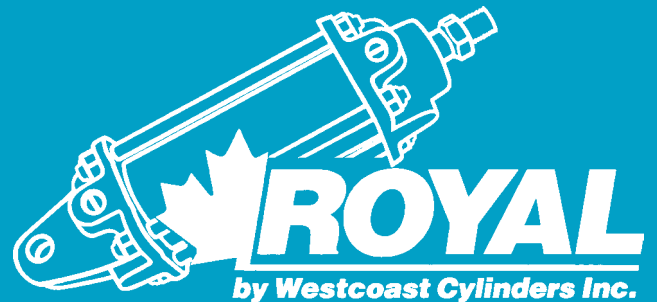


3000/5000
psi rating

series **H**

hydraulic cylinders



Page Description

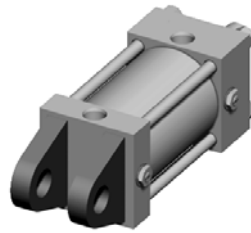
- 1 Mounting Styles
 2 Features Description
 3 Features Drawing

Mounting Dimensions

- 4 **C** Fixed Clevis (MP1)
 4 **E** Pivot Eye (MP3)
 4 **MP** Detachable Clevis (MP2)
 5 **W** Self-aligning Eye (MPU3)
 6 **NM** No Mount (MX0)
 6 **NA** Extended Tie-rods Both Ends (MX1)
 7 **NB** Extended Tie-rods Blind End (MX2)
 7 **NC** Extended Tie-rods Gland End (MX3)
 8 **R** Rod End Rectangular Flange (MF1)
 8 **RS** Rod End Square Flange (MF5)
 9 **B** Blind End Rectangular Flange (MF2)
 9 **BS** Blind End Square Flange (MF6)
 10 **G** Rect. Gland End Head (ME5)
 10 **H** Rect. Blind End Head (ME6)
 11 **TR** Rod End Trunnion (MT1)
 11 **TB** Blind End Trunnion (MT2)
 12 **T** Mid Trunnion (MT4)
 12 **HT** Mid Trunnion (HT)
 13 **F** Foot Mount (MS2)
 13 **S** Side Tapped (MS4)
 14 **D** Double Rod (MD)
 15 **CR** Common Rod
 15 **CH** Common Head
 16 **CHR** Common Head / Common Rod
 17-19 Rod End Styles, Accessories

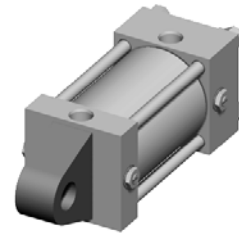
Parts

- 20 Parts List: 1.5 – 4" dia.
 21 Parts Drawing
 22 Parts List: 5 – 8" dia.
 23-25 Technical Data/Torque Specs
 Cover Cylinder Nomenclature



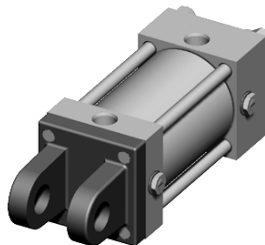
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Fixed Clevis



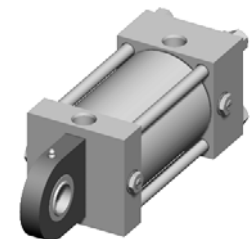
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Pivot Eye



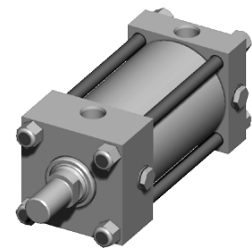
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Detachable Clevis



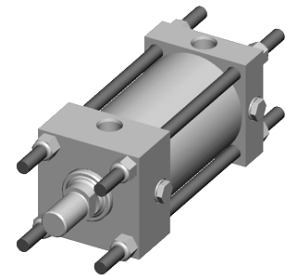
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Self-aligning Eye



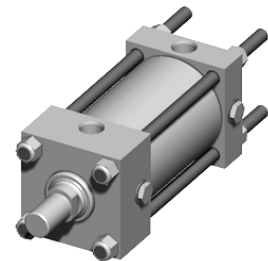
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No Mount



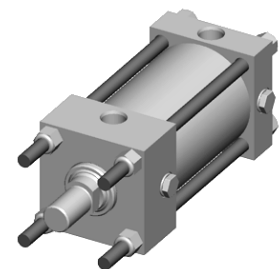
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Extended Tie-rods Both Ends



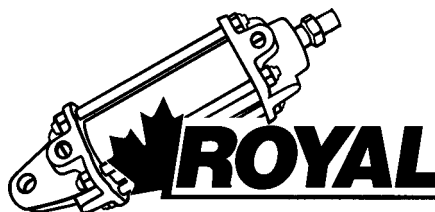
7

Extended Tie-rods Blind End



7

Extended Tie-rods Gland End

**Westcoast Cylinders Inc.**

225 Edworthy Way
 New Westminster BC
 Canada V3L 5G4

Telephone: 604 527 1120

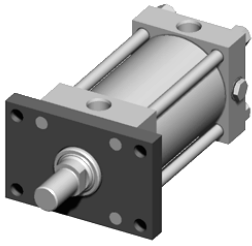
Facsimile: 604 527 1170

Phone Toll Free: 1-877-637-6925

Fax Toll Free: 1-866-527-1170

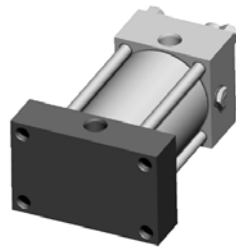
email: sales@royalcylinders.com

website: www.royalcylinders.com



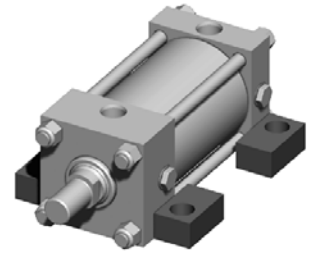
8

Rod End Rectangular Flange



10

Rectangular Blind End Head



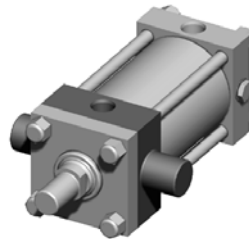
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Foot Mount



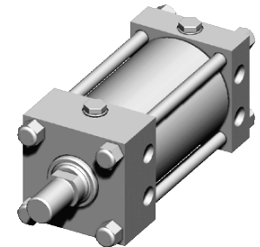
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Rod End Square Flange



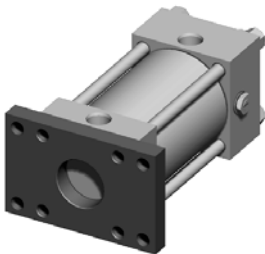
11

Rod End Trunnion



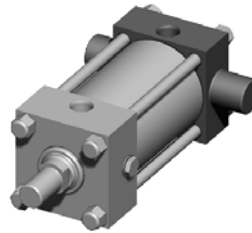
13

Side Tapped



9

Blind End Rectangular Flange



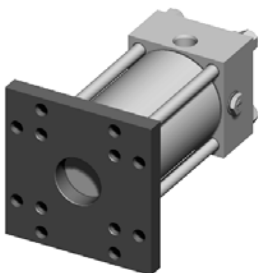
11

Blind End Trunnion



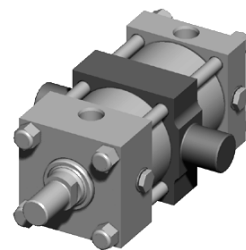
14

Double Rod



9

Blind End Square Flange



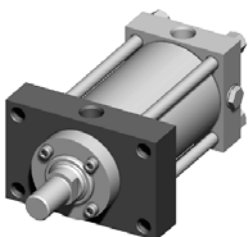
12

Mid Trunnion



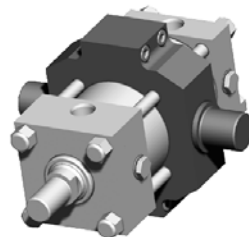
15

Common Rod



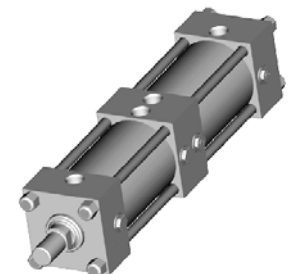
10

Rectangular Gland End Head



12

HT Mid Trunnion



15

Common Head

PISTON ROD

The piston rod is **Hiperchromium® 200** treated C1045 carbon steel. Hiperchromium® 200 offers 200 hour corrosion resistance to Saline atmospheric chamber testing.

Other rod materials are available including chrome plated 316 stainless steel and Nitrotec carbon steel. If you require a rod size that is not included in this catalog contact our factory for information regarding availability and dimensions.

HYTHANE® SEALS

Hythane® piston seals are standard on the Royal H-Series. It has an exceptional temperature range of from -50 to 230°F. The **Hythane®*** rod seal is a high performance, high temperature seal compound having ultra low friction and long seal life. The **Hythane®** rod wiper, with internal ribs for extra stability and prevention of pressure trapping, cleans the rod on the return stroke. The static external seal is Buna-N material.

ROTOCAST BRONZE GLAND BUSHING

The gland bushing is manufactured from Rotocast bronze for low friction and long bearing life. Other materials such as Zinc-alloy are available upon request. Optional gland bushings with wear rings may be available, contact our factory.

COLD FINISHED HEADS

Heads are precision machined from high quality cold finished steel for perfect alignment of barrel and moving parts.

IMPROVED CUSHIONING:

Springless Ball Checks

The Ball checks are designed to eliminate the need for a spring. As fluid flows through the check valve the ball is pulled into the low pressure zone, sealing when required and allowing the fluid to bypass for fast break away from the cushions.

2 1/2" and 3 1/4" bores with the #3 rod are now available with adjustable cushions both ends.

Standard Needle valve position P4 Ball check position P2

ONE-PIECE PISTON

The piston is a one-piece design, incorporating a replaceable wear ring to prevent metal to metal contact and increase the life of the cylinder.

SAE PORTS

SAE O-Ring Boss ports are the standard port on the H-Series cylinders. SAE CODE 61 Flange ports are also available. Contact our factory for specific requirements. For NPTF ports, WCI will supply an SAE to NPTF Female adapter if you require NPTF ports.

INTERNAL / EXTERNAL PISTON STOP

Standard internal and optional external piston stops are available to reduce side load stress on the piston rod, gland bushing and piston for all cylinder sizes.

STROKE POSITION SENSORS

WCI offers Proximity sensors fitted to H-Series cylinders, We have various levels of switches to meet your requirement, or we can manufacture our cylinders to suit the proximity you would like to supply. Contact our factory for details.

CYLINDER FLUSHING

A cylinder flushing service is available as a standard option. To choose this, select "-F" in the Options section of the Cylinder Nomenclature.

CUSTOM CYLINDERS

If our standard product does not meet your specifications, Westcoast Cylinders will manufacture custom cylinders to meet your requirements. Please contact our factory.

SPARE PARTS

Genuine Royal seal kits include all seal components, and wear rings. Please specify genuine Royal replacement parts to ensure you will receive all feature benefits.

* *Hythane®* is a registered trademark of Hallite Seals International Ltd.

Westcoast Cylinders Inc.:

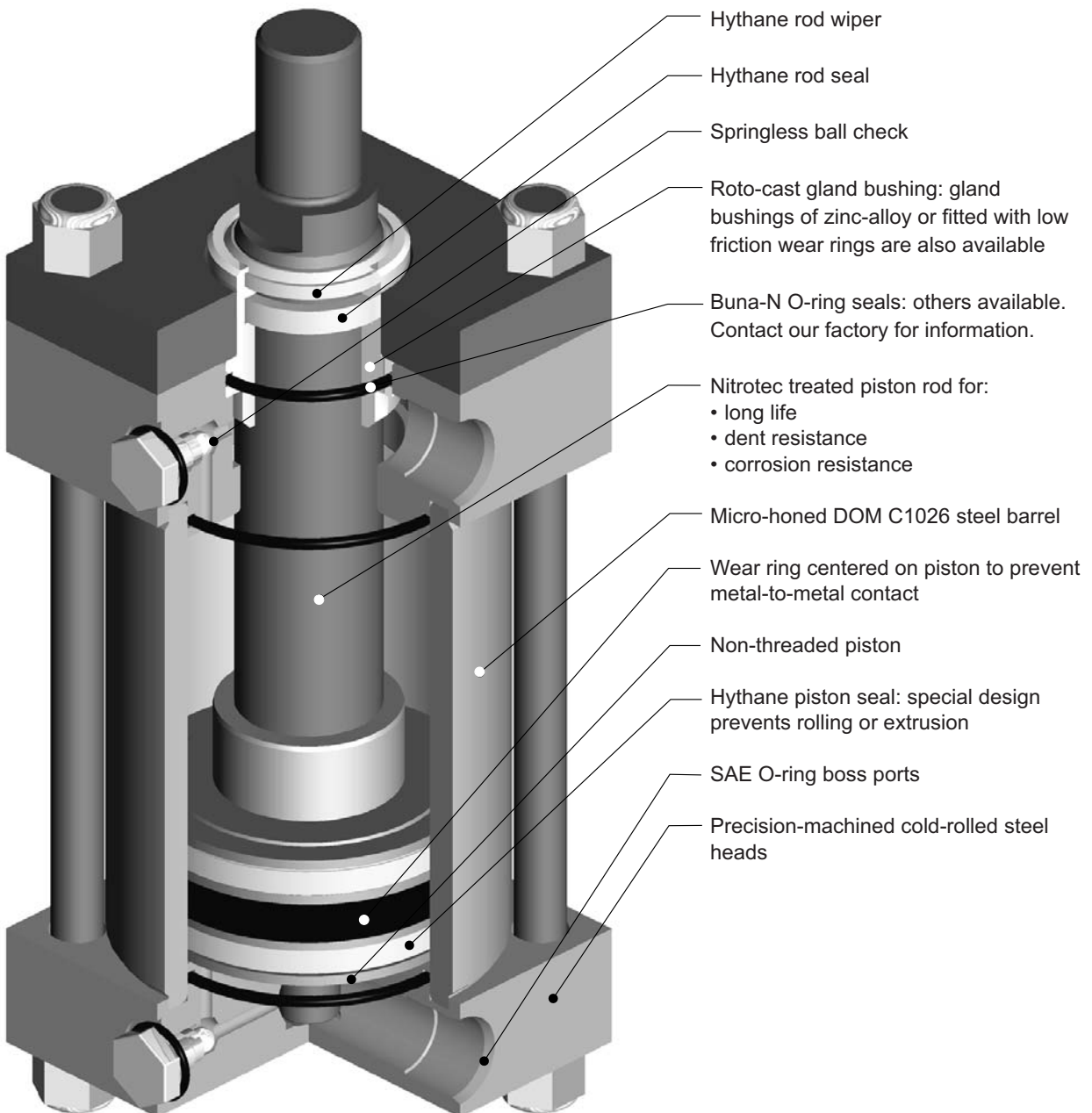
The Company has been manufacturing high quality, reliable ROYAL cylinders for over 40 years. Production started with a single cylinder design and expanded to a full range of multi-use, hydraulic, pneumatic cylinders and accessories.

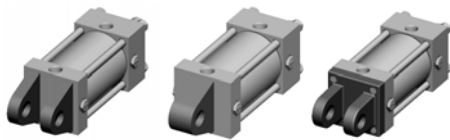
Quality:

WCI is a leader in the design and manufacture of custom heavy duty cylinders. The materials, machinery and tools used to produce our products are continuously being updated. Our cylinders are built to the highest standards utilizing the latest technology and processes.

Delivery:

WCI maintains a large range of stock parts which gives us the flexibility to respond to your needs in emergency situations. Please contact the factory to expedite your special requirements.





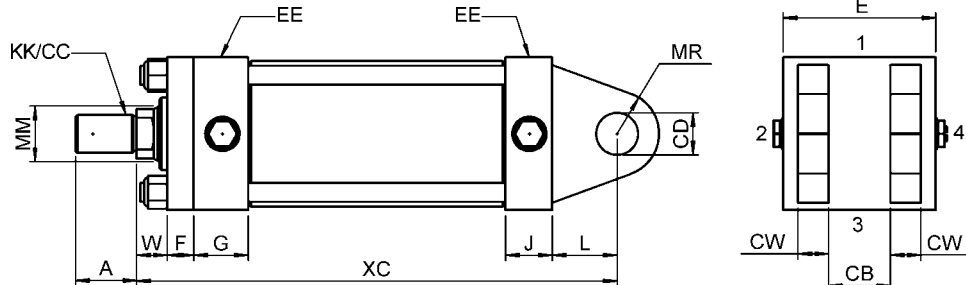
model HC, HE, HMP

BORE	ROD	ROD DIA		CC	A	W	ADD STROKE		E	F	G	J	L	HC CB	HE CB	EE		MR		
		MM	KK				XC	XD								NPTF	SAE			
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	6 3/8	6 3/4	2 1/2	3/8	1 9/16	1 5/16	3/4	25/32	3/4	1/2	1/2	1/2	-08	1/2
	2	1	3/4-16	7/8-14	1 1/8	1	6 3/4	7 1/8												
2	1	1	3/4-16	7/8-14	1 1/8	3/4	7 1/4	N/A	3	5/8	1 15/32	1 7/32	1 1/4	1 9/32	1 1/4	3/4	5/8	1/2	-08	3/4
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	7 1/2	N/A			2 1/8									
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	7 3/8	7 15/16	3 1/2	9/16	1 9/16	1 1/4	1 1/4	1 9/32	1 1/4	3/4	5/8	1/2	-08	3/4
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	7 5/8	8 3/16												
3 1/4	1	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	7 7/8	8 7/16			2 3/16									
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	8 5/8	9 3/8	4 1/2	3/4	1 25/32	1 17/32	1 1/2	1 17/32	1 1/2	1	3/4	3/4	-12	1
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	9 3/4	10 5/8	5	7/8	1 25/32	1 17/32	2 1/8	2 1/32	2	1 3/8	1	3/4	-12	1 3/8
	2	2	1 1/2-12	1 3/4-12	3	1 1/8	9 7/8	10 3/4												
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	10 1/2	11 3/8	6 1/2	7/8	1 25/32	1 17/32	2 1/4	2 17/32	2 1/2	1 3/4	1 1/4	3/4	-12	1 3/4
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	10 3/4	11 5/8												
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	12 1/8	13 1/8	7 1/2	1	2 5/32	2 5/32	2 1/2	2 17/32	2 1/2	2	1 1/4	1	-16	2
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	12 1/8	13 1/8												
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	13 3/4	14 3/4	8 1/2	1	2 17/32	2 17/32	3	3 1/32	3	2 1/2	1 1/2	1 1/4	-20	2 1/2
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	13 3/4	14 3/4												
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	15	16	9 1/2	1	2 31/32	2 19/32	3 1/4	3 1/32	3	3	1 1/2	1 1/2	-24	2 3/4
	2	4	3-12	3 3/4-12	4	1 1/4	15	16												
3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	15	16													

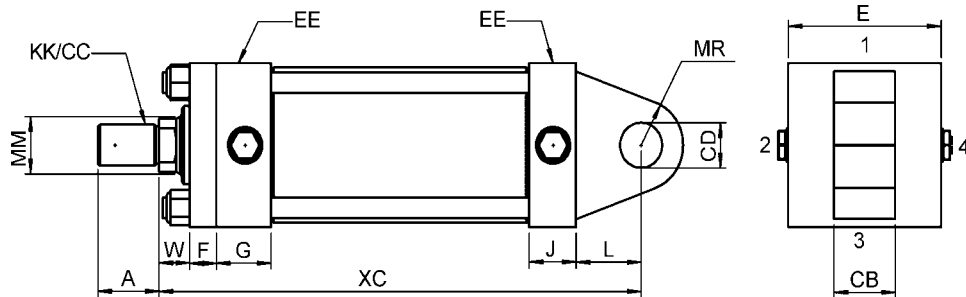
Notes:

- All dimensions in inches.
- EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
- See Cylinder Nomenclature for thread options.
- For Optional Rod Ends and dimensions see page 18.
- Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NPTF dimensions remain constant.

