

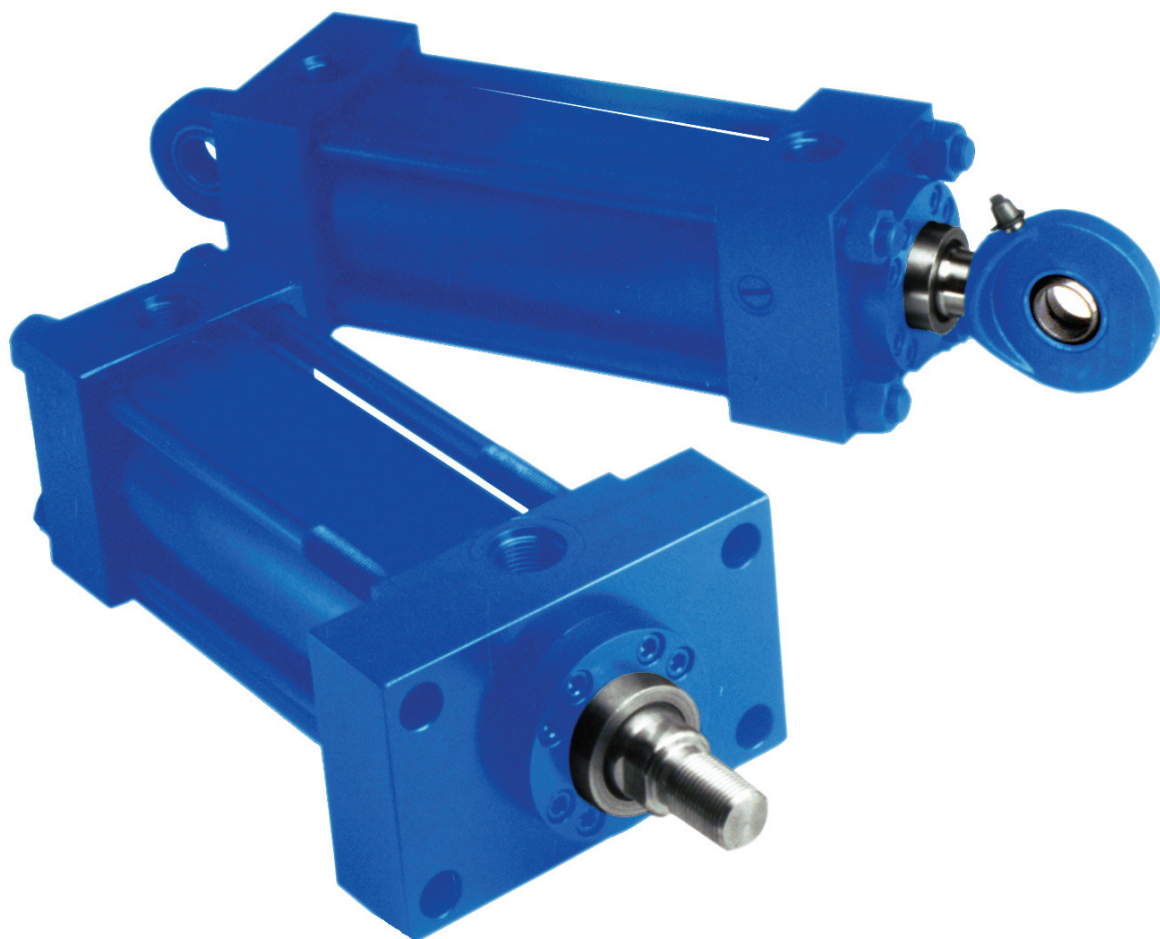
**EATON**

**Vickers**

**Hydraulic Cylinders  
Heavy-Duty Small Bore**

Catalog

Series NZ





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# Features

## 1. Rod Cartridge Assembly:

Machined to maximum bearing support and wear resistance.

Unitized, threadless assembly is pilot-fitted into the head on a precision bored diameter to assure true concentricity.

## 2. Special Wearbands:

Metal-to-metal contact is eliminated, providing superior wearability, increased load carrying capability, and prolonged cylinder life.

## 3. Piston Sealing System:

This system offers not only a selection of highly efficient seal materials, but also an extra wide wearband that rides smoothly within the precision-honed cylinder body to provide extended piston seal life.

## 4. Square Head Tie-Rod Design:

Suitable for nominal working pressure up to 3000 psi.

## 5. Piston Rod:

Case hardened, hard chrome plated piston rod in a variety of diameters between 1 and 5 1/2 inches provides maximum durability and extends seal life. Several different rod end types are available.

## 6. Captive Screws:

Inadvertent removal of cushion screws is prevented, while still allowing a full range of adjustment.

## 7. Fully Adjustable Cushioning System:

This design has been engineered to provide the ability to tune the cushion

performance for an optimized deceleration profile. Our patented floating ring cushion seal or an alternate ball check design allows maximum acceleration. This excellent acceleration profile translates into faster cycle times and increased machine production.

## 8. Global Design:

Engineered for ANSI B93.15/ NFPA interchangeability with the durability required for heavy-duty applications.

## 9. SureSeal Sealing System:

Carefully selected wiper and seal combinations are mated with a hard chrome plated piston rod to deliver exceptional all-around performance and durability.

## 10. Full Range of Ports:

Including SAE, BSPP, and metric to ISO 6149 and DIN standard 3852 to provide the broadest piping flexibility.

## 11. Teflon Tube Seals:

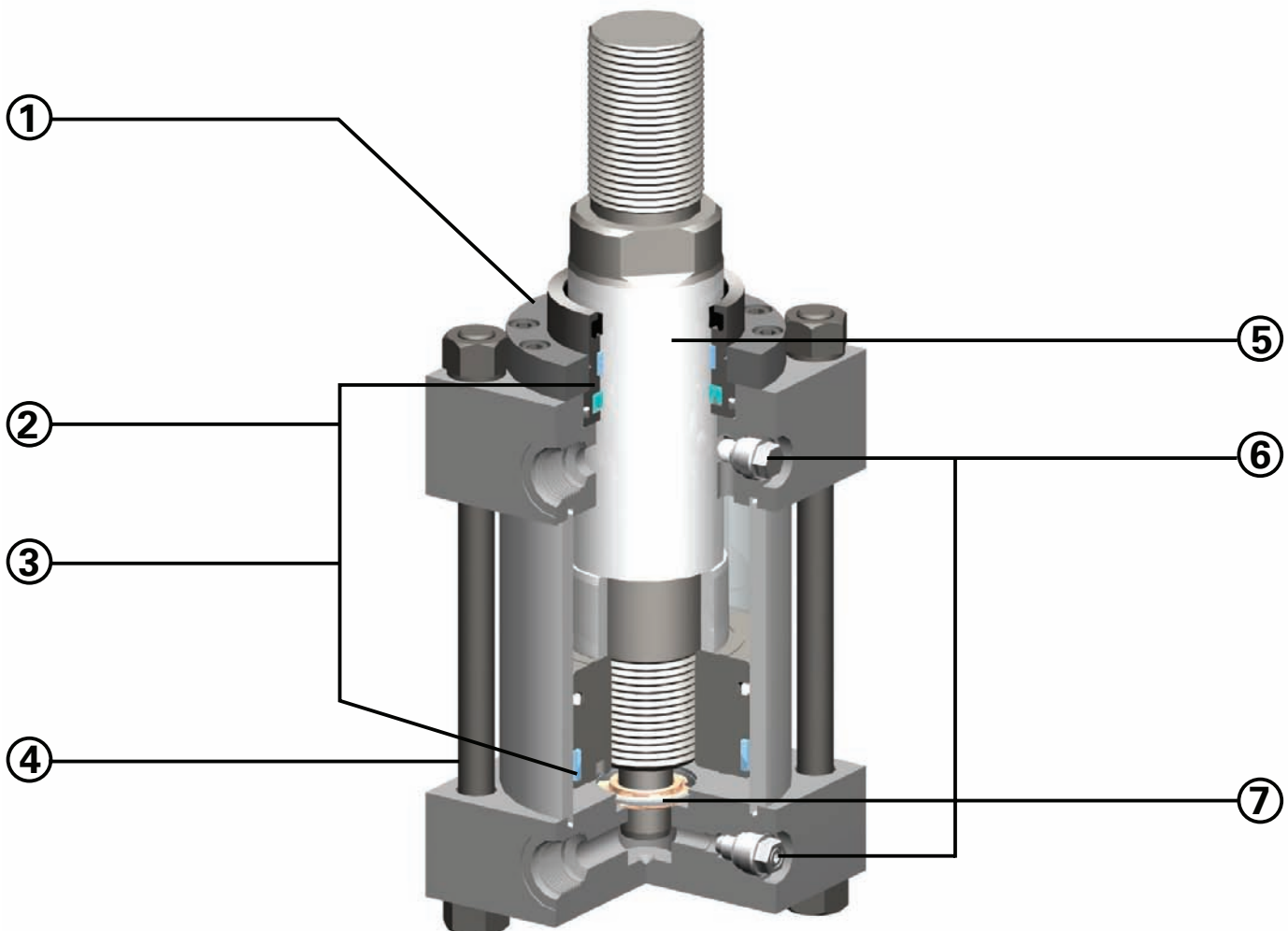
Superior design to prevent leakage

Compatible with virtually all fluids

Operating temperatures to 500°F

## 12. Bore Size Range:

Cylinder bores available between 1-1/2 and 8 inches.



# How To Order

## Standard Cylinders

Eaton has created an easy system for ordering Vickers™ Series NZ cylinders, developed to improve our service to you. The Standard model code consists of sixteen alpha-numeric digits which fully describe the most common standard options offered on Series NZ cylinders.

To specify your Series NZ cylinder, review the following pages for a full description of each option available and select the desired code.

This model code system will:

- **Simplify the re-order process.** Each Vickers™ Series NZ cylinder is assigned a sixteen digit model code. That code is unique to a particular cylinder description. That way, when you re-order your Series NZ cylinder, you're assured of exactly the same top quality cylinder design.

- **Improve identification.**

Every Series NZ cylinder has its sixteen digit model code clearly marked on the product, impression stamped in the metal head or cap. Each sixteen digit code completely describes a specific cylinder. This allows seals and replacement components to be easily identified in the field.

- **Facilitate communications.**

This fully descriptive model code system allows you to work directly with your local Eaton sales engineer to identify and service your Vickers cylinder.

### NOTE

See pages 6 and 7 for a summary of model code options.

## Custom Cylinders

### New Cylinders

Although the model code has been arranged to cover the vast majority of available options, there will be occasions when you require an option which cannot be coded.

When specifying such an option, enter an "X" for the appropriate item in the sixteen digit model code, then describe your requirements. For example, if you have an application which requires a custom thread on the end of the piston rod, enter an "X" for item 7. Then add a full description at the end of the model code, such as "With 3.25 inch total rod projection and M22 x 1,5 thread 1.375 inches long." The cylinder will then be given a unique six digit design number on receipt of order (as explained below).

If more than one of the available options represented in items 15 and 16 are required, add the appropriate codes as a suffix. The cylinder will then be given a unique six digit

design number on receipt of order (as explained below).

### Replacement Cylinders

Every custom Eaton cylinder is assigned a unique design number. A Custom cylinder will have 22 digits vs. 16 for the standard cylinder. The design number is contained in the last six digits of the model code, and position 17 is always an alpha character. In other words, the design number begins after position 16. When ordering a replacement cylinder, simply give the model code or the six digit design number to your local Eaton Cylinder Sales representative.

### Replacement Parts

Each design number is stored in a quick retrieval computerized storage system. This gives our field sales representatives rapid access to assist you in identifying and specifying genuine Eaton replacement parts.

# Model Codes

|           |           |           |          |          |          |          |          |            |           |
|-----------|-----------|-----------|----------|----------|----------|----------|----------|------------|-----------|
| <b>NZ</b> | <b>09</b> | <b>KM</b> | <b>1</b> | <b>N</b> | <b>1</b> | <b>K</b> | <b>W</b> | <b>99A</b> | <b>PR</b> |
|           |           |           |          |          |          |          |          |            |           |
| 1, 2      | 3, 4      | 5, 6      | 7        | 8        | 9        | 10       | 11       | 12, 13, 14 | 15, 16    |

## 1, 2 Series

**NZ** – ANSI B93.15/NFPA Interchangeable Hydraulic cylinder

## 3, 4 Mounting Styles

|                                               |     |
|-----------------------------------------------|-----|
| <b>01</b> – Side Lug                          | MS2 |
| <b>02</b> – Side Tapped                       | MS4 |
| <b>03</b> – End Lug Mount                     | MS7 |
| <b>04</b> – Keyed Side Lug                    |     |
| <b>05</b> – Keyed Tapped                      |     |
| <b>07</b> – Head Rectangular Flange           | MF1 |
| <b>08</b> – Head Square Flange                | MF5 |
| <b>09</b> – Head Rectangular                  | ME5 |
| <b>10</b> – Clevis                            | MP1 |
| <b>11</b> – Spherical Bushing                 | MP5 |
| <b>12</b> – Cap Rectangular Flange            | MF2 |
| <b>13</b> – Cap Square Flange                 | MF6 |
| <b>14</b> – Cap Rectangular                   | ME6 |
| <b>15</b> – Intermediate Trunnion             | MT4 |
| <b>16</b> – Cap Trunnion                      | MT2 |
| <b>17</b> – Head Trunnion                     | MT1 |
| <b>19</b> – Centerline Lug                    | MS3 |
| <b>21</b> – Cap End Extended Tie Rod          | MX2 |
| <b>22</b> – Head End Extended Tie Rod         | MX3 |
| <b>23</b> – Both Ends Extended Tie Rod        | MX1 |
| <b>24</b> – No Mount                          | -   |
| <b>25</b> – Double Rod, Side Lug              | -   |
| <b>26</b> – Double Rod, Tapped                | -   |
| <b>27</b> – Double Rod, End Lug               | -   |
| <b>28</b> – Double Rod, Keyed Side Lug        | -   |
| <b>29</b> – Double Rod, Keyed Tapped          | -   |
| <b>31</b> – Double Rod, Rectangular Flange    | -   |
| <b>32</b> – Double Rod, Square Flange         | -   |
| <b>33</b> – Double Rod, Head Rectangular      | -   |
| <b>34</b> – Double Rod, Intermediate Trunnion | -   |
| <b>35</b> – Double Rod, Head Trunnion         | -   |

|                                                    |     |
|----------------------------------------------------|-----|
| <b>37</b> – Double Rod, Centerline Lug             | -   |
| <b>39</b> – Double Rod, Extended Tie Rod           | -   |
| <b>40</b> – Double Rod, Both Ends Extended Tie Rod | -   |
| <b>41</b> – Double Rod, No Mount                   | -   |
| <b>47</b> – Cap Fixed Eye                          | MP3 |
| <b>48</b> – Detachable Eye                         | MP4 |
| <b>50</b> – Detachable Clevis                      | MP2 |

## 5, 6 Bore and Rod Size Combinations

| Code      | Bore(in) | Rod(in) |
|-----------|----------|---------|
| <b>CC</b> | 1-1/2    | 5/8     |
| <b>CE</b> | 1-1/2    | 1       |
| <b>DE</b> | 2        | 1       |
| <b>DH</b> | 2        | 1-3/8   |
| <b>EE</b> | 2-1/2    | 1       |
| <b>EH</b> | 2-1/2    | 1-3/8   |
| <b>EL</b> | 2-1/2    | 1-3/4   |
| <b>GH</b> | 3-1/4    | 1-3/8   |
| <b>GL</b> | 3-1/4    | 1-3/4   |
| <b>GM</b> | 3-1/4    | 2       |
| <b>HL</b> | 4        | 1-3/4   |
| <b>HM</b> | 4        | 2       |
| <b>HP</b> | 4        | 2-1/2   |
| <b>KM</b> | 5        | 2       |
| <b>KP</b> | 5        | 2-1/2   |
| <b>KU</b> | 5        | 3       |
| <b>KV</b> | 5        | 3-1/2   |
| <b>LP</b> | 6        | 2-1/2   |
| <b>LU</b> | 6        | 3       |
| <b>LV</b> | 6        | 3-1/2   |
| <b>LW</b> | 6        | 4       |
| <b>MU</b> | 7        | 3       |
| <b>MV</b> | 7        | 3-1/2   |
| <b>MW</b> | 7        | 4       |
| <b>MY</b> | 7        | 4-1/2   |
| <b>MZ</b> | 7        | 5       |
| <b>NV</b> | 8        | 3-1/2   |
| <b>NW</b> | 8        | 4       |
| <b>NY</b> | 8        | 4-1/2   |
| <b>NZ</b> | 8        | 5       |
| <b>N1</b> | 8        | 5-1/2   |

## 7 Rod End Type

| Code     | Type                                   |
|----------|----------------------------------------|
| <b>1</b> | Short Female Metric Thd.               |
| <b>2</b> | Short Female UN Thd.                   |
| <b>5</b> | Small Male UN Thd.                     |
| <b>6</b> | Plain No Attachment                    |
| <b>7</b> | Small Male Metric Thd.                 |
| <b>9</b> | Intermediate Male UN Thd.              |
| <b>0</b> | Intermediate Male Metric               |
| <b>G</b> | Grooved End                            |
| <b>K</b> | Extended Small Male UN Thd.            |
| <b>L</b> | Extended Small Male Metric Thd.        |
| <b>M</b> | Extended Intermediate Male UN Thd.     |
| <b>N</b> | Extended Intermediate Male Metric Thd. |
| <b>R</b> | Studded Small Male UN Thd.             |

## 8 Seal Options

**N** – Normal  
**L** – Low Friction  
**T** – High Temperature  
**C** – Normal with Cast Iron Piston Rings

## 9 Port Options

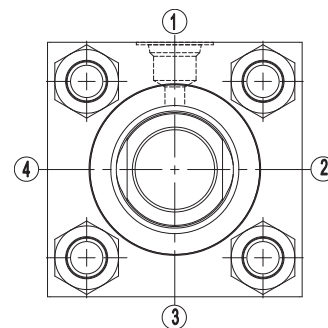
**1** – Standard NPTF\*  
**2** – Oversize NPTF\*  
**3** – SAE/UN O-ring  
**4** – Oversize SAE/UN  
**5** – NFPA Standard SAE/UN  
**6** – SAE 4-Bolt Flange  
**7** – BSPP  
**8** – Oversize BSPP  
**9** – Metric  
**0** – Oversize Metric  
**A** – ISO 6149  
**B** – Oversize ISO 6149  
**K** – Undersize ISO 6149  
**C** – Undersize 4-Bolt Flange  
**D** – Undersize NPTF\*  
**G** – Undersize Metric  
**M** – Standard Manifold

\* Not recommended for maximum reliability on new applications.

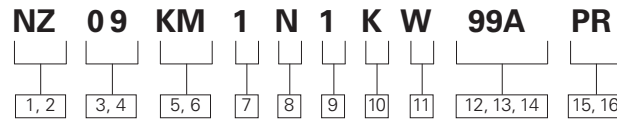
## 10 Port Locations

Ports are located as shown in Rod end type section when viewing cylinder from head end (mounting end of double rod cylinders).

| Code     | Head | Cap |
|----------|------|-----|
| <b>K</b> | 1    | 1   |
| <b>L</b> | 1    | 2   |
| <b>M</b> | 1    | 3   |
| <b>N</b> | 1    | 4   |
| <b>P</b> | 2    | 1   |
| <b>R</b> | 2    | 2   |
| <b>S</b> | 2    | 3   |
| <b>T</b> | 2    | 4   |
| <b>U</b> | 3    | 1   |
| <b>V</b> | 3    | 2   |
| <b>W</b> | 3    | 3   |
| <b>Y</b> | 3    | 4   |
| <b>1</b> | 4    | 1   |
| <b>2</b> | 4    | 2   |
| <b>3</b> | 4    | 3   |
| <b>4</b> | 4    | 4   |
| <b>5</b> | 1    | 5   |
| <b>6</b> | 2    | 5   |
| <b>7</b> | 3    | 5   |
| <b>8</b> | 4    | 5   |



# Model Codes



## 11 Cushion Location

Cushions are located as shown in Rod end type section when viewing cylinder from head end (mounting end of double rod cylinders). “-” in table indicates no cushion.

| Code | Head | Cap |
|------|------|-----|
| A    | -    | -   |
| B    | -    | 1   |
| C    | -    | 2   |
| D    | -    | 3   |
| E    | -    | 4   |
| F    | 1    | -   |
| G    | 2    | -   |
| H    | 3    | -   |
| J    | 4    | -   |
| K    | 1    | 1   |
| L    | 1    | 2   |
| M    | 1    | 3   |
| N    | 1    | 4   |
| P    | 2    | 1   |
| R    | 2    | 2   |
| S    | 2    | 3   |
| T    | 2    | 4   |
| U    | 3    | 1   |
| V    | 3    | 2   |
| W    | 3    | 3   |
| Y    | 3    | 4   |
| 1    | 4    | 1   |
| 2    | 4    | 2   |
| 3    | 4    | 3   |
| 4    | 4    | 4   |

## Double Rod Cylinders:

“Head” = “Mounting End”  
“Cap” = Non-mounting End

## 12, 13, 14 Cylinder Stroke

Items 12 and 13 indicate stroke length from 00 inches through 99 inches.  
Item 14 indicates fraction of an inch per the following codes:

## Code Fraction Code Fraction

|   |      |   |       |
|---|------|---|-------|
| 0 | 0    | 8 | 1/2   |
| 1 | 1/16 | 9 | 9/16  |
| 2 | 1/8  | A | 5/8   |
| 3 | 3/16 | B | 11/16 |
| 4 | 1/4  | C | 3/4   |
| 5 | 5/16 | D | 13/16 |
| 6 | 3/8  | E | 7/8   |
| 7 | 7/16 | F | 15/16 |

## 15, 16 Extra Rod Projection

Item 15 indicates inches from 0 thru 9.  
Item 16 indicates fraction of an inch per the following codes:

—————OR—————

## Proximity Switch, Gland Drain, Air Bleeder / flats / rod material / Limit switch / stop tube / keyed piston

| Code | No. of A/C Flat* |
|------|------------------|
| F4   | 4                |
| F6   | 6                |

\* Only upto 3.5” Rod.

## Gland Drain

| Code | Head | Cap |
|------|------|-----|
| * GB | -    | 1   |
| * GC | -    | 2   |
| * GD | -    | 3   |
| * GE | -    | 4   |
| GF   | 1    | -   |
| GG   | 2    | -   |
| GH   | 3    | -   |
| GJ   | 4    | -   |
| * GK | 1    | 1   |
| * GG | 1    | 2   |
| * GM | 1    | 3   |
| * GN | 1    | 4   |
| * GP | 2    | 1   |
| * GR | 2    | 2   |
| * GS | 2    | 3   |
| * GT | 2    | 4   |
| * GU | 3    | 1   |
| * GV | 3    | 2   |
| * GW | 3    | 3   |
| * GY | 3    | 4   |
| * G1 | 4    | 1   |
| * G2 | 4    | 2   |
| * G3 | 4    | 3   |
| * G4 | 4    | 4   |

\* Codes applicable to Double Rods only

## Proximity/Positions

| Code | Head | Cap |
|------|------|-----|
| PB   | -    | 1   |
| PC   | -    | 2   |
| PD   | -    | 3   |
| PE   | -    | 4   |
| PF   | 1    | -   |

|    |   |   |
|----|---|---|
| PG | 2 | - |
| PH | 3 | - |
| PJ | 4 | - |
| PK | 1 | 1 |
| PL | 1 | 2 |
| PM | 1 | 3 |
| PN | 1 | 4 |
| PP | 2 | 1 |
| PR | 2 | 2 |
| PS | 2 | 3 |
| PT | 2 | 4 |
| PU | 3 | 1 |
| PV | 3 | 2 |
| PW | 3 | 3 |
| PY | 3 | 4 |
| P1 | 4 | 1 |
| P2 | 4 | 2 |
| P3 | 4 | 3 |
| P4 | 4 | 4 |

|       |   |   |
|-------|---|---|
| ** P5 | 1 | 5 |
| ** P6 | 2 | 5 |
| ** P7 | 3 | 5 |
| ** P8 | 4 | 5 |

\*\* Applicable for Single rods, Except 1.50” Bore Cushioned option

## Air Bleed/Positions

| Code | Head | Cap |
|------|------|-----|
| HB   | -    | 1   |
| HC   | -    | 2   |
| HD   | -    | 3   |
| HE   | -    | 4   |
| HF   | 1    | -   |
| HG   | 2    | -   |
| HH   | 3    | -   |
| HJ   | 4    | -   |
| HK   | 1    | 1   |
| HL   | 1    | 2   |
| HM   | 1    | 3   |
| HN   | 1    | 4   |
| HP   | 2    | 1   |
| HR   | 2    | 2   |
| HS   | 2    | 3   |
| HT   | 2    | 4   |
| HU   | 3    | 1   |
| HV   | 3    | 2   |
| HW   | 3    | 3   |
| HY   | 3    | 4   |
| H1   | 4    | 1   |
| H2   | 4    | 2   |
| H3   | 4    | 3   |
| H4   | 4    | 4   |

## Double Rod Cylinders:

“Head” = “Mounting End”  
“Cap” = Non-mounting End

## Stop Tube/Positions

| Code | Length in inches |
|------|------------------|
| S1   | 1                |
| S2   | 2                |
| S3   | 3                |
| S4   | 4                |
| S5   | 5                |
| S6   | 6                |
| S7   | 7                |
| S8   | 8                |
| S9   | 9                |
| S0   | 10               |
| SA   | 11               |
| SB   | 12               |
| SC   | 13               |
| SD   | 14               |
| SE   | 15               |
| SF   | 16               |
| SG   | 17               |
| SH   | 18               |
| SJ   | 19               |
| SK   | 20               |

## Keyed Piston to Rod

| Code | Type               |
|------|--------------------|
| KG   | Grub Screw         |
| KS   | Weld Piston to rod |

## Rod Material Options

| Code  | Type                 |
|-------|----------------------|
| * RP  | Thick Chrome Plate   |
| RS    | Stainless Steel 17-4 |
| ** RT | Stainless Steel 303  |

\* .002 Chrome thickness

\*\* Consult factory for pressure Rating

# Mounting Styles

## Available Mountings

The variety of standard ANSI/NFPA mountings available in the Series NZ gives you a broad selection to match the proper mount to your application. Eaton offers rigid mounts (including side lug mounts, flange mounts, and extended tie rod mounts) and swivel mounts (including clevis mounts and trunnion

mounts). For custom mounts, enter "XX" for model code item 2, and give a detailed description with drawings. Series NZ cylinders are available in all mounting styles listed.

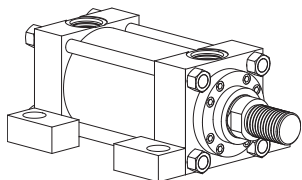
## Selecting the Proper Mounting

Just as the cylinder bore must be sized to provide the proper force for an application, a cylinder mounting that can absorb these application forces must also be specified. Note: In the mounting information, some mounts have been downrated to minimize deflection. For applications

where the motion is linear and parallel to the cylinder rod motion, a rigid mount is recommended. For curvilinear motion, a swivel mount should be chosen. The specifics of each application dictate the correct mounting style.

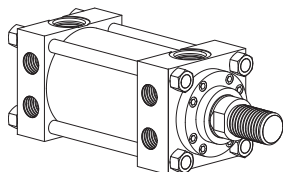
### NZ01

Side lug  
ANSI MS2



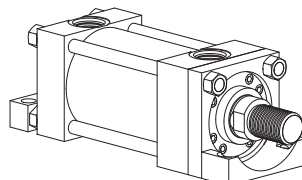
### NZ02

Side Tapped  
ANSI MS4



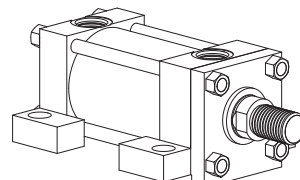
### NZ03

End lug  
ANSI MS7



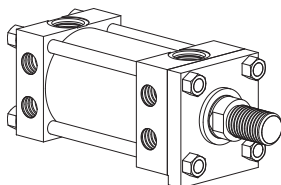
### NZ04

Keyed Side Lug



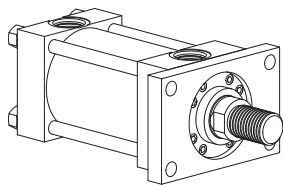
### NZ05

Keyed Side Tapped



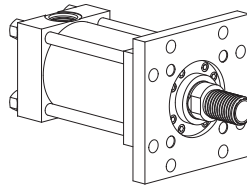
### NZ07

Head Rectangular flange  
ANSI MF1  
(Maximum working pressure  
800 PSI)



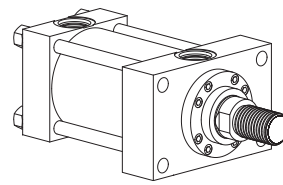
### NZ08

Head Square flange  
ANSI MF5  
(Maximum working pressure  
1500 PSI)



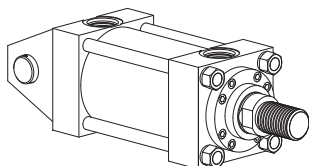
### NZ09

Head Rectangular  
ANSI ME5



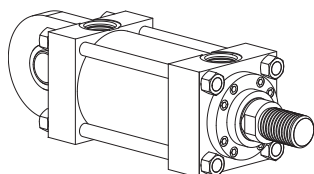
### NZ10

Cap Clevis  
ANSI MP1



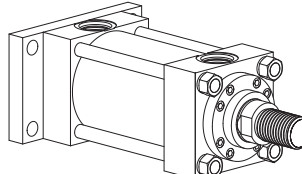
### NZ11

Cap Spherical bearing  
(Maximum working pressure  
per Bore on page 28.)



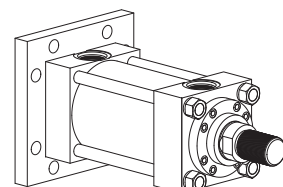
### NZ12

Cap Rectangular flange  
ANSI MF2  
(Maximum working pressure  
800 PSI)



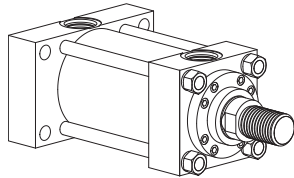
### NZ13

Cap Square flange  
ANSI MF6  
(Maximum working pressure  
1500 PSI)

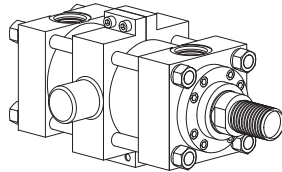


# Mounting Styles

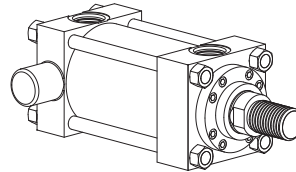
**NZ14**  
Cap Rectangular  
ANSI ME6



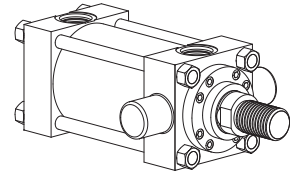
**NZ15**  
Intermediate Trunnion  
ANSI MT4



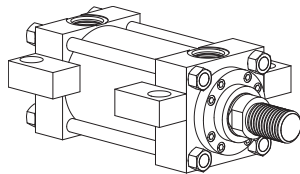
**NZ16**  
Cap Trunnion  
ANSI MT2



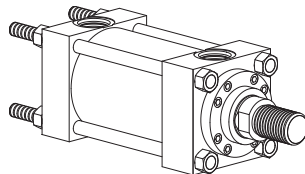
**NZ17**  
Head Trunnion  
ANSI MT1



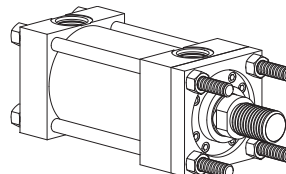
**NZ19**  
Center Lug  
ANSI MS3



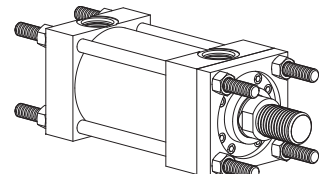
**NZ21**  
Cap Extended Tie rod  
ANSI MX2



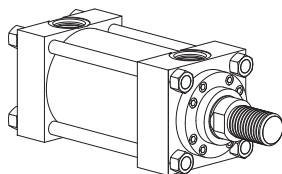
**NZ22**  
Head Extended Tie rod  
ANSI MX3



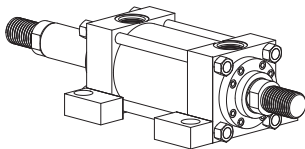
**NZ23**  
Both Ends Extended Tie rod  
ANSI MX1



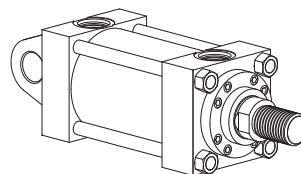
**NZ24**  
No Mount



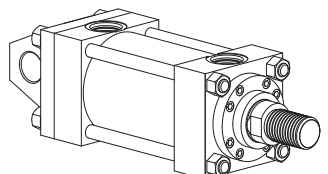
**NZ25**  
Double rod, Side Lug



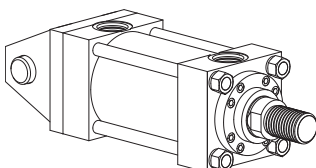
**NZ47**  
Cap Fixed Eye  
ANSI MP3



**NZ48**  
Cap Detachable Eye  
ANSI MP4

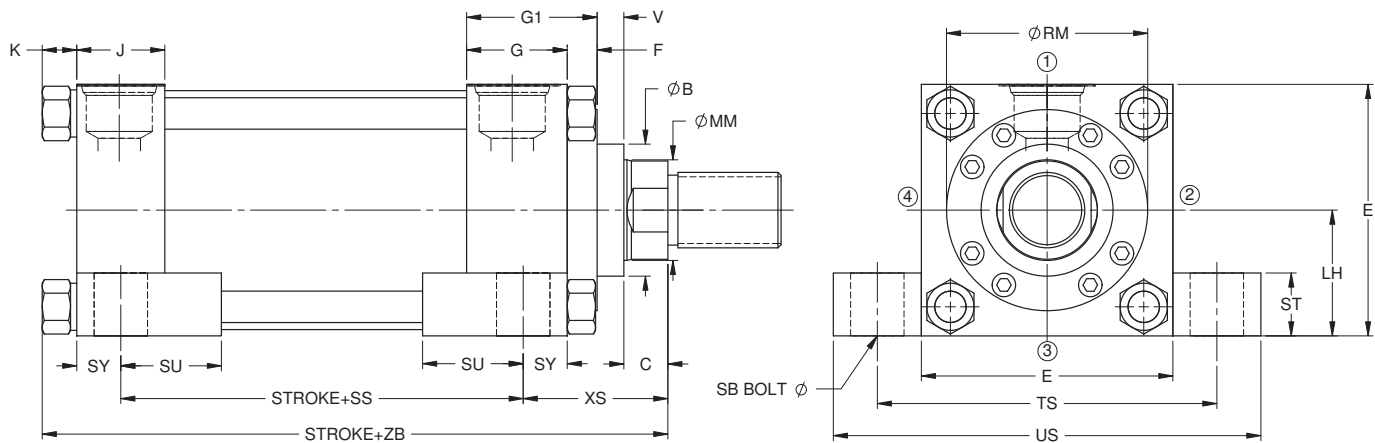


**NZ50**  
Cap Detachable Clevis  
ANSI MP2



# Mounting Style and Installation Dimensions

## NZ01 Side Lug Mount



| Bore | Rod Dia<br>MM | B<br>+0.000/-<br>.002 | C    | E    | G    | J    | F    | V    | RM   | LH<br>±.002 | SB   |
|------|---------------|-----------------------|------|------|------|------|------|------|------|-------------|------|
| 1.50 | 0.63          | 1.124                 | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 1.243       | 0.38 |
|      | 1.00          | 1.499                 | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 1.243       | 0.38 |
| 2.00 | 1.00          | 1.499                 | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 1.493       | 0.50 |
|      | 1.38          | 1.999                 | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.493       | 0.50 |
| 2.50 | 1.00          | 1.499                 | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 1.743       | 0.75 |
|      | 1.38          | 1.999                 | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.743       | 0.75 |
|      | 1.75          | 2.374                 | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 1.743       | 0.75 |
| 3.25 | 1.38          | 1.999                 | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 2.243       | 0.75 |
|      | 1.75          | 2.374                 | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 2.243       | 0.75 |
|      | 2.00          | 2.624                 | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 2.243       | 0.75 |
| 4.00 | 1.75          | 2.374                 | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 2.493       | 1.00 |
|      | 2.00          | 2.624                 | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 2.493       | 1.00 |
|      | 2.50          | 3.124                 | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 2.493       | 1.00 |
| 5.00 | 2.00          | 2.624                 | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 3.243       | 1.00 |
|      | 2.50          | 3.124                 | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 3.243       | 1.00 |
|      | 3.00          | 3.749                 | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 3.243       | 1.00 |
|      | 3.50          | 4.249                 | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 3.243       | 1.00 |
| 6.00 | 2.50          | 3.124                 | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 3.743       | 1.25 |
|      | 3.00          | 3.749                 | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 3.743       | 1.25 |
|      | 3.50          | 4.249                 | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 3.743       | 1.25 |
|      | 4.00          | 4.749                 | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 3.743       | 1.25 |
| 7.00 | 3.00          | 3.749                 | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 4.243       | 1.50 |
|      | 3.50          | 4.249                 | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 4.243       | 1.50 |
|      | 4.00          | 4.749                 | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 4.243       | 1.50 |
|      | 4.50          | 5.249                 | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 4.243       | 1.50 |
|      | 5.00          | 5.749                 | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 4.243       | 1.50 |
| 8.00 | 3.50          | 4.249                 | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 4.743       | 1.50 |
|      | 4.00          | 4.749                 | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 4.743       | 1.50 |
|      | 4.50          | 5.249                 | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 4.743       | 1.50 |
|      | 5.00          | 5.749                 | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 4.743       | 1.50 |
|      | 5.50          | 6.249                 | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 4.743       | 1.50 |

+ Plus Stroke

† For Port and Switch at position 2 & 4 please refer page 68, Mounting Holes requires counter Bore

# Mounting Style and Installation Dimensions

## NZ01 Side Lug Mount

Side lug mounts are for moving loads along a flat guided surface as in a carriage along rails. The mounting surface should be flat and parallel to the centerline of the piston rod. The load should be guided to traverse along the centerline of the piston rod. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

### NOTE

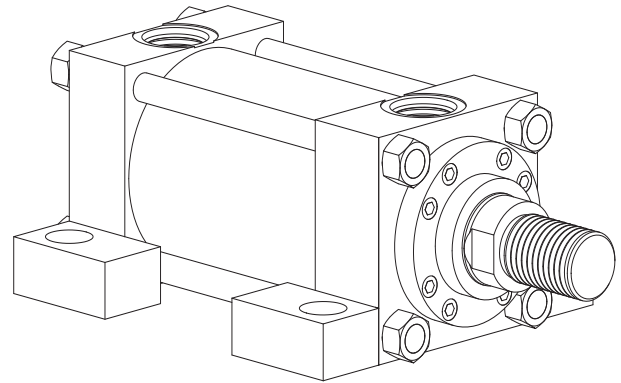
Limit operating pressure to 2320 psi for minimum deflec-

tion on 6, 7 and 8 inch bores. For strokes in excess of 30 inches, see "Stop tube selection" on page 72.

With unsupported loads, the bearing must absorb more force. For these applications, the larger available rod is recommended, and stop tubes should be considered. Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque. For high shock applications, dowel pins or shear keys should be incorporated in the

mounting design. For these applications, consider a keyed side lug mount, NZ04.

For severe side load applications, consult your local Eaton sales engineer.



| Bore | Rod Dia<br>MM | SS+  | ST   | SU   | SY   | TS    | US    | XS   | ZB+<br>Max | Piston<br>Thick. | K<br>Max |
|------|---------------|------|------|------|------|-------|-------|------|------------|------------------|----------|
| 1.50 | 0.63          | 3.88 | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.38 | 6.13       | 1.38             | 0.41     |
|      | 1.00          | 3.88 | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.75 | 6.50       | 1.38             | 0.41     |
| 2.00 | 1.00          | 3.63 | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 1.88 | 6.66       | 1.38             | 0.55     |
|      | 1.38          | 3.63 | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 2.13 | 6.92       | 1.38             | 0.55     |
| 2.50 | 1.00          | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.06 | 6.78       | 1.50             | 0.55     |
|      | 1.38          | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.31 | 7.04       | 1.50             | 0.55     |
|      | 1.75          | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.56 | 7.28       | 1.50             | 0.55     |
| 3.25 | 1.38          | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.31 | 7.91       | 1.75             | 0.67     |
|      | 1.75          | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.56 | 8.16       | 1.75             | 0.67     |
|      | 2.00          | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.69 | 8.29       | 1.75             | 0.67     |
| 4.00 | 1.75          | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.75 | 8.40       | 2.00             | 0.78     |
|      | 2.00          | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.88 | 8.53       | 2.00             | 0.78     |
|      | 2.50          | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 3.13 | 8.78       | 2.00             | 0.78     |
| 5.00 | 2.00          | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 2.88 | 9.32       | 2.50             | 0.92     |
|      | 2.50          | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.57       | 2.50             | 0.92     |
|      | 3.00          | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.56       | 2.50             | 0.92     |
|      | 3.50          | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.56       | 2.50             | 0.92     |
| 6.00 | 2.50          | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.80      | 2.88             | 1.03     |
|      | 3.00          | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.80      | 2.88             | 1.03     |
|      | 3.50          | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.80      | 2.88             | 1.03     |
|      | 4.00          | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.80      | 2.88             | 1.03     |
| 7.00 | 3.00          | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 12.09      | 3.00             | 1.17     |
|      | 3.50          | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 12.09      | 3.00             | 1.17     |
|      | 4.00          | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 12.09      | 3.00             | 1.17     |
|      | 4.50          | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 12.09      | 3.00             | 1.17     |
|      | 5.00          | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 12.09      | 3.00             | 1.17     |
| 8.00 | 3.50          | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.18      | 3.50             | 1.26     |
|      | 4.00          | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.18      | 3.50             | 1.26     |
|      | 4.50          | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.18      | 3.50             | 1.26     |
|      | 5.00          | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.18      | 3.50             | 1.26     |
|      | 5.50          | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.18      | 3.50             | 1.26     |

+ Plus Stroke

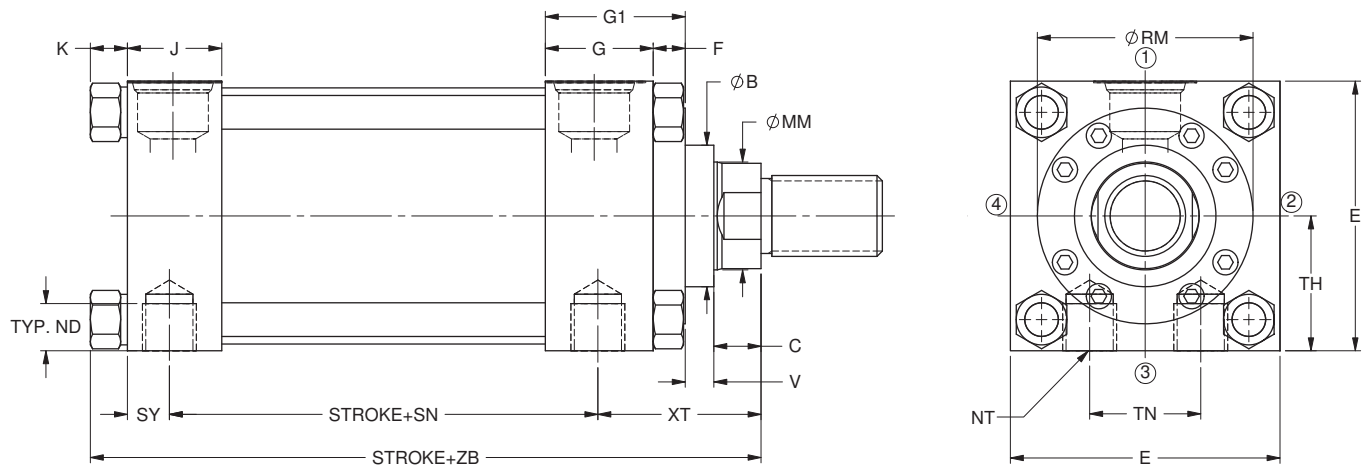
See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

NZ02 Side Tapped Mounts

ANSI MS4



| Bore | Rod Dia<br>MM | B<br>+0.000/-0.002 | C    | E    | G    | J    | F    | V    | RM   | TH<br>±.002 |
|------|---------------|--------------------|------|------|------|------|------|------|------|-------------|
| 1.50 | 0.63          | 1.124              | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 1.243       |
|      | 1.00          | 1.499              | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 1.243       |
| 2.00 | 1.00          | 1.499              | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 1.493       |
|      | 1.38          | 1.999              | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.493       |
| 2.50 | 1.00          | 1.499              | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 1.743       |
|      | 1.38          | 1.999              | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.743       |
|      | 1.75          | 2.374              | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 1.743       |
| 3.25 | 1.38          | 1.999              | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 2.243       |
|      | 1.75          | 2.374              | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 2.243       |
|      | 2.00          | 2.624              | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 2.243       |
| 4.00 | 1.75          | 2.374              | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 2.493       |
|      | 2.00          | 2.624              | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 2.493       |
|      | 2.50          | 3.124              | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 2.493       |
| 5.00 | 2.00          | 2.624              | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 3.243       |
|      | 2.50          | 3.124              | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 3.243       |
|      | 3.00          | 3.749              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 3.243       |
|      | 3.50          | 4.249              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 3.243       |
| 6.00 | 2.50          | 3.124              | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 3.743       |
|      | 3.00          | 3.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 3.743       |
|      | 3.50          | 4.249              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 3.743       |
|      | 4.00          | 4.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 3.743       |
| 7.00 | 3.00          | 3.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 4.243       |
|      | 3.50          | 4.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 4.243       |
|      | 4.00          | 4.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 4.243       |
|      | 4.50          | 5.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 4.243       |
|      | 5.00          | 5.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 4.243       |
| 8.00 | 3.50          | 4.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 4.743       |
|      | 4.00          | 4.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 4.743       |
|      | 4.50          | 5.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 4.743       |
|      | 5.00          | 5.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 4.743       |
|      | 5.50          | 6.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 4.743       |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ02 Side Tapped Mounts

#### ANSI MS4

Tapped mounts are for moving loads along a flat guided surface as in a carriage along rails.

