

## Cylinders For Abusive Conditions

Combining NFPA dimensional interchangeability and high quality components, the "HD1" Series offers excellent performance and long service life, even in the most severe of conditions.

## External Bearing Ensures Smooth Motion

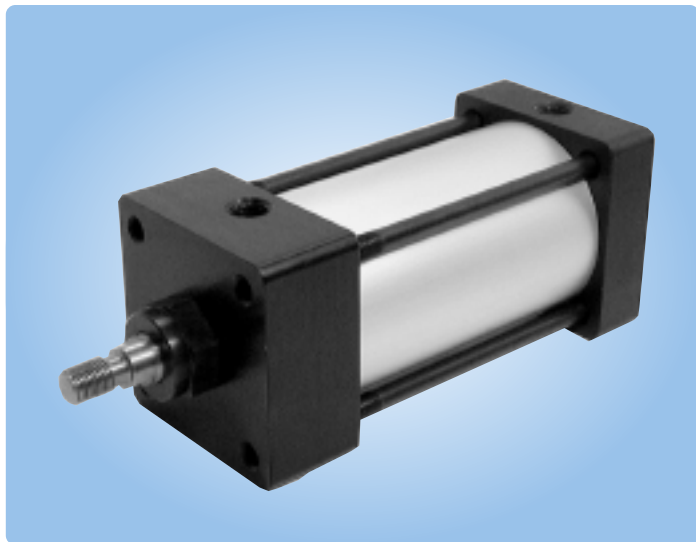
HD1 cylinders are fitted with a heavy-duty external rod bearing in the rod end head. Teflon<sup>®</sup>-impregnated and hardcoat anodized, this bearing ensures smooth rod motion while maintaining rod rigidity and stability. The entire rod gland and bearing may be quickly removed and replaced without disassembling the cylinder.

### Operating Specifications

**Temperature Range:** -40°F to +250°F (to +400°F on request)

**Lubrication:** For maximum cylinder life, non-detergent petroleum based oil is recommended.  
Non-lube seals avail.

**Filtration:** Not essential, but a standard 40 micron filter placed upstream will prolong seal life.



## Operating Parameters

Bore Diam.	Thrust*	Thrust Mult.**	Rod Diam.	Max. Oper. Pressure	
				Air	Oil ‡
1 1/2"	177	1.77	5/8" or 1"	250	1000
2"	314	3.14	5/8" or 1"	250	1000
2 1/2"	491	4.91	5/8" or 1"	250	1000
3 1/4"	830	8.30	1" or 1 3/8"	250	700
4"	1257	12.57	1" or 1 3/8"	250	650
6"	2827	28.27	1 3/8" or 1 3/4"	250	435

\*Pushing force of cylinder at 100 PSI inlet pressure. Pulling force will be about 10% less due to the displacement of the piston rod. Note: Actual realizable thrust could be somewhat lower due to side loading and internal friction. It is best to oversize your cylinder by about 25% to assure smooth operation.

\*\*To determine cylinder thrust at other inlet pressures, multiply this factor times the desired inlet pressure.

‡HD1 Cylinders are not rated or approved for use in a hydraulic circuit where an impulse or pressure spike may occur.

## Cylinder Construction

### Rod Bearing:

Teflon-impregnated, hardcoated aluminum

### Heads:

Machined from solid aluminum bar; black anodized

### Tubes:

Aluminum hard anodized to 60 Rc (16 RMS finish)

### Piston:

Solid high alloy aluminum and fitted with a PTFE Wear Band.\*

### Piston Rod:

High tensile ground and polished hard chrome plated steel

### Piston and Rod Seals:

Wear compensating Buna N vee rings. Non-lube seals are also available (see Option NL).

### Tube Seals:

Buna N o-rings

### Rod Wiper

Dupont Teflon<sup>®</sup>

### Tie Rods:

High tensile steel torqued to allow for flexure.

**NOTE:** 6" Bore Cylinders do not have wear bands. (HD)

## Customize Your Cylinder

The HD1 Series offers numerous accessories and design options. With hundreds of possible combinations available, you can "design" your own cylinder for any application.

### Cushions (CR, CF, CB)

For end-of-stroke load deceleration, specify cushions in either or both ends of your cylinder. Cushions decelerate the piston rod over the last 1<sup>1</sup>/<sub>16</sub>" of stroke. Adjustable, they allow you to set the degree of cushioning needed for each specific application.