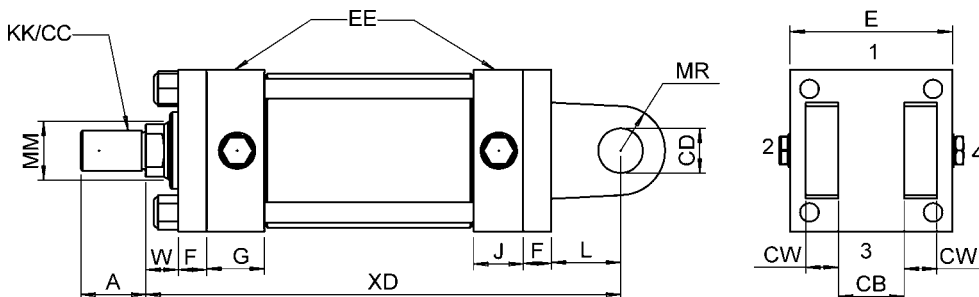
Model HC
Fixed Clevis
NFFA Style MP1

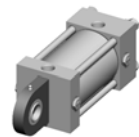


Model HE
Pivot Eye
NFFA Style MP3



Model HMP
Detachable Clevis
NFFA Style MP2



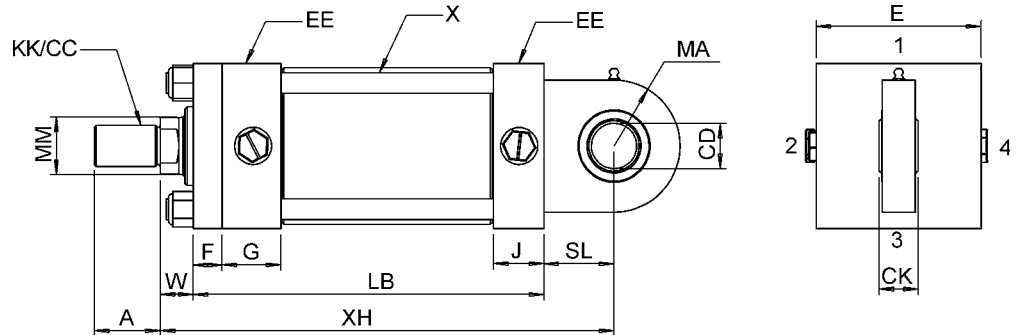


BORE	ROD	ROD DIA		CC	A	W	ADD STROKE		E	F	G	J	SL	CD	CK	EE		MA	X
		MM	KK				LB	XH								NPTF	SAE		
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5	6 3/8	2 1/2	3/8	1 9/16	1 5/16	3/4	1/2	7/16	1/2	-08	7/8	3/8
	2	1	3/4-16	7/8-14	1 1/8	1	5	6 3/4											
2	1	1	3/4-16	7/8-14	1 1/8	3/4	5 1/4	7 1/4	3	5/8	1 15/32	1 7/32	1 1/4	3/4	21/32	1/2	-08	1 1/4	1/2
	2	1 3/8	1-14	1 1/4-12	1 5/8	1		7 1/2			2 1/8								
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	5 3/8	7 3/8	3 1/2	9/16	1 9/16	1 1/4	1 1/4	3/4	21/32	1/2	-08	1 1/4	1/2
	2	1 3/8	1-14	1 1/4-12	1 5/8	1		7 5/8			2 3/16								
3 1/4	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	6 1/4	8 5/8	4 1/2	3/4	1 25/32	1 17/32	1 1/2	1	7/8	3/4	-12	1 1/2	5/8
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8		8 7/8											
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	6 5/8	9 3/4	5	7/8	1 25/32	1 17/32	2 1/8	1 3/8	1 3/16	3/4	-12	2	5/8
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8		9 7/8											
5	1	2	1 7/8-12	2 1/4-12	3	1 3/8	7 1/8	10 1/2	6 1/2	7/8	1 25/32	1 17/32	2 1/4	1 3/4	1 17/32	3/4	-12	2 3/4	7/8
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8		10 3/4											
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	8 3/8	12 1/8	7 1/2	1	2 5/32	2 5/32	2 1/2	2	1 3/4	1	-16	3	1
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4		12 1/8											
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	9 1/2	13 3/4	8 1/2	1	2 17/32	2 17/32	3	2 1/2	2 3/16	1 1/4	-20	3 1/2	1 1/8
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4		13 3/4											
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10 1/2	15	9 1/2	1	2 31/32	2 19/32	3 1/4	3	2 5/8	1 1/2	-24	4	1 1/4
	2	4	3-12	3 3/4-12	4	1 1/4		15											

Notes:

1. All dimensions in inches.
2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
3. See Cylinder Nomenclature for thread options.
4. For Optional Rod Ends and dimensions see page 18.
5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.

Model HW
Self-aligning Eye
NFPA Style MPU3

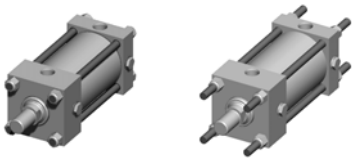


MAXIMUM OPERATING PRESSURE (PSI)

MODEL HW *

BORE	CONTINUOUS	INTERMITTENT
1 1/2	1600	2100
2	2100	2800
2 1/2	1300	1800
3 1/4	1400	1800
4	1700	2200
5	1800	2400
6	1600	2200
7	1900	1900
8	2100	2100

*Pressure ratings are based on the Dynamic Load Capacity of the bearing.



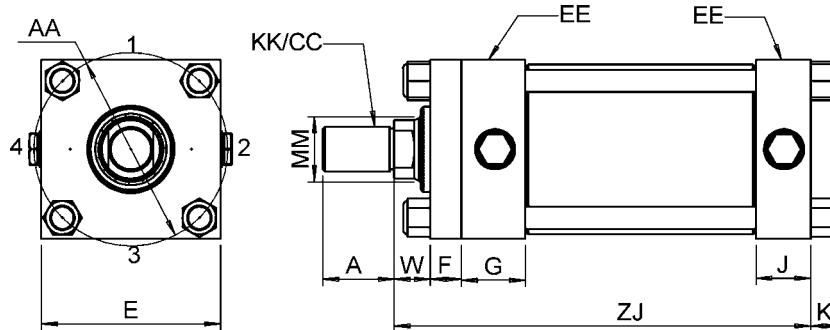
model HNM, HNA

BORE	ROD DIA		KK	CC	A	W	ADD STROKE		E	F	G	J	K	R	AA	BB	DD	EE						
	ROD	MM					ZJ	SAE																
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5	5/8	2	1/2	3/8	1	9/16	1	5/16	1/2	1.63	2.30	1	3/8	3/8-24	1/2	-08	
	2	1	3/4-16	7/8-14	1 1/8	1	6																	
2	1	1	3/4-16	7/8-14	1 1/8	3/4	6		3		5/8	1	15/32	1	7/32	5/8	2.19	3.09	1	13/16	1/2-20	1/2	-08	
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6	1/4																
2 1/2	1	1 3/8	3/4-16	7/8-14	1 1/8	3/4	6	1/8	3	1/2	9/16	1	9/16	1	1/4	5/8	2.55	3.60	1	13/16	1/2-20	1/2	-08	
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6	3/8																
3 1/4	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	7	1/8	4	1/2	3/4	1	25/32	1	17/32	3/4	3.25	4.60	2	5/16	5/8-18	3/4	-12	
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	7	3/8																
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	7	5/8	5		7/8	1	25/32	1	17/32	3/4	3.82	5.41	2	5/16	5/8-18	3/4	-12	
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7	3/4																
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	8	1/4	6	1/2	7/8	1	25/32	1	17/32	1	4.95	7.00	3	3/16	7/8-14	3/4	-12	
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	8	1/2																
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	9	5/8	7	1/2	1	2	5/32	2	5/32	1	5.73	8.10	3	5/8	1-14	1	-16	
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	9	5/8																
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	10	3/4	8	1/2	1	2	17/32	2	17/32	1	6.58	9.30	4	1/8	1 1/8-12	1	1/4	-20
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10	3/4																
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	11	3/4	9	1/2	1	2	31/32	2	19/32	1	7.50	10.60	4	1/2	1 1/4-12	1	1/2	-24
	2	4	3-12	3 3/4-12	4	1 1/4	11	3/4																
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	11	3/4																

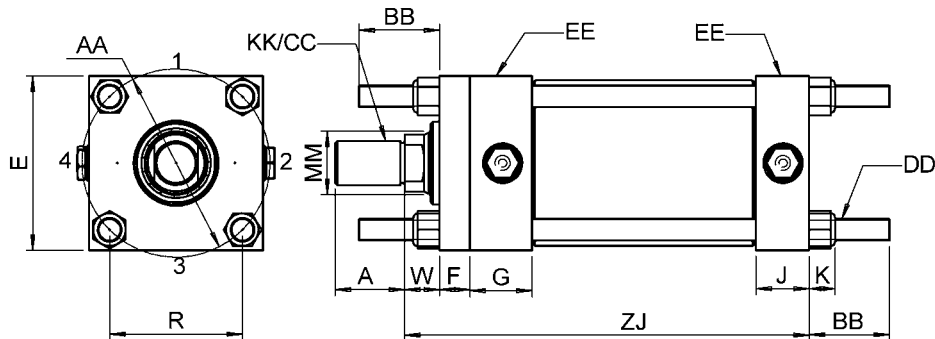
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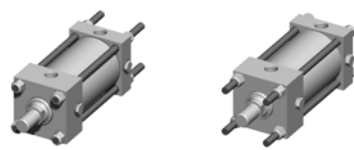
- All dimensions in inches.
- EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
- See Cylinder Nomenclature for thread options.
- For Optional Rod Ends and dimensions see page 18.
- Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
- Due to the heavy wall thickness of Royal cylinders, dimensions 'AA' and 'R' do not match NFPA standards for the 2" bore only.

Model HNM
No Mount
NFPA Style MX0



Model HNA
Extended Tie-Rods
both ends
NFPA Style MX1



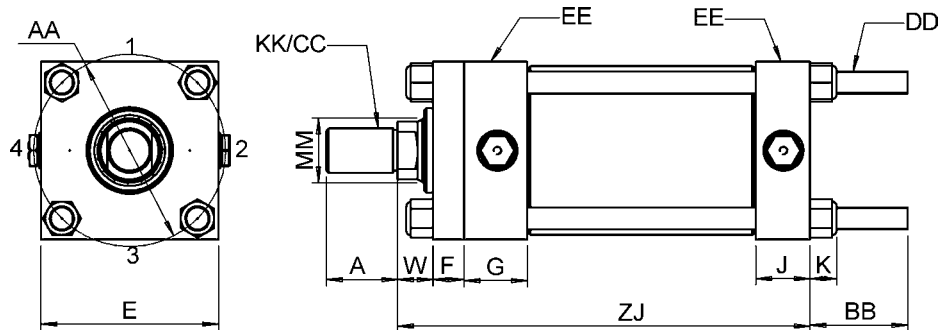


BORE	ROD DIA		KK	CC	A	W	ADD STROKE ZJ	E	F	G	J	K	R	AA	BB	DD	EE	
	ROD	MM															NPTF	SAE
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5 5/8	2 1/2	3/8	1 9/16	1 5/16	1/2	1.63	2.30	1 3/8	3/8-24	1/2	-08
	2	1	3/4-16	7/8-14	1 1/8	1	6											
2	1	1	3/4-16	7/8-14	1 1/8	3/4	6	3	5/8	1 15/32	1 7/32	5/8	2.19	3.09	1 13/16	1/2-20	1/2	-08
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6 1/4			2 1/8								
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	6 1/8	3 1/2	9/16	1 9/16	1 1/4	5/8	2.55	3.60	1 13/16	1/2-20	1/2	-08
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6 3/8											
3 1/4	1	1 3/8	1 1/4-12	1 1/2-12	2	1 1/4	6 5/8			2 3/16								
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	7 3/8	4 1/2	3/4	1 25/32	1 17/32	3/4	3.25	4.60	2 5/16	5/8-18	3/4	-12
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	7 5/8	5	7/8	1 25/32	1 17/32	3/4	3.82	5.41	2 5/16	5/8-18	3/4	-12
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7 3/4											
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	8 1/4	6 1/2	7/8	1 25/32	1 17/32	1	4.95	7.00	3 3/16	7/8-14	3/4	-12
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	8 1/2											
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	9 5/8	7 1/2	1	2 5/32	2 5/32	1 1/8	5.73	8.10	3 5/8	1-14	1	-16
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	9 5/8											
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	10 3/4	8 1/2	1	2 17/32	2 17/32	1 3/16	6.58	9.30	4 1/8	1 1/8-12	1 1/4	-20
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10 3/4											
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	11 3/4	9 1/2	1	2 31/32	2 19/32	1 7/16	7.50	10.60	4 1/2	1 1/4-12	1 1/2	-24
	2	4	3-12	3 3/4-12	4	1 1/4	11 3/4											
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	11 3/4											

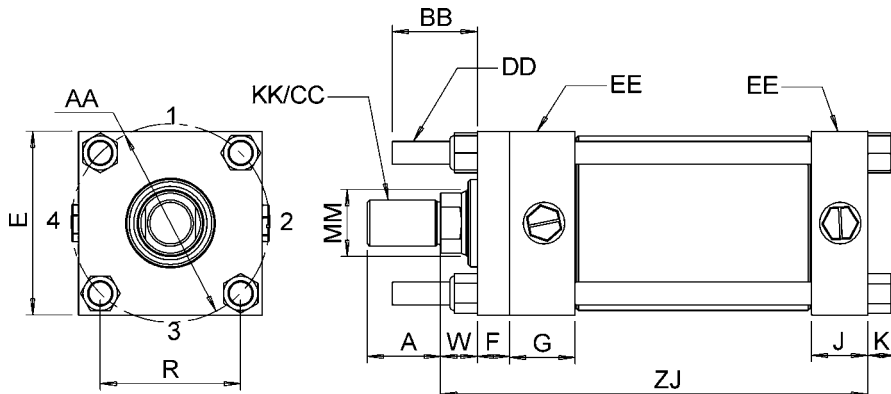
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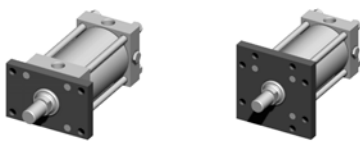
1. All dimensions in inches.
2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
3. See Cylinder Nomenclature for thread options.
4. For Optional Rod Ends and dimensions see page 18.
5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
6. Due to the heavy wall thickness of Royal cylinders, dimensions 'AA' and 'R' do not match NFPA standards for the 2" bore only.

