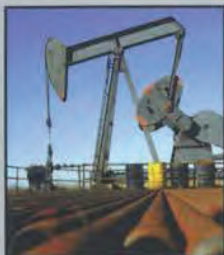


LINDBERG

FLUID POWER



SERVING A WIDE VARIETY
OF INDUSTRIES WITH HIGH
QUALITY CYLINDER PRODUCTS
FOR OVER 50 YEARS.

- Mill Type Air Cylinders
- Mill Type Hydraulic Cylinders
- Tie Rod Style Air & Hydraulic Cylinders
- NFPA Air & Hydraulic Cylinders
- Rotary Actuators
- Custom Applications



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WARRANTY STATEMENT

Lindberg Fluid Power's products are warranted for one (1) year to be free from defects in workmanship and material. Lindberg Fluid Power will replace, free of charge including lowest transportation costs, but not including installation or any other charges, any part that Lindberg Fluid Power's inspection shows to be defective. All defective parts must be returned to Lindberg Fluid Power's facility within guarantee period after shipment by Lindberg Fluid Power. Written permission for such return must first be obtained.

A complete explanation is required of the defects and circumstances. This warranty applies only if goods fail to function properly under correct use, normal operating conditions, and proper application because of defects in material or workmanship, and if Lindberg Fluid Power is notified promptly in writing of such failure. If goods are in accordance or in reference to an engineering drawing specified by or furnished to the customer, these specifications and information shall be applicable in determining such correct use, operations and application.

LINDBERG FLUID POWER MAKES NO WARRANTY THAT THE GOODS ARE DELIVERED FREE OF THE RIGHTFUL CLAIM OF ANY THIRD PERSON BY WAY OF INFRINGEMENT OR THE LIKE. THERE ARE NO WARRANTIES OF MERCHANTABILITY, JOB FITNESS FOR A PARTICULAR PURPOSE NOT WITHSTANDING ANY DISCLOSURE TO LINDBERG FLUID POWER OF THE USE TO WHICH THE PRODUCT IS TO BE PUT. Lindberg Fluid Power shall never be liable for any consequential or incidental damages. The sale of Lindberg Fluid Power products under any other representation, warranty or guarantee, express or implied is not authorized by Lindberg Fluid Power.

Design specifications are subject to change without notice.

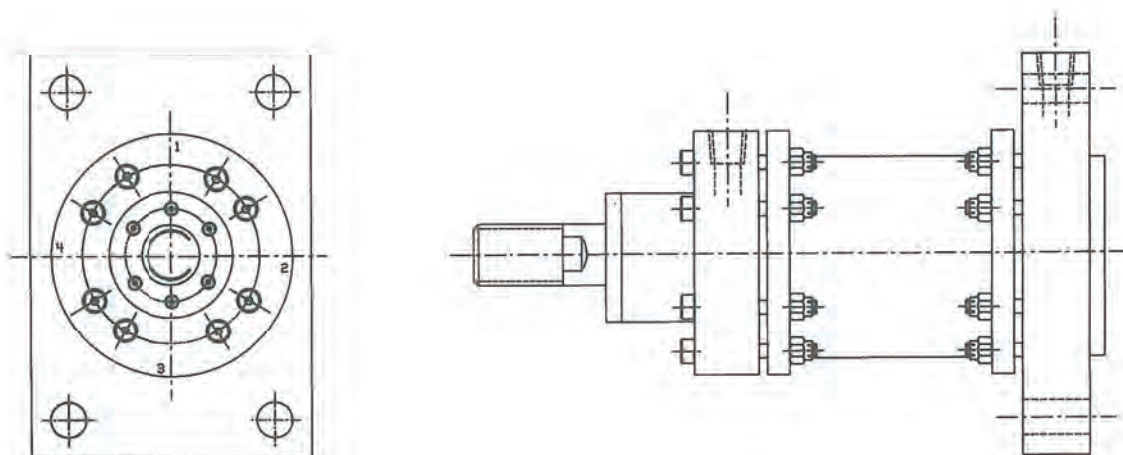


Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS
200 psi

SERIES BHMA-105

Heavy Duty Mill-Type Air Cylinders

200 PSI - a welded flange construction cylinder with many special features to suit your needs.



- Wide range of standard bore sizes from 2" to 16".
- Seven different mounting styles to choose from.
- Many accessories and options are available (see pp. 11-12).

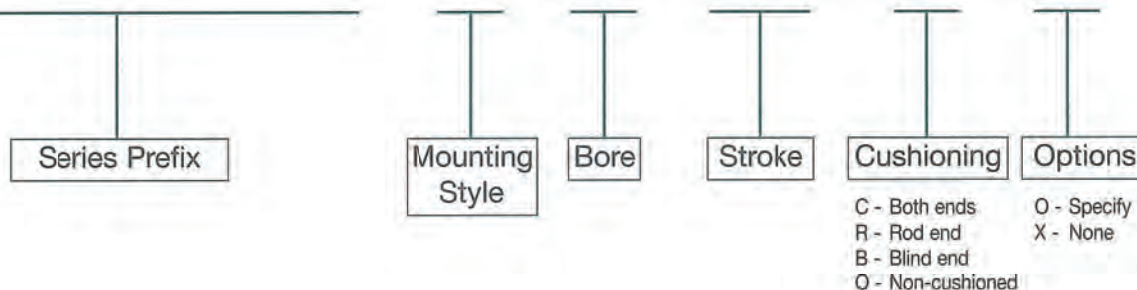
Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS
200 psi



HOW TO ORDER

Model Number Designation

BHMA - 105 - 1 - 6 - 24 - C - 0

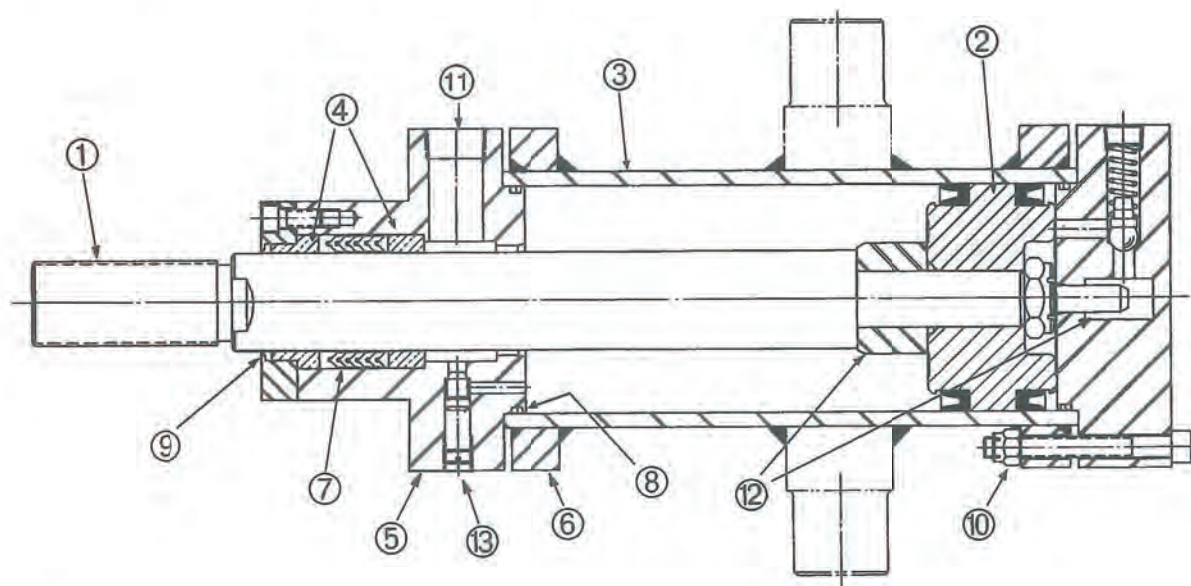


When ordering please specify:

- Correct Model Number
- Port Location if not as shown
- Any other optional features as described on page 30

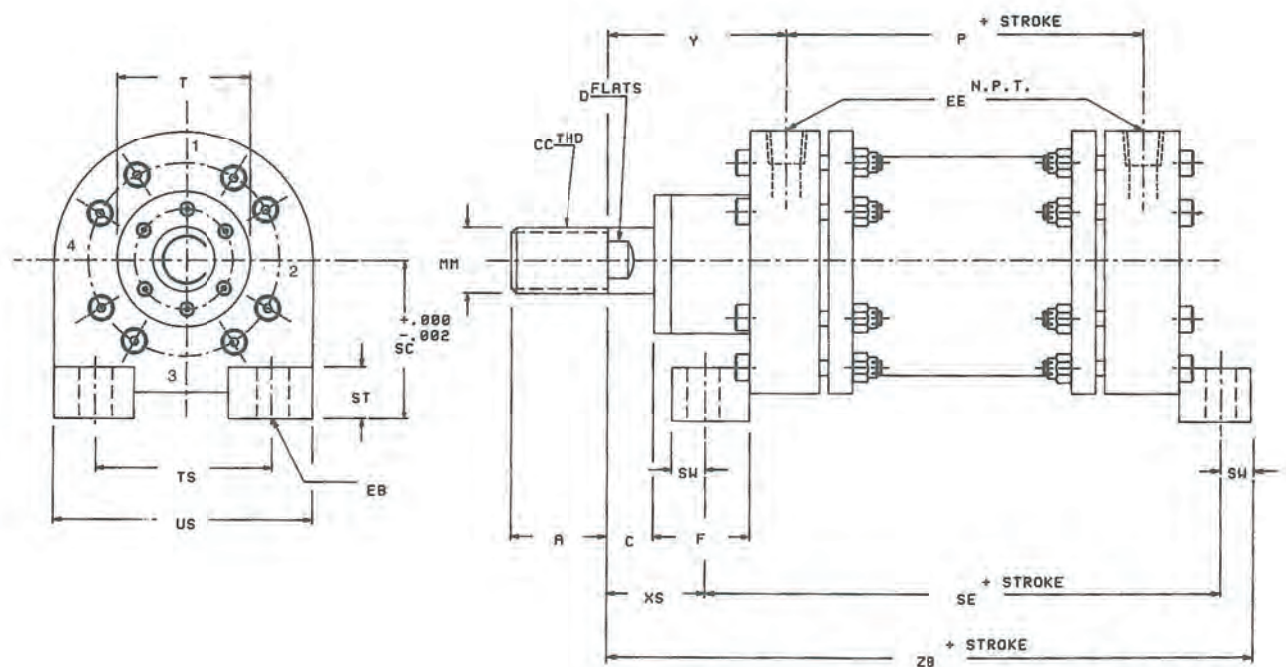
For larger bore size or custom design cylinders consult our engineering department for design specifications and quotation.

CONSTRUCTION FEATURES



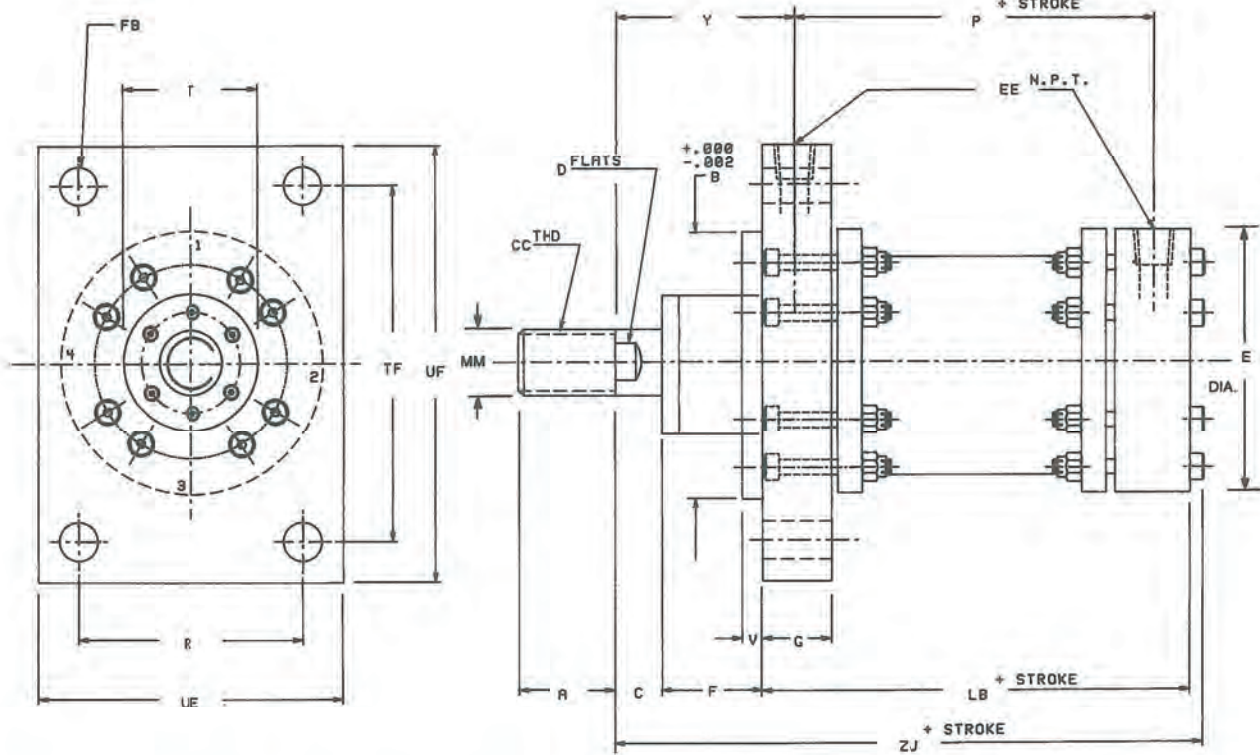
1. **PISTON ROD:** Chrome plated, ground and polished high tensile strength steel. Wrench flats available with any modifications to suit your needs. Optional added chrome plating for additional corrosion resistance.
2. **PISTON:** Continuous cast iron, dense grain, 40,000 p.s.i. with heavy duty U cups, fabric reinforced neoprene. Seals against the tube surface to prevent any harmful material from lodging between piston and tube. Protects piston bearing surface and tube.
3. **TUBE:** Precision honed and hard chrome plated steel tubing. Optional added plating for additional corrosion resistance.
4. **ROD GUIDE and THROAT BEARING:** S.A.E. 660 Bronze extended to give maximum support and ease of maintenance.
5. **CYLINDER HEADS:** Heavy duty construction made from steel bar or steel plate.
6. **FLANGES:** Made from steel tubing or steel plate. Welded to tube for complete reliability and maximum strength.
7. **CHEVRON PACKING:** Fabric reinforced Buna-N, automatic sealing. Multiple lip for heavy duty service.
8. **HEAD SEALS:** Synthetic rubber O ring for tight seal.
9. **ROD SCRAPER:** Polyurethane standard. Also available in brass or teflon.
10. **THRU BOLT CONSTRUCTION:** Alloy socket head cap screws with prevailing torque type lock nuts.
11. **EXTRA LARGE PORTS:** For unrestricted air flow. NPT style is standard, SAE is optional.
12. **CUSHIONS:** Optional rod end and blind end to minimize impact at end of stroke.
13. **METERING SCREW:** To adjust degree of cushion.
14. **THOROUGH INSPECTION:** For leaks, cushioning, stroke. All mounting dimensions are checked. Ports are sealed for shipment.

Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS
Foot Mounting Style 1 • 200 psi



FOOT MOUNTING STYLE 1

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	T	EB	SC	SE	ST	SW	TS	US	XS	ZB
2	1	2 3/8	1-14	11/16	7/8	1/2	2 1/8	3 7/8	3 9/16	2 1/2	9/16	2.625	6 5/8	7/8	1/2	4	5 1/2	2 3/16	9 5/16
2 1/2	1	2 3/8	1-14	1 1/8	7/8	3/4	2 3/8	4 1/4	4 5/16	2 1/2	9/16	2.875	7 1/8	7/8	5/8	4 1/2	6	2 7/8	10 5/8
3	1 3/8	2 3/4	1 1/4-12	1	1 1/8	3/4	2 9/16	4 1/4	4 3/8	3	11/16	3.125	7 3/8	7/8	3/4	5 1/4	7	2 13/16	10 15/16
3 1/2	1 3/8	2 3/4	1 1/4-12	1 3/16	1 1/8	3/4	2 9/16	4 5/8	4 9/16	3	13/16	3.500	8	1	3/4	5 3/4	7 3/4	2 7/8	11 5/8
4	1 3/4	3 1/2	1 1/2-12	1 1/8	1 1/2	3/4	2 9/16	4 5/8	4 1/2	3 1/2	13/16	3.750	8 1/8	1	7/8	6 1/4	8 1/4	2 3/4	11 3/4
5	2	3 3/4	1 3/4-12	1 5/16	1 3/4	1	2 9/16	5 1/16	4 7/8	3 5/8	1 1/16	4.500	9 9/16	1 1/2	15/16	7 1/2	9 3/4	2 5/8	13 1/8
6	2 1/4	4 1/2	2-12	1 21/32	2	1	2 9/16	5 3/16	5 7/32	3 7/8	1 1/16	5.125	10 3/8	1 1/2	1	7 1/2	10 1/4	2 9/8	14
7	2 1/2	5	2 1/4-8	1 5/8	2 1/4	1	2 9/16	5 1/4	5 3/16	4 5/16	1 1/16	5.875	10 5/8	1 1/2	1	8 7/8	11 1/2	2 1/2	14 1/8
8	3	5 1/2	2 1/2-8	1 11/16	2 3/4	1 1/4	2 11/16	5 3/4	5 9/16	4 7/8	1 3/16	6.375	10 5/8	1 3/4	1 1/4	9 3/4	12 3/4	3 1/8	15
10	3	5 1/2	2 1/2-8	2 1/4	2 3/4	1 1/4	2 11/16	5 3/4	6 1/8	4 7/8	1 3/16	7.250	11 3/4	1 3/4	1 1/4	10 3/4	13 1/2	3 1/8	16 1/8
12	3	5 1/2	2 1/2-8	2 3/16	2 3/4	1 1/4	2 11/16	5 7/8	6 1/16	4 7/8	1 3/16	8.625	11 3/4	1 3/4	1 1/4	12 1/4	15 3/4	3 1/8	16 1/8
14	3	5 1/2	2 1/2-8	1 3/4	2 3/4	1 1/4	2 11/16	6 3/4	5 9/16	4 7/8	1 5/16	9.750	12	1 7/8	1 1/2	14	18	3	16 1/2
16	3 1/4	5 1/2	2 1/2-8	2 1/8	3	1 1/2	2 11/16	7 1/8	6 3/16	5 1/4	1 5/16	11.250	13 1/2	1 7/8	1 1/2	16 1/2	21	3	18



FRONT FLANGE MOUNTING STYLE 2

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	E	V	G	B	FB	T	R	LB	TF	UE	UF	ZJ
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	4	1/4	1 1/2	3.625	7/16	2 1/2	3	5 3/8	4 1/4	4 3/8	5 1/8	8 3/8
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	4 1/2	1/4	1 5/8	4.000	9/16	2 1/2	3 1/2	5 7/8	5	5	6 1/4	9 1/8
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	4 3/4	1/4	1 5/8	4.875	11/16	3	3 3/4	5 7/8	5 3/4	5 5/8	7 1/8	9 1/4
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	5 1/2	1/4	1 5/8	5.250	13/16	3	4	6 1/4	6 3/4	6	8 1/4	9 11/16
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	6	1/4	1 5/8	5.750	13/16	3 1/2	4 1/2	6 1/4	7 1/4	6 1/2	8 7/8	9 11/16
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/16	4 1/16	7	1/4	2	6.500	1 1/16	3 5/8	5 3/4	7 1/16	8 1/2	8	10 1/4	10 1/2
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/16	4 1/16	8 1/2	1/4	2	7.250	1 5/16	3 7/8	6	7 3/16	10 1/4	9 1/8	13 1/4	10 3/4
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	9 1/2	1/4	2	8.000	1 7/16	4 5/16	8	7 1/4	11 1/2	10 3/4	14	10 13/16
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	10 1/2	1/4	2 3/8	8.750	1 9/16	4 7/8	8	8 1/8	12 1/2	11 3/4	15	11 13/16
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	12 3/4	1/4	2 3/8	8.750	1 9/16	4 7/8	10	8 1/8	13	13	16	11 13/16
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	14 3/4	1/4	2 3/8	8.750	1 9/16	4 7/8	12 3/4	8 1/4	14 1/2	15 3/4	17 1/2	11 15/16
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	18	1/4	2 3/8	8.750	1 13/16	4 7/8	14 1/2	9 1/8	17	18	20 1/2	12 13/16
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	21	1/4	2 3/4	8.750	1 13/16	5 1/4	17 1/2	9 7/8	18 1/2	21	22	13 9/16

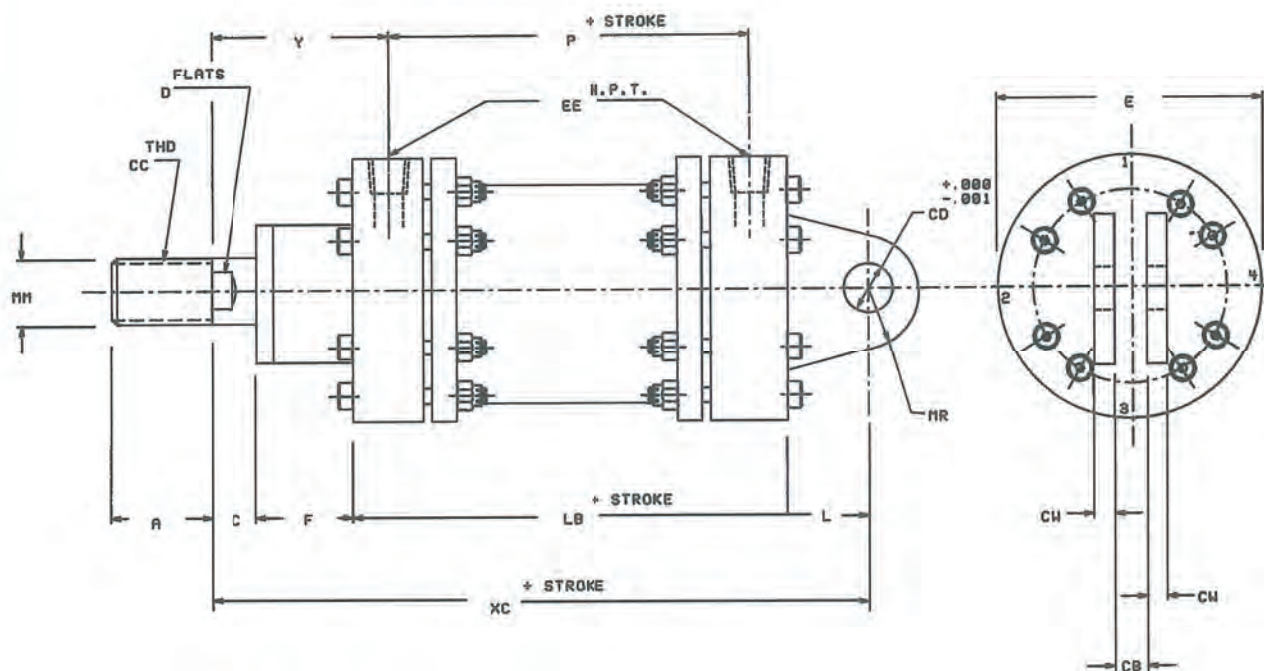
Series BHMA - 105

Heavy Duty Mill Type

AIR CYLINDERS

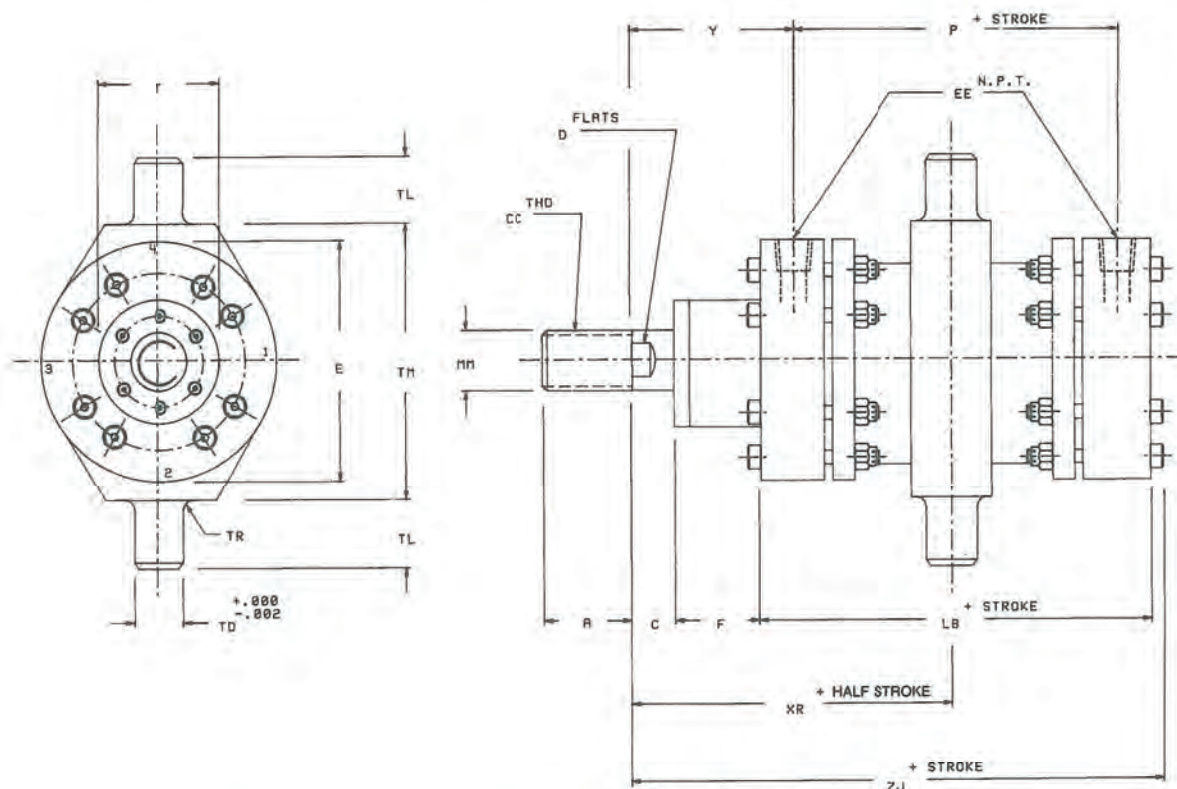
Clevis Mounting Style 3 • 200 psi

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CLEVIS MOUNTING STYLE 3

BORE	MM RCD DIA	A	CC	C	D	EE	F	P	Y	E	CB	CD	CW	MR	L	LB	XC
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	4	1	.875	3/4	1 1/8	1 7/16	5 3/8	9 7/16
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	4 1/2	1	1.000	3/4	1 1/8	1 1/2	5 7/8	10 1/4
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	4 3/4	1 1/4	1.250	7/8	1 1/4	1 5/8	5 7/8	10 9/16
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	5 1/2	1 1/4	1.250	7/8	1 1/4	1 3/4	6 1/4	11 1/16
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	6	1 1/2	1.250	1	1 1/2	2	6 1/4	11 5/16
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/16	4 1/16	7	1 3/4	1.500	1 1/8	1 1/2	2	7 1/16	12 1/8
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/16	4 1/16	8 1/2	2	1.750	1 1/2	1 3/4	2 1/2	7 3/16	12 3/4
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	9 1/2	3	2.000	1 1/2	2	2 3/4	7 1/4	13 1/16
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	10 1/2	3	2.000	1 1/2	2 1/8	2 7/8	8 1/8	14 3/16
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	12 3/4	3	2.000	1 1/2	2 1/4	3 1/8	8 1/8	14 7/16
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	14 3/4	3	2.000	1 1/2	2 1/4	3 1/8	8 1/4	14 9/16
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	18	3 1/2	2.500	2	3	3 7/8	9 1/8	16 3/16
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	21	3 1/2	2.750	2	3	3 7/8	9 7/8	16 15/16



TRUNNION MOUNTING STYLE 4

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	E	T	TD	TL	TM	TR	LB	XR	ZJ
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	4	2 1/2	1.125	1 1/8	4 3/4	1/8	5 3/8	5 5/16	8 3/8
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	4 1/2	2 1/2	1.250	1 3/8	5 1/4	1/8	5 7/8	5 13/16	9 1/8
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	4 3/4	3	1.375	1 1/2	6	1/8	5 7/8	6	9 1/4
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	5 1/2	3	1.500	1 1/2	6 1/4	1/8	6 1/4	6 3/16	9 11/16
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	6	3 1/2	1.625	1 1/2	6 3/4	1/8	6 1/4	6 3/16	9 11/16
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/8	4 1/16	7	3 5/8	1.750	1 3/4	8 3/8	1/8	7 1/16	6 5/8	10 1/2
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/8	4 1/16	8 1/2	3 7/8	2.000	2 1/8	9 1/2	1/8	7 3/16	6 11/16	10 3/4
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	9 1/2	4 5/16	2.250	2 9/16	11 1/8	1/8	7 1/4	6 11/16	10 13/16
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	10 1/2	4 7/8	2.500	2 9/16	12 1/8	1/8	8 1/8	7 1/4	11 13/16
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	12 3/4	4 7/8	2.750	3	13 1/2	1/8	8 1/8	7 1/4	11 13/16
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	14 3/4	4 7/8	2.750	3	16 1/2	1/8	8 1/4	7 5/16	11 15/16
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	18	4 7/8	3.000	3 1/4	19	1/8	9 1/8	7 3/4	12 13/16
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	21	5 1/4	3.000	3 1/2	22	1/8	9 7/8	8 1/8	13 9/16

