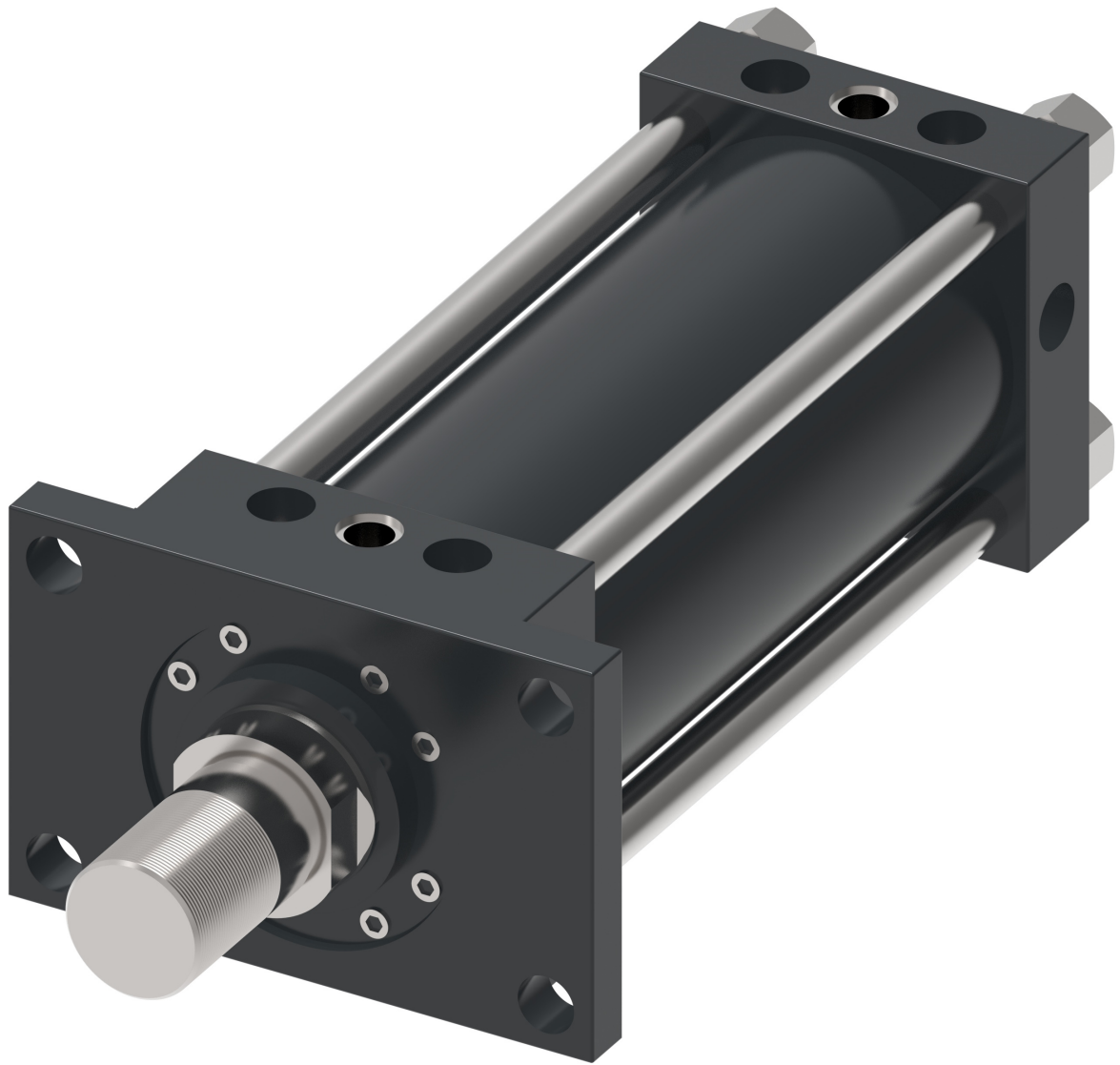


Vickers by Danfoss

NZ Series Heavy Duty NFPA Tie Rod Cylinders

Series NZ Cylinder
NFPA Interchangeable
Nominal Pressure:
3000 Psi [210 Bar]



BC430963419704en-000103

Disclaimer and Warning

USER RESPONSIBILITY - IMPROPER SELECTION, USE OR MAINTENANCE OF THE SYSTEM, PRODUCTS OR COMPONENTS DESCRIBED IN THIS CATALOG MAY CAUSE OR RESULT IN HARM, DEATH, PERSONAL INJURY AND/OR PROPERTY DAMAGE.

This document and other information from Danfoss Corporation, its subsidiaries and authorized distributors provide product or system options for users having technical expertise. This product is not intended for users who do not have technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Danfoss or its subsidiaries or authorized distributors.

To the extent that Danfoss or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and all reasonable foreseeable uses of the components or systems.

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Features

1. Rod Cartridge Assembly:

Machined to maximum bearing support and wear resistance. Unitized, thread-less 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:

Hard chrome plated piston rod in a variety of diameters between 1 and 5 1/2 inches provides maximum durability and extends seal life. Case hardened rods are standard up to 4 inches, and are an option for 4 1/2 inch and larger rods.

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:

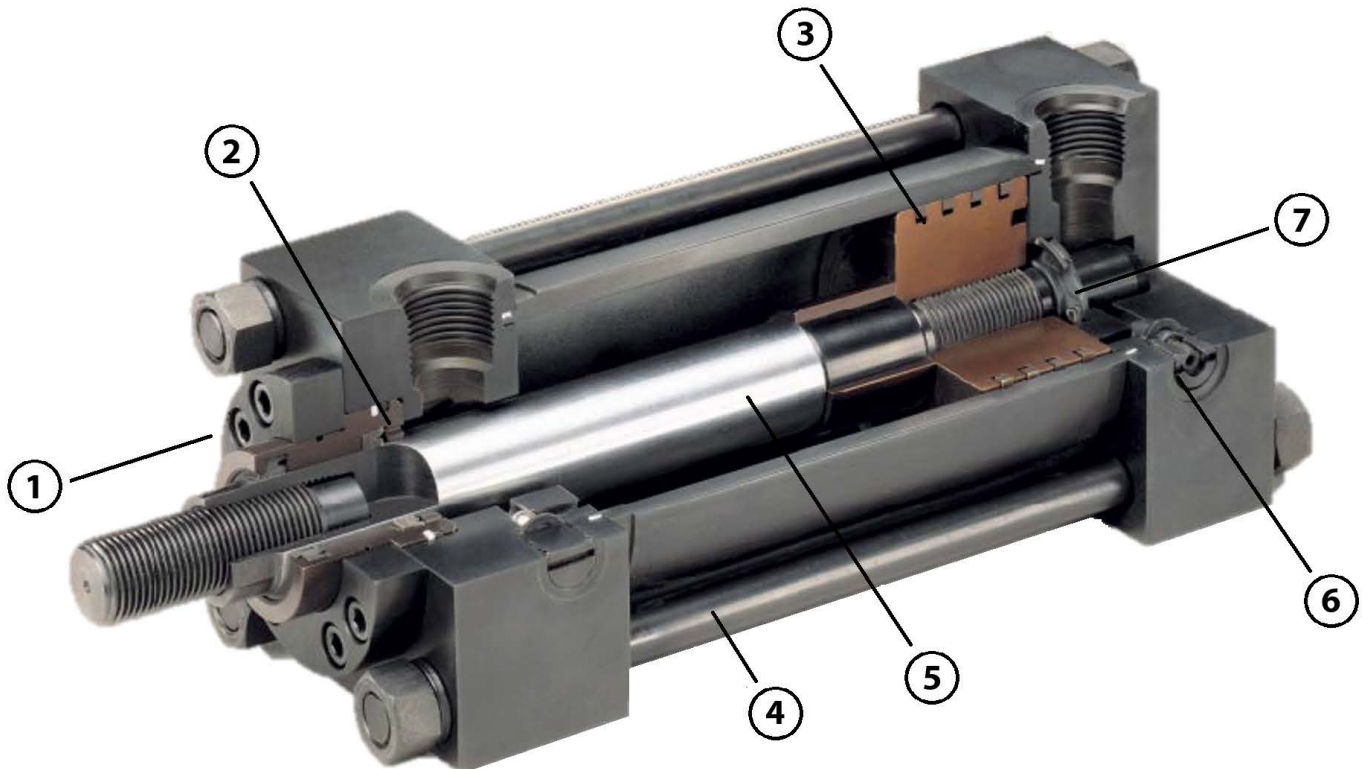
Including SAE, BSPP, and metric to ISO 614.9 and DIN standard 3852 to provide the broadest piping flexibility.

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.



NZ Series Mounting Application Data

Side- and Center-line Mountings

These mounts should be keyed or pinned to prevent shifting during operation. Keys or pins must be strong enough to resist the full thrust of the cylinder. The lugs on **01** and **19** mounts are large enough to accommodate dowel pins. Extended key plates for stock and custom cylinder models are available when specified. Pin or key the head whenever possible. Do not pin or key both ends. Cylinders become longer when pressure is applied and tube will tend to buckle.

The alignment and center-line height on the **03** mount are maintained by accurately machined surfaces on the head and cap which are held against the mounting surface by the end lugs.

End and Intermediate Pivot Mountings

Trunnion and pivot pins are designed to carry shear loads only. Trunnion and pivot bearings must fit closely for the entire length of the pin. Hold the trunnion bearings rigidly and in accurate alignment

DESCRIPTION	MOUNT	NFPA DESIGNATION	NZ BORES AVAILABLE
Side Lugs	01	MS2	1½" - 8"
Side Tapped	02	MS4	1½" - 8"
Center-Line Lugs	19 **	MS3	1½" - 8"
Side End Lugs	03	MS7	1½" - 8"

DESCRIPTION	MOUNT	NFPA DESIGNATION	NZ BORES AVAILABLE
Cap Fixed Clevis	10	**MP1	1½" - 8"
Cap Spherical Bearing	11	N/A	1½" - 6"
Detachable Clevis	50	MP2	1½" - 8"
Head Trunnion	17	**MT1	1" - 8"
Cap Trunnion	16	**MT2	1½" - 8"
Intermediate Fixed Trunnion	15	**MT4	1½" - 8"

End Mountings

The head and cap rectangular mounts **09** and **14** should be used for hydraulic applications to avoid excessive deflection which occurs on the **07** and **12** mountings.

Refer to the chart on page 22 and 32 respectively for pressure ratings for **07** mounts in push and **12** mounts in pull.

The **08, 09, 13** and **14** mounts are usable in both push and pull at full rated hydraulic pressures.

Piston Securing Methods

Piston to rod joints are threaded, anaerobically sealed and secured, and staked (single rod ends). Under normal operating conditions, additional securing is not necessary. However, in applications where: 1) temperatures exceed 250°F, 2) pressure spike or impact shock is present, or 3) a piston previously detached, the piston should be pinned; this must be specified when ordering. Consult factory for other securing methods.

Double Rod Cylinders

Double rod cylinders are available in all mountings except **10, 11, 12, 13, 14, 16, 21**, and **50**.

Mounting Accessories

See pages 78-81 for mounting accessories.

DESCRIPTION	MOUNT	NFPA DESIGNATION	NZ BORES AVAILABLE
Head Rectangular Flange	07	MF1	1½" - 8"
Cap Rectangular Flange	12	MF2	1½" - 8"
Head Square Flange	08	MF5	1½" - 8"
Cap Square Flange	13	MF6	1½" - 8"
Tie Rods Extended	23, 21, 22	MX1, MX2, MX3	1½" - 8"
Head Rectangular	09	**ME5	1½" - 8"
Cap Rectangular	14	**ME6	1½" - 8"
No Mount	24	N/A	1½" - 8"

** NFPA mounting dimensions are available on all cylinders 1½" - 8" bore.

Product Specifications

General Specifications

- Heavy duty service
- Standard construction: tie rod
- Bore diameters: 1.50" through 8.00"
- Strokes: available in any practical stroke length (see pg 63 for limitations)
- Piston rod diameters: 0.63" through 5.500" (based on bore size)
- Rod end styles: 12 standard, specials available
- Mounting styles: Over 30 standard styles. Additional mounting styles offered for custom cylinders.
- Nominal pressure: 3,000 psi¹ (207 Bar)
- Standard fluid media - Filtered hydraulic oil (Seals for different applications and temperatures are listed under Sealing System)

¹ - If hydraulic pressure exceeds 3,000 psi (207 Bar), send application data for engineering evaluation and recommendation.

Customization Options and Modifications

- Additional Mounts and Rod End Types
- Combination Mounts
- Special Heads, Caps, Pistons and Mounts
- Mount/Port Relocation
- Oversize/Undersize Ports
- Port Thread Styles
- Port Blocks/Valve Manifold and Flow Tubing (at either end)
- Multiple Ports
- Cartridge Valves
- Air Bleeds
- Double Rod End
- Oversize/Undersize Rod Diameters
- Extra Thick Chrome Plated Piston Rod
- Rod Materials (stainless steels, alloy steels, etc.)
- Rod Coatings
- Nitrided Rod
- Pinned Rod to Piston
- Welded Rod to Piston
- Extra Wrench Flats
- Rod Boot
- Metallic Rod Wiper
- Seal Materials (additional compounds)
- PolyPak Seals
- Stop Tube
- Stroke Adjuster
- Proximity Switch
- Fixed Cushions
- Pneumatic Service
- Water Submersible Design
- Chrome Plated Bore
- Nickel Plated Assembly
- Application-Specific Paint
- Stainless Steel Construction (derated operating pressure)
- Metric Rod and Bore Diameters
- See page **84** for Additional Options

Specifications in this catalog are subject to change.

How To Order

Standard Cylinders

Danfoss has created an easy system for ordering NZ cylinders, developed to improve our service to you. The Standard model code consists of 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 NZ cylinder is assigned an alpha numeric 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 model code clearly marked on the product, impression stamped in the metal head or cap. Each 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 Danfoss sales engineer to identify and service your cylinder.

NOTE

See pages 8 and 9 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 alpha-numeric 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".

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 design number on receipt of order.

Replacement Cylinders

Every custom Danfoss cylinder is assigned a unique design number. When ordering a replacement cylinder, simply give the model code or the design number to your local Danfoss Cylinder Sales representative.

Replacement Parts

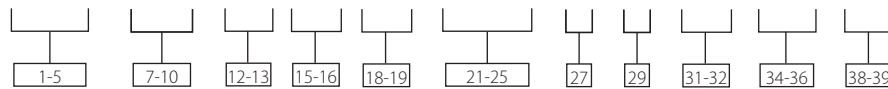
Each design number is stored in a quick retrieval computerized storage system. This gives our field sales representatives rapid access to assist you in identifying and specifying genuine Danfoss replacement parts.

WARNING

It is the user's responsibility to select the correct system, product or components.

Model Code Selection

CYL-F - NZ-- - IN - I1 - 34 - 0055E - K - A - TT - 633 - 45



1-5 Series Designation

CYL-F – Tie-Rod Cylinder

7-10 Series

NZ – ANSI B93.15/NFPA
Interchangeable Hydraulic
Cylinder

12-13 Bore Diameter

Code Bore (inch)

IC	1.50
ID	2.00
IE	2.50
IG	3.25
IH	4.00
IK	5.00
IL	6.00
IM	7.00
IN	8.00

15-16 Rod Diameter

Code Rod (Inches)

IC	0.63
IE	1.00
IH	1.38
IJ	1.50
IL	1.75
IM	2.00
IP	2.50
IU	3.00
IV	3.50
IW	4.00
IY	4.50
IZ	5.00
I1	5.50

18-19 Mounting Style

Code Mount

01	Side Lug
02	Side Tapped
03	End Lug Mount
04	Keyed Side Lug
05	Keyed Tapped
07	Head Rectangular Flange
08	Head Square Flange
09	Head Rectangular
10	Cap Fixed Clevis
11	Spherical Bushing
12	Cap Rectangular Flange
13	Cap Square Flange
14	Cap Rectangular
15	Intermediate Trunnion
16	Cap Trunnion
17	Head Trunnion
18	Rod end tapped flange
19	Centerline Lug
20	Rod end threaded head
21	Cap End Extended Tie Rod
22	Head End Extended Tie Rod
23	Both Ends Extended Tie Rod
24	No Mount
25	Double Rod Side Lug
26	Double Rod Tapped
27	Double Rod End Lug
28	Double Rod Keyed Side Lug
29	Double Rod Keyed Tapped
31	Double Rod Rectangular Flange
32	Double Rod Squared Flange
33	Double Rod Head Rectangular
34	Double Rod Intermediate Trunnion
35	Double Rod Head Trunnion
37	Double Rod Centerline Lug
39	Double Rod Extended Tie Rod
40	Double Rod Both Ends Extended Tie Rod
41	Double Rod No Mount
46	Cross Tube End
47	Cap Fixed Eye
48	Detachable Eye
50	Detachable Clevis

21-25 Cylinder Stroke

Item 21-24 indicate stroke
length from 0000 to 0099
inches. Item 25 indicates
fractions of an inch:

Code Fraction

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

27 Rod End Type

Code Rod End Style

A	Short female metric thread
B	Short female UN thread
C	Small Male UN thread
D	Plain no attachment
E	Small male metric thread
F	Intermediate male UN thread
G	Grooved end
H	Intermediate male metric
K	Extended small male UN thread
L	Extended small male metric thread
M	Extended intermediate male UN thread
N	Extended intermediate male metric thread
R	Studded small male thread
S	Full male UN thread

29 Rod Material

Code Material

A	Case Harden Rod 6415
B	Non case harden 3867
D	Stainless steel 17-4

31-32 Sealing System

Item 31 indicates rod seal:

Code Type

N	Normal
L	Low Friction
T	High Temperature

Item 32 indicates piston seal:

Code Type

N	Normal
L	Low Friction
T	High Temperature
C	Cast Iron Rings

34-36 Port Type

Item 34 indicates port type:

Code Type

1	Standard NPTF
3	SAE/UN O-ring
5	NFPA Standard SAE/UN
6	SAE 4-Bolt Flange
7	BSPP
9	Metric
A	ISO 6149
M	Standard Manifold

Item 35, 36 indicates port size.
Refer page number 67

38-39 Port Location

Item 38 indicates head port
position:

Code Location

1	Head 1
2	Head 2
3	Head 3
4	Head 4

Item 39 indicates cap port
position:

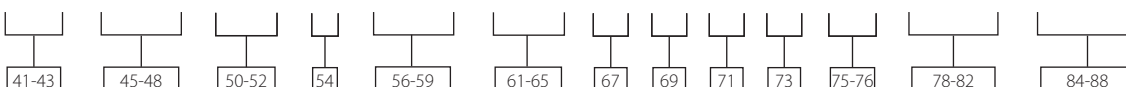
Code Location

1	Cap 1
2	Cap 2
3	Cap 3
4	Cap 4

NOTE: The model code separators “-”
do not have descriptions.

Model Code Selection

B31 - XXXX - XXX - X - XXXX - S110 - X - X - X - P - XX - 00884 - XXXXX



41-43 Cushion

Item 41 indicates cushion type:

Code	Type
B	Cushion Both Ends
H	Cushion Head End
C	Cushion Cap End
X	No Cushion

Item 42 indicates head cushion location:

Code	Location
1	Cushion Both Ends
2	Cushion Head End
3	Cushion Cap End
4	No Cushion
X	No Head Cushion

Item 43 indicates cap cushion location:

Code	Location
1	Cushion Cap 1
2	Cushion Cap 2
3	Cushion Cap 3
4	Cushion Cap 4
X	No Head Cushion

45-48 Switches

Item 45 indicates switch:

Code	Switch
B	Switch Both Ends
H	Switch Head End
C	Switch Cap End
X	No Switch

Item 46 indicates switch type:

Code	Switch type
P	Proximity Switch

Item 47 indicates head switch position:

Code	Location
1	Switch Head 1
2	Switch Head 2
3	Switch Head 3
4	Switch Head 4
X	No switch at head

Item 48 indicates cap switch position:

Code	Location
1	Switch Cap 1
2	Switch Cap 2
3	Switch Cap 3
4	Switch Cap 4
X	No switch at Cap

50-52 Bleeder

Item 50 indicates bleeder type for the following codes:

Code	Type
N	1/8" NPTF
S	SAE#2
X	No Bleeder

Item 51 indicates bleeder head location:

Code	Location
1	Bleeder Head 1
2	Bleeder Head 2
3	Bleeder Head 3
4	Bleeder Head 4
X	No Bleeder at Head

Item 52 indicates bleeder cap location:

Code	Location
1	Bleeder Cap 1
2	Bleeder Cap 2
3	Bleeder Cap 3
4	Bleeder Cap 4
X	No Bleeder at Cap

54 Gland Drain

Code	Location
1	Gland drain head 1
2	Gland drain head 2
3	Gland drain head 3
4	Gland drain head 4
X	No gland drain

56-59 Extra rod projection

Item 56, 57, 58 indicates value of extra rod projection provided by the customer.

Item 59 indicates fraction of an inch for extra rod projection:

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

61-65 Stop Tube

Item 61 indicates stop tube:

Code	Type
S	Stop Tube Required
X	No StopTube

Item 62,63,64 indicates value of stop tube:

Code	Length
001	1 inch
002	2 inch
003	3 inch
004	4 inch
005	5 inch
006	6 inch
007	7 inch
008	8 inch
009	9 inch

Item 65 indicates fraction of inch for stop tube length:

Code	Fraction
0	0
2	1/8
4	1/4
6	3/8
8	1/2
A	5/8
C	3/4
E	7/8

67 Bronze Bushing

Code	Type
B	Yes
X	No

69 Flats

Code	Type
2	2 Flats
4	4 Flats
S	Spanner holes
X	No flats

71 Piston to Rod Joint

Code	Type
G	Grub screw piston to rod
W	Weld piston to rod
X	No

73 Port Plug

Code	Type
S	Steel Port Plug
P	Plastic Plug Standard

75-76 Accessories

Code	Accessories
RC	Rod Clevis
RE	Rod Eye
RD	Rod Coupler
XX	No Accessories

78-82 Trunnion location

Only applicable for mount 15 and 34

Item 78, 79, 80, 81 indicates value of trunnion location provided by the customer. Item 82 indicates value of trunnion fraction for the following codes refer 56-59 extra rod projection table.

