

# HL SERIES

**MEDIUM PRESSURE HYDRAULIC CYLINDERS**  
**BORE SIZE: 1 1/2" – 14" • UP TO 2,000 PSI (13.6 MPA)**  
**N.F.P.A. INTERCHANGEABLE**



CONTRÔLE

# HL SERIES

## MEDIUM PRESSURE HYDRAULIC CYLINDERS

### CONSTRUCTION

THE MATERIALS USED TO MANUFACTURE RDC CONTRÔLE LTÉE CYLINDERS ARE SELECTED FROM THE BEST QUALITY AVAILABLE. THE HL SERIES COMPONENTS ARE MANUFACTURED WITH THE LATEST SOPHISTICATED PRECISION EQUIPMENT. EACH CYLINDER IS ASSEMBLED AND INDIVIDUALLY TESTED UNDER STRICT QUALITY CONDITIONS.

#### PISTON SEALS

Consists of 2 "U" CUP double lip seals made of urethane with a fitted nitrile seal to energize during low pressure operations. The piston seals are available in fluorocarbon (viton) for high temperature applications.

#### HEAD AND CAP

Numerically controlled machined from hot rolled steel plates ASTM A36 or better.

#### BARREL SEAL

A nitrile O-ring provides a positive leak tight seal. Also available in fluorocarbon (viton) for higher temperatures.

#### CYLINDER BARREL

Heavy wall steel tubing with a polished chromed interior provides low friction and long seal life.

#### CUSHION PLUNGER (optional)

Made from mild steel, the plunger is free floating for proper centering and consistent alignment.

#### CUSHION SEALS (optional)

Bronze floating ring provides deceleration and helps eliminate shock. It also serves as a check valve for rapid piston breakaway, thus increasing cycle rates.

#### CUSHION ADJUSTMENT SCREW (optional)

Manufactured from stainless steel #303, complete with extra fine threads (to obtain precise adjustment).

#### GLAND BUSHING

Cartridge type made from SAE 660 bronze. Easily removable gland permits seal and wiper replacement without dismantling the cylinder tie rods. No special tool required.

#### PISTON ROD

High carbon content SAE 1045 steel rod, polished and chrome hardened. Stainless steel 316 chrome plated and 17-4 PH rods also available.

#### PISTON WEAR STRIP

It consists of a teflon tape filled with particles of glass and bronze for smoother piston operation. It eliminates metal-to-metal contact and prevents the possibility of scoring expensive barrel tubing.

#### TIE RODS AND NUTS

High strength steel barstock along with Grade 5 zinc plated steel nuts for corrosion resistance.

#### PISTON

**Bore size from 3 1/4" to 8":** Numerically controlled machined from high strength aluminum barstock (6061-T6)

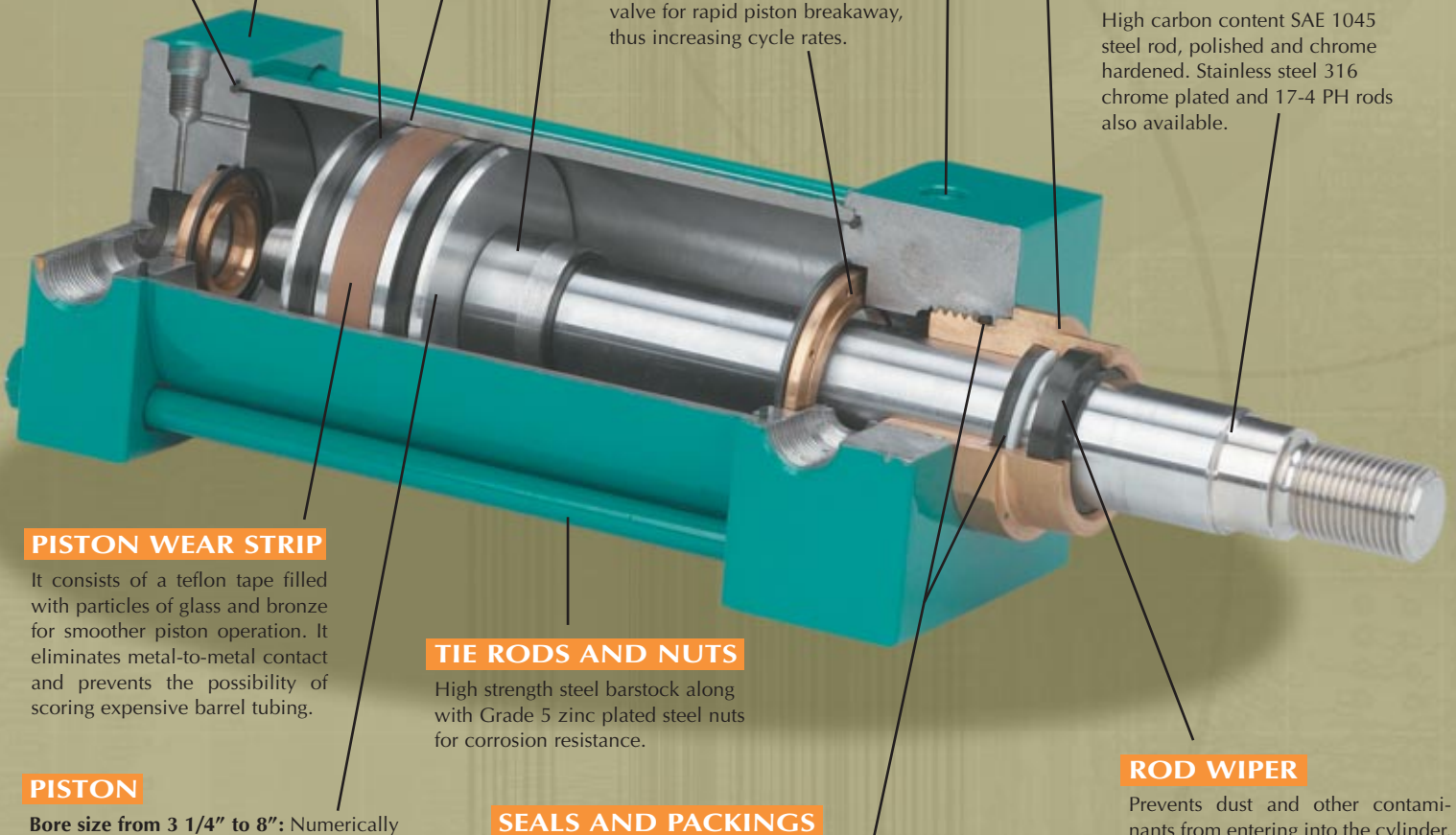
**Bore size from 10" to 14":** Made from high quality steel ASTM A36 or better.

#### SEALS AND PACKINGS

"U" CUP and O-ring are energized by a teflon ring assuring drip tight operation and reliability. A high durometer nitrile material is offered as standard equipment for temperatures ranging from -34°C to 80°C (-30°F to 180°F). Fluorocarbon (viton) seals and packings are available for temperatures up to 250°C (450°F).

#### ROD WIPER

Prevents dust and other contaminants from entering into the cylinder. Standard material is polyurethane. It can be replaced by fluorocarbon (viton) for higher temperature applications. A metal rod scraper is also available for severe applications.



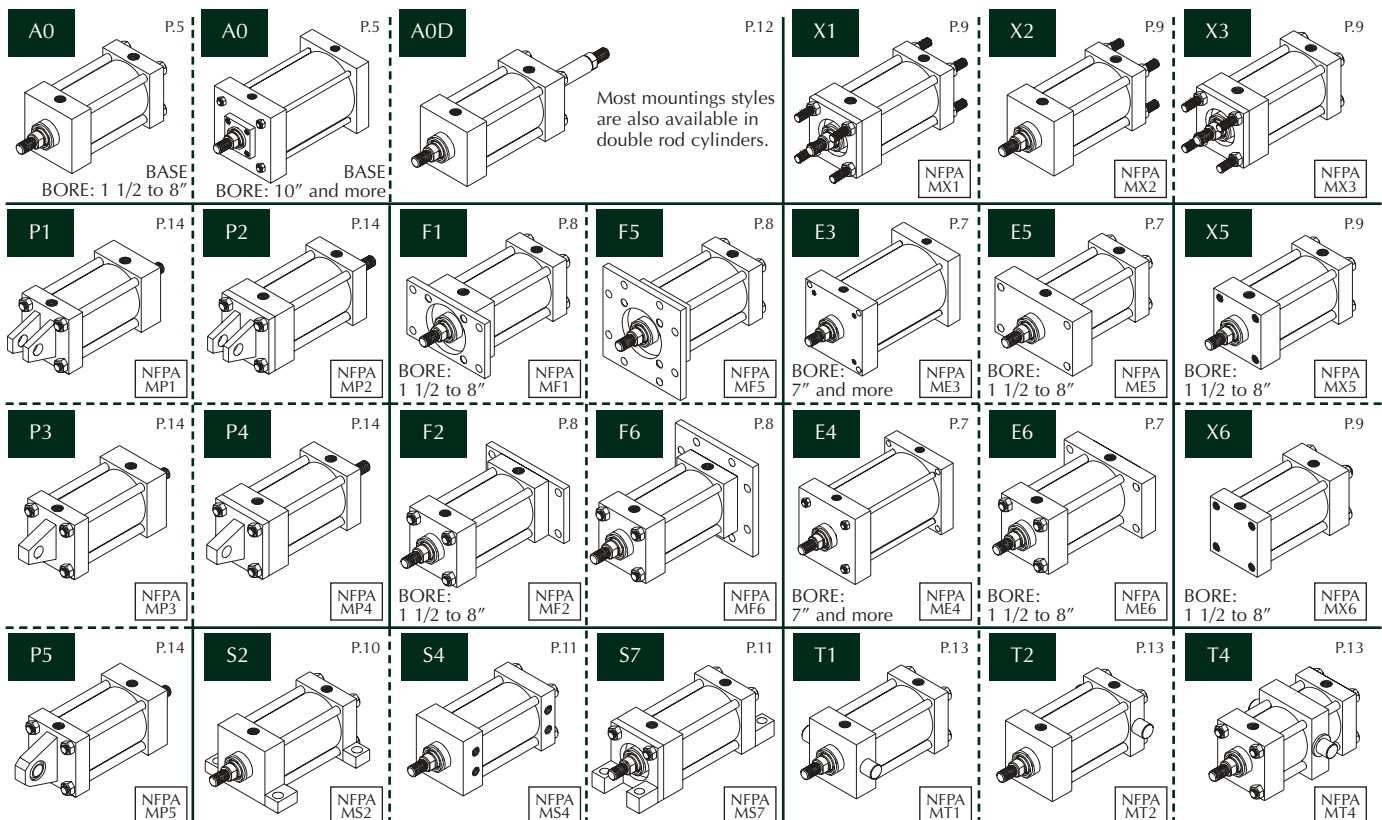
### FEATURES

- Type** Low pressure hydraulic cylinder conformed to N.F.P.A. specifications and ANSI B93.15-1981
  - Construction** Square steel head and cap, steel barrel tubing with polished and chromed i.d., tie rod assembled, removable bronze cartridge type gland bushing.
  - Operating pressure** Please consult chart below.
  - Operating temperature** -30°C to 80°C (-30°F to 180°F). Up to 250°C (450°F) for viton seals.
  - Standard bore size** 12 bore sizes available from 1 1/2" to 14"\*
  - Standard rods** 5/8", 1", 1 3/8", 1 3/4", 2", 2 1/2", 3", 3 1/2", 4", 4 1/2", 5", 5 1/2" \*
  - Stroke** All increments up to 120"\*
  - Cushions** Both cushions are optional and are available at either one end or both ends. Mounted with a floating cushion ring doubling as a check valve, the end of stroke cushioning is fully adjustable.
  - Mounting** 20 NFPA mounting styles are offered as standard equipment. (see chart)
- \* Other dimensions available on request.

NOMINAL PRESSURES (PSI)								
BORE SIZES	PISTON ROD DIAMETER							
	5/8	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2 ET +
1 1/2	2000	2000						
2	1200	2000						
2 1/2	750	1400	1400	1400				
3 1/4		1000	1200	1200	1200			
4		700	800	800	800	800		
5		550	800	950	950	950	950	950
6			550	600	650	650	650	650
7			450	550	650	750	750	750
8			350	400	500	600	600	600
10				400	550	550	550	550
12					400	400	400	400
14					400	400	400	400

Standard piston rod diameter

### STANDARD MOUNTING STYLES





### FEATURES

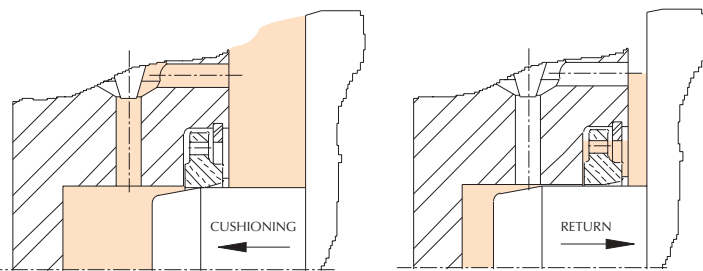
#### INTEGRATED CUSHION SEAL RING

The cylinder cushion seals are offered as optional equipment. They consist of a double action floating cushion ring which eliminates any potential alignment problems and the need of a mechanical check valve that would require constant maintenance.

This double action cushion ring diverts the oil through the adjustable orifice only for smoother end of stroke cushioning.

On the return stroke, the cushion seal allows oil to pass behind the piston thus obtaining a rapid breakaway and increase cycle rate.

The cushion adjustment screws supplied by RDC Contrôle Ltée are specially designed with extra fine threads (UNEF) to obtain a perfect adjustment. For added security, the screws will leak fluid before being accidentally ejected if they are attempted to be removed under pressure. These screws are normally installed on side n°2 of the cylinder except for trunnion mountings (T1, T2 and T4) on which they can be found on side n°3.

