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TECHNOLOGY GROUP

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along with credit for buybacks and trade-ins.

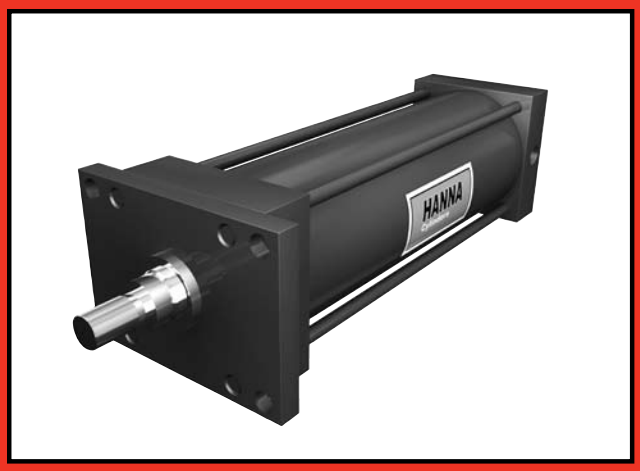
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- Critical and expedited services
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Expert team | Trust guarantee | 100% satisfaction

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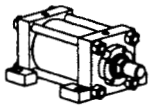
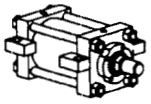
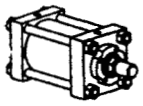
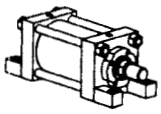
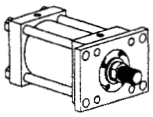
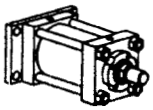
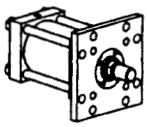
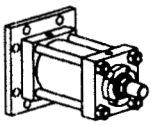
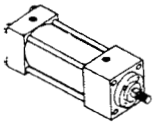
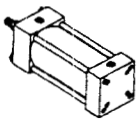
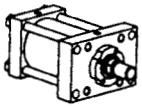
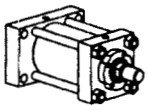
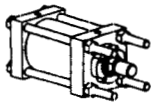
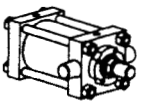
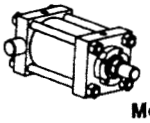
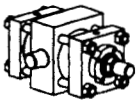
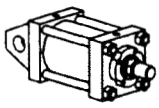
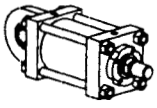
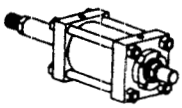
Visit our website - *Click HERE*



Series 3A and 3AN for Heavy-Duty Service

- High-Tech Duralon® Rod Bearing
- State-of-the-Art Rod and Piston Sealing System
- Heavy-Duty Piston-to-Rod Connection
- 1.50" – 14.00" Bores
- 150 – 250 PSI Pressure Ratings
- N.F.P.A. Interchangeability — 23 Mounting Styles
- No Lubrication Required with 3AN

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HANNA cylinders

Series 3A
Pneumatic Cylinders

Hanna's Series 3A low-pressure pneumatic cylinders are designed and built to meet today's exacting industrial requirements. Rugged, performance-oriented units, 3A cylinders incorporate field proven design features which assure long, trouble-free service.

Series 3A cylinders give you virtually unlimited flexibility in machinery design, with a full range of bore sizes (1.50" through 14.00") offered. Developed for pressure ratings of 150 to 250 p.s.i., Series 3A cylinders are available in 23 N.F.P.A. mounting styles.

When ordering, specify piston packing code "A" for moderate temperatures, and code "B" for high temperature service.

Series 3AN
for Non-Lubricated Service

Hanna's Series 3AN cylinders are available in the same bore sizes and mounting styles as our 3A cylinders, and offer the added advantage of requiring no lubrication.

Extensive laboratory testing and countless field applications have proven conclusively that 3AN cylinders provide millions of maintenance and lubrication-free cycles. The reason: the combination of Hanna's unique Duralon® rod bearing and our glass-filled Teflon® piston seal with a bronze-impregnated bearing strip completely eliminates metal-to-metal contact at bearing surfaces. This is an absolute requirement for non-lube service and extended bearing life.