84-88 Electronics

Item 84 indicates sensor type of transducer

Code	Type
X	Not available in NZ

Item 85 indicates sensor output

Code	Type
X	Not available in NZ

Item 86 indicates cable option

Code	Type
X	Not available in NZ

Item 87 indicates cover

Code	Type
X	Not available in NZ

Item 88 indicates valve pattern

Code	Type
X	Not available in NZ

NOTE: The model code separators "-" do not have descriptions.

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. Danfoss 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

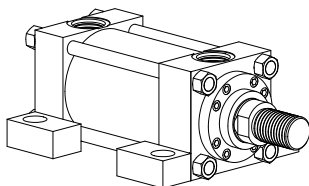
Just as the cylinder bore must be sized to provide the proper force for an application, a cylinder mounting that can absorb these application forces must also be specified.

CAUTION

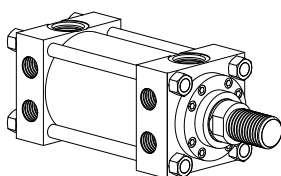
In the mounting information, some mounts have been downrated to minimize deflection.

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 it is the user's responsibility to make the correct determination.

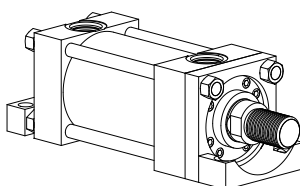
01
Side lug
ANSI MS2



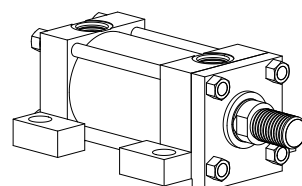
02
Side Tapped
ANSI MS4



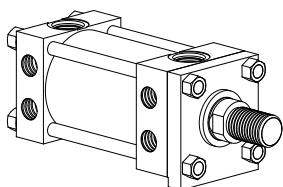
03
End lug
ANSI MS7



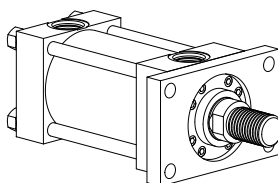
04
Keyed Side Lug



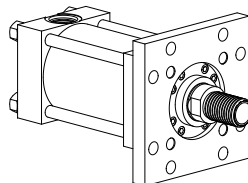
05
Keyed Side Tapped



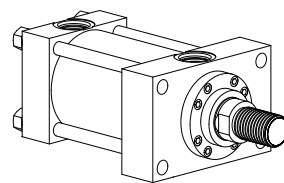
07
Head Rectangular flange
ANSI MF1
(Maximum working pressure
55 bar)



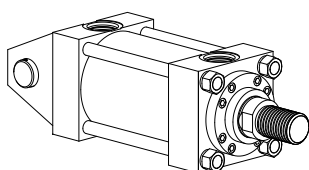
08
Head Square flange
ANSI MF5
(Maximum working pressure
103 bar)



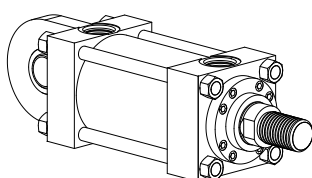
09
Head Rectangular
ANSI ME5



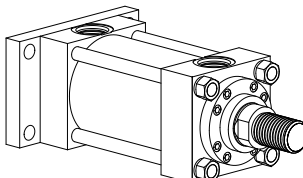
10
Cap Clevis
ANSI MP1



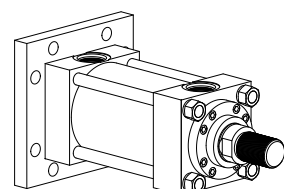
11
Cap Spherical bearing
(Maximum working pressure
per Bore on page 28.)



12
Cap Rectangular flange
ANSI MF2
(Maximum working pressure
55 bar)

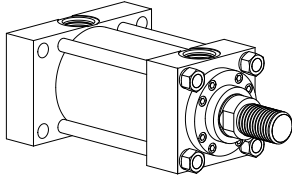


13
Cap Square flange
ANSI MF6
(Maximum working pressure
103 bar)

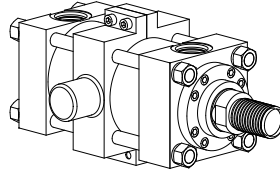


Mounting Styles

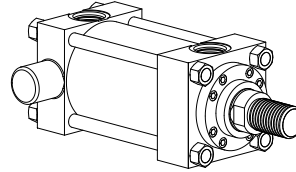
14
Cap Rectangular
ANSI ME6



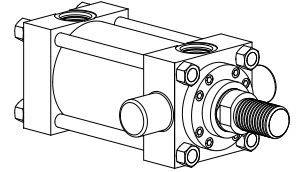
15
Intermediate Trunnion
ANSI MT4



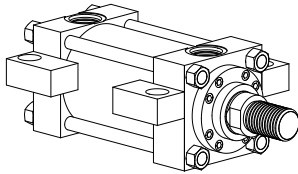
16
Cap Trunnion
ANSI MT2



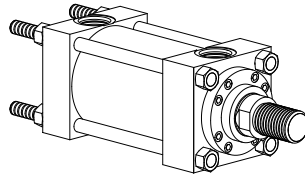
17
Head Trunnion
ANSI MT1



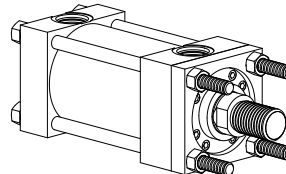
19
Center Lug
ANSI MS3



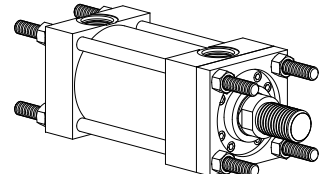
21
Cap Extended Tie rod
ANSI MX2



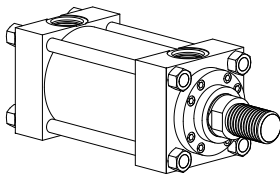
22
Head Extended Tie rod
ANSI MX3



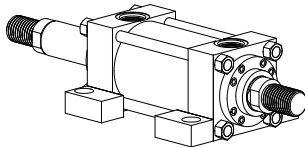
23
Both Ends Extended Tie rod
ANSI MX1



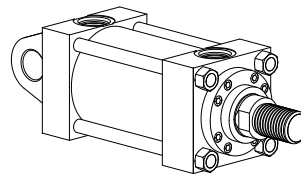
24
No Mount



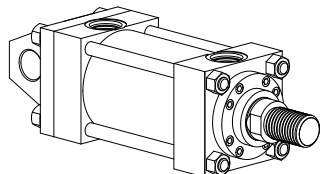
25
Double rod, Side Lug



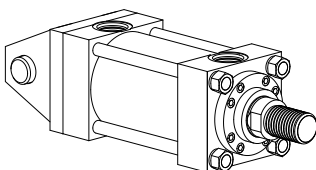
47
Cap Fixed Eye
ANSI MP3



48
Cap Detachable Eye
ANSI MP4



50
Cap Detachable Clevis
ANSI MP2



Mounting Style and Installation

Dimensions – 01 Side Lug Mount, ANSI MS2

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 76

WARNING

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.

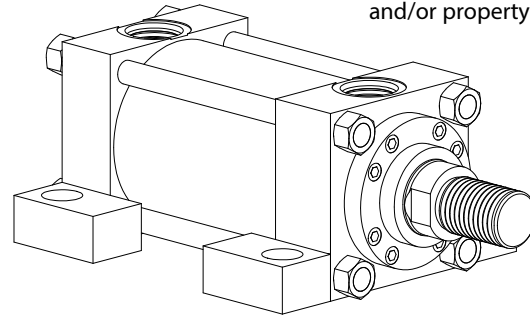
For high shock applications, dowel pins or shear keys

should be incorporated in the mounting design. For these applications, consider a keyed side lug mount, 04.

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.



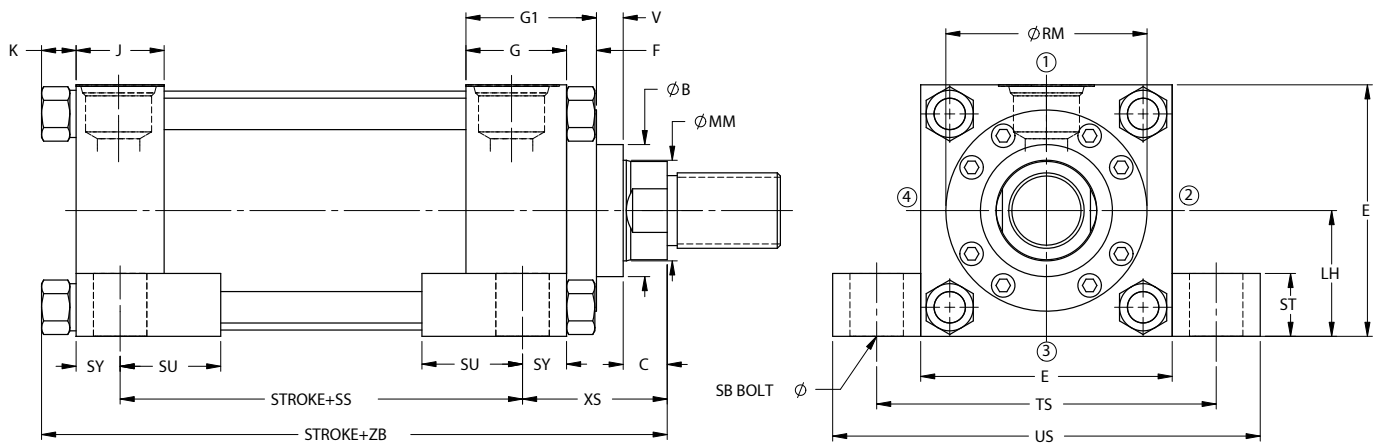
Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	F	V	RM	LH ±.002	SB
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	1.243	0.38
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	1.243	0.38
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	1.493	0.50
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	1.493	0.50
2.50	1.00	1.499	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 71, Mounting Holes requires counter Bore

Mounting Style and Installation

Dimensions – 01 Side Lug Mount, ANSI MS2



Bore	Rod Dia MM	SS+	ST	SU	SY	TS	US	XS	ZB+ Max	Piston Thick	K
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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 02 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 center-line 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 76

WARNING

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.

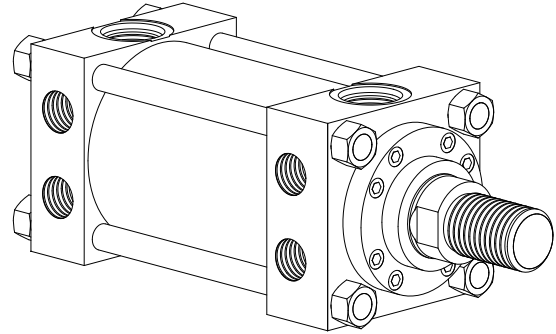
For high shock applications, dowel pins or shear keys should be incorporated in the

mounting design. For these applications, consider a keyed side lug mount, 04..

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

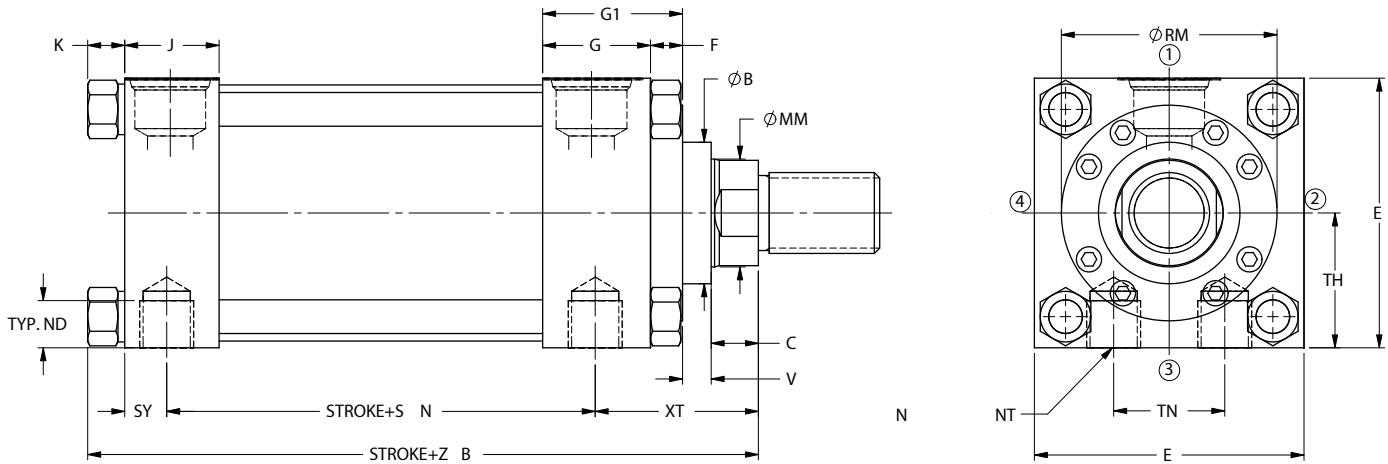


Bore	Rod Dia MM	B +0.000/-0.002	C	E	G	J	F	V	RM	TH ±.002
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	1.243
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50		1.243
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	1.493
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38		1.493
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	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

– 02 Side Tapped Mounts ANSI MS4



Bore	Rod Dia MM	ND	NT (Tap)	SN+	TN	SY	XT	ZB+ Max	Piston 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	1.00	3.50	10.66	2.88	1.03
	3.00	1.31	1.250-7	5.13	3.31	1.00	3.50	10.80	2.88	1.03
	3.50	1.31	1.250-7	5.13	3.31	1.00	3.50	10.80	2.88	1.03
	4.00	1.25	1.250-7	5.13	3.31	1.00	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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 03 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 center-line 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.

WARNING

With unsupported loads, the bearing must absorb more force.

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

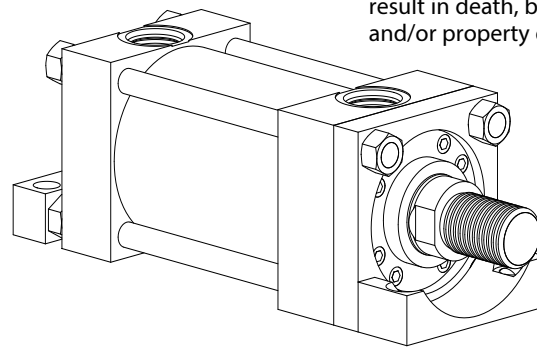
Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.

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, 04.

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

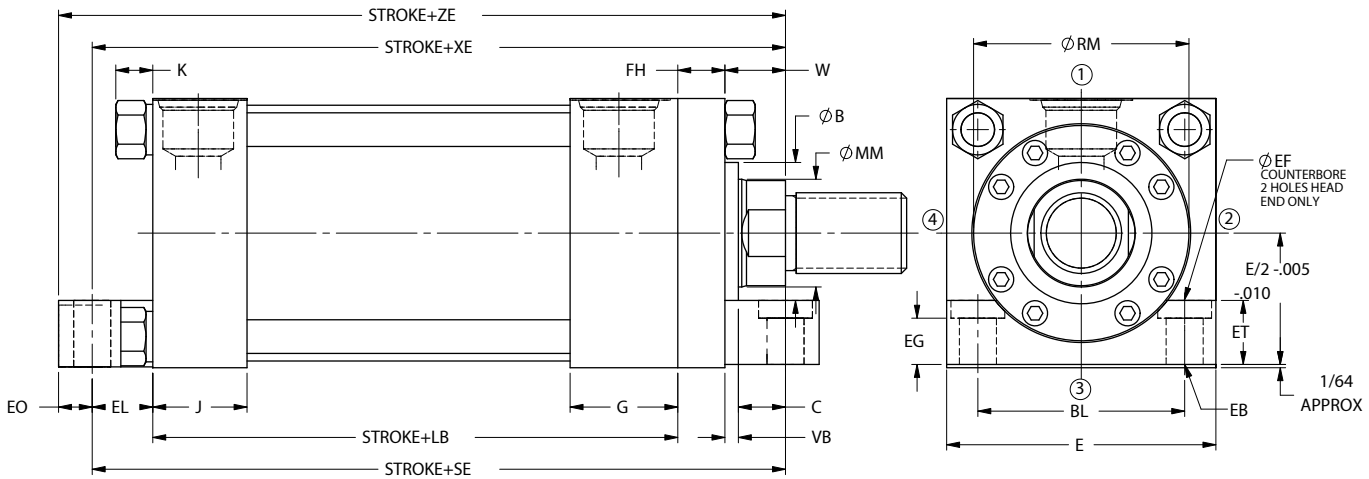


Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	FH	VB	W	EB	SE+
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	0.63	0.38	6.75
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	1.00	0.38	6.75
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	0.75	0.50	7.13
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	1.01	0.50	7.13
2.50	1.00	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 – 03 End Lug Mounts ANSI MS7



Bore	Rod Dia MM	ET	EG	EL	EF	BL	XE+	LB+	E0	ZE+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 04 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 center-line 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 76.

WARNING

With unsupported loads, the bearing must absorb more force.

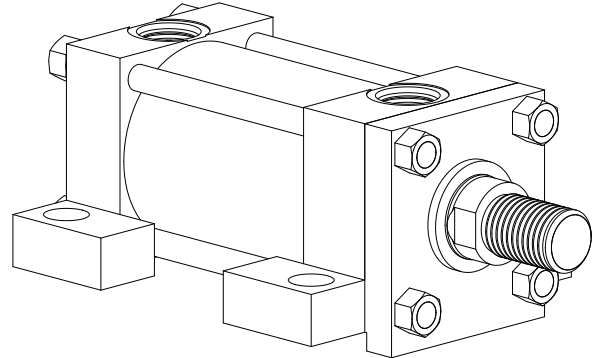
For these applications, the larger available rod is recommended, and stop tubes should be considered.

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 sales engineer.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.



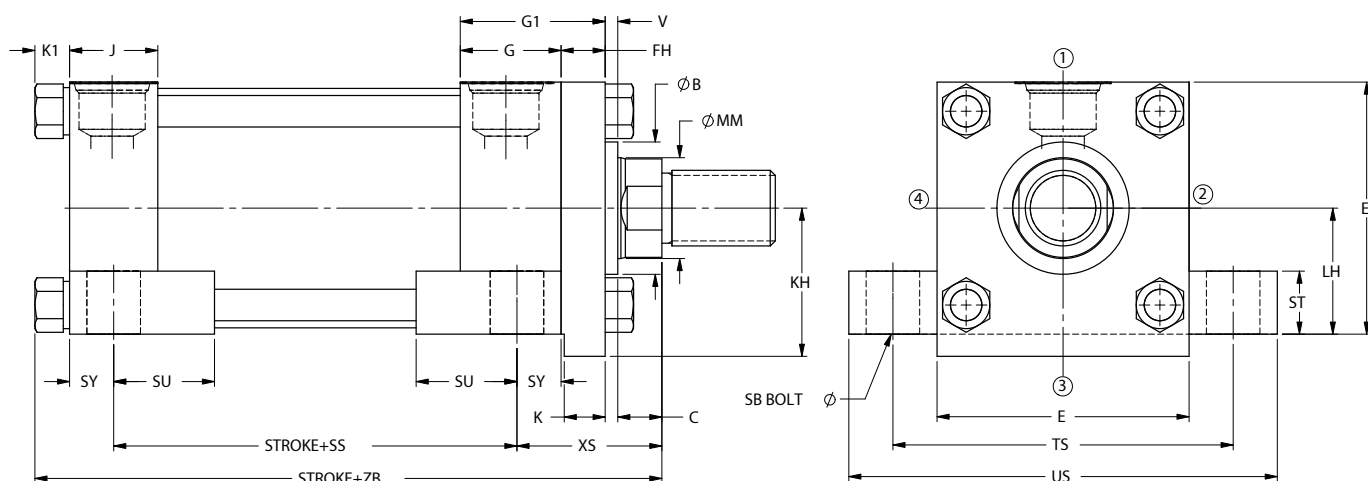
Bore	Rod Dia MM	B +.000/- .002	C	E	G1	J	FH	K +.000 /-.002	Max KH	LH ±.002	V
1.50	0.63	1.124	0.38	2.50	2.13	1.50	0.38	0.362	1.44	1.243	0.25
	1.00	1.499	0.50	2.50	2.13	1.50	0.38	0.362	1.43	1.243	0.50
2.00	1.00	1.499	0.50	3.00	2.38	1.50	0.63	0.612	1.81	1.493	0.25
	1.38	1.999	0.63	3.00	2.38	1.50	0.63	0.612	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
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
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 71, Mounting Holes requires counter Bore

Mounting Style and Installation Dimensions

– 04 Keyed Side Lug Mounts



Bore	Rod Dia MM	SB	SS+	ST	SU	SY	TS	US	XS	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 05 Keyed Tapped 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 center-line 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 76

WARNING

With unsupported loads, the bearing must absorb more force.

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

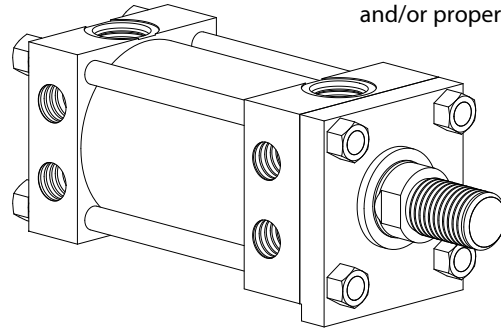
Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.

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, 04..

