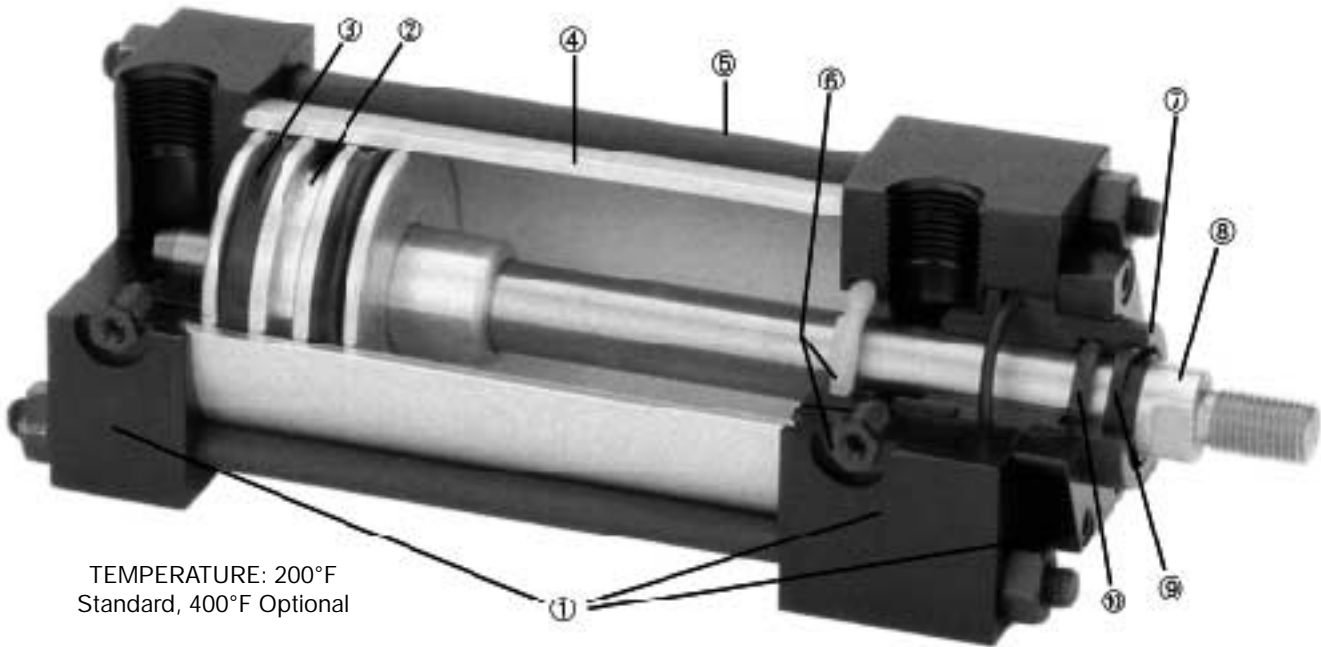


"TA" Series Construction



- 1 **HEAD, CAP & RETAINER** – Precision machined from high strength 6061-T6 aluminum alloy. Black anodized for corrosion resistance.
- 2 **PISTON** – Precision machined from high strength aluminum alloy for light weight and extended cycle life.
- 3 **PISTON SEALS** – Seals are molded from Carboxilated Nitrile and packed with Teflon grease for permanent lubrication. Lip seals are pressure activated and wear compensating.
- 4 **CYLINDER TUBE** – Precision machined from 6063-T832 high tensile aluminum alloy and hard coat to 60 Rc for wear resistance and extended cycle life.
- 5 **TIE RODS** – Prestressed tie rod construction eliminates axial loading of cylinder tube and maintains compression on tube end seals.
- 6 **CUSHIONS** – Floating cushion seals allow quick break-away, long life and trouble free operation. Adjustable needle design has fine thread metering and is captured to prevent accidental needle ejection during adjustment.
- 7 **BEARING** – Precision machined from graphite filled cast iron and Teflon® coated to reduce friction and extend cycle life. Design allows increased lubrication in effective bearing area.
- 8 **PISTON ROD** – Precision machined from high yield, polished and hard chrome plated steel.
- 9 **ROD WIPER** – Urethane wiper designed for extended cycle life. External lip provides superior wiping action.
- 10 **ROD SEAL** – Carboxilated Nitrile seal for extended cycle life. Seal is pressure activated and wear compensating.

FEATURES THAT CAN BE PROVIDED WITH TRD CYLINDERS

- Factory mounted shock absorbers
- Adjustable stroke
- Stop tubes
- Spring extend or return
- Multiple position cylinders
- Air boosters and pressure intensifiers
- Position sensing devices such as reed, hall effect or proximity switches
- Low friction seals available
- Consult factory for other special design requirements

How to Order

TA MX0 - 1 1/2 X 1 - H1C5 - BP - KK3 - MPR - 0 P = PORTS AT 3 & 7

| SERIES | |
|--------|-----------------------------------|
| TA | 250 PSI AIR |
| TH* | 400 PSI HYDRAULIC, NON-SHOCK |
| LF | LOW FRICTION (TA) |
| EN | ELECTROLESS NICKEL PLATED |
| SS | STAINLESS STEEL (303/304, OR 316) |
| FM | FLUSH MOUNT (ADD-A-MOUNT) |
| TR | TRIPLE ROD |
| NR | NON-ROTATING (INTERNALLY GUIDED) |

| NFA MOUNTS | |
|------------|--|
| MX0 | NO MOUNT (1-1/2" - 12") |
| MP1 | REAR PIVOT CLEVIS (1-1/2" - 12") |
| MP2 | REAR PIVOT CLEVIS (1-1/2" - 6") |
| MP4 | REAR PIVOT EYE (1-1/2" - 4") |
| MT1 | FRONT TRUNNION (1-1/2" - 8") |
| MT2 | REAR TRUNNION (1-1/2" - 8") |
| MT4 | INTERMEDIATE TRUNNION (1-1/2" - 8") |
| MX1 | EXTENDED TIE RODS (HEAD & CAP) (1-1/2" - 12") |
| MX2 | EXTENDED TIE RODS (CAP) (1-1/2" - 12") |
| MX3 | EXTENDED TIE RODS (HEAD) (1-1/2" - 12") |
| MF1 | FRONT FLANGE (1-1/2" - 6") |
| MF2 | REAR FLANGE (1-1/2" - 6") |
| ME3 | FRONT MOUNTING HOLES (8" - 12") |
| ME4 | REAR MOUNTING HOLES (8" - 12") |
| MS1 | FRONT & REAR END FOOT (1-1/2" - 8") |
| MS2 | SIDE LUG (1-1/2" - 4" Std, 5" & Above Consult Factory) |
| MS4 | BOTTOM TAPPED HOLES (1-1/2" - 12") |

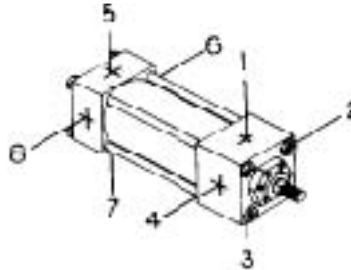
| CUSHIONS | |
|----------|---------------------------------------|
| H | HEAD CUSHION POSITIONS: 1, 2, 3, 4 |
| C | CAP CUSHION POSITIONS: 5, 6, 7, 8 |

| STROKE | |
|-----------------------------|--|
| 0" TO 120" MADE TO ORDER | |

| BORE | |
|--|--|
| 1-1/2", 2", 2-1/2" 3-1/4", 4", 5", 6", 8", 10", 12" | |

| STYLE | |
|--------------------------|--|
| SINGLE ROD (LEAVE BLANK) | |
| D = DOUBLE ROD END | |

| OPTIONS | |
|---------------------------------|--------------------------------------|
| A / O | AIR / OIL PISTON |
| B** | URETHANE BUMPER BOTH ENDS |
| BH** | URETHANE BUMPER HEAD ONLY |
| BC** | URETHANE BUMPER CAP ONLY |
| BP*** | BUMPER PISTON SEAL |
| *A = | EXTENDED PISTON ROD THREAD (SPECIFY) |
| *C = | EXTENDED PISTON ROD (SPECIFY) |
| KK2 | LARGE MALE ROD THREAD |
| KK3 | FEMALE ROD THREAD |
| KK4 | FULL DIAMETER MALE ROD THREAD |
| MPR | MAGNETIC PISTON FOR REED SWITCHES |
| MPH | MAGNETIC PISTON FOR HALL SWITCHES |
| MS | METALLIC ROD SCRAPER |
| OP | OPTIONAL PORT LOCATION (SPECIFY) |
| OS | OVER SIZE ROD (SPECIFY DIAMETER) |
| SE | SPRING EXTEND (CONSULT FACTORY) |
| SR | SPRING RETURN (CONSULT FACTORY) |
| ST | STOP TUBE (CONSULT FACTORY) |
| VS | WITON SEALS |
| WB | WEAR BAND ON PISTON |
| AS | ADJUSTABLE STROKE (RETRACT) |
| XX | SPECIAL VARIATIONS (SPECIFY) |
| BSP SAE PORTS (SPECIFY SIZE) | |
| STAINLESS STEEL PISTON ROD | |
| STAINLESS STEEL TIE RODS & NUTS | |
| STAINLESS STEEL RETAINER SCREWS | |
| STUDDER PISTON ROD (WITH KK3) | |



Standard Port and Cushion Adjustment Positions

- Ports - Positions 1 and 5
- Cushion Adjustment- Position 2 and 6

* CONSULT FACTORY FOR HYDRAULIC APPLICATIONS
 ** BUMPERS ADD 1/4" PER END TO CYLINDER LENGTH
 *** 1-1/2" - 5" BORE ONLY. NOT AVAILABLE IN *TR* SERIES

| | | | | |
|---------------------------|--|---------------------------|---------------------------|---------------------------|
| 1-1/2" - 12" Bores | 1-1/2" - 12" Bores | 1-1/2" - 12" Bores | 1-1/2" - 6" Bores | 1-1/2" - 4" Bores |
| 1-1/2" - 8" Bores | 1-1/2" - 8" Bores | 1-1/2" - 8" Bores | 1-1/2" - 12" Bores | 1-1/2" - 12" Bores |
| 1-1/2" - 12" Bores | 1-1/2" - 6" Bores | 1-1/2" - 6" Bores | 8" - 12" Bores | 8" - 12" Bores |
| 1-1/2" - 8" Bores | 1-1/2" - 4" Bores Consult factory for larger size. | 1-1/2" - 12" Bores | 1-1/2" - 6" Bores | |

List Prices

"TA" Series

| TA SERIES BASE PRICES WITH ZERO STROKE | | | | | | | | | | | | | | | | | |
|--|----------|---------|----------------------|-------------------|---------|---------|---------|----------------------|------------|---------|--------------------------|---------|----------------|----------------------|---------------|---------|--------------------|
| SINGLE ROD END CYLINDERS | | | | | | | | | | | DOUBLE ROD END CYLINDERS | | | | | | |
| BORE | ROD DIA. | MX0 | MF1# MF2# ME3# | MX1 MX2 MX3 | MS1* | MS2 | MS4 | MP1♦ MP2† MP4* | MT1 MT2 | MT4‡ | PER INCH OF STROKE | MX0D | MF1D# ME3D# | MX1D MX3D MS1D | MT1D MS2D‡ | MT4D‡ | PER INCH OF STROKE |
| 1½ | 5/8 | 74.05 | 83.60 | 78.10 | 85.25 | 87.80 | 79.60 | 90.85 | 98.00 | 151.70 | 2.90 | 121.80 | 125.50 | 127.55 | 134.75 | 193.00 | 3.45 |
| | 1** | 100.50 | 93.50 | 107.05 | 112.25 | 115.60 | 109.15 | 121.70 | 129.10 | 186.10 | 3.40 | 161.50 | 172.40 | 172.80 | 182.40 | 239.50 | 4.50 |
| 2 | 5/8 | 83.30 | 90.85 | 87.00 | 95.35 | 98.20 | 91.35 | 101.20 | 112.40 | 168.40 | 3.10 | 141.75 | 147.65 | 143.75 | 151.15 | 219.75 | 3.90 |
| | 1 | 113.35 | 123.65 | 116.35 | 124.50 | 128.25 | 122.15 | 131.80 | 135.95 | 199.35 | 3.80 | 172.50 | 189.95 | 187.00 | 194.50 | 250.50 | 4.70 |
| 2½ | 5/8 | 89.70 | 100.10 | 93.75 | 100.30 | 103.30 | 98.45 | 110.35 | 113.85 | 179.35 | 3.35 | 149.80 | 154.65 | 152.35 | 155.10 | 231.90 | 4.10 |
| | 1 | 120.50 | 126.70 | 123.65 | 132.25 | 136.20 | 129.85 | 146.25 | 151.75 | 211.05 | 4.10 | 200.25 | 205.05 | 209.20 | 210.60 | 282.35 | 4.90 |
| 3¼ | 1 | 122.85 | 133.05 | 128.75 | 137.20 | 141.30 | 135.20 | 149.30 | 156.15 | 256.30 | 5.00 | 203.85 | 216.10 | 218.00 | 226.60 | 326.40 | 5.90 |
| | 1 3/8 | 164.80 | 181.85 | 172.30 | 180.30 | 185.70 | 180.90 | 194.80 | 199.45 | 299.50 | 5.80 | 274.40 | 280.20 | 282.30 | 288.60 | 396.95 | 7.85 |
| 4 | 1 | 146.80 | 161.90 | 157.00 | 163.30 | 168.05 | 157.00 | 170.60 | 175.65 | 301.60 | 5.35 | 237.50 | 252.15 | 243.75 | 258.40 | 383.50 | 6.50 |
| | 1 3/8 | 193.80 | 217.30 | 210.80 | 210.65 | 216.75 | 210.80 | 222.20 | 227.90 | 348.60 | 6.30 | 307.45 | 326.00 | 320.25 | 332.10 | 453.45 | 8.05 |
| 5 | 1 | 191.65 | 216.60 | 204.50 | 208.25 | 280.65 | 204.50 | 232.85 | 227.15 | 423.25 | 6.85 | 280.80 | 306.70 | 290.10 | 311.95 | 499.30 | 8.25 |
| | 1 3/8 | 244.95 | 270.60 | 256.50 | 273.20 | 333.95 | 256.45 | 276.75 | 280.70 | 476.60 | 7.65 | 361.60 | 384.75 | 372.35 | 400.30 | 580.10 | 9.95 |
| 6 | 1 3/8 | 287.25 | 319.80 | 309.75 | 306.95 | 376.25 | 309.75 | 324.85 | 330.35 | 538.80 | 9.35 | 414.15 | 447.50 | 440.20 | 454.15 | 651.30 | 11.05 |
| | 1¾ | 362.75 | 394.25 | 385.25 | 387.95 | 451.75 | 385.25 | 401.95 | 405.30 | 614.10 | 10.40 | 519.20 | 556.50 | 549.10 | 563.00 | 756.35 | 13.15 |
| 8 | 1 3/8 | 433.25 | 457.55 | 463.45 | 462.95 | 522.25 | 463.45 | 488.95 | 494.40 | 915.20 | 12.80 | 654.20 | 658.70 | 654.80 | 687.20 | 1108.90 | 14.40 |
| | 1¾ | 528.10 | 546.60 | 555.75 | 566.35 | 617.10 | 555.75 | 584.65 | 589.90 | 1010.10 | 14.00 | 764.10 | 768.20 | 785.75 | 813.90 | 1218.80 | 16.75 |
| 10 | 1¾ | 969.00 | 986.85 | 985.80 | 1019.70 | 1058.00 | 985.80 | 1015.20 | N/A | N/A | 23.15 | 1132.75 | 1149.75 | 1148.50 | N/A | N/A | 24.50 |
| | 2 | 990.15 | 951.05 | 1005.50 | 1042.55 | 1079.15 | 1005.50 | 1048.65 | N/A | N/A | 26.70 | 1200.80 | 1218.50 | 1251.10 | N/A | N/A | 27.80 |
| 12 | 2 | 1583.50 | 1606.00 | 1601.50 | N/A | 1672.50 | 1601.50 | 1751.20 | N/A | N/A | 37.00 | 2058.55 | 2087.80 | 2081.95 | N/A | N/A | 39.70 |
| | 2½ | 1754.60 | 1776.70 | 1772.60 | N/A | 1843.60 | 1772.60 | 1922.30 | N/A | N/A | 39.00 | 2281.00 | 2309.75 | 2304.40 | N/A | N/A | 42.20 |

- * MP4 mounts available on 1-1/2" through 4" bores only.
 - † MP2 mount available on 1-1/2" through 6" bores only.
 - # ME3, ME4 and ME3D mounts available on 8", 10" & 12" bores only.
MF1, MF2 and MF2D mounts available on 1-1/2" through 6" bores only.
 - * MS2D available in 5", 6", 8", 10" & 12" - consult factory.
 - △ MT4 and MT4D mounts available on 1-1/2 through 8" bores only.
 - MS1 not available 10" & 12" bores.
 - ‡ Not available on MT1 mount.
 - ** Cushion available cap end only.
 - ◆ MP1 on 10" & 12" bores are welded mounts.
- Price includes clevis pin with all pivot mount cylinders.

CONSULT DISTRIBUTOR FOR PRICING SERIES EN, TH, LF & SS SERIES CYLINDERS

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

Cylinder Options

| Bore Size | 1½" | | 2" | | 2½" | | 3¼" | | 4" | | 5" | | 6" | | 8" | | 10" | | 12" | | | |
|--|-------------|-------|--|-------|-------|-------|---|--------|-------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--|
| Rod Diameter | 5/8" | 1"*** | 5/8" | 1" | 5/8" | 1" | 1" | 1 3/8" | 1" | 1 3/8" | 1" | 1 3/8" | 1 3/8" | 1¾" | 1 3/8" | 1¾" | 1¾" | 2" | 2" | 2½" | | |
| Adj. Cushions (per end) | 15.90 | | | | | | 20.25 | | | | | | 23.50 | | | | 63.50 | | 92.50 | | | |
| Head (H) Cap (C) | 15.90 | | | | | | 20.25 | | | | | | 23.50 | | | | 63.50 | | 92.50 | | | |
| Extended Piston Rod (per inch) | 1.35 | 2.00 | 1.35 | 2.00 | 1.35 | 2.00 | 2.00 | 2.80 | 2.00 | 2.80 | 2.00 | 2.80 | 2.80 | 4.15 | 2.80 | 4.15 | 4.15 | 4.70 | 4.70 | 5.40 | | |
| Extended Rod Threads (per inch) | 2.50 | 3.55 | 2.50 | 3.55 | 2.50 | 3.55 | 3.55 | 4.65 | 3.55 | 4.65 | 3.55 | 4.65 | 4.65 | 7.85 | 4.65 | 7.85 | 7.85 | 9.35 | 9.35 | 12.50 | | |
| Female Rod End (KK3) | 5.85 | | | | | | 6.75 | | | | | | 8.00 | | | | 10.00 | | 12.00 | | | |
| Studded Rod End | 10.10 | 17.90 | 10.10 | 17.90 | 10.10 | 17.90 | 17.90 | 22.00 | 17.90 | 22.00 | 17.90 | 22.00 | 22.00 | N/A | 22.00 | N/A | N/A | N/A | N/A | N/A | | |
| Optional Port & Cushion Position or Addnl. Ports (OP) | 5.95 | | | | | | 7.25 | | | | | | 8.40 | | | | 10.50 | | 14.50 | | | |
| Air Oil Piston (AO) | 3.25 | | 3.75 | | 4.25 | | 5.55 | | 6.00 | | 7.55 | | 9.00 | | 11.20 | | 15.60 | | 20.50 | | | |
| ****Urethane Bumpers Per End (B) Both (BH) Head (BC) Cap | 16.00 | | 16.00 | | 16.00 | | 21.00 | | 21.00 | | 21.00 | | 24.05 | | 24.05 | | 27.50 | | 42.00 | | | |
| Bumper Piston (BP) | 5.80 | | 11.55 | | 13.70 | | 20.10 | | 27.00 | | 39.40 | | N/A | | N/A | | N/A | | N/A | | | |
| Stop Tube Base (ST) | 12.00 | | 13.00 | | 14.00 | | 17.15 | | 18.15 | | 19.15 | | 20.20 | | 22.60 | | 28.00 | | 37.00 | | | |
| Per Inch of Stop Tube | 3.95 | 5.60 | 3.95 | 5.60 | 3.95 | 5.60 | 7.20 | 8.95 | 7.20 | 8.95 | 7.20 | 8.95 | 10.95 | 12.60 | 13.60 | 15.50 | 18.15 | 21.55 | 31.50 | 35.20 | | |
| Stainless Steel Piston Rod Base | 9.80 | 15.05 | 9.80 | 15.05 | 9.80 | 15.05 | 15.05 | 22.25 | 15.05 | 22.25 | 15.05 | 22.25 | 22.25 | 32.85 | 22.25 | 32.85 | 32.85 | 51.95 | 51.95 | 81.00 | | |
| Stainless Steel Rod Per Inch of Stroke | 1.10 | 2.40 | 1.10 | 2.40 | 1.10 | 2.40 | 2.40 | 4.15 | 2.40 | 4.15 | 2.40 | 4.15 | 4.15 | 6.25 | 4.15 | 6.25 | 6.25 | 10.00 | 10.00 | 12.30 | | |
| Stainless Steel Tie Rod Base | 6.25 | | | | | | 7.30 | | | | | | 9.90 | | | | 11.45 | | 18.70 | | 18.70 | |
| Stainless Steel Tie Rod Per Inch of Stroke | .70 | | | | | | 1.00 | | | | | | 1.55 | | | | 2.30 | | 4.70 | | 4.70 | |
| Stainless Steel Tie Rod Nuts | 3.55 | | 4.60 | | 6.00 | | 7.30 | | 8.30 | | 14.80 | | 14.80 | | 14.80 | | 14.80 | | 14.80 | | | |
| Stainless Steel Retainer Screws | N/A | | 2.40 | N/A | 2.40 | N/A | 3.65 | N/A | 3.65 | 3.65 | 3.65 | 3.65 | 3.65 | 3.65 | 3.65 | 3.65 | 6.85 | 6.85 | 6.85 | 6.85 | | |
| Adjustable Stroke Base (Retract) | 24.95 | | | | | | 32.70 | | | | | | 37.05 | | | | 43.60 | | 43.60 | | | |
| Per Inch of Adjustable Stroke | 2.10 | | | | | | 2.80 | | | | | | 6.95 | | | | 8.40 | | 8.40 | | | |
| Steel Tube Base | 34.00 | | | | | | | | | | | | | | | | | | △88.00 | | | |
| Per Inch of Steel Tube (Stroke) | .90 | | | | | | 1.15 | | 1.15 | | 1.25 | | 1.35 | | 1.55 | | 2.80 | | 6.85 | | | |
| Low Friction "LF" Series Adder | 10.20 | 11.20 | 11.15 | 11.45 | 11.65 | 11.80 | 12.30 | 12.90 | 13.50 | 14.10 | 15.50 | 16.35 | 17.35 | 18.60 | 26.00 | 27.45 | 38.20 | 40.35 | N/A | N/A | | |
| "TH" Series Hydraulic 400 P.S.I. | 9.50 | 12.75 | 9.95 | 13.15 | 10.45 | 13.70 | 14.90 | 21.30 | 15.35 | 21.75 | 16.80 | 23.20 | 24.55 | 26.75 | 26.70 | 28.85 | 48.55 | 53.10 | 62.75 | 70.50 | | |
| Viton Seals -15°F to 400°F (VS) | 32.65 | 36.40 | 39.60 | 43.70 | 45.15 | 48.90 | 59.30 | 63.45 | 69.45 | 74.95 | 82.70 | 95.95 | 100.85 | 107.05 | 132.50 | 141.00 | 334.00 | 350.00 | 475.00 | 501.50 | | |
| Metallic Rod Scraper (MS) | 12.15 | 13.50 | 12.15 | 13.50 | 12.15 | 13.50 | 13.50 | 16.00 | 13.50 | 16.00 | 13.50 | 16.00 | 16.00 | 20.15 | 16.00 | 20.15 | 20.15 | 21.30 | 21.30 | 29.95 | | |
| Magnetic Piston | 14.50 | | | | | | 18.25 | | | | | | 26.00 | | | | 35.90 | | 55.00 | | | |
| Reed Switch | RS 01 AC*** | | Includes Mounting Bracket and 6' Lead | | | | SB 510 FOR 1½" - 4" bore or SB 590 FOR 5" - 8" bore △ | | | | | | 42.70 | | | | | | | | | |
| | RS 02 DC | | Includes Mounting Bracket and 12' Lead | | | | 1½" - 6" bore | | | | | | 33.80 | | | | | | | | | |
| | RS 004 | | Includes Mounting Bracket and 12' Lead | | | | 1½" - 6" bore | | | | | | 33.80 | | | | | | | | | |
| Hall Effect Switch | HE 03SK** | | Includes Mounting Bracket and 6' Lead | | | | SB 510 FOR 1½" - 4" bore or SB 590 FOR 5" - 8" bore △ | | | | | | 54.55 | | | | | | | | | |
| | HE 04SC | | Includes Mounting Bracket and 6' Lead | | | | 1½" - 6" bore | | | | | | 47.90 | | | | | | | | | |
| | HE 011 | | Includes Mounting Bracket and 6' Lead | | | | 1½" - 6" bore | | | | | | 47.90 | | | | | | | | | |

* Must specify "MPR" for use with Reed Switch or "MPH" for use with Hall Effect Switch.

** Cushion Available Cap End only.

*** Must specify Switch Number and Mount Bracket - i.e. RS 01 AC SB 590 is AC Reed Switch with Mount for 5" thru 8" bore cylinders.

**** Bumpers, add 1/4" per end to overall length of cylinder.

△ Longer bracket mounting screws required - consult factory.

△ Consult factory for lead time.

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

“FM” Series Flush Mount

| FM SERIES BASE PRICES WITH ZERO STROKE | | | | | | | | | | CUSHIONS PER END | STD. PORT SIZE |
|--|----------|---------|---------|-------------|--------------------------|-----------|--------|--------------------|-------|------------------|----------------|
| SINGLE ROD END CYLINDERS | | | | | DOUBLE ROD END CYLINDERS | | | | | | |
| BORE | ROD DIA. | MX0 MS4 | MF1 MF2 | MP1 MP2 MP4 | PER INCH OF STROKE | MX0D MS4D | MF1D | PER INCH OF STROKE | | | |
| 1½ | 5/8 | 77.30 | 90.50 | 90.75 | 3.10 | 117.20 | 120.70 | 3.30 | 15.90 | ¼ | |
| | 1 | 158.20 | 163.50 | 171.55 | 3.40 | 222.15 | 228.05 | 4.50 | | | |
| 2 | 5/8 | 90.50 | 105.85 | 106.40 | 3.40 | 136.40 | 141.95 | 3.70 | 15.90 | ¼ | |
| | 1 | 165.70 | 173.40 | 181.15 | 3.80 | 238.50 | 245.95 | 4.70 | | | |
| 2½ | 5/8 | 101.35 | 118.95 | 120.00 | 3.90 | 144.10 | 148.75 | 3.90 | 15.90 | ¼ | |
| | 1 | 177.65 | 182.35 | 194.95 | 4.10 | 255.90 | 260.70 | 4.90 | | | |
| 3¼ | 1 | 132.30 | 154.90 | 156.30 | 5.60 | 196.05 | 207.80 | 5.55 | 20.25 | 3/8 | |
| | 1 3/8 | 220.65 | 228.85 | 241.15 | 5.80 | 330.05 | 335.85 | 7.85 | | | |
| 4 | 1 | 159.85 | 185.15 | 186.25 | 5.90 | 228.30 | 241.95 | 6.25 | 20.25 | 3/8 | |
| | 1 3/8 | 243.50 | 260.65 | 265.60 | 6.25 | 373.10 | 381.65 | 8.05 | | | |
| 5 | 1 | 197.95 | 226.40 | 227.50 | 7.30 | 267.95 | 294.95 | 7.80 | 20.25 | 3/8 | |
| | 1 3/8 | 291.75 | 310.95 | 316.75 | 7.65 | 427.25 | 440.40 | 9.95 | | | |
| 6 | 1 3/8 | 297.45 | 337.50 | 341.05 | 10.05 | 394.50 | 426.30 | 10.40 | 23.50 | ½ | |
| | 1¾ | 402.85 | 427.60 | 434.85 | 10.40 | 584.85 | 612.15 | 13.15 | | | |

Cushions not available at head 1-1/2" bore, 1" diameter rod.

Note: 'FM' series with oversize rods have a full square retainer plate held on with (4) socket head cap screws.

“FM” Series Flush Mount Kits

| BORE SIZE | CLEVIS BRACKET MP1 | | CLEVIS BRACKET MP2 | | CLEVIS BRACKET MP4 | | FLANGE MF1 & MF2 | | ANGLE MOUNT MS1 | | BASE BAR | |
|-----------|--------------------|-------|--------------------|-------|--------------------|-------|------------------|-------|-----------------|-------|----------|-------|
| | PART NO. | PRICE | PART NO. | PRICE | PART NO. | PRICE | PART NO. | PRICE | PART NO. | PRICE | PART NO. | PRICE |
| 1½ | FMP115 | 13.50 | FMP215 | 13.50 | FMP415 | 13.50 | FMF115 | 13.25 | FMS115 | 12.60 | FMS215 | 15.75 |
| 2 | FMP120 | 15.95 | FMP220 | 15.95 | FMP420 | 15.95 | FMF120 | 15.30 | FMS120 | 14.60 | FMS220 | 18.35 |
| 2½ | FMP125 | 18.65 | FMP225 | 18.65 | FMP425 | 18.65 | FMF125 | 17.60 | FMS125 | 16.75 | FMS225 | 21.70 |
| 3¼ | FMP132 | 23.75 | FMP232 | 23.75 | FMP432 | 23.75 | FMF132 | 22.65 | FMS132 | 21.55 | FMS232 | 25.95 |
| 4 | FMP140 | 26.15 | FMP240 | 26.15 | FMP440 | 26.15 | FMF140 | 25.30 | FMS140 | 24.10 | FMS240 | 25.95 |
| 5 | FMP150 | 29.30 | FMP250 | 29.30 | N/A | N/A | FMF150 | 28.50 | FMS150 | 27.10 | N/A | N/A |
| 6 | FMP160 | 43.15 | FMP260 | 43.15 | N/A | N/A | FMF160 | 40.00 | FMS160 | 38.10 | N/A | N/A |

△ If 'FM' MF1 ordered - specify standard or oversize rod diameter.

NOTE: See page 6 for option pricing.