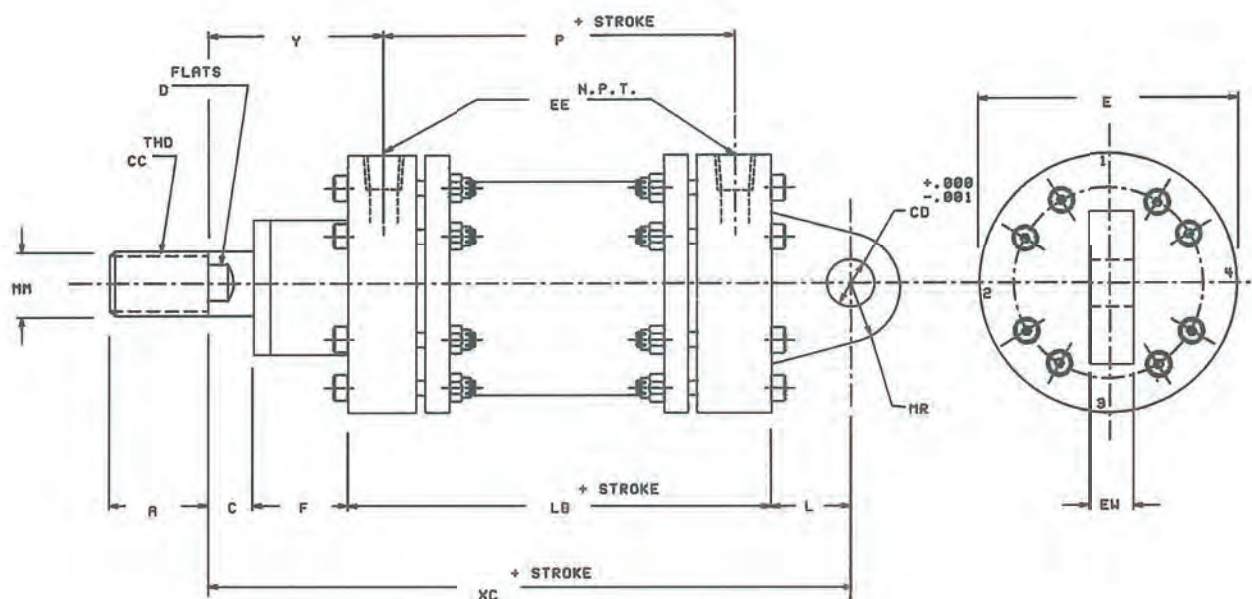
Series BHMA - 105

Heavy Duty Mill Type

AIR CYLINDERS

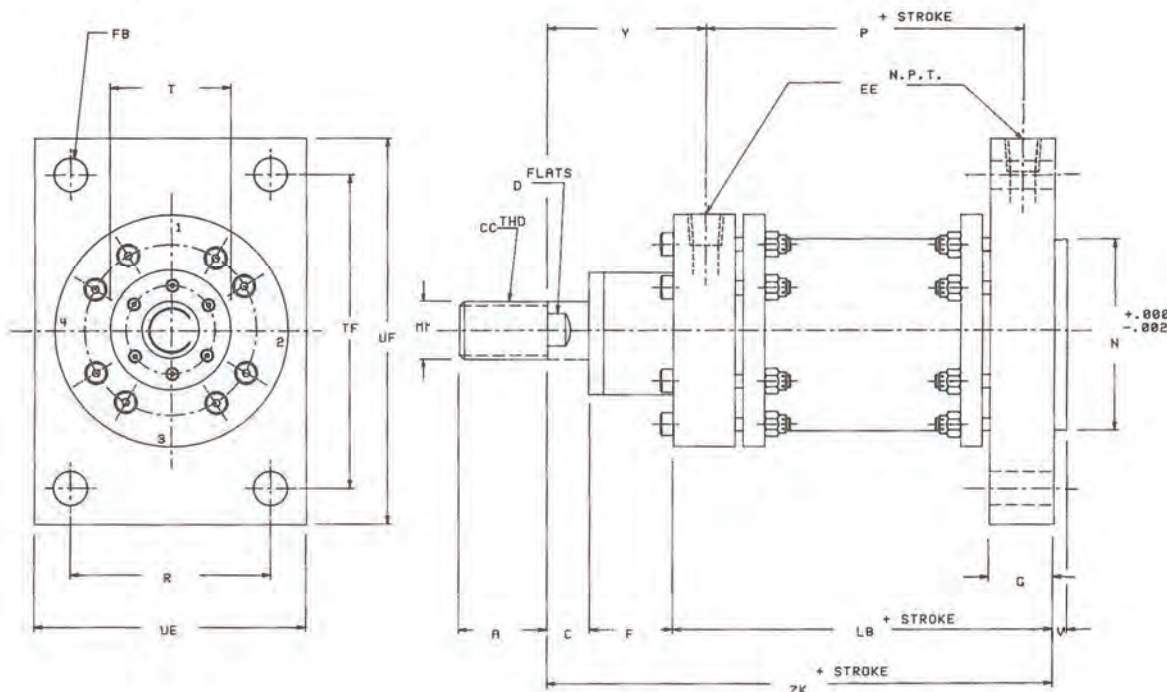
Hinge Lug Mounting Style 5 • 200 psi

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HINGE LUG MOUNTING STYLE 5

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	E	EW	CD	MR	L	LB	XC
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	4	1	.875	1 1/8	1 7/16	5 3/4	9 7/16
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	4 1/2	1	1.000	1 1/8	1 1/2	5 7/8	10 1/4
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	4 3/4	1 1/4	1.250	1 1/4	1 5/8	5 7/8	10 9/16
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	5 1/2	1 1/4	1.250	1 1/4	1 3/4	6 1/4	11 1/16
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	6	1 1/2	1.250	1 1/2	2	6 1/4	11 5/16
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/16	4 1/16	7	1 3/4	1.500	1 1/2	2	7 1/16	12 1/8
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/16	4 1/16	8 1/2	2	1.750	1 3/4	2 1/2	7 3/16	12 3/4
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	9 1/2	3	2.000	2	2 3/4	7 1/4	13 1/16
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	10 1/2	3	2.000	2 1/8	2 7/8	8 1/8	14 3/16
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	12 3/4	3	2.000	2 1/4	3 1/8	8 1/8	14 7/16
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	14 3/4	3	2.000	2 1/4	3 1/8	8 1/4	14 9/16
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	18	3 1/2	2.500	3	3 7/8	9 1/8	16 3/16
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	21	3 1/2	2.750	3	3 7/8	9 7/8	16 15/16

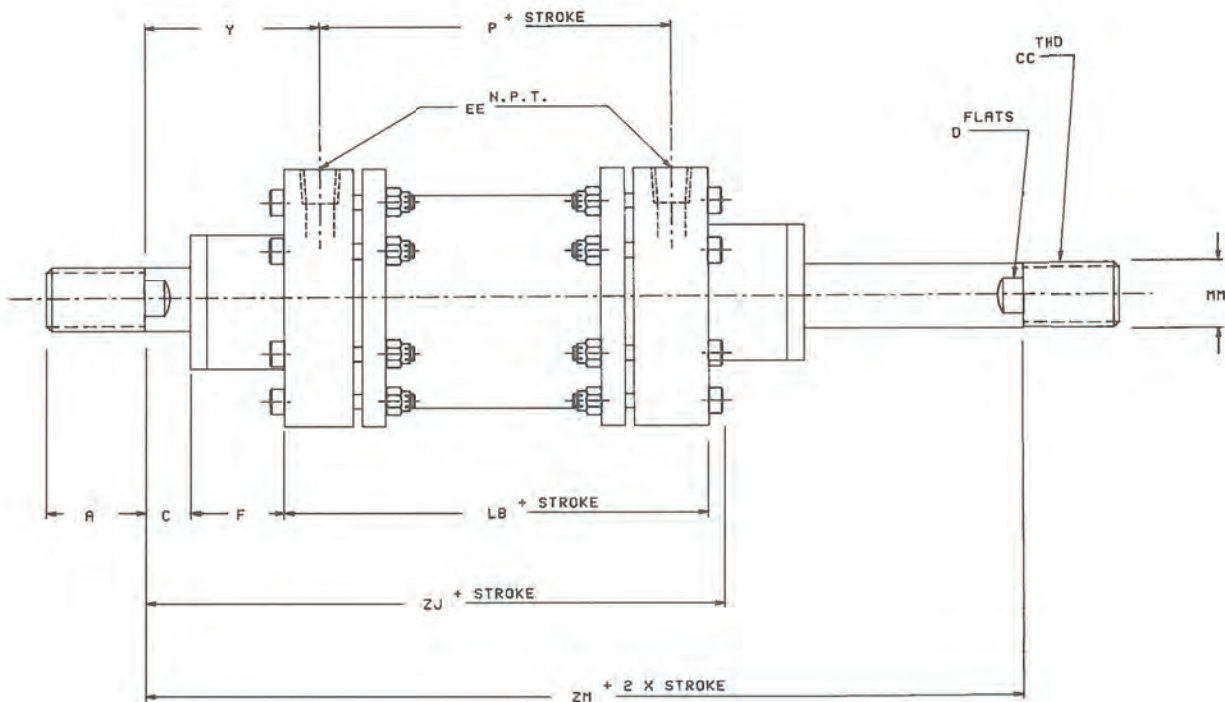


REAR FLANGE MOUNTING STYLE 6

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	V	G	N	FB	T	R	LB	TF	JE	UF	ZK
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	1/4	1 1/2	2.250	7/16	2 1/2	3	5 3/8	4 1/4	4 3/8	5 1/8	8
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	1/4	1 5/8	3.000	9/16	2 1/2	3 1/2	5 7/8	5	5	6 1/4	8 3/4
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	1/4	1 5/8	3.625	11/16	3	3 3/4	5 7/8	5 3/4	5 5/8	7 1/8	8 15/16
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	1/4	1 5/8	4.000	13/16	3	4	6 1/4	6 3/4	6	8 1/4	9 5/16
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	1/4	1 5/8	4.500	13/16	3 1/2	4 1/2	6 1/4	7 1/4	6 1/2	8 7/8	9 5/16
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/16	4 1/16	1/4	2	5.750	1 1/16	3 5/8	5 3/4	7 1/16	8 1/2	8	10 1/4	10 1/8
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/16	4 1/16	1/4	2	6.500	1 5/16	3 7/8	6	7 3/16	10 1/4	9 1/8	13 1/4	10 1/4
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	1/4	2	7.750	1 7/16	4 5/16	8	7 1/4	11 1/2	10 3/4	14	10 5/16
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	1/4	2 3/8	8.750	1 9/16	4 7/8	8	8 1/8	12 1/2	11 3/4	15	11 5/16
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	1/4	2 3/8	10.000	1 9/16	4 7/8	10	8 1/8	13	13	16	11 5/16
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	1/4	2 3/8	11.500	1 9/16	4 7/8	12 3/4	8 1/4	14 1/2	15 3/4	17 1/2	11 7/16
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	1/4	2 3/8	13.000	1 13/16	4 7/8	14 1/2	9 1/8	17	18	20 1/2	12 5/16
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	1/4	2 3/4	14.250	1 13/16	5 1/4	17 1/2	9 7/8	18 1/2	21	22	13 1/16

Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS

Double Rod End Mounting Style 7 • 200 psi



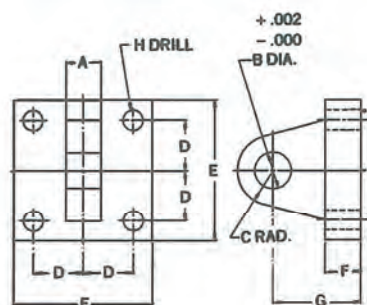
DOUBLE ROD END MOUNTING STYLE 7

BORE	MM ROD DIA	A	CC	C	D	EE	F	P	Y	LB	ZJ	ZM
2	1	2 3/8	1-14	1/2	7/8	1/2	2 1/8	3 7/8	3 3/8	5 3/8	8 3/8	10 5/8
2 1/2	1	2 3/8	1-14	1/2	7/8	3/4	2 3/8	4 1/4	3 11/16	5 7/8	9 1/8	11 5/8
3	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 1/4	3 7/8	5 7/8	9 1/4	12
3 1/2	1 3/8	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 9/16	4 5/8	3 7/8	6 1/4	9 11/16	12 3/8
4	1 3/4	3 1/2	1 1/2-12	1/2	1 1/2	3/4	2 9/16	4 5/8	3 7/8	6 1/4	9 11/16	12 3/8
5	2	3 3/4	1 3/4-12	1/2	1 3/4	1	2 9/16	5 1/16	4 1/16	7 1/16	10 1/2	13 3/16
6	2 1/4	4 1/2	2-12	1/2	2	1	2 9/16	5 3/16	4 1/16	7 3/16	10 3/4	13 5/16
7	2 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	5 1/4	4 1/16	7 1/4	10 13/16	13 3/8
8	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	8 1/8	11 13/16	14 1/2
10	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 3/4	4 3/8	8 1/8	11 13/16	14 1/2
12	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	5 7/8	4 3/8	8 1/4	11 15/16	14 5/8
14	3	5 1/2	2 1/2-8	1/2	2 3/4	1 1/4	2 11/16	6 3/4	4 3/8	9 1/8	12 13/16	15 1/2
16	3 1/4	5 1/2	2 1/2-8	1/2	3	1 1/2	2 11/16	7 1/8	4 9/16	9 7/8	13 9/16	16 1/4



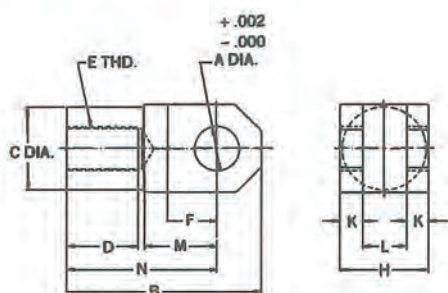
Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS
Accessories • 200 psi

CLEVIS MTG. BRKT.



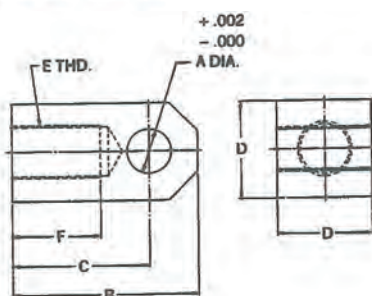
BORE	A	B	C	D	E	F	G	H
2	31/32	.875	7/8	1 1/8	3	9/16	1 3/4	7/16
2 1/2	31/32	1.000	1	1 1/2	4	11/16	2 1/16	9/16
3	1 7/32	1.250	1 1/4	1 7/8	5	15/16	2 9/16	11/16
3 1/2	1 7/32	1.250	1 1/4	2	5 1/2	1 1/16	2 13/16	13/16
4	1 15/32	1.250	1 1/4	2 1/4	6	1 1/16	2 13/16	13/16
5	1 23/32	1.500	1 1/2	2 1/2	7	1 3/16	3 3/16	1 1/16
6	1 15/16	1.750	1 3/4	3	8 1/4	1 5/16	3 13/16	1 5/16
7	2 15/16	2.000	2	3 3/8	9 1/4	1 7/16	4 3/16	1 7/16
8-10,12	2 15/16	2.000	2	4	10 1/2	1 9/16	4 7/16	1 9/16
14	3 7/16	2.500	2 1/2	4 7/8	12 1/2	1 13/16	5 3/16	1 13/16
16	3 7/16	2.750	2 3/4	5 7/8	14 1/2	1 13/16	5 7/16	1 13/16

ROD CLEVIS



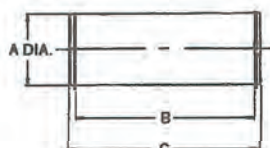
BORE	A	B	C	D	E	F	H	K	L	M	N
2	.875	4 11/16	1 5/8	1 7/8	1-14	1 1/8	1 3/4	7/16	7/8	1 7/8	3 13/16
2 1/2	1.000	5	1 7/8	1 7/8	1-14	1 1/4	2	1/2	1	2	4
3-3 1/2	1.250	5 3/4	2 3/8	2 1/16	1 1/4-12	1 1/2	2 1/2	5/8	1 1/4	2 3/8	4 1/2
4	1.250	6 3/8	2 3/8	2 11/16	1 1/2-12	1 1/2	2 1/2	5/8	1 1/4	2 3/8	5 1/8
5	1.500	7 1/8	2 7/8	2 13/16	1 3/4-12	1 3/4	3	3/4	1 1/2	2 3/4	5 5/8
6	1.750	8 1/2	3 3/8	3 7/16	2-12	2	3 1/2	7/8	1 3/4	3 1/4	6 3/4
7	2.000	9 1/2	3 7/8	3 13/16	2 1/4-8	2 1/4	4	1	2	3 3/4	7 1/2
8-10,12	2.000	9 7/8	3 7/8	4 1/16	2 1/2-8	2 1/4	4	1	2	3 3/4	7 7/8
14	2.500	10 7/8	4 7/8	4 1/16	2 1/2-8	2 3/4	5	1 1/4	2 1/2	4 1/4	8 3/8
16	2.750	11 5/8	5 3/8	4 1/16	2 1/2-8	3	5 1/2	1 3/8	2 3/4	4 3/4	8 7/8

ROD EYE



BORE	A	B	C	D	E	F
2	.875	4	3 1/8	1 3/4	1-14	1 7/8
2 1/2	1.000	4 1/4	3 1/4	2	1-14	1 7/8
3-3 1/2	1.250	4 7/8	3 5/8	2 1/2	1 1/4-12	2 1/16
4	1.250	5 1/2	4 1/4	2 1/2	1 1/2-12	2 11/16
5	1.500	6 1/8	4 5/8	3	1 3/4-12	2 13/16
6	1.750	7 3/8	5 5/8	3 1/2	2-12	3 7/16
7	2.000	8 1/4	6 1/4	4	2 1/4-8	3 13/16
8-10,12	2.000	8 5/8	6 5/8	4	2 1/2-8	4 1/16
14	2.500	9 3/8	6 7/8	5	2 1/2-8	4 1/16
16	2.750	10	7 1/4	5 1/2	2 1/2-8	4 1/16

ROD CLEVIS PIN

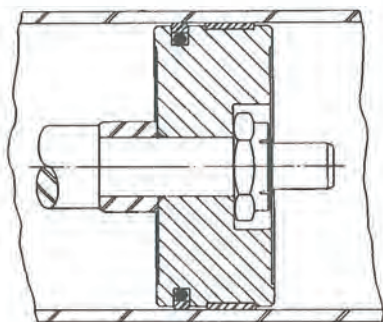


BORE	A	B	C
2	.875	1 7/8	2 1/4
2 1/2	1.000	2 1/8	2 3/8
3-3 1/2-4	1.250	2 5/8	3
5	1.500	3 1/8	3 1/2
6	1.750	3 5/8	4
7-8,10-12	2.000	4 1/8	4 1/2
14	2.500	5 1/8	5 1/2
16	2.750	5 5/8	6

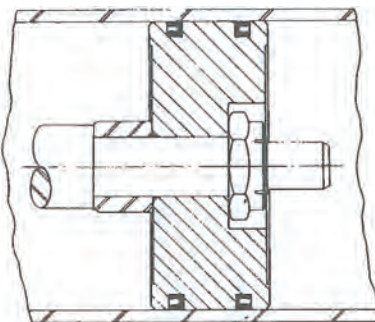
Series BHMA - 105
Heavy Duty Mill Type
AIR CYLINDERS
Options • 200 psi



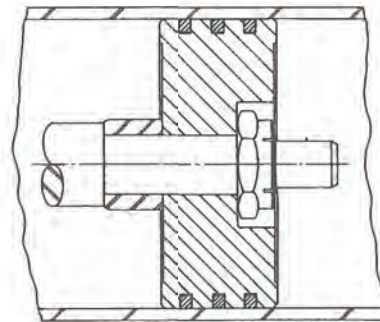
OPTIONAL PISTONS



Bronze filled wear strip and slipper seal. Excellent for high temp and non lubricated service.



Block vee packing. Homogeneous synthetic rubber. Sensitive and low friction characteristics.



Cast iron piston rings for severe duty or low pressure oil service.

OPTIONAL FEATURES

1. S.A.E. straight thread "O" ring ports
2. Longer than standard cushions
3. Protective boots
4. High temperature service
5. Modified or special mountings
6. Special anti-corrosion treating for rod and tube
7. Special piston seals and bearings
8. Bronze coated steel pistons
9. Stop tubes
10. Water jackets
11. Non lubricated service
12. Case hardened piston rods
13. Proximity switches
14. Piston rod diameters other than standard
15. Larger bore diameters
16. Additional rod extension
17. Rod end modifications
18. Increased port sizes



Series HMA - 104

Mill Type

AIR CYLINDERS

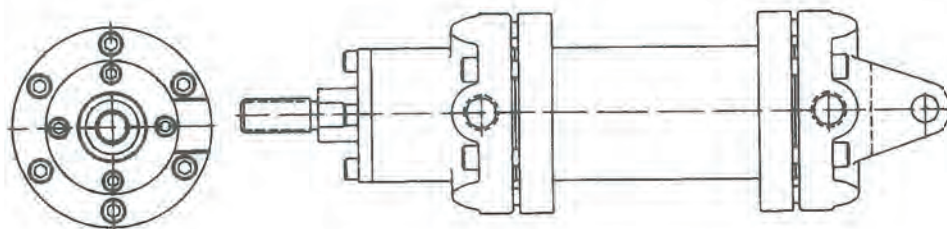
150 psi • Low Pressure Hydraulic

MILL TYPE

SERIES HMA-104

Mill-Type Air Cylinders

150 PSI air. Also can be used for low pressure hydraulic applications. Incorporates a C-ring flange mounted design with proven dependability in harsh environments.



- Wide range of standard bore sizes from 2" to 12".
- Five different mounting styles to choose from.
- Many accessories and options are available (see pp. 11,12,18).

Series HMA - 104

Mill Type

AIR CYLINDERS

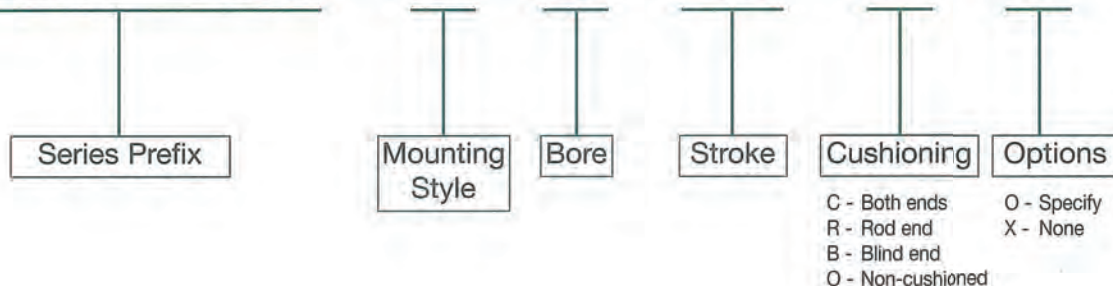
150 psi • Low Pressure Hydraulic

LINDBERG
FLUID POWER

HOW TO ORDER

Model Number Designation

HMA - 104 - 1 - 6 - 24 - C - 0



MAY ALSO BE USED FOR LOW PRESSURE HYDRAULIC SERVICE

HMA Series Cylinders may be used for low pressure hydraulic applications in accordance with the table at right. It is extremely important to specify the operating fluid and pressure in such cases since, for pressures over 150 psi, "O" ring seals are substituted for gasket seals. For water applications, the cylinder bore and piston rod are hard chrome plated and all other steel parts, exposed to the water, are cadmium plated. Without fluid and pressure information these changes will not be made.

BORE OF CYLINDER	MAXIMUM OIL PRESSURE
2, 2 1/2, 3, 4" Cylinders	400 PSI
5" Cylinders	300 PSI
6" Cylinders	200 PSI
7, 8, 10, 12" Cylinders	150 PSI

When ordering please specify:

- Correct Model Number
- Port Location if not as shown
- Any other optional features as described on page 12

For larger bore sizes or custom design cylinders consult our engineering department for design specifications and quotation.



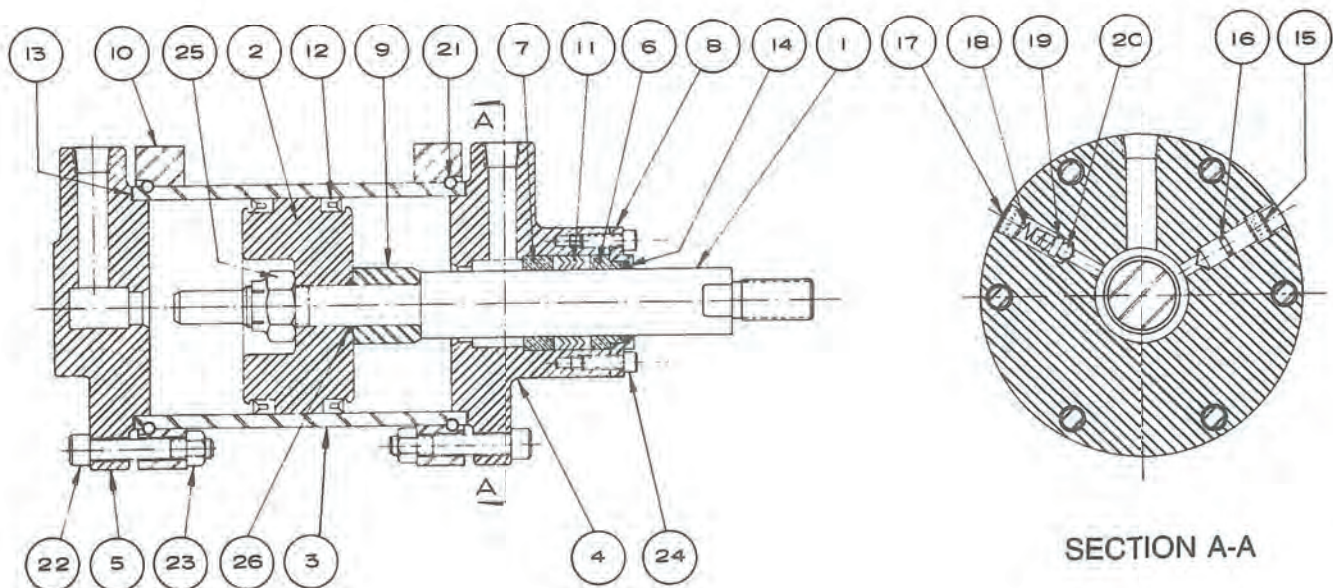
Series HMA - 104

Mill Type

AIR CYLINDERS

150 psl • Low Pressure Hydraulic

CONSTRUCTION FEATURES



1. **PISTON ROD:** Chrome plated
2. **PISTON**
3. **TUBE:** Chrome plated
4. **HEAD CAP**
5. **END CAP**
6. **ROD GUIDE**
7. **THROAT BEARING**
8. **PACKING GLAND**
9. **CUSHION PLUG**
10. **FLANGES**
11. **CHEVRON PACKING**
12. **U-RINGS**
13. **GASKETS**

14. **ROD WIPER**
15. **METERING SCREW**
16. **O-RING**
17. **PIPE PLUG**
18. **SPRING**
19. **SPRING ADAPTER**
20. **BALL**
21. **C-RING**
22. **HEAD BOLTS**
23. **SELF-LOCKING NUTS**
24. **PACKING GLAND SCREWS**
25. **SELF-LOCKING NUT**
26. **O-RING**

Series HMA - 104

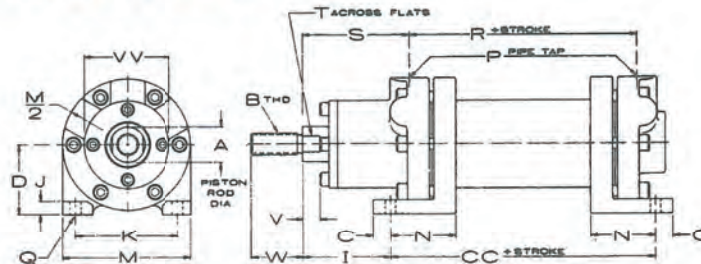
Mill Type

AIR CYLINDERS

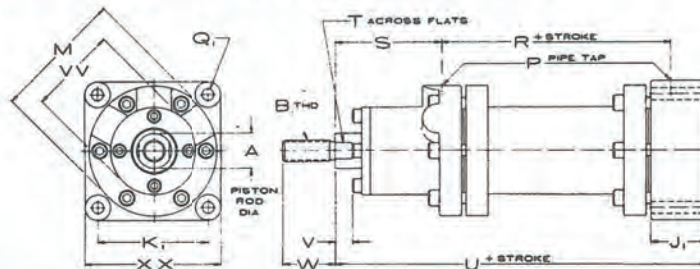
150 psi • Low Pressure Hydraulic

LINDBERG
FLUID POWER

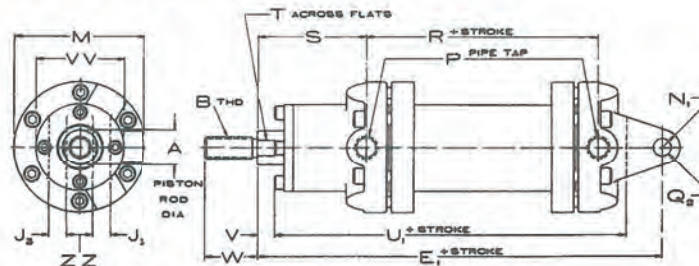
FOOT MOUNTING STYLE 15



BLIND END FLANGE MOUNTING STYLE 25

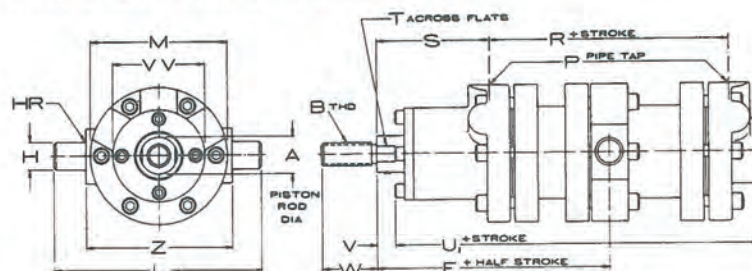


HINGE MOUNTING STYLE 35



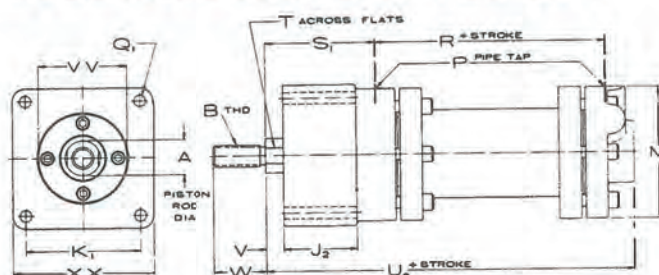
BORE	A	B	C	CC	D	E	E ₁	H	HR	I	J	J ₁	J ₂	J ₃	K	K ₁	L	M	N	N ₁
2	1	3/4-16	1/2	4 7/8	2	4 15/16	8 5/8	.750/.748	1/8	2 1/2	3/8	1 5/8	2 1/16	1/2	3	3 1/4	5 3/4	3 3/4	1 7/8	1/2
2 1/2	1	3/4-16	1/2	4 7/8	2 1/4	4 15/16	8 5/8	.750/.748	1/8	2 1/2	1/2	1 5/8	2 1/16	1/2	3 1/2	3 3/4	6 1/4	4 1/4	1 7/8	1/2
3	1 1/4	1-14	1/2	4 7/8	2 1/2	4 15/16	8 5/8	.750/.748	1/8	2 1/2	1/2	1 5/8	2 1/16	9/16	3 7/8	4 1/8	7 1/4	4 3/4	2	5/8
4	1 1/4	1-14	5/8	5 3/4	3 1/8	5 1/8	9 1/4	1.000/.998	1/8	2 1/4	5/8	1 5/8	1 15/16	3/4	4 3/4	5 1/4	8 1/2	6	2 3/8	7/8
5	1 1/2	1 1/8-12	5/8	5 13/16	3 5/8	5 5/32	9 7/16	1.000/.998	1/8	2 1/4	3/4	1 3/4	1 15/16	3/4	5 1/2	6 1/4	9 1/2	7	2 3/8	7/8
6	1 3/4	1 1/2-12	3/4	6 7/16	4 3/8	5 7/32	9 13/15	1.250/1.248	1/8	2	7/8	1 3/4	1 15/16	1	7	7 3/4	11	8 1/2	2 3/4	1
7	1 3/4	1 1/2-12	3/4	6 1/2	4 7/8	5 1/4	9 7/8	1.250/1.248	1/8	2	7/8	1 3/4	1 15/16	1	8	8 3/4	12	9 1/2	2 3/4	1
8	2	1 3/4-12	7/8	6 5/8	5 3/8	5 7/16	10 5/16	1.500/1.498	1/8	2 1/8	1	2	1 13/16	1 1/4	8 1/8	8 3/4	13 1/4	10 1/2	2 7/8	1 1/4
10	2 1/4	1 3/4-12	7/8	6 5/8	6 1/2	5 7/16	10 5/8	2.000/1.998	1/8	2 1/8	1 1/8	2	1 13/16	1 1/4	10 1/4	10 1/2	13	12 3/4	3	1 1/4
12	2 1/4	1 3/4-12	7/8	6 3/4	7 1/2	5 1/2	10 3/4	2.000/1.998	1/8	2 1/8	1 1/8	2	1 13/16	1 1/4	12 1/4	12 1/4	13	14 3/4	3	1 1/4

TRUNNION MOUNTING STYLE 45

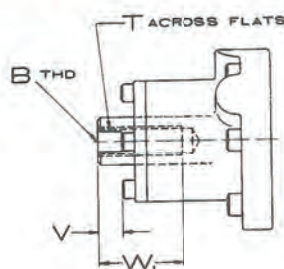


*See minimum stroke column in chart below

ROD END FLANGE MOUNTING STYLE 65



OPTIONAL ROD END THREAD



ROD STYLE 2

Style 4 Male Rod
(as shown in other drawings)
furnished unless otherwise
specified.