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

WARNING

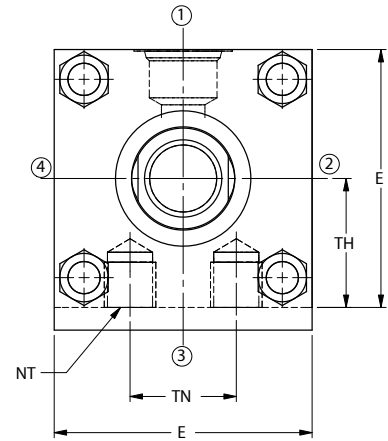
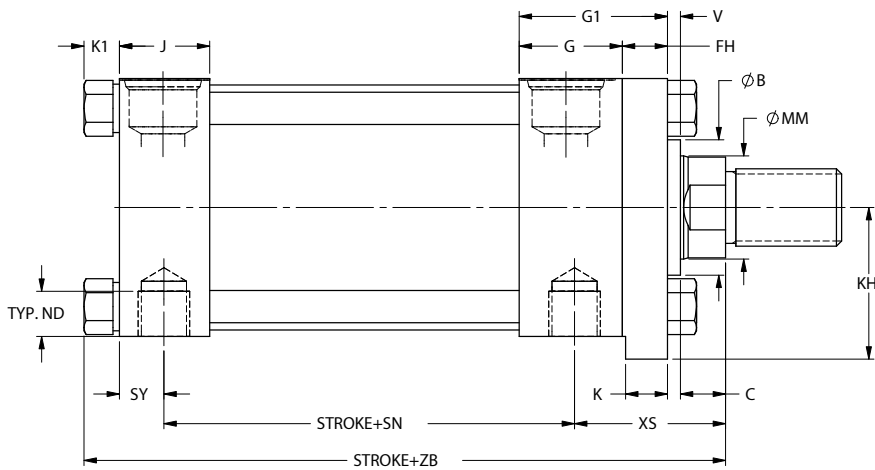
Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.



Bore	Rod MM	B +.000/- .002	C	E	G1	J	FH	K +.000/- .002	Max KH	V	TH ±.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 – 05 Keyed Tapped Mounts



Bore	Rod MM	ND	NT (Tap)	SN+	TN	SY	XS	ZB+ Max	Piston 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	1.00	3.50	10.66	2.88	1.03
	3.00	1.31	1.250-7	5.13	3.31	1.00	3.50	10.66	2.88	1.03
	3.50	1.31	1.250-7	5.13	3.31	1.00	3.50	10.66	2.88	1.03
	4.00	1.25	1.250-7	5.13	3.31	1.00	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 53 for Port Dimensions and Position

Mounting Style and Installation

Dimensions – 07 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.

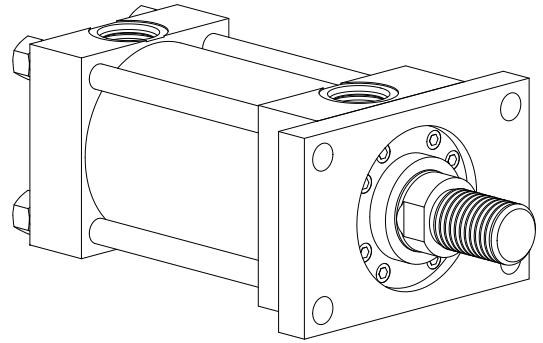
The frame on which the cylinder is mounted *must* be sufficiently rigid to resist bending moments.

NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 76.

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 (09) is recommended for heavy duty applications. Refer to the table for recommended pressure ratings in push stroke. Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.



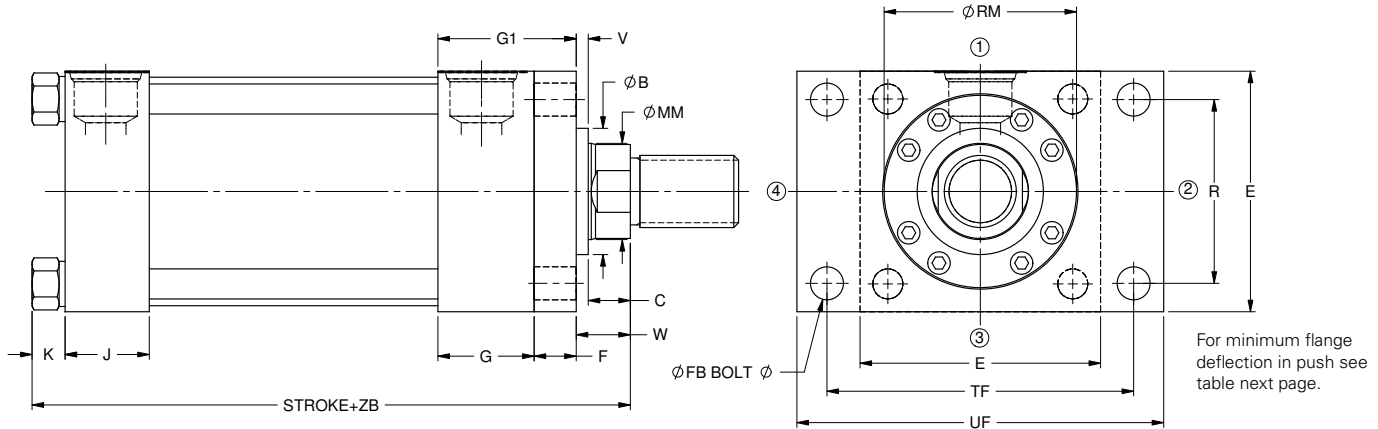
Bore Size	Recommended Pressure Rating in Push Stroke
1.50 to 4.00	3000 psi
5.00	1440 psi
6.00	1440 psi
7.00	1040 psi
8.00	800 psi

Bore	Rod Dia MM	B +.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

– 07 Head Rectangular Flange Mount ANSI MF1



Bore	Rod Dia MM	FB	R	TF	UF	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 08 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 selection” on page 76

WARNING

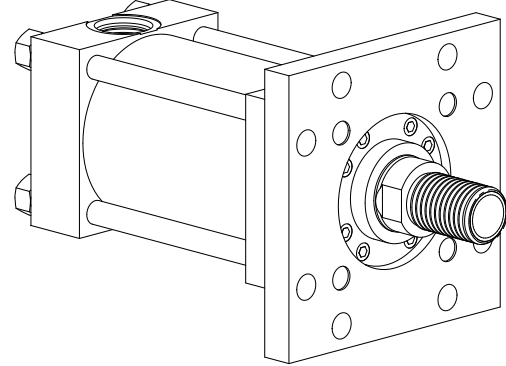
The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For eccentric loads, the larger of the two available rods in each bore size is recommended. Stop tubes should also be considered.

The head rectangular mounts (09) is recommended for heavy duty applications.

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

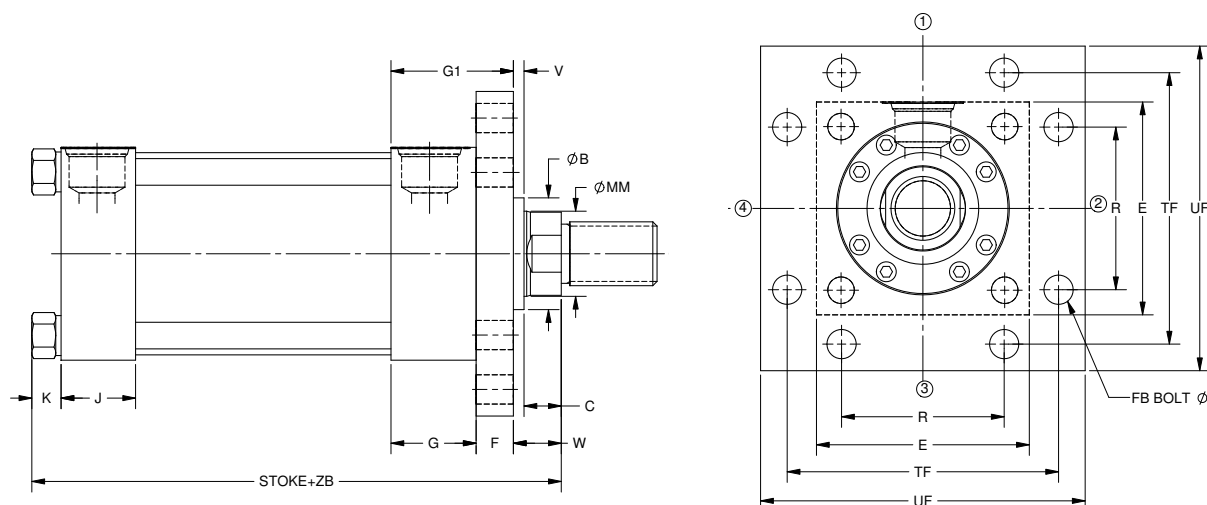


Bore	Rod Dia MM	B + .000/- .002	C	E	G1	J	F	V
1.50	0.63	1.124	0.38	2.50	2.13	1.50	0.38	0.25
	1.00	1.499	0.50	2.50	2.13	1.50	0.38	0.50
2.00	1.00	1.499	0.50	3.00	2.38	1.50	0.63	0.25
	1.38	1.999	0.63	3.00	2.38	1.50	0.63	0.38
2.50	1.00	1.499	0.50	3.50	2.38	1.50	0.63	0.25
	1.38	1.999	0.63	3.50	2.38	1.50	0.63	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

– 08 Head Square Flange Mount ANSI MF5



Bore	Rod Dia MM	W	FB	R	TF	UF	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 09 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 76

WARNING

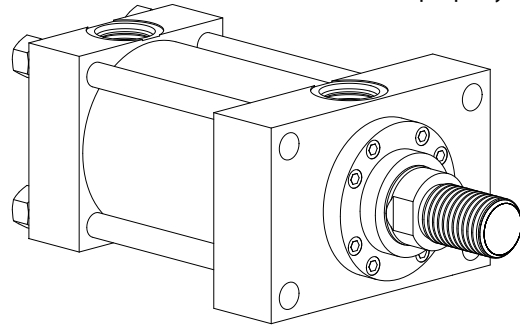
The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For eccentric loads, the larger of the two available rods in each bore size is recommended. Stop tubes should also be considered.

The head rectangular mounts (09) is recommended for heavy duty applications. Use high tensile socket head cap screws or hex head bolts

tightened to manufacturer's recommended torque.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

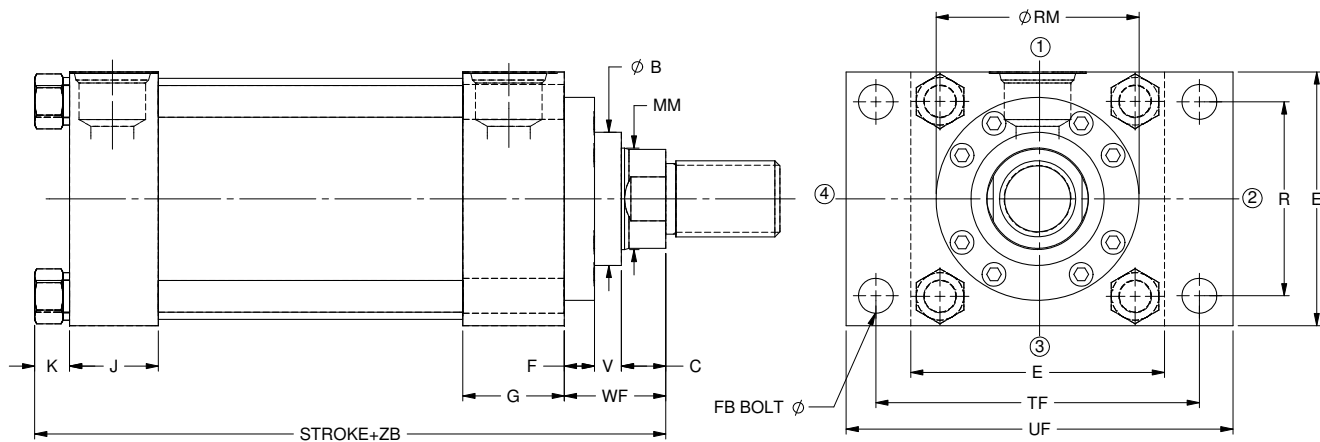


Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	F Max	V	WF
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.34	0.28	1.00
	1.00	1.499	0.50	2.50	1.75	1.50	0.50	0.38	1.38
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.50	0.38	1.38
	1.38	1.999	0.63	3.00	1.75	1.50	0.59	0.41	1.63
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	1.38
	1.38	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

– 09 Head Rectangular Mount ANSI ME5



Bore	Rod Dia MM	RM	FB	R	TF	UF	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 10 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 63 for stroke limitations.

NOTE

For strokes in excess of 24. inches, see “Stop tube selection” on page 76

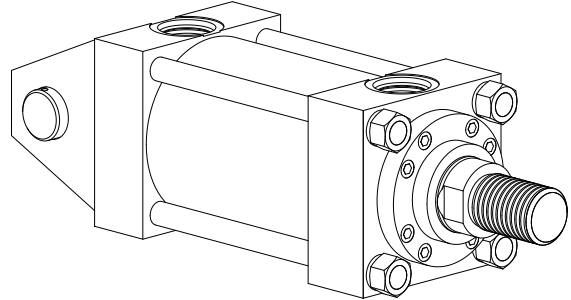
WARNING

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 mounting style 11.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

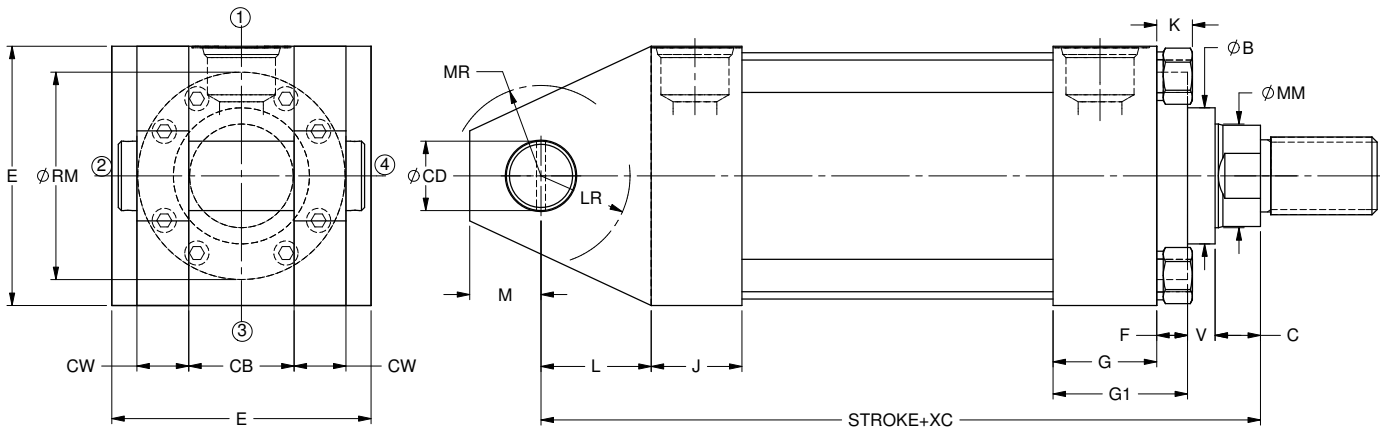


Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	F	V	RM	L
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	0.75
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	0.75
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	1.25
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	1.25
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63	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

– 10 Cap Fixed Clevis Mount ANSI MP1



Bore	Rod Dia MM	M	CB	CD	CW	LR	MR	XC+	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 11 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 76

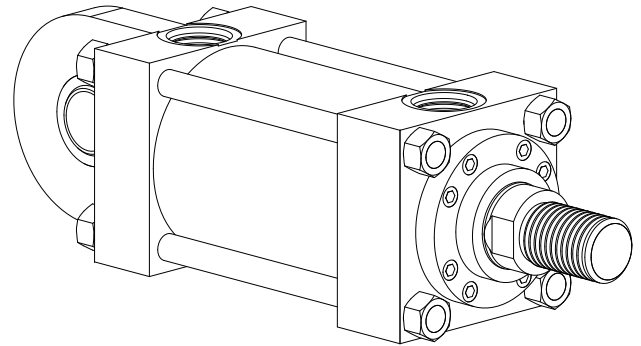
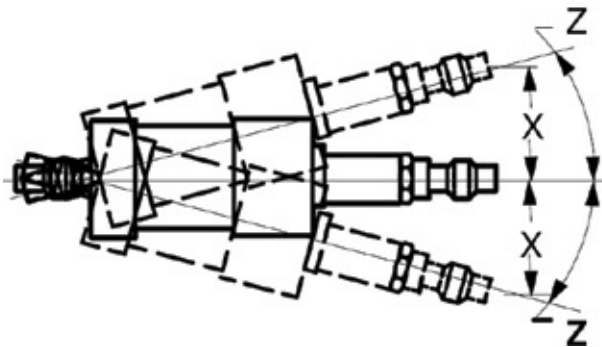
WARNING

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 dimensional drawing by the tangent of angle Z.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

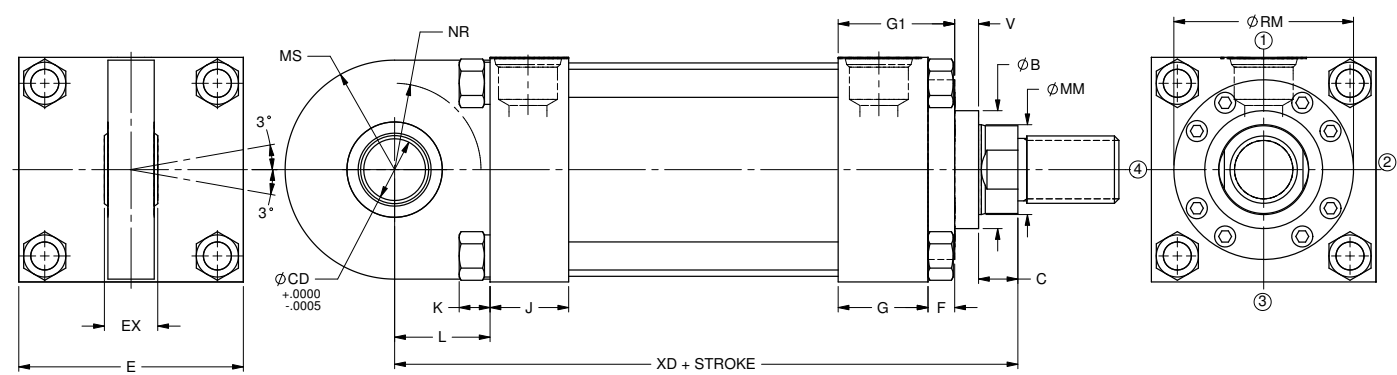


Bore	Rod Dia MM	B +.000/- .002	C	E	G	J	F	V
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38
	1.38	1.999	0.63	3.50	1.75	1.50	0.63	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

– 11 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 MM	RM	L	CD +.0000 -.0005	EX	NR	MS	XD+	Piston 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

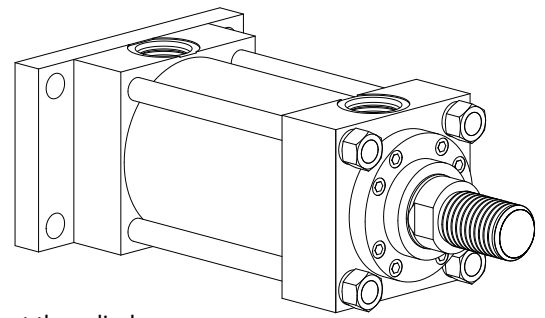
+ Plus Stroke

See Mount 24 on page 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 12 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 76

WARNING

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

The cap rectangular mounts (14) is recommended for heavy duty applications. Refer to the table for recommended pressure ratings in pull stroke.

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

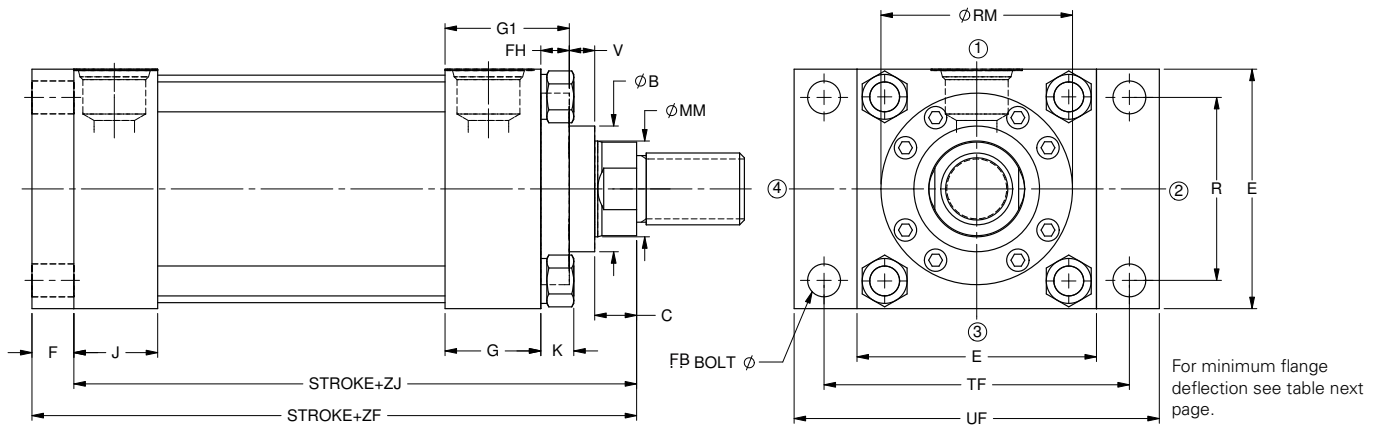
Bore Size	Recommended Pressure Rating in Pull Stroke
1.50 to 4.00	3000 psi
5.00	1800 psi
6.00	1800 psi
7.00	1300 psi
8.00	1000 psi

Bore	Rod Dia MM	B +.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

– 12 Cap Rectangular Flange Mount ANSI MF2



Bore	Rod Dia MM	FB	R	TF	UF	ZF+ Max	ZJ+ Max	Piston Thick.	K
1.50	0.63	0.38	1.63	3.44	4.25	6.01	5.64	1.38	0.41
	1.00	0.38	1.63	3.44	4.25	6.38	6.01	1.38	0.41
2.00	1.00	0.50	2.05	4.13	5.13	6.63	6.01	1.38	0.55
	1.38	0.50	2.05	4.13	5.13	6.89	6.27	1.38	0.55
2.50	1.00	0.50	2.55	4.63	5.63	6.76	6.13	1.50	0.55
	1.38	0.50	2.55	4.63	5.63	7.01	6.39	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	8.26	7.51	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	8.26	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	11.76	10.76	3.00	1.17
	4.50	1.13	6.58	10.63	12.63	11.76	10.76	3.00	1.17
	5.00	1.13	6.58	10.63	12.63	11.76	10.76	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	12.76	11.76	3.50	1.26
	4.50	1.25	7.50	11.81	14.00	12.76	11.76	3.50	1.26
	5.00	1.25	7.50	11.81	14.00	12.76	11.76	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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 13 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 76

WARNING

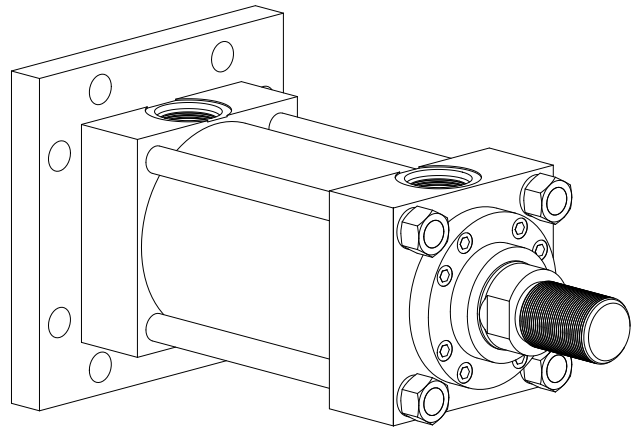
The frame on which the cylinder is mounted must be sufficiently rigid to resist bending moments.