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

"TR" Series Triple Rod Cylinder

| BORE SIZE | SINGLE ROD END THREE RODS & 1 TOOLING PLATE | | | | | | DOUBLE ROD END - THREE RODS BOTH ENDS & TWO TOOLING PLATES OR SINGLE ROD ON ONE END* | | | | |
|-----------|--|----------------------------|-------------------|-------------|-----------------------|------------------------|---|---------------|-------------|-----------------------|------------------------|
| | MS4 | ME4 ME5 MF1** MF2 | MP1 MP2 MP4 | BASE BAR | PER INCH STROKE | CUSHIONS PER END | MS4D | ME3** MF1D | BASE BAR | PER INCH STROKE | CUSHIONS PER END |
| 1½ | 194.90 | 213.10 | 220.10 | 205.70 | 5.70 | 24.95 | 327.25 | 345.90 | 338.05 | 9.60 | 24.95 |
| 2 | 203.45 | 223.30 | 228.60 | 216.40 | 7.85 | 24.95 | 353.50 | 373.65 | 368.15 | 13.95 | 24.95 |
| 2½ | 226.70 | 247.70 | 253.80 | 241.65 | 8.40 | 24.95 | 412.45 | 430.25 | 425.10 | 15.40 | 24.95 |
| 3¼ | 410.60 | 438.05 | 456.60 | 434.90 | 8.60 | 27.30 | 690.80 | 714.90 | 707.10 | 16.20 | 27.30 |
| 4 | 442.40 | 473.20 | 466.80 | 470.00 | 8.90 | 27.30 | 730.20 | 763.00 | 762.30 | 16.40 | 27.30 |
| 5 | 483.90 | 510.60 | 522.20 | N/A | 14.60 | 31.40 | 744.70 | 769.50 | N/A | 19.90 | 31.40 |
| 6 | 726.90 | 743.90 | 758.40 | N/A | 19.80 | 31.40 | 1098.20 | 1113.00 | N/A | 26.30 | 31.40 |
| 8 | 1048.30 | 1281.30 | 1103.10 | N/A | 26.70 | 31.40 | 1571.50 | 1536.40 | N/A | 33.50 | 31.40 |

* NOTE: Please specify if single rod is required on one end of triple rod

** 8" bore mount is ME5 (Head) ME4 (Cap)

| TOOLING PLATES FOR TR SERIES | |
|---------------------------------|------------|
| BORE | PRICE LIST |
| 1½ | 29.40 |
| 2 | 32.55 |
| 2½ | 35.20 |
| 3¼ | 39.60 |
| 4 | 47.75 |
| 5 | 59.35 |
| 6 | 82.95 |
| 8 | 149.25 |

| STAINLESS STEEL PISTON RODS FOR TR SERIES | | |
|--|---------------|--------------------------|
| BORE | BASE ADDER | PER INCH STROKE ADDER |
| 1½ | 13.35 | 3.70 |
| 2 | 16.70 | 4.80 |
| 2½ | 20.05 | 5.85 |
| 3¼ | 20.05 | 5.85 |
| 4 | 20.05 | 5.85 |
| 5 | 23.85 | 12.40 |
| 6 | 23.85 | 12.40 |
| 8 | 23.85 | 12.40 |

| PORT POSITION CHANGE | | |
|----------------------|---------------------------------------|-----------|
| BORE | POS 2 OR 4 (HEAD) OR DOUBLE END | POS 6 & 8 |
| 1½ | 17.85 | 5.95 |
| 2 | 17.85 | 5.95 |
| 2½ | 17.85 | 5.95 |
| 3¼ | 21.75 | 7.25 |
| 4 | 21.75 | 7.25 |
| 5 | 25.20 | 8.40 |
| 6 | 25.20 | 8.40 |
| 8 | 25.20 | 8.40 |

"NR Series Internally Guided Non Rotating Cylinder

| BORE | ADD TO STANDARD 'TA' PRICING | | GUIDE ROD DIA. (2) | CUSHION AVAILABILITY | PISTON ROD DIA. | SEAL KIT | |
|------|------------------------------|--------------------------|--------------------------|-------------------------|-----------------------|----------------|---------------|
| | BASE ADDER | PER INCH STROKE ADDER | | | | PART NUMBER | LIST PRICE |
| 2 | 161.50 | 1.05 | ¼ | CAP ONLY | 5/8 | NRSK 625-200 | 18.75 |
| 2½ | 161.50 | 1.05 | 5/16 | CAP ONLY | 5/8 | NRSK 625-250 | 19.85 |
| | | | | N/A* | 1 | NRSK-100-250 | 23.85 |
| 3¼ | 201.50 | 1.60 | 3/8 | HEAD & CAP | 1 | NRSK 100-325 | 25.75 |
| | | | | CAP ONLY | 1 3/8 | NRSK-137-325 | 30.60 |
| 4 | 201.50 | 1.60 | 5/8 | HEAD & CAP | 1 | NRSK 100-400 | 29.20 |
| | | | | HEAD & CAP | 1 3/8 | NRSK 137-400 | 31.60 |
| 5 | 242.55 | 1.75 | 5/8 | HEAD & CAP | 1 | NRSK 100-500 | 30.70 |
| | | | | HEAD & CAP | 1 3/8 | NRSK 137-500 | 33.45 |
| 6 | 242.55 | 1.75 | 5/8 | HEAD & CAP | 1 3/8 | NRSK 137-600 | 44.10 |
| | | | | HEAD & CAP | 1¾ | NRSK 175-600 | 45.35 |
| 8 | 323.40 | 2.10 | 1 | HEAD & CAP | 1 3/8 | NRSK 137-800 | 52.00 |
| | | | | HEAD & CAP | 1¾ | NRSK 175-800 | 54.70 |
| 10 | 323.40 | 2.40 | 1 | HEAD & CAP | 1 3/8 | NRSK 175-1000 | 134.00 |
| | | | | HEAD & CAP | 2 | NRSK 200-1000 | 138.75 |
| 12 | 545.60 | 5.75 | 1 | HEAD & CAP | 2 | NRSK 200-1200 | 157.10 |
| | | | | HEAD & CAP | 2½ | NRSK 250-1200 | 173.80 |

*Not available in oversize rod

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

"MS" Multi-Stage Cylinder

| BORE | ROD DIA. | BASE PRICE | | | PRICE PER INCH OF STROKE | | | MOUNTS | | | ** BUMPER PER END | *** CUSHION PER END | ** MPR MPH |
|------|----------|------------|---------|---------|--------------------------|-------|-------|-------------------------------|---------|-------|-------------------|---------------------|------------|
| | | STAGES | | | STAGES | | | MS4, MX1, MX2, MX3, ME3 & ME4 | MF1 MF2 | MS2 | | | |
| | | 2 | 3 | 4 | 2 | 3 | 4 | | | | | | |
| 1½ | 5/8 | 114.05 | 141.15 | 164.55 | 8.35 | 11.00 | 15.00 | N/C | 10.85 | 25.45 | 16.00 | 15.90 | 28.00 |
| | 1 | 155.70 | 182.85 | 206.25 | 9.45 | 12.10 | 16.10 | | | | | | |
| 2 | 5/8 | 114.75 | 148.15 | 178.50 | 13.35 | 16.55 | 19.10 | N/C | 13.45 | 28.15 | 16.00 | 15.90 | 28.00 |
| | 1 | 156.45 | 189.85 | 220.20 | 14.20 | 17.40 | 19.95 | | | | | | |
| 2½ | 5/8 | 117.30 | 154.10 | 186.90 | 22.60 | 29.40 | 34.60 | N/C | 16.55 | 29.95 | 16.00 | 15.90 | 28.00 |
| | 1 | 170.25 | 207.05 | 239.90 | 23.40 | 30.25 | 35.45 | | | | | | |
| 3¼ | 1 | 152.80 | 185.50 | 222.35 | 28.15 | 34.65 | 40.95 | N/C | 21.10 | 32.55 | 21.00 | 20.25 | 35.00 |
| | 1 3/8 | 226.85 | 259.55 | 296.40 | 30.20 | 36.70 | 43.00 | | | | | | |
| 4 | 1 | 193.30 | 243.20 | 291.95 | 32.15 | 39.45 | 46.20 | N/C | 23.95 | 35.65 | 21.00 | 20.25 | 35.00 |
| | 1 3/8 | 266.75 | 316.65 | 365.40 | 33.75 | 41.05 | 47.85 | | | | | | |
| 5 | 1 | 335.00 | 409.00 | 491.30 | 39.70 | 46.85 | 53.85 | N/C | 25.20 | N/A | 21.00 | 20.25 | 35.00 |
| | 1 3/8 | 419.85 | 493.85 | 576.15 | 41.50 | 48.60 | 55.65 | | | | | | |
| 6 | 1 3/8 | 429.90 | 525.75 | 623.45 | 46.45 | 50.30 | 61.50 | N/C | 28.35 | N/A | 24.05 | 23.50 | 50.00 |
| | 1¾ | 540.20 | 636.10 | 733.75 | 48.70 | 52.50 | 63.70 | | | | | | |
| 8 | 1 3/8 | 751.00 | 882.55 | 1014.05 | 66.50 | 75.45 | 84.35 | N/C | N/A | N/A | 24.05 | 23.50 | 50.00 |
| | 1¾ | 938.45 | 1102.50 | 1267.55 | 69.00 | 79.30 | 89.65 | | | | | | |

MF1 & MF2 not available on 8" bore

ME3 & ME4 available 8" bore only

MS2 not available 5, 6, or 8" bore

**Consult Factory for additional length to cylinder

***1-1/2 bore with 1" diameter piston rod cannot have cushions on the head end.

Note: Cushion available on head end only of multi-stage extend, and only available on cap end of multi-stage retract.

Air Oil Tanks

| BORE | MODEL NO. | BASE PRICE | PER INCH OF INTERNAL LENGTH |
|------|---------------------------|------------|-----------------------------|
| 2½ | A/T 250 x (Stroke Length) | 89.90 | 3.70 |
| 3¼ | A/T 325 x (Stroke Length) | 105.30 | 4.00 |
| 4 | A/T 400 x (Stroke Length) | 116.30 | 4.85 |
| 5 | A/T 500 x (Stroke Length) | 129.25 | 5.30 |
| 8 | A/T 800 x (Stroke Length) | 225.85 | 9.55 |

NOTE: When sizing A/T use 75% of tank volume as useable.

Example: A/T 3-1/4 x 6 = 8.29 sq. in. x 6 = 49.74 C.I. x .75 = 37.31 C.I. useable volume

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

Accessories (NFPA Interchangeable)

| ROD CLEVIS | | | ROD EYE | | | EYE BRACKETS | | | CLEVIS BRACKETS | | |
|------------|----------|--------|----------|----------|-------|--------------|----------|--------|-----------------|----------|--------|
| PART NO. | THREADS | PRICE | PART NO. | THREADS | PRICE | PART NO. | PIN DIA. | PRICE | PART NO. | PIN DIA. | PRICE |
| RC437 | 7/16-20 | 15.55 | RE437 | 7/16-20 | 14.10 | EB500 | 1/2 | 17.15 | CB500 | 1/2 | 20.85 |
| RC500 | 1/2-20 | 15.55 | RE500 | 1/2-20 | 14.10 | EB750 | 3/4 | 22.00 | CB750 | 3/4 | 35.65 |
| RC750 | 3/4-16 | 23.50 | RE750 | 3/4-16 | 19.75 | EB1000 | 1 | 42.50 | CB1000 | 1 | 56.80 |
| RC875 | 7/8-14 | 39.15 | RE875 | 7/8-14 | 35.30 | EB1375 | 1 3/8 | 95.50 | CB1375 | 1 3/8 | 167.15 |
| RC1000 | 1-14 | 35.70 | RE1000 | 1-14 | 31.45 | EB1750 | 1 3/4 | 138.70 | CB1750 | 1 3/4 | 248.00 |
| RC1250 | 1 1/4-12 | 52.65 | RE1250 | 1 1/4-12 | 47.70 | | | | | | |
| RC1500 | 1 1/2-12 | 89.55 | RE1500 | 1 1/2-12 | 79.40 | | | | | | |
| RC1750 | 1 3/4-12 | 153.50 | | | | | | | | | |
| RC1875 | 1 7/8-12 | 187.65 | | | | | | | | | |

Accessories (Non NFPA Interchangeable)

| SMALL ROD CLEVIS | | | EYE BRACKETS | | | CLEVIS BRACKETS | | |
|------------------|---------|-------|----------------------------|----------|-------|-----------------------------|----------|-------|
| PART NO. | THREADS | PRICE | * ^Δ PART NO. | PIN DIA. | PRICE | ** ^Δ PART NO. | PIN DIA. | PRICE |
| RC437CCS | 7/16-20 | 12.15 | EB15D | 1/2 | 14.70 | CB15D | 1/2 | 15.05 |
| RC500CCS | 1/2-20 | 12.15 | EB20D | 1/2 | 15.90 | CB20D | 1/2 | 18.20 |
| RC750CCS | 3/4-16 | 16.55 | EB25D | 1/2 | 18.20 | CB25D | 1/2 | 21.25 |
| | | | EB32D | 3/4 | 23.60 | CB32D | 3/4 | 27.35 |
| | | | EB40D | 3/4 | 26.25 | CB40D | 3/4 | 30.10 |
| | | | | | | CB50D | 3/4 | 39.70 |
| | | | | | | CB60D | 1 | 57.85 |

* Note: Rework of "MP4" mount, page 8 of cylinder catalog

** Note: Rework of "MP2" mount, page 8 of cylinder catalog

The "D" in part number represents drilled out tie rod threads

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

Clevis Pins

| NFPA CLEVIS PINS | | | NON NFPA CLEVIS PINS (short) | | | PIVOT PINS (chromed) | | | PIVOT PINS (E-Rings) | | |
|------------------|-------|-------|------------------------------|------|-------|----------------------|------|-------|----------------------|------|-------|
| PART NO. | DIA. | PRICE | PART NO. | DIA. | PRICE | PART NO. | DIA. | PRICE | PART NO. | DIA. | PRICE |
| CP500 | 1/2 | 3.20 | CP500CCS | 1/2 | 3.15 | CP500C | 1/2 | 5.10 | CP500E | 1/2 | 7.60 |
| CP750 | 3/4 | 4.75 | CP750CCS | 3/4 | 3.80 | CP750C | 3/4 | 6.25 | CP750E | 3/4 | 8.95 |
| CP1000 | 1 | 8.30 | | | | CP1000C | 1 | 10.65 | CP1000E | 1 | 12.60 |
| CP1375 | 1 3/8 | 11.85 | | | | | | | | | |
| CP1750 | 1 3/4 | 28.15 | | | | | | | | | |

List Prices

Seal Kits

| STANDARD SINGLE ROD END | | | | | DOUBLE ROD END | | |
|-------------------------|-------------|------------|----------|------|----------------|------------|----------------------|
| BORE | PART NO. | LIST PRICE | CUSHION* | | PART NO. | LIST PRICE | CUSHION "H" EACH END |
| | | | H | C | | | |
| 1½ | SK 625-150 | 13.25 | 6.15 | 4.85 | SKD 625-150 | 17.25 | 6.15 |
| 2 | SK 625-200 | 14.50 | 6.15 | 4.85 | SKD 625-200 | 18.00 | 6.15 |
| 2½ | SK 625-250 | 15.50 | 6.15 | 4.85 | SKD 625-250 | 21.00 | 6.15 |
| 3¼ | SK 100-325 | 21.50 | 7.30 | 5.75 | SKD 100-325 | 28.00 | 7.30 |
| 4 | SK 100-400 | 24.75 | 7.30 | 5.75 | SKD 100-400 | 32.00 | 7.30 |
| 5 | SK 100-500 | 26.75 | 7.30 | 5.75 | SKD 100-500 | 32.50 | 7.30 |
| 6 | SK 137-600 | 40.75 | 8.05 | 6.15 | SKD 137-600 | 49.75 | 8.05 |
| 8 | SK 137-800 | 48.25 | 8.05 | 6.15 | SKD 137-800 | 57.50 | 8.05 |
| 10 | SK 175-1000 | 129.75 | 19.55 | 6.15 | SKD 175-1000 | 155.75 | 19.55 |
| 12 | SK 200-1200 | 153.25 | 24.90 | 6.15 | SKD 200-1200 | 164.50 | 24.90 |

| OVERSIZE SINGLE ROD END | | | | | OVERSIZE DOUBLE ROD END | | |
|-------------------------|-------------|------------|----------|------|-------------------------|------------|----------------------|
| BORE | PART NO. | LIST PRICE | CUSHION* | | PART NO. | LIST PRICE | CUSHION "H" EACH END |
| | | | H | C | | | |
| 1½ | SK 100-150 | 14.50 | N/A | 4.85 | SKD 100-150 | 20.00 | N/A |
| 2 | SK 100-200 | 15.50 | 7.30 | 4.85 | SKD 100-200 | 21.50 | 7.30 |
| 2½ | SK 100-250 | 16.50 | 7.30 | 4.85 | SKD 100-250 | 23.50 | 7.30 |
| 3¼ | SK 137-325 | 23.00 | 8.05 | 5.75 | SKD 137-325 | 30.50 | 8.05 |
| 4 | SK 137-400 | 27.50 | 8.05 | 5.75 | SKD 137-400 | 34.50 | 8.05 |
| 5 | SK 137-500 | 29.50 | 8.05 | 5.75 | SKD 137-500 | 37.50 | 8.05 |
| 6 | SK 175-600 | 43.00 | 19.55 | 6.15 | SKD 175-600 | 52.00 | 19.55 |
| 8 | SK 175-800 | 50.50 | 19.55 | 6.15 | SKD 175-800 | 59.50 | 19.55 |
| 10 | SK 200-1000 | 132.50 | 24.90 | 6.15 | SKD 200-1000 | 161.00 | 24.90 |
| 12 | SK 250-1200 | 168.00 | 32.60 | 6.15 | SKD 250-1200 | 178.00 | 32.60 |

*Add suffix H and/or C to indicate if cushion seals are required on head and/or cap. Example: SK 625-150 HC
 Seal Kit includes: 2 Piston Seals, 2 Tube End Seals, Rod Wiper, Rod Seal & Bushing "O" Ring.

"TR" Series Seal Kits & Bushings

| BORE | THREE RODS SINGLE END | LIST PRICE | THREE RODS DOUBLE END | LIST PRICE | TR BUSHINGS (3 required) | LIST PRICE/ea. |
|------|-----------------------|------------|-----------------------|------------|--------------------------|----------------|
| 1½ | SK-TR15 | 19.50 | SKD-TR15 | 29.00 | TR-B30-1 | 9.55 |
| 2 | SK-TR20 | 21.00 | SKD-TR20 | 30.50 | TR-B30-2 | 10.10 |
| 2½ | SK-TR25 | 22.50 | SKD-TR25 | 31.50 | TR-B30-3 | 10.85 |
| 3¼ | SK-TR32 | 32.50 | SKD-TR32 | 45.50 | TR-B30-3 | 10.85 |
| 4 | SK-TR40 | 47.00 | SKD-TR40 | 65.50 | TR-B30-3 | 10.85 |
| 5 | SK-TR50 | 50.00 | SKD-TR50 | 74.50 | TR-B30-4 | 21.15 |
| 6 | SK-TR60 | 69.00 | SKD-TR60 | 93.50 | TR-B30-4 | 21.15 |
| 8 | SK-TR80 | 87.00 | SKD-TR80 | 122.00 | A-30-2-BZ | 30.05 |

Bushings

| ROD DIA. | TA SERIES (cast iron) | | FM SERIES (cast iron) | | TA SERIES (bronze) | | TH SERIES (cast iron) | | ROD DIA. |
|----------|-----------------------|-------|-----------------------|-------|--------------------|-------|-----------------------|-------|----------|
| | PART NUMBER | PRICE | PART NUMBER | PRICE | PART NUMBER | PRICE | PART NUMBER | PRICE | |
| 5/8 | A-30-1 | 16.70 | FM-30-1 | 16.70 | A-30-1-BZ | 24.50 | TH-30-1 | 24.50 | 5/8 |
| 1 | A-30-2** | 21.15 | FM-30-2 | 21.15 | A-30-2-BZ | 30.05 | TH-30-2 | 30.05 | 1 |
| 1 3/8 | A-30-3 | 24.50 | FM-30-3 | 24.50 | A-30-3-BZ | 35.10 | TH-30-3 | 35.10 | 1 3/8 |
| 1¾ | A-30-4 | 32.25 | N/A | N/A | A-30-4-BZ | 46.20 | TH-30-4 | 46.20 | 1¾ |
| 2 | A-30-5 | 63.45 | N/A | N/A | A-30-5-BZ | 90.75 | TH-30-5 | 90.75 | 2 |
| 2½ | A-30-6 | 69.75 | N/A | N/A | A-30-6-BZ | 96.40 | TH-30-6 | 96.40 | 2½ |

**1-1/2 bore 1" Ø rod, part number is: A-30-2-OS

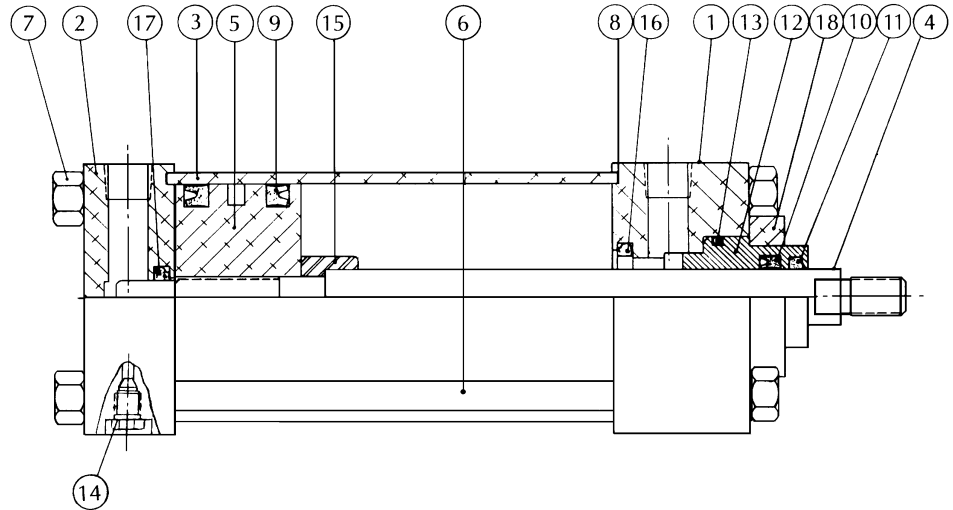
Magnetic Strip

| SWITCH TYPE | 1½ | 2 | 2½ | 3¼ | 4 | 5 | 6 | 8 | 10 | 12 |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| REED SWITCH | MPR-15 | MPR-20 | MPR-25 | MPR-32 | MPR-40 | MPR-50 | MPR-60 | MPR-80 | MPR-100 | MPR-120 |
| HALL EFFECT SWITCH | MPH-15 | MPH-20 | MPH-25 | MPH-32 | MPH-40 | MPH-50 | MPH-60 | MPH-80 | MPH-100 | MPH-120 |
| PRICE | 14.50 | 14.50 | 14.50 | 18.25 | 18.25 | 18.25 | 26.00 | 26.00 | 35.90 | 55.00 |

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

"TA" Series Cylinder Parts List



NOTE:
When ordering any part,
please supply TRD Serial
Number to insure proper
parts are supplied.

| ITEM | QTY | PART NAME | BORE SIZE | | | | | | | | | |
|------|--------|--------------------------|---------------------------------------|---------------------------------------|---|--|--|---|---|--|--|--|
| | | | 1½ | 2 | 2½ | 3¼ | 4 | 5 | 6 | 8 | 10 | 12 |
| 1 | 1 | HEAD | A-10-15 28.40 | A-10-20 33.80 | A-10-25 44.10 | A-10-32 51.35 | A-10-40 62.90 | A-10-50 87.95 | A-10-60 118.30 | A-10-80 158.20 | A-10-100 288.30 | A-10-120 343.70 |
| 2 | 1 | CAP | A-25-15 18.70 | A-25-20 25.40 | A-25-25 31.15 | A-25-32 37.35 | A-25-40 43.35 | A-25-50 54.35 | A-25-60 83.50 | A-25-80 118.75 | A-25-100 272.50 | A-25-120 313.70 |
| 3 | 1 | TUBE | A-40-15 1 ¼ + STK 11.15+2.50/in | A-40-20 1 ¼ + STK 13.40+2.85/in | A-40-25 1 3/8 + STK 13.75+3.70/in | A-40-32 1 7/16 + STK 21.75+4.50/in | A-40-40 1 7/16+STK 24.55+5.50/in | A-40-50 1 11/16 + STK 29.40+7.45/in | A-40-60 1 11/16 + STK 44.10+9.60/in | A-40-80 1 13/16 + STK 56.50+11.45/in | A-40-100 2 5/16 + STK 82.45+24.70/in | A-40-120 2 7/8 + STK 148.15+37.05/in |
| 4 | 1 | PISTON ROD ▲ | Consult Factory with Serial Number | | | | | | | | | |
| 5 | 1 | *PISTON | A-15-15 7.95 | A-15-20 14.05 | A-15-25 17.85 | A-15-32 24.55 | A-15-40 45.35 | A-15-50 69.20 | A-15-60 93.60 | A-15-80 160.10 | A-15-100 215.90 | A-15-120 318.60 |
| 6 | 4 | +TIE ROD | A-50-15 3.75+.75/in | A-50-20 4.05+.75/in | A-50-25 4.05+.75/in | A-50-32 4.70+.95/in | A-50-32 4.70+.95/in | A-50-50 6.95+1.10/in | A-50-60 6.95+1.10/in | A-50-80 10.50+1.60/in | A-50-100 11.70+1.85/in | A-50-120 11.70+1.85/in |
| 7 | 8 | TIE ROD NUTS | ¼-28 3.00 set | 5/16-24 3.85 set | 5/16-24 3.85 set | 3/8-24 5.15 set | 3/8-24 5.15 set | ½-20 6.20 set | ½-20 6.20 set | 5/8-18 7.05 set | ¾-16 12.60 set | ¾-16 12.60 set |
| 8 | 2 | TUBE SEAL | TS-15 1.50 ea. | TS-20 1.60 ea. | TS-25 1.65 ea. | TS-32 2.10 ea. | TS-40 2.55 ea. | TS-50 3.25 ea. | TS-60 6.20 ea. | TS-80 6.95 ea. | TS-100 9.65 ea. | TS-120 13.30 ea. |
| 9 | 2 | PISTON SEAL | PS-15 4.75 ea. | PS-20 5.15 ea. | PS-25 5.40 ea. | PS-32 5.80 ea. | PS-40 8.05 ea. | PS-50 9.60 ea. | PS-60 15.95 ea. | PS-80 19.00 ea. | PS-100 20.30 ea. | PS-120 31.25 ea. |
| 10 | 1 | ROD SEAL | RS-625 3.95 ea. | RS-625 3.95 ea. | RS-625 3.95 ea. | RS-1000 4.10 ea. | RS-1000 4.10 ea. | RS-1000 4.10 ea. | RS-1375 6.95 ea. | RS-1375 6.95 ea. | RS-1750 9.85 ea. | RS-2000 10.15 ea. |
| 11 | 1 | ROD WIPER | RW-625 2.80 ea. | RW-625 2.80 ea. | RW-625 2.80 ea. | RW-1000 3.55 ea. | RW-1000 3.55 ea. | RW-1000 3.55 ea. | RW-1375 4.90 ea. | RW-1375 4.90 ea. | RW-1750 7.30 ea. | RW-2000 7.55 ea. |
| 12 | 1 | ROD BUSHING | A-30-1 16.70 | A-30-1 16.70 | A-30-1 16.70 | A-30-2 21.15 | A-30-2 21.15 | A-30-2 21.15 | A-30-3 24.50 | A-30-3 24.50 | A-30-4 32.25 | A-30-5 63.45 |
| 13 | 1 | BUSHING "O" RING | BO-1 2.80 | BO-1 2.80 | BO-1 2.80 | BO-2 4.10 | BO-2 4.10 | BO-2 4.10 | BO-3 4.85 | BO-3 4.85 | BO-4 7.30 | BO-5 7.45 |
| 14 | 1 or 2 | ADJ. NEEDLE (incl) SEAL | A-66-1 4.95 ea. | A-66-1 4.95 ea. | A-66-1 4.95 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. |
| 15 | 1 | CUSHION SPUD | A-65-1 6.30 | A-65-1 6.30 | A-65-1 6.30 | A-65-2 9.60 | A-65-2 9.60 | A-65-2 9.60 | A-65-3 11.15 | A-65-3 11.15 | A-65-4 20.75 | A-65-5 20.75 |
| 16 | 1 | CUSHION SEAL-H | CS-3 6.15 | CS-3 6.15 | CS-3 6.15 | CS-4 7.30 | CS-4 7.30 | CS-4 7.30 | CS-5 8.05 | CS-5 8.05 | CS-7 19.55 | CS-6 24.90 |
| 17 | 1 | CUSHION SEAL-C | CS-1 4.85 | CS-1 4.85 | CS-1 4.85 | CS-2 5.75 | CS-2 5.75 | CS-2 5.75 | CS-3 6.15 | CS-3 6.15 | CS-3 6.15 | CS-3 6.15 |
| 18 | 1 | RETAINER PLATE | A-35-15 15.90 | A-35-1 15.90 | A-35-1 15.90 | A-35-2 19.60 | A-35-2 19.60 | A-35-2 19.60 | A-35-3 26.50 | A-35-3 26.50 | A-35-4 34.45 | A-35-5 44.55 |
| | 1 | ROD BUSH SEALS INSTALLED | A-30-1A 25.45 | A-30-1A 25.45 | A-30-1A 25.45 | A-30-2A 31.85 | A-30-2A 31.85 | A-30-2A 31.85 | A-30-3A 40.00 | A-30-3A 40.00 | A-30-4A 55.25 | A-30-5A 85.55 |

▲ When ordering piston rod it is recommended to order both piston rod & piston (parts 4 & 5) please specify TRD serial number.

* Specify if air/oil seal is required - standard piston will accept magnetic strip only for center groove.

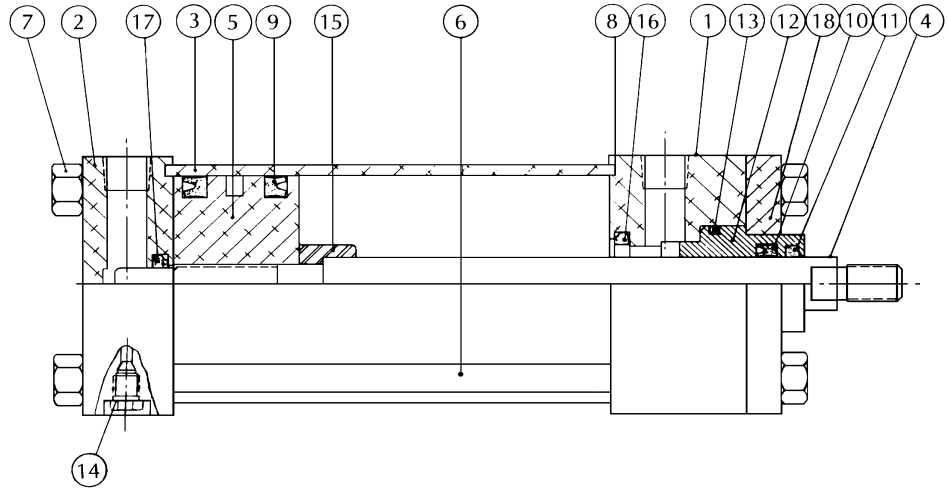
† Must supply serial number to insure proper tie rods are supplied.

All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

List Prices

"TA" Series Cylinder Parts List - Oversized Rod Diameter

NOTE:
When ordering any part, please supply TRD Serial Number to insure proper parts are supplied.



| ITEM | QTY | PART NAME | BORE SIZE | | | | | | | | | |
|------|--------|--------------------------|--------------------------------------|--------------------------------------|---|--|--|---|---|--|--|--|
| | | | 1½ | 2 | 2½ | 3¼ | 4 | 5 | 6 | 8 | 10 | 12 |
| 1 | 1 | HEAD | A-103-15 40.15 | A-103-20 45.50 | A-103-25 55.60 | A-103-32 70.25 | A-103-40 81.25 | A-103-50 88.90 | A-103-60 140.45 | A-103-80 177.85 | A-103-100 275.70 | A-103-120 367.55 |
| 2 | 1 | CAP | A-25-15 18.70 | A-25-20 25.40 | A-25-25 31.15 | A-25-32 37.35 | A-25-40 43.35 | A-25-50 54.35 | A-25-60 83.50 | A-25-80 118.75 | A-25-100 272.50 | A-25-120 313.70 |
| 3 | 1 | TUBE | A-40-15 1¼ + STK 11.15+2.50/in | A-40-20 1¼ + STK 13.40+2.85/in | A-40-25 1 3/8 + STK 13.75+3.70/in | A-40-32 1 7/16 + STK 21.75+4.50/in | A-40-40 1 7/16 + STK 24.55+5.50/in | A-40-50 1 11/16 + STK 29.40+7.45/in | A-40-60 1 11/16 + STK 44.10+9.60/in | A-40-80 1 13/16 + STK 56.50+11.45/in | A-40-100 2 5/16 + STK 82.45+24.70/in | A-40-120 2 7/8 + STK 148.15+37.05/in |
| 4 | 1 | PISTON ROD | Consult Factory with Serial Number | | | | | | | | | |
| 5 | 1 | *PISTON | A-15-15-OS 7.95 | A-15-20-OS 14.05 | A-15-25-OS 17.85 | A-15-32-OS 24.55 | A-15-40-OS 45.35 | A-15-50-OS 69.20 | A-15-60-OS 93.60 | A-15-80-OS 160.10 | A-15-100-OS 215.90 | A-15-120-OS 318.60 |
| 6 | 4 | †TIE ROD | A-50-15 3.75+.75/in | A-50-20 4.05+.75/in | A-50-25 4.05+.75/in | A-50-32 4.70+.95/in | A-50-32 4.70+.95/in | A-50-50 6.95+1.10/in | A-50-60 6.95+1.10/in | A-50-80 10.50+1.60/in | A-50-100 11.70+1.85/in | A-50-120 11.70+1.85/in |
| 7 | 8 | TIE ROD NUTS | ¼-28 3.00 set | 5/16-24 3.85 set | 5/16-24 3.85 set | 3/8-24 5.15 set | 3/8-24 5.15 set | ½-20 6.20 set | ½-20 6.20 set | 5/8-18 7.05 set | ¾-16 12.60 set | ¾-16 12.60 set |
| 8 | 2 | TUBE SEAL | TS-15 1.50 ea. | TS-20 1.60 ea. | TS-25 1.65 ea. | TS-32 2.10 ea. | TS-40 2.55 ea. | TS-50 3.25 ea. | TS-60 6.20 ea. | TS-80 6.95 ea. | TS-100 9.65 ea. | TS-120 13.30 ea. |
| 9 | 2 | PISTON SEAL | PS-15 4.75 ea. | PS-20 5.15 ea. | PS-25 5.40 ea. | PS-32 5.80 ea. | PS-40 8.05 ea. | PS-50 9.60 ea. | PS-60 15.95 ea. | PS-80 19.00 ea. | PS-100 20.30 ea. | PS-120 31.25 ea. |
| 10 | 1 | ROD SEAL | RS-1000 4.10 ea. | RS-1000 4.10 ea. | RS-1000 4.10 ea. | RS-1375 6.95 ea. | RS-1375 6.95 ea. | RS-1375 6.95 ea. | RS-1750 9.85 ea. | RS-1750 9.85 ea. | RS-2000 10.15 ea. | RS-2500 12.10 ea. |
| 11 | 1 | ROD WIPER | RW-1000 3.55 ea. | RW-1000 3.55 ea. | RW-1000 3.55 ea. | RW-1375 4.90 ea. | RW-1375 4.90 ea. | RW-1375 4.90 ea. | RW-1750 7.30 ea. | RW-1750 7.30 ea. | RW-2000 7.55 ea. | RW-2500 10.30 ea. |
| 12 | 1 | ROD BUSHING | A-30-2-OS 21.15 | A-30-2 21.15 | A-30-2 21.15 | A-30-3 24.50 | A-30-3 24.50 | A-30-3 24.50 | A-30-4 32.25 | A-30-4 32.25 | A-30-5 63.45 | A-30-6 69.75 |
| 13 | 1 | BUSHING "O" RING | BO-2 4.10 | BO-2 4.10 | BO-2 4.10 | BO-3 4.85 | BO-3 4.85 | BO-3 4.85 | BO-4 7.30 | BO-4 7.30 | BO-5 7.45 | BO-6 9.95 |
| 14 | 1 or 2 | ADJ. NEEDLE (incl) SEAL | A-66-1 4.95 ea. | A-66-1 4.95 ea. | A-66-1 4.95 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. | A-66-2 6.20 ea. |
| 15 | 1 | CUSHION SPUD | N/A | A-65-2 9.60 | A-65-2 9.60 | A-65-3 11.15 | A-65-3 11.15 | A-65-3 11.15 | A-65-4 20.75 | A-65-4 20.75 | A-65-5 20.75 | A-65-6 21.75 |
| 16 | 1 | CUSHION SEAL-H | N/A | CS-4 7.30 | CS-4 7.30 | CS-5 8.05 | CS-5 8.05 | CS-5 8.05 | CS-7 19.55 | CS-7 19.55 | CS-6 24.90 | CS-10 32.60 |
| 17 | 1 | CUSHION SEAL-C | CS-1 4.85 | CS-1 4.85 | CS-1 4.85 | CS-2 5.75 | CS-2 5.75 | CS-2 5.75 | CS-3 6.15 | CS-3 6.15 | CS-3 6.15 | CS-3 6.15 |
| 18 | 1 | RETAINER PLATE | A-36-15-OS 15.90 | A-36-20-OS 16.95 | A-36-25-OS 19.60 | A-36-32-OS 23.10 | A-36-40-OS 30.10 | A-36-50-OS 33.50 | A-36-60-OS 41.15 | A-35-4 34.45 | A-35-5 44.50 | A-35-6 47.70 |
| | 1 | ROD BUSH SEALS INSTALLED | A-30-2A-OS 31.85 | A-30-2A 31.85 | A-30-2A 31.85 | A-30-3A 40.00 | A-30-3A 40.00 | A-30-3A 40.00 | A-30-4A 55.25 | A-30-4A 55.25 | A-30-5A 85.55 | A-30-6A 104.40 |

△ When ordering piston rod it is recommended to order both piston rod & piston (parts 4 & 5) please specify TRD serial number.