The mounting surface should be flat and parallel to the centerline of the piston rod.

The load should be guided to traverse along the centerline of the piston rod.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

#### NOTE

For strokes in excess of 30

inches, see "Stop tube selection" on page 72.

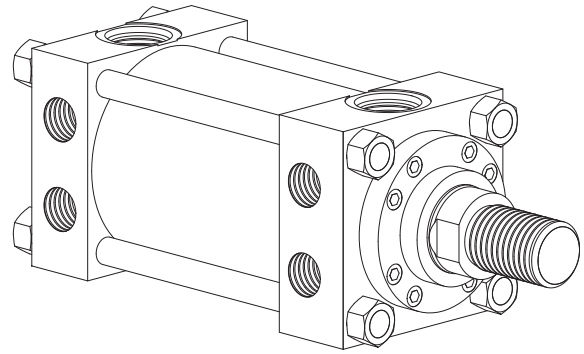
With unsupported loads, the bearing must absorb more force. For these applications, the larger available rod is recommended, and stop tubes should be considered.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.

For high shock applications, dowel pins or shear keys should be incorporated in the mounting design. For

these applications, consider a keyed side lug mount, NZ04.

For severe side load applications, consult your local Eaton sales engineer.



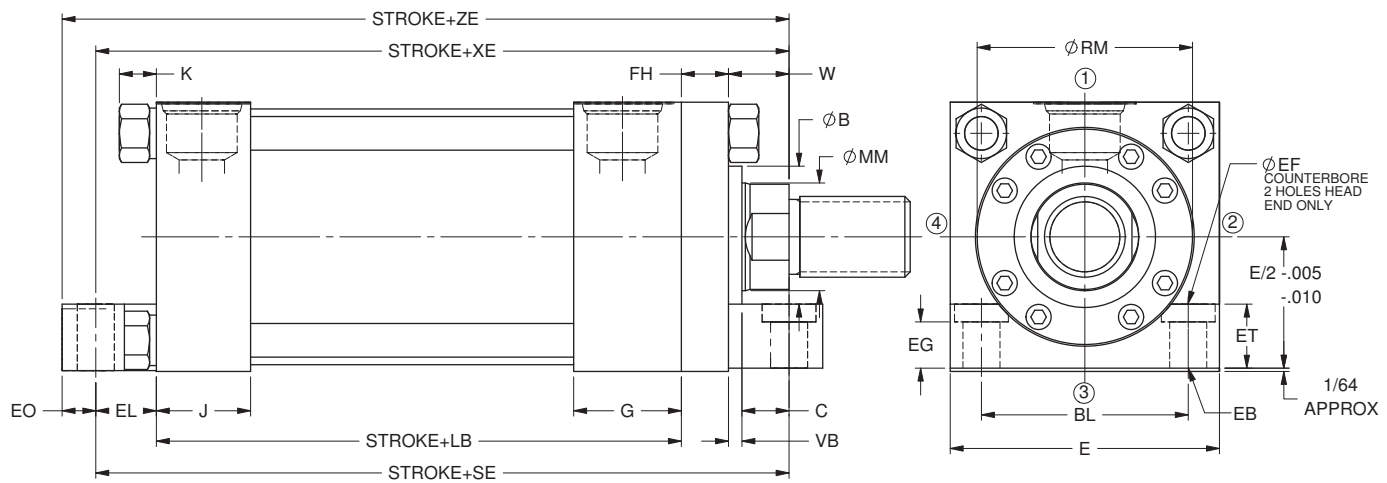
| Bore | Rod Dia<br>MM | ND   | NT<br>(Tap) | SN+  | TN   | SY   | XT   | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|-------------|------|------|------|------|------------|------------------|------|
| 1.50 | 0.63          | 0.56 | 0.375-16    | 2.88 | 0.75 | 0.75 | 2.00 | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.375-16    | 2.88 | 0.75 | 0.75 | 2.38 | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 0.500-13    | 2.88 | 0.94 | 0.75 | 2.38 | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 0.500-13    | 2.88 | 0.94 | 0.75 | 2.63 | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.81 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.38 | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 0.61 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.63 | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 0.61 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.88 | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 2.75 | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 3.00 | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 3.13 | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.00 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.00 | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 0.75 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.13 | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 0.69 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.38 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.13 | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.42       | 2.50             | 0.92 |
|      | 3.50          | 1.00 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.42       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.80      | 2.88             | 1.03 |
|      | 3.50          | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.80      | 2.88             | 1.03 |
|      | 4.00          | 1.25 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.81      | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 2.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 1.75 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 1.50 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 1.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 1.38 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ03 End Lug Mounts ANSI MS7



| Bore | Rod Dia<br>MM | B<br>+.000/-0.002 | C    | E    | G    | J    | FH   | VB   | W    | EB   | SE+   |
|------|---------------|-------------------|------|------|------|------|------|------|------|------|-------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | 0.63 | 0.38 | 6.75  |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | 1.00 | 0.38 | 6.75  |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | 0.75 | 0.50 | 7.13  |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | 1.01 | 0.50 | 7.13  |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.63 | 0.25 | 0.75 | 0.50 | 7.25  |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | 1.01 | 0.50 | 7.25  |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | 1.25 | 0.50 | 7.25  |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.75 | 0.25 | 0.88 | 0.63 | 8.50  |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 1.13 | 0.63 | 8.50  |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 1.26 | 0.63 | 8.50  |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 1.00 | 0.63 | 8.88  |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 1.13 | 0.63 | 8.88  |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 | 0.63 | 8.88  |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.88 | 0.25 | 1.13 | 0.88 | 10.13 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 | 0.88 | 10.13 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 | 0.88 | 10.13 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 | 0.88 | 10.13 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 | 1.00 | 11.75 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 | 1.00 | 11.75 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 | 1.00 | 11.75 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 | 1.00 | 11.75 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 | 1.13 | 13.13 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 | 1.13 | 13.13 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 | 1.13 | 13.13 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 | 1.13 | 13.13 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 | 1.13 | 13.13 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 | 1.25 | 14.50 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 | 1.25 | 14.50 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 | 1.25 | 14.50 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 | 1.25 | 14.50 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 | 1.25 | 14.50 |

+ Plus Stroke

† Port at Position 3 not available on 1.50", 2.00", 2.50", 3.25" and 4.00"

# Mounting Style and Installation

## Dimensions

### NZ03 End Lug Mounts

#### ANSI MS7

End lug mounts are for moving loads along a flat guided surface as in a carriage along rails.

The mounting surface should be flat and parallel to the centerline of the piston rod.

The load should be guided to traverse along the centerline of the piston rod.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

#### NOTE

Port at position 3 not available

on 1.50", 2.00", 2.50", 3.25" and 4.00" diameter bores. With unsupported loads, the bearing must absorb more force.

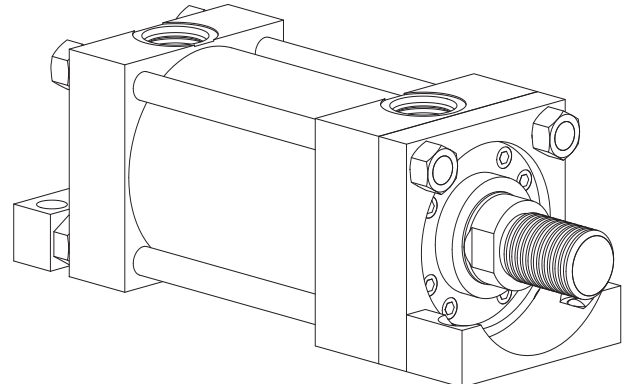
For these applications, the larger available rod is recommended, and stop tubes should be considered.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.

For high shock applications, dowel pins or shear keys should be incorporated in the mounting design. For these

applications, consider a keyed side lug mount, NZ04.

For severe side load applications, consult your local Eaton sales engineer.



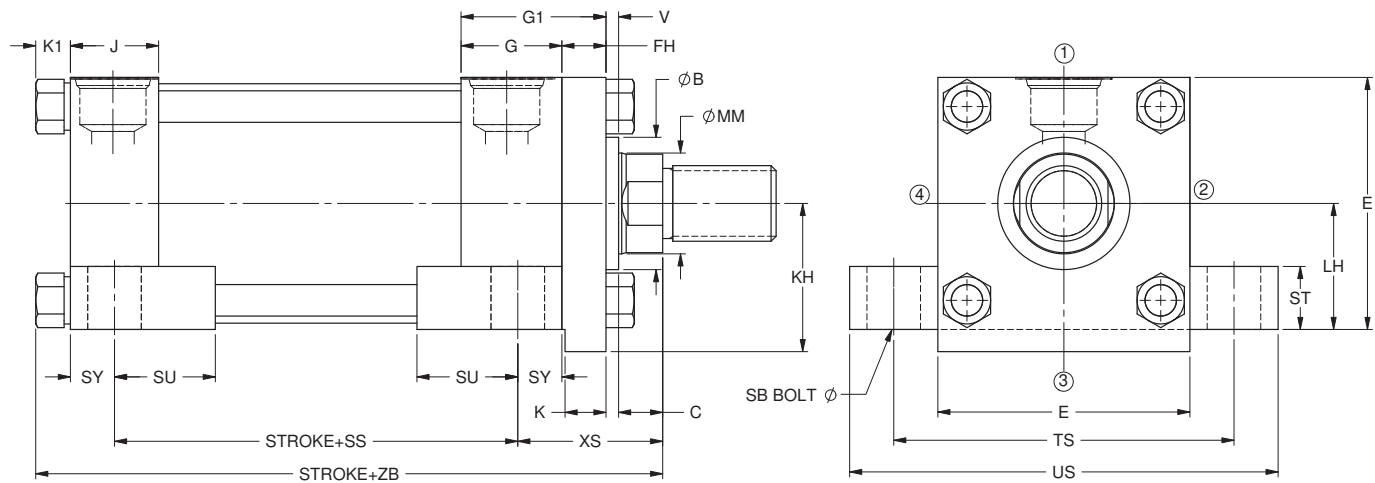
| Bore | Rod Dia<br>MM | ET   | EG   | EL   | EF   | BL   | XE+   | LB+  | E0   | ZE+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|------|------|------|-------|------|------|------------|------------------|------|
| 1.50 | 0.63          | 0.88 | 0.69 | 0.88 | 0.63 | 1.63 | 6.51  | 4.63 | 0.38 | 6.89       | 1.38             | 0.41 |
|      | 1.00          | 0.88 | 0.69 | 0.88 | 0.63 | 1.63 | 6.88  | 4.63 | 0.38 | 7.26       | 1.38             | 0.41 |
| 2.00 | 1.00          | 1.00 | 0.75 | 0.94 | 0.81 | 2.07 | 6.94  | 4.63 | 0.50 | 7.44       | 1.38             | 0.55 |
|      | 1.38          | 1.00 | 0.75 | 0.94 | 0.81 | 2.07 | 7.20  | 4.63 | 0.50 | 7.70       | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.00 | 0.75 | 0.94 | 0.81 | 2.56 | 7.07  | 4.75 | 0.50 | 7.57       | 1.50             | 0.55 |
|      | 1.38          | 1.00 | 0.75 | 0.94 | 0.81 | 2.56 | 7.33  | 4.75 | 0.50 | 7.83       | 1.50             | 0.55 |
|      | 1.75          | 1.00 | 0.75 | 0.94 | 0.81 | 2.56 | 7.57  | 4.75 | 0.50 | 8.07       | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.25 | 1.06 | 1.13 | 1.00 | 3.27 | 8.26  | 5.50 | 0.63 | 8.88       | 1.75             | 0.67 |
|      | 1.75          | 1.25 | 1.06 | 1.13 | 1.00 | 3.27 | 8.51  | 5.50 | 0.63 | 9.13       | 1.75             | 0.67 |
|      | 2.00          | 1.25 | 1.06 | 1.13 | 1.00 | 3.27 | 8.64  | 5.50 | 0.63 | 9.26       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.25 | 0.88 | 1.13 | 1.00 | 3.84 | 8.75  | 5.75 | 0.63 | 9.38       | 2.00             | 0.78 |
|      | 2.00          | 1.25 | 0.88 | 1.13 | 1.00 | 3.84 | 8.88  | 5.75 | 0.63 | 9.51       | 2.00             | 0.78 |
|      | 2.50          | 1.25 | 0.88 | 1.13 | 1.00 | 3.84 | 9.13  | 5.75 | 0.63 | 9.76       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.50 | 1.25 | 1.50 | 1.38 | 4.95 | 9.76  | 6.25 | 0.75 | 10.51      | 2.50             | 0.92 |
|      | 2.50          | 1.50 | 1.25 | 1.50 | 1.38 | 4.95 | 10.01 | 6.25 | 0.75 | 10.76      | 2.50             | 0.92 |
|      | 3.00          | 1.50 | 1.25 | 1.50 | 1.38 | 4.95 | 10.01 | 6.25 | 0.75 | 10.76      | 2.50             | 0.92 |
|      | 3.50          | 1.50 | 1.25 | 1.50 | 1.38 | 4.95 | 10.01 | 6.25 | 0.75 | 10.76      | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.75 | 1.50 | 1.69 | 1.63 | 5.74 | 11.31 | 7.38 | 0.88 | 12.19      | 2.88             | 1.03 |
|      | 3.00          | 1.75 | 1.50 | 1.69 | 1.63 | 5.74 | 11.31 | 7.38 | 0.88 | 12.19      | 2.88             | 1.03 |
|      | 3.50          | 1.75 | 1.50 | 1.69 | 1.63 | 5.74 | 11.31 | 7.38 | 0.88 | 12.19      | 2.88             | 1.03 |
|      | 4.00          | 1.75 | 1.50 | 1.69 | 1.63 | 5.74 | 11.31 | 7.38 | 0.88 | 12.19      | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.00 | 1.50 | 1.81 | 1.63 | 6.58 | 12.56 | 8.50 | 1.00 | 13.56      | 3.00             | 1.17 |
|      | 3.50          | 2.00 | 1.50 | 1.81 | 1.63 | 6.58 | 12.56 | 8.50 | 1.00 | 13.56      | 3.00             | 1.17 |
|      | 4.00          | 2.00 | 1.50 | 1.81 | 1.63 | 6.58 | 12.56 | 8.50 | 1.00 | 13.56      | 3.00             | 1.17 |
|      | 4.50          | 2.00 | 1.50 | 1.81 | 1.63 | 6.58 | 12.56 | 8.50 | 1.00 | 13.56      | 3.00             | 1.17 |
|      | 5.00          | 2.00 | 1.50 | 1.81 | 1.63 | 6.58 | 12.56 | 8.50 | 1.00 | 13.56      | 3.00             | 1.17 |
| 8.00 | 3.50          | 2.00 | 1.75 | 2.00 | 2.09 | 7.51 | 13.75 | 9.50 | 1.13 | 14.88      | 3.50             | 1.26 |
|      | 4.00          | 2.00 | 1.75 | 2.00 | 2.09 | 7.51 | 13.75 | 9.50 | 1.13 | 14.88      | 3.50             | 1.26 |
|      | 4.50          | 2.00 | 1.75 | 2.00 | 2.09 | 7.51 | 13.75 | 9.50 | 1.13 | 14.88      | 3.50             | 1.26 |
|      | 5.00          | 2.00 | 1.75 | 2.00 | 2.09 | 7.51 | 13.75 | 9.50 | 1.13 | 14.88      | 3.50             | 1.26 |
|      | 5.50          | 2.00 | 1.75 | 2.00 | 2.09 | 7.51 | 13.75 | 9.50 | 1.13 | 14.88      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ04 Keyed Side Lug Mounts



| Bore | Rod Dia B<br>MM | +0.000/-0.002 | C    | E    | G1   | J    | FH   | K<br>+0.000 /-0.002 | Max<br>KH | LH<br>$\pm 0.002$ | V    |
|------|-----------------|---------------|------|------|------|------|------|---------------------|-----------|-------------------|------|
| 1.50 | 0.63            | 1.124         | 0.38 | 2.50 | 2.13 | 1.50 | 0.38 | 0.362               | 1.44      | 1.243             | 0.25 |
|      | 1.00            | 1.499         | 0.50 | 2.50 | 2.13 | 1.50 | 0.38 | 0.362               | 1.43      | 1.243             | 0.50 |
| 2.00 | 1.00            | 1.499         | 0.50 | 3.00 | 2.38 | 1.50 | 0.63 | 0.612               | 1.81      | 1.493             | 0.25 |
|      | 1.38            | 1.999         | 0.63 | 3.00 | 2.38 | 1.50 | 0.63 | 0.612               | 1.81      | 1.493             | 0.38 |
| 2.50 | 1.00            | 1.499         | 0.50 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612               | 2.06      | 1.743             | 0.25 |
|      | 1.38            | 1.999         | 0.63 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612               | 2.06      | 1.743             | 0.38 |
|      | 1.75            | 2.374         | 0.75 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612               | 2.06      | 1.743             | 0.50 |
| 3.25 | 1.38            | 1.999         | 0.63 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737               | 2.63      | 2.243             | 0.25 |
|      | 1.75            | 2.374         | 0.75 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737               | 2.63      | 2.243             | 0.38 |
|      | 2.00            | 2.624         | 0.88 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737               | 2.63      | 2.243             | 0.38 |
| 4.00 | 1.75            | 2.374         | 0.75 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862               | 2.94      | 2.493             | 0.25 |
|      | 2.00            | 2.624         | 0.88 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862               | 2.94      | 2.493             | 0.25 |
|      | 2.50            | 3.124         | 1.00 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862               | 2.94      | 2.493             | 0.38 |
| 5.00 | 2.00            | 2.624         | 0.88 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862               | 3.68      | 3.243             | 0.25 |
|      | 2.50            | 3.124         | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862               | 3.68      | 3.243             | 0.38 |
|      | 3.00            | 3.749         | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862               | 3.68      | 3.243             | 0.38 |
|      | 3.50            | 4.249         | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862               | 3.68      | 3.243             | 0.38 |
|      | 4.00            | 4.749         | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862               | 3.68      | 3.243             | 0.38 |
| 6.00 | 2.50            | 3.124         | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987               | 4.25      | 3.743             | 0.25 |
|      | 3.00            | 3.749         | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987               | 4.25      | 3.743             | 0.25 |
|      | 3.50            | 4.249         | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987               | 4.25      | 3.743             | 0.25 |
|      | 4.00            | 4.749         | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987               | 4.25      | 3.743             | 0.25 |
|      | 4.50            | 5.249         | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987               | 4.25      | 3.743             | 0.25 |
| 7.00 | 3.00            | 3.749         | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987               | 4.75      | 4.243             | 0.25 |
|      | 3.50            | 4.249         | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987               | 4.75      | 4.243             | 0.25 |
|      | 4.00            | 4.749         | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987               | 4.75      | 4.243             | 0.25 |
|      | 4.50            | 5.249         | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987               | 4.75      | 4.243             | 0.25 |
|      | 5.00            | 5.749         | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987               | 4.75      | 4.243             | 0.25 |
| 8.00 | 3.50            | 4.249         | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987               | 5.25      | 4.743             | 0.25 |
|      | 4.00            | 4.749         | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987               | 5.25      | 4.743             | 0.25 |
|      | 4.50            | 5.249         | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987               | 5.25      | 4.743             | 0.25 |
|      | 5.00            | 5.749         | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987               | 5.25      | 4.743             | 0.25 |
|      | 5.50            | 6.249         | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987               | 5.25      | 4.743             | 0.25 |

+ Plus Stroke

† For Port and Switch at position 2 & 4 please refer page 68, Mounting Holes requires counter Bore

# Mounting Style and Installation Dimensions

## NZ04 Keyed Side Lug Mounts

Keyed side lug mounts are for moving loads along a flat guided surface as in a carriage along rails.

The mounting surface should be flat and parallel to the centerline of the piston rod.

The load should be guided to traverse along the centerline of the piston rod.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72.

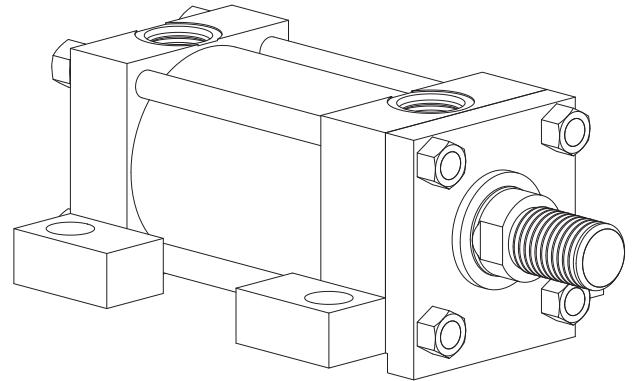
With unsupported loads, the bearing must absorb more force.

For these applications, the larger available rod is recommended, and stop tubes should be considered.

Use high tensile socket head cap screws or hex head bolts

tightened to the manufacturer's recommended torque.

For severe side load applications, consult your local Eaton sales engineer.



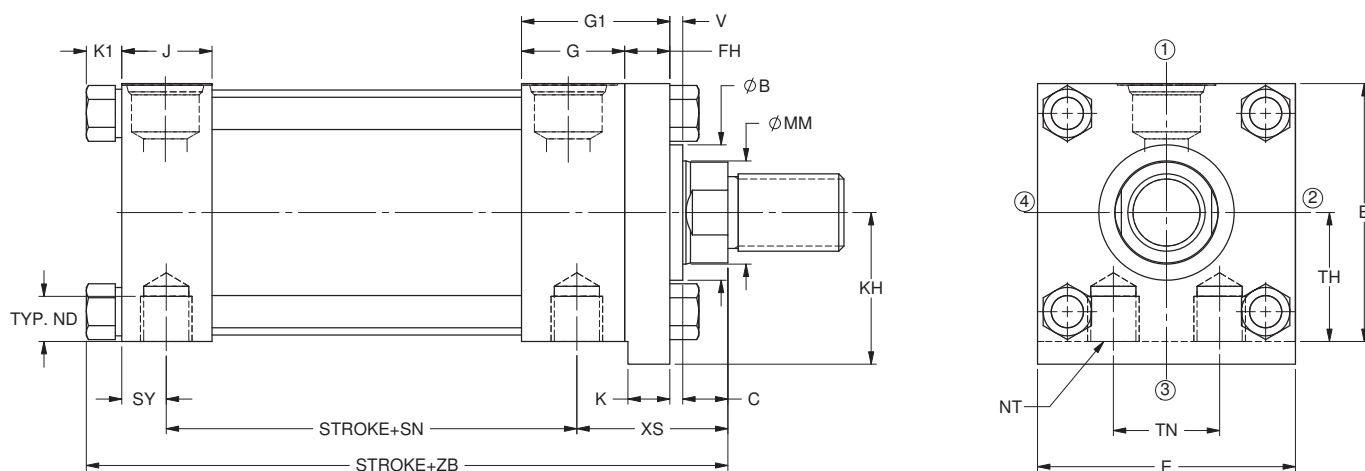
| Bore | Rod Dia<br>MM | SB   | SS+  | ST   | SU   | SY   | TS    | US    | XS   | ZB+<br>Max | Piston<br>Thick. | K1   |
|------|---------------|------|------|------|------|------|-------|-------|------|------------|------------------|------|
| 1.50 | 0.63          | 0.38 | 3.88 | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.38 | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 0.38 | 3.88 | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.75 | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 3.63 | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 1.88 | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 3.63 | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 2.13 | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.75 | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.06 | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 0.75 | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.31 | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 0.75 | 3.38 | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.56 | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.75 | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.31 | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 0.75 | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.56 | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 0.75 | 4.13 | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.69 | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.00 | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.75 | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 1.00 | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.88 | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 1.00 | 4.00 | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 3.13 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.00 | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 2.88 | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.00 | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.00 | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 1.00 | 4.50 | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.25 | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 1.25 | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 1.25 | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 1.25 | 5.13 | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.50 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 1.50 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 1.50 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 1.50 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 1.50 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.50 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 1.50 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 1.50 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 1.50 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 1.50 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ05 Keyed Tapped Lug Mounts



| Bore | Rod<br>MM | B<br>+.000/-0.002 | C    | E    | G1   | J    | FH   | K<br>+.000/-0.002 | Max<br>KH | V    | TH<br>±.002 |
|------|-----------|-------------------|------|------|------|------|------|-------------------|-----------|------|-------------|
| 1.50 | 0.63      | 1.124             | 0.38 | 2.50 | 2.13 | 1.50 | 0.38 | 0.362             | 1.44      | 0.25 | 1.243       |
|      | 1.00      | 1.499             | 0.50 | 2.50 | 2.13 | 1.50 | 0.38 | 0.362             | 1.44      | 0.50 | 1.243       |
| 2.00 | 1.00      | 1.499             | 0.50 | 3.00 | 2.38 | 1.50 | 0.63 | 0.612             | 1.81      | 0.25 | 1.493       |
|      | 1.38      | 1.999             | 0.63 | 3.00 | 2.38 | 1.50 | 0.63 | 0.612             | 1.81      | 0.38 | 1.493       |
| 2.50 | 1.00      | 1.499             | 0.50 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612             | 2.06      | 0.25 | 1.743       |
|      | 1.38      | 1.999             | 0.63 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612             | 2.06      | 0.38 | 1.743       |
|      | 1.75      | 2.374             | 0.75 | 3.50 | 2.38 | 1.50 | 0.63 | 0.612             | 2.06      | 0.50 | 1.743       |
| 3.25 | 1.38      | 1.999             | 0.63 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737             | 2.63      | 0.25 | 2.243       |
|      | 1.75      | 2.374             | 0.75 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737             | 2.63      | 0.38 | 2.243       |
|      | 2.00      | 2.624             | 0.88 | 4.50 | 2.75 | 1.75 | 0.75 | 0.737             | 2.63      | 0.38 | 2.243       |
| 4.00 | 1.75      | 2.374             | 0.75 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862             | 2.94      | 0.25 | 2.493       |
|      | 2.00      | 2.624             | 0.88 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862             | 2.94      | 0.25 | 2.493       |
|      | 2.50      | 3.124             | 1.00 | 5.00 | 2.88 | 1.75 | 0.88 | 0.862             | 2.94      | 0.38 | 2.493       |
| 5.00 | 2.00      | 2.624             | 0.88 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862             | 3.68      | 0.25 | 3.243       |
|      | 2.50      | 3.124             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862             | 3.68      | 0.38 | 3.243       |
|      | 3.00      | 3.749             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862             | 3.68      | 0.38 | 3.243       |
|      | 3.50      | 4.249             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.862             | 3.68      | 0.38 | 3.243       |
| 6.00 | 2.50      | 3.124             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987             | 4.25      | 0.25 | 3.743       |
|      | 3.00      | 3.749             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987             | 4.25      | 0.25 | 3.743       |
|      | 3.50      | 4.249             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987             | 4.25      | 0.25 | 3.743       |
|      | 4.00      | 4.749             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.987             | 4.25      | 0.25 | 3.743       |
| 7.00 | 3.00      | 3.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987             | 4.75      | 0.25 | 4.243       |
|      | 3.50      | 4.249             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987             | 4.75      | 0.25 | 4.243       |
|      | 4.00      | 4.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987             | 4.75      | 0.25 | 4.243       |
|      | 4.50      | 5.249             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987             | 4.75      | 0.25 | 4.243       |
|      | 5.00      | 5.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.987             | 4.75      | 0.25 | 4.243       |
| 8.00 | 3.50      | 4.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987             | 5.25      | 0.25 | 4.743       |
|      | 4.00      | 4.749             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987             | 5.25      | 0.38 | 4.743       |
|      | 4.50      | 5.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987             | 5.25      | 0.38 | 4.743       |
|      | 5.00      | 5.749             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987             | 5.25      | 0.38 | 4.743       |
|      | 5.50      | 6.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.987             | 5.25      | 0.38 | 4.743       |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ05 Keyed Tapped Lug Mounts

Tapped mounts are for moving loads along a flat guided surface as in a carriage along rails.

The mounting surface should be flat and parallel to the centerline of the piston rod.

The load should be guided to traverse along the centerline of the piston rod.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

#### NOTE

For strokes in excess of 30

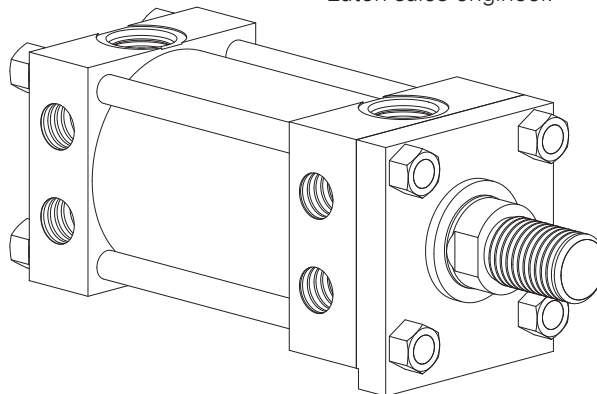
inches, see "Stop tube selection" on page 72.

With unsupported loads, the bearing must absorb more force.

For these applications, the larger available rod is recommended, and stop tubes should be considered. Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque. For high shock applications, dowel pins or shear keys should be incorporated in the mounting design. For

these applications, consider a keyed side lug mount, NZ04.

For severe side load applications, consult your local Eaton sales engineer.



| Bore | Rod<br>MM | ND   | NT<br>(Tap) | SN+  | TN   | SY   | XS   | ZB+<br>Max | Piston<br>Thick. | K1   |
|------|-----------|------|-------------|------|------|------|------|------------|------------------|------|
| 1.50 | 0.63      | 0.56 | 0.375-16    | 2.88 | 0.75 | 0.75 | 2.00 | 6.04       | 1.38             | 0.41 |
|      | 1.00      | 0.50 | 0.375-16    | 2.88 | 0.75 | 0.75 | 2.38 | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00      | 0.50 | 0.500-13    | 2.88 | 0.94 | 0.75 | 2.38 | 6.56       | 1.38             | 0.55 |
|      | 1.38      | 0.50 | 0.500-13    | 2.88 | 0.94 | 0.75 | 2.63 | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00      | 0.81 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.38 | 6.68       | 1.50             | 0.55 |
|      | 1.38      | 0.61 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.63 | 6.94       | 1.50             | 0.55 |
|      | 1.75      | 0.61 | 0.625-11    | 3.00 | 1.31 | 0.75 | 2.88 | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38      | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 2.75 | 7.80       | 1.75             | 0.67 |
|      | 1.75      | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 3.00 | 8.05       | 1.75             | 0.67 |
|      | 2.00      | 0.75 | 0.750-10    | 3.50 | 1.50 | 0.88 | 3.13 | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75      | 1.00 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.00 | 8.40       | 2.00             | 0.78 |
|      | 2.00      | 0.75 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.13 | 8.53       | 2.00             | 0.78 |
|      | 2.50      | 0.69 | 1.000-8     | 3.75 | 2.06 | 0.88 | 3.38 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00      | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.13 | 9.18       | 2.50             | 0.92 |
|      | 2.50      | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.43       | 2.50             | 0.92 |
|      | 3.00      | 1.13 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.43       | 2.50             | 0.92 |
|      | 3.50      | 1.00 | 1.000-8     | 4.25 | 2.94 | 0.88 | 3.38 | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50      | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.66      | 2.88             | 1.03 |
|      | 3.00      | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.66      | 2.88             | 1.03 |
|      | 3.50      | 1.31 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.66      | 2.88             | 1.03 |
|      | 4.00      | 1.25 | 1.250-7     | 5.13 | 3.31 | 1.13 | 3.50 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00      | 2.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 3.50      | 2.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 4.00      | 1.75 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 4.50      | 1.50 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
|      | 5.00      | 1.13 | 1.500-6     | 5.88 | 3.75 | 1.06 | 3.81 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50      | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 4.00      | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 4.50      | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 5.00      | 1.56 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |
|      | 5.50      | 1.38 | 1.500-6     | 6.63 | 4.25 | 1.19 | 3.94 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

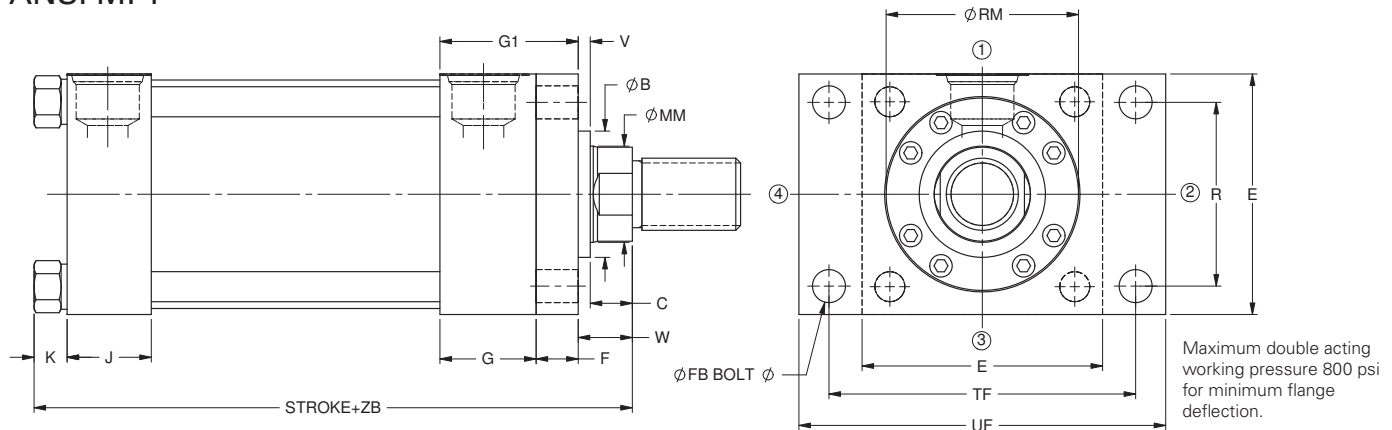
# Mounting Style and Installation

## Dimensions

NZ07 Head Rectangular

Flange Mount

ANSI MF1



| Bore | Rod Dia<br>MM | B<br>+.000/ -.002 | C    | E    | G1   | J    | F    | V    | RM   | W    |
|------|---------------|-------------------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 2.13 | 1.50 | 0.38 | 0.25 | -    | 0.63 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 2.13 | 1.50 | 0.38 | 0.50 | -    | 1.00 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 2.38 | 1.50 | 0.63 | 0.25 | -    | 0.75 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 2.38 | 1.50 | 0.63 | 0.38 | -    | 1.00 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 2.38 | 1.50 | 0.63 | 0.25 | 2.63 | 0.75 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 2.38 | 1.50 | 0.63 | 0.38 | -    | 1.00 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 2.38 | 1.50 | 0.63 | 0.50 | -    | 1.25 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.75 | 1.75 | 0.75 | 0.25 | 3.25 | 0.88 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.75 | 1.75 | 0.75 | 0.38 | -    | 1.13 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.75 | 1.75 | 0.75 | 0.38 | -    | 1.25 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.88 | 1.75 | 0.88 | 0.25 | 3.88 | 1.00 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.88 | 1.75 | 0.88 | 0.25 | 4.00 | 1.13 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.88 | 1.75 | 0.88 | 0.38 | 4.44 | 1.38 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.88 | 1.75 | 0.88 | 0.25 | 4.00 | 1.13 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 | 4.44 | 1.38 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 | 5.25 | 1.38 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 | 5.63 | 1.38 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 | 4.44 | 1.25 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 | 5.25 | 1.25 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 | 5.63 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 | 6.44 | 1.25 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 | 5.25 | 1.25 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 | 5.63 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 | 6.44 | 1.25 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 | 7.13 | 1.25 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 | 7.56 | 1.25 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 | 5.63 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 | 6.44 | 1.25 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 | 7.13 | 1.25 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 | 7.56 | 1.25 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 | 8.38 | 1.25 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ07 Head Rectangular Flange Mount ANSI MF1

These mounts are ideal for straight line force transfer applications in which the cylinder is used in tension (pulling). The mounting surface should be flat, and the rod end cartridge should be piloted into it.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

#### NOTE

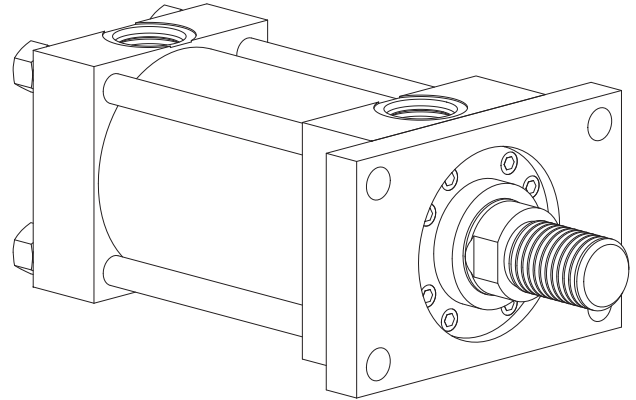
For strokes in excess of 30 inches, see "Stop tube selec-

tion" on page 72.

The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For eccentric loads, the larger of the two available rods in each bore size is recommended. Stop tubes should also be considered. The head rectangular mounts (NZ09) is recommended for heavy duty applications. NZ07 mounts are only rated for a maximum of 800 psi (55 bar) on the push stroke.

Use high tensile socket head cap screws or hex head bolts

tightened to the manufacturer's recommended torque.