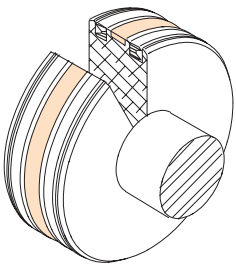


CUSHIONS LENGTH

BORE SIZE	ROD DIA.	HEAD END	CAP END
1 1/2	5/8 STD.	11/16	3/4
	1	11/16	3/4
2	5/8 STD.	11/16	3/4
	1	11/16	3/4
2 1/2	5/8 STD.	11/16	3/4
	1	11/16	3/4
3 1/4	1" STD.	15/16	15/16
	1 3/8	15/16	15/16
4	1" STD.	15/16	15/16
	1 3/8	15/16	15/16
5	1" STD.	15/16	15/16
	1 3/8	15/16	15/16
6	1 3/8 STD.	1 3/16	1 3/16
	1 3/4	1 3/16	1 3/16
7	1 3/8 STD.	1 3/16	1 3/16
	1 3/4	1 3/16	1 3/16
8	1 3/8 STD.	1 3/16	1 3/16
	1 3/4	1 3/16	1 3/16
10	1 3/4 STD.	1 1/4	1 1/4
	2 1/2	1 1/4	1 1/4
12	2" STD.	1 1/4	1 1/4
	3	1 1/4	1 1/4
14	2 1/2 STD.	1 1/2	1 1/2
	3 1/2	1 1/2	1 1/2

#### STANDARD PISTON WEAR STRIP

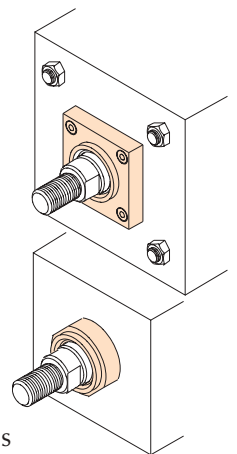
All standard pistons on HL Series cylinders are equipped with a bronze and glass impregnated teflon wear band. In addition to giving the piston a more secure fit, the self-lubricating feature protects the interior surface and adds to the life of the cylinder.



#### CARTRIDGE TYPE GLAND BUSHING

The gland bushing of the HL Series cylinders is designed for easy removal, thus allowing easy seal maintenance without dismantling the entire cylinder. For piston rod diameters less than or equal to 1 3/4", a simple wrench may be used.

For piston rod diameters greater than 1 3/4", the non-threaded glandbushing is held in place with a removable bolted-on plate.



#### DIFFERENT OPTIONS AVAILABLE

The HL Series hydraulic cylinders offered by RDC Contrôle Ltée can be adapted to accept a wide range of options and accessories to meet your specific needs. Please contact our customer service department for more details on the options mentioned below or about other special applications.

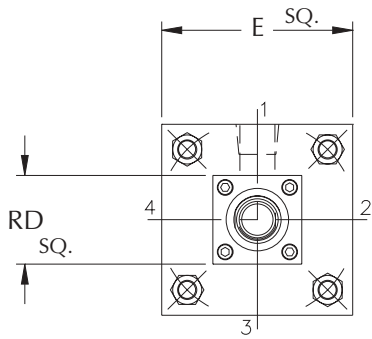
##### OPTIONS

- Multi-stage cylinder (Duplex, Tandem)
- Double rod cylinder
- Spring return cylinder
- Water operated cylinder (A.W.W.A.)
- Stroke adjustment device
- Stainless Steel piston rod #17-4PH
- Protective rod boot
- Piston rod scraper
- High temperature seals
- SAE O-ring ports

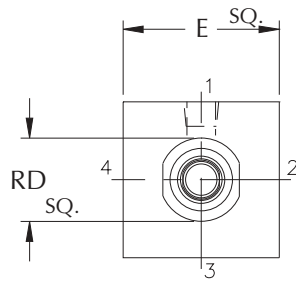
##### ACCESSORIES

- Mounting accessories (see pages 15-16)
- Self-alignment rod coupler
- Manual control valve
- Solenoid valve
- Flow control
- Proximity switch
- Limit switch
- Position transducer

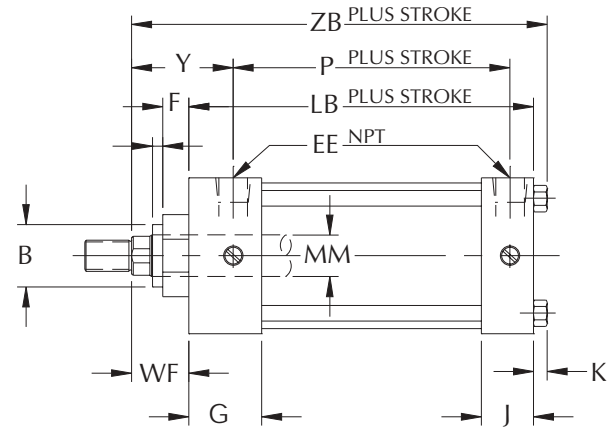
### BASIC CYLINDER A0 MOUNTING



ROD DIA. 2" AND MORE



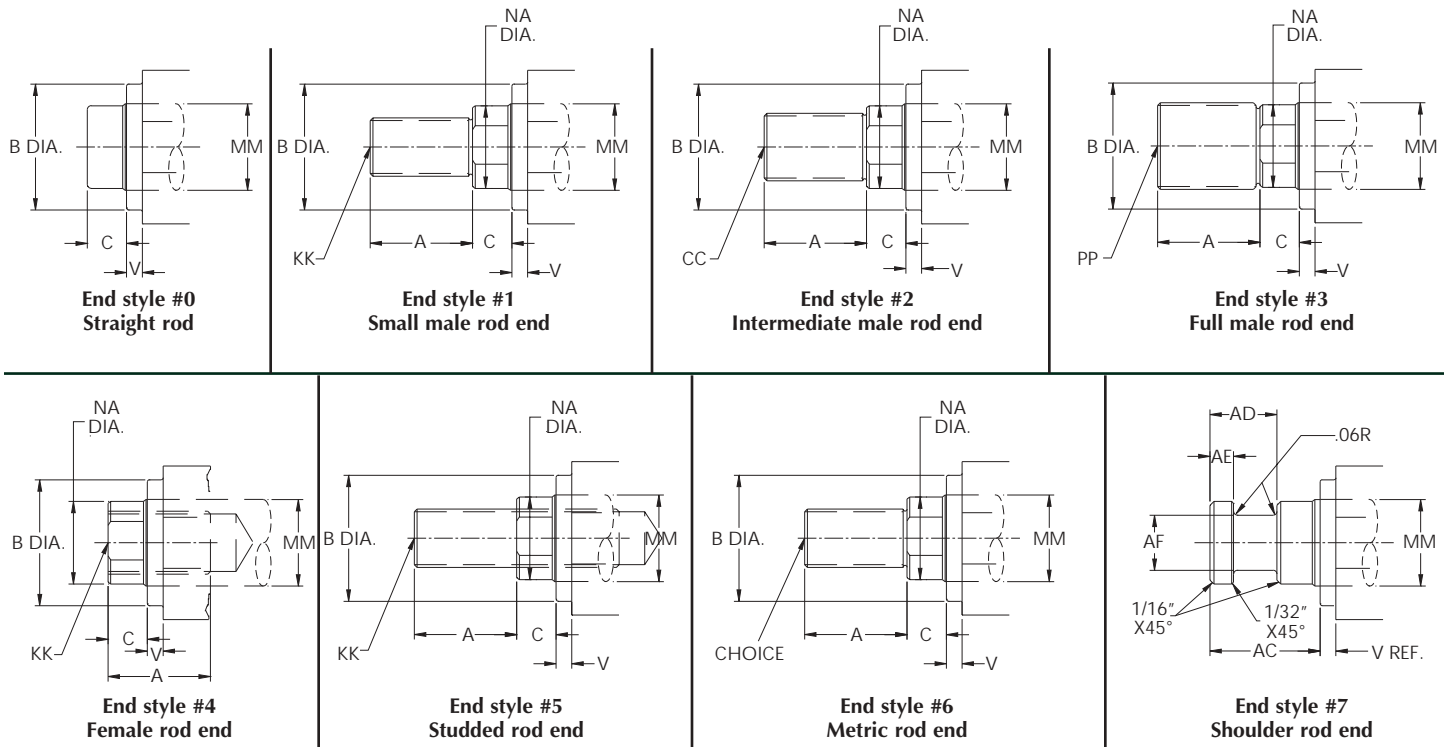
ROD DIA.: 5/8" TO 1 3/4"



BORE SIZE	MM ROD DIA.	B	RD	V	WF	Y	ZB	E	EE	F	G	J	K	LB	P
1 1/2	5/8 STD.	1.124	1 3/8	1/4	1	1 15/16	4 7/8	2	1/4	3/8	1 1/2	1	1/4	3 5/8	2 1/4
	1	1.499	1 3/4	1/2	1 3/8	2 5/16	5 1/4								
2	5/8 STD.	1.124	1 3/8	1/4	1	1 15/16	4 15/16	2 1/2	3/8	3/8	1 1/2	1	5/16	3 5/8	2 1/4
	1	1.499	1 3/4	1/2	1 3/8	2 5/16	5 5/16								
2 1/2	5/8	1.124	1 3/8	1/4	1	1 15/16	5 1/16	3	3/8	3/8	1 1/2	1	5/16	3 3/4	2 3/8
	1" STD.	1.499	1 3/4	1/2	1 3/8	2 5/16	5 7/16								
3 1/4	1 3/8	1.999	2 7/16	5/8	1 5/8	2 9/16	5 11/16	3 3/4	1/2	5/8	1 3/4	1 1/4	3/8	4 1/4	2 5/8
	1" STD.	1.499	1 3/4	1/4	1 3/8	2 7/16	6								
	1 3/4	1.999	2 7/16	3/8	1 5/8	2 11/16	6 1/4								
4	1 3/4	2.374	2 13/16	1/2	1 7/8	2 15/16	6 1/2	4 1/2	1/2	5/8	1 3/4	1 1/4	3/8	4 1/4	2 5/8
	1"	1.499	1 3/4	1/4	1 3/8	2 7/16	6								
	1 3/8 STD.	1.999	2 7/16	3/8	1 5/8	2 11/16	6 1/4								
5	1 3/8	1.999	2 7/16	3/8	1 5/8	2 11/16	6 5/8	5 1/2	1/2	5/8	1 3/4	1 1/4	1/2	4 1/2	2 7/8
	1 3/4 STD.	2.374	2 13/16	1/2	1 7/8	2 15/16	6 3/4								
	2"	2.624	4	1/2	2	3 1/16	7								
	1 3/8	1.999	2 7/16	1/4	1 5/8	2 13/16	7 1/8								
6	1 3/4 STD.	2.374	2 13/16	3/8	1 7/8	3 1/16	7 3/8	6 1/2	3/4	3/4	2	1 1/2	1/2	5	3 1/8
	2"	2.624	4	3/8	2	3 3/16	7 1/2								
	2 1/2	3.124	4	1/2	2 1/4	3 7/16	7 3/4								
7	1 3/8	1.999	2 7/16	1/4	1 5/8	2 13/16	7 3/8	7 1/2	3/4	3/4	2	1 1/2	5/8	5 1/8	3 1/4
	1 3/4	2.374	2 13/16	3/8	1 7/8	3 1/16	7 5/8								
	2" STD.	2.624	4	3/8	2	3 3/16	7 3/4								
8	2 1/2	3.124	4	1/2	2 1/4	3 7/16	8	8 1/2	3/4	3/4	2	1 1/2	5/8	5 1/8	3 1/4
	1 3/8	1.999	2 7/16	1/4	1 5/8	2 13/16	7 3/8								
	1 3/4	2.374	2 13/16	3/8	1 7/8	3 1/16	7 5/8								
10	2" STD.	2.624	4	3/8	2	3 1/4	9 3/8	10 5/8	1	3/4	2 1/4	2	3/4	6 3/8	4 1/8
	2 1/2	3.124	4	1/2	2 1/4	3 1/2	9 3/8								
	3"	3.749	5	1/2	2 1/4	3 1/2	9 3/8								
	2" STD.	2.624	4	3/8	2	3 1/4	9 5/8								
12	2 1/2	3.124	4	1/2	2 1/4	3 1/2	9 7/8	12 3/4	1	3/4	2 1/4	2	3/4	6 7/8	4 5/8
	3"	3.749	5	1/2	2 1/4	3 1/2	9 7/8								
	3 1/2	4.249	5	1/2	2 1/4	3 1/2	9 7/8								
14	2 1/2 STD.	3.124	4	1/2	2 1/4	3 13/16	11 1/4	14 3/4	1 1/4	3/4	2 3/4	2 1/4	7/8	8 1/8	5 1/2
	3"	3.749	5	1/2	2 1/4	3 13/16	11 1/4								
	3 1/2	4.249	5	1/2	2 1/4	3 13/16	11 1/4								
	4"	4.749	5 3/4	1/2	2 1/4	3 13/16	11 1/4								

### PISTON ROD END STYLES

RDC Contrôle Ltée offers 8 different standard piston rod end models.