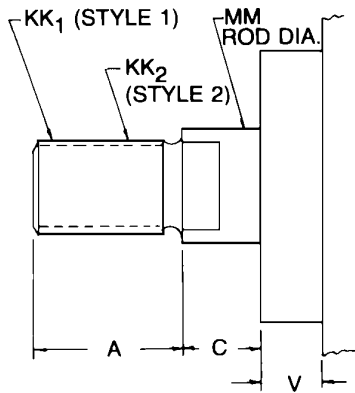
* Specify if air/oil seal is required - standard piston will accept magnetic strip only for center groove.

† Must supply serial number to insure proper tie rods are supplied.

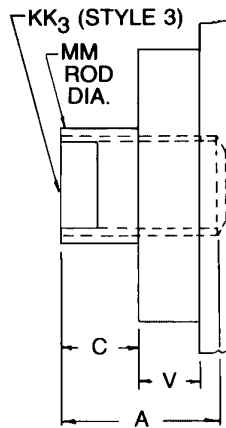
All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

Piston Rod End Styles

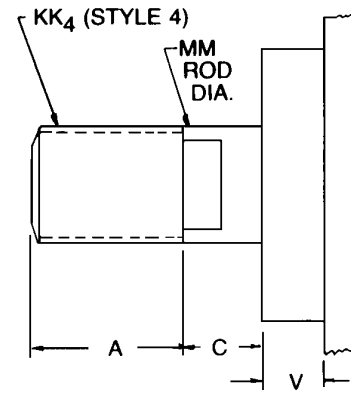
Style 1 & 2



Style 3



Style 4

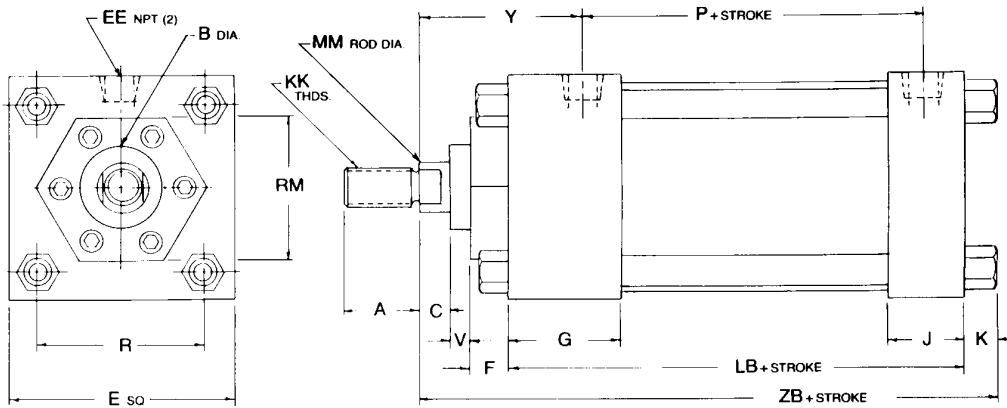


| BORE | MM ROD DIAMETER | STANDARD | | OPTIONAL | | | | | | C | V |
|-----------|-----------------|----------------|----------------|------------------|----------------|----------|-------|----------|-------|-----|-----|
| | | Style 1 - Male | Style 2 - Male | Style 3 - Female | Style 4 - Male | | | | | | |
| | | KK1 | A | KK2 | A | KK3 | A | KK4 | A | | |
| 1½, 2, 2½ | 5/8 Standard | 7/16-20 | ¾ | ½-20 | ¾ | 7/16-20 | ¾ | 5/8-18 | ¾ | 3/8 | ¼ |
| | 1 Oversize | 3/4-16 | 1 1/8 | 7/8-14 | 1 1/8 | 3/4-16 | 1 1/8 | 1"-14 | 1 1/8 | ½ | ½ |
| 3¼, 4, 5 | 1 Standard | 3/4-16 | 1 1/8 | 7/8-14 | 1 1/8 | 3/4-16 | 1 1/8 | 1"-14 | 1 1/8 | ½ | ¼ |
| | 1 3/8 Oversize | 1"-14 | 1 5/8 | 1¼-12 | 1 5/8 | 1"-14 | 1 5/8 | 1 3/8-12 | 1 5/8 | 5/8 | 3/8 |
| 6 & 8 | 1 3/8 Standard | 1"-14 | 1 5/8 | 1¼-12 | 1 5/8 | 1"-14 | 1 5/8 | 1 3/8-12 | 1 5/8 | 5/8 | 3/8 |
| | 1 ¾ Oversize | 1¼-12 | 2 | 1½-12 | 2 | 1¼-12 | 2 | 1¼-12 | 2 | ¾ | ½ |
| 10 | 1 ¾ Standard | 1¼-12 | 2 | 1½-12 | 2 | 1¼-12 | 2 | 1¼-12 | 2 | ¾ | ½ |
| | 2 Oversize | 1½-12 | 2¼ | 1¾-12 | 2¼ | 1½-12 | 2¼ | 2-12 | 2¼ | 7/8 | 3/8 |
| 12 | 2 Standard | 1½-12 | 2¼ | 1¾-12 | 2¼ | 1½-12 | 2¼ | 2-12 | 2¼ | 7/8 | 3/8 |
| | 2½ Oversize | 1 7/8-12 | 3 | 2¼-12 | 3 | 1 7/8-12 | 3 | 2½-12 | 3 | 1 | ½ |

Force / Volume Chart

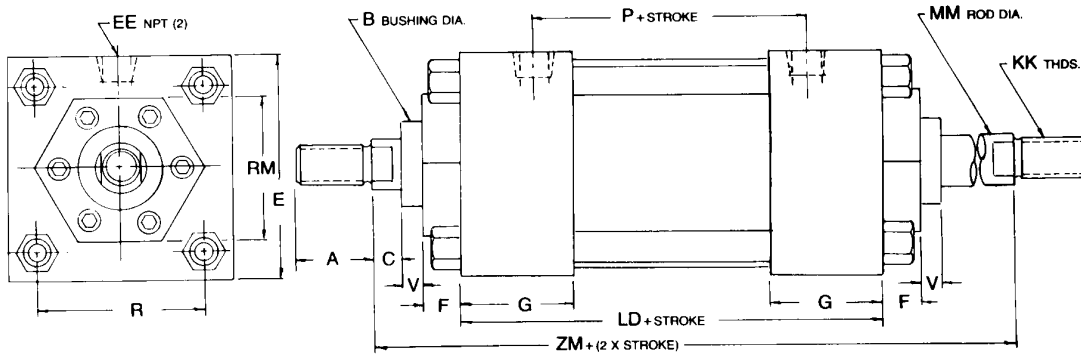
| CYLINDER BORE | ROD | STROKE TYPE | EFFECTIVE PISTON AREA | POUNDS OF FORCE AT PSI | | | | | | CU. FT. DISPLACEMENT PER IN. OF STROKE |
|---------------|-------|-------------|-----------------------|------------------------|------|-------|-------|-------|-------|--|
| | | | | 60 | 80 | 100 | 200 | 250 | 400 | |
| 1½ | ALL | PUSH | 1.767 | 106 | 142 | 177 | 353 | 442 | 706 | .00102 |
| | 5/8 | PULL | 1.460 | 88 | 117 | 146 | 292 | 365 | 584 | .00084 |
| | 1 | PULL | .982 | 59 | 79 | 98 | 196 | 246 | 392 | .00057 |
| 2 | ALL | PUSH | 3.142 | 188 | 251 | 314 | 628 | 785 | 1256 | .00182 |
| | 5/8 | PULL | 2.835 | 170 | 227 | 284 | 567 | 708 | 1134 | .00164 |
| | 1 | PULL | 2.357 | 141 | 189 | 236 | 471 | 589 | 942 | .00136 |
| 2½ | ALL | PUSH | 4.909 | 295 | 393 | 491 | 981 | 1227 | 1962 | .00284 |
| | 5/8 | PULL | 4.602 | 276 | 368 | 460 | 920 | 1150 | 1840 | .00266 |
| | 1 | PULL | 4.124 | 247 | 330 | 412 | 825 | 1031 | 1650 | .00239 |
| 3¼ | ALL | PUSH | 8.296 | 498 | 664 | 830 | 1659 | 2074 | 3318 | .00480 |
| | 1 | PULL | 7.511 | 451 | 601 | 751 | 1502 | 1877 | 3004 | .00435 |
| | 1 3/8 | PULL | 6.811 | 409 | 545 | 681 | 1362 | 1702 | 2724 | .00394 |
| 4 | ALL | PUSH | 12.566 | 754 | 1005 | 1257 | 2513 | 3141 | 5026 | .00727 |
| | 1 | PULL | 11.781 | 707 | 942 | 1178 | 2356 | 2945 | 4712 | .00682 |
| | 1 3/8 | PULL | 11.081 | 665 | 886 | 1108 | 2216 | 2770 | 4432 | .00641 |
| 5 | ALL | PUSH | 19.635 | 1178 | 1571 | 1964 | 3927 | 4908 | 7854 | .01136 |
| | 1 | PULL | 18.850 | 1131 | 1508 | 1885 | 3770 | 4712 | 7540 | .01090 |
| | 1 3/8 | PULL | 18.150 | 1089 | 1452 | 1815 | 3630 | 4537 | 7260 | .01050 |
| 6 | ALL | PUSH | 28.274 | 1696 | 2262 | 2827 | 5655 | 7068 | 11310 | .01636 |
| | 1 3/8 | PULL | 26.789 | 1607 | 2144 | 2679 | 5358 | 6697 | 10716 | .01550 |
| | 1¼ | PULL | 25.869 | 1552 | 2070 | 2587 | 5174 | 6467 | 10348 | .01497 |
| 8 | ALL | PUSH | 50.265 | 3016 | 4021 | 5026 | 10053 | 12566 | 20106 | .02908 |
| | 1 3/8 | PULL | 48.780 | 2927 | 3902 | 4878 | 9756 | 12195 | 19512 | .02823 |
| | 1¼ | PULL | 47.860 | 2872 | 3829 | 4786 | 9572 | 11965 | 19144 | .02770 |
| 10 | ALL | PUSH | 78.54 | 4712 | 6283 | 7854 | 15708 | 19635 | 31416 | .04545 |
| | 1¼ | PULL | 76.13 | 4568 | 6090 | 7613 | 15226 | 19032 | 30452 | .04406 |
| | 2 | PULL | 75.40 | 4524 | 6032 | 7540 | 15080 | 18850 | 30160 | .04363 |
| 12 | ALL | PUSH | 113.098 | 6786 | 9048 | 11310 | 22620 | 28275 | 45239 | .06545 |
| | 2 | PULL | 109.956 | 6597 | 8796 | 10996 | 21992 | 27489 | 43982 | .06363 |
| | 2½ | PULL | 108.189 | 6491 | 8655 | 10819 | 21638 | 27047 | 43276 | .06261 |

'TA' Series Cylinders Single Rod End Dimensions (MXO)



Basic Dimensions MXO – Standard Rod Diameter

| BORE | A | B | C | E | EE | F | G | J | K | KK | LB | MM | P | R | RM | V | Y | ZB |
|------|-------|-------|-----|--------|-----|-----|----|----|-------|---------|-------|-------|--------|------|-------|-----|--------|---------|
| 1½ | ¾ | 1 1/8 | 3/8 | 2 | 3/8 | 3/8 | 1½ | 1 | ¼ | 7/16-20 | 3 5/8 | 5/8 | 2 3/8 | 1.43 | 2 SQ. | ¼ | 1 7/8 | 4 7/8 |
| 2 | ¾ | 1 1/8 | 3/8 | 2½ | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 3 5/8 | 5/8 | 2 3/8 | 1.84 | 1¾ | ¼ | 1 7/8 | 4 15/16 |
| 2½ | ¾ | 1 1/8 | 3/8 | 3 | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 3¾ | 5/8 | 2½ | 2.19 | 1¾ | ¼ | 1 7/8 | 5 1/16 |
| 3¼ | 1 1/8 | 1½ | ½ | 3¾ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | 3/4-16 | 4¼ | 1 | 2¾ | 2.76 | 2¾* | ¼ | 2 3/8 | 6 |
| 4 | 1 1/8 | 1½ | ½ | 4½ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | 3/4-16 | 4¼ | 1 | 2¾ | 3.32 | 2¾* | ¼ | 2 3/8 | 6 |
| 5 | 1 1/8 | 1½ | ½ | 5½ | ½ | 5/8 | 1¾ | 1¼ | 7/16 | 3/4-16 | 4½ | 1 | 3 | 4.10 | 2¾* | ¼ | 2 3/8 | 6 5/16 |
| 6 | 1 5/8 | 2 | 5/8 | 6½ | ¾ | 5/8 | 2 | 1½ | 7/16 | 1-14 | 5 | 1 3/8 | 3¼ | 4.88 | 3½* | 3/8 | 2 ¾ | 7 1/16 |
| 8 | 1 5/8 | 2 | 5/8 | 8½ | ¾ | 5/8 | 2 | 1½ | 9/16 | 1-14 | 5 1/8 | 1 3/8 | 3 3/8 | 6.44 | 3½* | 3/8 | 2 ¾ | 7 5/16 |
| 10 | 2 | 2 3/8 | ¾ | 10 5/8 | 1 | 5/8 | 2¼ | 2 | 11/16 | 1¼-12 | 6 3/8 | 1¾ | 4 5/16 | 7.92 | 3½* | ½ | 3 1/16 | 8 15/16 |
| 12 | 2¼ | 2 5/8 | 7/8 | 12¾ | 1 | ¾ | 2¼ | 2 | 11/16 | 1½-12 | 6 7/8 | 2 | 4¾ | 9.40 | 5* | 3/8 | 3 3/16 | 9 9/16 |

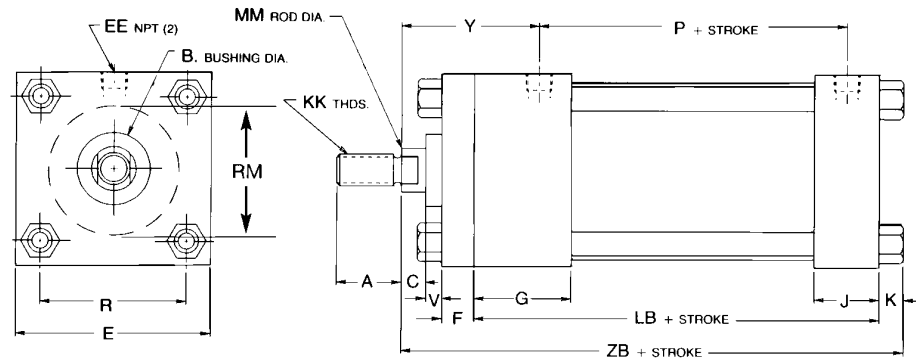


Double Rod End Dimensions MXOD – Standard Rod Diameter

| BORE | A | B | C | E | EE | F | G | KK | LD | MM | P | R | RM | V | Y | ZM |
|------|-------|-------|-----|--------|-----|-----|----|---------|-------|-------|--------|------|-------|-----|--------|--------|
| 1½ | ¾ | 1 1/8 | 3/8 | 2 | 3/8 | 3/8 | 1½ | 7/16-20 | 4 1/8 | 5/8 | 2 3/8 | 1.43 | 2 SQ. | ¼ | 1 7/8 | 6 1/8 |
| 2 | ¾ | 1 1/8 | 3/8 | 2½ | 3/8 | 3/8 | 1½ | 7/16-20 | 4 1/8 | 5/8 | 2 3/8 | 1.84 | 1¾ | ¼ | 1 7/8 | 6 1/8 |
| 2½ | ¾ | 1 1/8 | 3/8 | 3 | 3/8 | 3/8 | 1½ | 7/16-20 | 4¼ | 5/8 | 2½ | 2.19 | 1¾ | ¼ | 1 7/8 | 6¼ |
| 3¼ | 1 1/8 | 1½ | ½ | 3¾ | ½ | 5/8 | 1¾ | 3/4-16 | 4¾ | 1 | 2¾ | 2.76 | 2¾* | ¼ | 2 3/8 | 7½ |
| 4 | 1 1/8 | 1½ | ½ | 4½ | ½ | 5/8 | 1¾ | 3/4-16 | 4¾ | 1 | 2¾ | 3.32 | 2¾* | ¼ | 2 3/8 | 7½ |
| 5 | 1 1/8 | 1½ | ½ | 5½ | ½ | 5/8 | 1¾ | 3/4-16 | 5 | 1 | 3 | 4.10 | 2¾* | ¼ | 2 3/8 | 7¾ |
| 6 | 1 5/8 | 2 | 5/8 | 6½ | ¾ | 5/8 | 2 | 1-14 | 5½ | 1 3/8 | 3¼ | 4.88 | 3½* | 3/8 | 2 ¾ | 8¾ |
| 8 | 1 5/8 | 2 | 5/8 | 8½ | ¾ | 5/8 | 2 | 1-14 | 5 5/8 | 1 3/8 | 3 3/8 | 6.44 | 3½* | 3/8 | 2 ¾ | 8 7/8 |
| 10 | 2 | 2 3/8 | ¾ | 10 5/8 | 1 | 5/8 | 2¼ | 1¼-12 | 6 5/8 | 1¾ | 4 5/16 | 7.92 | 3½* | ½ | 3 1/16 | 10 3/8 |
| 12 | 2¼ | 2 5/8 | 7/8 | 12¾ | 1 | ¾ | 2¼ | 1½-12 | 7 1/8 | 2 | 4¾ | 9.40 | 5* | 3/8 | 3 3/16 | 11 1/8 |

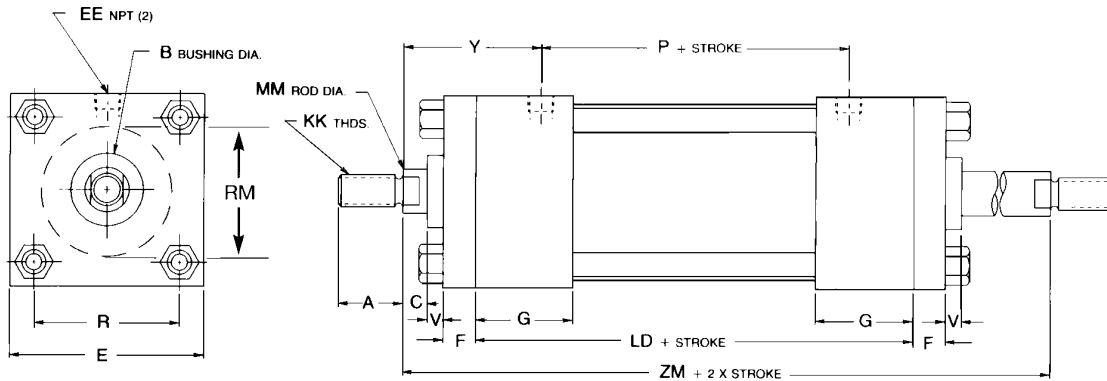
* RM dimension is round retainer diameter.

'TA' Series Cylinders Oversize Rod Diameter



Basic Dimensions MXO - Oversize Rod Diameter

| BORE | A | B | C | E | EE | *F | G | J | K | KK | LB | MM | P | R | +RM | V | Y | ZB |
|-------|-------|-------|-----|--------|-----|-----|-------|-------|-------|----------|-------|-------|--------|------|-------|-----|--------|---------|
| 1 1/2 | 1 1/8 | 1 1/2 | 1/2 | 2 | 3/8 | 3/8 | 1 1/2 | 1 | 1/4 | 3/4-16 | 3 5/8 | 1 | 2 3/8 | 1.43 | — | 1/2 | 2 1/4 | 5 1/4 |
| 2 | 1 1/8 | 1 1/2 | 1/2 | 2 1/2 | 3/8 | 3/8 | 1 1/2 | 1 | 5/16 | 3/4-16 | 3 5/8 | 1 | 2 3/8 | 1.84 | — | 1/2 | 2 1/4 | 5 5/16 |
| 2 1/2 | 1 1/8 | 1 1/2 | 1/2 | 3 | 3/8 | 3/8 | 1 1/2 | 1 | 5/16 | 3/4-16 | 3 3/4 | 1 | 2 1/2 | 2.19 | — | 1/2 | 2 1/4 | 5 7/16 |
| 3 1/4 | 1 5/8 | 2 | 5/8 | 3 3/4 | 1/2 | 5/8 | 1 3/4 | 1 1/4 | 3/8 | 1-14 | 4 1/4 | 1 3/8 | 2 3/4 | 2.76 | — | 3/8 | 2 5/8 | 6 1/4 |
| 4 | 1 5/8 | 2 | 5/8 | 4 1/2 | 1/2 | 5/8 | 1 3/4 | 1 1/4 | 3/8 | 1-14 | 4 1/4 | 1 3/8 | 2 3/4 | 3.32 | 3 1/2 | 3/8 | 2 5/8 | 6 1/4 |
| 5 | 1 5/8 | 2 | 5/8 | 5 1/2 | 1/2 | 5/8 | 1 3/4 | 1 1/4 | 7/16 | 1-14 | 4 1/2 | 1 3/8 | 3 | 4.10 | 3 1/2 | 3/8 | 2 5/8 | 6 9/16 |
| 6 | 2 | 2 3/8 | 3/4 | 6 1/2 | 3/4 | 5/8 | 2 | 1 1/2 | 7/16 | 1 1/4-12 | 5 | 1 3/4 | 3 1/4 | 4.88 | 3 1/2 | 1/2 | 3 | 7 5/16 |
| 8 | 2 | 2 3/8 | 3/4 | 8 1/2 | 3/4 | 5/8 | 2 | 1 1/2 | 9/16 | 1 1/4-12 | 5 1/8 | 1 3/4 | 3 3/8 | 6.44 | 3 1/2 | 1/2 | 3 | 7 9/16 |
| 10 | 2 1/4 | 2 5/8 | 7/8 | 10 5/8 | 1 | 3/4 | 2 1/4 | 2 | 11/16 | 1 1/2-12 | 6 3/8 | 2 | 4 5/16 | 7.92 | 5 | 3/8 | 3 3/16 | 9 |
| 12 | 3 | 3 1/8 | 1 | 12 3/4 | 1 | 3/4 | 2 1/4 | 2 | 11/16 | 1 7/8-12 | 6 7/8 | 2 1/2 | 4 3/4 | 9.40 | 5 | 1/2 | 3 7/16 | 9 13/16 |

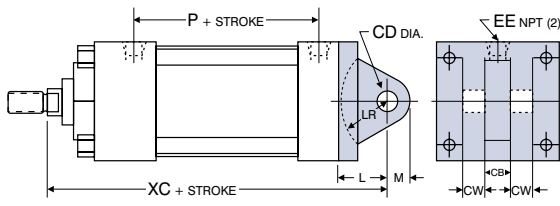


Double Rod End Dimensions MXOD - Oversize Rod Diameter

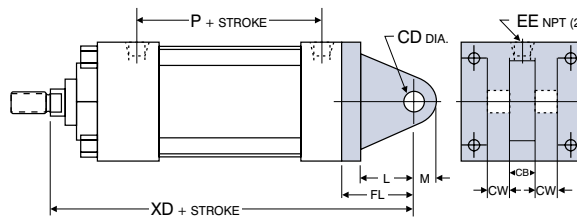
| BORE | A | B | C | E | EE | *F | G | KK | LD | MM | P | R | +RM | V | Y | ZM |
|-------|-------|-------|-----|--------|-----|-----|-------|----------|-------|-------|--------|------|-------|-----|--------|--------|
| 1 1/2 | 1 1/8 | 1 1/2 | 1/2 | 2 | 3/8 | 3/8 | 1 1/2 | 3/4 - 16 | 4 1/8 | 1 | 2 3/8 | 1.43 | — | 1/2 | 2 1/4 | 6 7/8 |
| 2 | 1 1/8 | 1 1/2 | 1/2 | 2 1/2 | 3/8 | 3/8 | 1 1/2 | 3/4 - 16 | 4 1/8 | 1 | 2 3/8 | 1.84 | — | 1/2 | 2 1/4 | 6 7/8 |
| 2 1/2 | 1 1/8 | 1 1/2 | 1/2 | 3 | 3/8 | 3/8 | 1 1/2 | 3/4 - 16 | 4 1/4 | 1 | 2 1/2 | 2.19 | — | 1/2 | 2 1/4 | 7 |
| 3 1/4 | 1 5/8 | 2 | 5/8 | 3 3/4 | 1/2 | 5/8 | 1 3/4 | 1-14 | 4 3/4 | 1 3/8 | 2 3/4 | 2.76 | — | 3/8 | 2 5/8 | 8 |
| 4 | 1 5/8 | 2 | 5/8 | 4 1/2 | 1/2 | 5/8 | 1 3/4 | 1-14 | 4 3/4 | 1 3/8 | 2 3/4 | 3.32 | 3 1/2 | 3/8 | 2 5/8 | 8 |
| 5 | 1 5/8 | 2 | 5/8 | 5 1/2 | 1/2 | 5/8 | 1 3/4 | 1-14 | 5 | 1 3/8 | 3 | 4.10 | 3 1/2 | 3/8 | 2 5/8 | 8 1/4 |
| 6 | 2 | 2 3/8 | 3/4 | 6 1/2 | 3/4 | 5/8 | 2 | 1 1/4-12 | 5 1/2 | 1 3/4 | 3 1/4 | 4.88 | 3 1/2 | 1/2 | 3 | 9 1/4 |
| 8 | 2 | 2 3/8 | 3/4 | 8 1/2 | 3/4 | 5/8 | 2 | 1 1/4-12 | 5 5/8 | 1 3/4 | 3 3/8 | 6.44 | 3 1/2 | 1/2 | 3 | 9 3/8 |
| 10 | 2 1/4 | 2 5/8 | 7/8 | 10 5/8 | 1 | 3/4 | 2 1/4 | 1 1/2-12 | 6 5/8 | 2 | 4 5/16 | 7.92 | 5 | 3/8 | 3 3/16 | 10 5/8 |
| 12 | 3 | 3 1/8 | 1 | 12 3/4 | 1 | 3/4 | 2 1/4 | 1 7/8-12 | 7 1/8 | 2 1/2 | 4 3/4 | 9.40 | 5 | 1/2 | 3 7/16 | 11 5/8 |

* Full square retainer on 1-1/2" thru 3-1/4" bores.
 + Round retainer on 4" thru 12" bores.

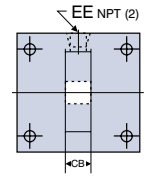
Pivot Mounts



MP1
(Casting)

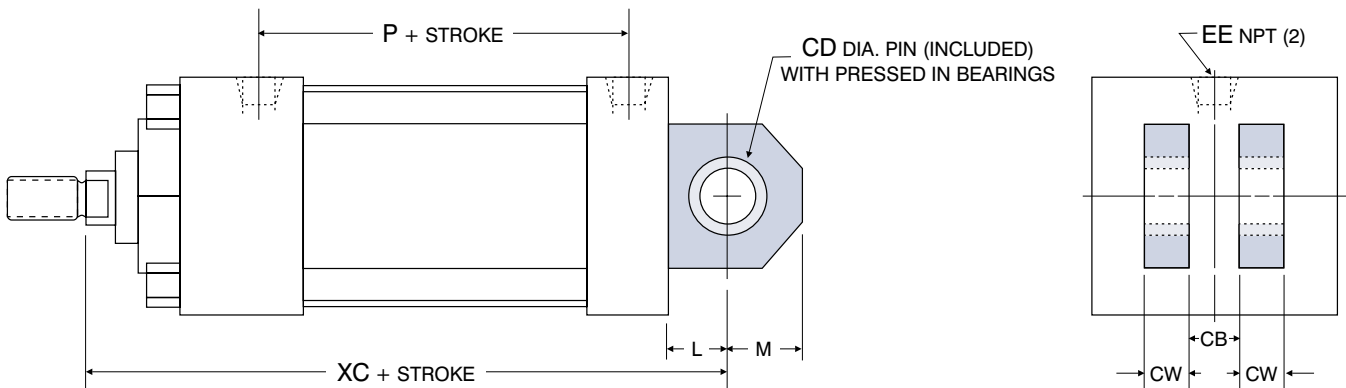


MP2
(Casting)



MP4*
(Casting)

(New) Extruded MP1 Mount - 1-1/2" to 8" Bores



| MP1 & MP2 CLEVIS AND MP4 EYE MOUNT DIMENSIONS | | | | | | | | | | | | |
|---|----------------|-------|-------|-------|-------|--------|-------|-------|-------|------------|--------|--------|
| BORE | ROD DIAMETER | CB | CD | CW | FL | EEENPT | L | M | LR | ADD STROKE | | |
| | | | | | | | | | | P | XC | XD |
| 1 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/8 | 3/4 | 5/8 | 3/4 | 2 3/8 | 5 3/8 | 5 3/4 |
| | 1 Oversize | | | | | | | | | | 5 3/4 | 6 1/8 |
| 2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/8 | 3/4 | 5/8 | 3/4 | 2 3/8 | 5 3/8 | 5 3/4 |
| | 1 Oversize | | | | | | | | | | 5 3/4 | 6 1/8 |
| 2 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/8 | 3/4 | 5/8 | 3/4 | 2 1/2 | 5 1/2 | 5 7/8 |
| | 1 Oversize | | | | | | | | | | 5 7/8 | 6 1/4 |
| 3 1/4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1/2 | 1 1/4 | 7/8 | 1 1/4 | 2 3/4 | 6 7/8 | 7 1/2 |
| | 1 3/8 Oversize | | | | | | | | | | 7 1/8 | 7 3/4 |
| | 1 Standard | | | | | | | | | | 6 7/8 | 7 1/2 |
| 4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1/2 | 1 1/4 | 7/8 | 1 1/4 | 2 3/4 | 7 1/8 | 7 3/4 |
| | 1 3/8 Oversize | | | | | | | | | | 7 1/8 | 7 3/4 |
| 5 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1/2 | 1 1/4 | 7/8 | 1 1/4 | 3 | 7 1/8 | 7 3/4* |
| | 1 3/8 Oversize | | | | | | | | | | 7 3/8 | 8* |
| 6 | 1 3/8 Standard | 1 1/2 | 1 | 3/4 | 2 1/4 | 3/4 | 1 1/2 | 1 | 1 1/2 | 3 1/4 | 8 1/8 | 8 7/8* |
| | 1 3/4 Oversize | | | | | | | | | | 8 3/8 | 9 1/8* |
| 8 | 1 3/8 Standard | 1 1/2 | 1 | 3/4 | NA | 3/4 | 1 1/2 | 1 | NA | 3 3/8 | 8 1/4 | NA |
| | 1 3/4 Oversize | | | | | | | | | | 8 1/2 | NA |
| 10 | 1 3/4 Standard | 2 | 1 3/8 | 1 | NA | 1 | 2 1/8 | 1 3/8 | NA | 4 5/16 | 10 3/8 | NA |
| | 2 Oversize | | | | | | | | | | 10 1/2 | NA |
| 12 | 2 Standard | 2 1/2 | 1 3/4 | 1 1/4 | NA | 1 | 2 1/4 | 1 3/4 | NA | 4 3/4 | 11 1/8 | NA |
| | 2 1/2 Oversize | | | | | | | | | | 11 3/8 | NA |

Clevis Pin provided with pivot mounts.
 * MP4 not available as standard for 5" and 6" bores.
 For dimensions not shown see pages 16 and 17.
 Note: Extruded MP1 mounts are standard (1-1/2" - 8" bores).
 Cast iron removable mounts are optional, and must be requested when ordering (1-1/2" - 6" bores).

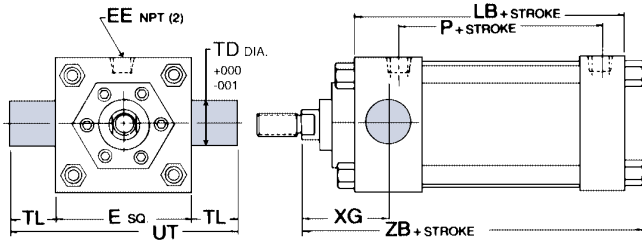
TRD Cylinders

Alignment Couplers

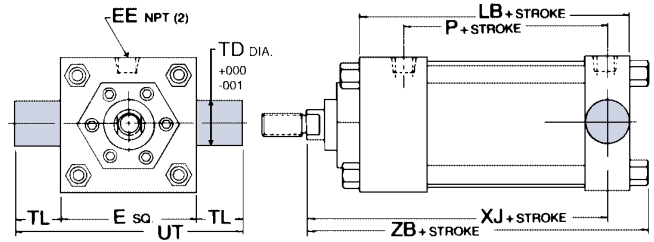
Flow Controls

Double-Wall Cylinders

Pivot Mounts (in.)