Model HNB
Extended Tie-Rods
Blind End
NFPA Style MX2



Model HNC
Extended Tie-Rods
Gland End
NFPA Style MX3

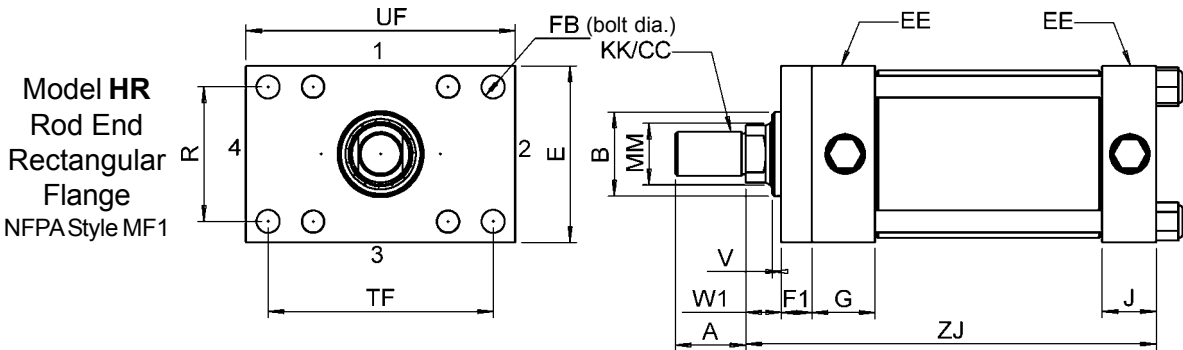




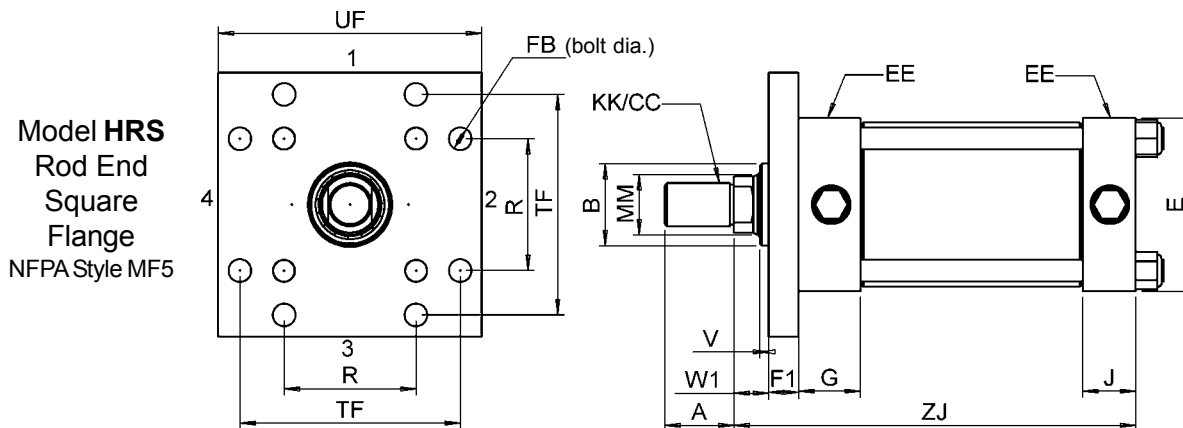
model HR, HRS

BORE	ROD	ROD DIA		KK	CC	A	W1	ADD STROKE		E	F1	G	J	EE		R	FB	TF	UF	B	V	
		MM	IN					ZJ	NPTF					SAE								
1 1/2	1	5/8	7/16-20	1/2-20	3/4	1/2	5	5/8	2 1/2	1/2	1 9/16	1 5/16	1/2	-08	1.63	3/8	3	7/16	4	1/4	1.125	1/16
	2	1	3/4-16	7/8-14	1 1/8	7/8	6	3	5/8	1 15/32	1 7/32	1/2	-08	2.05	1/2	4	1/8	5	1/8	1.563	1/8	
2	1	3/8	1-14	1 1/4-12	1 5/8	1	6	1/4	3 1/2	5/8	1 9/16	1 1/4	1/2	-08	2.55	1/2	4	5/8	5	5/8	1.563	3/16
	2	1	3/8	1-14	1 1/4-12	1 5/8	15/16	6	3/8	5/8	2 1/8	1 9/16	1/2	-08	2.55	1/2	4	5/8	5	5/8	2.125	3/8
2 1/2	1	3/4	1 1/4-12	1 1/2-12	2	1 3/16	6	5/8	4 1/2	3/4	1 25/32	1 17/32	3/4	-12	3.25	5/8	5	7/8	7	1/8	1.563	3/16
	2	1	3/4	1 1/4-12	1 1/2-12	2	1 1/8	7	3/8	3/4	2 3/16	1 17/32	3/4	-12	3.25	5/8	5	7/8	7	1/8	2.125	3/8
3 1/4	1	3/8	1-14	1 1/4-12	1 5/8	7/8	7	1/8	4 1/2	3/4	1 25/32	1 17/32	3/4	-12	3.25	5/8	5	7/8	7	1/8	2.375	1/2
	2	1	3/4	1 1/4-12	1 1/2-12	2	1 1/8	7	3/8	3/4	2 3/16	1 17/32	3/4	-12	3.25	5/8	5	7/8	7	1/8	2.375	3/8
4	1	3/4	1 1/4-12	1 1/2-12	2	1	7	5/8	5	7/8	1 25/32	1 17/32	3/4	-12	3.81	5/8	6	3/8	7	5/8	2.750	1/4
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7	3/4	5	7/8	1 25/32	1 17/32	3/4	-12	3.81	5/8	6	3/8	7	5/8	2.750	1/4
5	1	1/2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	8	1/4	6 1/2	7/8	1 25/32	1 17/32	3/4	-12	4.95	7/8	8	3/16	9	3/4	3.250	7/16
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	8	1/2	6 1/2	7/8	1 25/32	1 17/32	3/4	-12	4.95	7/8	8	3/16	9	3/4	3.250	7/16
6	1	2	2 1/2-12	3 1/4-12	3 1/2	1 3/8	8	1/2	7 1/2	1	2 5/32	2 5/32	1	-16	5.73	1	9	7/16	11	1/4	3.875	5/16
	2	3	2 1/2-12	2 3/4-12	3 1/2	1 1/4	9	5/8	7 1/2	1	2 5/32	2 5/32	1	-16	5.73	1	9	7/16	11	1/4	3.875	3/8
7	1	3	2 1/2-12	3 1/4-12	3 1/2	1 1/4	9	5/8	8 1/2	1	2 17/32	2 17/32	1 1/4	-20	6.58	1 1/8	10	5/8	12	5/8	4.375	1/4
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10	3/4	8 1/2	1	2 17/32	2 17/32	1 1/4	-20	6.58	1 1/8	10	5/8	12	5/8	4.375	1/4
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10	3/4	9 1/2	1	2 31/32	2 19/32	1 1/2	-24	7.50	1 1/4	11	13/16	14		4.875	13/32
	2	4	3-12	3 3/4-12	4	1 1/4	11	3/4	9 1/2	1	2 31/32	2 19/32	1 1/2	-24	7.50	1 1/4	11	13/16	14		4.875	1/4
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	11	3/4	9 1/2	1	2 31/32	2 19/32	1 1/2	-24	7.50	1 1/4	11	13/16	14		5.750	1/4

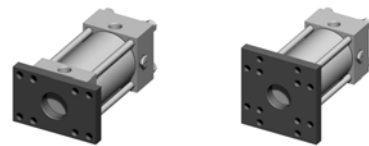
- Notes:**
- All dimensions in inches.
 - EE standard port is SAE flange or Alternate port size is required.
 - See Cylinder Nomenclature for thread options.
 - For Optional Rod Ends and dimensions see page 18.
 - Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.



Model HR		
Max. Pressure (PSI)		
BORE	PUSH	PULL
1 1/2	3000	3000
2	2500	3000
2 1/2	2000	3000
3 1/4	1500	3000
4	1500	3000
5	1000	2000
6	1000	2000
7	1000	2000
8	700	2000



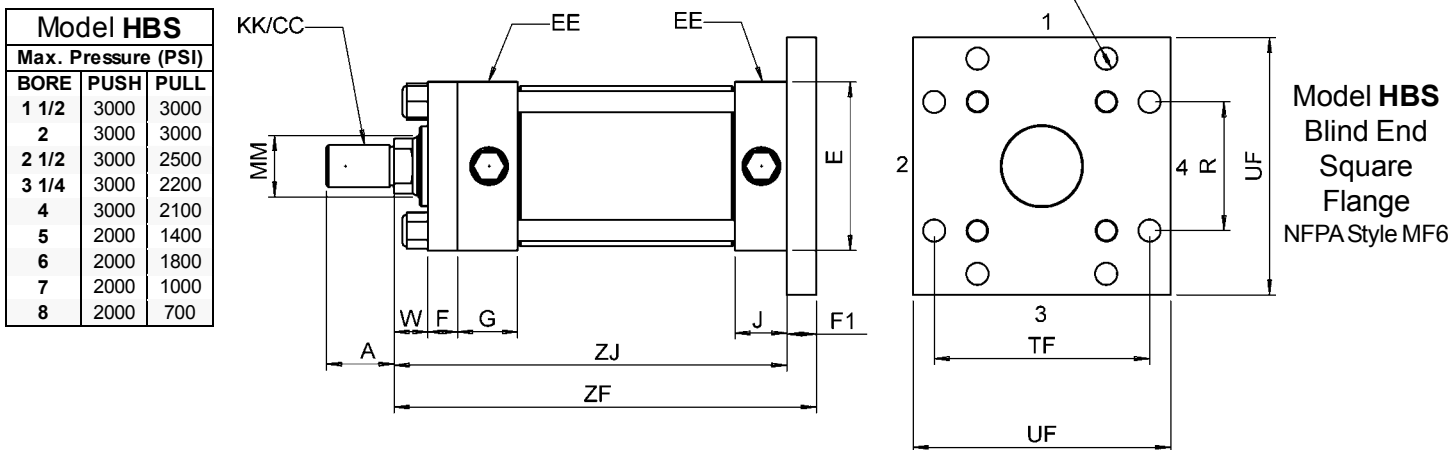
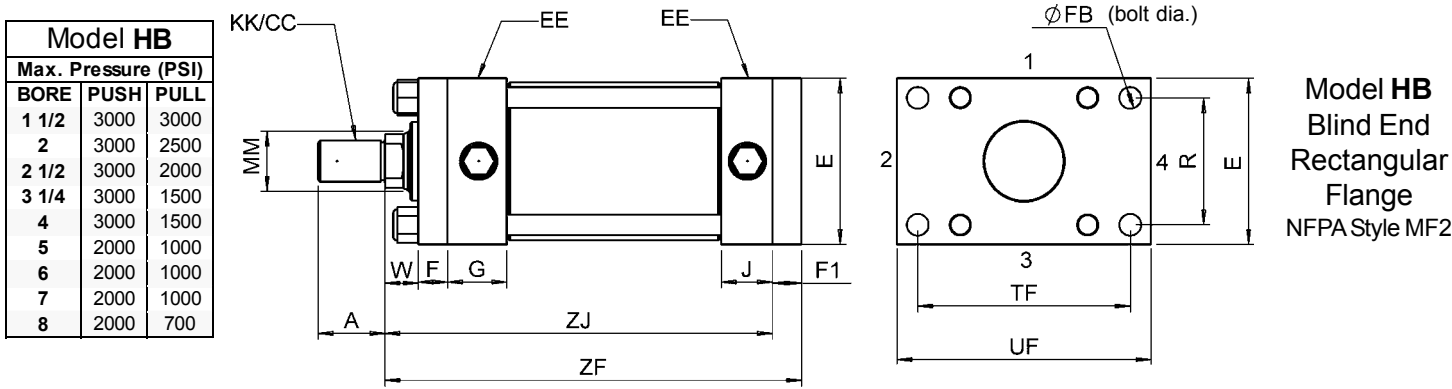
Model HRS		
Max. Pressure (PSI)		
BORE	PUSH	PULL
1 1/2	3000	3000
2	3000	3000
2 1/2	2500	3000
3 1/4	2200	3000
4	2100	3000
5	1400	2000
6	1800	2000
7	1000	2000
8	700	2000

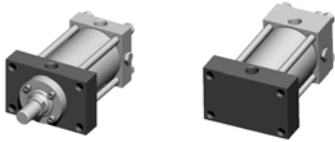


BORE	ROD DIA		ADD STROKE															
	ROD	MM	KK	CC	A	W	ZF	ZJ	E	F	F1	G	J	EE		R	FB	TF
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	6 1/8	5 5/8	2 1/2	3/8	1/2	1 9/16	1 5/16	1/2	-08	1.63	3/8	3 7/16
	2	1	3/4-16	7/8-14	1 1/8	1	6 1/2	6										
2	1	1	3/4-16	7/8-14	1 1/8	3/4	6 5/8	6	3	5/8	5/8	1 15/32	1 7/32	1/2	-08	2.05	1/2	4 1/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6 7/8	6 1/4				2 1/8						
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	6 3/4	6 1/8	3 1/2	9/16	5/8	1 9/16	1 1/4	1/2	-08	2.55	1/2	4 5/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	7	6 3/8										
3 1/4	1	1 3/8	1 1/4-12	1 1/2-12	2	1 1/4	7 1/4	6 5/8				2 3/16						
	2	1 3/8	1-14	1 1/4-12	1 5/8	7/8	7 7/8	7 1/8	4 1/2	3/4	3/4	1 25/32	1 17/32	3/4	-12	3.25	5/8	5 7/8
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	8 1/2	7 5/8	5	7/8	7/8	1 25/32	1 17/32	3/4	-12	3.82	5/8	6 3/8
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	8 5/8	7 3/4										
5	1	2	1 7/8-12	2 1/4-12	3	1 3/8	8 7/8	8										
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	9 3/8	8 1/2	6 1/2	7/8	7/8	1 25/32	1 17/32	3/4	-12	4.95	7/8	8 3/16
6	1	2 1/2	2 1/4-12	2 3/4-12	3 1/2	1 3/8	9 3/8	8 1/2										
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	10 5/8	9 5/8	7 1/2	1	1	2 5/32	2 5/32	1	-16	5.73	1	9 7/16
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	11 3/4	10 3/4	8 1/2	1	1	2 17/32	2 17/32	1 1/4	-20	6.58	1 1/8	10 5/8
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	11 3/4	10 3/4										
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	12 3/4	11 3/4	9 1/2	1	1	2 31/32	2 19/32	1 1/2	-24	7.50	1 1/4	11 13/16
	2	4	3-12	3 3/4-12	4	1 1/4	12 3/4	11 3/4										

Notes:

1. All dimensions in inches.
2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
3. See Cylinder Nomenclature for thread options.
4. For Optional Rod Ends and dimensions see page 18.
5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.





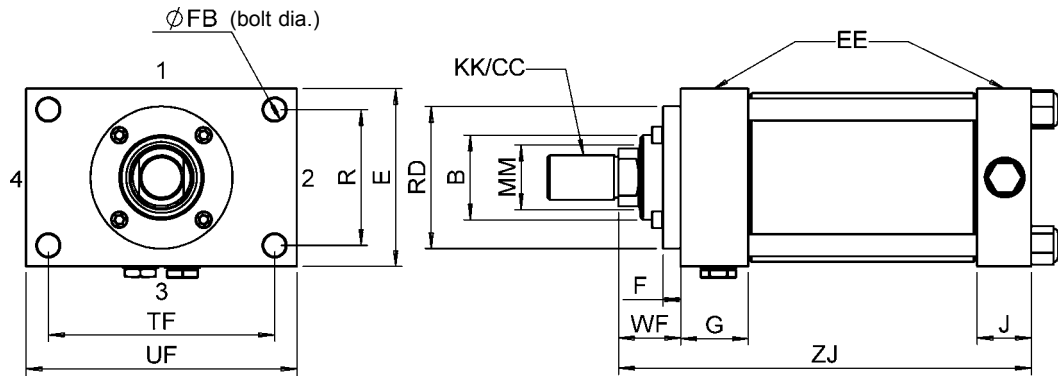
model **HG, HH**

BORE	ROD	ROD DIA		A	W	WF	ADD STROKE ZJ	E	F	ME5		ME6		EE			RD	TF	
		MM	KK							G	G	J	NPTF	SAE	R	FB			
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	*	5 5/8	2 1/2	3/8	*	2 9/16	1 5/16	1/2	-08	1.63	3/8	*	3 7/16
	2	1	3/4-16	7/8-14	1 1/8	1	*	6			*							*	
2	1	1	3/4-16	7/8-14	1 1/8	3/4	*	6	3	5/8	*	1 15/32	1 7/32	1/2	-08	2.05	1/2	*	4 1/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	*	6 1/4			*							*	
note 5	2	1 3/8																	
	3	1 3/8																	
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	1 3/8	6 1/8	3 1/2	5/8	1 1/2	1 9/16	1 1/4	1/2	-08	2.55	1/2	3	4 5/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	1 5/8	6 3/8										3	1/2
note 5	3	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	1 7/8	6 5/8										3	3/4
	3	1 3/4																	
3 1/4	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	1 5/8	7 1/8	4 1/2	3/4	2 1/8	2 3/16	1 17/32	3/4	-12	3.25	5/8	3	1/2
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	1 7/8	7 3/8			2 25/32	2 25/32	1 17/32	3/4	-12	3.25	5/8	4	5/8
note 5	3	2	1 1/2-12	1 3/4-12	2 1/4	1 1/4	2	7 1/2										4	1/2
	3	2																	
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	1 7/8	7 5/8	5	7/8	2 7/16	3 7/16	1 17/32	3/4	-12	3.81	5/8	4	6 3/8
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	2	7 3/4			2 25/32	2 25/32	1 17/32	3/4	-12	3.81	5/8	4	1/2
note 5	3	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	2 1/4	8										5	
	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	2	8 1/4	6 1/2	7/8	1 25/32	1 25/32	1 17/32	3/4	-12	4.95	7/8	4	1/2
5	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	2 1/4	8 1/2										5	
	3	3	2 1/4-12	2 3/4-12	3 1/2	1 3/8	2 1/4	8 1/2										5	3/4
note 5	4	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 3/8	2 1/4	8 1/2										6	
	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	2 1/4	9 5/8	7 1/2	1	2 5/32	2 5/32	2 5/32	1	-16	5.73	1	5	9 7/16
6	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	2 1/4	9 5/8										6	3/8
	3	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	2 1/4	9 5/8										6	1/2
note 5	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	2 1/4	10 3/4	8 1/2	1	2 17/32	2 17/32	2 17/32	1 1/4	-20	6.58	1 1/8	6	1/2
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	2 1/4	10 3/4										6	1/2
7	3	4	3-12	3 3/4-12	4	1 1/4	2 1/4	10 3/4										7	1/2
	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	2 1/4	11 3/4	9 1/2	1	2 31/32	2 31/32	2 19/32	1 1/2	-24	7.50	1 1/4	6	1/2
note 5	2	4	3-12	3 3/4-12	4	1 1/4	2 1/4	11 3/4										7	1/2
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	2 1/4	11 3/4										8	1/2

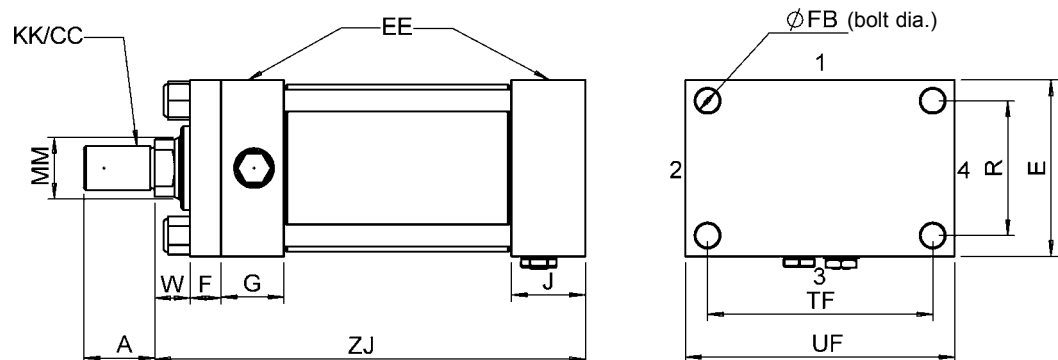
Notes:

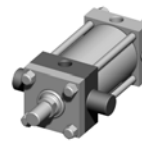
1. All dimensions in inches.
 2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
 3. See Cylinder Nomenclature for thread options.
 4. For Optional Rod Ends and dimensions see page 18.
 5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
- * For 1 1/2" bore and 2" bore contact the factory for these dimensions.