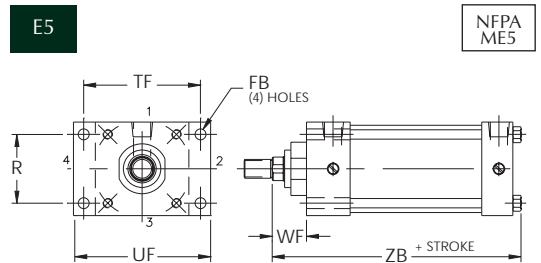
### DIMENSION CHART

MM ROD DIA.	A	B <sup>-.000 -.002</sup> DIA.	C	CC	PP	KK	NA	AD	AE <sup>+.000 +.002</sup>	AF DIA.	AC
5/8"	3/4"	1.124"	3/8"	1/2 - 20 UNF	5/8 - 18 UNF	7/16 - 20 UNF	9/16"	5/8"	1/4"	3/8"	1 1/8"
1"	1 1/8"	1.499"	1/2"	7/8 - 14 UNF	1 - 14 UNS	3/4 - 16 UNF	15/16"	15/16"	3/8"	11/16"	1 1/2"
1 3/8"	1 5/8"	1.999"	5/8"	1 1/4 - 12 UNF	1 3/8 - 12 UNF	1 - 14 UNS	1 5/16"	1 1/16"	3/8"	7/8"	1 3/4"
1 3/4"	2"	2.374"	3/4"	1 1/2 - 12 UNF	1 3/4 - 12 UNF	1 1/4 - 12 UNF	1 11/16"	1 5/16"	1/2"	1 1/8"	2"
2"	2 1/4"	2.624"	7/8"	1 3/4 - 12 UNF	2 - 12 UNF	1 1/2 - 12 UNF	1 15/16"	1 11/16"	5/8"	1 3/8"	2 5/8"
2 1/2"	3"	3.124"	1"	2 1/4 - 12 UNF	2 1/2 - 12 UNF	1 7/8 - 12 UNF	2 3/8"	1 15/16"	3/4"	1 3/4"	3 1/4"
3"	3 1/2"	3.729"	1"	2 3/4 - 12 UNF	3 - 12 UNF	2 1/4 - 12 UNF	2 7/8"	2 7/16"	7/8"	2 1/4"	3 5/8"
3 1/2"	3 1/2"	4.249"	1"	3 1/4 - 12 UNF	3 1/2 - 12 UNF	2 1/2 - 12 UNF	3 3/8"	2 11/16"	1"	2 1/2"	4 3/8"
4"	4"	4.749"	1"	3 3/4 - 12 UNF	4 - 12 UNF	3 - 12 UNF	3 7/8"	2 11/16"	1"	3"	4 1/2"
4 1/2"	4 1/2"	5.249"	1"	4 1/4 - 12 UNF	4 1/2 - 12 UNF	3 1/4 - 12 UNF	4 3/8"	3 3/16"	1 1/2"	3 1/2"	5 1/4"
5"	5"	5.749"	1"	4 3/4 - 12 UNF	5 - 12 UNF	3 1/2 - 12 UNF	4 7/8"	3 3/16"	1 1/2"	3 7/8"	5 3/8"
5 1/2"	5 1/2"	6.249"	1"	5 1/4 - 12 UNF	5 1/2 - 12 UNF	4 - 12 UNF	5 3/8"	3 15/16"	1 7/8"	4 3/8"	6 1/4"

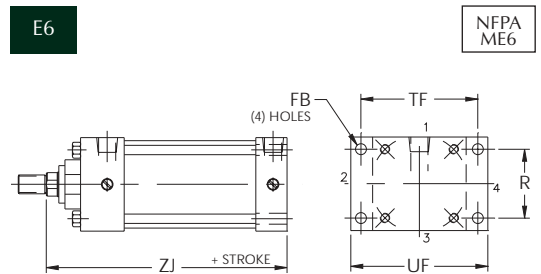
RDC Contrôle Ltée can also manufacture a piston rod end adapted to customer specifications through a detailed sketch. In this case, we will use #8 for the female special and #9 for the male special end styles.

### RECTANGULAR HEAD OR CAP MOUNTINGS

BORE SIZE	MM ROD DIA.	RD	WF	ZJ	FB	R	TF	UF
1 1/2	5/8 STD.	1 3/8	1	4 5/8	5/16	1.43	2 3/4	3 3/8
	1	1 3/4	1 3/8	5				
2	5/8 STD.	1 3/8	1	4 5/8	3/8	1.84	3 3/8	4 1/8
	1	1 3/4	1 3/8	5				
2 1/2	5/8	1 3/8	1	4 3/4	3/8	2.19	3 7/8	4 5/8
	1" STD.	1 3/4	1 3/8	5 1/8				
	1 3/8	2 7/16	1 5/8	5 3/8				
3 1/4	1" STD.	1 3/4	1 3/8	5 5/8	7/16	2.76	4 11/16	5 1/2
	1 3/8	2 7/16	1 5/8	5 7/8				
	1 3/4	2 13/16	1 7/8	6 1/8				
4	1"	1 3/4	1 3/8	5 5/8	7/16	3.32	5 7/16	6 1/4
	1 3/8 STD.	2 7/16	1 5/8	5 7/8				
	1 3/4	2 13/16	1 7/8	6 1/8				
5	1"	1 3/4	1 3/8	5 7/8	9/16	4.10	6 5/8	7 5/8
	1 3/8	2 7/16	1 5/8	6 1/8				
	1 3/4 STD.	2 13/16	1 7/8	6 3/8				
6	2"	4	2	6 1/2	9/16	4.88	7 5/8	8 5/8
	1 3/8	2 7/16	1 5/8	6 5/8				
	1 3/4 STD.	2 13/16	1 7/8	6 7/8				
	2"	4	2	7				
7	2 1/2	4	2 1/4	7 1/4	11/16	5.73	9	10 1/4
	1 3/8	2 7/16	1 5/8	6 3/4				
	1 3/4	2 13/16	1 7/8	7				
8	2" STD.	4	2	7 1/8	11/16	6.44	10	11 1/4
	2 1/2	4	2 1/4	7 3/8				
	1 3/8	2 7/16	1 5/8	6 3/4				
	1 3/4	2 13/16	1 7/8	7				

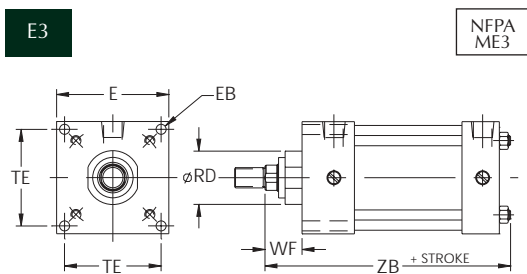


E5 - Rectangular head mounting



E6 - Rectangular cap mounting

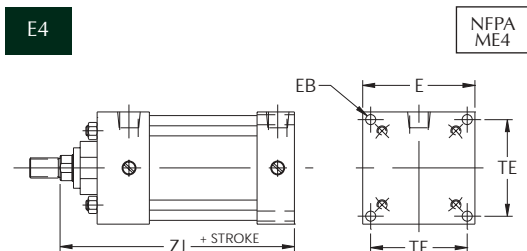
### SQUARE HEAD OR CAP MOUNTINGS



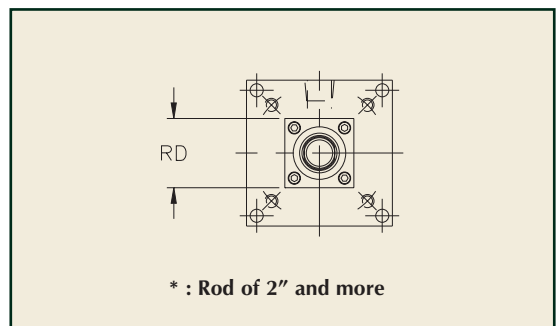
E3 - Square head mounting

BORE SIZE	MM ROD DIA.	WF	ZB	ZJ	RD	E	EB	TE
7	1 3/8	1 5/8	7 3/8	6 3/4	2 7/16	7 1/2	9/16	6.75
	1 3/4	1 7/8	7 5/8	7	2 13/16			
	2" STD.	2	7 3/4	7 1/8	*			
8	2 1/2	2 1/4	7	7 3/8	*	8 1/2	11/16	7.57
	1 3/8	1 5/8	7 3/8	6 3/4	2 7/16			
	1 3/4	1 7/8	7 5/8	7	2 13/16			
	2" STD.	2	7 3/4	7 1/8	*			
	2 1/2	2 1/4	7	7 3/8	*			

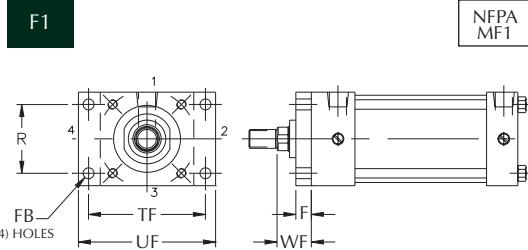
10" - 12" - 14" : dimensions available on request



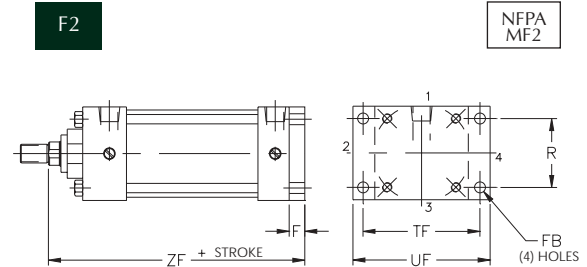
E4 - Square cap mounting



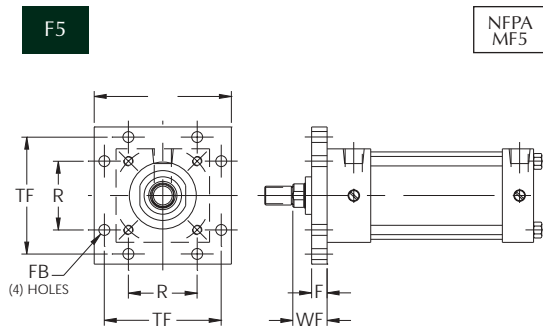
### FLANGE MOUNTINGS



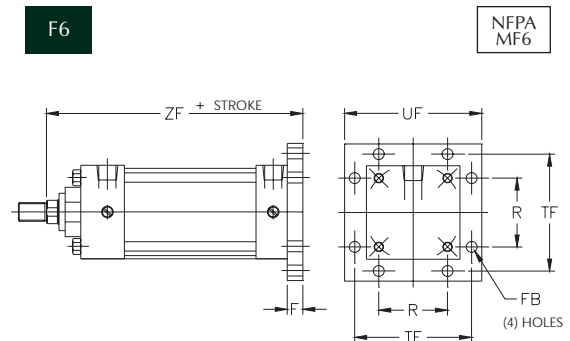
F1 – Head end rectangular flange



F2 – Cap end rectangular flange



F5 – Head end square flange



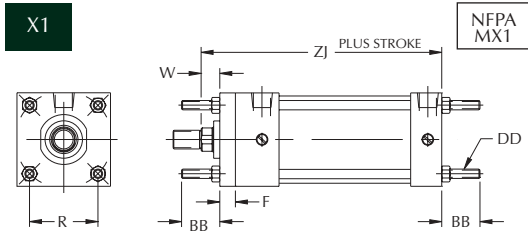
F6 – Cap end square flange

BORE SIZE	MM ROD DIA.	WF	ZF	F	FB	R	TF	UF
1 1/2	5/8 STD.	1	5	3/8	5/16	1.43	2 3/4	3 3/8
	1	1 3/8	5 3/8					
2	5/8 STD.	1	5	3/8	3/8	1.84	3 3/8	4 1/8
	1	1 3/8	5 3/8					
2 1/2	5/8	1	5 1/8	3/8	3/8	2.19	3 7/8	4 5/8
	1 STD.	1 3/8	5 1/2					
3 1/4	1 3/8	1 5/8	6 1/2	5/8	7/16	2.76	4 11/16	5
	1 3/4	1 7/8	6 3/4					
	1"	1 3/8	6 1/4					
4	1 3/8 STD.	1 5/8	6 1/2	5/8	7/16	3.32	5 7/16	6 1/4
	1 3/4	1 7/8	6 3/4					
	1"	1 3/8	6 1/2					
5	1 3/8	1 5/8	6 3/4	5/8	9/16	4.10	6 5/8	7 5/8
	1 3/4 STD.	1 7/8	7					
	2"	2	7 1/8					
6	1 3/8	1 5/8	7 3/8	3/4	9/16	4.88	7 5/8	8 5/8
	1 3/4 STD.	1 7/8	7 5/8					
	2"	2	7 3/4					
7	2 1/2	2 1/4	8	3/4	11/16	5.73	9	10 1/4
	1 3/8	1 5/8	7 1/2					
	1 3/4	1 7/8	7 3/4					
8	2" STD.	2	7 7/8	3/4	11/16	6.44	10	11 1/4
	2 1/2	2 1/4	8 1/8					
	1 3/8	1 5/8	7 1/2					
	1 3/4	1 7/8	7 3/4					
8	2" STD.	2	7 7/8	3/4	11/16	6.44	10	11 1/4
	2 1/2	2 1/4	8 1/8					
	1 3/8	1 5/8	7 1/2					

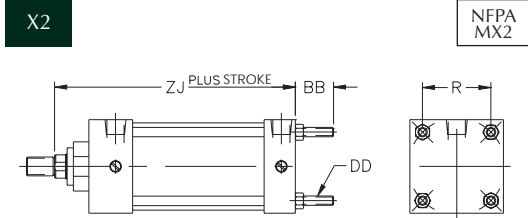
10" - 12" - 14" : dimensions available on request