When ordering, specify piston packing code "G" for moderate temperature service.

Consult factory for special requirements.

Series 3A and 3AN Features

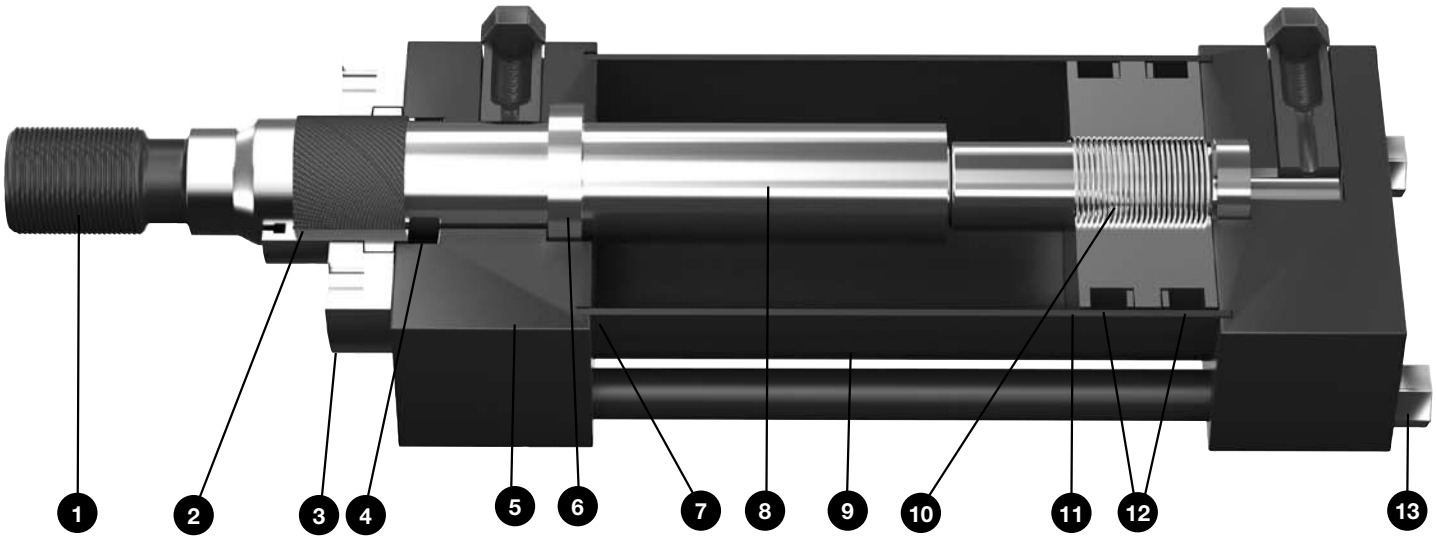
1. Piston Rod End
Integral thread construction, precision-machined for close concentricity. Studded rod ends are available.

2. Duralon Rod Bearing
Hanna's high-tech Duralon rod bearing is designed to perform under poorly lubricated, high-load conditions. The exact combination of woven Teflon and Dacron®, plus the fiberglass structural shell, increases load-carrying capabilities and eliminates "cold-flow" associated with Teflon. Duralon bearings are capable of sustaining much higher compressive loads than either bronze or cast iron, have an extremely low coefficient of friction, and require no lubrication to the bearing surface.

3. Gland Construction
Two-piece (gland plus retainer plate), bolted-on or full-face retainer design. Packings may be captive in the gland or located in the head.

4. Rod Seal
Series 3A and 3AN cylinders incorporate the industry's heaviest cross-section polyurethane U-cup piston rod seal, assuring zero leakage and outstanding wear resistance. Viton U-cup is available for higher temperature service.

Duralon is a Trademark of Rexnord, Inc
Teflon and Dacron are Trademarks of DuPont Company



5. Heads
Steel heads are precision-machined to assure accurate alignment and close concentricity between piston, tube, piston rod and rod bearing.

6. Cushion Check Seals
With self-aligning, full-floating design, the cushion check seals are closely fitted to cushion sleeve and spear. The seals serve as both cushion seal and check valve, providing effective cushioning and fast breakaway.