Model **HG**
Rectangular Gland
End Head
NFPA Style ME5



Model **HH**
Rectangular Blind
End Head
NFPA Style ME6

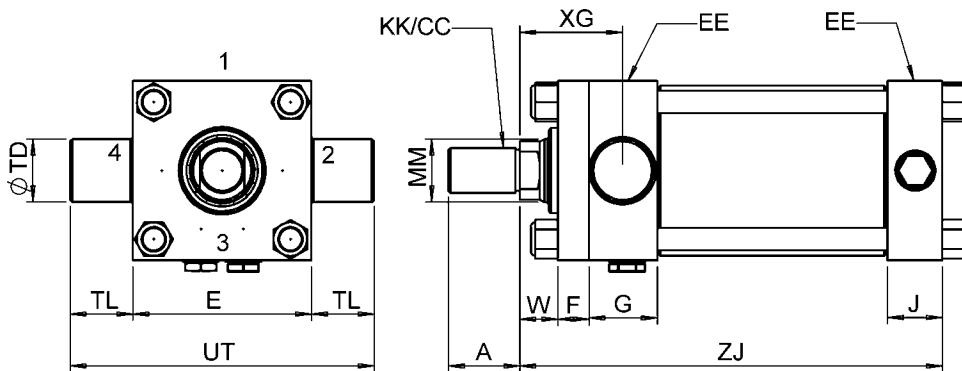




BORE	ROD	ROD DIA		KK	CC	A	HTR		HTB		ADD STROKE		E	F	HTR		HTB		EE		TD	TL
		MM	MM				W	W	XG	XJ	ZJ	ZJ			G	J	G	J	NPTF	SAE		
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5/8	1 7/8	4 7/8	5 5/8	5 5/8	2 1/2	3/8	1 9/16	1 5/16	1 9/16	1 5/16	1/2	-08	1	1	
	2	1	3/4-16	7/8-14	1 1/8	1	1	2 1/4	5 1/4	6	6											
2	1	3/8	3/4-16	7/8-14	1 1/8	3/4	3/4	2 1/4	5 1/2	6 3/16	6 1/4	3	5/8	1 21/32	1 7/32	1 15/32	1 7/32	1/2	-08	1 3/8	1 3/8	
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	1	2 1/2	5 3/4	6 7/16	6 1/2											
2 1/2	1	3/8	3/4-16	7/8-14	1 1/8	3/4	3/4	2 1/4	5 11/16	6 5/16	6 7/16	3 1/2	9/16	1 3/4	1 1/4	2 1/8	1 9/16	1 9/16	1/2	-08	1 3/8	1 3/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	1	2 1/2	5 15/16	6 9/16	6 11/16											
3 1/4	1	3/4	1 1/4-12	1 1/2-12	2	1 1/4	1 1/4	2 3/4	6 3/16	6 13/16	6 15/16											
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	1 1/4	3	6 7/8	7 5/8	7 7/8											
4	1	3/4	1 1/4-12	1 1/2-12	2	1	1	2 7/8	7 1/4	7 13/16	8 3/16	5	7/8	1 31/32	1 17/32	2 7/16	2 1/32	3/4	-12	1 3/4	1 3/4	
	2	1 1/2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	1 1/8	3	7 3/8	7 15/16	8 5/16											
5	1	1/2	1 1/2-12	1 3/4-12	2 1/4	1 3/16	1 1/8	3	7 3/4	8 1/2	8 13/16	6 1/2	7/8	1 31/32	1 17/32	2 5/32	2 5/32	3/4	-12	1 3/4	1 3/4	
	2	1 1/2	1 1/2-12	1 3/4-12	2 1/4	1 7/16	1 3/8	3 1/4	8	8 3/4	9 1/16											
6	1	1/2	1 1/2-12	1 3/4-12	2 1/4	1 1/4	1 1/4	3 3/8	8 9/16	9 3/4	9 5/8	7 1/2	1	2 9/32	2 5/32	2 5/32	2 5/32	1	-16	2	2	
	2	3/4	2 1/2-12	2 3/4-12	3 1/2	1 1/4	1 1/4	3 3/8	8 9/16	9 3/4	9 5/8											
7	1	3/4	2 1/2-12	2 3/4-12	3 1/2	1 1/4	1 1/4	3 3/8	8 9/16	9 3/4	9 5/8	8 1/2	1	2 21/32	2 17/32	2 17/32	2 17/32	1 1/4	-20	2 1/2	2 1/2	
	2	1 1/2	2 1/2-12	2 3/4-12	3 1/2	1 5/16	1 1/4	3 5/8	9 11/16	10 15/16	10 3/4											
8	1	3/4	3-12	3 3/4-12	4	1 5/16	1 1/4	3 5/8	9 11/16	10 15/16	10 3/4	9 1/2	1	3 3/32	2 19/32	2 31/32	3 1/16	1 1/2	-24	3	3	
	2	1 1/2	3-12	3 3/4-12	4	1 1/4	1 1/4	3 3/4	10 11/16	11 7/8	12 5/32											

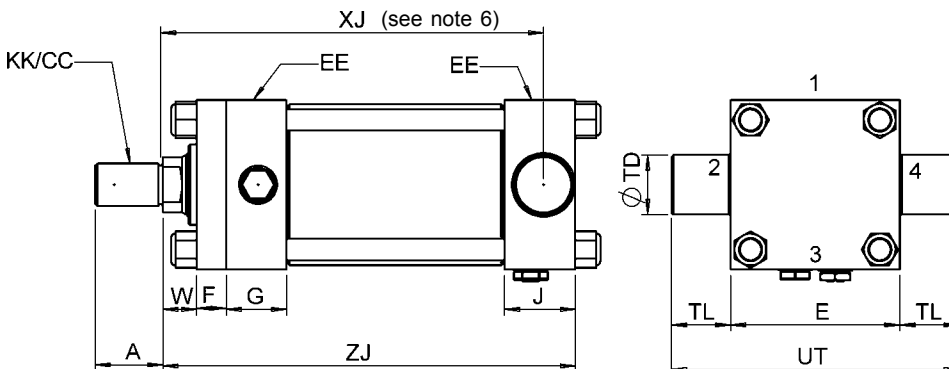
Notes:

- All dimensions in inches.
- EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
- See Cylinder Nomenclature for thread options.
- For Optional Rod Ends and dimensions see page 18.
- Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
- XJ dimensions are not NFPA compliant for 2" through 8" bores.

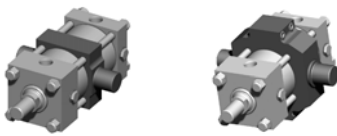


Model HTR
Rod End Trunnion
NFFA Style MT1

Warning: Trunnion mounted cylinders swivel in one direction and are designed to carry shear loads only. Pins must be held rigidly and in accurate alignment. Improper mounting may result in failure of mount.



Model HTB
Blind End Trunnion
NFFA Style MT2



model HT, HHT

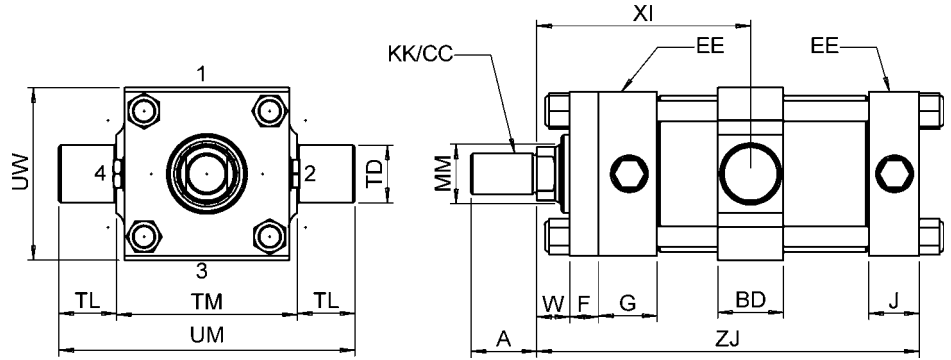
BORE	ROD	ROD DIA		CC	A	W	ADD STROKE					E	F	G	J	EE		TD
		MM	KK				HT XI (min)	HHT XI (min)	HT XI (max)	HHT XI (max)	ZJ					NPTF	SAE	
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	3 5/32	3 11/16	3 23/32	3 3/16	5 5/8	2 1/2	3/8	1 9/16	1 5/16	1/2	-08	1
	2	1	3/4-16	7/8-14	1 1/8	1	3 17/32	4 1/16	4 3/32	3 9/16	6							1
2	1	1	3/4-16	7/8-14	1 1/8	3/4	3 19/32	3 15/16	4 1/32	3 21/32	6	3	5/8	1 15/32	1 7/32	1/2	-08	1 3/8
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	3 27/32	4 3/16	4 9/32	3 29/32	6 1/4							1 3/8
note 5	2	1 3/8					4 1/2	4 5/8	4 9/32	3 29/32								
	1	1	3/4-16	7/8-14	1 1/8	3/4	3 5/8	4	4 1/8	3 3/4	6 1/8	3 1/2	9/16	1 9/16	1 1/4	1/2	-08	1 3/8
2 1/2	2	1 3/8	1-14	1 1/4-12	1 5/8	1	3 7/8	4 1/4	4 3/8	4								1 3/8
	3	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	4 1/8	4 1/2	4 5/8	4 1/4	6 5/8							1 3/8
note 5	3	1 3/4					4 3/4	4 15/16	4 5/8	4 1/4				2 3/16				
	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	4 13/32	4 3/4	4 19/32	4 7/32	7 1/8	4 1/2	3/4	1 25/32	1 17/32	3/4	-12	1 3/4
3 1/4	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	4 21/32	5	4 27/32	4 15/32	7 3/8							1 3/4
	3	2	1 1/2-12	1 3/4-12	2 1/4	1 1/4	4 25/32	5 1/8	4 31/32	4 19/32	7 1/2							1 3/4
note 5	3	2					5 7/16		4 31/32	4 19/32				2 7/16				
	1	1 3/4	1 1/4-12	1 1/2-12	2	1	4 21/32	5 1/8	5 3/32	4 19/32	7 5/8	5	7/8	1 25/32	1 17/32	3/4	-12	1 3/4
4	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	4 25/32	5 1/4	5 7/32	4 23/32	7 3/4							1 3/4
	3	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	5 1/32	5 3/8	5 15/32	4 31/32	8							1 3/4
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	4 25/32	5 3/4	5 23/32	4 23/32	8 1/4	6 1/2	7/8	1 25/32	1 17/32	3/4	-12	1 3/4
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	5 1/32	6	5 31/32	4 31/32	8 1/2							1 3/4
6	3	3	2 1/4-12	2 3/4-12	3 1/2	1 3/8	5 1/32	6	5 31/32	4 31/32	8 1/2							1 3/4
	4	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 3/8	5 1/32	6	5 31/32	4 31/32	8 1/2							1 3/4
7	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	5 29/32	6 5/8	5 31/32	5 7/32	9 5/8	7 1/2	1	2 5/32	2 5/32	1	-16	2
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	5 29/32	6 5/8	5 31/32	5 7/32	9 5/8							2
8	3	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	5 29/32	6 5/8	5 31/32	5 7/32	9 5/8							2
	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	6 9/32	N/A	6 23/32	N/A	10 3/4	8 1/2	1	2 17/32	2 17/32	1 1/4	-20	2 1/2
9	3	4	3-12	3 3/4-12	4	1 1/4	6 9/32	N/A	6 23/32	N/A	10 3/4							2 1/2
	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	6 31/32	N/A	7 13/32	N/A	11 3/4	9 1/2	1	2 31/32	2 19/32	1 1/2	-24	3
10	2	4	3-12	3 3/4-12	4	1 1/4	6 31/32	N/A	7 13/32	N/A	11 3/4							3
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	6 31/32	N/A	7 13/32	N/A	11 3/4							3

- Notes:
1. All dimensions in inches.
 2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
 3. See Cylinder Nomenclature for thread options.

4. For Optional Rod Ends and dimensions see page 18.
5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.

Model HT Mid-Trunnion
NFPA Style MT4

BORE	BD		TM		UM		UW	
	HT	UM	HT	UM	HT	UM	HT	UM
1 1/2	1 3/16	3	3	5	3	3	3	3
2	1 1/2	3 1/2	3 1/2	6 1/4	3 1/2	3 1/2	3 1/2	3 1/2
2 1/2	1 1/2	4	4	6 3/4	4	4	4	4
3 1/4	2	5	5	8 1/2	5	5	5	5
4	2	5 1/2	5 1/2	9	5 1/4	5 1/4	5 1/4	5 1/4
5	2	7	7	10 1/2	6 3/4	6 3/4	6 3/4	6 3/4
6	3	8 1/2	8 1/2	12 1/2	9	9	9	9
7	3	9 3/4	9 3/4	14 3/4	10	10	10	10
8	3 1/2	11	11	17	12	12	12	12

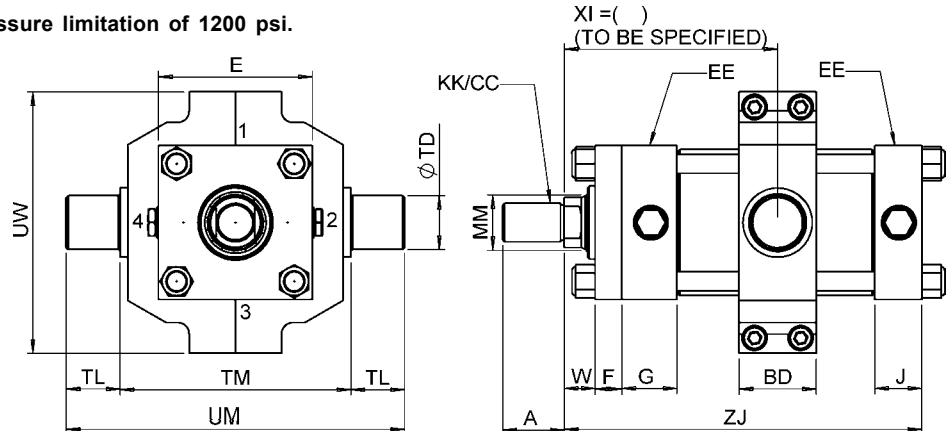


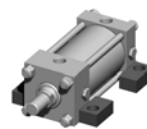
Warning: Trunnion mounted cylinders swivel in one direction and are designed to carry shear loads only. Pins must be held rigidly and in accurate alignment. Improper mounting may result in failure of mount.

Note: All bore sizes of model HHT have a pressure limitation of 1200 psi.

Model HHT
Mid-Trunnion (Split)

BORE	BD		TM		UM		UW	
	HHT	UM	HHT	UM	HHT	UM	HHT	UM
1 1/2	1 3/4	4	4	6	4 7/16	4 7/16	4 7/16	4 7/16
2	1 3/4	5	5	7 3/4	5	5	5	5
2 1/2	1 3/4	5 1/2	5 1/2	8 1/4	5 1/2	5 1/2	5 1/2	5 1/2
3 1/4	2 1/4	7	7	10 1/2	7 1/4	7 1/4	7 1/4	7 1/4
4	2 1/2	7 1/2	7 1/2	11	8 1/2	8 1/2	8 1/2	8 1/2
5	3 1/2	9	9	12 1/2	9 3/4	9 3/4	9 3/4	9 3/4
6	4	10 1/2	10 1/2	14 1/2	11 13/16	11 13/16	11 13/16	11 13/16