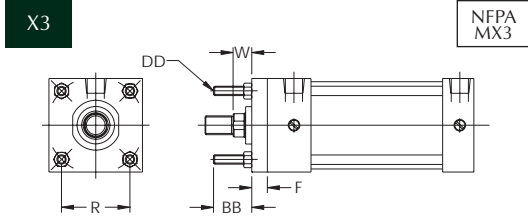
### EXTENDED TIE ROD MOUNTINGS



X1 - Both ends extended tie rods



X2 - Cap end extended tie rods

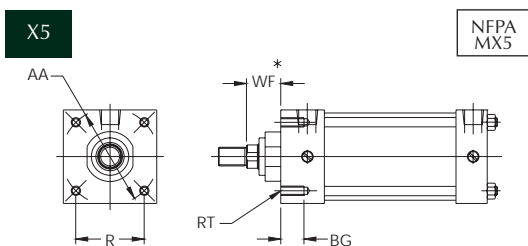


X3 - Head end extended tie rods

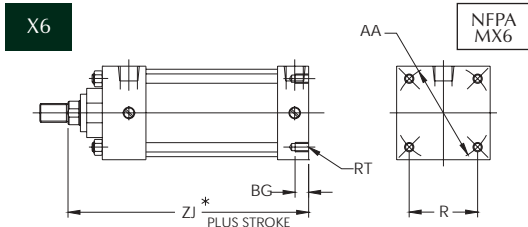
BORE SIZE	MM ROD DIA.	W	WF	ZJ	BB	DD	F	R
1 1/2	5/8 STD.	5/8	1	4 5/8	1	1/4 - 28	3/8	1.43
	1	1	1 3/8	5				
2	5/8 STD.	5/8	1	4 5/8	1 1/8	5/16 - 24	3/8	1.84
	1	1	1 3/8	5				
2 1/2	5/8	5/8	1	4 3/4	1 1/8	5/16 - 24	3/8	2.19
	1 STD.	1	1 3/8	5 1/8				
	1 3/8	1 1/4	1 5/8	5 3/8				
3 1/4	1" STD.	3/4	1 3/8	5 5/8	1 3/8	3/8 - 24	5/8	2.76
	1 3/8	1	1 5/8	5 7/8				
	1 3/4	1 1/4	1 7/8	6 1/8				
4	1" STD.	3/4	1 3/8	5 5/8	1 3/8	3/8 - 24	5/8	3.32
	1 3/8	1	1 5/8	5 7/8				
	1 3/4	1 1/4	1 7/8	6 1/8				
5	1" STD.	3/4	1 3/8	5 7/8	1 13/16	1/2 - 20	5/8	4.10
	1 3/8	1	1 5/8	6 1/8				
	1 3/4 STD.	1 1/4	1 7/8	6 3/8				
6	2"	1 3/8	2	6 1/2	1 13/16	1/2 - 20	3/4	4.88
	1 3/8	7/8	1 5/8	6 5/8				
	1 3/4 STD.	1 1/8	1 7/8	6 7/8				
7*	2"	1 1/4	2	7	2 5/16	5/8 - 18	-	5.73
	2 1/2	1 1/2	2 1/4	7 1/4				
	1 3/8	1 5/8	1 5/8	6 3/4				
8*	1 3/4	1 7/8	1 7/8	7	2 5/16	5/8 - 18	-	6.44
	2" STD.	2	2	7 1/8				
	2 1/2	2 1/4	2 1/4	7 3/8				

Front flange: BB measured from head - (W) equals (WF)

### TAPPED HOLES ON END



X5 - Head end tapped holes



X6 - Cap end tapped holes

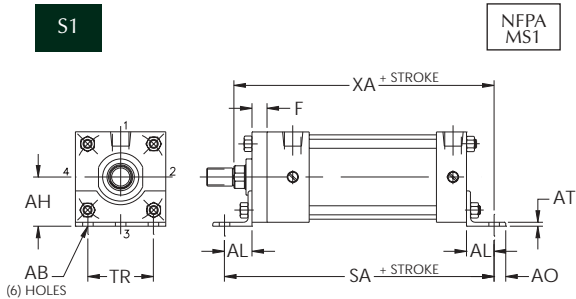
BORE SIZE	AA	BG	R	RT
1 1/2	2.02	3/4	1.43	1/4 - 28
2	2.60	3/4	1.84	5/16 - 24
2 1/2	3.10	3/4	2.19	5/16 - 24
3 1/4	3.90	7/8	2.76	3/8 - 24
4	4.70	7/8	3.32	3/8 - 24
5	5.80	7/8	4.10	1/2 - 20
6	6.90	1	4.88	1/2 - 20
7	8.10	1 1/8	5.73	5/8 - 18
8	9.10	1 1/8	6.44	5/8 - 18

Please refer to the above chart for the WF and ZJ dimensions.

### SIDE BASE MOUNTINGS

BORE SIZE	MM ROD DIA.	XA	AB	AH	AL	AO	AT	F	TR	SA
1 1/2	5/8 STD.	5 5/8	7/16	1 3/16	1	1/2	1/8	3/8	1 1/4	6
	1	N/A								
2	5/8 STD.	5 5/8	7/16	1 7/16	1	1/2	1/8	3/8	1 3/4	6
	1	6								
2 1/2	5/8	5 3/4	7/16	1 5/8	1	1/2	1/8	3/8	2 1/4	6 1/8
	1 STD.	6 1/8								
	1 3/8	6 3/8								
3 1/4	1" STD.	6 7/8	9/16	1 15/16	1 1/4	1/2	1/8	5/8	2 3/4	7 3/8
	1 3/8	7 1/8								
	1 3/4	7 3/8								
4	1"	6 7/8	9/16	2 1/4	1 1/4	1/2	1/8	5/8	3 1/2	7 3/8
	1 3/8 STD.	7 1/8								
	1 3/4	7 3/8								
5	1"	7 1/4	11/16	3 3/4	1 3/8	5/8	3/16	5/8	4 1/4	7 7/8
	1 3/8	7 1/2								
	1 3/4 STD.	7 3/4								
6	2"	7 7/8	13/16	3 1/4	1 3/8	5/8	3/16	3/4	5 1/4	8 1/2
	1 3/8	8								
	1 3/4 STD.	8 1/4								
7*	2"	8 3/8	13/16	3 3/4	1 13/16	11/16	1/4	-	6 1/8	8 3/4
	2 1/2	8 5/8								
	1 3/8	8 9/16								
8*	1 3/4	8 13/16	13/16	4 1/4	1 13/16	11/16	1/4	-	7 1/8	8 3/4
	2" STD.	8 15/16								
	2 1/2	9 3/16								

10" - 12" - 14" : dimensions available on request  
N/A: Not available

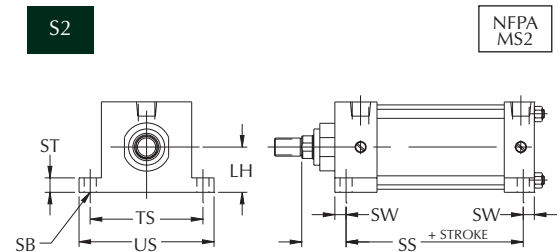


#### S1 - Parallel base mounting

\* Front flange:  
Dimension "F" is no longer applicable to this mounting.

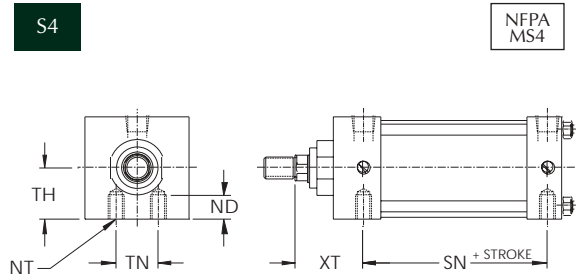
BORE SIZE	MM ROD DIA.	XS	LH	BOLTS SB	SS	ST	SW	TS	US
1 1/2	5/8 STD.	1 3/8	1	3/8	2 7/8	1/2	3/8	2 3/4	3 1/2
	1	1 3/4							
2	5/8 STD.	1 3/8	1 1/4	3/8	2 7/8	1/2	3/8	3 1/4	4
	1	1 3/4							
2 1/2	5/8	1 3/8	1 1/2	3/8	3	1/2	3/8	3 3/4	4 1/2
	1 STD.	1 3/4							
	1 3/8	2							
3 1/4	1" STD.	1 7/8	1 7/8	1/2	3 1/4	3/4	1/2	4 3/4	5 3/4
	1 3/8	2 1/8							
	1 3/4	2 3/8							
4	1"	1 7/8	2 1/4	1/2	3 1/4	3/4	1/2	5 1/2	6 1/2
	1 3/8 STD.	2 1/8							
	1 3/4	2 3/8							
5	1"	2 1/16	2 3/4	3/4	3 1/8	1	11/16	6 7/8	8 1/4
	1 3/8	2 5/16							
	1 3/4 STD.	2 9/16							
6	2"	2 11/16	3 1/4	3/4	3 5/8	1	11/16	7 7/8	9 1/4
	1 3/8	2 5/16							
	1 3/4 STD.	2 9/16							
7	2 1/2	2 15/16	3 3/4	3/4	3 3/4	1	11/16	8 7/8	10 1/4
	1 3/8	2 5/16							
	1 3/4	2 9/16							
8	2" STD.	2 11/16	4 1/4	3/4	3 3/4	1	11/16	9 7/8	11 1/4
	2 1/2	2 15/16							
	1 3/8	2 5/16							

10" - 12" - 14" : dimensions available on request



#### S2 - Side lugs mounting

### SIDE BASE MOUNTINGS



S4 - Side tapped holes mounting

BORE SIZE	MM ROD DIA.	XT	ND	NT UNC	TN	SN	TH
1 1/2	5/8 STD.	1 15/16	3/8	1/4 - 20	5/8	2 1/4	1
	1	2 3/16					
2	5/8 STD.	1 15/16	1/2	5/16 - 18	7/8	2 1/4	1 1/4
	1	2 3/16					
2 1/2	5/8	1 15/16	3/4	3/8 - 16	1 1/4	2 3/8	1 1/2
	1 STD.	2 3/16					
	1 3/8	2 9/16					
3 1/4	1" STD.	2 7/16	7/8	1/2 - 13	1 1/2	2 5/8	1 7/8
	1 3/8	2 11/16					
	1 3/4	2 15/16					
4	1"	2 7/16	7/8	1/2 - 13	2 1/16	2 5/8	2 1/4
	1 3/8 STD.	2 11/16					
	1 3/4	2 15/16					
5	1"	2 7/16	1	5/8 - 11	2 11/16	2 7/8	2 3/4
	1 3/8	2 11/16					
	1 3/4 STD.	2 15/16					
	2"	3 1/16					
6	1 3/8	2 13/16	1 1/8	3/4 - 10	3 1/4	3 1/8	3 1/4
	1 3/4 STD.	3 1/16					
	2"	3 3/16					
	2 1/2	3 7/16					
7	1 3/8	2 13/16	1 1/8	3/4 - 10	3 1/2	3 1/4	3 3/4
	1 3/4	3 1/16					
	2" STD.	3 3/16					
	2 1/2	3 7/16					
8	1 3/8	2 13/16	1 1/8	3/4 - 10	4 1/2	3 1/4	4 1/4
	1 3/4	3 1/16					
	2" STD.	3 3/16					
	2 1/2	3 7/16					

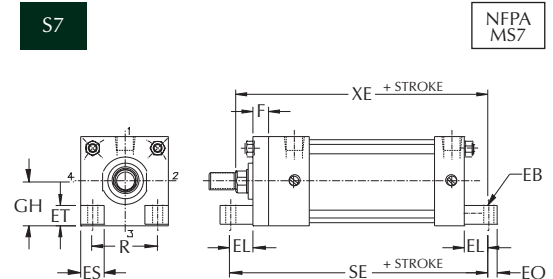
10" - 12" - 14" : dimensions available on request

BORE SIZE	MM ROD DIA.	XE	GH	BOLTS EB	EL	EO	ET	ES	R	SE
1 1/2	5/8 STD.	5 3/8	1	1/4	3/4	1/4	9/16	9/16	1.43	5 1/2
	1	N/A								
2	5/8 STD.	5 9/16	1 1/4	5/16	15/16	5/16	5/8	5/8	1.84	5 7/8
	1	N/A								
2 1/2	5/8	5 13/16	1 1/2	5/16	1 1/16	5/16	3/4	3/4	2.19	6 1/4
	1 STD.	6 3/16								
	1 3/8	6 7/16								
3 1/4	1" STD.	6 1/2	1 7/8	3/8	7/8	3/8	1	15/16	2.76	6 5/8
	1 3/8	6 3/4								
	1 3/4	7								
4	1"	6 5/8	2 1/4	3/8	1	3/8	1 3/16	1 1/8	3.32	6 7/8
	1 3/8 STD.	6 7/8								
	1 3/4	7 1/8								
5	1"	6 15/16	2 3/4	1/2	1 1/16	1/2	1 3/8	1 3/8	4.10	7 1/4
	1 3/8	7 3/16								
	1 3/4 STD.	7 7/16								
	2"	7 9/16								
6	1 3/8	7 5/8	3 1/4	1/2	1	1/2	1 5/8	1 9/16	4.88	7 3/4
	1 3/4 STD.	7 7/8								
	2"	8								
	2 1/2	8 1/4								
7*	1 3/8	7 7/8	3 3/4	5/8	1 1/8*	5/8	1 3/4	1 3/4	5.73	7 3/8
	1 3/4	8 1/8								
	2" STD.	8 1/4								
	2 1/2	8 1/2								
8*	1 3/8	7 7/8	4 1/4	5/8	1 1/8*	5/8	2 1/16	2	6.44	7 3/8
	1 3/4	8 1/8								
	2" STD.	8 1/4								
	2 1/2	8 1/2								

10" - 12" - 14" : dimensions available on request

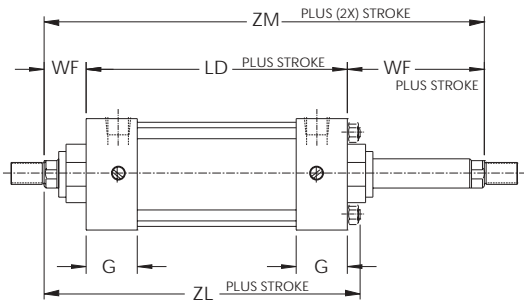
N/A: Not available

\* Front flange: "EL" measured from the head.