A built-in check valve assures a fast getaway in the opposite direction. A pre-lubricated nitrile cushion seal provides years of reliable service.

**Note:** Cushions are not recommended on hydraulic cylinders.

### Double Rod (DR)

Double rod cylinders have a common piston rod that protrudes from both ends of the cylinder. In addition to providing a dual power source, double rod cylinders serve to minimize rod deflection and to facilitate the control and adjustment of rod travel.

### Inter-Pilots® (IP)



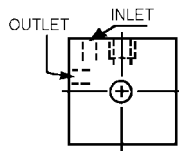
Mead's Inter-Pilot® is a miniature 3-way valve built in the cylinder head. Actuated by the cylinder's piston as it reaches the end of its stroke, the valve emits an air signal. Thus, sequencing is achieved without external limit switches and electric wiring.

Inter-Pilots may be built into either or both cylinder heads. They are not for hydraulic use. Cylinder operating pressure must not exceed pressure used to feed the Inter-Pilot®.

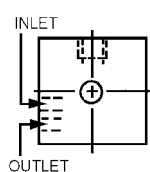
INTER-PILOT® PORT LOCATIONS (Port Size = 10-32)

Inter-Pilot port location style that is offered with each cylinder head

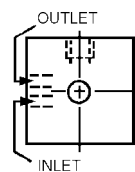
Bore (Either Head)	1 1/2"	2"	2 1/2"	3 1/4"	4"	6"
Non-Cushion	2	1	1	1	1	3
Cushion	2	1	1	1	1	3



STYLE 1



STYLE 2



STYLE 3

### Non-Rotating Rod (NR)

For prevention of piston and rod rotation, an internal rod is embedded internally into both cylinder heads. This rod also passes through the piston and acts as a linear guide for the piston. Note: NR option available on 3 1/4", 4" and 6" bore cylinders only.

### Viton™ Seals (VI)

For high temperature environments, Viton™ seals can be specified to replace standard Buna N seals. While HD1 cylinders are normally rated to 250°F, cylinders with Viton seals are rated to 400°F.

### Low Breakaway Option (NL)

For non-lube service, polyurethane seals replace standard piston and rod seals. These specially formulated seals have an inherent lubricity that provides low breakaway between the piston and tube. Note: NL seals are not available on hydraulic cylinders.

### Magnetic Piston (MP)

If you will be using either Hall Effect or Reed switches for sensing rod position, you will need to order your cylinder with a magnetic piston.

Mead's Hall Effect and Reed switches allow the cylinder user to sense rod position anywhere within the stroke. They emit an electrical signal when the magnetized piston reaches a point opposite their location. Tie rod mounting facilitates fast and accurate position setting.

### Oversized Rod (OR)

Available on all models; the HD1-150, 200 and 250, you can order a 1" rod diameter rather than the standard 5/8" diameter; the HD1-325 and HD1-400 with a 1-3/8" rather than the standard 1"; the HD1-600 with a 1-3/4" rather than the standard 1-3/8".

### Accessories

#### Pneumatic Stroke Completion Sensors (SCS)

Port mounted SCS valves emit an air signal when the cylinder rod has stopped even if the piston has not contacted the end cap. Ideal for use in situations where the full cylinder stroke is not used. See pg. 57.

#### Self Aligning Rod Couplers



Rod couplers simplify cylinder alignment problems by compensating for 2° angular error and 1/16" lateral misalignment on both extension and retraction strokes. Greater reliability is achieved by reducing cylinder and component wear. All components are heat treated for wear and corrosion resistance.

\* see page 30 for complete listing of Mead's self aligning rod couplers.

#### Flow Control Valves



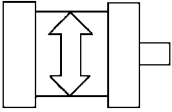
**Dyla-Trol®** - For unprecedented smoothness in cylinder speed control, use Mead's Dyla-Trol® valves with a perfectly tapering flow. Where needle type flow controls generate turbulence as they close, Dyla-Trol maintains an even 360 laminar flow regardless of the setting. Pg. 59.



**Right Angle Flow Controls (RAF)** - RAF flow controls feature push-in-fittings, pre-applied Teflon® based thread sealant, a recessed screw driver adjustment and convenient swivel for ease of tubing alignment. See page 66.