The cap rectangular mounts (14) is recommended for heavy duty applications.

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

WARNING

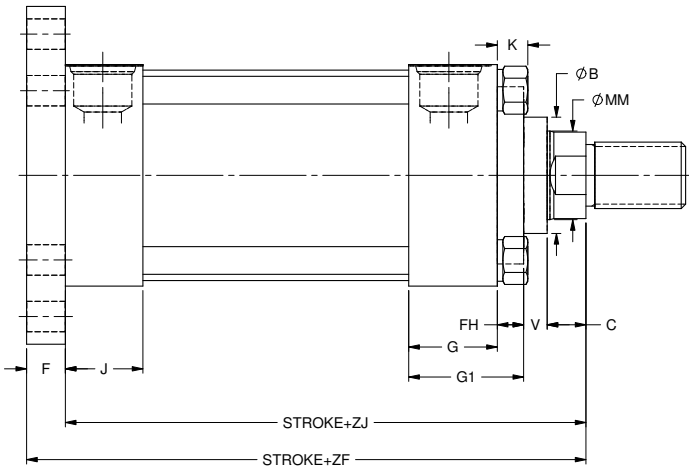
Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.



Bore	Rod Dia MM	B + .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

– 13 Cap Square Flange Mount ANSI MF6



Bore	Rod Dia MM	FB	R	TF	UF	ZF+ Max	ZJ+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 14 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 (14) is recommended for heavy duty applications.

NOTE

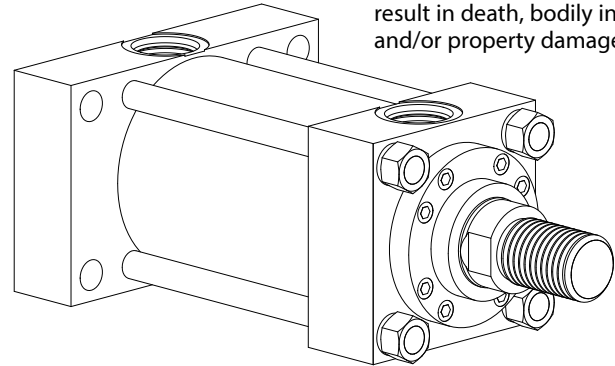
For strokes in excess of 30 inches, see "Stop tube selection" on page 76

WARNING

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

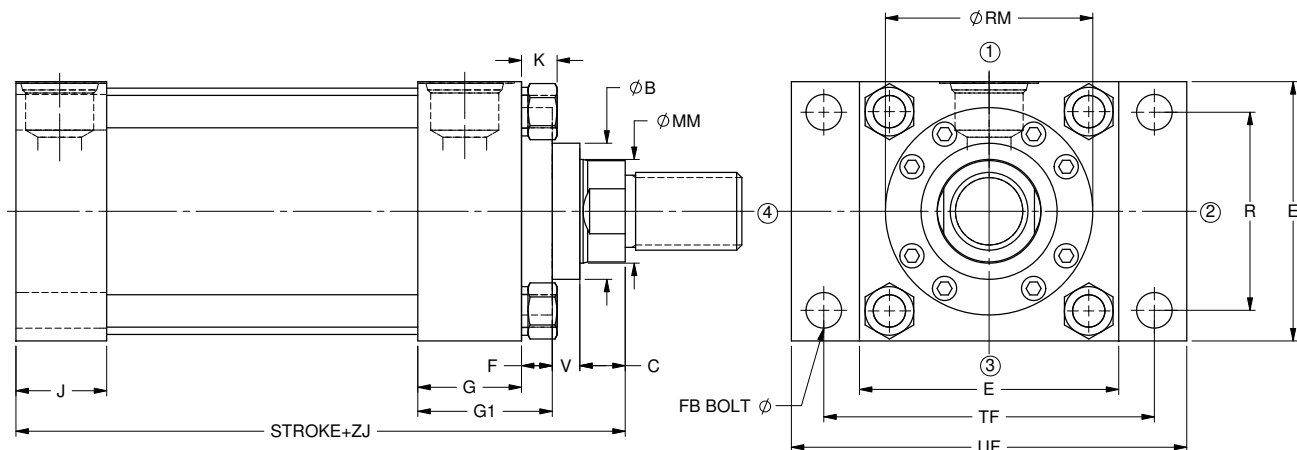


Bore	Rod Dia MM	B +.000/- .002	C	E	G	J	F	V	RM
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63
	1.38	1.999	0.63	3.50	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

– 14 Cap Rectangle Mount ANSI ME6



Bore	Rod Dia MM	FB	R	TF	UF	ZJ+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 15 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

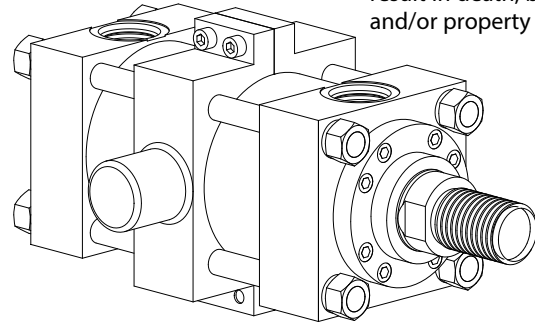
For strokes in excess of 24 inches, see “Stop tube selection” on page 76

WARNING

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.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

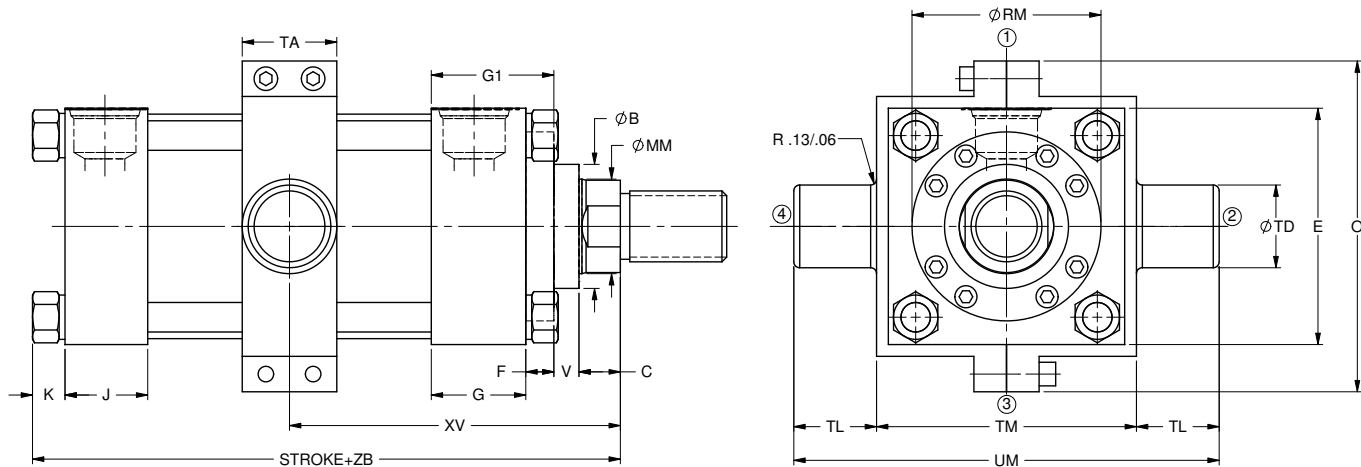


Bore	Rod Dia MM	B +.000/- .002	C	E	G	J	F	V	RM	TD +.000/- .001	TL
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	1.000	1.00
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	1.000	1.00
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	1.375	1.38
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	1.375	1.38
2.50	1.00	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

- 15 Intermediate Trunnion Mounts NFPA MT4 Mount



Bore	Rod Dia MM	UM	TM	TA	Max. O	XV Std *	ZB+ Max	Piston Thick.	K	Minimum stroke 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 16 Cap Trunnion 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 76

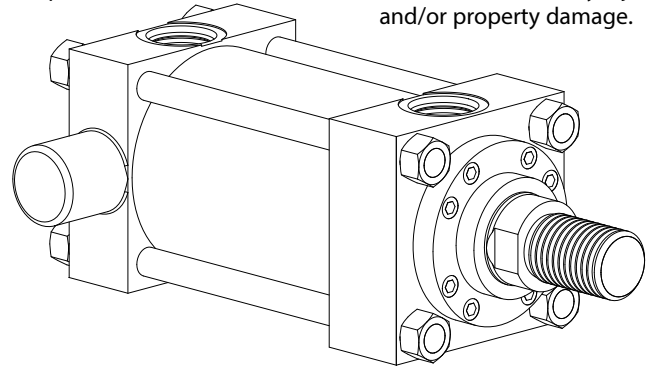
The trunnion pins are an integral part of the head and can be sleeved to provide an extremely tight fit to the mating machine member and permit curvilinear motion.

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.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

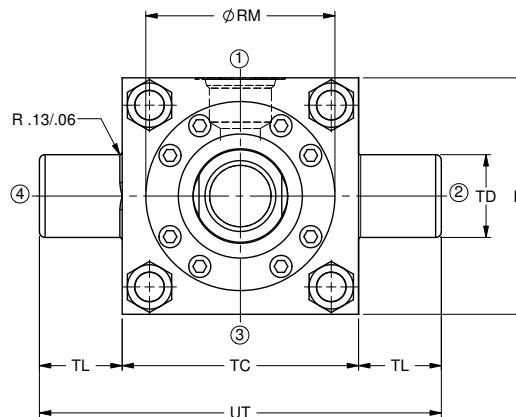
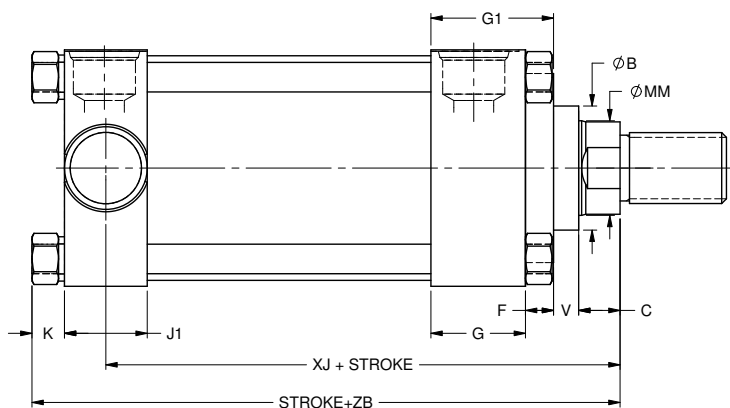


Bore	Rod Dia MM	B +.000/- .002	C	E	G	J1	F	V	RM
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63
	1.38	1.999	0.63	3.50	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

-16 Cap Trunnion NFPA MT2 Mount



Bore	Rod Dia MM	TD +.000/-0.001	TL	TC	UT	XJ+	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions – 17 Head Trunnion 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 selec-

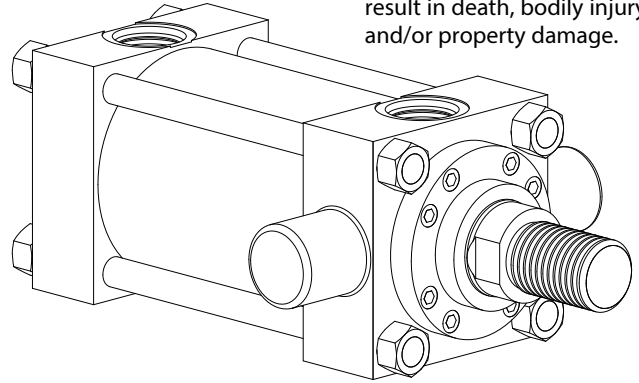
tion” on page 76

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.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

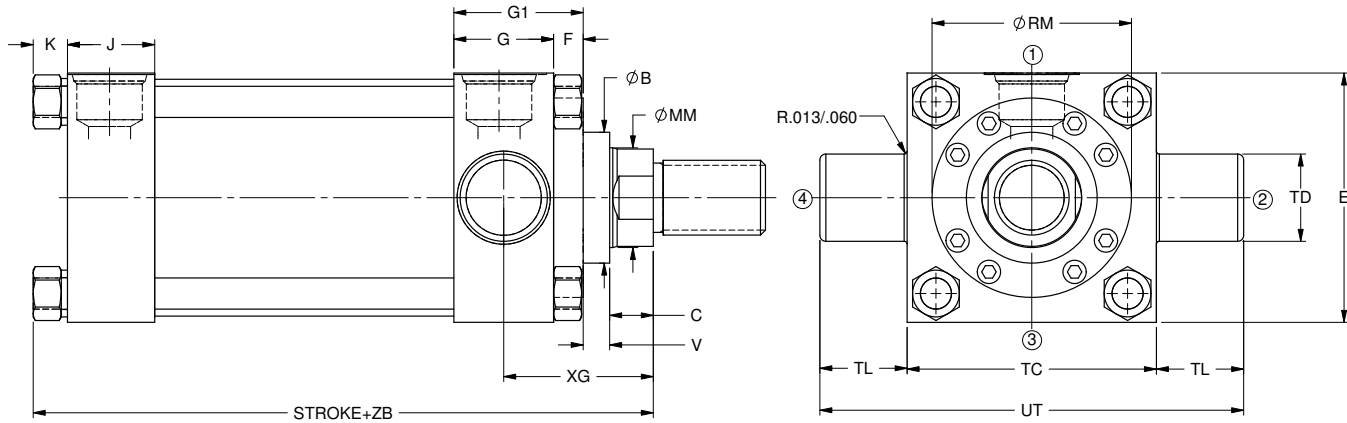


Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	F	V	RM
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63
	1.38	1.999	0.63	3.50	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

– 17 Head Trunnion NFPA MT1 Mount



Bore	Rod Dia MM	TD +.000/- .001	TL	TC	UT	XG+	ZB+ Max	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 19 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 center-line 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 76

WARNING

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

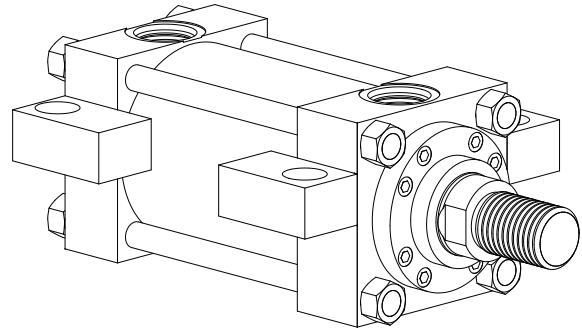
Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque.

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

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

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

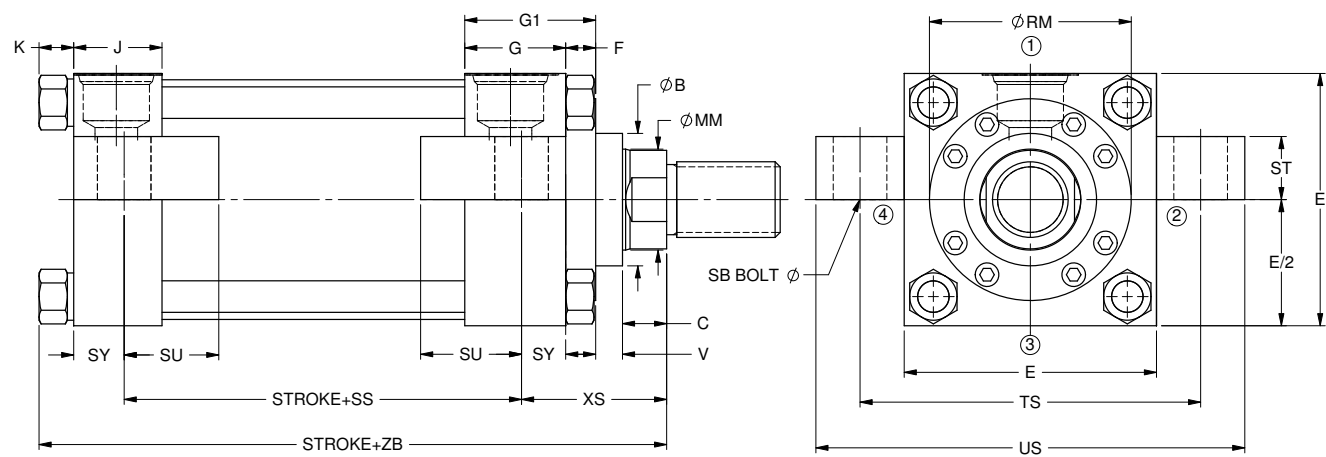


Bore	Rod Dia MM	B +0.000/- .002	C	E	G	J	F	V	RM	SB	SS+
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	0.38	3.88
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	0.38	3.88
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	0.50	3.63
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	0.50	3.63
2.50	1.00	1.499	0.50	3.50	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

– 19 Center Lug Mounts ANSI MS3



Bore	Rod Dia MM	ST	SU	SY	TS	US	XS	ZB+ Max	Piston 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 53 for Port Dimensions and Position

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 extend-ed tie rod mount is recom-mended for compression (pushing) applications.

The mounting surface should be flat and the frame on which the cylinder is mount-ed *must* be sufficiently rigid to resist bending moments.

Once fitted into the applica-tion framework, tmounting nuts should be torqued to the values listed in the table (right).

Tie Rod Torque Values

Torque values in the follow-ing table apply to all mount-ing styles.

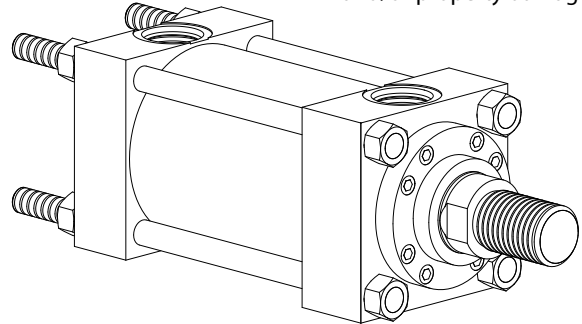
Bore	Tie Rod Torque	
	Ft-Lb	Nm
1.50	30	41
2.00	40	54
2.50	80	108
3.25	190	258
4.00	190	258
5.00	550	746
6.00	700	949
7.00	750	1017
8.00	1250	1695

NOTE

For strokes in excess of 30 inches, see “Stop tube selection” on page 76

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

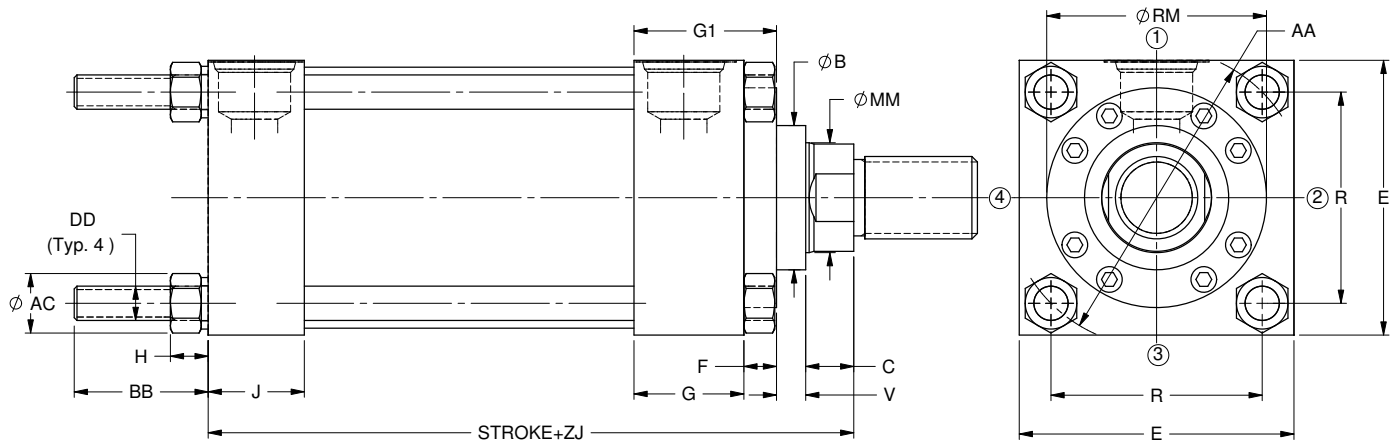


Bore	Rod Dia MM	B +.000/-.002	C	E	G	J	F	V	RM
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63
	1.38	1.999	0.63	3.50	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



Bore	Rod Dia MM	R	AA	Max AC	BB	(UN) DD	ZJ+	Piston Thick.	Max 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 53 for Port Dimensions and Position

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 46.