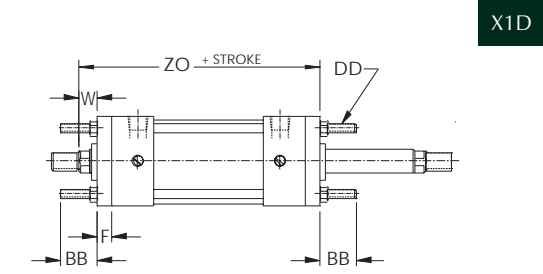
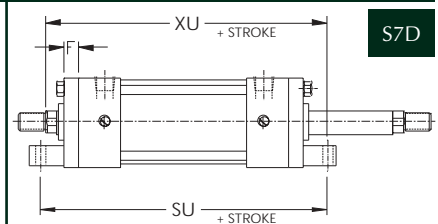
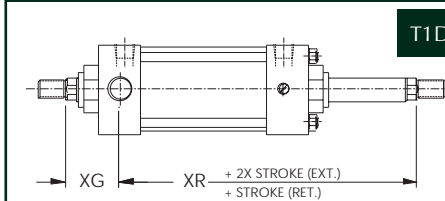
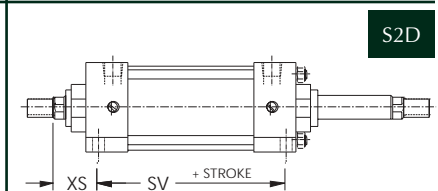
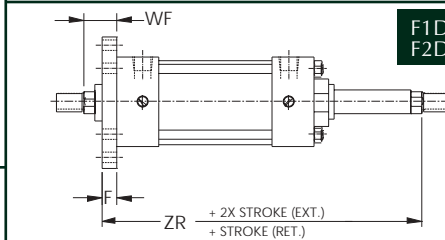
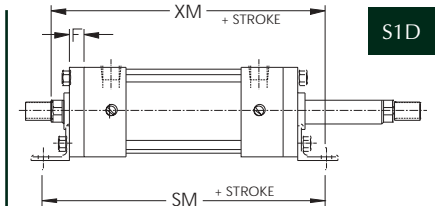
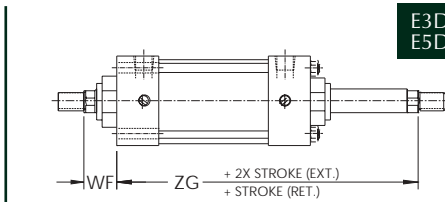


S7 - End lugs mounting

### DOUBLE ROD CYLINDERS BASIC DIMENSIONS



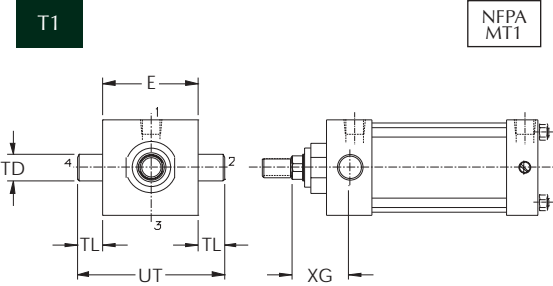
G and WF Dimensions;  
Refer to basic mounting on page 5.



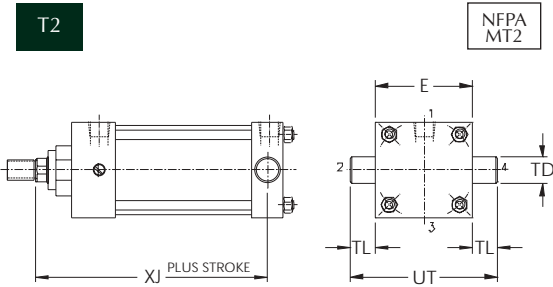
MOUNTING		ALL			F1D F5D	E3D E5D	S1		S7		S2	TI	X1D X3D
BORE SIZE	MM DIA.TIGE	+ STROKE	+ STROKE	+ 2X + STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE	+ STROKE
		LD	ZL	ZM	ZR	ZG	SM	XM	SU	XU	SV	XR	ZO
1 1/2	5/8 STD.	4 1/8	5 3/8	6 1/8	5 1/2	5 1/8	6 7/8	6 1/2	-	-	3 3/8	4 3/8	5 1/2
	1	4 1/8	-	-	5 7/8	5 1/2	-	-	-	-	3 3/8	4 3/4	5 7/8
2	5/8 STD.	4 1/8	5 7/16	6 1/8	5 1/2	5 1/8	6 7/8	6 1/2	6 3/4	6 7/16	3 3/8	4 3/8	5 1/2
	1	4 1/8	5 13/16	6 7/8	5 7/8	5 1/2	6 7/8	6 7/8	-	-	3 3/8	4 3/4	5 7/8
2 1/2	5/8	4 1/4	5 9/16	6 1/4	5 5/8	5 1/4	7	6 5/8	8 3/8	7 5/16	3 1/2	4 1/2	5 5/8
	1 STD.	4 1/4	5 15/16	7	6	5 5/8	7	7	8 3/8	7 11/16	3 1/2	4 7/8	6
	1 3/8	4 1/4	6 3/16	7 1/2	6 1/4	5 7/8	7	7 1/4	-	-	3 1/2	5 1/8	6 1/4
3 1/4	1" STD.	4 3/4	6 1/2	7 1/2	6 3/4	6 1/8	8 1/2	8	7 3/4	7 5/8	3 3/4	5 1/4	6 3/4
	1 3/8	4 3/4	6 3/4	8	7	6 3/8	8 1/2	8 1/4	7 3/4	7 7/8	3 3/4	5 1/2	7
	1 3/4	4 3/4	7	8 1/2	7 1/4	6 5/8	8 1/2	8 1/2	7 3/4	8 1/8	3 3/4	5 3/4	7 1/4
4	1"	4 3/4	6 1/2	7 1/2	6 3/4	6 1/8	8 1/2	8	8	7 3/4	3 3/4	5 1/4	6 3/4
	1 3/8 STD.	4 3/4	6 3/4	8	7	6 3/8	8 1/2	8 1/4	8	8	3 3/4	5 1/2	7
	1 3/4	4 3/4	7	8 1/2	7 1/4	6 5/8	8 1/2	8 1/2	8	8 1/4	3 3/4	5 3/4	7 1/4
5	1"	5	6 7/8	7 3/4	7	6 3/8	9	8 3/8	8 3/8	8 1/16	3 5/8	5 1/2	7
	1 3/8	5	7 1/8	8 1/4	7 1/4	6 5/8	9	8 5/8	8 3/8	8 5/16	3 5/8	5 3/4	7 1/4
	1 3/4 STD.	5	7 3/8	8 3/4	7 1/2	6 7/8	9	8 7/8	8 3/8	8 9/16	3 5/8	6	7 1/2
	2"	5	7 1/2	9	7 5/8	7	9	9	8 3/8	8 11/16	3 5/8	6 1/8	7 5/8
6	1 3/8	5 1/2	7 5/8	8 3/4	7 7/8	7 1/8	9 3/4	9 1/4	9	8 7/8	4 1/8	6 1/8	7 7/8
	1 3/4 STD.	5 1/2	7 7/8	9 1/4	8 1/8	7 3/8	9 3/4	9 1/2	9	9 1/8	4 1/8	6 3/8	8 1/8
	2"	5 1/2	8	9 1/2	8 1/4	7 1/2	9 3/4	9 5/8	9	9 1/4	4 1/8	6 1/2	8 1/4
	2 1/2	5 1/2	8 1/4	10	8 1/2	7 3/4	9 3/4	9 7/8	9	9 1/2	4 1/8	6 3/4	8 1/2
7	1 3/8	5 5/8	7 7/8	8 7/8	8	7 1/4	10 3/4	9 13/16	9 3/8	9 1/8	4 1/4	6 1/4	8
	1 3/4	5 5/8	8 1/8	9 3/8	8 1/4	7 1/2	10 3/4	10 1/16	9 3/8	9 3/8	4 1/4	6 1/2	8 1/4
	2" STD.	5 5/8	8 1/4	9 5/8	8 3/8	7 5/8	10 3/4	10 3/16	9 3/8	9 1/2	4 1/4	6 5/8	8 3/8
	2 1/2	5 5/8	8 1/2	10 1/8	8 5/8	7 7/8	10 3/4	10 7/16	9 3/8	9 3/4	4 1/4	6 7/8	8 5/8
8	1 3/8	5 5/8	7 7/8	8 7/8	8	7 1/4	10 3/4	10 13/16	9 3/8	9 1/8	4 1/4	6 1/4	8
	1 3/4	5 5/8	8 1/8	9 3/8	8 1/4	7 1/2	10 3/4	10 1/16	9 3/8	9 3/8	4 1/4	6 1/2	8 1/4
	2" STD.	5 5/8	8 1/4	9 5/8	8 3/8	7 5/8	10 3/4	10 3/16	9 3/8	9 1/2	4 1/4	6 5/8	8 3/8
	2 1/2	5 5/8	8 1/2	10 1/8	8 5/8	7 7/8	10 3/4	10 7/16	9 3/8	9 3/4	4 1/4	6 7/8	8 5/8

10" - 12" - 14" : dimensions available on request

### TRUNNION MOUNTINGS



T1 - Head end trunnion mounting



T2 - Cap end trunnion mounting

BORE SIZE	MM ROD DIA.	XG	XJ	E	TD	TL <sup>+0.000</sup> <sub>-.002</sub>	UT
1 1/2	5/8 STD.	1 3/4	4 1/8	2	1.000	1	4
	1	2 1/8	4 1/2				
2	5/8 STD.	1 3/4	4 1/8	2 1/2	1.000	1	4 1/2
	1	2 1/8	4 1/2				
2 1/2	5/8	1 3/4	4 1/4	3	1.000	1	5
	1 STD.	2 1/8	4 5/8				
	1 3/8	2 3/8	4 7/8				
3 1/4	1" STD.	2 1/4	5	3 3/4	1.000	1	5 3/4
	1 3/8	2 1/2	5 1/4				
	1 3/4	2 3/4	5 1/2				
4	1"	2 1/4	5	4 1/2	1.000	1	6 1/2
	1 3/8 STD.	2 1/2	5 1/4				
	1 3/4	2 3/4	5 1/2				
5	1"	2 1/4	5 1/4	5 1/2	1.000	1	7 1/2
	1 3/8	2 1/2	5 1/2				
	1 3/4 STD.	2 3/4	5 3/4				
6	2"	2 7/8	5 7/8	6 1/2	1.375	1 3/8	9 1/4
	1 3/8	2 5/8	5 7/8				
	1 3/4 STD.	2 7/8	6 1/8				
7	2 1/2	3	6 1/4	7 1/2	1.375	1 3/8	10 1/4
	2 1/2	3 1/4	6 1/2				
	1 3/8	2 5/8	6				
8	1 3/4	2 7/8	6 1/4	8 1/2	1.375	1 3/8	11 1/4
	2" STD.	3	6 3/8				
	2 1/2	3 1/4	6 5/8				

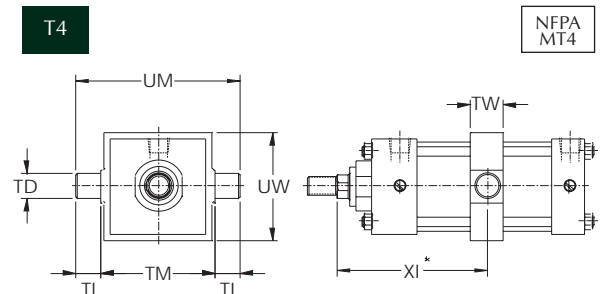
10" - 12" - 14" : dimensions available on request

BORE SIZE	MM ROD DIA.	XI MIN.	TD	TL	TM	TW	UM	UW
1 1/2	5/8 STD.	3 1/8	1.000	1	2 1/2	1 1/4	4 1/2	2 1/2
	1	3 1/2						
2	5/8 STD.	3 1/8	1.000	1	3	1 1/4	5	3
	1	3 1/2						
2 1/2	5/8	3 1/8	1.000	1	3 1/2	1 1/4	5 1/2	3 1/2
	1 STD.	3 1/2						
	1 3/8	3 3/4						
3 1/4	1" STD.	3 7/8	1.000	1	4 1/2	1 1/2	6 1/2	4 1/4
	1 3/8	4 1/8						
	1 3/4	4 3/8						
4	1"	3 7/8	1.000	1	5 1/4	1 1/2	7 1/4	5
	1 3/8 STD.	4 1/8						
	1 3/4	4 3/8						
5	1"	3 7/8	1.000	1	6 1/4	1 1/2	8 1/4	6
	1 3/8	4 1/8						
	1 3/4 STD.	4 3/8						
6	2"	4 1/2	1.375	1 3/8	7 5/8	1 3/4	10 3/8	7
	1 3/8	4 1/2						
	1 3/4 STD.	4 3/4						
7	2 1/2	4 7/8	1.375	1 3/8	8 3/4	1 3/4	11 1/2	8 1/2
	2 1/2	5 1/8						
	1 3/8	4 1/2						
8	1 3/4	4 3/4	1.375	1 3/8	9 3/4	1 3/4	12 1/2	9 1/2
	2" STD.	4 7/8						
	2 1/2	5 1/8						

10" - 12" - 14" : dimensions available on request

\* Customer must specify the XI dimension when ordering.