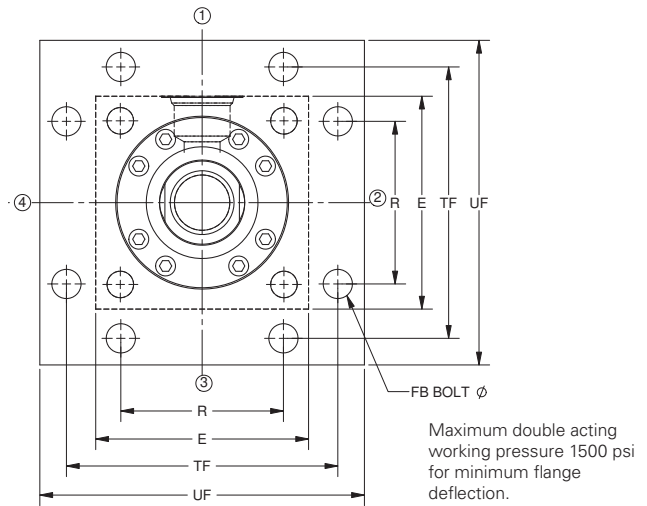
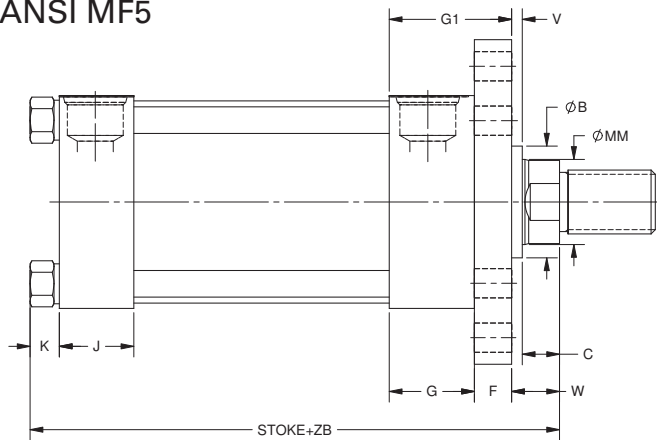
| Bore | Rod Dia<br>MM | FB   | R    | TF    | UF    | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|-------|-------|------------|------------------|------|
| 1.50 | 0.63          | 0.38 | 1.63 | 3.44  | 4.25  | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 0.38 | 1.63 | 3.44  | 4.25  | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 2.05 | 4.13  | 5.13  | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 2.05 | 4.13  | 5.13  | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.50 | 2.55 | 4.63  | 5.63  | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 0.50 | 2.55 | 4.63  | 5.63  | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 0.50 | 2.55 | 4.63  | 5.63  | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.63 | 3.25 | 5.88  | 7.13  | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 0.63 | 3.25 | 5.88  | 7.13  | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 0.63 | 3.25 | 5.88  | 7.13  | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 0.63 | 3.82 | 6.38  | 7.63  | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 0.63 | 3.82 | 6.38  | 7.63  | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 0.63 | 3.82 | 6.38  | 7.63  | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ08 Head Square Flange Mount ANSI MF5



| Bore | Rod Dia<br>MM | B<br>+.000/-.002 | C    | E    | G1   | J    | F    | V    |
|------|---------------|------------------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124            | 0.38 | 2.50 | 2.13 | 1.50 | 0.38 | 0.25 |
|      | 1.00          | 1.499            | 0.50 | 2.50 | 2.13 | 1.50 | 0.38 | 0.50 |
| 2.00 | 1.00          | 1.499            | 0.50 | 3.00 | 2.38 | 1.50 | 0.63 | 0.25 |
|      | 1.38          | 1.999            | 0.63 | 3.00 | 2.38 | 1.50 | 0.63 | 0.38 |
| 2.50 | 1.00          | 1.499            | 0.50 | 3.50 | 2.38 | 1.50 | 0.63 | 0.25 |
|      | 1.38          | 1.999            | 0.63 | 3.50 | 2.38 | 1.50 | 0.63 | 0.38 |
|      | 1.75          | 2.374            | 0.75 | 3.50 | 2.38 | 1.50 | 0.63 | 0.50 |
| 3.25 | 1.38          | 1.999            | 0.63 | 4.50 | 2.75 | 1.75 | 0.75 | 0.25 |
|      | 1.75          | 2.374            | 0.75 | 4.50 | 2.75 | 1.75 | 0.75 | 0.38 |
|      | 2.00          | 2.624            | 0.88 | 4.50 | 2.75 | 1.75 | 0.75 | 0.38 |
| 4.00 | 1.75          | 2.374            | 0.75 | 5.00 | 2.88 | 1.75 | 0.88 | 0.25 |
|      | 2.00          | 2.624            | 0.88 | 5.00 | 2.88 | 1.75 | 0.88 | 0.25 |
|      | 2.50          | 3.124            | 1.00 | 5.00 | 2.88 | 1.75 | 0.88 | 0.38 |
| 5.00 | 2.00          | 2.624            | 0.88 | 6.50 | 2.88 | 1.75 | 0.88 | 0.25 |
|      | 2.50          | 3.124            | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 |
|      | 3.00          | 3.749            | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 |
|      | 3.50          | 4.249            | 1.00 | 6.50 | 2.88 | 1.75 | 0.88 | 0.38 |
| 6.00 | 2.50          | 3.124            | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 |
|      | 3.00          | 3.749            | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 |
|      | 3.50          | 4.249            | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 |
|      | 4.00          | 4.749            | 1.00 | 7.50 | 3.25 | 2.25 | 1.00 | 0.25 |
| 7.00 | 3.00          | 3.749            | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 |
|      | 3.50          | 4.249            | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 |
|      | 4.00          | 4.749            | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 |
|      | 4.50          | 5.249            | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 |
|      | 5.00          | 5.749            | 1.00 | 8.50 | 3.75 | 2.75 | 1.00 | 0.25 |
| 8.00 | 3.50          | 4.249            | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 |
|      | 4.00          | 4.749            | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 |
|      | 4.50          | 5.249            | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 |
|      | 5.00          | 5.749            | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 |
|      | 5.50          | 6.249            | 1.00 | 9.50 | 4.00 | 3.00 | 1.00 | 0.25 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ08 Head Square Flange Mount ANSI MF5

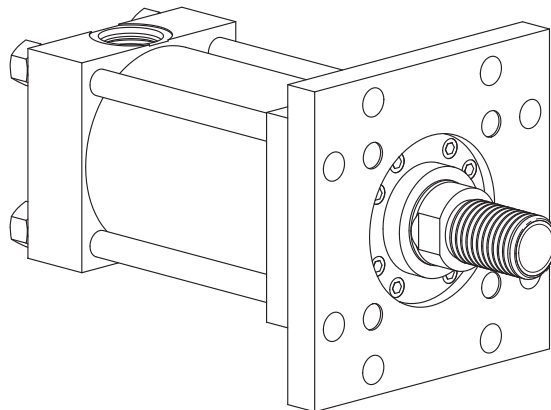
These mounts are ideal for straight line force transfer applications in which the cylinder is used in tension (pulling). The mounting surface should be flat, and the rod end cartridge should be piloted into it. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

### NOTE

For strokes in excess of 30 inches, see "Stop tube selec-

tion" on page 72. The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For eccentric loads, the larger of the two available rods in each bore size is recommended. Stop tubes should also be considered. The head rectangular mounts (NZ09) is recommended for heavy duty applications. Seven and eight inch bore NZ08 mounts are only rated for a maximum of 1500 psi (105 bar) on the push stroke.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.



| Bore | Rod Dia<br>MM | W    | FB   | R    | TF    | UF    | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|------|-------|-------|------------|------------------|------|
| 1.50 | 0.63          | 0.63 | 0.38 | 1.63 | 3.44  | 4.25  | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 1.00 | 0.38 | 1.63 | 3.44  | 4.25  | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 0.50 | 2.05 | 4.13  | 5.13  | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 1.00 | 0.50 | 2.05 | 4.13  | 5.13  | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.75 | 0.50 | 2.55 | 4.63  | 5.63  | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 1.00 | 0.50 | 2.55 | 4.63  | 5.63  | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 1.25 | 0.50 | 2.55 | 4.63  | 5.63  | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.88 | 0.63 | 3.25 | 5.88  | 7.13  | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 1.13 | 0.63 | 3.25 | 5.88  | 7.13  | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 1.25 | 0.63 | 3.25 | 5.88  | 7.13  | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.00 | 0.63 | 3.82 | 6.38  | 7.63  | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 1.13 | 0.63 | 3.82 | 6.38  | 7.63  | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 1.38 | 0.63 | 3.82 | 6.38  | 7.63  | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.13 | 0.88 | 4.95 | 8.19  | 9.75  | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.38 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.38 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 1.38 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.25 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 1.25 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 1.25 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 1.25 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 1.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 1.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 1.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 1.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.25 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 1.25 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 1.25 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 1.25 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 1.25 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

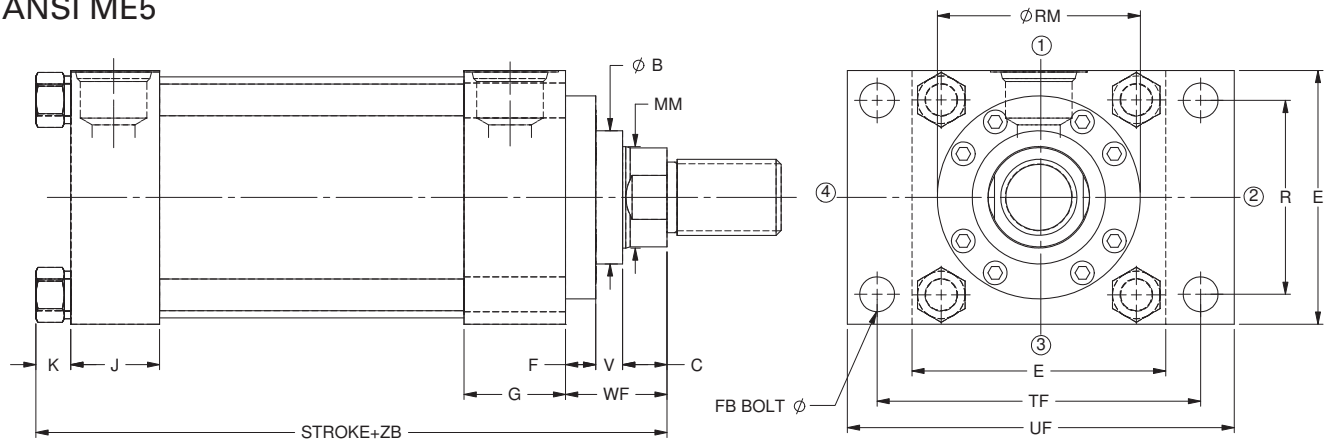
See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

NZ09 Head Rectangular  
Mount

ANSI ME5



| Bore | Rod Dia<br>MM | B<br>+.000/-0.002 | C    | E    | G    | J    | F<br>Max | V    | WF   |
|------|---------------|-------------------|------|------|------|------|----------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.34     | 0.28 | 1.00 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.50     | 0.38 | 1.38 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.50     | 0.38 | 1.38 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.59     | 0.41 | 1.63 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50     | 0.38 | 1.38 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.59     | 0.41 | 1.63 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.59     | 0.54 | 1.88 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59     | 0.41 | 1.63 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.59     | 0.54 | 1.88 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.59     | 0.53 | 2.00 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59     | 0.54 | 1.88 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59     | 0.53 | 2.00 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59     | 0.66 | 2.25 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59     | 0.53 | 2.00 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59     | 0.66 | 2.25 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72     | 0.53 | 2.25 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72     | 0.53 | 2.25 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59     | 0.66 | 2.25 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72     | 0.53 | 2.25 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72     | 0.53 | 2.25 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88     | 0.38 | 2.25 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72     | 0.53 | 2.25 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72     | 0.53 | 2.25 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88     | 0.38 | 2.25 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88     | 0.38 | 2.25 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88     | 0.38 | 2.25 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72     | 0.53 | 2.25 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88     | 0.38 | 2.25 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88     | 0.38 | 2.25 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88     | 0.38 | 2.25 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88     | 0.38 | 2.25 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ09 Head Rectangular Mount ANSI ME5

These mounts are ideal for straight line force transfer applications in which the cylinder is used in tension (pulling). The mounting surface should be flat, and the rod end cartridge should be piloted into it. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

#### NOTE

For strokes in excess of 30

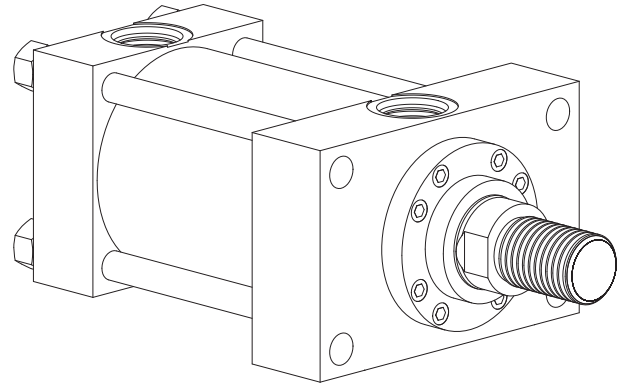
inches, see "Stop tube selection" on page 72.

The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For eccentric loads, the larger of the two available rods in each bore size is recommended. Stop tubes should also be considered.

The head rectangular mounts (NZ09) is recommended for heavy duty applications.

Use high tensile socket head cap screws or hex head bolts

tightened to the manufacturer's recommended torque.



| Bore | Rod Dia<br>MM | RM   | FB   | R    | TF    | UF    | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|------|-------|-------|------------|------------------|------|
| 1.50 | 0.63          | 2.38 | 0.38 | 1.63 | 3.44  | 4.25  | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 2.63 | 0.38 | 1.63 | 3.44  | 4.25  | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 2.63 | 0.50 | 2.05 | 4.13  | 5.13  | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 3.25 | 0.50 | 2.05 | 4.13  | 5.13  | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 2.63 | 0.50 | 2.55 | 4.63  | 5.63  | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 3.25 | 0.50 | 2.55 | 4.63  | 5.63  | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 3.88 | 0.50 | 2.55 | 4.63  | 5.63  | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 3.25 | 0.63 | 3.25 | 5.88  | 7.13  | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 3.88 | 0.63 | 3.25 | 5.88  | 7.13  | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 4.00 | 0.63 | 3.25 | 5.88  | 7.13  | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 3.88 | 0.63 | 3.82 | 6.38  | 7.63  | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 4.00 | 0.63 | 3.82 | 6.38  | 7.63  | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 4.44 | 0.63 | 3.82 | 6.38  | 7.63  | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 4.00 | 0.88 | 4.95 | 8.19  | 9.75  | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 4.44 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 5.25 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 5.63 | 0.88 | 4.95 | 8.19  | 9.75  | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 4.44 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 5.25 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 5.63 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 6.44 | 1.00 | 5.73 | 9.44  | 11.25 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 5.25 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 5.63 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 6.44 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 7.13 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 7.56 | 1.13 | 6.58 | 10.63 | 12.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 5.63 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 6.44 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 7.13 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 7.56 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 8.38 | 1.25 | 7.50 | 11.81 | 14.00 | 13.00      | 3.50             | 1.26 |

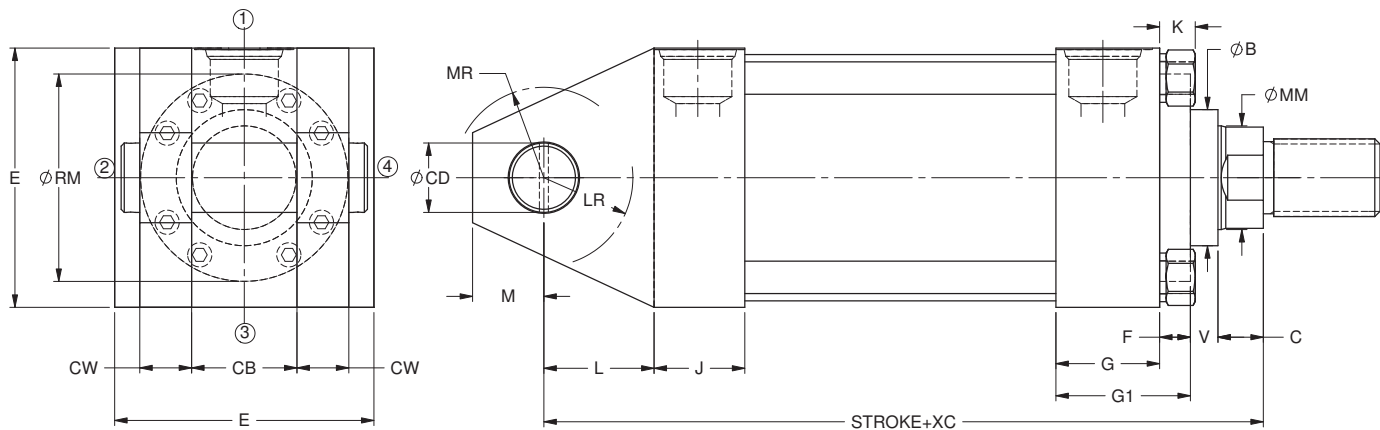
+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

NZ10 Cap Fixed Clevis  
Mount  
ANSI MP1



| Bore | Rod Dia<br>MM | B<br>+.000/-0.002 | C    | E    | G    | J    | F    | V    | RM   | L    |
|------|---------------|-------------------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 0.75 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 0.75 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 1.25 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.25 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 1.25 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.25 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 1.25 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 1.50 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 1.50 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 1.50 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 2.13 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 2.13 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 2.13 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 2.25 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 2.25 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 2.25 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 2.25 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 2.50 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 2.50 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 2.50 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 2.50 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 3.00 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 3.00 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 3.00 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 3.00 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 3.00 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 3.25 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 3.25 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 3.25 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 3.25 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 3.25 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ10 Cap Fixed Clevis Mount ANSI MP1

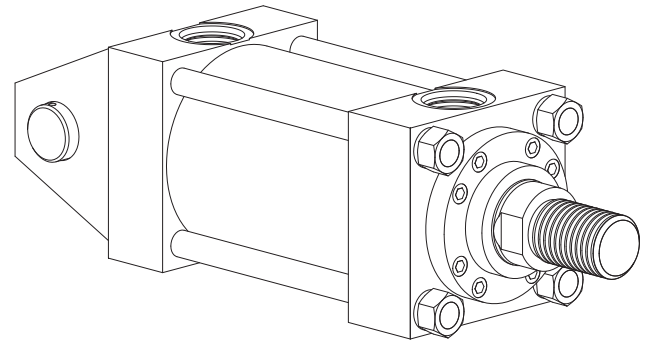
These mounts are for applications in which the machine member travels in a curved path within one plane. These mounts can be used both in compression (push) and tension (pull). Care must be exercised to prevent rod buckling in compression applications with long strokes. See page 75 for stroke limitations.

#### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72. The centerline of the machine member that attaches to the swivel pin must be perpendicular to the centerline of the piston rod and the curved path must be in one plane only. Any misalignment will cause excess side loading on the bearing and piston. This will lead to premature failure.

For applications with small amounts of misalignment,

consider the spherical bearing mount, as shown in the NZ11



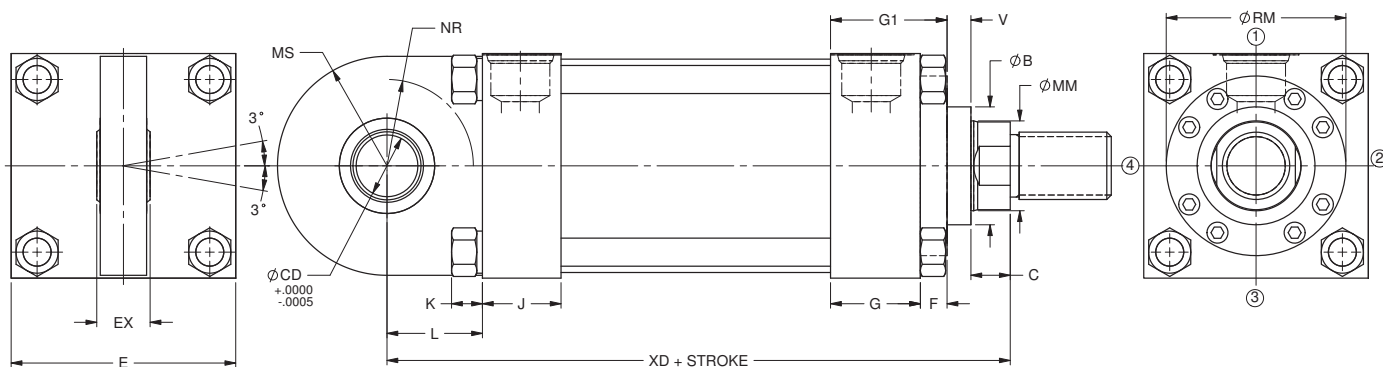
| Bore | Rod Dia<br>MM | M    | CB   | CD   | CW   | LR   | MR   | XC+   | Piston<br>Thick. | K    |
|------|---------------|------|------|------|------|------|------|-------|------------------|------|
| 1.50 | 0.63          | 0.50 | 0.75 | 0.50 | 0.50 | 0.56 | 0.56 | 6.38  | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.75 | 0.50 | 0.50 | 0.56 | 0.56 | 6.75  | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 1.25 | 0.75 | 0.63 | 1.06 | 1.06 | 7.25  | 1.38             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.75 | 0.63 | 1.06 | 1.06 | 7.50  | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.75 | 1.25 | 0.75 | 0.63 | 1.06 | 1.06 | 7.38  | 1.50             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.75 | 0.63 | 1.06 | 1.06 | 7.63  | 1.50             | 0.55 |
|      | 1.75          | 0.75 | 1.25 | 0.75 | 0.63 | 1.06 | 1.06 | 7.88  | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.00 | 1.50 | 1.00 | 0.75 | 1.25 | 1.13 | 8.63  | 1.75             | 0.67 |
|      | 1.75          | 1.00 | 1.50 | 1.00 | 0.75 | 1.25 | 1.13 | 8.88  | 1.75             | 0.67 |
|      | 2.00          | 1.00 | 1.50 | 1.00 | 0.75 | 1.25 | 1.13 | 9.00  | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.38 | 2.00 | 1.38 | 1.00 | 1.88 | 1.75 | 9.75  | 2.00             | 0.78 |
|      | 2.00          | 1.38 | 2.00 | 1.38 | 1.00 | 1.88 | 1.75 | 9.88  | 2.00             | 0.78 |
|      | 2.50          | 1.38 | 2.00 | 1.38 | 1.00 | 1.88 | 1.75 | 10.13 | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.75 | 2.50 | 1.75 | 1.25 | 1.94 | 1.88 | 10.50 | 2.50             | 0.92 |
|      | 2.50          | 1.75 | 2.50 | 1.75 | 1.25 | 1.94 | 1.88 | 10.75 | 2.50             | 0.92 |
|      | 3.00          | 1.75 | 2.50 | 1.75 | 1.25 | 1.94 | 1.88 | 10.75 | 2.50             | 0.92 |
|      | 3.50          | 1.75 | 2.50 | 1.75 | 1.25 | 1.94 | 1.88 | 10.75 | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.00 | 2.50 | 2.00 | 1.25 | 2.06 | 2.13 | 12.13 | 2.88             | 1.03 |
|      | 3.00          | 2.00 | 2.50 | 2.00 | 1.25 | 2.06 | 2.13 | 12.13 | 2.88             | 1.03 |
|      | 3.50          | 2.00 | 2.50 | 2.00 | 1.25 | 2.06 | 2.13 | 12.13 | 2.88             | 1.03 |
|      | 4.00          | 2.00 | 2.50 | 2.00 | 1.25 | 2.06 | 2.13 | 12.13 | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.50 | 3.00 | 2.50 | 1.50 | 2.56 | 2.50 | 13.75 | 3.00             | 1.17 |
|      | 3.50          | 2.50 | 3.00 | 2.50 | 1.50 | 2.56 | 2.50 | 13.75 | 3.00             | 1.17 |
|      | 4.00          | 2.50 | 3.00 | 2.50 | 1.50 | 2.56 | 2.50 | 13.75 | 3.00             | 1.17 |
|      | 4.50          | 2.50 | 3.00 | 2.50 | 1.50 | 2.56 | 2.50 | 13.75 | 3.00             | 1.17 |
|      | 5.00          | 2.50 | 3.00 | 2.50 | 1.50 | 2.56 | 2.50 | 13.75 | 3.00             | 1.17 |
| 8.00 | 3.50          | 2.75 | 3.00 | 3.00 | 1.50 | 2.69 | 2.75 | 15.00 | 3.50             | 1.26 |
|      | 4.00          | 2.75 | 3.00 | 3.00 | 1.50 | 2.69 | 2.75 | 15.00 | 3.50             | 1.26 |
|      | 4.50          | 2.75 | 3.00 | 3.00 | 1.50 | 2.69 | 2.75 | 15.00 | 3.50             | 1.26 |
|      | 5.00          | 2.75 | 3.00 | 3.00 | 1.50 | 2.69 | 2.75 | 15.00 | 3.50             | 1.26 |
|      | 5.50          | 2.75 | 3.00 | 3.00 | 1.50 | 2.69 | 2.75 | 15.00 | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ11 Cap Spherical Bearing Mount



### Max. operating pressure

| Bore | PSI  |
|------|------|
| 1.50 | 1650 |
| 2.00 | 2000 |
| 2.50 | 1400 |
| 3.25 | 1500 |
| 4.00 | 1750 |
| 5.00 | 1900 |
| 6.00 | 1700 |

| Bore | Rod Dia<br>MM | B<br>+0.000/-0.002 | C    | E    | G    | J    | F    | V    |
|------|---------------|--------------------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124              | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 |
|      | 1.00          | 1.499              | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 |
| 2.00 | 1.00          | 1.499              | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 |
|      | 1.38          | 1.999              | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 |
| 2.50 | 1.00          | 1.499              | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 |
|      | 1.38          | 1.999              | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 |
|      | 1.75          | 2.374              | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 |
| 3.25 | 1.38          | 1.999              | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 |
|      | 1.75          | 2.374              | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 |
|      | 2.00          | 2.624              | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 |
| 4.00 | 1.75          | 2.374              | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 |
|      | 2.00          | 2.624              | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 |
|      | 2.50          | 3.124              | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 |
| 5.00 | 2.00          | 2.624              | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 |
|      | 2.50          | 3.124              | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 |
|      | 3.00          | 3.749              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 |
|      | 3.50          | 4.249              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 |
| 6.00 | 2.50          | 3.124              | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 |
|      | 3.00          | 3.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 |
|      | 3.50          | 4.249              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 |
|      | 4.00          | 4.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ11 Cap Spherical Bearing Mount

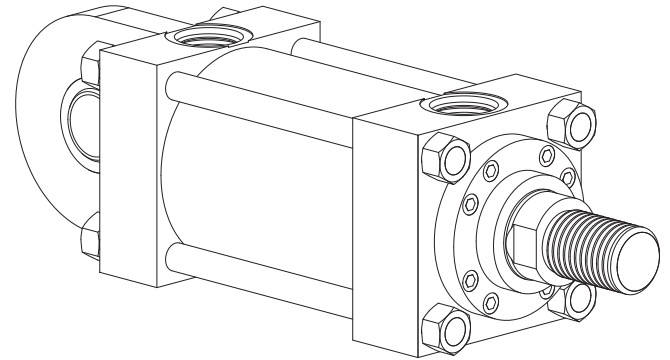
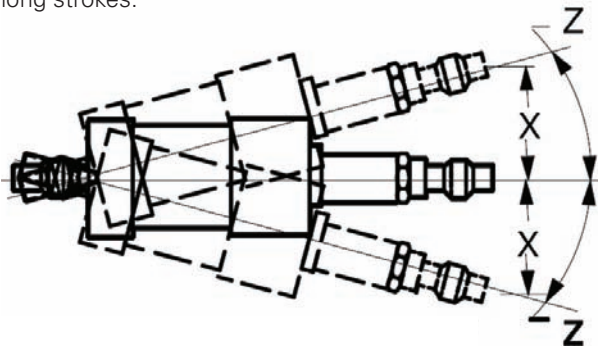
This mount is for applications in which the machine member travels in a curved path in one plane where some misalignment is unavoidable. The amount of allowable misalignment can be calculated. This mount can be used both in compression (push) and tension (pull) applications. Care must be exercised to prevent rod buckling in compression applications with long strokes.

### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72. Maximum radial static and dynamic bearing loads must not exceed the recommended ratings shown in the following table. Angle Z is the recommended maximum angle of misalignment.

To find the maximum recommended X distance, multiply the distance between pivot

mounting holes (see NZ11 dimensional drawing) by the tangent of angle Z.



| Bore | Rod Dia | Mtg. Hole Dia | Angle "Z" | Tangent of "Z" | Static Load Ratings |        |
|------|---------|---------------|-----------|----------------|---------------------|--------|
|      |         |               |           |                | Radial              | Thrust |
| 1.50 | 0.63    | 0.50          | 1.5       | .026           | 8,100               | 3,200  |
| 2.00 | 1.00    | 2.00          | 2         | .035           | 18,800              | 7,500  |
| 2.50 | 1.00    | 2.00          | 2         | .035           | 18,800              | 7,500  |
| 3.25 | 1.38    | 2.00          | 2         | .035           | 33,300              | 13,300 |
| 4.00 | 1.75    | 2.00          | 2         | .035           | 59,800              | 24,000 |
| 5.00 | 2.00    | 2.50          | 2.5       | .044           | 102,000             | 40,700 |
| 6.00 | 2.50    | 2.50          | 2.5       | .044           | 132,000             | 53,000 |

| Bore | Rod Dia<br>MM | RM   | L    | CD<br>+.0000<br>-.0005 | EX   | NR   | MS   | XD+   | Piston<br>Thick. | K    |
|------|---------------|------|------|------------------------|------|------|------|-------|------------------|------|
| 1.50 | 0.63          | -    | 0.75 | 0.5000                 | 0.44 | 0.63 | 0.94 | 6.38  | 1.38             | 0.41 |
|      | 1.00          | -    | 0.75 | 0.5000                 | 0.44 | 0.63 | 0.94 | 6.75  | 1.38             | 0.41 |
| 2.00 | 1.00          | -    | 1.25 | 0.7500                 | 0.66 | 1.00 | 1.38 | 7.25  | 1.38             | 0.55 |
|      | 1.38          | -    | 1.25 | 0.7500                 | 0.66 | 1.00 | 1.38 | 7.50  | 1.38             | 0.55 |
| 2.50 | 1.00          | 2.63 | 1.25 | 0.7500                 | 0.66 | 1.00 | 1.38 | 7.38  | 1.50             | 0.55 |
|      | 1.38          | -    | 1.25 | 0.7500                 | 0.66 | 1.00 | 1.38 | 7.63  | 1.50             | 0.55 |
|      | 1.75          | -    | 1.25 | 0.7500                 | 0.66 | 1.00 | 1.38 | 7.88  | 1.50             | 0.55 |
| 3.25 | 1.38          | 3.25 | 1.50 | 1.0000                 | 0.88 | 1.25 | 1.69 | 8.63  | 1.75             | 0.67 |
|      | 1.75          | -    | 1.50 | 1.0000                 | 0.88 | 1.25 | 1.69 | 8.88  | 1.75             | 0.67 |
|      | 2.00          | -    | 1.50 | 1.0000                 | 0.88 | 1.25 | 1.69 | 9.00  | 1.75             | 0.67 |
| 4.00 | 1.75          | 3.88 | 2.13 | 1.3750                 | 1.19 | 1.63 | 2.44 | 9.75  | 2.00             | 0.78 |
|      | 2.00          | 4.00 | 2.13 | 1.3750                 | 1.19 | 1.63 | 2.44 | 9.88  | 2.00             | 0.78 |
|      | 2.50          | 4.44 | 2.13 | 1.3750                 | 1.19 | 1.63 | 2.44 | 10.13 | 2.00             | 0.78 |
| 5.00 | 2.00          | 4.00 | 2.25 | 1.7500                 | 1.53 | 2.06 | 2.88 | 10.50 | 2.50             | 0.92 |
|      | 2.50          | 4.44 | 2.25 | 1.7500                 | 1.53 | 2.06 | 2.88 | 10.75 | 2.50             | 0.92 |
|      | 3.00          | 5.25 | 2.25 | 1.7500                 | 1.53 | 2.06 | 2.88 | 10.75 | 2.50             | 0.92 |
|      | 3.50          | 5.63 | 2.25 | 1.7500                 | 1.53 | 2.06 | 2.88 | 10.75 | 2.50             | 0.92 |
| 6.00 | 2.50          | 4.44 | 2.50 | 2.0000                 | 1.75 | 2.38 | 3.31 | 12.13 | 2.88             | 1.03 |
|      | 3.00          | 5.25 | 2.50 | 2.0000                 | 1.75 | 2.38 | 3.31 | 12.13 | 2.88             | 1.03 |
|      | 3.50          | 5.63 | 2.50 | 2.0000                 | 1.75 | 2.38 | 3.31 | 12.13 | 2.88             | 1.03 |
|      | 4.00          | 6.44 | 2.50 | 2.0000                 | 1.75 | 2.38 | 3.31 | 12.13 | 2.88             | 1.03 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

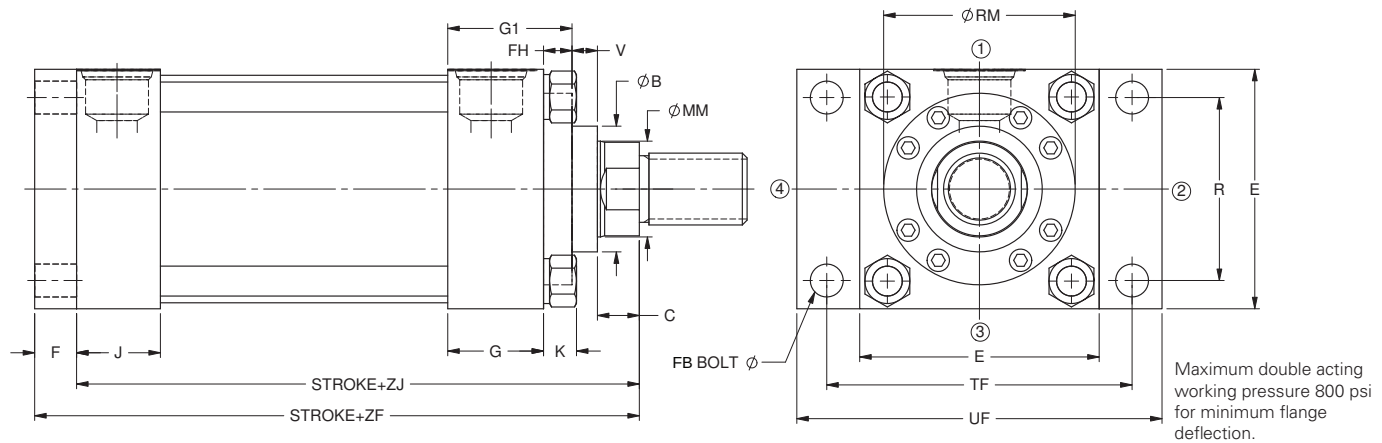
# Mounting Style and Installation

## Dimensions

NZ12 Cap Rectangular

Flange Mount

ANSI MF2



| Bore | Rod Dia<br>MM | B<br>+.000/-0.002 | C    | E    | G    | J    | FH   | RM   | V    | F    |
|------|---------------|-------------------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | -    | 0.25 | 0.38 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | -    | 0.50 | 0.38 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | -    | 0.25 | 0.63 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | -    | 0.38 | 0.63 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 2.63 | 0.38 | 0.63 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | -    | 0.38 | 0.63 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | -    | 0.50 | 0.63 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 3.25 | 0.41 | 0.75 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | -    | 0.38 | 0.75 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | -    | 0.38 | 0.75 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 3.88 | 0.53 | 0.88 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 4.00 | 0.53 | 0.88 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 4.44 | 0.66 | 0.88 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 4.00 | 0.53 | 0.88 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 4.44 | 0.66 | 0.88 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 5.25 | 0.53 | 0.88 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 5.63 | 0.53 | 0.88 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 4.44 | 0.66 | 1.00 |
| 6.00 | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 5.25 | 0.53 | 1.00 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 6.44 | 0.38 | 1.00 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 7.13 | 0.38 | 1.00 |
| 7.00 | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 6.44 | 0.38 | 1.00 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 7.13 | 0.38 | 1.00 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 7.56 | 0.38 | 1.00 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 8.38 | 0.38 | 1.00 |
| 8.00 | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 6.44 | 0.38 | 1.00 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 7.13 | 0.38 | 1.00 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 7.56 | 0.38 | 1.00 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 8.38 | 0.38 | 1.00 |
|      | 6.00          | 6.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 8.81 | 0.38 | 1.00 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ12 Cap Rectangular Flange Mount

#### ANSI MF2

These mounts are ideal for straight line force transfer applications in which the cylinder is used in compression (pushing), as in push presses.

For tension applications (pulling), a head rectangular mount is more appropriate.

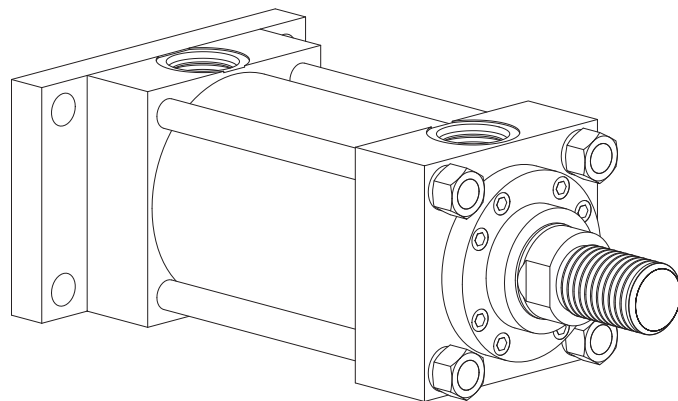
#### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

The cap rectangular mounts (NZ14) is recommended for heavy duty applications. NZ12 mounts are only rated for a maximum of 800 psi (55 bar) on the pull stroke.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.



| Bore | Rod Dia<br>MM | FB   | R    | TF    | UF    | ZF+<br>Max | ZJ+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|-------|-------|------------|------------|------------------|------|
| 1.50 | 0.63          | 0.38 | 1.63 | 3.44  | 4.25  | 6.00       | 5.63       | 1.38             | 0.41 |
|      | 1.00          | 0.38 | 1.63 | 3.44  | 4.25  | 6.38       | 6.00       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 2.05 | 4.13  | 5.13  | 6.63       | 6.00       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 2.05 | 4.13  | 5.13  | 6.88       | 6.26       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.50 | 2.55 | 4.63  | 5.63  | 6.75       | 6.13       | 1.50             | 0.55 |
|      | 1.38          | 0.50 | 2.55 | 4.63  | 5.63  | 7.00       | 6.38       | 1.50             | 0.55 |
|      | 1.75          | 0.50 | 2.55 | 4.63  | 5.63  | 7.25       | 6.63       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.63 | 3.25 | 5.88  | 7.13  | 7.88       | 7.13       | 1.75             | 0.67 |
|      | 1.75          | 0.63 | 3.25 | 5.88  | 7.13  | 8.13       | 7.38       | 1.75             | 0.67 |
|      | 2.00          | 0.63 | 3.25 | 5.88  | 7.13  | 8.25       | 7.50       | 1.75             | 0.67 |
| 4.00 | 1.75          | 0.63 | 3.82 | 6.38  | 7.63  | 8.50       | 7.63       | 2.00             | 0.78 |
|      | 2.00          | 0.63 | 3.82 | 6.38  | 7.63  | 8.63       | 7.75       | 2.00             | 0.78 |
|      | 2.50          | 0.63 | 3.82 | 6.38  | 7.63  | 8.88       | 8.00       | 2.00             | 0.78 |
| 5.00 | 2.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.13       | 8.25       | 2.50             | 0.92 |
|      | 2.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
|      | 3.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
|      | 3.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 3.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 3.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 4.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 3.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 4.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 4.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 5.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 4.00          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 4.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 5.00          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 5.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

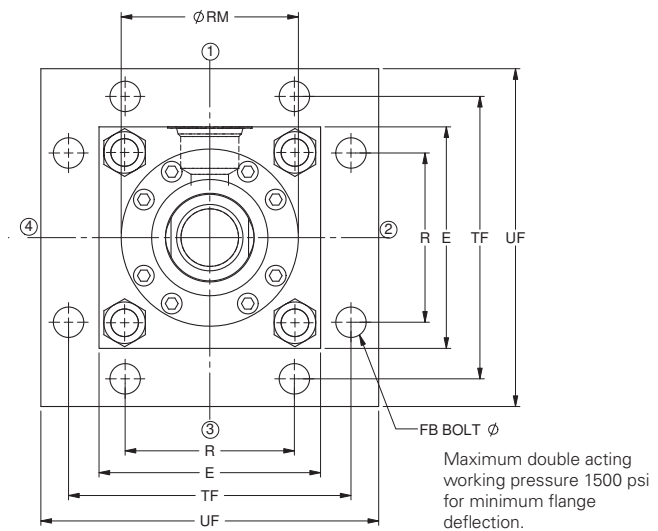
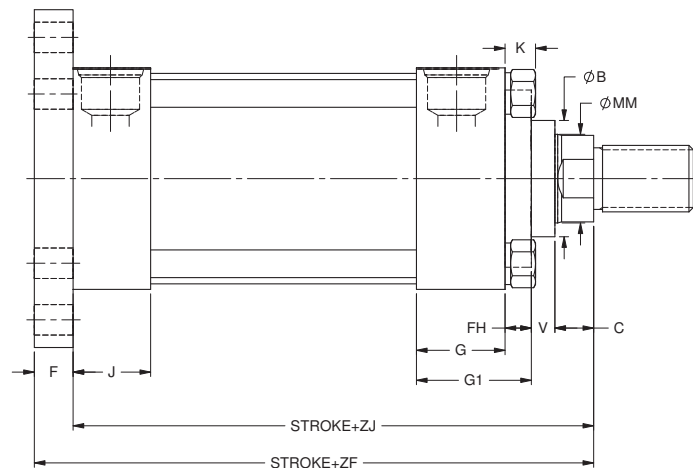
# Mounting Style and Installation

## Dimensions

NZ13 Cap Square

Flange Mount

ANSI MF6



| Bore | Rod Dia<br>MM | B<br>+.000/- .002 | C    | E    | G    | J    | FH   | RM   | V    | F    |
|------|---------------|-------------------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | -    | 0.25 | 0.38 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | -    | 0.50 | 0.38 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | -    | 0.25 | 0.63 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | -    | 0.38 | 0.63 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 2.63 | 0.38 | 0.63 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | -    | 0.38 | 0.63 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | -    | 0.50 | 0.63 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 3.25 | 0.41 | 0.75 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | -    | 0.38 | 0.75 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | -    | 0.38 | 0.75 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 3.88 | 0.53 | 0.88 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 4.00 | 0.53 | 0.88 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 4.44 | 0.66 | 0.88 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 4.00 | 0.53 | 0.88 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 4.44 | 0.66 | 0.88 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 5.25 | 0.53 | 0.88 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 5.63 | 0.53 | 0.88 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 4.44 | 0.66 | 1.00 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 5.25 | 0.53 | 1.00 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 6.44 | 0.38 | 1.00 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 5.25 | 0.53 | 1.00 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 6.44 | 0.38 | 1.00 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 7.13 | 0.38 | 1.00 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 7.56 | 0.38 | 1.00 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 5.63 | 0.53 | 1.00 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 6.44 | 0.38 | 1.00 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 7.13 | 0.38 | 1.00 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 7.56 | 0.38 | 1.00 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 8.38 | 0.38 | 1.00 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ13 Cap Square Flange Mount ANSI MF6

These mounts are ideal for straight line force transfer applications in which the cylinder is used in compression (pushing), as in push presses.

For tension applications (pulling), a head rectangular mount is more appropriate.

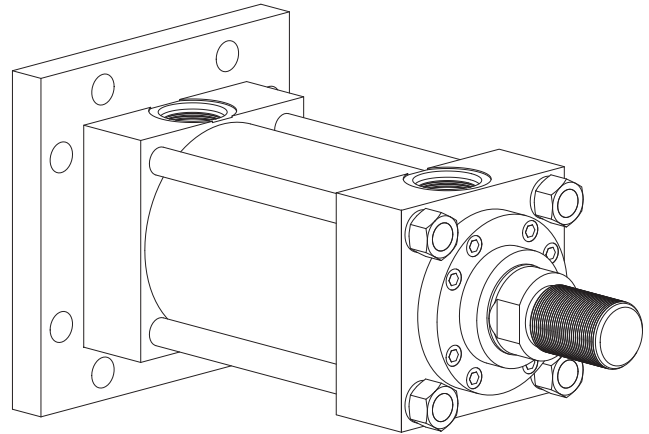
### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72.

