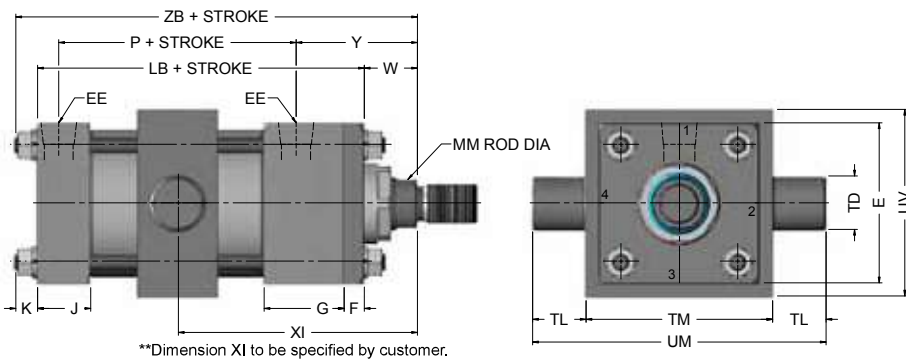
Head Trunnion  
Style ST5T1  
(NFFPA Style MT1)



Cap Trunnion  
Style ST5T2  
(NFFPA Style MT2)

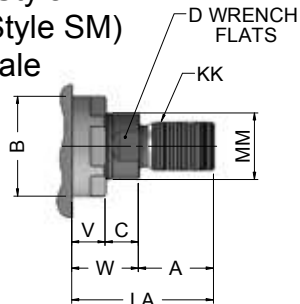


Intermediate Fixed Trunnion  
Style ST5T4  
(NFFPA Style MT4)

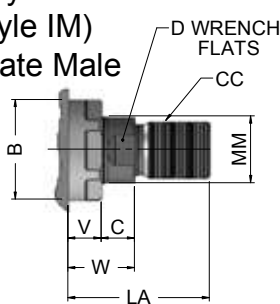


Rod End Dimensions—see table 2

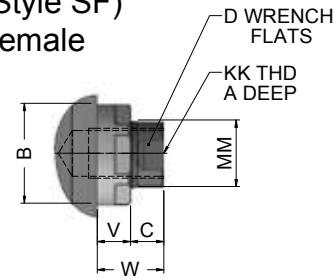
Thread Style #2  
(NFFPA Style SM)  
Small Male



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

# ST5 SERIES

## Medium 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 TD -.001	TL	TM	UM	UT	UV	ADD STROKE		MIN STROKE
			NPTF*	SAE**											LB	P	
1 1/2	1 1/4	2	3/8	6	3/8	1 1/2	1	1/4	1.000	1	2 1/2	4 1/2	4	2 1/2	4	2 1/4	1/4
2	1 1/2	2 1/2	3/8	6	3/8	1 1/2	1	5/16	1.000	1	3	5	4 1/2	3	4	2 1/4	1/2
2 1/2	1 1/2	3	3/8	6	3/8	1 1/2	1	5/16	1.000	1	3 1/2	5 1/2	5	3 1/2	4 1/8	2 3/8	3/8
3 1/4	2	3 3/4	1/2	10	5/8	1 3/4	1 1/4	3/8	1.000	1	4 1/2	6 1/2	5 3/4	4 1/4	4 7/8	2 5/8	7/8
4	2	4 1/2	1/2	10	5/8	1 3/4	1 1/4	3/8	1.000	1	5 1/4	7 1/4	6 1/2	5	4 7/8	2 5/8	7/8
5	2	5 1/2	1/2	10	5/8	1 3/4	1 1/4	7/16	1.000	1	6 1/4	8 1/4	7 1/2	6	5 1/8	2 7/8	5/8
6	2 1/2	6 1/2	3/4	12	3/4	2	1 1/2	7/16	1.375	1 3/8	7 5/8	10 3/8	9 1/4	7	5 3/4	3 1/8	1 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

Table 3—Envelope and Mounting Dimensions

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions									Add Stroke				
		STYLE #1	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 3/4	3 3/16	1 15/16	4 1/8	4 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 1/8	3 9/16	2 5/16	4 1/2	5 1/4	
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 3/4	3 5/16	1 15/16	4 1/8	4 15/16
	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 1/8	3 11/16	2 5/16	4 1/2	5 5/16	
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2 3/8	3 15/16	2 9/16	4 3/8	5 9/16	
2.5		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 3/4	3 5/16	1 15/16	4 1/4	5 1/16
	std	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 1/8	3 11/16	2 5/16	4 5/8	5 7/16
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2 3/8	3 15/16	2 9/16	4 7/8	5 11/16	
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	5 5/8	4 3/16	2 13/16	5 1/8	5 15/16	
3.25	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	2 1/4	4 3/16	1 15/16	5	5 1/16
	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 7/16	2 11/16	5 1/4	5 1/4	
	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 11/16	2 15/16	5 1/2	6 1/2	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 7/8	4 13/16	3 1/16	5 5/8	6 5/8	
4		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	2 1/4	4 3/16	1 15/16	5	5 1/16
	std	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 7/16	2 11/16	5 1/4	5 1/4
	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 11/16	2 15/16	5 1/2	6 1/2	
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 7/8	4 13/16	3 1/16	5 5/8	6 5/8	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	3 1/8	5 1/16	3 5/16	5 7/8	6 7/8	
5		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	4 3/16	2 7/16	5 1/4	6 5/16
	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 7/16	2 11/16	5 1/2	6 9/16	
	std	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 11/16	2 15/16	5 3/4	6 13/16
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	2 7/8	4 13/16	3 1/16	5 7/8	6 15/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	3 1/8	5 1/16	3 5/16	6 1/8	7 3/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	3 1/8	5 1/16	3 5/16	6 1/8	7 3/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	3 1/8	5 1/16	3 5/16	6 1/8	7 3/16	
6		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 15/16	2 11/16	5 7/8	7 1/16
	std	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	5 3/16	3 1/16	6 1/8	7 5/16
	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	5 5/16	3 1/16	6 1/4	7 7/16	
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	3 1/4	5 9/16	3 7/16	6 1/2	7 11/16	
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	3 1/4	5 9/16	3 7/16	6 1/2	7 11/16	
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	3 1/4	5 9/16	3 7/16	6 1/2	7 11/16	
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	3 1/4	5 9/16	3 7/16	6 1/2	7 11/16	

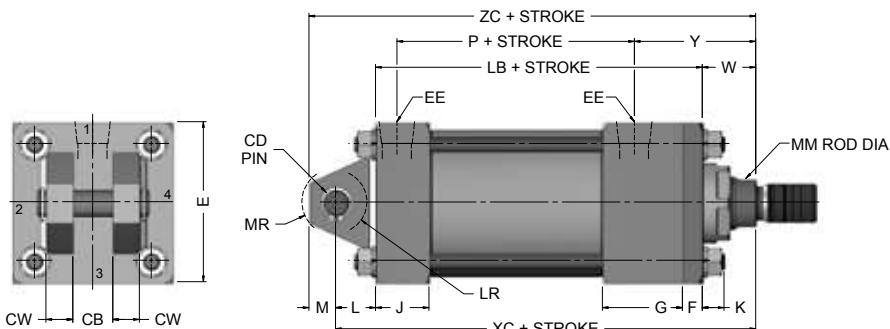
\*\*Dimension XI to be specified by customer.

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Clevis Mountings  
1 1/2 to 6" Bore Sizes

Cap Fixed Clevis\*  
Style ST5P1  
(NFPA Style MP1)

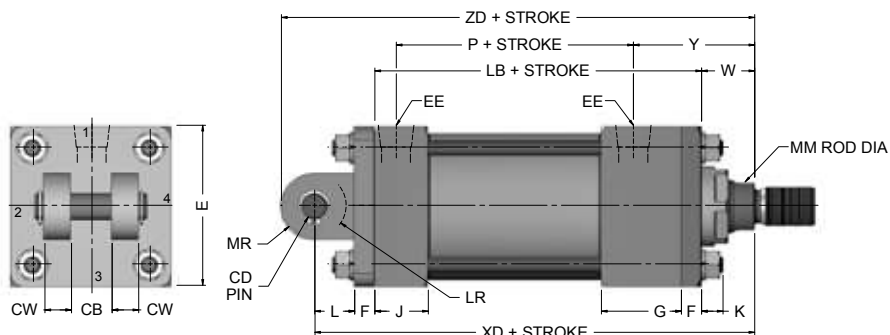


\* DETACHABLE IS ALSO AVAILABLE (NFPA MP1)

CAP FIXED EYE MOUNT (NFPA MP3) ALSO AVAILABLE ASK FACTORY

Cap Detachable Clevis  
Style ST5P2  
(NFPA Style MP2)

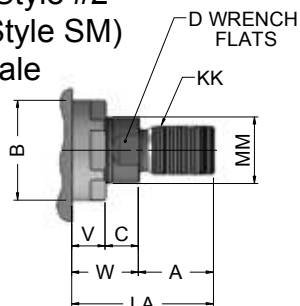
MAX WORKING PRESSURE: 500 PSI



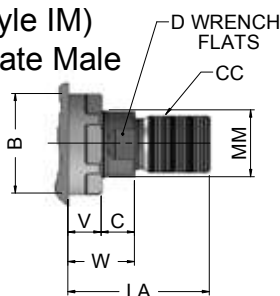
CAP DETACHABLE EYE (NFPA MP4) ALSO AVAILABLE ASK FACTORY

Rod End Dimensions—see table 2

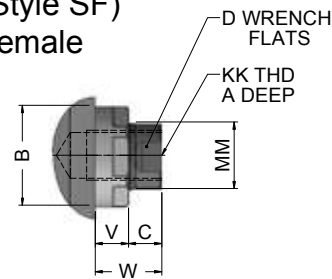
Thread Style #2  
(NFPA Style SM)  
Small Male



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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Clevis Mountings  
1 1/2 to 6" Bore Sizes

Table 1—Envelope and Mounting Dimensions

BORE	CB	+.000 CD -.002	CW	E	EE		F	G	J	K	L	LR	M	MR	ADD STROKE	
					NPTF*	SAE**									LB	P
1 1/2	3/4	.501	1/2	2	3/8	6	3/8	1 1/2	1	1/4	3/4	3/4	1/2	5/8	4	2 1/4
2	3/4	.501	1/2	2 1/2	3/8	6	3/8	1 1/2	1	5/16	3/4	3/4	1/2	5/8	4	2 1/4
2 1/2	3/4	.501	1/2	3	3/8	6	3/8	1 1/2	1	5/16	3/4	3/4	1/2	5/8	4 1/8	2 3/8
3 1/4	1 1/4	.751	5/8	3 3/4	1/2	10	5/8	1 3/4	1 1/4	3/8	1 1/4	1	3/4	15/16	4 7/8	2 5/8
4	1 1/4	.751	5/8	4 1/2	1/2	10	5/8	1 3/4	1 1/4	3/8	1 1/4	1	3/4	15/16	4 7/8	2 5/8
5	1 1/4	.751	5/8	5 1/2	1/2	10	5/8	1 3/4	1 1/4	7/16	1 1/4	1	3/4	15/16	5 1/8	2 7/8
6	1 1/2	1.001	3/4	6 1/2	3/4	12	3/4	2	1 1/2	7/16	1 1/2	1 1/4	1	1 3/16	5 3/4	3 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke				
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	XC	XD	ZC	ZD
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 15/16	5 3/8	5 3/4	5 7/8	6 1/4
	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 5/16	5 3/4	6 1/8	6 1/4	6 5/8
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 15/16	5 3/8	5 3/4	5 7/8	6 1/4
	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 5/16	5 3/4	6 1/8	6 1/4	6 5/8
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2 9/16	6	6 3/8	6 1/2	6 7/8
2.5	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 15/16	5 1/2	5 7/8	6	6 3/8
	std 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 5/16	5 7/8	6 1/4	6 3/8	6 3/4
	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 7/8	1 5/16	5/8	1 1/4	2 9/16	6 1/8	6 1/2	6 5/8	7
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/2	1 11/16	3/4	1 1/2	2 13/16	6 3/8	6 3/4	6 7/8	7 1/4
3.25	std 1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1 15/16	6 7/8	7 1/2	7 5/8	8 1/4
	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 11/16	7 1/8	7 3/4	7 7/8	8 1/2
	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 15/16	7 3/8	8	8 1/8	8 3/4
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	3 1/16	7 1/2	8 1/8	8 1/4	8 7/8
4	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	5/8	1 15/16	6 7/8	7 1/2	7 5/8	8 1/4
	std 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 11/16	7 1/8	7 3/4	7 7/8	8 1/2
	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 15/16	7 3/8	8	8 1/8	8 3/4
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	3 1/16	7 1/2	8 1/8	8 1/4	8 7/8
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	3 5/16	7 3/4	8 3/8	8 1/2	9 1/8
5	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 7/16	7 1/8	7 3/4	7 7/8	8 1/2
	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 11/16	7 3/8	8	8 1/8	8 3/4
	std 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 15/16	7 5/8	8 1/4	8 3/8	9
	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 5/8	1 15/16	1/2	1 3/8	3 1/16	7 3/4	8 3/8	8 1/2	9 1/8
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 5/8	2 3/8	5/8	1 5/8	3 5/16	8	8 5/8	8 3/4	9 3/8
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5 1/8	2 7/8	5/8	1 5/8	3 5/16	8	8 5/8	8 3/4	9 3/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5 1/8	3 3/8	5/8	1 5/8	3 5/16	8	8 5/8	8 3/4	9 3/8
6	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 11/16	8 1/8	8 7/8	9 1/8	9 7/8
	std 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 1/16	8 3/8	9 1/8	9 3/8	10 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 1/16	8 1/2	9 1/4	9 1/2	10 1/4
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	3 7/16	8 3/4	9 1/2	9 3/4	10 1/2
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	3 7/16	8 3/4	9 1/2	9 3/4	10 1/2
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	3 7/16	8 3/4	9 1/2	9 3/4	10 1/2
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	3 7/16	8 3/4	9 1/2	9 3/4	10 1/2

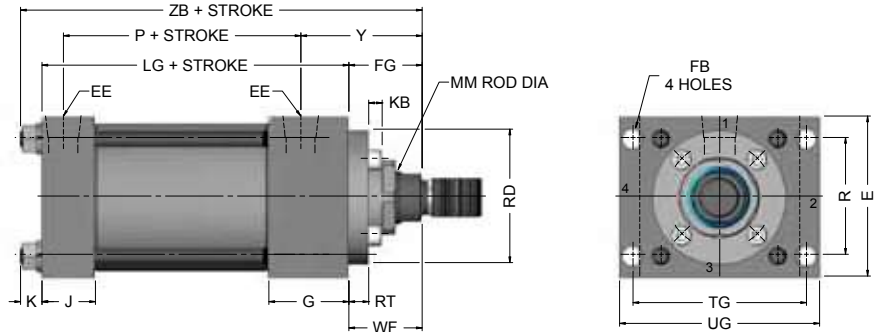
Table 3—Envelope and Mounting Dimensions

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

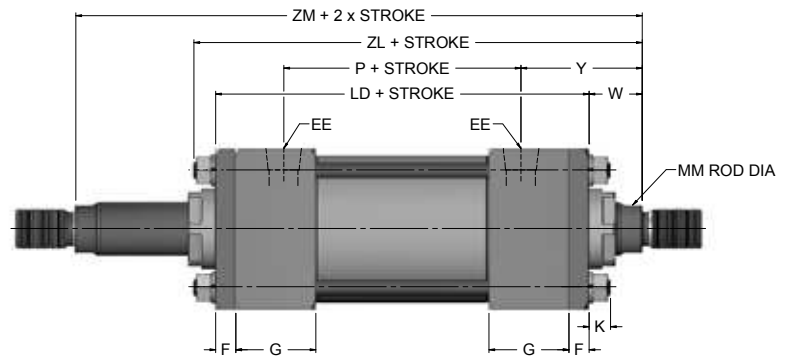
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Head Rectangular  
Style ST5E5  
(\*NOT NFPA - JJ Style ME5)

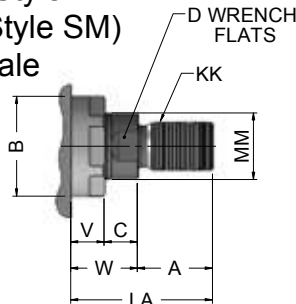


Double Rod end  
Style ST5D

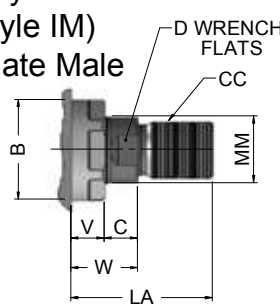


Rod End Dimensions—see table 2

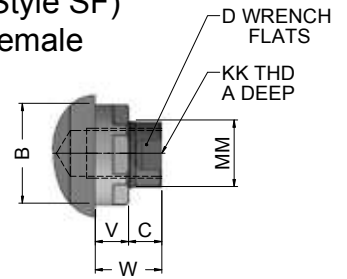
Thread Style #2  
(NFPA Style SM)  
Small Male



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



# ST5 SERIES

## Medium Duty Hydraulic Cylinders

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

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		FB	G	J	K	R	UF	TF	ADD STROKE	
		NPTF*	SAE**								LG	P
1 1/2	2	3/8	6	5/16	1 1/2	1	1/4	1.43	2 3/4	2 5/16	3 5/8	2 1/4
2	2 1/2	3/8	6	3/8	1 1/2	1	5/16	1.84	3 3/8	2 7/8	3 5/8	2 1/4
2 1/2	3	3/8	6	3/8	1 1/2	1	5/16	2.19	3 3/4	3 1/4	3 3/4	2 3/8
3 1/4	3 3/4	1/2	10	7/16	1 3/4	1 1/4	3/8	2.76	4 5/8	4	4 1/4	2 5/8
4	4 1/2	1/2	10	7/16	1 3/4	1 1/4	3/8	3.32	5 1/8	4 1/2	4 1/4	2 5/8
5	5 1/2	1/2	10	9/16	1 3/4	1 1/4	7/16	4.10	6 7/16	5 5/8	4 1/2	2 7/8
6	6 1/2	3/4	12	9/16	2	1 1/2	7/16	4.88	7 1/4	6 7/16	5	3 1/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions

BORE		ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke	
			STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	RT	MAX. RD	KB	WF	Y	XC
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1/4	1.967	3/16	1	1 15/16	4 7/8
2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1/4	1.967	3/16	1	1 15/16	4 15/16
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	3/8	2.467	1/4	1 3/8	2 5/16	5 5/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	3/8	2.467	1/4	1 3/8	2 5/16	5 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	3/8	2.967	1/4	1 5/8	2 9/16	5 11/16
3 1/4	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	3/8	2.467	1/4	1 3/8	1 15/16	6
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	3/8	2.967	1/4	1 5/8	2 11/16	6 1/4
4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	3/8	2.967	1/4	1 5/8	2 11/16	6 1/4
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3/8	3.467	1/4	1 7/8	2 15/16	6 1/2
5	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3/8	3.467	1/4	1 7/8	2 15/16	6 13/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3/8	3.717	1/4	2	3 1/16	6 15/16
6	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3/8	3.467	1/4	1 7/8	3 1/16	7 5/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3/8	3.717	1/4	2	3 1/16	7 7/16

Table 3—Envelope and Mounting Dimensions

## DOUBLE ROD END

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 #1 only. (See port position information in Page 24.)

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>	ZM
1 1/2	std	5/8	4 7/8	5 3/4	3 3/8	2 1/4	6 3/8	6 1/4	6 1/2	6 1/8
2	std	5/8	4 7/8	5 13/16	3 3/8	2 1/4	6 3/4	6 7/16	6 3/4	6 1/8
2 1/2	std	1	5	6 5/16	3 1/2	2 3/8	7 1/8	7 1/16	7 3/8	7
3 1/4	std	1	6	7 1/8	3 3/4	2 5/8	7 3/4	7 5/8	8	7 1/2
4	std	1 3/8	6	7 3/8	3 3/4	2 5/8	8	8	8 3/8	8
5	std	1 3/4	6 1/4	7 15/16	3 5/8	2 7/8	8 3/8	8 9/16	9 1/16	8 3/4
6	std	1 3/4	7	8 11/16	4 1/8	3 1/8	9	9 1/8	9 5/8	9 1/4
Replaces :			<b>LB</b>	<b>ZB</b>	<b>SS</b>	<b>SN</b>	<b>SE</b>	<b>XE</b>	<b>ZE</b>	--
On single rod mounting styles:			All Mtgs. Style		MS2, MS3	MS4	MS7			All Mtgs.

All dimensions are in inches and apply to standard rod sizes only.

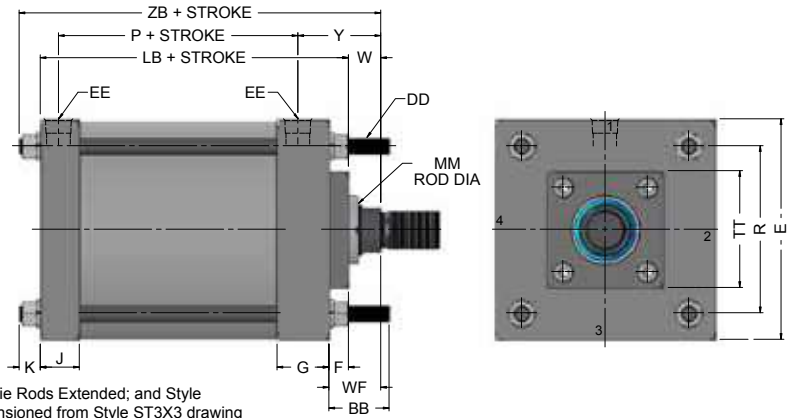
For alternate rod sizes, determine all envelope dimensions (within LD dim.) as described above and then use appropriate rod end dimensions for proper rod size from single rod cylinder.

**Tie Rod, Head Square and  
Cap Square Mountings  
8" Bore Size**

# ST5 SERIES

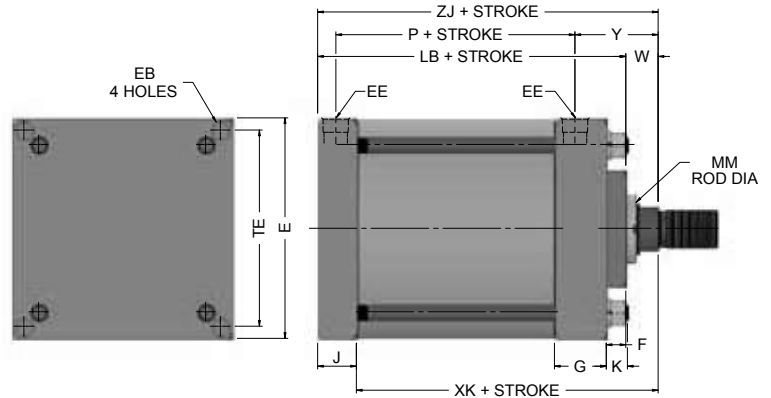
## Medium Duty Hydraulic Cylinders

**Tie Rods Extended  
Style ST5X3  
(NFPA Style MX3)**

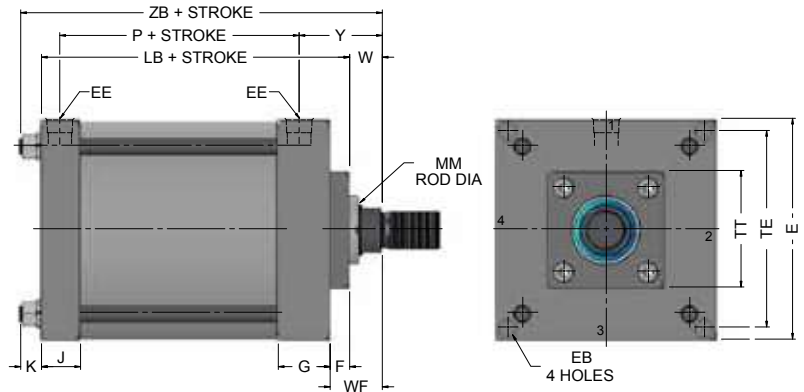


Style ST5X3 (NFPA MX3) Head Tie Rods Extended, illustrated: Style ST5X2 (NFPA MX2), Cap Tie Rods Extended; and Style ST3X1 (NFPA MX1), Both Ends Tie Rods Extended are also available. All "T" styles can be dimensioned from Style ST3X3 drawing at right. Basic Mounting ST3X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

**Head Square Flange  
Style ST5E3  
(NFPA Style ME3)**

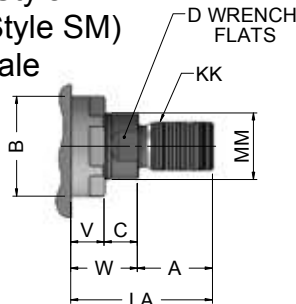


**Cap Square Flange  
Style ST5E4  
(NFPA Style ME4)**

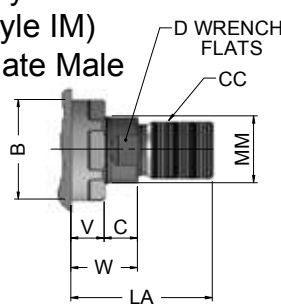


**Rod End Dimensions—see table 2**

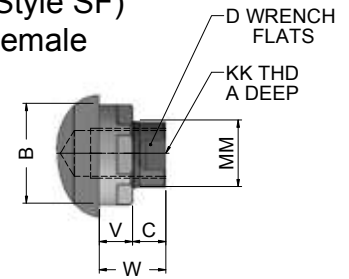
**Thread Style #2  
(NFPA Style SM)  
Small Male**



**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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Tie Rod, Head Square and  
Cap Square Mountings  
8" Bore Size

Table 1—Envelope and Mounting Dimensions- MX1, MX2, MX3 style

BORE	AA	BB	DD	E	EE		F	G	J	K	R	ADD STROKE	
					NPTF*	SAE**						LB	P
8	9.1	2 5/16	5/8-18	8 1/2	3/4	12	3/4	2	1 1/2	9/16	6.44	5 7/8	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - MX1, MX2, MX3 style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								TT	WF	Y	Add Stroke ZB
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W				
8	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	4	1 5/8	2 13/16	7 5/16
	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	4	1 7/8	3 1/16	7 9/16
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	2	3 3/16	7 11/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	2 1/4	3 7/16	7 15/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	7 15/16
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	7 15/16
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	7 15/16
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	2 1/4	3 7/16	7 15/16
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	2 1/4	3 7/16	7 15/16
5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	2 1/4	3 7/16	7 15/16	

Table 3—Envelope and Mounting Dimensions

Table 1—Envelope and Mounting Dimensions - ME3, ME4 styles

BORE	E	EE		F	G	J	K	TE	ADD STROKE	
		NPTF*	SAE**						LB	P
8	8 1/2	3/4	12	3/4	2	1 1/2	9/16	7.57	5 7/8	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - ME3, ME4, style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								TT	WF	Y	Add Stroke		
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W				XK	ZB	ZJ
8	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	4	1 5/8	2 13/16	5 1/4	7 5/16	6 3/4
	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	4	1 7/8	3 1/16	5 1/2	7 9/16	7
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	2	3 3/16	5 5/8	7 11/16	7 1/8
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8
5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	2 1/4	3 7/16	5 7/8	7 15/16	7 3/8	

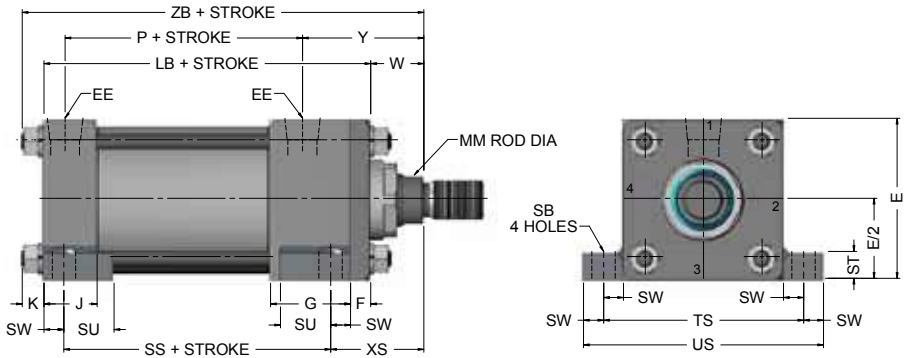
Table 3—Envelope and Mounting Dimensions

Side and Centerline Lugs and Side Tapped Mountings  
8" Bore Size

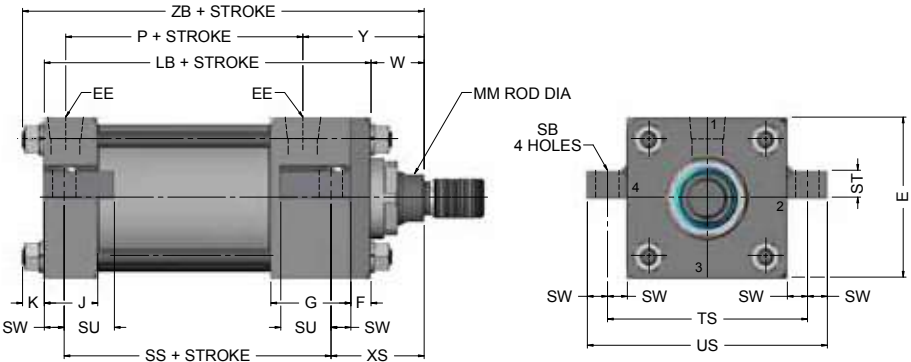
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

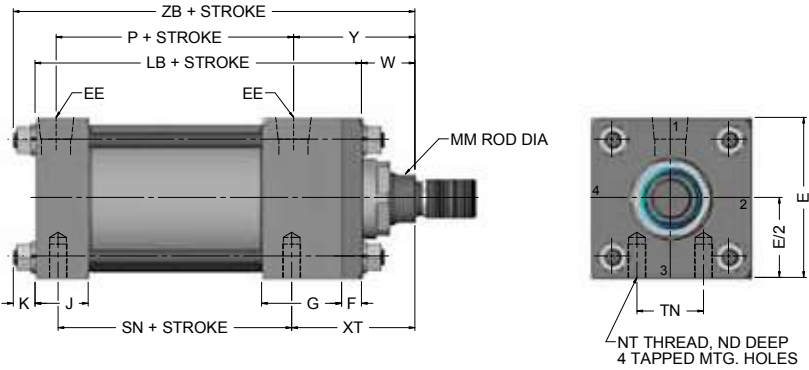
Side Lugs  
Style ST5S2  
(NFFPA Style MS2)



Centerline Lugs  
Style ST5S3  
(NFFPA Style MS3)

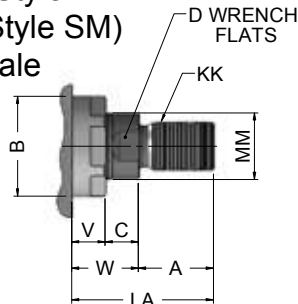


Side Tapped  
Style ST5S4  
(NFFPA Style MS4)

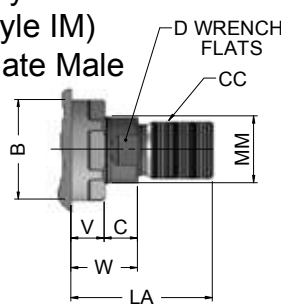


Rod End Dimensions—see table 2

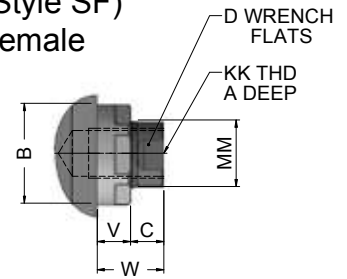
Thread Style #2  
(NFFPA Style SM)  
Small Male



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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Side and Centerline Lugs and  
Side Tapped Mountings  
8" Bore Size

Table 1—Envelope and Mounting Dimensions- MS2, MS3 style

BORE	E	EE		F	G	J	K	SB*	ST	SU	SW	TS	US	ADD STROKE		
		NPTF*	SAE**											LB	P	SS
8	8 1/2	3/4	12	3/4	2	1 1/2	9/16	13/16	1	1 9/16	11/16	9 7/8	11 1/4	5 7/8	3 1/4	3 3/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

\* Upper surface spot faced for socket head screws.