* Applies to style 45 mounting only

P	Q	Q ₁	Q ₂	R	S	S ₁	T	U	U ₁	U ₂	V	VV	W	W ₁	XX	Z	ZZ	WEIGHT		
																		*MIN STROKE	ZERO STROKE	PER INCH
3/8	11/32	11/32	1/2	3 3/4	3 1/16	3 1/8	7/8	7 7/8	7 1/8	7 11/16	1/2	2 1/2	1 1/2	2	4	4	3/4	2	14	.73
3/8	11/32	11/32	1/2	3 3/4	3 1/16	3 1/8	7/8	7 7/8	7 1/8	7 11/16	1/2	2 1/2	1 1/2	2	4 1/2	4 1/2	3/4	2	17	.83
3/8	13/32	13/32	5/8	3 3/4	3 1/16	3 1/8	1 1/8	7 7/8	7 1/8	7 11/16	1/2	2 3/4	1 1/2	2	5	5	1	2 1/2	22	1.07
3/8	17/32	17/32	5/8	4 1/4	3	3 1/16	1 1/8	8 1/4	7 1/2	8 1/16	1/2	2 3/4	1 1/2	2	6 1/4	6 1/4	1 1/2	2 1/16	33	1.31
1/2	17/32	17/32	3/4	4 5/16	3	3 1/16	1 5/16	8 7/16	7 11/16	8 1/4	1/2	3	1 1/2	2	7 1/4	7 1/4	1 1/2	2 13/16	54	1.61
1/2	17/32	17/32	1	4 7/16	3	3 1/16	1 5/8	8 9/16	7 13/16	8 3/8	1/2	3 3/8	2	2	8 3/4	8 3/4	1 1/2	3 7/16	80	2.12
1/2	17/32	17/32	1	4 1/2	3	3 1/16	1 5/8	8 5/8	7 7/8	8 7/16	1/2	3 3/8	2	2	9 3/4	9 3/4	1 1/2	3 7/16	97	2.31
3/4	25/32	21/32	1 1/4	4 7/8	3	3 1/16	1 7/8	9 1/8	8 3/8	8 15/16	1/2	3 5/8	2 1/2	2	10 3/4	10 3/4	1 3/4	4 1/2	110	2.40
3/4	25/32	21/32	1 1/4	4 7/8	3	3 1/16	2	9 1/8	8 3/8	8 15/16	1/2	3 7/8	2 1/2	2	12 3/4	13	1 3/4	5 5/8	138	3.10
3/4	25/32	21/32	1 1/4	5	3	3 1/16	2	9 1/4	8 1/2	9 1/16	1/2	3 7/8	2 1/2	2	14 3/4	15	1 3/4	5 5/8	165	6.40

Series HMA - 104

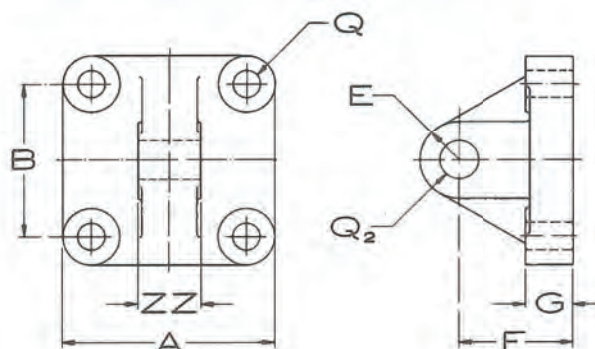
Mill Type

AIR CYLINDERS

150 psi • Low Pressure Hydraulic
Accessories



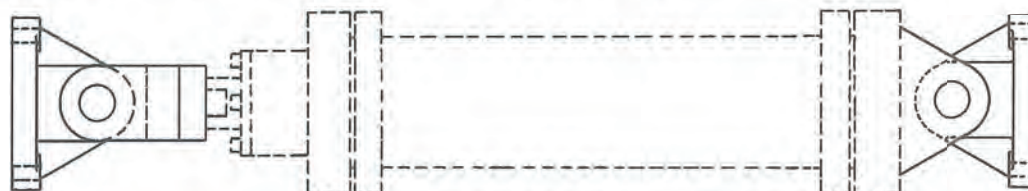
MALE HINGE BRACKET



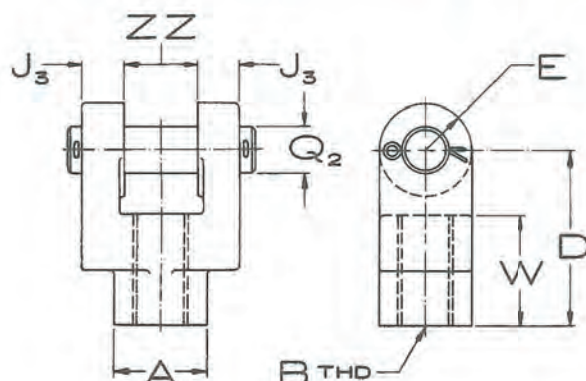
PART NO.	CYL. BORE	A	B	E	F	G	Q	Q ₂	ZZ
410003-17	2-2 1/2	3	2 1/4	1/2	1 3/4	5/8	3/8	1/2	3/4
410003-18	3	3 3/8	2 1/2	5/8	1 7/8	3/4	7/16	5/8	1
410003-19	4	4 5/8	3 1/2	7/8	2 3/8	7/8	9/16	5/8	1 1/2
410003-20	5	4 5/8	3 1/2	7/8	2 1/2	7/8	9/16	3/4	1 1/2
410003-21	6-7	5 1/2	4 3/8	1	3	1 1/8	9/16	1	1 1/2
410003-22	8-10-12	6 1/2	5	1 1/4	3 3/4	1 3/8	11/16	1 1/4	1 3/4

TYPICAL ARRANGEMENT

Style 35 Hinge Cylinder with Piston Rod Clevis and Male Hinge Brackets



PISTON ROD CLEVIS



PART NO.	CYL. BORE	A	B	D	E	J ₃	Q ₂	W	ZZ
410003-10	2-2 1/2	1	5/8-18	2 1/4	1/2	1/2	1/2	1 1/2	3/4
410003-11	3	1 1/4	3/4-16	2 3/8	5/8	9/16	5/8	1 1/2	1
410003-12	4	1 3/4	3/4-16	2 5/8	7/8	3/4	5/8	1 1/2	1 1/2
410003-13	5	1 3/4	1-14	2 5/8	7/8	3/4	3/4	1 1/2	1 1/2
410003-14	6-7	2	1 1/4-12	3 1/4	1	1	1	2	1 1/2
410003-15	8	2 1/2	1 1/2-12	4	1 1/4	1 1/4	1 1/4	2 1/2	1 3/4
410003-16	10-12	2 1/2	1 3/4-12	4	1 1/4	1 1/4	1 1/4	2 1/2	1 3/4

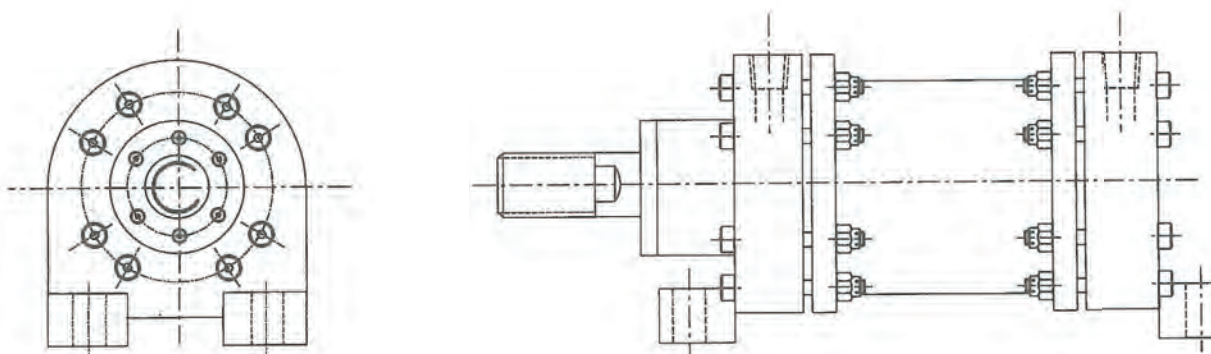


Series BMMH - 110
Heavy Duty Mill Type
HYDRAULIC CYLINDERS
3000 psi

SERIES BMMH-110

Heavy Duty Mill-Type Hydraulic Cylinders

3000 PSI -This cylinder is a welded flange construction and has features that make it durable for heavy duty usage.



- Wide range of standard bore sizes from 2" to 12".
- Seven different mounting styles to choose from.
- Many accessories and options are available (see pp. 29-30).
- Please contact our Sales or Engineering Departments for your special PSI requirements.

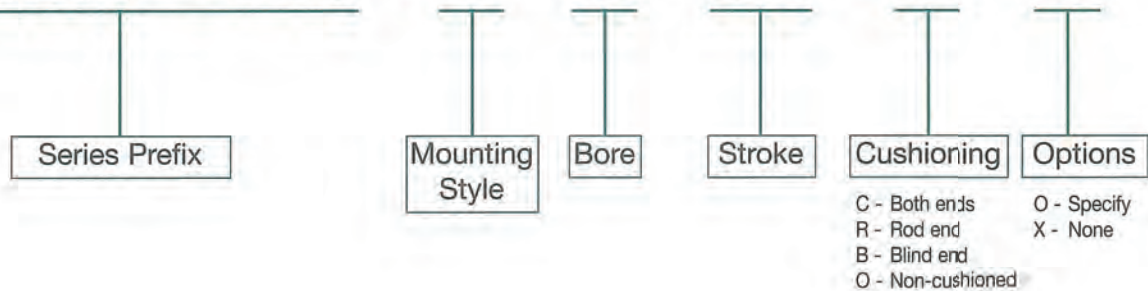
Series BMMH - 110
Heavy Duty Mill Type
HYDRAULIC CYLINDERS
3000 psi



HOW TO ORDER

Model Number Designation

BMMH - 110 - 4 - 8 - 36 - C - 0

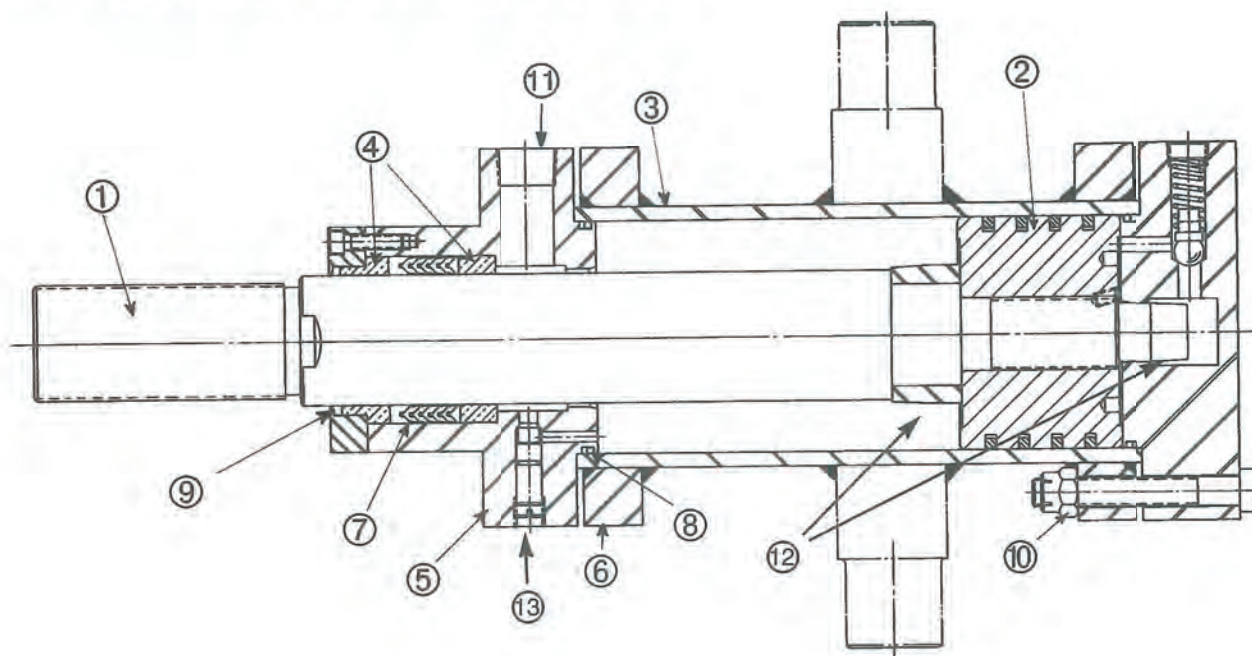


When ordering please specify:

- Correct Model Number
- Port Location if not as Shown
- Any other optional features as described on page 30

For larger bore sizes or custom design cylinders consult our engineering department for design specifications and quotation.

CONSTRUCTION FEATURES



1. **PISTON ROD:** Chrome plated, ground and polished high tensile strength steel. Wrench flats available with any modifications to suit your needs. Optional added chrome plating for additional corrosion resistance.
2. **PISTON:** Continuous cast iron, dense grain, 40,000 p.s.i. class, cast iron piston rings for long life.
3. **TUBE:** Precision honed and hard chrome plated steel tubing. Optional added plating for additional corrosion resistance.
4. **ROD GUIDE and THROAT BEARING:** S.A.E. 660 Bronze extended to give maximum support and ease of maintenance.
5. **CYLINDER HEADS:** Made from steel bar or steel plate.
6. **FLANGES:** Made from steel tubing or steel plate. Welded to tube for complete reliability and maximum strength.
7. **CHEVRON PACKING:** Fabric reinforced Buna-N, automatic sealing. Multiple lip for heavy duty service.
8. **HEAD SEALS:** Synthetic rubber O ring for tight seal, plus back-up washers.
9. **ROD SCRAPER:** Polyurethane standard also available in brass or teflon.
10. **THRU BOLT CONSTRUCTION:** Alloy socket head cap screws with the best prevailing torque type lock nuts. Will not shake loose under most severe vibrations.
11. **EXTRA LARGE PORTS:** For unrestricted air flow. NPT style is standard.
12. **CUSHIONS:** Optional rod end and blind end cushions to minimize impact at end of stroke.
13. **METERING SCREW:** To adjust degree of cushion.
14. **THOROUGH INSPECTION:** For leaks, cushioning, stroke. All mounting dimensions are checked. Ports are sealed for shipment.

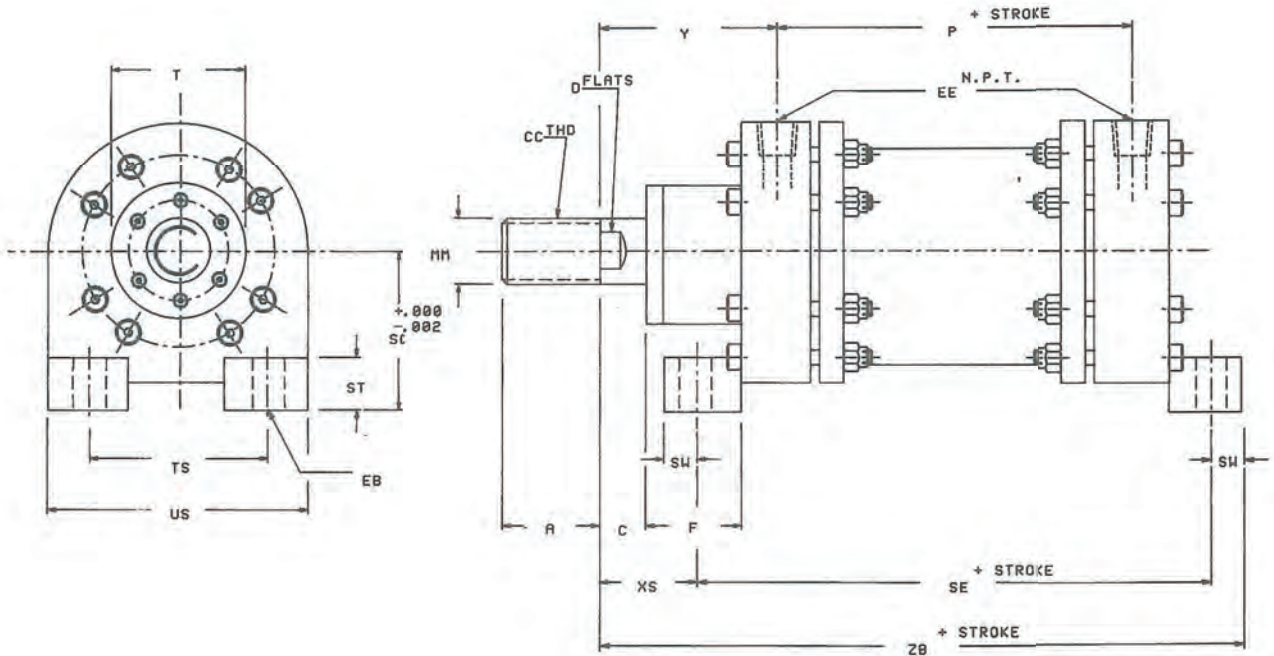
Series BMMH - 110

Heavy Duty Mill Type

HYDRAULIC CYLINDERS

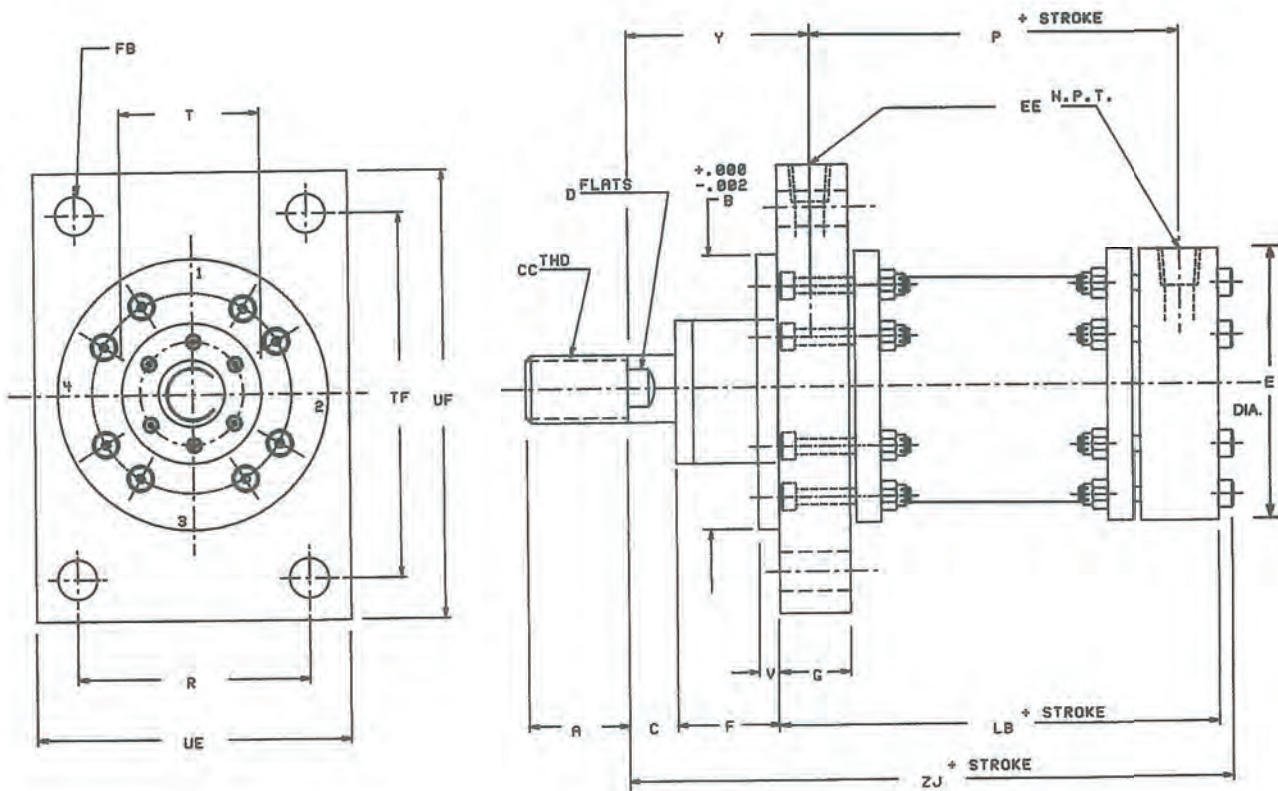
Foot Mounting Style 1 • 3000 psi

LINDBERG
FLUID POWER



FOOT MOUNTING STYLE 1

BORE	MM ROD DIA	2:1 ROD DIA	A	CC	C	D	EE	F	P	Y	T	EB	SC	SE	ST	SW	TS	US	XS	ZB
2	1	1 3/8	2 3/8	1-14	1 3/16	7/8	1/2	2 3/8	4 1/4	4 5/16	2 1/2	9/16	2 3/4	8 1/2	7/8	1/2	4	5 1/2	2 3/16	11 3/16
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1 5/8	1 1/8	3/4	2 3/8	4 3/4	4 13/16	2 3/4	9/16	3	8 5/8	7/8	5/8	4 1/2	6	2 7/8	12 1/8
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1 11/16	1 1/4	3/4	2 9/16	4 3/4	5 1/16	3 1/8	11/16	3 3/8	9 1/4	7/8	3/4	5 1/4	7	2 13/16	12 13/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1 15/16	1 3/4	3/4	2 9/16	5 1/8	5 5/16	3 5/8	13/16	3 5/8	9 3/4	1	3/4	5 3/4	7 3/4	3	13 1/2
4	2 1/4	2 3/4	4 1/2	2-8	1 15/16	2	3/4	2 9/16	5 1/8	5 5/16	3 7/8	13/16	4 1/4	9 3/4	1	7/8	6 1/4	8 1/4	3	13 5/8
5	2 1/2	3 1/2	5	2 1/4-8	1 13/16	2 1/4	1	2 9/16	6 3/8	5 3/8	4 5/16	1 1/16	5	11 5/8	1 1/2	15/16	7 1/2	9 3/4	2 3/4	15 5/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	2	2 1/2	1	2 9/16	6 7/8	5 9/16	4 11/16	1 1/16	5 1/4	12 1/2	1 1/2	1	7 1/2	10 1/4	2 3/4	16 1/4
7	3 1/4	5	6	2 3/4-8	2	3	1	2 11/16	7 5/8	5 11/16	5 1/4	1 1/16	5 7/8	13 3/4	1 1/2	1	8 7/8	11 1/2	2 5/8	17 3/8
8	3 1/2	5 3/4	7	3-8	2 1/4	3 1/4	1 1/4	2 11/16	8	6 1/8	5 5/8	1 3/16	7	14	1 3/4	1 1/4	10 1/2	13	3 1/8	18 3/8
10	4 1/4	7	8	3 3/4-8	4 1/8	4	1 1/2	2 13/16	9 1/8	8 5/16	6 1/2	1 3/16	8 1/4	15	1 3/4	1 1/4	10 3/4	15 1/2	5 3/8	21 5/8
12	5	8 1/2	8 1/2	4 1/2-8	4 5/8	4 3/4	1 1/2	2 13/16	9 1/8	8 5/16	7 9/16	1 3/16	9 1/2	17 1/2	1 3/4	1 1/4	12 1/4	18	4 5/8	23 3/8



FRONT FLANGE MOUNTING STYLE 2

BORE	MM ROD DIA	2:1 ROD DIA	A	CC	C	D	EE	F	P	Y	E	V	G	B	FB	T	R	LB	TF	UE	UF	ZJ
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	4	1/4	1 1/2	3.625	9/16	2 1/2	3 1/2	5 3/4	4 3/4	4 3/4	6	9
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	4 1/2	1/4	1 5/8	4.000	11/16	2 3/4	3 3/4	6 3/8	6 1/2	5 1/8	8	9 5/8
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	5	1/4	1 5/8	4.875	13/16	3 1/8	4 1/2	6 3/8	6 3/4	6	8 3/4	9 13/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	6	1/4	1 5/8	5.250	15/16	3 5/8	4 1/2	6 3/4	7 1/2	6 1/2	9 1/2	10 3/16
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	6 1/2	1/4	1 5/8	5.750	1 1/16	3 7/8	5 1/2	6 3/4	8 1/2	7 1/2	11	10 5/16
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	7 3/4	1/4	2	6.500	1 5/16	4 5/16	6 1/2	8 3/8	10	9 1/4	13	11 15/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	9 1/4	1/4	2	7.500	1 9/16	4 11/16	6 1/2	8 7/8	11 1/2	9 3/4	15	12 9/16
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	10 1/2	1/4	2	8.250	1 9/16	5 1/4	7 1/2	9 5/8	12 1/2	10 3/4	16	13 9/16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	11 3/4	1/4	2 3/8	9.000	1 13/16	5 5/8	9	10 3/8	15	13	19	14 5/16
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	15	1/4	2 3/4	10.500	2 3/8	6 1/2	11	11 7/8	18 1/4	15 1/2	23	15 15/16
12	5	8 1/2	8 1/2	4 1/2-8	1/2	4 3/4	1 1/2	2 13/16	9 1/8	4 11/16	18	1/4	2 3/4	12.000	2 5/8	7 9/16	12	11 7/8	20 1/2	18	26	16 3/16

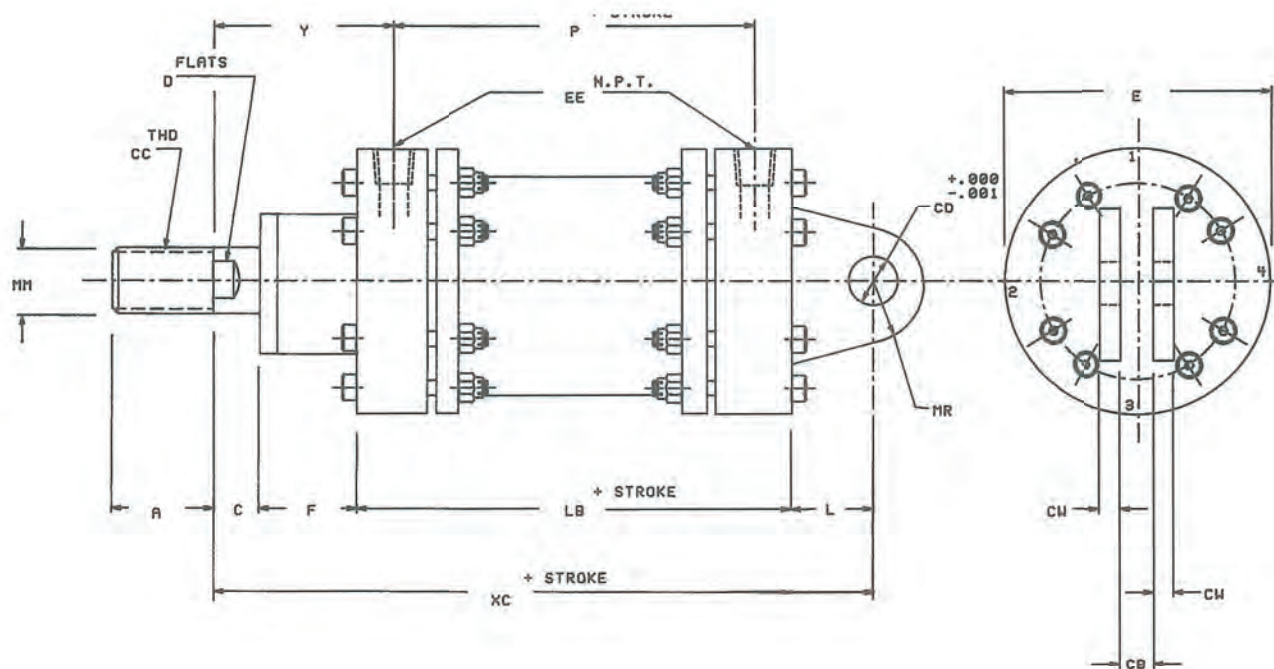
Series BMMH - 110

Heavy Duty Mill Type

HYDRAULIC CYLINDERS

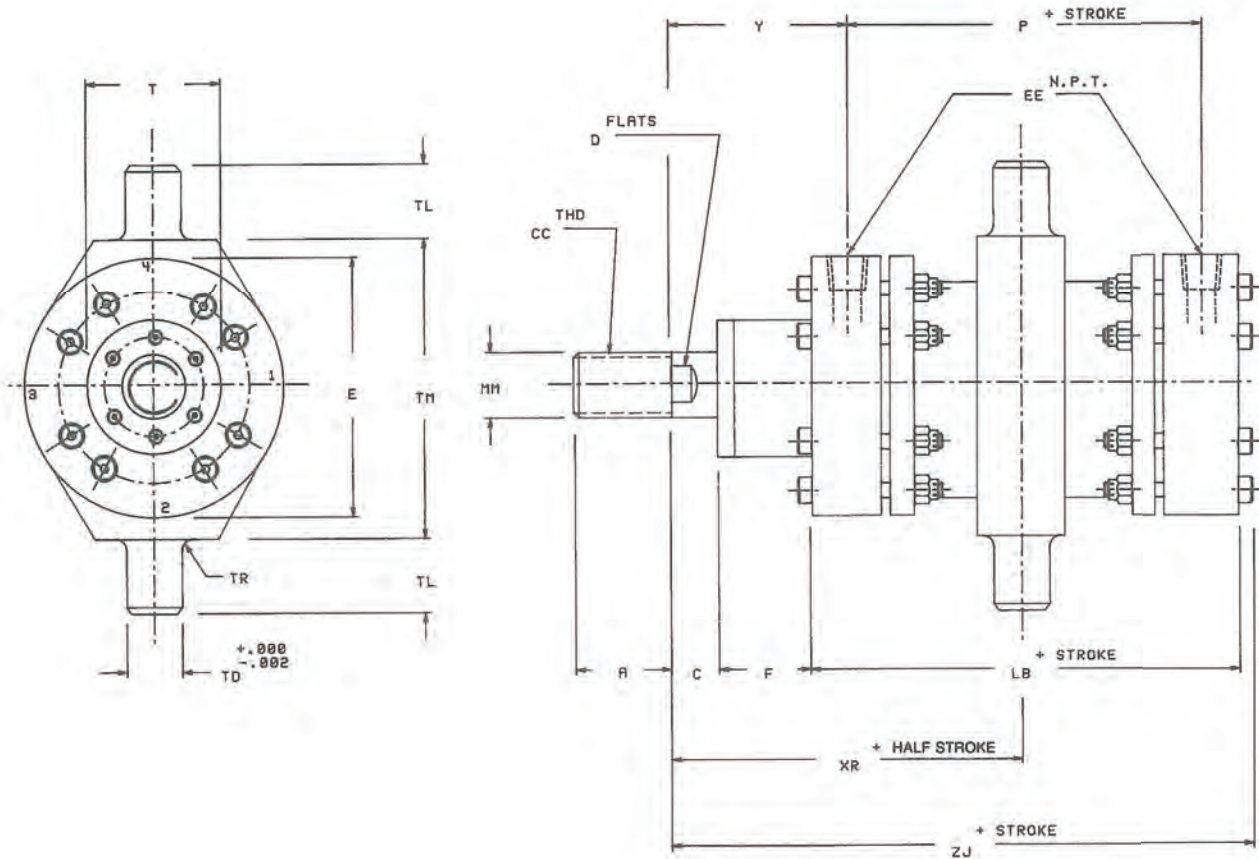
Clevis Mounting Style 3 • 3000 psi

LINDBERG
FLUID POWER



CLEVIS MOUNTING STYLE 3

BORE	MM ROD DIA	2:1 ROD DIA	A	CC	C	D	EE	F	P	Y	E	CB	CD	CW	MR	L	LB	XC
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	4	1	.875	3/4	1 1/8	1 1/2	5 3/4	10 1/8
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	4 1/2	1	1.000	3/4	1 1/8	1 1/2	6 3/8	10 3/4
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	5	1 1/4	1.250	7/8	1 1/4	1 5/8	6 3/8	11 1/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	6	1 1/2	1.500	1	1 1/2	2	6 3/4	11 13/16
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	6 1/2	1 3/4	1.750	1 1/8	1 3/4	2 1/4	6 3/4	12 1/16
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	7 3/4	2 1/4	2.250	1 1/2	2 1/4	2 3/4	8 3/8	14 3/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	9 1/4	2 1/2	2.500	1 1/2	2 1/4	3	8 7/8	14 15/16
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	10 1/2	3	2.750	1 1/2	2 3/4	3 5/8	9 5/8	16 7/16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	11 3/4	3 1/4	3.000	1 3/4	3	3 7/8	10 3/8	17 7/16
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	15	4 1/2	3.500	2 1/4	3 1/2	4 1/2	11 7/8	19 11/16
12	5	8 1/2	8 1/2	4 1/2-8	1/2	4 3/4	1 1/2	2 13/16	9 1/8	4 11/16	18	5	4.000	2 1/2	4	5	11 7/8	20 3/16