7. Tube Seal
Buna-N O-ring seal. Viton available for higher temperature service.

8. Piston Rod
Hanna's piston rods are machined to a close tolerance with minimum stock removal to maximize shank size and reduce stress. Relief grooves are machined in areas of high stress to guard against fatigue failures. The rods provide 100,000 minimum yield strength in diameters up to 3.50"; 59,000 average yield strength in 4.00" diameter and above. All sizes are hard chrome plated for scratch and corrosion resistance. To maximize seal and bearing life, plated surface is polished to a 6-8 micro-inch finish.

9. Tubing
Steel tubing is precision-honed to a 16-20 micro-inch finish for close tolerance between piston and tube wall, and chrome plated for corrosion resistance.

10. Piston-to-Rod Connection
Piston rods are piloted to the piston to ensure concentricity, then bonded by an anerobic adhesive, torqued and pinned.

11. Piston
One-piece piston of high impact-resistant ductile iron threaded to piston rod, and furnished with breakaway spirals on each side.

12. Piston Sealing System
Two Buna-N U-cups are standard, with Viton U-cups available for higher temperature service. For non-lubricated service, 3AN cylinders utilize a glass-filled, O-ring energized piston seal that provides positive sealing. A bronze-filled Teflon bearing strip provides a non-metallic bearing point on the piston, assuring long life and extremely low friction.

13. Tie Rods
Made from high-strength steel, the tie rods are pre-stressed for fatigue resistance.

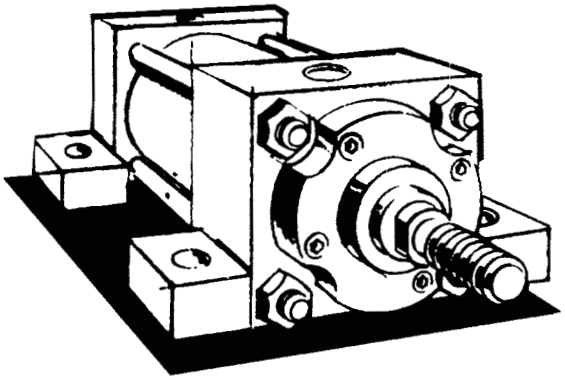
SERIES "3A"

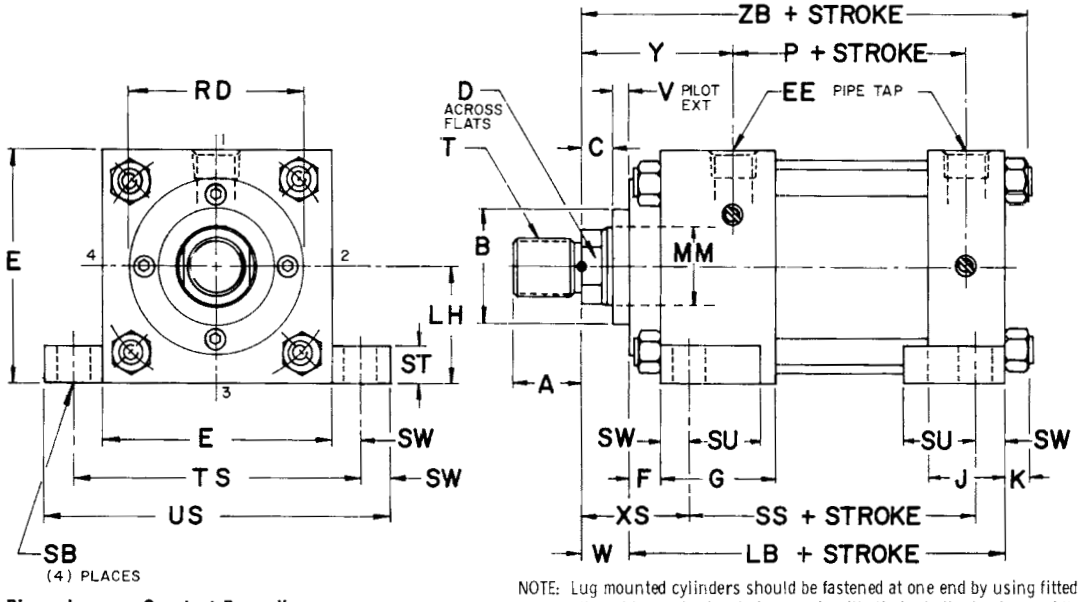
PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MS2

SIDE LUG MOUNT





These Dimensions are Constant Regardless of Rod Diameter

NOTE: Lug mounted cylinders should be fastened at one end by using fitted bolts, a thrust key or by dowel pins. This will eliminate the tendency of the cylinder to shift when pushing or pulling.