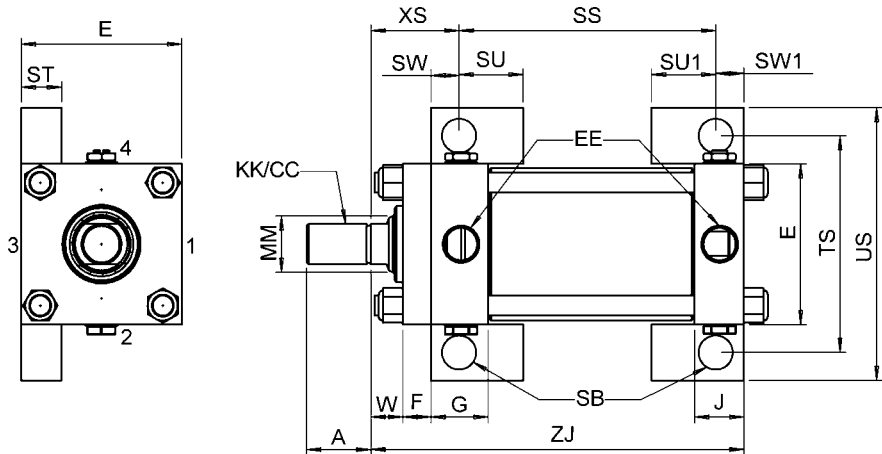




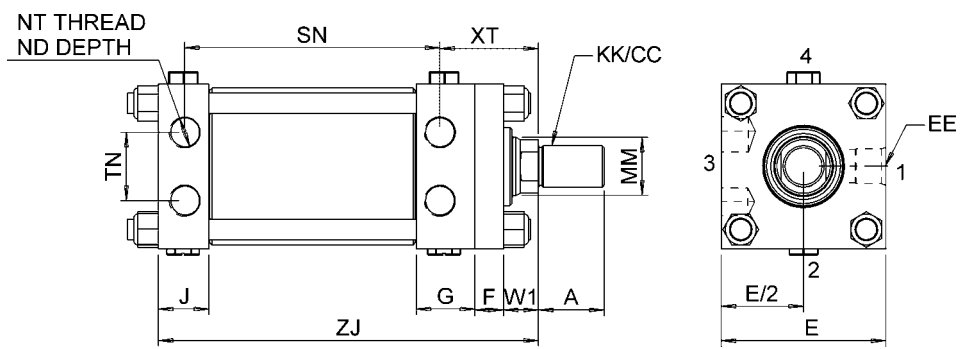
BORE	ROD DIA				ADD STROKE		EE (min.)		E	F	G	J	EE (min.)		ND	SB	SU	SW	ST	TS	US
	ROD	MM	KK	CC	A	W	W1	XS					XT	ZJ							
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5/8	1 3/8	2	5 5/8	3 7/8	1 5/16	1/2	-08	3/8	3/8	15/16	3/8	1/2	3 1/4	4
	2	1	3/4-16	7/8-14	1 1/8	1	1	1 3/4	2 3/8	6	3 7/8	1 5/16	1/2	-08	3/8	3/8	15/16	3/8	1/2	3 1/4	4
2	1	1	3/4-16	7/8-14	1 1/8	3/4	3/4	1 7/8	2 3/8	6	3 5/8	1 7/32	1/2	-08	7/16	1/2	1 1/4	1/2	3/4	4	5
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	1	2 1/8	2 5/8	6 1/4	3 5/8	1 7/32	1/2	-08	7/16	1/2	1 1/4	1/2	3/4	4	5
2 1/2	1	1	3/4-16	7/8-14	1 1/8	3/4	3/4	2 1/16	2 3/8	6 1/8	3 3/8	1 1/4	1/2	-08	5/8	3/4	1 1/2	3/4	1	4 7/8	6 1/4
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	1	2 5/16	2 5/8	6 3/8	3 3/8	1 1/4	1/2	-08	5/8	3/4	1 1/2	3/4	1	4 7/8	6 1/4
3 1/4	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	7/8	2 5/16	2 3/4	7 1/8	4 1/8	1 1/4	3/4	-12	3/4	3/4	1 9/16	11/16	1	5 7/8	7 1/4
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	1 1/8	2 9/16	3	7 3/8	4 1/8	1 1/4	3/4	-12	3/4	3/4	1 9/16	11/16	1	5 7/8	7 1/4
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	1 1/16	2 3/4	3	7 9/16	4	1 1/4	3/4	-12	1	1	2	7/8	1 1/4	6 3/4	8 1/2
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	1 3/16	2 7/8	3 1/8	7 11/16	4	1 1/4	3/4	-12	1	1	2	7/8	1 1/4	6 3/4	8 1/2
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	1 3/16	2 7/8	3 1/8	8 3/16	4 1/2	1 1/4	3/4	-12	1	1	2	7/8	1 1/4	8 1/4	10
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	1 7/16	3 1/8	3 3/8	8 7/16	4 1/2	1 1/4	3/4	-12	1	1	2	7/8	1 1/4	8 1/4	10
6	1	2 1/2	2 1/4-12	2 3/4-12	3 1/2	1 3/8	1 7/16	3 1/8	3 3/8	8 7/16	4 1/2	1 1/4	3/4	-12	1	1	2	7/8	1 1/2	9 3/4	12
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	1 1/4	3 3/8	3 1/2	9 5/8	5 1/8	1 1/4	3/4	-16	1 1/4	1 1/4	2 1/2	1 1/8	1 1/2	9 3/4	12
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	1 1/4	3 5/8	3 13/16	10 3/4	5 3/4	1 1/4	3/4	-20	1 1/2	1 1/2	2 7/8	1 3/8	1 1/2	11 1/4	14
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	1 1/4	3 5/8	3 13/16	10 3/4	5 3/4	1 1/4	3/4	-20	1 1/2	1 1/2	2 7/8	1 3/8	1 1/2	11 1/4	14
8	1	3 1/2	3-12	3 3/4-12	4	1 1/4	1 1/4	3 5/8	3 13/16	10 3/4	5 3/4	1 1/2	3/4	-24	1 1/2	1 1/2	2 7/8	1 3/8	1 1/2	12 1/4	15
	2	4	3-12	3 3/4-12	4	1 1/4	1 1/4	3 5/8	3 15/16	11 3/4	6 3/4	1 1/2	3/4	-24	1 1/2	1 1/2	2 7/8	1 3/8	1 1/2	12 1/4	15

Notes:

- All dimensions in inches.
- EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
- See Cylinder Nomenclature for thread options.
- For Optional Rod Ends and dimensions see page 18.
- Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
- SU1 = SU and SW1 = SW except for 2 1/2" bore, where SU1 = 1 9/16" and SW1 = 11/16".



Model HF
Foot Mount
NFPA Style MS2



Bottom View

Model HS
Side Tapped
NFPA Style MS4

BORE	ADD STROKE	
	NT	TN
1 1/2	3/8-16	3/4
2	1/2-13	15/16
2 1/2	5/8-11	1 5/16
3 1/4	3/4-10	1 1/2
4	1-8	2 1/16
5	1-8	2 15/16
6	1 1/4-7	3 5/16
7	1 1/2-6	3 3/4
8	1 1/2-6	4 1/4



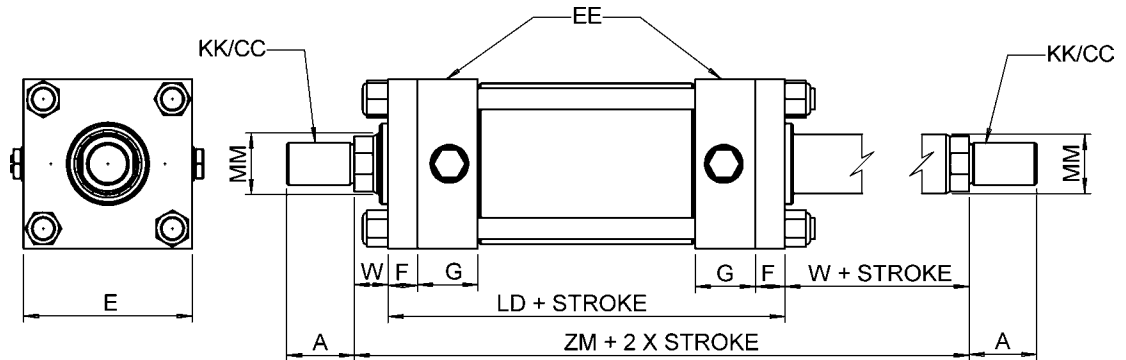
model HD

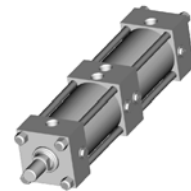
BORE	ROD	ROD DIA		CC	A	W	ADD	ADD	E	F	G	EE	
		STROKE	STROKE X2				NPTF	SAE					
		MM	KK				LD	ZM					
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5 5/8	6 7/8	2 1/2	3/8	1 9/16	1/2	-08
	2		3/4-16	7/8-14	1 1/8	1	5 5/8	7 5/8					
2	1		3/4-16	7/8-14	1 1/8	3/4	6 1/8	7 5/8	3	5/8	1 15/32	1/2	-08
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6 1/8	8 1/8			2 1/8		
note 5	1	1 3/8											
	2	1 3/8											
2 1/2	1		3/4-16	7/8-14	1 1/8	3/4	6 1/4	7 3/4	3 1/2	9/16	1 9/16	1/2	-08
	2	1 3/8	1-14	1 1/4-12	1 5/8	1	6 1/4	8 1/4					
note 5	3	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4	6 1/4	8 3/4					
	3	1 3/4									2 3/16		
3 1/4	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	7 1/4	9	4 1/2	3/4	1 25/32	3/4	-12
	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8	7 1/4	9 1/2					
note 5	3	2	1 1/2-12	1 3/4-12	2 1/4	1 1/4	7 1/4	9 3/4					
	3	2									2 7/16		
4	1	1 3/4	1 1/4-12	1 1/2-12	2	1	7 3/4	9 3/4	5	7/8	1 25/32	3/4	-12
	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7 3/4	10					
5	1	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	7 3/4	10 1/2					
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8	8 1/4	10 1/2	6 1/2	7/8	1 25/32	3/4	-12
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	9 3/8	11 7/8	7 1/2	1	2 5/32	1	-16
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	9 3/8	11 7/8					
7	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	10 1/2	13	8 1/2	1	2 17/32	1 1/4	-20
	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10 1/2	13					
8	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	11 7/8	14 3/8	9 1/2	1	2 31/32	1 1/2	-24
	2	4	3-12	3 3/4-12	4	1 1/4	11 7/8	14 3/8					
	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4	11 7/8	14 3/8					

Notes:

- All dimensions in inches.
- EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
- See Cylinder Nomenclature for thread options.
- For Optional Rod Ends and dimensions see page 18.
- Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.
- Other standard mounting styles are available, add the required mounting code after the "D" for Double rod in the cylinder nomenclature.
 H_DF_ Foot Mount
 H_DS_ Side Tapped
 H_DT_ Mid Trunnion (include XI in nomenclature)
- For mounting styles not common to both ends, letter code after "D" for double rod is gland end, Letter following last is blind end.
 H_DRC_ Rectangular Flange - No mount
 H_DTRC_ Gland end Trunnion - No mount

Model HD Double Rod

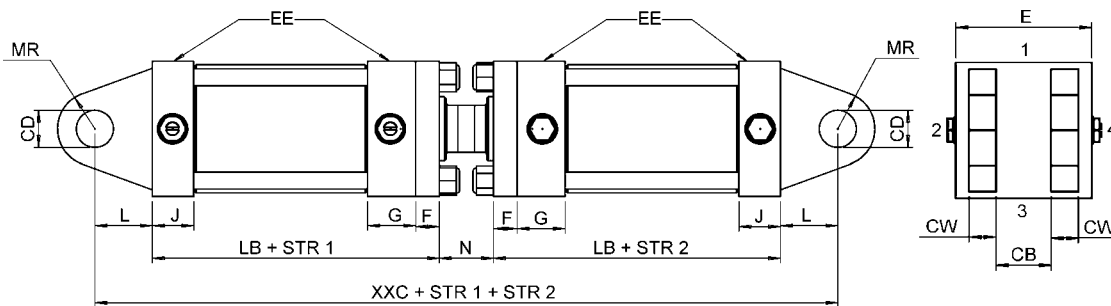




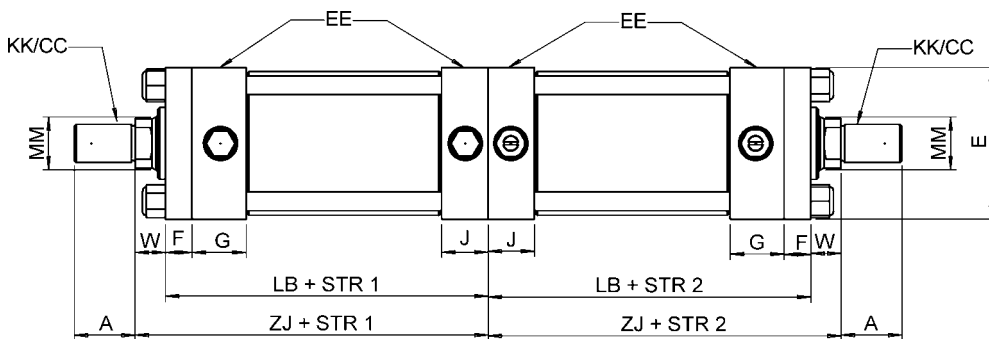
BORE	ROD	ROD DIA					W	ADD STROKE LB	ADD STROKE ZJ	ADD STR1+STR2 XXC	N	E	F	G	J	L	HC CB	HE CB	CD	CW	EE	
		MM	KK	CC	A	NPTF															SAE	
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5	5 5/8	12 3/4	1 1/4	2 1/2	3/8	1 9/16	1 5/16	3/4	25/32	3/4	1/2	1/2	1/2	-08	
	2		3/4-16	7/8-14	1 1/8	1	6	6	12 3/4													
2	1		3/4-16	7/8-14	1 1/8	3/4	5 1/4	6	14 1/2	1 1/2	3		1 15/32	1 7/32	1 1/4	1 9/32	1 1/4	3/4	5/8	1/2	-08	
	2	1 3/8	1-14	1 1/4-12	1 5/8	1		6 1/4	14 1/2				2 1/8									
note 5	2	1 3/8																				
	3	1 3/4	3/4-16	7/8-14	1 1/8	3/4	5 3/8	6 1/8	14 3/4	1 1/2	3 1/2	9/16	1 9/16	1 1/4	1 1/4	1 9/32	1 1/4	3/4	5/8	1/2	-08	
2 1/2	2	1 3/8	1-14	1 1/4-12	1 5/8	1		6 3/8	14 3/4													
	3	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4		6 5/8	14 3/4				2 3/16									
note 5	3	1 3/4																				
	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	6 1/4	7 1/8	17 1/4	1 3/4	4 1/2	3/4	1 25/32	1 17/32	1 1/2	1 17/32	1 1/2	1	3/4	3/4	-12	
3 1/4	2	1 3/4	1 1/4-12	1 1/2-12	2	1 1/8		7 3/8	17 1/4													
	3	2	1 1/2-12	1 3/4-12	2 1/4	1 1/4		7 1/2	17 1/4				2 7/16									
note 5	3	2																				
	1	1 3/4	1 1/4-12	1 1/2-12	2	1	6 5/8	7 5/8	19 5/8	2 1/8	5	7/8	1 25/32	1 17/32	2 1/8	2 1/32	2	1 3/8	1	3/4	-12	
4	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8		7 3/4	19 5/8													
	3	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8		8	19 5/8													
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7 1/8	8 1/4	21	2 1/4	6 1/2	7/8	1 25/32	1 17/32	2 1/4	2 17/32	2 1/2	1 3/4	1 1/4	3/4	-12	
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8		8 1/2	21													
note 5	3	3	2 1/4-12	2 3/4-12	3 1/2	1 3/8		8 1/2	21													
	4	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 3/8		8 1/2	21													
6	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	8 3/8	9 5/8	24 1/4	2 1/2	7 1/2	1	2 5/32	2 5/32	2 1/2	2 17/32	2 1/2	2	1 1/4	1	-16	
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4		9 5/8	24 1/4													
note 5	3	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4		9 5/8	24 1/4													
	1	3	2 1/4-12	3 1/4-12	3 1/2	1 1/4	9 1/2	10 3/4	28	3	8 1/2	1	2 17/32	2 17/32	3	3 1/32	3	2 1/2	1 1/2	1 1/4	-20	
7	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4		10 3/4	28													
	3	4	3-12	3 3/4-12	4	1 1/4		10 3/4	28													
note 5	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10 1/2	11 3/4	30 3/4	3 1/4	9 1/2	1	2 31/32	2 19/32	3 1/4	3 1/32	3	3	1 1/2	1 1/2	-24	
	2	4	3-12	3 3/4-12	4	1 1/4		11 3/4	30 3/4													
8	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4		11 3/4	30 3/4													

Notes:

1. All dimensions in inches.
2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
3. See Cylinder Nomenclature for thread options.
4. For Optional Rod Ends and dimensions see page18.
5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.



Model HCR
Common Rod

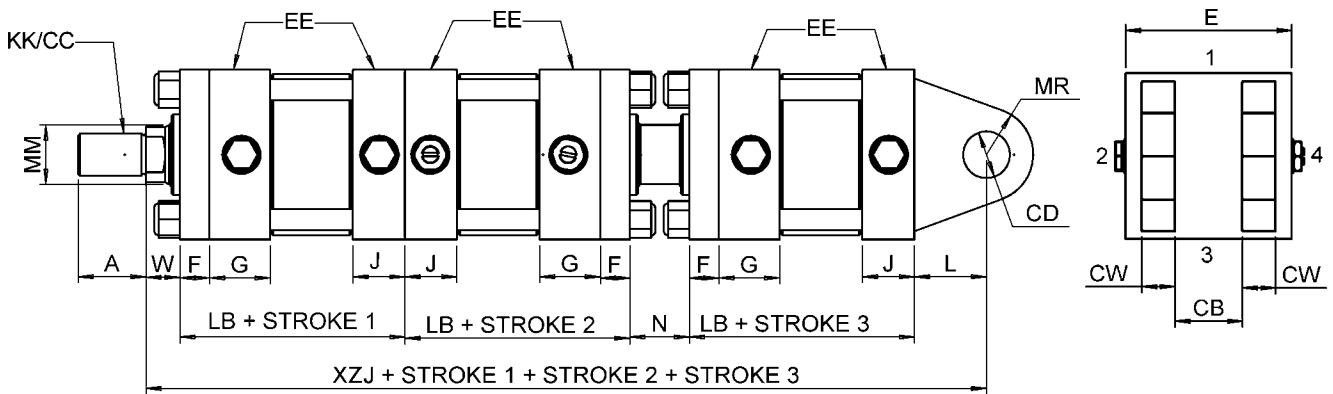


Model HCH
Common Head

BORE	ROD	ROD DIA		KK	CC	A	W	ADD	ADD STR1+	E	F	G	J	L	N	HC		EE		MR
		STROKE	STR2+STR3					CB	CD							CW	NPTF	SAE		
		MM						LB	XZJ											
1 1/2	1	5/8	7/16-20	1/2-20	3/4	5/8	5	17 5/8	2 1/2	3/8	1 9/16	1 5/16	3/4	1 1/4	25/32	1/2	1/2	1/2	-08	1/2
	2	1	3/4-16	7/8-14	1 1/8	1		18												
2	1	3/8	3/4-16	7/8-14	1 1/8	3/4	5 1/4	19 1/4	3	5/8	1 15/32	1 7/32	1 1/4	1 1/2	1 9/32	3/4	5/8	1/2	-08	3/4
	2	1 3/8	1-14	1 1/4-12	1 5/8	1		19 1/2												
note 5	2	1 3/8																		
	1	1	3/4-16	7/8-14	1 1/8	3/4	5 3/8	19 5/8	3 1/2	9/16	1 9/16	1 1/4	1 1/4	1 1/2	1 9/32	3/4	5/8	1/2	-08	3/4
2 1/2	2	3/8	1-14	1 1/4-12	1 5/8	1		19 7/8												
	3	1 3/4	1 1/4-12	1 1/2-12	2	1 1/4		20 1/8												
note 5	3	1 3/4																		
	1	1 3/8	1-14	1 1/4-12	1 5/8	7/8	6 1/4	22 7/8	4 1/2	3/4	1 25/32	1 17/32	1 1/2	1 3/4	1 17/32	1	3/4	3/4	-12	1
3 1/4	2	3/4	1 1/4-12	1 1/2-12	2	1 1/8		23 1/8												
	3	2	1 1/2-12	1 3/4-12	2 1/4	1 1/4		23 1/4												
note 5	3	2																		
	1	1 3/4	1 1/4-12	1 1/2-12	2	1	6 5/8	25	5	7/8	1 25/32	1 17/32	2 1/8	2	2 1/32	1 3/8	1	3/4	-12	1 3/8
4	2	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8		25 1/8												
	3	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8		25 3/8												
5	1	2	1 1/2-12	1 3/4-12	2 1/4	1 1/8	7 1/8	27	6 1/2	7/8	1 25/32	1 17/32	2 1/4	2 1/4	2 17/32	1 3/4	1 1/4	3/4	-12	1 3/4
	2	2 1/2	1 7/8-12	2 1/4-12	3	1 3/8		27 1/4												
6	3	3	2 1/4-12	2 3/4-12	3 1/2	1 3/8		27 1/4												
	4	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 3/8		27 1/4												
7	1	2 1/2	1 7/8-12	2 1/4-12	3	1 1/4	8 3/8	31 3/8	7 1/2	1	2 5/32	2 5/32	2 1/2	2 1/2	2 17/32	2	1 1/4	1	-16	2
	2	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4		31 3/8												
8	3	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4		31 3/8												
	1	3	2 1/4-12	2 3/4-12	3 1/2	1 1/4	9 1/2	35 3/4	8 1/2	1	2 17/32	2 17/32	3	3	3 1/32	2 1/2	1 1/2	1 1/4	-20	2 1/2
9	2	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4		35 3/4												
	3	4	3-12	3 3/4-12	4	1 1/4		35 3/4												
10	1	3 1/2	2 1/2-12	3 1/4-12	3 1/2	1 1/4	10 1/2	39 1/4	9 1/2	1	2 31/32	2 19/32	3 1/4	3 1/4	3 1/32	3	1 1/2	1 1/2	-24	2 3/4
	2	4	3-12	3 3/4-12	4	1 1/4		39 1/4												
11	3	4 1/2	3 1/4-12	4 1/4-12	4 1/2	1 1/4		39 1/4												
	4	1/2						39 1/4												