The frame on which the

cylinder is mounted must be sufficiently rigid to resist bending moments. The cap rectangular mounts (NZ14) is recommended for heavy duty applications. Seven and eight inch bore NZ13 mounts are only rated for a maximum of 1500 psi (105 bar) pull stroke.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.



| Bore | Rod Dia<br>MM | FB   | R    | TF    | UF    | ZF+<br>Max | ZJ+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|-------|-------|------------|------------|------------------|------|
| 1.50 | 0.63          | 0.38 | 1.63 | 3.44  | 4.25  | 6.00       | 5.63       | 1.38             | 0.41 |
|      | 1.00          | 0.38 | 1.63 | 3.44  | 4.25  | 6.38       | 6.00       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 2.05 | 4.13  | 5.13  | 6.63       | 6.00       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 2.05 | 4.13  | 5.13  | 6.88       | 6.26       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.50 | 2.55 | 4.63  | 5.63  | 6.75       | 6.13       | 1.50             | 0.55 |
|      | 1.38          | 0.50 | 2.55 | 4.63  | 5.63  | 7.00       | 6.38       | 1.50             | 0.55 |
|      | 1.75          | 0.50 | 2.55 | 4.63  | 5.63  | 7.25       | 6.63       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.63 | 3.25 | 5.88  | 7.13  | 7.88       | 7.13       | 1.75             | 0.67 |
|      | 1.75          | 0.63 | 3.25 | 5.88  | 7.13  | 8.13       | 7.38       | 1.75             | 0.67 |
|      | 2.00          | 0.63 | 3.25 | 5.88  | 7.13  | 8.25       | 7.50       | 1.75             | 0.67 |
| 4.00 | 1.75          | 0.63 | 3.82 | 6.38  | 7.63  | 8.50       | 7.63       | 2.00             | 0.78 |
|      | 2.00          | 0.63 | 3.82 | 6.38  | 7.63  | 8.63       | 7.75       | 2.00             | 0.78 |
|      | 2.50          | 0.63 | 3.82 | 6.38  | 7.63  | 8.88       | 8.00       | 2.00             | 0.78 |
| 5.00 | 2.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.13       | 8.25       | 2.50             | 0.92 |
|      | 2.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
|      | 3.00          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
|      | 3.50          | 0.88 | 4.95 | 8.19  | 9.75  | 9.38       | 8.50       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 3.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 3.50          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
|      | 4.00          | 1.00 | 5.73 | 9.44  | 11.25 | 10.63      | 9.63       | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 3.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 4.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 4.50          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
|      | 5.00          | 1.13 | 6.58 | 10.63 | 12.63 | 11.75      | 10.75      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 4.00          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 4.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 5.00          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |
|      | 5.50          | 1.25 | 7.50 | 11.81 | 14.00 | 12.75      | 11.75      | 3.50             | 1.26 |

+ Plus Stroke

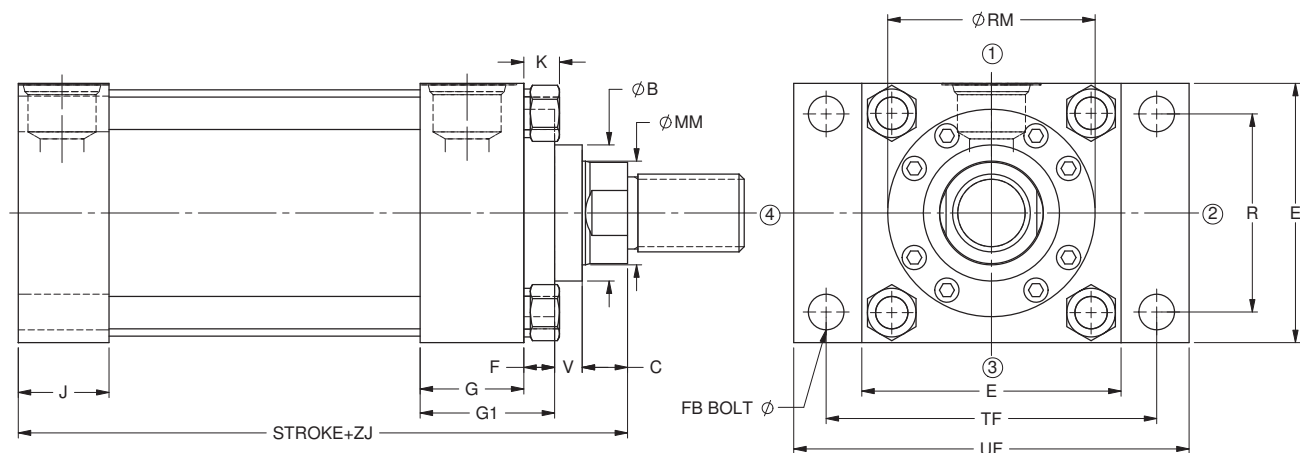
See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

NZ14 Cap Rectangle Mount

ANSI ME6



| Bore | Rod Dia<br>MM | B<br>+.000/-.002 | C    | E    | G    | J    | F    | V    | RM   |
|------|---------------|------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124            | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    |
|      | 1.00          | 1.499            | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    |
| 2.00 | 1.00          | 1.499            | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    |
|      | 1.38          | 1.999            | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
| 2.50 | 1.00          | 1.499            | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 |
|      | 1.38          | 1.999            | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
|      | 1.75          | 2.374            | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    |
| 3.25 | 1.38          | 1.999            | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 |
|      | 1.75          | 2.374            | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
|      | 2.00          | 2.624            | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
| 4.00 | 1.75          | 2.374            | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 |
|      | 2.00          | 2.624            | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
| 5.00 | 2.00          | 2.624            | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 |
| 6.00 | 2.50          | 3.124            | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 |
| 7.00 | 3.00          | 3.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 |
| 8.00 | 3.50          | 4.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 |
|      | 5.50          | 6.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 |

+ Plus Stroke

# Mounting Style and Installation

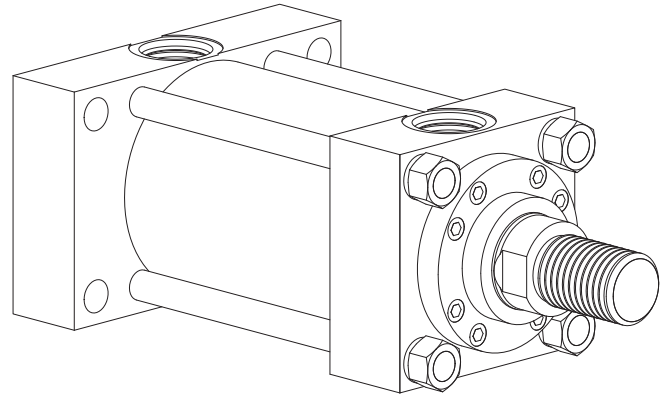
## Dimensions

### NZ14 Cap Rectangle Mount ANSI ME6

These mounts are for straight line force transfer applications in which the cylinder is used in compression (pushing) and tension (pulling) applications. The mounting surface should be flat and perpendicular to the force of the load. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments. The cap rectangular mount (NZ14) is recommended for heavy duty applications.

#### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72. Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque value.



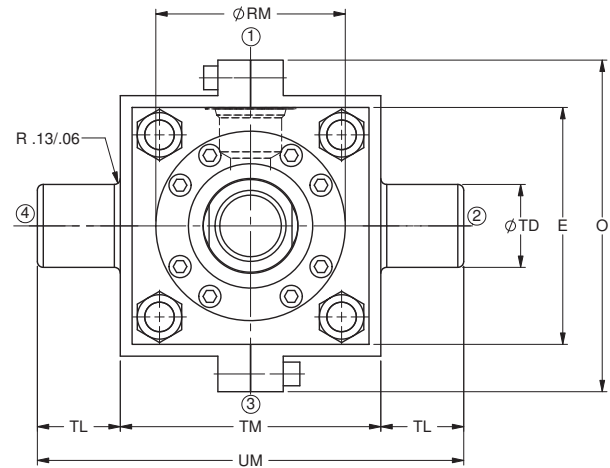
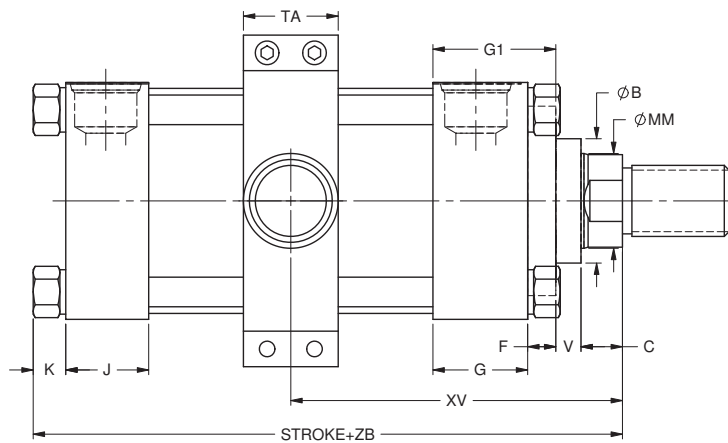
| Bore | Rod Dia<br>MM | FB   | R    | TF    | UF    | ZJ+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|-------|-------|------------|------------------|------|
| 1.50 | 0.63          | 0.38 | 1.63 | 3.44  | 4.25  | 5.63       | 1.38             | 0.41 |
|      | 1.00          | 0.38 | 1.63 | 3.44  | 4.25  | 6.00       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.50 | 2.05 | 4.13  | 5.13  | 6.00       | 1.38             | 0.55 |
|      | 1.38          | 0.50 | 2.05 | 4.13  | 5.13  | 6.25       | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.50 | 2.55 | 4.63  | 5.63  | 6.13       | 1.50             | 0.55 |
|      | 1.38          | 0.50 | 2.55 | 4.63  | 5.63  | 6.38       | 1.50             | 0.55 |
|      | 1.75          | 0.50 | 2.55 | 4.63  | 5.63  | 6.63       | 1.50             | 0.55 |
| 3.25 | 1.38          | 0.63 | 3.25 | 5.88  | 7.13  | 7.13       | 1.75             | 0.67 |
|      | 1.75          | 0.63 | 3.25 | 5.88  | 7.13  | 7.38       | 1.75             | 0.67 |
|      | 2.00          | 0.63 | 3.25 | 5.88  | 7.13  | 7.50       | 1.75             | 0.67 |
| 4.00 | 1.75          | 0.63 | 3.82 | 6.38  | 7.63  | 7.63       | 2.00             | 0.78 |
|      | 2.00          | 0.63 | 3.82 | 6.38  | 7.63  | 7.75       | 2.00             | 0.78 |
|      | 2.50          | 0.63 | 3.82 | 6.38  | 7.63  | 8.00       | 2.00             | 0.78 |
| 5.00 | 2.00          | 0.88 | 4.95 | 8.19  | 9.75  | 8.25       | 2.50             | 0.92 |
|      | 2.50          | 0.88 | 4.95 | 8.19  | 9.75  | 8.50       | 2.50             | 0.92 |
|      | 3.00          | 0.88 | 4.95 | 8.19  | 9.75  | 8.50       | 2.50             | 0.92 |
|      | 3.50          | 0.88 | 4.95 | 8.19  | 9.75  | 8.50       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.00 | 5.73 | 9.44  | 11.25 | 9.63       | 2.88             | 1.03 |
|      | 3.00          | 1.00 | 5.73 | 9.44  | 11.25 | 9.63       | 2.88             | 1.03 |
|      | 3.50          | 1.00 | 5.73 | 9.44  | 11.25 | 9.63       | 2.88             | 1.03 |
|      | 4.00          | 1.00 | 5.73 | 9.44  | 11.25 | 9.63       | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.13 | 6.58 | 10.63 | 12.63 | 10.75      | 3.00             | 1.17 |
|      | 3.50          | 1.13 | 6.58 | 10.63 | 12.63 | 10.75      | 3.00             | 1.17 |
|      | 4.00          | 1.13 | 6.58 | 10.63 | 12.63 | 10.75      | 3.00             | 1.17 |
|      | 4.50          | 1.13 | 6.58 | 10.63 | 12.63 | 10.75      | 3.00             | 1.17 |
|      | 5.00          | 1.13 | 6.58 | 10.63 | 12.63 | 10.75      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.25 | 7.50 | 11.81 | 14.00 | 11.75      | 3.50             | 1.26 |
|      | 4.00          | 1.25 | 7.50 | 11.81 | 14.00 | 11.75      | 3.50             | 1.26 |
|      | 4.50          | 1.25 | 7.50 | 11.81 | 14.00 | 11.75      | 3.50             | 1.26 |
|      | 5.00          | 1.25 | 7.50 | 11.81 | 14.00 | 11.75      | 3.50             | 1.26 |
|      | 5.50          | 1.25 | 7.50 | 11.81 | 14.00 | 11.75      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ15 Intermediate Trunnion Mounts NFPA MT4 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/- .002 | C    | E    | G    | J    | F    | V    | RM   | TD<br>+.000/- .001 | TL   |
|------|---------------|-------------------|------|------|------|------|------|------|------|--------------------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 1.000              | 1.00 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 1.000              | 1.00 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 1.375              | 1.38 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.375              | 1.38 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 1.375              | 1.38 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 1.375              | 1.38 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 1.375              | 1.38 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 1.750              | 1.75 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 1.750              | 1.75 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 1.750              | 1.75 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 1.750              | 1.75 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 1.750              | 1.75 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 1.750              | 1.75 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 1.750              | 1.75 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 1.750              | 1.75 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 1.750              | 1.75 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 1.750              | 1.75 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 2.000              | 2.00 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 2.000              | 2.00 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 2.000              | 2.00 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 2.000              | 2.00 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 2.500              | 2.50 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 2.500              | 2.50 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 2.500              | 2.50 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 2.500              | 2.50 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 2.500              | 2.50 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 3.000              | 3.00 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 3.000              | 3.00 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 3.000              | 3.00 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 3.000              | 3.00 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 3.000              | 3.00 |

+ Plus Stroke

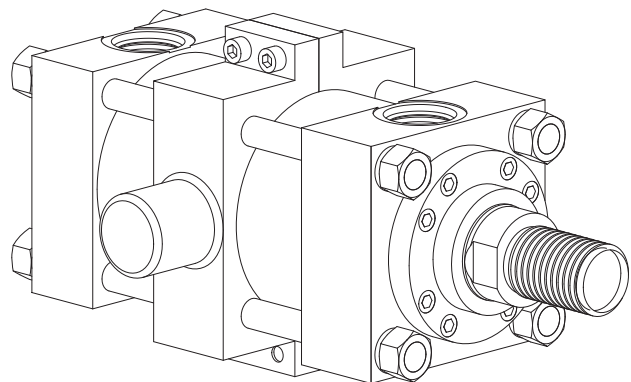
# Mounting Style and Installation Dimensions

## NZ15 Intermediate Trunnion Mounts NFPA MT4 Mount

The Intermediate Trunnion Mount is for longer stroke applications in which the machine member travels in a curved path in one plane. On special orders, the trunnion can be located anywhere along the body. This mount can be used both in compression (push) and tension (pull) applications.

### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72. It is recommended that rigidly mounted pillow blocks with bearings at least as long as the trunnion pins be used. The pillow blocks should be installed as close to the shoulder of the trunnion as possible.



| Bore | Rod Dia<br>MM | UM    | TM    | TA   | Max.<br>O | XV<br>Std * | ZB+<br>Max | Piston<br>Thick. | K    | Minimum<br>stroke<br>Required |
|------|---------------|-------|-------|------|-----------|-------------|------------|------------------|------|-------------------------------|
| 1.50 | 0.63          | 5.00  | 3.00  | 1.50 | -         | 3.44        | 6.04       | 1.38             | 0.41 | 0.25                          |
|      | 1.00          | 5.00  | 3.00  | 1.50 | -         | 3.81        | 6.41       | 1.38             | 0.41 | 0.25                          |
| 2.00 | 1.00          | 6.25  | 3.50  | 1.50 | -         | 3.81        | 6.56       | 1.38             | 0.55 | 0.25                          |
|      | 1.38          | 6.25  | 3.50  | 1.50 | -         | 4.19        | 6.82       | 1.38             | 0.55 | 0.25                          |
| 2.50 | 1.00          | 6.75  | 4.00  | 1.50 | -         | 3.88        | 6.68       | 1.50             | 0.55 | 0.13                          |
|      | 1.38          | 6.75  | 4.00  | 1.50 | -         | 4.14        | 6.94       | 1.50             | 0.55 | 0.13                          |
|      | 1.75          | 6.75  | 4.00  | 1.50 | -         | 4.38        | 7.18       | 1.50             | 0.55 | 0.13                          |
| 3.25 | 1.38          | 8.50  | 5.00  | 2.00 | -         | 4.50        | 7.80       | 1.75             | 0.67 | 0.38                          |
|      | 1.75          | 8.50  | 5.00  | 2.00 | -         | 4.76        | 8.05       | 1.75             | 0.67 | 0.38                          |
|      | 2.00          | 8.50  | 5.00  | 2.00 | -         | 4.89        | 8.18       | 1.75             | 0.67 | 0.38                          |
| 4.00 | 1.75          | 9.00  | 5.50  | 2.00 | -         | 4.88        | 8.40       | 2.00             | 0.78 | 0.13                          |
|      | 2.00          | 9.00  | 5.50  | 2.00 | -         | 5.00        | 8.53       | 2.00             | 0.78 | 0.13                          |
|      | 2.50          | 9.00  | 5.50  | 2.00 | -         | 5.25        | 8.78       | 2.00             | 0.78 | 0.13                          |
| 5.00 | 2.00          | 10.50 | 7.00  | 2.50 | -         | 5.25        | 9.18       | 2.50             | 0.92 | 0.13                          |
|      | 2.50          | 10.50 | 7.00  | 2.50 | -         | 5.50        | 9.43       | 2.50             | 0.92 | 0.13                          |
|      | 3.00          | 10.50 | 7.00  | 2.50 | -         | 5.50        | 9.43       | 2.50             | 0.92 | 0.13                          |
|      | 3.50          | 10.50 | 7.00  | 2.50 | -         | 5.50        | 9.43       | 2.50             | 0.92 | 0.13                          |
| 6.00 | 2.50          | 12.50 | 8.50  | 3.00 | 9.50      | 5.94        | 10.66      | 2.88             | 1.03 | 0.25                          |
|      | 3.00          | 12.50 | 8.50  | 3.00 | 9.50      | 5.94        | 10.66      | 2.88             | 1.03 | 0.25                          |
|      | 3.50          | 12.50 | 8.50  | 3.00 | 9.50      | 5.94        | 10.66      | 2.88             | 1.03 | 0.25                          |
|      | 4.00          | 12.50 | 8.50  | 3.00 | 9.50      | 5.94        | 10.66      | 2.88             | 1.03 | 0.25                          |
| 7.00 | 3.00          | 14.75 | 9.75  | 3.00 | 11.50     | 6.50        | 11.92      | 3.00             | 1.17 | 0.13                          |
|      | 3.50          | 14.75 | 9.75  | 3.00 | 11.50     | 6.50        | 11.92      | 3.00             | 1.17 | 0.13                          |
|      | 4.00          | 14.75 | 9.75  | 3.00 | 11.50     | 6.50        | 11.92      | 3.00             | 1.17 | 0.13                          |
|      | 4.50          | 14.75 | 9.75  | 3.00 | 11.50     | 6.50        | 11.92      | 3.00             | 1.17 | 0.13                          |
|      | 5.00          | 14.75 | 9.75  | 3.00 | 11.50     | 6.50        | 11.92      | 3.00             | 1.17 | 0.13                          |
| 8.00 | 3.50          | 17.00 | 11.00 | 3.50 | 13.25     | 7.13        | 13.00      | 3.50             | 1.26 | -                             |
|      | 4.00          | 17.00 | 11.00 | 3.50 | 13.25     | 7.13        | 13.00      | 3.50             | 1.26 | -                             |
|      | 4.50          | 17.00 | 11.00 | 3.50 | 13.25     | 7.13        | 13.00      | 3.50             | 1.26 | -                             |
|      | 5.00          | 17.00 | 11.00 | 3.50 | 13.25     | 7.13        | 13.00      | 3.50             | 1.26 | -                             |
|      | 5.50          | 17.00 | 11.00 | 3.50 | 13.25     | 7.13        | 13.00      | 3.50             | 1.26 | -                             |

+ Plus Stroke

\*XV = XV std + 1/2 Stroke

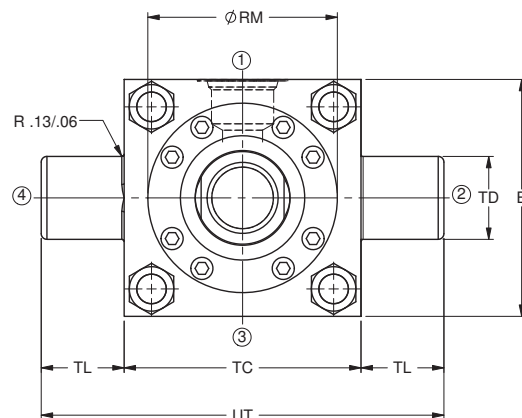
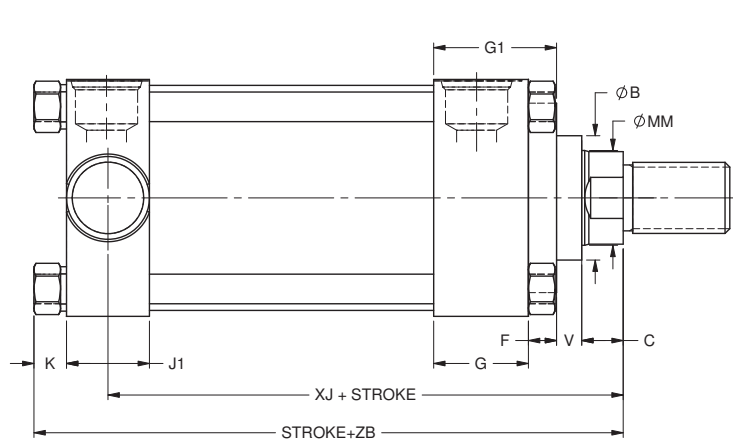
See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

### NZ16 Trunnion Mounts

### NFPA MT2 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/- .002 | C    | E    | G    | J1   | F    | V    | RM   |
|------|---------------|-------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ16 Trunnion Mounts

#### NFPA MT2 Mount

These mounts are for applications in which the machine member travels in a curved path in one plane. Either mount can be used both in compression (push) and tension (pull) applications. When used in compression applications, head trunnion mounts provide a longer maximum stroke than cap trunnion mounts.

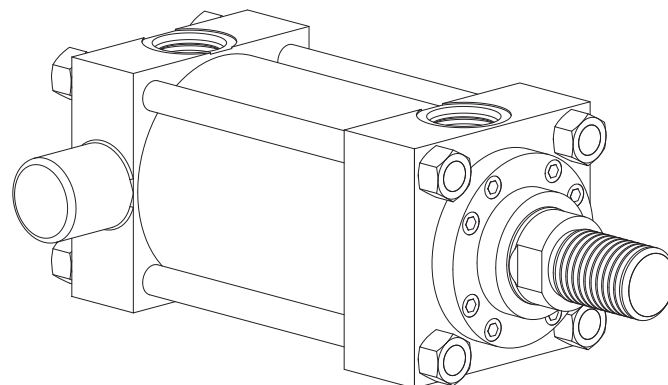
#### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72.

The trunnion pins are an integral part of the head and can be sleeved to provide an extremely tight fit to the mating machine member and permit curvilinear motion. It is recommended that rigidly mounted pillow blocks with bearings at least as long as the trunnion pins be used.

The pillow blocks should be installed as close to the

shoulder of the trunnion as possible.



| Bore | Rod Dia<br>MM | TD<br>+.000/-.001 | TL   | TC   | UT    | XJ+   | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|-------------------|------|------|-------|-------|------------|------------------|------|
| 1.50 | 0.63          | 1.000             | 1.00 | 2.50 | 4.50  | 4.88  | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 1.000             | 1.00 | 2.50 | 4.50  | 5.25  | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 1.375             | 1.38 | 3.00 | 5.75  | 5.25  | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 1.375             | 1.38 | 3.00 | 5.75  | 5.50  | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.375             | 1.38 | 3.50 | 6.25  | 5.38  | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 1.375             | 1.38 | 3.50 | 6.25  | 5.63  | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 1.375             | 1.38 | 3.50 | 6.25  | 5.88  | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.750             | 1.75 | 4.50 | 8.00  | 6.25  | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 1.750             | 1.75 | 4.50 | 8.00  | 6.50  | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 1.750             | 1.75 | 4.50 | 8.00  | 6.63  | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.750             | 1.75 | 5.00 | 8.50  | 6.75  | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 1.750             | 1.75 | 5.00 | 8.50  | 6.88  | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 1.750             | 1.75 | 5.00 | 8.50  | 7.13  | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.750             | 1.75 | 6.50 | 10.00 | 7.38  | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.750             | 1.75 | 6.50 | 10.00 | 7.63  | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.750             | 1.75 | 6.50 | 10.00 | 7.63  | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 1.750             | 1.75 | 6.50 | 10.00 | 7.63  | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.000             | 2.00 | 7.50 | 11.50 | 8.38  | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 2.000             | 2.00 | 7.50 | 11.50 | 8.38  | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 2.000             | 2.00 | 7.50 | 11.50 | 8.38  | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 2.000             | 2.00 | 7.50 | 11.50 | 8.38  | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.500             | 2.50 | 8.50 | 13.50 | 9.38  | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 2.500             | 2.50 | 8.50 | 13.50 | 9.38  | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 2.500             | 2.50 | 8.50 | 13.50 | 9.38  | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 2.500             | 2.50 | 8.50 | 13.50 | 9.38  | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 2.500             | 2.50 | 8.50 | 13.50 | 9.38  | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 3.000             | 3.00 | 9.50 | 15.50 | 10.25 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 3.000             | 3.00 | 9.50 | 15.50 | 10.25 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 3.000             | 3.00 | 9.50 | 15.50 | 10.25 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 3.000             | 3.00 | 9.50 | 15.50 | 10.25 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 3.000             | 3.00 | 9.50 | 15.50 | 10.25 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

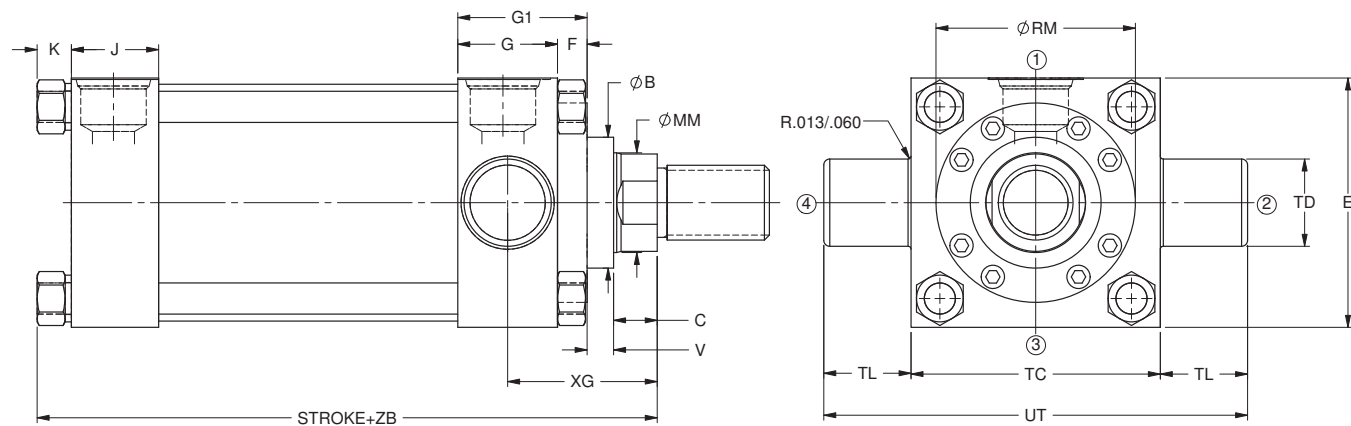
See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation

## Dimensions

### NZ17 Head Trunnion Mounts

#### NFPA MT1 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/-.002 | C    | E    | G    | J    | F    | V    | RM   |
|------|---------------|------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124            | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | 2.38 |
|      | 1.00          | 1.499            | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | 2.63 |
| 2.00 | 1.00          | 1.499            | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | 2.63 |
|      | 1.38          | 1.999            | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | 3.25 |
| 2.50 | 1.00          | 1.499            | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 |
|      | 1.38          | 1.999            | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | 3.25 |
|      | 1.75          | 2.374            | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | 3.88 |
| 3.25 | 1.38          | 1.999            | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 |
|      | 1.75          | 2.374            | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 3.88 |
|      | 2.00          | 2.624            | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 4.00 |
| 4.00 | 1.75          | 2.374            | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 |
|      | 2.00          | 2.624            | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
| 5.00 | 2.00          | 2.624            | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 |
| 6.00 | 2.50          | 3.124            | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 |
| 7.00 | 3.00          | 3.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 |
| 8.00 | 3.50          | 4.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 |
|      | 5.50          | 6.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ17 Head Trunnion Mounts

#### NFPA MT1 Mount

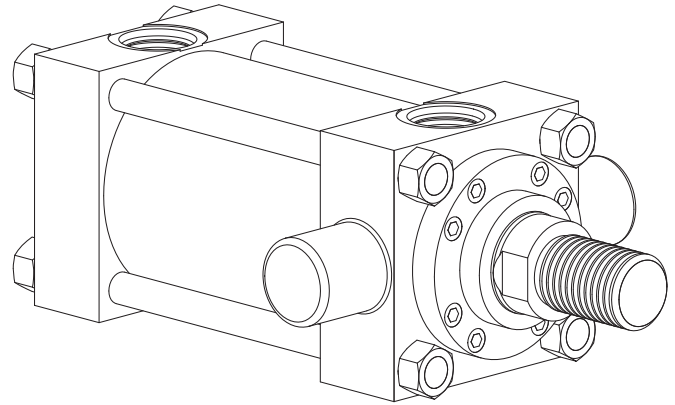
These mounts are for applications in which the machine member travels in a curved path in one plane. Either mount can be used both in compression (push) and tension (pull) applications. When used in compression applications, head trunnion mounts provide a longer maximum stroke than cap trunnion mounts.

#### NOTE

For strokes in excess of 24

inches, see "Stop tube selection" on page 72.

The trunnion pins are an integral part of the head and can be sleeved to provide an extremely tight fit to the mating machine member and permit curvilinear motion. It is recommended that rigidly mounted pillow blocks with bearings at least as long as the trunnion pins be used. The pillow blocks should be installed as close to the shoulder of the trunnion as possible.



| Bore | Rod DIA<br>MM | TD<br>+.000/--.001 | TL   | TC   | UT    | XG+  | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|--------------------|------|------|-------|------|------------|------------------|------|
| 1.50 | 0.63          | 1.000              | 1.00 | 2.50 | 4.50  | 1.88 | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 1.000              | 1.00 | 2.50 | 4.50  | 2.25 | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 1.375              | 1.38 | 3.00 | 5.75  | 2.25 | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 1.375              | 1.38 | 3.00 | 5.75  | 2.50 | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.375              | 1.38 | 3.50 | 6.25  | 2.25 | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 1.375              | 1.38 | 3.50 | 6.25  | 2.50 | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 1.375              | 1.38 | 3.50 | 6.25  | 2.75 | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.750              | 1.75 | 4.50 | 8.00  | 2.63 | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 1.750              | 1.75 | 4.50 | 8.00  | 2.88 | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 1.750              | 1.75 | 4.50 | 8.00  | 3.00 | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.750              | 1.75 | 5.00 | 8.50  | 2.88 | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 1.750              | 1.75 | 5.00 | 8.50  | 3.00 | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 1.750              | 1.75 | 5.00 | 8.50  | 3.25 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.750              | 1.75 | 6.50 | 10.00 | 3.00 | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.750              | 1.75 | 6.50 | 10.00 | 3.25 | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.750              | 1.75 | 6.50 | 10.00 | 3.25 | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 1.750              | 1.75 | 6.50 | 10.00 | 3.25 | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.000              | 2.00 | 7.50 | 11.50 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 2.000              | 2.00 | 7.50 | 11.50 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 2.000              | 2.00 | 7.50 | 11.50 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 2.000              | 2.00 | 7.50 | 11.50 | 3.38 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.500              | 2.50 | 8.50 | 13.50 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 2.500              | 2.50 | 8.50 | 13.50 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 2.500              | 2.50 | 8.50 | 13.50 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 2.500              | 2.50 | 8.50 | 13.50 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 2.500              | 2.50 | 8.50 | 13.50 | 3.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 3.000              | 3.00 | 9.50 | 15.50 | 3.75 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 3.000              | 3.00 | 9.50 | 15.50 | 3.75 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 3.000              | 3.00 | 9.50 | 15.50 | 3.75 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 3.000              | 3.00 | 9.50 | 15.50 | 3.75 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 3.000              | 3.00 | 9.50 | 15.50 | 3.75 | 13.00      | 3.50             | 1.26 |

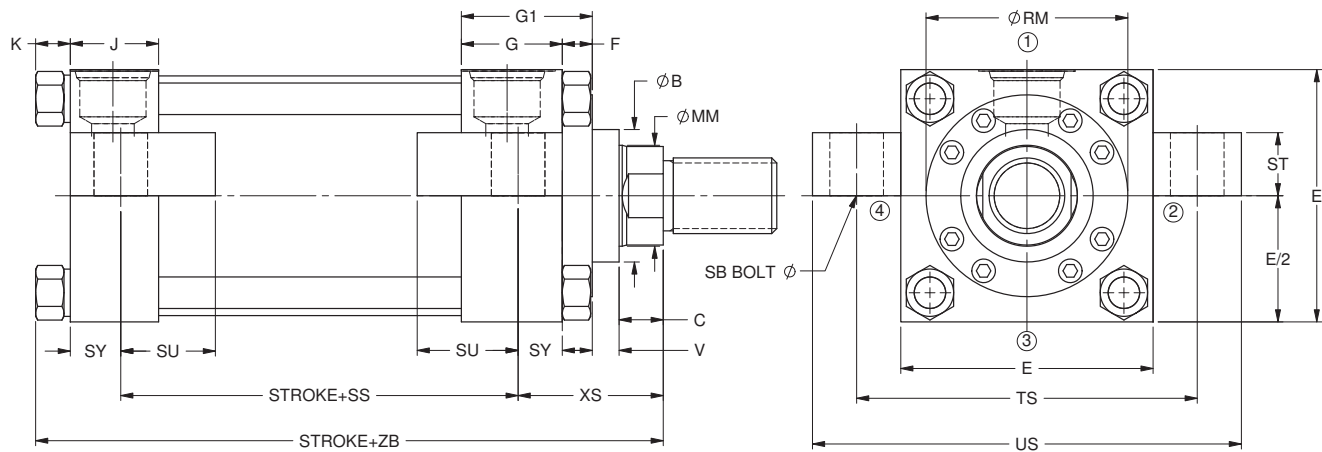
+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ19 Center Lug Mounts

### ANSI MS3



| Bore | Rod Dia<br>MM | B<br>+0.000/-0.002 | C    | E    | G    | J    | F    | V    | RM   | SB   | SS+  |
|------|---------------|--------------------|------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124              | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 0.38 | 3.88 |
|      | 1.00          | 1.499              | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 0.38 | 3.88 |
| 2.00 | 1.00          | 1.499              | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 0.50 | 3.63 |
|      | 1.38          | 1.999              | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 0.50 | 3.63 |
| 2.50 | 1.00          | 1.499              | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 0.75 | 3.38 |
|      | 1.38          | 1.999              | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 0.75 | 3.38 |
|      | 1.75          | 2.374              | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 0.75 | 3.38 |
| 3.25 | 1.38          | 1.999              | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 0.75 | 4.13 |
|      | 1.75          | 2.374              | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 0.75 | 4.13 |
|      | 2.00          | 2.624              | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 0.75 | 4.13 |
| 4.00 | 1.75          | 2.374              | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 1.00 | 4.00 |
|      | 2.00          | 2.624              | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 1.00 | 4.00 |
|      | 2.50          | 3.124              | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 1.00 | 4.00 |
| 5.00 | 2.00          | 2.624              | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 1.00 | 4.50 |
|      | 2.50          | 3.124              | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 1.00 | 4.50 |
|      | 3.00          | 3.749              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 1.00 | 4.50 |
|      | 3.50          | 4.249              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 1.00 | 4.50 |
| 6.00 | 2.50          | 3.124              | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 1.25 | 5.13 |
|      | 3.00          | 3.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 1.25 | 5.13 |
|      | 3.50          | 4.249              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 1.25 | 5.13 |
|      | 4.00          | 4.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 1.25 | 5.13 |
| 7.00 | 3.00          | 3.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 1.50 | 5.75 |
|      | 3.50          | 4.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 1.50 | 5.75 |
|      | 4.00          | 4.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 1.50 | 5.75 |
|      | 4.50          | 5.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 1.50 | 5.75 |
|      | 5.00          | 5.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 1.50 | 5.75 |
| 8.00 | 3.50          | 4.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 1.50 | 6.75 |
|      | 4.00          | 4.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 1.50 | 6.75 |
|      | 4.50          | 5.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 1.50 | 6.75 |
|      | 5.00          | 5.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 1.50 | 6.75 |
|      | 5.50          | 6.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 1.50 | 6.75 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ19 Center Lug Mounts

### ANSI MS3

Centerline lug mounts are for moving loads along a flat guided surface as in a carriage along rails. The mounting surface should be flat and parallel to the centerline of the piston rod. The load should be guided to traverse along the centerline of the piston rod. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

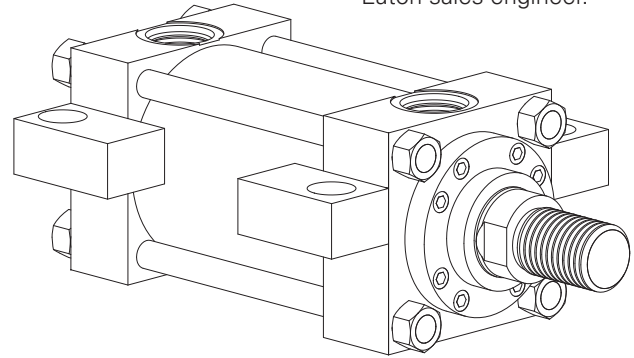
#### NOTE

Limit operating pressure to

1500 psi for minimum deflection. For strokes in excess of 30 inches, see "Stop tube selection" on page 72. With unsupported loads, the bearing must absorb more force. For these applications, the larger available rod is recommended, and stop tubes should be considered. Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque. For high shock applications, dowel pins or shear keys

should be incorporated in the mounting design.

For severe side load applications, consult your local Eaton sales engineer.



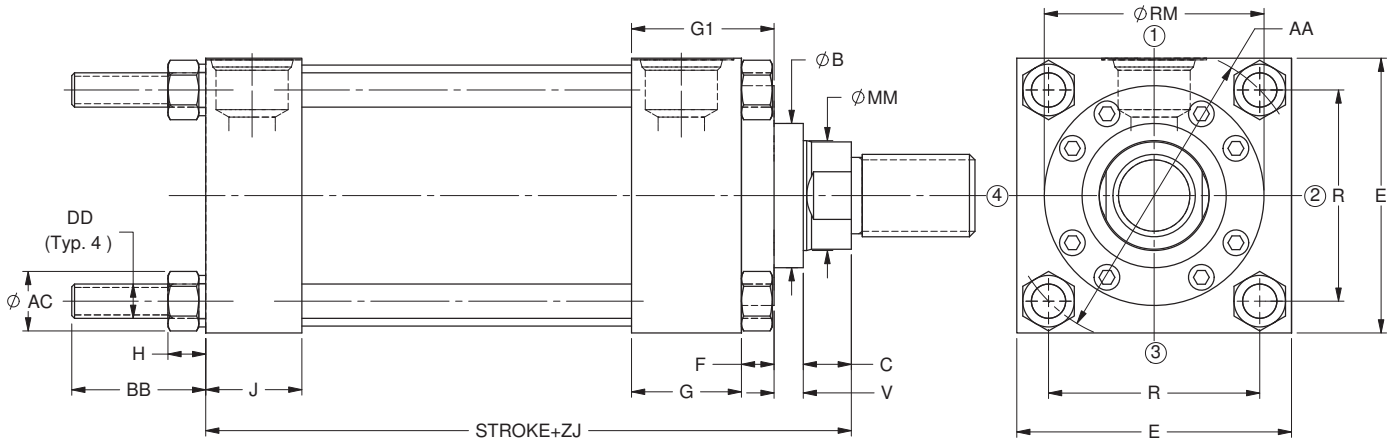
| Bore | Rod Dia<br>MM | ST   | SU   | SY   | TS    | US    | XS   | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------|------|------|-------|-------|------|------------|------------------|------|
| 1.50 | 0.63          | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.38 | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 1.75 | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 1.88 | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 2.13 | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.06 | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.31 | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 2.56 | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.31 | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.56 | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 2.69 | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.75 | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 2.88 | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 3.13 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 2.88 | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 3.13 | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 3.38 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 3.63 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 3.63 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

NZ21 Cap End Extended  
Tie Rod Mounts  
NFPA MX2 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/- .002 | C    | E    | G    | J    | F    | V    | RM   |
|------|---------------|-------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ21 Cap End Extended

### Tie Rod Mounts

### NFPA MX2 Mount

These mounts are for straight line force transfer applications. The cap extended tie rod mount is recommended for compression (pushing) applications.

The mounting surface should be flat and the frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments. Once fitted into the application framework, mounting nuts should be torqued to the values listed in the table (right).

#### Tie Rod Torque Values

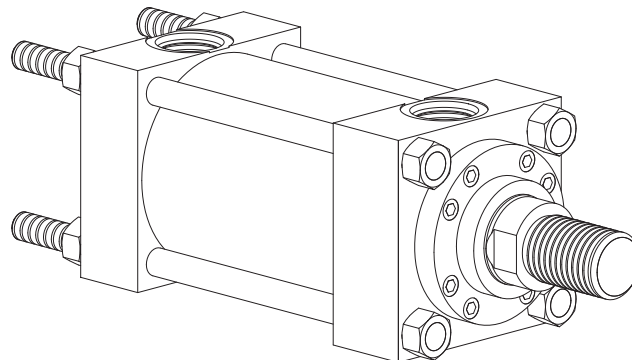
Torque values in the following table apply to all mounting styles.

| Tie Rod Torque |       |      |
|----------------|-------|------|
| Bore           | Ft-Lb | Nm   |
| 1.50           | 30    | 41   |
| 2.00           | 40    | 54   |
| 2.50           | 80    | 108  |
| 3.25           | 190   | 258  |
| 4.00           | 190   | 258  |
| 5.00           | 550   | 746  |
| 6.00           | 700   | 949  |
| 7.00           | 750   | 1017 |
| 8.00           | 1250  | 1695 |

#### NOTE

For strokes in excess of 30

inches, see "Stop tube selection" on page 72.