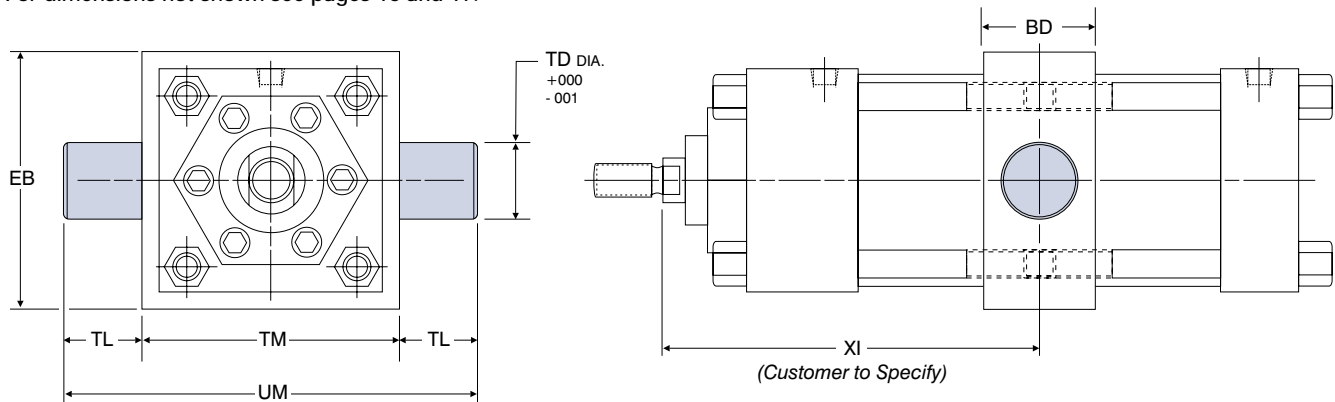
MT1



MT2

| MT1 HEAD TRUNNION AND MT2 CAP TRUNNION MOUNT DIMENSIONS | | | | | | | | | | | |
|---|----------------|-------|-------|-------|-------|--------|-------|------------|-------|--------|---------|
| BORE | ROD DIAMETER | E | EENPT | TD | TL | UT | XG | ADD STROKE | | | |
| | | | | | | | | LB | P | XJ | ZB |
| 1 1/2 | 5/8 Standard | 2 | 3/8 | 1 | 1 | 4 | 1 1/4 | 3 5/8 | 2 3/8 | 4 1/8 | 4 7/8 |
| | 2 1/8 | | | | | | 4 1/2 | | | 5 1/4 | |
| 2 | 5/8 Standard | 2 1/2 | 3/8 | 1 | 1 | 4 1/2 | 1 3/4 | 3 5/8 | 2 3/8 | 4 1/8 | 4 15/16 |
| | 2 1/8 | | | | | | 4 1/2 | | | 5 5/16 | |
| 2 1/2 | 5/8 Standard | 3 | 3/8 | 1 | 1 | 5 | 1 3/4 | 3 3/4 | 2 1/2 | 4 1/4 | 5 1/16 |
| | 2 1/8 | | | | | | 4 5/8 | | | 5 7/16 | |
| 3 1/4 | 1 Standard | 3 3/4 | 1/2 | 1 | 1 | 5 3/4 | 2 1/4 | 4 1/4 | 2 3/4 | 5 | 6 1/16 |
| | 2 1/2 | | | | | | 5 1/4 | | | 6 5/16 | |
| 4 | 1 Standard | 4 1/2 | 1/2 | 1 | 1 | 6 1/2 | 2 1/4 | 4 1/4 | 2 3/4 | 5 | 6 1/16 |
| | 2 1/2 | | | | | | 5 1/4 | | | 6 5/16 | |
| 5 | 1 Standard | 5 1/2 | 1/2 | 1 | 1 | 7 1/2 | 2 1/4 | 4 1/2 | 3 | 5 1/4 | 6 5/16 |
| | 2 1/2 | | | | | | 5 1/2 | | | 6 9/16 | |
| 6 | 1 3/8 Standard | 6 1/2 | 3/4 | 1 3/8 | 1 3/8 | 9 1/4 | 2 5/8 | 5 | 3 1/4 | 5 7/8 | 7 1/8 |
| | 2 7/8 | | | | | | 6 1/8 | | | 7 3/8 | |
| 8 | 1 3/8 Standard | 8 1/2 | 3/4 | 1 3/8 | 1 3/8 | 11 1/4 | 2 5/8 | 5 1/8 | 3 3/8 | 6 | 7 5/16 |
| | 2 7/8 | | | | | | 6 1/4 | | | 7 9/16 | |

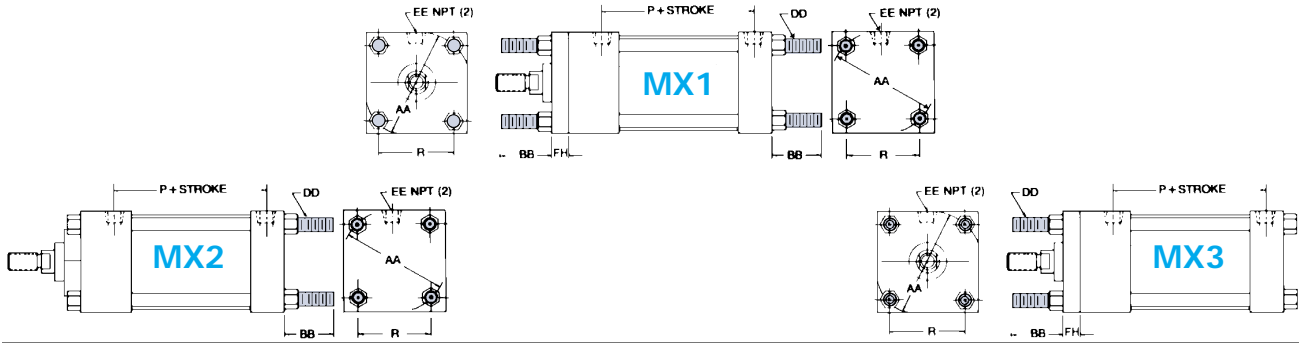
* No oversized rod 1-1/2" bore – MT1
For dimensions not shown see pages 16 and 17.



MT4

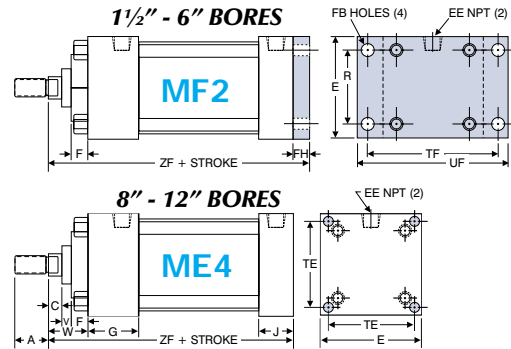
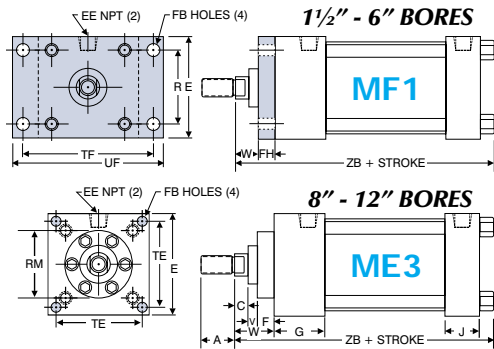
| MT4 INTERMEDIATE TRUNNION MOUNT DIMENSIONS | | | | | | | |
|--|-------|-------|-------|-------|-------|--------|---------------------|
| BORE | BD | EB | TD | TL | TM | UM | XI |
| 1 1/2 | 1 1/4 | 2 1/2 | 1 | 1 | 2 1/2 | 4 1/2 | CUSTOMER TO SPECIFY |
| 2 | 1 1/2 | 3 | 1 | 1 | 3 | 5 | |
| 2 1/2 | 1 1/2 | 3 1/2 | 1 | 1 | 3 1/2 | 5 1/2 | |
| 3 1/4 | 2 | 4 1/4 | 1 | 1 | 4 1/2 | 6 1/2 | |
| 4 | 2 | 5 | 1 | 1 | 5 1/4 | 7 1/4 | |
| 5 | 2 | 6 | 1 | 1 | 6 1/4 | 8 1/4 | |
| 6 | 2 | 7 | 1 3/8 | 1 3/8 | 7 5/8 | 10 3/8 | |
| 8 | 2 1/2 | 9 1/2 | 1 3/8 | 1 3/8 | 9 3/4 | 12 1/2 | |

Tie Rod & Flange Mounts (in.)



| TIE ROD EXTENDED (MX1 BOTH ENDS) (MX2 CAP) (MX3 HEAD) MOUNT DIMENSIONS | | | | | | | | |
|--|----------------|------|----------|---------|-------|------|------|------------|
| BORE | ROD DIAMETER | AA | BB | DD | EENPT | FH | R | ADD STROKE |
| | | | | | | | | P |
| 1 1/2 | 5/8 Standard | 2.02 | 1 | 1/4-28 | 3/8 | 3/8 | 1.43 | 2 3/8 |
| | 1 Oversize | | | | | | | |
| 2 | 5/8 Standard | 2.6 | 1 1/8 | 5/16-24 | 3/8 | 3/8 | 1.84 | 2 3/8 |
| | 1 Oversize | | | | | | | |
| 2 1/2 | 5/8 Standard | 3.1 | 1 1/8 | 5/16-24 | 3/8 | 3/8 | 2.19 | 2 1/2 |
| | 1 Oversize | | | | | | | |
| 3 1/4 | 1 Standard | 3.9 | 1 3/8 | 3/8-24 | 1/2 | 5/8 | 2.76 | 2 3/4 |
| | 1 3/8 Oversize | | | | | | | |
| 4 | 1 Standard | 4.7 | 1 3/8 | 3/8-24 | 1/2 | 5/8 | 3.32 | 2 3/4 |
| | 1 3/8 Oversize | | | | | | | |
| 5 | 1 Standard | 5.8 | 1 13/16 | 1/2-20 | 1/2 | 5/8 | 4.10 | 3 |
| | 1 3/8 Oversize | | | | | | | |
| 6 | 1 3/8 Standard | 6.9 | 1 13/16 | 1/2-20 | 3/4 | 3/4 | 4.88 | 3 1/4 |
| | 1 1/4 Oversize | | | | | | | |
| 8 | 1 3/8 Standard | 9.1 | 2 5/16* | 5/8-18 | 3/4 | 5/8* | 6.44 | 3 3/8 |
| | 1 1/4 Oversize | | | | | | | |
| 10 | 1 3/4 Standard | 11.2 | 2 11/16* | 3/4-16 | 1 | 5/8* | 7.92 | 4 5/16 |
| | 2 Oversize | | | | | | | |
| 12 | 2 Standard | 13.3 | 2 11/16* | 3/4-16 | 1 | 3/4* | 9.40 | 4 3/4 |
| | 2 1/2 Oversize | | | | | | | |

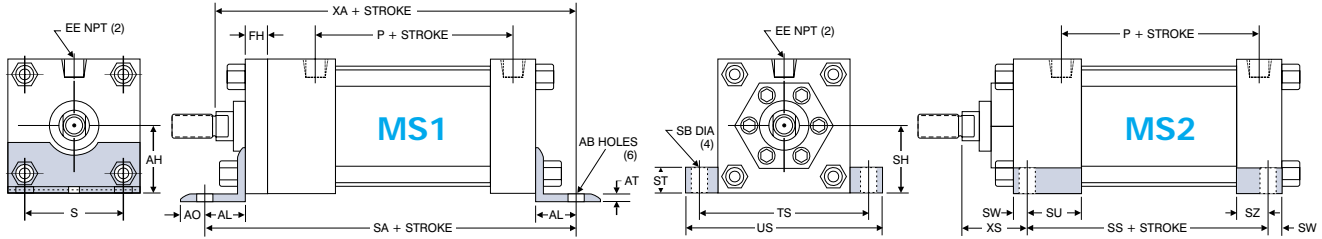
* Round retainer used to retain bushing, not a full front plate as other bores. "BB" dimensioned from head for 8", 10", and 12" bores. For dimensions not shown see pages 16 and 17.



| MF1 & MF2 FLANGE AND ME3 & ME4 CAP MOUNT DIMENSIONS | | | | | | | | | | | | | | | | |
|---|----------------|-------|-----|--------|-----|-----|-------|-----|------|------|---------|-------|-----|-------|------------|-------|
| BORE | ROD DIAMETER | A | C | E | EE | F | FB | FH | R | TE | TF | UF | V | W | ADD STROKE | |
| | | | | | | | | | | | | | | | ZB | ZF |
| 1 1/2 | 5/8 Standard | 3/4 | 3/8 | 2 | 3/8 | 3/8 | 5/16 | 3/8 | 1.43 | — | 2 3/4 | 3 3/8 | 1/4 | 5/8 | 4 7/8 | 5 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | | | | | | | |
| 2 | 5/8 Standard | 3/4 | 3/8 | 2 1/2 | 3/8 | 3/8 | 3/8 | 3/8 | 1.84 | — | 3 3/8 | 4 1/8 | 1/2 | 5/8 | 4 15/16 | 5 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | | | | | | | |
| 2 1/2 | 5/8 Standard | 3/4 | 3/8 | 3 | 3/8 | 3/8 | 3/8 | 3/8 | 2.19 | — | 3 7/8 | 4 5/8 | 3/4 | 5/8 | 5 1/16 | 5 1/8 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | | | | | | | |
| 3 1/4 | 1 Standard | 1 1/8 | 1/2 | 3 3/4 | 1/2 | 5/8 | 7/16 | 5/8 | 2.76 | — | 4 11/16 | 5 1/2 | 1/4 | 3/4 | 6 | 6 1/4 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | | | | | | | |
| 4 | 1 Standard | 1 1/8 | 1/2 | 4 1/2 | 1/2 | 5/8 | 7/16 | 5/8 | 3.32 | — | 5 7/16 | 6 1/4 | 3/8 | 1 | 6 5/16 | 6 1/2 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | | | | | | | |
| 5 | 1 Standard | 1 1/8 | 1/2 | 5 1/2 | 1/2 | 5/8 | 9/16 | 5/8 | 4.10 | — | 6 5/8 | 7 5/8 | 3/8 | 1 | 6 9/16 | 6 3/4 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | | | | | | | |
| 6 | 1 3/8 Standard | 1 5/8 | 5/8 | 6 1/2 | 3/4 | 5/8 | 9/16 | 3/4 | 4.88 | — | 7 5/8 | 8 5/8 | 1/2 | 1 1/8 | 7 3/8 | 7 5/8 |
| | 1 1/4 Oversize | 2 | 3/4 | | | | | | | | | | | | | |
| 8 | 1 3/8 Standard | 1 5/8 | 5/8 | 8 1/2 | 3/4 | 5/8 | 11/16 | NA | — | 7.57 | NA | NA | 3/8 | 1 5/8 | 7 5/16 | 6 3/4 |
| | 1 1/4 Oversize | 2 | 3/4 | | | | | | | | | | | | | |
| 10 | 1 3/4 Standard | 2 | 3/4 | 10 5/8 | 1 | 5/8 | 13/16 | NA | — | 9.40 | NA | NA | 1/2 | 1 7/8 | 8 15/16 | 8 1/4 |
| | 2 Oversize | 2 1/4 | 7/8 | | | | | | | | | | | | | |
| 12 | 2 Standard | 2 1/4 | 7/8 | 12 3/4 | 1 | 3/4 | 13/16 | NA | — | 11.1 | NA | NA | 3/8 | 2 | 9 9/16 | 8 7/8 |
| | 2 1/2 Oversize | 3 | 1 | | | | | | | | | | | | | |

For dimensions not shown see pages 16 and 17.

Base Mounts (in.)



| MS1 ANGLE MOUNT DIMENSIONS | | | | | | | | | | | | |
|----------------------------|----------------|-------|---------|---------|-------|------|-------|------|-------|------------|-------|---------|
| BORE | ROD DIAMETER | AB | AH | AL | AO | AT | EENPT | FH | S | ADD STROKE | | |
| | | | | | | | | | | P | SA+ | XA |
| 1½ | 5/8 Standard | 7/16 | 1 3/16 | 1 | 3/8 | 1/8 | 3/8 | 3/8 | 1¼ | 2 3/8 | 6 | 5 5/8 |
| | 1 Oversize | | | | | | | | | | | 6 |
| 2 | 5/8 Standard | 7/16 | 1 7/16 | 1 | 3/8 | 1/8 | 3/8 | 3/8 | 1¾ | 2 3/8 | 6 | 5 5/8 |
| | 1 Oversize | | | | | | | | | | | 6 |
| 2½ | 5/8 Standard | 7/16 | 1 5/8 | 1 | 3/8 | 1/8 | 3/8 | 3/8 | 2¼ | 2 ½ | 6 1/8 | 5 ¾ |
| | 1 Oversize | | | | | | | | | | | 6 1/8 |
| ¾ | 1 Standard | 9/16 | 1 15/16 | 1¼ | ½ | 1/8 | ½ | 5/8 | 2¾ | 2 ¾ | 7 3/8 | 6 7/8 |
| | 1 3/8 Oversize | | | | | | | | | | | 7 1/8 |
| 4 | 1 Standard | 9/16 | 2¼ | 1¼ | ½ | 1/8 | ½ | 5/8 | 3½ | 2 ¾ | 7 3/8 | 6 7/8 |
| | 1 3/8 Oversize | | | | | | | | | | | 7 1/8 |
| 5 | 1 Standard | 11/16 | 2¾ | 1 3/8 | 5/8 | 3/16 | ½ | 5/8 | 4¼ | 3 | 7 7/8 | 7¼ |
| | 1 3/8 Oversize | | | | | | | | | | | 7½ |
| 6 | 1 3/8 Standard | 13/16 | 3¼ | 1 3/8 | 5/8 | 3/16 | ¾ | ¾ | 5¼ | 3 3/16 | 8½ | 8 |
| | 1¼ Oversize | | | | | | | | | | | 8¼ |
| 8 | 1 3/8 Standard | 13/16 | 4¼ | 1 13/16 | 11/16 | ¼ | ¾ | 5/8* | 7 1/8 | 3 3/8 | 8¾ | 8 9/16 |
| | 1¼ Oversize | | | | | | | | | | | 8 13/16 |

* Round retainer on 8" bore.

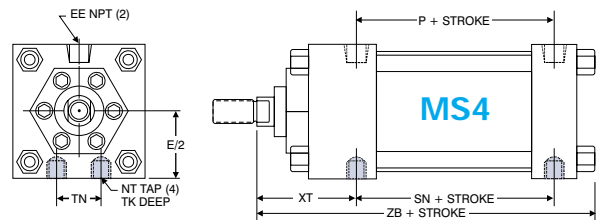
| MS2 SIDE LUG MOUNT DIMENSIONS | | | | | | | | | | | | |
|-------------------------------|----------------|------|-------|----|-------|-----|-----|----|----|-------|------------|-------|
| BORE | ROD DIAMETER | SB | SH | ST | SU | SW | SZ | TS | US | XS | ADD STROKE | |
| | | | | | | | | | | | P | SS* |
| 1½ | 5/8 Standard | 7/16 | 1 | ½ | 1 1/8 | 3/8 | 5/8 | 2¾ | 3½ | 1 3/8 | 2 3/8 | 2 7/8 |
| | 1 Oversize | | | | | | | | | | | |
| 2 | 5/8 Standard | 7/16 | 1¼ | ½ | 1 1/8 | 3/8 | 5/8 | 3¼ | 4 | 1 3/8 | 2 3/8 | 2 7/8 |
| | 1 Oversize | | | | | | | | | | | |
| 2½ | 5/8 Standard | 7/16 | 1½ | ½ | 1 1/8 | 3/8 | 5/8 | 3¾ | 4½ | 1 3/8 | 2½ | 3 |
| | 1 Oversize | | | | | | | | | | | |
| ¾ | 1 Standard | 9/16 | 1 7/8 | ¾ | 1¼ | ½ | ¾ | 4¾ | 5¾ | 1 7/8 | 2¾ | 3¼ |
| | 1 3/8 Oversize | | | | | | | | | | | |
| 4 | 1 Standard | 9/16 | 2¼ | ¾ | 1¼ | ½ | ¾ | 5½ | 6½ | 1 7/8 | 2¾ | 3¼ |
| | 1 3/8 Oversize | | | | | | | | | | | |

* SS dimensions increase 1/2" on double rod cylinders.

Consult factory for 5", 6" and 8" bore MS2 mount.

+ SA dimensions increase 1/2" and one "FH" on double rod cylinders.

For dimensions not shown see pages 16 and 17.



| MS4 BOTTOM TAPPED MOUNT DIMENSIONS | | | | | | | | | | | | |
|------------------------------------|----------------|--------|-------|---------|-------|---------|---------|------------|-------|---------|---------|--|
| BORE | ROD DIAMETER | E/2 | EENPT | NT | TK | TN | XT | ADD STROKE | | | | |
| | | | | | | | | P | SN | ZB | | |
| 1½ | 5/8 Standard | 1 | 3/8 | ¼-20 | 3/8 | 5/8 | 1 15/16 | 2 3/8 | 2¼ | 4 7/8 | | |
| | 1 Oversize | | | | | | | | | | 5¼ | |
| 2 | 5/8 Standard | 1¼ | 3/8 | 5/16-18 | ½ | 7/8 | 1 15/16 | 2 3/8 | 2¼ | 4 15/16 | | |
| | 1 Oversize | | | | | | | | | | 5 5/16 | |
| 2½ | 5/8 Standard | 1½ | 3/8 | 3/8-16 | 5/8 | 1¼ | 1 15/16 | 2½ | 2 3/8 | 5 1/16 | | |
| | 1 Oversize | | | | | | | | | | 5 7/16 | |
| ¾ | 1 Standard | 1 7/8 | ½ | ½-13 | ¾ | 1½ | 2 7/16 | 2¾ | 2 5/8 | 6 1/16 | | |
| | 1 3/8 Oversize | | | | | | | | | | 2 11/16 | |
| 4 | 1 Standard | 2¼ | ½ | ½-13 | ¾ | 2 1/16 | 2 7/16 | 2¾ | 2 5/8 | 6 1/16 | | |
| | 1 3/8 Oversize | | | | | | | | | | 2 11/16 | |
| 5 | 1 Standard | 2¾ | ½ | 5/8-11 | 1 | 2 11/16 | 2 7/16 | 3 | 2 7/8 | 6 5/16 | | |
| | 1 3/8 Oversize | | | | | | | | | | 2 11/16 | |
| 6 | 1 3/8 Standard | 3¼ | ¾ | ¾-10 | 1 1/8 | 3¼ | 2 13/16 | 3¼ | 3 1/8 | 7 1/8 | | |
| | 1¼ Oversize | | | | | | | | | | 3 1/16 | |
| 8 | 1 3/8 Standard | 4¼ | ¾ | ¾-10 | 1 1/8 | 4½ | 2 13/16 | 3 3/8 | 3¼ | 7 5/16 | | |
| | 1¼ Oversize | | | | | | | | | | 3 1/16 | |
| 10 | 1¼ Standard | 5 5/16 | 1 | 1-8 | 1½ | 5½ | 3 1/8 | 4 5/16 | 4 1/8 | 8 15/16 | | |
| | 2 Oversize | | | | | | | | | | 3¼ | |
| 12 | 2 Standard | 6 3/8 | 1 | 1-8 | 1½ | 7¼ | 3¼ | 4¾ | 4 5/8 | 9 1/16 | | |
| | 2½ Oversize | | | | | | | | | | 3½ | |

For dimensions not shown see pages 16 and 17

'TR' Series Cylinders (in.)

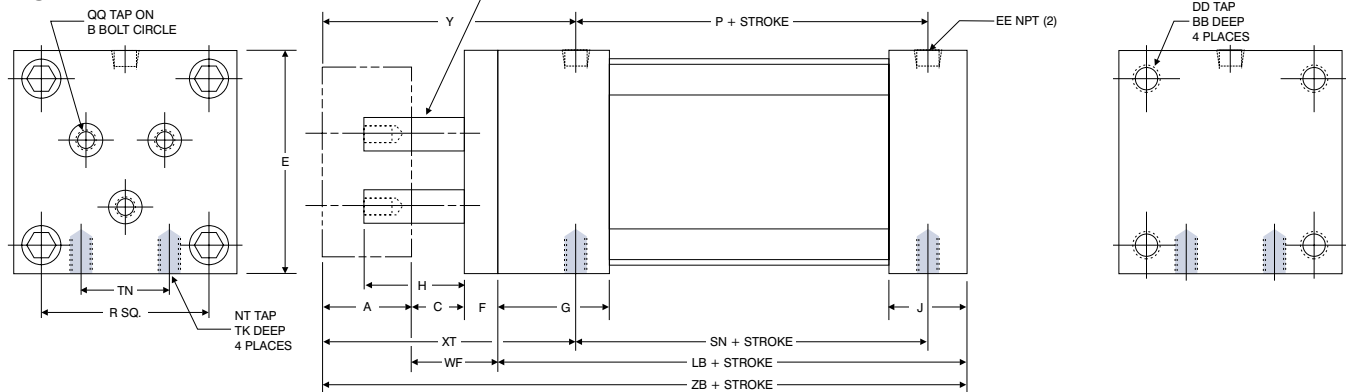
Triple-Rod Non-Rotating Series – 1-1/2" to 8" Bore

TRD's innovative non-rotating rod cylinder utilizes a Triangulated Rod Design to provide precision linear movement and positioning. The triple rod design increases the stability and angular positioning of the tooling plate over competitive non-rotating rod cylinders.

- 200 PSI pneumatic, optional 400 PSI non-shock hydraulic
- Removable bronze cartridge bearings
- Head designed for additional bearing support
- Precision ground tooling plate included. Mounting dimensions interchangeable with other competitive non-rotating cylinders
- Universal mount sleeve nut construction
- Position sensing devices such as reed, hall effect or proximity switches
- Available in stainless steel and electroless nickel
- Consult factory for your special requirements



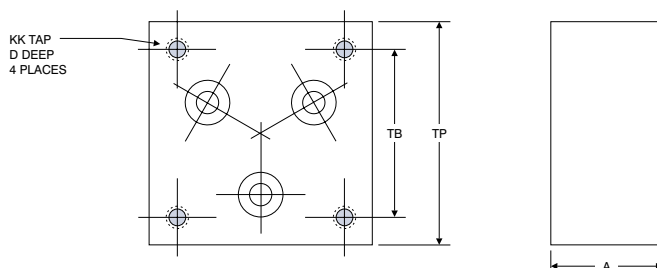
MS4



| TR SERIES BASIC CYLINDER DIMENSIONS (MS4) | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-------|-----|-------|---------|-------|-----|------|-------|------|-------|-------|------|---------|-------|------|-------|---------|-------|---------|---------|-------|-------|-------|
| BORE | A | B | BB | C | DD | E | EE | F | G | H | J | LB | MM | NT | P | R | SN | QQ | TK | TN | XT | Y | ZB | WF |
| 1 1/2 | 3/4 | .89 | 1/2 | 3/4 | 1/4-28 | 2 | 1/4 | 3/8 | 1 1/2 | 1.1 | 1 | 3 5/8 | 5/16 | 1/4-20 | 2 3/8 | 1.43 | 2 1/4 | 10-32 | 3/8 | 5/8 | 2 13/16 | 2 3/4 | 5 1/2 | — |
| 2 | 3/4 | 1.195 | 1/2 | 3/4 | 5/16-24 | 2 1/2 | 1/4 | 3/8 | 1 1/2 | 1.1 | 1 | 3 5/8 | 1/2 | 5/16-18 | 2 3/8 | 1.84 | 2 1/4 | 1/4-28 | 1/2 | 7/8 | 2 13/16 | 2 3/4 | 5 1/2 | — |
| 2 1/2 | 1 | 1.5 | 1/2 | 3/4 | 5/16-24 | 3 | 1/4 | 3/8 | 1 1/2 | 1.35 | 1 | 3 3/4 | 5/8 | 3/8-16 | 2 1/2 | 2.19 | 2 3/8 | 5/16-24 | 5/8 | 1 1/4 | 3 1/16 | 3 | 5 7/8 | — |
| 3 1/4 | 1 | 2.075 | 5/8 | 3/4 | 3/8-24 | 3 3/4 | 3/8 | 5/8 | 1 3/4 | 1.1 | 1 1/4 | 4 1/4 | 5/8 | 1/2-13 | 2 3/4 | 2.76 | 2 5/8 | 3/8-24 | 3/4 | 1 1/2 | 3 7/16 | 3 3/8 | 6 5/8 | — |
| 4 | 1 | 2.825 | 5/8 | 3/4 | 3/8-24 | 4 1/2 | 3/8 | 5/8 | 1 3/4 | 1.1 | 1 1/4 | 4 1/4 | 5/8 | 1/2-13 | 2 3/4 | 3.32 | 2 5/8 | 3/8-24 | 3/4 | 2 1/16 | 3 7/16 | 3 3/8 | 6 5/8 | — |
| 5 | 1 | 3.375 | 5/8 | 1 1/4 | 1/2-20 | 5 1/2 | 3/8 | 5/8 | 1 3/4 | 1.84 | 1 1/4 | 4 1/2 | 1 | 5/8-11 | 3 | 4.10 | 2 7/8 | 1/2-20 | 1 | 2 11/16 | 3 15/16 | 3 7/8 | 7 3/8 | — |
| 6 | 1 | 3.937 | 3/4 | 1 1/4 | 1/2-20 | 6 1/2 | 1/2 | 3/4 | 2 | 1.84 | 1 1/2 | 5 | 1 | 3/4-10 | 3 1/4 | 4.88 | 3 1/8 | 1/2-20 | 1 1/8 | 3 1/4 | 4 3/16 | 4 1/8 | 8 | — |
| 8 | 1 | 5.750 | 3/4 | 1 1/4 | 5/8-18 | 8 1/2 | 3/4 | 5/8* | 2 | 2.21 | 1 1/2 | 5 1/8 | 1 | 3/4-10 | 3 3/8 | 6.44 | 3 1/4 | 1/2-20 | 1 1/8 | 4 1/2 | 4 7/16 | 4 3/8 | 8 3/8 | 2 1/4 |

* 8" bore has (3) round retainers, 5/8" thick, 2-3/4" Ø.
 WF dimensions = "F" (5/8") "C" (1-1/4") & 3/8" bushing extension.
 See page 24 (8") bore only.

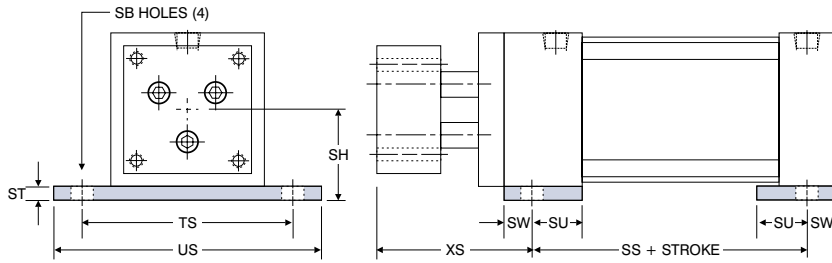
Tooling Plate



| TR SERIES TOOLING PLATE | | | | | |
|-------------------------|-----|-----|---------|------|-------|
| BORE | A | D | KK | TB | TP |
| 1 1/2 | 3/4 | 3/4 | 10-32 | 1.12 | 1 1/2 |
| 2 | 3/4 | 3/4 | 1/4-28 | 1.43 | 2 |
| 2 1/2 | 1 | 1 | 5/16-24 | 1.84 | 2 1/2 |
| 3 1/4 | 1 | 1 | 3/8-24 | 2.19 | 3 1/4 |
| 4 | 1 | 1 | 3/8-24 | 2.76 | 4 |
| 5 | 1 | 1 | 1/2-20 | 3.32 | 5 |
| 6 | 1 | 1 | 1/2-20 | 4.10 | 6 |
| 8 | 1 | 1 | 1/2-20 | 4.88 | 8 |

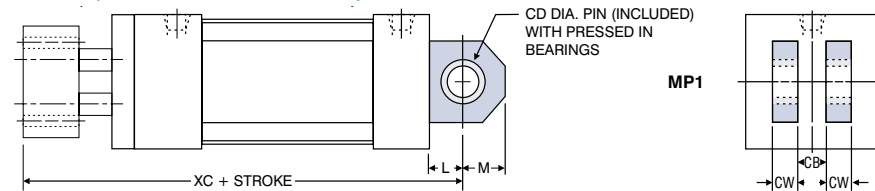
'TR' Series Cylinders (in.)