Table 2—Rod Dimensions - MS2, MS3 style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								TT	XS	Y	Add Stroke ZB
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W				
8	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	4	2 5/16	2 13/16	7 5/16
	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	4	2 9/16	3 1/16	7 9/16
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	2 11/16	3 3/16	7 11/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	2 15/16	3 7/16	7 15/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	2 15/16	3 7/16	7 15/16
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	2 15/16	3 7/16	7 15/16
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	2 15/16	3 7/16	7 15/16
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	2 15/16	3 7/16	7 15/16
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	2 15/16	3 7/16	7 15/16
	5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	2 15/16	3 7/16	7 15/16

Table 3—Envelope and Mounting Dimensions

Table 1—Envelope and Mounting Dimensions - MS4 style

BORE	E	EE		F	G	J	K	SB*	ND	NT	TN	ADD STROKE		
		NPTF*	SAE**									LB	P	SN
8	8 1/2	3/4	12	3/4	2	1 1/2	9/16	13/16	11/8	3/4-10	4 1/2	5 7/8	3 1/4	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.

\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - MS4, style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								TT	XT	Y	Add Stroke ZB
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W				
8	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	4	2 13/16	2 13/16	7 5/16
	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	4	3 1/16	3 1/16	7 9/16
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	3 3/16	3 3/16	7 11/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	3 7/16	3 7/16	7 15/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	3 7/16	3 7/16	7 15/16
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	3 7/16	3 7/16	7 15/16
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	3 7/16	3 7/16	7 15/16
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	3 7/16	3 7/16	7 15/16
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	3 7/16	3 7/16	7 15/16
	5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	3 7/16	3 7/16	7 15/16

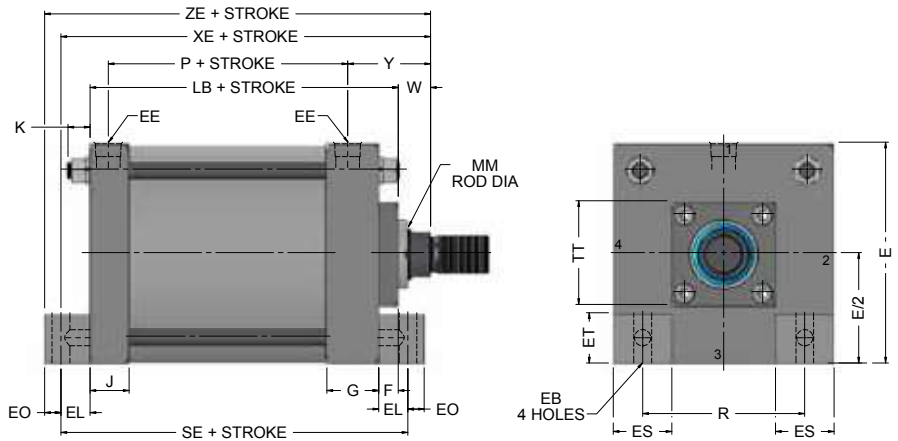
Table 3—Envelope and Mounting Dimensions

Side End Lugs and Clevis Mountings  
8" Bore Size

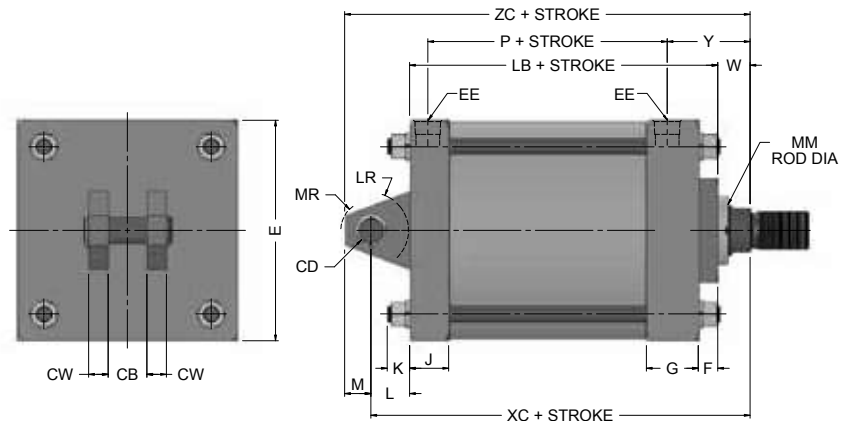
# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Side End Lugs  
Style ST5S7  
(NFFPA Style MS7)



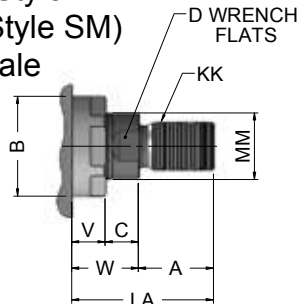
Cap Fixed Clevis  
Style ST5P1  
(NFFPA Style MP1)



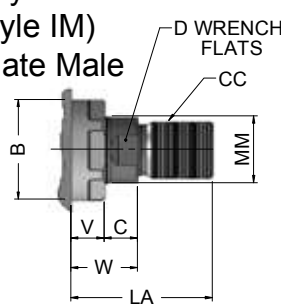
Cylinders with this mounting style are mounted on the precision ground surfaces of the head and cap. There must be a minimum gap of at least 1/64 of an inch between the bottom of the lug and the mounting surface before the mounting bolts are tightened.

Rod End Dimensions—see table 2

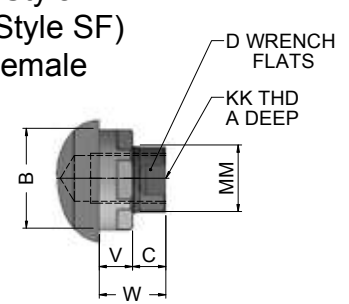
Thread Style #2  
(NFFPA Style SM)  
Small Male



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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Side End Lugs and  
Clevis Mountings  
8" Bore Size

Table 1—Envelope and Mounting Dimensions- MS2 style

BORE	E	EB	EE		EL	EO	ES	ET	F	G	J	K	NT	R	ADD STROKE		
			NPTF*	SAE**											LB	P	SE
8	8 1/2	11/16	3/4	12	1 1/8	5/8	2 1/4	1 15/16	3/4	2	1 1/2	9/16	13/16	1	5 7/8	3 1/4	7 3/8

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - MS7 style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke			
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	TT	Y	XE	ZE
8	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	4	2 13/16	7 7/8	8 1/2
	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	4	3 1/16	8 1/8	8 3/4
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	3 3/16	8 1/4	8 7/8
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	3 7/16	8 1/2	9 1/8

\*Mounting style MS7 not offered in all rod size.  
Caution: When using mounting style G, check clearance between mounting members and rod attachment or accessory.  
If necessary, specify longer rod extension to avoid interference with mounting members.

Table 3—Envelope and Mounting Dimensions

Table 1—Envelope and Mounting Dimensions - MP1 style

BORE	CB	+.000 -.002 CD*	CW	E	EE		F	G	J	K	L	LR	M	ADD STROKE		
					NPTF*	SAE**								MR	LB	P
8	1 1/2	1.001	3/4	8 1/2	3/4	12	3/4	2	1 1/2	9/16	1 1/2	1 1/4	1	1 3/16	5 7/8	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.  
\* Dimension CD is pin diameter

Table 2—Rod Dimensions - MP1, style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke		
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	XC	ZC
8	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 13/16	8 1/4	9 1/4
	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 1/16	8 1/2	9 1/2
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	3 3/16	8 5/8	9 5/8
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8
	5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	3 7/16	8 7/8	9 7/8

Table 3—Envelope and Mounting Dimensions

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

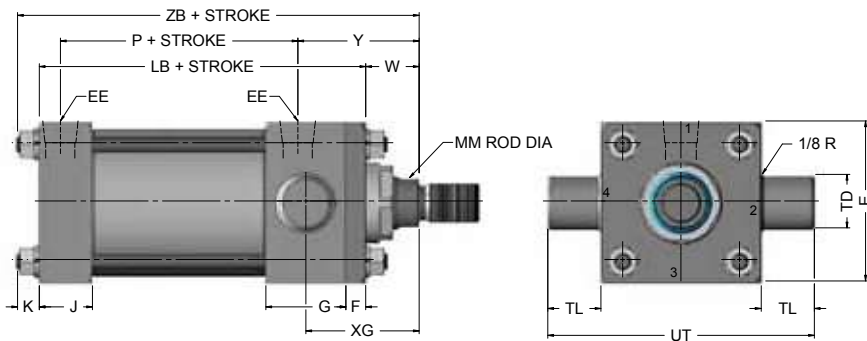
### Trunnion Mountings

#### 8" Bore Size

#### Head Trunnion

#### Style ST5T1

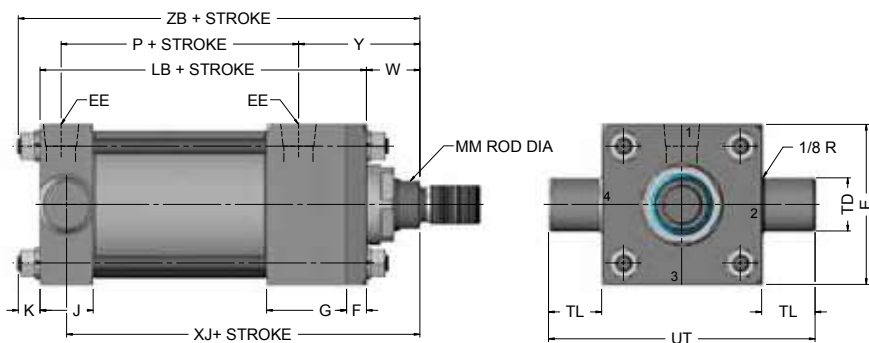
#### (NFFPA Style MT1)



#### Cap Trunnion

#### Style ST5T2

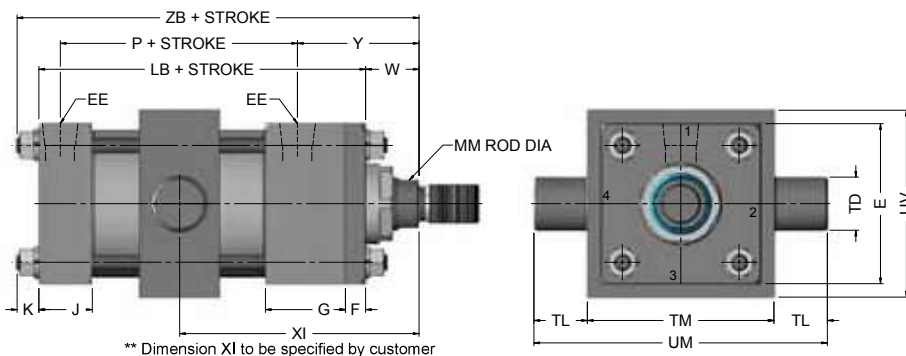
#### (NFFPA Style MT2)



#### Intermediate Fixed Trunnion

#### Style ST5T4

#### (NFFPA Style MT4)

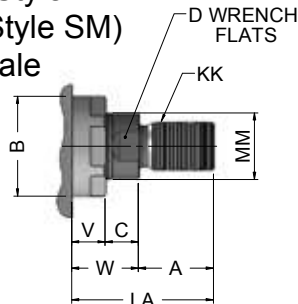


### Rod End Dimensions—see table 2

#### Thread Style #2

#### (NFFPA Style SM)

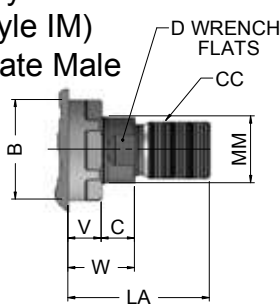
#### Small Male



#### Thread Style #1

#### (NFFPA Style IM)

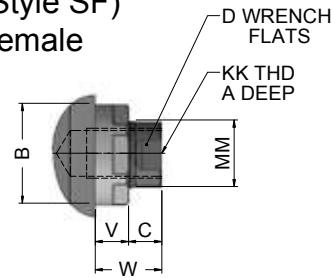
#### Intermediate Male



#### 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.



# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Trunnion Mountings  
8" Bore Size

Table 1—Envelope and Mounting Dimensions- MT1, MT2 style

BORE	E	EE		F	G	J	K	+.000 -.001 TD	TL	UT	ADD STROKE	
		NPTF*	SAE**								LB	P
8	8 1/2	3/4	12	3/4	2	1 1/2	9/16	1.375	1 3/8	11 1/4	5 7/8	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - MT1, MT2 style

BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke				
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	TT	XG	Y	XJ	ZB
8	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	4	2 5/8	2 13/16	6	7 5/16
	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	4	2 7/8	3 1/16	6 1/4	7 9/16
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	3	3 3/16	6 3/8	7 11/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	3 1/4	3 7/16	6 5/8	7 15/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	3 1/4	3 7/16	6 5/8	7 15/16
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	3 1/4	3 7/16	6 5/8	7 15/16
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	3 1/4	3 7/16	6 5/8	7 15/16
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	3 1/4	3 7/16	6 5/8	7 15/16
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	3 1/4	3 7/16	6 5/8	7 15/16
	5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	3 1/4	3 7/16	6 5/8	7 15/16

Table 3—Envelope and Mounting Dimensions

Table 1—Envelope and Mounting Dimensions - MT4 style

BORE	BD	E	EE		F	G	J	K	+.000 -.001 TD	TL	TM	UM	UV	STYLE MT4 MIN STROKE	ADD STROKE	
			NPTF*	SAE**											LB	P
8	2 1/2	8 1/2	3/4	12	3/4	2	1 1/2	9/16	1.375	1 3/8	9 3/4	12 1/2	9 1/2	7/8	5 7/8	3 1/4

\*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.  
\*\* SAE straight thread ports are indicated by port number.

Table 2—Rod Dimensions - MT4, style

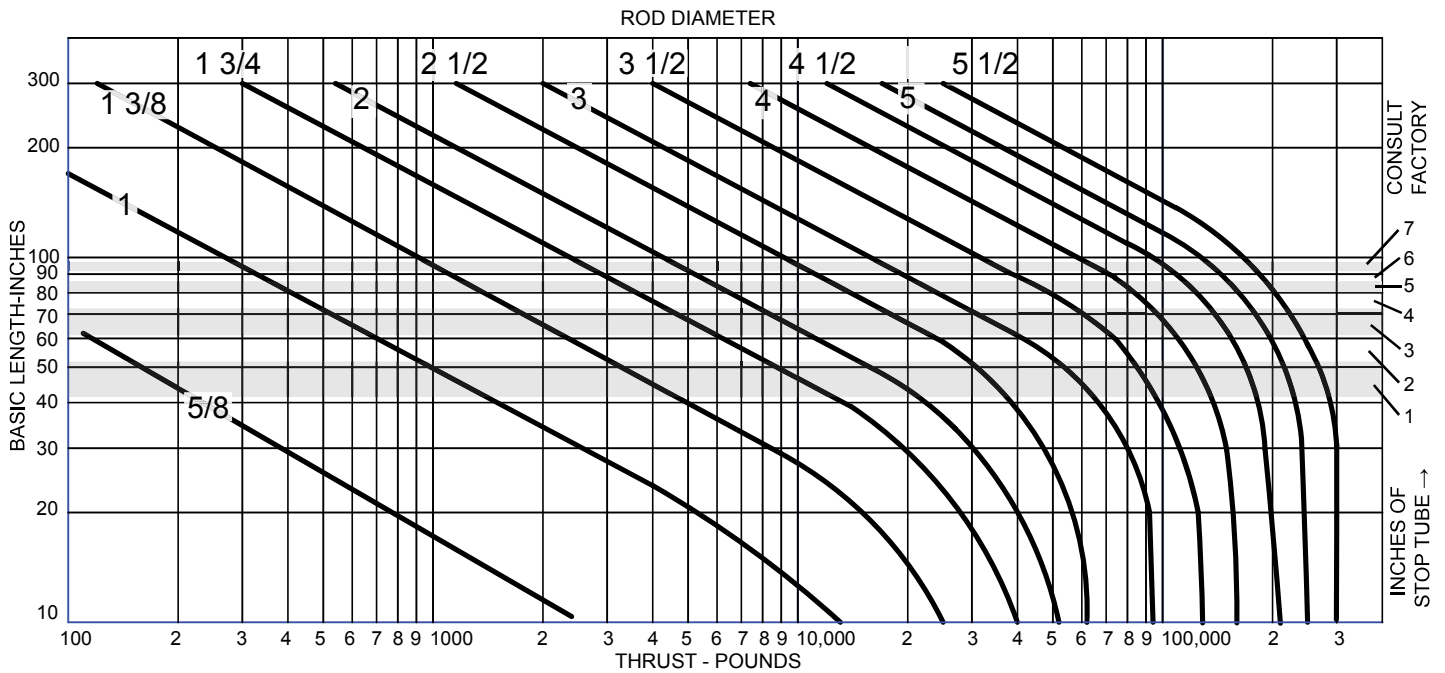
BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke			
		STYLE #1	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	TT	MIN** XI	Y	ZB
8	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	4	4 15/16	2 13/16	7 5/16
	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	4	5 3/16	3 1/16	7 9/16
	std 2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 5/16	3/8	1 1/4	4	5 5/16	3 3/16	7 11/16
	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/2	2 3/8	1/2	1 1/2	4	5 9/16	3 7/16	7 15/16
	3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	5	2 7/8	1/2	1 1/2	5 1/2	5 9/16	3 7/16	7 15/16
	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	5	3 3/8	1/2	1 1/2	5 1/2	5 9/16	3 7/16	7 15/16
	4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/2	3 7/8	1/2	1 1/2	5 1/2	5 9/16	3 7/16	7 15/16
	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.248	1	3 7/8	6	4 3/8	1/2	1 1/2	7	5 9/16	3 7/16	7 15/16
	5	4 3/4-12	3 1/2-12	5	5.748	1	4 1/4	6 1/2	4 7/8	1/2	1 1/2	7	5 9/16	3 7/16	7 15/16
	5 1/2	5 1/4-12	4-12	5 1/2	6.248	1	4 5/8	7	5 3/8	1/2	1 1/2	7	5 9/16	3 7/16	7 15/16

\*\* Dimension XI to be specified by customer

Table 3—Envelope and Mounting Dimensions

# ST5 SERIES

## Medium Duty Hydraulic Cylinders



### 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 21) (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 36 on Stop Tube Option and how to Order**

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

# ST5 SERIES

## Medium Duty Hydraulic Cylinders

Pressure Rating for ST5 series hydraulic cylinders vary by bore size and rod size as shown in table below. For pressure higher than those indicated, ST6 series Heavy Duty cylinders should be used.

Bore Size	Rod Size	Pressure Rating at 4:1 Design Factor (on Tensile)
1 1/2	5/8	2280
	1	2500
2	5/8	1235
	1	1925
	1 3/8	1925
2 1/2	5/8	775
	1	1550
	1 3/8	1550
	1 3/4	1550
3 1/4	1	1030
	1 3/8	1200
	1 3/4	1200
	2	1200
4	1	670
	1 3/8	845
	1 3/4	845
	2	845
	2 1/2	845
5	1	545
	1 3/8	700
	1 3/4	780
	2	780
	2 1/2	780
	3	780
	3 1/2	780
	4	780
6	1 3/8	500
	1 3/4	600
	2	660
	2 1/2	660
	3	660
	3 1/2	660
	4	660
8	1 3/8	310
	1 3/4	400
	2	450
	2 1/2	630
	3	630
	3 1/2	630
	4	630
	4 1/2	630
	5	630
	5 1/2	630

### Push Force and Displacement

Bore Size	piston Area	Cylinder Push Force in pounds at various Pressures					Displacement Per inch of stroke (Gallons)
		50	100	500	1000	1500	
1 1/2	1.767	88	177	885	1770	2655	.00765
2	3.14	157	314	1570	3140	4710	.0136
2 1/2	4.91	245	491	2455	4910	7365	.0213
3 1/4	8.30	415	830	4150	8300	12450	.0359
4	12.57	628	1257	6285	12570	18855	.0544
5	19.64	982	1964	9820	19640	29460	.0850
6	28.27	1414	2827	14135	28270	42405	.1224
8	50.27	2513	5027	25135	50270	75405	.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)
		50	100	500	1000	1500	
5/8	0.307	15	31	154	307	460	.0013
1	0.785	39	79	392	785	1177	.0034
1 3/8	1.490	75	149	745	1490	2235	.0065
1 3/4	2.410	121	241	1205	2410	3615	.0104
2	3.141	157	314	1570	3141	4711	.0136
2 1/2	4.910	245	491	2455	4910	7365	.0213
3	7.070	354	707	3535	7070	10605	.0306
3 1/2	9.620	481	962	4810	9620	14430	.0416
4	12.57	628	1257	6285	12570	23355	.0544
4 1/2	15.90	795	1590	7950	15900	23850	.0688
5	19.64	982	1964	9820	19640	23460	.0850
5 1/2	23.76	1188	2376	11880	23760	35640	.1028

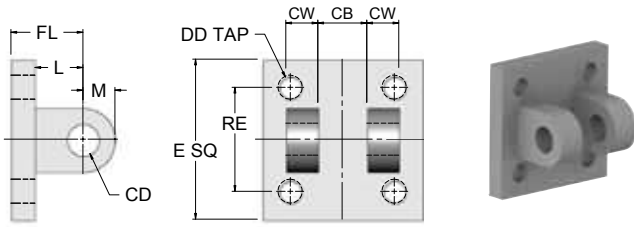
Area Extended stroke Push :  $AE = .7854 BD^2$   
 Area Retracted stroke Pull :  $AR = (.7854 BD^2 - .7854 RD^2)$   
 Cylinder Push Force Formula :  $FE = P \times AE$   
 Cylinder Pull Force Formula :  $FR = P \times AR$   
 Cylinder Volume (Gallons) :  $G = \frac{\text{Net area (in}^2\text{)} \times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

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

# ST5 SERIES

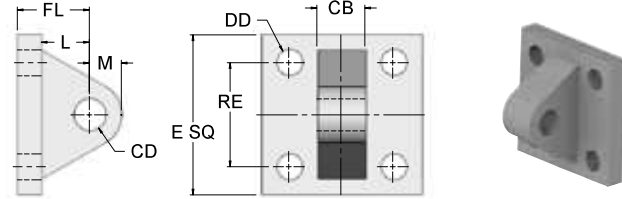
## Medium Duty Hydraulic Cylinders

### NFPA CLEVIS BRACKET



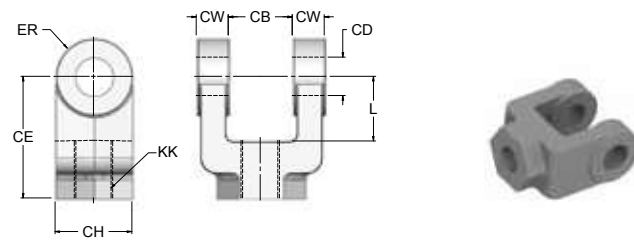
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16
CB-17	2.531	1 3/4	1 1/4	7/8-14	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16
CB-20	2.531	2	1 1/4	1-14	7 1/2	3 1/2	2 1/2	2	5 3/4
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
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
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
CB-40	4.532	4	2 1/4	2-12	14 7/8	6 7/16	4 1/2	4	11 1/2

### NFPA EYE BRACKET



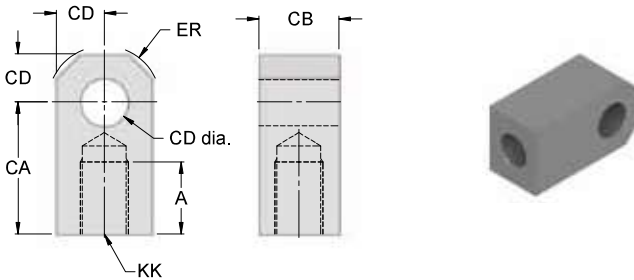
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16
EB-10	1.5	1	21/32	1 1/2	2 1/4	1 1/2	1	3 1/4
EB-10H	1.50	1	21/32	4 1/2	2 3/8	1 1/2	1	3 1/4
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	1 3/8	3 13/16
EB-17	2.5	1 3/4	29/32	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16
EB-17H	2.50	1 3/4	29/32	6 1/2	3 3/8	2 1/4	1 3/4	4 15/16
EB-20	2.50	2	1 1/16	7 1/2	3 1/2	2 1/2	2	5 3/4
EB-20H	2.50	2	1 1/16	7 1/2	4	2 1/2	2	5 3/4
EB-25	3.00	2 1/2	1 3/16	8 1/2	4	3	2 1/2	6 19/32
EB-25H	3.00	2 1/2	1 3/16	8 1/2	4 3/4	3	2 1/2	6 19/32
EB-30H	3.00	3	1 5/16	9 1/2	5 1/4	3 1/4	3	7 1/2
EB-35	4.00	3 1/2	1 13/16	12 5/8	5 11/16	4	3 1/2	9 5/8
EB-40	4.50	4	2 1/16	14 7/8	6 7/16	4 1/2	4	11 1/2

### NFPA ROD CLEVIS



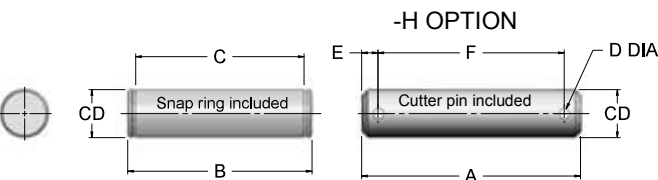
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4
RC-07H	1.265	3/4	2 1/8	1 3/8	5/8	3/4	3/4-16	1
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2
RC-10H	1.515	1	2 15/16	1 1/2	3/4	1	1-14	1 5/16
RC-13	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8
RC-13H	2.032	1 3/8	3 3/4	2	1	1 3/8	1 1/4-12	1 3/4
RC-17	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 1/2-12	2 1/4
RC-20	2.531	2	5 1/2	2 15/16	1 1/4	2	1 7/8-12	2 1/2
RC-25	3.032	2 1/2	6 1/2	3 1/2	1 1/2	2 1/2	2 1/4-12	3
RC-30	3.032	3	6 3/4	3 7/8	1 1/2	2 3/4	2 1/2-12	3 1/4
RC-30H	3.032	3	6 3/4	3 7/8	1 1/2	3	2 1/2-12	3 1/4
RC-35	4.032	3 1/2	8 1/2	5	2	3 1/2	3 1/4-12	4
RC-35H	4.032	3 1/2	7 3/4	5	2	3 1/2	3 1/4-12	4 1/4
RC-40	4.532	4	10	6 1/8	2 1/4	4	4-12	4 1/2

### NFPA ROD EYE



Part #	A	CA	CB	CD PIN DIA.	ER	KK
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16
RE-10	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14
RE-10H	1 1/8	2 3/8	1 1/2	1	1 7/16	1-14
RE-13	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12
RE-17	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12
RE-20	3	5	2 1/2	2	2 1/2	1 7/8-12
RE-20H	2 1/4	4 3/8	2 1/2	2	2 7/8	1 3/4-12
RE-25	3 1/2	6 13/16	3	2 1/2	2 13/16	2 1/4-12
RE-30	3 1/2	6 1/8	3	3	3 1/4	2 1/2-12
RE-30H	3 5/8	6 1/2	3 1/2	3	3 1/4	2 3/4-12
RE-35	4 1/2	7 5/8	4	3 1/2	3 7/8	3 1/4-12
RE-35H	5	7 5/8	4	3 1/2	3 7/8	3 1/2-12
RE-40	5 1/2	9 1/8	4 1/2	4	4 7/16	4-12
RE-40H	5 3/4	9 1/8	5	4	4 7/16	4 1/2-12