# Order HD1 Cylinder

## STEP 1:

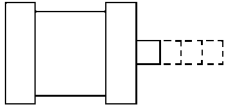


### Select A Bore Size

Bore	1 1/2"	2"	2 1/2"	3 1/4"	4"	6"
Force*	177	314	491	830	1257	2827
Model	HD1-150	HD1-200	HD1-250	HD1-325	HD1-400	HD-600

\* Maximum force output (lbs.) at 100 PSI inlet pressure

## STEP 2:



### Choose Stroke Length

#### PISTON ROD DIAMETERS:

Bore Diam.	1 1/2"	2"	2 1/2"	3 1/4"	4"	6"
Rod Diam.	5/8" or 1"	5/8" or 1"	5/8" or 1"	1" or 1 3/8"	1" or 1 3/8"	1 3/8" or 1 3/4"

**Non-Standard Piston Rods:** Special rod threads or extensions are available. Please enclose a sketch of what you require.

## STEP 3:

### Select A Mounting Style

	Mead Code	Bore Diameter						NFA Code	Description
		1 1/2"	2"	2 1/2"	3 1/4"	4"	6"		
<b>Flush Bottom/Front Rear</b>	<b>FB</b>	•	•	•	•	•	•	MS-4	Four tapped holes in bottom and in both cylinder faces (front and rear). Rear sleeve nuts standard.
<b>Long Clevis</b>	<b>PB</b>	•	•	•	•	•	•	MP-2	Two ears extend from rear head (clevis is detachable).
<b>Short Clevis</b>	<b>PF</b>	•	•	•	•	•	NA	MP-1	Two ears extend from rear head (clevis is detachable).
<b>Pivot</b>	<b>PE</b>	•	•	•	•	•	NA	MP-4	A single ear extends from rear head (pivot is detachable).
<b>Tie Rods Ext. Front</b>	<b>TIF</b>	•	•	•	•	•	•	MX-3	All four tie-rods extend forward from cylinder face. Consult factory for rear extended tie-rods (or both ends).
<b>Front Flange NFA Std.</b>	<b>FH</b>	•	•	•	•	•	•	MF-1	Flange plate extends beyond the thicker front head.
<b>Rear Flange</b>	<b>FR</b>	•	•	•	•	•	•	MF-2	Flange plate extends beyond the rear head.
<b>Trunnion Front</b>	<b>TF</b>	•	•	•	•	•	•	MT-1	Two pivot bars extend from two sides of front head.; not available with front Inter-Pilots® or front cushions.
<b>Trunnion Rear</b>	<b>TR</b>	•	•	•	•	•	•	MT-2	Two pivot bars extend from two sides of rear head. Not available with rear Inter-Pilots® or rear cushions.
<b>Foot</b>	<b>FT</b>	•	•	•	•	•	•	Non Std.	A plate with two holes is mounted to the bottom of each head.

## STEP 4:

## Select Cylinder Options

	Mead Code	Bore Diameter						Description
		1 1/2"	2"	2 1/2"	3 1/4"	4"	6"	
<b>Double Rod</b>	<b>DR</b>	•	•	•	•	•	•	Rod extends through both heads (adds to cylinder rigidity)
<b>Oversized Rod</b>	<b>OR</b>	•*	•	•	•	•	•	Standard rod is replaced by larger diameter rod.
<b>Cushions</b> (Not available with Trunnion)	<b>Front (CF)</b> <b>Rear (CR)</b> <b>Both (CB)</b>	•*	•	•	•	•	•	Dampen the impact and sound that occur at stroke completion; Adjustable; Note: Not available on hydraulic cylinders.
<b>Inter-Pilots®</b> (Not available with Trunnion)	<b>Front (IPF)</b> <b>Rear (IPR)</b> <b>Both (IPB)</b>	•	•	•	•	•	•	Inter-Pilots® emit an air signal at the end of each stroke; Integral with cylinder head; Note: Not available on hydraulic cylinders.
<b>Non-Rotating Rod</b> (6" Max.Stroke)	<b>NR</b>	NA	NA	NA	•	•	•	Internal bar prevents piston and rod rotation.
<b>Non-Lube Seals</b>	<b>NL</b>	•	•	•	•	•	NA	Self-Lubricating seals are used in place of standard Buna N seals; Note: Not available on hydraulic cylinders.
<b>High Temp. Seals</b>	<b>VI</b>	•	•	•	•	•	NA	Viton  seals are suitable for high temperature environments (400°F Max.)
<b>Magnetic Pistons</b>	<b>MP</b>	•	•	•	•	•	•	Enables Reed & Hall Effect switches to sense piston. Note: Reed switch/Hall Effect not available on all hydraulic cylinders. (Contact Mead)

\* Cushions or Inter-Pilots® are not available on the rod end head of 1 1/2" bore cylinders with oversized rod.