- Notes:**
1. All dimensions in inches.
 2. EE standard port is SAE contact our factory if SAE flange or Alternate port size is required.
 3. See Cylinder Nomenclature for thread options.
 4. For Optional Rod Ends and dimensions see page 18.
 5. Cushion 1 or 4, refer to cylinder nomenclature. When a cushion on the gland end is specified for rod #3 the gland end head is longer, but NFPA dimensions remain constant.

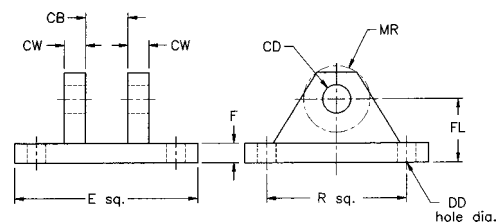
Model HCCHR
Common Head Common Rod



Clevis Type Mounting Bracket

Adapts to HE mount cylinder or HE rod eye

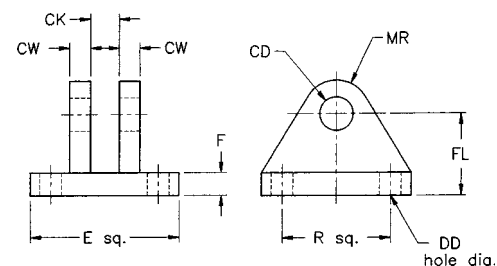
PART	HCM15	HCM2	HCM32	HCM4	HCM5	HCM6	HCM7	HCM8	HCM10	HCM12
CB	25/32	1 9/32	1 17/32	2 1/32	2 9/16	2 9/16	3 1/16	3 1/16	4 1/16	4 9/16
CD	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
CW	1/2	5/8	3/4	1	1 1/4	1 1/4	1 1/2	1 1/2	2	2
DD	13/32	17/32	21/32	21/32	15/16	1 1/16	1 3/16	1 5/16	1 13/16	2 1/16
E	3 1/2	5	6 1/2	7 1/2	9 1/2	12 3/4	12 3/4	12 3/4	15 1/2	17 1/2
F	1/2	5/8	3/4	7/8	7/8	1	1	1	1 11/16	1 15/16
FL	1 1/2	1 7/8	2 1/4	3	3 5/8	4 1/4	4 1/2	6	6 11/16	7 11/16
MR	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
R	2.55	3.82	4.95	5.73	7.50	9.40	9.40	9.40	12.00	13.75



Mounting Bracket for Self-Aligning Rod Eye

Adapts to HW mount cylinder, HWE and HRES rod eye

PART	HWM15	HWM2-D	HWM2*	HWM32	HWM4	HWM5	HWM6	HWM7	HWM8
CD	1/2	3/4	3/4	1	1 3/8	1 3/4	2	2 1/2	3
CK	15/32	11/16	11/16	29/32	1 7/32	1 19/32	1 13/16	2 1/4	2 23/32
CW	5/16	1/2	1/2	5/8	3/4	3/4	7/8	1 1/4	1 1/2
DD	13/32	17/32	1/2"-20	21/32	21/32	15/16	1 1/16	1 3/16	1 5/16
E	2 1/2	3 1/2	3 1/2	4 1/2	5	6 1/2	7 1/2	8 1/2	9 1/2
F	3/8	9/16	9/16	11/16	13/16	15/16	15/16	15/16	1
FL	1 1/2	2 1/16	2 1/16	2 7/16	3 1/16	3 15/16	4 3/16	4 11/16	5 1/4
MR	1/2	3/4	3/4	1	1 3/8	1 3/4	2	2 1/2	3
R	1.63	2.55	2.55	3.25	3.82	4.95	5.73	6.58	7.50



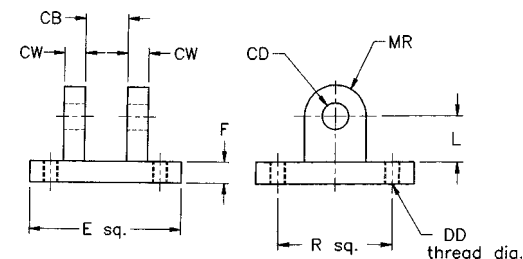
Notes:

- 1. For use with Socket Head Cap Screws only.
- * Tapped mounting holes this model only.

Detachable Clevis - MP2 Mount (NFPA)

Mounts on cylinder and adapts to HM eye-type mounting bracket

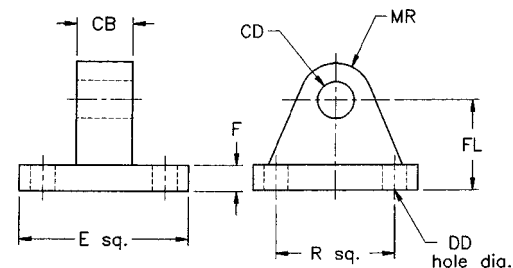
PART	HMP2-15T	HMP2-25T	HMP2-32T	HMP2-4T	HMP2-5T	HMP2-6T	HMP2-7T	HMP2-8T
CB	0.76	0.76	1.51	2.03	2.53	2.53	3.03	3.03
CD	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3
CW	1/2	5/8	3/4	1	1 1/4	1 1/4	1 1/2	1 1/2
DD	3/8-24	1/2-20	5/8-18	5/8-18	7/8-14	1-14	1 1/8-12	1 1/4-12
E	2 1/2	3 1/2	4 1/2	5	6 1/2	7 1/2	8 1/2	9 1/2
F	3/8	5/8	3/4	7/8	7/8	1	1	1
L	3/4	1 1/4	1 1/2	2 1/8	2 1/4	2 1/2	3	3 1/4
MR	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3
R	1.63	2.56	3.25	3.81	4.94	5.75	6.59	7.50



Eye Type Mounting Bracket

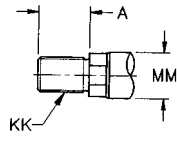
Adapts to HC mount cylinder or HC rod clevis

PART	HM15	HM25	HM32	HM4	HM5	HM6	HM7	HM8	HM10	HM12
CB	3/4	1 1/4	1 1/2	2	2 1/2	2 1/2	3	3	4	4 1/2
CD	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
DD	13/32	17/32	21/32	21/32	29/32	1 1/16	1 3/16	1 5/16	1 13/16	2 1/16
E	2 1/2	3 1/2	4 1/2	5	6 1/2	7 1/2	8 1/2	9 1/2	12 5/8	14 7/8
F	3/8	5/8	3/4	7/8	7/8	1	1	1	1 11/16	1 15/16
FL	1 1/8	1 7/8	2 1/4	3	3 1/8	3 1/2	4	4 1/4	5 11/16	6 7/16
MR	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
R	1.63	2.56	3.25	3.81	4.95	5.75	6.59	7.50	9.62	11.50

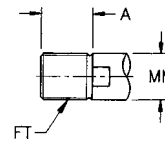


Rod End Styles

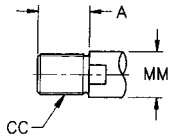
(See model dimension tables for dimension values)



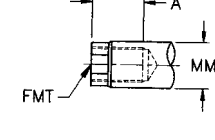
A
Standard Male Thread
NFFA Style SM



C
Full Thread
NFFA Style FM



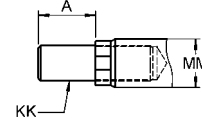
B
Oversize Male Thread
NFFA Style IM



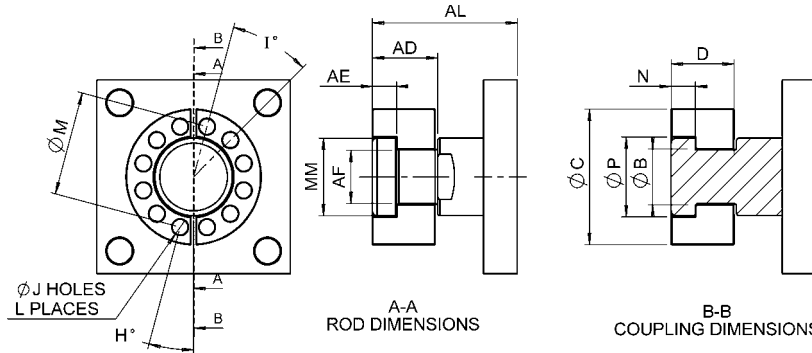
D
Female Thread
NFFA Style SF



E
No Thread



G
Rod Stud
NFFA Style SM

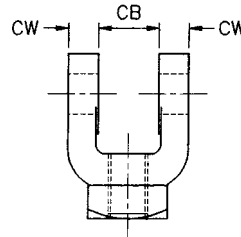
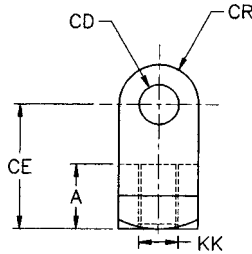


F
Rod End Coupler
Contact Our Factory for
Details

Rod Clevis

Adapts to male thread on piston rod

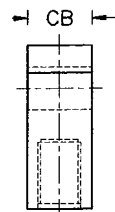
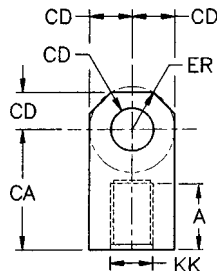
PART	HC15	HC15C	HC2	HC2C	HC32	HC4	HC5	HC5C	HC6	HC7	HC8	HC7C	HC10	HC10C	HC12C	HC12D
A	3/4	3/4	1 1/8	1 5/8	1 5/8	2	2 1/4	3	3	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	4	4 1/2
CB	0.781	0.781	1.281	1.531	1.531	2.031	2.563	2.563	2.563	3.063	3.063	3.063	4.063	4.063	4.531	4.531
CD	1/2	1/2	3/4	1	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	3 1/2	4	4
CE	1 1/2	1 1/2	2 3/8	3 1/8	3 1/8	4 1/8	4 1/2	5 1/2	5 1/2	6 1/2	6 3/4	6 3/4	7 3/4	7 3/4	8 1/2	9
CW	1/2	1/2	5/8	3/4	3/4	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2 1/4	2 1/4
CR	1/2	1/2	3/4	1	1	1 3/8	1 3/4	2	2	2 1/2	2 3/4	2 3/4	3 1/2	3 1/2	4	4
KK	7/16-20	1/2-20	3/4-16	7/8-14	1-14	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 1/2-12	2 3/4-12	3 1/4-12	3-12	3 3/4-12	4 1/4-12



Rod Eye

Adapts to HCM clevis-type mounting bracket

PART	HE15	HE15C	HE2	HE2C	HE32	HE4	HE5	HE5C	HE6	HE7	HE7C	HE8	HE10	HE12C	HE12D
A	3/4	3/4	1 1/8	1 1/8	1 5/8	2	2 1/4	2 1/4	3	3 1/2	3 5/8	3 1/2	4 1/2	4	4 1/2
CA	1/2	1/2	2 1/16	2 3/8	2 13/16	3 7/16	4	4 3/8	5	5 13/16	6 1/2	6 1/8	7 5/8	7 5/8	8 1/8
CB	3/4	3/4	1 1/4	1 1/2	1 1/2	2	2 1/2	2 1/2	2 1/2	3	3 1/2	3	4	4 1/2	5
CD	1/2	1/2	3/4	1	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4	4
ER	5/8	5/8	7/8	1 1/8	1 3/16	1 9/16	2	2 7/8	2 1/2	2 13/16	3 1/4	3 1/4	3 7/8	4	4
KK	7/16-20	1/2-20	3/4-16	7/8-14	1-14	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 3/4-12	2 1/2-12	3 1/4-12	3 3/4-12	4 1/4-12



Accessories for Rod End

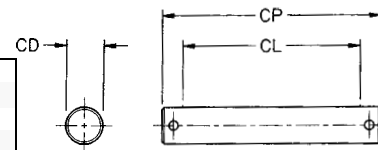
BORE	ROD DIA. MM	THREAD SIZE	ROD CLEVIS	LUG			ROD EYE	CLEVIS		SELF ALIGNING	
				MOUNTING BRACKET	PIVOT PIN	MOUNTING BRACKET		ROD EYE	MOUNTING BRACKET	PIVOT PIN	
1 1/2	5/8	7/16-20	HC15	HM15	P3	HE15	HCM15	HWE15	HWM15	HWP15	
			HC15C	HM15	P3	HE15C	HCM15	N/A	N/A	N/A	
3 1/4	2 1/2	2	HC2	HM25	P4	HE2	HCM2	HWE2	HWM2	HWP2	
			HC2C	HM32	P6	HE2C	HCM32	N/A	N/A	N/A	
			HC32	HM32	P6	HE32	HCM32	HWE32	HWM32	HWP32	
			HC4	HM4	HP4	HE4	HCM4	HWE4	HWM4	HWP4	
			HC4	HM4	HP4	HE4	HCM4	HWE4	HWM4	HWP4	
			HC5	HM5	P12	HE5	HCM5	HWE5	HWM5	HWP5	
6	5	4	HC5	HM5	P12	HE5	HCM5	HWE5	HWM5	HWP5	
			HC5C	HM6	HP6	HE5C	HCM6	N/A	N/A	N/A	
			HC6	HM6	HP6	HE6	HCM6	HWE6	HWM6	HWP6	
			HC7	HM7	HP7	HE7	HCM7	N/A	N/A	N/A	
			HC7C	HM8	HP8	HE7C	HCM8	N/A	N/A	N/A	
			HC8	HM8	HP8	HE8	HCM8	HWE8	HWM8	HWP8	
	7	4	HC10	HM10	HP10	HE10	HCM10	N/A	N/A	N/A	
			HC10C	HM10	HP10	HE10	HCM10	N/A	N/A	N/A	
			HC12C	HM12	HP12	HE12C	HCM12	N/A	N/A	N/A	
			HC10	HM10	HP10	HE10	HCM10	N/A	N/A	N/A	
			HC12D	HM12	HP12	HE12D	HCM12	N/A	N/A	N/A	
			HC12D	HM12	HP12	HE12D	HCM12	N/A	N/A	N/A	

Pivot Pin

Comes complete with cotter pins

Adapts to HC rod clevis or HCM clevis-type mounting bracket

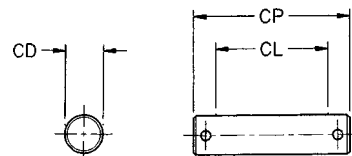
PART	P3	P4	P6	HP4	P12	HP6	HP5C	HP7	HP8	HP7C	HP10	HP12
CD	1/2	3/4	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4
CL	1 3/4	2 1/2	3 1/16	4	5	5 1/2	5 13/16	6 3/16	6	6 1/2	8	9
CP	2 5/16	3 1/8	3 19/32	4 13/16	6 1/8	6	6 3/8	7 1/4	7 1/4	7 5/8	9 1/4	10 1/4



Pivot Pin for Self-Aligning Rod Eye

Adapts to HWM mounting bracket. Comes complete with cotter pins

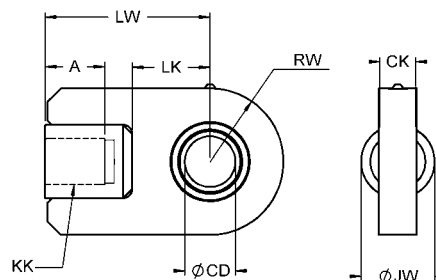
PART	HWP15	HWP2	HWP32	HWP4	HWP5	HWP6	HWP8
CD	1/2	3/4	1	1 3/8	1 3/4	2	3
CL	1 5/16	2	2 17/32	3 3/32	3 7/16	3 15/16	6 1/8
CP	1 7/8	2 9/16	3 3/16	3 3/4	4 3/16	4 11/16	7 1/4