### NFPA PIN



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

# ST5 SERIES

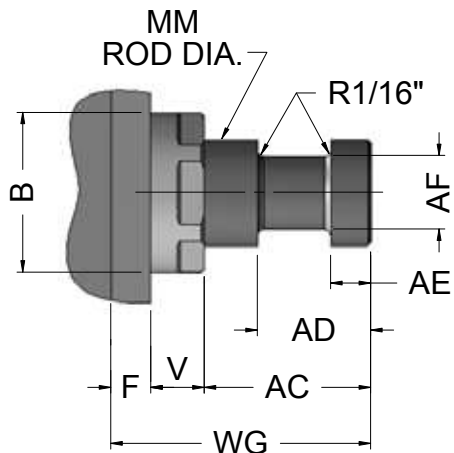
## Medium Duty Hydraulic Cylinders

Cylinder Special Rod End

### Style #5 Piston Rod End Flange

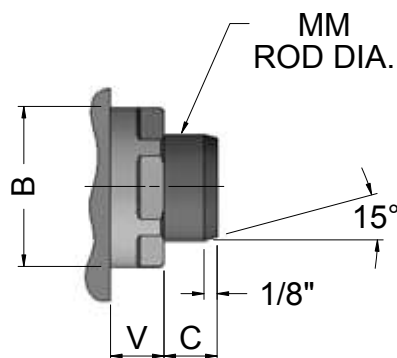
Rod End Flange Coupling For series ST5, ST6 Hydraulic and ST3 and ST4 Pneumatic

- Simplifies alignment
- Reduces assembly time
- Allows full rated hydraulic pressure in push and pull directions
- Available in 5/8" through 5.5" piston rod diameters



BORE	ROD SIZE	MM								
			±.001 B	C	AC	AD	AE	AF	V	WG
1 1/2	std	5/8	1.123	3/8	1 1/8	5/8	1/4	3/8	1/4	1 3/4
	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8	
2	std	5/8	1.123	3/8	1 1/8	5/8	1/4	3/8	1/4	1 3/4
	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8	
	1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4	
2.5		5/8	1.123	3/8	1 1/8	5/8	1/4	3/8	1/4	1 3/4
	std	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
	1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4	
	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8	
3.25	std	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
	1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4	
	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8	
	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4	
4		1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
	std	1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4
	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8	
	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4	
	2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2	
5		1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
	1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4	
	std	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4	
	2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2	
	3	3.748	1	3 5/8	2 7/16	7/8	2 1/4	5/8	4 7/8	
6		1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4
	std	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4	
	2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2	
	3	3.748	1	3 5/8	2 7/16	7/8	2 1/4	5/8	4 7/8	
8		1 3/8	1.998	5/8	1 3/4	1 11/16	3/8	7/8	5/8	2 3/4
	std	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4	
	2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2	
8		3	3.748	1	3 5/8	2 7/16	7/8	2 1/4	5/8	4 7/8
	std	3 1/2	4.248	1	4 3/8	2 11/16	1	2 1/2	5/8	5 5/8
	4	4.748	1	4 1/2	2 11/16	1	3	1/2	5 3/4	
	4 1/2	5.248	1	5 1/4	3 3/16	1 1/2	3 1/2	1/2	6 1/2	
	5	5.748	1	5 3/8	3 3/16	1 1/2	3 7/8	1/2	6 5/8	
	5 1/2	6.248	1	6 1/4	3 15/16	1 7/8	4 3/8	1/2	7 1/2	

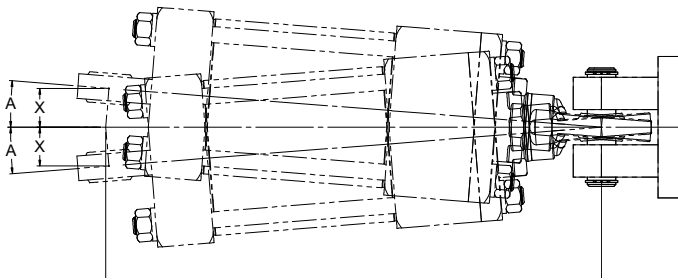
### Style #6 Piston Rod End Plain



**Spherical Bearing Mount  
 Style SB**



**Mounting Information**  
 Head End Mounting



**Mounting Information**  
 Cap End Mounting

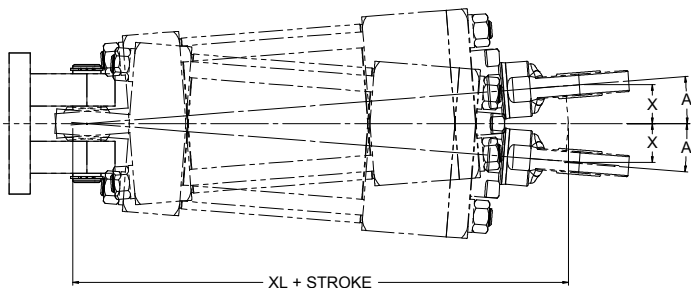


Table 1 — Dimensions

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

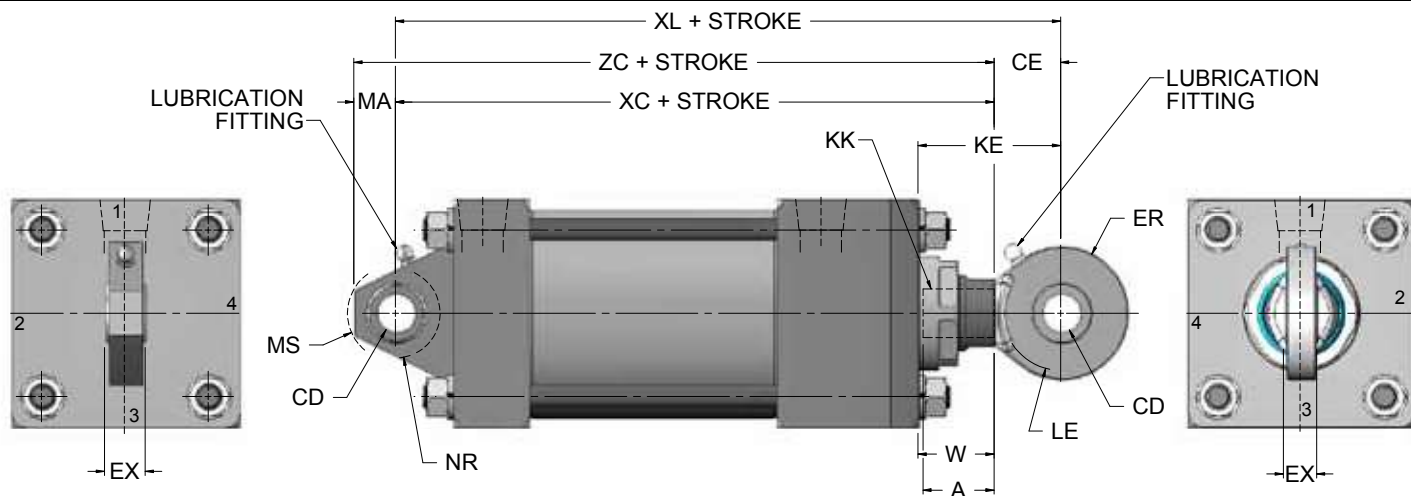
Bore	Head End Mount		Cap End Mount	
	Angle A	Tan. of A	Angle A	Tan. of A
1 1/2	2 1/2	0.035	2 1/2	0.035
2	2 1/2	0.044	4 1/2	0.079
2 1/2	2 1/2	0.044	4 1/2	0.079
3 1/4	3 1/2	0.052	3 1/2	0.052
4	2 1/2	0.044	3 1/2	0.052
5	3 1/2	0.052	3 1/2	0.052
6	3 1/2	0.052	3 1/2	0.052

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  $X = XL \text{ times } 2X \text{ stroke}$ .

# ST5 SERIES

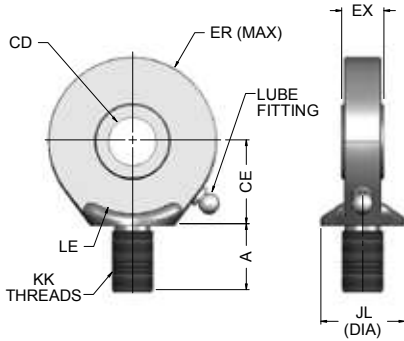
## Medium Duty Hydraulic Cylinders

Spherical Bearing Mount  
Style SB  
1 1/2 to 8" Bore Sizes



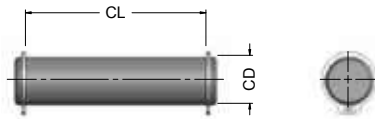
BORE	ROD SIZE	Thread Style		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max Oper. PSI	
		STYLE #4 KK	STYLE #7 KK			XC	XL	ZC										ST4	ST5
1 1/2	std 5/8	7/16-20	-	3/4	5/8	5 3/8	6 1/4	6 1/8	1 1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	1750
	1	-	7/16-20	3/4	1	5 3/4	6 5/8	6 1/2	1 7/8	.5000									
2	std 5/8	7/16-20	-	3/4	5/8	5 3/8	6 1/4	6 1/8	1 1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	980
	1	-	7/16-20	3/4	1	5 3/4	6 5/8	6 1/2	1 7/8										
	1 3/8	-	7/16-20	3/4	1 1/4	6	6 7/8	6 3/4	2 1/8	.5000									
2.5	std 5/8	7/16-20	-	3/4	5/8	5 3/8	6 1/4	6 1/8	1 1/2	-.0005	7/8	13/16	7/16	3/4	3/4	15/16	5/8	250	630
	1	-	7/16-20	3/4	1	5 3/4	6 5/8	6 1/2	1 7/8	.5000									
	1 3/8	-	7/16-20	3/4	1 1/4	6	6 7/8	6 3/4	2 1/8										
	1 3/4	-	7/16-20	3/4	1 1/2	6 3/8	7 1/4	7 1/8	2 3/8										
3.25	std 1	3/4-16	-	1 1/8	3/4	6 7/8	8 1/8	7 7/8	2	-.0005	1 1/4	1 1/8	21/32	11/16	1	1 3/8	1	250	830
	1 3/8	-	3/4-16	1 1/8	1	7 1/8	8 3/8	8 1/8	2 1/4	.7500									
	1 3/4	-	3/4-16	1 1/8	1 1/4	7 3/8	8 5/8	8 3/8	2 1/2										
	2	-	3/4-16	1 1/8	1 3/8	7 1/2	8 3/4	8 1/2	2 5/8										
4	std 1	3/4-16	-	1 1/8	5/8	6 7/8	8 1/8	7 7/8	2	-.0005	1 1/4	1 1/8	21/32	1 1/16	1	1 3/8	1	250	550
	1 3/8	-	3/4-16	1 1/8	1	7 1/8	8 3/8	8 1/8	2 1/4	.7500									
	1 3/4	-	3/4-16	1 1/8	1 1/4	7 3/8	8 5/8	8 3/8	2 1/2										
	2	-	3/4-16	1 1/8	1 3/8	7 1/2	8 3/4	8 1/2	2 5/8										
	2 1/2	-	3/4-16	1 1/8	1 5/8	7 3/4	9	8 3/4	2 7/8										
5	std 1	3/4-16	-	1 1/8	3/4	7 1/8	8 3/8	8 1/8	2	-.0005	1 1/4	1 1/8	21/32	1 1/16	1	1 3/8	1	250	350
	1 3/8	-	3/4-16	1 1/8	1	7 3/8	8 5/8	8 3/8	2 1/4	.7500									
	1 3/4	-	3/4-16	1 1/8	1 1/4	7 5/8	8 7/8	8 5/8	2 1/2										
	2	-	3/4-16	1 1/8	1 3/8	7 3/4	9	8 3/4	2 5/8										
	2 1/2	-	3/4-16	1 1/8	1 5/8	8	9 1/4	9	2 7/8										
	3	-	3/4-16	1 1/8	1 5/8	8	9 1/4	9	2 7/8										
6	std 1 3/8	1-14	-	1 5/8	7/8	8 1/8	10	9 3/8	2 3/4	-.0005	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	250	440
	1 3/4	-	1-14	1 5/8	1 1/8	8 3/8	10 1/4	9 5/8	3	1.0000									
	2	-	1-14	1 5/8	1 1/4	8 1/2	10 3/8	9 3/4	3 1/8										
	2 1/2	-	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8										
	3	-	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8										
	3 1/2	-	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8										
8	std 1 3/8	1-14	-	1 5/8	7/8	8 1/4	10 1/8	9 1/2	2 3/4	-.0005	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	250	250
	1 3/4	-	1-14	1 5/8	1 1/8	8 1/2	10 3/8	9 3/4	3	1.0000									
	2	-	1-14	1 5/8	1 1/4	8 5/8	10 1/2	9 7/8	3 1/8										
	2 1/2	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	3	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	3 1/2	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	4	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	4 1/2	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
5 1/2	-	1-14	1 5/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8											

### NFPA SPHERICAL ROD EYE



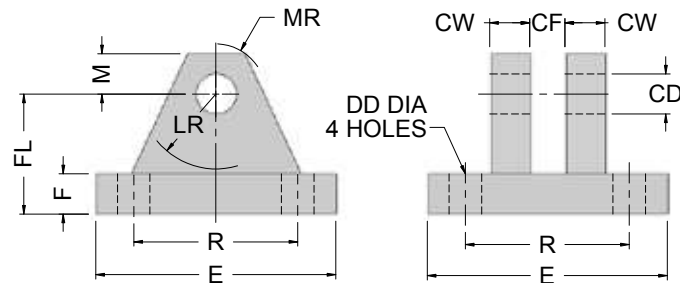
Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2, 2 & 2 1/2	RES-05	.5000 <sup>-0005</sup>	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
3 1/4, 4 & 5	RES-07	.7500 <sup>-0005</sup>	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
6 & 8	RES-10	1.0000 <sup>-0005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860
10	RES-13	1.3750 <sup>-0005</sup>	2	2 1/8	1 3/16	1 11/16	1 7/8	1 1/4-12	2	28562
12	RES-17	1.7500 <sup>-0005</sup>	2 1/8	2 1/2	1 17/32	2 1/16	2 1/8	1 1/2-12	2 1/4	43005
14	RES-20	2.000 <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, 2 & 2 1/2	PS-05	.5000 <sup>-0004</sup>	1 9/16	8600
3 1/4, 4 & 5	PS-07	.7500 <sup>-0005</sup>	2 1/32	19300
6 & 8	PS-10	1.0000 <sup>-0005</sup>	2 1/2	34300
10	PS-13	1.3750 <sup>-0006</sup>	3 5/16	65000
12	PS-17	1.7500 <sup>-0006</sup>	4 7/32	105200
14	PS-20	2.000 <sup>-0007</sup>	4 15/16	137400

### NFPA SPHERICAL CLEVIS BRACKET



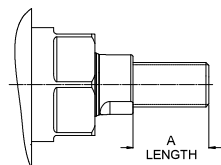
Bore Size	Part #	CD	CF	CW	DD	E	F	FL	LR	M	MR	R	LOAD
1 1/2, 2 & 2 1/2	CBS-05	1/2 <sup>+004/+002</sup>	7/16	1/2	13/32	3	1/2	1 1/2	15/16	1/2	5/8	2.05	5770
3 1/4, 4 & 5	CBS-07	3/4 <sup>+004/+002</sup>	21/32	5/8	17/32	3 3/4	5/8	2	1 3/8	7/8	1	2.76	9450
6 & 8	CBS-10	1 <sup>+004/+002</sup>	7/8	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1	1 3/16	4.10	14300
10	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
12	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
14	CBS-20	2 <sup>+004/+002</sup>	1 3/4	1 1/2	29/32	10 5/8	1 1/2	5 1/2	3 5/16	2	2 3/8	7.92	50375



# ST5 SERIES

## Medium Duty Hydraulic Cylinders

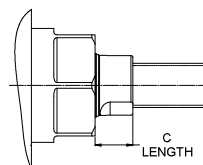
### Thread Extension



#### Option code A

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

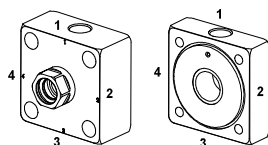
### Rod Extension



#### Option code C

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

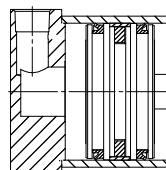
### Port & Adjustable Cushion Location



#### Option code N( ) C( )

Specify optional location, N11 C22 default

### Magnetic Piston & Aluminum Tubing



#### Option Code T2

When position sensing of the cylinder is required, a Magnetic Ring Must be added. The Magnetic ring is placed at the center of the piston under the wear band. The magnetic band will create a magnetic field which will actuate the sensor. Option code **T2. Must be used with aluminum tubing - Low Pressure**

### 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 and Cap

#### 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

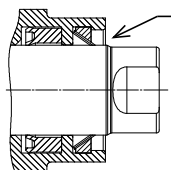
Fluorocarbon will be chosen for higher temperature range from 200°F to 400°F (200°C)

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

### 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.

### Air Bleeder

#### Option B1, B2, B3, B4

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 bleed 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.

### Chrome Rod Or Nitrotec Rod

#### Option Code R2 or R3

We still can supply old technology, for that matter you can request Chrome Rod (R2) Or Nitrotec Rod (R3).

### END OF STROKE SENSOR

#### Option Code G1( ) & 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 : G3 switch will be in position 3

#### 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



Option Code G1



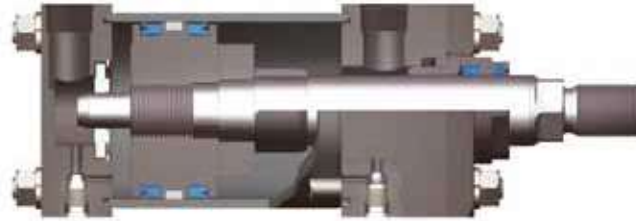
Option Code H1

#### How it Works

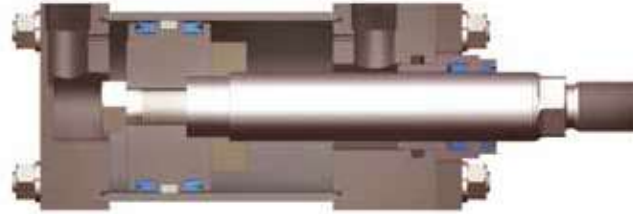
When the ferrous cushion of a cylinder enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod forward. As a result, the common contact snaps to its operated position, closing the other contact circuit. When the target is removed the common contact automatically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

### Stop Tube Design

**Drawing A**  
Cushion design



**Drawing B**  
Non Cushion design



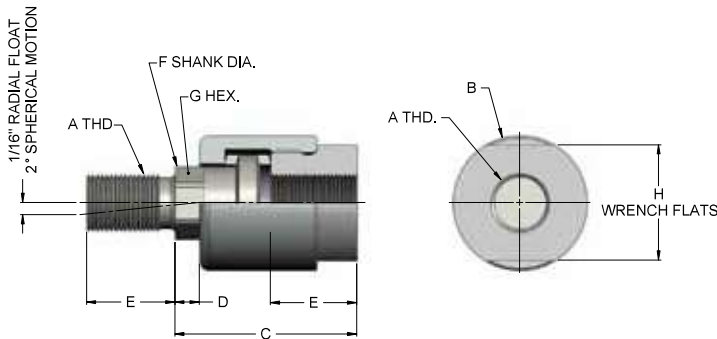
#### Stop Tube

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: ST5-3.25x60x1.38-ST4-N11C00 is a 3.25" bore with 60" Net stroke and a dual piston stop tube of 4" long, for a total gross stroke of 64" (must be used to calculate overall length "LB").

## Linear Alignment Couplers



**Star cyl'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 Star cyl 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

### Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by STARCYL Cylinder, and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions.

Buyer's order for any item described in its document, when communicated to STARCYL cylinder, or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F. O. B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment to Buyer. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

**5. Limitation of Remedy:** SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**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.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefor upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**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.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, act of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

**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.

# HOW TO ORDER

# ST5 SERIES Medium Duty Hydraulic Cylinders

## ST5 D F1 - 3.25 X 22.22 X 1.38 - #2

Bore\*

Stroke\*

Rod Dia\*

FEATURE	DESCRIPTION	SYMBOL
SERIES	Used in All ST4 part number (AIR HD)	ST4
	Used in All ST5 part number	ST5

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Double rod End	Used only if double rod cylinder is required	18	D
Back-to-Back	(must request drawing)		B
Position Sensor	Temposonic Ready***		X

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Mounting Style	Head End Tie Rod Extended	6, 20	X3
	Cap End Tie Rods Extended	6, 20	X2
	Both End Tie Rod Extended	6, 20	X1
	Head Rectangular Flange	6	F1
	Cap Rectangular Flange	6	F2
	Head Square Flange	8	F5
	Cap Square Flange	8	F6
	Side Lugs	10, 22	S2
	Centerline Lugs	10, 22	S3
	Side Tapped	12, 22	S4
	Side End Lugs	12, 24	S7
	Head Trunnion	14, 26	T1
	Cap Trunnion	14, 26	T2
	Intermediate Fixed Trunnion Xi=( )	14, 26	T4
	Cap Fixed Clevis	16, 24	P1
	Cap Detachable Clevis	16	P2
	Head Square Mount (8" BORE ONLY)	20	E3
	Cap Square Mount (8" BORE ONLY)	20	E4
	Head Rectangular Flange	18	E5
	Spherical Mounting	32,33	SB

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Piston Rod End	Select :		
	Style #1 Intermediate Male		#1
	<b>Style #2 Small Male</b>	18	#2
	Style #3 Full Male	6	#3
	Style #4 Short Female		#4
	Style #5 Flange Coupling	23	#5
	Style #6 Plain	23	#6
	Style #7 Spherical female	33	#7
Style #X Special (Specify)		#X	

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

\*\*\* AVAILABLE STARTING AT 2.5" BORE WITH 1" ROD

# -S081 S061 C00 - LU - A1 - FP

FEATURE	DESCRIPTION	SYMBOL
<b>Head Port</b>	NPT Port SAE Straight Thread O-ring Port Flange Port (C.61) British Parallel British Tappered	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
<b>Cap Port</b>	NPT Port SAE Straight Thread O-ring Port Flange Port (C.61) British Parallel British Tappered	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

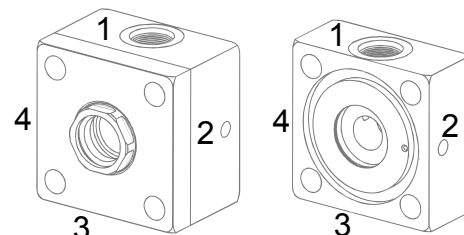
FEATURE	DESCRIPTION	SYMBOL
Cushion & Location	<b>Head Non Cushion, Cap Non Cushion</b> Head Cushion Only (where x = position 1,2,3,4) Cap Cushion Only (where x = position 1,2,3,4) Cushion both ends (where x = position 1,2,3,4)	C00 CX0 C0X CXX

Piston seals Option	DESCRIPTION	SYMBOL
	Buna U-cup With Backup	LB
	Viton U-cup With Teflon Backup	LV
	<b>Urethane asymmetric U-cup seals (std)</b>	<b>LU</b>
	Polypack Urethane U-cup	PU
	Polypack Viton U-cup	PV
	Hi-Load Piston	LH
	BUMPER SEALS (STAR4 ONLY)	BS
	Ring Packed	RP

Options	DESCRIPTION	SYMBOL
	Rod Extension C=	35 C=( )
	Thread Extension A=	35 A=( )
	Rod Scraper	35 A1
	Bleeder (Captive Ball Bearing/Set screw) pos.1,2,3,4	35 BA( )*
	Bleeder (philips screw type ) pos.1,2,3,4	35 BB( )*
	Bleeder (standard Sae Port) pos.1,2,3,4	35 BC( )*
	Aluminum Tubing (max 250 psi)	35 T1
	Alum. Tube With Magnet (max 250 psi)	35 T2
	Composite tubing (Fiberglass/epoxy)	T3
	Go Switches (round) Position 1,2,3,4	35 G1
	Go Switches Cylindicator, Pos, 1 2 3 4	35 H1
	Stop Tube (length)	ST( )
	Stop Tube Double piston (length)	STD( )
	Rod Boot	RB
	Chomed Rod	35 R1
	Induction Hard Chromed	R2
	Nitrotec Rod	35 R3
	Stainless Steel Rod 303 Chromed Rod	S1
	Stainless Steel Rod 17-4 ph Chromed Rod	S2
	Tie rods Support (Stroke from 60" and more)	TS

FP = Finish Paint  
FM = Finish Starnite  
FN = Finish Nickel

Port & Adjustable Cushion Location



BORE	STD PORT PER BORE				STD PORT LOCATION HEAD , CAP
	EE				
	NPTF	CODE	SAE	CODE	
1 1/2	3/8	06	6	06	1,1
2	3/8	06	6	06	1,1
2 1/2	3/8	06	6	06	1,1
3 1/4	1/2	08	10	10	1,1
4	1/2	08	10	10	1,1
5	1/2	08	10	10	1,1
6	3/4	12	12	12	1,1
8	3/4	12	12	12	1,1

PNEUMATIC & HYDRAULIC

# STARCYL CYLINDERS

• 1994 •

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STARCYL CYLINDERS  
MAY THE FORCE BE WITH YOU!

**SPACE SAVING MULTI-STAGES AIR CYLINDER**

**STAR 1 SERIES**

**STAR1 - Multistage Upgradable air cylinders**

STARCYL CYLINDERS

**SPACE-SAVER**

**STAR2 SERIES**

- ☑ Bore size from 1 1/2" to 10"
- ☑ Stroke up to 40"
- ☑ Save Space up to 35% (vs. standard)
- ☑ 250 PSI AIR, OIL
- ☑ Two-Year Warranty
- ☑ Economic design

**NFPA STYLE MOUNT**

**STAR2 - NFPA style Mount spacesaver air cylinders**

STARCYL AIR CYLINDERS

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

**STAR3 SERIES**

WWW.STARCYL.COM

- ☑ NFPA Interchangeable Heavy Duty Air Cylinders
- ☑ Flush Mount Standard
- ☑ 11 Bore Sizes From 1.5" through 12"
- ☑ Stroke - available to any practical length
- ☑ 18 standard Mounting Styles
- ☑ Adjustable Air Cushion Standard
- ☑ 250 PSI AIR/OIL
- ☑ Two Year Warranty
- ☑ Economic Design

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

STARCYL AIR CYLINDERS

**NFPA ROD LOCK CYLINDER**

**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 Life Accuracy
Extremely Low Backlash	Precision Holding
Spring Engaged Units	Holds Load During Power/Pressure Loss
Rated for 2,750,000 Cycles	Long Maintenance-Free Life
4 bar (60 psi) Release Pressure	Compact Unit, Easy Integration
	Broad Application

**STAR3RL - NFPA Rod Lock for STAR3 air cylinders**

STARCYL AIR CYLINDERS

**SPACE ONE**

Space. The Final Frontier.