Base Bar (Non-NFPA)



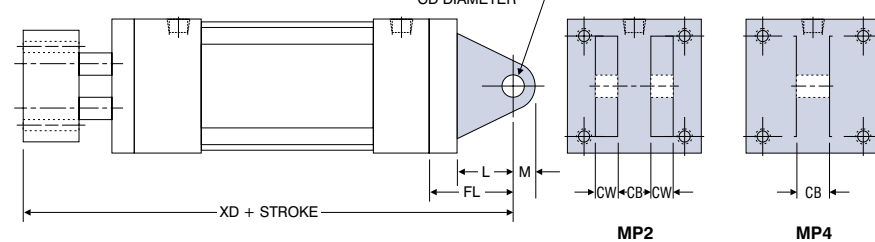
| TR SERIES BASE BAR | | | | | | | | | | |
|--------------------|------|-------|-------|-----|-------|-----|-------|-------|-------|--|
| BORE | SB | SH | SS | ST | SU | SW | TS | US | XS | |
| 1 1/2 | 7/16 | 1 1/4 | 2 7/8 | 1/4 | 1 1/8 | 3/8 | 2 3/4 | 3 1/2 | 2 1/4 | |
| 2 | 7/16 | 1 1/2 | 2 7/8 | 1/4 | 1 1/8 | 3/8 | 3 1/4 | 4 | 2 1/4 | |
| 2 1/2 | 7/16 | 1 7/8 | 3 | 3/8 | 1 1/8 | 3/8 | 3 3/4 | 4 1/2 | 2 1/2 | |
| 3 1/4 | 9/16 | 2 3/8 | 3 1/4 | 1/2 | 1 1/4 | 1/2 | 4 3/4 | 5 3/4 | 2 7/8 | |
| 4 | 9/16 | 2 3/4 | 3 1/4 | 1/2 | 1 1/4 | 1/2 | 5 1/2 | 6 1/2 | 2 7/8 | |

MP1 (Extruded Mount)



| TR SERIES MP1 - MP2 - MP4 | | | | | | | | | |
|---------------------------|-------|-----|-----|-------|-------|-----|-------|--------|--|
| BORE | CB | CD | CW | FL | L | M | XC | XD | |
| 1 1/2 | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 6 1/4 | 6 5/8 | |
| 2 | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 6 1/4 | 6 5/8 | |
| 2 1/2 | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 6 5/8 | 7 | |
| 3 1/4 | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 7/8 | 8 1/2 | |
| 4 | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 7/8 | 8 1/2 | |
| 5 | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 8 5/8 | 9 1/4 | |
| 6 | 1 1/2 | 1 | 3/4 | 2 1/4 | 1 1/2 | 1 | 9 5/8 | 10 1/4 | |
| 8 | 1 1/2 | 1 | 3/4 | N/A | 1 1/2 | 1 | 9 7/8 | N/A | |

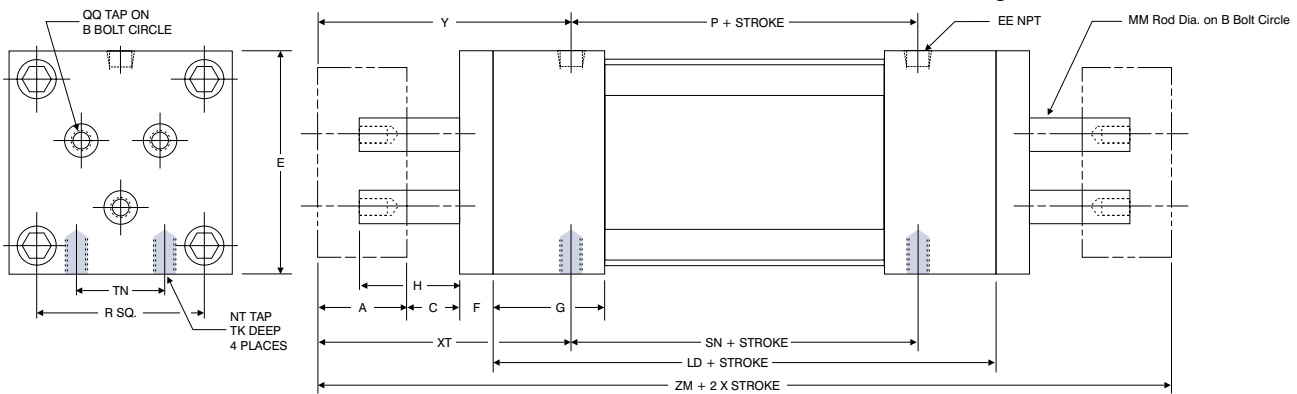
MP2 & MP4



Clevis Pin included with MP2 & MP4 mounts

Note: 8" bore is a welded mount.
 △ MP4 not available in 5, 6, & 8" bores.
 Note: Extruded MP1 mounts are standard (1-1/2" - 8" bores). Cast iron removable mounts are optional, and must be requested when ordering (1-1/2" - 6" bores).

MS4D



| TR SERIES TWIN TOOLING PLATE BASIC CYLINDER DIMENSIONS MS4D | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-------|-------|-------|-----|------|-------|------|-------|------|---------|-------|---------|------|-------|-------|---------|---------|-------|--------|-------|
| BORE | A | B | C | E | EE | F | G | H | LD | MM | NT | P | QQ | R | SN | TK | TN | XT | Y | ZM | WF |
| 1 1/2 | 3/4 | .89 | 3/4 | 2 | 1/4 | 3/8 | 1 1/2 | 1.1 | 4 1/8 | 5/16 | 1/4-20 | 2 3/8 | 10-32 | 1.43 | 2 1/4 | 3/8 | 5/8 | 2 13/16 | 2 3/4 | 7 7/8 | — |
| 2 | 3/4 | 1.195 | 3/4 | 2 1/2 | 1/4 | 3/8 | 1 1/2 | 1.1 | 4 1/8 | 1/2 | 5/16-18 | 2 3/8 | 1/4-28 | 1.84 | 2 1/4 | 1/2 | 7/8 | 2 13/16 | 2 3/4 | 7 7/8 | — |
| 2 1/2 | 1 | 1.5 | 3/4 | 3 | 1/4 | 3/8 | 1 1/2 | 1.35 | 4 1/4 | 5/8 | 3/8-16 | 2 1/2 | 5/16-24 | 2.19 | 2 3/8 | 5/8 | 1 1/4 | 3 1/16 | 3 | 8 1/2 | — |
| 3 1/4 | 1 | 2.075 | 3/4 | 3 3/4 | 3/8 | 5/8 | 1 3/4 | 1.1 | 4 3/4 | 5/8 | 1/2-13 | 2 3/4 | 3/8-24 | 2.76 | 2 5/8 | 3/4 | 1 1/2 | 3 7/16 | 3 3/8 | 9 1/2 | — |
| 4 | 1 | 2.825 | 3/4 | 4 1/2 | 3/8 | 5/8 | 1 3/4 | 1.1 | 4 3/4 | 5/8 | 1/2-13 | 2 3/4 | 3/8-24 | 3.32 | 2 5/8 | 3/4 | 2 1/16 | 3 7/16 | 3 3/8 | 9 1/2 | — |
| 5 | 1 | 3.375 | 1 1/4 | 5 1/2 | 3/8 | 5/8 | 1 3/4 | 1.84 | 5 | 1 | 5/8-11 | 3 | 1/2-20 | 4.10 | 2 7/8 | 1 | 2 11/16 | 3 15/16 | 3 7/8 | 10 3/4 | — |
| 6 | 1 | 3.937 | 1 1/4 | 6 1/2 | 1/2 | 3/4 | 2 | 1.84 | 5 1/2 | 1 | 3/4-10 | 3 1/4 | 1/2-20 | 4.88 | 3 1/8 | 1 1/8 | 3 1/4 | 4 3/16 | 4 1/8 | 11 1/2 | — |
| 8 | 1 | 5.750 | 1 1/4 | 8 1/2 | 3/4 | 5/8* | 2 | 2.21 | 5 5/8 | 1 | 3/4-10 | 3 3/8 | 1/2-20 | 6.44 | 3 1/4 | 1 1/8 | 4 1/2 | 4 7/16 | 4 3/8 | 12 1/8 | 2 1/4 |

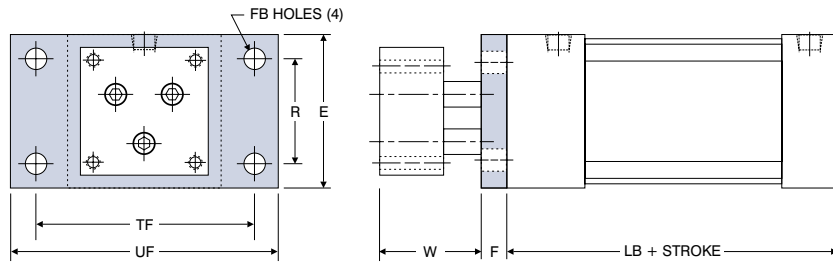
See page 24 (8") bore only.

* 8" bore has (3) round retainers, 5/8" thick, 2-3/4" Ø. WF dimension = "F" (5/8") "C" (1-1/4") & 3/8" bushing extension.

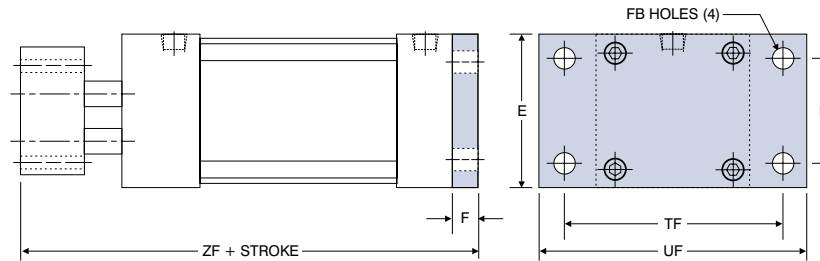
'TR' Series Cylinders (in.)

| TR SERIES MF1 MF2 | | | | | | | | | |
|-------------------|----|-----|------|------|---------|-------|----|-------|-------|
| BORE | E | F | FB | R | TF | UF | W | ZF | LB |
| 1½ | 2 | 3/8 | 5/16 | 1.43 | 2¾ | 3 3/8 | 1½ | 5 7/8 | 3 5/8 |
| 2 | 2½ | 3/8 | 3/8 | 1.84 | 3 3/8 | 4 1/8 | 1½ | 5 7/8 | 3 5/8 |
| 2½ | 3 | 3/8 | 3/8 | 2.19 | 3 7/8 | 4 5/8 | 1¾ | 6¼ | 3¾ |
| 3¼ | 3¾ | 5/8 | 7/16 | 2.76 | 4 11/16 | 5½ | 1¾ | 7¼ | 4¼ |
| 4 | 4½ | 5/8 | 7/16 | 3.32 | 5 7/16 | 6¼ | 1¾ | 7¼ | 4¼ |
| 5 | 5½ | 5/8 | 9/16 | 4.1 | 6 5/8 | 7 5/8 | 2¼ | 8 | 4½ |
| 6 | 6½ | ¾ | 9/16 | 4.88 | 7 5/8 | 8 5/8 | 2¼ | 8¾ | 5 |

MF1



MF2

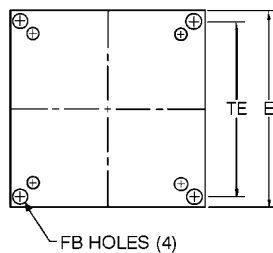
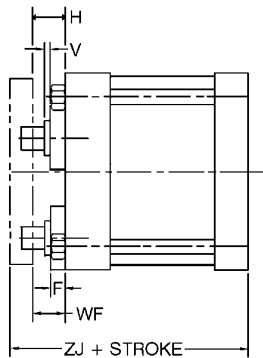


See page 22 for standard cylinder dimensions.

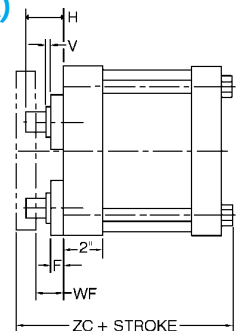
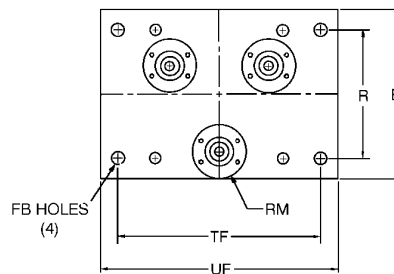
| TR SERIES ME4 ME5 | | | | | | | | | | | | | |
|-------------------|----|-----|-------|------|------|----|------|-----|----|-----|----|---------|----|
| BORE | E | F | FB | H | R | RM | TE | TF | UF | V | WF | ZC | ZJ |
| 8 | 8½ | 5/8 | 11/16 | 2.21 | 6.44 | 2¾ | 7.57 | 10¼ | 12 | 3/8 | 2¼ | 8 15/16 | 8¼ |

Note: (3) 1" diameter rods on 5.750 B.C.

ME4

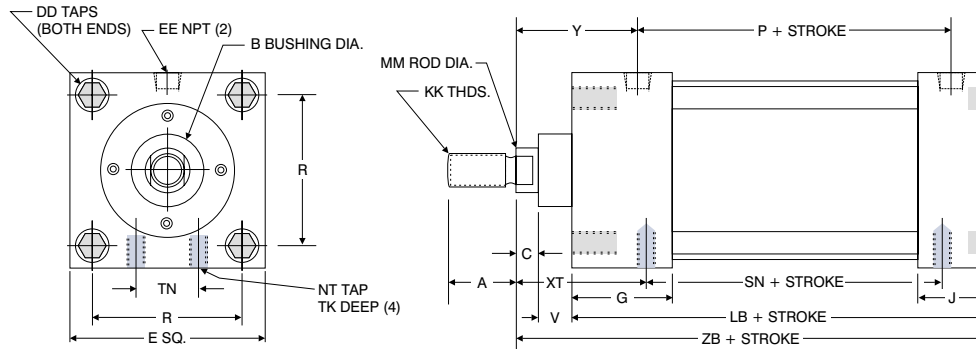


ME5 (Non-NFPA)



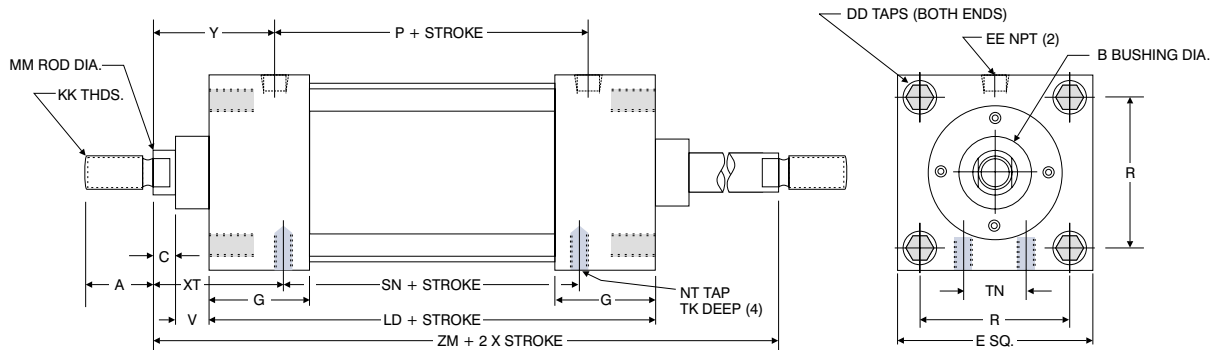
'FM' Series Flush Mount with Sleeve Nut Construction

Basic Dimensions MS4 (in.)



| BORE | A | B | C | DD | E | EE | G | J | KK | LB | MM | P | R | V | Y | ZB | NT | TK | TN | SN | XT |
|-------|-------|-------|-----|---------|-------|-----|-------|-------|---------|-------|-------|-------|------|-----|---------|-------|---------|-------|---------|-------|---------|
| 1 1/2 | 3/4 | 1 1/8 | 3/8 | 1/4-28 | 2 | 1/4 | 1 1/2 | 1 | 7/16-20 | 3 5/8 | 5/8 | 2 3/8 | 1.43 | 5/8 | 1 7/8 | 4 5/8 | 1/4-20 | 3/8 | 5/8 | 2 1/4 | 1 15/16 |
| 2 | 3/4 | 1 1/8 | 3/8 | 5/16-24 | 2 1/2 | 1/4 | 1 1/2 | 1 | 7/16-20 | 3 5/8 | 5/8 | 2 3/8 | 1.84 | 5/8 | 1 7/8 | 4 5/8 | 5/16-18 | 1/2 | 7/8 | 2 1/4 | 1 15/16 |
| 2 1/2 | 3/4 | 1 1/8 | 3/8 | 5/16-24 | 3 | 1/4 | 1 1/2 | 1 | 7/16-20 | 3 3/4 | 5/8 | 2 1/2 | 2.19 | 5/8 | 1 7/8 | 4 3/4 | 3/8-16 | 5/8 | 1 1/4 | 2 3/8 | 1 15/16 |
| 3 1/4 | 1 1/8 | 1 1/2 | 1/2 | 3/8-24 | 3 3/4 | 3/8 | 1 3/4 | 1 1/4 | 3/4-16 | 4 1/4 | 1 | 2 3/4 | 2.76 | 7/8 | 2 3/8 | 5 5/8 | 1/2-13 | 3/4 | 1 1/2 | 2 5/8 | 2 7/16 |
| 4 | 1 1/8 | 1 1/2 | 1/2 | 3/8-24 | 4 1/2 | 3/8 | 1 3/4 | 1 1/4 | 3/4-16 | 4 1/4 | 1 | 2 3/4 | 3.32 | 7/8 | 2 3/8 | 5 5/8 | 1/2-13 | 3/4 | 2 1/16 | 2 5/8 | 2 7/16 |
| 5 | 1 1/8 | 1 1/2 | 1/2 | 1/2-20 | 5 1/2 | 3/8 | 1 3/4 | 1 1/4 | 3/4-16 | 4 1/2 | 1 | 3 | 4.10 | 7/8 | 2 3/8 | 5 7/8 | 5/8-11 | 1 | 2 11/16 | 2 7/8 | 2 7/16 |
| 6 | 1 5/8 | 2 | 5/8 | 1/2-20 | 6 1/2 | 1/2 | 2 | 1 1/2 | 1-14 | 5 | 1 3/8 | 3 1/4 | 4.88 | 1 | 2 11/16 | 6 5/8 | 3/4-10 | 1 1/8 | 3 1/4 | 3 1/8 | 2 13/16 |

Basic Dimensions Double Rod End MS4D (in.)



| BORE | A | B | C | DD | E | EE | G | KK | LD | MM | P | R | V | Y | NT | TK | TN | SN | XT | ZM |
|-------|-------|-------|-----|---------|-------|-----|-------|---------|-------|-------|-------|------|-----|---------|---------|-------|---------|-------|---------|-------|
| 1 1/2 | 3/4 | 1 1/8 | 3/8 | 1/4-28 | 2 | 1/4 | 1 1/2 | 7/16-20 | 4 1/8 | 5/8 | 2 3/8 | 1.43 | 5/8 | 1 7/8 | 1/4-20 | 3/8 | 5/8 | 2 1/4 | 1 15/16 | 6 1/8 |
| 2 | 3/4 | 1 1/8 | 3/8 | 5/16-24 | 2 1/2 | 1/4 | 1 1/2 | 7/16-20 | 4 1/8 | 5/8 | 2 3/8 | 1.84 | 5/8 | 1 7/8 | 5/16-18 | 1/2 | 7/8 | 2 1/4 | 1 15/16 | 6 1/8 |
| 2 1/2 | 3/4 | 1 1/8 | 3/8 | 5/16-24 | 3 | 1/4 | 1 1/2 | 7/16-20 | 4 1/4 | 5/8 | 2 1/2 | 2.19 | 5/8 | 1 7/8 | 3/8-16 | 5/8 | 1 1/4 | 2 3/8 | 1 15/16 | 6 1/4 |
| 3 1/4 | 1 1/8 | 1 1/2 | 1/2 | 3/8-24 | 3 3/4 | 3/8 | 1 3/4 | 3/4-16 | 4 3/4 | 1 | 2 3/4 | 2.76 | 7/8 | 2 3/8 | 1/2-13 | 3/4 | 1 1/2 | 2 5/8 | 2 7/16 | 7 1/2 |
| 4 | 1 1/8 | 1 1/2 | 1/2 | 3/8-24 | 4 1/2 | 3/8 | 1 3/4 | 3/4-16 | 4 3/4 | 1 | 2 3/4 | 3.32 | 7/8 | 2 3/8 | 1/2-13 | 3/4 | 2 1/16 | 2 5/8 | 2 7/16 | 7 1/2 |
| 5 | 1 1/8 | 1 1/2 | 1/2 | 1/2-20 | 5 1/2 | 3/8 | 1 3/4 | 3/4-16 | 5 | 1 | 3 | 4.1 | 7/8 | 2 3/8 | 5/8-11 | 1 | 2 11/16 | 2 7/8 | 2 7/16 | 7 3/4 |
| 6 | 1 5/8 | 2 | 5/8 | 1/2-20 | 6 1/2 | 1/2 | 2 | 1-14 | 5 1/2 | 1 3/8 | 3 1/4 | 4.88 | 1 | 2 11/16 | 3/4-10 | 1 1/8 | 3 1/4 | 3 1/8 | 2 13/16 | 8 3/4 |

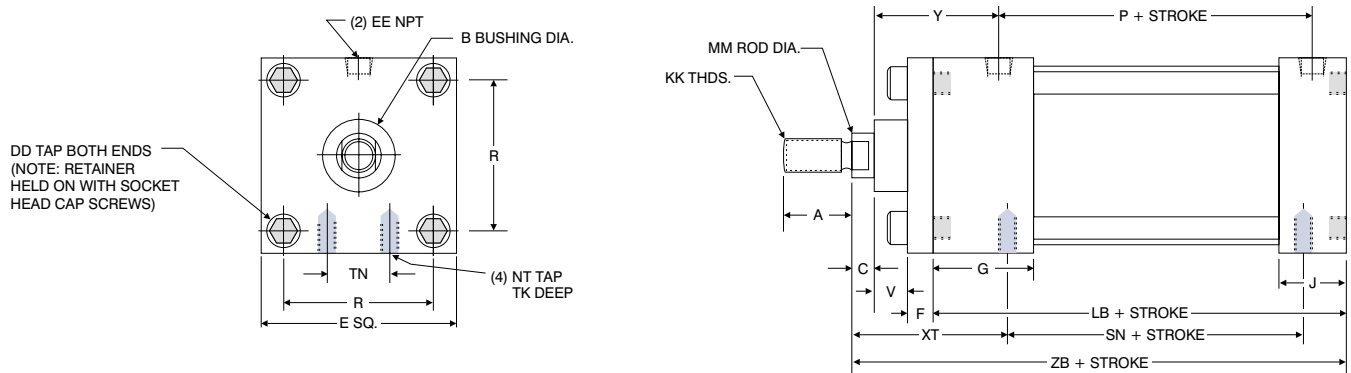
FM SERIES MOUNTING KITS

| BORE SIZE | MP1 | MP2 | MP4 | MF1/MF2 | MS1 | *MS2 BASE BAR | |
|-----------|-------------|-------------|-------------|-------------|-------------|---------------|--------------|
| | Part Number | Part Number | Part Number | Part Number | Part Number | Part Number | SH Dimension |
| 1 1/2 | FMP115 | FMP215 | FMP415 | FMF115 | FMS115 | FMS215 | 1 1/4 |
| 2 | FMP120 | FMP220 | FMP420 | FMF120 | FMS120 | FMS220 | 1 1/2 |
| 2 1/2 | FMP125 | FMP225 | FMP425 | FMF125 | FMS125 | FMS225 | 1 7/8 |
| 3 1/4 | FMP132 | FMP232 | FMP432 | FMF132 | FMS132 | FMS232 | 2 3/8 |
| 4 | FMP140 | FMP240 | FMP440 | FMF140 | FMS140 | FMS240 | 2 3/4 |
| 5 | FMP150 | FMP250 | N/A | FMF150 | FMS150 | N/A | — |
| 6 | FMP160 | FMP260 | N/A | FMF160 | FMS160 | N/A | — |

* Base Bar 'SH' dimension is not NFPA, refer to page 28. All other dimensions NFPA, refer to 'TA' Series for mount dimensions.

Basic Dimensions 'FM' Series MS4

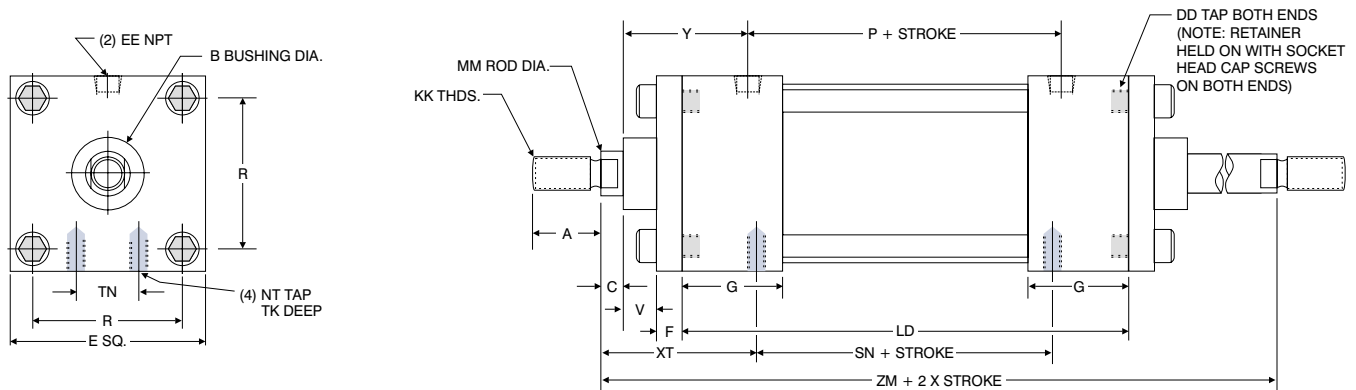
Oversize Rod Diameter (in.)



| BORE | A | B | C | DD | E | EE | F | G | J | KK | LB | MM | P | R | V | Y | NT | TK | TN | SN | XT | ZB |
|-------|-------|-------|-----|---------|-------|-----|-----|-------|-------|----------|-------|-------|-------|------|-----|-------|---------|-------|---------|-------|---------|-------|
| 1 1/2 | 1 1/8 | 1 1/2 | 1/2 | 1/4-28 | 2 | 1/4 | 3/8 | 1 1/2 | 1 | 3/4-16 | 3 5/8 | 1 | 2 3/8 | 1.43 | 1/2 | 2 1/4 | 1/4-20 | 3/8 | 5/8 | 2 1/4 | 2 5/16 | 5 |
| 2 | 1 1/8 | 1 1/2 | 1/2 | 5/16-24 | 2 1/2 | 1/4 | 3/8 | 1 1/2 | 1 | 3/4-16 | 3 5/8 | 1 | 2 3/8 | 1.84 | 1/2 | 2 1/4 | 5/16-18 | 1/2 | 7/8 | 2 1/4 | 2 5/16 | 5 |
| 2 1/2 | 1 1/8 | 1 1/2 | 1/2 | 5/16-24 | 3 | 1/4 | 3/8 | 1 1/2 | 1 | 3/4-16 | 3 3/4 | 1 | 2 1/2 | 2.19 | 1/2 | 2 1/4 | 3/8-16 | 5/8 | 1 1/4 | 2 3/8 | 2 5/16 | 5 1/8 |
| 3 1/4 | 1 5/8 | 2 | 5/8 | 3/8-24 | 3 3/4 | 3/8 | 5/8 | 1 3/4 | 1 1/4 | 1-14 | 4 1/4 | 1 3/8 | 2 3/4 | 2.76 | 3/8 | 2 5/8 | 1/2-13 | 3/4 | 1 1/2 | 2 5/8 | 2 11/16 | 5 7/8 |
| 4 | 1 5/8 | 2 | 5/8 | 3/8-24 | 4 1/2 | 3/8 | 5/8 | 1 3/4 | 1 1/4 | 1-14 | 4 1/4 | 1 3/8 | 2 3/4 | 3.32 | 3/8 | 2 5/8 | 1/2-13 | 3/4 | 2 1/16 | 2 5/8 | 2 11/16 | 5 7/8 |
| 5 | 1 5/8 | 2 | 5/8 | 1/2-20 | 5 1/2 | 3/8 | 5/8 | 1 3/4 | 1 1/4 | 1-14 | 4 1/2 | 1 3/8 | 3 | 4.10 | 3/8 | 2 5/8 | 5/8-11 | 1 | 2 11/16 | 2 7/8 | 2 11/16 | 6 1/8 |
| 6 | 2 | 2 3/8 | 3/4 | 1/2-20 | 6 1/2 | 1/2 | 5/8 | 2 | 1 1/2 | 1 1/4-12 | 5 | 1 3/4 | 3 1/4 | 4.88 | 1/2 | 3 | 3/4-10 | 1 1/8 | 3 1/4 | 3 1/8 | 3 1/16 | 6 7/8 |

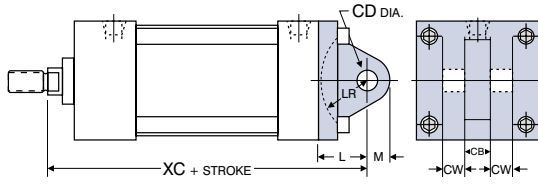
Basic Dimensions Double Rod End 'FM' Series MS4D

Oversize Rod Diameter (in.)

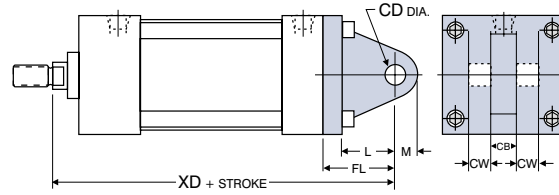


| BORE | A | B | C | DD | E | EE | F | G | KK | LD | MM | P | R | V | Y | NT | TK | TN | SN | XT | ZM |
|-------|-------|-------|-----|---------|-------|-----|-----|-------|----------|-------|-------|-------|------|-----|-------|---------|-------|---------|-------|---------|-------|
| 1 1/2 | 1 1/8 | 1 1/2 | 1/2 | 1/4-28 | 2 | 1/4 | 3/8 | 1 1/2 | 3/4-16 | 4 1/8 | 1 | 2 3/8 | 1.43 | 1/2 | 2 1/4 | 1/4-20 | 3/8 | 5/8 | 2 1/4 | 2 5/16 | 6 7/8 |
| 2 | 1 1/8 | 1 1/2 | 1/2 | 5/16-24 | 2 1/2 | 1/4 | 3/8 | 1 1/2 | 3/4-16 | 4 1/8 | 1 | 2 3/8 | 1.84 | 1/2 | 2 1/4 | 5/16-18 | 1/2 | 7/8 | 2 1/4 | 2 5/16 | 6 7/8 |
| 2 1/2 | 1 1/8 | 1 1/2 | 1/2 | 5/16-24 | 3 | 1/4 | 3/8 | 1 1/2 | 3/4-16 | 4 1/4 | 1 | 2 1/2 | 2.19 | 1/2 | 2 1/4 | 3/8-16 | 5/8 | 1 1/4 | 2 3/8 | 2 5/16 | 7 |
| 3 1/4 | 1 5/8 | 2 | 5/8 | 3/8-24 | 3 3/4 | 3/8 | 5/8 | 1 3/4 | 1-14 | 4 3/4 | 1 3/8 | 2 3/4 | 2.76 | 3/8 | 2 5/8 | 1/2-13 | 3/4 | 1 1/2 | 2 5/8 | 2 11/16 | 8 |
| 4 | 1 5/8 | 2 | 5/8 | 3/8-24 | 4 1/2 | 3/8 | 5/8 | 1 3/4 | 1-14 | 4 3/4 | 1 3/8 | 2 3/4 | 3.32 | 3/8 | 2 5/8 | 1/2-13 | 3/4 | 2 1/16 | 2 5/8 | 2 11/16 | 8 |
| 5 | 1 5/8 | 2 | 5/8 | 1/2-20 | 5 1/2 | 3/8 | 5/8 | 1 3/4 | 1-14 | 5 | 1 3/8 | 3 | 4.10 | 3/8 | 2 5/8 | 5/8-11 | 1 | 2 11/16 | 2 7/8 | 2 11/16 | 8 1/4 |
| 6 | 2 | 2 3/8 | 3/4 | 1/2-20 | 6 1/2 | 1/2 | 5/8 | 2 | 1 1/4-12 | 5 1/2 | 1 3/4 | 3 1/4 | 4.88 | 1/2 | 3 | 3/4-10 | 1 1/8 | 3 1/4 | 3 1/8 | 3 1/16 | 9 1/4 |

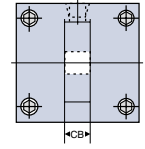
'FM' Series Pivot Mounts (in.)



FM-MP1



FM-MP2

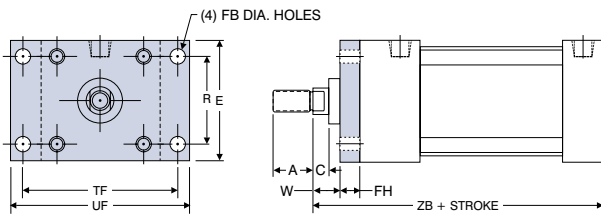


FM-MP4
(1-1/2"-4" bore)

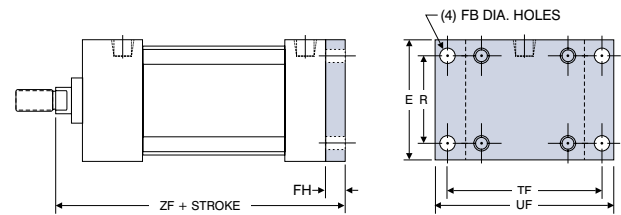
| 'FM' SERIES MP1 & MP2 CLEVIS AND MP4 EYE MOUNT DIMENSIONS | | | | | | | | | |
|---|----------------|-------|-----|-----|-------|-------|-----|------------|-------|
| BORE | ROD DIAMETER | CB | CD | CW | FL | L | M | ADD STROKE | |
| | | | | | | | | XC | XD |
| 1 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 3/8 | 5 3/4 |
| | 1 Oversize | | | | | | | 5 3/4 | 6 1/8 |
| 2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 3/8 | 5 3/4 |
| | 1 Oversize | | | | | | | 5 3/4 | 6 1/8 |
| 2 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 1/2 | 5 7/8 |
| | 1 Oversize | | | | | | | 5 7/8 | 6 1/4 |
| 3 1/4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 6 7/8 | 7 1/2 |
| | 1 3/8 Oversize | | | | | | | 7 1/8 | 7 3/4 |
| 4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 6 7/8 | 7 1/2 |
| | 1 3/8 Oversize | | | | | | | 7 1/8 | 7 3/4 |
| 5 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 1/8 | 7 3/4 |
| | 1 3/8 Oversize | | | | | | | 7 3/8 | 8 |
| 6 | 1 3/8 Standard | 1 1/2 | 1 | 3/4 | 2 1/4 | 1 1/2 | 1 | 8 1/8 | 8 7/8 |
| | 1 3/4 Oversize | | | | | | | 8 3/8 | 9 1/8 |

For dimensions not shown see pages 25 and 26.

'FM' Series Flange Mounts (in.)