TRUNNION MOUNTING STYLE 4

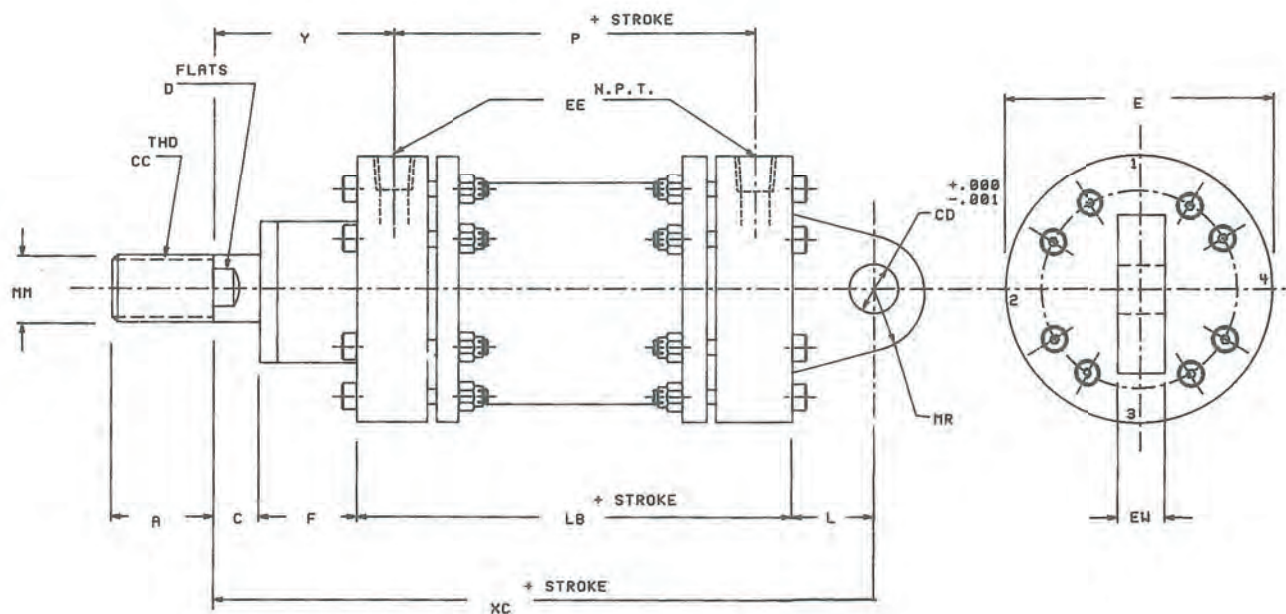
BORE	MM	2:1	A	CC	C	D	EE	F	P	Y	E	T	TD	TL	TM	TR	LB	XR	ZJ
ROD DIA	ROD DIA																		
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	4	2 1/2	1.125	1 1/8	5	1/8	5 3/4	5 3/4	9
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	4 1/2	2 3/4	1.250	1 3/8	5 1/2	1/8	6 3/8	6 1/16	9 5/8
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	5	3 1/8	1.375	1 1/2	6 1/4	1/8	6 3/8	6 1/4	9 13/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	6	3 5/8	1.500	1 1/2	6 3/4	1/8	6 3/4	6 7/16	10 3/16
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	6 1/2	3 7/8	1.625	1 1/2	7 3/4	1/8	6 3/4	6 7/16	10 5/16
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	7 3/4	4 5/16	1.750	1 3/4	9 1/2	1/8	8 3/8	7 1/4	11 15/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	9 1/4	4 11/16	2.250	2 1/2	10	1/8	8 7/8	7 1/2	12 9/16
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	10 1/2	5 1/4	2.500	3	11	1/8	9 5/8	8	13 9/16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	11 3/4	5 5/8	3.000	3 1/2	13 1/2	1/8	10 3/8	8 3/8	14 5/16
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	15	6 1/2	3.500	4	16	1/8	11 7/8	9 1/4	15 15/16
12	5	8 1/2	8 1/2	4 1/4-8	1/2	4 3/4	1 7/2	2 13/16	9 1/8	4 11/16	18	7 9/16	4.250	4 1/2	18 1/2	1/8	11 7/8	9 1/4	16 3/16

Series BMMH - 110

Heavy Duty Mill Type

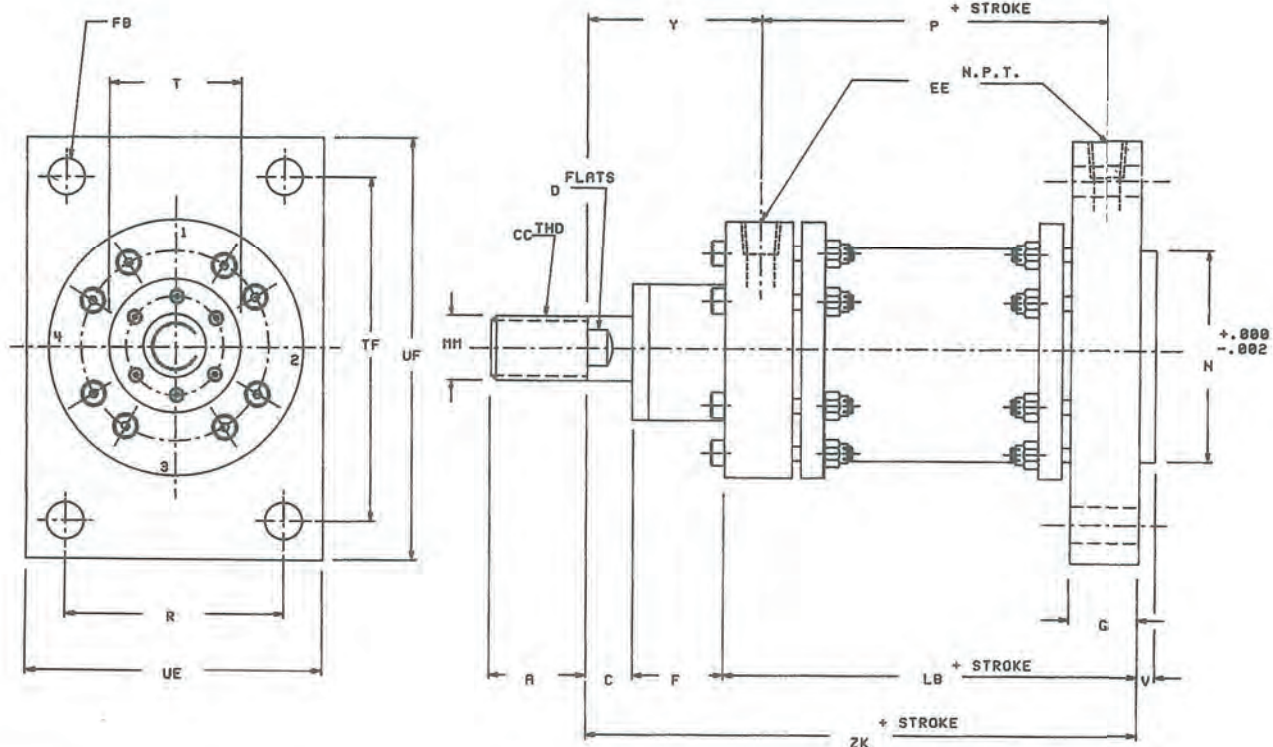
HYDRAULIC CYLINDERS

Pivot Lug Mounting Style 5 • 3000 psi



PIVOT LUG MOUNTING STYLE 5

BORE	MM ROD DIA	2:1 ROD DIA	A	CC	C	D	EE	F	P	Y	E	EW	CD	MR	L	LB	XC
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	4	1	.875	1 1/8	1 1/2	5 3/4	10 1/8
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	4 1/2	1	1.000	1 1/8	1 1/2	6 3/8	10 3/4
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	5	1 1/4	1.250	1 1/4	1 5/8	6 3/8	11 1/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	6	1 1/2	1.500	1 1/2	2	6 3/4	11 13/16
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	6 1/2	1 3/4	1.750	1 3/4	2 1/4	6 3/4	12 1/16
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	7 3/4	2 1/4	2.250	2 1/4	2 3/4	8 3/8	14 3/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	9 1/4	2 1/2	2.500	2 1/4	3	8 7/8	14 15/16
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	10 1/2	3	2.750	2 3/4	3 5/8	9 5/8	16 7/16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	11 3/4	3 1/4	3.000	3	3 7/8	10 3/8	17 7/16
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	15	4 1/2	3.500	3 1/2	4 1/2	11 7/8	19 11/16
12	5	8 1/2	8 1/2	4 1/2-8	1/2	4 3/4	1 1/2	2 13/16	9 1/8	4 11/16	18	5	4.000	4	5	11 7/8	20 3/16

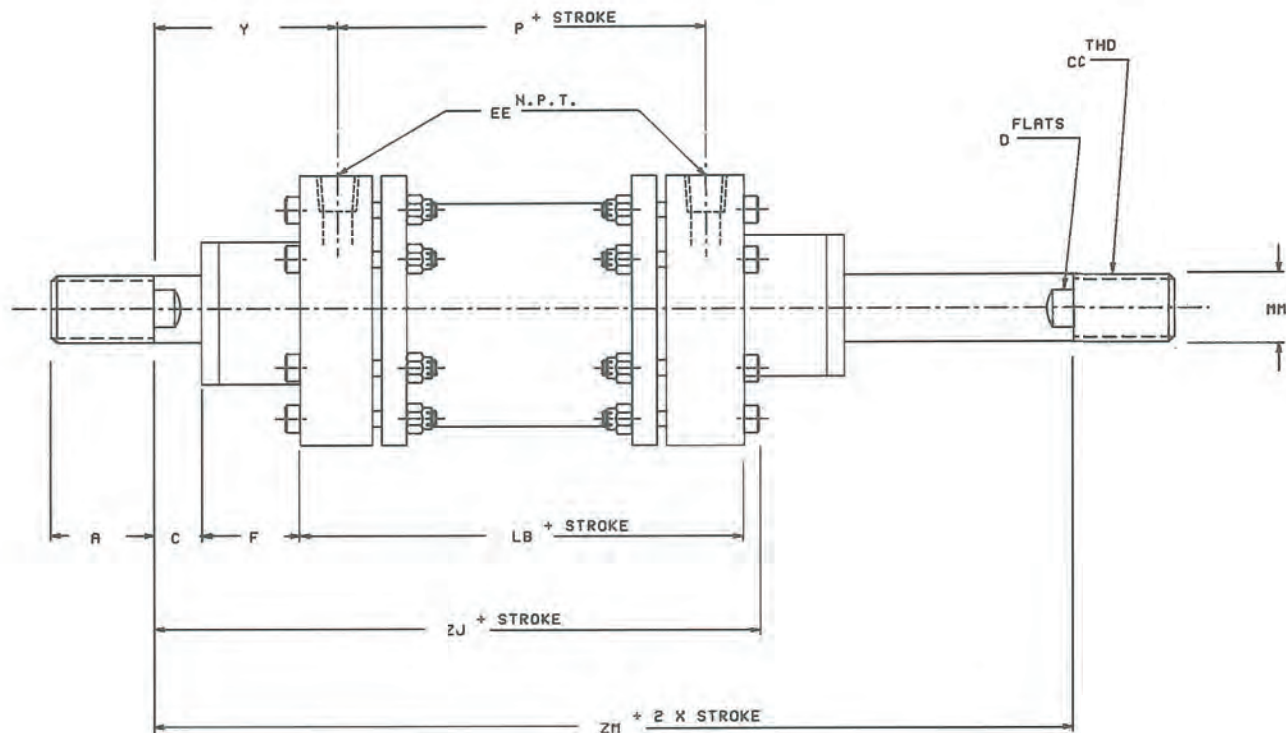


REAR FLANGE MOUNTING STYLE 6

BORE	MM ROD DIA	2:1 ROD DIA	A	CC	C	D	EE	F	P	Y	V	G	N	FB	T	R	LB	TF	UE	UF	ZK
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	1/4	1 1/2	2.250	9/16	2 1/2	3 1/2	5 3/4	4 3/4	4 3/4	6	8 5/8
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	1/4	1 5/8	3.000	11/16	2 3/4	3 3/4	6 3/8	6 1/2	5 1/8	8	9 1/4
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	1/4	1 5/8	3.625	13/16	3 1/8	4 1/2	6 3/8	6 3/4	6	8 3/4	9 7/16
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	1/4	1 5/8	4.000	15/16	3 5/8	4 1/2	6 3/4	7 1/2	6 1/2	9 1/2	9 13/16
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	1/4	1 5/8	4.500	1 1/16	3 7/8	5 1/2	6 3/4	8 1/2	7 1/2	11	9 13/16
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	1/4	2	5.750	1 5/16	4 5/16	6 1/2	8 3/8	9 1/2	9 1/4	12 1/2	11 7/16
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	1/4	2	6.500	1 9/16	4 11/16	6 1/2	8 7/8	11 1/2	9 3/4	15	11 15/16
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	1/4	2	7.750	1 9/16	5 1/4	7 1/2	9 5/8	12 1/2	10 3/4	16	12 13/16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	1/4	2 3/8	8.750	1 13/16	5 5/8	9	10 3/8	15	13	19	13 9/16
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	1/4	2 3/4	10.000	2 3/8	6 1/2	11	11 7/8	18 1/4	15 1/2	23	15 3/16
12	5	8 1/2	8 1/2	4 1/2-8	1/2	4 3/4	1 1/2	2 13/16	9 1/8	4 11/16	1/4	2 3/4	11.500	2 5/8	7 9/16	12	11 7/8	20 1/2	18	26	15 3/16

Series BMMH - 110
Heavy Duty Mill Type
AIR CYLINDERS

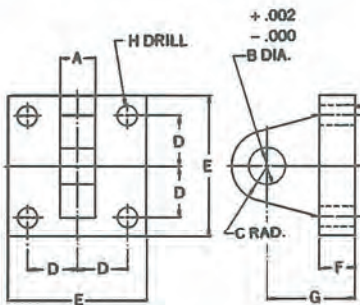
Double Rod End Mounting Style 7 • 3000 psi



DOUBLE ROD END MOUNTING STYLE 7

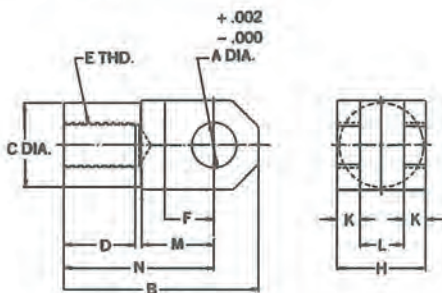
BORE	MM ROD DIA	2:1 ROD DIA	A	C	C	D	EE	F	P	Y	LB	ZJ	ZM
2	1	1 3/8	2 3/8	1-14	1/2	7/8	1/2	2 3/8	4 1/4	3 5/8	5 3/4	9	11 1/2
2 1/2	1 1/4	1 3/4	2 3/4	1 1/4-12	1/2	1 1/8	3/4	2 3/8	4 3/4	3 11/16	6 3/8	9 5/8	12 1/8
3	1 1/2	2 1/4	2 3/4	1 1/4-12	1/2	1 1/4	3/4	2 9/16	4 3/4	3 7/8	6 3/8	9 13/16	12 1/2
3 1/2	2	2 1/2	3 3/4	1 3/4-12	1/2	1 3/4	3/4	2 9/16	5 1/8	3 7/8	6 3/4	10 3/16	12 7/8
4	2 1/4	2 3/4	4 1/2	2-8	1/2	2	3/4	2 9/16	5 1/8	3 7/8	6 3/4	10 5/16	12 7/8
5	2 1/2	3 1/2	5	2 1/4-8	1/2	2 1/4	1	2 9/16	6 3/8	4 1/16	8 3/8	11 15/16	14 1/2
6	2 3/4	4 1/4	5 1/2	2 1/2-8	1/2	2 1/2	1	2 9/16	6 7/8	4 1/16	8 7/8	12 9/16	15
7	3 1/4	5	6	2 3/4-8	1/2	3	1	2 11/16	7 5/8	4 3/16	9 5/8	13 9/16	16
8	3 1/2	5 3/4	7	3-8	1/2	3 1/4	1 1/4	2 11/16	8	4 3/8	10 3/8	14 5/16	16 3/4
10	4 1/4	7	8	3 3/4-8	1/2	4	1 1/2	2 13/16	9 1/8	4 11/16	11 7/8	15 15/16	18 1/2
12	5	8 1/2	8 1/2	4 1/2-8	1/2	4 3/4	1 1/2	2 13/16	9 1/8	4 11/16	11 7/8	16 3/16	18 1/2

CLEVIS MTG. BRKT.



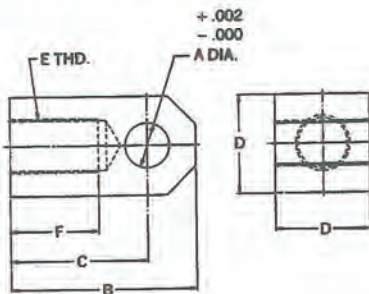
BORE	A	B	C	D	E	F	G	H
2	31/32	.875	7/8	1 1/16	3	9/16	1 13/16	9/16
2 1/2	31/32	1.000	1	1 7/16	4	11/16	2 1/16	11/16
3	1 7/32	1.250	1 1/4	1 7/8	5	15/16	2 9/16	13/16
3 1/2	1 15/32	1.500	1 1/2	2	5 1/2	1 1/16	3 1/16	15/16
4	1 23/32	1.750	1 3/4	2 1/8	6	1 3/16	3 7/16	1 1/16
5	2 3/16	2.250	2 1/4	2 1/2	7	1 7/16	4 3/16	1 5/16
6	2 7/16	2.500	2 1/2	2 7/8	8 1/4	1 11/16	4 15/16	1 9/16
7	2 15/16	2.750	2 3/4	3 3/8	9 1/4	1 13/16	5 7/16	1 9/16
8	3 3/16	3.000	3	3 5/8	10	1 15/16	5 13/16	1 13/16
10	4 7/16	3.500	3 1/2	4 7/8	13 1/4	2 3/16	6 11/16	2 3/8
12	4 15/16	4.000	4	5 7/8	15 3/4	2 7/16	7 7/16	2 5/8

ROD CLEVIS



BORE	A	B	C	D	E	F	H	K	L	M	N
2	.875	4 11/16	1 5/8	1 7/8	1-14	1 1/8	1 3/4	7/16	7/8	1 7/8	3 13/16
2 1/2	1.000	5 3/8	1 7/8	2 1/16	1 1/4-12	1 1/4	2	1/2	1	2 1/4	4 3/8
3	1.250	5 7/8	2 3/8	2 1/16	1 1/4-12	1 1/2	2 1/2	5/8	1 1/4	2 3/4	4 5/8
3 1/2	1.500	7 1/4	2 7/8	2 13/16	1 3/4-12	1 3/4	3	3/4	1 1/2	2 3/4	5 3/4
4	1.750	8 1/2	3 3/8	3 7/16	2-8	2	3 1/2	7/8	1 3/4	3 1/4	6 3/4
5	2.250	10	4 3/8	3 13/16	2 1/4-8	2 1/2	4 1/2	1 1/8	2 1/4	4	7 3/4
6	2.500	10 7/8	4 7/8	4 1/16	2 1/2-8	2 3/4	5	1 1/4	2 1/2	4 1/4	8 3/8
7	2.750	11 7/8	5 3/8	4 7/16	2 3/4-8	3	5 1/2	1 3/8	2 3/4	4 3/4	9 1/8
8	3.000	13 3/8	5 7/8	5 5/16	3-8	3 1/4	6	1 1/2	3	5 1/4	10 3/8
10	3.500	15	6 7/8	5 7/8	3 3/4-8	3 3/4	7	1 3/4	3 1/2	6	11 1/2
12	4.000	16 1/4	7 7/8	6	4 1/2-8	4 1/4	8	2	4	6 3/4	12 1/4

ROD EYE



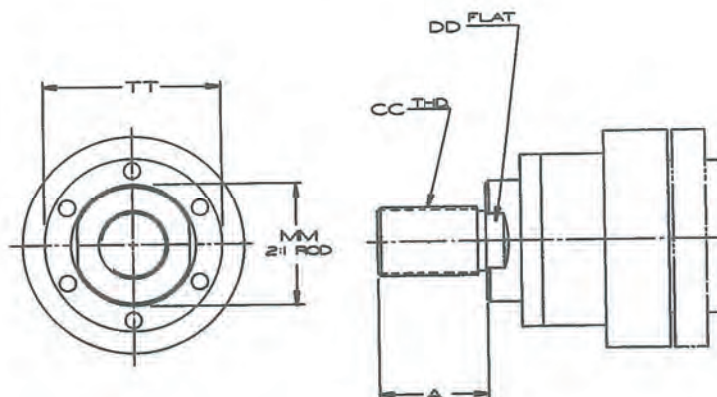
BORE	A	B	C	D	E	F
2	.875	4	3 1/8	1 3/4	1-14	1 7/8
2 1/2	1.000	4 5/8	3 5/8	2	1 1/4-12	2 1/16
3	1.250	5	3 3/4	2 1/2	1 1/4-12	2 1/16
3 1/2	1.500	6 1/4	4 3/4	3	1 3/4-12	2 13/16
4	1.750	7 3/8	5 5/8	3 1/2	2-8	3 7/16
5	2.250	8 5/8	6 3/8	4 1/2	2 1/4-8	3 13/16
6	2.500	9 3/8	6 7/8	5	2 1/2-8	4 1/16
7	2.750	10 1/4	7 1/2	5 1/2	2 3/4-8	4 7/16
8	3.000	11 5/8	8 5/8	6	3-8	5 5/16
10	3.500	13	9 1/2	7	3 3/4-8	5 7/8
12	4.000	14	10	8	4 1/2-8	6

ROD CLEVIS PIN



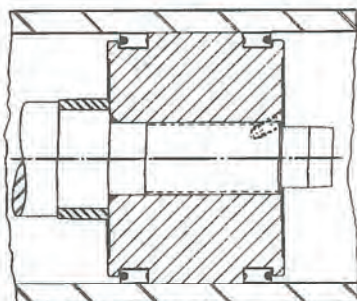
BORE	A	B	C
2	.875	1 7/8	2 1/4
2 1/2	1.000	2 1/8	2 1/2
3	1.250	2 5/8	3
3 1/2	1.500	3 1/8	3 1/2
4	1.750	3 5/8	4
5	2.250	4 5/8	5
6	2.500	5 1/8	5 1/2
7	2.750	5 5/8	6
8	3.000	6 1/8	6 5/8
10	3.500	7 1/8	7 5/8
12	4.000	8 1/8	8 5/8

2:1 ROD DIMENSIONS

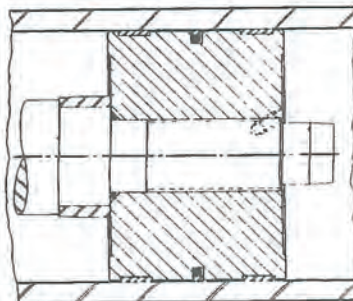


BORE	MM ROD DIA	A	CC	DD	TT
2	1 3/8	2 3/8	1-14	2 1/4	3
2 1/2	1 3/4	2 3/4	1 1/4-12	1 5/8	3 1/2
3	2 1/4	2 3/4	1 1/4-12	2 1/2	3 7/8
3 1/2	2 1/2	3 3/4	1 3/4-12	3 1/2	4 5/16
4	2 3/4	4 1/2	2-8	4 1/4	4 11/16
5	3 1/2	5	2 1/4-8	4 3/4	5 5/8
6	4 1/4	5 1/2	2 1/2-8	5 1/4	6 1/2
7	5	6	2 3/4-8	5 3/4	7 9/16
8	5 3/4	7	3-8	6 3/4	8 7/16
10	7	8	3 3/4-8	7 3/4	9 3/4
12	8 1/2	8 1/2	4 1/2-8	8 1/4	11 1/4

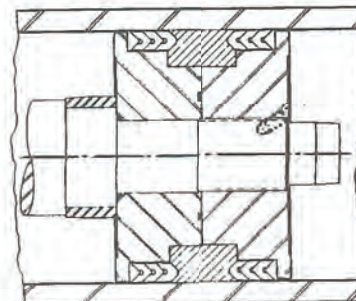
OPTIONAL PISTONS



Poly-Seal
"O" ring expanded
Tough polyurethane seal



Bronze filled wear strip and
slipper seal.



Vee packed piston — steel
followers and cast iron or
bronze bearing.

OPTIONAL FEATURES

1. S.A.E. straight thread "O" ring ports
2. Longer than standard cushions
3. Protective boots
4. High temperature service
5. Modified or special mountings
6. Special anti-corrosion treating for rod and tube
7. Special piston seals and bearings
8. Bronze coated steel pistons
9. Stop tubes
10. Case hardened piston rods
11. Proximity switches
12. Piston rod diameters other than standard
13. Larger bore diameters
14. Additional rod extension
15. Rod end modifications
16. Increased port size
17. Increased operating pressure
18. Many other options as required.

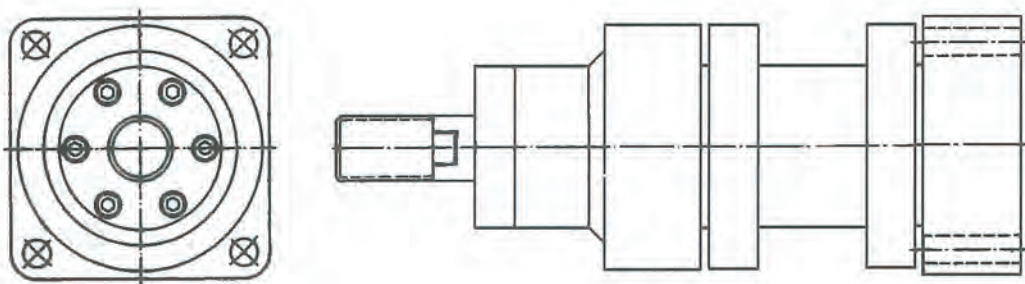


Series HMH - 103
Mill Type
HYDRAULIC CYLINDERS
2000 psi

SERIES HMH-103

Mill-Type Hydraulic Cylinders

2000 PSI - This cylinder incorporates a C-ring flange mounted design with proven dependability in harsh environments.



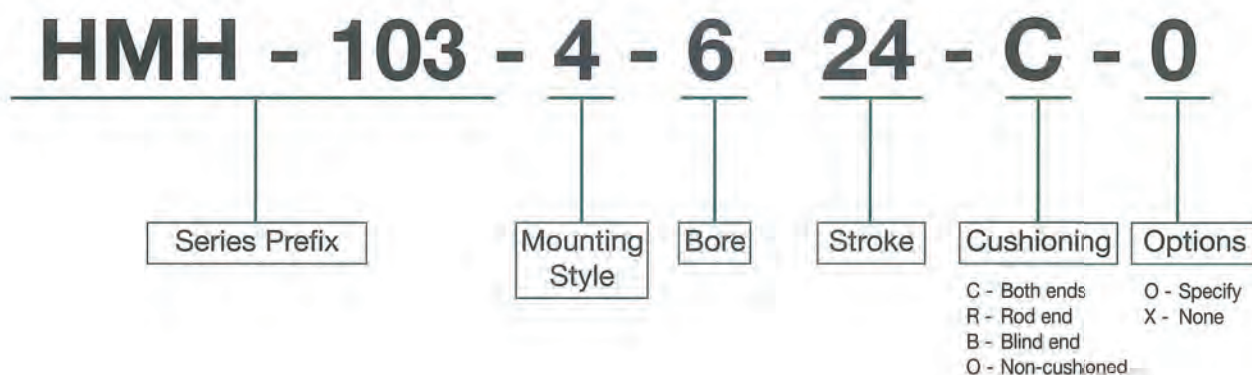
- Wide range of standard bore sizes from 2" to 8".
- Five different mounting styles to choose from.
- Many accessories and options are available (see pp. 29, 30, 36).

Series HMH - 103
Mill Type
HYDRAULIC CYLINDERS
2000 psi



HOW TO ORDER

Model Number Designation

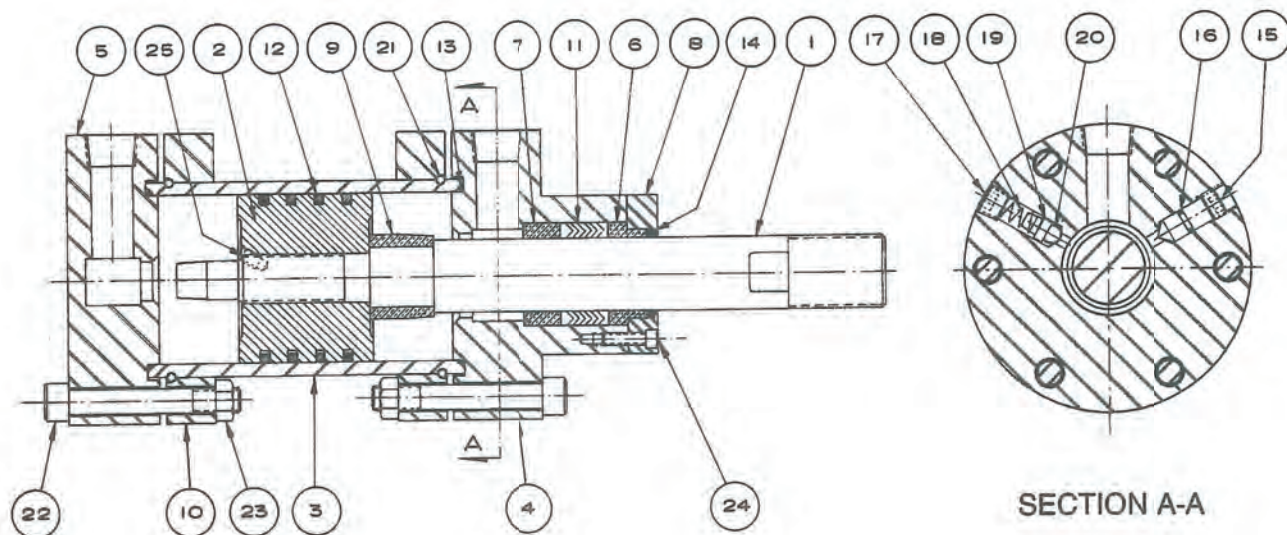


When ordering please specify:

- Correct Model Number
- Port Location if not as shown
- Any other optional features as described on page 30

For larger bore sizes or custom design cylinders consult our engineering department for design specifications and quotation.