Space Saver Air Cylinders

**SO - Space One, Spacesaver Air Cylinder**

STARCYL CYLINDERS

**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

STARRITE™ AVAILABLE ON ALL STEEL PARTS

**STAR6 - Heavy Duty NFPA interchangeable Hydraulic cylinders, 3000 psi**

STARCYL AIR CYLINDERS

**MULTI-STAGES**

**M3 SERIES**

MULTI-STAGES NFPA STYLE MOUNT HEAVY DUTY - HIGH FLOW

NOMINAL PRESSURE AIR 250 PSI

STANDARD BORE SIZES 1.5" THROUGH 10"

STROKE UP TO 12"

NFPA STYLE MOUNT

TWO-YEAR WARRANTY

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

STARCYL AIR CYLINDERS

**ISOMETRIC SERIES**

AIR CYLINDER ISO/DIN/ISO 6432 & 15552

WWW.STARCYL.COM

**STMM - Isometric series ISO 6432 & 15552 Air Cylinder**

**WWW.STARCYL.COM**

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**STARCYL CYLINDERS**

**877-STARCYL**

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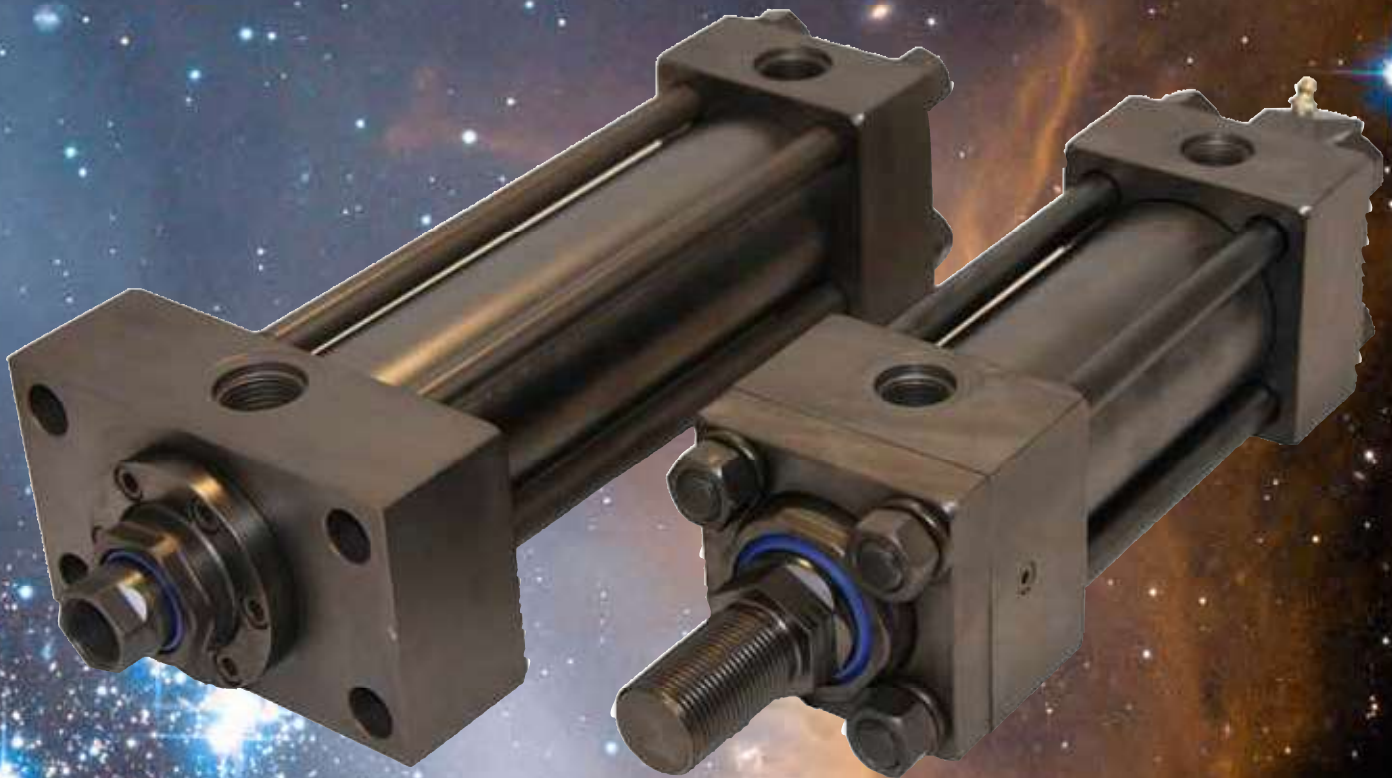
**IN CANADA: PH: 450-688-0505 - FAX 514-221-3798**



**ST5-SEPT12**



# 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 \*\*\* ●

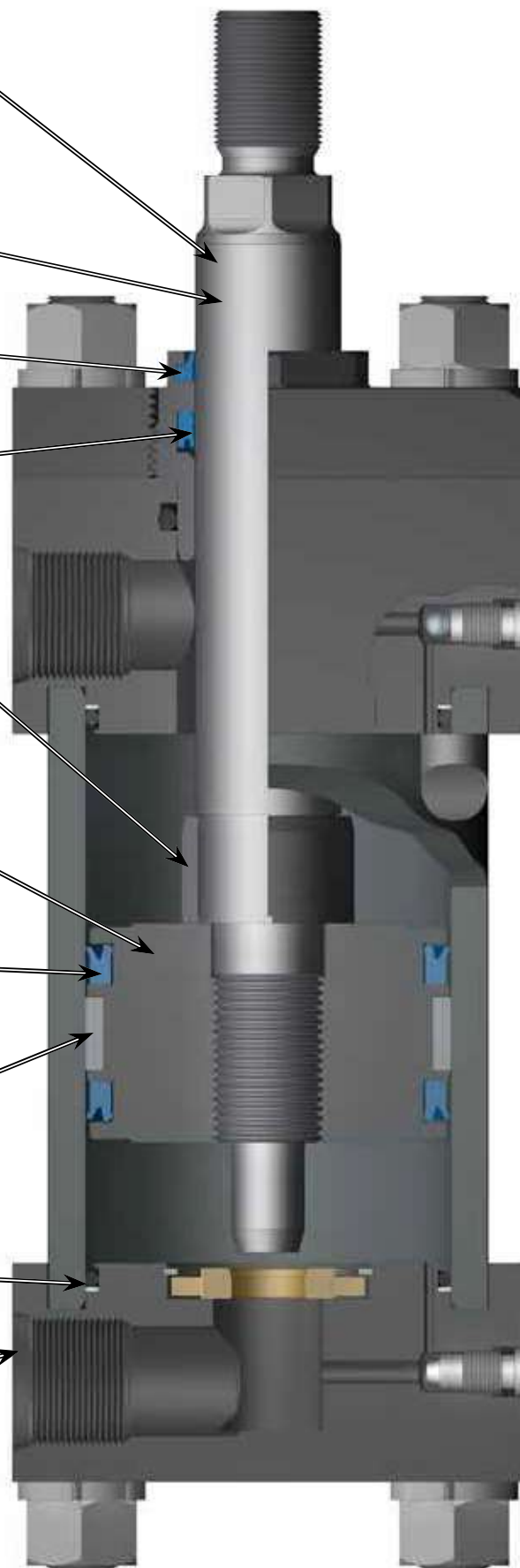
Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

### 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.



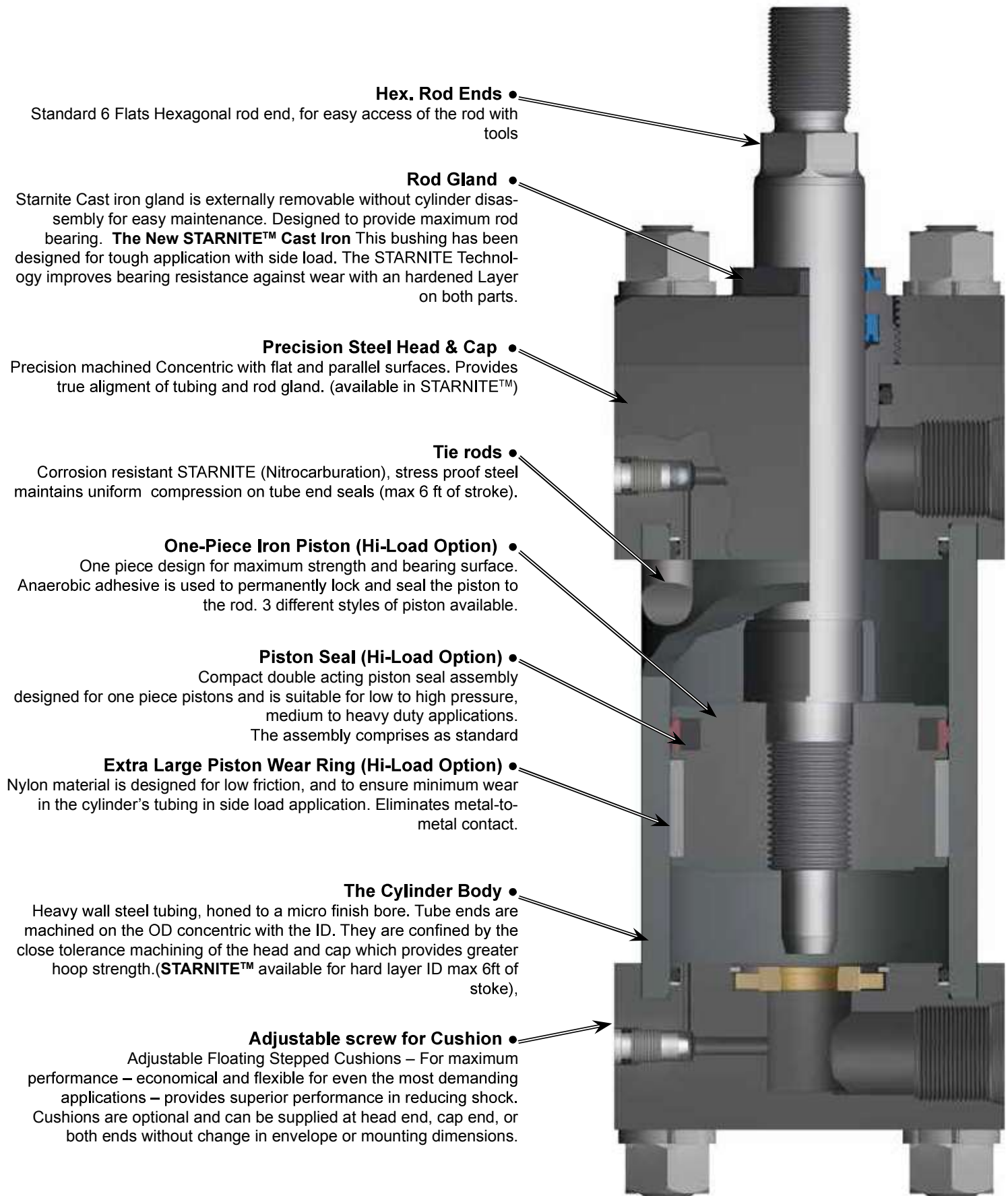
\*All Blue seals can withstand most chemical washdown, No Fluorocarbon Required



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Cylinder Design Features,  
Hi-load Piston



# 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.

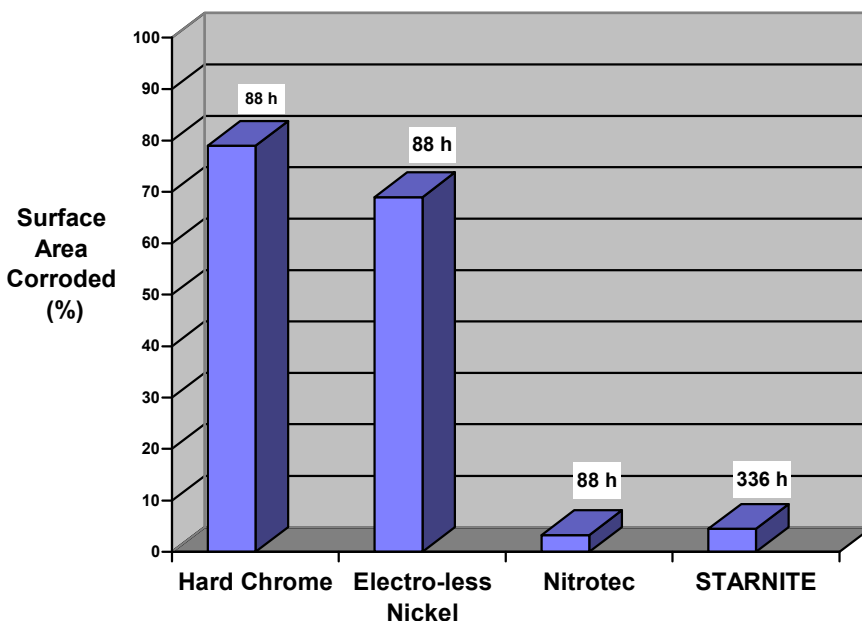
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitride layer consisting of a monophase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating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

- Chrome plate can flake and blister.
- Flakes and slivers will destroy seals and glands.
- Loose chrome will cause massive leaking and rapid system failure.
- Chrome lacks dimensional uniformity.

### STARNITE™ Process on cylinders

- Superior corrosion resistance.
- Improved wear resistance.
- Better lubrication retention.
- Dent resistance without induction hardening.
- Environmentally Friendly
- No surface pitting, flaking, or hydrogen embrittlement.
- INCREASED SERVICE LIFE.

# 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.

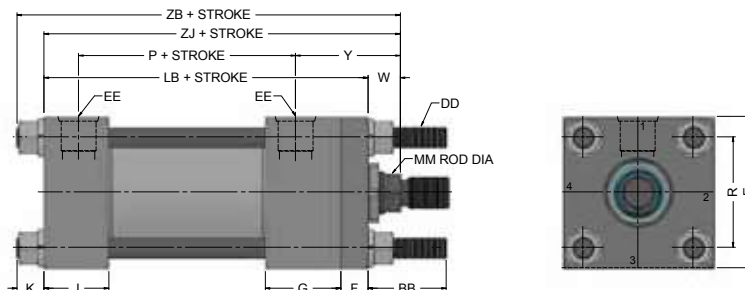
Tie rods Head end ST6X3  NFPA MX3 page 6	Tie rods Cap end ST6X2  NFPA MX2 page 6	Tie rods Extended Both ends ST6X1  NFPA MX1 page 6	Head Rectangular Flange ST6F1  NFPA MF1 page 8
Head Square Flange ST6F5  NFPA MF5 page 8	Head Rectangular Mount ST6E5  NFPA ME5 page 8	Cap Rectangular Flange ST6F2  NFPA 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

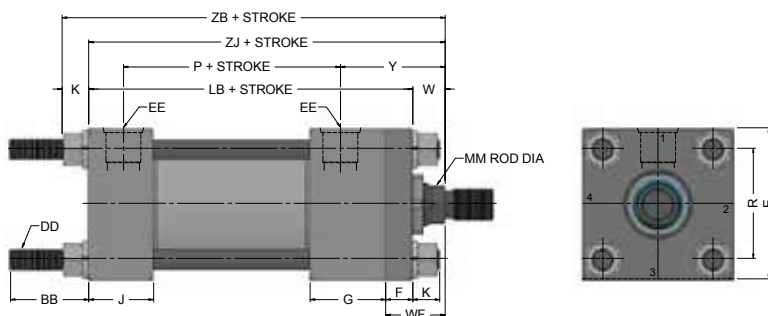
## Heavy Duty Hydraulic Cylinders

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

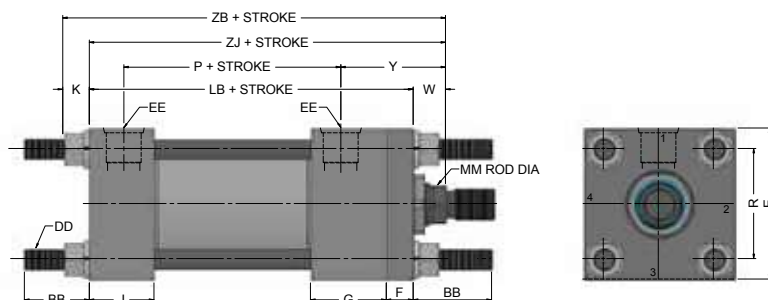
Tie Rods Extended Head End  
Style ST6X3  
(NFPA Style MX3)



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



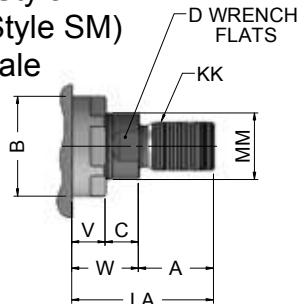
Tie Rods Extended Both End  
Style ST6X1  
(NFPA Style MX1)



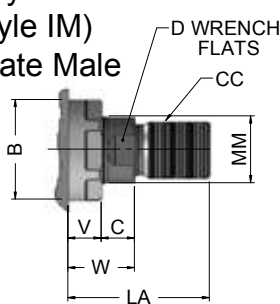
Basic Mounting ST6X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

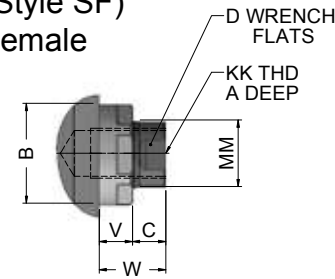
Thread Style #2  
(NFPA Style SM)  
Small Male



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

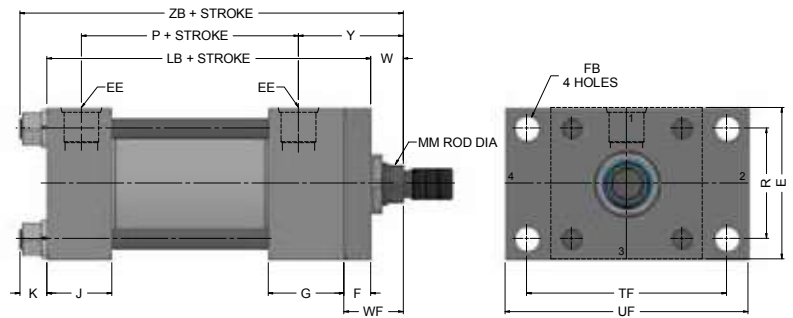
Rectangular Flange and Head Mountings  
1 1/2 to 6" Bore Sizes

### 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

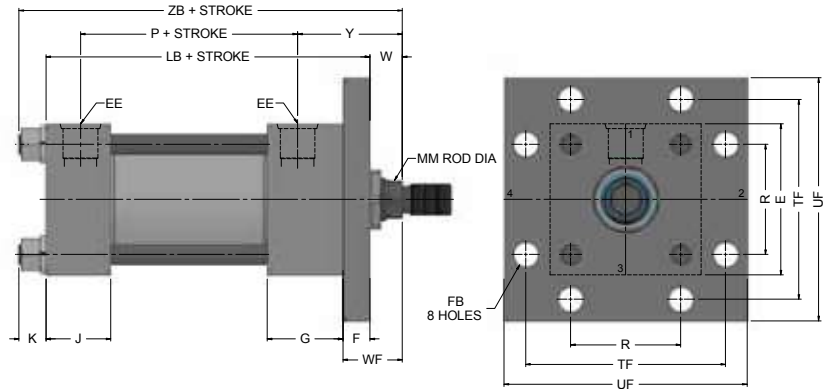


\* Maximum pressure rating — push application.

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

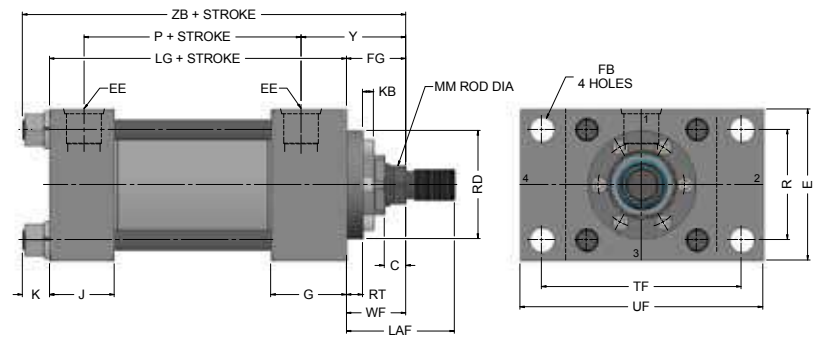


Bore Size	Max PSI — Push*				
	Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	3000	3000	-	-	-
2	-	3000	3200	-	-
2 1/2	-	3000	3000	3000	-
3 1/4	-	-	3000	3000	3000
4	-	-	-	3000	3000
5	-	-	-	-	3000
Bore	Rod size				
	2 1/2	3	3 1/2	4	
4	3000	-	-	-	
5	3000	3000	3000	-	
6	3000	2700	3000	2700	



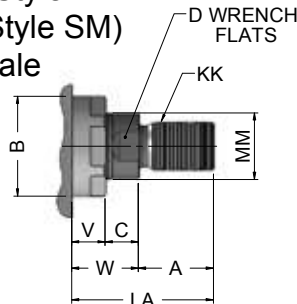
\* Maximum pressure rating — push application.

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

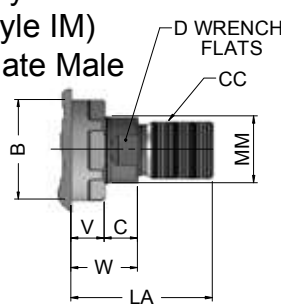


### Rod End Dimensions—see table 2

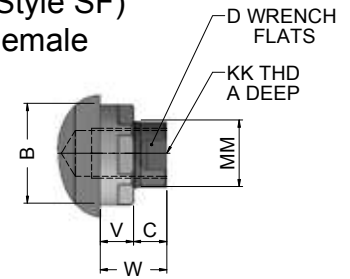
#### Thread Style #2 (NFFA Style SM) Small Male



#### 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

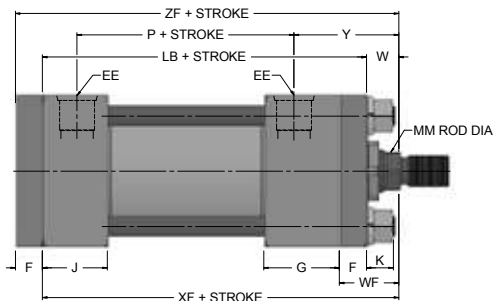
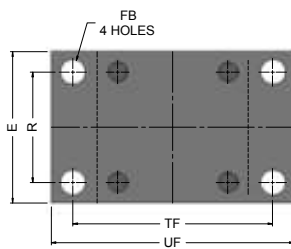


Bore Size	Max PSI — Pull*			
	5/8	1	1 3/8	1 3/4
1 1/2	2500	3000	-	-
2	-	3000	3000	-
2 1/2	-	3000	3000	3000
3 1/4	-	-	3000	3000
4	-	-	-	3000
5	-	-	-	2000

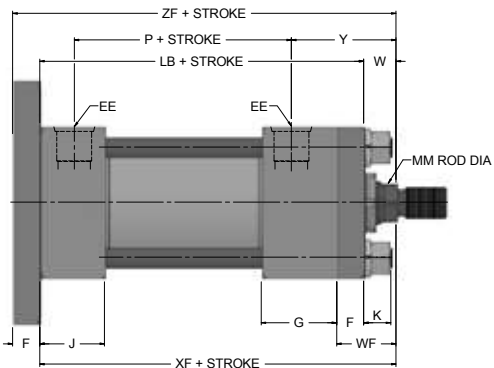
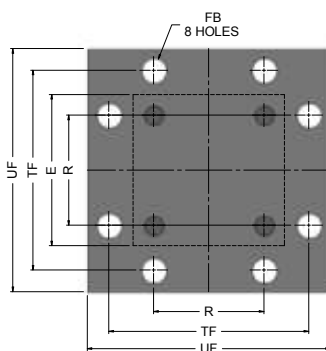
  

Bore	Rod size		
	2 1/2	3	3 1/2
4	3000	-	-
5	3000	2000	3000
6	1800	2500	2000

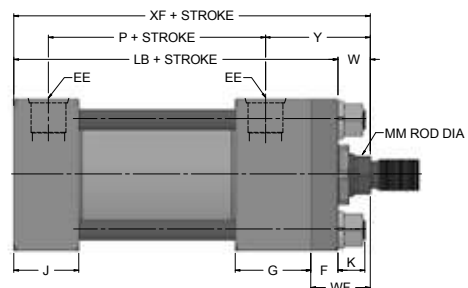
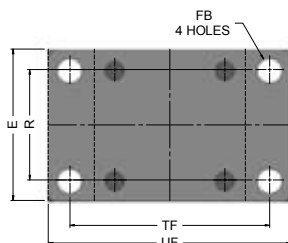
\* Maximum pressure rating — pull application.



Cap Square Flange mounting  
Style ST6F6  
(NFPA Style MF6)

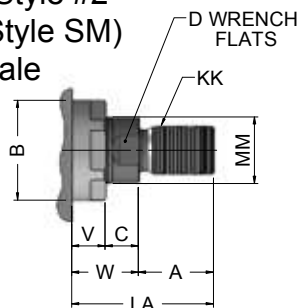


Cap Rectangular mounting  
Style ST6E6  
(NFPA Style ME6)

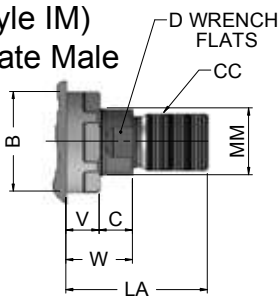


Rod End Dimensions—see table 2

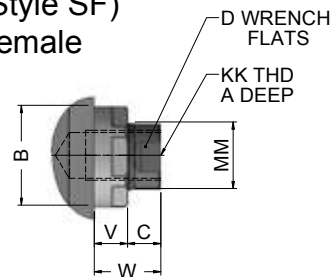
Thread Style #2  
(NFPA Style SM)  
Small Male



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 3—  
Envelope and  
Mounting  
Dimensions

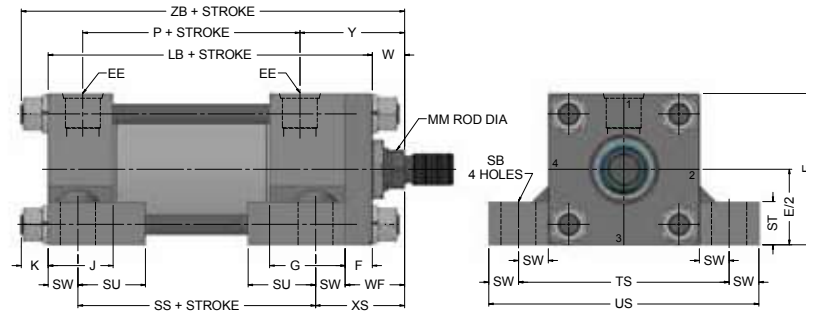
Table 2—Rod Dimensions

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	9 5/8	10 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	2 1/4	9 5/8	10 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	2 1/4	9 5/8	10 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	2 1/4	9 5/8	10 5/8

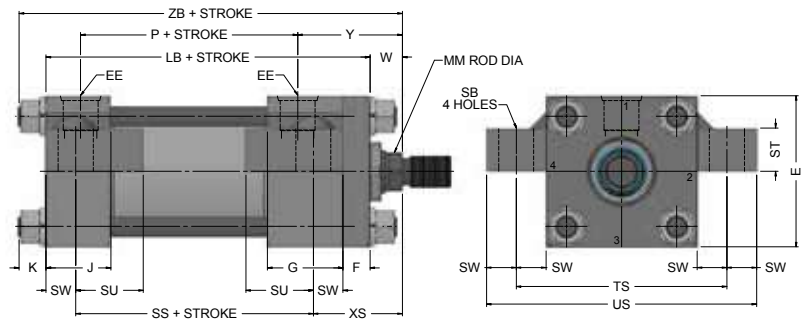
# ST6 SERIES Heavy Duty Hydraulic Cylinders

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

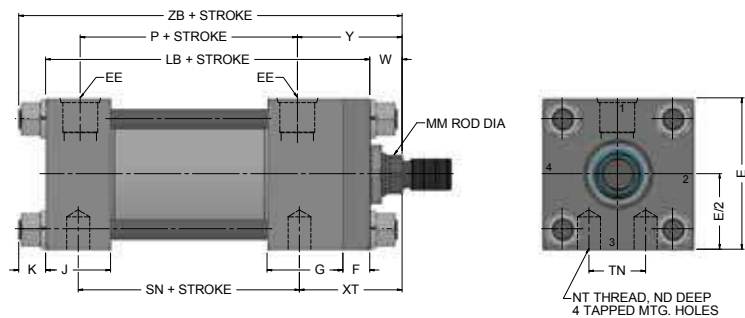
Side Lugs mounting  
Style ST6S2  
(NFFA Style MS2 )



Center Lugs mounting  
Style ST6S3  
(NFFA Style MS3)

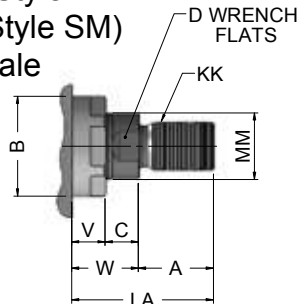


Side Tapped mounting  
Style ST6S4  
(NFFA Style MS4)

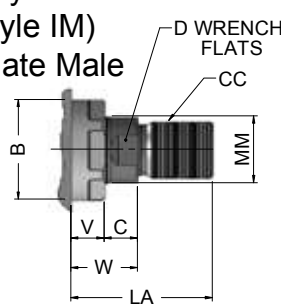


Rod End Dimensions—see table 2

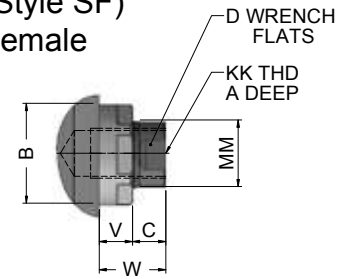
Thread Style #2  
(NFFA Style SM)  
Small Male



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 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	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

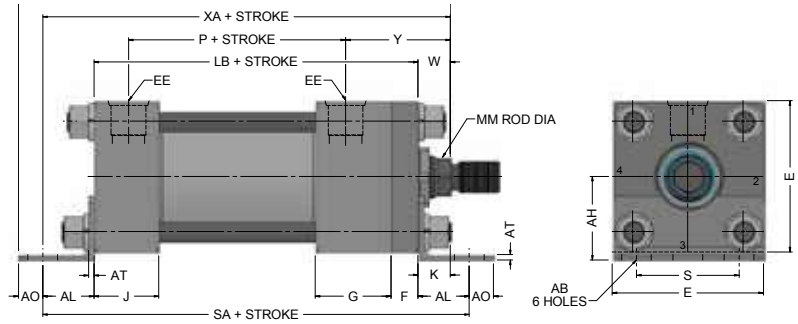
Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

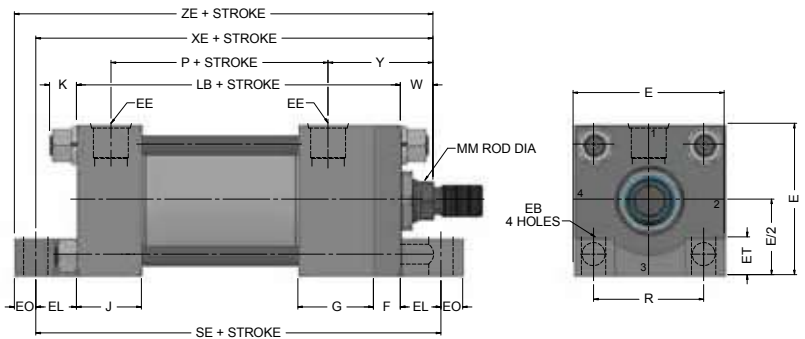
Side End Angles, Side End Lugs  
and Cap Fixed Clevis Mountings  
1 1/2 to 6" Bore Sizes

Side End Angles mounting  
Style ST6S1  
(NFFA Style MS1)



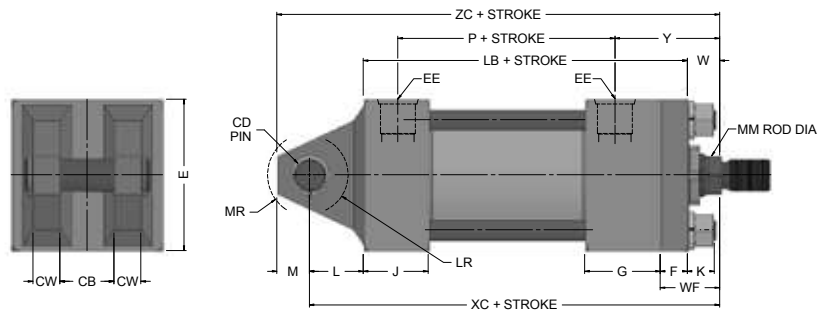
The maximum recommended operating pressure for Style ST6S1 (MS1) is 500 psi. The recommended minimum stroke length is two times the bore size.

