# NFPA Series SS Actuators 1-1/2" to 8" bore sizes

- Precision machined 300 Series stainless steel components
- Cylinders rated to 250 PSI air
- Designed for non-lube service
- Switches available on all bore sizes

## Technical features

**Operating Temperatures:**
Series SS
-20°F to 200°F
(-29°C to 93°C)
Series D
-20°F to 250°F
(-29°C to 121°C)
w/FPM Seals
-20°F to 400°F
(-29°C to 204°C)

**Operating Pressure:**
250 PSIG Air (17.2 Bar)

**Bore Sizes:**
1-1/8", 1-1/2", 2", 2-1/2", 3-1/4", 4", 5", 6", 8"

**Supply:**
Filtered compressed air to 250 PSI

**Lubrication:**
None required
Norgren Air Cylinders are rated for "no lube added" service. All internal components are lubricated at time of assembly with a PTFE based grease.

**Materials:**
Head and End Caps:
304 stainless steel
Tube: 304 stainless steel
Piston Rod: hard chrome plated 303 stainless steel
Piston: Aluminum alloy with PTFE composite wearband
Rod Bearings: 304 stainless steel with PTFE composite wearband
Seals: urethane rod seal and wiper, nitrile piston seals
Tie Rods: 303 stainless steel

## Options selector

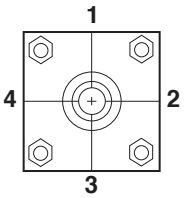
S C 04 J - A 01 - A A 6 00

| Series | Substitute |
|---|---|
| Series SS | S |
| Series D* | D |

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

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

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




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

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

* D series built with PTFE seals.
**On 1-1/2", 2" & 2-1/2" Bore Sizes with 5/8" Rod, CC = 7/16 - 20 (NFPA)

| Options | Substitute |
|---|---|
| No Options | 00 |
| Magnetic piston | 90 |

| Optional Seals | Substitute |
|---|---|
| No Option | A |
| FPM Seals | 1 |
| Air/Oil Seal | 3 |
| Metallic Rod Scraper | 5 |
| Ecology piston seal | 6 |

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

| Ports | Substitute | | | |
|---|---|---|---|---|
| Position | 1† | 2 | 3 | 4 |
| Standard | A | B | C | D |
| Oversized* | E | G | H | J |

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

†Standard position
*NFPA
#8" Bores only

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

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

3 **Head/Cap:** Precision machined from solid corrosion-resistant 300 Series stainless steel bar.

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

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

6 **Piston Rod:** 300 Series stainless steel, 40,000 PSI minimum yield, hard chrome plated, ground and polished.

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

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

9 **Wear Strip:** PTFE composite for minimum friction, maximum wear and side load resistance.