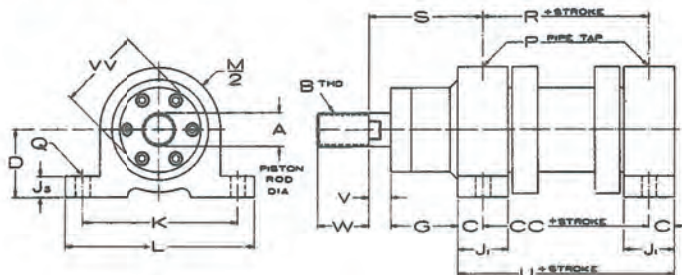
CONSTRUCTION FEATURES



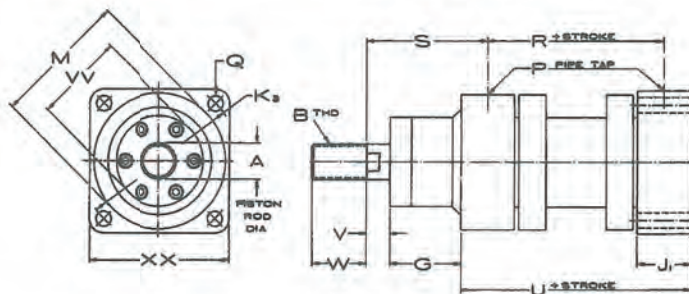
1. **PISTON ROD:** Chrome plated
2. **PISTON**
3. **TUBE:** Chrome plated
4. **HEAD CAP**
5. **END CAP**
6. **ROD GUIDE**
7. **THROAT BEARING**
8. **PACKING GLAND**
9. **CUSHION PLUG**
10. **FLANGE**
11. **CHEVRON PACKING**
12. **PISTON RINGS**
13. **O-RING**

14. **ROD WIPER**
15. **METERING SCREW**
16. **O-RING**
17. **PIPE PLUG**
18. **SPRING**
19. **SPRING ADAPTER**
20. **BALL**
21. **C-RING**
22. **HEAD BOLTS**
23. **SELF-LOCKING NUTS**
24. **PACKING GLAND SCREWS**
25. **SOCKET HEAD SET SCREW**

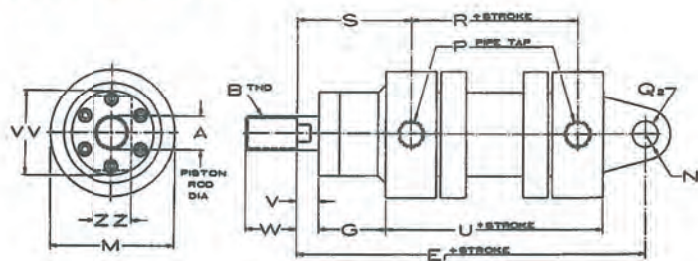
FOOT MOUNTING STYLE 1



BLIND END FLANGE MOUNTING STYLE 2

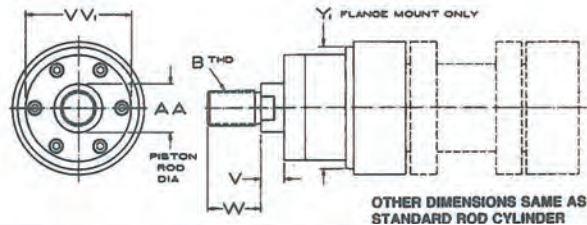


HINGE MOUNTING STYLE 3



BORE	A	AA	B	C	CC	D	E	E ₁	F	G	H	HR	J	J ₁	K	K ₃	L	L ₁	M	N ₁
2	1	1 3/8	1-14	3/4	2 3/4	2	5 3/4	9 1/8	1/4	2 5/8	1.250/1.248	1/16	5/8	1 1/2	4 3/4	4 9/16	5 3/4	5 3/8	3 13/16	3/4
2 1/2	1 1/4	1 3/4	1 1/4-12	3/4	3	2 3/8	5 7/8	9 5/8	1/4	2 5/8	1.250/1.248	1/16	5/8	1 1/2	5 5/8	5 7/16	7	6 1/8	4 1/2	1
3	1 1/2	2 1/4	1 1/2-12	13/16	4	2 5/8	6 5/16	10 7/8	1/4	2 1/2	1.375/1.373	1/8	7/8	1 5/8	6 3/8	6 3/16	8	7 1/8	5	1 1/4
4	1 1/2	2 3/4	1 1/2-12	15/16	4 5/8	3 3/8	6 3/4	11 7/8	1/4	2 1/2	1.750/1.748	1/8	7/8	1 7/8	8 1/8	8 1/8	10	8 7/8	6 1/2	1 3/8
5	1 3/4	3 3/4	1 3/4-12	1 1/16	5 3/4	4	7 3/8	13 5/16	1/4	2 7/16	2.000/1.998	3/16	1	2 1/8	9 7/8	9 3/4	12	10 7/8	7 3/4	1 1/2
6	2 1/2	4 1/4	2 1/2-8	1 1/16	6 1/4	4 3/4	7 7/8	14 1/16	1/4	2 11/16	2.250/2.248	3/16	1 1/4	2 1/8	11 3/4	11 5/8	14 1/4	12 3/8	9 1/4	1 1/2
7	2 1/2	5	2 1/2-8	1 5/16	7 1/2	5 3/8	8 15/16	16 1/2	1/4	2 7/8	2.500/2.498	3/16	1 1/2	2 5/8	13 1/4	13 1/8	16	14 1/8	10 1/2	2
8	3	5 3/4	3-8	1 5/16	7 1/2	6	8 15/16	16 1/2	1/4	2 7/8	2.500/2.498	3/16	1 1/2	2 5/8	14 3/4	14 5/8	17 3/4	15 3/8	11 3/4	2

*2:1 PISTON ROD



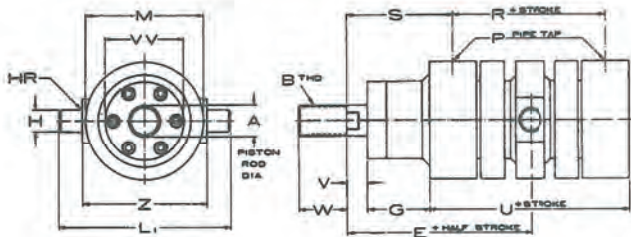
2:1 DIFFERENTIAL — PISTON ROD

A 2:1 piston rod has approximately one half the cross sectional area of the bore; thus the term 2:1.

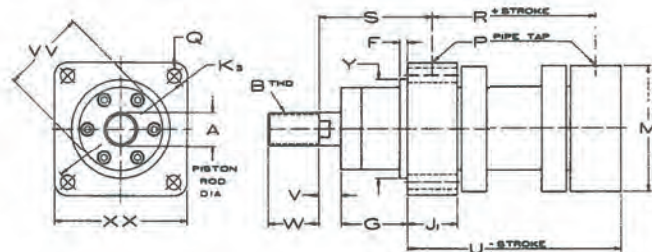
The selection of this rod is usually due to one of the following considerations:

1. Long stroke cylinder where greater piston rod rigidity is desired.
2. Fast piston rod return—Normally, the “return” speed is about twice that of the “work” stroke, when a 2:1 rod is used.
3. Same speed in both directions—proper valving will give the same rate of travel in both directions
4. Heavy pushing load - 2:1 rod provides shoulder at threaded end for extra load bearing surface.

TRUNNION MOUNTING STYLE 4



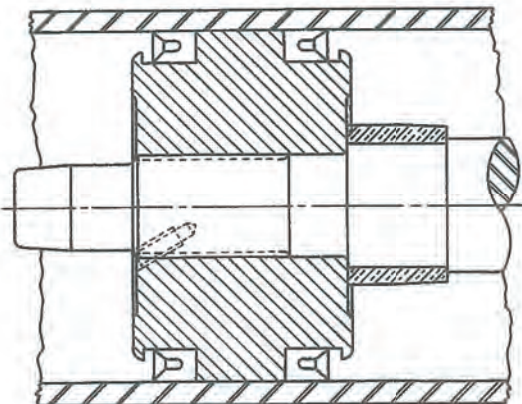
ROD END FLANGE MOUNTING STYLE 6



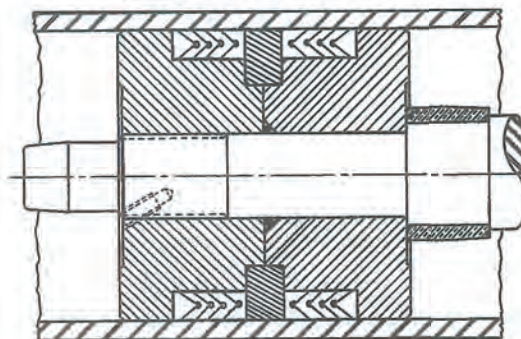
*2 and 2 1/2 bore cylinders with 2:1 rods cannot be cushioned on the rod end.

															WEIGHT			
															STD ROD		2:1 ROD	
P	Q	Q ₂	R	S	U	V	VV	VV ₁	W	XX	Y	Y ₁	Z	ZZ	ZERO STROKE	PER INCH	ZERO STROKE	PER INCH
1/2	13/32	3/4	2 3/4	4 3/8	4 1/4	1	2 1/2	3	1 1/2	4	3.000/2.995	3.500/3.495	3 7/8	1	18	.7	20	1.4
1/2	17/32	1	3	4 3/8	4 1/2	1	2 3/4	3 3/8	1 3/4	4 3/4	3.250/3.245	3.875/3.870	4 5/8	1 1/4	28	.9	30	1.9
3/4	21/32	1 1/4	4	4 3/16	5 5/8	1	3 1/8	3 7/8	2	5 1/2	3.625/3.620	4.375/4.370	5 1/8	1 1/2	39	1.2	42	2.9
3/4	25/32	1 3/8	4 5/8	4 7/16	6 1/2	1	3 1/8	4 11/16	2 1/4	7 3/16	3.625/3.620	5.375/5.370	6 5/8	1 3/4	75	1.4	80	4.6
1	1 1/32	1 1/2	5 3/4	4 1/2	7 7/8	1	3 1/2	5 7/8	2 3/4	8 3/4	4.000/3.995	6.562/6.557	7 7/8	2	132	2.5	139	8.1
1	1 9/32	1 1/2	6 1/4	4 3/4	8 3/8	1	4 5/16	6 1/2	3	10 1/2	5.250/5.245	7.437/7.432	9 3/8	2	197	4.3	207	11.4
1 1/4	1 13/32	2	7 1/2	5 3/16	10 1/8	1	4 5/16	7 9/16	3 3/4	11 7/8	5.250/5.245	8.500/8.495	10 5/8	3	300	4.7	318	14.0
1 1/4	1 17/32	2	7 1/2	5 3/16	10 1/8	1	4 7/8	8 1/16	4	13	5.875/5.870	9.375/9.370	11 7/8	3	380	5.8	396	19.2

ALTERNATE PISTON DESIGNS



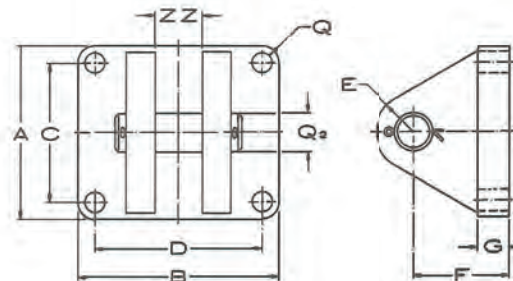
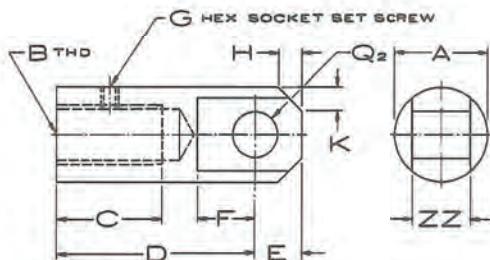
U-RING PACKED PISTON



CHEVRON PACKED PISTON

Consult our engineering department for dimensional changes resulting from the selection of these alternate piston designs. In addition to the above designs, many other variations are possible. Consult our engineering department for recommendations for your particular design problem.

ACCESSORIES



PART NO.	CYL. BORE	A	B	C	D	E	F	G	H	K	Q ₂	ZZ
31003-31	2	17/8	1-14	2 1/4	4	15/16	1	3/8-16	5/8	15/32	3/4	1
31003-32	2 1/2	2	1 1/4-12	2 1/4	4 1/4	1	1 1/4	3/8-16	1/2	1/2	1	1 1/4
31003-33	3	2 1/2	1 1/2-12	2 3/4	5 1/2	1 1/4	1 1/2	3/8-16	1/2	5/8	1 1/4	1 1/2
31003-34	4	2 7/8	1 1/2-12	3 1/4	6 1/2	1 7/16	1 3/4	1/2-13	1	13/16	1 3/8	1 3/4
31003-36	5	3	1 3/4-12	3 3/4	7 1/2	1 1/2	2	1/2-13	7/8	13/16	1 1/2	2
31003-37	6	3 1/2	2 1/2-8	3 3/4	8	1 3/4	2 1/4	5/8-11	1 1/2	1 1/16	1 1/2	2
31003-38	7	4 3/8	2 1/2-8	4 1/4	8 1/2	2 3/16	2 1/2	3/4-10	1 3/8	1 3/16	2	3
31003-39	8	4 3/8	3-8	4 1/4	8 3/4	2 3/16	2 1/2	3/4-10	1 3/8	1 3/16	2	3

PART NO.	CYL. BORE	A	B	C	D	E	F	G	Q	Q ₂	ZZ
31003-11	2	3 1/2	4 1/4	2 3/4	3 1/2	3/4	17/8	5/8	7/16	3/4	1
31003-12	2 1/2	4 1/2	5 1/4	3 5/8	4 3/8	1	2 3/8	3/4	9/16	1	1 1/4
31003-13	3	5 3/4	6 1/2	4 1/2	5 1/4	1 1/4	3	1	13/16	1 1/4	1 1/2
31003-14	4	6	8 1/4	4 1/2	6 3/4	1 3/8	3 1/4	1 1/4	15/16	1 3/8	1 3/4
31003-15	5-6	7	10 1/4	5	8 1/4	1 1/2	3 7/8	1 1/2	15/16	1 1/2	2
31003-16	7-8	9	13 1/2	6 1/2	11	2	4 3/4	1 3/4	1 9/16	2	3

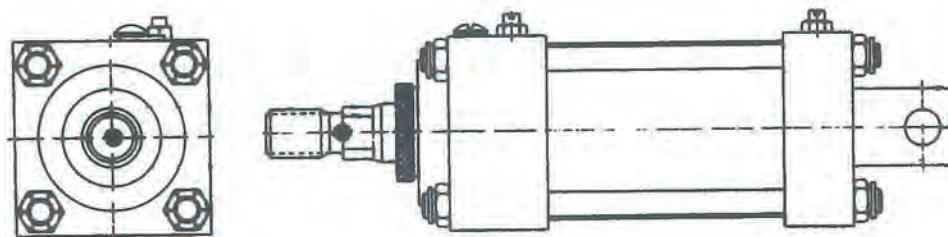


S Line Air & Hydraulic CYLINDERS

250 psi air • up to 1000 psi hydraulic

SQUAREHEAD "S" LINE SERIES

Rated at 250 PSI for air and up to 1000 PSI for hydraulic. Ideal for low and medium pressure needs. Mounting styles with standardized dimensions to fit your needs.



- Wide range of standard bore sizes from 1 1/2" to 6".
- Eleven different mounting styles to choose from.
- Many accessories and options are available (see pg. 49).

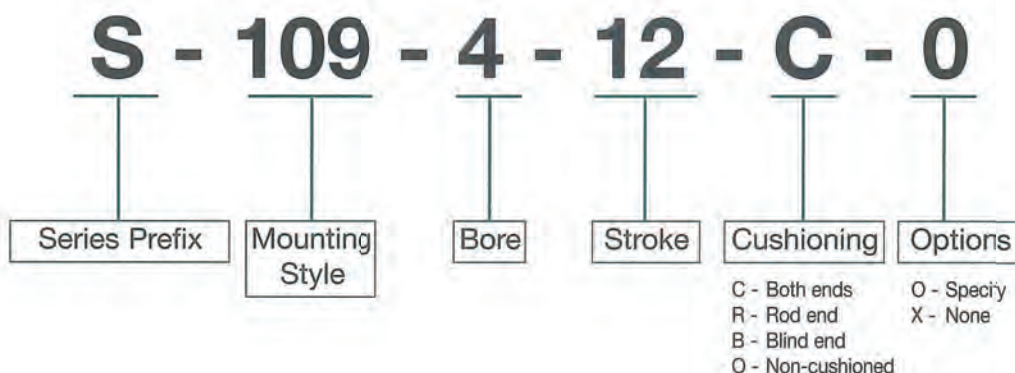
S Line Air
& Hydraulic
CYLINDERS

250 psi air • Up to 1000 psi hydraulic



HOW TO ORDER

Model Number Designation



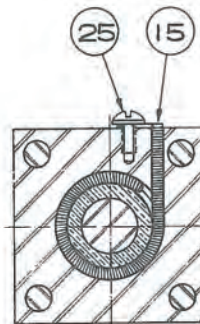
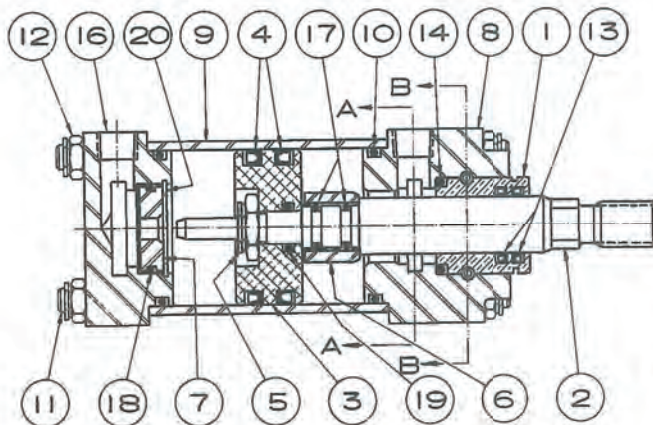
To insure prompt and correct processing of your order or request for quotation, please include the following information:

- | | |
|--|---|
| 1. Quantity | 7. Specify trunnion location if other than standard (type 109 mounting only). |
| 2. Model (type of mounting) | 8. Fluid pressure |
| 3. Bore | 9. Air, Oil, or what other fluid? |
| 4. Stroke | 10. Operating temperature (if abnormally high or low) |
| 5. Cushions desired | |
| 6. Piston rod end desired (either style 2, 3 or 4) | |

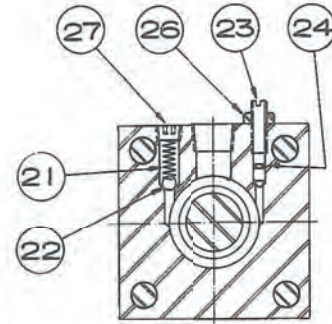
SQUAREHEAD "S" LINE CYLINDERS

A feature packed line with the "quick change" feature - Rod cartridge may be removed and replaced in minutes without disassembly of cylinder or use of special tools. Rated 250 psi for air, up to 1000 psi hydraulic. 7 bore sizes up thru 6". Mounting styles with standardized dimensions to fit your needs. Ideal for your low and medium pressure needs.

CONSTRUCTION FEATURES



SECTION B-B



SECTION A-A

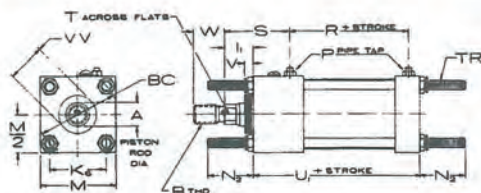
1. **ROD CARTRIDGE:** High strength bronze with generous bearing area for piston rod. Cartridge may be easily removed and replaced without dismantling any other part of the cylinder. Rod packing, wiper, and rod bearing can be replaced as a unit.
2. **PISTON ROD:** This large diameter, hard chrome plated steel rod is engineered to eliminate stress concentration at shoulders and threads insuring greater strength.
3. **PISTON:** One piece construction. Material is high strength aluminum alloy, which offers low friction and low inertia.
4. **PISTON PACKING:** "U" cup design. Easily replaced without removing piston from rod.
5. **PISTON ROD NUT:** Full floating on "O" rings. Floating construction eliminates misalignment, permits closer fit of male and female cushion members. This means better cushioning.
6. **ROD END CUSHION:** Full floating on "O" rings. Floating construction eliminates misalignment, permits closer fit of male and female cushion members. This means better cushioning.
7. **BLIND END CUSHIONING:** Full floating on "O" ring. Provides same effective cushion as on rod end.
8. **ROD END HEAD:** Solid steel, precision machined. Gives rod cartridge full support and accurate location without loose face plates.
9. **CYLINDER TUBE:** High strength steel tubing resists mechanical damage and has a hard chrome plated, low micro-inch finish bore for long life of piston packing.
10. **HEAD TO TUBE SEAL:** "O" Ring—Pressure Type Seal.
11. **TIE RODS:** Pre-stressed to several times rated load.
12. **TIE ROD NUT:** Self-locking type, pre-torqued. Not affected by vibration.
13. **PISTON ROD PACKING AND WIPER:** "U" cup design. Entire cartridge replaceable as a unit.
14. **ROD CARTRIDGE SEAL:** "O" ring—positive seal of cartridge.
15. **ROD CARTRIDGE RETAINING SPRING:** Stainless steel, close wound high strength, located for positive locking of rod cartridge.
16. **BLIND END HEAD:** Solid steel, precision machined.
17. **ROD END CUSHION SEALS:** "O" rings which assure balanced cushion float and prevent cushion leakage.
18. **BLIND END CUSHION SEAL:** "O" ring to assure balanced cushion float and prevent cushion leakage.
19. **PISTON TO ROD SEAL:** "O" ring Positive Seal between rod and piston.
20. **BLIND END CUSHION RETAINING RING:** Steel, snap ring for positive lock.
21. **CHECK VALVE SPRING:** Stainless steel, designed for low break-away pressure.
22. **CHECK VALVE BALL:** High chrome, high carbon, hardened steel ball.
23. **METERING SCREW:** Fine threaded for easier cushion adjustment.
24. **METERING SCREW SEAL:** "O" ring.
25. **RETAINING SCREW:** Truss head type.
26. **METERING SCREW LOCK NUT**
27. **CHECK VALVE PLUG**

S Line Air & Hydraulic CYLINDERS

250 psi air • Up to 1000 psi hydraulic

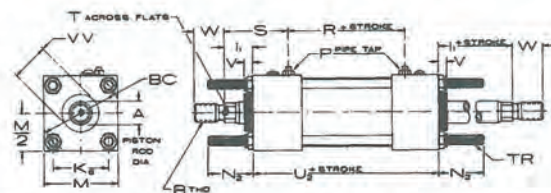


TIE ROD MOUNTING-MODEL 101-104



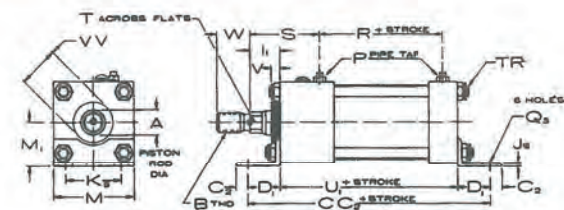
Model 101 - Tie Rods not extended (basic)
Model 102 - Tie Rods extended, blind end
Model 103 - Tie Rods extended, rod end
Model 104 - Tie Rods extended, both ends (shown)

DOUBLE END PISTON ROD-MODEL 104



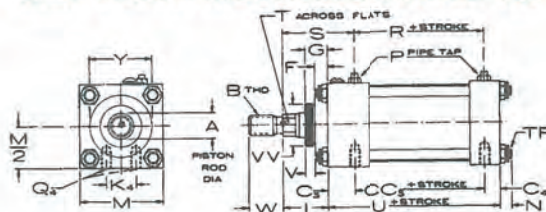
Also available in all other Models except 112 and 113—Add Prefix "D" to Model Number.

ANGLE MOUNTING-MODEL 105



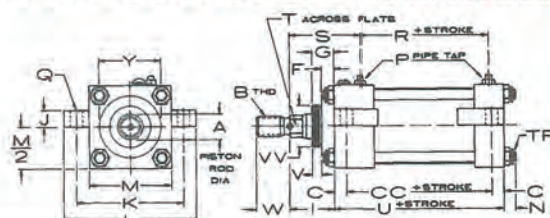
For double end rod cylinders, use U_2 instead of U_1 to find CC_2 add U_2 to 2 D_1 .

SIDE FLUSH MOUNTING-MODEL 106



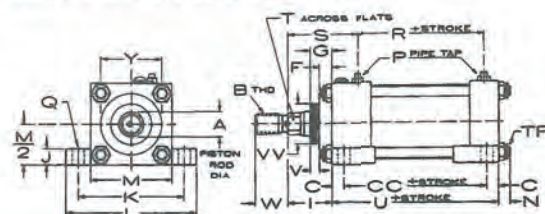
For double end rod cylinders add U_3 to U then subtract 2 C_3 to obtain CC_3 .

CENTERLINE LUG MOUNTING-MODEL 107



For double end rod cylinders, add U_3 to U and CC .

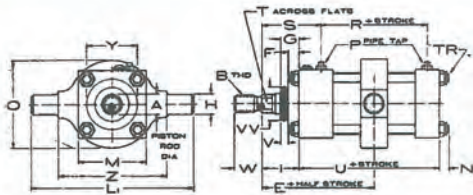
SIDE LUG MOUNTING-MODEL 108



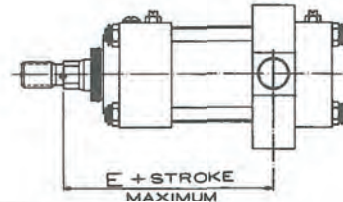
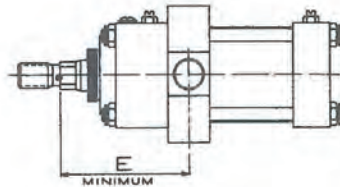
For double end rod cylinders, add U_3 to U and CC .

BORE	A	B	BB	BC	C	CC	C ₁	CC ₁	C ₂	CC ₂	C ₃	CC ₃	C ₄	D	D ₁	E	E ₁	F	G	H	I	I ₁	J	J ₁	J ₂	J ₃	J ₆	K	K ₁	K ₂	K ₄	K ₅
1 1/2	5/8	7/16-20	7/16-20	2.02	3/8	2 7/8	1/4	5 1/2	3/8	6	15/16	2 1/4	7/16	3/4	1	3 1/16	5 3/8	3/8	5/8	3/4	1	5/8	1/2	3/8	9/16	1/2	1 1/8	2 3/4	1 7/16	1 7/16	5/8	1 1/4
2	3/4	5/8-18	7/16-20	2.60	3/8	2 7/8	5/16	5 7/8	3/8	6	15/16	2 1/4	7/16	15/16	1	3 1/16	5 3/8	3/8	5/8	3/4	1	5/8	1/2	1/2	5/8	1/2	1 1/8	3 1/4	1 27/32	1 27/32	7/8	1 3/4
2 1/2	3/4	5/8-18	7/16-20	3.10	3/8	3	9/16	6 1/4	3/8	6 1/8	15/16	2 3/8	7/16	1 1/16	1	3 1/8	5 1/2	3/8	5/8	3/4	1	5/8	1/2	1/2	13/16	1/2	1 1/8	3 3/4	2 3/16	2 3/16	1 1/4	2 1/4
3 1/4	1	3/4-16	3/4-16	3.91	1/2	3 1/4	3/8	6 5/8	1/2	7 3/8	1 1/16	2 5/8	9/16	7/8	1 1/4	3 3/4	6 7/8	5/8	7/8	1	1 3/8	3/4	3/4	5/8	1	5/8	1 1/8	4 3/4	2 3/4	2 3/4	1 1/2	2 3/4
4	1	3/4-16	3/4-16	4.95	1/2	3 1/4	3/8	6 7/8	1/2	7 3/8	1 1/16	2 5/8	9/16	1	1 1/4	3 3/4	6 7/8	5/8	7/8	1	1 3/8	3/4	3/4	5/8	1	5/8	1 1/8	5 1/2	3 5/16	3 5/16	2 1/16	3 1/2
5	1 1/2	1-14	3/4-16	6.19	11/16	3 1/8	1/2	7 1/4	5/8	7 7/8	1 1/16	2 7/8	9/16	1 1/16	1 3/8	3 15/16	7 1/8	5/8	7/8	1	1 3/8	3/4	1	5/8	1 1/8	5/8	3/16	6 7/8	4 3/32	4 3/32	2 11/16	4 1/4
6	1 3/4	1 3/8-12	1-14	7.07	11/16	3 5/8	1/2	7 3/4	5/8	8 1/2	1 3/16	3 1/8	11/16	1	1 3/8	4 7/16	8 1/8	3/4	1	1 3/8	1 5/8	7/8	1	3/4	1 1/2	3/4	3/16	7 7/8	4 7/8	4 7/8	3 1/4	5 1/4

TRUNNION MOUNTING-MODEL 109

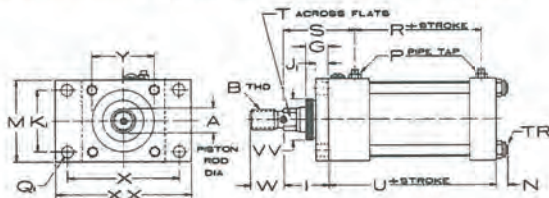


Standard location of trunnion is at midpoint of cylinder tube unless otherwise specified. Trunnion can be located between "E", as minimum, and "E + stroke", as shown.



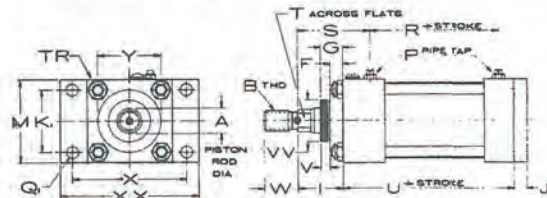
For double end rod cylinders, add U_3 to U.

ROD END FLANGE MOUNTING-MODEL 110

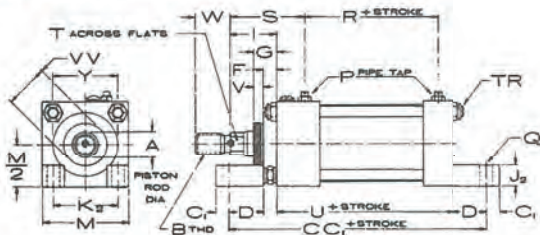


For double end rod cylinders, add U_3 to U.

BLIND END FLANGE MOUNTING-MODEL 112

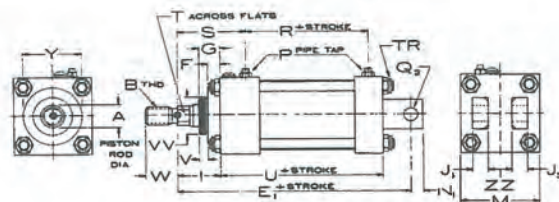


FOOT LUG MOUNTING-MODEL 111



For double end rod cylinders add U_3 to U. To find dimension CC_1 add $U_3 + U + 2F + 2D$.

HINGE MOUNTING-MODEL 113



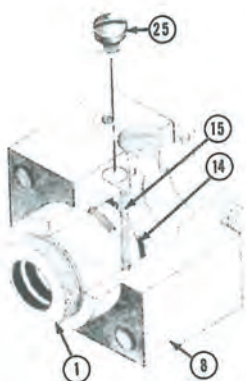
																														WEIGHT		
K ₆	L	L ₁	M	M ₁	N	N ₁	N ₂	O	P	Q	Q ₁	Q ₂	Q ₃	Q ₄	R	S	T	U	U ₁	U ₂	U ₃	V	W	W	X	XX	Y	Z	ZZ	TR	ZERO STROKE	PER INCH
1.43	3 1/2	4 1/2	2	1 3/16	5/16	7/16	1	2 5/8	1/4	7/16	5/16	1/2	7/16	1/4-20	2 5/16	1 15/16	1/2	3 5/8	4	4 7/8	1/2	1/4	1 1/8	3/4	2 3/4	3 3/8	1 7/16	2 3/4	3/4	1/4-28	4	.32
1.84	4	6	2 1/2	1 7/16	3/8	7/16	1 1/8	3 1/4	1/4	7/16	3/8	1/2	7/16	5/16-18	2 5/16	1 15/16	5/8	3 5/8	4	4 7/8	1/2	1/4	1 1/4	3/4	3 3/8	4 1/8	1 7/8	4	3/4	5/16-24	7	.45
2.19	4 1/2	6 1/2	3	1 5/8	3/8	7/16	1 1/8	3 3/4	1/4	7/16	3/8	1/2	7/16	3/8-16	2 7/16	1 15/16	5/8	3 3/4	4 1/8	5	1/2	1/4	1 1/4	3/4	3 7/8	4 5/8	2 3/8	4 1/2	3/4	5/16-24	9	.52
2.76	5 3/4	7 1/4	3 3/4	1 15/16	9/16	5/8	1 3/8	4 3/4	1/2	9/16	7/16	3/4	9/16	1/2-13	2 11/16	2 7/16	13/16	4 1/4	4 7/8	6 1/16	9/16	1/4	1 1/2	1 1/8	4 11/16	5 1/2	2 3/4	5 1/4	1 1/4	3/8-24	17	.72
3.50	6 1/2	8	4 1/2	2 1/4	9/16	5/8	1 3/8	5 3/4	1/2	9/16	7/16	3/4	9/16	1/2-13	2 11/16	2 7/16	13/16	4 1/4	4 7/8	6 1/16	9/16	1/4	1 1/2	1 1/8	5 7/16	6 1/4	3 1/4	6	1 1/4	3/8-24	25	1.29
4.37	8 1/4	9	5 1/2	2 3/4	1 1/16	5/8	1 13/16	7	1/2	13/16	9/16	3/4	11/16	5/8-11	2 13/16	2 9/16	1 1/4	4 1/2	5 1/8	6 3/8	5/8	1/4	2 1/4	1 1/8	6 5/8	7 5/8	4 1/2	7	1 1/4	1/2-20	40	1.89
5.00	9 1/4	11 1/4	6 1/2	3 1/4	1 1/16	13/16	1 13/16	8 1/4	3/4	13/16	9/16	1	13/16	3/4-10	3 1/16	2 29/32	1 1/2	5	5 3/4	7 1/8	5/8	1/4	2 1/2	1 5/8	7 5/8	8 5/8	5	8 1/2	1 1/2	1/2-20	61	2.29

S Line Air & Hydraulic CYLINDERS

250 psi air • up to 1000 psi hydraulic



Your maintenance personnel can be "Quick Change Artists" with our maintenance friendly rod cartridge! They can replace a worn rod seal in minutes with no special tools.