NOTE

For strokes in excess of 30 inches, see “Stop tube selection” on page 76

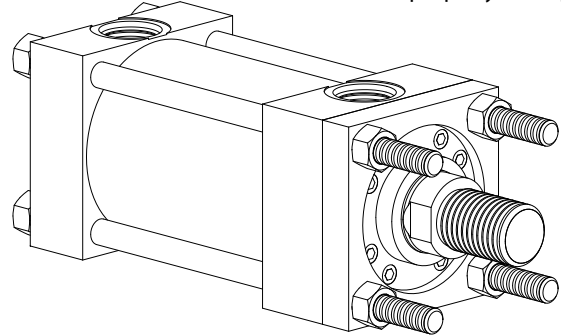
WARNING

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.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

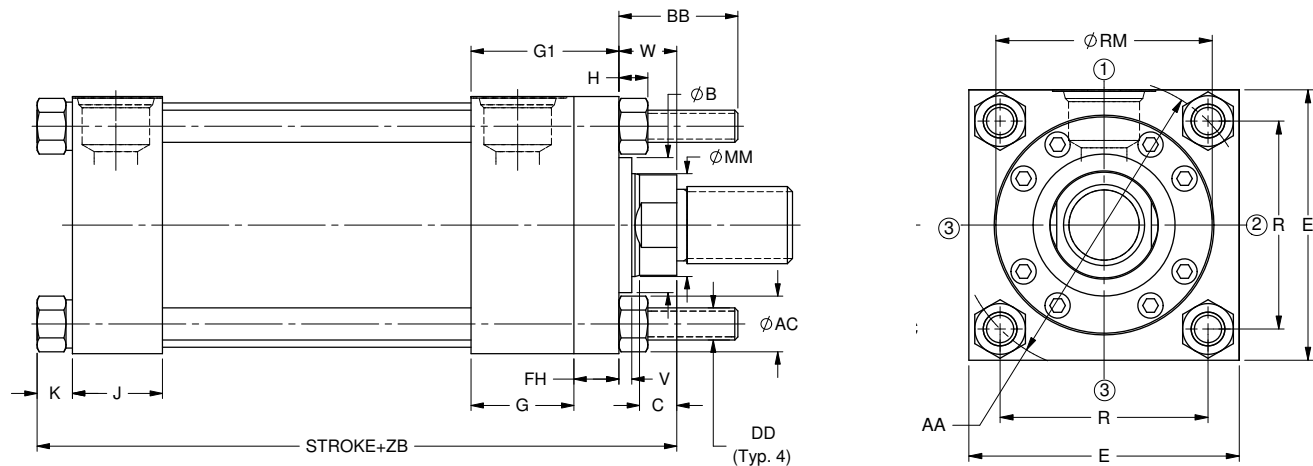


Bore	Rod Dia MM	B +0.000/-0.002	C	E	G	J	FH	V	R
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	1.63
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	1.63
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	2.05
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	2.05
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.63	0.25	2.55
	1.38	1.999	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



Bore	Rod Dia MM	AA	Max AC	BB	(UN) DD	Max H	ZB+ Max	Piston 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 53 for Port Dimensions and Position

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 46

NOTE

For strokes in excess of 30 inches, see "Stop tube selection" on page 76

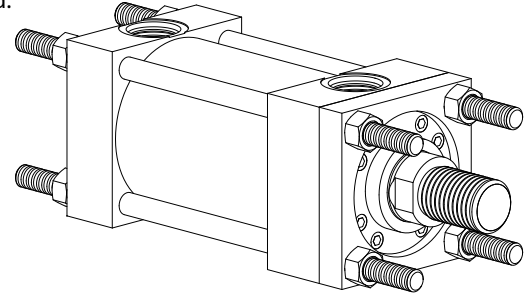
WARNING

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.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

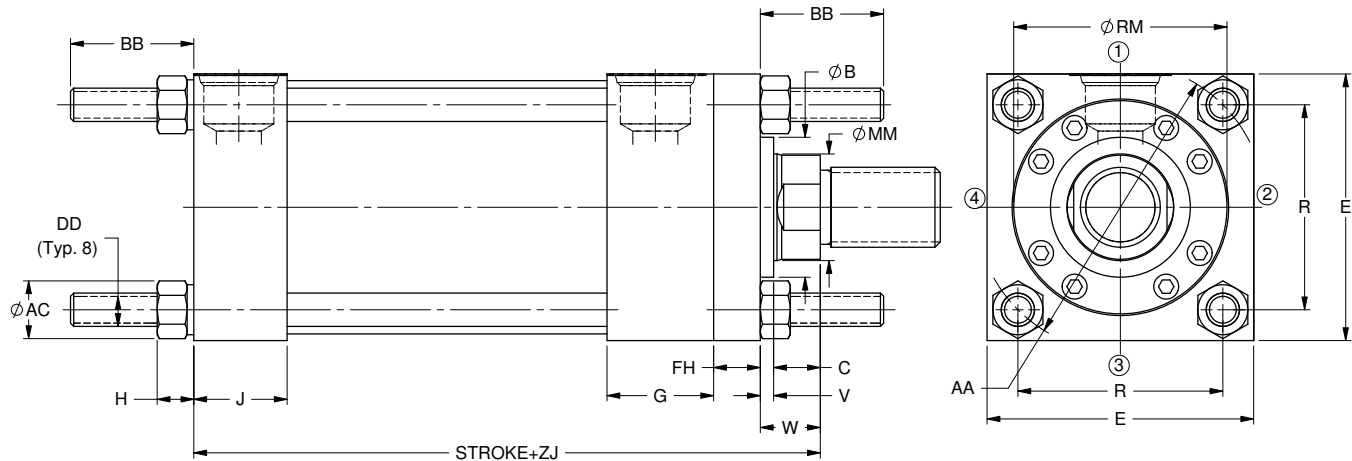


Bore	Rod Dia MM	B +.000/- .002	C	E	G	J	FH	V	W
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	0.63
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	1.00
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	0.75
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	1.01
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.63	0.25	0.75
	1.38	1.999	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



Bore	Rod Dia MM	R	AA	Max AC	BB	(UN) DD	ZJ+ Max	Piston Thick.	Max 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 5 for Port Dimensions

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 center-line 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 76

WARNING

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.

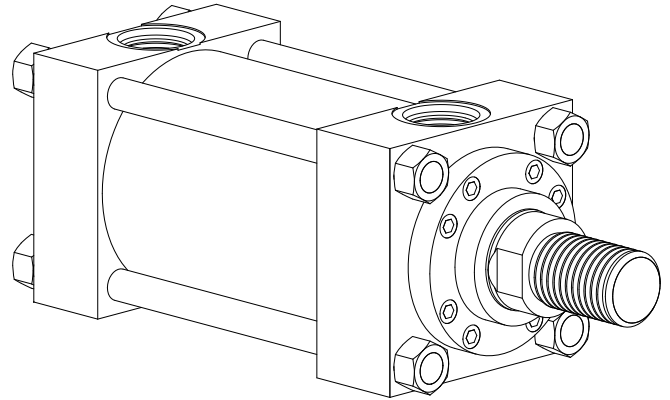
Use high tensile socket head cap screws or hex head bolts tightened to the manufacturer's recommended torque in clamping.

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, 04.

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

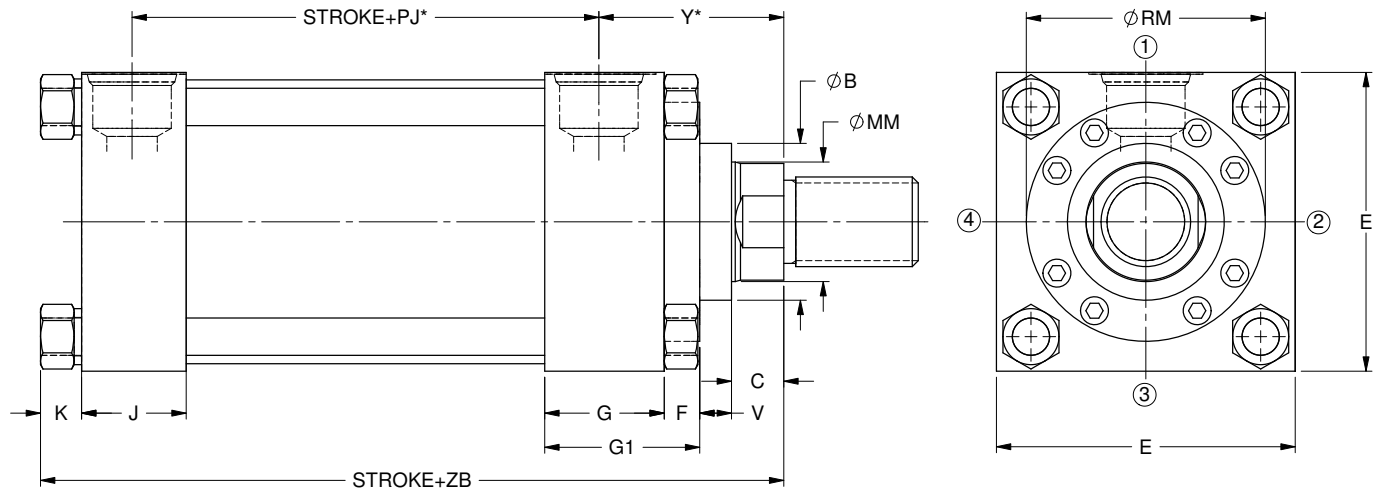
WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.



Mounting Style and Installation Dimensions

– NZ24 No Mounts



Bore	Rod Dia MM	B +0.000/ -0.002	C	E	G	J	F	V	Y	PJ+	RM	ZB+ Max	Piston 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

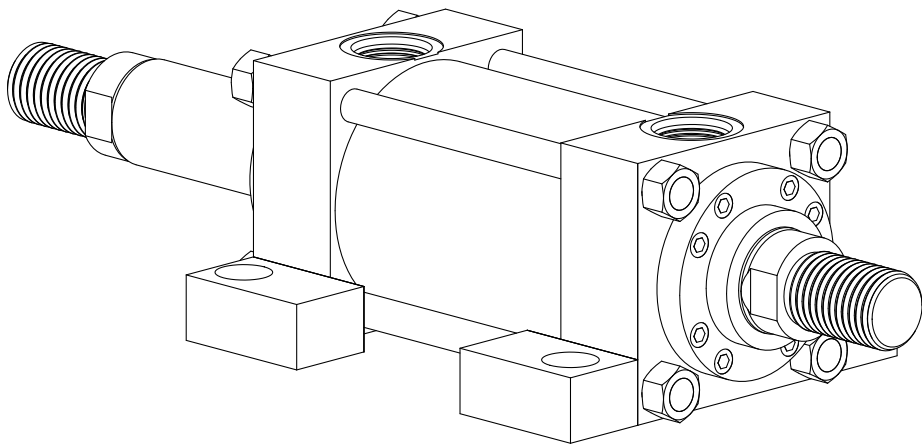
* Port dimensions for standard ports only. Consult for flange, manifold and special ports.

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.

WARNING
Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

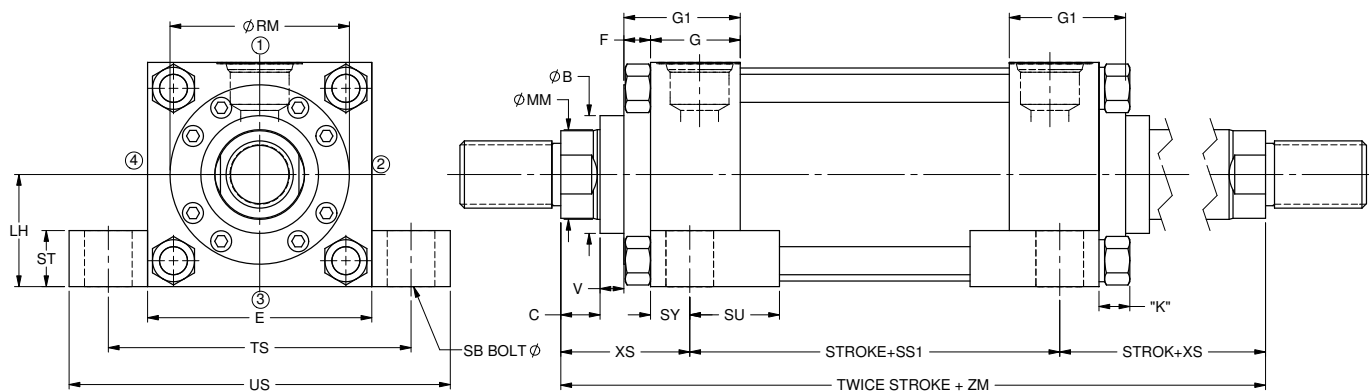


Bore	Rod Dia MM	B +.000/- .002	C	E	G	F	V	RM	LH ±.002	SS1+
1.50	0.63	1.124	0.38	2.50	1.75	0.38	0.25	-	1.243	4.13
	1.00	1.499	0.50	2.50	1.75	0.38	0.50	-	1.243	4.13
2.00	1.00	1.499	0.50	3.00	1.75	0.63	0.25	-	1.493	3.88
	1.38	1.999	0.63	3.00	1.75	0.63	0.38	-	1.493	3.88
2.50	1.00	1.499	0.50	3.50	1.75	0.50	0.38	2.63	1.743	3.63
	1.38	1.999	0.63	3.50	1.75	0.63	0.38	-	1.743	3.63
	1.75	2.374	0.75	3.50	1.75	0.63	0.50	-	1.743	3.63
3.25	1.38	1.999	0.63	4.50	2.00	0.59	0.41	3.25	2.243	4.38
	1.75	2.374	0.75	4.50	2.00	0.75	0.38	-	2.243	4.38
	2.00	2.624	0.88	4.50	2.00	0.75	0.38	-	2.243	4.38
4.00	1.75	2.374	0.75	5.00	2.00	0.59	0.53	3.88	2.493	4.25
	2.00	2.624	0.88	5.00	2.00	0.59	0.53	4.00	2.493	4.25
	2.50	3.124	1.00	5.00	2.00	0.59	0.66	4.44	2.493	4.25
5.00	2.00	2.624	0.88	6.50	2.00	0.59	0.53	4.00	3.243	4.75
	2.50	3.124	1.00	6.50	2.00	0.59	0.66	4.44	3.243	4.75
	3.00	3.749	1.00	6.50	2.00	0.72	0.53	5.25	3.243	4.75
	3.50	4.249	1.00	6.50	2.00	0.72	0.53	5.63	3.243	4.75
6.00	2.50	3.124	1.00	7.50	2.25	0.59	0.66	4.44	3.743	5.13
	3.00	3.749	1.00	7.50	2.25	0.72	0.53	5.25	3.743	5.13
	3.50	4.249	1.00	7.50	2.25	0.72	0.53	5.63	3.743	5.13
	4.00	4.749	1.00	7.50	2.25	0.88	0.38	6.44	3.743	5.13
7.00	3.00	3.749	1.00	8.50	2.75	0.72	0.53	5.25	4.243	5.75
	3.50	4.249	1.00	8.50	2.75	0.72	0.53	5.63	4.243	5.75
	4.00	4.749	1.00	8.50	2.75	0.88	0.38	6.44	4.243	5.75
	4.50	5.249	1.00	8.50	2.75	0.88	0.38	7.13	4.243	5.75
	5.00	5.749	1.00	8.50	2.75	0.88	0.38	7.56	4.243	5.75
8.00	3.50	4.249	1.00	9.50	3.00	0.72	0.53	5.63	4.743	6.75
	4.00	4.749	1.00	9.50	3.00	0.88	0.38	6.44	4.743	6.75
	4.50	5.249	1.00	9.50	3.00	0.88	0.38	7.13	4.743	6.75
	5.00	5.749	1.00	9.50	3.00	0.88	0.38	7.56	4.743	6.75
	5.50	6.249	1.00	9.50	3.00	0.88	0.38	8.38	4.743	6.75

+ Plus Stroke

Mounting Style and Installation Dimensions

– NZ25 Double Rod Side Lug Mount NFPA MS7 Mount



Bore	Rod Dia MM	ST	SU	SY	TS	US	SB	XS	ZM+	Piston 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 for Port Dimensions

Mounting Style and Installation Dimensions – 47 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 63 for stroke limitations.

NOTE

For strokes in excess of 24 inches, see Stop tube selection" on page 76

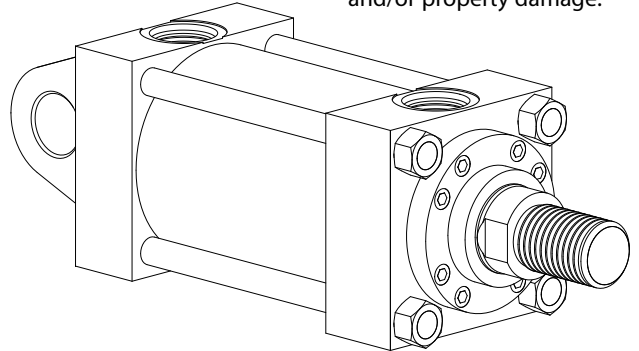
WARNING

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 11.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

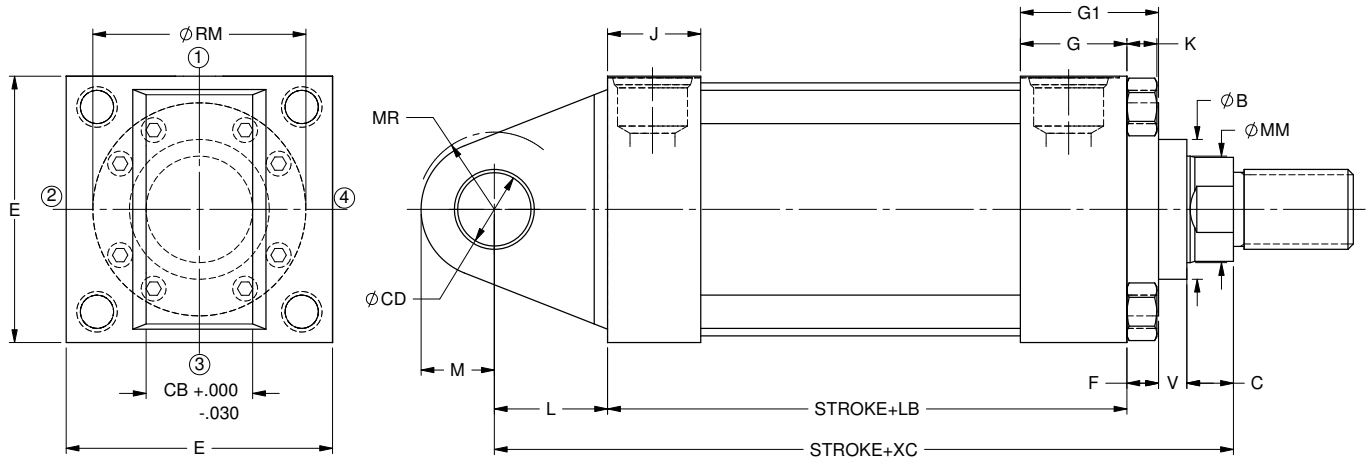


Bore	Rod Dia MM	B +.000/-.002	C	E	G	J	F	V	RM
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63
	1.38	1.999	0.63	3.50	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

– 47 Cap Fixed Eye Mount ANSI MP3



Bore	Rod Dia MM	L	M	CB	CD	MR	LB+	XC+	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 48 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 63 for stroke limitations.

NOTE

For strokes in excess of 24 inches, see “Stop tube selection” on page 76

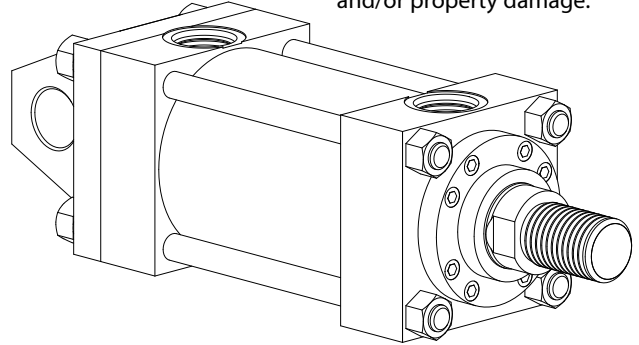
WARNING

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 11.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

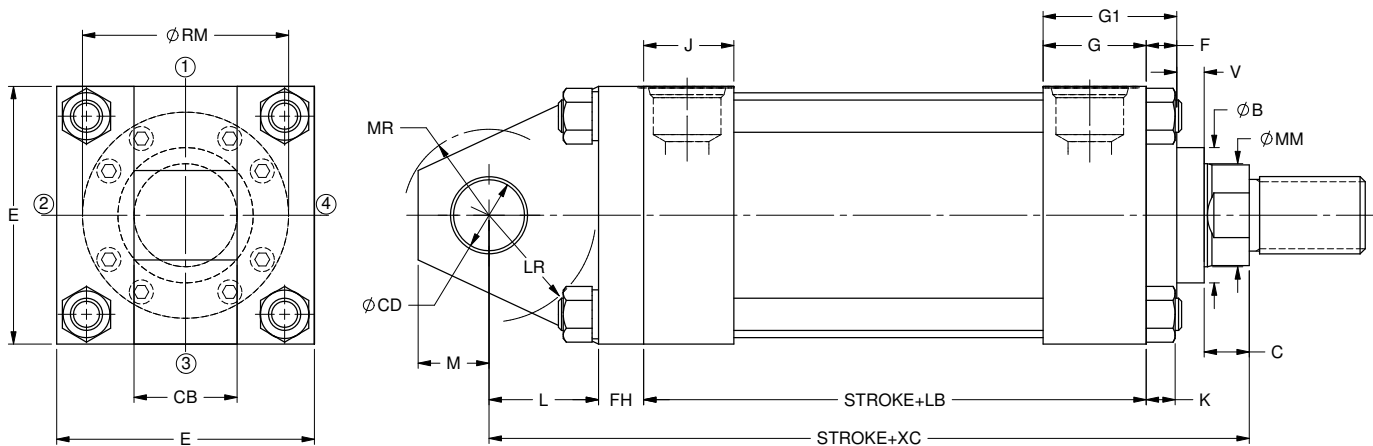


Bore	Rod Dia MM	B +.000/-.002	C	E	G	J	F	V	RM	L
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	0.75
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	0.75
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	1.25
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	1.25
2.50	1.00	1.499	0.50	3.50	1.75	1.50	0.50	0.38	2.63	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

– 48 Cap Detachable Eye Mount ANSI MP4



Bore	Rod Dia MM	M	CB	CD	MR	LB+	FH	XC+	Piston 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 53 for Port Dimensions and Position

Mounting Style and Installation Dimensions

– 50 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 63 for stroke limitations.