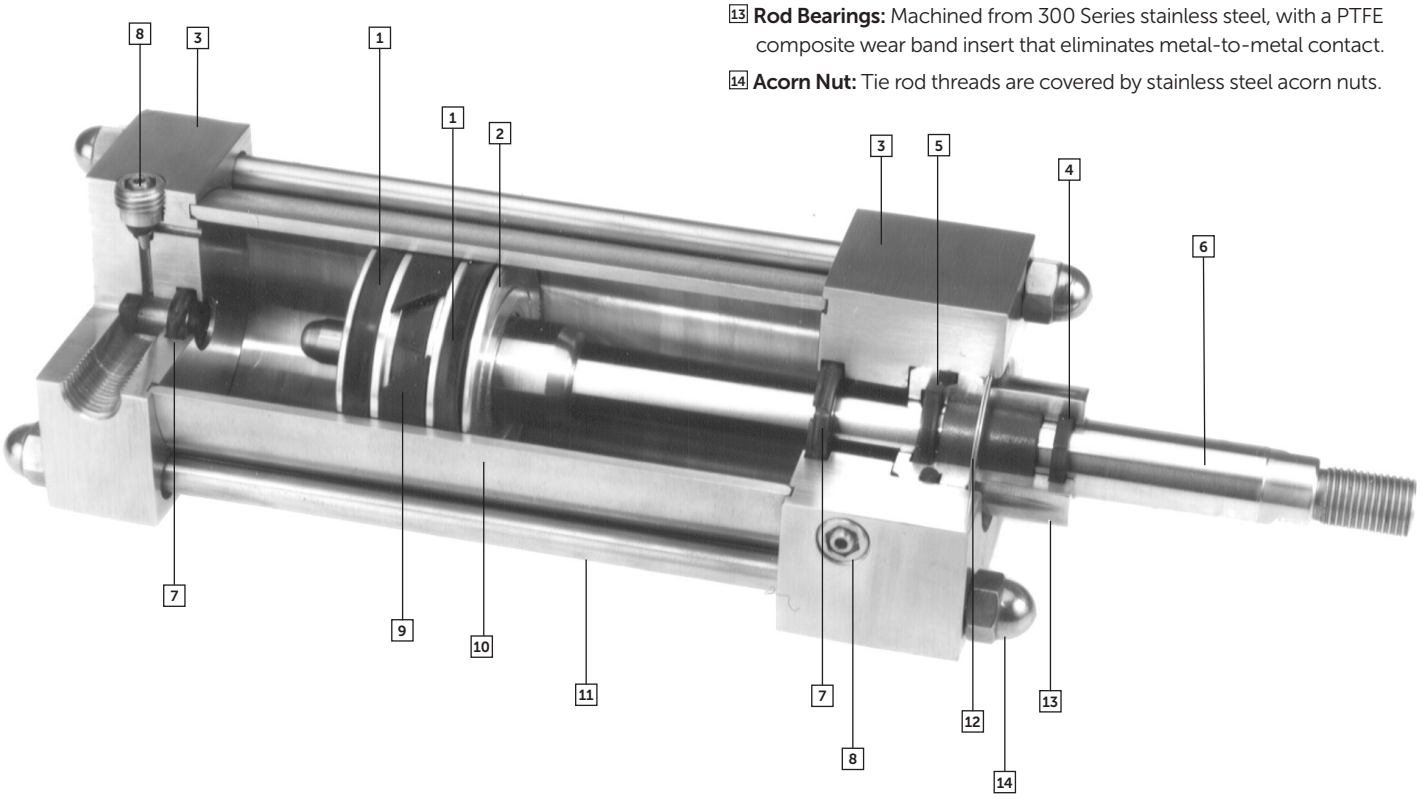
10 **Tube:** Corrosion-resistant 300 Series stainless steel.

11 **Tie Rods:** High-strength 300 Series stainless steel maintains compression on tube end seals.

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

13 **Rod Bearings:** Machined from 300 Series stainless steel, with a PTFE composite wear band insert that eliminates metal-to-metal contact.

14 **Acorn Nut:** Tie rod threads are covered by stainless steel acorn nuts.



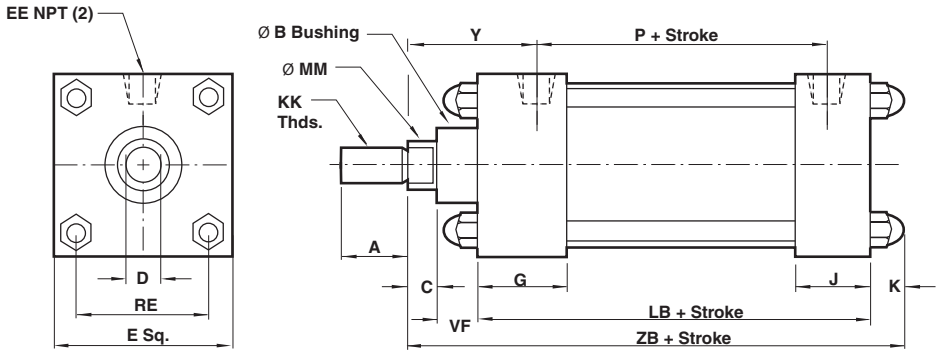

## Series D

Series D cylinders are designed for extremely smooth stroke performance on applications requiring very slow extension and/or retraction speeds. They are identical to the Series SS in design, function and dimensions, but have "ELF" carboxylated nitrile piston seals, rod seals, and rod wipers. "ELF" carboxylated nitrile is a blend of PTFE and other low friction additives that are molded into the substrate of the base seal material. Incorporating this compound in the dynamic seals of the cylinder results in diminished friction, lower breakaway and superior stroke performance.