FM-MF1



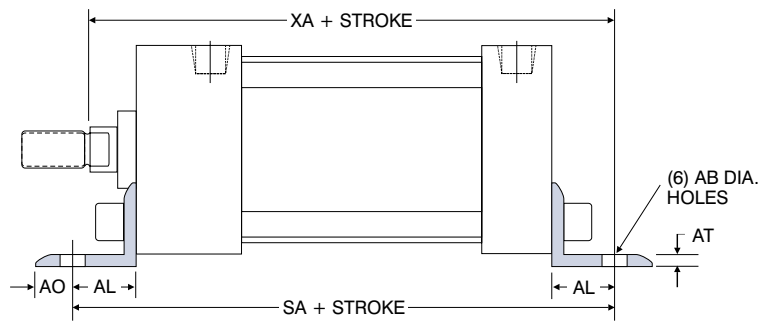
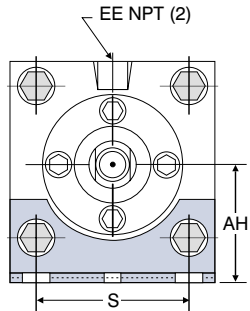
FM-MF2

| 'FM' SERIES MF1 & MF2 FLANGE MOUNT DIMENSIONS | | | | | | | | | | | | |
|---|----------------|-------|-----|-------|------|-----|------|---------|-------|-------|-------|-------|
| BORE | ROD DIAMETER | A | C | E | FB | FH | R | TF | UF | W | ZB | ZF |
| 1 1/2 | 5/8 Standard | 3/4 | 3/8 | 2 | 5/16 | 3/8 | 1.43 | 2 3/4 | 3 3/8 | 5/8 | 4 5/8 | 5 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | 1 | 5 | 5 3/8 |
| 2 | 5/8 Standard | 3/4 | 3/8 | 2 1/2 | 3/8 | 3/8 | 1.84 | 3 3/8 | 4 1/8 | 5/8 | 4 5/8 | 5 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | 1 | 5 | 5 3/8 |
| 2 1/2 | 5/8 Standard | 3/4 | 3/8 | 3 | 3/8 | 3/8 | 2.19 | 3 7/8 | 4 5/8 | 5/8 | 4 3/4 | 5 1/8 |
| | 1 Oversize | 1 1/8 | 1/2 | | | | | | | 1 | 5 1/8 | 5 1/2 |
| 3 1/4 | 1 Standard | 1 1/8 | 1/2 | 3 3/4 | 7/16 | 5/8 | 2.76 | 4 11/16 | 5 1/2 | 3/4 | 5 5/8 | 6 1/4 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | 1 | 5 7/8 | 6 1/2 |
| 4 | 1 Standard | 1 1/8 | 1/2 | 4 1/2 | 7/16 | 5/8 | 3.32 | 5 7/16 | 6 1/4 | 3/4 | 5 5/8 | 6 1/4 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | 1 | 5 7/8 | 6 1/2 |
| 5 | 1 Standard | 1 1/8 | 1/2 | 5 1/2 | 9/16 | 5/8 | 4.10 | 6 5/8 | 7 5/8 | 3/4 | 5 7/8 | 6 1/2 |
| | 1 3/8 Oversize | 1 5/8 | 5/8 | | | | | | | 1 | 6 1/8 | 6 3/4 |
| 6 | 1 3/8 Standard | 1 5/8 | 5/8 | 6 1/2 | 9/16 | 3/4 | 4.88 | 7 5/8 | 8 5/8 | 7/8 | 6 5/8 | 7 3/8 |
| | 1 3/4 Oversize | 2 | 3/4 | | | | | | | 1 1/8 | 6 7/8 | 7 5/8 |

For dimensions not shown see pages 25 and 26.

'FM' Series Base Mounts (in.)

FM-MS1

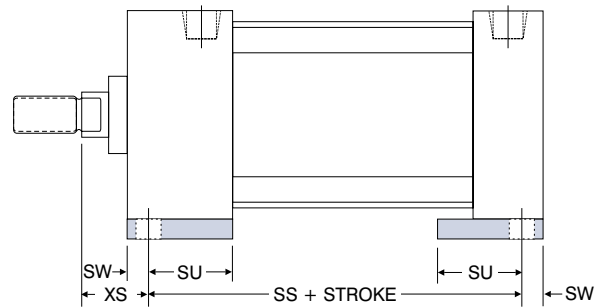
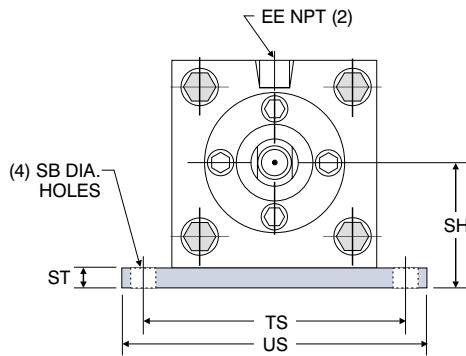


| 'FM' SERIES MS1 ANGLE MOUNT DIMENSIONS | | | | | | | | | |
|--|----------------|-------|---------|-------|-----|------|----|------------|-------|
| BORE | ROD DIAMETER | AB | AH | AL | AO | AT | S | ADD STROKE | |
| | | | | | | | | SA | XA |
| 1½ | 5/8 Standard | 7/16 | 1 3/16 | 1 | 3/8 | 1/8 | 1¼ | 6 | 5 5/8 |
| | 1 Oversize | | | | | | | | 6 |
| 2 | 5/8 Standard | 7/16 | 1 7/16 | 1 | 3/8 | 1/8 | 1¼ | 6 | 5 5/8 |
| | 1 Oversize | | | | | | | | 6 |
| 2½ | 5/8 Standard | 7/16 | 1 5/8 | 1 | 3/8 | 1/8 | 2¼ | 6 1/8 | 5¾ |
| | 1 Oversize | | | | | | | | 6 1/8 |
| ¾ | 1 Standard | 9/16 | 1 15/16 | 1¼ | ½ | 1/8 | 2¾ | 7 3/8 | 6 7/8 |
| | 1 3/8 Oversize | | | | | | | | 7 1/8 |
| 4 | 1 Standard | 9/16 | 2¼ | 1¼ | ½ | 1/8 | 3½ | 7 3/8 | 6 7/8 |
| | 1 3/8 Oversize | | | | | | | | 7 1/8 |
| 5 | 1 Standard | 11/16 | 2¾ | 1 3/8 | 5/8 | 3/16 | 4¼ | 7 7/8 | 7¼ |
| | 1 3/8 Oversize | | | | | | | | 7½ |
| 6 | 1 3/8 Standard | 13/16 | 3¼ | 1 3/8 | 5/8 | 3/16 | 5¼ | 8½ | 8 |
| | 1¾ Oversize | | | | | | | | 8¼ |

Note: On bores with oversize rods, a square plate is used to retain the bushing ("F" dimension on page 26. For dimensions not shown see pages 25 and 26.

'FM' Series Base Bar (Non-NFPA) (in.)

FM-MS2



| 'FM' SERIES MS2 BASE BAR (Non-NFPA) DIMENSIONS | | | | | | | | | | |
|--|----------------|------|-------|-------|-----|-------|-----|----|----|-------|
| BORE | ROD DIAMETER | SB | SH | SS | ST | SU | SW | TS | US | XS |
| 1½ | 5/8 Standard | 7/16 | 1¼ | 2 7/8 | ¼ | 1 1/8 | 3/8 | 2¾ | 3½ | 1 3/8 |
| | 1 Oversize | | | | | | | | | 1¼ |
| 2 | 5/8 Standard | 7/16 | 1½ | 2 7/8 | ¼ | 1 1/8 | 3/8 | 3¼ | 4 | 1 3/8 |
| | 1 Oversize | | | | | | | | | 1¼ |
| 2½ | 5/8 Standard | 7/16 | 1 7/8 | 3 | 3/8 | 1 1/8 | 3/8 | 3¾ | 4½ | 1 3/8 |
| | 1 Oversize | | | | | | | | | 1¼ |
| ¾ | 1 Standard | 9/16 | 2 3/8 | 3¼ | ½ | 1¼ | ½ | 4¾ | 5¾ | 1 7/8 |
| | 1 3/8 Oversize | | | | | | | | | 2 1/8 |
| 4 | 1 Standard | 9/16 | 2¾ | 3¼ | ½ | 1¼ | ½ | 5½ | 6½ | 1 7/8 |
| | 1 3/8 Oversize | | | | | | | | | 2 1/8 |

For dimensions not shown see pages 25 and 26.

'MS' Series – Ordering Instructions

Multi-Stage NFPA Mount Cylinders
 Force Multiplier Air and Non-Shock Hydraulic Cylinders 125 PSI
 Eight Bore Sizes 1-1/2" thru 8"
 Extend or Retract 2, 3 or 4 Stages

| | | | | | | | | |
|--|----|---|--|--|--|---|--|---|
| MSE MULTI STAGE EXTEND | or | MSR MULTI STAGE RETRACT | MODEL VARIATIONS D - DOUBLE ROD END NR -NON-ROTATING △ (Internally Guided) TR - TRIPLE ROD EN -ELECTROLESS NICKLE PLATE SS - STAINLESS STEEL TH -HYDRAULIC (Consult Factory) | NFPA MOUNTS REFERENCE 'TA' SERIES CHARTS AND 'MS' SERIES CHARTS THAT FOLLOW. | BORE 1½ 4 2 5 2½ 6 3¼ 8 | STROKE TO 12" CONSULT FACTORY FOR LONGER STROKES AND STROKES UNDER ½" | STAGES 2S (TWO) 3S (THREE) 4S (FOUR) | OPTIONS *MPR- MAGNETIC △ PISTON REED *MPH- MAGNETIC △ PISTON HALL SE- SPRING EXTEND SR- SPRING RETRACT AS- ADJ STROKE VS- VITON SEALS *H- HEAD CUSH B- BUMPER BOTH △ ENDS BH- BUMPER HEAD △ ENDS BC- BUMPER CAP △ ENDS *C- CAP CUSH. *TH-HYDRAULIC MS- METALLIC ROD SCRAPER OS- OVERSIZE ROD OP- OPTIONAL PORTS KK2 } OPTIONAL KK3 } ROD KK4 } ENDS |
|--|----|---|--|--|--|---|--|---|

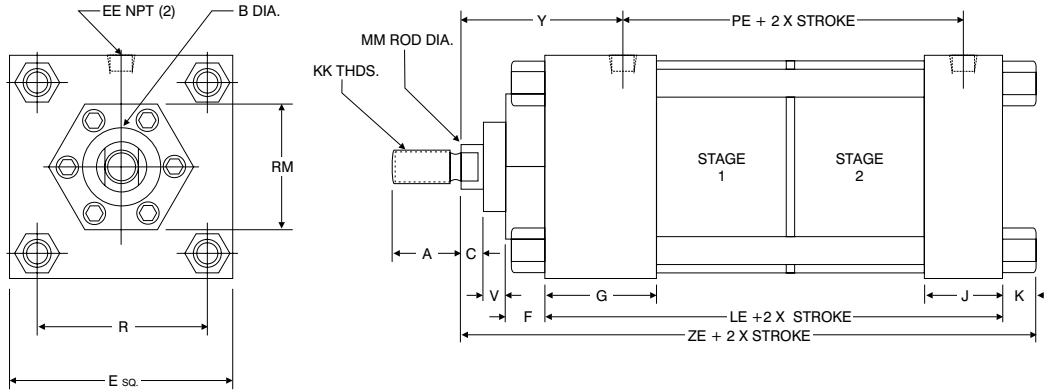
EXAMPLE 1: MF1 3¼ Bore, 2" Stroke, 3 Stage Force Multiplied in Extend is:
 MSE MF1 3¼ x 2 x 3S

EXAMPLE 2: Stainless Steel Double Rod End MS4 Mount 2 Stage, 6" Bore, 3" Stroke
 Force Multiplied in Extend with Magnetic Piston for Reed Switch is:
 MS4 SS MS4 6 x 3 x 2S MPR
 △ Additional length - consult factory
 △ Add ¼" length per bumper

* Consult factory.

'MS' Series Cylinders – 2 Stage Extend or Retract

Standard Rod Diameter Basic Dimensions MX0 (in.)

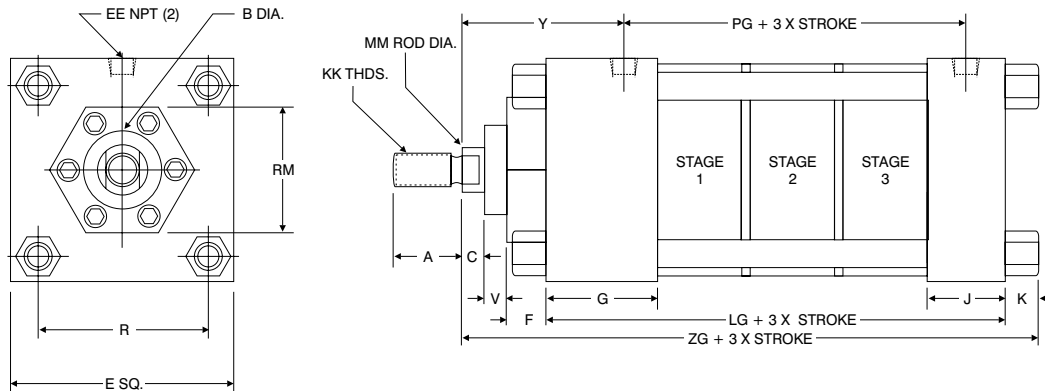


| BORE | A | B | C | E | EE | F | G | J | K | KK | LE | MM | PE | R | RM | V | Y | ZE |
|------|-------|-------|-----|----|-----|-----|----|----|------|---------|-------|-------|-------|------|-------|-----|-------|---------|
| 1½ | ¾ | 1 1/8 | 3/8 | 2 | 3/8 | 3/8 | 1½ | 1 | ¼ | 7/16-20 | 4 | 5/8 | 2¾ | 1.43 | 2 SQ. | ¼ | 1 7/8 | 5¼ |
| 2 | ¾ | 1 1/8 | 3/8 | 2½ | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 4 | 5/8 | 2¾ | 1.84 | 1¾ | ¼ | 1 7/8 | 5 5/16 |
| 2½ | ¾ | 1 1/8 | 3/8 | 3 | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 4 | 5/8 | 2¾ | 2.19 | 1¾ | ¼ | 1 7/8 | 5 5/16 |
| 3¼ | 1 1/8 | 1½ | ½ | 3¾ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 4 7/8 | 1 | 3 3/8 | 2.76 | 2¾* | ¼ | 2 3/8 | 6 5/8 |
| 4 | 1 1/8 | 1½ | ½ | 4½ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 4 7/8 | 1 | 3 3/8 | 3.32 | 2¾* | ¼ | 2 3/8 | 6 5/8 |
| 5 | 1 1/8 | 1½ | ½ | 5½ | ½ | 5/8 | 1¾ | 1¼ | 7/16 | ¾-16 | 4 7/8 | 1 | 3 3/8 | 4.10 | 2¾* | ¼ | 2 3/8 | 6 11/16 |
| 6 | 1 5/8 | 2 | 5/8 | 6½ | ¾ | 5/8 | 2 | 1½ | 7/16 | 1-14 | 5¾ | 1 3/8 | 4 | 4.88 | 3½* | 3/8 | 2¾ | 7 13/16 |
| 8 | 1 5/8 | 2 | 5/8 | 8½ | ¾ | 5/8 | 2 | 1½ | 9/16 | 1-14 | 5¾ | 1 3/8 | 4 | 6.44 | 3½* | 3/8 | 2¾ | 7 15/16 |

* Round retainer (dia.) (Hex retainer illustrated).

'MS' Series Cylinders – 3 Stage Extend or Retract

Standard Rod Diameter Basic Dimensions MX0 (in.)

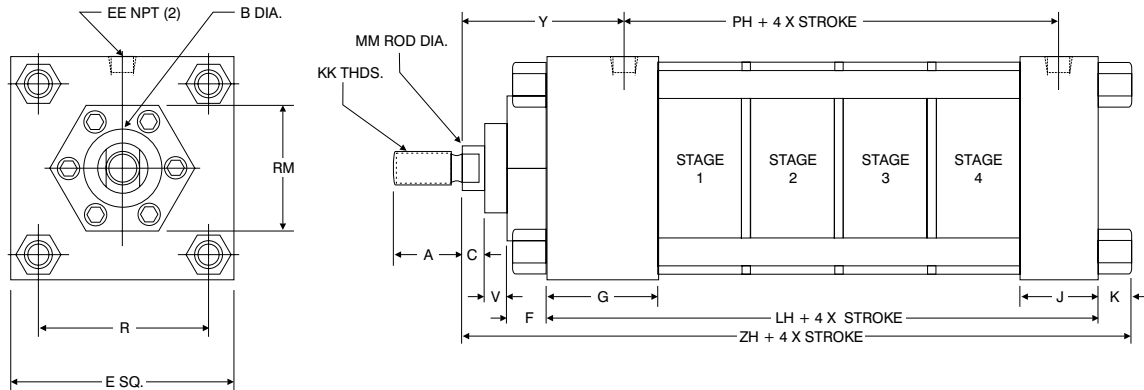


| BORE | A | B | C | E | EE | F | G | J | K | KK | LG | MM | PG | R | RM | V | Y | ZG |
|------|-------|-------|-----|----|-----|-----|----|----|------|---------|-------|-------|-------|------|-------|-----|-------|---------|
| 1½ | ¾ | 1 1/8 | 3/8 | 2 | 3/8 | 3/8 | 1½ | 1 | ¼ | 7/16-20 | 5 | 5/8 | 3¾ | 1.43 | 2 SQ. | ¼ | 1 7/8 | 6¼ |
| 2 | ¾ | 1 1/8 | 3/8 | 2½ | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 5 | 5/8 | 3¾ | 1.84 | 1¾ | ¼ | 1 7/8 | 6 5/16 |
| 2½ | ¾ | 1 1/8 | 3/8 | 3 | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 5 | 5/8 | 3¾ | 2.19 | 1¾ | ¼ | 1 7/8 | 6 5/16 |
| 3¼ | 1 1/8 | 1½ | ½ | 3¾ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 6 1/8 | 1 | 4 5/8 | 2.76 | 2¾* | ¼ | 2 3/8 | 7 7/8 |
| 4 | 1 1/8 | 1½ | ½ | 4½ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 6 1/8 | 1 | 4 5/8 | 3.32 | 2¾* | ¼ | 2 3/8 | 7 7/8 |
| 5 | 1 1/8 | 1½ | ½ | 5½ | ½ | 5/8 | 1¾ | 1¼ | 7/16 | ¾-16 | 6 1/8 | 1 | 4 5/8 | 4.10 | 2¾* | ¼ | 2 3/8 | 7 15/16 |
| 6 | 1 5/8 | 2 | 5/8 | 6½ | ¾ | 5/8 | 2 | 1½ | 7/16 | 1-14 | 7¼ | 1 3/8 | 5½ | 4.88 | 3½* | 3/8 | 2¾ | 9 5/16 |
| 8 | 1 5/8 | 2 | 5/8 | 8½ | ¾ | 5/8 | 2 | 1½ | 9/16 | 1-14 | 7¼ | 1 3/8 | 5½ | 6.44 | 3½* | 3/8 | 2¾ | 9 7/16 |

* Round retainer (dia.) (Hex retainer illustrated).

'MS' Series Cylinders – 4 Stage Extend or Retract

Standard Rod Diameter Basic Dimensions MX0 (in.)

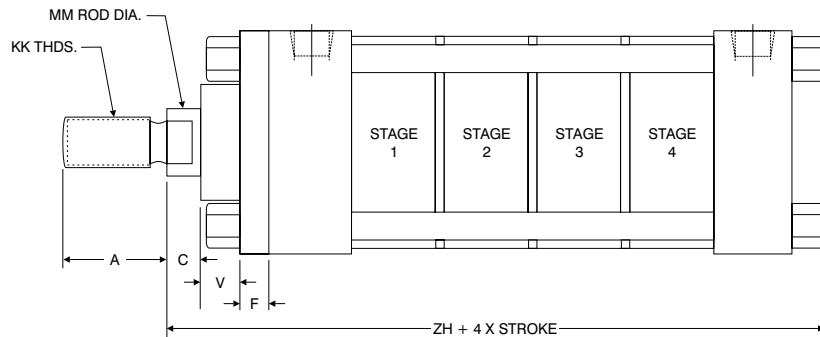
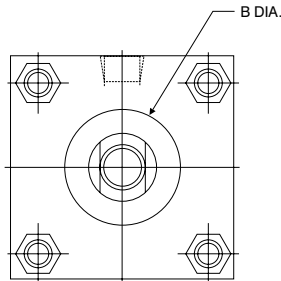
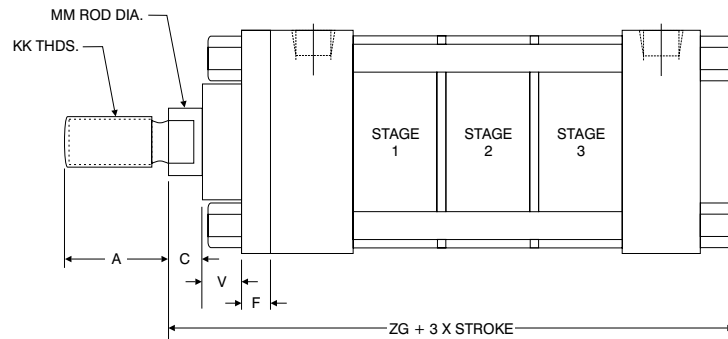
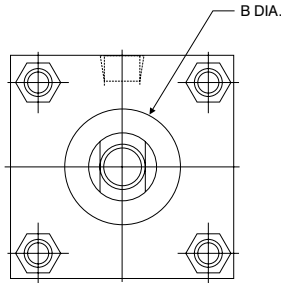
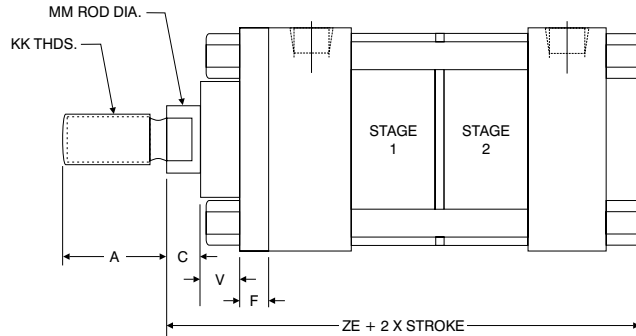
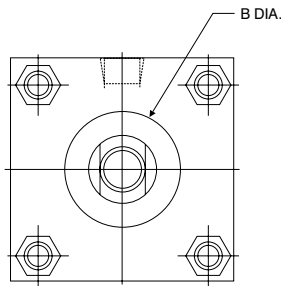


| BORE | A | B | C | E | EE | F | G | J | K | KK | LH | MM | PH | R | RM | V | Y | ZH |
|------|-------|-------|-----|----|-----|-----|----|----|------|---------|-------|-------|-------|------|-------|-----|-------|----------|
| 1½ | ¾ | 1 1/8 | 3/8 | 2 | 3/8 | 3/8 | 1½ | 1 | ¼ | 7/16-20 | 6 | 5/8 | 4¾ | 1.43 | 2 SQ. | ¼ | 1 7/8 | 7¼ |
| 2 | ¾ | 1 1/8 | 3/8 | 2½ | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 6 | 5/8 | 4¾ | 1.84 | 1¾ | ¼ | 1 7/8 | 7 5/16 |
| 2½ | ¾ | 1 1/8 | 3/8 | 3 | 3/8 | 3/8 | 1½ | 1 | 5/16 | 7/16-20 | 6 | 5/8 | 4¾ | 2.19 | 1¾ | ¼ | 1 7/8 | 7 5/16 |
| 3¼ | 1 1/8 | 1½ | ½ | 3¾ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 7 3/8 | 1 | 5 7/8 | 2.76 | 2¾* | ¼ | 2 3/8 | 9 1/8 |
| 4 | 1 1/8 | 1½ | ½ | 4½ | ½ | 5/8 | 1¾ | 1¼ | 3/8 | ¾-16 | 7 3/8 | 1 | 5 7/8 | 3.32 | 2¾* | ¼ | 2 3/8 | 9 1/8 |
| 5 | 1 1/8 | 1½ | ½ | 5½ | ½ | 5/8 | 1¾ | 1¼ | 7/16 | ¾-16 | 7 3/8 | 1 | 5 7/8 | 4.10 | 2¾* | ¼ | 2 3/8 | 9 3/16 |
| 6 | 1 5/8 | 2 | 5/8 | 6½ | ¾ | 5/8 | 2 | 1½ | 7/16 | 1-14 | 8¾ | 1 3/8 | 7 | 4.88 | 3½* | 3/8 | 2¾ | 10 13/16 |
| 8 | 1 5/8 | 2 | 5/8 | 8½ | ¾ | 5/8 | 2 | 1½ | 9/16 | 1-14 | 8¾ | 1 3/8 | 7 | 6.44 | 3½* | 3/8 | 2¾ | 10 15/16 |

* Round retainer (dia.) (Hex retainer illustrated).

'MS' Series Cylinders – Extend or Retract

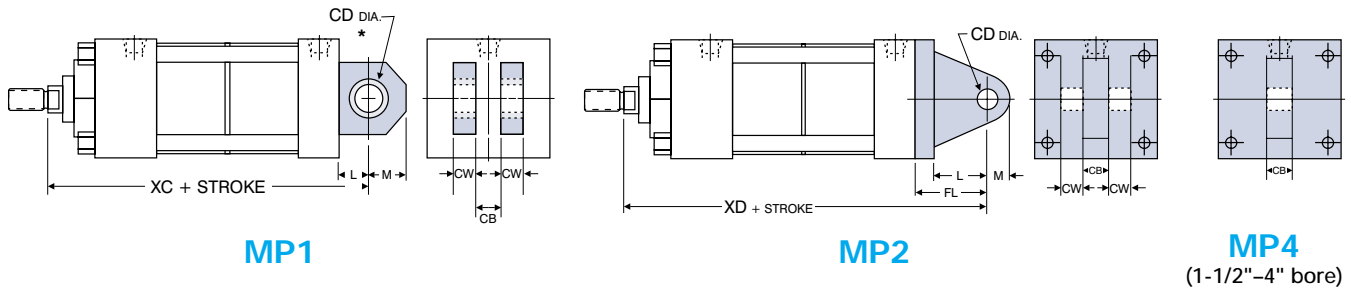
Oversize Rod Diameter Basic Dimensions MX0



| BORE | MULTI-STAGE OVERSIZE ROD DIAMETER | | | | | | | ADD STROKE PER STAGE | | |
|------|-----------------------------------|-------|-----|-----|-----|-------|-------|----------------------|---------|---------|
| | A | B | C | F | V | KK | MM | ZE | ZG | ZH |
| 1½ | 1 1/8 | 1½ | ½ | 3/8 | ½ | ¾-16 | 1 | 5 5/8 | 6 5/8 | 7 5/8 |
| 2 | 1 1/8 | 1½ | ½ | 3/8 | ½ | ¾-16 | 1 | 5 11/16 | 6 11/16 | 7 11/16 |
| 2½ | 1 1/8 | 1½ | ½ | 3/8 | ½ | ¾-16 | 1 | 5 11/16 | 6 11/16 | 7 11/16 |
| 3¼ | 1 5/8 | 2 | 5/8 | 5/8 | 3/8 | 1-14 | 1 3/8 | 6 7/8 | 8 1/8 | 9 3/8 |
| 4 | 1 5/8 | 2 | 5/8 | 5/8 | 3/8 | 1-14 | 1 3/8 | 6 7/8 | 8 1/8 | 9 3/8 |
| 5 | 1 5/8 | 2 | 5/8 | 5/8 | 3/8 | 1-14 | 1 3/8 | 6 15/16 | 8 3/16 | 9 7/16 |
| 6 | 2 | 2 3/8 | ¾ | 5/8 | ½ | 1¼-12 | 1¾ | 8 1/16 | 9 9/16 | 11 1/16 |
| 8 | 2 | 2 3/8 | ¾ | 5/8 | ½ | 1¼-12 | 1¾ | 8 3/16 | 9 11/16 | 11 3/16 |

For dimensions not shown see pages 29 and 30.

'MS' Series Pivot Mounts (in.)



MP1

MP2

MP4
(1-1/2"-4" bore)

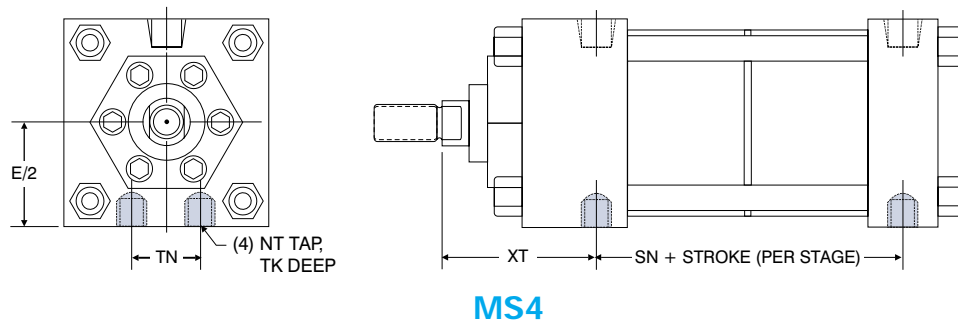
| MULTI-STAGE MP1 & MP2 CLEVIS AND MP4 EYE MOUNT DIMENSIONS | | | | | | | | ADD STROKE PER STAGE | | | | | |
|---|----------------|-------|-----|-----|-------|-------|-----|----------------------|--------|---------|--------|---------|--------|
| BORE | ROD DIAMETER | CB | CD | CW | FL | L | M | 2 STAGE | | 3 STAGE | | 4 STAGE | |
| | | | | | | | | XC | XD | XC | XD | XC | XD |
| 1 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 3/4 | 6 1/8 | 6 3/4 | 7 1/8 | 7 3/4 | 8 1/8 |
| | 6 1/8 | | | | | | | 6 1/2 | 7 1/8 | 7 1/2 | 8 1/8 | 8 1/2 | |
| 2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 3/4 | 6 1/8 | 6 3/4 | 7 1/8 | 7 3/4 | 8 1/8 |
| | 6 1/8 | | | | | | | 6 1/2 | 7 1/8 | 7 1/2 | 8 1/8 | 8 1/2 | |
| 2 1/2 | 5/8 Standard | 3/4 | 1/2 | 1/2 | 1 1/8 | 3/4 | 5/8 | 5 3/4 | 6 1/8 | 6 3/4 | 7 1/8 | 7 3/4 | 8 1/8 |
| | 6 1/8 | | | | | | | 6 1/2 | 7 1/8 | 7 1/2 | 8 1/8 | 8 1/2 | |
| 3 1/4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 1/2 | 8 1/8 | 8 3/4 | 9 3/8 | 10 | 10 5/8 |
| | 7 3/4 | | | | | | | 8 3/8 | 9 | 9 5/8 | 10 1/4 | 10 7/8 | |
| 4 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 1/2 | 8 1/8 | 8 3/4 | 9 3/8 | 10 | 10 5/8 |
| | 7 3/4 | | | | | | | 8 3/8 | 9 | 9 5/8 | 10 1/4 | 10 7/8 | |
| 5 | 1 Standard | 1 1/4 | 3/4 | 5/8 | 1 7/8 | 1 1/4 | 7/8 | 7 1/2 | 8 1/8 | 8 3/4 | 9 3/8 | 10 | 10 5/8 |
| | 7 3/4 | | | | | | | 8 3/8 | 9 | 9 5/8 | 10 1/4 | 10 7/8 | |
| 6 | 1 3/8 Standard | 1 1/2 | 1 | 3/4 | 2 1/4 | 1 1/2 | 1 | 8 7/8 | 9 5/8 | 10 3/8 | 11 1/8 | 11 7/8 | 12 5/8 |
| | 9 1/8 | | | | | | | 9 7/8 | 10 5/8 | 11 3/8 | 12 1/8 | 12 7/8 | |
| 8 | 1 3/8 Standard | 1 1/2 | 1 | 3/4 | N/A | 1 1/2 | 1 | 8 7/8 | N/A | 10 3/8 | N/A | 11 7/8 | N/A |
| | 9 1/8 | | | | | | | N/A | 10 5/8 | N/A | 11 7/8 | N/A | |

For dimensions not shown see pages 29 - 31.

* Pin included, (2) pressed in bearings.

Note: Extruded "MPI" mounts are standard (1-1/2" - 8" bores) cast iron mounts are optional and can be requested when ordering (1-1/2" - 6" bores).

'MS' Series Pivot Mounts (in.)



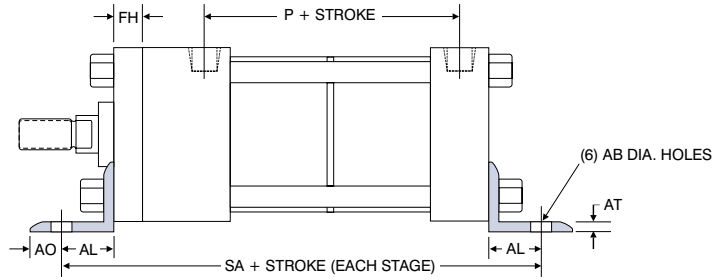
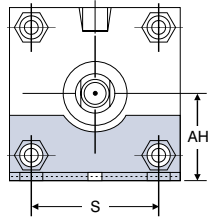
MS4

| MS4 BOTTOM TAPPED MOUNT DIMENSIONS | | | | | | | | | |
|------------------------------------|----------------|-------|---------|-------|---------|---------|-----------------------|---------|---------|
| BORE | ROD DIAMETER | E/2 | NT | TK | TN | XT | SN + STROKE PER STAGE | | |
| | | | | | | | 2 STAGE | 3 STAGE | 4 STAGE |
| 1 1/2 | 5/8 Standard | 1 | 1/4-20 | 3/8 | 5/8 | 1 15/16 | 2 5/8 | 3 5/8 | 4 5/8 |
| | 2 5/16 | | | | | | | | |
| 2 | 5/8 Standard | 1 1/4 | 5/16-18 | 1/2 | 7/8 | 1 15/16 | 2 5/8 | 3 5/8 | 4 5/8 |
| | 2 5/16 | | | | | | | | |
| 2 1/2 | 5/8 Standard | 1 1/2 | 3/8-16 | 5/8 | 1 1/4 | 1 15/16 | 2 5/8 | 3 5/8 | 4 5/8 |
| | 2 5/16 | | | | | | | | |
| 3 1/4 | 1 Standard | 1 7/8 | 1/2-13 | 3/4 | 1 1/2 | 2 7/16 | 3 3/4 | 4 1/2 | 5 1/4 |
| | 2 11/16 | | | | | | | | |
| 4 | 1 Standard | 2 1/4 | 1/2-13 | 3/4 | 2 1/16 | 2 7/16 | 3 3/4 | 4 1/2 | 5 1/4 |
| | 2 11/16 | | | | | | | | |
| 5 | 1 Standard | 2 3/4 | 5/8-11 | 1 | 2 11/16 | 2 7/16 | 3 3/4 | 4 1/2 | 5 1/4 |
| | 2 11/16 | | | | | | | | |
| 6 | 1 3/8 Standard | 3 3/4 | 3/4-10 | 1 1/8 | 3/4 | 2 13/16 | 3 7/8 | 5 3/8 | 6 7/8 |
| | 3 1/16 | | | | | | | | |
| 8 | 1 3/8 Standard | 4 1/4 | 3/4-10 | 1 1/8 | 4 1/2 | 2 13/16 | 3 7/8 | 5 3/8 | 6 7/8 |
| | 3 1/16 | | | | | | | | |

For dimensions not shown see pages 29 - 31.