NOTE

For strokes in excess of 24 inches, see "Stop tube selection" on page 76

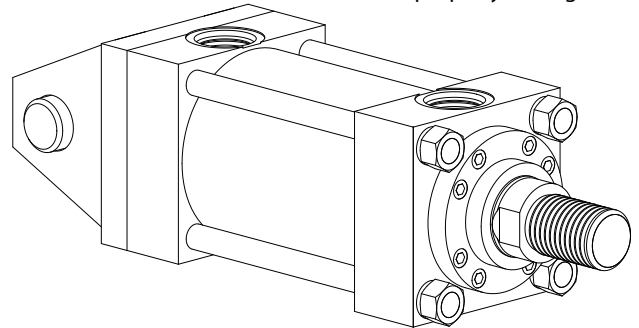
WARNING

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 11.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

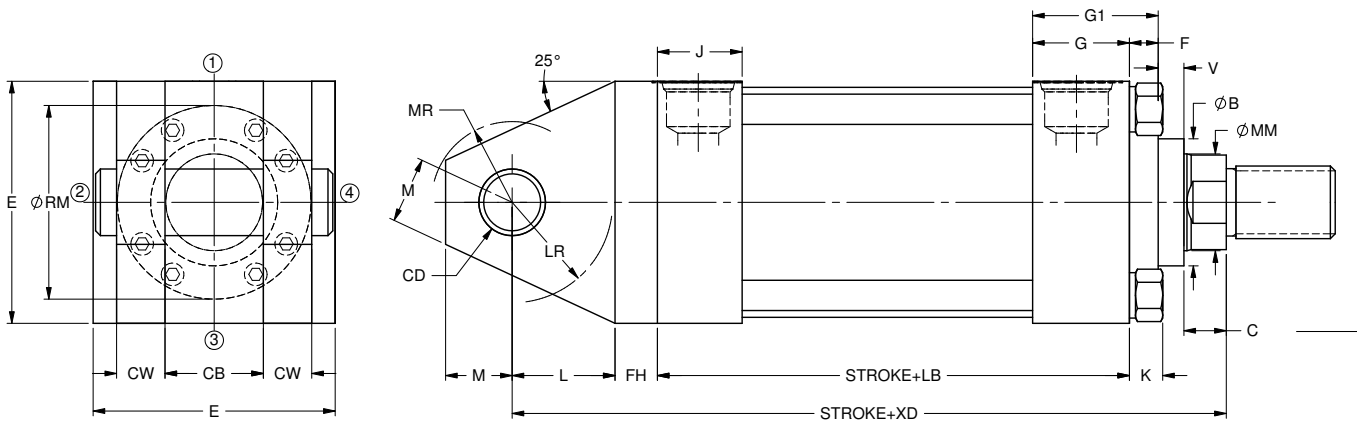


Bore	Rod Dia MM	B + .000/- .002	C	E	G	J	F	V	RM	FH	L
1.50	0.63	1.124	0.38	2.50	1.75	1.50	0.38	0.25	-	0.38	0.75
	1.00	1.499	0.50	2.50	1.75	1.50	0.38	0.50	-	0.38	0.75
2.00	1.00	1.499	0.50	3.00	1.75	1.50	0.63	0.25	-	0.63	1.25
	1.38	1.999	0.63	3.00	1.75	1.50	0.63	0.38	-	0.63	1.25
2.50	1.00	1.499	0.50	3.50	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

– 50 Cap Detachable Clevis Mount ANSI MP2



Bore	Rod Dia MM	M	CB	CD+.000/ -.002	CW	LR	MR	LB+	XD+	Piston 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 53 for Port Dimensions and Position

Bore and 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 derieved from charts and formulas may be therotically correct, but other factor 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.

WARNING

It is the user's responsibility to select the correct cylinder size.

Bore φ in	Rod φ in	Work Area (in²)	Maximum Force (lbf) At working pressure(psi)					
			500 (psi)	750 (psi)	1000 (psi)	1500 (psi)	2000 (psi)	3000 (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")

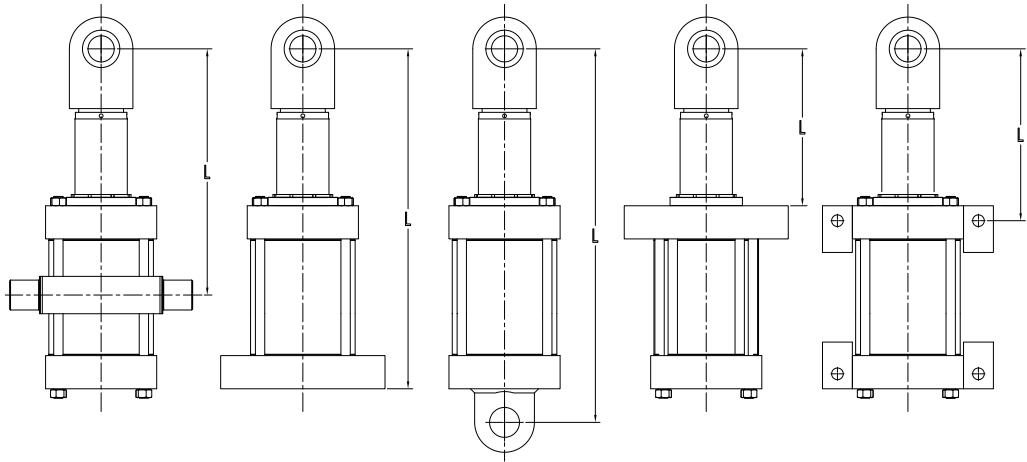
In push application, a cylinder acts as loaded column.

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 spelling analysis only and does not consider side load-ing, stop tube requirments or other cylinder stroke limitations.

For pressure above 3000 PSI Consult your local representative.



Maximum Length L (in) at Working Pressure (psi) (Length L in full extend condition)

Bore φ in	Rod φ in	Rigid Mount (01,02,04,05,07,08,09,12, 13,14,19,21,22,23,24)								Swivel Mount (10,11,15,16,17,47,48,50)							
		3000 psi	2000 psi	1500 psi	1000 psi	750 psi	500 psi	250 psi	3000 psi	2000 psi	1500 psi	1000 psi	750 psi	500 psi	250 psi	3000 psi	2000 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	19	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		

End conditions for above chart

Mount	Condition
Rigid Mounts	Fixed-Guided
Swivel Mounts	Pin-Pin

Calculation according to Euler

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

Calculation according to Jb Johnson

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

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

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 con-

tact your local sales engineer and we will build to your requirements.

Table on page 63 gives maximum allowable push length at various operating pressures for available rod diameters. Rod ends on rigid mount should be supported.

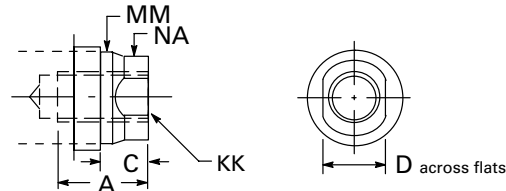
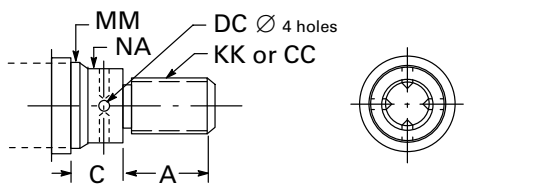
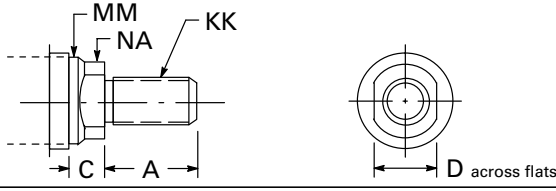
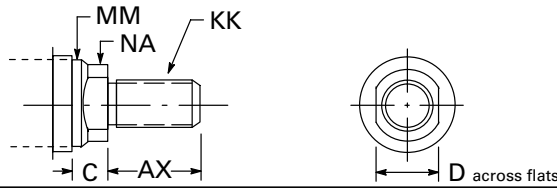
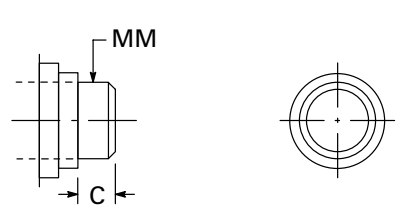
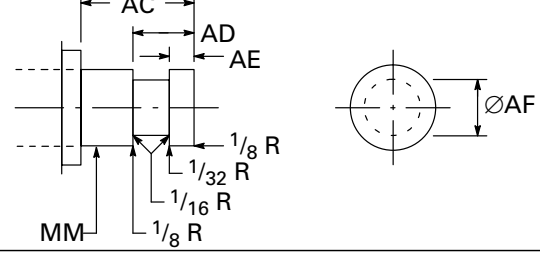
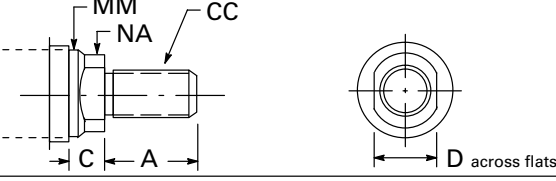
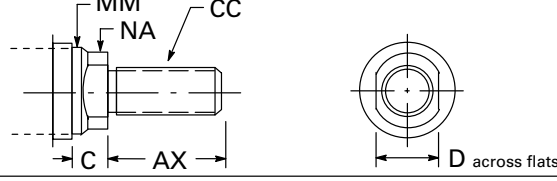
Longer strokes allowable for pull only applications.

Contact your local sales engineer for application assistance if necessary

Note: Code A, H, 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

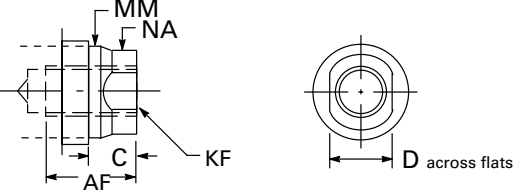
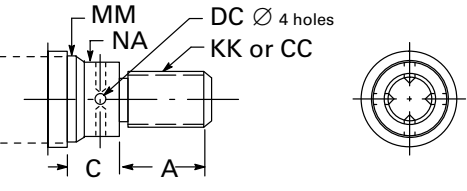
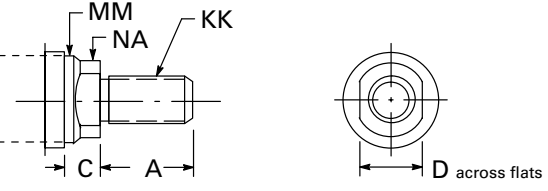
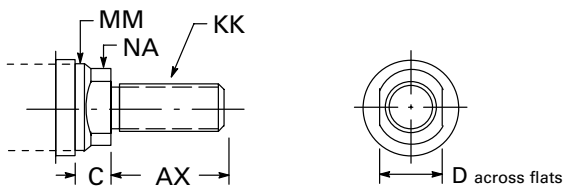
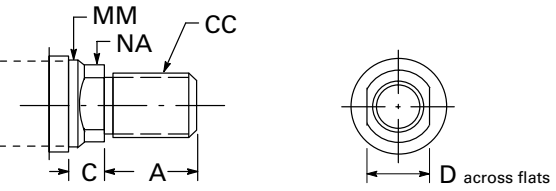
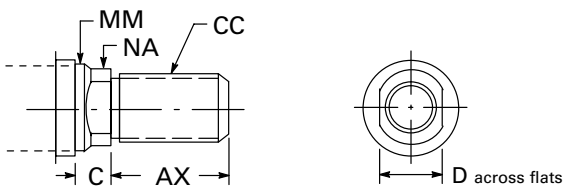
Code B		For rod sizes 3 1/2" thru 5 1/2"	
Code C		Code K	
Code D		Code G	
Code F		Code M	

Rod Ø MM	UN(F) Thread											
	A	C	D	AC	AD	AE	AF	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 1/4-12	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

Metric Rod Ends

Code A		For rod sizes 3 1/2" thru 5 1/2"	
Code E		L	
Code H		N	

Rod Dia 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	75	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 E or L. Note: Dimensions in millimeters.

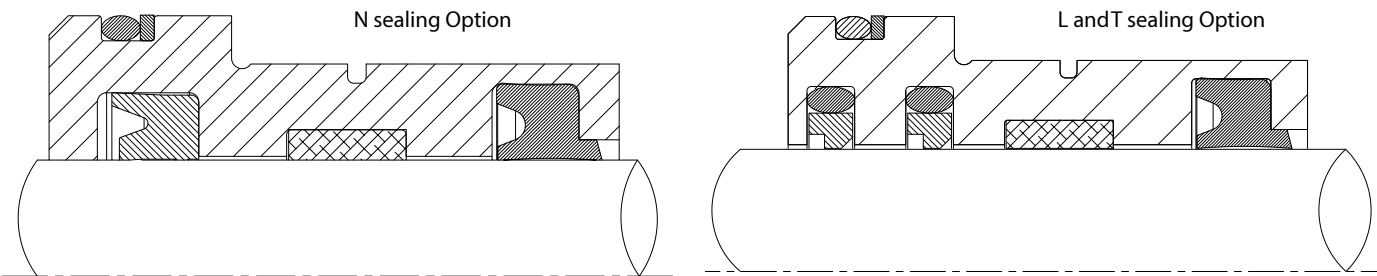
Sealing system

Four different sealing systems are available in Series NZ cylinders.

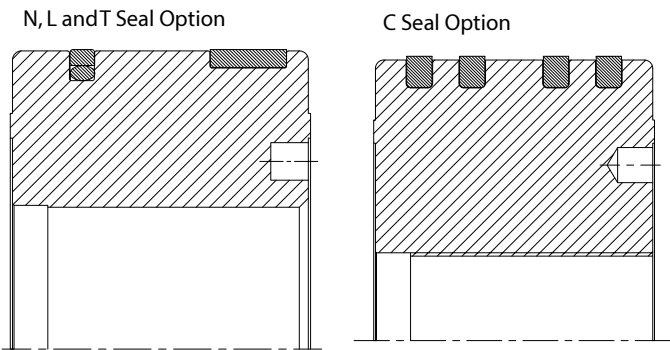
Determine the correct seal code for your application, then enter it as item 8 in the model code.

Code	Fluid	Temperature (°F)	Max. Speed (ft/s)	(m/sec)	Application
N	Mineral oil, petroleum base	-31 to 176	2.25	0.69	Normal, typical industrial
	Automotive transmission fluid				
L	Mineral oil	-31 to 248	15	4.57	Low friction servo Fire retardant fluids
	Water glycol (HFC)	50 to 158	3	0.91	
	Oil-in-water emulsions (HFA)				
	Water-in-oil emulsions (HFB)				
T	Mineral oil	-13 to 392	15	4.57	High temperature Fire retardant fluids
	Phosphate esters, petroleum oil blends	32 to 392	15	4.57	
	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	0.69	Normal, typical industrial
	Automotive transmission fluid				

Rod Seal Configuration

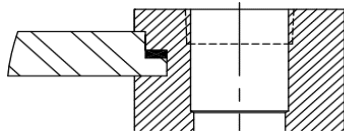


Piston Seal Configuration



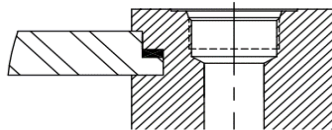
Port types and sizes

CODE 1



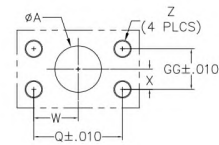
Code	Port Size
11	NPTF-.125
12	NPTF-.250
13	NPTF-.375
14	NPTF-0.50
15	NPTF-0.75
16	NPTF-1.00
17	NPTF-1.25
18	NPTF-1.50
19	NPTF-2.00
20	NPTF-2.50
59	NPTF-3.00

CODE 3,5



Code	Port Size
01	SAE#4
02	SAE#6
03	SAE#8
04	SAE#10
05	SAE#12
06	SAE#14
07	SAE#16
08	SAE#20
09	SAE#24
10	SAE#32

CODE 6

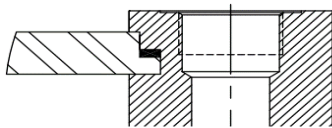


Dimensions in inches

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)

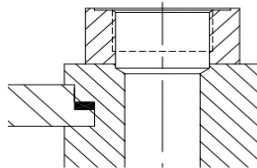
Code	Port Size
29	4 Bolt flange code 61- 0.50
30	4 Bolt flange code 61- 0.75
31	4 Bolt flange code 61- 1.00
32	4 Bolt flange code 61- 1.25
33	4 Bolt flange code 61- 1.50
34	4 Bolt flange code 61- 2.00
35	4 Bolt flange code 61- 2.50

CODE 7



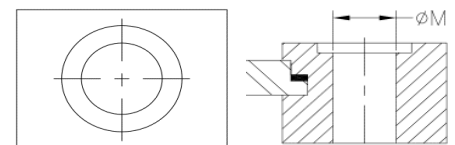
Code	Port Size
21	BSPP G-0.25
22	BSPP G-0.375
23	BSPP G-0.50
24	BSPP G-0.75
25	BSPP G-1.00
26	BSPP G-1.25
27	BSPP G-1.50
28	BSPP G-2.00
60	BSPP G-3.00

CODE 9,A



Code	Port Size
45	ISO 6149 M14X1.5
46	ISO 6149 M22X1.5
47	ISO 6149 M27X2
48	ISO 6149 M33X2
49	ISO 6149 M42X2
50	ISO 6149 M48X2
51	ISO 6149 M20X1.5
52	DIN 3852 M14X1.5
53	DIN 3852 M20X1.5
54	DIN 3852 M22X1.5
55	DIN 3852 M27X2
56	DIN 3852 M33X2
57	DIN 3852 M42X2
58	DIN 3852 M48X2

CODE M



Code	Port Size
36	1/4" Manifold port
37	3/8" Manifold port
38	1/2" Manifold port
39	9/16" Manifold port
40	5/8" Manifold port
41	13/16" Manifold port
42	1" Manifold port
43	1-1/16" Manifold port
44	1-3/8" Manifold port
61	3/16" Manifold port
62	3/4" Manifold port
63	1-1/4" Manifold port
64	1-1/2" Manifold port
65	1-5/8" Manifold port

Port types and sizes

Available Ports

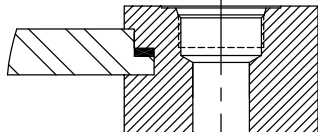
Series NZ cylinders are available with SAE straight thread O-ring ports and the alternate ports listed below. The table

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

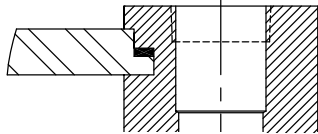
with each bore diameter and port type combination. Some mounting styles have port location restrictions. Check the port location table on page

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

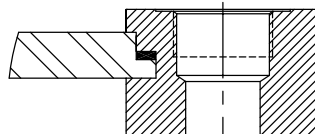
CODE 3



CODE 1



CODE 7, 9, A



Port Code

		3		5		1		7		6				
		SAE J1926 / UN O-ring			NPTF ‡ Pipe			BSPP ‡ ISO 228-1			SAE 518 Code 61 Flange			
Bore	Rod	Std	Over size	NFPA Std	Under Size	Std	Oversize		Under Size	Std	Oversize		Under Size	Std
							Head	Cap			Head	Cap		
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

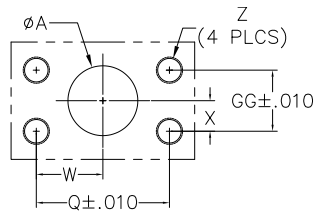
* Port Boss required for port position 1 and 3, These ports are not feasible for port position 2 & 4

** 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 Types and Sizes

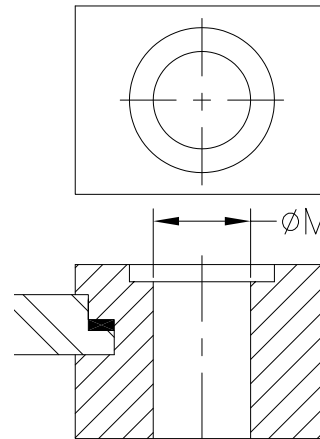
CODE 6



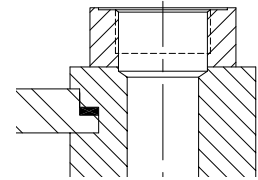
Dimensions in inches

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 7, 9, A with*



Port Code

		9				A				M
		DIN 3852 Form X Metric				ISO 6149-1				Manifold
Bore	Rod	Under Size		Oversize		Under Size		Oversize		Std Φ M
		Std	Head	Cap	Head	Std	Head	Cap	Head	
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 Ø in	Rod Ø in	Fluid Required per Inch of stroke		Port Codes 1,5,6,9 & A		Port Code 3		Port Code 7	
		(gal)	(in³)	Flow (gpm)	Piston Velocity (In/sec)	Flow (gpm)	Piston Velocity (In/sec)	Flow (gpm)	Piston Velocity (In/sec)
1.50	Cap	0.008	1.767	6.0	13.1	6.0	13.1	3.4	7.4
	0.63	0.006	1.460	6.0	15.8	6.0	15.8	3.4	9.0
	1.00	0.004	0.982	6.0	23.5	6.0	23.5	3.4	13.3
2.00	Cap	0.014	3.142	6.0	7.4	6.0	7.4	3.4	4.2
	1.00	0.010	2.356	6.0	9.8	6.0	9.8	3.4	5.6
	1.38	0.007	1.657	6.0	13.9	6.0	13.9	3.4	7.9
2.50	Cap	0.021	4.909	6.0	4.7	6.0	4.7	3.4	2.7
	1.00	0.018	4.123	6.0	5.6	6.0	5.6	3.4	3.2
	1.38	0.015	3.424	6.0	6.7	6.0	6.7	3.4	3.8
	1.75	0.011	2.503	6.0	9.2	6.0	9.2	3.4	5.2
3.25	Cap	0.036	8.296	14.5	6.7	14.5	6.7	9.2	4.3
	1.38	0.029	6.811	14.5	8.2	14.5	8.2	9.2	5.2
	1.75	0.026	5.891	14.5	9.5	14.5	9.5	9.2	6.0
	2.00	0.022	5.154	14.5	10.8	14.5	10.8	9.2	6.9
4.00	Cap	0.054	12.566	14.5	4.4	14.5	4.4	9.2	2.8
	1.75	0.044	10.161	14.5	5.5	14.5	5.5	9.2	3.5
	2.00	0.041	9.425	14.5	5.9	14.5	5.9	9.2	3.8
	2.50	0.033	7.658	14.5	7.3	14.5	7.3	9.2	4.6
5.00	Cap	0.085	19.635	14.5	2.8	14.5	2.8	9.2	1.8
	2.00	0.071	16.493	14.5	3.4	14.5	3.4	9.2	2.1
	2.50	0.064	14.726	14.5	3.8	14.5	3.8	9.2	2.4
	3.00	0.054	12.566	14.5	4.4	14.5	4.4	9.2	2.8
	3.50	0.043	10.014	14.5	5.6	14.5	5.6	9.2	3.5
6.00	Cap	0.122	28.274	27.9	3.8	27.9	3.8	14.5	2.0
	2.50	0.101	23.366	27.9	4.6	27.9	4.6	14.5	2.4
	3.00	0.092	21.206	27.9	5.1	27.9	5.1	14.5	2.6
	3.50	0.081	18.653	27.9	5.8	27.9	5.8	14.5	3.0
	4.00	0.068	15.708	27.9	6.8	27.9	6.8	14.5	3.6
7.00	Cap	0.167	38.485	45.5	4.6	45.5	4.6	27.9	2.8
	3.00	0.136	31.416	45.5	5.6	45.5	5.6	27.9	3.4
	3.50	0.125	28.863	45.5	6.1	45.5	6.1	27.9	3.7
	4.00	0.112	25.918	45.5	6.8	45.5	6.8	27.9	4.1
	4.50	0.098	22.580	45.5	7.8	45.5	7.8	27.9	4.8
	5.00	0.082	18.850	45.5	9.3	45.5	9.3	27.9	5.7
8.00	Cap	0.218	50.266	67.4	5.2	45.5	3.5	27.9	2.1
	3.50	0.176	40.644	67.4	6.4	45.5	4.3	27.9	2.6
	4.00	0.163	37.699	67.4	6.9	45.5	4.6	27.9	2.8
	4.50	0.149	34.361	67.4	7.6	45.5	5.1	27.9	3.1
	5.00	0.133	30.631	67.4	8.5	45.5	5.7	27.9	3.5
	5.50	0.115	26.507	67.4	9.8	45.5	6.6	27.9	4.1

Note: Under size and over size port velocities are not shown.