BORE	E	LH -.006 -.008	EE (NPTF)	F	G	J	K	LB	P	SB +.005 -.000	SS	ST	SU	SW	TS ±.010	US
1.50	2.00	1.000	3/8	.38	1.50	1.00	.25	4.00	2.31	.438	2.88	.50	.94	.38	2.75	3.50
2.00	2.50	1.250	3/8	.38	1.50	1.00	.31	4.00	2.31	.438	2.88	.50	.94	.38	3.25	4.00
2.50	3.00	1.500	3/8	.38	1.50	1.00	.31	4.12	2.44	.438	3.00	.50	.94	.38	3.75	4.50
3.25	3.75	1.875	1/2	.62	1.75	1.25	.38	4.88	2.69	.562	3.25	.75	1.25	.50	4.75	5.75
4.00	4.50	2.250	1/2	.62	1.75	1.25	.38	4.88	2.69	.562	3.25	.75	1.25	.50	5.50	6.50
5.00	5.50	2.750	1/2	.62	1.75	1.25	.44	5.12	2.94	.812	3.12	.94	1.56	.69	6.88	8.25
6.00	6.50	3.250	3/4	.75	2.00	1.50	.44	5.75	3.19	.812	3.62	.94	1.56	.69	7.88	9.25
8.00	8.50	4.250	3/4	.75	2.00	1.50	.56	5.88	3.31	.812	3.75	.94	1.56	.69	9.88	11.25
10.00	10.62	5.312	1	.75	2.25	2.00	.66	7.12	4.19	1.062	4.62	1.25	2.00	.88	12.38	14.12
12.00	12.75	6.375	1	.75	2.25	2.00	.66	7.62	4.69	1.062	5.12	1.25	2.00	.88	14.50	16.25
14.00	14.75	7.375	1 1/4	.75	2.75	2.25	.75	8.88	5.62	1.312	5.88	1.50	2.50	1.12	17.00	19.25

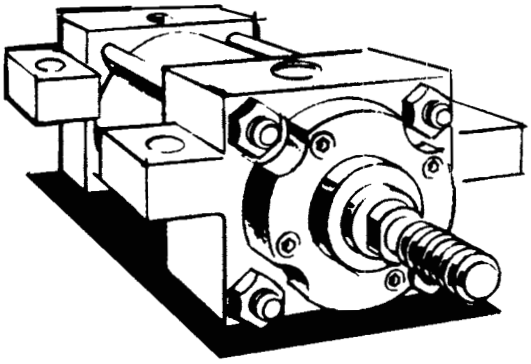
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	XS	Y	ZB	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	4.88	-	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.25	-	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.00	2.50	5.56	-	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.00	2.50	5.69	-	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	2.25	2.75	5.94	-	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.88	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.12	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.38	2.88	6.50	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.50	3.00	6.62	-	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.88	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.12	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.38	2.88	6.50	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.50	3.00	6.62	-	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.75	3.25	6.88	-	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.06	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.31	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.56	2.88	6.81	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.69	3.00	6.94	-	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.94	3.25	7.19	-	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	2.94	3.25	7.19	-	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	2.94	3.25	7.19	-	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.31	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.56	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.69	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.94	3.38	7.69	-	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.94	3.38	7.69	-	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	2.94	3.38	7.69	-	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.94	3.38	7.69	-	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.31	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.56	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.69	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.94	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.94	3.38	7.94	-	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.94	3.38	7.94	-	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	2.94	3.38	7.94	-	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	2.94	3.38	7.94	-	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.75	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.88	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.12	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.12	3.44	9.31	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.12	3.44	9.31	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.12	3.44	9.31	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.12	3.44	9.31	-	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.88	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.12	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.12	3.44	9.81	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.12	3.44	9.81	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.12	3.44	9.81	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.12	3.44	9.81	-	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	3.69	11.19	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	3.69	11.19	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	3.69	11.19	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	3.69	11.19	-	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