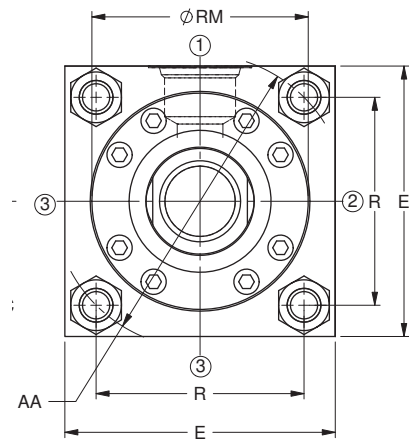
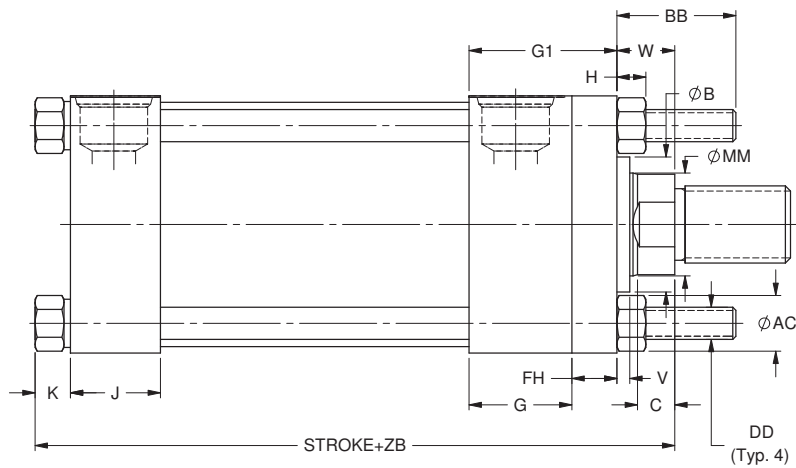
| Bore | Rod Dia<br>MM | R    | AA    | Max<br>AC | BB   | (UN)<br>DD | ZJ+   | Piston<br>Thick. | Max<br>H |
|------|---------------|------|-------|-----------|------|------------|-------|------------------|----------|
| 1.50 | 0.63          | 1.63 | 2.30  | 0.69      | 1.38 | .375-24    | 5.63  | 1.38             | 0.38     |
|      | 1.00          | 1.63 | 2.30  | 0.69      | 1.38 | .375-24    | 6.00  | 1.38             | 0.38     |
| 2.00 | 1.00          | 2.05 | 2.90  | 0.88      | 1.81 | .500-20    | 6.00  | 1.38             | 0.50     |
|      | 1.38          | 2.05 | 2.90  | 0.88      | 1.81 | .500-20    | 6.26  | 1.38             | 0.50     |
| 2.50 | 1.00          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.13  | 1.50             | 0.50     |
|      | 1.38          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.38  | 1.50             | 0.50     |
|      | 1.75          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.63  | 1.50             | 0.50     |
| 3.25 | 1.38          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.13  | 1.75             | 0.63     |
|      | 1.75          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.38  | 1.75             | 0.63     |
|      | 2.00          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.51  | 1.75             | 0.63     |
| 4.00 | 1.75          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 7.63  | 2.00             | 0.63     |
|      | 2.00          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 7.75  | 2.00             | 0.63     |
|      | 2.50          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 8.00  | 2.00             | 0.63     |
| 5.00 | 2.00          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.26  | 2.50             | 0.81     |
|      | 2.50          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50  | 2.50             | 0.81     |
|      | 3.00          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50  | 2.50             | 0.81     |
|      | 3.50          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50  | 2.50             | 0.81     |
| 6.00 | 2.50          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63  | 2.88             | 0.94     |
|      | 3.00          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63  | 2.88             | 0.94     |
|      | 3.50          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63  | 2.88             | 0.94     |
|      | 4.00          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63  | 2.88             | 0.94     |
| 7.00 | 3.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75 | 3.00             | 1.06     |
|      | 3.50          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75 | 3.00             | 1.06     |
|      | 4.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75 | 3.00             | 1.06     |
|      | 4.50          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75 | 3.00             | 1.06     |
|      | 5.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75 | 3.00             | 1.06     |
| 8.00 | 3.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75 | 3.50             | 1.12     |
|      | 4.00          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75 | 3.50             | 1.12     |
|      | 4.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75 | 3.50             | 1.12     |
|      | 5.00          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75 | 3.50             | 1.12     |
|      | 5.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75 | 3.50             | 1.12     |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

NZ22 Head End Extended  
Tie Rod Mounts  
NFPA MX3 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/- .002 | C    | E    | G    | J    | FH   | V    | R    |
|------|---------------|-------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | 1.63 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | 1.63 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | 2.05 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | 2.05 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.63 | 0.25 | 2.55 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | 2.55 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | 2.55 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.75 | 0.25 | 3.25 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 3.25 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 3.25 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 3.82 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 3.82 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.88 | 0.38 | 3.82 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.88 | 0.25 | 4.95 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 4.95 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 4.95 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 4.95 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 5.73 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 5.73 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 5.73 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 5.73 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 6.58 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 6.58 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 6.58 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 6.58 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 6.58 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 7.50 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 7.50 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 7.50 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 7.50 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 7.50 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ22 Head End Extended Tie Rod Mounts NFPA MX3 Mount

These mounts are for straight line force transfer applications. The head extended tie rod mount is recommended for tension (pulling) applications.

The mounting surface should be flat and the frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments. On head mount applications, the cartridge provides a pilot diameter to align the rod in the mounting frame.

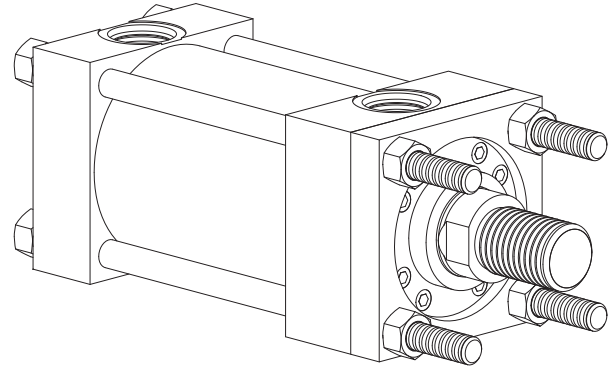
Once fitted into the application framework, mounting nuts should be torqued to the values listed in the table on page 45.

### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72. The force on the rod should be perpendicular to the mounting surface and coincide with the centerline of the piston rod. For eccentric loads, the larger of the two

available rods in each bore size is recommended.

Stop tubes should also be considered.



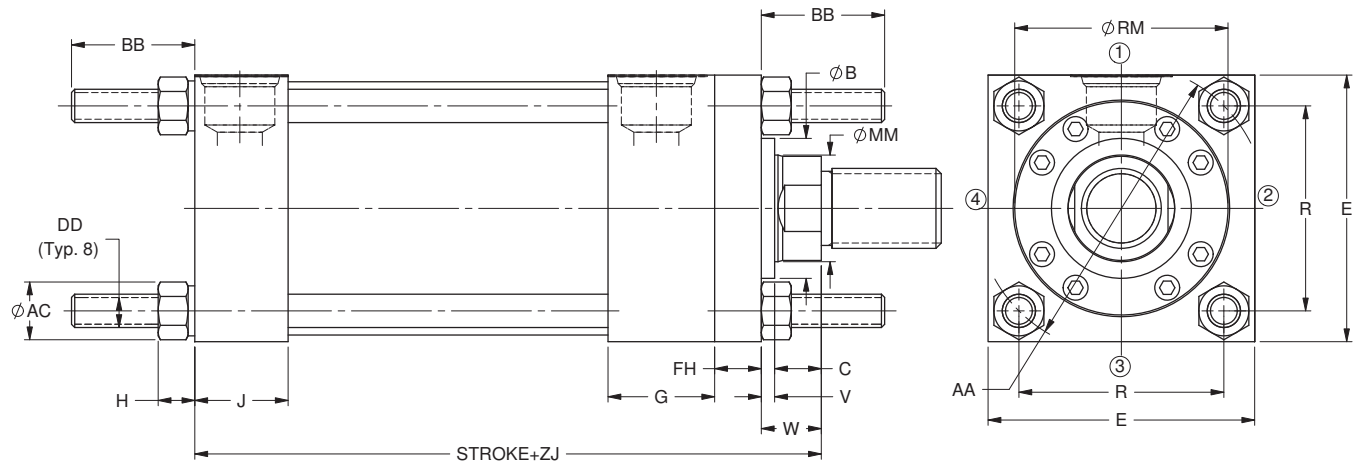
| Bore | Rod Dia<br>MM | AA    | Max<br>AC | BB   | (UN)<br>DD | Max<br>H | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|-------|-----------|------|------------|----------|------------|------------------|------|
| 1.50 | 0.63          | 2.30  | 0.69      | 1.38 | .375-24    | 0.34     | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 2.30  | 0.69      | 1.38 | .375-24    | 0.34     | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 2.90  | 0.88      | 1.81 | .500-20    | 0.45     | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 2.90  | 0.88      | 1.81 | .500-20    | 0.45     | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 3.60  | 0.88      | 1.81 | .500-20    | 0.45     | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 3.60  | 0.88      | 1.81 | .500-20    | 0.45     | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 3.60  | 0.88      | 1.81 | .500-20    | 0.45     | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 4.60  | 1.12      | 2.31 | .625-18    | 0.56     | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 4.60  | 1.12      | 2.31 | .625-18    | 0.56     | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 4.60  | 1.12      | 2.31 | .625-18    | 0.56     | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 5.40  | 1.12      | 2.31 | .625-18    | 0.56     | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 5.40  | 1.12      | 2.31 | .625-18    | 0.56     | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 5.40  | 1.12      | 2.31 | .625-18    | 0.56     | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 7.00  | 1.56      | 3.19 | .875-14    | 0.78     | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 7.00  | 1.56      | 3.19 | .875-14    | 0.78     | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 7.00  | 1.56      | 3.19 | .875-14    | 0.78     | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 7.00  | 1.56      | 3.19 | .875-14    | 0.78     | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 8.10  | 1.75      | 3.63 | 1.000-14   | 0.89     | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 8.10  | 1.75      | 3.63 | 1.000-14   | 0.89     | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 8.10  | 1.75      | 3.63 | 1.000-14   | 0.89     | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 8.10  | 1.75      | 3.63 | 1.000-14   | 0.89     | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 9.30  | 2.00      | 4.13 | 1.125-12   | 1.00     | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 9.30  | 2.00      | 4.13 | 1.125-12   | 1.00     | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 9.30  | 2.00      | 4.13 | 1.125-12   | 1.00     | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 9.30  | 2.00      | 4.13 | 1.125-12   | 1.00     | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 9.30  | 2.00      | 4.13 | 1.125-12   | 1.00     | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 10.60 | 2.19      | 4.50 | 1.250-12   | 1.09     | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 10.60 | 2.19      | 4.50 | 1.250-12   | 1.09     | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 10.60 | 2.19      | 4.50 | 1.250-12   | 1.09     | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 10.60 | 2.19      | 4.50 | 1.250-12   | 1.09     | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 10.60 | 2.19      | 4.50 | 1.250-12   | 1.09     | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

NZ23 Both End Extended  
Tie Rod Mounts  
NFPA MX1 Mount



| Bore | Rod Dia<br>MM | B<br>+.000/-0.002 | C    | E    | G    | J    | FH   | V    | W    |
|------|---------------|-------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124             | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | 0.63 |
|      | 1.00          | 1.499             | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | 1.00 |
| 2.00 | 1.00          | 1.499             | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | 0.75 |
|      | 1.38          | 1.999             | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | 1.01 |
| 2.50 | 1.00          | 1.499             | 0.50 | 3.50 | 1.75 | 1.50 | 0.63 | 0.25 | 0.75 |
|      | 1.38          | 1.999             | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | 1.01 |
|      | 1.75          | 2.374             | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | 1.25 |
| 3.25 | 1.38          | 1.999             | 0.63 | 4.50 | 2.00 | 1.75 | 0.75 | 0.25 | 0.88 |
|      | 1.75          | 2.374             | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 1.13 |
|      | 2.00          | 2.624             | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 1.26 |
| 4.00 | 1.75          | 2.374             | 0.75 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 1.00 |
|      | 2.00          | 2.624             | 0.88 | 5.00 | 2.00 | 1.75 | 0.88 | 0.25 | 1.13 |
|      | 2.50          | 3.124             | 1.00 | 5.00 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 |
| 5.00 | 2.00          | 2.624             | 0.88 | 6.50 | 2.00 | 1.75 | 0.88 | 0.25 | 1.13 |
|      | 2.50          | 3.124             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 |
|      | 3.00          | 3.749             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 |
|      | 3.50          | 4.249             | 1.00 | 6.50 | 2.00 | 1.75 | 0.88 | 0.38 | 1.38 |
| 6.00 | 2.50          | 3.124             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 |
|      | 3.00          | 3.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 |
|      | 3.50          | 4.249             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 7.50 | 2.25 | 2.25 | 1.00 | 0.25 | 1.25 |
| 7.00 | 3.00          | 3.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 |
|      | 3.50          | 4.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 |
|      | 4.50          | 5.249             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 |
|      | 5.00          | 5.749             | 1.00 | 8.50 | 2.75 | 2.75 | 1.00 | 0.25 | 1.25 |
| 8.00 | 3.50          | 4.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 |
|      | 4.00          | 4.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 |
|      | 4.50          | 5.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 |
|      | 5.00          | 5.749             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 |
|      | 5.50          | 6.249             | 1.00 | 9.50 | 3.00 | 3.00 | 1.00 | 0.25 | 1.25 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ23 Both End Extended Tie Rod Mounts NFPA MX1 Mount

These mounts are for straight line force transfer applications. Both ends extended tie rod mounts are suited for tension and compression applications or applications where additional hardware is to be attached to cylinders. The mounting surface should be flat and the frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

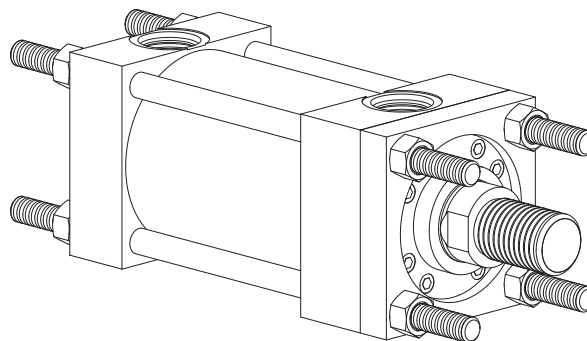
Once fitted into the application framework, mounting nuts should be torqued to the values listed in the table on page 45.

### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72. The force on the rod should be perpendicular to the mounting surface and coincide with the centerline of the

piston rod. For eccentric loads, the larger of the two available rods in each bore

size is recommended. Stop tubes should also be considered.



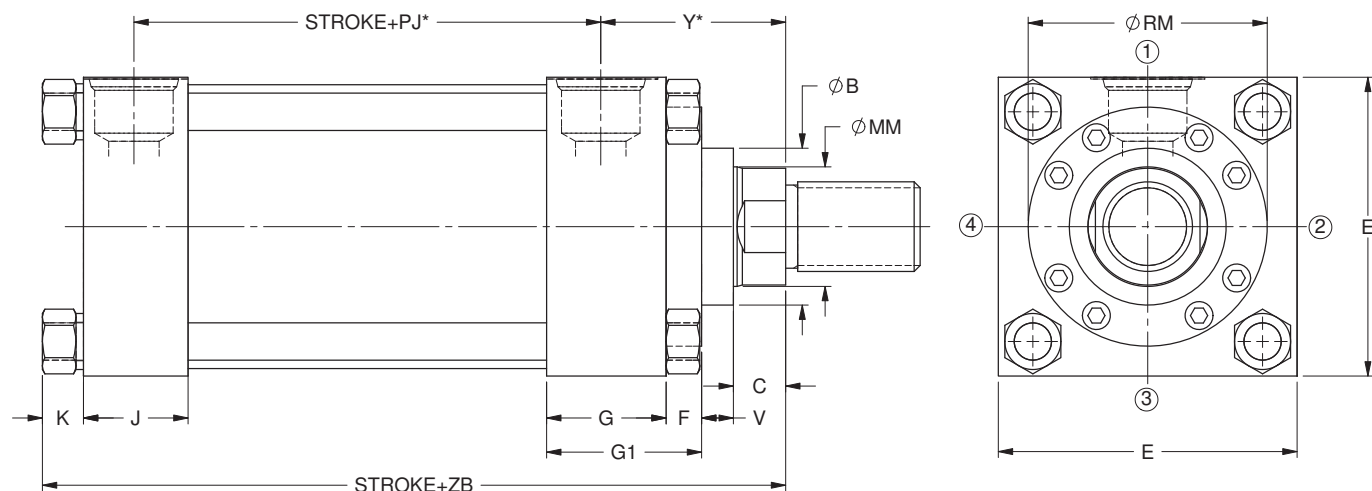
| Bore | Rod Dia<br>MM | R    | AA    | Max<br>AC | BB   | (UN)<br>DD | ZJ+<br>Max | Piston<br>Thick. | Max<br>H |
|------|---------------|------|-------|-----------|------|------------|------------|------------------|----------|
| 1.50 | 0.63          | 1.63 | 2.30  | 0.69      | 1.38 | .375-24    | 5.63       | 1.38             | 0.34     |
|      | 1.00          | 1.63 | 2.30  | 0.69      | 1.38 | .375-24    | 6.00       | 1.38             | 0.34     |
| 2.00 | 1.00          | 2.05 | 2.90  | 0.88      | 1.81 | .500-20    | 6.00       | 1.38             | 0.45     |
|      | 1.38          | 2.05 | 2.90  | 0.88      | 1.81 | .500-20    | 6.26       | 1.38             | 0.45     |
| 2.50 | 1.00          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.13       | 1.50             | 0.45     |
|      | 1.38          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.38       | 1.50             | 0.45     |
|      | 1.75          | 2.55 | 3.60  | 0.88      | 1.81 | .500-20    | 6.63       | 1.50             | 0.45     |
| 3.25 | 1.38          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.13       | 1.75             | 0.56     |
|      | 1.75          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.38       | 1.75             | 0.56     |
|      | 2.00          | 3.25 | 4.60  | 1.12      | 2.31 | .625-18    | 7.51       | 1.75             | 0.56     |
| 4.00 | 1.75          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 7.63       | 2.00             | 0.56     |
|      | 2.00          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 7.76       | 2.00             | 0.56     |
|      | 2.50          | 3.82 | 5.40  | 1.12      | 2.31 | .625-18    | 8.00       | 2.00             | 0.56     |
| 5.00 | 2.00          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.26       | 2.50             | 0.78     |
|      | 2.50          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50       | 2.50             | 0.78     |
|      | 3.00          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50       | 2.50             | 0.78     |
|      | 3.50          | 4.95 | 7.00  | 1.56      | 3.19 | .875-14    | 8.50       | 2.50             | 0.78     |
| 6.00 | 2.50          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63       | 2.88             | 0.89     |
|      | 3.00          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63       | 2.88             | 0.89     |
|      | 3.50          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63       | 2.88             | 0.89     |
|      | 4.00          | 5.73 | 8.10  | 1.75      | 3.63 | 1.000-14   | 9.63       | 2.88             | 0.89     |
| 7.00 | 3.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75      | 3.00             | 1.00     |
|      | 3.50          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75      | 3.00             | 1.00     |
|      | 4.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75      | 3.00             | 1.00     |
|      | 4.50          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75      | 3.00             | 1.00     |
|      | 5.00          | 6.58 | 9.30  | 2.00      | 4.13 | 1.125-12   | 10.75      | 3.00             | 1.00     |
| 8.00 | 3.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75      | 3.50             | 1.09     |
|      | 4.00          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75      | 3.50             | 1.09     |
|      | 4.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75      | 3.50             | 1.09     |
|      | 5.00          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75      | 3.50             | 1.09     |
|      | 5.50          | 7.50 | 10.60 | 2.19      | 4.50 | 1.250-12   | 11.75      | 3.50             | 1.09     |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ24 No Mounts



| Bore | Rod Dia<br>MM | B<br>+0.000/<br>-0.002 | C    | E    | G    | J    | F    | V    | Y    | PJ+  | RM   | ZB+<br>Max | Piston<br>Thick. | K    |
|------|---------------|------------------------|------|------|------|------|------|------|------|------|------|------------|------------------|------|
| 1.50 | 0.63          | 1.124                  | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | 2.47 | 2.69 | -    | 6.04       | 1.38             | 0.41 |
|      | 1.00          | 1.499                  | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | 2.47 | 2.69 | -    | 6.41       | 1.38             | 0.41 |
| 2.00 | 1.00          | 1.499                  | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | 2.47 | 2.69 | -    | 6.56       | 1.38             | 0.55 |
|      | 1.38          | 1.999                  | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | 2.72 | 2.69 | -    | 6.82       | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.499                  | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.47 | 2.81 | 2.63 | 6.68       | 1.50             | 0.55 |
|      | 1.38          | 1.999                  | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | 2.72 | 2.81 | -    | 6.94       | 1.50             | 0.55 |
|      | 1.75          | 2.374                  | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | 2.97 | 2.81 | -    | 7.18       | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.999                  | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 2.72 | 3.56 | 3.25 | 7.80       | 1.75             | 0.67 |
|      | 1.75          | 2.374                  | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 2.97 | 3.56 | -    | 8.05       | 1.75             | 0.67 |
|      | 2.00          | 2.624                  | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | 3.09 | 3.56 | -    | 8.18       | 1.75             | 0.67 |
| 4.00 | 1.75          | 2.374                  | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 2.97 | 3.81 | 3.88 | 8.40       | 2.00             | 0.78 |
|      | 2.00          | 2.624                  | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.09 | 3.81 | 4.00 | 8.53       | 2.00             | 0.78 |
|      | 2.50          | 3.124                  | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 3.34 | 3.81 | 4.44 | 8.78       | 2.00             | 0.78 |
| 5.00 | 2.00          | 2.624                  | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 3.09 | 4.31 | 4.00 | 9.18       | 2.50             | 0.92 |
|      | 2.50          | 3.124                  | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 3.34 | 4.31 | 4.44 | 9.43       | 2.50             | 0.92 |
|      | 3.00          | 3.749                  | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 3.34 | 4.31 | 5.25 | 9.43       | 2.50             | 0.92 |
|      | 3.50          | 4.249                  | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 3.34 | 4.31 | 5.63 | 9.43       | 2.50             | 0.92 |
| 6.00 | 2.50          | 3.124                  | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 3.59 | 4.69 | 4.44 | 10.66      | 2.88             | 1.03 |
|      | 3.00          | 3.749                  | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 3.59 | 4.69 | 5.25 | 10.66      | 2.88             | 1.03 |
|      | 3.50          | 4.249                  | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 3.59 | 4.69 | 5.63 | 10.66      | 2.88             | 1.03 |
|      | 4.00          | 4.749                  | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 3.59 | 4.69 | 6.44 | 10.66      | 2.88             | 1.03 |
| 7.00 | 3.00          | 3.749                  | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 3.94 | 5.13 | 5.25 | 11.92      | 3.00             | 1.17 |
|      | 3.50          | 4.249                  | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 3.94 | 5.13 | 5.63 | 11.92      | 3.00             | 1.17 |
|      | 4.00          | 4.749                  | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 3.94 | 5.13 | 6.44 | 11.92      | 3.00             | 1.17 |
|      | 4.50          | 5.249                  | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 3.94 | 5.13 | 7.13 | 11.92      | 3.00             | 1.17 |
|      | 5.00          | 5.749                  | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 3.94 | 5.13 | 7.56 | 11.92      | 3.00             | 1.17 |
| 8.00 | 3.50          | 4.249                  | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 4.06 | 5.88 | 5.63 | 13.00      | 3.50             | 1.26 |
|      | 4.00          | 4.749                  | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 4.06 | 5.88 | 6.44 | 13.00      | 3.50             | 1.26 |
|      | 4.50          | 5.249                  | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 4.06 | 5.88 | 7.13 | 13.00      | 3.50             | 1.26 |
|      | 5.00          | 5.749                  | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 4.06 | 5.88 | 7.56 | 13.00      | 3.50             | 1.26 |
|      | 5.50          | 6.249                  | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 4.06 | 5.88 | 8.38 | 13.00      | 3.50             | 1.26 |

+ Plus Stroke

\* Port dimensions for standard ports only. Consult Eaton for flange, manifold and special ports.

# Mounting Style and Installation Dimensions

## NZ24 No Mounts

No mounts are for moving loads on a flat guided surface such as carriage rails.

Mounting surface should be flat and parallel to centerline of the piston rod.

The load should be guided to traverse along the centerline of the piston rod.

The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

### NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 72.

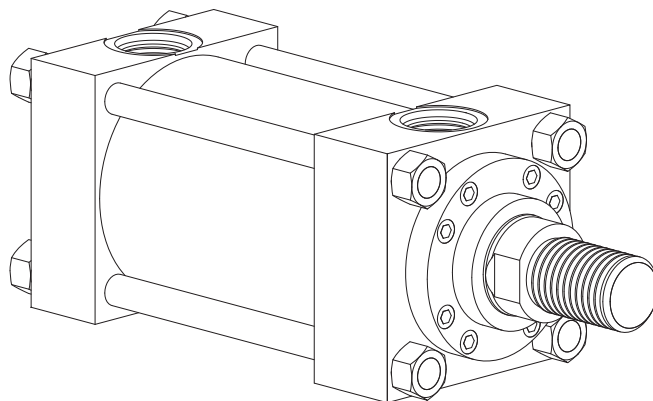
With unsupported loads, the bearing must absorb more force.

For these applications, the larger available rod is recommended, and stop tubes should be considered.

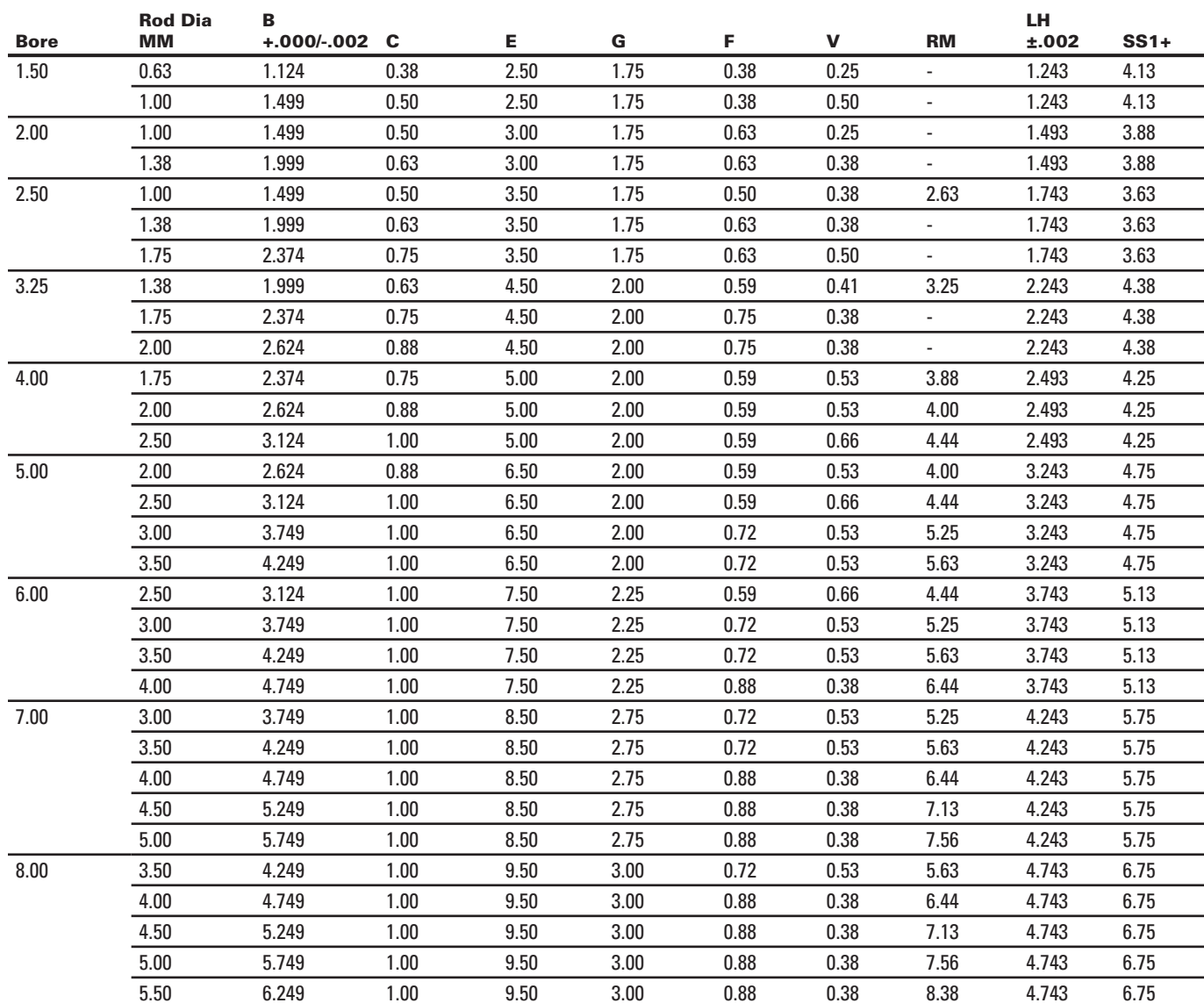
External clamping mechanism on head and cap is required to hold cylinder in place during operation.

Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque in clamping.

For high shock applications, dowel pins or shear keys should be incorporated in the mounting design. For these applications, consider a keyed side lug mount, NZ04. For severe side load applications, consult your local Eaton sales engineer.



NZ25 Double Rod Side  
Lug Mount  
NFPA MS7 Mount

52 **Eaton Vickers** Small Bore Cylinder Catalog V-CYTR-MC002-E November 2007

# Mounting Style and Installation

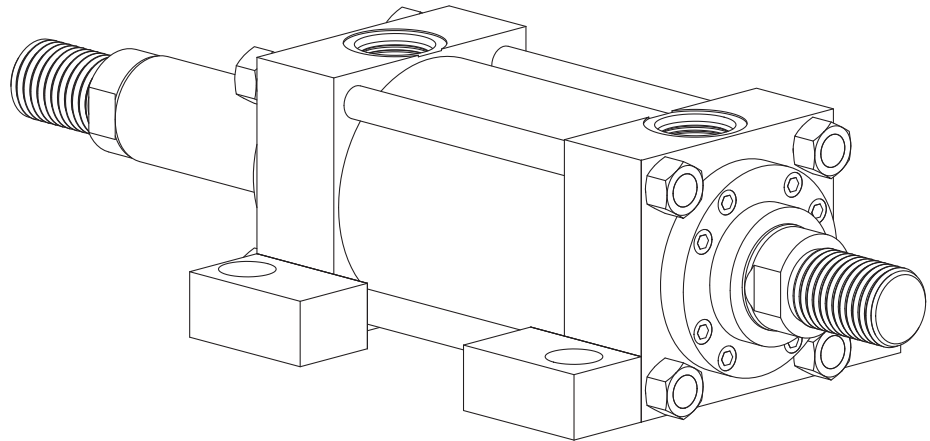
## Dimensions

### NZ25 Double Rod Side

### Lug Mount

### NFPA MS7 Mount

Double rod cylinders are specified when equal displacement is desired on both sides of the piston, or when the application is such that another function can be performed simultaneously with a second rod. The single rod mount application data is also applicable to double rod cylinders. Rod and pilot related dimensions are typical for both ends.



| Bore | Rod Dia<br>MM | ST   | SU   | SY   | TS    | US    | SB   | XS   | ZM+   | Piston<br>Thick. | K    |
|------|---------------|------|------|------|-------|-------|------|------|-------|------------------|------|
| 1.50 | 0.63          | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 0.38 | 1.38 | 6.88  | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.91 | 0.38 | 3.25  | 4.00  | 0.38 | 1.75 | 7.63  | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 0.50 | 1.88 | 7.63  | 1.38             | 0.55 |
|      | 1.38          | 0.75 | 1.24 | 0.50 | 4.00  | 5.00  | 0.50 | 2.13 | 8.13  | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 0.75 | 2.06 | 7.75  | 1.50             | 0.55 |
|      | 1.38          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 0.75 | 2.31 | 8.25  | 1.50             | 0.55 |
|      | 1.75          | 1.00 | 1.56 | 0.69 | 4.88  | 6.25  | 0.75 | 2.56 | 8.75  | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 0.75 | 2.31 | 9.00  | 1.75             | 0.67 |
|      | 1.75          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 0.75 | 2.56 | 9.50  | 1.75             | 0.67 |
|      | 2.00          | 1.00 | 1.55 | 0.69 | 5.88  | 7.25  | 0.75 | 2.69 | 9.75  | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 1.00 | 2.75 | 9.75  | 2.00             | 0.78 |
|      | 2.00          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 1.00 | 2.88 | 10.00 | 2.00             | 0.78 |
|      | 2.50          | 1.25 | 2.00 | 0.88 | 6.75  | 8.50  | 1.00 | 3.13 | 10.50 | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 1.00 | 2.88 | 10.50 | 2.50             | 0.92 |
|      | 2.50          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 1.00 | 3.13 | 11.00 | 2.50             | 0.92 |
|      | 3.00          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 1.00 | 3.13 | 11.00 | 2.50             | 0.92 |
|      | 3.50          | 1.25 | 2.00 | 0.88 | 8.25  | 10.00 | 1.00 | 3.13 | 11.00 | 2.50             | 0.92 |
| 6.00 | 2.50          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 1.25 | 3.38 | 11.88 | 2.88             | 1.03 |
|      | 3.00          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 1.25 | 3.38 | 11.88 | 2.88             | 1.03 |
|      | 3.50          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 1.25 | 3.38 | 11.88 | 2.88             | 1.03 |
|      | 4.00          | 1.50 | 2.50 | 1.13 | 9.75  | 12.00 | 1.25 | 3.38 | 11.88 | 2.88             | 1.03 |
| 7.00 | 3.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 1.50 | 3.63 | 13.00 | 3.00             | 1.17 |
|      | 3.50          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 1.50 | 3.63 | 13.00 | 3.00             | 1.17 |
|      | 4.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 1.50 | 3.63 | 13.00 | 3.00             | 1.17 |
|      | 4.50          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 1.50 | 3.63 | 13.00 | 3.00             | 1.17 |
|      | 5.00          | 1.75 | 2.88 | 1.38 | 11.25 | 14.00 | 1.50 | 3.63 | 13.00 | 3.00             | 1.17 |
| 8.00 | 3.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 1.50 | 3.63 | 14.00 | 3.50             | 1.26 |
|      | 4.00          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 1.50 | 3.63 | 14.00 | 3.50             | 1.26 |
|      | 4.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 1.50 | 3.63 | 14.00 | 3.50             | 1.26 |
|      | 5.00          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 1.50 | 3.63 | 14.00 | 3.50             | 1.26 |
|      | 5.50          | 1.75 | 2.88 | 1.38 | 12.25 | 15.00 | 1.50 | 3.63 | 14.00 | 3.50             | 1.26 |

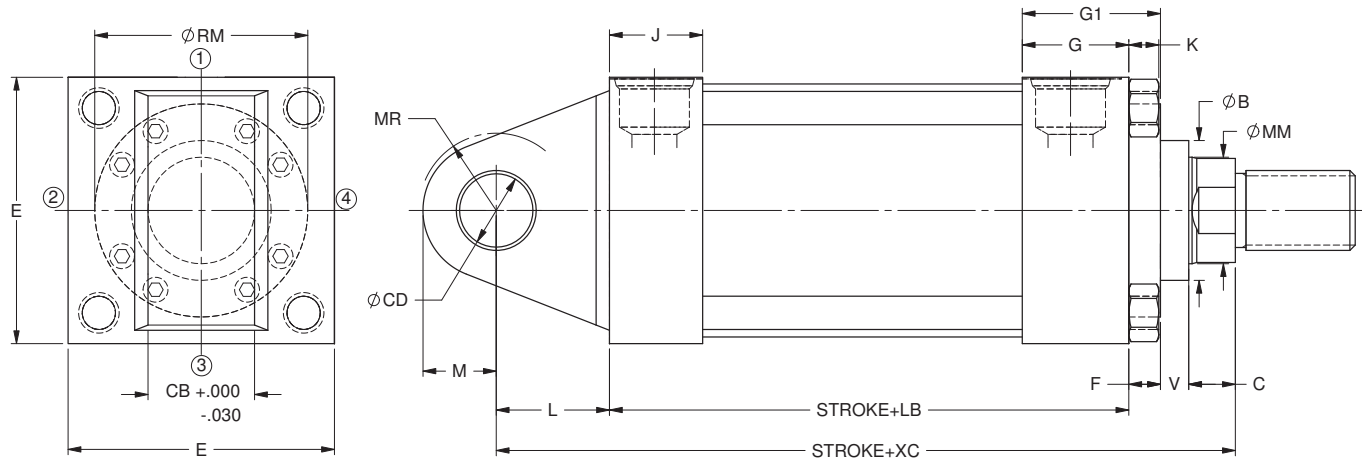
+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

# Mounting Style and Installation Dimensions

## NZ47 Cap Fixed Eye Mount

### ANSI MP3



| Bore | Rod Dia<br>MM | B<br>+.000/-.002 | C    | E    | G    | J    | F    | V    | RM   |
|------|---------------|------------------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124            | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    |
|      | 1.00          | 1.499            | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    |
| 2.00 | 1.00          | 1.499            | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    |
|      | 1.38          | 1.999            | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
| 2.50 | 1.00          | 1.499            | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 |
|      | 1.38          | 1.999            | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    |
|      | 1.75          | 2.374            | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    |
| 3.25 | 1.38          | 1.999            | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 |
|      | 1.75          | 2.374            | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
|      | 2.00          | 2.624            | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    |
| 4.00 | 1.75          | 2.374            | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 |
|      | 2.00          | 2.624            | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
| 5.00 | 2.00          | 2.624            | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 |
|      | 2.50          | 3.124            | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 |
| 6.00 | 2.50          | 3.124            | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 |
|      | 3.00          | 3.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 |
| 7.00 | 3.00          | 3.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 |
|      | 3.50          | 4.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 |
| 8.00 | 3.50          | 4.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 |
|      | 4.00          | 4.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 |
|      | 4.50          | 5.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 |
|      | 5.00          | 5.749            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 |
|      | 5.50          | 6.249            | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 |

+ Plus Stroke

# Mounting Style and Installation Dimensions

## NZ47 Cap Fixed Eye Mount ANSI MP3

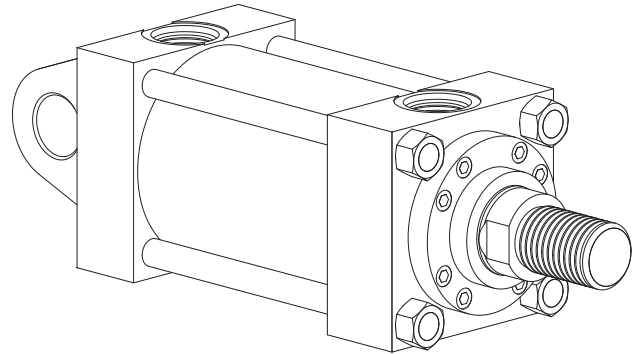
These mounts are for applications in which the machine member travels in a curved path within one plane. These mounts can be used both in compression (push) and tension (pull). Care must be exercised to prevent rod buckling in compression applications with long strokes. See page 75 for stroke limitations.

### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72. The centerline of the machine member that attaches to the swivel pin must be perpendicular to the centerline of the piston rod and the curved path must be in one plane only. Any misalignment will cause excess side loading on the bearing and piston. This will lead to premature failure.

For applications with small amounts of misalignment,

consider the spherical bearing mount NZ11.

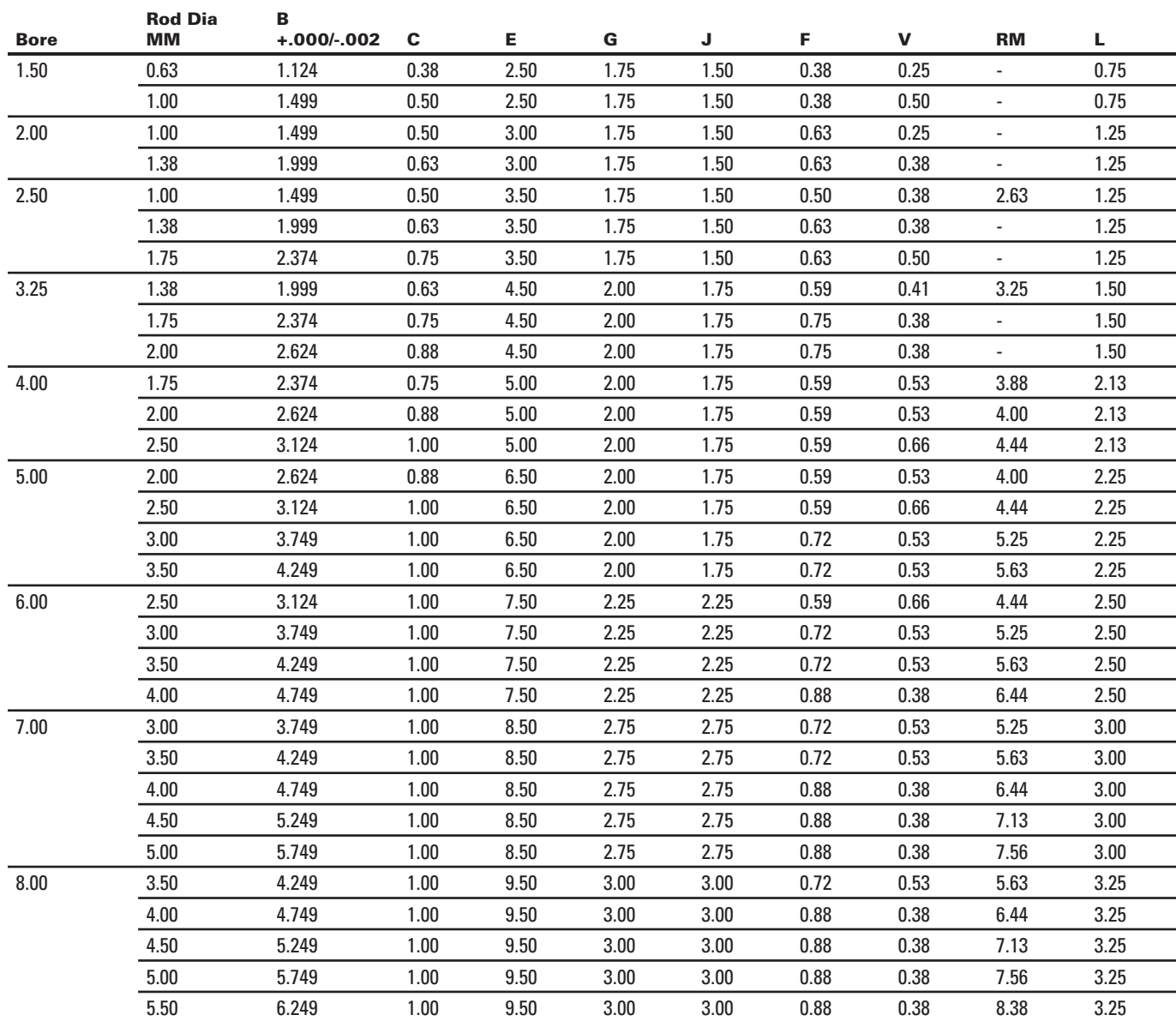


| Bore | Rod Dia<br>MM | L    | M    | CB   | CD    | MR   | LB+  | XC+   | Piston<br>Thick. | K    |
|------|---------------|------|------|------|-------|------|------|-------|------------------|------|
| 1.50 | 0.63          | 0.75 | 0.50 | 0.75 | 0.500 | 0.56 | 4.63 | 6.38  | 1.38             | 0.41 |
|      | 1.00          | 0.75 | 0.50 | 0.75 | 0.500 | 0.56 | 4.63 | 6.75  | 1.38             | 0.41 |
| 2.00 | 1.00          | 1.25 | 0.75 | 1.25 | 0.750 | 1.06 | 4.63 | 7.25  | 1.38             | 0.55 |
|      | 1.38          | 1.25 | 0.75 | 1.25 | 0.750 | 1.06 | 4.63 | 7.50  | 1.38             | 0.55 |
| 2.50 | 1.00          | 1.25 | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 7.38  | 1.50             | 0.55 |
|      | 1.38          | 1.25 | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 7.63  | 1.50             | 0.55 |
|      | 1.75          | 1.25 | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 7.88  | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.50 | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 8.63  | 1.75             | 0.67 |
|      | 1.75          | 1.50 | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 8.88  | 1.75             | 0.67 |
|      | 2.00          | 1.50 | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 9.00  | 1.75             | 0.67 |
| 4.00 | 1.75          | 2.13 | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 9.75  | 2.00             | 0.78 |
|      | 2.00          | 2.13 | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 9.88  | 2.00             | 0.78 |
|      | 2.50          | 2.13 | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 10.13 | 2.00             | 0.78 |
| 5.00 | 2.00          | 2.25 | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 10.50 | 2.50             | 0.92 |
|      | 2.50          | 2.25 | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 10.75 | 2.50             | 0.92 |
|      | 3.00          | 2.25 | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 10.75 | 2.50             | 0.92 |
|      | 3.50          | 2.25 | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 10.75 | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.50 | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 12.13 | 2.88             | 1.03 |
|      | 3.00          | 2.50 | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 12.13 | 2.88             | 1.03 |
|      | 3.50          | 2.50 | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 12.13 | 2.88             | 1.03 |
|      | 4.00          | 2.50 | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 12.13 | 2.88             | 1.03 |
| 7.00 | 3.00          | 3.00 | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 13.75 | 3.00             | 1.17 |
|      | 3.50          | 3.00 | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 13.75 | 3.00             | 1.17 |
|      | 4.00          | 3.00 | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 13.75 | 3.00             | 1.17 |
|      | 4.50          | 3.00 | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 13.75 | 3.00             | 1.17 |
|      | 5.00          | 3.00 | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 13.75 | 3.00             | 1.17 |
| 8.00 | 3.50          | 3.25 | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 15.00 | 3.50             | 1.26 |
|      | 4.00          | 3.25 | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 15.00 | 3.50             | 1.26 |
|      | 4.50          | 3.25 | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 15.00 | 3.50             | 1.26 |
|      | 5.00          | 3.25 | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 15.00 | 3.50             | 1.26 |
|      | 5.50          | 3.25 | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 15.00 | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

NZ48 Cap Detachable  
Eye Mount  
ANSI MP4

56 **Eaton Vickers** Small Bore Cylinder Catalog V-CYTR-MC002-E November 2007

# Mounting Style and Installation

## Dimensions

### NZ48 Cap Detachable Eye Mount ANSI MP4

These mounts are for applications in which the machine member travels in a curved path within one plane. These mounts can be used both in compression (push) and tension (pull). Care must be exercised to prevent rod buckling in compression applications with long strokes. See page 75 for stroke limitations.