## STEP 5:

## Build A Model Number

When ordering Dyna-mation cylinders, list the:

1. Base Model
2. Stroke
3. Mounting Style
4. Options (If Needed)

Base Model	Stroke	Mounting Style	Options
<b>HD1-200</b>	<b>- 10</b>	<b>- PB</b>	<b>- CF</b>
2" Bore	10" Stroke	Clevis Mount (PB)	Cushioned Front (CF)

## Hall Effect Switches

**Model CS-6200P**

Sourcing

**Model CS-6200N**

Sinking

Cylinders must have a magnetic piston (MP). For technical information, see page 33.

## Reed Switches

**Model CS-6200R**

Wire Leads

Cylinders must have a magnetic piston (MP). For technical information, see page 33.

## Special Cylinders

We invite inquiries regarding non-standard cylinders. Please call 773-685-6800 or your local Mead representative.

## Accessories

	Bore Diameter:	Rod Size	1 1/2"	2"	2 1/2"	3 1/4"	4"	6"	
			1 1/2"	2"	2 1/2"	3 1/4"	4"	6"	
	Flex Rod Couplers	STD	DMA-437	DMA-437	DMA-437	DMA-750	DMA-750	DMA-1000	
		OR	DMA-750	DMA-750	DMA-750	DMA-1000	DMA-1000	DMA-1250	
	Forged Rod Clevis	STD	DMC-1	DMC-1	DMC-1	NA	NA	NA	
		OR	NA	NA	NA	NA	NA	NA	
	Rod Clevis (NFPA Std.)	STD	DMC-2	DMC-2	DMC-2	DMC-4	DMC-4	DMC-6	
		OR	DMC-4	DMC-4	DMC-4	DMC-6	DMC-6	DMC-7	
	Machined Rod Eye (NFPA Std.)	STD	DME-1	DME-1	DME-1	DME-2	DME-2	DME-3	
		OR	DME-2	DME-2	DME-2	DME-3	DME-3	DME-7	
	Pivot Bracket Kit	ALL	HD40-150	HD40-200	HD40-250	HD40-325	HD40-400	DMP-8 Bracket Only	
	Clevis Bracket Mounting Kits	Short Clevis (with Pin)	ALL	HD35S-150	HD35S-200	HD35S-250	HD35S-325	HD35S-400	NA
		Long Clevis (with Pin)	ALL	HD35-150	HD35-200	HD35-250	HD35-325	HD35-400	DMR-8 Bracket Only
	Flange Mounting Kits (for front* or rear flanges)	ALL	HD45-150	HD45-200	HD45-250	HD45-325	HD45-400	NA	

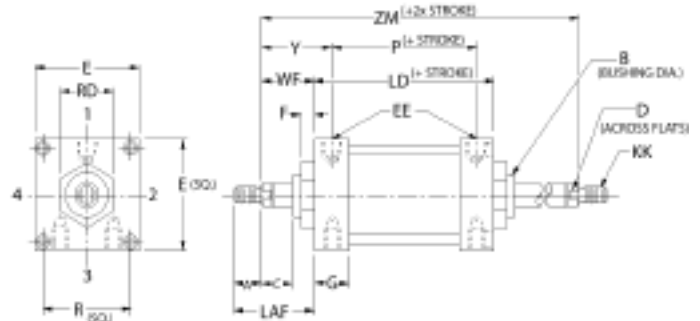
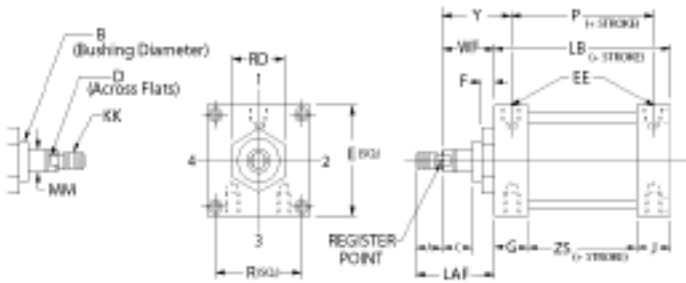
NOTE: All Kits include mounting hardware; for DMC-1 Dimensions see page 37; all others see page 45.