Side End Lugs mounting  
Style ST6S7  
(NFFA Style MS7)



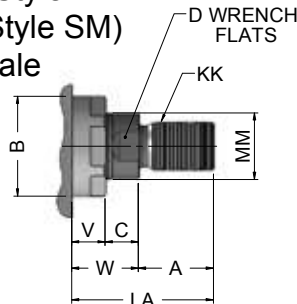
For this cylinder mounting style, both the mounting lugs and cylinder end caps must rest on a firm surface

Cap Fixed Clevis mounting  
Style ST6P1  
(NFFA Style MP1)

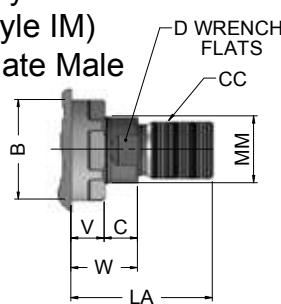


Rod End Dimensions—see table 2

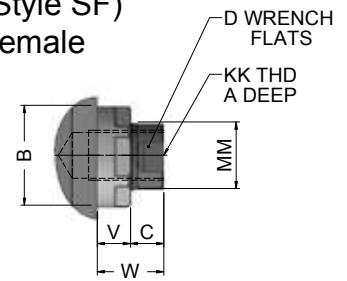
Thread Style #2  
(NFFA Style SM)  
Small Male



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

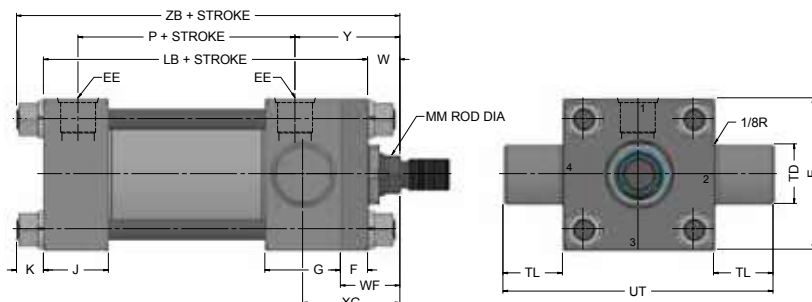
BORE	ROD SIZE	Thread Style		Rod Extensions and pilot dimensions								Add Stroke							
		STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	XA	XC	XE	ZA	ZC	ZE	
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	6 5/8	6 3/8	6 1/2	7	6 7/8	6 7/8
	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8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

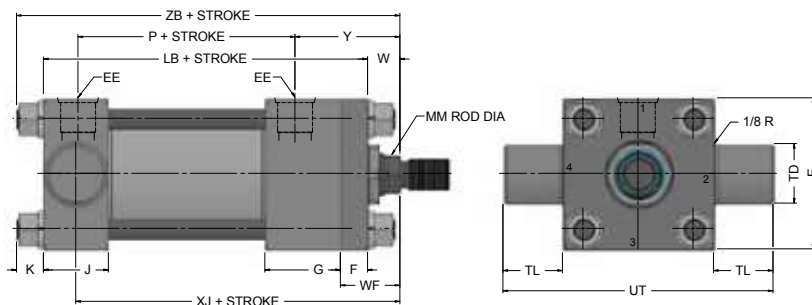
## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
1 1/2 to 6" Bore Sizes

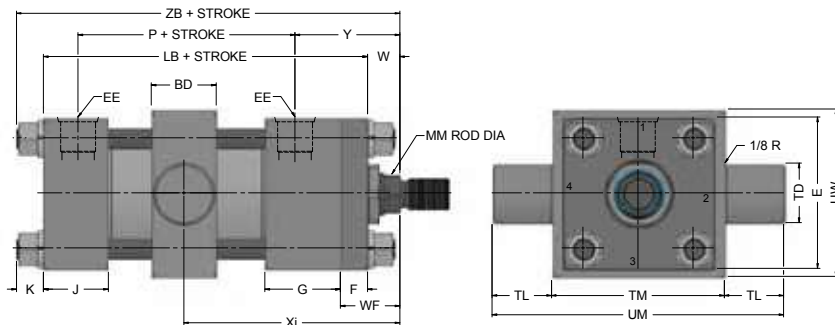
Head Trunnion  
Style ST6T1  
(NFFPA Style MT1)



Cap Trunnion  
Style ST6T2  
(NFFPA Style MT2)



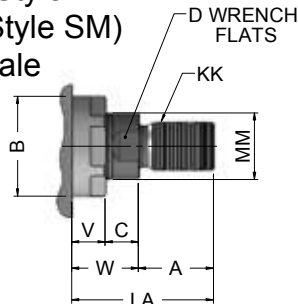
Intermediate Fixed Trunnion  
Style ST6T4  
(NFFPA Style MT4)



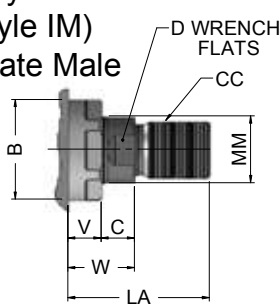
\*\*Dimension Xi to be specified by customer.

### Rod End Dimensions—see table 2

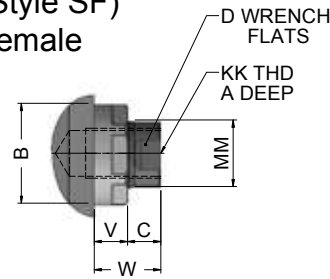
Thread Style #2  
(NFFPA Style SM)  
Small Male



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

# 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.

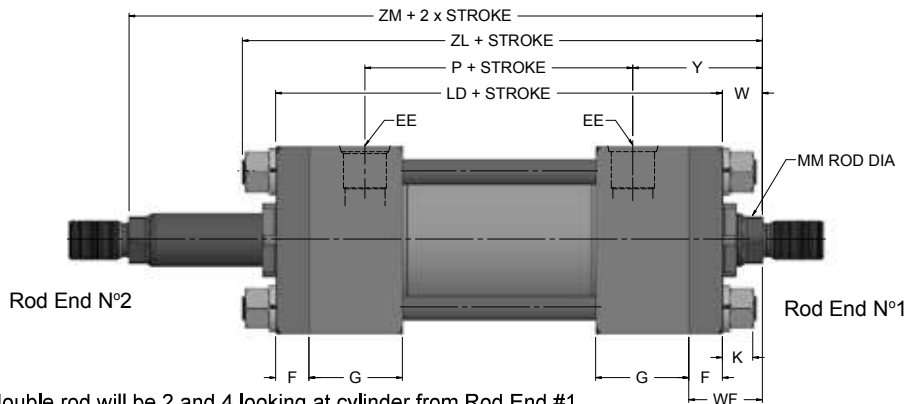
Table 3—Envelope and  
Mounting Dimensions

# 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 :		LB	ZB	SS	SN	SE	XE	ZE	SA	XA	XA	--	
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.



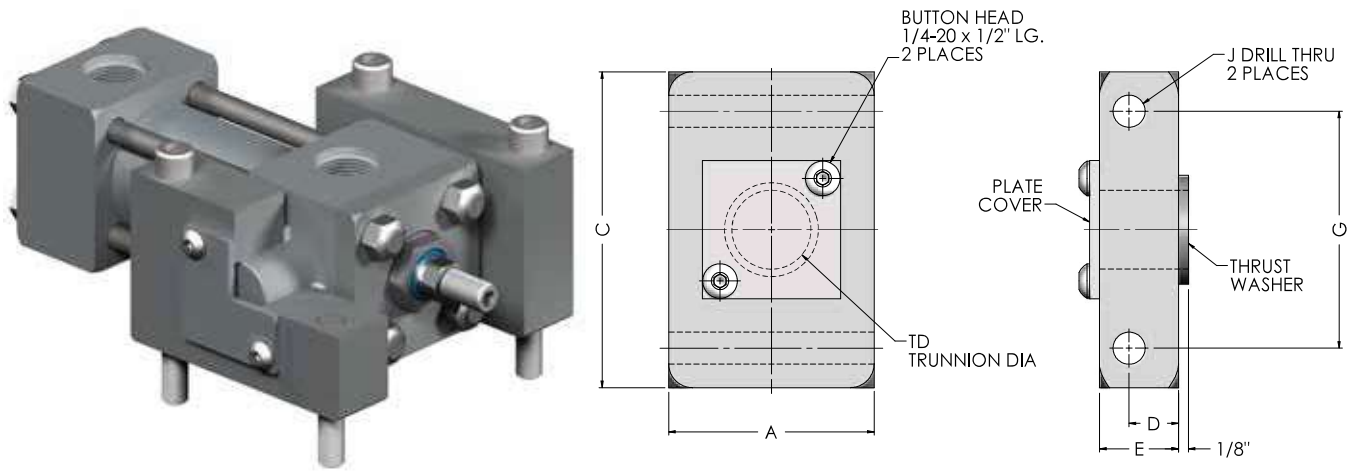


# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Block Accessories  
and Adjustable Stroke Option

### TRUNNION BLOCK

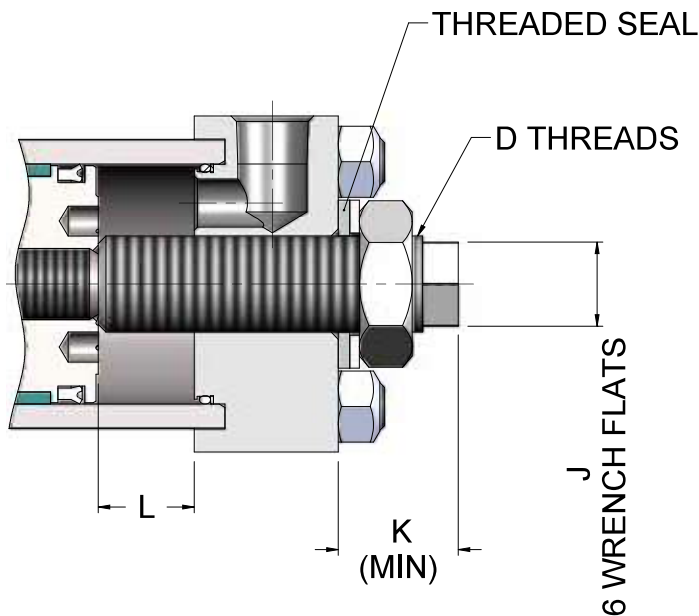


BORE	TD Trunnion Dia	Part Number*	A	C	D	E	G	J
1 1/2	1.000	ST6TB-1000-D-FP	2.60	4"	0.625	1	3.00	13/32
2, 2 1/2	1.375	ST6TB-1375-D-FP	2.60	4"	0.875	1 1/2	3.00	9/16
3 1/4, 4, 5	1.750	ST6TB-1750-D-FP	3.40	5"	1.000	1 3/4	3.50	11/16
6	2.000	ST6TB-2000-D-F	3.80	6"	1.250	2	4.00	13/16

\* SOLD IN PAIR, AS STANDARD AND FINISH BLACK PAINT, BOLTS NOT INCLUDED.

### ASU - ADJUSTABLE STROKE UP

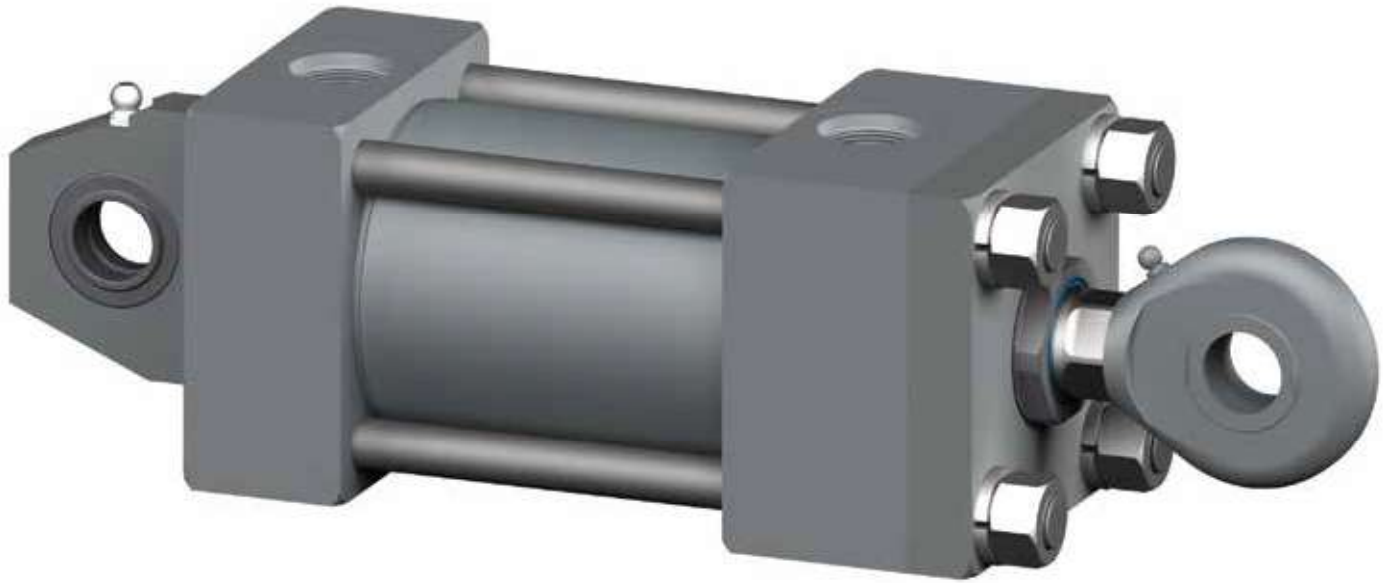
For the requirement where adjusting the stroke is specified, Starcyl has several designs to offer, one of which is shown below. This is suitable for infrequent adjustment and is economical.



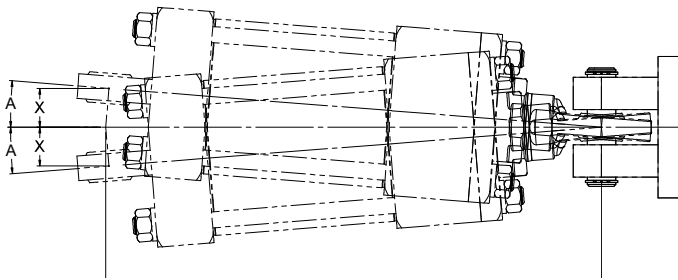
BORE	D	J	K	L (MAX)
1 1/2	1/2-20	5/16	15/16	5
2	3/4-16	7/16	1 1/4	8
2 1/2, 3 1/4	1-14	5/8	1 11/16	9
4	1 1/2-12	15/16	2 1/8	18
5	2-12	1 5/16	2 11/16	20
6	2 1/2-12	1 11/16	3 1/8	20
7	3-12	2	3 1/4	20
8	3 1/2-12	2 3/8	3 1/2	20

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

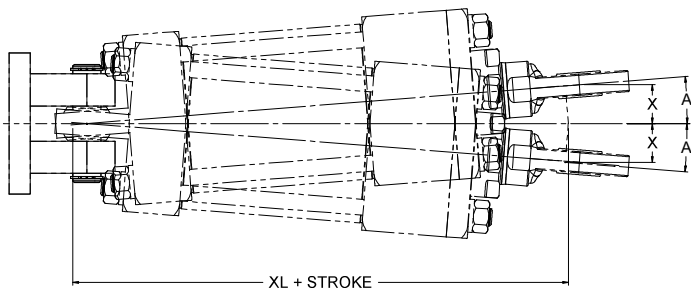


Table 1 — Dimensions

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

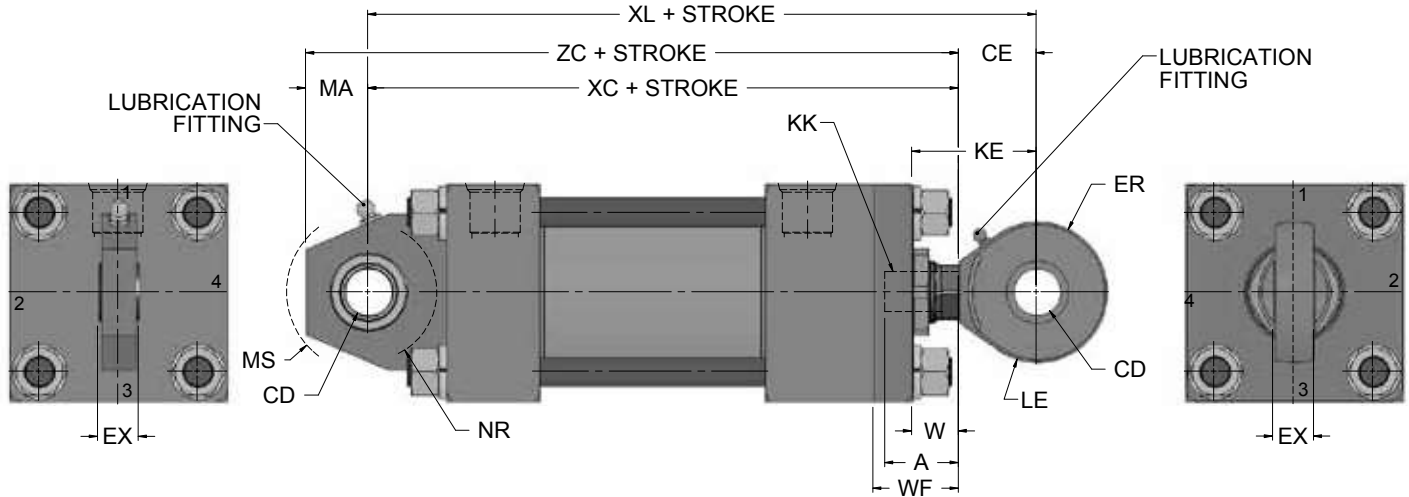
Bore	Head End Mount		Cap End Mount	
	Angle A	Tan. of A	Angle A	Tan. of A
1 1/2	2°	0.035	2°	0.035
2	2 1/2°	0.044	4 1/2°	0.079
2 1/2	2 1/2°	0.044	4 1/2°	0.079
3 1/4	3°	0.052	3°	0.052
4	2 1/2°	0.044	3°	0.052
5	3°	0.052	3°	0.052
6	3°	0.052	3°	0.052

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

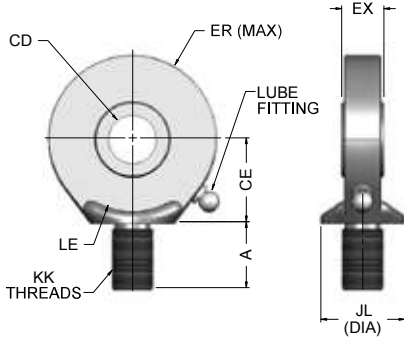
\*\* Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

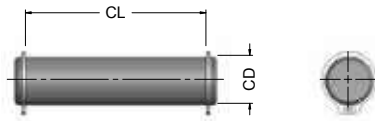
Cylinder accessories  
Spherical Bearing Mounting

### NFPA SPHERICAL ROD EYE



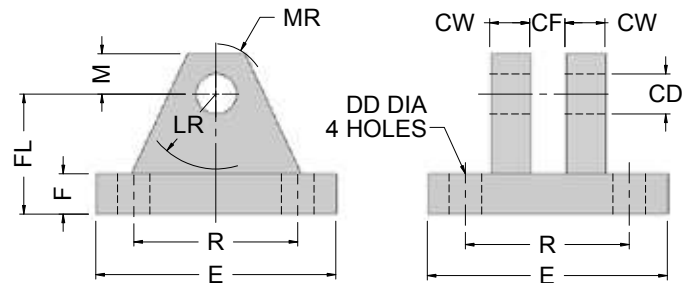
Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2	RES-05	.5000 <sup>-0005</sup>	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
2 & 2.5	RES-07	.7500 <sup>-0005</sup>	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
3.25	RES-10	1.0000 <sup>-0005</sup>	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860
4	RES-13	1.3750 <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.

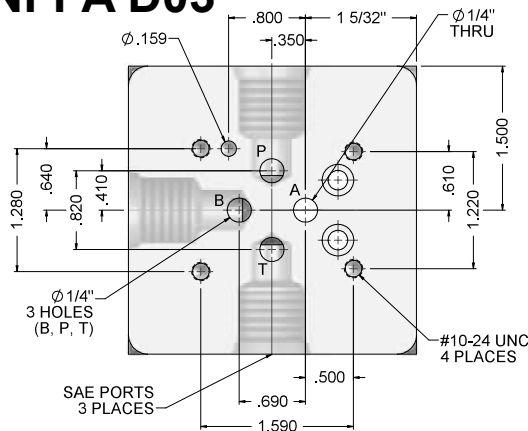
No Leak plumbing assembly



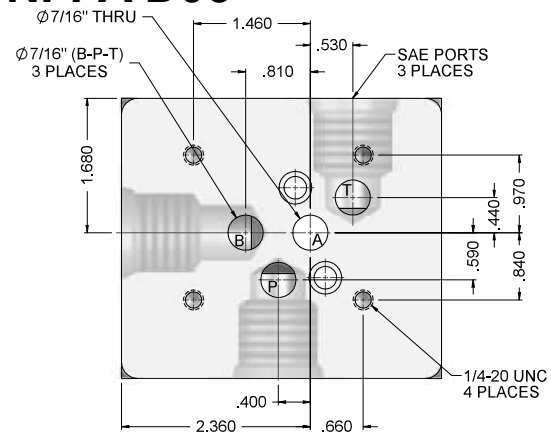
### Features and Benefits

- 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

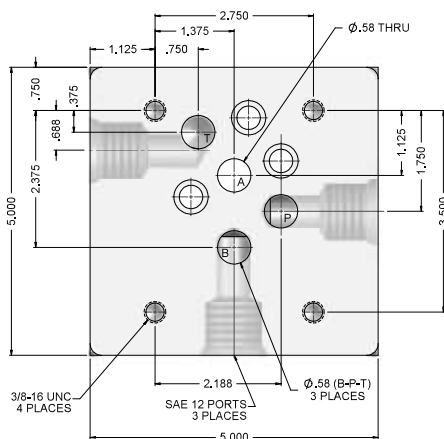
### NFPA D03



### 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

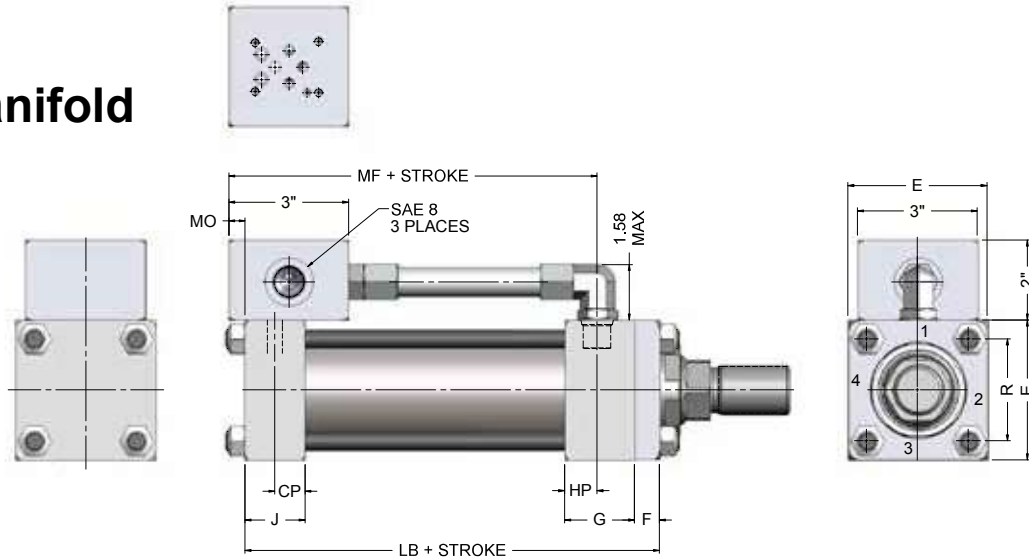
Replace port type and size by Manifold Number like D03, D05 or D06

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

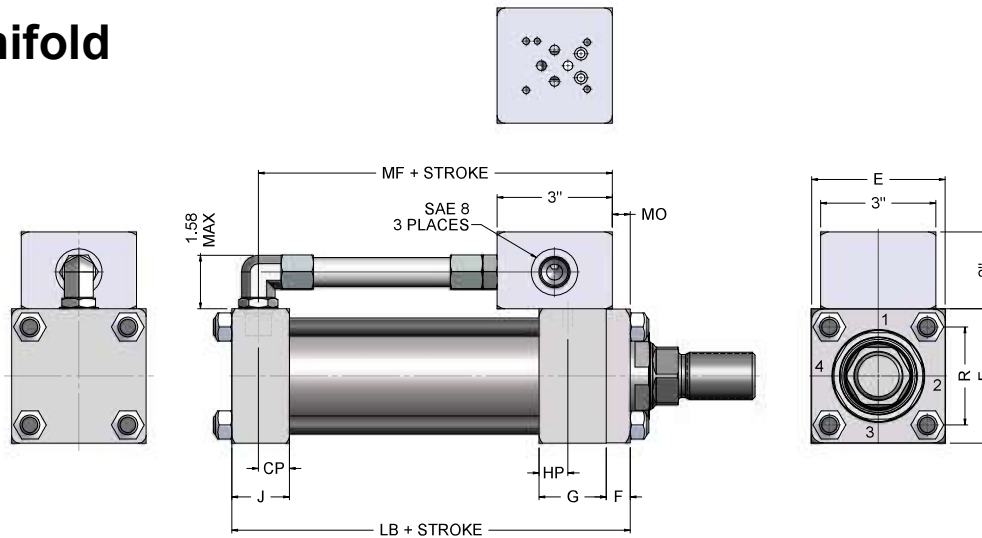
Bolt-On Manifold  
DO3 Dimensions

### 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



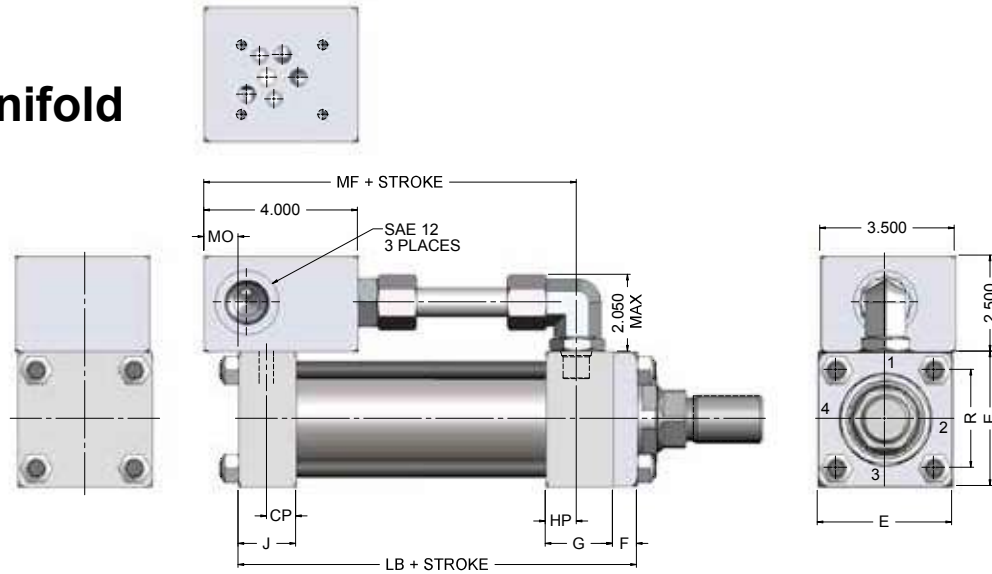
BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
1 1/2	2 1/2	1.63	3/4	25/32	4 1/16	.406	1.75	1.50	5.000	1.750
2	3	2.05	3/4	25/32	4 1/16	.406	1.75	1.50	5.250	1.750
2 1/2	3 1/2	2.55	3/4	13/16	4 7/32	.406	1.75	1.50	5.375	1.625
3 1/4	4 1/2	3.25	29/32	29/32	4 23/32	.312	2.00	1.75	6.250	1.000
4	5 1/2	3.82	29/32	29/32	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