'MS' Series Base Mounts (in.)

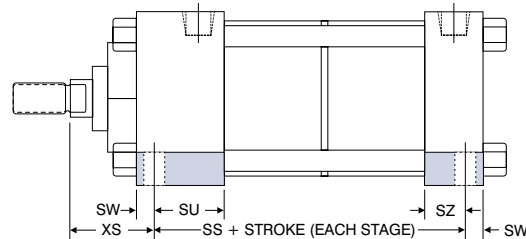
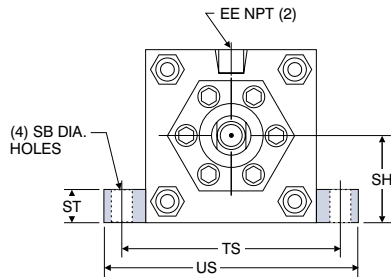
MS1



| MS2 SIDE LUG MOUNT DIMENSIONS | | | | | | | | | | | | |
|-------------------------------|----------------|-------|---------|---------|-------|------|------|-------|------------------------|---------|---------|--|
| BORE | ROD DIAMETER | AB | AH | AL | AO | AT | FH | S | +SA + STROKE PER STAGE | | | |
| | | | | | | | | | 2 STAGE | 3 STAGE | 4 STAGE | |
| 1½ | 5/8 Standard | 7/16 | 1 3/16 | 1 | 3/8 | 1/8 | 3/8 | 1¼ | 6 3/8 | 7 3/8 | 8 3/8 | |
| | 1 Oversize | | | | | | | | | | | |
| 2 | 5/8 Standard | 7/16 | 1 7/16 | 1 | 3/8 | 1/8 | 3/8 | 1¾ | 6 3/8 | 7 3/8 | 8 3/8 | |
| | 1 Oversize | | | | | | | | | | | |
| 2½ | 5/8 Standard | 7/16 | 1 5/8 | 1 | 3/8 | 1/8 | 3/8 | 2¼ | 6 3/8 | 7 3/8 | 8 3/8 | |
| | 1 Oversize | | | | | | | | | | | |
| 3¼ | 1 Standard | 9/16 | 1 15/16 | 1¼ | ½ | 1/8 | 5/8 | 2¾ | 8 | 9¼ | 10½ | |
| | 1 3/8 Oversize | | | | | | | | | | | |
| 4 | 1 Standard | 9/16 | 2¼ | 1¼ | ½ | 1/8 | 5/8 | 3½ | 8 | 9¼ | 10½ | |
| | 1 3/8 Oversize | | | | | | | | | | | |
| 5 | 1 Standard | 11/16 | 2¾ | 1 3/8 | 5/8 | 3/16 | 5/8 | 4¼ | 8¼ | 9½ | 10¾ | |
| | 1 3/8 Oversize | | | | | | | | | | | |
| 6 | 1 3/8 Standard | 13/16 | 3¼ | 1 3/8 | 5/8 | 3/16 | ¾ | 5¼ | 9¼ | 10¾ | 12¼ | |
| | 1¾ Oversize | | | | | | | | | | | |
| 8 | 1 3/8 Standard | 13/16 | 4¼ | 1 13/16 | 11/16 | ¼ | 5/8* | 7 1/8 | 9 3/8 | 10 7/8 | 12 3/8 | |
| | 1¾ Oversize | | | | | | | | | | | |

* Round retainer on 8" bore.

MS2



| MS2 SIDE LUG MOUNT DIMENSIONS | | | | | | | | | | | | | |
|-------------------------------|----------------|------|-------|----|-------|-----|-----|----|----|-------|-----------------------|---------|---------|
| BORE | ROD DIAMETER | SB | SH | ST | SU | SW | SZ | TS | US | XS | SS + STROKE PER STAGE | | |
| | | | | | | | | | | | 2 STAGE | 3 STAGE | 4 STAGE |
| 1½ | 5/8 Standard | 7/16 | 1 | ½ | 1 1/8 | 3/8 | 5/8 | 2¾ | 3½ | 1 3/8 | 3¼ | 4¼ | 5¼ |
| | 1 Oversize | | | | | | | | | | | | |
| 2 | 5/8 Standard | 7/16 | 1¼ | ½ | 1 1/8 | 3/8 | 5/8 | 3¼ | 4 | 1 3/8 | 3¼ | 4¼ | 5¼ |
| | 1 Oversize | | | | | | | | | | | | |
| 2½ | 5/8 Standard | 7/16 | 1½ | ½ | 1 1/8 | 3/8 | 5/8 | 3¾ | 4½ | 1 3/8 | 3¼ | 4¼ | 5¼ |
| | 1 Oversize | | | | | | | | | | | | |
| 3¼ | 1 Standard | 9/16 | 1 7/8 | ¾ | 1¼ | ½ | ¾ | 4¾ | 5¾ | 1 7/8 | 3 7/8 | 5 1/8 | 6 3/8 |
| | 1 3/8 Oversize | | | | | | | | | | | | |
| 4 | 1 Standard | 9/16 | 2¼ | ¾ | 1¼ | ½ | ¾ | 5½ | 6½ | 1 7/8 | 3 7/8 | 5 1/8 | 6 3/8 |
| | 1 3/8 Oversize | | | | | | | | | | | | |

* SS dimensions increase 1/2" on double rod cylinders.
Consult factory for 5, 6 & 8" bore MS2 mount.

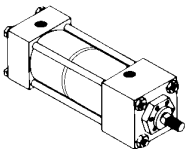
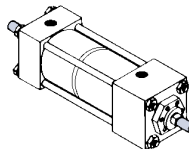
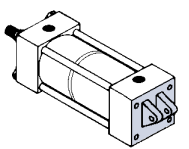
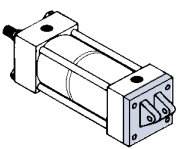
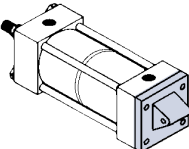
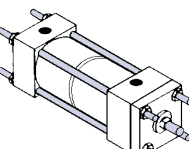
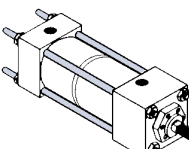
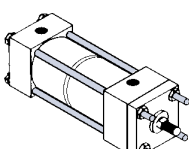
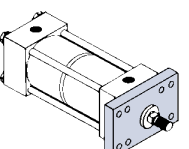
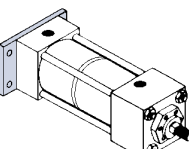
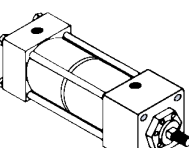
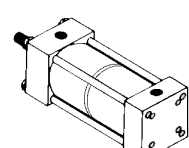
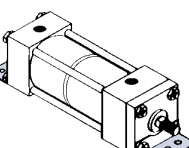
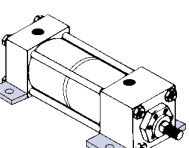
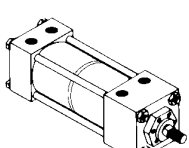
+ SA dimensions increase 1/2" and one FH on double rod cylinders.
For dimensions not shown see pages 29 - 31.

Note: overall lengths will change with the addition of non-rotating or magnetic pistons - consult factory.

'MS' Series Effective Piston Area/Force Chart

| BORE | STAGES | EFF. PISTON AREA (SQ. IN.) | | | | FORCE IN LBS. AT 60 PSI | | | | FORCE IN LBS. AT 100 PSI | | | |
|------|--------|----------------------------|----------|---------------|----------|-------------------------|----------|---------------|----------|--------------------------|----------|---------------|----------|
| | | EXTEND (MSE) | | RETRACT (MSR) | | EXTEND (MSE) | | RETRACT (MSR) | | EXTEND (MSE) | | RETRACT (MSR) | |
| | | STD. ROD Ø | O'SIZE Ø | STD. ROD Ø | O'SIZE Ø | STD. ROD Ø | O'SIZE Ø | STD. ROD Ø | O'SIZE Ø | STD. ROD Ø | O'SIZE Ø | STD. ROD Ø | O'SIZE Ø |
| 1½ | 2 | 3.228 | 2.749 | 2.922 | 1.964 | 193 | 164 | 175 | 117 | 322 | 274 | 292 | 196 |
| | 3 | 4.687 | 3.731 | 4.383 | 2.946 | 281 | 223 | 262 | 176 | 468 | 373 | 438 | 294 |
| | 4 | 6.150 | 4.713 | 5.844 | 3.928 | 369 | 282 | 350 | 235 | 615 | 471 | 584 | 392 |
| 2 | 2 | 5.974 | 5.499 | 5.668 | 4.714 | 358 | 329 | 340 | 282 | 597 | 549 | 566 | 471 |
| | 3 | 8.808 | 7.856 | 8.502 | 7.071 | 528 | 471 | 510 | 424 | 880 | 785 | 850 | 707 |
| | 4 | 11.642 | 10.213 | 11.336 | 9.428 | 698 | 612 | 680 | 565 | 1164 | 1021 | 1133 | 942 |
| 2½ | 2 | 9.490 | 9.033 | 9.188 | 8.248 | 569 | 541 | 551 | 494 | 949 | 903 | 918 | 824 |
| | 3 | 14.080 | 13.157 | 13.782 | 12.372 | 844 | 789 | 826 | 742 | 1408 | 1315 | 1378 | 1237 |
| | 4 | 18.680 | 17.281 | 18.376 | 16.496 | 1120 | 1036 | 1102 | 989 | 1868 | 1728 | 1837 | 1649 |
| 3¼ | 2 | 15.807 | 15.107 | 15.022 | 13.622 | 948 | 906 | 901 | 817 | 1580 | 1510 | 1502 | 1362 |
| | 3 | 23.317 | 21.918 | 22.532 | 20.433 | 1399 | 1315 | 1351 | 1225 | 2331 | 2191 | 2253 | 2043 |
| | 4 | 30.828 | 28.729 | 30.043 | 27.244 | 1849 | 1723 | 1802 | 1634 | 3082 | 2872 | 3004 | 2724 |
| 4 | 2 | 24.347 | 23.647 | 23.562 | 22.166 | 1460 | 1418 | 1413 | 1329 | 2434 | 2364 | 2356 | 2216 |
| | 3 | 36.127 | 34.728 | 35.342 | 33.243 | 2167 | 2083 | 2120 | 1994 | 3612 | 3472 | 3534 | 3324 |
| | 4 | 47.908 | 45.809 | 47.123 | 44.324 | 2874 | 2748 | 2827 | 2659 | 4790 | 4580 | 4712 | 4432 |
| 5 | 2 | 38.485 | 37.785 | 37.700 | 36.3 | 2309 | 2267 | 2262 | 2178 | 3848 | 3778 | 3770 | 3630 |
| | 3 | 57.334 | 55.935 | 56.549 | 54.45 | 3440 | 3356 | 3392 | 3267 | 5733 | 5593 | 5654 | 5445 |
| | 4 | 76.184 | 74.085 | 75.399 | 72.6 | 4571 | 4445 | 4523 | 4356 | 7618 | 7408 | 7539 | 7260 |
| 6 | 2 | 55.065 | 54.143 | 53.582 | 51.736 | 3303 | 3248 | 3214 | 3104 | 5506 | 5414 | 5358 | 5136 |
| | 3 | 81.854 | 80.012 | 80.370 | 77.607 | 4911 | 4800 | 4822 | 4656 | 8185 | 8001 | 8037 | 7760 |
| | 4 | 108.644 | 105.881 | 107.16 | 103.476 | 6518 | 6352 | 6429 | 6208 | 10864 | 10588 | 10716 | 10347 |
| 8 | 2 | 99.047 | 98.125 | 97.564 | 95.72 | 5942 | 5887 | 5853 | 5743 | 9904 | 9812 | 9756 | 9572 |
| | 3 | 147.834 | 145.985 | 146.35 | 143.58 | 8870 | 8759 | 8781 | 8614 | 14783 | 14598 | 14635 | 14358 |
| | 4 | 196.611 | 193.845 | 195.13 | 191.44 | 11796 | 11630 | 11707 | 11486 | 19661 | 19384 | 19513 | 19144 |

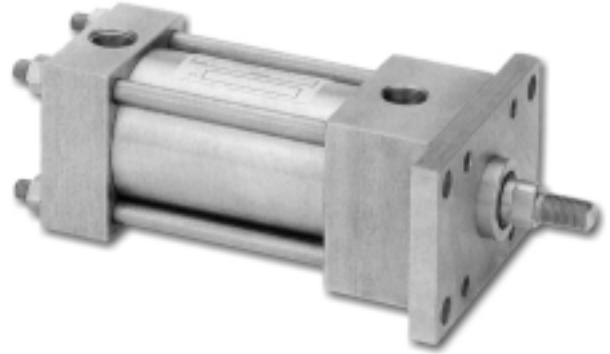
'MS' Series – NFPA Mounts

| | | | | |
|--|---|--|---|--|
|  MX0 1½ - 8 Bores |  MX0D 1½ - 8 Bores |  MP1 1½ - 8 Bores |  MP2 1½ - 6 Bores |  MP4 1½ - 4 Bores |
|  MX1 1½ - 8 Bores |  MX2 1½ - 8 Bores |  MX3 1½ - 8 Bores |  MF1 1½ - 6 Bores |  MF2 1½ - 6 Bores |
|  ME3 8" Bores |  ME4 8" Bores |  MS1 1½ - 8 Bores |  MS2 1½ - 4 Bores |  MS4 1½ - 8 Bores |

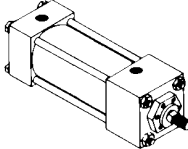
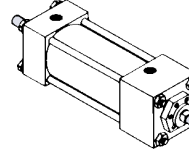
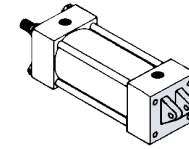
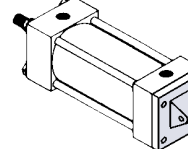
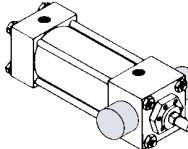
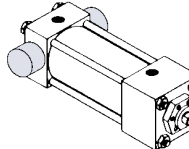
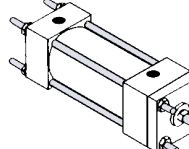
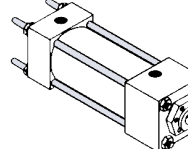
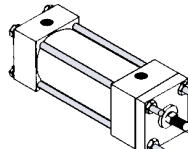
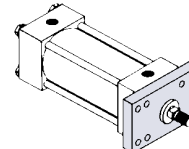
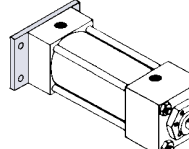
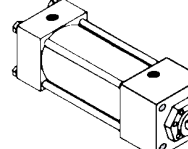
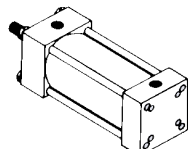
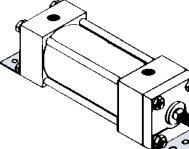
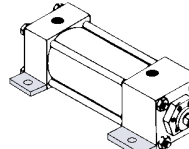
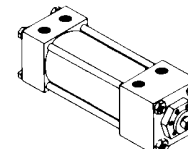
'SS' Series NFPA Cylinders

Stainless Steel Cylinders for Highly Corrosive Environments 1-1/2" through 10" Bore

- All external components manufactured of series 300 stainless steel.
- All cylinders built to NFPA specifications offering 16 standard mounting styles.
- Bearing is precision machined from bearing bronze.
- Adjustable cushions optional.
- Magnetic piston can be incorporated to activate position sensing devices.
- Pressure rated to 250 PSI air and 400 PSI hydraulic (non-shock).



NFPA Mounts

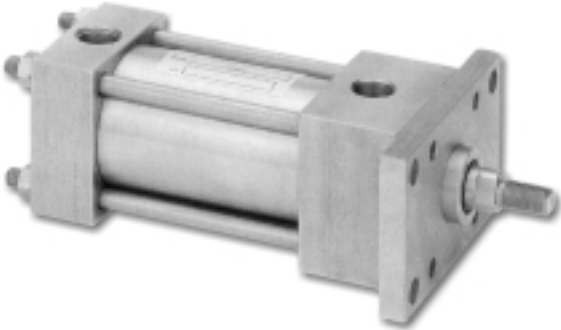
| | | | |
|---|--|---|---|
| <p>MX0</p>  <p>1 1/2" - 10" Bores Page 16 & 17</p> | <p>MX0D</p>  <p>1 1/2" - 10" Bores Page 16 & 17</p> | <p>MP1</p>  <p>1 1/2" - 10" Bores Page 18</p> | <p>MP4</p>  <p>1 1/2" - 4" Bores Page 18</p> |
| <p>MT1</p>  <p>1 1/2" - 8" Bores Page 19</p> | <p>MT2</p>  <p>1 1/2" - 8" Bores Page 19</p> | <p>MX1</p>  <p>1 1/2" - 10" Bores Page 20</p> | <p>MX2</p>  <p>1 1/2" - 10" Bores Page 20</p> |
| <p>MX3</p>  <p>1 1/2" - 10" Bores Page 20</p> | <p>MF1</p>  <p>1 1/2" - 6" Bores Page 20</p> | <p>MF2</p>  <p>1 1/2" - 6" Bores Page 20</p> | <p>ME3</p>  <p>8" - 10" Bores Page 20</p> |
| <p>ME4</p>  <p>8" & 10" Bores Page 20</p> | <p>MS1</p>  <p>1 1/2" - 8" Bores Page 21</p> | <p>MS2</p>  <p>1 1/2" - 10" Bores Page 21</p> | <p>MS4</p>  <p>1 1/2" - 10" Bores Page 21</p> |

'EN' Series NFPA Cylinders

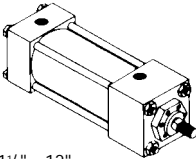
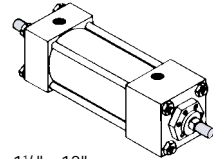
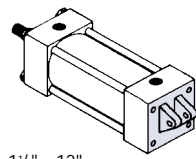
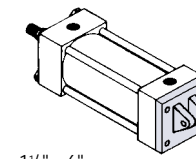
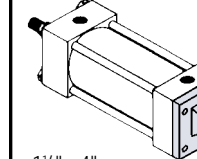
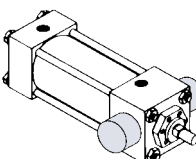
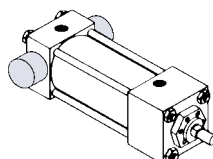
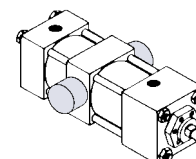
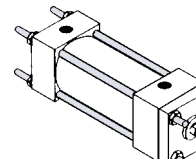
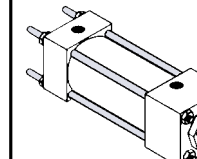
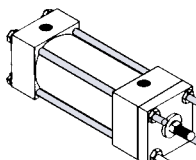
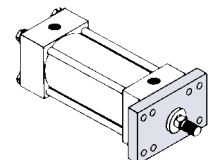
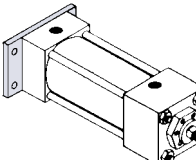
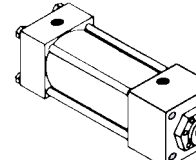
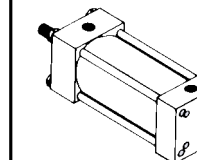
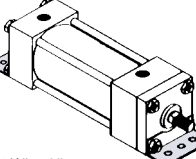
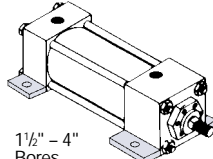
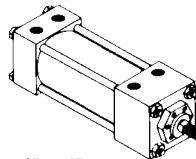
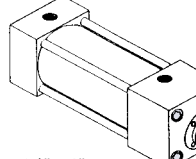
Electroless Nickel Plated Cylinders for Highly Corrosive Environments 1-1/2" through 12" Bore

TRD's Electroless Nickel Plated Cylinders are designed for specific applications in chemical, food processing, and dairy plants. Electroless nickel plated cylinders are an economical alternative to stainless steel cylinders in many corrosive applications. TRD recommends stainless steel cylinders in chemical environments that affect electroless nickel plating.

- Bushing retainer, end caps, tube and mounting accessories are electroless nickel plated.
- All other external components are 300 series stainless steel.



NFPA Mounts

| | | | | |
|--|---|---|--|---|
| <p>MX0</p>  <p>1 1/2" - 12" Bores Page 16 & 17</p> | <p>MX0D</p>  <p>1 1/2" - 12" Bores Page 16 & 17</p> | <p>MP1</p>  <p>1 1/2" - 12" Bores Page 18</p> | <p>MP2</p>  <p>1 1/2" - 6" Bores Page 18</p> | <p>MP4</p>  <p>1 1/2" - 4" Bores Page 18</p> |
| <p>MT1</p>  <p>1 1/2" - 8" Bores Page 19</p> | <p>MT2</p>  <p>1 1/2" - 8" Bores Page 19</p> | <p>MT4</p>  <p>1 1/2" - 8" Bores Page 19</p> | <p>MX1</p>  <p>1 1/2" - 12" Bores Page 20</p> | <p>MX2</p>  <p>1 1/2" - 12" Bores Page 20</p> |
| <p>MX3</p>  <p>1 1/2" - 12" Bores Page 20</p> | <p>MF1</p>  <p>1 1/2" - 6" Bores Page 20</p> | <p>MF2</p>  <p>1 1/2" - 6" Bores Page 20</p> | <p>ME3</p>  <p>8" - 12" Bores Page 20</p> | <p>ME4</p>  <p>8" - 12" Bores Page 20</p> |
| <p>MS1</p>  <p>1 1/2" - 8" Bores Page 21</p> | <p>MS2</p>  <p>1 1/2" - 4" Bores Consult factory for larger size. Page 21</p> | <p>MS4</p>  <p>1 1/2" - 12" Bores Page 21</p> | <p>FM Series</p>  <p>1 1/2" - 6" Bores Page 26-28</p> | |

'NR' Series NFPA Cylinders

Non-Rotating Cylinders

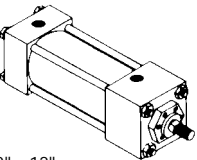
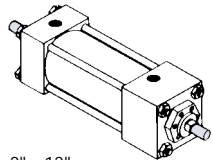
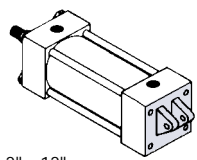
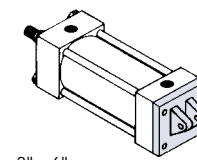
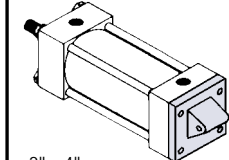
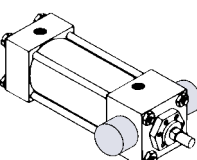
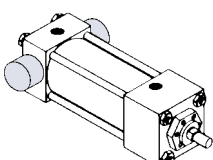
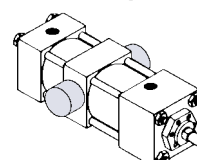
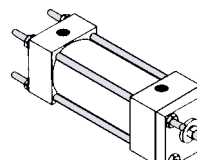
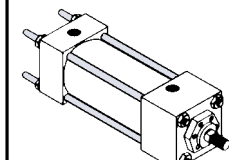
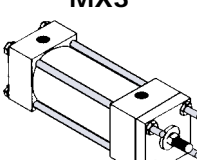
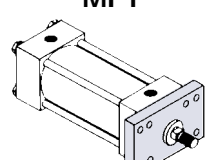
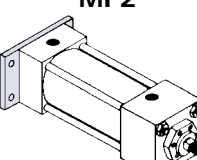
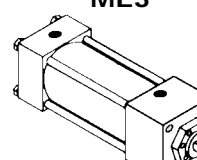
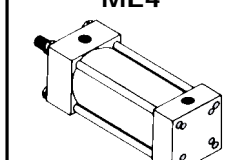
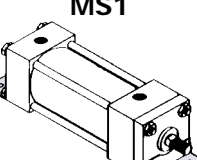
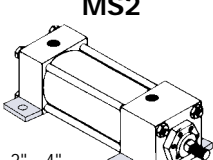
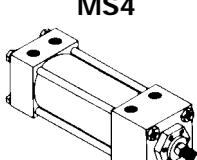
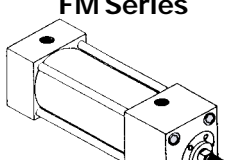
2" through 12" Bore

200 PSI Air, 400 PSI Hydraulic (Non-Shock)

- Non-rotating feature is accomplished by use of internal guide rods.
- All external dimensions of 'TA' series remain unchanged.
- Standard rod available 2" through 12" bore. Oversized rod available 2½" through 12" bore.
- Adjustable cushions available with standard rods 3¼" through 12" bore and oversized rods 4" through 12" bore.
- Double rod end construction available.
- All stainless steel or electroless nickel plated construction available.



NFPA Mounts

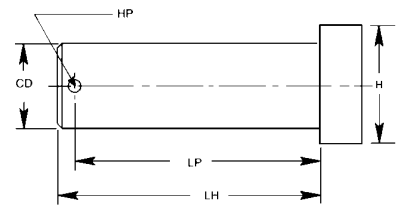
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|--|---|---|---|---|
| <p>MX0</p>  <p>2" - 12" Bores Page 16 & 17</p> | <p>MX0D</p>  <p>2" - 12" Bores Page 16 & 17</p> | <p>MP1</p>  <p>2" - 12" Bores Page 18</p> | <p>MP2</p>  <p>2" - 6" Bores Page 18</p> | <p>MP4</p>  <p>2" - 4" Bores Page 18</p> |
| <p>MT1</p>  <p>2" - 8" Bores Page 19</p> | <p>MT2</p>  <p>2" - 8" Bores Page 19</p> | <p>MT4</p>  <p>2" - 8" Bores Page 19</p> | <p>MX1</p>  <p>2" - 12" Bores Page 20</p> | <p>MX2</p>  <p>2" - 12" Bores Page 20</p> |
| <p>MX3</p>  <p>2" - 12" Bores Page 20</p> | <p>MF1</p>  <p>2" - 6" Bores Page 20</p> | <p>MF2</p>  <p>2" - 6" Bores Page 20</p> | <p>ME3</p>  <p>8" - 12" Bores Page 20</p> | <p>ME4</p>  <p>8" - 12" Bores Page 20</p> |
| <p>MS1</p>  <p>2" - 8" Bores Page 21</p> | <p>MS2</p>  <p>2" - 4" Bores Consult factory for larger size. Page 21</p> | <p>MS4</p>  <p>2" - 12" Bores Page 21</p> | <p>FM Series</p>  <p>2" - 6" Bores Page 25 -28</p> | |

Cylinder Accessories (in.)

| CLEVIS PIN | | | | | |
|------------|--|--------|-------|-------|---------|
| PART NO. | CD ^{-0.010} / _{-0.015} | H | HP | LH | LP |
| CP500 | 1/2 | 5/8 | 5/32 | 2 1/4 | 2 3/32 |
| CP750 | 3/4 | 15/16 | 5/32 | 3 | 2 27/32 |
| CP1000 | 1 | 1 3/16 | 13/64 | 3 1/2 | 3 5/16 |
| CP1375 | 1 3/8 | 1 3/4 | 1/4 | 5 | 4 1/2 |
| CP1750 | 1 3/4 | 2 9/64 | 1/4 | 6 | 5 1/2 |

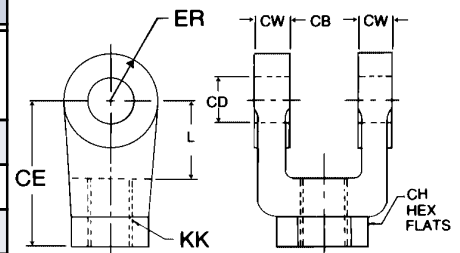


Bridge Pin



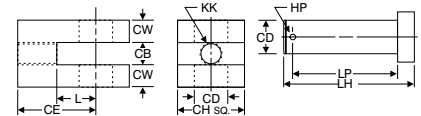
Clevis Pins sold with Bridge Pins.
Close tolerance pins available.

| ROD CLEVIS | | | | | | | | |
|------------|-------|-------|-------|-------|-------|-------|----------|-------|
| PART NO. | CB | CD | CE | CH | CW | ER | KK | L |
| RC437 | 3/4 | 1/2 | 1 1/2 | 1 | 1/2 | 1/2 | 7/16-20 | 3/4 |
| RC500 | | | | | | | 1/2-20 | |
| RC750 | 1 1/4 | 3/4 | 2 3/8 | 1 1/4 | 5/8 | 3/4 | 3/4-16 | 1 1/4 |
| RC1000 | 1 1/2 | 1 | 3 1/8 | 1 1/2 | 3/4 | 1 | 1-14 | 1 1/2 |
| RC1250 | 2 | 1 3/8 | 4 1/8 | 2 | 1 | 1 3/8 | 1 1/4-12 | 2 1/8 |
| RC1500 | 2 1/2 | 1 3/4 | 4 1/2 | 2 3/8 | 1 1/4 | 1 3/4 | 1 1/2-12 | 2 1/4 |

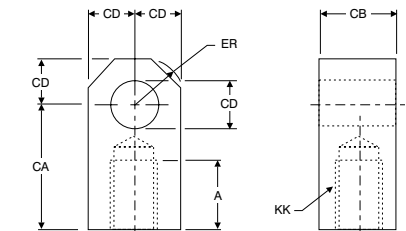


| SMALL ROD CLEVIS | | | | | | | | |
|------------------|-----|-----|-------|-------|-----|---------|--------|-----|
| PART NO. | CB | CD | CE | CH | CW | KK1 | KK2 | L |
| RC437CCS | 1/2 | 1/2 | 1 3/8 | 1 | 1/4 | 7/16-20 | — | 3/4 |
| RC500CCS | 1/2 | 1/2 | 1 3/8 | 1 | 1/4 | — | 1/2-20 | 3/4 |
| RC750CCS | 3/4 | 3/4 | 1 3/4 | 1 1/2 | 3/8 | 3/4-16 | — | 1 |

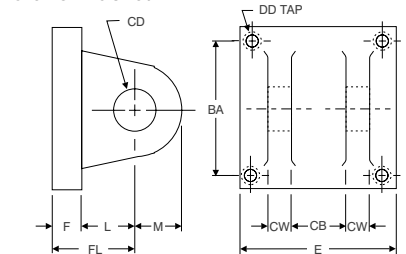
| SMALL CLEVIS PIN | | | | |
|------------------|-----|------|-------|-------|
| PART NO. | CD | HP | LH | LP |
| CP500CCS | 1/2 | 5/32 | 1 3/8 | 1 1/4 |
| CP750CCS | 3/4 | 5/32 | 2 | 1 7/8 |



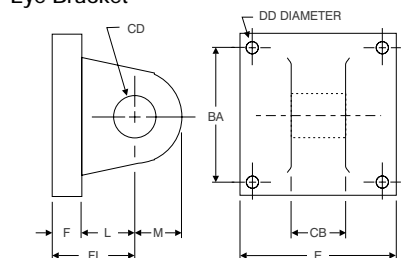
| ROD EYE | | | | | | |
|----------|-------|---------|-------|-------|--------|----------|
| PART NO. | A | CA | CB | CD | ER | KK |
| RE437 | 3/4 | 1 1/2 | 3/4 | 1/2 | 5/8 | 7/16-20 |
| RE500 | | | | | | 1/2-20 |
| RE750 | 1 1/8 | 2 1/16 | 1 1/4 | 3/4 | 7/8 | 3/4-16 |
| RE1000 | 1 5/8 | 2 13/16 | 1 1/2 | 1 | 1 3/16 | 1-14 |
| RE1250 | 2 | 3 7/16 | 2 | 1 3/8 | 1 9/16 | 1 1/4-12 |
| RE1500 | 2 1/4 | 4 | 2 1/2 | 1 1/4 | 2 | 1 1/2-12 |



Clevis Bracket



Eye Bracket



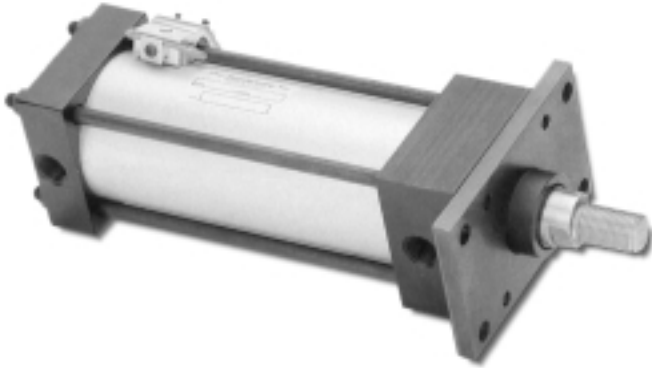
| CLEVIS BRACKETS AND EYE BRACKETS | | | | | | | | | | | |
|----------------------------------|-----------------|---------|-------|-------|-----|--------|-------|-----|-------|-------|-------|
| PART NO. | DESCRIPTION | BA | CB | CD | CW | DD | E | F | FL | L | M |
| CB500 | CLEVIS BRACKETS | 1 5/8 | 3/4 | 1/2 | 1/2 | 3/8-24 | 2 1/2 | 3/8 | 1 1/8 | 3/4 | 5/8 |
| CB750 | | 2 9/16 | 1 1/4 | 3/4 | 5/8 | 1/2-20 | 3 1/2 | 5/8 | 1 7/8 | 1 1/4 | 3/4 |
| CB1000 | | 3 3/4 | 1 1/2 | 1 | 3/4 | 5/8-18 | 4 1/2 | 3/4 | 2 1/4 | 1 1/2 | 1 |
| CB1375 | | 3 13/16 | 2 | 1 3/8 | 1 | 5/8-18 | 5 | 7/8 | 3 | 2 1/8 | 1 3/8 |
| EB500 | EYE BRACKETS | 1 5/8 | 3/4 | 1/2 | N/A | 13/32 | 2 1/2 | 3/8 | 1 1/8 | 3/4 | 1/2 |
| EB750 | | 2 9/16 | 1 1/4 | 3/4 | | 17/32 | 3 1/2 | 5/8 | 1 7/8 | 1 1/4 | 3/4 |
| EB1000 | | 3 3/4 | 1 1/2 | 1 | | 21/32 | 4 1/2 | 3/4 | 2 1/4 | 1 1/2 | 1 |
| EB1375 | | 3 13/16 | 2 | 1 3/8 | | 21/32 | 5 | 7/8 | 3 | 2 1/8 | 1 3/8 |

* Clevis Pins sold separately from Rod Clevises and Brackets.