Basic Cylinder

NFPA: MXO

Double Rod

NFPA: MDXO



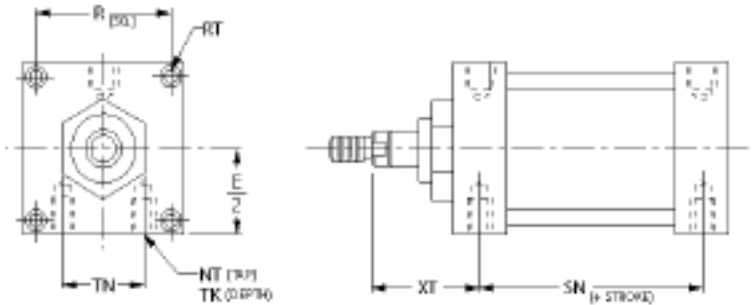
• EE Dimension is NPTF

\* 6" bore HD cylinders have a rear tie rod nut, shown below as the "K" dimension.  $K = 7/16"$

BORE	MM	ROD	A	B	C	D	E	EE	F	G	J	K	KK	LAF	LB	LD	P	R	WF	Y	ZS	ZM	RD
1 1/2	5/8	1	3/4	1 1/8	3/8	1/2	2	1/4	3/8	1 7/16	1 5/16	-	7/16-20	1 3/4	3 5/8	4 1/8	2 1/4	1 7/16	1	1 15/16	1 1/4	6 1/8	1 1/8
		3/4-16	2 1/2	1 3/8	2 5/16	6 1/2																	
2	5/8	1	1 1/8	1 1/2	5/8	7/8	2 1/2	1/4	3/8	1 7/16	1 5/16	-	7/16-20	1 3/4	3 5/8	4 1/8	2 1/4	1 27/32	1	1 15/16	1 1/4	6 1/8	1 1/8
		3/4-16	2 1/2	1 3/8	2 5/16	6 1/2																	
2 1/2	5/8	1	1 1/8	1 1/2	5/8	7/8	3	1/4	3/8	1 7/16	1 5/16	-	7/16-20	1 3/4	3 3/4	4 1/4	2 3/8	2 3/16	1	1 15/16	1 3/8	6 1/4	1 1/2
		3/4-16	2 1/2	1 3/8	2 5/16	6 5/8																	
3 1/4	1 3/8	1 1/8	1 1/2	1 1/2	3/8	7/8	3 3/4	1/2	5/8	1 11/16	1 3/16	-	3/4-16	2 1/2	4 1/2	4 3/4	2 5/8	2 3/4	1 3/8	2 7/16	1 3/8	7 1/2	1 3/4
		1-14	3 1/4	1 5/8	2 11/16	7 3/4																	
4	1 3/8	1 1/8	1 1/2	1 1/2	7/8	4 1/2	1/2	5/8	1 11/16	1 3/16	-	3/4-16	2 1/2	4 1/2	4 3/4	2 5/8	3 21/64	1 3/8	2 7/16	1 3/8	7 1/2	1 3/4	
		1-14	3 1/4	1 5/8	2 11/16							7 3/4											
6	1 3/8	1 5/8	2	5/8	1 1/8	6 1/2	3/4	3/4	2	1 1/2	7/16	-	1-14	3 1/4	5	5 1/2	3 1/8	4 7/8	1 5/8	2 13/16	1 1/2	8 3/4	2
		1 3/4	2	2 3/8	3/4								1 1/2	1 7/8					3 1/16	9			

Rear, Front & Bottom Tapped (FB)

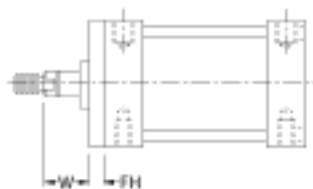
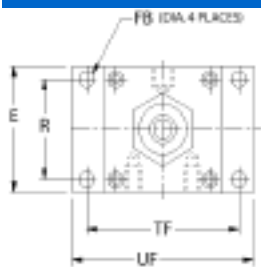
NFPA Code: MS4



BORE	MM	ROD DIA.	NT	RT	TK	TN	SN	XT
1 1/2	5/8	1	1/4-20	1/4-28	3/8	5/8	2 1/4	1 15/16
		1						2 5/16
2	5/8	1	5/16-18	5/16-24	1/2	7/8	2 1/4	1 15/16
		1						2 5/16
2 1/2	5/8	1	3/8-16	5/16-24	9/16	1 1/4	2 3/8	1 15/16
		1						2 5/16
3 1/4	1 3/8	1	1/2-13	3/8-24	3/4	1 1/2	2 5/8	2 7/16
		1 3/8						2 11/16
4	1 3/8	1	1/2-13	3/8-24	3/4	2 1/16	2 5/8	2 7/16
		1 3/8						2 11/16
6	1 3/8	1 5/8	3/4-10	1/2-20	1 1/8	3 1/4	3 1/8	2 13/16
		1 3/4						3 1/16