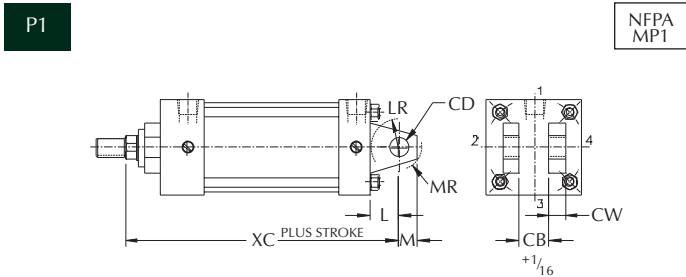
### INTERMEDIATE TRUNNION MOUNTING



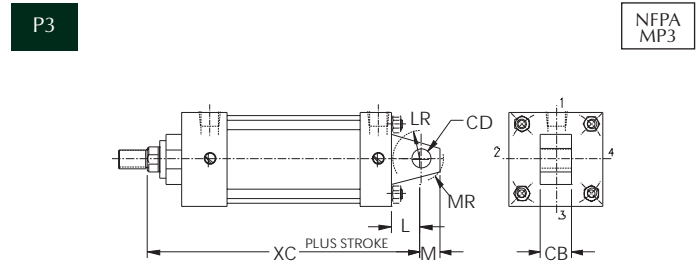
T4 - Intermediate trunnion mounting



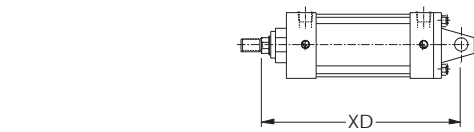
### CLEVIS MOUNTINGS



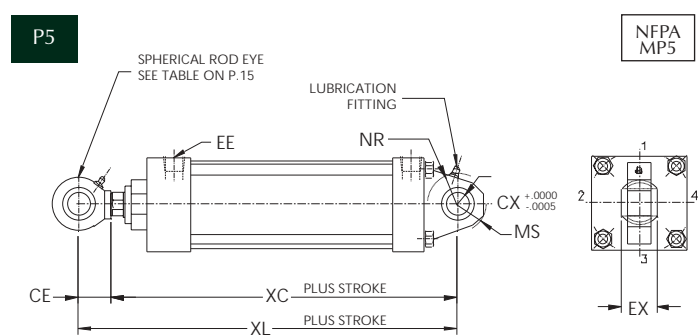
**P1 - Fixed clevis mounting**



**P3 - Fixed eye mounting**



**P2 and P4 – Detachable clevis mounting**



**P5 - Spherical bearing mounting**

**P2** NFPA MP2  
Mounting dimensions as per mounting P1 except XC which becomes XD.

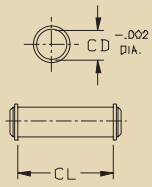
**P4** NFPA MP4  
Mounting dimensions as per mounting P3 except XC which becomes XD.

BORE SIZE	MM ROD. DIA.	P1, P2, P3, P4 MOUNTING										P5 MOUNTING							
		XC	XD	CB	CD <sup>+002 -001</sup>	CW	L	LR	M	MR	CX <sup>+0000 -0005</sup>	EX	MS	NR	MM ROD DIA.	WITH ROD EYE			
															PART #	CE	XL		
1 1/2	5/8 STD.	5 3/8	5 3/4	3/4	.500	1/2	3/4	3/4	1/2	5/8	.5000	7/16	15/16	5/8	5/8 STD.	72-PCADP5	7/8	6 1/4	
	1	5 3/4	6 1/8												1	72-PCAEP5	1 1/4	7	
2	5/8 STD.	5 3/8	5 3/4	3/4	.500	1/2	3/4	3/4	1/2	5/8	.5000	7/16	15/16	5/8	5/8 STD.	72-PCADP5	7/8	6 1/4	
	1	5 3/4	6 1/8												1	72-PCAEP5	1 1/4	7	
2 1/2	5/8	5 1/2	5 7/8	3/4	.500	1/2	3/4	3/4	1/2	5/8	.5000	7/16	15/16	5/8	5/8	72-PCADP5	7/8	6 3/8	
	1 STD.	5 7/8	6 1/4												1 STD.	72-PCAEP5	1 1/4	7 1/8	
	1 3/8	6 1/8	6 1/2												1 3/8	72-PCAGP5	1 7/8	8	
	1 3/4	7 3/8	8												1 3/4	72-PCAHP5	2 1/8	9 1/2	
3 1/4	1" STD.	6 7/8	7 1/2	1 1/4	.750	5/8	1 1/4	1	3/4	15/16	.7500	21/32	1 3/8	1"	1" STD.	72-PCAEP5	1 1/4	8 1/8	
	1 3/8	7 1/8	7 3/4												1 3/8	72-PCAGP5	1 7/8	9	
	1 3/4	7 3/8	8												1 3/4	72-PCAHP5	2 1/8	9 1/2	
	1"	6 7/8	7 1/2												1"	72-PCAEP5	1 1/4	8 1/8	
4	1 3/8 STD.	7 1/8	7 3/4	1 1/4	.750	5/8	1 1/4	1	3/4	15/16	.7500	21/32	1 3/8	1"	1 3/8 STD.	72-PCAGP5	1 7/8	9	
	1 3/4	7 3/8	8												1 3/4	72-PCAHP5	2 1/8	9 1/2	
	1"	7 1/8	7 3/4												1"	72-PCAEP5	1 1/4	8 3/8	
	1 3/8	7 3/8	8												1 3/8	72-PCAGP5	1 7/8	9 1/4	
5	1 3/8	7 3/8	8	1 1/4	.750	5/8	1 1/4	1	3/4	15/16	.7500	21/32	1 3/8	1"	1"	72-PCAEP5	1 1/4	8 3/8	
	1 3/4 STD.	7 5/8	8 1/4												1 3/8	72-PCAGP5	1 7/8	9 1/4	
	2"	7 3/4	8 3/8												1 3/4 STD.	72-PCAHP5	2 1/8	9 3/4	
	2"	7 3/4	8 3/8												2"	72-PCAIP5	2 1/2	10 1/4	
6	1 3/8	8 1/8	8 7/8	1 1/2	1.000	3/4	1 1/2	1 1/4	1	1 3/16	1.0000	7/8	1 11/16	1 1/4	1 3/8	72-PCAGP5	1 7/8	10	
	1 3/4 STD.	8 3/8	9 1/8												1 3/4 STD.	72-PCAHP5	2 1/8	10 1/2	
	2"	8 1/2	9 1/4												2"	72-PCAIP5	2 1/2	11	
	2 1/2	8 3/4	9 1/2												2 1/2	72-PCAKP5	2 3/4	11 1/2	
7	1 3/8	8 1/4	9	1 1/2	1.000	3/4	1 1/2	1 1/4	1	1 3/16	1.0000	7/8	1 11/16	1 1/4	1 3/8	72-PCAGP5	1 7/8	10 1/8	
	1 3/4	8 1/2	9 1/4												1 3/4	72-PCAHP5	2 1/8	10 5/8	
	2" STD.	8 5/8	9 3/8												2" STD.	72-PCAIP5	2 1/2	11 1/8	
	2 1/2	8 7/8	9 5/8												2 1/2	72-PCAKP5	2 3/4	11 5/8	
8	1 3/8	8 1/4	9	1 1/2	1.000	3/4	1 1/2	1 1/4	1	1 3/16	1.0000	7/8	1 11/16	1 1/4	1 3/8	72-PCAGP5	1 7/8	10 1/8	
	1 3/4	8 1/2	9 1/4												1 3/4	72-PCAHP5	2 1/8	10 5/8	
	2" STD.	8 5/8	9 3/8												2" STD.	72-PCAIP5	2 1/2	11 1/8	
	2 1/2	8 7/8	9 5/8												2 1/2	72-PCAKP5	2 3/4	11 5/8	

10" - 12" - 14" : dimensions available on request

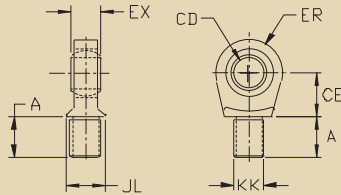
### SPHERICAL ROD END ACCESSORIES

#### 70 - CLEVIS PIN



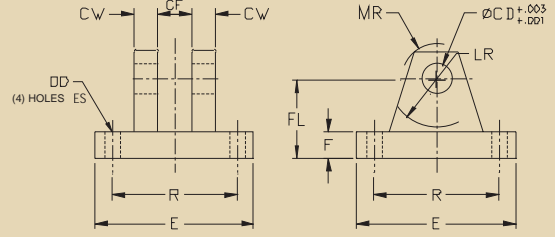
PART NO.	-0.0005 CD	CL
70-AAADP5	.4997	1 9/16
70-AAAEP5	.7497	2 1/16
70-AAAGP5	.9997	2 1/2
70-AAHP5	1.3746	3 5/16
70-AAJP5	1.7596	4 1/4
70-AAKP5	1.9996	4 15/16
70-AAALP5	C/E	C/E
70-AAAMP5	C/E	C/E

#### 72 - SPHERICAL ROD EYE



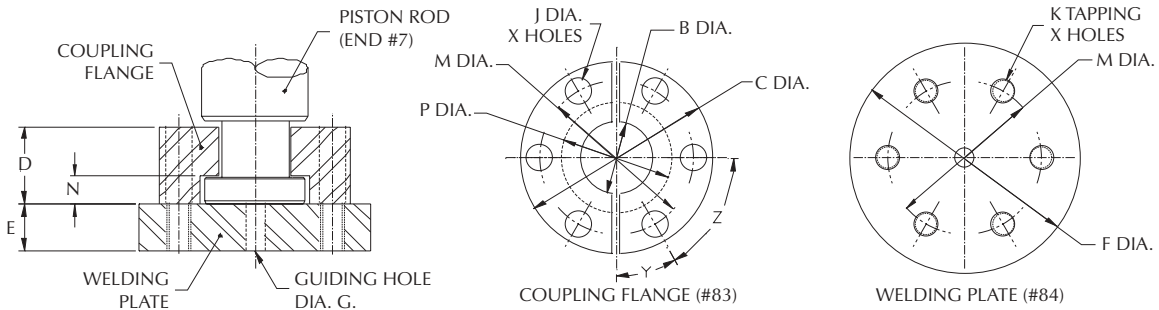
PART NO.	KK	A	-0.0005 CD	CE	ER	EX	JL	LR
72-AAADP5	7/16-20	11/16	.5000	7/8	7/8	7/16	7/8	3/4
72-AAAEP5	3/4-16	1	.7500	1 1/4	1 1/4	21/32	1 5/16	1 1/16
72-AAAGP5	1-14	1 1/2	1.0000	1 7/8	1 3/8	7/8	1 1/2	1 7/16
72-AAHP5	1 1/4-12	2	1.3750	2 1/8	1 13/16	1 3/16	2	1 7/8
72-AAJP5	1 1/2-12	2 1/8	1.7500	2 1/2	2 3/16	1 17/32	2 1/4	2 1/8
72-AAKP5	1 3/8-12	2 7/8	2.0000	2 3/4	2 5/8	1 3/4	2 3/4	2 1/2
72-AAALP5	2 1/4-12	3 3/8	2.5000	C/E	C/E	C/E	C/E	C/E
72-AAAMP5	2 1/2-12	3 3/8	3.0000	C/E	C/E	C/E	C/E	C/E

#### 75 - CLEVIS BRACKET



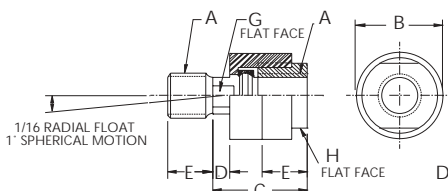
PART NO.	CD	CF	CW	DD	E	F	FL	LR	MR	R
75-AAADP5	.500	.44	1/2	13/32	3	1/2	1 1/2	1 5/16	5/8	2.05
75-AAAEP5	.750	.66	5/8	17/32	3 3/4	5/8	2	1 3/8	1	2.76
75-AAAGP5	1.000	.88	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1 3/16	4.10
75-AAHP5	1.375	1.19	1	21/32	6 1/2	7/8	3 1/2	2 7/16	1 5/8	4.95
75-AAJP5	1.750	1.53	1 1/4	29/32	8 1/2	1 1/4	4 1/2	2 7/8	2 1/16	6.58
75-AAKP5	2.000	1.75	1 1/2	29/32	10 5/8	1 1/2	5	3 5/16	2 3/8	7.92
75-AAALP5	2.500	C/E	C/E	C/E	C/E	C/E	C/E	C/E	C/E	C/E
75-AAAMP5	3.000	C/E	C/E	C/E	C/E	C/E	C/E	C/E	C/E	C/E

### SHOULDER ROD END RETAINING COUPLING



ROD DIA.	FLANGE PART NO.	PLATE PART NO.	B	C	D	E	F	G	J	K	M	N	P	X	Y	Z
5/8	83-AAAD7	84-AAAD7	.406	1 1/2	9/16	.500	2	.250	7/32	#10-24	1.125	.250	21/32	4	45°	90°
1"	83-AAAE7	84-AAAE7	.750	2	7/8	.500	2 1/2	.250	9/32	1/4-20	1.500	.375	1 1/16	6	30°	60°
1 3/8	83-AAAG7	84-AAAG7	.938	2 1/2	1	.625	3	.250	11/32	5/16-18	2.000	.375	1 7/16	6	30°	60°
1 3/4	83-AAAH7	84-AAAH7	1.187	3	1 1/4	.625	4	.250	11/32	5/16-18	2.375	.500	1 13/16	8	22.5°	45°
2"	83-AAAJ7	84-AAAJ7	1.438	3 1/2	1 5/8	.750	4	.375	13/32	3/8-16	2.688	.625	2 1/16	12	15°	30°
2 1/2	83-AAAK7	84-AAAK7	1.875	4	1 7/8	.750	4 1/2	.375	13/32	3/8-16	3.188	.750	2 5/8	12	15°	30°
3"	83-AAAL7	84-AAAL7	2.375	5	2 3/8	1.000	5 1/2	.375	17/32	1/2-13	4.000	.875	3 1/8	12	15°	30°
3 1/2	83-AAAM7	84-AAAM7	2.625	5 7/8	2 5/8	1.000	7	.375	21/32	5/8-11	4.688	1.000	3 5/8	12	15°	30°