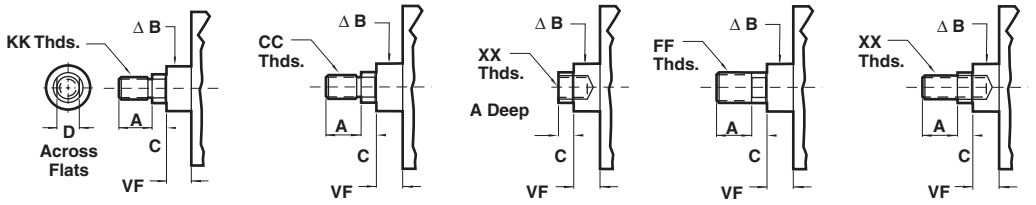
## Features:

- Extra smooth performance throughout the entire stroke of the cylinder
- NFPA interchangeable
- Cylinders rated to 250 PSI air

## Standard Cylinder Dimensions

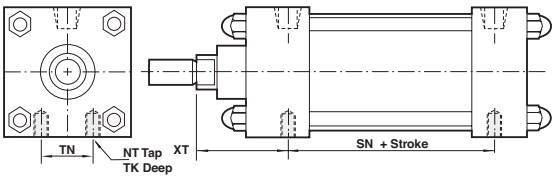



## Standard & Optional Rod Ends



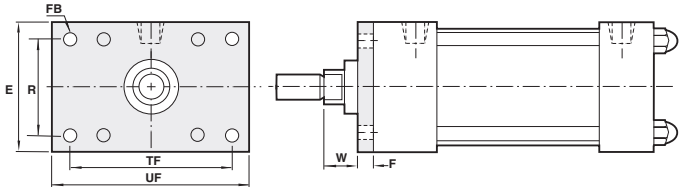

| Bore | | 1–1/2" | 2" | 2–1/2" | 3–1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| ø Rod | Std. | 5/8" | 5/8" | 5/8" | 1" | 1" | 1" | 1-3/8" | 1-3/8" |
| (MM) | O.S. | 1" | 1" | 1" | 1-3/8" | 1-3/8" | 1-3/8" | 1-3/4" | 1-3/4" |
| A | Std. | 0.75 | 0.75 | 0.75 | 1.125 | 1.125 | 1.125 | 1.625 | 1.625 |
| | O.S. | 1.125 | 1.125 | 1.125 | 1.625 | 1.625 | 1.625 | 2.000 | 2.000 |
| B +.000 | Std. | 1.125 | 1.125 | 1.125 | 1.500 | 1.500 | 1.500 | 2.000 | 2.000 |
| -.002 | O.S. | 1.500 | 1.500 | 1.500 | 2.000 | 2.000 | 2.000 | 2.375 | 2.375 |
| C | Std. | 0.375 | 0.375 | 0.375 | 0.5 | 0.5 | 0.5 | 0.625 | 0.625 |
| | O.S. | 0.5 | 0.5 | 0.5 | 0.625 | 0.625 | 0.625 | 0.75 | 0.75 |
| CC | Std. | 7/16 – 20 | 7/16 – 20 | 7/16 – 20 | 7/8 –14 | 7/8 –14 | 7/8 –14 | 1-1/4 – 12 | 1-1/4 – 12 |
| | O.S. | 7/8 –14 | 7/8 –14 | 7/8 –14 | 1-1/4 – 12 | 1-1/4 – 12 | 1-1/4 – 12 | 1-1/2 – 12 | 1-1/2 – 12 |
| D | Std. | 0.5 | 0.5 | 0.5 | 0.812 | 0.812 | 0.812 | 1.125 | 1.125 |
| | O.S. | 0.812 | 0.812 | 0.812 | 1.125 | 1.125 | 1.125 | 1.5 | 1.5 |
| E | | 2 | 2.5 | 3 | 3.75 | 4.5 | 5.5 | 6.5 | 8.5 |
| EE | Std. | 0.25 | 0.25 | 0.25 | 0.375 | 0.375 | 0.375 | 0.5 | 0.5 |