The cutaway view at the left shows the rod cartridge (1) in position in the rod end head (8). The cartridge is locked securely in place by means of the rod cartridge retaining spring (15). This spring winds around the rod cartridge spring groove which mates with a similar groove in the head. This construction locks the cartridge to the head as securely as if the two parts were of solid construction!

When necessary to remove and replace a rod seal, wiper, or rod bearing, the following simple steps are all that are necessary.

- A. Remove Retaining Screw (25).
- B. Press inward on exposed portion of Rod Cartridge and at same time pull on end of retaining spring withdrawing it entirely out of the head.
- C. Twist the Rod Cartridge slightly to free it from the Rod Cartridge Seal (14) then pull Cartridge off of piston rod.

To replace cartridge reverse the above procedure
No tools, No disassembly, Minimum downtime

PRESSURE RATINGS (PSI)

BORE	1 1/2 -2	2 1/2-3 1/4	4-5	6
Hydraulic	1000	800	600	500
Pneumatic	250			

RECOMMENDATIONS

S Line Cylinders are equipped with "Buna-N" seals and will give excellent service when used with lubricated air or hydraulic oil.

Operating temperatures should not exceed 250 F.

Cushions are designed to decelerate fast moving loads at the end of each stroke. Specify cushioning both ends to avoid costly damage.

Heat treated socket head cap screws are recommended for fastening cylinders to equipment.

All operating media must be filtered to protect the internal parts of cylinders.

Combination mountings available. Consult factory for dimensions, prices, etc.

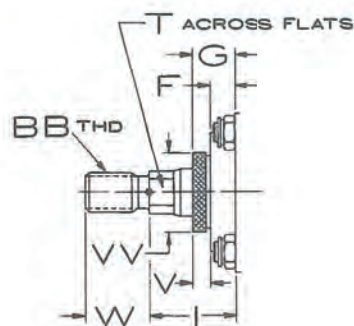


S Line Air & Hydraulic CYLINDERS

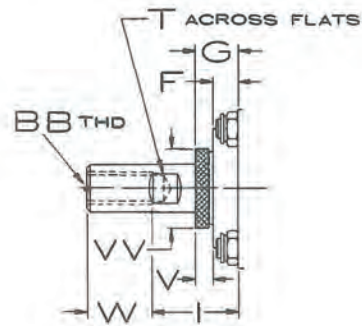
250 psi air • up to 1000 psi hydraulic

OPTIONAL ROD END STYLES

STYLE 2 THREAD (shown on drawings) will be supplied unless otherwise specified.

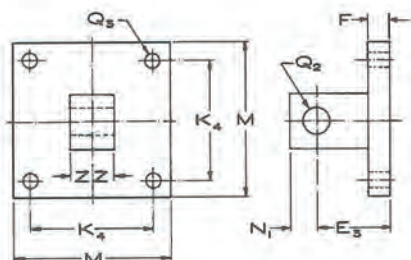


Style 3 Thread



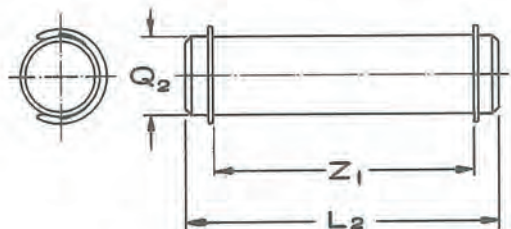
Style 4 Thread

ACCESSORIES



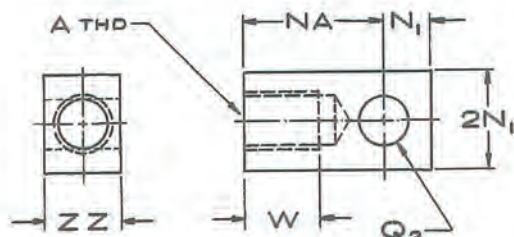
MALE HINGE BRACKET

PART NO.	CYL. BORE	E ₃	F	K ₄	M	N ₁	Q ₂	Q ₃	ZZ
220080	1 1/2, 2, 2 1/2	1 1/8	3/8	1 27/32	2 1/2	7/16	1/2	1 1/32	3/4
220111	3 1/4, 4, 5	1 7/8	5/8	3 1/2	4 1/2	5/8	3/4	1 3/32	1 1/4
220142	6	2 1/4	3/4	5	6 1/2	13/16	1	1 7/32	1 1/2



HINGE PIN ASSEMBLY

PART NO.	CYL. BORE	SIZE	L ₂	Q ₂	Z ₁
100001	1 1/2, 2, 2 1/2	1 1/2 x 1 3/4	2 1/4	1/2	1 3/4
100002	3 1/4, 4, 5	3/4 x 2 1/2	3	3/4	2 1/2
100003	6	1 x 3	3 1/2	1	3



PISTON ROD EYE

PART NO.	CYL. BORE	A	N ₁	NA	Q ₂	W	ZZ
300014	1 1/2	7/16-20	1/2	1 1/2	1/2	3/4	3/4
300049	2, 2 1/2	5/8-18	1/2	1 1/2	1/2	3/4	3/4
300096	3 1/4, 4	3/4-16	3/4	2 1/16	3/4	1 1/8	1 1/4
300097	5	1-14	1	2 13/16	1	1 5/8	1 1/2
300150	6	1 3/8-12	1	2 13/16	1	1 5/8	1 1/2

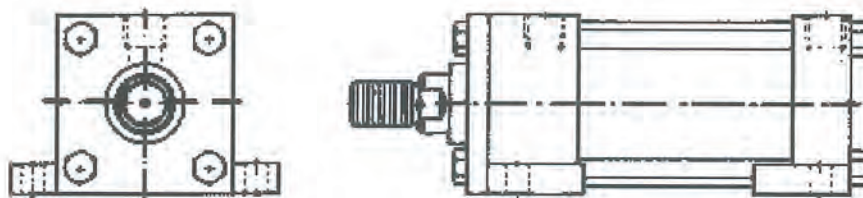
Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



SERIES "SA"

250 PSI Air Service • 1 1/2 in. thru 16 in. bore.

LINDBERG SERIES "SA" HEAVY DUTY AIR CYLINDERS are rugged, top quality cylinders, built to be interchangeable with most four tie rod square head cylinders. Series "SA" cylinders conform to NFPA standards and meet the dimensional codes and model specifications set forth by the National Fluid Power Association. The Series "SA" cylinders have been engineered for the highest dependability, using a design based on experience and manufactured with the finest craftsmanship. Lindberg cylinders may be purchased for O.E.M or as replacements with complete confidence that they are the very finest available.



SERIES "SJ"

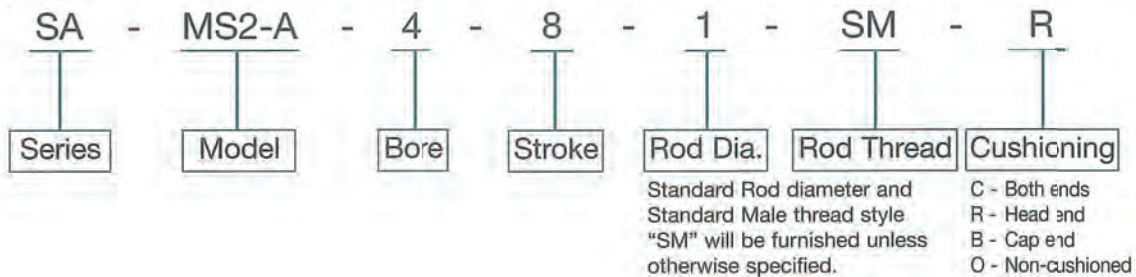
750 to 1500 PSI Hydraulic • 1 1/2 in. thru 6 in. bore.

LINDBERG SERIES "SJ" LOW PRESSURE HYDRAULIC CYLINDERS are designed and built to the same top quality standards as the "SA" cylinders. The Series "SJ" cylinders may be used for air or as an economical, low-pressure hydraulic actuator. The "SJ" cylinders are available with a variety of seals to meet most industrial requirements. Because mounting dimensions of the "SJ" series are identical to the "SA" series, changeover from air to oil may be accomplished with complete ease. In addition, the complete Lindberg line includes a complete open-stock assortment of clevises, rod eyes, mounting brackets and other accessory items interchangeable for both series.

HOW TO ORDER

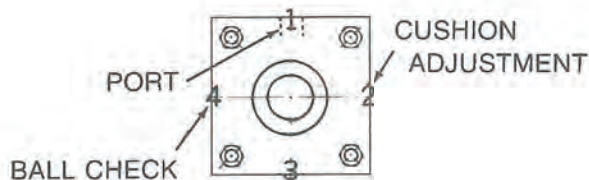
Series "SA" and Series "SJ" Cylinders

EXAMPLE:



NOTE: Cylinder modifications or deviations from standard must be specified with full information. Every Lindberg Air Cylinder is assigned a serial number at the time of order entry. This number is kept on-file for quick positive identification in case of duplicate part or cylinder orders. If intermediate Trunnion Mounting (MTA-4), specify:

- Trunnion Location ("XL" Dimension).
- Operating Fluid (Air, Oil or Other).
- Operating Pressure.
- Operating Temperature (if abnormally high or low).



Accessories: Specify Quantity and call out Part Number and Part Name.

PORT LOCATION

Specify if other than Quadrant Number 1 which is standard.

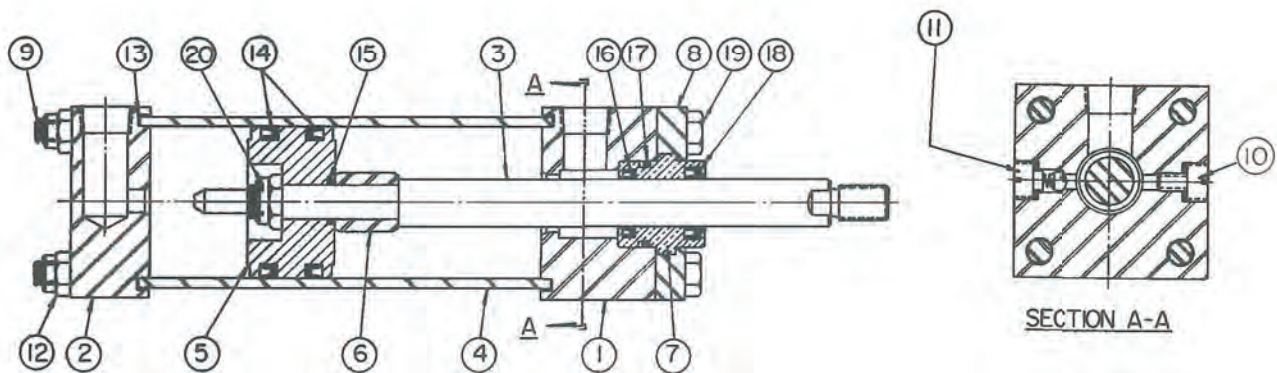
CUSHION ADJUSTMENT

Specify if other than Quadrant Number 2 which is standard.

BALL CHECK

Specify if other than Quadrant Number 4 which is standard.

CONSTRUCTION FEATURES



- | | |
|--------------------------|------------------------|
| 1. ROD END CAP | 11. CALL CHECK ASS'Y |
| 2. BLIND END CAP | 12. TIE ROD NUTS |
| 3. PISTON ROD | 13. TUBE SEALS |
| 4. CYLINDER TUBE | 14. PISTON SEALS |
| 5. PISTON | 15. PISTON TO ROD SEAL |
| 6. CUSHION PLUG | 16. ROD SEAL |
| 7. ROD CARTRIDGE | 17. CARTRIDGE SEAL |
| 8. CARTRIDGE RETAINER | 18. ROD WIPER SEAL |
| 9. TIE RODS | 19. HEX HEAD SCREWS |
| 10. METERING SCREW ASS'Y | 20. PISTON NUT |

NOTE:

Section drawing and parts list shows a typical SA-line cylinder cushioned both ends. Cushioned rod end, cushioned blind end and non-cushioned cylinders will not have some of the parts shown or quantities per part may differ. Item number 13 tube seal is a gasket for Series-SA. For Series SJ item number 13 is an O-ring.

COMMON DESIGN FEATURES

MOUNTING DIMENSIONS - Lindberg series "SA" and "SJ" cylinders are identical in their mounting dimensions and are completely interchangeable. They conform with the National Fluid Power Association dimensional codes and model specifications. In addition they are completely interchangeable with most square head, four tie-rod type cylinders and can be selected for cylinder replacement with complete confidence.

PISTON - Precision machined from high strength modular iron alloy. The piston is secured to its rod with a self locking nut. Seals are Buna-N Neoprene design—proven to provide a leak-proof piston of superior quality. Special packing compounds for high temperature or synthetic fire-resistant fluids are available upon request.

TIE RODS & NUTS - Made of stress-proof steel to provide 100,000 to 110,000 PSI yield. Tie rod threads are accurately machined for rigid engagement of tie rod units. Prevailing torque-type nuts are evenly torqued for maximum overall unitized cylinder strength.

HEADS, ENDS, & MOUNTING - Made of solid steel to withstand greater shock loads, to resist shattering under extreme overloading and to eliminate leakage often caused by the porosity of castings. All mountings are rigidly attached and precision machined to assure accurate alignment of mated mounting surfaces.

PISTON RODS - Made from high-strength carbon steel (100,000 PSI min. yield) turned, ground and polished to mirror-like finish then hard chrome plated to resist scoring and corrosion. Compete with rod flats and precision machine rod ends.

ROD WIPER - All Lindberg square head cylinders incorporated a durable double lip rod wiper. Securely retained to provide maximum rod seal protection from external foreign materials. The wiper ring may be furnished in a choice of materials and metal rod scrapers are available upon request.

PORTS - Large, unrestricted ports, tapped with dry seal national pipe threads are provided as standard. The ports may be rotated to any 90 degree position in relation to each other and the cylinder mounting. Also available upon request are SAE straight thread ports, manifold ports, oversized and/or multiple ports.

CUSHIONS - Lindberg rod end cushions are precisely machined to close tolerances and are piloted directly to the rod. The blind end cushion plugs, which are machined as an integral part of the piston rod, and the rod end cushion plugs are concentric and do not require floating or resilient members to compensate for misaligned assemblies. Cushion adjusting screws and spring loaded ball checks are sealed with a teflon ring. Both adjusting screw and check valve are flush set and interchangeable.

Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



SERIES "SA" • Heavy Duty Air Cylinders

250 PSI Air Service • 1 1/2 in. thru 16 in. bore.

ROD CYLINDER - Lindberg's threadless rod cartridge pilots into a precision bored head assuring true concentricity and may be serviced by simply removing four cap screws and the retaining plate. A pry groove, machined into the cartridge flange, facilitates extraction. This removable bearing cartridge is accurately machined from bearing bronze and incorporates Buna-N Neoprene seals and rod wiper to insure a performance-tested, leakproof rod cartridge. Special packings or cartridge designs are available for high temperature, synthetic, fire-resistant fluids or for special applications.



CYLINDER TUBE - Machined from cold-drawn steel tubing with bores honed to a 10 microinch finish. Inside diameter is chrome plated to resist scoring, corrosion and provide for a longer life. Alternate tubing available upon request in brass, aluminum or molybdenum desulfide lined fiberglass.

TUBE SEALS - The cylinder tube ends are sealed to the end caps with a high-temperature, compression type gasket which seals over the entire face of the tube. The simplicity and effectiveness of this seal for air service is excellent.

RETAINER PLATE - By removing four cap screws and the retainer plate, the rod cartridge or bearing may be removed without disassembling the entire cylinder. This operation may be performed using available shop tools.



Series SA - Pneumatic

Series SJ - Hydraulic

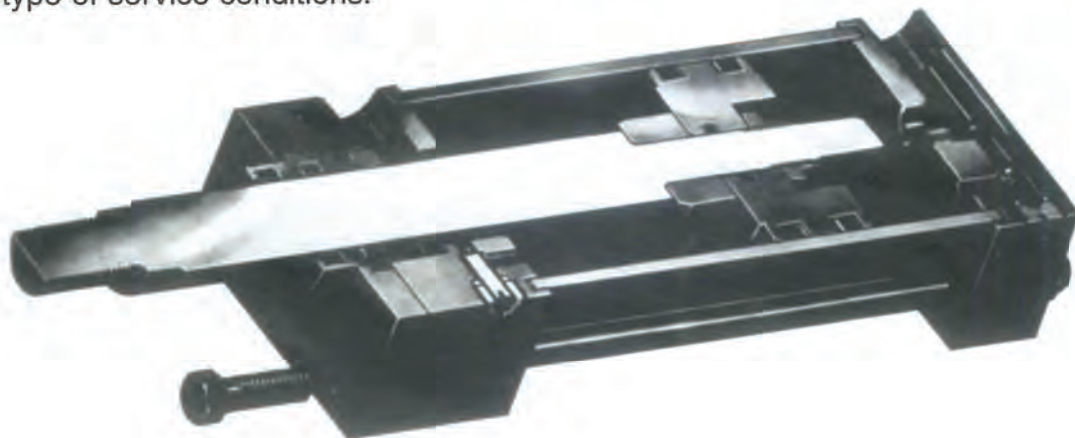
NFPA INTERCHANGEABLE

SERIES "SJ" • Low Pressure Hydraulic Cylinders

750 to 1500 PSI Hydraulic Service • 1 1/2 in. thru 6 in. bore.

ROD CARTRIDGE - This removable rod cartridge is accurately machined from bearing bronze with Buna-N Neoprene seals and rod wiper. Lindberg's threadless rod bearing pilots into a precision bored head assuring true concentricity and may be serviced by removing four cap screws and the retaining plate. Pry groove, machined into the cartridge flange, facilitates extraction.

As an optional design, a directly interchangeable bronze rod bearing with multiple vee-ring packing and rod wiper is available. This unique versatility of seals can be accomplished with a simple bushing change and makes possible a selection of seals to meet all type of service conditions.



CYLINDER TUBE - Machined from cold-drawn steel tubing with bores honed to a 10 microinch finish. Inside diameter is chrome plated to resist scoring, corrosion and provide for a longer life.

TUBE SEALS - "O" rings trapped in a triangular cavity provide a perfect seal for leakproof hydraulic service. "O" rings are available in a variety of compounds to meet all service requirements.

RETAINER PLATE - By removing four cap screws and the retainer plate, the rod cartridge or bearing may be removed without disassembling the entire cylinder. This operation may be performed using available shop tools.

Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE

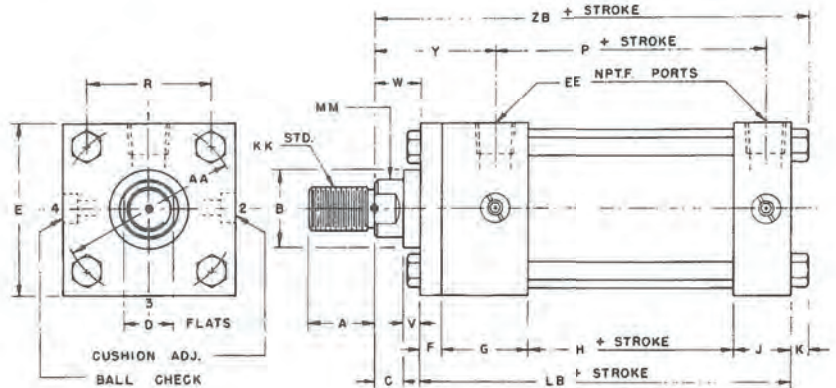


MOUNTING DATA

*Series "SA" 250 PSI Air and Series "SJ" 750 to 1500 PSI Hydraulic
1 1/2 in. thru 6 in. bore.*

NOTES:

- Model MS4-A not available in these sizes.
- ▼ Available with fixed cushions on rod end, adjustable cushions on cap end.
- † Standard rod eye or rod clevis will interfere with foot lugs on Model MS7-A. Use additional rod extension.
- * Add 1/8" for "SJ" dimension.
The "SJ" low pressure hydraulic cylinder is dimensionally interchangeable with the Series "SA" air cylinders.
- o Use bolt 1/16" smaller.

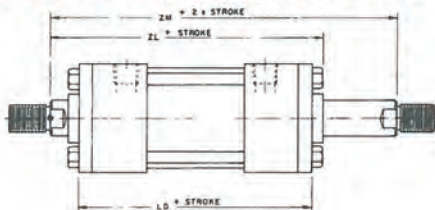


TRUNNION MTGS: Trunnion pins are designed for shear. Mount and clamp in sturdy pillow blocks to prevent bending loads. Models MT 1-A, MT2-A and MT4-A can be supplied with removable trunnion pins.

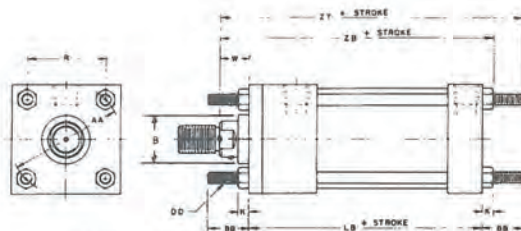
FOOT MTGS: Mounting holes are sized 1/16" dia. over bolt size. For best results drill and pin in place after installation.

PORTS: Standard cylinders have NPTF ports. SAE "O" ring ports or manifold ports are available.

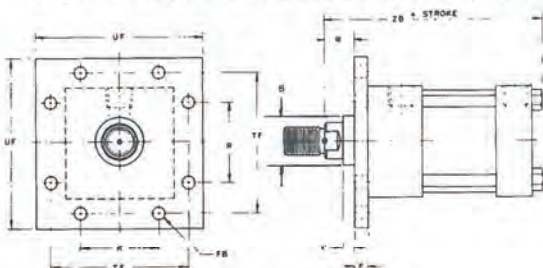
BASIC DIMENSIONS



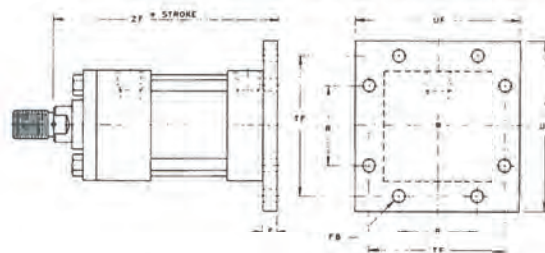
MODEL MDX-A • DOUBLE ROD END CYLINDERS
Available in all models except MP1-A and MPL3-A. Use above dimensions for other models adding desired mounts.
To specify Double End Rods add suffix letter "D" to code No.



MODEL MX -A—Plain, no Tie Rod extension.
MODEL MX1-A—Plain, Tie Rods extended both ends.
MODEL MX2-A—Plain, Tie Rods extended Cap End
MODEL MX3-A—Plain, Tie Rods extended Head End.



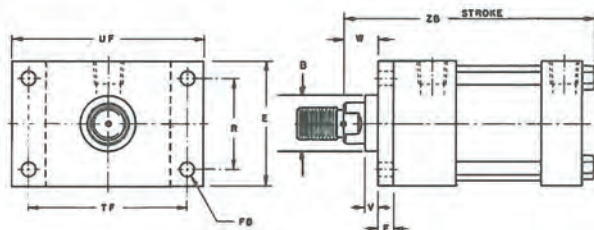
MODEL MF5-A
Square flange Mtg. on Head End.



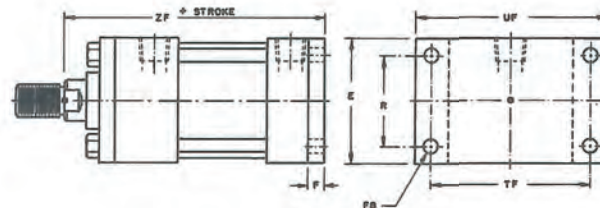
MODEL MF6-A
Square Flange Mtg. on Cap End.



Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



MODEL MF1-A
Rectangular Flange Mtg. on Head End.



MODEL MF2-A
Rectangular Flange on Cap End.

TABLE 1 - FLUID POWER CYLINDERS
Varying Length Dimensions

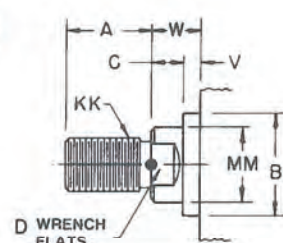
BORE DIA.	ROD MM	V	W	Y	ZB*	XC	XE	XG	XJ	XS	XT	XH	ZF	ZH	ZL*	ZM	ZT	ZC	ZE
1 1/2	5/8	1/4	5/8	1 15/16	4 7/8	5 3/8	5 3/8	1 15/16	4 3/16	1 3/8	1 15/16	5 1/2	5	6 1/4	5 3/4	6 1/8	5 5/8	5 7/8	5 5/8
	•1▼	1/2	1	2 5/16	5 1/4	5 3/4	5 3/4	2 5/16	4 9/16	1 3/4	2 5/16	5 7/8	5 3/8	6 5/8	6 1/8	6 7/8	6	6 1/4	6
2	5/8	1/4	5/8	1 15/16	4 15/16	5 3/8	5 9/16	1 15/16	4 3/16	1 3/8	1 15/16	5 1/2	5	6 1/4	5 13/16	6 1/8	5 3/4	5 7/8	5 7/8
	•1▼↑	1/2	1	2 5/16	5 5/16	5 3/4	5 15/16	2 5/16	4 9/16	1 3/4	2 5/16	5 7/8	5 3/8	6 5/8	6 3/16	6 7/8	6 1/8	6 1/4	6 1/4
	•1 3/8	5/8	1 1/4	2 9/16	5 9/16	6	6 3/16	2 9/16	4 13/16	2	2 9/16	6 1/8	5 5/8	6 7/8	6 7/16	7 3/8	6 3/8	6 1/2	6 1/2
2 1/2	5/8	1/4	5/8	1 15/16	5 1/16	5 1/2	5 13/16	1 15/16	4 5/16	1 3/8	1 15/16	5 5/8	5 1/8	6 3/8	5 15/16	6 1/4	5 7/8	6	6 1/8
	1	1/2	1	2 5/16	5 7/16	5 7/8	6 3/16	2 5/16	4 11/16	1 3/4	2 5/16	6	5 1/2	6 3/4	6 5/16	7	6 1/4	6 3/8	6 1/2
	•1 3/8↑	5/8	1 1/4	2 9/16	5 11/16	6 1/8	6 7/16	2 9/16	4 15/16	2	2 9/16	6 1/4	5 3/4	7	6 9/16	7 1/2	6 1/2	6 5/8	6 3/4
	•1 3/4	3/4	1 1/2	2 13/16	5 15/16	6 3/8	6 11/16	2 13/16	5 3/16	2 1/4	2 13/16	6 3/8	6	7 1/8	6 13/16	8	6 3/4	6 7/8	7
3 1/4	1	1/4	3/4	2 7/16	6	6 7/8	6 1/2	2 7/16	5 1/16	1 7/8	2 7/16	6 7/8	6 1/4	8 1/8	7 1/8	7 1/2	7	7 5/8	6 7/8
	1 3/8	3/8	1	2 11/16	6 1/4	7 1/8	6 3/4	2 11/16	5 5/16	2 1/8	2 11/16	7 1/8	6 1/2	8 3/8	7 3/8	8	7 1/4	7 7/8	7 1/8
	•1 3/4	1/2	1 1/4	2 15/16	6 1/2	7 3/8	7	2 15/16	5 9/16	2 3/8	2 15/16	7 3/8	6 3/4	8 5/8	7 5/8	8 1/2	7 1/2	8 1/8	7 3/8
	•2	1/2	1 3/8	3 1/16	6 5/8	7 1/2	7 1/8	3 1/16	5 11/16	2 1/2	3 1/16	7 1/2	6 7/8	8 3/4	7 3/4	8 3/4	7 5/8	8 1/4	7 1/2
4	1	1/4	3/4	2 7/16	6	6 7/8	6 5/8	2 7/16	5 1/16	1 7/8	2 7/16	6 7/8	6 1/4	8 1/8	7 1/8	7 1/2	7	7 5/8	7
	1 3/8	3/8	1	2 11/16	6 1/4	7 1/8	6 7/8	2 11/16	5 5/16	2 1/8	2 11/16	7 1/8	6 1/2	8 3/8	7 3/8	8	7 1/4	7 7/8	7 1/4
	1 3/4	1/2	1 1/4	2 15/16	6 1/2	7 3/8	7 1/8	2 15/16	5 9/16	2 3/8	2 15/16	7 3/8	6 3/4	8 5/8	7 5/8	8 1/2	7 1/2	8 1/8	7 1/2
	2	1/2	1 3/8	3 1/16	6 5/8	7 1/2	7 1/4	3 1/16	5 11/16	2 1/2	3 1/16	7 1/2	6 7/8	8 3/4	7 3/4	8 3/4	7 5/8	8 1/4	7 5/8
	•2 1/2	5/8	1 5/8	3 5/16	6 7/8	7 3/4	7 1/2	3 5/16	5 15/16	2 3/4	3 5/16	7 3/4	7 1/8	9	8	9 1/4	7 7/8	8 1/2	7 7/8
5	1	1/4	3/4	2 7/16	6 5/16	7 1/8	6 15/16	2 7/16	5 5/16	2 1/16	2 7/16	7 1/8	6 1/2	8 3/8	7 7/16	7 3/4	7 11/16	7 7/8	7 7/16
	1 3/8	3/8	1	2 11/16	6 9/16	7 3/8	7 3/16	2 11/16	5 9/16	2 5/16	2 11/16	7 3/8	6 3/4	8 5/8	7 11/16	8 1/4	7 15/16	8 1/8	7 11/16
	1 3/4	1/2	1 1/4	2 15/16	6 13/16	7 5/8	7 7/16	2 15/16	5 13/16	2 9/16	2 15/16	7 5/8	7	8 7/8	7 15/16	8 3/4	8 3/16	8 3/8	7 15/16
	2	1/2	1 3/8	3 1/16	6 15/16	7 3/4	7 9/16	3 1/16	5 15/16	2 11/16	3 1/16	7 3/4	7 1/8	9	8 1/16	9	8 5/16	8 1/2	8 1/16
	2 1/2	5/8																	
	3	5/8	1 5/8	3 5/16	7 3/16	8	7 13/16	3 5/16	6 3/16	2 15/16	3 5/16	8	7 3/8	9 1/4	8 5/16	9 1/2	8 9/16	8 3/4	8 5/16
	•3 1/2	5/8																	
6	1 3/8	1/4	7/8	2 13/16	7 1/16	8 1/8	7 5/8	2 13/16	5 15/16	2 5/16	2 13/16	8 1/4	7 3/8	10	8 5/16	8 3/4	8 7/16	9 1/8	8 1/8
	1 3/4	3/8	1 1/8	3 1/16	7 5/16	8 3/8	7 7/8	3 1/16	6 3/16	2 9/16	3 1/16	8 1/2	7 5/8	10 1/4	8 9/16	9 1/4	8 11/16	9 3/8	8 3/8
	2	3/8	1 1/4	3 3/16	7 7/16	8 1/2	8	3 3/16	6 5/16	2 11/16	3 3/16	8 5/8	7 3/4	10 3/8	8 11/16	9 1/2	8 13/16	9 1/2	8 1/2
	2 1/2	1/2																	
	3	1/2	1 1/2	3 7/16	7 11/16	8 3/4	8 1/4	3 7/16	6 9/16	2 15/16	3 7/16	8 7/8	8	10 5/8	8 15/16	10	9 1/16	9 3/4	8 3/4
	3 1/2	1/2																	
	•4	1/2																	

Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE

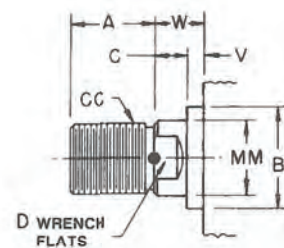


GENERAL ROD DIMENSIONS

ROD DIA. MM	KK	CC	A	B -.001 -.003	C	D
5/8	7/16-20	1/2-20	3/4	1 1/8	3/8	1/2
1	3/4-16	7/8-14	1 1/8	1 1/2	1/2	7/8
1 3/8	1-14	1 1/4-12	1 5/8	2	5/8	1 1/8
1 3/4	1 1/4-12	1 1/2-12	2	2 3/8	3/4	1 1/2
2	1 1/2-12	1 3/4-12	2 1/4	2 5/8	7/8	1 11/16
2 1/2	1 7/8-12	2 1/4-12	3	3 1/8	1	2 1/16
3	2 1/4-12	2 3/4-12	3 1/2	3 3/4	1	2 5/8
3 1/2	2 1/2-12	3 1/4-12	3 1/2	4 1/4	1	3
4	3-12	3 3/4-12	4	4 3/4	1	3 3/8