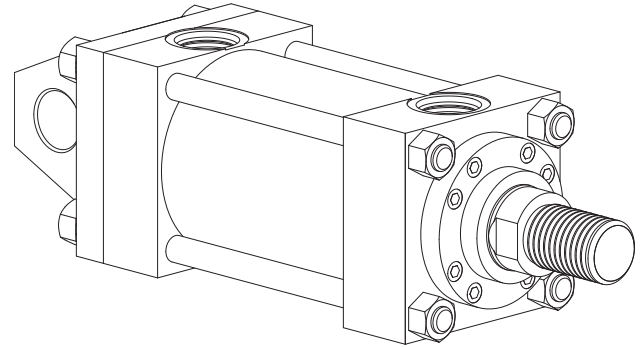
#### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72.

The centerline of the machine member that attaches to the swivel pin must be perpendicular to the centerline of the piston rod and the curved path must be in one plane only. Any misalignment will cause excess side loading on the bearing and piston. This will lead to premature failure.

For applications with small amounts of misalignment,

consider the spherical bearing mount NZ11.



| Bore | Rod Dia<br>MM | M    | CB   | CD    | MR   | LB+  | FH   | XC+   | Piston<br>Thick. | K    |
|------|---------------|------|------|-------|------|------|------|-------|------------------|------|
| 1.50 | 0.63          | 0.50 | 0.75 | 0.500 | 0.56 | 4.63 | 0.38 | 6.75  | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.75 | 0.500 | 0.56 | 4.63 | 0.38 | 7.13  | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 1.25 | 0.750 | 1.06 | 4.63 | 0.63 | 7.88  | 1.38             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.750 | 1.06 | 4.63 | 0.63 | 8.13  | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 0.63 | 8.00  | 1.50             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 0.63 | 8.25  | 1.50             | 0.55 |
|      | 1.75          | 0.75 | 1.25 | 0.750 | 1.06 | 4.75 | 0.63 | 8.50  | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 0.75 | 9.38  | 1.75             | 0.67 |
|      | 1.75          | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 0.75 | 9.63  | 1.75             | 0.67 |
|      | 2.00          | 1.00 | 1.50 | 1.000 | 1.13 | 5.50 | 0.75 | 9.75  | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 0.88 | 10.63 | 2.00             | 0.78 |
|      | 2.00          | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 0.88 | 10.75 | 2.00             | 0.78 |
|      | 2.50          | 1.38 | 2.00 | 1.375 | 1.75 | 5.75 | 0.88 | 11.00 | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 0.88 | 11.38 | 2.50             | 0.92 |
|      | 2.50          | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 0.88 | 11.63 | 2.50             | 0.92 |
|      | 3.00          | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 0.88 | 11.63 | 2.50             | 0.92 |
|      | 3.50          | 1.75 | 2.50 | 1.750 | 1.88 | 6.25 | 0.88 | 11.63 | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 1.00 | 13.13 | 2.88             | 1.03 |
|      | 3.00          | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 1.00 | 13.13 | 2.88             | 1.03 |
|      | 3.50          | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 1.00 | 13.13 | 2.88             | 1.03 |
|      | 4.00          | 2.00 | 2.50 | 2.000 | 2.13 | 7.38 | 1.00 | 13.13 | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 1.00 | 14.75 | 3.00             | 1.17 |
|      | 3.50          | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 1.00 | 14.75 | 3.00             | 1.17 |
|      | 4.00          | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 1.00 | 14.75 | 3.00             | 1.17 |
|      | 4.50          | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 1.00 | 14.75 | 3.00             | 1.17 |
|      | 5.00          | 2.50 | 3.00 | 2.500 | 2.50 | 8.50 | 1.00 | 14.75 | 3.00             | 1.17 |
| 8.00 | 3.50          | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 1.00 | 16.00 | 3.50             | 1.26 |
|      | 4.00          | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 1.00 | 16.00 | 3.50             | 1.26 |
|      | 4.50          | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 1.00 | 16.00 | 3.50             | 1.26 |
|      | 5.00          | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 1.00 | 16.00 | 3.50             | 1.26 |
|      | 5.50          | 2.75 | 3.00 | 3.000 | 2.75 | 9.50 | 1.00 | 16.00 | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

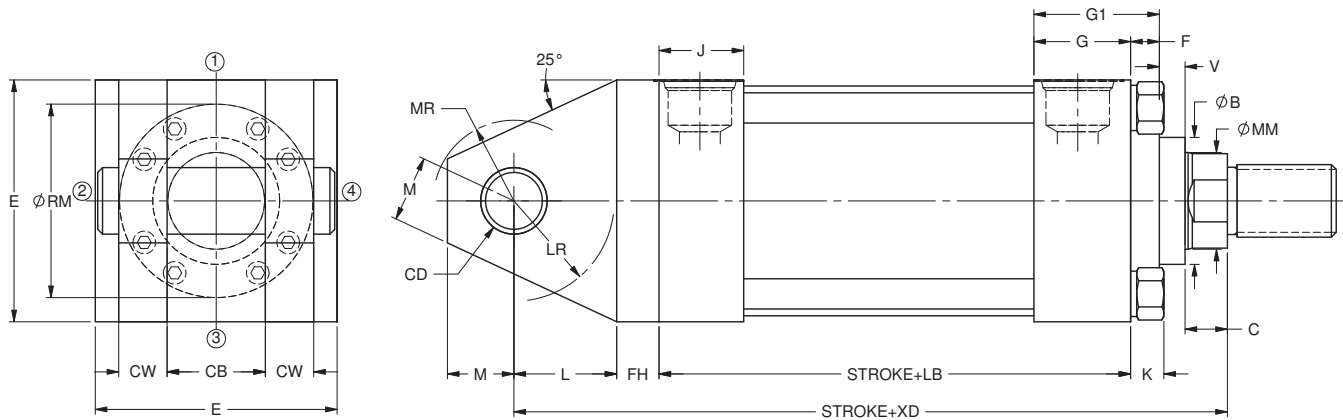
# Mounting Style and Installation

## Dimensions

NZ50 Cap Detachable

Clevis Mount

ANSI MP2



| Bore | Rod Dia<br>MM | B<br>+0.000/-0.002 | C    | E    | G    | J    | F    | V    | RM   | FH   | L    |
|------|---------------|--------------------|------|------|------|------|------|------|------|------|------|
| 1.50 | 0.63          | 1.124              | 0.38 | 2.50 | 1.75 | 1.50 | 0.38 | 0.25 | -    | 0.38 | 0.75 |
|      | 1.00          | 1.499              | 0.50 | 2.50 | 1.75 | 1.50 | 0.38 | 0.50 | -    | 0.38 | 0.75 |
| 2.00 | 1.00          | 1.499              | 0.50 | 3.00 | 1.75 | 1.50 | 0.63 | 0.25 | -    | 0.63 | 1.25 |
|      | 1.38          | 1.999              | 0.63 | 3.00 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 0.63 | 1.25 |
| 2.50 | 1.00          | 1.499              | 0.50 | 3.50 | 1.75 | 1.50 | 0.50 | 0.38 | 2.63 | 0.63 | 1.25 |
|      | 1.38          | 1.999              | 0.63 | 3.50 | 1.75 | 1.50 | 0.63 | 0.38 | -    | 0.63 | 1.25 |
|      | 1.75          | 2.374              | 0.75 | 3.50 | 1.75 | 1.50 | 0.63 | 0.50 | -    | 0.63 | 1.25 |
| 3.25 | 1.38          | 1.999              | 0.63 | 4.50 | 2.00 | 1.75 | 0.59 | 0.41 | 3.25 | 0.75 | 1.50 |
|      | 1.75          | 2.374              | 0.75 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 0.75 | 1.50 |
|      | 2.00          | 2.624              | 0.88 | 4.50 | 2.00 | 1.75 | 0.75 | 0.38 | -    | 0.75 | 1.50 |
| 4.00 | 1.75          | 2.374              | 0.75 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 3.88 | 0.88 | 2.13 |
|      | 2.00          | 2.624              | 0.88 | 5.00 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 0.88 | 2.13 |
|      | 2.50          | 3.124              | 1.00 | 5.00 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 0.88 | 2.13 |
| 5.00 | 2.00          | 2.624              | 0.88 | 6.50 | 2.00 | 1.75 | 0.59 | 0.53 | 4.00 | 0.88 | 2.25 |
|      | 2.50          | 3.124              | 1.00 | 6.50 | 2.00 | 1.75 | 0.59 | 0.66 | 4.44 | 0.88 | 2.25 |
|      | 3.00          | 3.749              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.25 | 0.88 | 2.25 |
|      | 3.50          | 4.249              | 1.00 | 6.50 | 2.00 | 1.75 | 0.72 | 0.53 | 5.63 | 0.88 | 2.25 |
| 6.00 | 2.50          | 3.124              | 1.00 | 7.50 | 2.25 | 2.25 | 0.59 | 0.66 | 4.44 | 1.00 | 2.50 |
|      | 3.00          | 3.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.25 | 1.00 | 2.50 |
|      | 3.50          | 4.249              | 1.00 | 7.50 | 2.25 | 2.25 | 0.72 | 0.53 | 5.63 | 1.00 | 2.50 |
|      | 4.00          | 4.749              | 1.00 | 7.50 | 2.25 | 2.25 | 0.88 | 0.38 | 6.44 | 1.00 | 2.50 |
| 7.00 | 3.00          | 3.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.25 | 1.00 | 3.00 |
|      | 3.50          | 4.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.72 | 0.53 | 5.63 | 1.00 | 3.00 |
|      | 4.00          | 4.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 6.44 | 1.00 | 3.00 |
|      | 4.50          | 5.249              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.13 | 1.00 | 3.00 |
|      | 5.00          | 5.749              | 1.00 | 8.50 | 2.75 | 2.75 | 0.88 | 0.38 | 7.56 | 1.00 | 3.00 |
| 8.00 | 3.50          | 4.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.72 | 0.53 | 5.63 | 1.00 | 3.25 |
|      | 4.00          | 4.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 6.44 | 1.00 | 3.25 |
|      | 4.50          | 5.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.13 | 1.00 | 3.25 |
|      | 5.00          | 5.749              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 7.56 | 1.00 | 3.25 |
|      | 5.50          | 6.249              | 1.00 | 9.50 | 3.00 | 3.00 | 0.88 | 0.38 | 8.38 | 1.00 | 3.25 |

+ Plus Stroke

# Mounting Style and Installation

## Dimensions

### NZ50 Cap Detachable Clevis Mount ANSI MP2

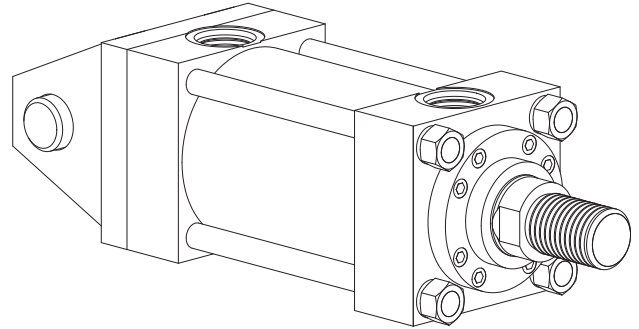
These mounts are for applications in which the machine member travels in a curved path within one plane. These mounts can be used both in compression (push) and tension (pull). Care must be exercised to prevent rod buckling in compression applications with long strokes. See page 75 for stroke limitations.

#### NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 72. The centerline of the machine member that attaches to the swivel pin must be perpendicular to the centerline of the piston rod and the curved path must be in one plane only. Any misalignment will cause excess side loading on the bearing and piston. This will lead to premature failure.

For applications with small amounts of misalignment,

consider the spherical bearing mount NZ11.



| Bore | Rod Dia<br>MM | M    | CB   | CD+.000/<br>-.002 | CW   | LR   | MR   | LB+  | XD+   | Piston<br>Thick. | K    |
|------|---------------|------|------|-------------------|------|------|------|------|-------|------------------|------|
| 1.50 | 0.63          | 0.50 | 0.75 | 0.500             | 0.50 | 0.56 | 0.56 | 4.63 | 6.75  | 1.38             | 0.41 |
|      | 1.00          | 0.50 | 0.75 | 0.500             | 0.50 | 0.56 | 0.56 | 4.63 | 7.13  | 1.38             | 0.41 |
| 2.00 | 1.00          | 0.75 | 1.25 | 0.750             | 0.63 | 1.06 | 1.06 | 4.63 | 7.88  | 1.38             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.750             | 0.63 | 1.06 | 1.06 | 4.63 | 8.13  | 1.38             | 0.55 |
| 2.50 | 1.00          | 0.75 | 1.25 | 0.750             | 0.63 | 1.06 | 1.06 | 4.75 | 8.00  | 1.50             | 0.55 |
|      | 1.38          | 0.75 | 1.25 | 0.750             | 0.63 | 1.06 | 1.06 | 4.75 | 8.25  | 1.50             | 0.55 |
|      | 1.75          | 0.75 | 1.25 | 0.750             | 0.63 | 1.06 | 1.06 | 4.75 | 8.50  | 1.50             | 0.55 |
| 3.25 | 1.38          | 1.00 | 1.50 | 1.000             | 0.75 | 1.25 | 1.13 | 5.50 | 9.38  | 1.75             | 0.67 |
|      | 1.75          | 1.00 | 1.50 | 1.000             | 0.75 | 1.25 | 1.13 | 5.50 | 9.63  | 1.75             | 0.67 |
|      | 2.00          | 1.00 | 1.50 | 1.000             | 0.75 | 1.25 | 1.13 | 5.50 | 9.75  | 1.75             | 0.67 |
| 4.00 | 1.75          | 1.38 | 2.00 | 1.375             | 1.00 | 1.88 | 1.75 | 5.75 | 10.63 | 2.00             | 0.78 |
|      | 2.00          | 1.38 | 2.00 | 1.375             | 1.00 | 1.88 | 1.75 | 5.75 | 10.75 | 2.00             | 0.78 |
|      | 2.50          | 1.38 | 2.00 | 1.375             | 1.00 | 1.88 | 1.75 | 5.75 | 11.00 | 2.00             | 0.78 |
| 5.00 | 2.00          | 1.75 | 2.50 | 1.750             | 1.25 | 1.94 | 1.88 | 6.25 | 11.38 | 2.50             | 0.92 |
|      | 2.50          | 1.75 | 2.50 | 1.750             | 1.25 | 1.94 | 1.88 | 6.25 | 11.63 | 2.50             | 0.92 |
|      | 3.00          | 1.75 | 2.50 | 1.750             | 1.25 | 1.94 | 1.88 | 6.25 | 11.63 | 2.50             | 0.92 |
|      | 3.50          | 1.75 | 2.50 | 1.750             | 1.25 | 1.94 | 1.88 | 6.25 | 11.63 | 2.50             | 0.92 |
| 6.00 | 2.50          | 2.00 | 2.50 | 2.000             | 1.25 | 2.06 | 2.13 | 7.38 | 13.13 | 2.88             | 1.03 |
|      | 3.00          | 2.00 | 2.50 | 2.000             | 1.25 | 2.06 | 2.13 | 7.38 | 13.13 | 2.88             | 1.03 |
|      | 3.50          | 2.00 | 2.50 | 2.000             | 1.25 | 2.06 | 2.13 | 7.38 | 13.13 | 2.88             | 1.03 |
|      | 4.00          | 2.00 | 2.50 | 2.000             | 1.25 | 2.06 | 2.13 | 7.38 | 13.13 | 2.88             | 1.03 |
| 7.00 | 3.00          | 2.50 | 3.00 | 2.500             | 1.50 | 2.56 | 2.50 | 8.50 | 14.75 | 3.00             | 1.17 |
|      | 3.50          | 2.50 | 3.00 | 2.500             | 1.50 | 2.56 | 2.50 | 8.50 | 14.75 | 3.00             | 1.17 |
|      | 4.00          | 2.50 | 3.00 | 2.500             | 1.50 | 2.56 | 2.50 | 8.50 | 14.75 | 3.00             | 1.17 |
|      | 4.50          | 2.50 | 3.00 | 2.500             | 1.50 | 2.56 | 2.50 | 8.50 | 14.75 | 3.00             | 1.17 |
|      | 5.00          | 2.50 | 3.00 | 2.500             | 1.50 | 2.56 | 2.50 | 8.50 | 14.75 | 3.00             | 1.17 |
| 8.00 | 3.50          | 2.75 | 3.00 | 3.000             | 1.50 | 2.69 | 2.75 | 9.50 | 16.00 | 3.50             | 1.26 |
|      | 4.00          | 2.75 | 3.00 | 3.000             | 1.50 | 2.69 | 2.75 | 9.50 | 16.00 | 3.50             | 1.26 |
|      | 4.50          | 2.75 | 3.00 | 3.000             | 1.50 | 2.69 | 2.75 | 9.50 | 16.00 | 3.50             | 1.26 |
|      | 5.00          | 2.75 | 3.00 | 3.000             | 1.50 | 2.69 | 2.75 | 9.50 | 16.00 | 3.50             | 1.26 |
|      | 5.50          | 2.75 | 3.00 | 3.000             | 1.50 | 2.69 | 2.75 | 9.50 | 16.00 | 3.50             | 1.26 |

+ Plus Stroke

See Mount 24 on page 50 for Port Dimensions

## Accessories

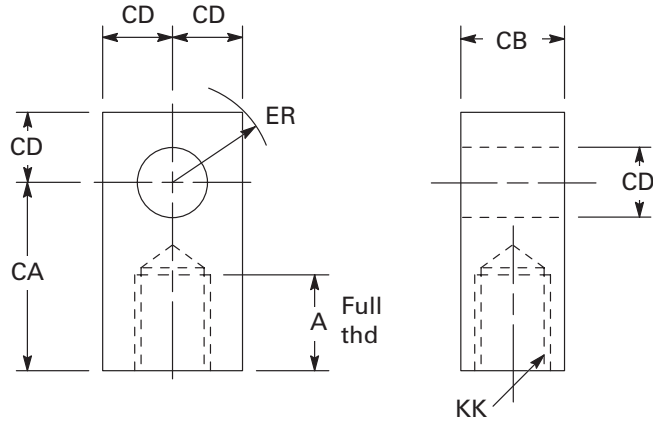
**All rod accessories must be torqued against the rod shoulder.**

Mounting brackets, rod clevises, and rod eyes for all NZ cylinders are available from Eaton. These accessories are detailed below showing part numbers and all pertinent

dimensional data. Make sure the rod end type selected has threads that match the threads of any required accessory. Dimensions are in inches unless otherwise

noted. When ordering, please specify the part name and part number.

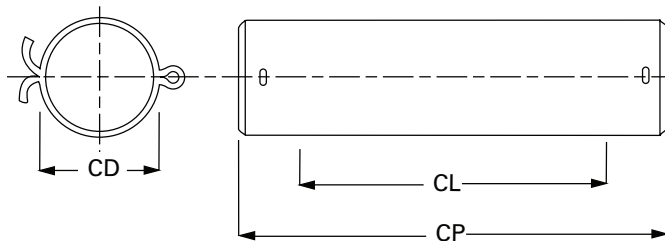
### Rod Eye



\* Recommended torque values using MoS<sub>2</sub> lubricant with 0.12 co-efficient of friction.

| Bore | KK              | Torque*<br>(ft-lb) | Part<br>Number | Weight<br>(lbs) | A    | CA   | CB   | CD   | ER   |
|------|-----------------|--------------------|----------------|-----------------|------|------|------|------|------|
| 1.50 | 7/16-20 UNF-2B  | 36                 | NZ-160         | 0.38            | 0.75 | 1.50 | 0.75 | 0.50 | 0.63 |
| 2.00 | 3/4-16 UNF-2B   | 125                | NZ-260         | 1.25            | 1.13 | 2.06 | 1.25 | 0.75 | 0.88 |
| 2.50 | 3/4-16 UNF-2B   | 125                | NZ-260         | 1.25            | 1.13 | 2.06 | 1.25 | 0.75 | 0.88 |
| 3.25 | 1-14 NS-2B      | 250                | NZ-360         | 2.5             | 1.63 | 2.81 | 1.50 | 1.00 | 1.18 |
| 4.00 | 1 1/4-12 UNF-2B | 460                | NZ-460         | 5.94            | 2.00 | 3.44 | 2.00 | 1.38 | 1.56 |
| 5.00 | 1 1/2-12 UNF-2B | 663                | NZ-560         | 11.4            | 2.25 | 4.00 | 2.50 | 1.75 | 2.00 |
| 6.00 | 1 7/8-12 UNF-2B | 944                | NZ-660         | 15.1            | 3.00 | 5.00 | 2.50 | 2.00 | 2.25 |
| 7.00 | 2 1/4-12 UNF-2B | 1315               | NZ-760         | 27              | 3.50 | 5.81 | 3.00 | 2.50 | 2.81 |
| 8.00 | 2 1/2-12 UNF-2B | 5050               | NZ-860         | 35              | 3.50 | 6.12 | 3.00 | 3.00 | 3.25 |

### Pivot Pin



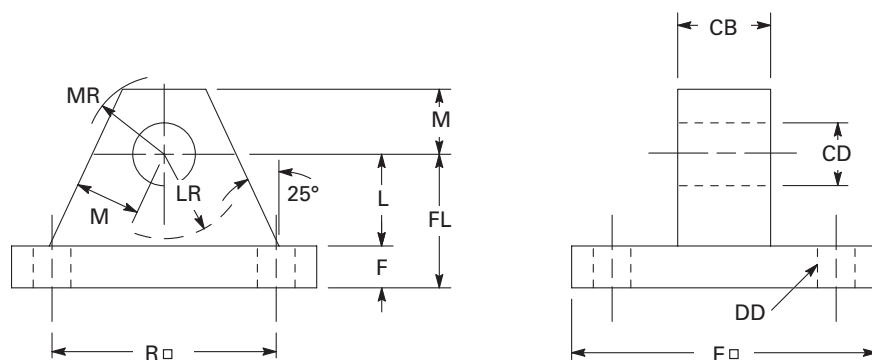
- Pivot pins are furnished with clevis mounted cylinders.
- $CL = (2 \times CW) + CB$

| Bore | Part Number | CD   | CL   | CP   |
|------|-------------|------|------|------|
| 1.50 | NZ83050A    | 0.50 | 1.75 | 2.38 |
| 2.00 | NZ83075A    | 0.75 | 2.50 | 3.13 |
| 2.50 | NZ83075A    | 0.75 | 2.50 | 3.13 |
| 3.25 | NZ83100A    | 1.00 | 3.00 | 3.75 |
| 4.00 | NZ83137A    | 1.38 | 4.00 | 4.75 |
| 5.00 | NZ83175A    | 1.75 | 5.00 | 6.03 |
| 6.00 | NZ83200A    | 2.00 | 5.00 | 6.03 |
| 7.00 | NZ83250A    | 2.50 | 6.00 | 7.03 |
| 8.00 | NZ83300A    | 3.00 | 6.00 | 7.13 |

## Accessories

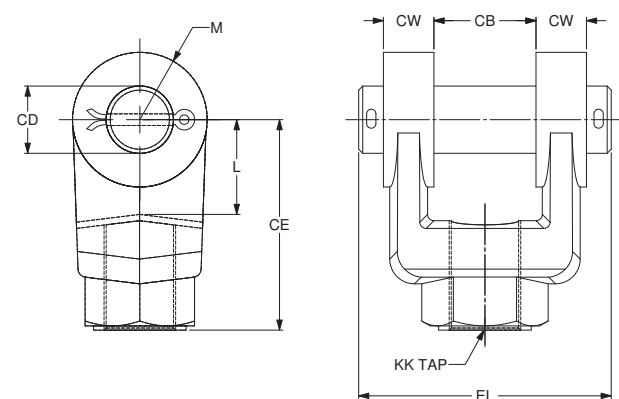
(Continued...)

### Mounting Eye Bracket



| Bore | Part Number | Weight (lbs) | E    | F    | L    | M    | R    | CB   | CD   | DD   | FL   | LR   | MR   |
|------|-------------|--------------|------|------|------|------|------|------|------|------|------|------|------|
| 1.50 | NZ-152      | 0.94         | 2.50 | 0.38 | 0.75 | 0.50 | 1.63 | 0.75 | 0.50 | 0.38 | 1.13 | 0.50 | 0.56 |
| 2.00 | NZ-252      | 3.19         | 3.50 | 0.63 | 1.25 | 0.75 | 2.55 | 1.25 | 0.75 | 0.50 | 1.88 | 1.00 | 1.06 |
| 2.50 | NZ-252      | 3.19         | 3.50 | 0.63 | 1.25 | 0.75 | 2.55 | 1.25 | 0.75 | 0.50 | 1.88 | 1.00 | 1.06 |
| 3.25 | NZ-352      | 7.17         | 4.50 | 0.88 | 1.50 | 1.00 | 3.25 | 1.50 | 1.00 | 0.63 | 2.38 | 1.00 | 1.13 |
| 4.00 | NZ-452      | 11.7         | 5.00 | 0.88 | 2.13 | 1.38 | 3.82 | 2.00 | 1.38 | 0.63 | 3.00 | 1.13 | 1.75 |
| 5.00 | NZ-552      | 22           | 6.50 | 1.13 | 2.25 | 1.75 | 4.95 | 2.50 | 1.75 | 0.88 | 3.38 | 1.75 | 1.88 |
| 6.00 | NZ-652      | 34.5         | 7.50 | 1.50 | 2.50 | 2.00 | 5.73 | 2.50 | 2.00 | 1.00 | 4.00 | 2.00 | 2.13 |
| 7.00 | NZ-752      | 55.4         | 8.50 | 1.75 | 3.00 | 2.50 | 6.58 | 3.00 | 2.50 | 1.13 | 4.75 | 2.50 | 2.50 |
| 8.00 | NZ-852      | 72.5         | 9.50 | 2.00 | 3.25 | 2.75 | 7.50 | 3.00 | 3.00 | 1.25 | 5.25 | 2.75 | 2.75 |

### Rod Clevis

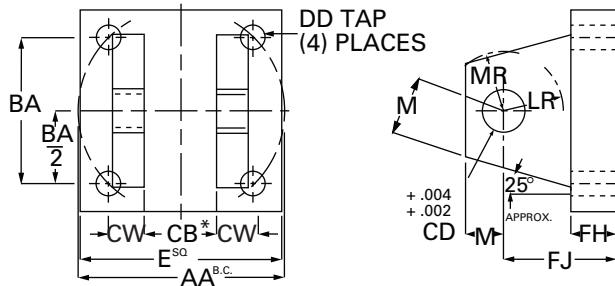


| Bore | KK              | Part Number | Weight (lbs) | L    | M    | CB   | CD   | CE   | CW   | EL   |
|------|-----------------|-------------|--------------|------|------|------|------|------|------|------|
| 1.50 | 7/16-20 UNF-2B  | NZ-162-10   | 0.56         | 0.75 | 0.50 | 0.75 | 0.50 | 1.50 | 0.50 | 2.38 |
| 2.00 | 3/4-16 UNF-2B   | NZ-262-10   | 1.56         | 1.25 | 0.75 | 1.25 | 0.75 | 2.38 | 0.63 | 3.13 |
| 2.50 | 3/4-16 UNF-2B   | NZ-262-10   | 1.56         | 1.25 | 0.75 | 1.25 | 0.75 | 2.38 | 0.63 | 3.13 |
| 3.25 | 1-14 NS-2B      | NZ-362-10   | 3.31         | 1.50 | 1.00 | 1.50 | 1.00 | 3.13 | 0.75 | 3.75 |
| 4.00 | 1 1/4-12 UNF-2B | NZ-462-10   | 9.25         | 2.13 | 1.38 | 2.00 | 1.38 | 4.13 | 1.00 | 4.75 |
| 5.00 | 1 1/2-12 UNF-2B | NZ-562-10   | 14.62        | 2.25 | 1.75 | 2.50 | 1.75 | 4.50 | 1.25 | 6.03 |
| 6.00 | 1 7/8-12 UNF-2B | NZ-662-10   | 21           | 2.50 | 2.00 | 2.50 | 2.00 | 5.50 | 1.25 | 6.03 |
| 7.00 | 2 1/4-12 UNF-2B | NZ-762-10   | 36           | 3.00 | 2.50 | 3.00 | 2.50 | 6.50 | 1.50 | 7.03 |
| 8.00 | 2 1/2-12 UNF-2B | NZ-862-10   | 43           | 3.25 | 2.75 | 3.00 | 3.00 | 6.75 | 1.50 | 7.13 |

## Accessories

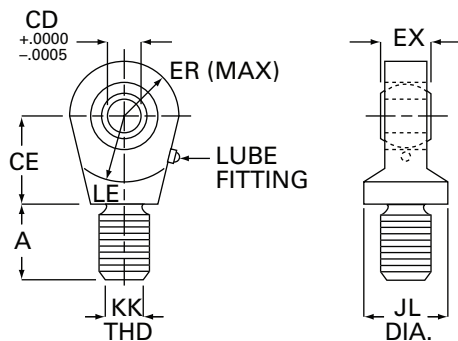
(Continued...)

### Clevis Bracket



| Bore | Part No.   | AA    | BA   | CB   | CD    | CW   | DD       | E    | FH   | FJ   | LR   | M    | MR   |
|------|------------|-------|------|------|-------|------|----------|------|------|------|------|------|------|
| 1.50 | NZ-133-03  | 2.30  | 1.63 | 0.78 | 0.500 | 0.50 | 3/8-24   | 2.50 | 0.38 | 1.38 | 0.50 | 0.50 | 0.56 |
| 2.00 | NZ-133-04  | 2.90  | 2.06 | 0.59 | 0.750 | 0.63 | 1/2-20   | 3.00 | 0.63 | 1.88 | 1.00 | 0.75 | 0.69 |
| 2.50 | NZ-133-05  | 3.60  | 2.56 | 0.59 | 0.750 | 0.63 | 1/2-20   | 3.50 | 0.63 | 1.88 | 1.06 | 0.75 | 0.69 |
| 3.25 | NZ-133-065 | 4.60  | 3.25 | 1.53 | 1.000 | 0.75 | 5/8-18   | 4.50 | 0.75 | 2.25 | 1.25 | 1.00 | 1.13 |
| 4.00 | NZ-133-08  | 5.40  | 3.81 | 2.03 | 1.375 | 1.00 | 5/8-18   | 5.00 | 0.88 | 3.00 | 1.88 | 1.38 | 1.75 |
| 5.00 | NZ-133-10  | 7.00  | 4.94 | 2.53 | 1.750 | 1.25 | 7/8-14   | 6.50 | 0.88 | 3.13 | 2.00 | 1.75 | 1.88 |
| 6.00 | NZ-133-12  | 8.10  | 5.75 | 2.53 | 2.000 | 1.25 | 1-14     | 7.50 | 1.00 | 3.50 | 2.13 | 2.00 | 2.13 |
| 7.00 | NZ-133-14  | 9.30  | 6.59 | 3.03 | 2.500 | 1.50 | 1 1/8-12 | 8.50 | 1.00 | 4.00 | 2.63 | 2.50 | 2.50 |
| 8.00 | NZ-133-16  | 10.60 | 7.50 | 3.03 | 3.000 | 1.50 | 1 1/4-12 | 9.50 | 1.00 | 4.25 | 2.88 | 2.75 | 2.75 |

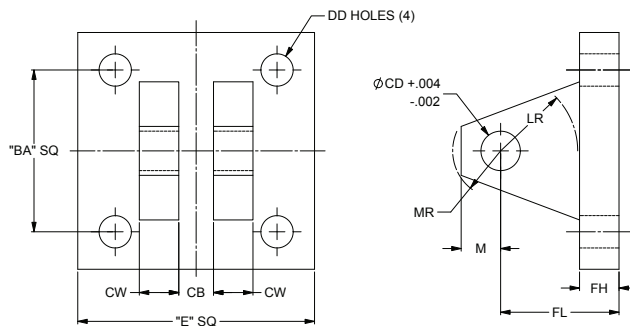
### Spherical Rod Eye



| Bore | KK       | Part Number | A    | CD<br>+.0000<br>-.0005 | CE   | EX   | ER   | JL   | LE   | Load Capacity<br>(lbs) |
|------|----------|-------------|------|------------------------|------|------|------|------|------|------------------------|
| 1.50 | 7/16-20  | NZ-160-SAB  | 0.69 | 0.5000                 | 0.88 | 0.44 | 0.88 | 0.88 | 0.75 | 2600                   |
| 2.00 | 3/4-16   | NZ-260-SAB  | 1.00 | 0.7500                 | 1.25 | 0.66 | 1.25 | 1.31 | 1.06 | 9400                   |
| 2.50 | 3/4-16   | NZ-260-SAB  | 1.00 | 0.7500                 | 1.25 | 0.66 | 1.25 | 1.31 | 1.06 | 9400                   |
| 3.25 | 1-14     | NZ-360-SAB  | 1.50 | 1.0000                 | 1.88 | 0.88 | 1.38 | 1.50 | 1.44 | 16800                  |
| 4.00 | 1 1/4-12 | NZ-460-SAB  | 2.00 | 1.3750                 | 2.13 | 1.19 | 1.19 | 2.00 | 1.88 | 28600                  |
| 5.00 | 1 1/2-12 | NZ-560-SAB  | 2.13 | 1.7500                 | 2.50 | 1.22 | 2.19 | 2.25 | 2.13 | 43000                  |
| 6.00 | 1 7/8-12 | NZ-660-SAB  | 2.88 | 2.0000                 | 2.75 | 1.75 | 2.63 | 2.75 | 2.50 | 70000                  |

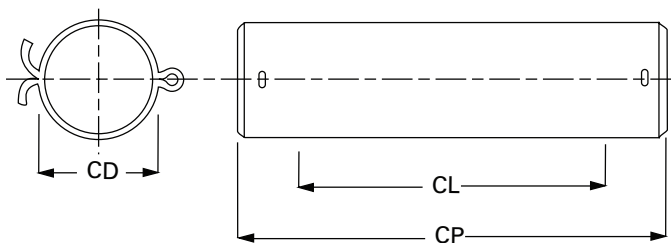
# Accessories - For Spherical Bushing Mounted Cylinder (Continued...)

## Clevis Bracket



| Bore | Part No.   | BA   | CB   | CD    | CW   | DD   | E     | FH   | FL   | LR   | M    | MR   |
|------|------------|------|------|-------|------|------|-------|------|------|------|------|------|
| 1.50 | 6000422-01 | 2.05 | 0.44 | 0.500 | 0.50 | 0.41 | 3.00  | 0.50 | 1.50 | 0.94 | 0.50 | 0.62 |
| 2.00 | 6000422-02 | 2.76 | 0.66 | 0.750 | 0.62 | 0.53 | 3.75  | 0.62 | 2.00 | 1.38 | 0.88 | 1.00 |
| 2.50 | 6000422-02 | 2.76 | 0.66 | 0.750 | 0.62 | 0.53 | 3.75  | 0.62 | 2.00 | 1.38 | 0.88 | 1.00 |
| 3.25 | 6000422-03 | 4.10 | 0.88 | 1.000 | 0.75 | 0.53 | 5.50  | 0.75 | 2.50 | 1.69 | 1.00 | 1.19 |
| 4.00 | 6000422-04 | 4.95 | 1.19 | 1.375 | 1.00 | 0.66 | 6.50  | 0.88 | 3.50 | 2.44 | 1.38 | 1.62 |
| 5.00 | 6000422-05 | 6.58 | 1.53 | 1.750 | 1.25 | 0.91 | 8.50  | 1.25 | 4.50 | 2.88 | 1.75 | 2.06 |
| 6.00 | 6000422-06 | 7.92 | 1.75 | 2.000 | 1.50 | 0.91 | 10.62 | 1.50 | 5.00 | 3.31 | 2.00 | 2.38 |

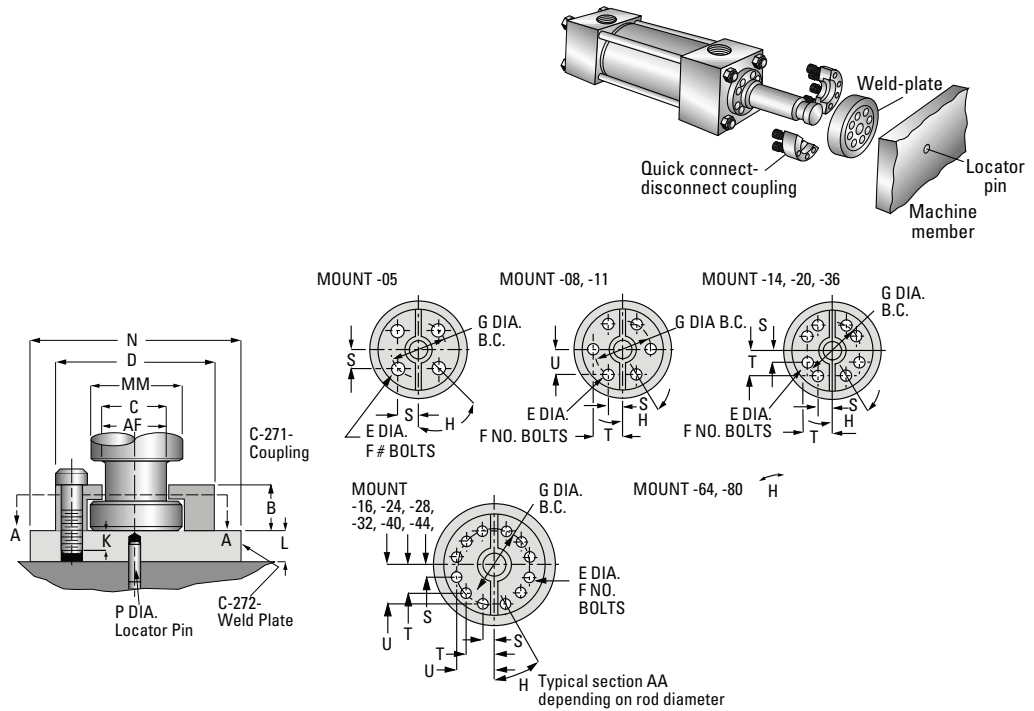
## Pivot Pin



| Bore | Part Number | CD   | CL   | CP    |
|------|-------------|------|------|-------|
| 1.50 | 6856A-1-10  | 2.05 | 0.44 | 0.500 |
| 2.00 | 6856A-2-10  | 2.76 | 0.66 | 0.750 |
| 2.50 | 6856A-2-10  | 2.76 | 0.66 | 0.750 |
| 3.25 | 6856A-3-10  | 4.10 | 0.88 | 1.000 |
| 4.00 | 6856A-4-10  | 4.95 | 1.19 | 1.375 |
| 5.00 | 6856A-5-10  | 6.58 | 1.53 | 1.750 |
| 6.00 | NZ83200A    | 7.92 | 1.75 | 2.000 |

# Rod End Couplings

Used with the Hydro-Line style 10 Rod End, the Hydro-Line Rod End Coupling provides for close lateral alignment between the rod end and machine member. The two-piece steel coupling features high tensile strength socket head cap screws (with safety factor designed to take full load), permits quick assembly/disassembly for fast and easy installation and servicing.