| | O.S. | 0.375 | 0.375 | 0.375 | 0.5 | 0.5 | 0.5 | 0.75 | 0.75 |
| FF | Std. | 5/8 – 18 | 5/8 – 18 | 5/8 – 18 | 1 – 14 | 1 – 14 | 1 – 14 | 1-3/8 – 12 | 1-3/8 – 12 |
| | O.S. | 1 –14 | 1 –14 | 1 –14 | 1-3/8 – 12 | 1-3/8 – 12 | 1-3/8 – 12 | 1-3/4 – 12 | 1-3/4 – 12 |
| G | | 1.5 | 1.5 | 1.5 | 1.75 | 1.75 | 1.75 | 2 | 2 |
| J | | 1 | 1 | 1 | 1.25 | 1.25 | 1.5 | 1.5 | 1.5 |
| K | | 0.469 | 0.531 | 0.531 | 0.625 | 0.625 | 0.83 | 0.83 | 1 |
| KK | Std. | 1/2 – 20 | 1/2 – 20 | 1/2 – 20 | 3/4 – 16 | 3/4 – 16 | 3/4 – 16 | 1 – 14 | 1 – 14 |
| | O.S. | 3/4 – 16 | 3/4 – 16 | 3/4 – 16 | 1 – 14 | 1 – 14 | 1 – 14 | 1-1/4 – 12 | 1-1/4 –12 |
| LB | | 3.625 | 3.625 | 3.75 | 4.25 | 4.25 | 4.5 | 5 | 5.125 |
| P | | 2.125 | 2.125 | 2.25 | 2.625 | 2.625 | 2.875 | 3 | 3.125 |
| RE | | 1.43 | 1.84 | 2.19 | 2.76 | 3.32 | 4.1 | 4.88 | 6.435 |
| VF | Std. | 0.625 | 0.625 | 0.625 | 0.875 | 0.875 | 0.875 | 1 | 1 |
| | O.S. | 0.875 | 0.875 | 0.875 | 1 | 1 | 1 | 1.125 | 1.125 |
| XX | Std. | 7/16 – 20 | 7/16 - 20 | 7/16 - 20 | 3/4 - 16 | 3/4 - 16 | 3/4 - 16 | 1 - 14 | 1 - 14 |
| | O.S. | 3/4 – 16 | 3/4 – 16 | 3/4 – 16 | 1 – 14 | 1 – 14 | 1 – 14 | 1-1/4 – 12 | 1-1/4 – 12 |
| Y | Std. | 2 | 2 | 2 | 2.437 | 2.437 | 2.437 | 2.875 | 2.875 |
| | O.S. | 2.375 | 2.375 | 2.375 | 2.687 | 2.687 | 2.687 | 3.125 | 3.125 |
| ZB | Std. | 5.094 | 5.156 | 5.281 | 6.25 | 6.25 | 6.705 | 7.455 | 7.75 |
| | O.S. | 5.469 | 5.531 | 5.656 | 6.5 | 6.5 | 6.955 | 7.705 | 8 |