Self-Aligning Rod Eye - Female

Adapts to male thread on piston rod

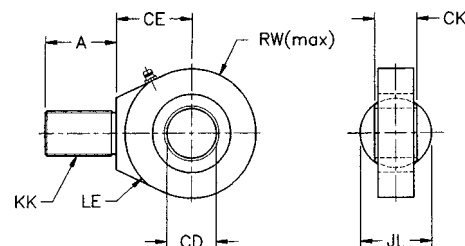
PART	HWE15	HWE2	HWE32	HWE4	HWE5	HWE6	HWE7	HWE8
A	3/4	1 1/8	1 5/8	2	2 1/4	3	3 1/2	3 1/2
CD	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3
CK	7/16	21/32	7/8	1 3/16	1 17/32	1 3/4	2 3/16	2 5/8
JW	3/4	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
KK	7/16-20	3/4-16	1-14	1 1/4-12	1 1/2-12	1 7/8-12	2 1/4-12	2 1/2-12
LW	1 3/4	2 3/4	3 5/8	4 1/2	5 5/8	6 3/4	7	7 1/8
RW	7/8	1 1/4	1 1/2	2	2 3/4	3	3 1/8	4
LK	5/8	1 1/4	1 5/8	2 1/8	2 5/8	3 1/2	3 1/8	3 1/4



Self-Aligning Rod Eye - Male

Adapts to female thread on piston rod

PART	HRES-1	HRES-2	HRES-3	HRES-4	HRES-5	HRES-6
A	11/16	1	1 1/2	2	2 1/8	2 7/8
CD	1/2	3/4	1	1 3/8	1 3/4	2
CE	7/8	1 1/4	1 7/8	2 1/8	2 1/2	2 3/4
CK	7/16	21/32	7/8	1 3/16	1 17/32	1 3/4
JL	7/8	1 5/16	1 1/2	2	2 1/4	2 3/4
KK	7/16-20	3/4-16	1-14	1 1/4-12	1 1/2-12	1 7/8-12
LE	3/4	1 1/16	1 7/16	1 7/8	2 1/8	2 1/2
RW	7/8	1 1/4	1 3/8	1 13/16	2 3/16	2 5/8



DESCRIPTION	BORE												
	5/8	1	1 1/2	2	2 1/2	3	3 1/4	3 1/2	4	4 1/2	5	5 1/2	
1 PISTON	1H2015H	1H2015H	1H2015H	1H2020H	1H2025H	1H2032	1H2032	1H2032	1H2032	1H2032	1H2032	1H2032	1H2040H
3' CUSHION SLEEVE	3H152	3H202	3H202	3H200	3H252	3H2503	3H250	3H252	3H250	3H252	3H250	3H252	3H402
4 ROD - MALE	4H1325-	4H134-	4H134-	4H234-	4H284-	4H285-	4H285-	4H285-	4H285-	4H285-	4H285-	4H285-	4H438-
4 ROD - FEMALE "HD" MODEL	26H1325-	26H134-	26H134-	26H234-	26H284-	26H285-	26H285-	26H285-	26H285-	26H285-	26H285-	26H285-	26H438-
4 ROD COMMON	44H1325-	44H134-	44H134-	44H234-	44H284-	44H285-	44H285-	44H285-	44H285-	44H285-	44H285-	44H285-	44H438-
4 ROD (CUSHIONED CBE)	4H1125-	4H114-	4H114-	4H204-	4H254-	4H255-	4H255-	4H255-	4H255-	4H255-	4H255-	4H255-	4H408-
5 BARREL (M-HONED STEEL)	5H015-	5H015-	5H015-	5H2020-	5H252-	5H255-	5H255-	5H255-	5H255-	5H255-	5H255-	5H255-	5H408-
5 BARREL HT2 TRUN. MOUNT	5H21015-	5H21015-	5H21015-	5H2020-	5H252-	5H255-	5H255-	5H255-	5H255-	5H255-	5H255-	5H255-	5H408-
6 GLAND BUSHING	6H1562H	6H1510H	6H1510H	6H210H	6H210H	6H213H	6H213H	6H213H	6H213H	6H213H	6H213H	6H213H	6H6025H
7 NEEDLE VALVE	2 N/A	N/A	N/A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H832-2A	7H850-3A
8 TIE ROD (EA) (STANDARD)	8H 156-	8H 156-	8H 156-	8H 208-	8H 258-	8H 258-	8H 258-	8H 258-	8H 258-	8H 258-	8H 258-	8H 258-	8H 4010-
9 PISTON SEAL INTERNAL	N/A	9A113	9A113	9A210	9A210	9A210	9A210	9A210	9A210	9A210	9A210	9A210	9A220
10 PISTON CUP	10H755-15	10H755-15	10H755-15	10H20H	10H25H	10H25H	10H25H	10H25H	10H25H	10H25H	10H25H	10H25H	10H40H
12 GLAND BUSHING SEAL	9H218	9H222	9H222	9H224	9H224	9H227	9H227	9H227	9H227	9H227	9H227	9H227	9H232
13 ROD SEAL	13H62H	13H10H	13H10H	13H10H	13H10H	13H13H	13H13H	13H13H	13H13H	13H13H	13H13H	13H13H	13H25H
14 ROD WIPER	14H62	14H10	14H10	14H10	14H10	14H13	14H13	14H13	14H13	14H13	14H13	14H13	14H25
16 NEEDLE VALVE SEAL	2 N/A	N/A	N/A	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A017
17 LOCK NUT - TIE ROD	19A006	19A006	19A006	19A008	19A008	19A008	19A008	19A008	19A008	19A008	19A008	19A008	19A010
19 LOCK NUT - PISTON	19A007	19H008	19H008	19A010	19A010	19A010	19A010	19A010	19A010	19A010	19A010	19A010	19H020
21 BARREL SEAL	9H218	9H218	9H218	9H224	9H224	9H228	9H228	9H228	9H228	9H228	9H228	9H228	9H240
22 HEAD BLIND END (SEE BELOW)	H_15B	H_15B	H_15B	H_2B	H_2B	H_25B	H_25B	H_25B	H_25B	H_25B	H_25B	H_25B	H_4B
23 HEAD GLAND END (SEE BELOW)	H_15G62SP08	H_15G10SP08	H_15G10SP08	H_2G10SP08	H_2G10SP08	H_25G13SP08	H_25G13SP08	H_25G13SP08	H_25G13SP08	H_25G13SP08	H_25G13SP08	H_25G13SP08	H_4G25SP12
24 TRUNNION	HT1.5	HT1.5	HT1.5	HT2	HT2.5	HT2.5	HT2.5	HT2.5	HT2.5	HT2.5	HT2.5	HT2.5	HT4
24 TRUNNION (HT2)	H2T1.5	H2T1.5	H2T1.5	H2T2	H2T2.5	H2T2.5	H2T2.5	H2T2.5	H2T2.5	H2T2.5	H2T2.5	H2T2.5	H2T4
33 CHECK BALL	2 N/A	N/A	N/A	33H18	33H18	33H18	33H18	33H18	33H18	33H18	33H18	33H18	33A32
35 CHECK PLUG	2 N/A	N/A	N/A	35H20-1	35H20-1	35H20-1	35H20-1	35H20-1	35H20-1	35H20-1	35H20-1	35H20-1	35H500-1
36 CHECK VALVE SEAL	2 N/A	N/A	N/A	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A013	9A017
37 NEEDLE VALVE HOUSING	2 N/A	N/A	N/A	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H832-2B	7H850-3B
37A NEEDLE VALVE HOUSING SEAL	2 N/A	N/A	N/A	9A008	9A008	9A008	9A008	9A008	9A008	9A008	9A008	9A008	9A007
38 FRONT PLATE	FP1562	FP1510	FP1510	FP2010	FP2010	FP2513	FP2513	FP2513	FP2513	FP2513	FP2513	FP2513	FP4020
40 PISTON WEAR STRIP	40H1525	40H1525	40H1525	40H2037	40H2037	40H323	40H323	40H323	40H323	40H323	40H323	40H323	40H405
41 SEAL KIT	KH1562H	KH1510H	KH1510H	KH2013H	KH2013H	KH2513H	KH2513H	KH2513H	KH2513H	KH2513H	KH2513H	KH2513H	KH4020H
42 SEAL KIT UNIVERSAL	KH1562U	KH1510U	KH1510U	KH2013U	KH2013U	KH2513U	KH2513U	KH2513U	KH2513U	KH2513U	KH2513U	KH2513U	KH4020U

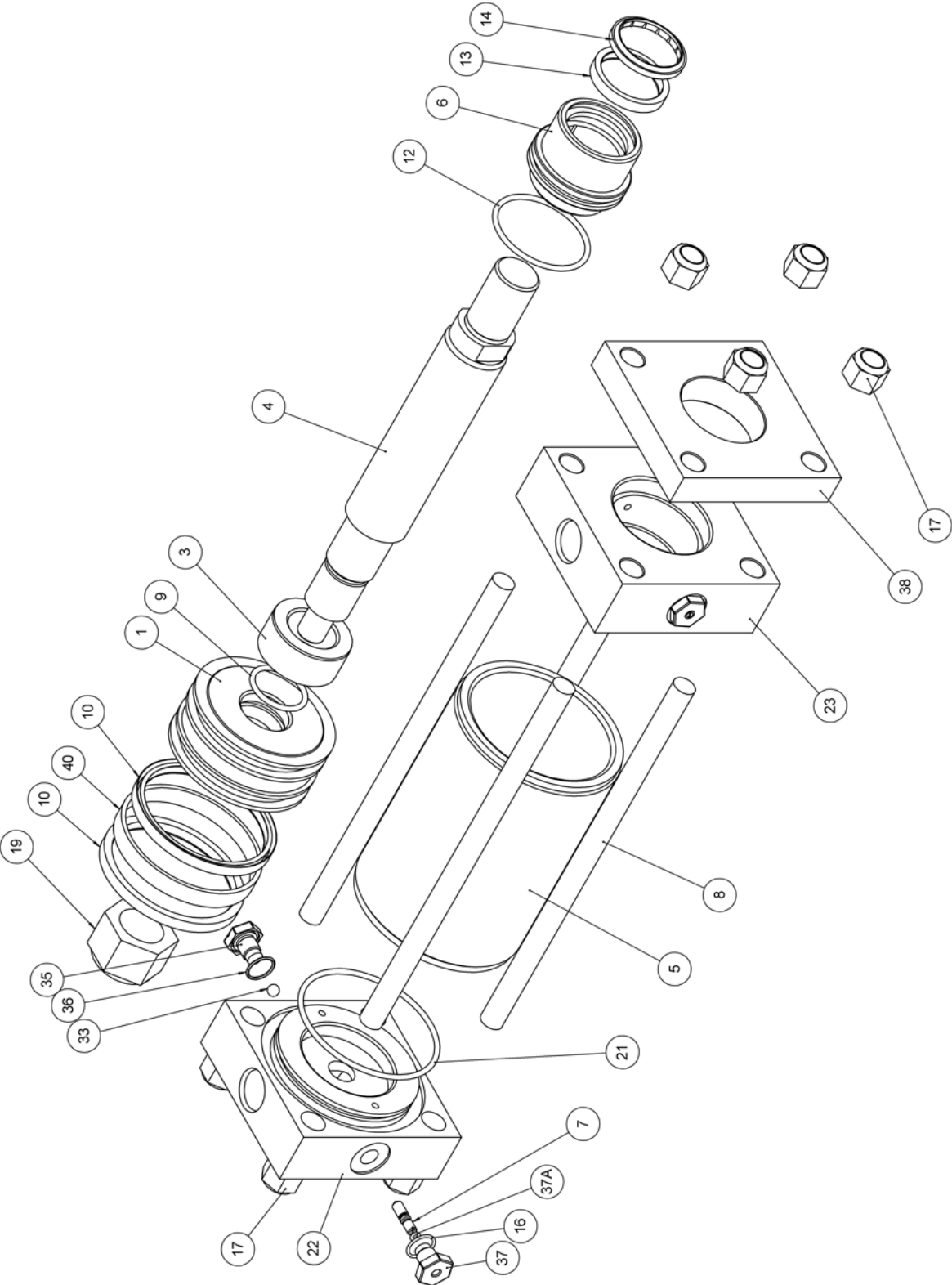
MOUNTING STYLE	GLAND HEAD	BLIND HEAD	BORE	CODE	ROD DIA.	CODE
B	C	R	1 1/2	15	5/8	62
BS	C	R	2	2	1	10
C	C	R	2 1/2	25	1 3/8	13
D	C	n/a	3 1/4	32	1 3/4	17
E	C	E	4	4	2	20
F	F	F	5	5	2 1/2	25
G	G	R	6	6	3	30
H	C	H	7	7	3 1/2	35
MP	C	R	8	8	4	40
NA	C	R			4 1/2	45
NB	C	R				
NC	C	R				
NM	C	R				
R	C	R				
RS	C	R				
S	ST	ST				
T	C	R				
TB	C	T				
TR	T	R				
W	C	W				

NOTES:
 A part no. having an underscore indicates a model letter code is required. See tables below.
 Part numbers terminating in a dash must have the stroke value added immediately afterward.
 * Blind end cushion on 1-1/2" bore cylinder is a cushion nut-spear. Part #3H152B (Rod #1), 3H150B (Rod #2) (Self regulating - no needle valve)
 ** 2", 2 1/2" and 3 1/4" Bore Cushioned Rod end require (1) std barrel seal and (1) other seal see item #21.
The following models have unique components - contact factory for parts list:
 4" and 5" bore HS (Side-tapped) model.
 All bores HTR (Rod End Trunnion) model.
 2", 2 1/2" and 3 1/4" bores that use the largest rod size and are cushioned on the gland end.

HEAD PART NUMBER STRUCTURE:
 1) Use "H" for Series - H
 2) Use table (to right) to select head mounting style.
 3) BORE eg 3-1/4" bore use 32, 4" bore use 4.
 4) LOCATION; B=Blind G=Gland or Rod end.
 5) Rod Size (Gland end only) 1" = 10, 1-3/4 = 17 etc.
 6) CUSHIONED = "C"; NONCUSHIONED = BLANK
 7) PORT SIZE; SAE-08 = SP08, SAE-12 = SP12
 SAE-12 Code 61 = SF12 etc.
 eg. Oyl. Model "HRS", 3-1/4" Bore, Cushioned
 Gland end head "HC32G13CSP12" Blind end head "HR32CSP12"

SEE PAGE FOLLOWING PARTS DRAWING FOR 5" BORE THROUGH 8" BORE PARTS AND TIE-ROD PART NUMBER STRUCTURE.

H-Series Parts Drawing



H-SERIES PARTS LIST - 5" BORE TO 8" BORE																			
DESCRIPTION	QTY	5					6			7			8						
		2	2 1/2	3	3 1/2	3 1/2	2 1/2	3	3 1/2	3	3 1/2	4	4	4 1/2					
1 PISTON	1	1H205				1H206						1H207							
3 CUSHION SLEEVE	1	3H502	3H503	3H501	3H500	3H602	3H603	3H600	3H702	3H702	3H802	3H803	3H802	3H803	3H802	3H803	3H802	3H803	3H800
4 ROD - FEMALE "HD" MODEL	1	4H538-	4H5310-	4H5312-	4H5314-	4H6310-	4H6312-	4H6314-	4H7312-	4H7312-	4H7314-	4H7316-	4H7312-	4H7316-	4H8314-	4H8316-	4H8316-	4H8318-	4H8318-
4 ROD - MALE "HD" MODEL	1	26H538-	26H5310-	26H5312-	26H5314-	26H6310-	26H6312-	26H6314-	26H7312-	26H7312-	26H7314-	26H7316-	26H7312-	26H7316-	26H8314-	26H8316-	26H8316-	26H8318-	26H8318-
4 ROD COMMON	1	44H538-	44H5310-	44H5312-	44H5314-	44H6310-	44H6312-	44H6314-	44H7312-	44H7312-	44H7314-	44H7316-	44H7312-	44H7316-	44H8314-	44H8316-	44H8316-	44H8318-	44H8318-
4 ROD (CUSHIONED CBE)	1	4H508-	4H5010-	4H5012-	4H5014-	4H6010-	4H6012-	4H6014-	4H7012-	4H7012-	4H7014-	4H7016-	4H7012-	4H7016-	4H8014-	4H8016-	4H8016-	4H8018-	4H8018-
5 BARREL (M-HONED STEEL)	1	5H050-				5H060-					5H070-					5H080-			
6 BARREL (M-HONED STEEL)	2	5H2T050-				5H2T060-					5H2T070-					5H2T080-			
6 GLAND BUSHING	1	6H5020H	6H5025H	6H5030H	6H5035H	6H6025H	6H6030H	6H6035H	6H7030H	6H7030H	6H7035H	6H7040H	6H7030H	6H7040H	6H8035H	6H8040H	6H8040H	6H8045H	6H8045H
7 NEEDLE VALVE	2	7H850-3A				7H850-3A					7H850-3A				7H850-3A				
8 TIE ROD (EA) (STANDARD)	4	8H_5014-				8H_5016-					8H_7018-				8H_8020-				
9 PISTON SEAL INTERNAL	1	9A017	9A017	9A017	9A017	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223	9A223
10 PISTON CUP	2	10H50H				10H60H					10H70H				10H80H				
12 GLAND BUSHING SEAL	1	9H232	9H236	9H242	9H245	9H238	9H242	9H245	9H242	9H242	9H246	9H252	9H242	9H252	9H248	9H252	9H252	9H256	9H256
13 ROD SEAL	1	13H20H	13H25H	13H30H	13H35H	13H25H	13H30H	13H35H	13H25H	13H25H	13H30H	13H40H	13H30H	13H40H	13H35H	13H40H	13H40H	13H45H	13H45H
14 ROD WIPER	1	14H20	14H25	14H30	14H35	14H25	14H30	14H35	14H25	14H25	14H30	14H40	14H30	14H40	14H35	14H40	14H40	14H45	14H45
16 NEEDLE VALVE SEAL	2	16A017				16A017					16A017				16A017				
17 LOCK NUT - TIE ROD	4,8	17A014				17A014					17A018				17A020				
19 LOCK NUT - PISTON	1	19A024				19A024					19A036				19A036				
21 BARREL SEAL	2	21H248				21H248					21H261				21H265				
22 HEAD BLIND END (SEE BELOW)	1	H_5BSP12				H_5BSP12					H_7BSP20				H_8BSP24				
23 HEAD GLAND END (SEE BELOW)	1	H_5G20SP12 H_5G25SP12 H_5G30SP12 H_5G35SP12				H_6G25SP16 H_6G30SP16 H_6G35SP16					H_7G25SP20 H_7G30SP20 H_7G35SP20				H_8C45SP24 H_8C45SP24 H_8C45SP24				
24 TRUNNION	1	H15				H16					H17				H18				
24 TRUNNION (H2T)	1	H2T5				H2T6					N/A				N/A				
33 CHECK BALL	2	33A32				33A32					33A32				33A32				
35 CHECK PLUG	2	35H500-1				35H500-1					35H500-1				35H500-1				
36 CHECK VALVE SEAL	2	36A017				36A017					36A017				36A017				
37 NEEDLE VALVE HOUSING	2	37H850-3B				37H850-3B					37H850-3B				37H850-3B				
37A NEEDLE VALVE HOUSING SEAL	2	37A007				37A007					37A007				37A007				
38 FRONT PLATE	1	FF5020	FF5025	FF5030	FF5035	FF6025	FF6030	FF6035	FF7030	FF7030	FF7035	FF7040	FF7030	FF7040	FF8035	FF8040	FF8040	FF8045	FF8045
40 PISTON WEAR STRIP	1	40H507				40H507					40H7010				40H8010				
41 SEAL KIT	1	KH5020H	KH5025H	KH5030H	KH5035H	KH6025H	KH6030H	KH6035H	KH7030H	KH7030H	KH7035H	KH7040H	KH7030H	KH7040H	KH8035H	KH8040H	KH8040H	KH8045H	KH8045H
42 SEAL KIT UNIVERSAL	1	KH6020U	KH6025U	KH6030U	KH6035U	KH6025U	KH6030U	KH6035U	KH7030U	KH7030U	KH7035U	KH7040U	KH7030U	KH7040U	KH8035U	KH8040U	KH8040U	KH8045U	KH8045U