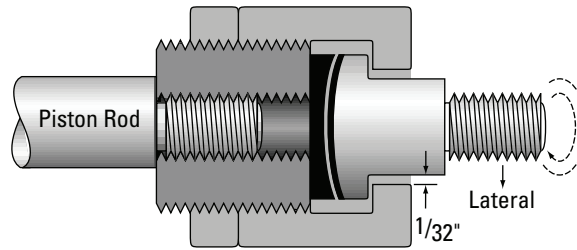


| Coupling and Weld plate Assembly | Coupling NZ-271- | Rod Dia (MM) | AF   | B    | C    | D    | E    | F     | G    | H       | K    |
|----------------------------------|------------------|--------------|------|------|------|------|------|-------|------|---------|------|
| NZ-275-05                        | NZ-271-05        | 0.63         | 0.38 | 0.44 | 0.41 | 1.50 | 0.22 | 4.00  | 1.12 | 45°     | 0.44 |
| NZ-275-08                        | NZ-271-08        | 1.00         | 0.69 | 0.62 | 0.75 | 2.00 | 0.28 | 6.00  | 1.50 | 30°     | 0.38 |
| NZ-275-11                        | NZ-271-11        | 1.38         | 0.88 | 0.69 | 0.94 | 2.50 | 0.34 | 6.00  | 2.00 | 30°     | 0.56 |
| NZ-275-14                        | NZ-271-14        | 1.75         | 1.12 | 0.88 | 1.18 | 3.00 | 0.41 | 8.00  | 2.38 | 22° 30' | 0.62 |
| NZ-275-16                        | NZ-271-16        | 2.00         | 1.38 | 1.25 | 1.44 | 3.50 | 0.41 | 12.00 | 2.69 | 15°     | 0.75 |
| NZ-275-20                        | NZ-271-20        | 2.50         | 1.75 | 1.38 | 1.88 | 4.25 | 0.53 | 8.00  | 3.44 | 22° 30' | 0.88 |
| NZ-275-24                        | NZ-271-24        | 3.00         | 2.25 | 1.88 | 2.38 | 5.00 | 0.53 | 12.00 | 4.00 | 15°     | 0.88 |
| NZ-275-28                        | NZ-271-28        | 3.50         | 2.50 | 2.00 | 2.62 | 5.88 | 0.66 | 12.00 | 4.69 | 15°     | 1.00 |
| NZ-275-32                        | NZ-271-32        | 4.00         | 3.00 | 2.00 | 3.12 | 6.38 | 0.66 | 12.00 | 5.18 | 15°     | 1.00 |
| NZ-275-36                        | NZ-271-36        | 4.50         | 3.50 | 2.38 | 3.62 | 6.88 | 0.78 | 8.00  | 5.69 | 22° 30' | 1.12 |
| NZ-275-40                        | NZ-271-40        | 5.00         | 3.88 | 2.50 | 4.00 | 7.38 | 0.66 | 12.00 | 6.18 | 15°     | 1.25 |
| NZ-275-44                        | NZ-271-44        | 5.50         | 4.38 | 3.12 | 4.50 | 8.25 | 0.78 | 12.00 | 6.88 | 15°     | 1.38 |

| Weld Plate NZ-272- | L    | N    | P    | Sco. Hd. Cap Screws | Bolt Torq. Ft. lb. | S    | T    | U    | X |
|--------------------|------|------|------|---------------------|--------------------|------|------|------|---|
| NZ-272-05          | 0.50 | 2.00 | 0.25 | #10-24x.88          | 5                  | 0.40 | —    | —    | — |
| NZ-272-08          | 0.50 | 2.50 | 0.25 | 1/4"-20x1.0         | 14                 | 0.38 | 0.75 | 0.65 | — |
| NZ-272-11          | 0.62 | 3.00 | 0.25 | 5/16"-18x1.25       | 30                 | 0.50 | 1.00 | 0.87 | — |
| NZ-272-14          | 0.75 | 3.50 | 0.25 | 3/8"-16x1.5         | 52                 | 0.45 | 1.10 | —    | — |
| NZ-272-16          | 0.88 | 4.00 | 0.38 | 3/8"-16x2.0         | 52                 | 0.35 | 0.95 | 1.30 | — |
| NZ-272-20          | 1.00 | 5.00 | 0.38 | 1/2"-13x2.25        | 128                | 0.66 | 1.59 | —    | — |
| NZ-272-24          | 1.00 | 5.50 | 0.38 | 1/2"-13x2.75        | 128                | 0.52 | 1.41 | 1.93 | — |
| NZ-272-28          | 1.12 | 6.50 | 0.38 | 5/8"-11x3.0         | 255                | 0.61 | 1.66 | 2.26 | — |
| NZ-272-32          | 1.12 | 7.00 | 0.38 | 5/8"-11x3.0         | 255                | 0.67 | 1.83 | 2.51 | — |
| NZ-272-36          | 1.25 | 7.50 | 0.38 | 3/4"-10x3.5         | 450                | 1.09 | 2.63 | —    | — |
| NZ-272-40          | 1.38 | 8.00 | 0.38 | 5/8"-11x3.75        | 255                | 0.80 | 2.19 | 2.99 | — |
| NZ-272-44          | 1.50 | 9.00 | 0.38 | 3/4"-10x4.5         | 450                | 0.89 | 2.43 | 3.32 | — |

# Self-Aligning Coupler

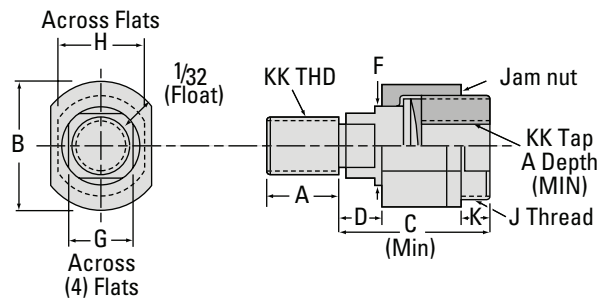
Lateral movement (on push only) and radial movement provide precision alignment between cylinder and machine. Couplers preset with proper clearances and completely lubricated at factory before shipping.



## Note

When ordering oversize and 2:1 rod cylinders, specify modification to suit standard rod diameter's coupler.

Self-aligning Coupler



Self-aligning Rod End Coupler

| Part Number | Rod Diameter | A    | B    | C    | D    | F    | G    | H    | J        | K    | KK       | Max. Pull at Yield |
|-------------|--------------|------|------|------|------|------|------|------|----------|------|----------|--------------------|
| AC-2-05     | 0.63         | 0.75 | 1.25 | 2.00 | 0.50 | 0.63 | 0.50 | 0.81 | 1-14     | 0.31 | 7/16-20  | 8,320              |
| AC-2-08     | 1.00         | 1.13 | 1.69 | 2.31 | 0.50 | 0.97 | 0.81 | 1.13 | 1 3/8-12 | 0.50 | 3/4-16   | 35,000             |
| AC-2-11     | 1.38         | 1.63 | 2.38 | 2.91 | 0.50 | 3.47 | 1.16 | 1.63 | 1 7/8-12 | 0.69 | 1-14     | 64,500             |
| AC-2-14     | 1.75         | 2.00 | 2.63 | 3.59 | 0.75 | 1.72 | 1.44 | 2.00 | 2 1/4-12 | 0.84 | 1 1/4-12 | 82,550             |
| AC-2-16     | 2.00         | 2.25 | 3.00 | 4.16 | 0.88 | 1.97 | 1.75 | 2.38 | 2 5/8-12 | 0.91 | 1 1/2-12 | 128,340            |
| AC-2-20     | 2.50         | 3.00 | 3.75 | 5.44 | 1.00 | 2.47 | 2.13 | 3.00 | 3 1/4-12 | 1.31 | 1 7/8-12 | 231,000            |
| AC-2-24     | 3.00         | 3.50 | 4.25 | 6.19 | 1.00 | 2.97 | *    | 3.38 | 3 3/4-12 | 1.19 | 2 1/4-12 | 289,200            |
| AC-2-28     | 3.50         | 3.50 | 5.00 | 6.44 | 1.00 | 3.47 | *    | 4.00 | 4 1/2-12 | 1.50 | 2 1/2-12 | 342,400            |
| AC-2-36     | 4.50         | 4.50 | 6.00 | 7.88 | 1.00 | 4.47 | *    | 4.75 | 5 1/4-12 | 1.63 | 3 1/4-12 | 475,500            |
| AC-2-44     | 5.50         | 5.50 | 7.25 | 9.38 | 1.00 | 5.47 | *    | 5.75 | 6 1/2-12 | 1.88 | 4-12     | 750,010            |

\* Four 1/2" diameter x 1/2" deep spanner holes instead of flats.

# Rod End Types

In addition to selecting the correct bore, you must specify the appropriate rod size and rod ends configuration for your application.

Twelve different inch and Metric rod ends configurations are available. If a custom design is required

contact your local Eaton sales engineer and we will build to your requirements.

Table on page 75 gives maximum allowable push length at various operating pressures for available rod diameters. Rod ends on rigid mount should be supported. Longer

strokes allowable for pull only applications.

Contact your local Eaton sales engineer for application assistance if necessary

Note: Code 0, 1, and N threads are to ISO 4395 and are based on the metric fine pitch series. Rod end acces-

series locknuts, tooling and gauges are available. These threads are also specified in ISO 6020-2 (160 Bar compact) cylinder series. Code 7 and L threads are based on the closest metric threads to the UN series and are recommended for replacement only.

## Inch Rod Ends

|                  |  |                                  |  |
|------------------|--|----------------------------------|--|
| Code<br><b>2</b> |  | For rod sizes 3 1/2" thru 5 1/2" |  |
| Code<br><b>5</b> |  | Code<br><b>K</b>                 |  |
| Code<br><b>6</b> |  | Code<br><b>G</b>                 |  |
| Code<br><b>9</b> |  | Code<br><b>M</b>                 |  |

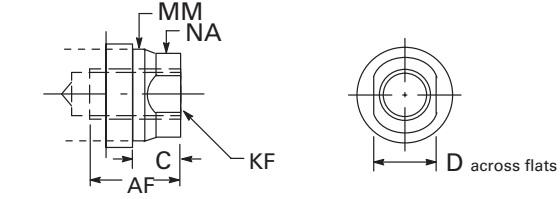
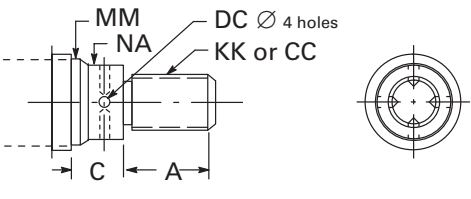
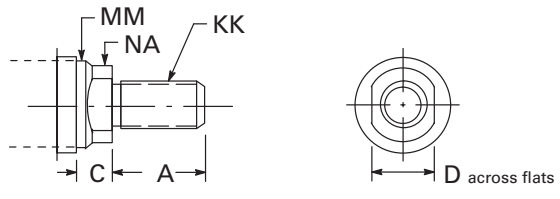
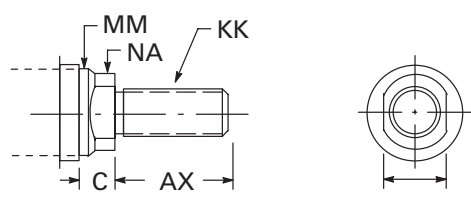
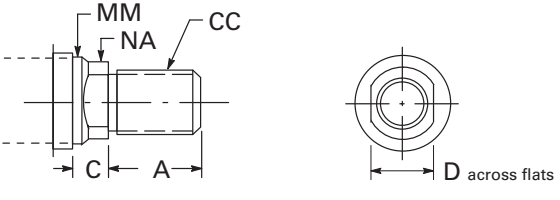
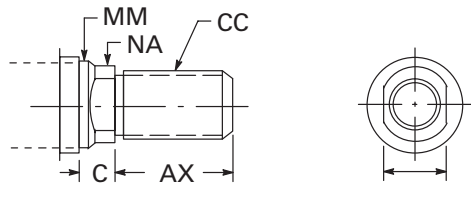
| Rod<br>Φ<br>MM |      |      |      |      |      |      |      |      |      |  | UN(F) Thread |          |       |
|----------------|------|------|------|------|------|------|------|------|------|--|--------------|----------|-------|
|                | A    | C    | D    | AC   | AD   | AF   | AE   | AX   | DC   |  | CC           | KK       | NA    |
| 0.625          | 0.75 | 0.38 | 0.50 | 1.13 | 0.63 | 0.38 | 0.25 | 1.13 | -    |  | 1/2-10       | 7/16-20  | 0.585 |
| 1.000          | 1.13 | 0.50 | 0.88 | 1.50 | 0.94 | 0.69 | 0.38 | 1.69 | -    |  | 7/8-14       | 3/4-16   | 0.968 |
| 1.375          | 1.63 | 0.63 | 1.13 | 1.75 | 1.06 | 0.88 | 0.38 | 2.44 | -    |  | 1 1/4-12     | 1-14     | 1.343 |
| 1.750          | 2.00 | 0.75 | 1.50 | 2.00 | 1.31 | 1.13 | 0.50 | 3.00 | -    |  | 1 1/2-12     | 1 1/4-12 | 1.718 |
| 2.000          | 2.25 | 0.88 | 1.75 | 2.63 | 1.69 | 1.38 | 0.63 | 3.38 | -    |  | 1 3/4-12     | 1 1/2-12 | 1.953 |
| 2.500          | 3.00 | 1.00 | 2.13 | 3.25 | 1.94 | 1.75 | 0.75 | 4.50 | -    |  | 2 1/4-12     | 1 7/8-12 | 2.437 |
| 3.000          | 3.50 | 1.00 | 2.63 | 3.63 | 2.44 | 2.25 | 0.88 | 5.25 | -    |  | 2 3/4-12     | 2 1/4-12 | 2.937 |
| 3.500          | 3.50 | 1.00 | 3.00 | 4.38 | 2.69 | 2.50 | 1.00 | 5.25 | -    |  | 3 1/4-12     | 2 1/2-12 | 3.437 |
| 4.000          | 4.00 | 1.00 | -    | 4.50 | 2.69 | 3.00 | 1.00 | 6.00 | 0.50 |  | 3 3/4-12     | 3-12     | 3.906 |
| 4.500          | 4.50 | 1.00 | -    | 5.25 | 3.19 | 3.50 | 1.50 | 6.75 | 0.50 |  | 4 1/2-12     | 3 1/4-12 | 4.406 |
| 5.000          | 5.00 | 1.00 | -    | 5.38 | 3.19 | 3.88 | 1.50 | 7.50 | 0.50 |  | 4 3/4-12     | 3 1/2-12 | 4.906 |
| 5.500          | 5.50 | 1.00 | -    | 6.25 | 3.94 | 4.38 | 1.88 | 8.25 | 0.50 |  | 5 1/4-12     | 4-12     | 5.406 |

\* Dimensions are in Inches

# Rod End Types

(Continued...)

## Metric Rod Ends

|               |                                                                                    |                                  |                                                                                     |
|---------------|------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------|
| Code<br><br>1 |   | For rod sizes 3 1/2" thru 5 1/2" |   |
| Code<br><br>7 |   | L                                |   |
| Code<br><br>0 |  | N                                |  |

| Rod Dia<br>MM (in) |     |      |    |       |     |       | Metric Thread |               |              |        |
|--------------------|-----|------|----|-------|-----|-------|---------------|---------------|--------------|--------|
|                    | A   | C    | D  | AF    | AX  | DC    | CC (ISO 4395) | KF (ISO 4395) | KK (ISO 261) | NA     |
| 0.625              | 16  | 9,5  | 13 | 19,0  | 24  | —     | M12 x 1,25    | M10 x 1,25    | M10 x 1,5    | 14.86  |
| 1                  | 28  | 12,7 | 22 | 28,6  | 40  | —     | *             | M20 x 1,5     | M20 x 1,5    | 24.59  |
| 1.375              | 36  | 15,9 | 30 | 41,3  | 54  | —     | M27 x 2       | M27 x 2       | M26 x 1,5    | 34.11  |
| 1.75               | 45  | 19,0 | 36 | 50,8  | 66  | —     | *             | M33 x 2       | M33 x 2      | 43.64  |
| 2                  | 56  | 22,2 | 41 | 57,1  | 84  | —     | M42 x 2       | M42 x 2       | M39 x 2      | 49.61  |
| 2.5                | 63  | 25,4 | 55 | 76,2  | 96  | —     | *             | M48 x 2       | M48 x 2      | 61.90  |
| 3                  | 85  | 25,4 | 65 | 88,9  | 128 | —     | M64 x 3       | M58 x 2       | M58 x 2      | 74.60  |
| 3.5                | 85  | 25,4 | —  | 88,9  | 128 | 9,52  | M64 x 3       | M64 x 3       | M64 x 2      | 87.30  |
| 4                  | 95  | 25,4 | —  | 101,6 | 140 | 11,11 | M80 x 3       | M80 x 3       | M76 x 2      | 99.21  |
| 4.5                | 106 | 25,4 | —  | 114,3 | 158 | 11,11 | M90 x 3       | M90 x 3       | M80 x 2      | 111.91 |
| 5                  | 112 | 25,4 | —  | 139,7 | 168 | 12,70 | M100 x 3      | M100 x 3      | M90 x 2      | 124.61 |
| 5.5                | 112 | 25,4 | —  | 139,7 | 168 | 12,70 | M100 x 3      | M100 x 3      | M100 x 2     | 137.31 |

\* Intermediate male metric thread not available for 1, 1 3/4, and 2 1/2 inch rod sizes. Use codes 7 or L.

Note: Dimensions in millimeters.

# Port Type and Size

## Available Ports

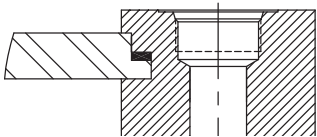
Series NZ cylinders are available with SAE straight thread O-ring ports and the alternate ports listed below. The table

below lists the port types and sizes available for each bore diameter. The table on the next page lists the maximum piston velocities obtainable

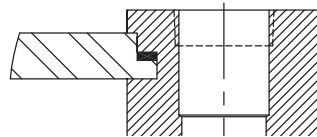
with each bore diameter and port type combination. Some mounting styles have port location restrictions. Check the port location table on

page 68 for your particular mounting style. Where a port or port boss interferes with cylinder mounting, mounting should take precedence.

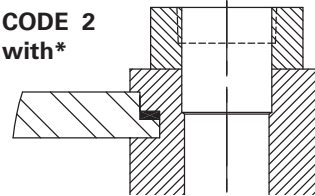
### CODE 3, 4, 5,



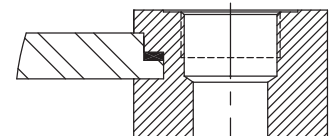
### CODE D,1,2



### CODE 2 with\*



### CODE H,7,8, G, 9, 0, K, A, B



| Port Code |      |                          |              |                |               |                     |       |                     |               |                     |          |                              |               |         |  |
|-----------|------|--------------------------|--------------|----------------|---------------|---------------------|-------|---------------------|---------------|---------------------|----------|------------------------------|---------------|---------|--|
|           |      | 3                        | 4            | 5              | D             | 1                   | 2     | H                   | 7             | 8                   | C        | 6                            |               |         |  |
|           |      | SAE J1926 /<br>UN O-ring |              | NPTF ‡<br>Pipe |               | BSPP ‡<br>ISO 228-1 |       | BSPP ‡<br>ISO 228-1 |               | BSPP ‡<br>ISO 228-1 |          | SAE 518<br>Code 61<br>Flange |               |         |  |
| Bore      | Rod  | Std                      | Over<br>size | NFPA<br>Std    | Under<br>Size | Std                 | Head  | Cap                 | Under<br>Size | Std                 | Head     | Cap                          | Under<br>Size | Std     |  |
| 1.50      | 0.63 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4   | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | NA      |  |
|           | 1.00 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4*  | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | NA      |  |
| 2.00      | 1.00 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4   | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | NA      |  |
|           | 1.38 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4*  | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | NA      |  |
| 2.50      | 1.00 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4   | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | 0.50 ** |  |
|           | 1.38 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4   | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | 0.50 ** |  |
|           | 1.75 | # 6                      | # 10         | # 8            | 3/8           | 1/2                 | 3/4*  | 3/4                 | G 3/8         | G 1/2               | G 3/4*   | G 3/4*                       | NA            | NA      |  |
| 3.25      | 1.38 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
|           | 1.75 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
|           | 2.00 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
| 4.00      | 1.75 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
|           | 2.00 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
|           | 2.50 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75 ** |  |
| 5.00      | 2.00 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75    |  |
|           | 2.50 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75    |  |
|           | 3.00 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75    |  |
|           | 3.50 | # 10                     | # 14         | # 12           | 1/2           | 3/4                 | 1     | 1                   | G 1/2         | G 3/4               | G 1      | G 1                          | .50           | 0.75    |  |
| 6.00      | 2.50 | # 12                     | # 20         | # 16           | 3/4           | 1                   | 1 1/4 | 1 1/4               | G 3/4         | G 1                 | G 1 1/4  | G 1 1/4                      | .75           | 1.00    |  |
|           | 3.00 | # 12                     | # 20         | # 16           | 3/4           | 1                   | 1 1/4 | 1 1/4               | G 3/4         | G 1                 | G 1 1/4  | G 1 1/4                      | .75           | 1.00    |  |
|           | 3.50 | # 12                     | # 20         | # 16           | 3/4           | 1                   | 1 1/4 | 1 1/4               | G 3/4         | G 1                 | G 1 1/4* | G 1 1/4                      | .75           | 1.00    |  |
|           | 4.00 | # 12                     | # 20         | # 16           | 3/4           | 1                   | 1 1/4 | 1 1/4               | G 3/4         | G 1                 | G 1 1/4* | G 1 1/4                      | .75           | 1.00    |  |
| 7.00      | 3.00 | # 16                     | # 24         | # 20           | 1             | 1 1/4               | 1 1/2 | 1 1/2               | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.00          | 1.25    |  |
|           | 3.50 | # 16                     | # 24         | # 20           | 1             | 1 1/4               | 1 1/2 | 1 1/2               | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.00          | 1.25    |  |
|           | 4.00 | # 16                     | # 24         | # 20           | 1             | 1 1/4               | 1 1/2 | 1 1/2               | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.00          | 1.25    |  |
|           | 4.50 | # 16                     | # 24         | # 20           | 1             | 1 1/4               | 1 1/2 | 1 1/2               | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.00          | 1.25    |  |
|           | 5.00 | # 16                     | # 24         | # 20           | 1             | 1 1/4               | 1 1/2 | 1 1/2               | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.00          | 1.25    |  |
| 8.00      | 3.50 | # 16                     | # 20         | # 24           | 1 1/4         | 1 1/2               | 2     | 2                   | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.25          | 1.50    |  |
|           | 4.00 | # 16                     | # 20         | # 24           | 1 1/4         | 1 1/2               | 2     | 2                   | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.25          | 1.50    |  |
|           | 4.50 | # 16                     | # 20         | # 24           | 1 1/4         | 1 1/2               | 2     | 2                   | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.25          | 1.50    |  |
|           | 5.00 | # 16                     | # 20         | # 24           | 1 1/4         | 1 1/2               | 2     | 2                   | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.25          | 1.50    |  |
|           | 5.50 | # 16                     | # 20         | # 24           | 1 1/4         | 1 1/2               | 2     | 2                   | G 1           | G 1 1/4             | G 1 1/2  | G 1 1/2                      | 1.25          | 1.50    |  |

\* With Port Boss

‡ NPTF and BSPP ports are not recommended for maximum reliability on new application

Following notes applies to 01,04 mounts

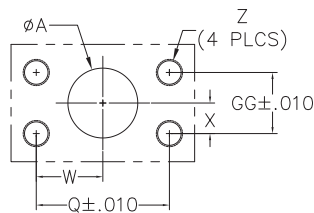
\* Port Boss required for port position 1 and 3, These ports are not feasible for port position 2 & 4

\*\* Port is not feasible for port position 2 and 4

Port at position 3 not available on 1.50", 2.00", 2.50", 3.25" and 4.00" for 03 mount

# Port Type and Size (Continued...)

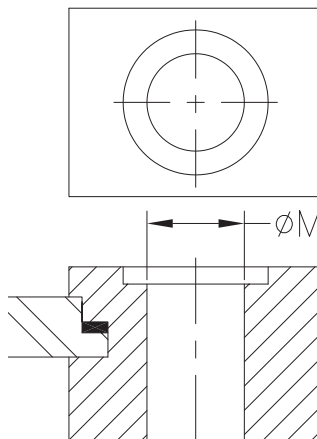
## CODE C,6



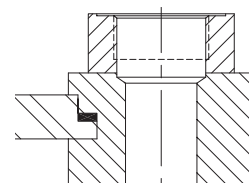
Dimensions in inches

| Flange Size | A    | Q     | W    | X    | GG    | Z          |
|-------------|------|-------|------|------|-------|------------|
| 3/4 (-12)   | 0.75 | 1.875 | 0.94 | 0.44 | 0.875 | 3/8 (-16)  |
| 1 (-16)     | 1.00 | 2.062 | 1.03 | 0.52 | 1.031 | 3/8 (-16)  |
| 1 1/4 (-20) | 1.25 | 2.312 | 1.16 | 0.59 | 1.118 | 7/16 (-14) |
| 1 1/2 (-24) | 1.50 | 2.750 | 1.38 | 0.70 | 1.406 | 1/2 (-13)  |

## CODE M



## CODE H,7,8, G, 9, 0, K, A, B with\*



|      |      | Port Code              |           |          |          |            |           |          |          |          |
|------|------|------------------------|-----------|----------|----------|------------|-----------|----------|----------|----------|
|      |      | G                      | 9         | 0        |          | K          | A         | B        |          | M        |
|      |      | DIN 3852 Form X Metric |           |          |          | ISO 6149-1 |           |          |          | Manifold |
| Bore | Rod  | Under Size             | Std       | Oversize |          | Under Size | Std       | Oversize |          | Std Φ M  |
|      |      |                        |           | Head     | Cap      |            |           | Head     | Cap      |          |
| 1.50 | 0.63 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
|      | 1.00 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
| 2.00 | 1.00 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
|      | 1.38 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
| 2.50 | 1.00 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
|      | 1.38 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
|      | 1.75 | M20 x 1.5              | M22 x 1.5 | M27 x 2* | M27 x 2* | M20 x 1.5  | M22 x 1.5 | M27 x 2* | M27 x 2* | 9/16     |
| 3.25 | 1.38 | M22 x 1.5              | M27 x 2   | M33 x 2* | M33 x 2* | M22 x 1.5  | M27 x 2   | M33 x 2* | M33 x 2* | 3/4      |
|      | 1.75 | M22 x 1.5              | M27 x 2   | M33 x 2* | M33 x 2* | M22 x 1.5  | M27 x 2   | M33 x 2* | M33 x 2* | 3/4      |
|      | 2.00 | M22 x 1.5              | M27 x 2   | M33 x 2* | M33 x 2* | M22 x 1.5  | M27 x 2   | M33 x 2* | M33 x 2* | 3/4      |
| 4.00 | 1.75 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
|      | 2.00 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
|      | 2.50 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
| 5.00 | 2.00 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
|      | 2.50 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
|      | 3.00 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
|      | 3.50 | M22 x 1.5              | M27 x 2   | M33 x 2  | M33 x 2  | M22 x 1.5  | M27 x 2   | M33 x 2  | M33 x 2  | 3/4      |
| 6.00 | 2.50 | M27 x 1.5              | M33 x 2   | M42 x 2  | M42 x 2  | M27 x 1.5  | M33 x 2   | M42 x 2  | M42 x 2  | 1        |
|      | 3.00 | M27 x 1.5              | M33 x 2   | M42 x 2  | M42 x 2  | M27 x 1.5  | M33 x 2   | M42 x 2  | M42 x 2  | 1        |
|      | 3.50 | M27 x 1.5              | M33 x 2   | M42 x 2  | M42 x 2  | M27 x 1.5  | M33 x 2   | M42 x 2  | M42 x 2  | 1        |
|      | 4.00 | M27 x 1.5              | M33 x 2   | M42 x 2* | M42 x 2  | M27 x 1.5  | M33 x 2   | M42 x 2* | M42 x 2  | 1        |
| 7.00 | 3.00 | M33 x 2                | M42 x 2   | M48 x 2  | M48 x 2  | M33 x 2    | M42 x 2   | M48 x 2  | M48 x 2  | 1 3/8    |
|      | 3.50 | M33 x 2                | M42 x 2   | M48 x 2  | M48 x 2  | M33 x 2    | M42 x 2   | M48 x 2  | M48 x 2  | 1 3/8    |
|      | 4.00 | M33 x 2                | M42 x 2   | M48 x 2  | M48 x 2  | M33 x 2    | M42 x 2   | M48 x 2  | M48 x 2  | 1 3/8    |
|      | 4.50 | M33 x 2                | M42 x 2   | M48 x 2  | M48 x 2  | M33 x 2    | M42 x 2   | M48 x 2  | M48 x 2  | 1 3/8    |
|      | 5.00 | M33 x 2                | M42 x 2   | M48 x 2  | M48 x 2  | M33 x 2    | M42 x 2   | M48 x 2  | M48 x 2  | 1 3/8    |
| 8.00 | 3.50 | M42 x 2                | M48 x 2   | NA       | NA       | M42 x 2    | M48 x 2   | NA       | NA       | 1 5/8    |
|      | 4.00 | M42 x 2                | M48 x 2   | NA       | NA       | M42 x 2    | M48 x 2   | NA       | NA       | 1 5/8    |
|      | 4.50 | M42 x 2                | M48 x 2   | NA       | NA       | M42 x 2    | M48 x 2   | NA       | NA       | 1 5/8    |
|      | 5.00 | M42 x 2                | M48 x 2   | NA       | NA       | M42 x 2    | M48 x 2   | NA       | NA       | 1 5/8    |
|      | 5.50 | M42 x 2                | M48 x 2   | NA       | NA       | M42 x 2    | M48 x 2   | NA       | NA       | 1 5/8    |

# Port Selections

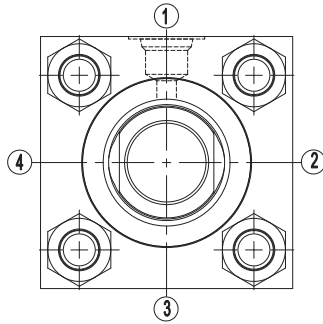
Use this table to determine which bore diameter, rod diameter and port combination will provide the piston velocity required for your application.

| Bore<br>Ø<br>in | Rod<br>Ø<br>in | Fluid<br>Required per<br>Inch of stroke<br><br>(gal) (in³) |        | Port Codes<br>1,5,6,9 & A |                                | Port Codes<br>2,4,0 & B |                                | Port Code<br>3 |                                | Port Code<br>7 |                                | Port Code<br>8 |                                |
|-----------------|----------------|------------------------------------------------------------|--------|---------------------------|--------------------------------|-------------------------|--------------------------------|----------------|--------------------------------|----------------|--------------------------------|----------------|--------------------------------|
|                 |                |                                                            |        | Flow<br>(gpm)             | Piston<br>Velocity<br>(In/sec) | Flow<br>(gpm)           | Piston<br>Velocity<br>(In/sec) | Flow<br>(gpm)  | Piston<br>Velocity<br>(In/sec) | Flow<br>(gpm)  | Piston<br>Velocity<br>(In/sec) | Flow<br>(gpm)  | Piston<br>Velocity<br>(In/sec) |
| 1.50            | Cap            | 0.008                                                      | 1.767  | 6.0                       | 13.1                           | 9.2                     | 20.0                           | 6.0            | 13.1                           | 3.4            | 7.4                            | 9.2            | 20.0                           |
|                 | 0.63           | 0.006                                                      | 1.460  | 6.0                       | 15.8                           | 9.2                     | 24.3                           | 6.0            | 15.8                           | 3.4            | 9.0                            | 9.2            | 24.3                           |
|                 | 1.00           | 0.004                                                      | 0.982  | 6.0                       | 23.5                           | 9.2                     | 36.1                           | 6.0            | 23.5                           | 3.4            | 13.3                           | 9.2            | 36.1                           |
| 2.00            | Cap            | 0.014                                                      | 3.142  | 6.0                       | 7.4                            | 9.2                     | 11.3                           | 6.0            | 7.4                            | 3.4            | 4.2                            | 9.2            | 11.3                           |
|                 | 1.00           | 0.010                                                      | 2.356  | 6.0                       | 9.8                            | 9.2                     | 15.0                           | 6.0            | 9.8                            | 3.4            | 5.6                            | 9.2            | 15.0                           |
|                 | 1.38           | 0.007                                                      | 1.657  | 6.0                       | 13.9                           | 9.2                     | 21.4                           | 6.0            | 13.9                           | 3.4            | 7.9                            | 9.2            | 21.4                           |
| 2.50            | Cap            | 0.021                                                      | 4.909  | 6.0                       | 4.7                            | 9.2                     | 7.2                            | 6.0            | 4.7                            | 3.4            | 2.7                            | 9.2            | 7.2                            |
|                 | 1.00           | 0.018                                                      | 4.123  | 6.0                       | 5.6                            | 9.2                     | 8.6                            | 6.0            | 5.6                            | 3.4            | 3.2                            | 9.2            | 8.6                            |
|                 | 1.38           | 0.015                                                      | 3.424  | 6.0                       | 6.7                            | 9.2                     | 10.3                           | 6.0            | 6.7                            | 3.4            | 3.8                            | 9.2            | 10.3                           |
|                 | 1.75           | 0.011                                                      | 2.503  | 6.0                       | 9.2                            | 9.2                     | 14.1                           | 6.0            | 9.2                            | 3.4            | 5.2                            | 9.2            | 14.1                           |
| 3.25            | Cap            | 0.036                                                      | 8.296  | 14.5                      | 6.7                            | 20.2                    | 9.4                            | 14.5           | 6.7                            | 9.2            | 4.3                            | 27.9           | 12.9                           |
|                 | 1.38           | 0.029                                                      | 6.811  | 14.5                      | 8.2                            | 20.2                    | 11.4                           | 14.5           | 8.2                            | 9.2            | 5.2                            | 27.9           | 15.8                           |
|                 | 1.75           | 0.026                                                      | 5.891  | 14.5                      | 9.5                            | 20.2                    | 13.2                           | 14.5           | 9.5                            | 9.2            | 6.0                            | 27.9           | 18.2                           |
|                 | 2.00           | 0.022                                                      | 5.154  | 14.5                      | 10.8                           | 20.2                    | 15.1                           | 14.5           | 10.8                           | 9.2            | 6.9                            | 27.9           | 20.8                           |
| 4.00            | Cap            | 0.054                                                      | 12.566 | 14.5                      | 4.4                            | 20.2                    | 6.2                            | 14.5           | 4.4                            | 9.2            | 2.8                            | 27.9           | 8.5                            |
|                 | 1.75           | 0.044                                                      | 10.161 | 14.5                      | 5.5                            | 20.2                    | 7.7                            | 14.5           | 5.5                            | 9.2            | 3.5                            | 27.9           | 10.6                           |
|                 | 2.00           | 0.041                                                      | 9.425  | 14.5                      | 5.9                            | 20.2                    | 8.3                            | 14.5           | 5.9                            | 9.2            | 3.8                            | 27.9           | 11.4                           |
|                 | 2.50           | 0.033                                                      | 7.658  | 14.5                      | 7.3                            | 20.2                    | 10.2                           | 14.5           | 7.3                            | 9.2            | 4.6                            | 27.9           | 14.0                           |
| 5.00            | Cap            | 0.085                                                      | 19.635 | 14.5                      | 2.8                            | 20.2                    | 4.0                            | 14.5           | 2.8                            | 9.2            | 1.8                            | 27.9           | 5.5                            |
|                 | 2.00           | 0.071                                                      | 16.493 | 14.5                      | 3.4                            | 20.2                    | 4.7                            | 14.5           | 3.4                            | 9.2            | 2.1                            | 27.9           | 6.5                            |
|                 | 2.50           | 0.064                                                      | 14.726 | 14.5                      | 3.8                            | 20.2                    | 5.3                            | 14.5           | 3.8                            | 9.2            | 2.4                            | 27.9           | 7.3                            |
|                 | 3.00           | 0.054                                                      | 12.566 | 14.5                      | 4.4                            | 20.2                    | 6.2                            | 14.5           | 4.4                            | 9.2            | 2.8                            | 27.9           | 8.5                            |
|                 | 3.50           | 0.043                                                      | 10.014 | 14.5                      | 5.6                            | 20.2                    | 7.8                            | 14.5           | 5.6                            | 9.2            | 3.5                            | 27.9           | 10.7                           |
| 6.00            | Cap            | 0.122                                                      | 28.274 | 27.9                      | 3.8                            | 45.5                    | 6.2                            | 27.9           | 3.8                            | 14.5           | 2.0                            | 45.5           | 6.2                            |
|                 | 2.50           | 0.101                                                      | 23.366 | 27.9                      | 4.6                            | 45.5                    | 7.5                            | 27.9           | 4.6                            | 14.5           | 2.4                            | 45.5           | 7.5                            |
|                 | 3.00           | 0.092                                                      | 21.206 | 27.9                      | 5.1                            | 45.5                    | 8.3                            | 27.9           | 5.1                            | 14.5           | 2.6                            | 45.5           | 8.3                            |
|                 | 3.50           | 0.081                                                      | 18.653 | 27.9                      | 5.8                            | 45.5                    | 9.4                            | 27.9           | 5.8                            | 14.5           | 3.0                            | 45.5           | 9.4                            |
|                 | 4.00           | 0.068                                                      | 15.708 | 27.9                      | 6.8                            | 45.5                    | 11.2                           | 27.9           | 6.8                            | 14.5           | 3.6                            | 45.5           | 11.2                           |
| 7.00            | Cap            | 0.167                                                      | 38.485 | 45.5                      | 4.6                            | 67.4                    | 6.7                            | 45.5           | 4.6                            | 27.9           | 2.8                            | 67.4           | 6.7                            |
|                 | 3.00           | 0.136                                                      | 31.416 | 45.5                      | 5.6                            | 67.4                    | 8.3                            | 45.5           | 5.6                            | 27.9           | 3.4                            | 67.4           | 8.3                            |
|                 | 3.50           | 0.125                                                      | 28.863 | 45.5                      | 6.1                            | 67.4                    | 9.0                            | 45.5           | 6.1                            | 27.9           | 3.7                            | 67.4           | 9.0                            |
|                 | 4.00           | 0.112                                                      | 25.918 | 45.5                      | 6.8                            | 67.4                    | 10.0                           | 45.5           | 6.8                            | 27.9           | 4.1                            | 67.4           | 10.0                           |
|                 | 4.50           | 0.098                                                      | 22.580 | 45.5                      | 7.8                            | 67.4                    | 11.5                           | 45.5           | 7.8                            | 27.9           | 4.8                            | 67.4           | 11.5                           |
|                 | 5.00           | 0.082                                                      | 18.850 | 45.5                      | 9.3                            | 67.4                    | 13.8                           | 45.5           | 9.3                            | 27.9           | 5.7                            | 67.4           | 13.8                           |
| 8.00            | Cap            | 0.218                                                      | 50.266 | 67.4                      | 5.2                            | 45.5                    | 3.5                            | 45.5           | 3.5                            | 27.9           | 2.1                            | 67.4           | 5.2                            |
|                 | 3.50           | 0.176                                                      | 40.644 | 67.4                      | 6.4                            | 45.5                    | 4.3                            | 45.5           | 4.3                            | 27.9           | 2.6                            | 67.4           | 6.4                            |
|                 | 4.00           | 0.163                                                      | 37.699 | 67.4                      | 6.9                            | 45.5                    | 4.6                            | 45.5           | 4.6                            | 27.9           | 2.8                            | 67.4           | 6.9                            |
|                 | 4.50           | 0.149                                                      | 34.361 | 67.4                      | 7.6                            | 45.5                    | 5.1                            | 45.5           | 5.1                            | 27.9           | 3.1                            | 67.4           | 7.6                            |
|                 | 5.00           | 0.133                                                      | 30.631 | 67.4                      | 8.5                            | 45.5                    | 5.7                            | 45.5           | 5.7                            | 27.9           | 3.5                            | 67.4           | 8.5                            |
|                 | 5.50           | 0.115                                                      | 26.507 | 67.4                      | 9.8                            | 45.5                    | 6.6                            | 45.5           | 6.6                            | 27.9           | 4.1                            | 67.4           | 9.8                            |

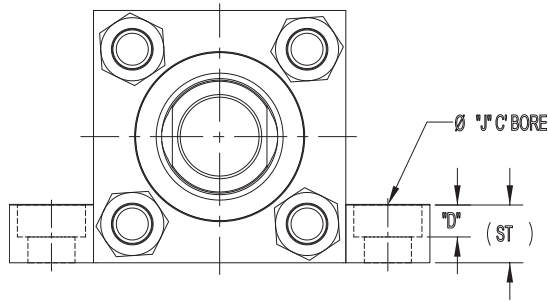
Note : Under size port velocities are not shown

# Port Locations

Port locations are identified by viewing the cylinder from the head end (or from the mounting end of double rod cylinders). The location numbers are shown here.



Certain Port locations cannot be specified with some mounting styles. The table below indicates which of the head and cap port locations are available for each Series NZ mounting style.



| Bore | J     | D     |
|------|-------|-------|
| 1.50 | 0.625 | 0.22  |
| 2.00 | 0.812 | 0.38  |
| 2.50 | 1.188 | 0.7   |
| 3.25 | 1.188 | 0.44  |
| 4.00 | 1.562 | 0.66  |
| 5.00 | 1.562 | 0.062 |
| 6.00 | 2.00  | -     |
| 7.00 | 2.312 | 0.31  |
| 8.00 | 2.312 | -     |

| Mounting Style code | Description                            | Head location |   |   |   | Cap location |   |   |   |   |
|---------------------|----------------------------------------|---------------|---|---|---|--------------|---|---|---|---|
|                     |                                        | 1             | 2 | 3 | 4 | 1            | 2 | 3 | 4 | 5 |
| 01                  | Side Lug                               | A             | W | A | W | A            | W | A | W | A |
| 02                  | Side Tapped                            | A             | A | N | A | A            | A | N | A | A |
| 03                  | End Lug Mount                          | A             | A | N | A | A            | A | N | A | A |
| 04                  | Keyed Side Lug                         | A             | W | A | W | A            | W | A | W | A |
| 05                  | Keyed Tapped                           | A             | A | N | A | A            | A | N | A | A |
| 07                  | Head Rectangular Flange                | A             | W | A | W | A            | A | A | A | A |
| 08                  | Head Square Flange                     | W             | W | W | W | A            | A | A | A | A |
| 09                  | Head Rectangular                       | A             | A | A | A | A            | A | A | A | A |
| 10                  | Clevis                                 | A             | A | A | A | A            | A | A | A | N |
| 11                  | Spherical Bushing                      | A             | A | A | A | A            | A | A | A | N |
| 12                  | Cap Rectangular Flange                 | A             | A | A | A | A            | W | A | W | N |
| 13                  | Cap Square Flange                      | A             | A | A | A | W            | W | W | W | N |
| 14                  | Cap Rectangular                        | A             | A | A | A | A            | A | A | A | N |
| 15                  | Intermediate Trunnion                  | A             | A | A | A | A            | A | A | A | A |
| 16                  | Cap Trunnion                           | A             | A | A | A | A            | N | A | N | A |
| 17                  | Head Trunnion                          | A             | N | A | N | A            | A | A | A | A |
| 19                  | Centerline Lug                         | A             | N | A | N | A            | N | A | N | A |
| 21                  | Cap End Extended Tie Rod               | A             | A | A | A | A            | A | A | A | A |
| 22                  | Head End Extended Tie Rod              | A             | A | A | A | A            | A | A | A | A |
| 23                  | Both Ends Extended Tie Rod             | A             | A | A | A | A            | A | A | A | A |
| 24                  | No Mount                               | A             | A | A | A | A            | A | A | A | A |
| 25                  | Double Rod, Side Lug                   | A             | A | A | A |              |   |   |   |   |
| 26                  | Double Rod, Tapped                     | A             | A | N | A |              |   |   |   |   |
| 27                  | Double Rod, End Lug                    | A             | A | N | A |              |   |   |   |   |
| 28                  | Double Rod, Keyed Side Lug             | A             | W | A | W |              |   |   |   |   |
| 29                  | Double Rod, Keyed Tapped               | A             | A | N | A |              |   |   |   |   |
| 31                  | Double Rod, Rectangular Flange         | A             | W | A | W |              |   |   |   |   |
| 32                  | Double Rod, Square Flange              | W             | W | W | W |              |   |   |   |   |
| 33                  | Double Rod, Head Rectangular           | A             | A | A | A |              |   |   |   |   |
| 34                  | Double Rod, Intermediate Trunnion      | A             | A | A | A |              |   |   |   |   |
| 35                  | Double Rod, Head Trunnion              | A             | N | A | N |              |   |   |   |   |
| 37                  | Double Rod, Centerline Lug             | A             | N | A | N |              |   |   |   |   |
| 39                  | Double Rod, Extended Tie Rod           | A             | A | A | A |              |   |   |   |   |
| 40                  | Double Rod, Both Ends Extended Tie Rod | A             | A | A | A |              |   |   |   |   |
| 41                  | Double Rod, No Mount                   | A             | A | A | A |              |   |   |   |   |
| 47                  | Cap Fixed Eye                          | A             | A | A | A | A            | A | A | A | N |
| 48                  | Cap Detachable Eye                     | A             | A | A | A | A            | A | A | A | N |
| 50                  | Cap Detachable Clevis                  | A             | A | A | A | A            | A | A | A | N |

A - Available

N - Not available

W - Port is available without port Boss only

Refer Page 65 for port Boss requirements, refer Page 71 for switch availability

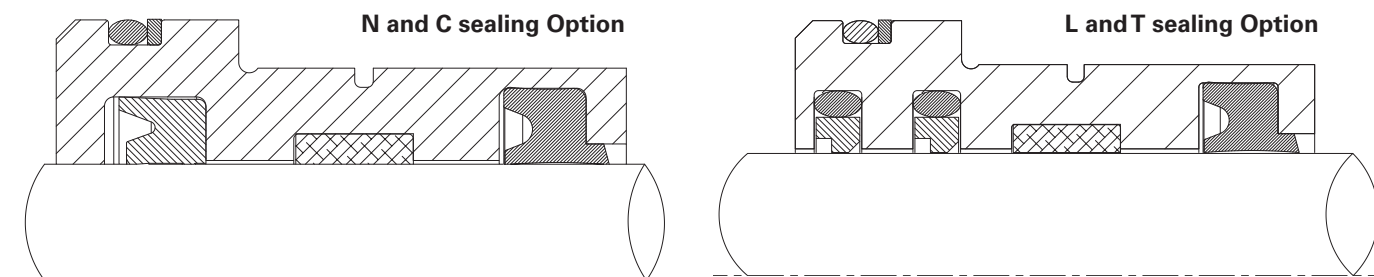
# Sealing system

Four different sealing systems are available in Series NZ cylinders.