### SELF-ALIGNMENT ROD COUPLER

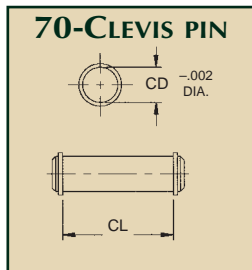


PART NO.	ROD DIA.	A	B	C	D	E	G	H	MAX. LOAD
78-AAAD1	5/8	7/16-20	1 1/4	2	1/2	3/4	9/16	1 1/8	3200
78-AAAD2	5/8	1/2-20	1 1/4	2	1/2	3/4	9/16	1 1/8	4000
78-AAAE1	1	3/4-16	1 3/4	2 5/16	5/16	1 1/8	7/8	1 1/2	9800
78-AAAE2	1	7/8-14	1 3/4	2 5/16	5/16	1 1/8	7/8	1 1/2	9800
78-AAAG1	1 3/8	1-14	2 1/2	2 15/16	1/2	1 5/8	1 1/4	2 1/4	20000
78-AAAH1	1 3/4	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	2 1/4	20000
78-AAAJ1	2	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 1/2	3	34000
78-AAAK1	2 1/2	1 7/8-12	3 3/4	5 7/16	11/16	3	1 7/8	3 1/2	65000

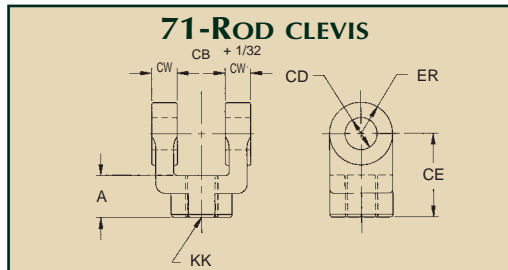
Other dimensions available on request.

### CLEVIS MOUNTING ACCESSORIES

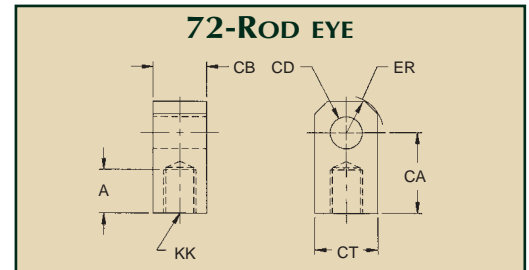
ROD DIA.	ROD END THREADS	ROD CLEVIS	ROD EYE	CLEVIS PIN	CLEVIS BRACKET	EYE BRACKET	BORE SIZE
5/8	7/16-20	71-AAAD	72-AAAD	70-AAAD	75-AAAD	76-AAAD	1 1/2 - 2 - 2 1/2
1	3/4-16	71-AAAE	72-AAAE	70-AAAE	75-AAAE	76-AAAE	3 1/4 - 4 - 5
1 3/8	1-14	71-AAAG	72-AAAG	70-AAAG	75-AAAG	76-AAAG	6 - 7 - 8
1 3/4	1 1/4-12	71-AAAH	72-AAAH	70-AAAH	75-AAAH	76-AAAH	10
2	1 1/2-12	71-AAAJ	72-AAAJ	70-AAAJ	75-AAAJ	76-AAAJ	12
2 1/2	1 7/8-12	71-AAAK	72-AAAK	70-AAAK	75-AAAK	76-AAAK	14
3	2 1/4-12	71-AAAL	72-AAAL	70-AAAL	-	-	-
3 1/2	2 1/2-12	71-AAAM	72-AAAM	70-AAAM	-	-	-



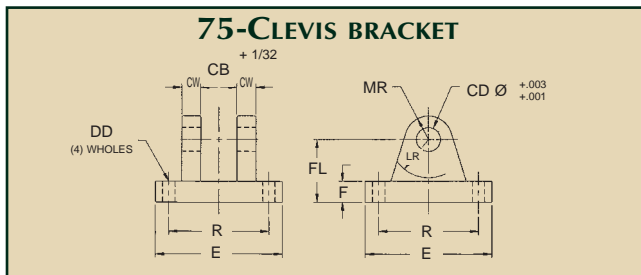
PART NO.	CD	CL
70-AAAD	1/2	1 7/8
70-AAAE	3/4	2 5/8
70-AAAG	1	3 1/8
70-AAAH	1 3/8	4 1/8
70-AAAJ	1 3/4	5 1/8
70-AAAK	2	5 1/2
70-AAAL	2 1/2	6 3/16
70-AAAM	3	6 1/4



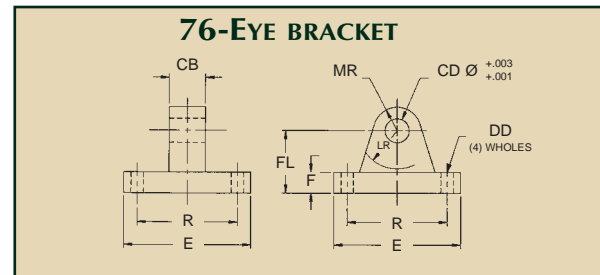
PART NO.	A	CB	CD	CE	CW	ER	KK
71-AAAD	3/4	3/4	1/2	1 1/2	1/2	1/2	7/16-20
71-AAAE	1 1/8	1 1/4	3/4	2 3/8	5/8	3/4	3/4-16
71-AAAG	1 5/8	1 1/2	1	3 1/8	3/4	1	1-14
71-AAAH	2	2	1 3/8	4 1/8	1	1 3/8	1 1/4-12
71-AAAJ	2 1/4	2 1/2	1 3/4	4 1/2	1 1/4	1 3/4	1 1/2-12
71-AAAK	3	2 1/2	2	5 1/2	1 1/4	2	1 7/8-12
71-AAAL	3 1/2	3	2 1/2	6 1/2	1 1/2	2 1/2	2 1/4-12
71-AAAM	3 1/2	3	3	6 3/4	1 1/2	2 3/4	2 1/2-12



PART NO.	A	CA	CB	CD	CT	ER	KK
72-AAAD	3/4	1 1/2	3/4	1/2	1	5/8	7/16-20
72-AAAE	1 1/8	2 1/16	1 1/4	3/4	1 1/2	7/8	3/4-16
72-AAAG	1 5/8	2 13/16	1 1/2	1	2	1 3/16	1-14
72-AAAH	2	3 7/16	2	1 3/8	2 3/4	1 9/16	1 1/4-12
72-AAAJ	2 1/4	4	2 1/2	1 3/4	3 1/2	2	1 1/2-12
72-AAAK	3 1/2	5	2 1/2	2	4	2 1/2	1 7/8-12
72-AAAL	3 1/2	5 13/16	3	2 1/2	5	2 13/16	2 1/4-12
72-AAAM	3 1/2	6 1/8	3	3	6	3 1/4	2 1/2-12



PART NO.	CB	CD	CW	DD	E	F	FL	LR	MR	R
75-AAAD	3/4	1/2	1/2	3/8 - 24	2 1/2	3/8	1 1/8	1/2	9/16	1.63
75-AAAE	1 1/4	3/4	5/8	1/2 - 20	3 1/2	5/8	1 7/8	1 1/16	1 1/16	2.55
75-AAAG	1 1/2	1	3/4	5/8 - 18	4 1/2	3/4	2 1/4	1 1/4	1 1/8	3.25
75-AAAH	2	1 3/8	1	5/8 - 18	5	7/8	3	1 7/8	1 3/4	3.82
75-AAAJ	2 1/2	1 3/4	1 1/4	7/8 - 14	6 1/2	7/8	3 1/8	2	1 7/8	4.95
75-AAAK	2 1/2	2	1 1/4	1 - 14	7 1/2	1	3 1/2	2 1/8	2 1/8	5.73



PART NO.	CB	CD	DD	E	F	FL	LR	MR	R
76-AAAD	3/4	1/2	13/32	2 1/2	3/8	1 1/8	3/4	9/16	1.63
76-AAAE	1 1/4	3/4	17/32	3 1/2	5/8	1 7/8	1 1/4	7/8	2.55
76-AAAG	1 1/2	1	21/32	4 1/2	3/4	2 1/4	1 1/2	1 1/4	3.25
76-AAAH	2	1 3/8	21/32	5	7/8	3	2 1/8	1 5/8	3.82
76-AAAJ	2 1/2	1 3/4	29/32	6 1/2	7/8	3 1/8	2 1/4	2 1/8	4.95
76-AAAK	2 1/2	2	1 1/16	7 1/2	1	3 1/2	2 1/2	2 7/16	5.73

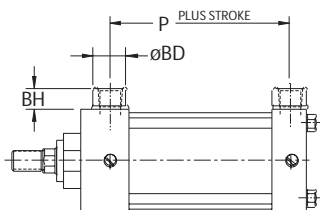
### FORCE AND VOLUME CHART TECHNICAL DATA

BORE SIZE	PISTON AREA	EXTENSION THRUST IN LBS										VOLUME PER INCH OF STROKE	
		PRESSURE IN PSI										SQUARE FEET	US GAL.
		100	150	200	250	400	600	800	1000	1500	2000		
1 1/2	1.77	177	265	353	442	707	1,060	1,414	1,767	2,651	3,534	0.00102	0.0076
2	3.14	314	471	628	785	1,257	1,885	2,513	3,142	4,712	6,283	0.00182	0.0136
2 1/2	4.91	491	736	982	1,227	1,963	2,945	3,927	4,909	7,363	9,817	0.00284	0.0212
3 1/4	8.30	830	1,244	1,659	2,074	3,318	4,977	6,637	8,296	12,444	16,592	0.00480	0.0359
4	12.57	1,257	1,885	2,513	3,142	5,027	7,540	10,053	12,566	18,850	25,133	0.00727	0.0544
5	19.63	1,963	2,945	3,927	4,909	7,854	11,780	15,708	19,635	29,452	39,270	0.01136	0.0850
6	28.27	2,827	4,241	5,655	7,069	11,310	16,965	22,619	28,274	42,412	56,549	0.01636	0.1224
7	38.48	3,848	5,773	7,697	9,621	15,394	23,091	30,788	38,485	57,727	76,969	0.02227	0.1666
8	50.27	5,027	7,540	10,053	12,566	20,106	30,159	40,212	50,265	75,398	100,531	0.02909	0.2176
10	78.5	7,854	11,781	15,708	19,635	31,416	47,124	62,832	78,540	117,810	157,080	0.04545	0.3400
12	113.1	11,310	16,965	22,619	28,274	45,239	67,858	90,478	113,097	169,646	226,195	0.06545	0.4896
14	153.9	15,394	23,091	30,788	38,485	61,575	92,363	123,150	153,938	230,907	307,876	0.08908	0.6664

BORE SIZE	PISTON AREA	RETRACTION THRUST IN LBS <small>Subtract corresponding value to obtain resulting pulling force in LBS</small>										VOLUME PER INCH OF STROKE	
		PRESSURE IN PSI										SQUARE FEET	US GAL.
		100	150	200	250	400	600	800	1000	1500	2000		
5/8	0.31	31	46	61	77	123	184	245	307	460	614	0.00018	0.0013
1	0.79	79	118	157	196	314	471	628	785	1,178	1,571	0.00045	0.0034
1 3/8	1.48	148	223	297	371	594	891	1,188	1,485	2,227	2,970	0.00086	0.0064
1 3/4	2.41	241	361	481	601	962	1,443	1,924	2,405	3,608	4,811	0.00139	0.0104
2	3.14	314	471	628	785	1,257	1,885	2,513	3,142	4,712	6,283	0.00182	0.0136
2 1/2	4.91	491	736	982	1,227	1,963	2,945	3,927	4,909	7,363	9,817	0.00284	0.0212
3	7.07	707	1,060	1,414	1,767	2,827	4,241	5,655	7,069	10,603	14,137	0.00409	0.0306
3 1/2	9.62	962	1,443	1,924	2,405	3,848	5,773	7,697	9,621	14,432	19,242	0.00557	0.0416
4	12.57	1,257	1,885	2,513	3,142	5,027	7,540	10,053	12,566	18,850	25,133	0.00727	0.0544

### PORTS

As a standard, the HL Series cylinder ports are built to accept NPTF connectors. As optional equipment, the cylinder can also be supplied with SAE O-Ring type ports. Oversized ports are available for both types of connections allowing higher fluid flow rates. For these applications, the coupling connections are welded on both ends of the cylinder, as shown below.