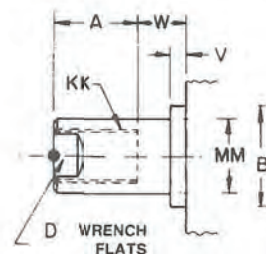


ROD END STYLE SM
Standard unless otherwise specified



ROD END STYLE IM

PISTON ROD END STYLES



ROD END STYLE LF

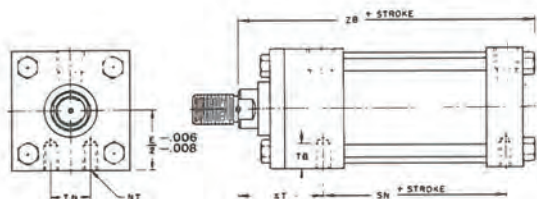
GENERAL DIMENSIONS

MODEL	MX-A		MX1-A		MX2-A				MX3-A					
BORE DIA	E	F	G	H	J	K*	P	R	AA	EE	LB	LD	BB	DD
1 1/2	2	3/8	1 1/2	1 1/8	1	1/4	2 1/4	1.43	2.02	3/8	4	4 7/8	1	1/4-28
2	2 1/2	3/8	1 1/2	1 1/8	1	5/16	2 1/4	1.84	2.60	3/8	4	4 7/8	1 1/8	5/16-24
2 1/2	3	3/8	1 1/2	1 1/4	1	5/16	2 3/8	2.19	3.10	3/8	4 1/8	5	1 1/8	5/16-24
3 1/4	3 3/4	5/8	1 3/4	1 1/4	1 1/4	3/8	2 5/8	2.76	3.90	1/2	4 7/8	6	1 3/8	3/8-24
4	4 1/2	5/8	1 3/4	1 1/4	1 1/4	3/8	2 5/8	3.32	4.70	1/2	4 7/8	6	1 3/8	3/8-24
5	5 1/2	5/8	1 3/4	1 1/2	1 1/4	7/16	2 7/8	4.10	5.80	1/2	5 1/8	6 1/4	1 13/16	1/2-20
6	6 1/2	3/4	2	1 1/2	1 1/2	7/16	3 1/8	4.88	6.90	3/4	5 3/4	7	1 13/16	1/2-20

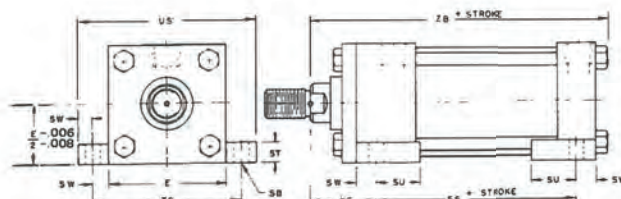
MODEL	MF2-A MF6-A		MF1-A MF5-A		MS4-A				MS2-A		MS3-A				MS7-A				
BORE DIA	FB*	UF	TF	NT	SN	TB	TN	SB*	SS	ST	SU	SW	TS	US	EB*	EL	EO	ET	SE
1 1/2	5/16	3 3/8	2 3/4	1/4-20	2 1/4	3/8	5/8	7/16	2 7/8	1/2	15/16	3/8	2 3/4	3 1/2	5/16	3/4	1/2	1/2	5 1/2
2	3/8	4 1/8	3 3/8	5/16-18	2 1/4	9/16	7/8	7/16	2 7/8	1/2	15/16	3/8	3 1/4	4	3/8	15/16	5/16	19/32	5 7/8
2 1/2	3/8	4 5/8	3 7/8	3/8-16	2 3/8	5/8	1 1/4	7/16	3	1/2	15/16	3/8	3 3/4	4 1/2	3/8	1 1/16	5/16	3/4	6 1/4
3 1/4	7/16	5 1/2	4 11/16	1/2-13	2 5/8	3/4	1 1/2	9/16	3 1/4	3/4	1 1/4	1/2	4 3/4	5 3/4	7/16	7/8	3/8	29/32	6 5/8
4	7/16	6 1/4	5 7/16	1/2-13	2 5/8	1	2 1/16	9/16	3 1/4	3/4	1 1/4	1/2	5 1/2	6 1/2	7/16	1	3/8	1 1/8	6 7/8
5	9/16	7 5/8	6 5/8	5/8-11	2 7/8	1	2 11/16	13/16	3 1/8	1	1 9/16	11/16	6 7/8	8 1/4	9/16	1 1/16	1/2	1 11/32	7 1/4
6	9/16	8 5/8	7 5/8	3/4-10	3 1/8	1 1/8	3 1/4	13/16	3 5/8	1	1 9/16	11/16	7 7/8	9 1/4	9/16	1	1/2	1 9/16	7 3/4

GENERAL DIMENSIONS

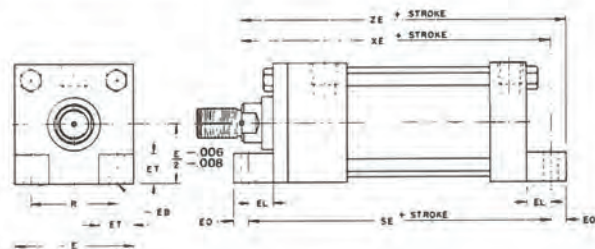
MODEL	MP1-A							MPU3-A					MT1-A		MT2-A		MT4-A				
BORE DIA.	L	M	CB	CD	CW	MR	LR	a ₂	H ₂	N	CD +.0025 -.0005	EW	LH	TL	UT	TD	TK	TM	UM	UV	
	1 1/2	3/4	1/2	3/4	1/2	1/2	5/8	5/8	13°	3/4	7/8	1/2	5/8	5/8	1	4	1	1 1/8	2 1/2	4 1/2	2 1/2
	2	3/4	1/2	3/4	1/2	1/2	5/8	5/8	13°	3/4	7/8	1/2	5/8	5/8	1	4 1/2	1	1 1/8	3	5	3
	2 1/2	3/4	1/2	3/4	1/2	1/2	5/8	5/8	13°	3/4	7/8	1/2	5/8	5/8	1	5	1	1 1/8	3 1/2	5 1/2	3 1/2
	3 1/4	1 1/4	3/4	1 1/4	3/4	5/8	15/16	1 1/16	14°	1 1/4	1 1/4	3/4	7/8	1	1	5 3/4	1	1 1/4	4 1/2	6 1/2	4 1/4
	4	1 1/4	3/4	1 1/4	3/4	5/8	15/16	1 1/16	14°	1 1/4	1 1/4	3/4	7/8	1	1	6 1/2	1	1 1/4	5 1/4	7 1/4	5
	5	1 1/4	3/4	1 1/4	3/4	5/8	15/16	1 1/16	14°	1 1/4	1 1/4	3/4	7/8	1	1	7 1/2	1	1 1/4	6 1/4	8 1/4	6
	6	1 1/2	1	1 1/2	1	3/4	1 3/16	1 1/4	12 1/2°	1 3/4	1 5/8	1	1 3/8	1 1/4	1 3/8	9 1/4	1 3/8	1 1/2	7 5/8	10 3/8	7



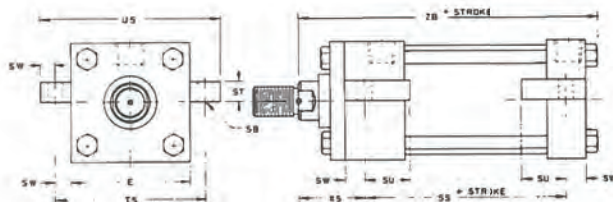
MODEL MS4-A
Side Tapped Mount



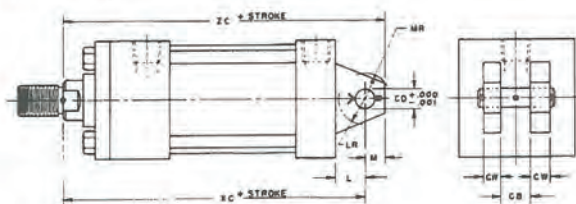
MODEL MS2-A
Side Lug Mount (Modification for Manifold Porting available.)



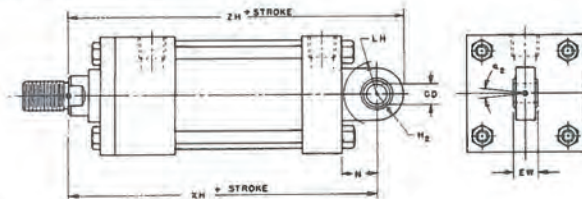
MODEL MS7-A
Side End Lug Mount



MODEL MS3-A
Centerline Lug Mount

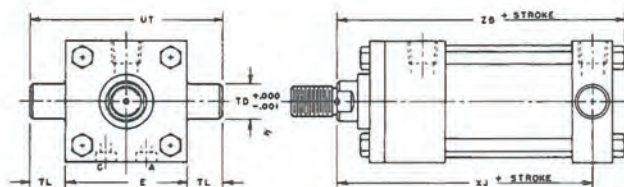


MODEL MP1-A
Fixed Clevis Mount

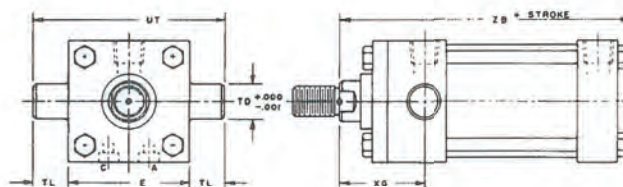


MODEL MPU3-A
Universal Fixed Eye Mount (Note Swivel Ball Bushing style.) If Clevis Bracket is used, two spacers are furnished so EW = CB.

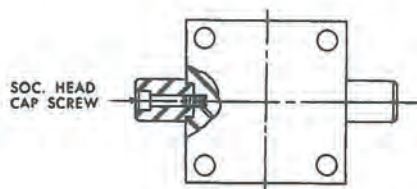
Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



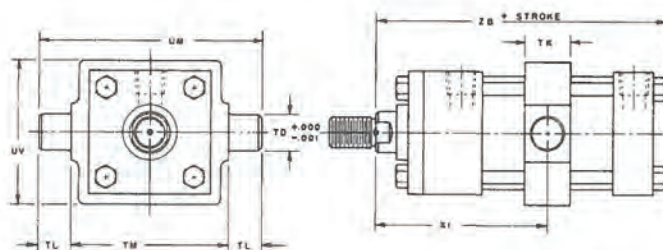
MODEL MT2-A
Cap Trunnion Mount



MODEL MT1-A
Head Trunnion Mount



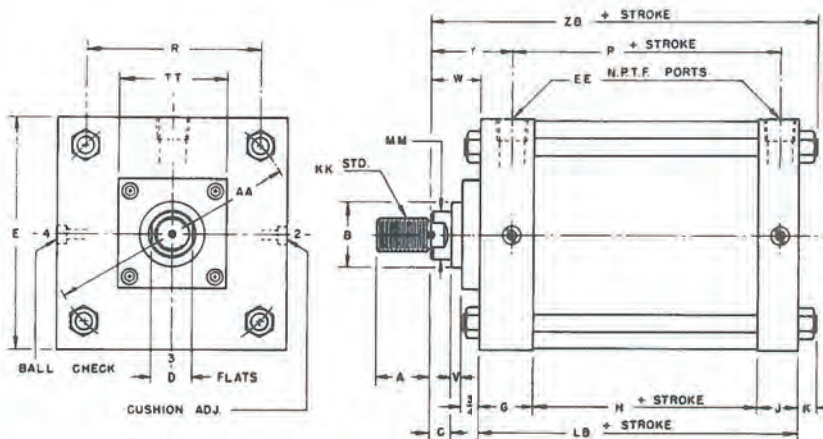
REMOVABLE TRUNNION FOR
"SA" AND "SJ" SERIES CYLINDERS
Notes: Trunnion dimensions same as MT1-A, MT2-A
and MT4-A.



MODEL MT4-A
Intermediate Fixed Trunnion Mount
*Customer to specify S1 dimension

MOUNTING DATA

*Series "SA" 250 PSI Air and Series "SJ" 500 PSI Hydraulic
7 in. thru 16 in. bore.*



NOTES:

- o Use bolt 1/16" smaller

TRUNNION MTGS: Trunnion pins are designed for shear. Mount and clamp in sturdy pillow blocks to prevent bending loads. Models MT1-A, MT2 and MT4-A can be supplied with removable trunnion pins.

FOOT MTGS: Mounting holes are sized 1/16" dia. over bolt size. For best results drill and pin in place after installation.

PORTS: Standard cylinders have NPTF ports. SAE "O" ring ports or manifold ports are available.

CUSHIONS: Standard cushion length is 1". Longer cushions are available but changes cylinder length.



Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



TABLE 2 - FLUID POWER CYLINDERS
Varying Length Dimensions

BORE DIA.	ROD MM	V	W	Y	ZB	XC	XE	XG	XJ	XS	XT	ZC	ZE	XH	ZH	ZL	ZM	ZT	ZJ		
7	1 3/8	1/4	1 5/8	2 13/16	7 5/16	8 1/4	7 7/8	2 13/16	6 1/16	2 5/16	2 13/16	9 1/4	8 1/2	8 3/8	10 1/8	7 13/16	8 7/8	9 1/16	6 3/4		
	1 3/4	3/8	1 7/8	3 1/16	7 9/16	8 1/2	8 1/8	3 1/16	6 5/16	2 9/16	3 1/16	9 1/2	8 3/4	8 5/8	10 3/8	8 1/16	9 3/8	9 5/16	7		
	2	3/8	2	3 3/16	7 11/16	8 5/8	8 1/4	3 3/16	6 7/16	2 11/16	3 3/16	9 5/8	8 7/8	8 3/4	10 1/2	8 3/16	9 5/8	9 7/16	7 1/8		
	2 1/2-5 1/2	1/2	2 1/4	3 7/16	7 15/16	8 7/8	8 1/2	3 7/16	6 11/16	2 15/16	3 7/16	9 7/8	9 1/8	9	10 3/4	8 7/16	10 1/8	9 11/16	7 3/8		
8	1 3/8	1/4	1 5/8	2 13/16	7 5/16	8 1/4	7 7/8	2 13/16	6 1/16	2 5/16	2 13/16	9 1/4	8 1/2	8 3/8	10 1/8	7 13/16	8 7/8	9 1/16	6 3/4		
	1 3/4	3/8	1 7/8	3 1/16	7 9/16	8 1/2	8 1/8	3 1/16	6 5/16	2 9/16	3 1/16	9 1/2	8 3/4	8 5/8	10 3/8	8 1/16	9 3/8	9 5/16	7		
	2	3/8	2	3 3/16	7 11/16	8 5/8	8 1/4	3 3/16	6 7/16	2 11/16	3 3/16	9 5/8	8 7/8	8 3/4	10 1/2	8 3/16	9 5/8	9 7/16	7 1/8		
	2 1/2-5 1/2	1/2	2 1/4	3 7/16	7 15/16	8 7/8	8 1/2	3 7/16	6 11/16	2 15/16	3 7/16	9 7/8	9 1/8	9	10 3/4	8 7/16	10 1/8	9 11/16	7 3/8		
10	1 3/4	3/8	1 7/8	3 1/8	8 15/16	10 3/8	9 9/16	3 1/8	7 1/4	2 3/4	3 1/8	11 3/4	10 3/16	Consult Factory for Dimensions on Model MPU3-A in bore sizes over 8" Diameter.				9 3/16	10 3/8	10 15/16	8 1/4
	2	3/8	2	3 1/4	9 1/16	10 1/2	9 11/16	3 1/4	7 3/8	2 7/8	3 1/4	11 7/8	10 5/16					9 5/16	10 5/8	11 1/16	8 3/8
	2 1/2-5 1/2	1/2	2 1/4	3 1/2	9 5/16	10 3/4	9 15/16	3 1/2	7 5/8	3 1/8	3 1/2	12 1/8	10 9/16					9 9/16	11 1/8	11 5/16	8 5/8
12	2	3/8	2	3 1/4	9 9/16	11 1/8	10 3/16	3 1/4	7 7/8	2 7/8	3 1/4	12 7/8	10 13/16					9 13/16	11 1/8	11 9/16	8 7/8
	2 1/2-5 1/2	1/2	2 1/4	3 1/2	9 13/16	11 3/8	10 7/16	3 1/2	8 1/8	3 1/8	3 1/2	13 1/8	11 1/16					10 1/16	11 5/8	11 13/16	9 1/8
14	2 1/2-5 1/2	1/2	2 1/4	3 13/16	11 3/16	12 7/8	11 7/8	3 13/16	9 5/16	3 3/8	3 13/16	14 7/8	12 5/8					11 11/16	13 1/8	13 9/16	10 3/8
16	2 1/2-5 1/2	1/2	2 1/4	3 3/4	11 3/16	14 3/8	11 7/8	3 13/16	9 5/16	3 3/8	3 13/16	16 7/8	12 5/8					11 11/16	13 1/8	13 9/16	10 3/8

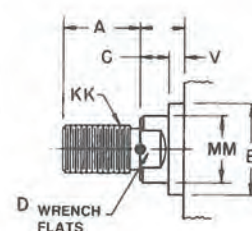
▲ Model MS4-A not available in 2 1/2 thru 5 1/2 rod dia. ■ Model MS4-A not available in 3 thru 5 1/2 rod dia. ● Model MS4-A not available in 4 1/2 thru 5 1/2 rod dia.

GENERAL DIMENSIONS

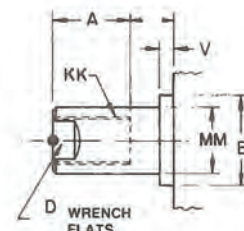
MODEL	MX-A		MX1-A		MX2-A		MX3-A					
BORE DIA	E	G	H	J	K	P	AA	EE	LB	LD	BB	DD
7	7 1/2	2	1 5/8	1 1/2	9/16	3 1/4	8.1	3/4	5 1/8	5 5/8	2 5/16	5/8-18
8	8 1/2	2	1 5/8	1 1/2	9/16	3 1/4	9.1	3/4	5 1/8	5 5/8	2 5/16	5/8-18
10	10 5/8	2 1/4	2 1/8	2	11/16	4 1/8	11.2	1	6 3/8	6 5/8	2 11/16	3/4-16
12	12 3/4	2 1/4	2 5/8	2	11/16	4 5/8	13.3	1	6 7/8	7 1/8	2 11/16	3/4-16
14	14 3/4	2 3/4	3 1/8	2 1/4	13/16	5 1/2	15.4	1 1/4	8 1/8	8 5/8	3 3/16	7/8-14
16	17	2 3/4	3 1/8	2 1/4	13/16	5 5/8	17.3	1 1/4	8 1/8	8 5/8	3 3/16	7/8-14

MODEL	ME3-A, ME4-A		MS4-A				MS2-A			MS3-A			
BORE DIA	EB*	TE	NT	SN	TB	TN	SB*	SS	ST	SU	SW	TS	US
7	11/16	6.75	3/4-10	3 1/4	1 1/8	3 7/8	13/16	3 3/4	1	1 9/16	11/16	8 7/8	10 1/4
8	11/16	7.57	3/4-10	3 1/4	1 1/8	4 1/2	13/16	3 3/4	1	1 9/16	11/16	9 7/8	11 1/4
10	13/16	9.4	1-8	4 1/8	1 5/8	5 1/2	1 1/16	4 5/8	1 1/4	2	7/8	12 3/8	14 1/8
12	13/16	11.10	1-8	4 5/8	1 1/2	7 1/4	1 1/16	5 1/8	1 1/4	2	7/8	14 1/2	16 1/4
14	15/16	12.87	1 1/4-7	5 1/2	2 1/4	8 3/8	1 5/16	5 7/8	1 1/2	2 1/2	1 1/8	17	19 1/4
16	1 1/16	14.84	1 3/8-6	5 1/2	2 1/2	5 3/4	1 5/16	5 7/8	1 1/2	2 1/2	1 1/8	19 1/4	22

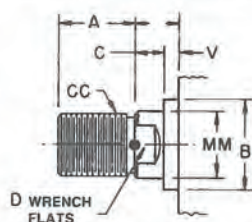
PISTON ROD END STYLES



ROD END STYLE SM
Standard unless otherwise specified



ROD END STYLE LF



ROD END STYLE IM

GENERAL DIMENSIONS

MODEL	MS7-A						MP1-A						
BORE	EB*	EL	EO	ET	R	SE	L	M	CB	CD	CW	MR	LR
7	11/16	1 1/8	5/8	2	5.73	7 3/8	1 1/2	1	1 1/2	1	3/4	1	1 1/4
8	11/16	1 1/8	5/8	2	6.44	7 3/8	1 1/2	1	1 1/2	1	3/4	1	1 1/4
10	13/16	1 5/16	5/8	2 5/8	7.92	9	2 1/8	1 3/8	2	1 3/8	1	1 3/8	1 7/8
12	13/16	1 5/16	5/8	3 9/32	9.40	9 1/2	2 1/4	1 3/4	2 1/2	1 3/4	1 1/4	1 3/4	2
14	15/16	1 1/2	3/4	3 25/32	10.90	11 1/8	2 1/2	2	2 1/2	2	1 1/4	2	2 1/4
16	1 1/16	2	1 1/8	3 5/8	12.65	11 1/4	4	2 1/2	2 1/2	2	1 1/4	3	3 5/8

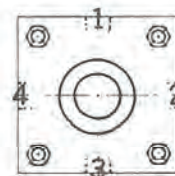
MODEL	MPU3-A					MT1-A		MT2-A		MT4-A		
BORE	a ₂	H2	CD +.0025 -.0005	EW	LH	TL	UT	TD	TK	TM	UM	UV
7	12 1/2	1 3/4	1	1 3/8	1 1/4	1 3/8	10 1/4	1 3/8	1 1/2	8 3/4	11 1/2	8 1/2
8	12 1/2	1 3/4	1	1 3/8	1 1/4	1 3/8	11 1/4	1 3/8	1 1/2	9 3/4	12 1/2	9 1/2
10	Consult Factory for Dimensions on Model MPU3-A in bore sizes over 8" Diameter.					1 3/4	14 1/8	1 3/4	2	12	15 1/2	11 3/4
12						1 3/4	16 1/4	1 3/4	2	14	17 1/2	13 3/4
14						2	18 3/4	2	2 1/4	16 1/4	20 1/4	16
16						2	21	2	2 1/4	18 1/2	22 1/2	18 1/4

GENERAL ROD DIMENSIONS

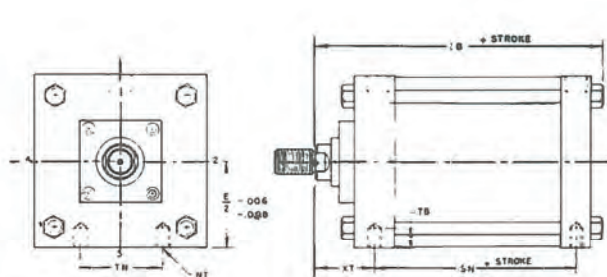
ROD MM	A	B -.001 -.003	C	CC	D	KK	TT
1 3/8	1 5/8	2	5/8	1 1/4-12	1 1/8	1-14	4
1 3/4	2	2 3/8	3/4	1 1/2-12	1 1/2	1 1/4-12	4
2	2 1/4	2 5/8	7/8	1 3/4-12	1 11/16	1 1/2-12	4
2 1/2	3	3 1/8	1	2 1/4-12	2 1/16	1 7/8-12	4
3	3 1/2	3 3/4	1	2 3/4-12	2 5/8	2 1/4-12	5 1/2
3 1/2	3 1/2	4 1/4	1	3 1/4-12	3	2 1/2-12	5 1/2
4	4	4 3/4	1	3 3/4-12	3 3/8	3-12	5 1/2
4 1/2	4 1/2	5 1/4	1	4 1/4-12	3 7/8	3 1/4-12	7
5	5	5 3/4	1	4 3/4-12	4 1/4	3 1/2-12	7
5 1/2	5 1/2	6 1/4	1	5 1/4-12	4 5/8	4-12	7

PORT LOCATIONS

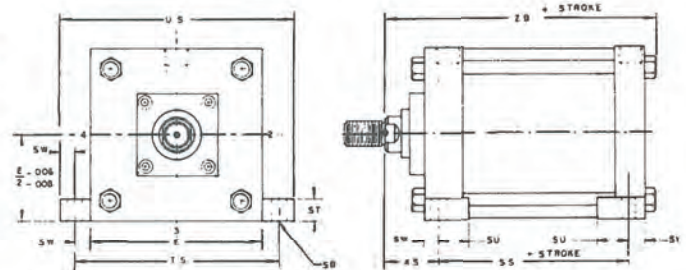
Ports are supplied in the No. 1 position as standard but can be located on any of the four sides of the square end cap providing mountings do not interfere. Cushion check balls and adjustment screws can also be located by any position not occupied by a port or mounting member. Specify port locations when ordering.



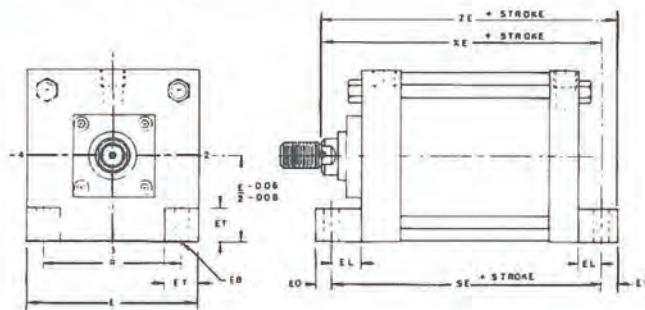
Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE



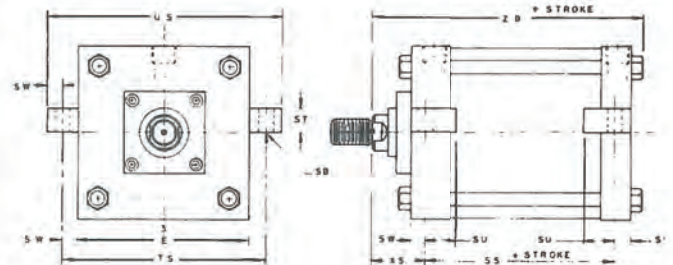
MODEL MS4-A
Flush Mount Tapped Holes in Caps



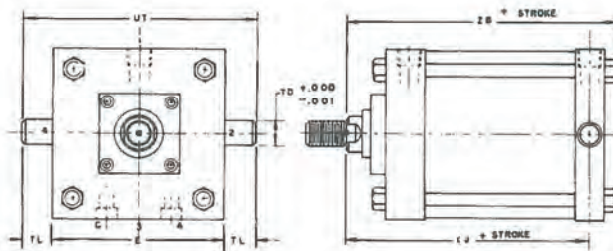
MODEL MS2-A
Side Lug Mounting (Modification for Manifold Porting available)



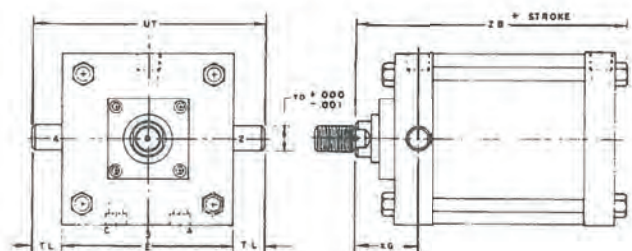
MODEL MS7-A
Foot Mounted



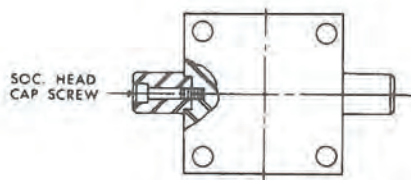
MODEL MS3-A
Center Line Lug Mounting



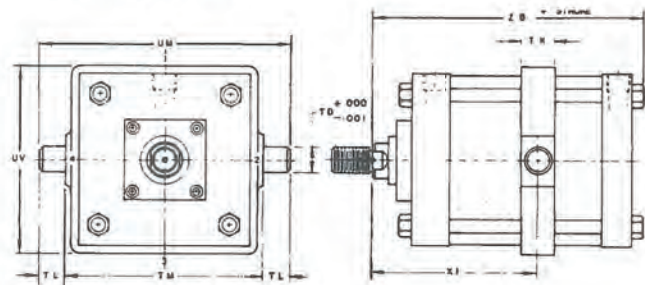
MODEL MT2-A
Trunnion Cap End



MODEL MT1-A
Trunnion Head End



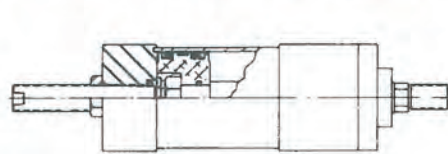
Removable Trunnion for "SA" Series Cylinders
Notes: Trunnion dimensions to conform to advertised literature.



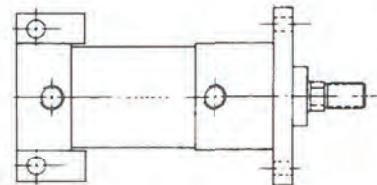
MODEL MT4-A
Trunnion between Head and Cap End. Customer to specify XI Dimensions

TRUNNION PILOT RECESSED INTO HEAD		
BORE	MOUNT	ROD SIZE
7	MT1-A	1 3/8-1 3/4
	MT2-A	2-2 1/2
		3-3 1/2
8	MT1-A	1 3/8-1 3/4
	MT2-A	2-2 1/2
		3-3 1/2
		4-4 1/2
10	MT1-A	1 3/4-2
	MT2-A	2 1/2-3
		3 1/2-4
		4 1/2-5
12	MT1-A & MT2-A	ALL
14	MT1-A & MT2-A	ALL
16	MT1-A & MT2-A	ALL

ADDITIONAL FEATURES



ADJUSTABLE STROKE CYLINDERS
Lindberg can supply a threaded stop adjustment in the cap end of the cylinder to limit the back travel of the piston rod. This limit will vary the effective stroke of the cylinder and can be locked in place for accurate repetitive cylinder stroking.



Mix mountings are available on Models SA and SJ and consist of a combination of standard mountings where practical.