## 02 (MS4) Bottom Tap



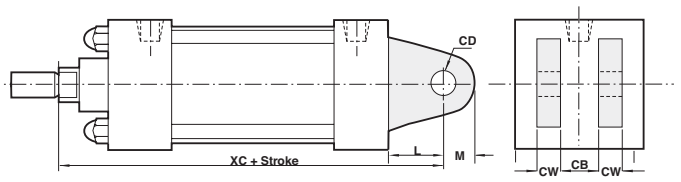

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| NT | | 1/4-20 | 5/16-18 | 3/8-16 | 1/2-13 | 1/2-13 | 5/8-11 | 3/4-10 | 3/4-10 |
| SN | | 2.250 | 2.250 | 2.375 | 2.625 | 2.625 | 2.875 | 3.125 | 3.250 |
| TK | | .375 | .500 | .625 | .750 | .750 | 1.000 | 1.125 | 1.125 |
| TN | | .625 | .875 | 1.250 | 1.500 | 2.062 | 2.687 | 3.250 | 4.500 |
| XT | Std. | 1.937 | 1.937 | 1.937 | 2.437 | 2.437 | 2.437 | 2.812 | 2.812 |
| | O.S. | 2.312 | 2.312 | 2.312 | 2.687 | 2.687 | 2.687 | 3.062 | 3.062 |

## 04 (MF1) Front Flange



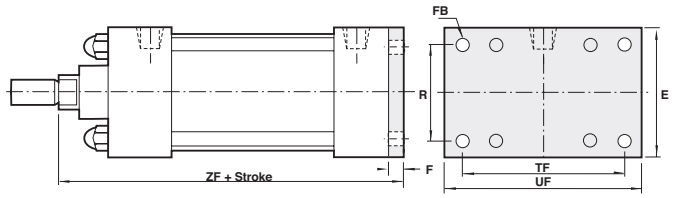

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" |
|---|---|---|---|---|---|---|---|---|
| E | | 2.000 | 2.500 | 3.000 | 3.750 | 4.500 | 5.500 | 6.500 |
| FB | | .312 | .375 | .375 | .437 | .437 | .562 | .562 |
| G | | 1.500 | 1.500 | 1.500 | 1.750 | 1.750 | 1.750 | 2.000 |
| F | | .375 | .375 | .375 | .625 | .625 | .625 | .750 |
| R | | 1.430 | 1.840 | 2.190 | 2.760 | 3.320 | 4.100 | 4.880 |
| TF | | 2.750 | 3.375 | 3.875 | 4.687 | 5.437 | 6.625 | 7.625 |
| UF | | 3.375 | 4.125 | 4.625 | 5.500 | 6.250 | 7.625 | 8.625 |
| W | Std. | .625 | .625 | .625 | .750 | .750 | .750 | .875 |
| | O.S. | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.125 |

## 06 (MP1) Cap Fixed Clevis



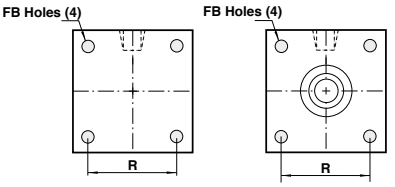

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| CB | | .750 | .750 | .750 | 1.250 | 1.250 | 1.250 | 1.500 | 1.500 |
| CD | | .500 | .500 | .500 | .750 | .750 | .750 | 1.000 | 1.000 |
| CW | | .500 | .500 | .500 | .625 | .625 | .625 | .750 | .750 |
| L | | .750 | .750 | .750 | 1.250 | 1.250 | 1.250 | 1.500 | 1.500 |
| M | | .50 | .50 | .50 | .75 | .75 | .75 | 1.000 | 1.000 |
| XC | Std. | 5.375 | 5.375 | 5.500 | 6.875 | 6.875 | 7.125 | 8.125 | 8.250 |
| | O.S. | 5.750 | 5.750 | 5.875 | 7.125 | 7.125 | 7.375 | 8.375 | 8.500 |