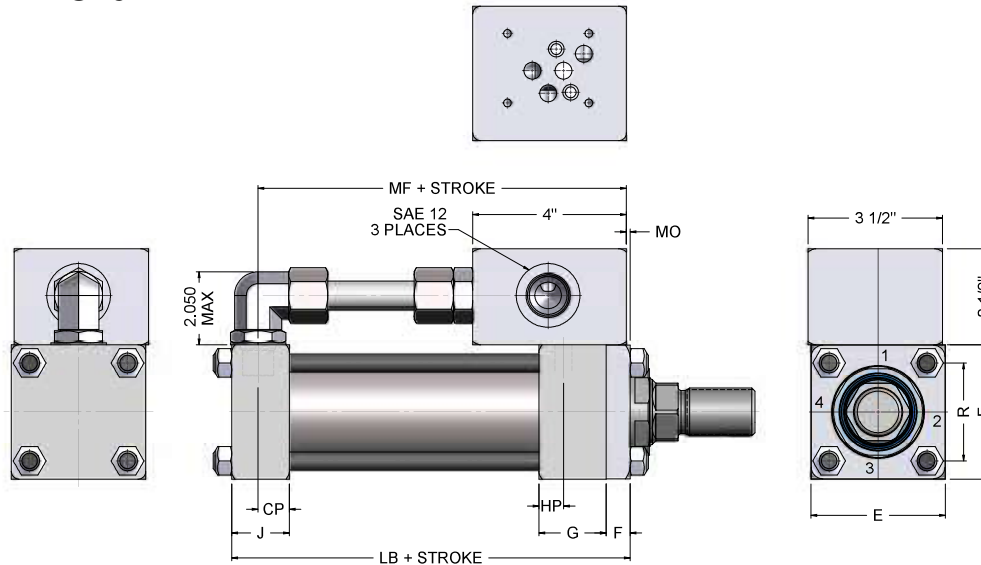
Bolt-On Manifold  
DO5 Dimensions

### 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

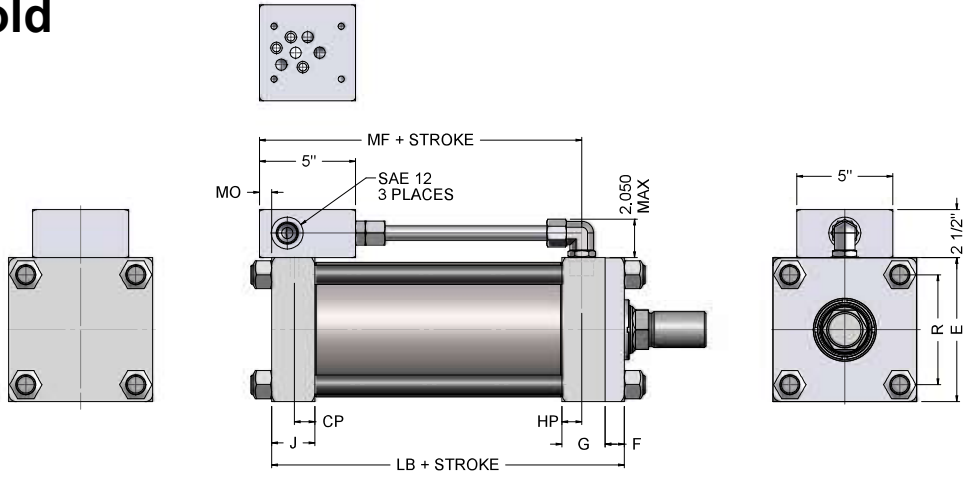
## Heavy Duty Hydraulic Cylinders

Bolt-On Manifold  
DO6 Dimensions

### NFPA D06

#### Bolt-on Manifold

#### Cap End

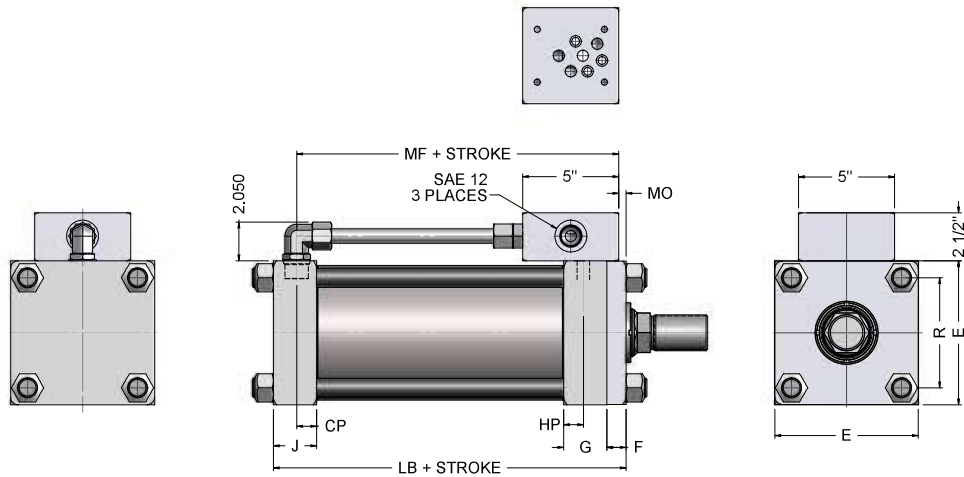


BORE	E	R	HP	CP	MF	MO	G	J	LB	MIN. STROKE
6	7 1/2	5.73	1.000	1.000	6.745	.620	2.25	2.25	8.375	1.750

### 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

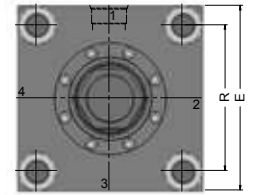
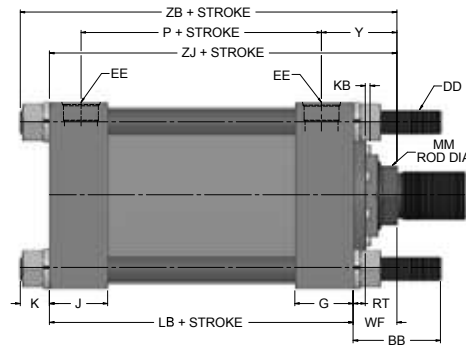
Tie rods Head end ST6X3  NFPA MX3 page 30	Tie rods Cap end ST6X2  NFPA MX2 page 30	Tie rods Extended Both ends ST6X1  NFPA MX1 page 30	Head Rectangular Flange ST6F1  NFPA MF1 page 32
Head Square Flange ST6F5  NFPA MF5 page 32	Head Rectangular Mount ST6E5  NFPA ME5 page 32	Cap Rectangular Flange ST6F2  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

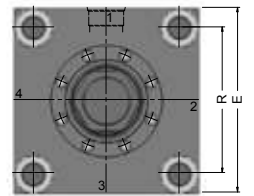
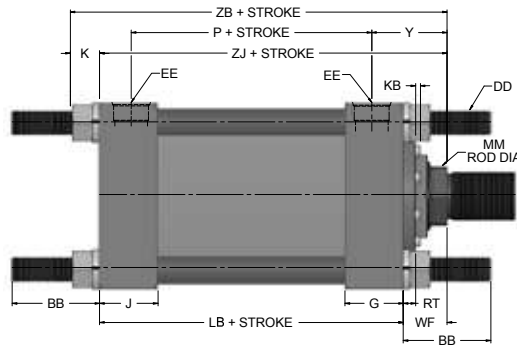
## Heavy Duty Hydraulic Cylinders

Tie rod Mountings  
7 to 8" Bore Sizes

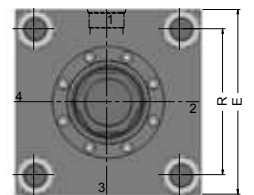
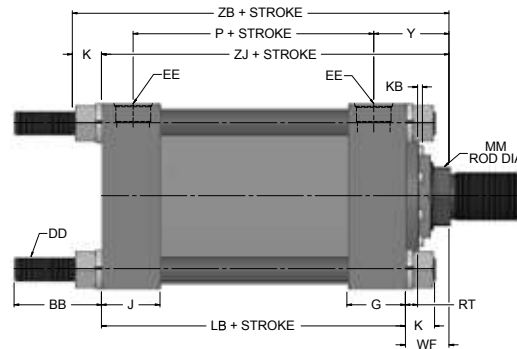
Tie Rods Extended Head End  
Style ST6X3  
(NFFA Style MX3)



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



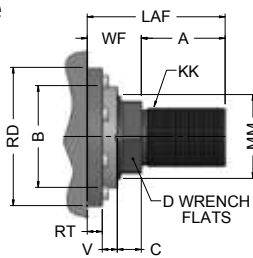
Tie Rods Extended Both End  
Style ST6X1  
(NFFA Style MX1)



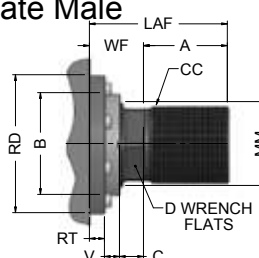
Basic Mounting ST6X0 — NFFA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

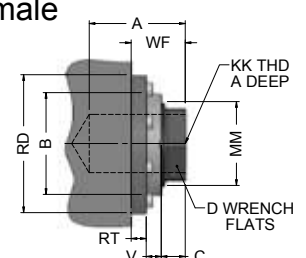
Thread Style #2  
(NFFA Style SM)  
Small Male



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 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 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

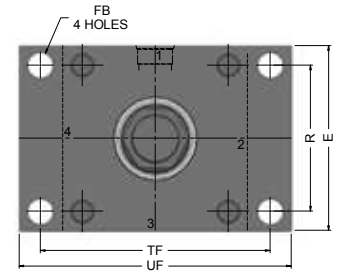
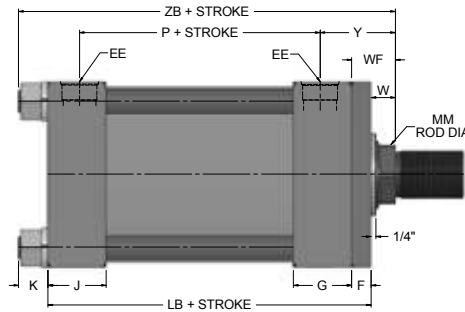
### Head Rectangular Flange mounting Style ST6F1 (NFFA Style MF1)



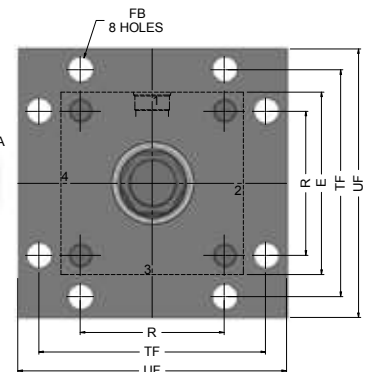
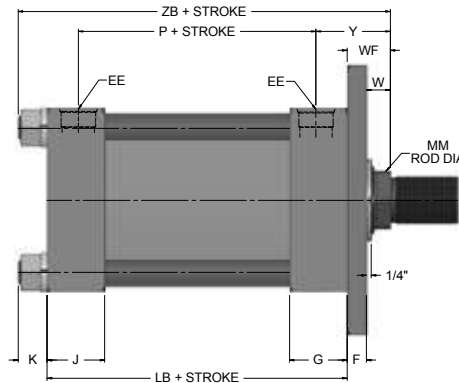
Bore Size	Max PSI — Push*					
	Rod Size					
	3	3 1/2	4	4 1/2	5	5 1/2
7	1500	1250	1000	800	500	-
8	-	900	800	700	600	500

\* Maximum pressure rating — push application.

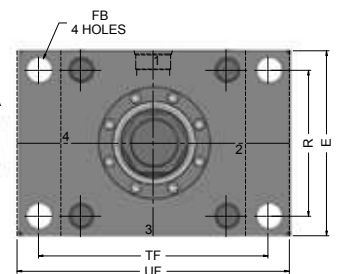
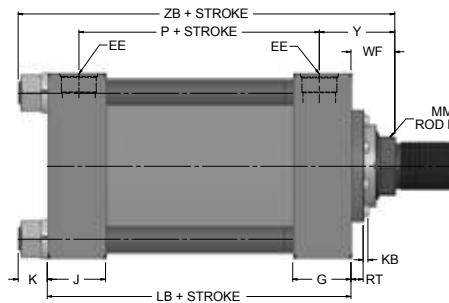
\*For Pressures exceeding those shown please use mounting style ST6F5 or ST6E5



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

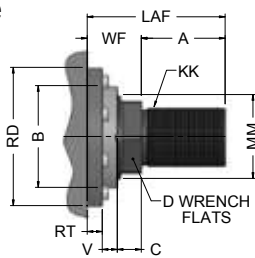


### Head Rectangular mounting Style ST6E5 (NFFA Style ME5)

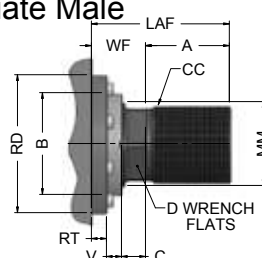


### Rod End Dimensions—see table 2

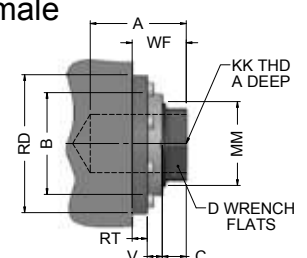
#### Thread Style #2 (NFFA Style SM) Small Male



#### 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. 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 5/16	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 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 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

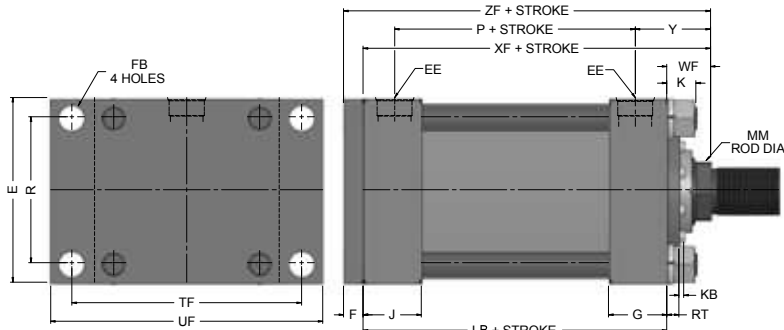
Rectangular Flange and Cap Mountings  
7 to 8" Bore Sizes

Cap Rectangular Flange mounting  
Style ST6F2  
(NFFPA Style MF2 )

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

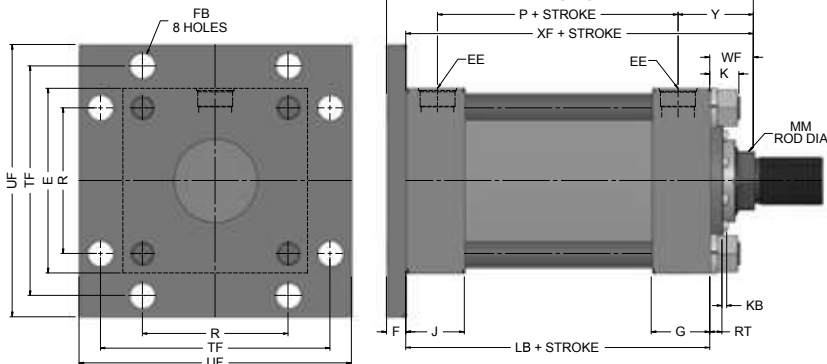


Bore Size	Max PSI — Pull*					
	Rod Size					
7	1500	1700	1800	1900	2000	-
8	-	1500	1700	1800	1900	2000

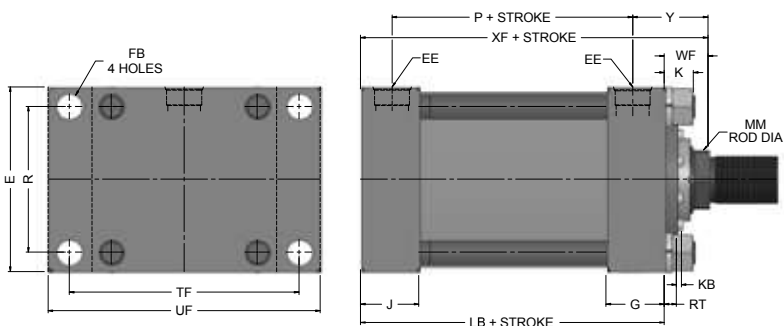


\* Maximum pressure rating — pull application.

Cap Square Flange mounting  
Style ST6F6  
(NFFPA Style MF6)

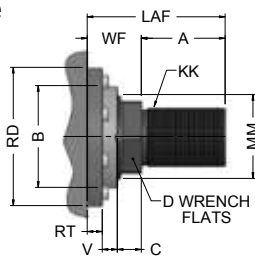


Cap Rectangular mounting  
Style ST6E6  
(NFFPA Style ME6)

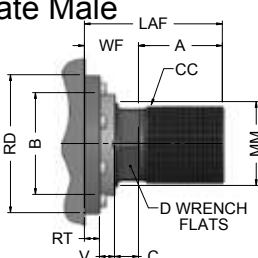


Rod End Dimensions—see table 2

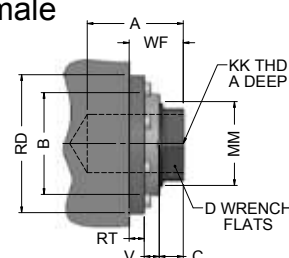
Thread Style #2  
(NFFPA Style SM)  
Small Male



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 5/16	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 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 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

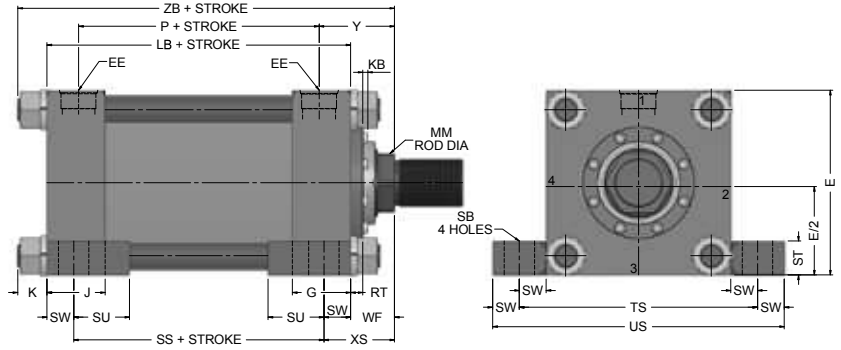
Table 3—  
Envelope and  
Mounting  
Dimensions

# ST6 SERIES

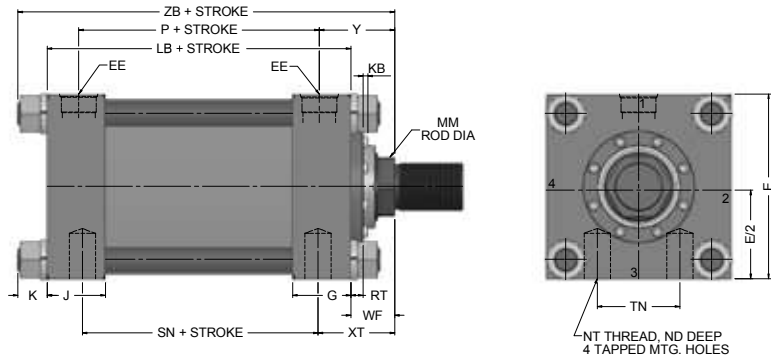
## Heavy Duty Hydraulic Cylinders

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

Side Lugs mounting  
Style ST6S2  
(NFPA Style MS2)



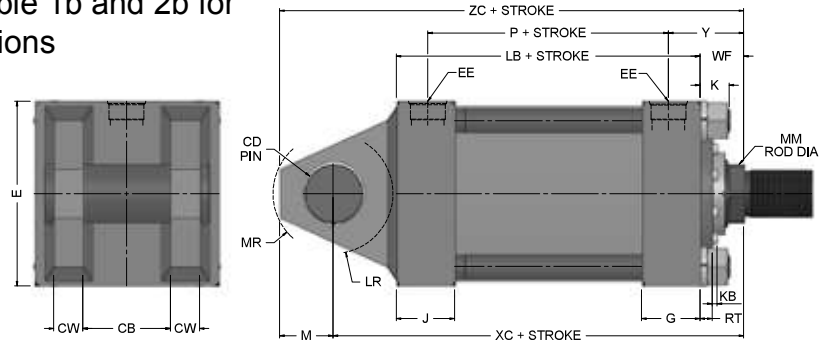
Side Tapped mounting  
Style ST6S4  
(NFPA Style MS4)



Cap Fixed Clevis mounting  
Style ST6P1  
(NFPA Style MP1)

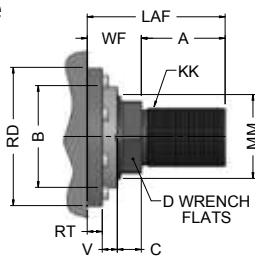


refer table 1b and 2b for dimensions

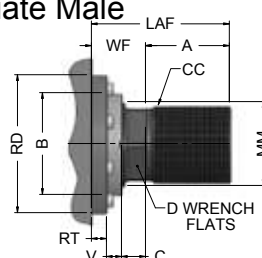


Rod End Dimensions—see table 2

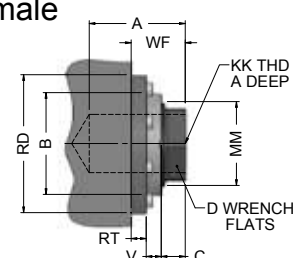
Thread Style #2  
(NFPA Style SM)  
Small Male



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

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	15	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 3a—  
Envelope and Mounting  
Dimensions

Table 2a—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions												Y	ND	XS	XT	Add Stroke
			STYLE #1 CC	STYLE #2 & #4 KK	A	±.001 B	C	D	KB	LAF	NA	V	MAX RD	RT	WF	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 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 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 3b—  
Envelope and Mounting  
Dimensions

Table 2b—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions												Add Stroke		
			STYLE #1	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 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 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 3/4	
		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	3 7/8	17 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	3 7/8	17 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	3 7/8	17 3/4	

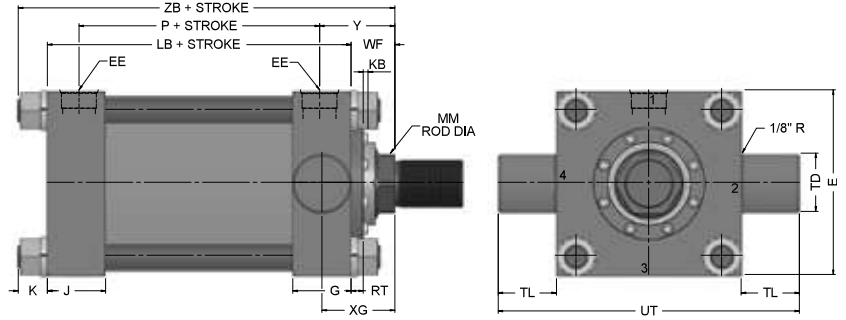
# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
7 to 8" Bore Sizes

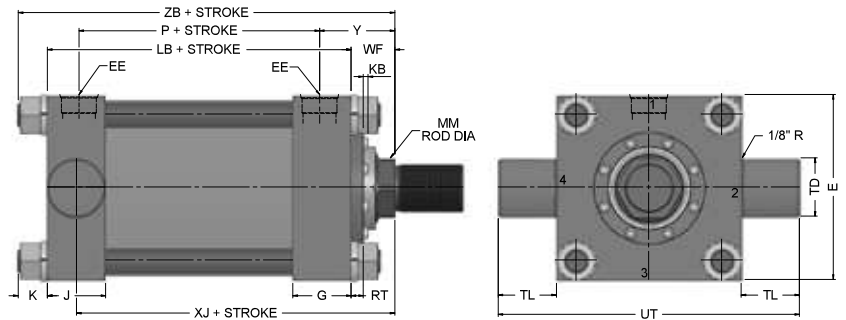
### Head Trunnion

Style ST6T1  
(NFFPA Style MT1)



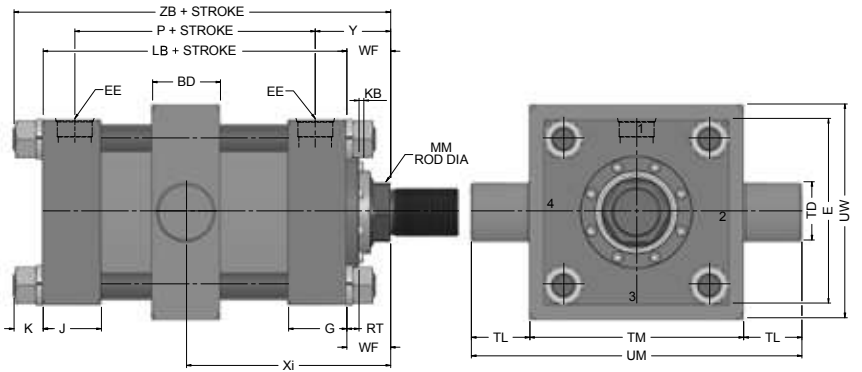
### Cap Trunnion

Style ST6T2  
(NFFPA Style MT2)



### Intermediate Fixed Trunnion

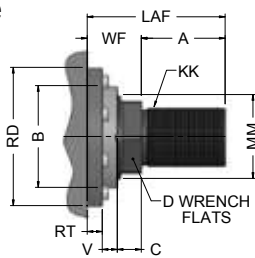
Style ST6T4  
(NFFPA Style MT4)



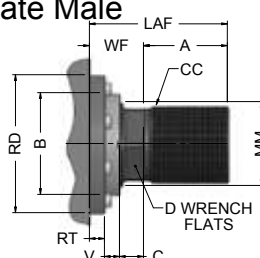
\*\*Dimension XI to be specified by customer.

### Rod End Dimensions—see table 2

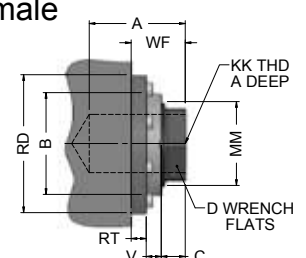
Thread Style #2  
(NFFPA Style SM)  
Small Male



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 4 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
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

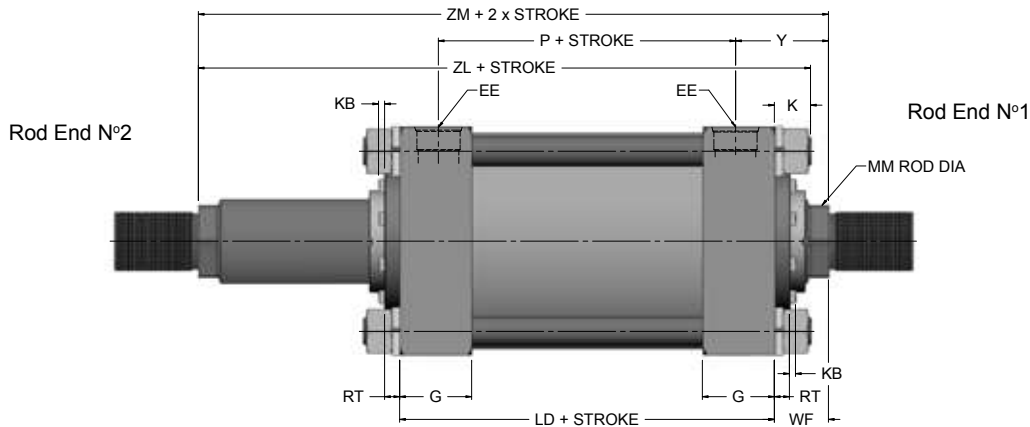
## Heavy Duty Hydraulic Cylinders

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”

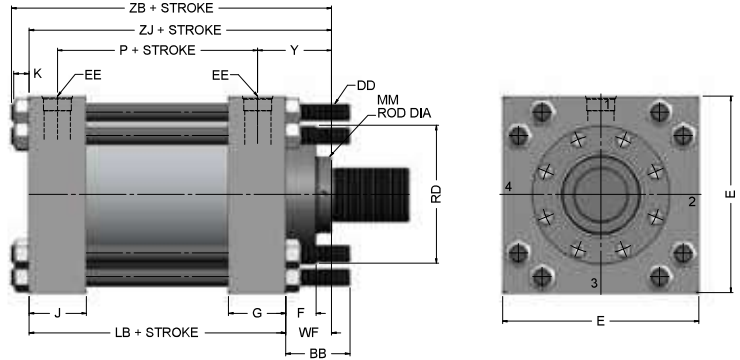
Mounting Styles: 10 standard styles at various application ratings  
 Strokes : Available in any practical stroke length  
 Cushions : Optional at either end or both ends of stroke.  
 Float Check at cap end.  
 Rod Ends : Two Standard Choices – Specials to Order

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		

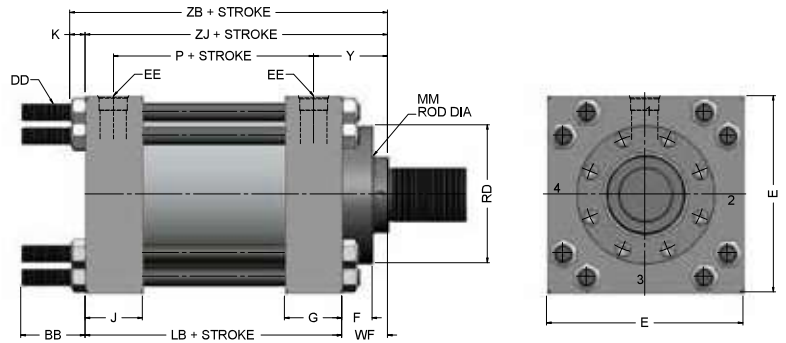
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Tie rod Mountings  
Large Bore Sizes

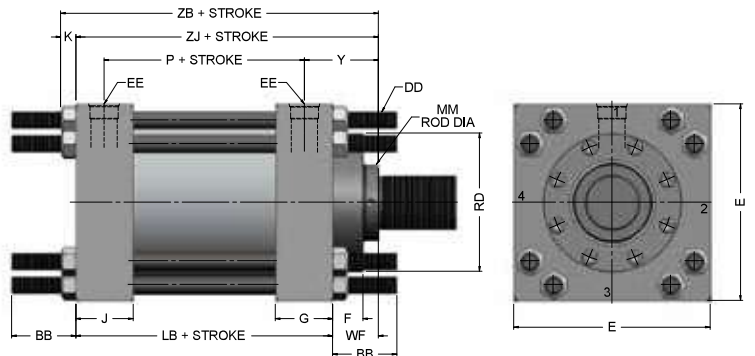
Tie Rods Extended Head End  
Style ST6X3  
(NFPA Style MX3)



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



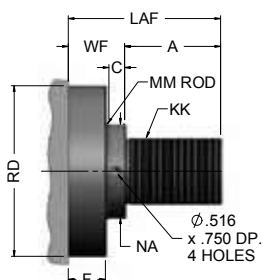
Tie Rods Extended Both End  
Style ST6X1  
(NFPA Style MX1)



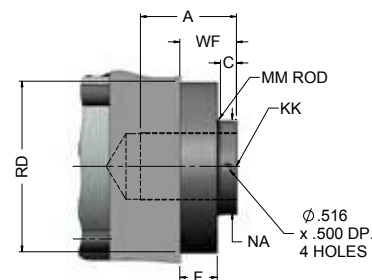
Basic Mounting ST6X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

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	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	
			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
			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
			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	
			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
			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	
			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
			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

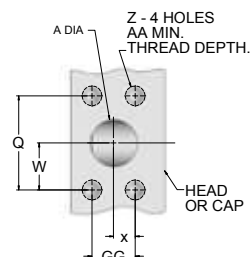
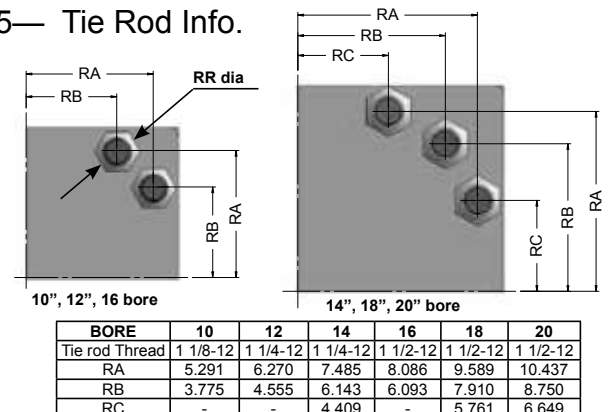


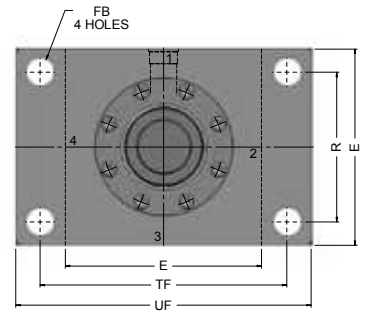
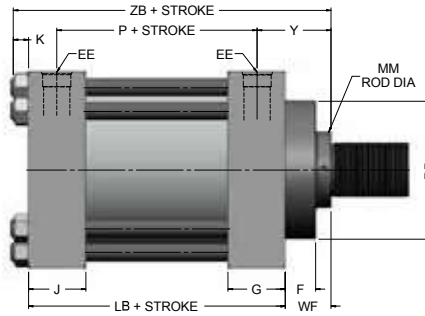
Table 5— Tie Rod Info.