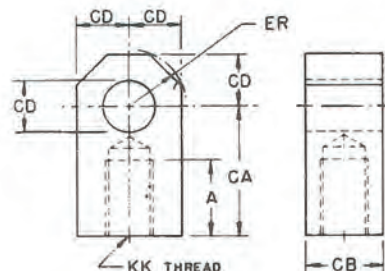
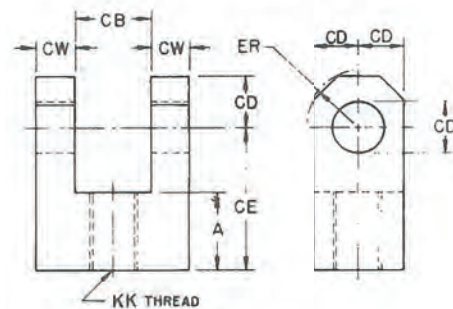
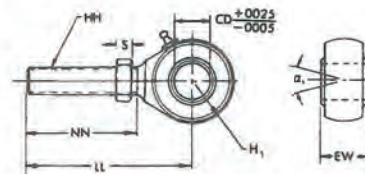
ACCESSORIES

For Series "SA" and Series "SJ" Cylinders

SPHERICAL ROD EYE									
PART NO.	*BORE SIZE	a ₁	H	S	CD	EW	HH	LL	NN
330497-A	1 1/2 - 2 - 2 1/2	12"	11/16	1/4	1/2	5/8	7/16-20	2 7/16	115/32
330497-B	3 1/4 - 4 - 5	13 1/2"	29/32	7/16	3/4	7/8	3/4-16	2 27/32	123/32
330497-C	6-7-8	14"	113/32	9/16	1	1 3/8	1-14	4 3/32	2 3/32

ROD CLEVIS								
PART NO.	*BORE SIZE	THREAD SIZE KK	A	CB	CD	CE	CW	ER
330499-A	1 1/2 - 2 - 2 1/2	7/16-20	3/4	3/4	1/2	1 1/2	1/2	9/16
330499-B	3 1/4 - 4 - 5	3/4-16	1 1/8	1 1/4	3/4	2 1/8	5/8	13/16
330499-C	6-7-8	1-14	1 5/8	1 1/2	1	2 15/16	3/4	1 1/8
330499-D	10	1 1/4-12	2	2	1 3/8	3 3/4	1	1 1/2
330499-E	12	1 1/2-12	2 1/4	2 1/2	1 3/4	4 1/2	1 1/4	1 15/16
330499-F	14-16	1 7/8-12	3	2 1/2	2	5 1/2	1 1/4	2 3/16

ROD EYE							
PART NO.	*BORE SIZE	THREAD SIZE KK	A	CA	CB	CD	ER
330498-A	1 1/2 - 2 - 2 1/2	7/16-20	3/4	1 1/2	3/4	1/2	9/16
330498-B	3 1/4 - 4 - 5	3/4-16	1 1/8	2 1/16	1 1/4	3/4	13/16
330498-C	6-7-8	1-14	1 5/8	2 13/16	1 1/2	1	1 1/8
330498-D	10	1 1/4-12	2	3 7/16	2	1 3/8	1 1/2
330498-E	12	1 1/2-12	2 1/4	4	2 1/2	1 3/4	1 15/16
330498-F	14-16	1 7/8-12	3	5	2 1/2	2	2 3/16



* With Standard Rod

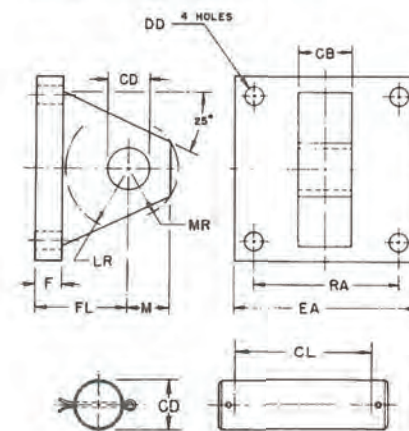
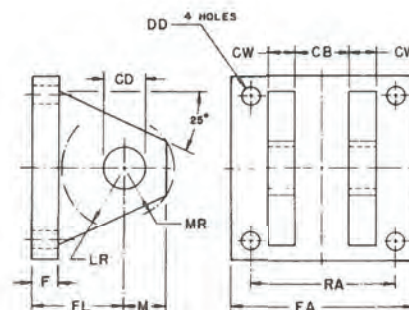
Series SA - Pneumatic
Series SJ - Hydraulic
NFPA INTERCHANGEABLE

LINDBERG
FLUID POWER

CLEVIS BRACKET											
PART NO.	BORE SIZE	CB	CD	CW	DD	EA	F	FL	LR	M	MR
330565-A	1 1/2 - 2 - 2 1/2	3/4	1/2	1/2	13/32	2 1/2	3/8	1 1/8	5/8	1/2	19/32
330565-B	3 1/4 - 4 - 5	1 1/4	3/4	5/8	17/32	3 1/2	5/8	1 7/8	1 1/8	3/4	29/32
330565-C	6-7-8	1 1/2	1	3/4	21/32	4 1/2	3/4	2 1/4	1 1/4	1	1 3/16
330565-D	10	2	1 3/8	1	21/32	5	7/8	3	1 7/8	1 3/8	1 5/8
330565-E	12	2 1/2	1 3/4	1 1/4	29/32	6 1/2	7/8	3 1/8	2	1 3/4	1 3/4
330565-F	14-16	2 1/2	2	1 1/4	1 1/32	7 1/2	1	3 1/2	2 1/16	2	2 3/16

EYE BRACKET											
PART NO.	BORE SIZE	CB	CD	DD	EA	F	FL	LR	M	MR	
330570-A	1 1/2 - 2 - 2 1/2	3/4	1/2	13/32	2 1/2	3/8	1 1/8	5/8	1/2	19/32	
330570-B	3 1/4 - 4 - 5	1 1/4	3/4	17/32	3 1/2	5/8	1 7/8	1 1/8	3/4	29/32	
330570-C	6-7-8	1 1/2	1	21/32	4 1/2	3/4	2 1/4	1 1/4	1	1 3/16	
330570-D	10	2	1 3/8	21/32	5	7/8	3	1 7/8	1 3/8	1 5/8	
330570-E	12	2 1/2	1 3/4	29/32	6 1/2	7/8	3 1/8	2	1 3/4	1 3/4	
330570-F	14-16	2 1/2	2	1 1/32	7 1/2	1	3 1/2	2 1/16	2	2 3/16	

PIVOT PIN					NOTE: Pivot pins are furnished with model MP1-A cylinders, but must be ordered separately for use with accessories.
PART NO.	BORE SIZE	CD	CL		
330500-A	1 1/2 - 2 - 2 1/2	1/2	1 3/4		
330500-B	3 1/4 - 4 - 5	3/4	2 1/2		
330500-C	6-7-8	1	3		
330500-D	10	1 3/8	4		
330500-E	12	1 3/4	5		
330500-F	14	2	5		
330500-G	16	2	5 1/2		



PISTON ROD SIZES

For rods in compression the limiting load is determined by the yield point of the material for short rods and by the modulus of elasticity of the material for longer rods. The longer rods will fail by buckling and the maximum stress allowable in the rod is a function of its length. The method of supporting the ends of the rod make a considerable difference in the allowable load. The severest loading is that where one end of the column is rigidly mounted and the other end is free as in a flagpole rigidly mounted at the base with a weight at its tip. The calculations have been simplified by referring to each condition in terms of the basic conditions of the column pivoted at both ends. The diagrams illustrate various mountings with the equivalent rod length shown.

ROD SIZE:

To determine the rod size necessary for the required stroke and thrust, the following procedure is recommended: 1: Determine the maximum thrust load that will be imposed on the rod and the corresponding "L" dimension for the Cylinder mounting to be used. For the purpose of this calculation "L" is the length of the basic column as shown in Figure 1B. 2: Refer to the table and opposite the thrust value determine the rod size for the cylinder chosen. 3: The table is not suitable if the load is eccentric.

Value of column length "L" in inches

THRUST IN POUNDS	PISTON ROD DIAMETER											
	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
50	62											
100	55	112										
200	47	99										
300	44	88	142									
500	38	75	130	180								
750	28	70	122	170	198	272						
1,000	25	60	103	156	191	258	332					
1,250	21	52	94	140	183	251	316	400				
1,500	19	50	92	136	168	240	300	390				
2,000	15	43	81	113	150	229	291	360	430	500		
4,000	12	31	62	96	120	170	252	309	380	445		
6,000		25	52	80	100	160	197	262	346	407	478	
8,000		22	45	75	99	134	189	230	310	372	445	
10,000		21	40	67	89	121	173	210	268	334	410	480
20,000			27	48	63	104	142	171	216	275	330	375
30,000				40	51	81	115	155	204	233	273	320
40,000				30	45	70	99	135	176	225	242	292
50,000					35	62	90	121	162	198	234	260
60,000						56	82	110	144	181	225	254
70,000						48	74	103	133	168	208	246
80,000						43	70	96	125	157	200	234
90,000						37	66	90	119	149	185	225
100,000							60	84	112	141	172	212

USE OF STOP TUBE TO PREVENT BUCKLING OF ROD AND PREVENT EXCESS ROD BEARING LOAD

For push stroke cylinders mounted as in Figure 1-A, B, C, D, it is advisable to use stop tubes to prevent side loading of the cylinder. When the value of "L" exceeds 40 inches, use one whole inch of stop tube for each 10 inches of length in excess of 40 inches. Add the stop tube length when determining the final value of "L" for the assembly. For a horizontal rigidly mounted cylinder with piston rod unsupported and no weight added to the rod, as in Figure 1-F, use one whole inch of stop tube for every 10 inches of length in excess of 40 inches. **This prevents the rod bearing from being overloaded** when the rod is at the fully extended position. For horizontally mounted models shown in Figure 1-J, K, M, N it is advisable to calculate the bearing loads with the rod fully extended. The bearing loads should be limited to 200 PSI for long life and not more than 350 PSI under any condition. For Figure 1-M (center trunnion cylinder), the most favorable rod bearing load is obtained with the XI dimension equal to about 1/3 the length of the collapsed cylinder length.

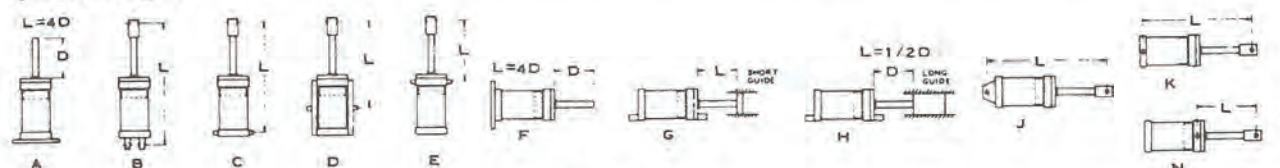


Figure 1

TIE-ROD NUT TORQUE SPECIFICATIONS								
BORE DIA.	SERIES	1 1/2	2, 2 1/2	3 1/4, 4	5, 6	8	10, 12	14, 16
Torque	SA	5	12	30	50	100	160	250
Ft. Lbs.	SJ	8	15	35	60	120	180	370

SERIES "SJ" HYDRAULIC PRESSURE RATING							
BORE DIA.	1 1/2	2	2 1/2	3 1/2	4	5	6
Pressure	1500	1500	1500*	1500	1000	1000*	750
Rating PSI							

NOTE: *2 1/2 Bore with 5/8" Rod, Rating 1000 PSI
*5" bore with 1" Rod, Rating 750 PSI



LINDBERG ROTA-VERSAL SERIES ROTARY ACTUATORS

Lindberg Rota-Versal series rotary actuators are rugged compact units used for converting fluid power (pneumatic or hydraulic) to bi-directional rotary motion. Rota-versal rotary actuators have been engineered for the highest dependability using a design based on experience and the finest manufacturing techniques. All Rota-versal rotary actuators are designed for direct on-shaft installations without costly flexible couplings, cams, chain and sprockets or lever arm mechanisms.

Lindberg Rota-versal series rotary actuators are available in a full range of five standard models, based on torque range. Standard rotation offered are 90°, 180°, 270°, & 360° with special rotations available upon request. Rotations may be adjusted from standard to minus 90° by adapting a rotational

adjustment accessory. The accessories listed on pages 65 and 66, undoubtedly makes this actuator a Universal utilization of rotary fluid power.

All standard Rota-versal models are equipped with "Buna-N" seals suitable for use in temperatures ranging from -40° F, to +180° F and are compatible with air, water and mineral base hydraulic fluids. Seals can be supplied to meet almost any requirement of operating media or environment.

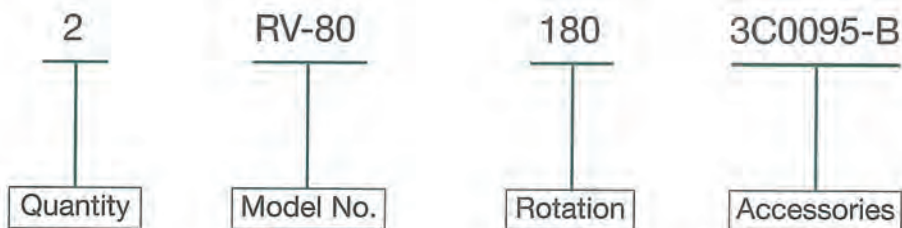
All Rota-versal units are operated by directional control valves in the same manner as air and hydraulic cylinders. Rotational speed may be controlled through the use of flow control valves or built in cushions may be incorporated into the actuator itself. Air-draulic or air-over-oil systems may easily be used with this actuator and are covered on page 67.

HOW TO ORDER THE ROTA-VERSALS

TO INSURE PROMPT AND CORRECT PROCESSING OF YOUR ORDER OR REQUEST FOR QUOTATION, PLEASE INCLUDE THE FOLLOWING INFORMATION:

1. Quantity
2. Model Number wanted
3. Rotation required (90°-180°-270°-360°)
4. Accessories
5. Operating pressure and fluid (if other than standard)
6. Operating temperature (if other than standard)

EXAMPLE:



If pressure, fluid or operating temperature is other than standard, please specify.

DESIGN AND CONSTRUCTION FEATURES

1. **ACTUATOR BODY** - Designed for rugged service and machined from a cold rolled flat to precise tolerances. Material of Models RV-10 and RV-30 is of heat treated alloy aluminum. Models RV-80 thru RV-350 are made from carbon steel with a black oxide finish and have bronze rack guide bushings.

2. **CYLINDER TUBES** - Cold drawn seamless steel tubing, honed to a 10 microinch finish and hard chrome plate on the bore. Outside surface treated with a black oxide finish.

3. **END CAPS** - Machined from a solid bar for heavy duty service. Large ports, tapped N.P.T.F. and located for ease of plumbing. Models RV-10 and RV-30 are made from heat treated alloy aluminum. Models RV-80 thru RV-350 are made from carbon steel and treated with a black oxide finish.

4. **PINION** - Rugged, heavy section pinion with a high strength gear tooth form. Machined from a stressproof, high yield steel. The shaft and gear being one homogeneous piece for the maximum in strength and dimensional stability.

5. **RACK** - Made from a high yield, heat treated steel bar. Turned and ground diameters with precision cut rack. Engineered for lasting service.

6. **PISTONS** - This piston is assured of a long and maintenance free life by simplicity of design and ridged construction using structurally dense aluminum.

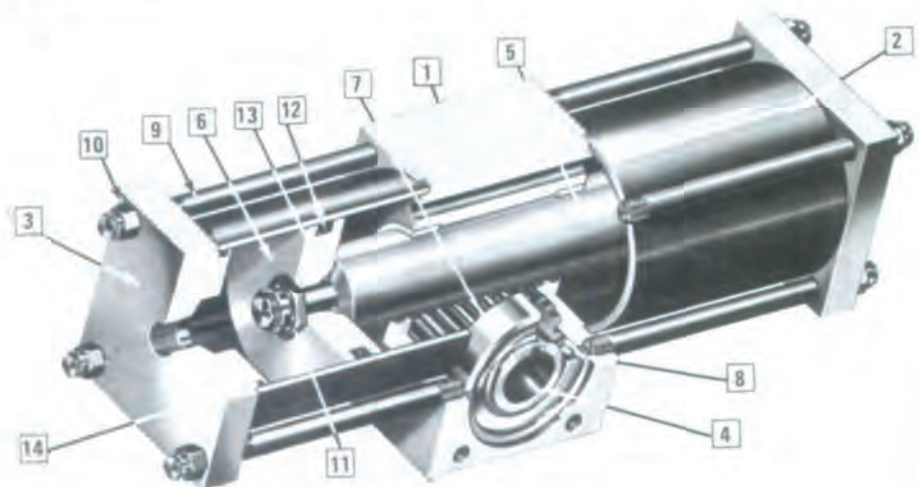
7. **PINION BEARINGS** - Sealed ball bearings, self-lubricated for life for minimum friction at peak radial loads.

8. **PINION BEARING RETAINER** - A steel retainer that requires no special tools to remove and will give the ultimate in serviceability to pinion assembly.

9. **TIE-RODS** - Cold rolled high yield steel, pre-stressed for maximum strength and reliability.

10. **TIE-ROD NUTS** - Steel self-locking nuts that lock positively and will not work loose even under the most severe vibration.

11. **PISTON NUTS** - Steel self-locking nuts that lock positively and will not work loose even under the most severe vibration.



12. **PISTON PACKING** - Block-vee type that is pressure compensating for ultimate in leak proof dynamic seal design.

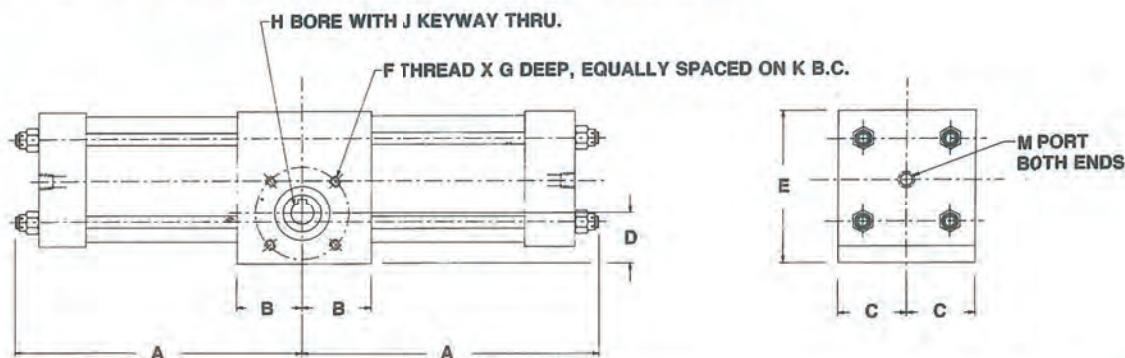
13. **RACK TO PISTON SEALS** - A proven O-ring static steel used in triangular groove.

14. **CYLINDER TUBE SEALS** - An O-ring seal used in a standard groove design for the ultimate in a leak proof static seal.

Rota-Versal ROTARY ACTUATORS

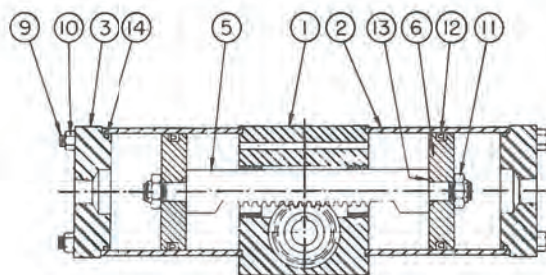


DIMENSIONAL DATA ROTA-VERSAL

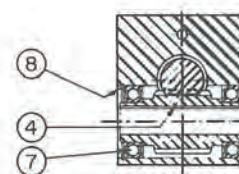


MODEL	BORE SIZE	ROTATION DEGREES	DISPLACEMENT CUBIC INCHES	A	B	C	D	E	F	G	H	J	K	M	OPERATING HYDRAULIC	PRESSURE PNEUMATIC	TORQUE INPUT RATIO IN LB/PSI
RV-10	1 1/2	90°	2.09	4 5/8	1 3/8	1 1/4	1 7/32	3 3/8	5/16-18	5/8	.563	1/8	2 1/2	1/4	1000 PSI	250PSI	1.32
		180°	4.19	5 13/16							.564				MAX	MAX	
		270°	6.29	7													
		360°	8.33	8 5/32													
RV-30	2	90°	5.00	5 15/32	1 3/4	1 1/4	1 13/32	4	5/16-18	5/8	.751	3/16	3	1/4	800 PSI	250 PSI	3.14
		180°	9.91	7 1/32							.752				MAX	MAX	
		270°	14.82	8 19/32													
		360°	19.82	10 3/16													
RV-80	3 1/4	90°	13.22	6 1/16	1 3/4	1 3/4	1 15/32	4 5/8	3/8-16	5/8	.876	3/16	3 1/4	1/2	500 PSI	250 PSI	8.29
		180°	26.18	7 5/8							.877				MAX	MAX	
		270°	39.13	9 3/16													
		360°	52.36	10 25/32													
RV-120	4	90°	20.02	6 11/16	2 1/4	2 1/4	1 19/32	5 1/4	3/8-16	1	.876	3/16	3 1/4	1/2	500 PSI	250 PSI	12.56
		180°	39.66	8 1/4							.877				MAX	MAX	
		270°	59.29	9 13/16													
		360°	79.32	11 13/32													
RV-350	5	90°	55.83	8 13/16	2 3/4	2 3/4	2 5/16	7 1/4	1/2-13	1 1/4	1.251	1/4	5	1/2	500 PSI	250 PSI	35.34
		180°	111.05	11 5/8							1.252				MAX	MAX	
		270°	166.89	14 15/32													
		360°	222.11	17 9/32													

PARTS LIST



SECTION B-B

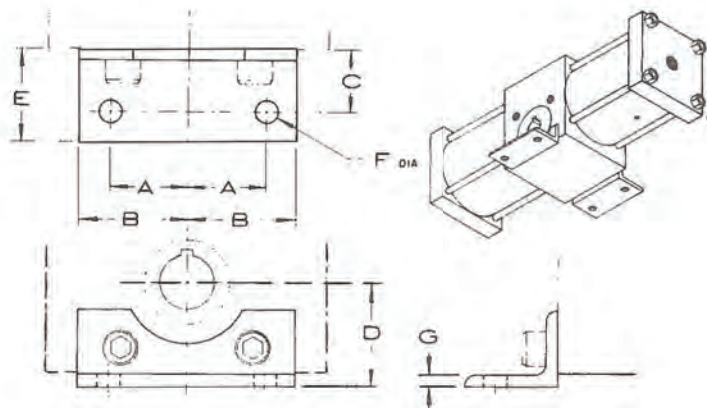


SECTION A-A

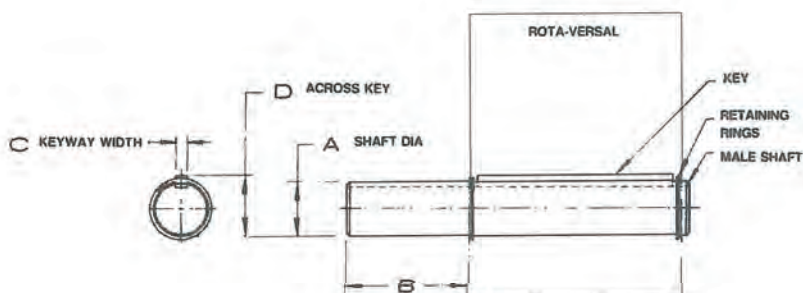
ITEM	QTY.	NAME	ITEM	QTY.	NAME	ITEM	QTY.	NAME
1	1	Actuator Body	6	2	Piston	11	2	Piston Nuts
2	2	Tubes	7	2	Ball Bearings	12	2	Piston Packing
3	2	End Caps	8	2	Retaining Rings	13	2	O-Rings
4	1	Pinion	9	8	Tie-Rods	14	2	O-Rings
5	1	Rack	10	8	Tie-Rod Nuts			

ACCESSORIES

MOUNTING FEET									
PART NO.	FOR MODEL #	A	B	C	D	E	F	G	H
930637-A	RV-10	7/8	1 3/8	1	1 1/2	1 1/2	11/32	1/8	1
930637-B	RV-30	1 1/4	1 3/4	1	1 11/16	1 1/2	11/32	1/8	1
930637-C	RV-80, RV-120	1 1/4	1 3/4	1 1/16	1 13/16	1 1/2	13/32	3/16	1 1/4
930637-D	RV-350	1 7/8	2 1/2	1 3/8	2 5/8	2	17/32	1/4	1 1/2



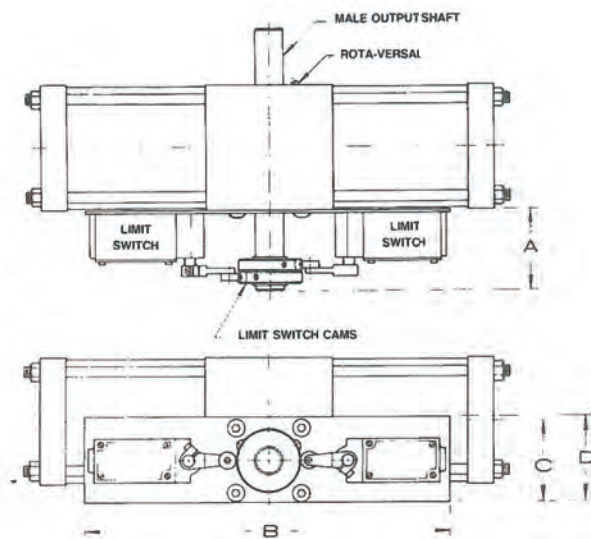
MALE OUTPUT SHAFT					
PART NO.	FOR ROTA-VERSAL MODEL #	A	B	C	D
930640-A	RV-10	.562/.560	1 1/4	1/8	.618/.613
930640-B	RV-30	.750/.748	1 1/2	3/16	.831/.826
930640-C	RV-80	.875/.873	1 3/4	3/16	.958/.953
930640-D	RV-120	.875/.873	1 3/4	3/16	.958/.953
930640-E	RV-350	1.250/1.248	2 1/2	1/4	1.362/1.357



Rota-Versal ROTARY ACTUATORS

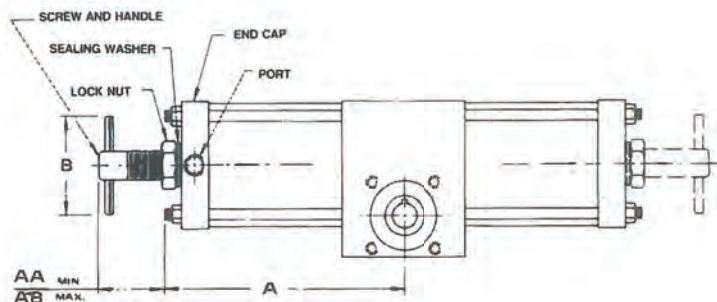


ACCESSORIES



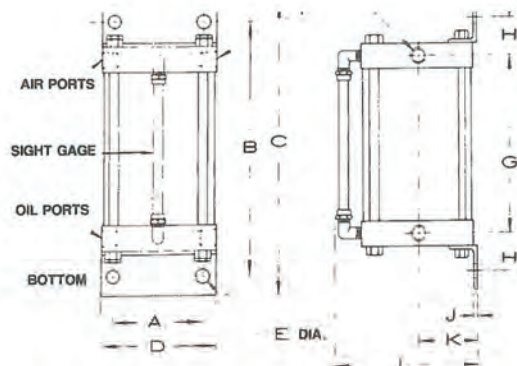
LIMIT SWITCH ACTUATOR							
PART NO.	MODEL #	A	B	C	D	E	F
950405-A	RV-10	2 7/8	12 1/2	2 21/32	3	.562/.560	1 1/8
950405-B	RV-30					.750/.748	1 1/2
950405-C	RV-80			2 29/32		.875/.873	1 3/4
950405-D	RV-120						
	RV-350			2 33/64		1.250/1.248	2 1/2

NOTE: Standard Limit Switches are single pole with 1 N.C. and 1 N.O. contact.



ROTATION ADJUSTMENT				
PART NO.	MODEL #	AA	AB	B
950410-A	RV-10	3/4	2	2
950410-B	RV-30	11/16	2 5/16	2
950410-C	RV-80	3/4	2 3/8	2 1/2
	RV-120	3/4	2 3/8	2 1/2
950410-D	RV-350	1	3 7/8	3

NOTE: Standard Adjustment is within 90°



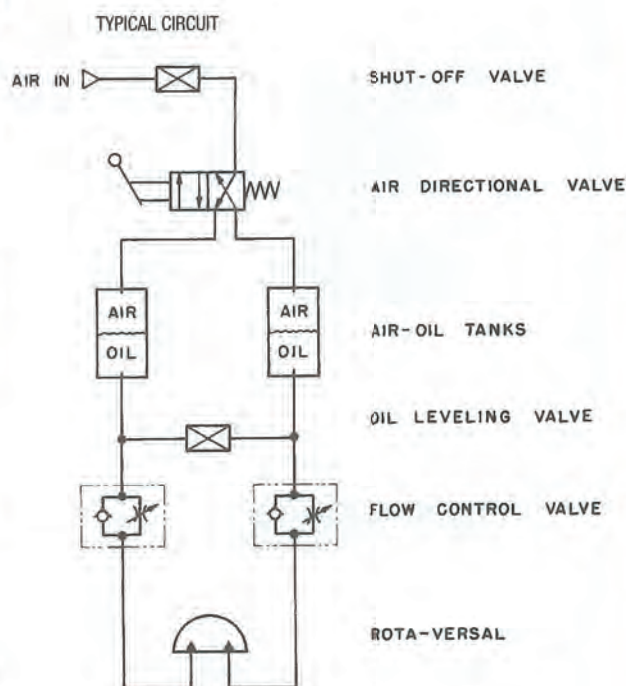
MOUNTING DIMENSIONS											
BORE	A	B	C	D	E	F	G	H	J	K	L
3 1/4	2 3/4	5	6	3 3/4	9/16	1/2	1 3/8	1 13/16	1/8	1 15/16	4 7/8
4	3 1/2	5	6	4 1/2	9/16	1/2	1 3/8	1 13/16	1/8	2 1/4	5 5/8
5	4 1/4	5 1/4	6 1/2	5 1/2	11/16	1/2	1 3/8	1 15/16	3/16	2 3/4	6 5/8

Lindberg air-oil tanks offer a smoother means of Rota-versal hydraulic speed control from an air line source. Compare this simple air-oil power source to a hydraulic power source requiring motor, pump, tank, filter, pressure relief valve, etc. The air-oil circuit controls the actuator exactly the same as the pumping unit circuit using the same control valves, except eliminating the costly power source.

All Lindberg air-oil tanks are equipped with internal baffles which permit rapid discharge and intake of air and oil without aeration of oil being blown from tank. Sight gauges are also standard and tell at a glance the amount of oil in the tank. All Lindberg tanks have large ports for rapid actuator speeds.

When designing and installing air-oil systems there are important points which must be remembered:

1. Most tanks vertical at the highest point in circuit for self-bleeding action
2. To insure minimum power loss, size liquid transmission lines for 5 ft./ sec. velocity.
3. Always provide "oil leveling" valve in circuit for balancing tank levels.
4. During prolonged periods of shut down, shut off air supply.



HOW TO ORDER AIR-OIL TANKS

TO INSURE PROMPT AND CORRECT PROCESSING OF YOUR ORDER OR REQUEST FOR QUOTATION, PLEASE INCLUDE THE FOLLOWING INFORMATION:

EXAMPLE:

2
Quantity

Air-Oil Tank
Name

3 1/4 Bore
Bore

5 Height
Height

CUSTOM APPLICATIONS



For over 50 years Lindberg has specialized in custom cylinder products for specific applications. No matter if your requirement is for 1 cylinder or 500 cylinders, we exist to serve you.

SPECIFICATIONS:

APPLICATION:



16" bore, 30" stroke, 8" rod, LVDT, 5000 psi.

Used for "fatigue" testing of heavy equipment axles.



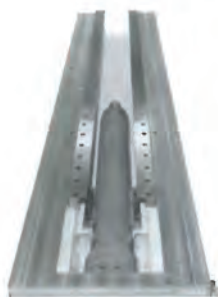
Rotary Union 5 port combination, 150 psi air and 2000 psi hydraulic

Used in an aluminum processing operation.



10" bore, 58" stroke, clevis mount, rod clevis, rod boot, 2000 psi.

Used to assist in rotating bells for pouring molten steel.



50 ton capacity. 72" stroke.

Used as main ram cylinder in a broaching machine.

Consult with Lindberg's technical assistance staff to discuss how you can take advantage of over 50 years experience in custom cylinder applications.

INDUSTRIES SERVED

Steel Mills
Mining
Aluminum Processing
Farm Equipment
Shipping Vessels
Oil/Gas Exploration
Machine Tool
Specialty Vehicles
Industrial Automation
And many more...



Lindberg Fluid Power has been in the mill-type, heavy-duty, and custom hydraulic/pneumatic cylinder business since 1945 and a division of Crankshaft Machine since 1980. Our current facility covers 45,000 square feet.

Multiple CAD engineering stations and a comprehensive machine shop and assembly area allows us to respond efficiently to both standard and custom applications.

Many years of experience in designing custom cylinders and an awareness of advanced components offers you an excellent source for your special requirements. We maintain records of all engineering data pertaining to each order assuring prompt delivery of replacement parts, regardless of the cylinder age.

Lindberg has the capability of manufacturing cylinders up to a 24" bore and 12' stroke. Our hydraulic cylinders can be engineered to 3000 psi capacity or beyond. We also have a repair business that can turn any manufacturer's old leaky cylinder into a sturdy, efficient product at 50-60% the cost of a new cylinder.

We have the highest confidence in our Lindberg Cylinders. They are engineered and built for low-maintenance, long lasting performance. We adhere to a comprehensive quality management system. Each cylinder is thoroughly inspected for leaks, cushioning, and adherence to dimensional criteria. Your inquiries are always welcome.

CALL: 517.841.4063
FAX: 517.787.7677
WWW.LINBERCYL.NET



Lindberg Fluid Power
Division of Crankshaft Machine Group
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P.O. Box 1127
Jackson, MI 49204-1127
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