## 05 (MF2) Rear Flange



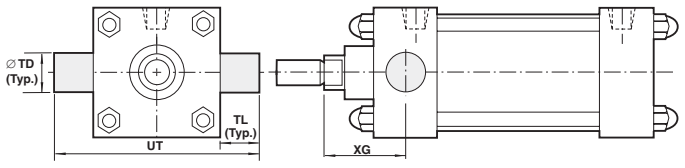

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" |
|---|---|---|---|---|---|---|---|---|
| E | | 2.000 | 2.500 | 3.000 | 3.750 | 4.500 | 5.500 | 6.500 |
| FB | | .312 | .375 | .375 | .437 | .437 | .562 | .562 |
| G | | 1.500 | 1.500 | 1.500 | 1.750 | 1.750 | 1.750 | 2.000 |
| F | | .375 | .375 | .375 | .625 | .625 | .625 | .750 |
| R | | 1.430 | 1.840 | 2.190 | 2.760 | 3.320 | 4.100 | 4.880 |
| TF | | 2.750 | 3.375 | 3.875 | 4.687 | 5.437 | 6.625 | 7.625 |
| UF | | 3.375 | 4.125 | 4.625 | 5.500 | 6.250 | 7.625 | 8.625 |
| W | Std. | .625 | .625 | .625 | .750 | .750 | .750 | .875 |
| | O.S. | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.125 |
| ZF | Std. | 5.000 | 5.000 | 5.125 | 6.250 | 6.250 | 6.500 | 7.375 |
| | O.S. | 5.375 | 5.375 | 5.500 | 6.500 | 6.500 | 6.750 | 7.625 |

## 10 (ME3) Head Square
## 11 (ME4) Cap Square



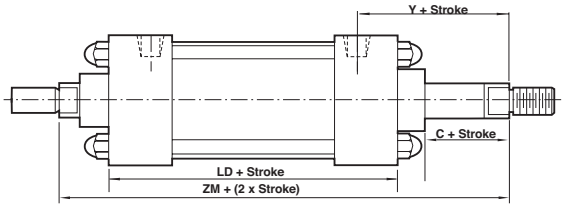

| Bore | 8" |
|---|---|
| FB | .687 |
| R | 7.570 |

## 15 (MT1) Head Trunnion



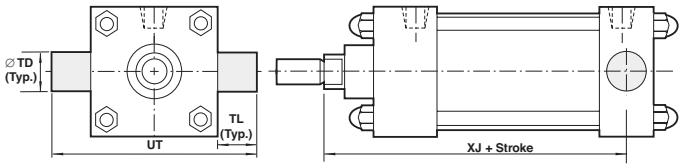

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| TD | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.375 | 1.375 |
| TL | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.375 | 1.375 |
| UT | | 4.000 | 4.500 | 5.000 | 5.750 | 6.500 | 7.500 | 9.250 | 11.250 |
| XG | Std. | 1.750 | 1.750 | 1.750 | 2.250 | 2.250 | 2.250 | 2.625 | 2.625 |
| | O.S. | 2.125 | 2.125 | 2.125 | 2.500 | 2.500 | 2.500 | 2.875 | 2.875 |

## Double Rod End 01 (MX0) Basic



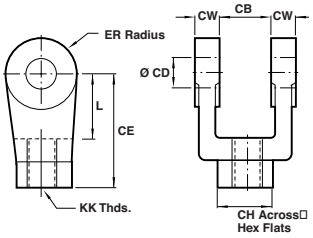

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| C | Std. | .375 | .375 | .375 | .500 | .500 | .500 | .625 | .625 |
| | O.S. | .500 | .500 | .500 | .625 | .625 | .625 | .750 | .750 |
| LD | | 4.125 | 4.125 | 4.250 | 4.750 | 4.750 | 5.000 | 5.500 | 5.500 |
| Y | Std. | 2.000 | 2.000 | 2.000 | 2.437 | 2.437 | 2.437 | 2.875 | 2.875 |
| | O.S. | 2.375 | 2.375 | 2.375 | 2.687 | 2.687 | 2.687 | 3.125 | 3.125 |
| ZM | Std. | 6.125 | 6.125 | 6.250 | 7.500 | 7.500 | 7.750 | 8.750 | 8.750 |
| | O.S. | 6.875 | 6.875 | 7.000 | 8.000 | 8.000 | 8.250 | 9.250 | 9.250 |