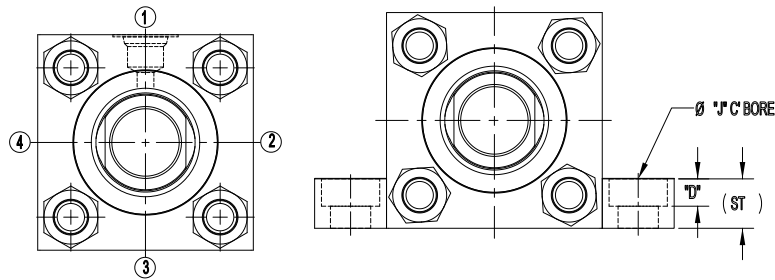
Port Locations

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

bers 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
01	Side Lug	A	A	N	A	A	A	N	A
02	Side Tapped	A	A	N	A	A	A	N	A
03	End Lug Mount	A	A	N	A	A	A	N	A
04	Keyed Side Lug	A	A	A	A	A	A	A	A
05	Keyed Tapped	A	A	N	A	A	A	N	A
07	Head Rectangular Flange	A	A	A	A	A	A	A	A
08	Head Square Flange	A	A	A	A	A	A	A	A
09	Head Rectangular	A	A	A	A	A	A	A	A
10	Clevis	A	A	A	A	A	A	A	A
11	Spherical Bushing	A	A	A	A	A	A	A	A
12	Cap Rectangular Flange	A	A	A	A	A	A	A	A
13	Cap Square Flange	A	A	A	A	A	A	A	A
14	Cap Rectangular	A	A	A	A	A	A	A	A
15	Intermediate Trunnion	A	A	A	A	A	A	A	A
16	Cap Trunnion	A	A	A	A	A	N	A	N
17	Head Trunnion	A	N	A	N	A	A	A	A
19	Centerline Lug	A	N	A	N	A	N	A	N
21	Cap End Extended Tie Rod	A	A	A	A	A	A	A	A
22	Head End Extended Tie Rod	A	A	A	A	A	A	A	A
23	Both Ends Extended Tie Rod	A	A	A	A	A	A	A	A
24	No Mount	A	A	A	A	A	A	A	A
25	Double Rod, Side Lug	A	A	N	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	A	A	A				
29	Double Rod, Keyed Tapped	A	A	N	A				
31	Double Rod, Rectangular Flange	A	A	A	A				
32	Double Rod, Square Flange	A	A	A	A				
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
48	Cap Detachable Eye	A	A	A	A	A	A	A	A
50	Cap Detachable Clevis	A	A	A	A	A	A	A	A

A - Available

N - Not available

W - Port is available without port Boss only

Refer Page 69 for port Boss requirements, refer Page 74. for switch availability

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.

FORCE FACTOR CHART

Force Factors ($a = v^2 \times .001294$)

PISTON	VELOCITY	PISTON	VELOCITY
ips	a	ips	a
1	.00129	26	.875
2	.00518	27	.944
3	.0117	28	1.02
4	.0208	29	1.09
5	.0324	30	1.16
6	.0466	31	1.24
7	.0635	32	1.33
8	.0829	33	1.41
9	.105	34	1.50
10	.129	35	1.59
11	.157	36	1.68
12	.186	37	1.77
13	.219	38	1.87
14	.254	39	1.97
15	.291	40	2.07
16	.332	41	2.18
17	.374	42	2.28
18	.420	43	2.39
19	.467	44	2.51
20	.518	45	2.62
21	.571	46	2.74
22	.627	47	2.86
23	.685	48	2.98
24	.746	49	3.11
25	.809	50	3.24

GENERAL FORMULAS

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

Use the information below, along with the examples on page 62 to determine if standard cushioning is sufficient for your application.

FORCE FACTOR TERMINOLOGY

TERM USED	EXPLANATION	UNITS
W	Weight of the 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's motion	Horizontal = .15; 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	pounds per square inch (psi)
Pc	Contained cushioning pressure	pounds per square inch (psi)

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

decelerated upward or accelerated downward, use the general formula $F_{acc} \text{ or } F_{dec} = (W \times \frac{a}{g}) - W$.

- 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.

Cylinder Size Selection: Cushions

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 be stopped in 1 1/4". Assume the coefficient of friction to be .15.

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

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.

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

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. ²)	
		Head	Cap	Head (A _{hc})	Cap (A _{cc})
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
	5.50	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

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 condi-

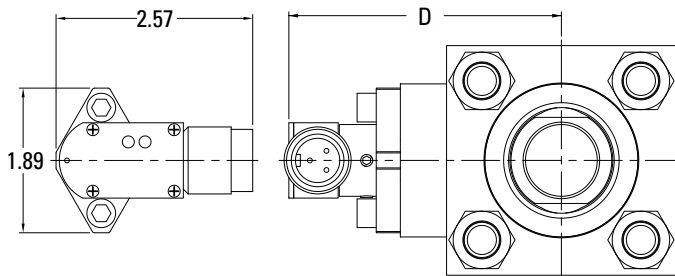
tion, the switch assumes a non-conducting mode. The fault condition *must* be removed and power turned off in order to reset the switch.

This feature prevents unintended automatic restarts. The switch indicated when it is in SCP mode by flashing both leads.

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

Balluff

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 2 lit: Target present (both flashing = SCP mode)



Note : NA - Not available

Proximity switch for 1.50" at postion 2 & 4 is not available for 07 Mount at Head end, 12 Mount at Cap end

Proximity Switch for "1.50" is unavailable for 08 Mount at Head end, 13 Mount at Cap end

Proximity Switch for "7.00 & 8.00" is unavailable for 14 Mount at Cap end

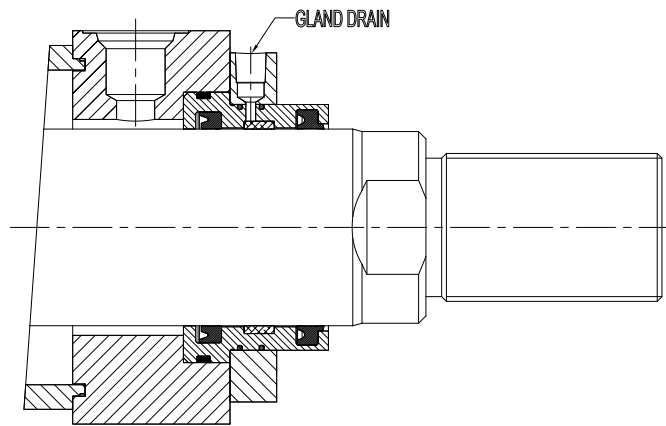
BORE	ROD	"D" Max.	"D" Max. 09 mounts Pos. 2 & 4	"D" Max. 14 mounts Pos. 2 & 4
1.50	0.63	2.99	4.03	2.99
	1.00	3.12	4.16	3.12
	CAP	2.99	2.99	3.80
2.00	1.00	3.37	5.00	3.37
	1.38	3.30	4.34	3.30
	CAP	3.08	3.08	4.73
2.50	1.00	3.35	5.00	3.35
	1.38	3.53	5.15	3.53
	1.75	3.49	4.53	3.49
	CAP	3.92	3.92	4.73
3.25	1.38	4.40	5.22	4.40
	1.75	4.59	5.40	4.59
	2.00	3.82	5.47	3.82
	CAP	4.03	4.03	5.75
4.00	1.75	4.59	5.41	4.59
	2.00	4.78	5.59	4.78
	2.50	4.07	5.72	4.07
	CAP	4.84	4.84	5.74
5.00	2.00	5.59	6.49	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	7.11	5.38
	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	8.03	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	6.32	NA	6.32
	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	6.21	6.21	NA

Gland Drains and Air Bleeds

Gland Drain Option

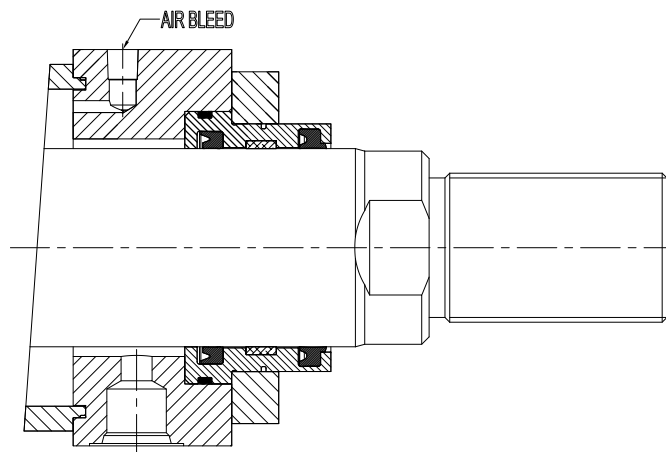
Gland drains are primarily used for long stroke cylinders (over 762mm) and when extended speed exceeds retract speed.

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.



Stop Tube Selection

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:

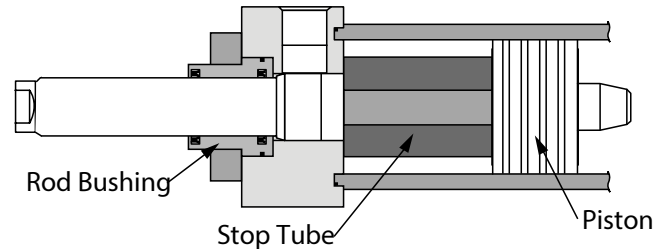
Determine the value of D with the piston rod in the fully extended position. If the value of D is under 40", no stop tube is needed.

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.



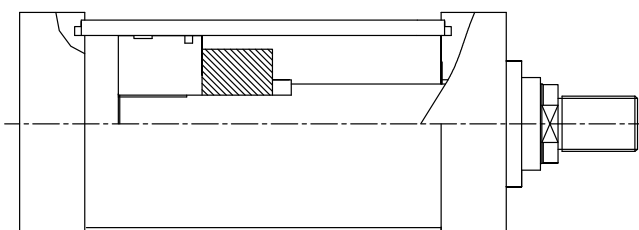
D = 4S Unsupported Rod End	D = S Supported Rod End	D = 0.5S Firmly Guided Rod End	D = 4S Unsupported Rod End
Cap Clevis or Trunnion	Intermediate Trunnion	Head Trunnion	D = S Supported Rod End
			D = 0.5S Firmly Guided Rod End

Stop Tubes

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

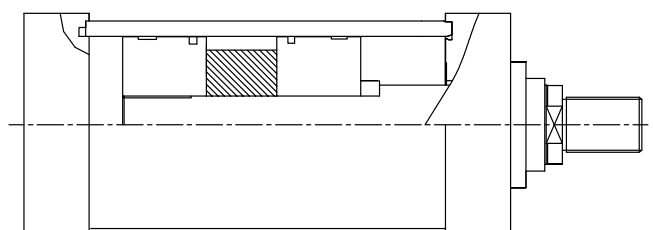
Design A

The standard stop tube design for lengths under 10".



Design B

The standard stop tube design for lengths over 254mm. Note that the piston's effective bearing area is doubled, in addition to gaining the normal increased minimum distance between bearing points.



Tie Rod Supports and Spacers

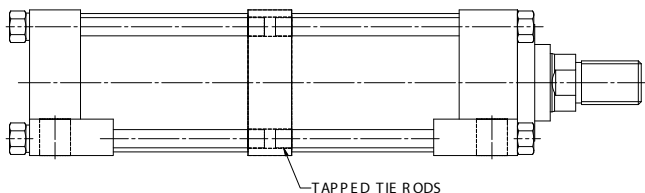
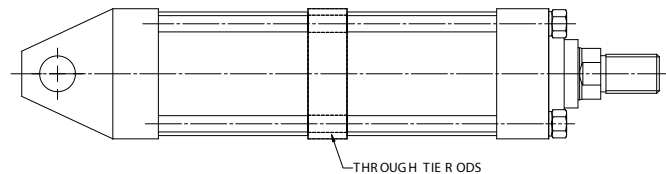
Tie rod Spacers and Center supports

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.

Accessories

WARNING

All rod accessories must be torqued against the rod shoulder.

Mounting brackets, rod clevises, and rod eyes for all NZ cylinders are available from . 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. It is user's responsibility to select the correct accessory.

WARNING

Failure to mount the cylinder correctly on the frame may result in death, bodily injury and/or property damage.

WARNING

It is the user's responsibility to select the correct accessory.

WARNINGS – Piston Rods

Cylinder users must always make sure that the piston rod is securely attached to the machine member.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod end to fail. If these types of additional loads are expected to be imposed on the piston rods, their magnitude should be made known to our Engineering Department so they may be properly addressed.

On occasion, cylinders are ordered with double rods. In some cases, a stop is threaded onto one of the piston rods and used as an external stroke adjuster. This type of

usage may result in a potential safety hazard and can also lead to premature piston rod failure. The external stop will create a pinch point. As a result, the cylinder user must use guards.

Furthermore, if an external stop is not parallel to the final contact surface, it will place a bending moment on the piston rod. An external stop will also negate the effect of a cushion and will subject the piston rod to an impact loading. These two (2) conditions can cause premature piston rod failure. The use of external stroke adjusters should be reviewed with our Engineering Department.

WARNINGS – Mounting & Accessories

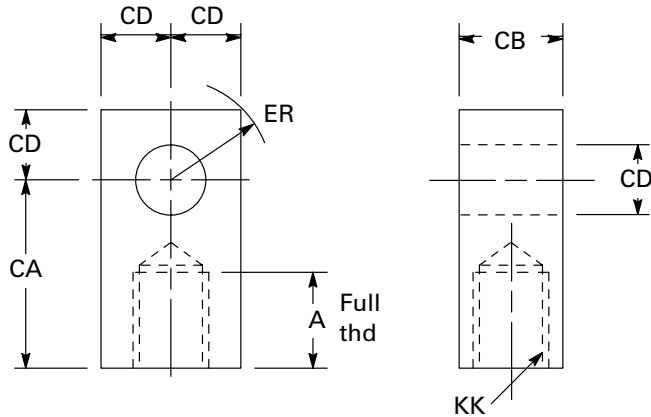
The cylinder user should avoid severe vibration and high impact load. Severe vibration can cause joints to become loose. A high impact load can reduce the fatigue life of the

piston rod, rod end, accessories and other components. Consult the Engineering Department if there is severe vibration or a high impact load.

Proper selection and installation of the mounting style options and accessories will improve cylinder performance and extend service life. Cylinders are capable of generating a very high force, so proper selection and maintenance is necessary. It is the user's responsibility to ensure proper selection and installation.

The failure to select the correct mounting options and accessories, the failure to mount the cylinder correctly and/or the failure to install the piston rod, rod ends, accessories and other components correctly may cause or result in Death, Bodily Injury and/or Property Damage.

Rod Eye

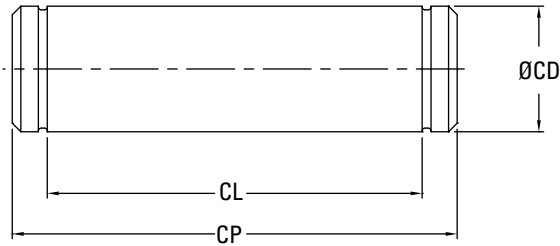


* Recommended torque values using MoS₂ lubricant with 0.12 co-efficient of friction.

Bore	KK	Torque* (ft-lb)	Part Number	Weight (lbs)	A	CA	CB	CD	ER
1.50	7/16-20 UNF-2B	36	FRE-0437	0.38	0.75	1.50	0.75	0.50	0.63
2.00	3/4-16 UNF-2B	125	FRE-0750	1.25	1.13	2.06	1.25	0.75	0.88
2.50	3/4-16 UNF-2B	125	FRE-0750	1.25	1.13	2.06	1.25	0.75	0.88
3.25	1-14 NS-2B	250	FRE-1000	2.5	1.63	2.81	1.50	1.00	1.18
4.00	1 1/4-12 UNF-2B	460	FRE-1250	5.94	2.00	3.44	2.00	1.38	1.56
5.00	1 1/2-12 UNF-2B	663	FRE-1500	11.4	2.25	4.00	2.50	1.75	2.00
6.00	1 7/8-12 UNF-2B	944	FRE-1875	15.1	3.00	5.00	2.50	2.00	2.25
7.00	2 1/4-12 UNF-2B	1315	FRE-2250	27	3.50	5.81	3.00	2.50	2.81
8.00	2 1/2-12 UNF-2B	5050	FRE-2500	35	3.50	6.12	3.00	3.00	3.25

Accessories

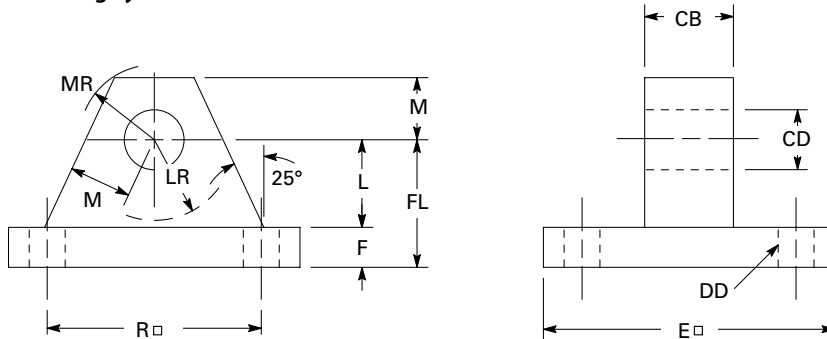
Pivot Pin



1. Pivot pins are furnished with clevis mounted cylinders.
2. Pivot pins supplied with retainer clips.

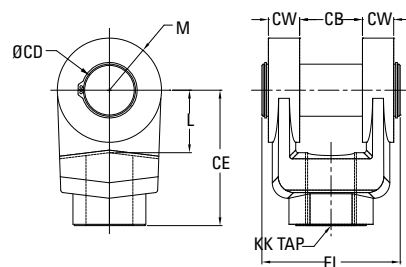
Bore	Part Number	CD	CL	CP
1.50	SVPIN-050-10	0.500	1.88	2.10
2.00	SVPIN-075-10	0.750	2.63	2.89
2.50	SVPIN-075-10	0.750	2.63	2.89
3.25	SVPIN-100-10	1.000	3.13	3.39
4.00	SVPIN-138-10	1.375	4.16	4.47
5.00	SVPIN-175-10	1.750	5.16	5.56
6.00	SVPIN-200-10	2.000	5.16	5.56
7.00	SVPIN-250-10	2.500	6.16	6.64
8.00	SVPIN-300-10	3.000	6.19	6.77

Mounting Eye Bracket



Bore	Part Number	Weight (lbs)	E	F	L	M	R	CB	CD	DD	FL	LR	MR
1.50	SEB-0500	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	SEB-0750	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	SEB-0750	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	SEB-1000	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	SEB-1375	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	SEB-1750A	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	SEB-2000A	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	SEB-2500A	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	SEB-3000	72.5	9.50	2.00	3.25	2.75	7.50	3.00	3.00	1.25	5.25	2.75	2.75

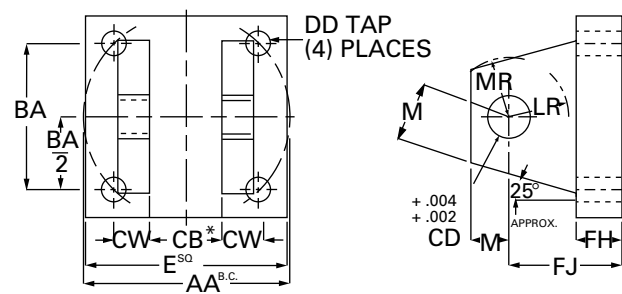
Rod Clevis



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

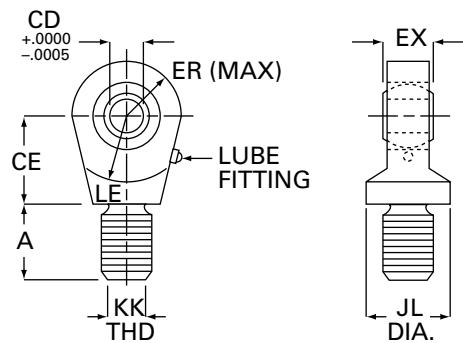
Accessories

Clevis Bracket



Bore	Part No.	AA	BA	CB	CD	CW	DD	E	FH	FJ	LR	M	MR
1.50	ECB-0500	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	ECB-0750	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	ECB-0750A	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	ECB-1000	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	ECB-1380	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	ECB-1750	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	ECB-2000	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	ECB-2500	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	ECB-3000	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