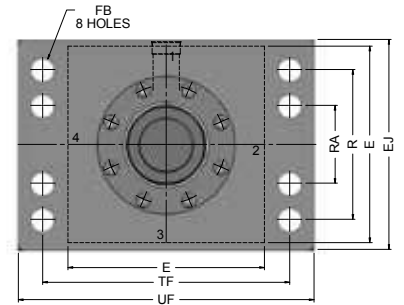
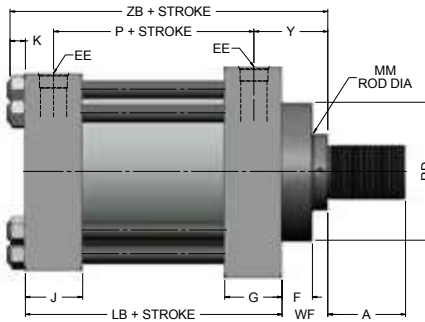
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Head Rectangular Flange  
and Square Mountings  
Large Bore Sizes

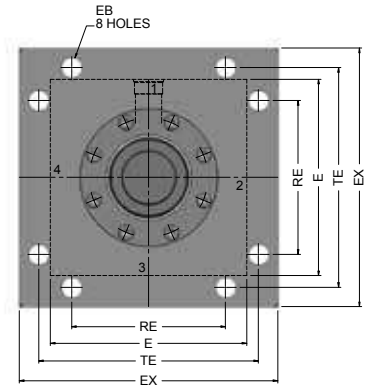
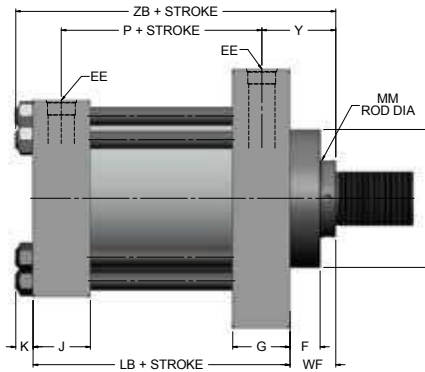
Head Rectangular Mounting (10"-14" Bore)  
Style ST6E5  
(NFA Style ME5)



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

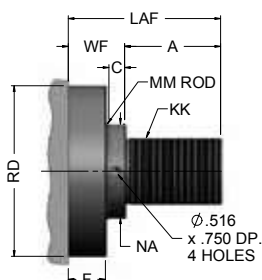


Head Square Flange Mounting  
Style ST6F5  
(NFA Style MF5)

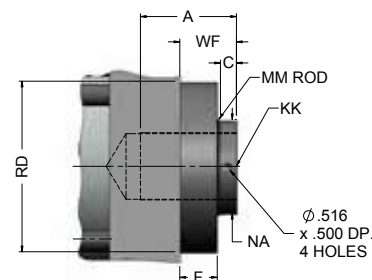


Rod End Dimensions—see table 2

Thread Style #2  
(NFA Style SM)  
Small Male



Thread Style #4  
(NFA 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	3	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	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	3	24	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	ZB	Add Stroke
				A	+0.000 -0.005 B	C	F	LAF	NA	-0.001 -0.006 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

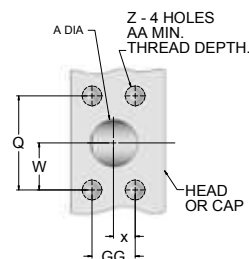
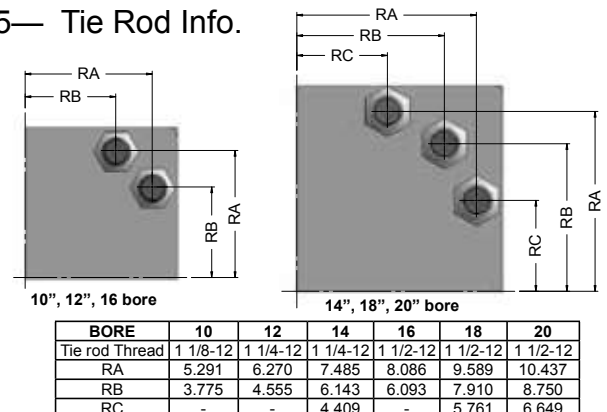


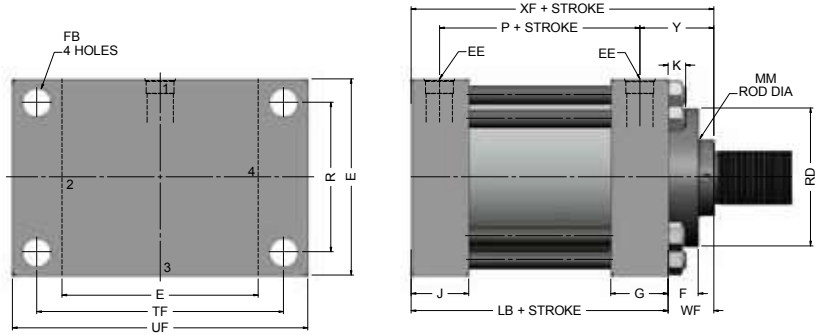
Table 5—Tie Rod Info.



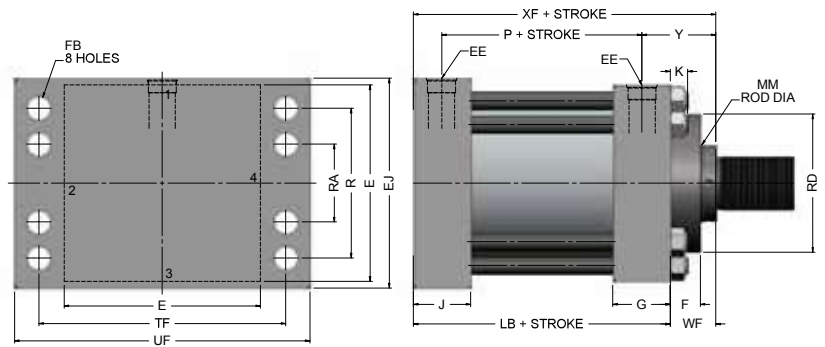
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Rectangular Flange  
and Cap Mountings  
Large Bore Sizes

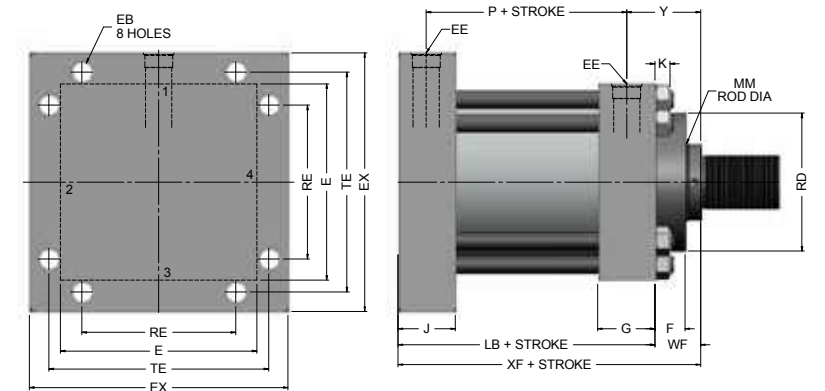
Cap Rectangular Mounting (10"-14" Bore)  
Style ST6E6  
(NFPA Style ME6)



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

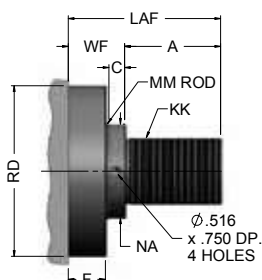


Cap Square Flange Mounting  
Style ST6F6  
(NFPA Style MF6)

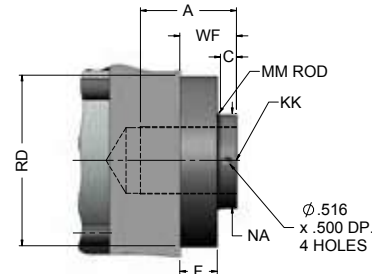


Rod End Dimensions—see table 2

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	Add Stroke XF
				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

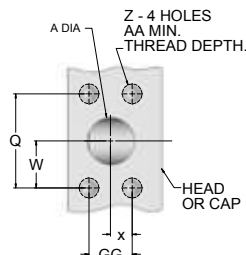
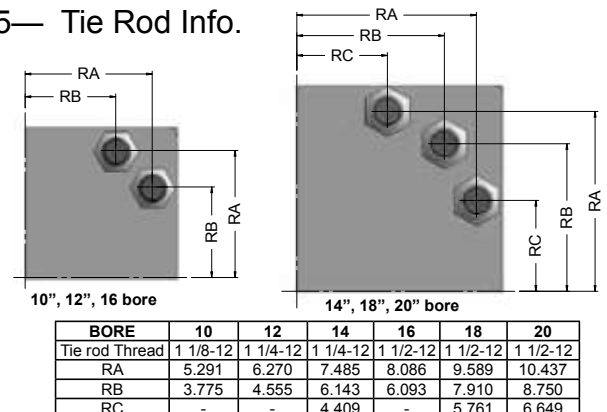


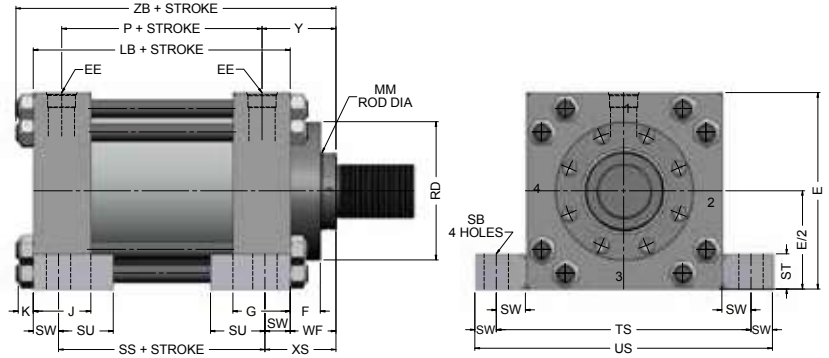
Table 5—Tie Rod Info.



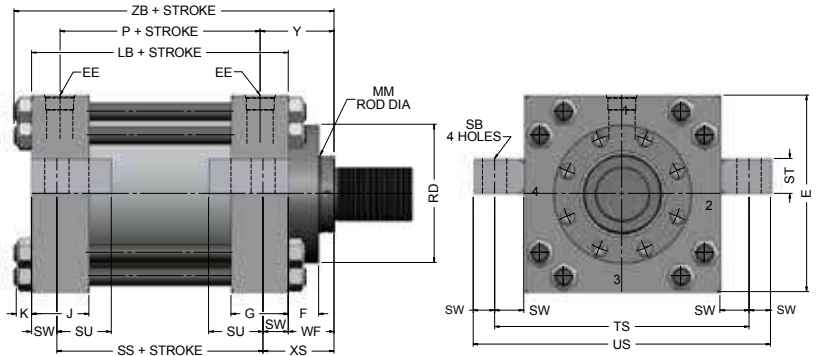
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

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

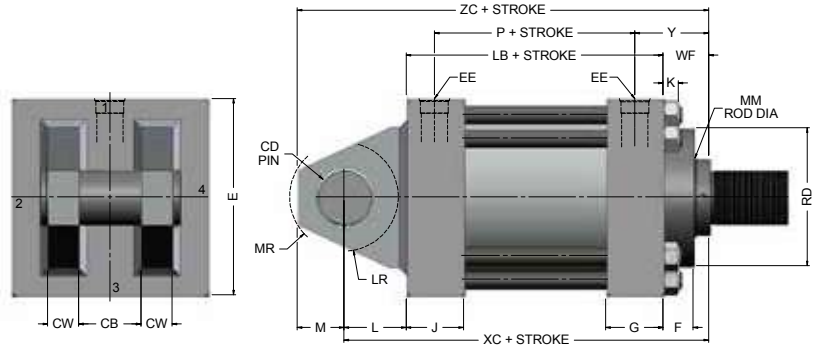
Side Lugs mounting  
Style ST6S2  
(NFPA Style MS2)



Centerline Lugs Mounting  
Style ST6S3  
(NFPA Style MS3)

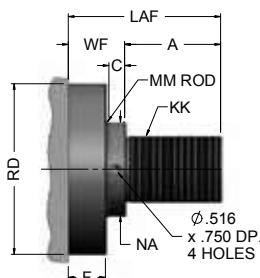


Cap Fixed Clevis mounting  
Style ST6P1  
(NFPA Style MP1)

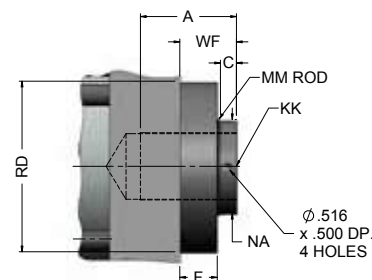


Rod End Dimensions—see table 2

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

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	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

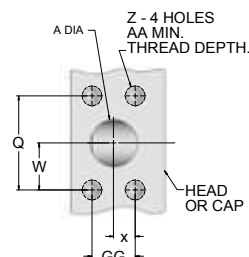
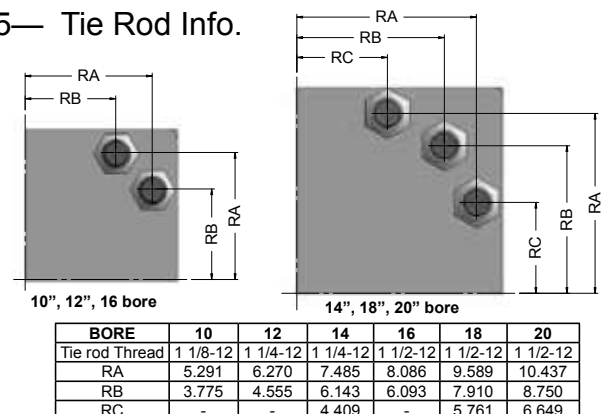


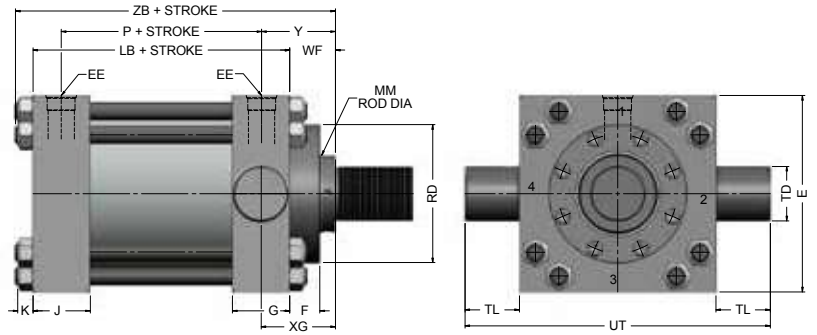
Table 5—Tie Rod Info.



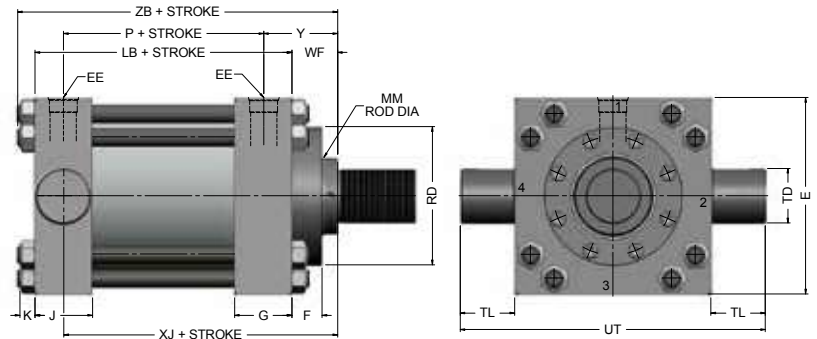
# ST6 SERIES - Large Bore Heavy Duty Hydraulic Cylinders

Trunnion Mountings  
Large Bore Sizes

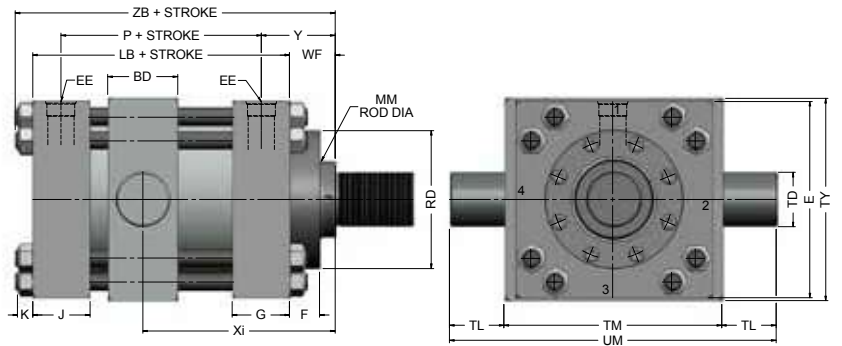
Head Trunnion (10" to 14" bore)  
Style ST6T1  
(NFFA Style MT1)



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



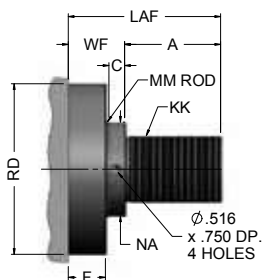
Intermediate Fixed Trunnion  
Style ST6T4  
(NFFA Style MT4)



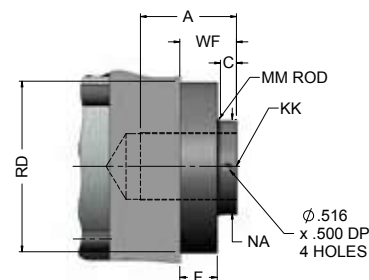
\*\*Dimension XI to be specified by customer.

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 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
	7	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	9 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 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

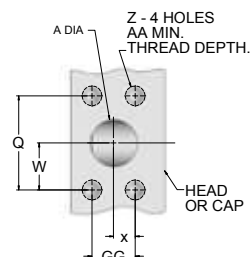


Table 5— Tie Rod Info.

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

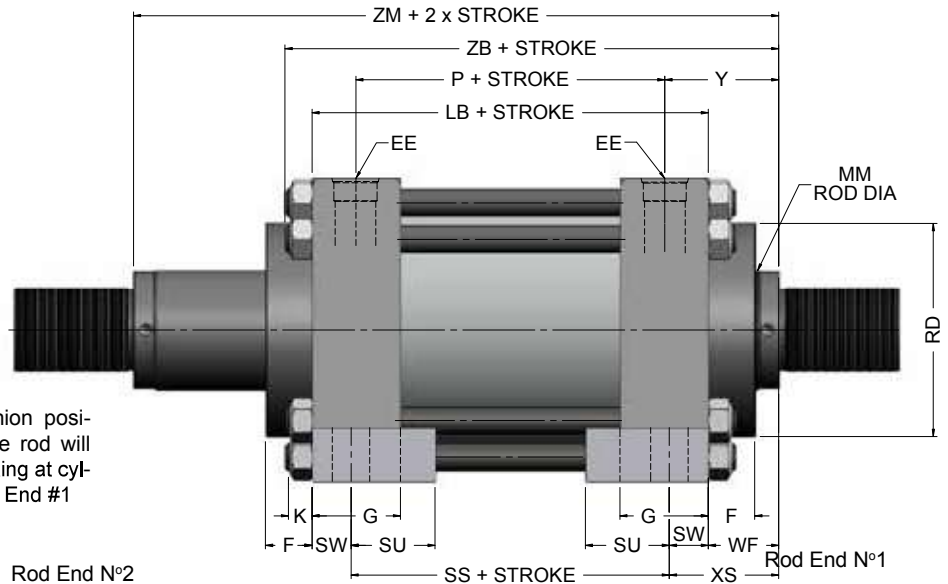
## Heavy Duty Hydraulic Cylinders

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**(\_)

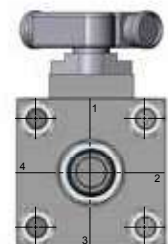
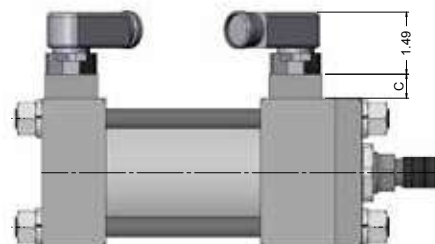
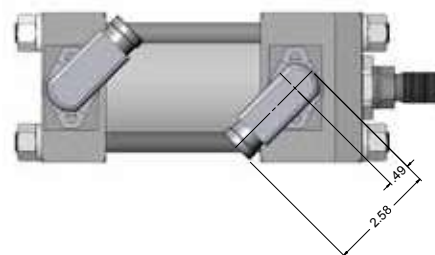
Option Code **H1**

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

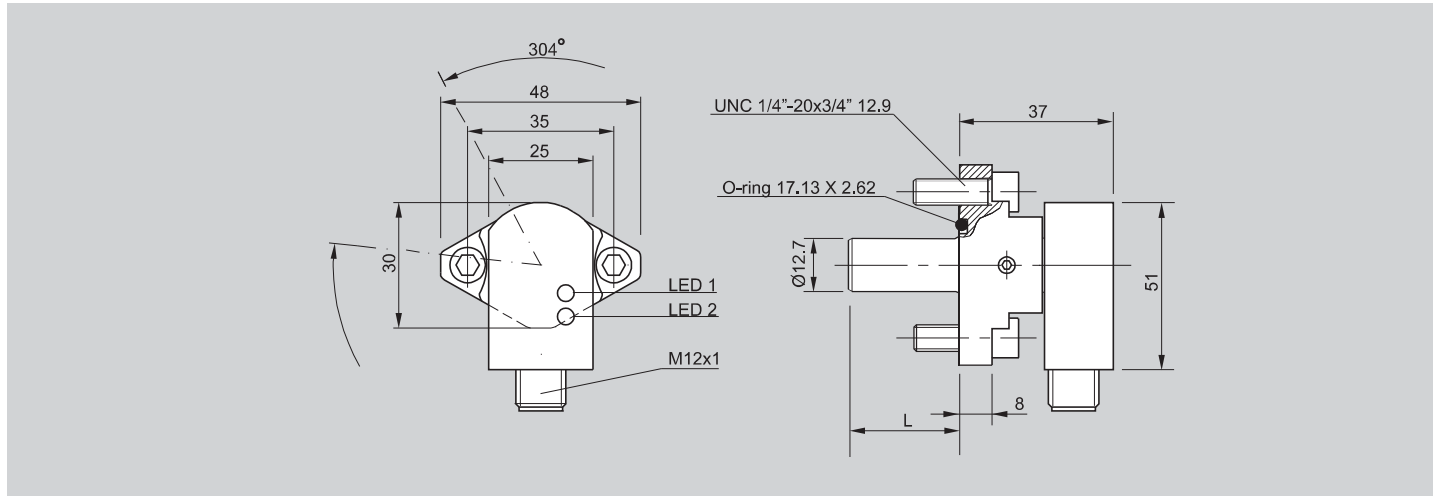


# ST6 SERIES

## 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



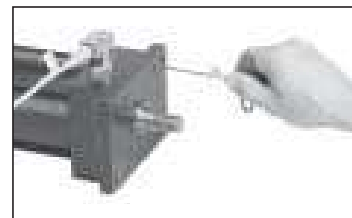
PNP	Normally-open $\odot$	BES 516-300-S 295/0.912"...4.560"-S4
Rated operational voltage $U_e$		24 Vdc
Supply voltage $U_B$		10...30 Vdc
Voltage drop $U_d$ at $I_e$		$\leq 2.5$ V
Rated insulation voltage $U_i$		75 Vdc
Rated operational current $I_e$		200 mA
No-load supply current $I_0$ damped/undamped		$\leq 18$ 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>



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.

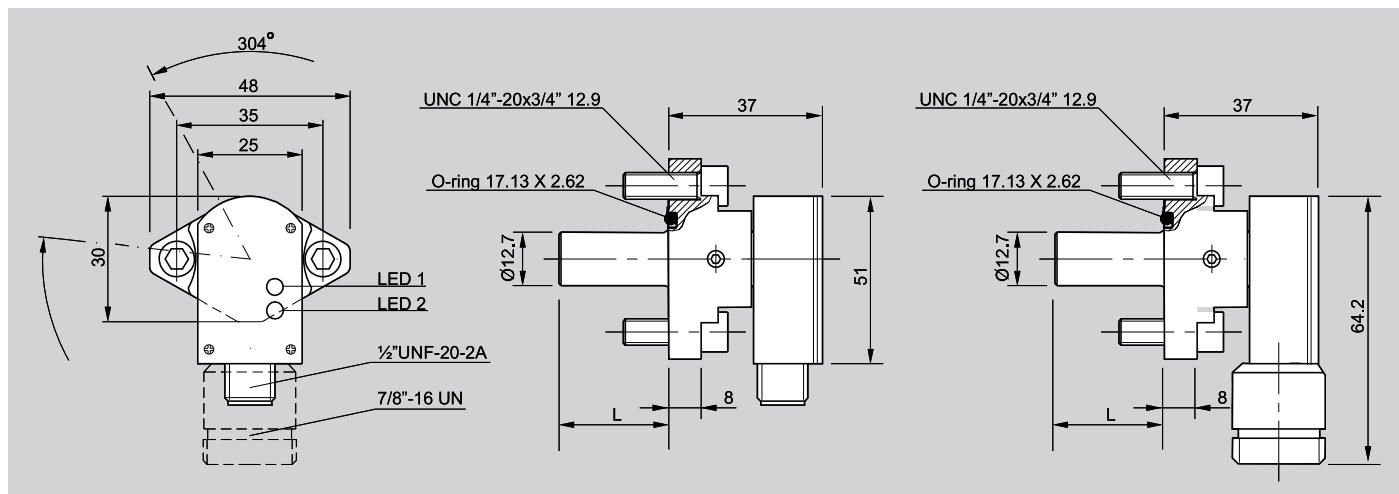
Note: Some DC units are also available with S5 Mini connector. Consult factory for sensor and cable part numbers.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

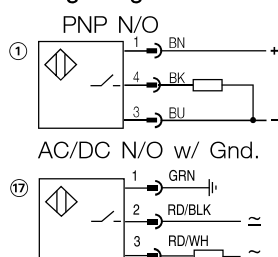
Sensors for Cylinders  
Strokemaster AC/DC

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 $\text{\textcircled{R}}$	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 $I_e$		$\leq 6$ V	$\leq 6$ 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 $I_r$		$\leq 1.7$ mA at 110 Vac	$\leq 1.7$ 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		$\leq 5$ %	$\leq 5$ %
Ambient temperature range $T_a$		-25...+70 °C	-25...+70 °C
Operating frequency f		$\leq 50$ Hz	$\leq 50$ 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 = 1/2-20	mini connector = 7/8-16
Approvals		cULus	cULus
High pressure rated up to		<b>207 bar (3000 psi)</b>	<b>207 bar (3000 psi)</b>
Recommended Connector :			BES516-C05-7/8-16

### Wiring Diagrams



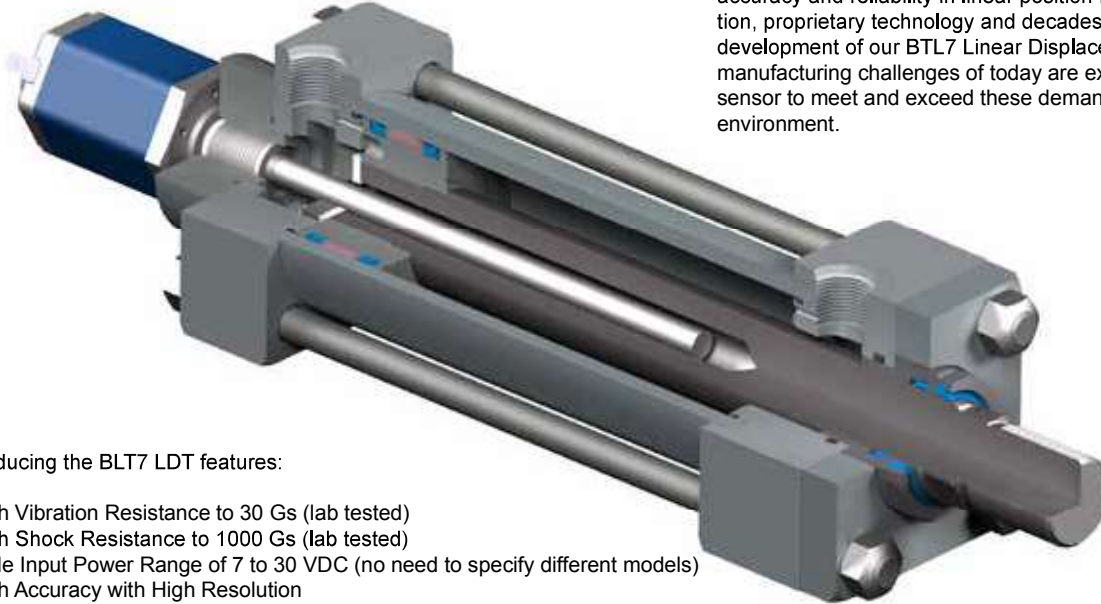


# ST6 SERIES

## 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 BTL7 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 BLT7 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
- 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

### BTL7 - A510 - Mxxxx - Z - KA05

interface, supply & output	
E500	4...20mA
G510	-10...+10V, +10...-10V
A510	0...10V
C500	0...20v
E570	20...4mA

Dimension of the rod in Metric, use stroke in metric or inche x 25.4 and round to the next  
Ex: 20" x 25.4 = 508mm round to 510  
"M0510"