Magnetic Switches

Magnetically operated Reed and Hall Effect Switches are an economical and reliable alternative to external limit switch and cam combinations. TRD offers both Reed and Hall Effect Switches. These switches are designed to clamp securely to a cylinder tie rod. The switch can be positioned anywhere along the cylinder stroke, or multiple switches can be installed on a cylinder for sequencing.

A magnetic strip mounted in the cylinder piston activates both types of switches. The magnetic strip is oriented differently for the Reed and Hall Effect Switches. When ordering specify MPR for Reed Switch applications and MPH for Hall Effect Switches.



- Low profile Reed and Hall Effect Switches can be mounted on 1½" through 8" bore cylinders.
- Cable Restraint Bracket is provided with Switch Bracket to prevent damage to switch due to flexing.
- Low profile brackets hold switches securely to the tie rod and tube. Brackets can be moved along the tie rods for precision adjustment.
- LED Indicator provides a convenient means for positioning and troubleshooting circuits.
- 6 ft. cord provided with switch with longer lengths available. Consult factory for details.

Reed Switches

| SPECIFICATIONS | Part No. RS 01 AC | Part No. RS 02 DC |
|---------------------|-----------------------------------|----------------------|
| OPERATING PRINCIPLE | Magnetic Reed | |
| ACTUATED BY | Piston Magnet | |
| INPUT VOLTAGE | 65 to 120 VAC | 4.5 to 24 VDC |
| OUTPUT VOLTAGE | Contact Closure | |
| POWER CAPACITY | 10 Watt Max. | |
| CURRENT RATING | 200 mA. Switched | |
| CONTACT RESISTANCE | 90 mOhm Max. | |
| ENVIRONMENTAL | NEMA 1, 2, 3, 4, 12, 13, IEC IP67 | |
| OPERATING TEMP. | 0 to 80°C | |

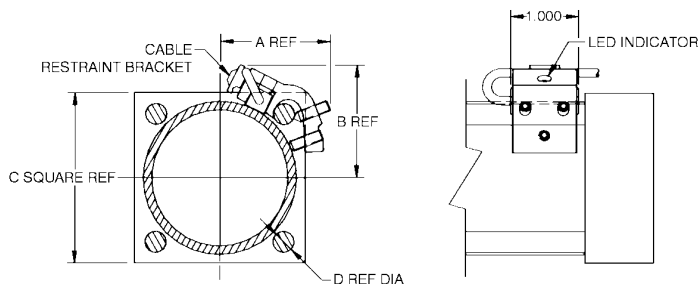
Hall Effect Switches

| SPECIFICATIONS | Part No. HE 03 SK | Part No. HE 04 SC |
|---------------------|-----------------------------------|----------------------|
| OPERATING PRINCIPLE | Hall Effect | |
| ACTUATED BY | Piston Magnet | |
| INPUT VOLTAGE | 4.5 to 24 VDC | |
| OUTPUT TYPE | Sinking (NPN) | Sourcing (PNP) |
| CURRENT RATING | 20 mA. Max. | 100 mA. Max. |
| VOLTAGE DROP | .5 VDC Max. | |
| SWITCH BURDEN | 10 mA. Max. | |
| ENVIRONMENTAL | NEMA 1, 2, 3, 4, 12, 13, IEC IP67 | |
| OPERATING TEMP. | 0 to 80°C | |

Note: Electrical Transients (inrush current or live spikes) associated with inductive or capacitive loads can damage and reduce the life of the switch.

| TRD MAGNETIC SWITCHES | | | TRD SWITCH BRACKETS | |
|-----------------------|----------------------|--------------|---------------------|-------------------------|
| Switch Part No. | Description | Switch Color | NFPA Cylinder Bore | Switch Bracket Part No. |
| RS01AC | Reed | Green | 1½, 2, 2½, 3¼ & 4 | SB510 |
| RS02DC | Reed | White | | |
| HE03SK | Hall Effect (Sink) | Yellow | 5, 6 & 8 | SB590 |
| HE04SC | Hall Effect (Source) | Red | | |

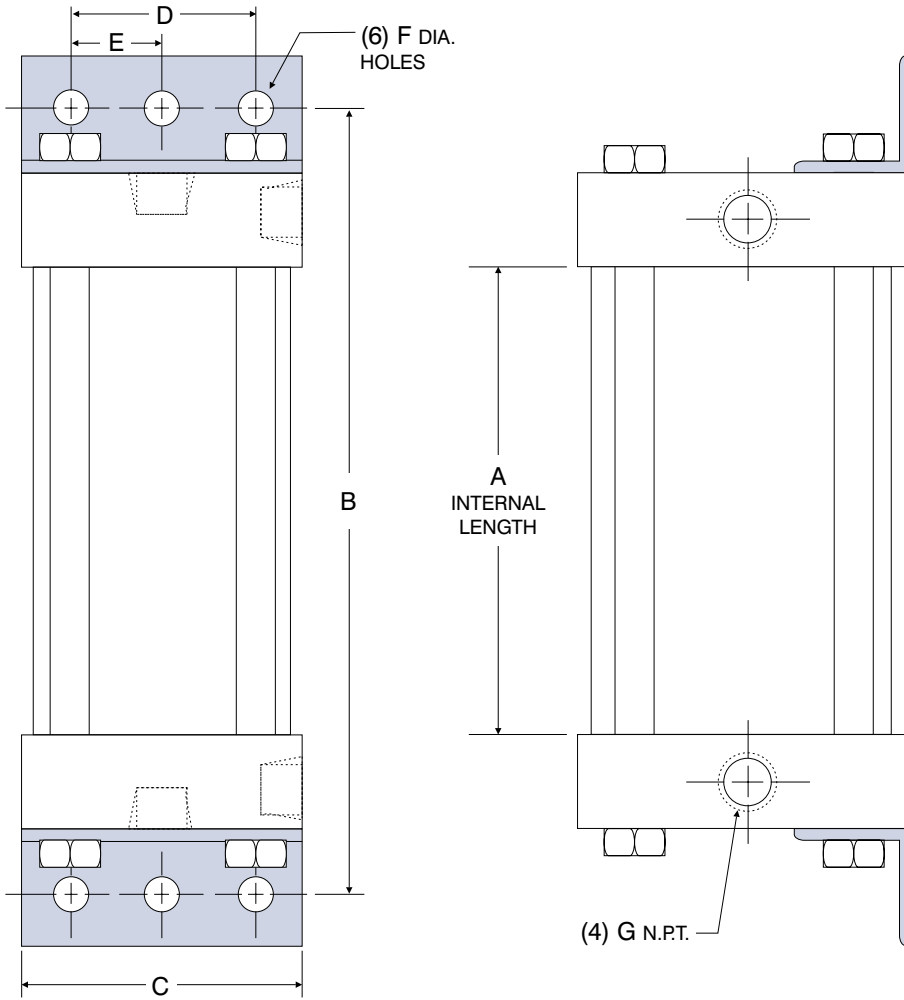
Consult factory for 10" & 12" bores.



| SWITCH BRACKETS | | | | | |
|-----------------|-----------|------------------|-------|-------|------|
| Part No. | BORE SIZE | LETTER DIMENSION | | | |
| | | A | B | C | D |
| SB510 | 1½ | 1.375 | 1.500 | 2.000 | .250 |
| | 2 | 1.500 | 1.750 | 2.500 | .312 |
| | 2½ | 1.750 | 1.875 | 3.000 | .312 |
| | 3¼ | 2.000 | 2.187 | 3.750 | .375 |
| SB590 | 4 | 2.375 | 2.500 | 4.500 | .375 |
| | 5 | 3.000 | 3.125 | 5.500 | .500 |
| | 6 | 3.375 | 3.375 | 6.500 | .500 |
| | 8 | 4.000 | 4.125 | 8.500 | .625 |

Air Oil Tanks (in.)

200 PSI Rating



TRD Cylinders

Alignment Couplers

Flow Controls

Double-Wall Cylinders

| PART NUMBER & VOLUME | | | | PLUS INTERNAL LENGTH | | TANK DIMENSIONS | | | | |
|----------------------|------|-------|---------------------|----------------------|-------|-----------------|-------|--------|-------|-----|
| PART NO. | BORE | AREA | *GALS PER INCH TANK | A | B | C | D | E | F | G** |
| A/T250 | 2½ | 4.909 | .0213 | 0 | 4 | 3 | 2¼ | 1 1/8 | 7/16 | 3/8 |
| A/T325 | 3¼ | 8.29 | .0359 | 0 | 5 | 3¾ | 2¾ | 1 3/8 | 9/16 | ½ |
| A/T400 | 4 | 12.56 | .0544 | 0 | 5 | 4½ | 3½ | 1¾ | 9/16 | ½ |
| A/T500 | 5 | 19.64 | .085 | 0 | 5¼ | 5½ | 4¼ | 2 1/8 | 11/16 | ½ |
| A/T800 | 8 | 50.26 | .2175 | 0 | 6 5/8 | 8½ | 7 1/8 | 3 9/16 | 11/16 | ¾ |

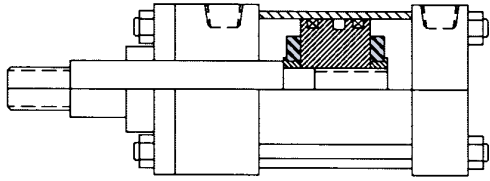
* This is total internal volume, not recommended usable oil capacity.

** Fill and drain ports located at top & bottom of air oil tank.

- Stainless baffles to reduce aeration & foaming.
- Fiber wound translucent tube construction.
- Available with aluminum tube & sight gauge as option.
- Note: When figuring useable volume - use 75% of capacity of tank as useable.
i.e.: 3 ¼ bore 6" internal length = 8.29 x 6 = 49.74 x .75 = 37.3 C.I. useable.

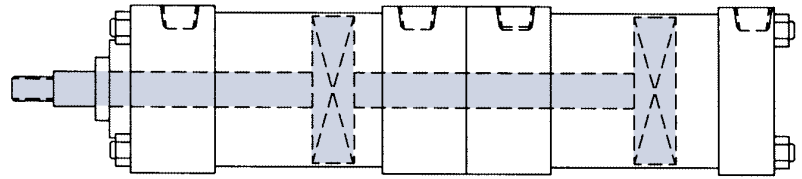
Custom Cylinders and Options

* Call TRD for Special Quote

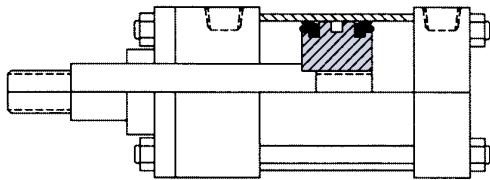


Impact dampening bumpers, used when cushions are not required and cylinder speeds are important. Note: overall length is increased by 1/4" per bumper.

Add to part description: -B (bumper both ends)
-BH (bumper head)
-BC (bumper caps)

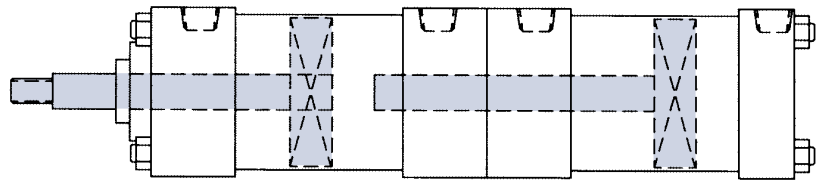


* Air/Oil Tandem Cylinder (Rods Connected)



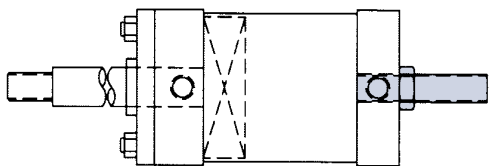
TRD can supply impact absorbing bumper piston seals. These seals work best in conjunction with the standard cushion option, and are designed for air service only. The cylinder stroke will be slightly effected (shortened) depending on operating pressure of the cylinder. The overall length of the cylinder is not affected by the addition of bumper piston seals and standard catalog dimensions can be used.

Add to part description: -BP



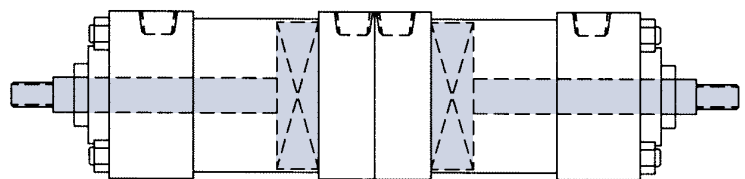
* Multiple Position Cylinder

(Advise total movement (stroke) in front cylinder) rods are not connected.

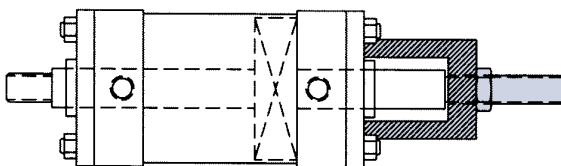


Standard Adjustable Stroke Cylinder

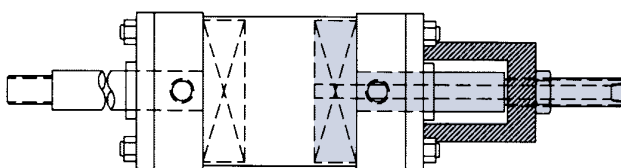
Add to part description: -AS



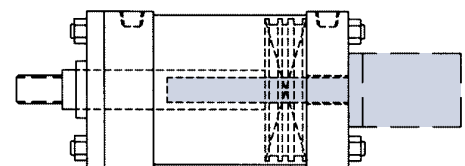
* Back to Back Cylinder



* Double Rod Adjustable Cylinder (Rods Connected)



* Adjustable/Retractable (Three Ports-Two Piston Construction)



* Linear Transducer Ready

TRD will machine the piston rod, piston, and cap to accept the linear transducer of your choice. Transducer to be mounted by customer or distributor.

Technical Data

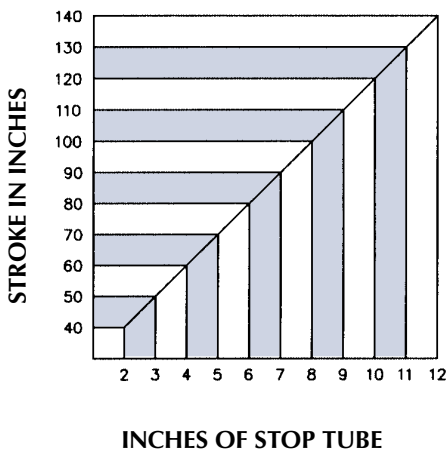
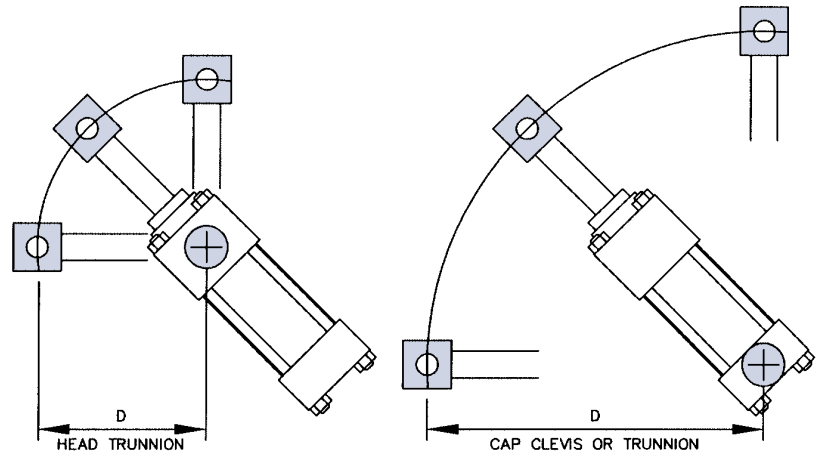
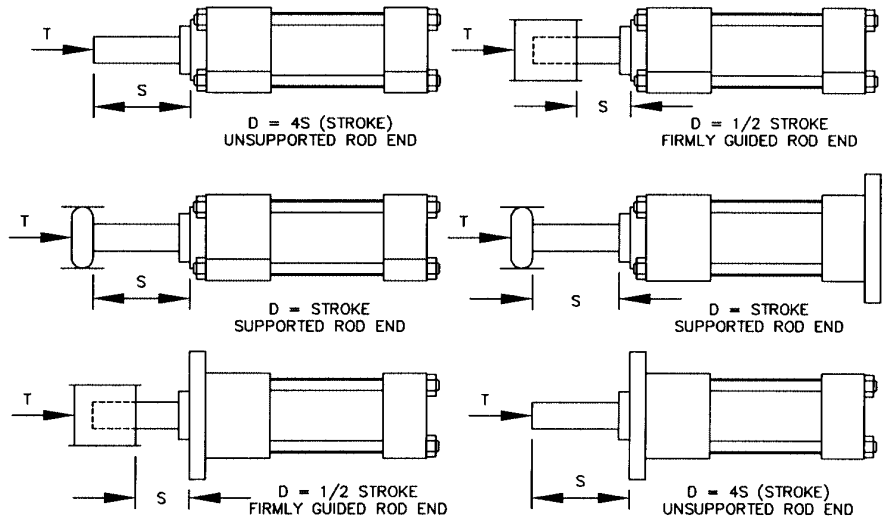
Mountings to Determine "D"

Stop Tube Selection

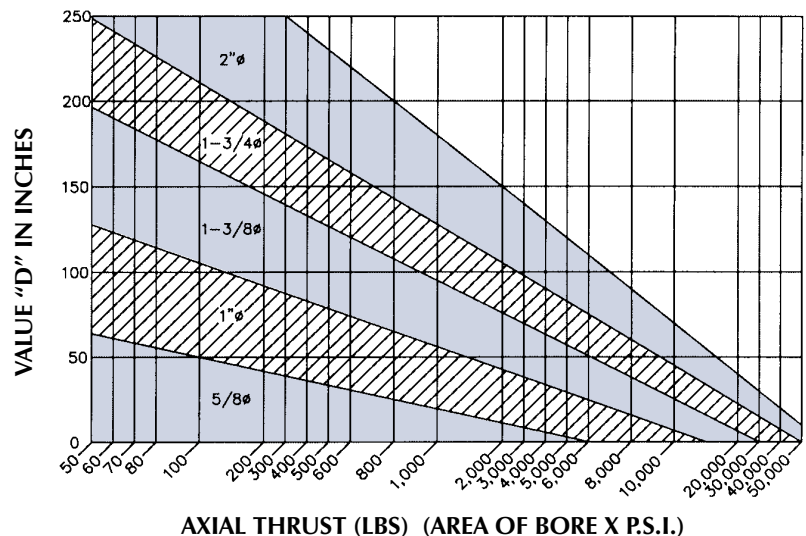
Stop tubes are installed between the piston and head on long stroke cylinders. This can reduce the load on the rod bearing, and buckling of the cylinder piston rod.

To determine if a stop tube is required, and its length, you must first determine the value of "D" from the chart shown with the rod in the fully extended position. If "D" is less than 40", *no stop tube is required. If "D" is over 40", a good "rule of thumb" would be 1" of stop tube for every 10" (or fraction of inch) over 40". When stop tubes are needed, TRD recommends a minimum of 2". This will automatically give you a double piston construction.

*These are basic guidelines to work with. Consult TRD engineering staff with any stop tube application questions you may have.



ROD SIZE SELECTION



Technical Data

Weight Chart – Basic Cylinders (Weight in Pounds)

| BORE | MODEL | | | | | | | | ADD PER IN. OF STROKE |
|------|-------|-------------|------|-------|------|------|-----------------|------|-----------------------|
| | MX0 | MS1 MT1/MT2 | MS4 | MP1 | MP2 | MP4 | MF1/MF2 ME3/ME4 | MS2 | |
| 1½ | 1.6 | 2.0 | 1.6 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 | .20 |
| 2 | 2.4 | 2.9 | 2.4 | 3.2 | 3.3 | 3.2 | 3.2 | 3.6 | .25 |
| 2½ | 3.3 | 3.9 | 3.3 | 4.3 | 4.5 | 4.5 | 4.5 | 4.7 | .27 |
| 3¼ | 6.5 | 7.9 | 6.5 | 9.2 | 10.1 | 10.0 | 10.0 | 9.0 | .51 |
| 4 | 8.8 | 10.5 | 8.8 | 12.1 | 13.3 | 13.2 | 13.2 | 11.1 | .55 |
| 5 | 13.2 | 14.3 | 13.2 | 17.8 | 19.9 | N/A | 20.0 | 17.5 | .59 |
| 6 | 21.5 | 25.2 | 21.5 | 29.7 | 32.2 | N/A | 32.2 | 27.2 | .84 |
| 8 | 35.4 | 36.5 | 35.4 | 43.5 | N/A | N/A | 35.4 | N/A | 1.25 |
| 10 | 70.3 | N/A | 70.0 | 72.0 | N/A | N/A | 70.3 | N/A | 1.60 |
| 12 | 107.9 | N/A | N/A | 109.9 | N/A | N/A | 107.5 | N/A | 2.30 |

All weights are in pounds. For oversize rod series add 10%.

* Weight includes clevis pins.

Accessories Weight Chart (Weight in Pounds)

| ROD CLEVIS | | ROD EYES | | EYE BRACKETS | | CLEVIS PINS | |
|------------|--------|----------|--------|--------------|--------|-------------|--------|
| PART NO. | WEIGHT | PART NO. | WEIGHT | PART NO. | WEIGHT | PART NO. | WEIGHT |
| RC437 | .40 | RE750 | 1.10 | EB500 | .86 | CP500C | .12 |
| RC500 | .40 | RE1000 | 2.40 | EB750 | 3.00 | CP750C | .38 |
| RC750 | 1.22 | RE1375 | 5.58 | EB1000 | 6.36 | CP1000C | .80 |
| RC1000 | 2.58 | RE1500 | 10.52 | EB1375 | 11.22 | CP1375C | 1.22 |
| RC1250 | 6.28 | — | — | — | — | — | — |
| RC1500 | 11.60 | — | — | — | — | — | — |

Alignment Couplers Weight Chart (Weight in Pounds)

| PART NO. | WEIGHT | PART NO. | WEIGHT | PART NO. | WEIGHT |
|----------|--------|----------|--------|----------|--------|
| AC250 | .30 | AC625 | .40 | AC1375 | 7.50 |
| AC312 | .30 | AC750 | 1.10 | AC1500 | 7.60 |
| AC375 | .30 | AC875 | 1.10 | AC1750 | 7.60 |
| AC437 | .30 | AC1000 | 2.90 | — | — |
| AC500 | .30 | AC1250 | 2.90 | — | — |

Cylinder Torques

| CYLINDER BORE | TIE ROD THREAD SIZE | TORQUE IN FT.-LBS. |
|---------------|---------------------|--------------------|
| 1½ | ¼-28 | 7 |
| 2 | 5/16-24 | 12 |
| 2½ | 5/16-24 | 14 |
| 3¼ | 3/8-24 | 30 |
| 4 | 3/8-24 | 35 |
| 5 | ½-20 | 45 |
| 6 | ½-20 | 50 |
| 8 | 5/8-18 | 125 |
| 10 | 3/4-16 | 125 |
| 12 | 3/4-16 | 125 |

Tighten cylinders using an "X" tightening pattern on tie rods.

Retainer Screws

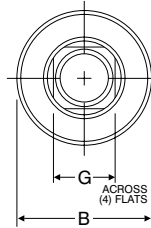
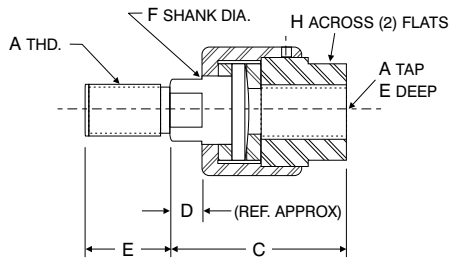
| BORE | SIZE | TORQUE IN FT.-LBS. |
|----------|-----------------|--------------------|
| 2 & 2½ | #10-32 S.H.C.S. | 5 |
| 3¼ TO 12 | 1/4-28 S.H.C.S. | 12 |

Alignment Couplers

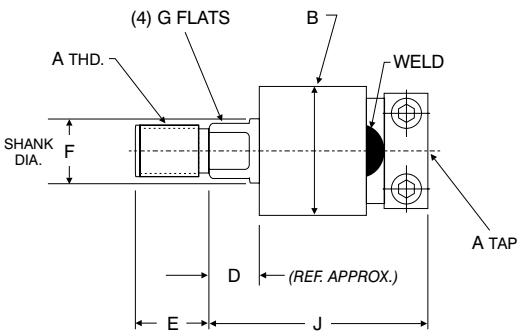
Standard Coupler – AC250-AC1000 / Models 3/8"-24 through 5/8"-18



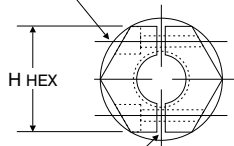
- Available, from 1/4"-28 to 1-3/4"-12, with 1 degree of spherical movement and 1/16" of lateral allowance.
- The alignment allowances can eliminate the need for expensive precision machining in rigidly mounted applications.
- Alignment couplers help reduce binding and simplify field alignment problems, enhancing cylinder performance and reducing seal and bearing wear.
- An innovative design to resist vibrational loosening is available on sizes 5/16"-24 and larger. In the ACH style coupler, a slot is milled through the tapped mounting threads. Two socket head cap screws are strategically placed to allow the coupler to be clamped to the rod, offering a superior strength connection.



**Standard Coupler
AC250-AC1750**



(2) DRILLED, TAPPED & C'BORED FOR (H) SOCKET HEAD CAP SCREWS



**ACH Coupler
ACH312-ACH1250**

TRD Cylinders

Alignment Couplers

Flow Controls

Double-Wall Cylinders

Dimensions (in.)

| ALIGNMENT COUPLERS | | | | | | | | | | | |
|--------------------|----------|-------|---------|------|-------|---------|--------|-------|-------|---------|-------------------|
| PART NO. | A | B | C | D | E | F | G | H | H HEX | J | MAX PULL AT YIELD |
| AC250 | 1/4-28 | 1 1/8 | 1 1/4 | 3/8 | 1/2 | 1/2 | 3/8 | 11/16 | — | — | 6,000 |
| AC312 | 5/16-24 | 1 1/8 | 1 1/4 | 3/8 | 1/2 | 1/2 | 3/8 | 11/16 | 1 1/8 | 2 | 8,300 |
| AC375 | 3/8-24 | 1 1/8 | 1 1/4 | 3/8 | 1/2 | 1/2 | 3/8 | 11/16 | 1 1/8 | 2 | 8,300 |
| AC437 | 7/16-20 | 1 1/4 | 2 | 7/16 | 3/4 | 5/8 | 1/2 | 13/16 | 1 1/8 | 2 5/32 | 10,000 |
| AC500 | 1/2-20 | 1 1/4 | 2 | 7/16 | 3/4 | 5/8 | 1/2 | 13/16 | 1 1/8 | 2 5/32 | 14,000 |
| AC625 | 5/8-18 | 1 1/4 | 2 | 7/16 | 3/4 | 5/8 | 1/2 | 13/16 | 1 1/4 | 2 5/32 | 19,000 |
| AC750 | 3/4-16 | 1 3/4 | 2 5/16 | 7/16 | 1 1/8 | 31/32 | 13/16 | 1 1/8 | 1 3/4 | 2 1/2 | 34,000 |
| AC875 | 7/8-14 | 1 3/4 | 2 5/16 | 7/16 | 1 1/8 | 31/32 | 13/16 | 1 1/8 | 1 3/4 | 2 1/2 | 39,000 |
| AC1000 | 1-14 | 2 1/2 | 2 15/16 | 7/16 | 1 5/8 | 1 11/32 | 1 5/32 | 1 5/8 | 2 1/2 | 2 15/16 | 64,000 |
| AC1250 | 1 1/4-12 | 2 1/2 | 2 15/16 | 7/16 | 1 5/8 | 1 11/32 | 1 5/32 | 1 5/8 | 2 1/2 | 2 15/16 | 78,000 |
| AC1375 | 1 3/8-12 | 2 1/2 | 2 15/16 | 7/16 | 1 5/8 | 1 11/32 | 1 5/32 | 1 5/8 | — | — | 78,000 |
| AC1500 | 1 1/2-12 | 3 1/4 | 4 3/8 | 7/8 | 2 1/4 | 1 31/32 | 1 3/4 | 2 3/8 | — | — | 134,000 |
| AC1750 | 1 3/4-12 | 3 1/4 | 4 3/8 | 7/8 | 2 1/4 | 1 31/32 | 1 3/4 | 2 3/8 | — | — | 134,000 |

List Price

| Alignment Couplers | | | | | | | | |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Part No. | AC250 | AC312 | AC375 | AC437 | AC500 | AC625 | AC750 | AC875 |
| Price | \$23.00 | \$27.35 | \$27.35 | \$35.20 | \$35.20 | \$37.50 | \$45.80 | \$45.80 |
| Jam Nut | | | | | | | | |
| Part No. | D-344 | D-746 | D-801 | D-154 | D-98 | D-9 | D-3556 | D-2545 |
| Price | .55 | .55 | .55 | .55 | .55 | .55 | .95 | .95 |

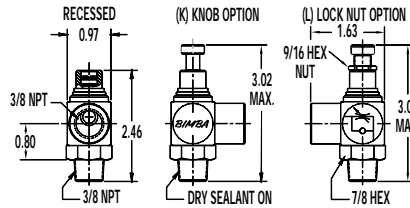
| Alignment Couplers | | | | | | | |
|--------------------|---------|--|----------|----------|----------|----------|--------|
| Part No. | AC1000 | AC1250 | AC1375 | AC1500 | AC1750 | AC1875 | AC2000 |
| Price | \$72.05 | \$72.05 | \$104.85 | \$155.95 | \$155.95 | \$270.10 | 288.75 |
| Jam Nut | | | | | | | |
| Part No. | D-1331 | Please consult factory for price and availability. | | | | | |
| Price | 1.40 | | | | | | |

| Alignment Couplers with Split Hexagon Locking Collar | | | | | | | | | |
|--|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| Part No. | ACH312 | ACH375 | ACH437 | ACH500 | ACH625 | ACH750 | ACH875 | ACH1000 | ACH1250 |
| Price | \$54.85 | \$54.85 | \$59.25 | \$59.25 | \$59.25 | \$82.95 | \$82.95 | \$112.00 | \$112.00 |

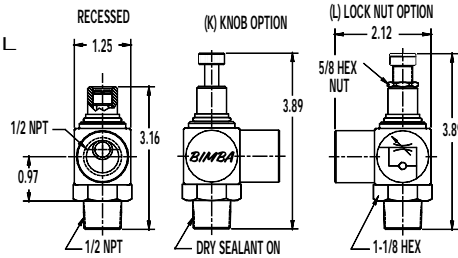
* Please specify AC or ACH coupler when ordering. Jam nut sold separately for 1/4"-28 through 1"-14 size. All prices are F.O.B. Loves Park, Illinois and are subject to change without notice.

Flow Controls: FCP Series (in.)

For 3/8 port

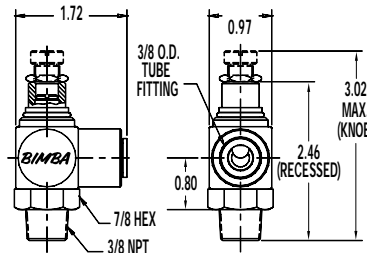


For 1/2 port

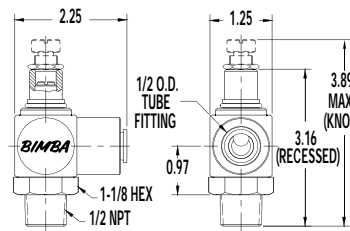


Quick-Flo® Flow Controls: FQP Series (in.)

For 3/8 port, 3/8" OD tubing



For 1/2 port, 1/2" OD tubing



Materials:

Banjo Connector:
Chrome plated,
zinc die cast

**Banjo Retaining
Ring:**
Zinc plated steel

Stem:
High strength
anodized
aluminum alloy

Adjusting Needle:
Stainless steel

**"O" Rings and Lip
Seal:**
Buna N

Collet:
Acetal copolymer

Gripping teeth:
Stainless steel

**Collet Retainer
(if applicable):**
Brass

Locknut:
Chrome-plated
brass

Tube Types:
All plastic tubing,
including nylon
and polyethylene

**Maximum
Operating
Pressure:**
150 PSI Air Only

**Operating
Temperature
Range:**

Quick Connect
(14° to +167° F)

Threaded
Banjos
(-20° to +20° F)

Bimba Needle Valves

Bimba offers a range of Quik-Flo® Needle Valves, allowing for controlled flow of both the air intake and exhaust through the same valve. A needle valve can control a double acting cylinder's extension and retraction by controlling the volume of air entering the cylinder and the volume of air leaving the cylinder.

| Model | Price | Tube Size | Port Size | Cv |
|-------|-------|-----------|-----------|-----|
| QNV6 | 19.50 | 3/8" | 3/8" NPT | .73 |
| QNV6K | 22.15 | 3/8" | 3/8" NPT | .73 |

All prices are F.O.B. Monee, Illinois and are subject to change without notice.