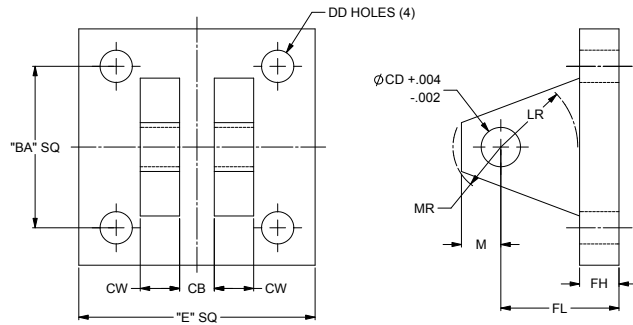
Spherical Rod Eye



Bore	KK	Part No.	A	CD +.0000 -.0005	CE	EX	ER	JL	LE	Load Capacity (lbs)
1.50	7/16-20	BRE-0437	0.69	0.5000	0.88	0.44	0.88	0.88	0.75	2600
2.00	3/4-16	BRE-0750	1.00	0.7500	1.25	0.66	1.25	1.31	1.06	9400
2.50	3/4-16	BRE-0750	1.00	0.7500	1.25	0.66	1.25	1.31	1.06	9400
3.25	1-14	BRE-1000	1.50	1.0000	1.88	0.88	1.38	1.50	1.44	16800
4.00	1 1/4-12	BRE-1250	2.00	1.3750	2.13	1.19	1.81	2.00	1.88	28600
5.00	1 1/2-12	BRE-1500	2.13	1.7500	2.50	1.53	2.19	2.25	2.13	43000
6.00	1 7/8-12	BRE-1875	2.88	2.0000	2.75	1.75	2.63	2.75	2.50	70000

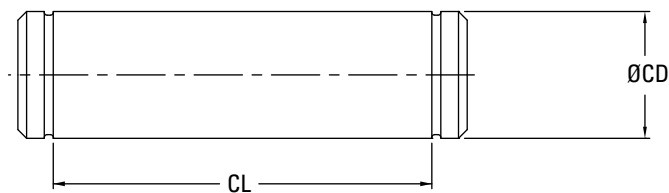
Accessories – For Spherical Bushing Mounted Cylinder (11)

Spherical Clevis Bracket



Bore	Part No.	BA	CB	CD	CW	DD	E	FH	FL	LR	M	MR
1.50	SCB-0500	2.05	0.44	0.500	0.50	0.41	3.00	0.50	1.50	0.94	0.50	0.62
2.00	SCB-0750	2.76	0.66	0.750	0.62	0.53	3.75	0.62	2.00	1.38	0.88	1.00
2.50	SCB-0750	2.76	0.66	0.750	0.62	0.53	3.75	0.62	2.00	1.38	0.88	1.00
3.25	SCB-1000	4.10	0.88	1.000	0.75	0.53	5.50	0.75	2.50	1.69	1.00	1.19
4.00	SCB-1380	4.95	1.19	1.375	1.00	0.66	6.50	0.88	3.50	2.44	1.38	1.62
5.00	SCB-1750	6.58	1.53	1.750	1.25	0.91	8.50	1.25	4.50	2.88	1.75	2.06
6.00	SCB-2000	7.92	1.75	2.000	1.50	0.91	10.62	1.50	5.00	3.31	2.00	2.38

Pivot Pin - for Spherical Bearing



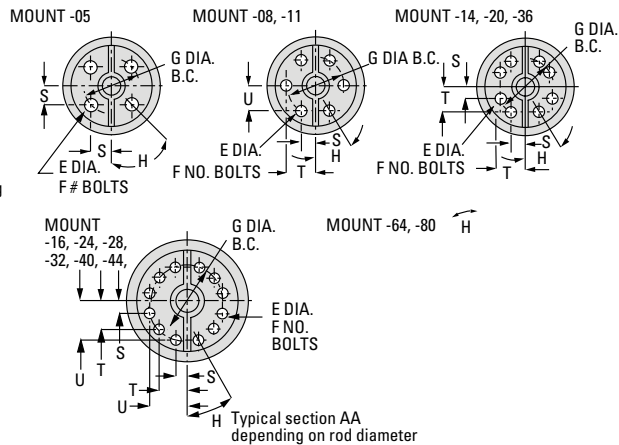
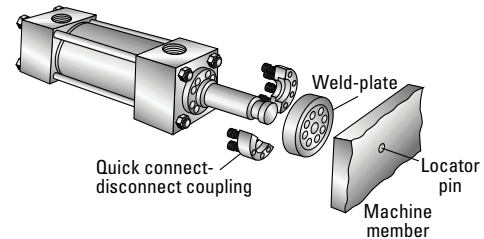
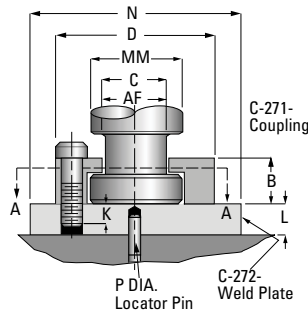
Bore	Part No.	CD	CL
1.50	SBPIN-050-10	0.500	1.56
2.00	SBPIN-075-10	0.750	2.03
2.50	SBPIN-075-10	0.750	2.03
3.25	SBPIN-100-10	1.000	2.50
4.00	SBPIN-138-10	1.375	3.31
5.00	SBPIN-175-10	1.750	4.22
6.00	SBPIN-200-10	2.000	4.94

1. Pivot pins supplied with retainer clips.

Rod End Couplings

Used with the Vickers style G Rod End, the Vickers 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.

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

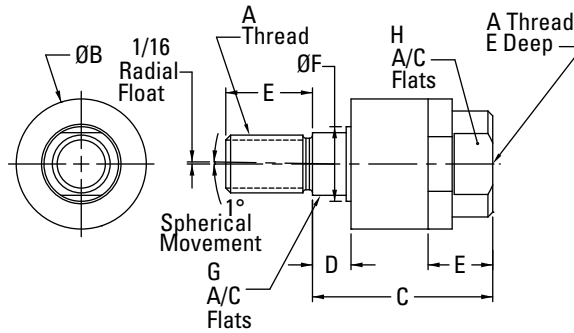
Self-Aligning Coupler

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.

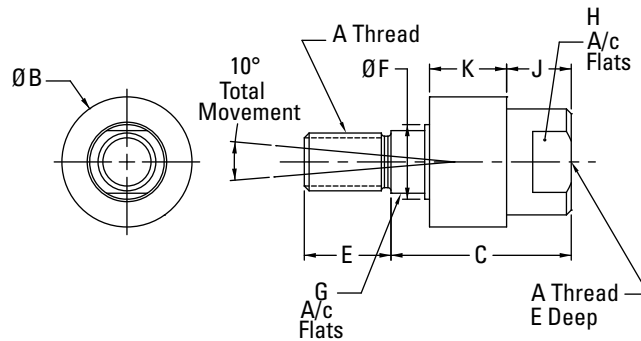
Note

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

SAC-0312 Thru SAC-2000, SAC-4000



SAC-2250 Thru SAC-3250, SAC-4250



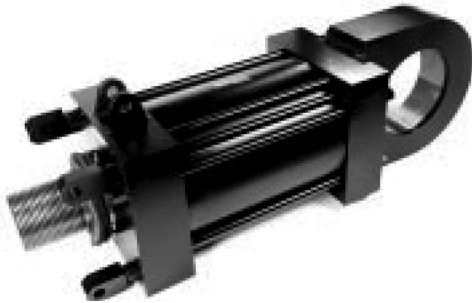
Part No.	"A" Thread	B	C	D	E	F	G	H	J	K	M° of Movement	Load Rating Max Pull at Yield (lbs)
SAC-0312	5/16-24	0.88	1.25	0.25	0.63	0.31	0.25	0.81	—	—	1	4,000
SAC-0375	3/8-24	0.88	1.25	0.25	0.63	0.37	0.31	0.81	—	—	1	5,000
SAC-0437	7/16-20	1.25	2.00	0.50	0.75	0.63	0.56	1.13	—	—	1	10,000
SAC-0500	1/2-20	1.25	2.00	0.50	0.75	0.63	0.56	1.13	—	—	1	14,000
SAC-0625	5/8-18	1.25	2.00	0.50	0.75	0.63	0.50	1.13	—	—	1	14,000
SAC-0750	3/4-16	1.75	2.31	0.31	1.13	0.97	0.88	1.50	—	—	1	34,000
SAC-0875	7/8-14	1.75	2.31	0.31	1.13	0.97	0.88	1.50	—	—	1	34,000
SAC-1000	1-14	2.50	2.94	0.50	1.63	1.38	1.25	2.25	—	—	1	64,000
SAC-1250	1-1/4-12	2.50	2.94	0.50	1.63	1.38	1.25	2.25	—	—	1	64,000
SAC-1500	1-1/2-12	3.25	4.38	0.81	2.25	1.75	1.50	3.00	—	—	1	120,000
SAC-1750	1-3/4-12	3.25	4.38	0.81	2.25	1.75	1.50	3.00	—	—	1	120,000
SAC-1875	1-7/8-12	3.75	5.44	0.69	3.00	2.25	1.88	3.50	—	—	1	240,000
SAC-2000	2-12	3.75	5.44	0.69	3.00	2.25	1.88	3.50	—	—	1	240,000
SAC-2250	2-1/4-12	6.75	6.38	—	3.50	2.75	2.38	2.88	1.63	3.38	10	397,000
SAC-2500	2-1/2-12	7.00	6.50	—	3.50	3.25	2.88	3.38	1.63	3.88	10	495,000
SAC-2375	2-3/4-12	7.00	6.50	—	3.50	3.25	2.88	3.38	1.63	3.88	10	603,800
SAC-3000	3-12	7.00	6.50	—	3.50	3.25	2.88	3.38	1.63	3.88	10	723,040
SAC-3250	3-1/4-12	9.25	8.50	—	4.50	4.00	3.38	4.50	2.00	5.50	10	853,800
SAC-4000	4-12	7.25	9.38	1.00	5.50	5.47	*	1.88	-	-	1	750,010
SAC-4250	4-1/4-12	12.88	11.25	—	4.50	5.50	4.88	7.00	1.50	8.75	10	1,483,400

Custom Cylinders

For Special Applications

Danfoss' full line of cylinder products and options fit most customers' application requirements, however, a special cylinder is often required to meet custom specifications. These custom cylinders are often needed to solve difficult application problems, upgrade existing equipment or are designed into new machinery.

Danfoss' Sales, Engineering and Manufacturing groups are cylinder specialists and have many years of experience in the interpretation of requirements, design and manufacture of custom cylinder products.



Commitment to Quality

Danfoss' policy is to design, produce and deliver defect-free products and provide superior services, the first time and every time, that consistently meet the needs of our customers. Our philosophy calls upon every employee to strive for excellence in customer satisfaction through continuous improvement.

Danfoss would appreciate an opportunity to submit a proposal to solve your application problem or fulfill your current cylinder requirements. Simply copy and complete the Application Data Sheet on page 88 and send to your authorized Danfoss distributor.

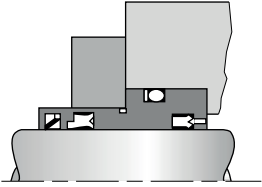


Our capabilities include

- Bore diameters to 30"
- Stroke lengths to 300"
- Operating pressures to 10,000 psi or higher
- Operating mediums ranging from shop air to nitrogen, or from standard hydraulic fluid to special synthetic fluids
- Tie rod, threaded and bolted cylinder construction
- Finite element analysis
- Application simulation in our testing laboratories

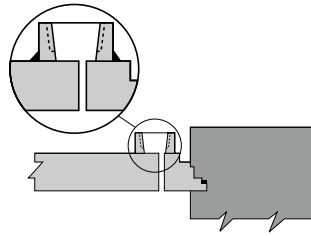
NZ Custom Additional Design Options

Metallic Rod Scrapers



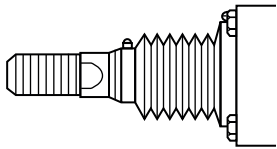
A Metallic Rod Scraper provides increased rod seal life by removing abrasive contamination from the rod in severe applications.

Air Bleeders



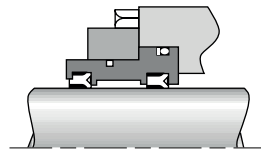
$\frac{1}{8}$ " NPTF bleeders are located in the tube or in the head and cap when specified. SAE #2 bleeders located in the head and cap are also available when specified. All bleeders may be located in positions 1, 2, 3 or 4.

Rod Boots



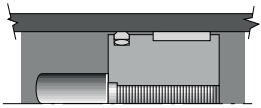
A rod boot surrounds the piston rod with an external, expandable cover to protect the rod surface from external contamination. Requires additional rod length which is determined by the cylinder stroke.

Wearbands



Wearbands fitted to the piston and/or rod cartridge eliminate metal-to-metal contact on the piston/tube I.D. and the cartridge/rod O.D. Bronze-filled Teflon wear-band material reduces friction and wear in applications where side-load is present.

Low Breakaway Piston



A low breakaway piston reduces running friction and metal-to-metal contact by utilizing a bronze-filled Teflon wearband and a bi-directional, O-ring energized, bronze-filled Teflon piston seal.

Special Rod Ends

Modifications of standard rod ends or completely special rod end styles are available to meet unique rod end connection requirements.

Special Ports

Metric, BSP, Manifold and other porting options are available to meet specific requirements.

Extra Heavy Chrome Tubes and Rods

Added wear and corrosion resistance are available by specifying Extra Heavy Chrome (.002" to .003" thick).

Electronic Feedback

A complete line of precision cylinder position sensing and feedback devices are available. These packaged cylinder systems can handle virtually any application requiring feedback throughout the cylinder stroke — pneumatic or hydraulic, large or small bore, long or short strokes, with or without velocity monitoring — with resolutions of ± 0.001 " or better.

Stainless Steel Piston Rods

Piston rods in 300 and 400 series, 17-4 PH and others are available for those applications requiring increased corrosion resistance.

Special Coating and Painting

Cylinders can be prepared with a primer coat, epoxy, lacquer or enamel paint finish coatings to customer specifications. Synergistic, Nitrocarburing and other material treatments are also available for special applications.

Plating

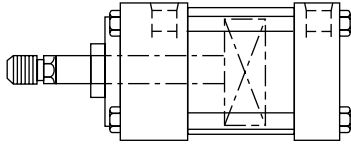
Electroless Nickel, Cadmium and other plating finishes are available for corrosive, washdown, pharmaceutical and other applications.

Special Materials

Bronze rod cartridges, brass, aluminum and composite tubing, complete stainless steel cylinders or other special materials are available to meet most unique material requirements.

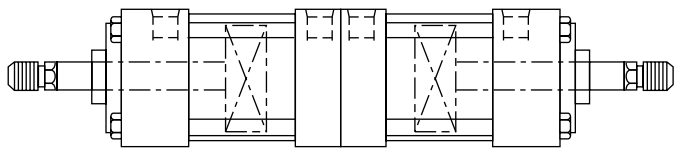
NZ Series Cylinder Types

Single/Double Acting Cylinders



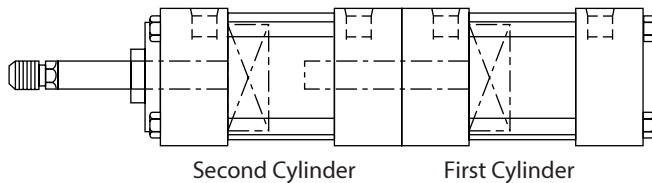
Standard NZ Series cylinders are double acting, with fluid power driving the piston in both directions. Single acting cylinders have fluid power driving the piston in one direction, relying on either the load or an external force to return the piston after the pressure is released.

Back-to-back Cylinders



Back-to-back cylinders are two single rod cylinders mounted together at the caps. Combinations of positions are possible through various combinations of piston actuation. Consult Danfoss for maximum operating pressure.

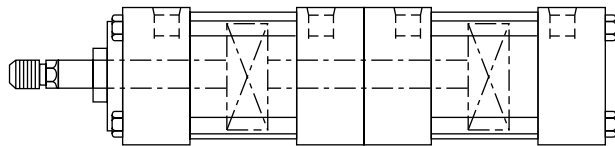
Multiple Position Cylinders



Multiple position cylinders are similar to tandem cylinders (except that the piston and rod assemblies are not connected) in that the output force is increased.

Additionally, they may act as a precision multiple positioning device by actuating each cylinder successively or independently. Consult Danfoss for maximum operating pressure.

Tandem Cylinders



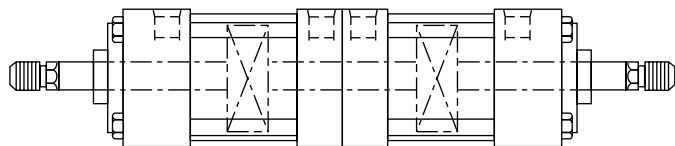
Tandem cylinders consist of two cylinders interconnected (piston and rod assemblies are connected). Pressure can act on two effective piston areas allowing the cylinder to be used as a force multiplier. This type of cylinder can also be used in air/oil systems to provide smooth, metered

flow because of equal volumes in one chamber of both cylinders. Consult Danfoss for maximum operating pressure.

Note

Front cylinder stroke is $\frac{1}{8}$ " longer at front cylinder when strokes are the same.

Double End Cylinders Back-to-Back



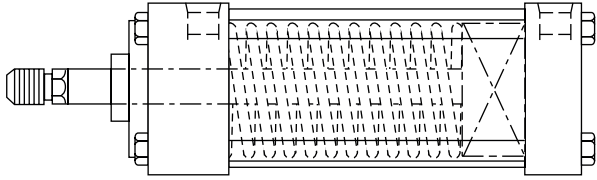
Double end cylinders mounted back-to-back have common piston rod and tie rods and the same stroke length. Consult Danfoss for maximum operating pressure.

Note

Cylinder length is $\frac{1}{8}$ " longer on one cylinder.

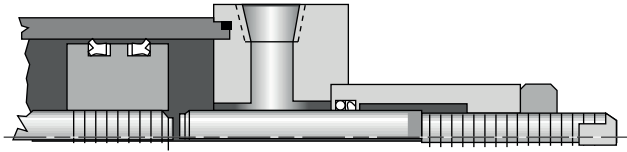
NZ Custom Additional Design Types

Spring Return/Extend Cylinders



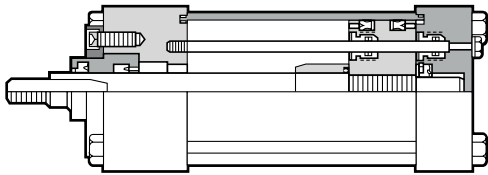
Spring return/extend cylinders provide thrust in one direction only (can be either direction). One port is used for pressure to act against the load while the inactive port is vented. An internal spring is used to return the cylinder to its normal position.

Adjustable Stroke Cylinders



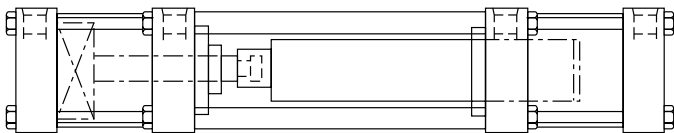
Adjustable stroke cylinders are furnished with a stroke adjusting screw in the cap end of the cylinder. Adjusting this screw in or out limits the retract stroke to the precise length desired.

Non-rotating Cylinders



Non-rotating cylinders are furnished with internal guide rods which prevent piston rod rotation throughout the stroke. Rotational torque and stroke length determine the amount and diameter of the guide rods.

Pumping Units



Pumping units consist of a standard hydraulic cylinder coupled with a volume displacing lance cylinder via tiebars. Special seals and lance surface treatments are available to provide

compatibility with resins and chemicals used in the pumping process. Single and double ended designs are available.

Cylinder Application Data Sheet

All other types of cylinders (Mill Duty, Tie Rod, Threaded) can be configured with different transducer, manifold, and mounting options upon request. Submit below form for a custom cylinder design to your local Danfoss sales engineer.

Customer Name:				
Customer P/N		Rev	Machine	Function
Contact	Ph		Fax	e-mail
Cylinder Description				
Series	Mtg Style	Bore	Rod	Stroke
Cushions: None ☐ Rod End ☐ Pos: Blind End ☐ Pos:				
Weight Connected to Rod (lbs):				
How is Cylinder Mounted				
Horizontal ☐	Vertical Rod Up ☐ Rod Down ☐		Angle ☐ Degrees Vertical	
Rod End Connection	Firmly Guided ☐ Supported ☐ Unsupported ☐ Know Side Load(lbs)			
How is Cylinder Used				
Operating Fluid:			Fluid Temp @ Cylinder: °F	
Pressure Setting Extend:		Pressure Setting Retract:		
Stop Internal Ext ☐	Stop Internal Ret ☐	Stop External Ext ☐	Stop External Ret ☐	
Force Ext lb f	Force Ret lb f	Velocity Ext:	Velocity Ret:	
Cycle Rate:	Cycle Life of Cylinder:		Cycle Life Seals:	
Environmental Conditions				
Standard Factory ☐ Very Dirty ☐ Outdoors ☐ Other:				
Application Sketch			Special Requirements	
Prepared By		Date	Reviewed By	
			Date	

ext = cylinder extends ret = cylinder retracts

Products we offer:

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software
- PLUS+1® software services, support and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

Go to www.danfoss.com for further product information.

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

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Hydro-Gear

www.hydro-gear.com

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