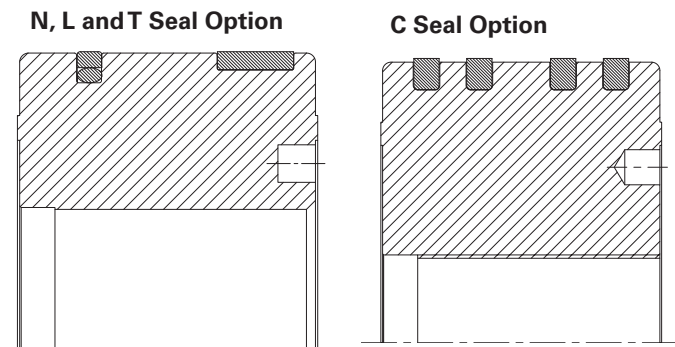
Determine the correct seal code for your application, then enter it as item 8 in the model code.

| Code | Fluid                                    | Temperature (°F) | Max. Speed (ft/s) | Application                |
|------|------------------------------------------|------------------|-------------------|----------------------------|
| N    | Mineral oil, petroleum base              | -31 to 176       | 2.25              | Normal, typical industrial |
|      | Automotive transmission fluid            |                  |                   |                            |
| L    | Mineral oil                              | -31 to 248       | 15                | Low friction servo         |
|      | Water glycol (HFC)                       | 50 to 158        | 3                 | Fire retardant fluids      |
|      | Oil-in-water emulsions (HFA)             |                  |                   |                            |
|      | Water-in-oil emulsions (HFB)             |                  |                   |                            |
| T    | Mineral oil                              | -13 to 392       | 15                | High temperature           |
|      | Phosphate esters, petroleum oil blends   | 32 to 392        | 15                | Fire retardant fluids      |
|      | Fyrquel 220, 550, 1000                   |                  |                   |                            |
|      | Hought-O-Safe 1340                       |                  |                   |                            |
|      | Pydraul 200, 230C, 280, 312C, 540C, A200 |                  |                   |                            |
| C    | Mineral oil, petroleum base              | -31 to 176       | 2.25              | Normal, typical industrial |
|      | Automotive transmission fluid            |                  |                   |                            |

## Rod Seal Configuration



## Piston Seal Configuration

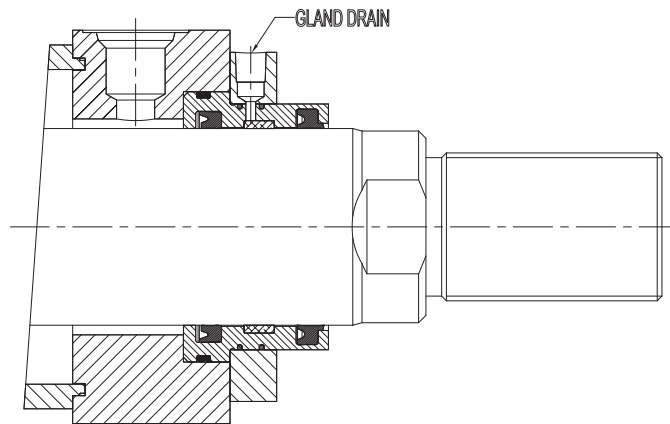


## Gland drains /Air bleeds

### Gland Drain Option

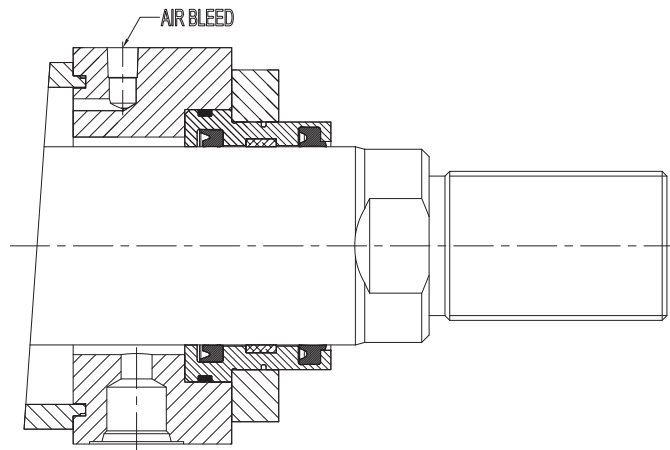
Gland drains are primarily used for long stroke cylinders (over 30 inches) and when extended speed exceeds retract speed.

The gland drain is used to return any accumulated fluid, between the rod seal and wiper, to tank. This is used in servo applications, for ultra-low leakage requirements, or for remote visual monitoring of rod seal leakage for preventive maintenance purposes.



### Air Bleed Option

Usually cylinders will bleed themselves of air when ports are vertical, on top. Bleed ports are often desirable to remove entrapped air, when the ports are on the bottom. High performance and high speed or heavy load applications are a few examples where air bleeds are desirable.



# Technical Data

## Proximity switches

Proximity switches for series NZ cylinder are inductive type switches with sensing probe that "looks" at the cushion collar or button to provide extended or retracted indication. Since the probe is inside the cylinder. Harsh external environments don't affect sensing. The 2-wire circuit will operate on AC or DC and works as reliably as

a programmable controller. Proximity switches will meet UL requirements for 3000-psi (210 bar) hydraulic cylinder.

Switch will allow 304° rotations. Short Circuit protection is standard feature on Proximity proximity switch. SCP protects the switch from shorts in load or line. Upon sensing short condition, the

switch assumes a non-conducting mode. The fault condition must be removed and power turned off in order to reset the switch.

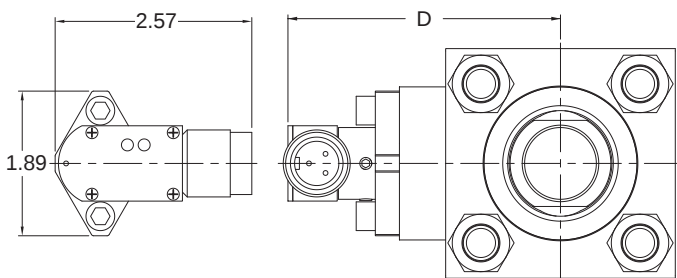
it is in SCP mode by flashing both leads.

Torque ¼-20 mounting screws to 15 ft-lb (20 Nm)

This feature prevents unintended automatic restarts. The switch indicated when

### Series PS 200 2-wire AC / DC Proximity Switch

|                                     |                                                                                        |
|-------------------------------------|----------------------------------------------------------------------------------------|
| Pressure                            | 3000 PSI                                                                               |
| Sensing Range                       | 0.08 in ± 10 %                                                                         |
| Sensing distance from End of stroke | 0.25" - 0.38" stroke to go                                                             |
| Operating temperature range         | -13° to +158° F                                                                        |
| Repeatability                       | 0.001 in                                                                               |
| Switching differential              | ≤ 15%                                                                                  |
| Supply Voltage                      | 20 - 250 V AC / DC                                                                     |
| Voltage drop                        | ≤ 6 V                                                                                  |
| Load Current capacity @ 25° C       | 5-400 mA                                                                               |
| Inrush current                      | ≤ 3A (t ≤ 20ms)                                                                        |
| Indicating LED's (Standard)         | 1 lit: Power on non-conducting<br>2 lit: Target present<br>(both flashing = SCP mode ) |



**Note : NA - Not available**  
**Proximity switch for 1.50" at postion 2 & 4 is not available**  
**For 07, 08 and 12 , 13 mounts**

| BORE | ROD  | "D" Max. | "D" Max.<br>09 mounts<br>Pos. 2 & 4 | "D" Max.<br>14 mounts<br>Pos. 2 & 4 |
|------|------|----------|-------------------------------------|-------------------------------------|
|      |      |          |                                     |                                     |
| 1.50 | 0.63 | 2.99     | 4.03                                | 2.99                                |
|      | 1.00 | 3.12     | 4.16                                | 3.12                                |
|      | CAP  | 2.99     | 3.80                                | 3.80                                |
| 2.00 | 1.00 | 3.37     | 5.00                                | 3.37                                |
|      | 1.38 | 3.30     | 4.34                                | 3.30                                |
|      | CAP  | 3.08     | 3.92                                | 4.73                                |
| 2.50 | 1.00 | 3.35     | 5.00                                | 4.19                                |
|      | 1.38 | 3.53     | 5.15                                | 3.53                                |
|      | 1.75 | 3.49     | 4.53                                | 3.49                                |
|      | CAP  | 3.92     | 3.92                                | 4.73                                |
| 3.25 | 1.38 | 4.40     | 6.12                                | 4.40                                |
|      | 1.75 | 4.59     | 5.40                                | 4.59                                |
|      | 2.00 | 3.82     | 5.47                                | 4.65                                |
|      | CAP  | 4.03     | 4.03                                | 5.75                                |
| 4.00 | 1.75 | 4.59     | 6.30                                | 4.59                                |
|      | 2.00 | 4.78     | 5.59                                | 4.78                                |
|      | 2.50 | 4.07     | 5.72                                | 4.91                                |
|      | CAP  | 4.84     | 4.84                                | 5.74                                |
| 5.00 | 2.00 | 5.59     | 7.28                                | 5.59                                |
|      | 2.50 | 5.03     | 6.74                                | 5.03                                |
|      | 3.00 | 5.28     | 6.99                                | 5.28                                |
|      | 3.50 | 5.40     | 7.12                                | 5.40                                |
|      | CAP  | 5.03     | 5.03                                | 6.72                                |
| 6.00 | 2.50 | 5.84     | 7.53                                | 5.84                                |
|      | 3.00 | 6.09     | 7.78                                | 6.09                                |
|      | 3.50 | 5.38     | 7.91                                | 6.22                                |
|      | 4.00 | 5.66     | 7.37                                | 5.66                                |
|      | CAP  | 6.18     | 6.18                                | 7.41                                |
| 7.00 | 3.00 | 6.09     | 8.22                                | 6.09                                |
|      | 3.50 | 6.34     | 8.47                                | 6.34                                |
|      | 4.00 | 6.47     | 8.15                                | 6.47                                |
|      | 4.50 | 6.03     | 8.53                                | 6.03                                |
|      | 5.00 | 6.19     | 8.68                                | 6.19                                |
|      | CAP  | 6.18     | 6.18                                | NA                                  |
| 8.00 | 3.50 | 7.24     | NA                                  | 7.24                                |
|      | 4.00 | 6.47     | 8.60                                | 6.47                                |
|      | 4.50 | 6.84     | 8.97                                | 6.84                                |
|      | 5.00 | 7.00     | 8.68                                | 7.00                                |
|      | 5.50 | 6.47     | 8.96                                | 6.47                                |
|      | CAP  | 6.97     | 6.97                                | NA                                  |

# Technical Data

(Continued...)

## Stop Tubes

Stop tubes are located between the piston and the rod shoulder on the head end of the cylinder. Bearing loading is reduced by separating the piston and the rod bushing. Bearing wear and tendency to buckle is reduced.

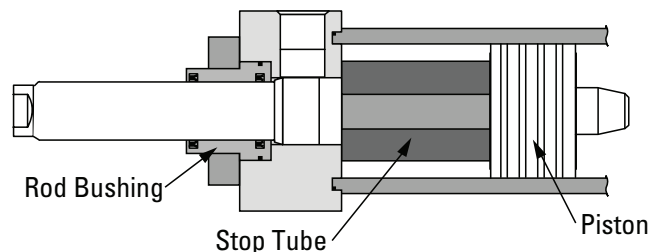
To determine if a stop tube is required and the length of stop tube needed, use the following procedure:

Determine the value of D with the piston rod in the fully extended position. If the value of D is under 40", no stop tube is needed. If D is greater than 40", one inch of stop tube is recommended for each 10", or fraction thereof, beyond 40".

## Special Note

When specifying stroke and stop tube lengths, please

include net working stroke plus stop tube length.



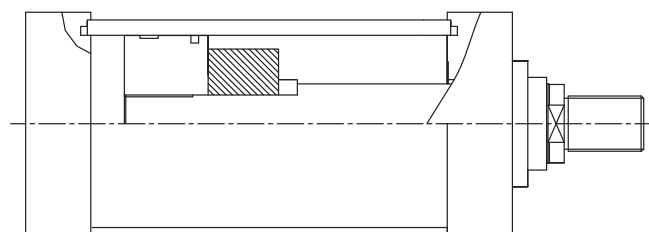
|                                                                    |                                                                 |                                                                        |                                                                        |
|--------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| <p><math>D = 4S + \text{stroke}</math><br/>Unsupported Rod End</p> | <p><math>D = S + \text{stroke}</math><br/>Supported Rod End</p> | <p><math>D = 0.5S + \text{stroke}</math><br/>Firmly Guided Rod End</p> | <p><math>D = 4S + \text{stroke}</math><br/>Unsupported Rod End</p>     |
| <p>Cap Clevis or Trunnion</p>                                      | <p>Intermediate Trunnion</p>                                    | <p>Head Trunnion</p>                                                   | <p><math>D = S + \text{stroke}</math><br/>Supported Rod End</p>        |
|                                                                    |                                                                 |                                                                        | <p><math>D = 0.5S + \text{stroke}</math><br/>Firmly Guided Rod End</p> |

## Stop Tubes

There are two stop tube designs depending on the length required.

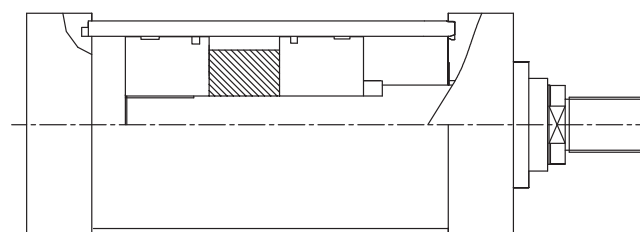
## Design A

The standard stop tube design for lengths under 10".



## Design B

The standard stop tube design for lengths over 10". Note that the piston's effective bearing area is doubled, in addition to gaining the normal increased minimum distance between bearing points.



## Technical Data

(Continued...)

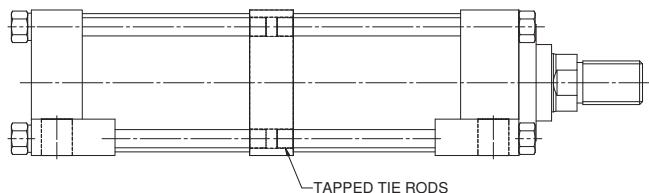
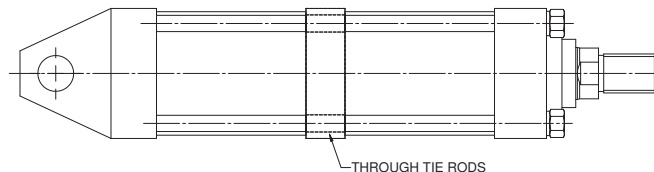
### Tie rod Spacers and Center supports

A tie rod spacer or center support should be applied when the stroke length exceeds 20 times the bore diameter.

#### Tie rod spacer

Tie rod spacers and center supports are used to improve the structural rigidity of long stroke tie rod cylinders. The

spacers have through holes for the tie rods and are held in place on the cylinder barrel with a small tack weld or set screw. The spacer keeps the tie rod in the proper position around the centerline of the cylinder and acts much like a truss in preventing excessive deflection in a long stroke cylinder that is not rigidly mounted (clevis mount, etc.).



#### Tie rod center support

The center support has side mounting lugs similar to side lug mount heads and serves as an additional mounting location. The tie rods are threaded into the center support and it becomes a load-carrying component of the cylinder assembly.

The exact location of the tie rod center support is generally optional, which greatly increases the flexibility in mounting a long stroke cylinder.

# Bore & Rod Diameter Cylinder Size Selection

To choose the proper size of cylinder for your application, first determine the maximum push or pull force required to do the job. Then use the below table to select the cylinder that will provide that force.

Remember that force capabilities derived from charts and formulas may be theoretically correct, but other factors must be considered. Be sure to allow for pressure drop

between pump outlet and cylinder port. Also some of a cylinder force is used up overcoming seal friction and lesser extent the inertia of the piston itself.

| Bore<br>φ<br>in | Rod<br>φ<br>in | Work<br>Area<br>(in <sup>2</sup> ) | Maximum Force (lbf) At working pressure(psi) |              |               |               |               |               |
|-----------------|----------------|------------------------------------|----------------------------------------------|--------------|---------------|---------------|---------------|---------------|
|                 |                |                                    | 500<br>(psi)                                 | 750<br>(psi) | 1000<br>(psi) | 1500<br>(psi) | 2000<br>(psi) | 3000<br>(psi) |
| 1.50            | -              | 1.767                              | 884                                          | 1325         | 1767          | 2651          | 3534          | 5301          |
|                 | 0.625          | 1.460                              | 730                                          | 1095         | 1460          | 2191          | 2921          | 4381          |
|                 | 1              | 0.982                              | 491                                          | 736          | 982           | 1473          | 1964          | 2945          |
| 2.00            | -              | 3.142                              | 1571                                         | 2356         | 3142          | 4712          | 6283          | 9425          |
|                 | 1              | 2.356                              | 1178                                         | 1767         | 2356          | 3534          | 4712          | 7069          |
|                 | 1.375          | 1.657                              | 828                                          | 1243         | 1657          | 2485          | 3313          | 4970          |
| 2.50            | -              | 4.909                              | 2454                                         | 3682         | 4909          | 7363          | 9817          | 14726         |
|                 | 1              | 4.123                              | 2062                                         | 3093         | 4123          | 6185          | 8247          | 12370         |
|                 | 1.375          | 3.424                              | 1712                                         | 2568         | 3424          | 5136          | 6848          | 10272         |
|                 | 1.75           | 2.503                              | 1252                                         | 1878         | 2503          | 3755          | 5007          | 7510          |
| 3.25            | -              | 8.296                              | 4148                                         | 6222         | 8296          | 12444         | 16592         | 24887         |
|                 | 1.375          | 6.811                              | 3405                                         | 5108         | 6811          | 10216         | 13622         | 20433         |
|                 | 1.75           | 5.891                              | 2945                                         | 4418         | 5891          | 8836          | 11781         | 17672         |
|                 | 2              | 5.154                              | 2577                                         | 3866         | 5154          | 7731          | 10308         | 15463         |
| 4.00            | -              | 12.566                             | 6283                                         | 9425         | 12566         | 18850         | 25133         | 37699         |
|                 | 1.75           | 10.161                             | 5081                                         | 7621         | 10161         | 15242         | 20322         | 30483         |
|                 | 2              | 9.425                              | 4712                                         | 7069         | 9425          | 14137         | 18850         | 28274         |
|                 | 2.5            | 7.658                              | 3829                                         | 5743         | 7658          | 11486         | 15315         | 22973         |
| 5.00            | -              | 19.635                             | 9817                                         | 14726        | 19635         | 29452         | 39270         | 58905         |
|                 | 2              | 16.493                             | 8247                                         | 12370        | 16493         | 24740         | 32987         | 49480         |
|                 | 2.5            | 14.726                             | 7363                                         | 11045        | 14726         | 22089         | 29453         | 44179         |
|                 | 3              | 12.566                             | 6283                                         | 9425         | 12566         | 18850         | 25133         | 37699         |
|                 | 3.5            | 10.014                             | 5007                                         | 7510         | 10014         | 15021         | 20028         | 30042         |
| 6.00            | -              | 28.274                             | 14137                                        | 21206        | 28274         | 42412         | 56549         | 84823         |
|                 | 2.5            | 23.366                             | 11683                                        | 17524        | 23366         | 35048         | 46731         | 70097         |
|                 | 3              | 21.206                             | 10603                                        | 15904        | 21206         | 31809         | 42412         | 63617         |
|                 | 3.5            | 18.653                             | 9327                                         | 13990        | 18653         | 27980         | 37307         | 55960         |
|                 | 4              | 15.708                             | 7854                                         | 11781        | 15708         | 23562         | 31416         | 47124         |
| 7.00            | -              | 38.485                             | 19242                                        | 28863        | 38485         | 57727         | 76969         | 115454        |
|                 | 3              | 31.416                             | 15708                                        | 23562        | 31416         | 47124         | 62832         | 94248         |
|                 | 3.5            | 28.863                             | 14432                                        | 21648        | 28863         | 43295         | 57727         | 86590         |
|                 | 4              | 25.918                             | 12959                                        | 19439        | 25918         | 38877         | 51836         | 77755         |
|                 | 4.5            | 22.580                             | 11290                                        | 16935        | 22580         | 33870         | 45161         | 67741         |
|                 | 5              | 18.850                             | 9425                                         | 14137        | 18850         | 28274         | 37699         | 56549         |
| 8.00            | -              | 50.266                             | 25133                                        | 37699        | 50266         | 75398         | 100531        | 150797        |
|                 | 3.5            | 40.644                             | 20322                                        | 30483        | 40644         | 60967         | 81289         | 121933        |
|                 | 4              | 37.699                             | 18850                                        | 28274        | 37699         | 56549         | 75398         | 113098        |
|                 | 4.5            | 34.361                             | 17181                                        | 25771        | 34361         | 51542         | 68723         | 103084        |
|                 | 5              | 30.631                             | 15315                                        | 22973        | 30631         | 45946         | 61261         | 91892         |
|                 | 5.5            | 26.507                             | 13254                                        | 19880        | 26507         | 39761         | 53015         | 79522         |

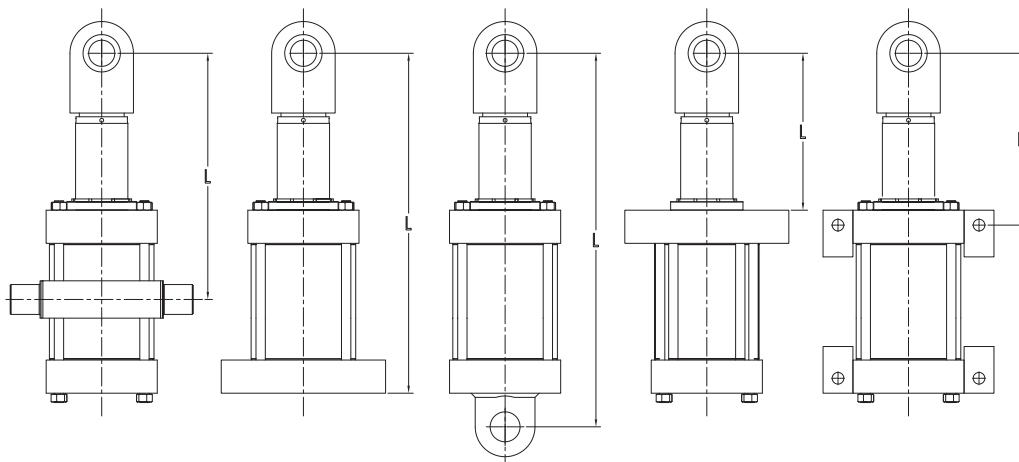
# Maximum allowable Push stroke (Recommended "L")

In Push application, a cylinder acts as loaded column.

To use the side table first go to section for your mounting style. Then locate the column which is closest to, but not below, your application's operating pressure. The intersection of operating pressure and Bore /rod size represents the allowable length (L) in full extended condition.

The maximum allowable length "L" is based on column loading analysis only and does not consider side loading, stop tube requirements or other cylinder stroke limitations.

For pressure above 3000 PSI Consult your local Eaton representative.



| Maximum Length L (in) at Working Pressure (psi) { Length L in full extend condition} |                |                                                                |      |      |      |     |     |     |      |                                        |      |      |     |     |     |  |
|--------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------|------|------|------|-----|-----|-----|------|----------------------------------------|------|------|-----|-----|-----|--|
| Bore<br>φ<br>in                                                                      | Rod<br>φ<br>in | Rigid Mount (01,02,04,05,07,08,09,12,<br>13,14,19,21,22,23,24) |      |      |      |     |     |     |      | Swivel Mount (10,11,15,16,17,47,48,50) |      |      |     |     |     |  |
|                                                                                      |                | 3000                                                           | 2000 | 1500 | 1000 | 750 | 500 | 250 | 3000 | 2000                                   | 1500 | 1000 | 750 | 500 | 250 |  |
|                                                                                      |                | psi                                                            | psi  | psi  | psi  | psi | psi | psi | psi  | psi                                    | psi  | psi  | psi | psi | psi |  |
| 1.50                                                                                 | 0.63           | 14                                                             | 19   | 22   | 27   | 31  | 38  | 54  | 10   | 13                                     | 15   | 19   | 22  | 27  | 38  |  |
|                                                                                      | 1.00           | 40                                                             | 48   | 56   | 69   | 79  | 97  | 137 | 28   | 34                                     | 40   | 48   | 56  | 69  | 97  |  |
| 2.00                                                                                 | 1.00           | 30                                                             | 36   | 42   | 51   | 59  | 73  | 103 | 21   | 26                                     | 30   | 36   | 42  | 51  | 73  |  |
|                                                                                      | 1.38           | 56                                                             | 69   | 79   | 97   | 112 | 137 | 194 | 40   | 49                                     | 56   | 69   | 79  | 97  | 137 |  |
| 2.50                                                                                 | 1.00           | 20                                                             | 19   | 34   | 41   | 47  | 58  | 82  | 14   | 13                                     | 24   | 29   | 34  | 41  | 58  |  |
|                                                                                      | 1.38           | 45                                                             | 55   | 63   | 78   | 90  | 110 | 156 | 32   | 39                                     | 45   | 55   | 63  | 78  | 110 |  |
|                                                                                      | 1.75           | 73                                                             | 89   | 103  | 126  | 145 | 178 | 252 | 51   | 63                                     | 73   | 89   | 103 | 126 | 178 |  |
| 3.25                                                                                 | 1.38           | 32                                                             | 42   | 49   | 60   | 69  | 85  | 120 | 23   | 30                                     | 35   | 42   | 49  | 60  | 85  |  |
|                                                                                      | 1.75           | 56                                                             | 69   | 79   | 97   | 112 | 137 | 194 | 40   | 48                                     | 56   | 69   | 79  | 97  | 137 |  |
|                                                                                      | 2.00           | 73                                                             | 89   | 103  | 127  | 146 | 179 | 253 | 52   | 63                                     | 73   | 89   | 103 | 127 | 179 |  |
| 4.00                                                                                 | 1.75           | 43                                                             | 56   | 64   | 79   | 91  | 111 | 157 | 31   | 39                                     | 45   | 56   | 64  | 79  | 111 |  |
|                                                                                      | 2.00           | 59                                                             | 73   | 84   | 103  | 119 | 145 | 206 | 42   | 51                                     | 59   | 73   | 84  | 103 | 145 |  |
|                                                                                      | 2.50           | 93                                                             | 114  | 131  | 161  | 186 | 227 | 321 | 66   | 80                                     | 93   | 114  | 131 | 161 | 227 |  |
| 5.00                                                                                 | 2.00           | 40                                                             | 38   | 67   | 82   | 95  | 116 | 165 | 28   | 27                                     | 47   | 58   | 67  | 82  | 116 |  |
|                                                                                      | 2.50           | 74                                                             | 91   | 105  | 129  | 148 | 182 | 257 | 52   | 64                                     | 74   | 91   | 105 | 129 | 182 |  |
|                                                                                      | 3.00           | 107                                                            | 131  | 151  | 185  | 214 | 262 | 370 | 76   | 93                                     | 107  | 131  | 151 | 185 | 262 |  |
|                                                                                      | 3.50           | 145                                                            | 178  | 206  | 252  | 291 | 356 | 504 | 103  | 126                                    | 145  | 178  | 206 | 252 | 356 |  |
| 6.00                                                                                 | 2.50           | 56                                                             | 76   | 87   | 107  | 124 | 151 | 214 | 40   | 54                                     | 62   | 76   | 87  | 107 | 151 |  |
|                                                                                      | 3.00           | 89                                                             | 109  | 126  | 154  | 178 | 218 | 308 | 63   | 77                                     | 89   | 109  | 126 | 154 | 218 |  |
|                                                                                      | 3.50           | 121                                                            | 148  | 171  | 210  | 242 | 297 | 420 | 86   | 105                                    | 121  | 148  | 171 | 210 | 297 |  |
|                                                                                      | 4.00           | 158                                                            | 194  | 224  | 274  | 317 | 388 | 548 | 112  | 137                                    | 158  | 194  | 224 | 274 | 388 |  |
| 7.00                                                                                 | 3.00           | 72                                                             | 93   | 108  | 132  | 153 | 187 | 264 | 51   | 66                                     | 76   | 93   | 108 | 132 | 187 |  |
|                                                                                      | 3.50           | 104                                                            | 127  | 147  | 180  | 208 | 254 | 360 | 73   | 90                                     | 104  | 127  | 147 | 180 | 254 |  |
|                                                                                      | 4.00           | 136                                                            | 166  | 192  | 235  | 271 | 332 | 470 | 96   | 118                                    | 136  | 166  | 192 | 235 | 332 |  |
|                                                                                      | 4.50           | 172                                                            | 210  | 243  | 297  | 344 | 421 | 595 | 121  | 149                                    | 172  | 210  | 243 | 297 | 421 |  |
|                                                                                      | 5.00           | 212                                                            | 260  | 300  | 367  | 424 | 519 | 735 | 150  | 184                                    | 212  | 260  | 300 | 367 | 519 |  |
| 8.00                                                                                 | 3.50           | 87                                                             | 111  | 129  | 157  | 182 | 223 | 315 | 62   | 79                                     | 91   | 111  | 129 | 157 | 223 |  |
|                                                                                      | 4.00           | 119                                                            | 145  | 168  | 206  | 237 | 291 | 411 | 84   | 103                                    | 119  | 145  | 168 | 206 | 291 |  |
|                                                                                      | 4.50           | 150                                                            | 184  | 213  | 260  | 301 | 368 | 521 | 106  | 130                                    | 150  | 184  | 213 | 260 | 368 |  |
|                                                                                      | 5.00           | 186                                                            | 227  | 262  | 321  | 371 | 454 | 643 | 131  | 161                                    | 186  | 227  | 262 | 321 | 454 |  |
|                                                                                      | 5.50           | 224                                                            | 275  | 317  | 389  | 449 | 550 | 778 | 159  | 194                                    | 224  | 275  | 317 | 389 | 550 |  |

Calculation according to Euler

$$P = \frac{C\pi^2 EI}{FL^2} \quad \frac{L}{k} \triangleright \left[ \frac{2C\pi^2 E}{S_y} \right]$$

Calculation according to Jb Johnson

$$P = \frac{AS_y}{F} \left[ 1 - \frac{S_y L^2}{4C\pi^2 E k^2} \right] \quad \frac{L}{k} \leq \left[ \frac{2C\pi^2 E}{S_y} \right]$$

End conditions for above chart  
Mount Condition  
Rigid Mounts Fixed-Guided  
Swivel Mounts Pin-Pin

F Safety factor,  
P Critical load, Lb  
E Modulus of elasticity, 30000000 psi  
L Length, in  
I Moment of inertia, in<sup>4</sup>  
C End condition  
Fixed-Guided 2  
Fixed-Fixed 4  
Pin-Pin 1  
A Rod area, in<sup>2</sup>  
k Radius of gyration, in

# Technical Data

## Cushion Formulas and Factors

Cushions are recommended when piston speed is in excess of 20-25 feet per minute. Cushions decelerate the piston and rod assembly at the end of the stroke, lessening the noise and shock and increasing cylinder life.

Heavy loads attached to the piston and rod assembly should be stopped by external means, such as shock absorbers, springs, decelerating valves, etc.

Use the information below, along with the examples on page 77 to determine if standard cushioning is sufficient for your application.

### FORCE FACTOR CHART

Force Factors ( $a = \sqrt{2} \times .001294$ )

(continued)

| PISTON | VELOCITY | PISTON | VELOCITY |
|--------|----------|--------|----------|
| ips    | a        | ips    | a        |
| 1      | 0.001    | 26     | 0.000    |
| 2      | 0.005    | 27     | 0.000    |
| 3      | 0.012    | 28     | 0.00     |
| 4      | 0.021    | 29     | 0.00     |
| 5      | 0.032    | 30     | 0.00     |
| 6      | 0.047    | 31     | 0.00     |
| 7      | 0.063    | 32     | 0.00     |
| 8      | 0.083    | 33     | 0.00     |
| 9      | 0.105    | 34     | 0.00     |
| 10     | 0.129    | 35     | 0.00     |
| 11     | 0.157    | 36     | 0.00     |
| 12     | 0.186    | 37     | 0.00     |
| 13     | 0.219    | 38     | 0.00     |
| 14     | 0.254    | 39     | 0.00     |
| 15     | 0.291    | 40     | 0.00     |
| 16     | 0.331    | 41     | 0.00     |
| 17     | 0.374    | 42     | 0.00     |
| 18     | 0.419    | 43     | 0.00     |
| 19     | 0.467    | 44     | 0.00     |
| 20     | 0.518    | 45     | 0.00     |
| 21     | 0.571    | 46     | 0.00     |
| 22     | 0.626    | 47     | 0.00     |
| 23     | 0.685    | 48     | 0.00     |
| 24     | 0.745    | 49     | 0.00     |
| 25     | 0.809    | 50     | 0.00     |

### GENERAL FORMULAS

|                                                               |                                                                                                                   |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Horizontal motion                                             | $F_{acc} \text{ or } F_{dec} = W \times \frac{a}{s}$                                                              |
| Vertical motion, decelerating downward or accelerating upward | $F_{acc} \text{ or } F_{dec} = (W \times \frac{a}{s}) + W$                                                        |
| Vertical motion, decelerating upward or accelerating downward | $F_{acc} \text{ or } F_{dec} = (W \times \frac{a}{s}) - W$                                                        |
| Frictional force                                              | $F_f = u \times W$                                                                                                |
| Total cushioning force                                        | $F_t = F_{acc} \text{ or } F_{dec} + F_p \pm F_f$<br>(+ $F_f$ if load accelerating, — $F_f$ if load decelerating) |
| Contained pressure                                            | $P_c = F_t/A_{cc} \text{ or } F_t/A_{hc}$                                                                         |

### FORCE FACTOR TERMINOLOGY

| TERMS USED | EXPLANATION                               | UNITS                            |
|------------|-------------------------------------------|----------------------------------|
| W          | Weight of load                            | pounds                           |
| Ab         | Bore area                                 | square inches                    |
| Ah         | Ab less rod area                          | square inches                    |
| Acc        | Ab less cap plunger cross-sectional area  | square inches                    |
| Ahc        | Ab less head plunger cross-sectional area | square inches                    |
| a          | Force factor                              | -                                |
| s          | Acceleration or deceleration distance     | inches                           |
| u          | Coefficient of friction of load motions   | Horizontal = .15<br>Vertical = 0 |
| v          | Velocity                                  | inches per second (ips)          |
| Facc       | Force needed to accelerate a weight       | pounds                           |
| Fdec       | Force needed to decelerate a weight       | pounds                           |
| Ff         | Friction force due to load motion         | pounds                           |
| Fp         | Driving pressure force                    | pounds                           |
| Ft         | Total cushioning force                    | pounds                           |
| Pp         | Pump pressure                             | inches per second (ips)          |
| Pc         | Contained cushioning pressure             | inches per second (ips)          |

### Acceleration and Deceleration Forces

The a force factors shown are used to determine the forces required to accelerate or decelerate a weight through a given distance, s (Refer to **Force Factor Chart**).

- If the motion of the load is horizontal, use the general formula  $F_{acc} \text{ or } F_{dec} = W \times \frac{a}{s}$ .
- If the motion of the load is vertical and is being decelerated downward or accelerated upward, use the general formula  $F_{acc} \text{ or } F_{dec} = (W \times \frac{a}{s}) + W$ .
- If the motion of the load is vertical and is being decelerated upward or accelerated downward, use the general formula  $F_{acc} \text{ or } F_{dec} = (W \times \frac{a}{s}) - W$ .

- Friction due to load motion affects  $F_t$ . Add  $F_f$  to  $F_t$  if the load is accelerating. Subtract  $F_f$  from  $F_t$  if the load is decelerating.
- Cylinder friction is negligible.

### Note

The contained cushioning pressure must not exceed 5000 psi. If the standard cushion results in a too high pressure, then a longer cushion spud must be specified.

# Technical Data

## How to Calculate Cushion Requirements

### HYDRAULIC EXAMPLES

#### Example A

Horizontal deceleration

NZ series cylinder, 3 1/4" bore, 1 3/8" rod (standard), cushioning at cap.

A weight of 3000 lbs., moving at 25 ips, and driven by a pump pressure of 1000 psi should stopped in 1 1/4". Assume the coefficient of friction to be .15.

- $F_f = u \times W$   
 $= .15 \times 3000 \text{ lbs.}$   
 $F_f = 450 \text{ lbs.}$
- $F_p = A_h \times P_p$   
 $A_h = A_b - \text{rod area}$   
 $= 8.45 \text{ sq. in.} - 1.49 \text{ sq. in.}$   
 $A_h = 6.96 \text{ sq. in.}$   
 $F_p = 6.96 \text{ sq. in.} \times 1000 \text{ psi}$   
 $F_p = 6960 \text{ lbs.}$
- $F_{dec} = W \times a/s$   
 $= 3000 \text{ lbs.} \times .809/1.25 \text{ in.}$   
 $F_{dec} = 1942 \text{ lbs.}$
- $F_t = F_{dec} + F_p - F_f$   
 $= 1942 + 6960 - 450$   
 $F_t = 8452 \text{ lbs.}$
- $P_c = F_t / A_{cc}$   
 $= 8452 \text{ lbs.} / 7.85 \text{ sq. in.}$   
 $P_c = 1077 \text{ psi}$

This figure does not exceed the pressure capability of the cylinder, therefore, the standard cushion is acceptable.

#### Example B

Horizontal deceleration

NZ series cylinder, 6" bore, 2 1/2" rod (standard), cushioning at head. The cylinder is mounted vertical rod down, with a 2000 lb. load attached to the rod end. Pump pressure is 750 psi, the load is moving at 40 ips, and must be stopped in 1 3/8". There is no load friction.

- $F_p = P_p \times A_b$   
 $= 750 \text{ psi} \times 28.56 \text{ sq. in.}$   
 $F_p = 21,420 \text{ lbs.}$
- $F_{dec} = (W \times a/s) + W$   
 $= (2000 \text{ lbs.} \times 2.07/1.375 \text{ in.}) + 2000 \text{ lbs.}$   
 $F_{dec} = 5011 \text{ lbs.}$
- $F_t = F_p + F_{dec}$   
 $= 21,420 + 5011 \text{ lbs.}$   
 $F_t = 26,431 \text{ lbs.}$
- $P_c = F_t / A_{hc}$   
 $= 26,431 \text{ lbs.} / 22.07 \text{ sq. in.}$   
 $P_c = 1198 \text{ psi}$

This does not exceed the pressure capability of the cylinder, therefore, the standard cushion is acceptable.

Note

If your calculations show you need a longer cushion than standard, longer cushions are available in 1/4 inch increments.

| Bore Size | Rod Dia | Cushion Length (in.) |      | Effective Cushion Area (in. <sup>2</sup> ) |                        |
|-----------|---------|----------------------|------|--------------------------------------------|------------------------|
|           |         | Head                 | Cap  | Head (A <sub>hc</sub> )                    | Cap (A <sub>cc</sub> ) |
| 1.50      | 0.63    | 1.13                 | 1.81 | 1.24                                       | 1.70                   |
|           | 1.00    | 1.13                 | 1.81 | 0.73                                       | 1.70                   |
| 2.00      | 1.00    | 1.13                 | 1.13 | 2.13                                       | 2.91                   |
|           | 1.38    | 1.13                 | 1.13 | 1.17                                       | 2.90                   |
| 2.50      | 1.00    | 1.13                 | 1.13 | 3.92                                       | 4.77                   |
|           | 1.38    | 1.13                 | 1.13 | 2.96                                       | 4.77                   |
|           | 1.75    | 1.13                 | 1.13 | 1.89                                       | 4.77                   |
| 3.25      | 1.38    | 1.38                 | 1.25 | 6.38                                       | 7.85                   |
|           | 1.75    | 1.38                 | 1.25 | 5.31                                       | 7.85                   |
|           | 2.00    | 1.38                 | 1.25 | 4.02                                       | 7.85                   |
| 4.00      | 1.75    | 1.38                 | 1.25 | 9.62                                       | 12.16                  |
|           | 2.00    | 1.38                 | 1.25 | 8.33                                       | 12.16                  |
|           | 2.50    | 1.38                 | 1.25 | 6.27                                       | 12.16                  |
| 5.00      | 2.00    | 1.38                 | 1.25 | 15.44                                      | 18.64                  |
|           | 2.50    | 1.38                 | 1.25 | 13.38                                      | 18.64                  |
|           | 3.00    | 1.31                 | 1.25 | 10.93                                      | 18.64                  |
|           | 3.50    | 1.31                 | 1.25 | 8.08                                       | 18.64                  |
| 6.00      | 2.50    | 1.38                 | 1.50 | 22.07                                      | 26.16                  |
|           | 3.00    | 1.31                 | 1.50 | 19.62                                      | 26.16                  |
|           | 3.50    | 1.31                 | 1.50 | 16.77                                      | 26.16                  |
|           | 4.00    | 1.50                 | 1.50 | 15.20                                      | 26.16                  |
| 7.00      | 3.00    | 2.00                 | 2.00 | 29.88                                      | 36.42                  |
|           | 3.50    | 2.00                 | 2.00 | 27.03                                      | 36.42                  |
|           | 4.00    | 2.00                 | 2.00 | 25.46                                      | 36.42                  |
|           | 4.50    | 2.00                 | 2.00 | 19.29                                      | 36.42                  |
|           | 5.00    | 2.00                 | 2.00 | 17.70                                      | 36.42                  |
| 8.00      | 3.50    | 2.00                 | 2.00 | 38.85                                      | 48.24                  |
|           | 4.00    | 2.00                 | 2.00 | 37.28                                      | 48.24                  |
|           | 4.50    | 2.00                 | 2.00 | 31.11                                      | 48.24                  |
|           | 5.00    | 2.00                 | 2.00 | 29.52                                      | 48.24                  |
|           | 5.50    | 2.00                 | 2.00 | 29.52                                      | 48.24                  |

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