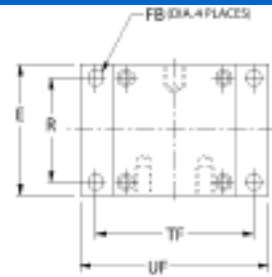
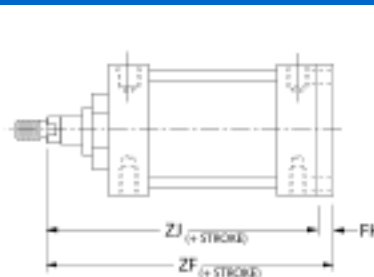
## Front Flange (FH)

## NFPA: MF1



## Rear Flange (FR)

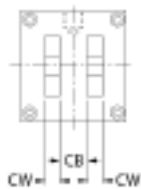
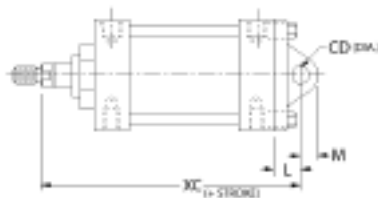
## NFPA: MF2



BORE	MM ROD DIA.	E	FB (BOLT)	FH	R	TF	UF	W	ZJ	ZF
1 1/2	5/8	2	5/16	3/8	1 7/16	2 3/4	3 3/8	5/8	4 5/8	5
	1							5	5 3/8	
2	5/8	2 1/2	3/8	3/8	1 27/32	3 3/8	4 1/8	5/8	4 5/8	5
	1							5	5 3/8	
2 1/2	5/8	3	3/8	3/8	2 3/16	3 7/8	4 5/8	5/8	4 3/4	5 1/8
	1							5 1/8	5 1/2	
3 1/4	1	3 3/4	7/16	5/8	2 3/4	4 11/16	5 1/2	3/4	5 5/8	6 1/4
	1 3/8							5 7/8	6 1/2	
4	1	4 1/2	7/16	5/8	3 21/64	5 7/16	6 1/4	3/4	5 5/8	6 1/4
	1 3/8							5 7/8	6 1/2	
6	1 3/8	6 1/2	9/16	3/4	4 7/8	7 5/8	8 5/8	7/8	6 5/8	7 3/8
	1 3/4							6 7/8	7 5/8	

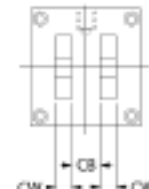
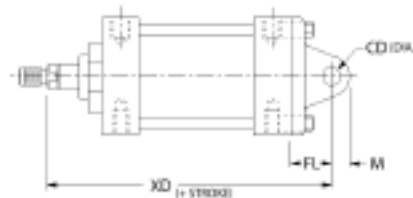
## Short Clevis (PF)

## NFPA: MP1



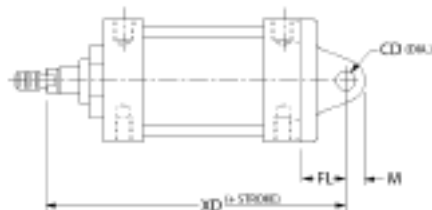
## Long Clevis (PB)