BORE SIZE	STD. NPTF	OPT. SAE	XX NPTF	XX SAE	OVERSIZED PORTS		
					BD	BH	P
1 1/2	1/4	-6	3/8	-8	1 1/8	1	2 3/16
2	3/8	-6	1/2	-8	1 1/8	1	2 3/16
2 1/2	3/8	-6	1/2	-8	1 1/8	1	2 5/16
3 1/4	1/2	-10	3/4	-12	1 3/8	1	2 9/16
4	1/2	-10	3/4	-12	1 3/8	1	2 9/16
5	1/2	-10	3/4	-12	1 3/8	1	2 13/16
6	3/4	-12	1	-16	1 3/4	1 1/4	3 1/8
7	3/4	-12	1	-16	1 3/4	1 1/4	3 1/4
8	3/4	-12	1	-16	1 3/4	1 1/4	3 1/4

### PISTON ROD DIMENSION AND STOP TUBE SELECTION

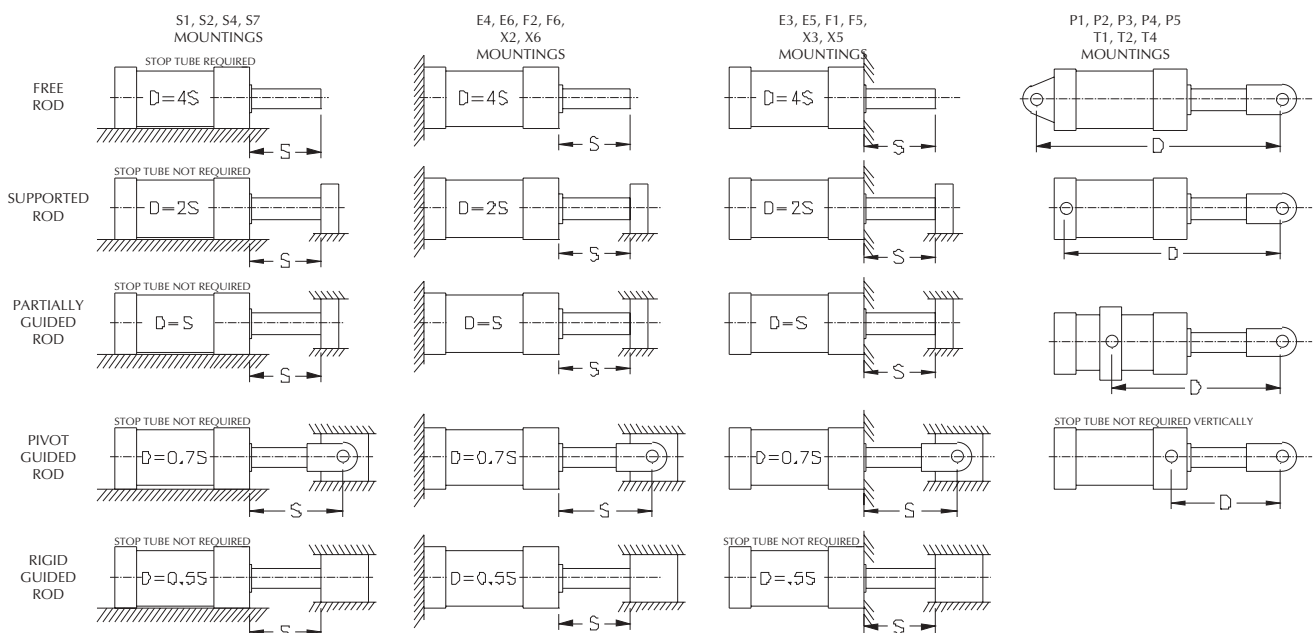
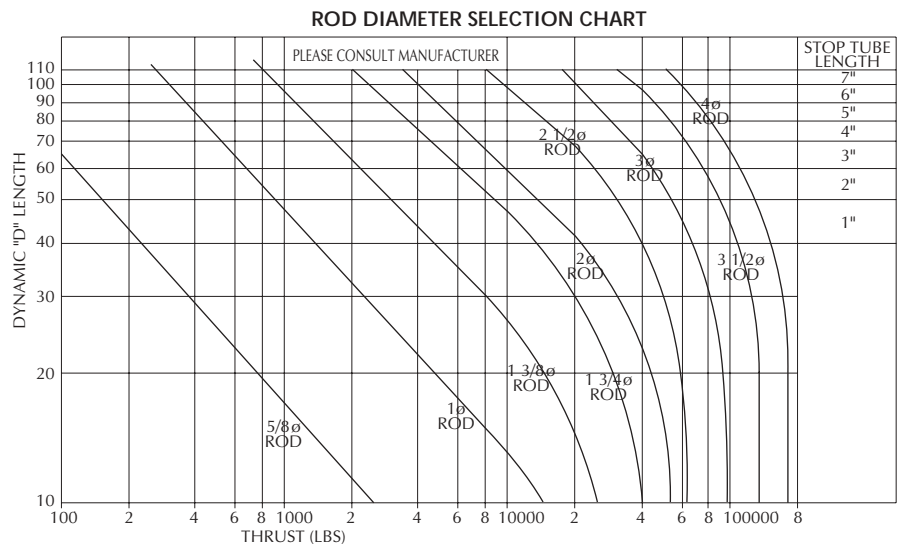
Applications that require long extended (push) stroke or an extended piston rod may require an oversized piston rod to avoid any buckling. Furthermore, if the cylinder is working under extension, or if it is installed horizontally, the installation of a stop tube might be necessary to avoid premature wear of the end stroke guides.

#### How to select the piston rod diameter

- 1) Determine the cylinder extension thrust by using the force chart on page 17.
- 2) Select the mounting for your application from the diagrams below.
- 3) Use the dimension diagrams below to help you calculate the dynamic length "D".
- 4) Locate the intersection point where the thrust and the "D" length meet on the selection chart below. The minimum piston rod diameter required is indicated on the diagonal line immediately above the point.

#### How to calculate the stop tube

The stop tube is a spacer between the head end and the piston. The separation reduces the lateral force on the piston preventing premature barrel and gland bushing wear. We recommend a stop tube when the "D" length is over 40 inches. One inch of stop tube length is recommended for every 10 inches (or fraction thereof) of "D" length. The stop tube is not required for vertically mounted cylinders or applications working under pulling forces (retraction) only.

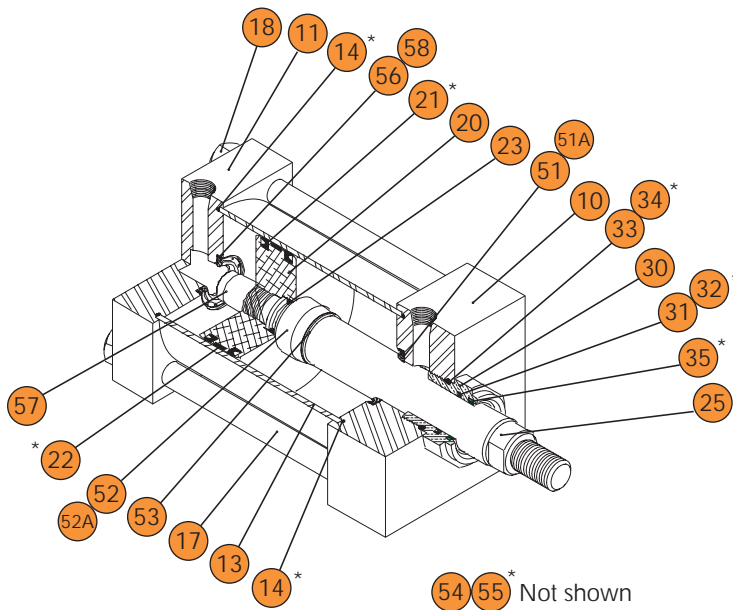




### REPLACEMENT PARTS

The spare parts and seal kits can be ordered, using part number prefix followed by the cylinder model number.  
Ex.: 20 – HLGE1BP1 – 12 → Piston.

It is recommended to provide the cylinder serial number to facilitate inquiries for part replacement.



Parts	Description	Qty
10	Head	1
11	Feet	1
13	Barrel	1
14 *	Barrel seal	2
17	Tie rod	4
18	Tie rod nuts	4
20	Piston	1
21 *	Piston packing	2
22 *	Piston wear strip	1
23 *	Piston O-ring	1
25	Piston rod	1
30	Gland bushing	1
31 *	Gland packing	1
32 *	Gland packing backup ring	1
33 *	Gland bushing seal	1
34 *	Gland seal backup ring	1
35 *	Rop wiper	1
51	Head end cushion ring	1
51 A	Head end spring clip	1
52	Head end cushion plunger	1
52 A	Head end O-ring cushion	1
53	Head end plunger retainer	1
54	Cushion adjustment screw	2
55 *	Adjustment screw seal (O-ring)	2
56	Cap end cushion ring	1
57	Cap end cushion plunger	1
58	Cap end spring clip	1

54 55\* Not shown

#### Recommended torque chart for tie rods and gland bushing

BORE SIZE	TIE RODS DIA.	TORQUE (FT-LBS)	
		TIE RODS	GLAND BUSHING
1 1/2	1/4	5	35
2 - 2 1/2	5/16	10	35
3 1/4 - 4	3/8	20	35
5 - 6	1/2	50	45
7	5/8	80	45
8	5/8	95	45
10	3/4	130	55
12	3/4	160	X
14	7/8	230	X

#### Repair kit

19	For barrel (part #14)
29	For piston (parts #21 and 22)
38	Bushing and seals (parts #30 to 35)
39	For gland bushing (parts #31 to 35)
99	Complete (parts marked with an *)

Our maintenance and operation manual #8-HL can be ordered for more detailed maintenance instructions on the HL Series Cylinders.

### WARRANTY

RDC Contrôle Ltée, hereinafter referred to as The Seller, warrants products of its manufacture to be free from defects in material or workmanship under normal use for 12 months after the date of original shipment from the factory.

The liability of The Seller is limited to the repair or replacement of the defective component or product, at The Seller's option, during the warranty period only if factory inspection shows no external affects or customer repair has altered the functioning of the product. All transportation costs are for the buyer's account.

All defective parts must be returned to RDC Contrôle Ltée within the warranty period after shipment by RDC Contrôle Ltée. Written permission for such return must first be obtained. A complete explanation is required of the defect and circumstances.

Any alteration or repair of the goods by the party not authorized by RDC Contrôle Ltée without specific written consent shall automatically terminate the warranty obligations.

In no event shall The Seller be liable for any incidental, consequential or special damages or any kind or nature whatsoever, including but not limited to lost profits arising from or in any way connected with this agreement or items sold hereunder, whether alleged to arise from breach of contract, express or implied warranty, or in tort, including without limitation, negligence, failure to warn or strict liability.

This warranty shall be rendered null and void when, in the judgement of RDC Contrôle Ltée, the equipment has been subject to abnormal or abusive use or lack of proper care and maintenance by the buyer, or when it has been determined that environmental or application conditions have exceeded those specified for normal use of a specific product.

Notwithstanding the foregoing, there are no warranties whatsoever on items built wholly or partially, to buyer's design or specifications.

Finished materials and accessories purchased from other manufacturers are warranted only to the extent of the manufacturers' warranty to the seller.

The Seller makes no warranty of any kind whatsoever, expressed or implied, other than as specifically stated herein; and there are no warranties of merchantability and/or fitness for a particular purpose which exceed the obligations and warranties specifically stated herein.

Parts furnished without charge as replacements for original parts under warranty are warranted for the remainder of the original warranty period.

## MODEL NUMBERS

Series	Bore Size	Rod dia.	Rod end style	Cushions	Mounting	Option suffix	Stroke
<b>HL</b>	C - 1 1/2 D - 2 E - 2 1/2 G - 3 1/4 H - 4 K - 5 L - 6 M - 7 N - 8 P - 10 R - 12 S - 14 T - 16 V - 18 W - 20 Z - OTHERS	D - 5/8 E - 1 G - 1 3/8 H - 1 3/4 J - 2 K - 2 1/2 L - 3 M - 3 1/2 N - 4 P - 4 1/2 R - 5 Z - OTHERS	Details p.6 0 - Straight rod 1 - Small male 2 - Intern. Male 3 - Full male 4 - Female 5 - Studded 6 - Metric 7 - Shoulder 8 - Female spl. 9 - Male spl.	B - Both sides C - Cap end H - Head end N - None Z - Special	Details p.3 A0 - Base E3 - Square head E4 - Square cap E5 - Rectangular head E6 - Rectangular cap F1 - Head end rectangular flange F2 - Cap end rectangular flange F5 - Head end square flange F6 - Cap end square flange P1 - Cap fixed clevis P2 - Cap detachable clevis P3 - Cap fixed eye P4 - Cap detachable eye P5 - Spherical bearing mounting S1 - Parallel base mountings S2 - Side lug mountings S4 - Side tapped holes S7 - End lug mountings T1 - Head trunnions T2 - Cap trunnions T4 - Intermediate trunnion X1 - Extended tie rods at both ends X2 - Extended tie rods cap end X3 - Extended tie rods head end X4 - 2 tie rods extended at both ends X5 - Head end tapped holes X6 - Cap end tapped holes Z9 - Special mounting	(Omit if none) A - Stroke adjustment B - Rod boot C - Dimension changes D - Double rod E - Special exterior finish G - Composite fiber barrel J - Piston rod extension K - Material change L - Permanent lubrication M - Magnetic piston N - SAE O-ring ports P - Ports position change R - Rod scraper S - Stainless steel piston rod T - Stop tube V - Viton seals for temp. up to 250°C (450°F) W - Water operation AWWA specs C-540-93 X - Spring to extend Y - Spring to retract Z - Other or more than 3 options	
<b>HL</b>	<b>G</b>	<b>G</b>	<b>4</b>	<b>B</b>	<b>F5</b>	<b>D</b>	<b>8</b>
HL Series	Bore: 3 1/4"	Rod dia.: 1 3/8"	Female threads	Cushions at both ends	Head end square flange mounting	Double rod option	8" Stroke



C O N T R Ô L E

**MANUFACTURER  
THERMOCOUPLES – RTD'S  
CYLINDERS**

1100 Michèle-Bohec, Blainville (Quebec) J7C 5N5  
Tel.: (450) 434-0216 • Fax: (450) 434-0219 • Watts: 1 800 363-2264  
Internet: [www.rdccontrol.com](http://www.rdccontrol.com)