TIE ROD PART NUMBER STRUCTURE:

- 1) SERIES - "8H"
- 2) Use table to select mounting style.
- 3) ADD BORE CODE IN SPACE PROVIDED.
- 4) - STROKE
- 5) -X1 (only for mounting style 'T').

eg. Cyl. Model "HRS", 3-1/4" Bore, 12" Stroke
Tie Rod Part Number 8HR3210-12

BORE	CODE
1 1/2	1506
2	208
2 1/2	258
3 1/4	3210
4	4010
5	5014
6	6016
7	7018
8	8020

MOUNTING STYLE	TIE ROD PART NUMBERS
C,E,W,MP,H	8HC(BORE CODE)-STROKE
D	8HD(BORE CODE)-STROKE
NM, HT, F, S	8HF(BORE CODE)-STROKE
NA	8HA(BORE CODE)-STROKE
NB,NC	8HB(BORE CODE)-STROKE
R,RS,B,BS	8HR(BORE CODE)-STROKE
G	8HG(BORE CODE)-STROKE
TR	8HTR(BORE CODE)-STROKE
TB	8HT(BORE CODE)-STROKE
T (Rod size 1)	8HTA(BORE CODE)-STROKE-X1
T (Rod size 2)	8HTB(BORE CODE)-STROKE-X1
T (Rod size 3)	8HTC(BORE CODE)-STROKE-X1
T (Rod size 4)	8HTD(BORE CODE)-STROKE-X1



Warning

These products are intended for industrial use only. Do not use these products in applications where the pressure and temperature exceeds the values listed below.

Through misuse, age or malfunction, components used in fluid power systems can fail. A designer utilizing these products must consider all modes of failure when designing machines and provide safeguards or warn the end user of possible modes of failure.

Cylinder Pressure and Temperature Ratings

H-Series cylinders are rated to 3000 psig hydraulic pressure for normal use, and 5000 psi for non-shock applications. Some mounting styles are downrated, see model pages for operating pressures.

Temperature ratings for cylinders are limited to the maximum published temperature range of the least resistant seal component. In most cases that would be the standard Buna-N O-ring seals. Buna-N temperature ratings: -30°F to 200°F (-34°C to 93°C). For higher temperatures specify a "V" in the Options box of the Cylinder Nomenclature.

Published Design Data

Westcoast Cylinders Inc. reserves the right to change specifications and other information included in this catalogue without notice. All information, data and dimension tables in this catalogue have been carefully compiled and thoroughly checked. However, no responsibility for possible errors or omissions can be assumed.

Warranty

Westcoast Cylinders Inc. warrants the material and workmanship of our cylinders for one full year when used under normal conditions, subject to factory inspection. WCI will repair or replace, at no cost, defective parts or cylinders. WCI will not assume expenses incurred in the field, pertaining to such repairs or replacements, except upon written authority. For a complete statement of terms and warranty contact Westcoast Cylinders Inc.

TIE-ROD LOCKNUT TORQUE			PISTON LOCKNUT TORQUE		
BORE	TIE ROD	TORQUE (FT-LBS)	BORE	SIZE	TORQUE (FT-LBS)
1 1/2	3/8-24	25	1 1/2	3/4-16	150
2	1/2-20	55	2	3/4-16	150
2 1/2	1/2-20	60	2 1/2	3/4-16	150
3 1/4	5/8-18	100	3 1/4	1-14	700
4	5/8-18	150	4	1 1/4-12	850
5	7/8-14	320	5	1 1/2-12	1500
6	1-14	450	6	1 3/4-12	1500
7	1 1/8-12	600	7	2 1/4-12	3500
8	1 1/4-12	850	8	2 1/4-12	3500

Values based on lubricated threads

CYLINDER DEVELOPED FORCE

BORE in	ROD DIA in	Work Major Area (in ²)	Work Minor Area (in ²)	Developed Force (lb) @ Differential Pressure															
				500		750		1000		1500		2000		2500		3000			
				push	pull	push	pull	push	pull	push	pull	push	pull	push	pull	push	pull		
1 1/2	5/8	1.77	1.46	884	730	1325	1095	1767	1460	2651	2191	3534	2921	4418	3651	5301	4381		
	1	1.77	0.98	884	491	1325	736	1767	982	2651	1473	3534	1963	4418	2454	5301	2945		
2	1 3/8	3.14	2.36	1571	1178	2356	1767	3142	2356	4712	3534	6283	4712	7854	5890	9425	7069		
	1	3.14	1.66	1571	828	2356	1243	3142	1657	4712	2485	6283	3313	7854	4142	9425	4970		
2 1/2	1 3/8	4.91	4.12	2454	2062	3682	3093	4909	4123	7363	6185	9817	8247	12272	10308	14726	12370		
	1 3/4	4.91	3.42	2454	1712	3682	2568	4909	3424	7363	5136	9817	6848	12272	8560	14726	10272		
3 1/4	1 3/4	8.30	6.81	4148	3405	6222	5108	8296	6811	12444	10216	16592	13622	20739	17027	24887	20433		
	1 3/4	8.30	5.89	4148	2945	6222	4418	8296	5890	12444	8836	16592	11781	20739	14726	24887	17671		
4	2	8.30	5.15	4148	2577	6222	3866	8296	5154	12444	7731	16592	10308	20739	12885	24887	15463		
	1 3/4	12.57	10.16	6283	5081	9425	7621	12566	10161	18850	15242	25133	20322	31416	25403	37699	30483		
5	2 1/2	12.57	9.42	6283	4712	9425	7069	12566	9425	18850	14137	25133	18850	31416	23562	37699	28274		
	2 1/2	12.57	7.66	6283	3829	9425	5743	12566	7658	18850	11486	25133	15315	31416	19144	37699	22973		
6	3	19.63	16.49	9817	8247	14726	12370	19635	16493	29452	24740	39270	32987	49087	41233	58905	49480		
	2 1/2	19.63	14.73	9817	7363	14726	11045	19635	14726	29452	22089	39270	29452	49087	36816	58905	44179		
7	3 1/2	19.63	12.57	9817	6283	14726	9425	19635	12566	29452	18850	39270	25133	49087	31416	58905	37699		
	3 1/2	19.63	10.01	9817	5007	14726	7510	19635	10014	29452	15021	39270	20028	49087	25035	58905	30041		
8	4	28.27	23.37	14137	11683	21206	17524	28274	23366	42412	35048	56549	46731	70686	58414	84823	70097		
	3 1/2	28.27	21.21	14137	10603	21206	15904	28274	21206	42412	31809	56549	42412	70686	53014	84823	63617		
9	4 1/2	28.27	18.65	14137	9327	21206	13990	28274	18653	42412	27980	56549	37306	70686	46633	84823	55960		
	4	38.48	31.42	19242	15708	28863	23562	38485	31416	57727	47124	76969	62832	96211	78540	115454	94248		
10	5	38.48	28.86	19242	14432	28863	21648	38485	28863	57727	43295	76969	57727	96211	72158	115454	86590		
	4	38.48	25.92	19242	12959	28863	19439	38485	25918	57727	38877	76969	51836	96211	64795	115454	77754		
11	5 1/2	50.27	40.64	25133	20322	37699	30483	50265	40644	75398	60967	100531	81289	125664	101611	150796	121933		
	5 1/2	50.27	37.70	25133	18850	37699	28274	50265	37699	75398	56549	100531	75398	125664	94248	150796	113097		
12	6	50.27	34.36	25133	17181	37699	25771	50265	34361	75398	51542	100531	68722	125664	85903	150796	103084		

CYLINDER SIZING

- A cylinder must generate sufficient force to accelerate a load and overcome friction losses.
- System pressure losses must also be considered.
- The cylinder developed force table does not take into account friction, pressure losses or acceleration force.



**PISTON ROD MAX. LENGTH L_e (in.)
@ ROD DIAMETER (in.)**

AXIAL FORCE (lbs)	5/8	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4	4 1/2
100	64	165	310							
200	45	115	220							
300	37	95	180	300						
400	32	82	160	260						
600	26	67	130	210	280					
800	23	58	110	180	240					
1000	20	52	100	160	210					
1200	19	48	90	148	195	300				
1400	17	44	84	137	180	280				
1600	16	41	78	128	170	260				
1800	15	39	74	120	160	250				
2000	14	37	70	115	150	240				
2500	13	33	63	102	135	210	300			
3000	11	30	58	92	120	190	270			
4000	6	26	50	80	105	170	240			
5000	4	23	44	72	96	150	280	290		
6000		21	40	66	88	130	190	260		
8000		17	35	56	76	115	170	225	290	
10000		12	31	51	68	100	150	200	260	
12000			29	46	62	94	137	185	230	300
16000			22	40	54	82	120	160	210	260
20000			13	35	46	72	105	142	190	235
24000				31	43	66	96	130	170	215
30000				20	37	60	86	117	150	190
34000				10	32	56	82	110	145	180
40000					23	50	76	100	132	170
50000						42	66	90	120	150
60000						31	62	82	110	138
80000							46	71	94	120
100000							23	59	80	107
120000								43	70	96
140000								20	60	86
160000									50	78

ROD SIZE SELECTION

To ensure adequate column strength of the piston rod, the rod diameter should be selected as follows:

- 1) Using the mounting style table below, find the length **L** and the effective length factor **K** by referencing the appropriate mounting style and rod end connection.
- 2) Calculate the rod effective length L_e where:
 $L_e = L \times K$
If L_e is greater than 40 inches, refer to the piston stop section below.
- 3) From the Cylinder Developed Force Table, determine the maximum force available at system operating pressure.
- 4) Using the Rod Size Table, find the axial force value which is equal to or greater than the cylinder developed force. Read horizontally across the table to the piston rod maximum length L_e . Read the rod diameter from the indicated column. If the rod size is not available for the cylinder bore size, always choose the the next larger size.

PISTON STOP

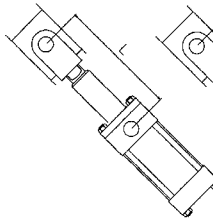
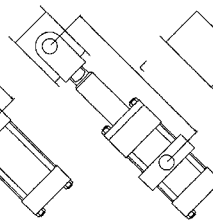
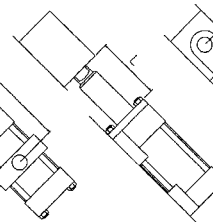
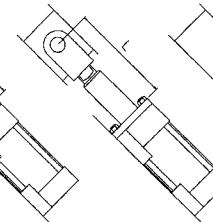
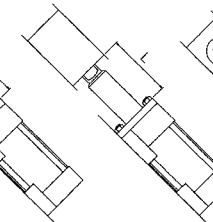
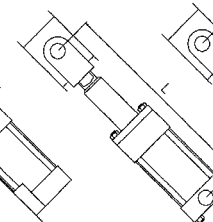
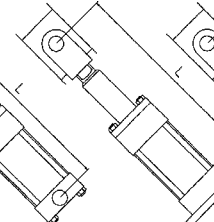
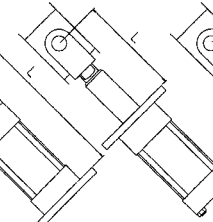
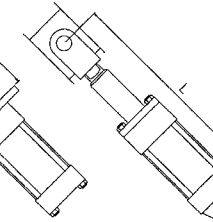
A piston stop may be required on long push stroke cylinders in order to prevent the following:

- excessive wear on the gland bushing and piston
- piston rod buckling
- cylinder jack-knifing

If the effective length L_e exceeds 40 inches, then add 1 inch of piston stop for every 10 inches of stroke in excess of 40 inches.

Note: When adding a piston stop the effective stroke is reduced by the piston stop length. If stroke length must be maintained increase the stroke as required.

MOUNTING STYLE (shown with rod extended)

Pinned & rigidly guided	Pinned & rigidly guided	Supported	Pinned & rigidly guided	Fixed & rigidly guided	Pinned & rigidly guided	Pinned & rigidly guided	Pinned & rigidly guided	Pinned & rigidly guided
								
K values	1	1	2	1	.5	1	1	1
Effective Length Factor (K)								

SPECIFYING AN "X" IN ANY FIELD REQUIRES DETAILS IN THE CUSTOM FEATURES BOX.

H	SERIES	BORE	STYLE	STROKE	ROD MATERIAL	ROD SIZE	THREAD	CUSHIONS	BARREL	PORT LOC'N	PORT SIZE	OPTIONS	CUSTOM
EXAMPLE	H	1 1/2"	32	C	12.188	C	1	A	1	A	A		

CUSTOM FEATURES:

NUMBER ASSIGNED BY WESTCOAST CYLINDERS

OPTIONS	CUSTOM
A THREAD LENGTH	X
D ROD SCRAPER (BRASS)	
-F FLUSH CYLINDER	
PS PISTON STOP	
R CAST IRON PISTON RINGS	
V HIGH TEMPERATURE SEALS	
W ROD EXTENSION "W" LENGTH	

O-RING BOSS (ORB) PORT

PORT SIZE	PORT LOC'N
A OVERSIZE PORT	1
B NPT PORT	2
C TRANSITION MANIFOLD	3
D SAE CODE 61 FLANGE	4
E SPECIFY	X

- BLIND END RECTANGULAR FLANGE (MF2)
- BLIND END SQUARE FLANGE (MF6)
- BLIND END CLEVIS (MP1)
- COMMON HEAD
- COMMON ROD
- DOUBLE ROD (MD)
- PIVOT EYE (MP3)
- FOOT MOUNT (MS2)
- RECTANGULAR FRONT FLANGE HEAD (ME5)
- RECTANGULAR REAR FLANGE HEAD (ME6)
- MID TRUNNION (REDUCED PRESSURE RATING)
- DETACHABLE CLEVIS (MP2)
- NO MOUNT EXTENDED THE RODS (MX1)
- NO MOUNT EXTENDED THE RODS BLIND END (MX2)
- NO MOUNT EXTENDED THE RODS ROD END (MX3)
- NO MOUNT (MX0)
- ROD END RECTANGULAR FLANGE (MF1)
- ROD END SQUARE FLANGE (MF5)
- SIDETAPPED (MS4)
- MID TRUNNION (MT4)
- MID TRUNNION (MT2)
- ROD END TRUNNION (MT1)
- SELF-ALIGNING EYE (MP3)

STYLE	STROKE	ROD MATERIAL	ROD SIZE	THREAD	CUSHIONS	BARREL	MICRO-HONED STEEL	PORT LOC'N	PORT SIZE
B		A	1	A	1	A	1	A	A
BS		C	2	B	2	X	2	B	B
C		E	3	C	3		3	C	C
CH		F	4	D	4		4	D	D
OR		X		E				E	E
D				F					R
E				G					V
F				H					W
G				I					X
H				J					
HT				K					
MP				L					
NA				M					
NB				N					
NC				O					
NM				P					
R				Q					
RS				R					
S				S					
T				T					
TB				U					
TR				V					
W				Y					

CHROME PLATED STEEL
 CHROME PLATED STAINLESS STEEL
 INDUCTION HARDENED CHROME PLATED

NITRO-TEC TREATED
 INCHES
 ROD MATERIAL
 ROD #1
 ROD #2
 ROD #3
 ROD #4
 (WHERE APPLICABLE) ROD #4

CUSHIONS
 1 BOTH ENDS
 2 NON CUSHIONED (STANDARD)
 3 BLIND END ONLY
 4 ROD END ONLY
 SPECIFY

BARREL
 A SPECIFY

MICRO-HONED STEEL
 1 POS #1 (STANDARD)
 2 POS #2
 3 POS #3
 4 POS #4
 SPECIFY

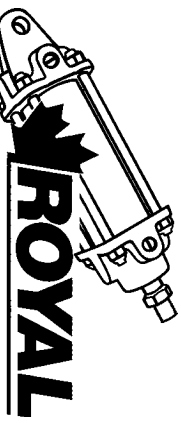
PORT LOC'N
 1
 2
 3
 4
 SPECIFY

PORT SIZE
 A
 B
 C
 D
 E
 SPECIFY

O-RING BOSS (ORB) PORT
 A
 B
 C
 D
 E
 SPECIFY

STANDARD THREAD KK
 A
 B
 C
 D
 E
 F
 G
 H
 I
 J
 K
 L
 M
 N
 O
 P
 Q
 R
 S
 SPECIFY

EXAMPLE "H32C12.188C1A1A1A"



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An "X" in any field requires an explanation in special notes.
 Consult factory for options not shown.