## NFPA: MP2



## Pivot (PE)

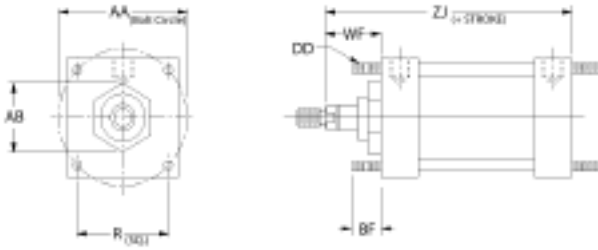
## NFPA: MP4



BORE	MM ROD DIA.	CB	CD	CW	FL	L	M	XC	XD
1 1/2	5/8	3/4	1/2	1/2	1 1/8	3/4	1/2	5 3/8	5 3/4
	1							5 3/4	6 1/8
2	5/8	3/4	1/2	1/2	1 1/8	3/4	1/2	5 3/8	5 3/4
	1							5 3/4	6 1/8
2 1/2	5/8	3/4	1/2	1/2	1 1/8	3/4	1/2	5 1/2	5 7/8
	1							5 7/8	6 1/4
3 1/4	1	1 1/4	3/4	5/8	1 7/8	1 1/4	3/4	6 7/8	7 1/2
	1 3/8							7 1/8	5 3/4
4	1	1 1/4	3/4	5/8	1 7/8	1 1/4	3/4	6 7/8	7 1/2
	1 3/8							7 1/8	7 3/4
6	1 3/8	1 1/2	1	3/4	2 1/4 Clevis	-	1 1/8 Clevis	NA	8 7/8
	1 3/4								9 1/8

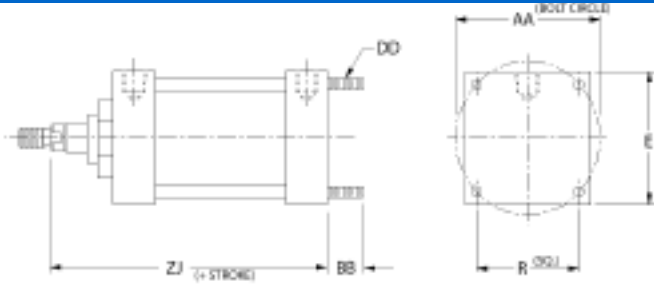
Extended Tie Rods, Both Ends (TIB)

NFPA Code: MX1



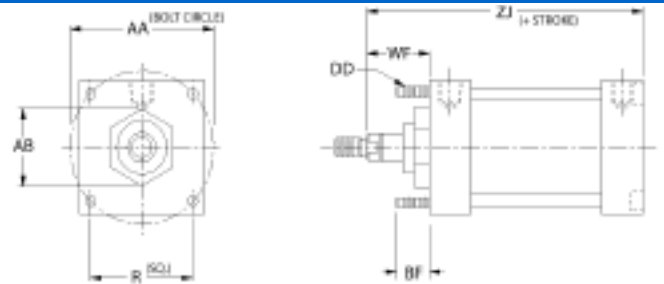
Back End (TIR)

NFPA: MX2



Rod End (TIF)

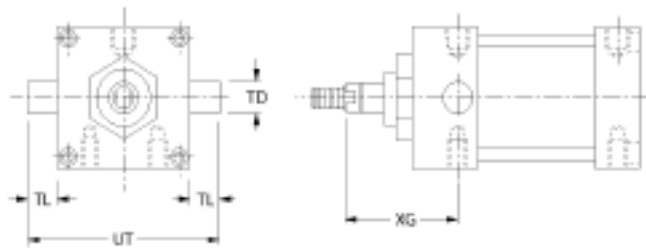
NFPA: MX3



BORE	MM ROD DIA.	AA	BB	AB	BF	DD	R	ZJ
1 1/2	5/8	2.02	1	1 5/16	1 3/8	1/4-28	1 7/16	4 5/8
	1							5
2	5/8	2.6	1 1/8	1 5/16	1 1/2	5/16-24	1 27/32	4 5/8
	1							5
2 1/2	5/8	3.1	1 1/8	1 3/4	1 1/2	5/16-24	2 3/16	4 3/4
	1							5 1/8
3 1/4	1	3.9	1 3/8	2 1/32	2	3/8-24	2 3/4	5 5/8
	1 3/8							5 7/8
4	1	4.7	1 3/8	2 1/32	2	3/8-24	3 21/64	5 5/8
	1 3/8							5 7/8
6	1 3/8	6.9	1 13/16	2 5/16	2 9/16	1/2-20	4 7/8	6 5/8
	1 3/4							6 7/8

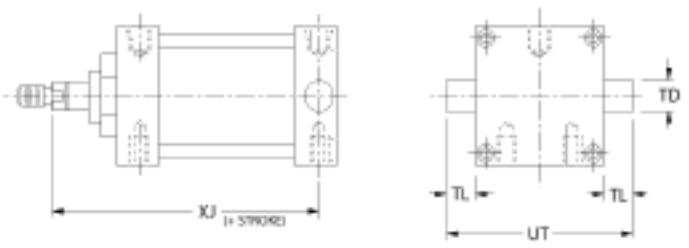
Front Trunnion (TF)