## 16 (MT2) Cap Trunnion



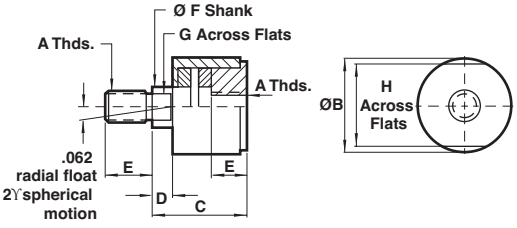

| Bore | | 1-1/2" | 2" | 2-1/2" | 3-1/4" | 4" | 5" | 6" | 8" |
|---|---|---|---|---|---|---|---|---|---|
| TD | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.375 | 1.375 |
| TL | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.375 | 1.375 |
| UT | | 4.000 | 4.500 | 5.000 | 5.750 | 6.500 | 7.500 | 9.250 | 11.250 |
| XJ | Std. | 4.125 | 4.125 | 4.250 | 5.000 | 5.000 | 5.250 | 5.875 | 6.000 |
| | O.S. | 4.500 | 4.500 | 4.625 | 5.250 | 5.250 | 5.500 | 6.125 | 6.250 |

## Rod Clevis
## 303 Stainless Steel




| | S-92-03 | S-92-065 | S-92-12 | S-92-16 |
|---|---|---|---|---|
| CB | .375 | 1.250 | 1.500 | 2.000 |
| CD | .500 | .750 | 1.000 | 1.375 |
| CE | 1.500 | 2.375 | 3.125 | 4.125 |
| CH | 1.000 | 1.250 | 1.500 | 2.000 |
| CW | .500 | .625 | .750 | 1.000 |
| ER | .500 | .750 | 1.000 | 1.375 |
| KK | 1/2-20 | 3/4-16 | 1-14 | 1-1/4 - 12 |
| L | .750 | 1.250 | 1.500 | 2.125 |

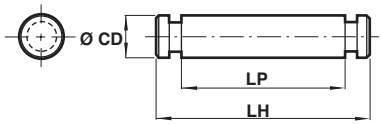
## Rod Alignment Coupler




| | SC-107 | SC-1-08 | SC-1-12 | SC-1-16 |
|---|---|---|---|---|
| A | 7/16-20 | 1/2 – 20 | 3/4 – 16 | 1-14 |
| B | 1.250 | 1.250 | 1.750 | 2.500 |
| C | 2.000 | 2.000 | 2.312 | 2.937 |
| D | .500 | .500 | .500 | .500 |
| E | .750 | .750 | 1.125 | 1.625 |
| F | .625 | .625 | .963 | 1.375 |
| G | .563 | .563 | .875 | 1.250 |
| H | 1.125 | 1.125 | 1.500 | 2.250 |
| Max Pull (lbs) | 2.250 | 3.150 | 7.750 | 12.250 |

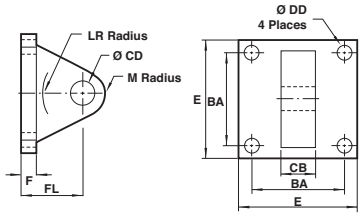
Made of 303 Stainless Steel, the Rod Alignment Coupler allows 1/16° of radial float and 2° of spherical movement.

## NFPA Pin
## 303 Stainless Steel




| | S-96-03A | S-96-065A | S-96-12A | S-96-16A |
|---|---|---|---|---|
| CD | 500 | .750 | 1.000 | 1.375 |
| LH | 2.219 | 3.125 | 3.750 | 5.625 |
| LP | 1.875 | 2.750 | 3.250 | 4.375 |

## Eye Bracket
## 303 Stainless Steel




| | S-89-03A | S-89-065A | S-89-12A |
|---|---|---|---|
| BA | 1.625 | 2.562 | 3.250 |
| CB | .750 | 1.250 | 1.500 |
| CD | .500 | .750 | 1.000 |
| DD | .406 | .531 | .656 |
| E | 2.500 | 3.500 | 4.500 |
| F | .375 | .625 | .750 |
| FL | 1.125 | 1.875 | 2.250 |
| LR | .750 | 1.250 | 1.500 |
| M | .500 | .750 | 1.000 |