Staracyl use SAE 12 mount, 3/4-16 oring boss, rod diameter of 10.2mm

Electrical Connection	
KA05	5 meter cable (16') other lenth available
S115	8-pin, M12 plug
S32	8-pin, M16 plug per IEC 130-9
S135	6-pin, M16 plug per IEC 130-9

#### Connector type S115

Pin	-A_10	-G_10	-C_00	-C_70	-E_00	-E_70
1	0 V (pin 3)					
2	0 V (pin 5)					
3	10 to 0 V	10 to -10 V	Not used <sup>1)</sup>			
4	La (programming input)					
5	0 to 10 V	-10 to 10 V	0 to 20 mA	20 to 0 mA	4 to 20 mA	20 to 4 mA
8	Lb (programming input)					
	BTL7-_1_ _-...			BTL7-_5_ _-...		
6	GND <sup>2)</sup>			GND <sup>2)</sup>		
7	20 to 28 V			10 to 30 V		



Fig. 4-10: Pin assignment of S115 (view of connector pins of transducer), 8-pin M12 circular plug

#### Cable connection KA\_ \_

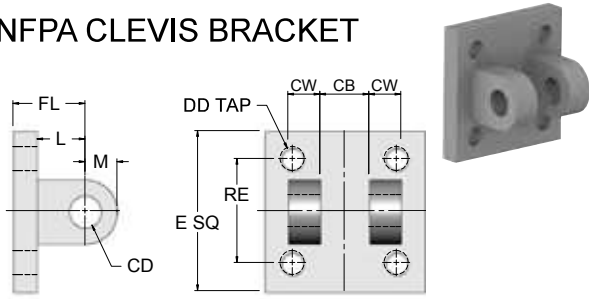
Cable color	-A_10	-G_10	-C_00	-C_70	-E_00	-E_70
YE yellow	Not used <sup>1)</sup>		0 to 20 mA	20 to 0 mA	4 to 20 mA	20 to 4 mA
GY gray	0 V					
PK pink	10 to 0 V	10 to -10 V	Not used <sup>1)</sup>			
RD red	La (programming input)					
GN green	0 to 10 V	-10 to 10 V	Not used <sup>1)</sup>			
WH white	Lb (programming input)					
	BTL7-_1_ _-...			BTL7-_5_ _-...		
BU blue	GND <sup>2)</sup>			GND <sup>2)</sup>		
BN brown	20 to 28 V			10 to 30 V		

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

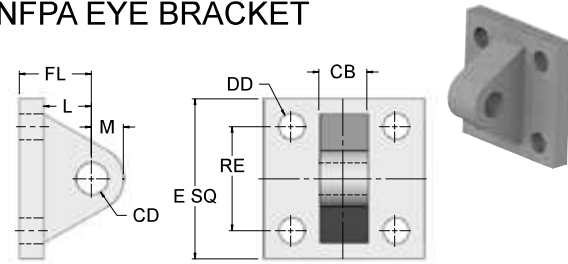
Cylinder  
Accessories

### NFPA CLEVIS BRACKET



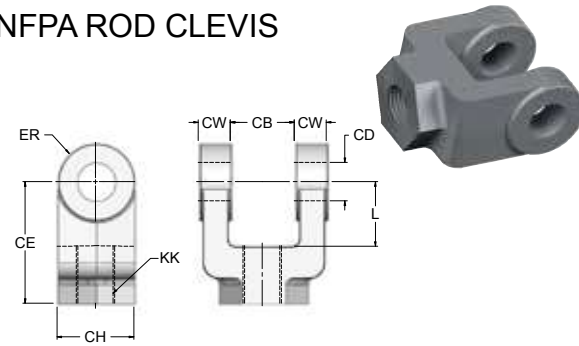
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE	load capacity (lbs)
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	7300
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	14000
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4	19200
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16	36900
CB-17	2.531	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



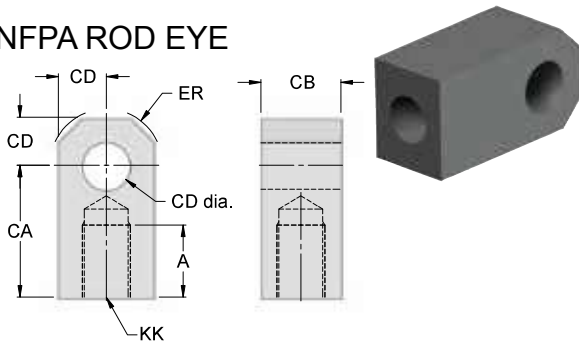
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE	load capacity (lbs)
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8	4100
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16	10500
EB-10	1.50	1	21/32	4 1/2	2 1/4	1 1/2	1	3 1/4	17500
EB-10H	1.50	1	21/32	4 1/2	2 3/8	1 1/2	1	3 1/4	20400
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	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



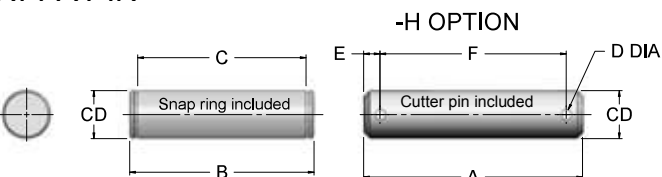
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L	load capacity (lbs)
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4	4250
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4	11200
RC-07H	1.265	3/4	2 1/8	1 3/8	5/8	3/4	3/4-16	1	11200
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2	19500
RC-10H	1.515	1	2 15/16	1 1/2	3/4	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

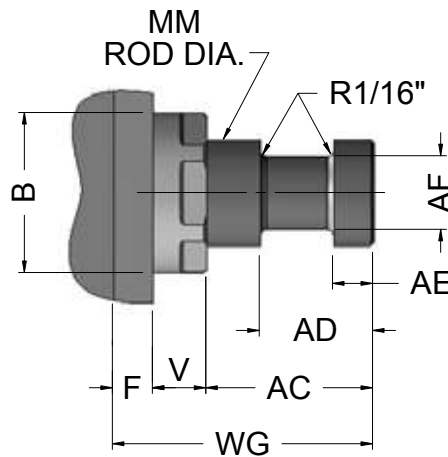
# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

### Style #5 Piston Rod End Flange

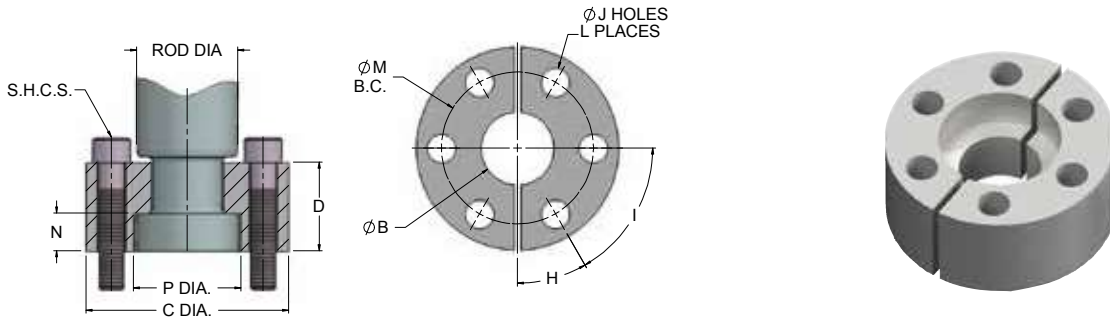
Rod End Flange Coupling  
For series ST6 Hydraulic

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



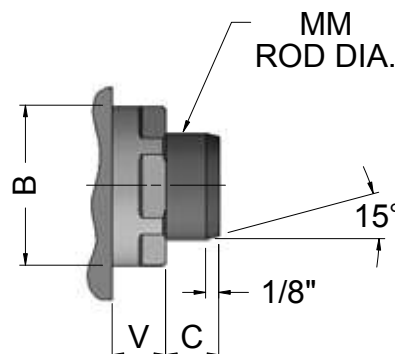
ROD SIZE MM	Dimensions Style #5 Rod End				
	AM	AD	AE	AF	WG
5/8	0.57	5/8	1/4	3/8	1 3/4
1	0.95	15/16	3/8	11/16	2 3/8
1 3/8	1.32	1 1/16	3/8	7/8	2 3/4
1 3/4	1.70	1 5/16	1/2	1 1/8	3 1/8
2	1.95	1 11/16	5/8	1 3/8	3 3/4
2 1/2	2.45	1 15/16	3/4	1 3/4	4 1/2
3	2.95	2 7/16	7/8	2 1/4	4 7/8
3 1/2	3.45	2 11/16	1	2 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	J	L	M	N	P	MAT'L
FC-063	0.625	0.406	1 1/2	9/16	7/32	4	1 1/8	1/4	9/16	1144 CD
FC-100	1.000	0.750	2	7/8	9/32	6	1 1/2	3/8	1 1/16	1144 CD
FC-138	1.375	0.938	2 1/2	1	11/32	6	2	3/8	1 7/16	1018 CD
FC-175	1.750	1.187	3	1 1/4	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	13/32	12	2 11/16	5/8	2 1/16	1018 CD
FC-250	2.500	1.875	4	1 7/8	13/32	12	3 3/16	3/4	2 5/8	1018 CD
FC-300	3.000	2.375	5	2 3/8	17/32	12	4	7/8	3 1/8	1018 CD
FC-350	3.500	2.625	5 7/8	2 5/8	21/32	12	4 11/16	1	3 5/8	C1119 MOD
FC-400	4.000	3.125	6 3/8	2 5/8	21/32	12	5 3/16	1	4 1/8	C1119 MOD
FC-450	4.500	3.625	6 7/8	3 1/8	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	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	25/32	12	6 7/8	1 7/8	5 5/8	C1119 MOD
FC-700	7.000		10 3/8	4	1-1/32	12	8.750			C1119 MOD
FC-800	8.000		11 3/8	4	1 1/32	12	9.750			C1119 MOD
FC-900	9.000		13 1/8	4	1 9/32	12	-			C1119 MOD
FC-1000	10.000		14 1/8	4 1/2	1 9/32	12	12.125			C1119 MOD

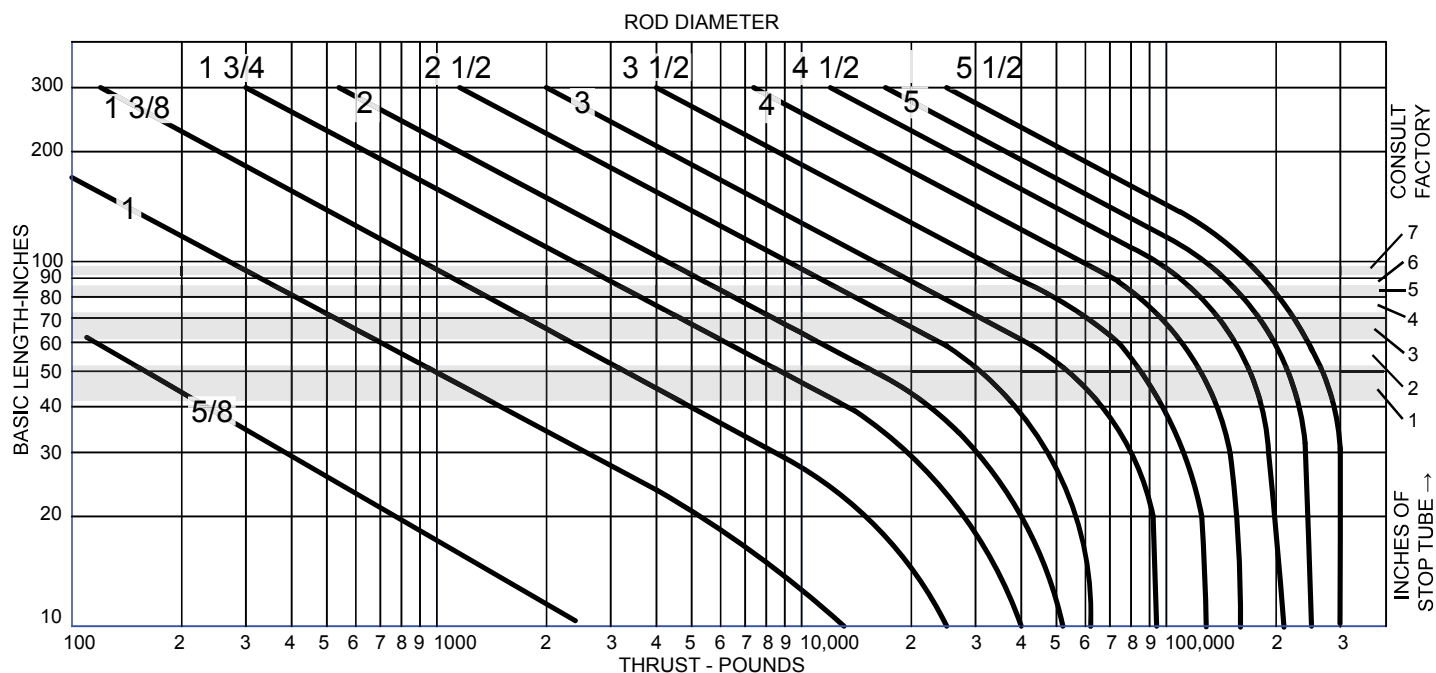
### Style #6 Piston Rod End Plain



# 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 63) (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 INTERMEDI- ANTE TRUN- NION	<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

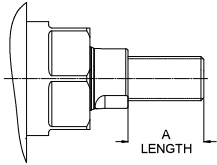
FE= Force Extended Stroke  
 FR= Force Retracted Stroke  
 P= Working Pressure  
 BD= Bore Diameter  
 RD= Rod Diameter

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Cylinder  
Options

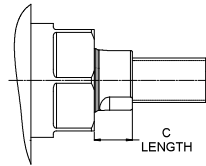
### Thread Extension



#### Option code A

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

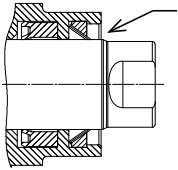
### Rod Extension



#### 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

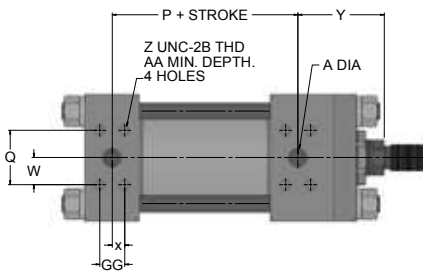
### Air Bleeder

#### 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								
	2 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

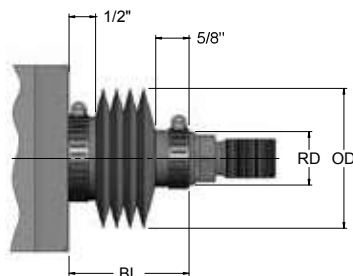
To determine extra length of piston rod required to accommodate boot, calculate:

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

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

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

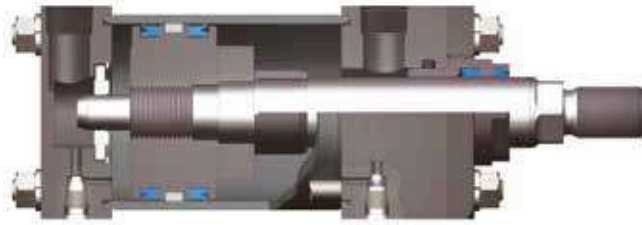


# ST6 SERIES Heavy Duty Hydraulic Cylinders

Stop Tube Design and  
Alignment couplers

## Stop Tube Design

Drawing A - Cushion design



Drawing B - Non Cushion design



### Stop Tube

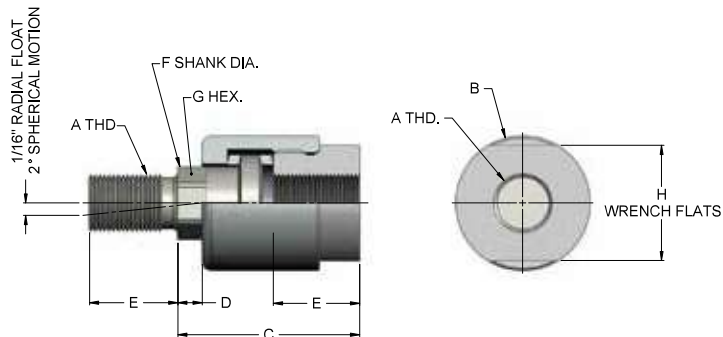
Option Code **ST( )** Enhances the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and the rod bearing at full extension when placed on head end. Ideal for applications requiring longer strokes or where additional rod stability is desired. Specify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



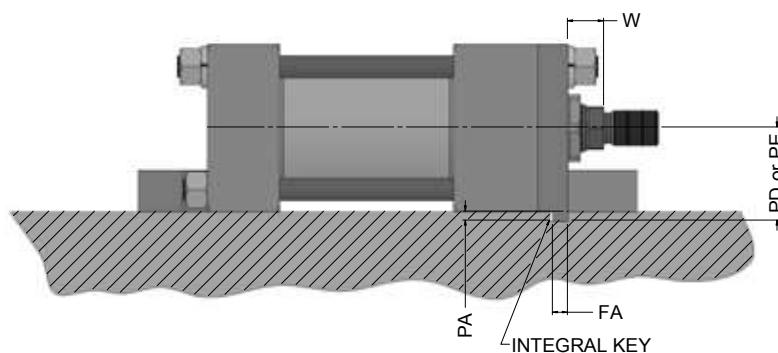
\* Use jam nut to lock coupler to rod when used with full diameter threads.

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

Ask Factory for Bigger size :  
AC-1250F, AC-1375F, AC-1500F, AC-1875F, AC-2000F, ...

## Thrust Key Mounting - Option code P

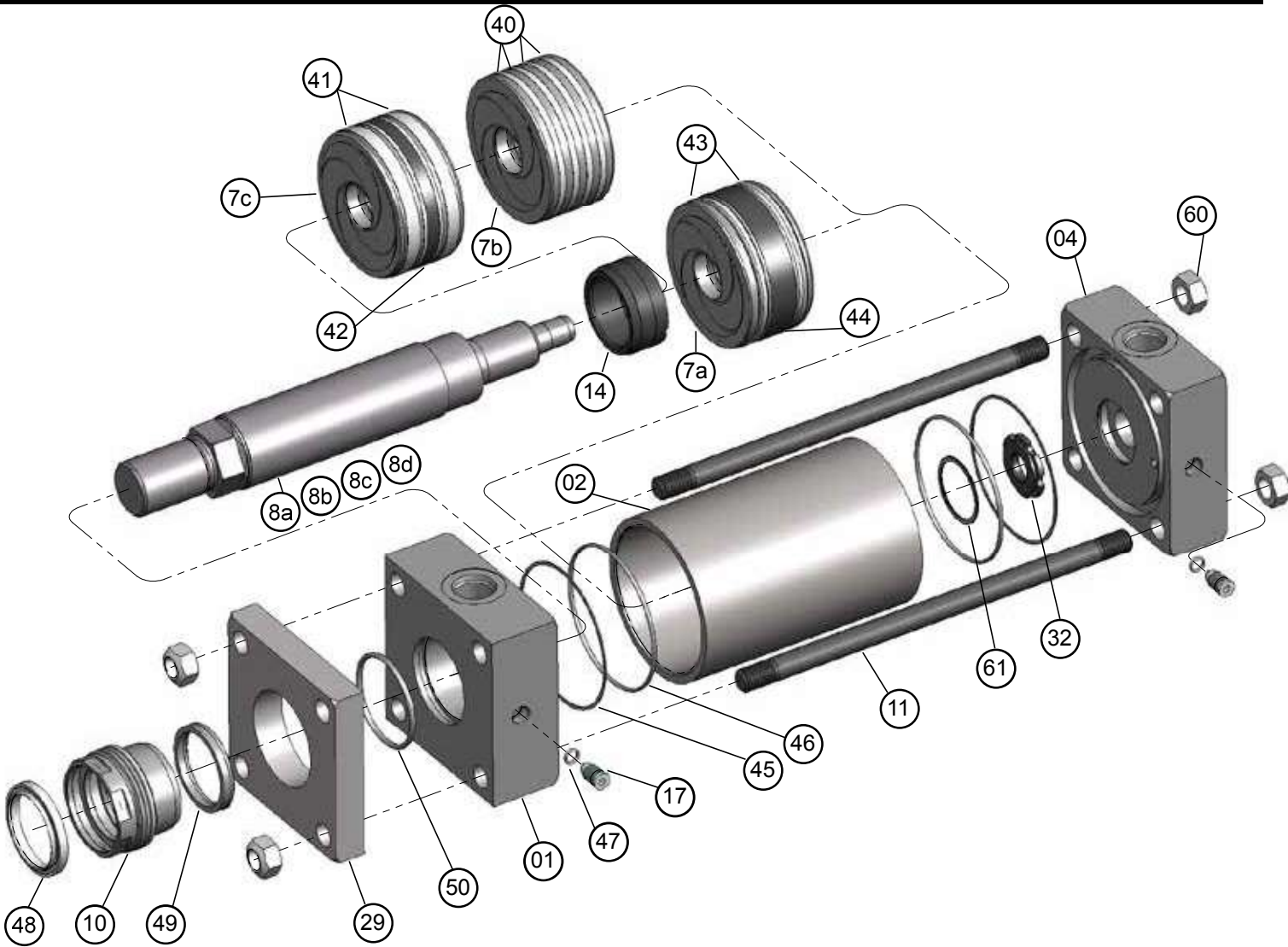
Thrust key mountings eliminate the need of using fitted bolts or external keys on side mounted cylinders. Starcyl Cylinders can provide on mounting styles such as ST6S1, ST6S2, ST6S4 and ST6S7 with the gland retainer plate extended below the mounting side of the cylinder (see drawing below). This extended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



Symbol	Description	Assembly
1	HEAD	A1SB - Head cushion ass'y ( 1, 17, 47)
2	TUBING	
4	CAP	A4SB - Cap Cushion ass'y ( 4,17,47)
7a	PISTON UCUP TYPE "LU"	A7ASB - Piston & rod Ass'y (7a,8,43,44)
7b	PISTON RING PACKED TYPE "RP"	
7c	PISTON HIGH LOAD TYPE "LH"	
8a	ROD WITH CUSHION	A8ASB - Piston & rod Ass'y ( 7,8a,43,44,14)
8b	ROD HEAD CUSHION ONLY	A8BSB - Piston & rod Ass'y ( 7,8b,43,44,14)
8c	ROD CAP CUSHION ONLY	A8CSB - Piston & rod Ass'y ( 7,8c,43,44,)
8d	ROD NON CUSHION	A8DSB - Piston & rod Ass'y ( 7,8d,43,44,)
10	ROD GLAND	A10SB - rod gland Ass'y ( 10, 48, 49,50)
11	TIE ROD	
14	CUSHION SPUD	
17	CUSHION NEEDLE VALVE	A17SB - needle valve Ass'y (17,47)
29	GLAND RETAINER	
32	CUSHION CHECK SEAL	
40	CAST IRON RING	
41	WEAR RING HIGH LOAD	
42	SYMETRIC SEALS HIGH LOAD	
43	U CUP SEALS	
44	WEAR RING (LU PISTON)	
45	BACKUP END TUBE	

Symbol	Description
46	ORING END TUBE
47	NEEDLE VALVE ORING
48	ROD WIPER
49	ROD U-CUP
50	GLAND ORING
60	STOVER NUTS
61	RETAINING RING



# 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 MX0, MX3, MX2, MX1	MP1, MS2, MS1, MT1, MT2 MT4, MS3, MS7, ME6, ME5		MX0 MX1 MX2 MF5	ME5 MS2 MS3 MT1 MT2 MT4	
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			
	8		2073	2257	2226	35.0	149.0	50.0
	9		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

		1.5" to 6" Bore	7 & 8" Bore	10 to 20" Bore	
FEATURE	DESCRIPTION	PAGE NO.	PAGE NO.	PAGE NO.	SYMBOL
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 R B
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

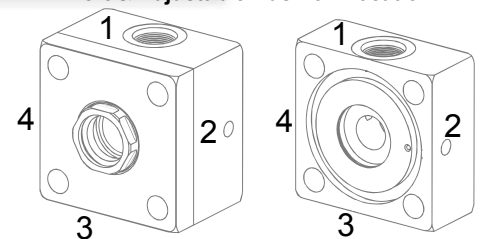
FEATURE	DESCRIPTION	SYMBOL
Cushion & Location	<b>Head Non Cushion, Cap Non Cushion</b> Head Cushion Only (where x = position 1,2,3,4) Cap Cushion Only (where x = position 1,2,3,4) Cushion both ends (where x = position 1,2,3,4)	<b>C00</b> CX0 C0X CXX

Piston seals Option	DESCRIPTION	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	LH
	Ring Packed	RP

Options	DESCRIPTION	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( )*
	<b>Bleeder (standard Sae Port) pos.1,2,3,4</b>	<b>64 BC( )*</b>
	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=( )
	High Velocity Cushioning	HV
	Extra Heavy Duty Bolted Gland ( with Wear ring )	BG
	5000 PSI HYDRAULIC OPTION (ETD 150 TIE RODS)	HP

**FP = Finish Paint\***  
 FM = Finish Starnite™  
 FEP = Finish Epoxy Paint  
 FEPYM = Finish Epoxy Yellow Marine  
 \* 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

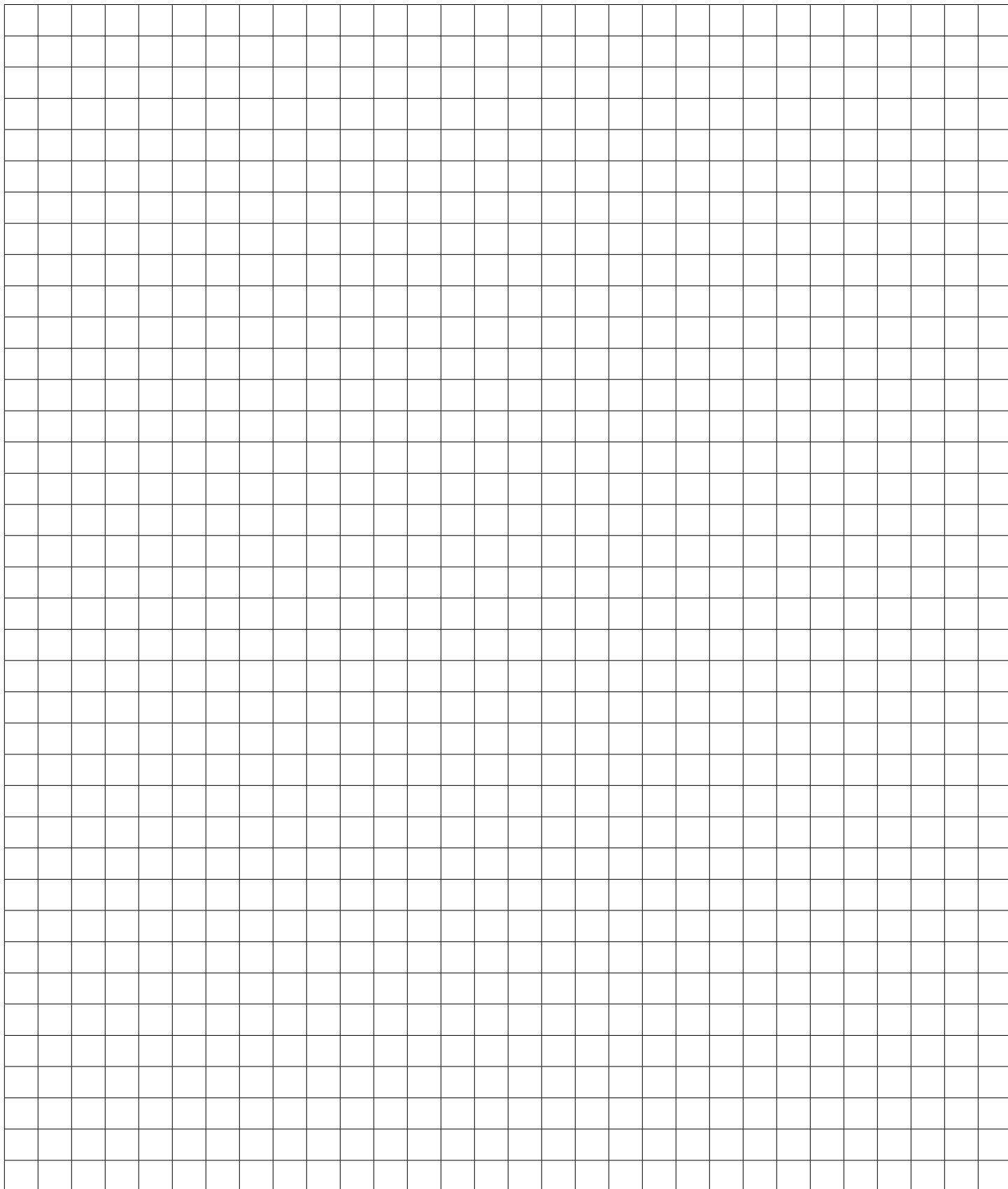
‡: for Bolt on Manifold, refer to page 24 on how to order and for more details.

# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

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Notes:



# ST6 SERIES

## Heavy Duty Hydraulic Cylinders

Offer of sales and  
Warranty

### Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by STARCYL Cylinder, and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to STARCYL cylinder, or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F. O. B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment to Buyer. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

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**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**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.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**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.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, act of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

**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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- ☑ Two-Year Warranty
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- ☑ 250 PSIA R.O.I.
- ☑ Two Year Warranty
- ☑ Economic Design

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

STARCYL AIR CYLINDERS

NFPA ROD LOCK CYLINDER

ST3RL option

FEATURES	BENEFITS
No Rod Displacement on Engagement	Maintains Accurate Positioning
Large Clamping Surface	Consistent Clamping Force
(IP67) Rated for use in Wash-Down Areas	Suitable for Wash-Down Areas
Very Fast Response Time	High Cycle/Stroke Accuracy
Extremely Low Backlash	Precision Holding
Spring Engaged Units	Holds Load During Power-Pressure Loss
Rated for 2,750,000 Cycles	Long Maintenance-Free Life
4 bar (58 psi) Release Pressure	Compact Unit Easy Integration
	Broad Application

**ST3RL** - NFPA Rod Lock for STAR3 air cylinders

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Space Saver Air Cylinders

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