NFPA: MT1



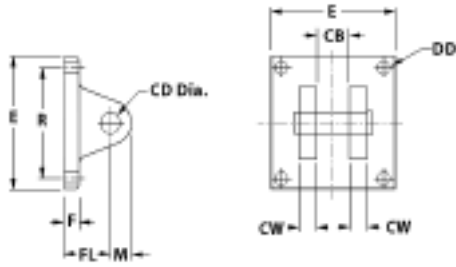
Rear Trunnion

NFPA: MT2

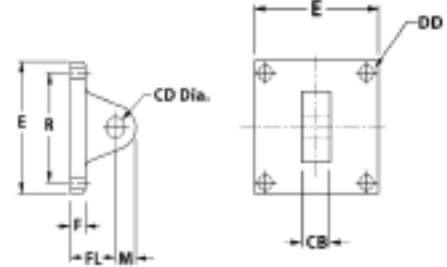


BORE	MM ROD DIA.	TD ± .001	TL	UT	XG	XJ
1 1/2	5/8	1	1	4	1 3/4	4 1/8
	1					4 1/2
2	5/8	1	1	4 1/2	1 3/4	4 1/8
	1					4 1/2
2 1/2	5/8	1	1	5	1 3/4	4 1/4
	1					4 5/8
3 1/4	1	1	1	5 3/4	2 1/4	5
	1 3/8					5 1/4
4	1	1	1	6 1/2	2 1/4	5
	1 3/8					5 1/4
6	1 3/8	1 3/8	1 3/8	9 1/4	2 5/8	5 7/8
	1 3/4					6 1/8

## Clevis Bracket

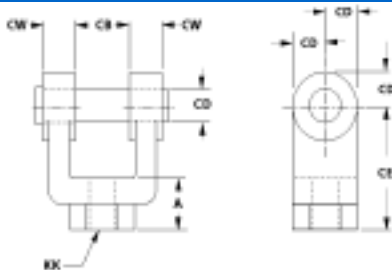


## Pivot Bracket

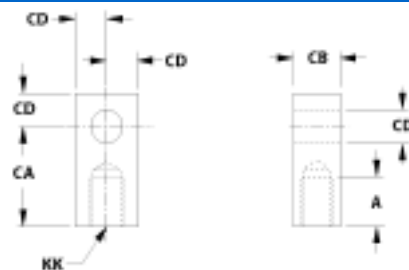


BORE	CB	CD	CW	DD	E	FL	M	R
1½	¾	½	½	17/64	2	1⅛	½	17/16
2	¾	½	½	23/64	2½	1⅛	½	127/32
2½, 2½*	¾	½	½	23/64	3	1⅛	½	23/16
¾	1¼	¾	5/8	7/16	¾	1⅞	¾	2¾
4	1¼	¾	5/8	7/16	4½	1⅞	¾	321/64
6	1½	1	¾	17/32 Clevis 21/32 Pivot	6½ Clevis 4½ Pivot	2¼	1⅛ Clevis 1¼ Pivot	47/8

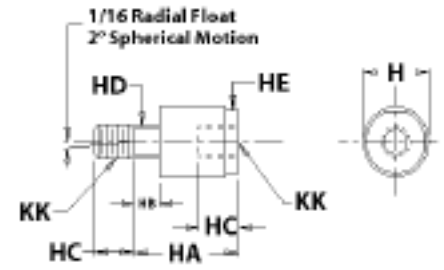
## Rod Clevis



## Rod Eye



## Rod Coupler



Part # Rod Clevis Rod Eye Rod Coupler	Cylinder	A	CA	CB	CD	CE	CW	KK	H	HA	HB	HC	HD	HE
DMC-2 DME-1 DMA-437	HD1-150 HD1-200 HD1-250	¾	1½	¾	½	1½	½	7/16-20	1¼	2	½	¾	5/8	1⅛
DMC-4 DME-2 DMA-750	HD1-150 OR HD1-200 OR HD1-250 OR HD1-325 HD1-400	1⅛	21/16	1¼	¾	23/8	5/8	¾-16	1¾	25/16	5/16	1⅛	31/32	1½
DMC-6 DME-3 DMA-1000	HD1-325 OR HD1-400 OR HD-600	15/8	213/16	1	1	3⅞	¾	1-14	2½	215/16	½	15/8	13/8	2¼
DMC-7 DME-7 DMA-1250	HD-600 OR	15/8	37/16	2	13/8	4⅞	1	1¼-12	2½	215/16	½	15/8	13/8	2¼