## Cylinder Force and Volume Charts
## Extend Forces lbs (N)

| Bore | Piston Area | | Pressure PSIG (bar) | | | | | | | | | | | | Displacement Volume per inch Ft³ (cm³) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | (mm) | 40 | (3) | 60 | (4) | 80 | (6) | 100 | (7) | 150 | (10) | 200 | (14) | | |
| 1-1/8" | .99 | (6.41) | 40 | (177) | 60 | (265) | 80 | (354) | 99 | (442) | 149 | (664) | 200 | (890) | .00057 | (16) |
| 1-1/2" | 1.77 | (11.40) | 71 | (315) | 106 | (472) | 142 | (629) | 177 | (786) | 266 | (1179) | 353 | (1570) | .00102 | (29) |
| 2" | 3.14 | (20.27) | 126 | (559) | 189 | (839) | 251 | (1119) | 314 | (1398) | 471 | (2097) | 628 | (2793) | .00182 | (52) |
| 2-1/2" | 4.91 | (31.67) | 196 | (874) | 295 | (1311) | 393 | (1748) | 491 | (2185) | 737 | (3277) | 982 | (4368) | .00284 | (80) |
| 3-1/4" | 8.30 | (53.32) | 332 | (1477) | 498 | (2215) | 664 | (2953) | 830 | (3692) | 1245 | (5538) | 1659 | (7379) | .00480 | (136) |
| 4" | 12.57 | (81.07) | 503 | (2237) | 754 | (3355) | 1005 | (4473) | 1257 | (5592) | 1886 | (8388) | 2513 | (11178) | .00727 | (206) |
| 5" | 19.64 | (126.71) | 785 | (3491) | 1178 | (5240) | 1571 | (6988) | 1964 | (8736) | 2946 | (13104) | 3928 | (17472) | .01137 | (322) |
| 6" | 28.27 | (182.39) | 1130 | (5026) | 1696 | (7544) | 2262 | (10061) | 2827 | (12574) | 4240 | (18860) | 5654 | (25149) | .01837 | (520) |
| 8" | 50.26 | (324.26) | 2010 | (8940) | 3015 | (13411) | 4020 | (17881) | 5026 | (22356) | 7539 | (33533) | 10052 | (44711) | .02227 | (631) |

## Deduct these Forces for Retract Strokes

| Rod | Rod Area | | Pressure PSIG (bar) | | | | | | | | | | | | Displacement Volume per inch Ft³ (cm³) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | (mm) | 40 | (3) | 60 | (4) | 80 | (6) | 100 | (7) | 150 | (10) | 200 | (14) | | |
| 3/8" | .112 | (.72) | 5 | (20) | 7 | (30) | 9 | (40) | 11 | (50) | 17 | (75) | 22 | (100) | .00007 | (2) |
| 1/2" | .196 | (1.26) | 8 | (35) | 12 | (52) | 16 | (70) | 20 | (87) | 30 | (131) | 39 | (174) | .00011 | (3) |
| 5/8" | .307 | (1.98) | 12 | (53) | 18 | (80) | 25 | (111) | 31 | (138) | 46 | (205) | 61 | (271) | .00018 | (5) |
| 1" | .785 | (5.06) | 31 | (138) | 47 | (209) | 63 | (280) | 70 | (351) | 118 | (525) | 157 | (698) | .00045 | (13) |
| 1-3/8" | 1.485 | (9.58) | 59 | (262) | 89 | (396) | 119 | (529) | 149 | (663) | 222 | (997) | 297 | (1321) | .00086 | (24) |
| 1-3/4" | 2.404 | (15.51) | 95 | (423) | 144 | (641) | 192 | (854) | 240 | (1068) | 360 | (1601) | 480 | (2135) | .00139 | (39) |