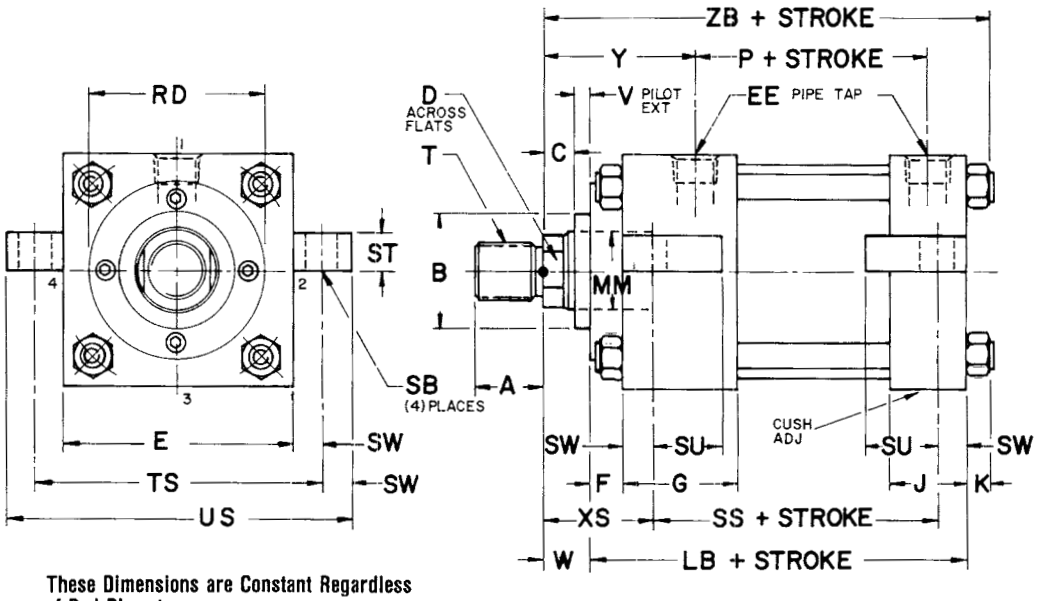
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MS3

CENTERLINE LUG
MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	G	J	K	LB	P	SB +.005 -.000	SS	ST	SU	SW	TS ±.010	US
1.50	2.00	3/8	.38	1.50	1.00	.25	4.00	2.31	.438	2.88	.50	.94	.38	2.75	3.50
2.00	2.50	3/8	.38	1.50	1.00	.31	4.00	2.31	.438	2.88	.50	.94	.38	3.25	4.00
2.50	3.00	3/8	.38	1.50	1.00	.31	4.12	2.44	.438	3.00	.50	.94	.38	3.75	4.50
3.25	3.75	1/2	.62	1.75	1.25	.38	4.88	2.69	.562	3.25	.75	1.25	.50	4.75	5.75
4.00	4.50	1/2	.62	1.75	1.25	.38	4.88	2.69	.562	3.25	.75	1.25	.50	5.50	6.50
5.00	5.50	1/2	.62	1.75	1.25	.44	5.12	2.94	.812	3.12	.94	1.56	.69	6.88	8.25
6.00	6.50	3/4	.75	2.00	1.50	.44	5.75	3.19	.812	3.62	.94	1.56	.69	7.88	9.25
8.00	8.50	3/4	.75	2.00	1.50	.56	5.88	3.31	.812	3.75	.94	1.56	.69	9.88	11.25
10.00	10.62	1	.75	2.25	2.00	.66	7.12	4.19	1.062	4.62	1.25	2.00	.88	12.38	14.12
12.00	12.75	1	.75	2.25	2.00	.66	7.62	4.69	1.062	5.12	1.25	2.00	.88	14.50	16.25
14.00	14.75	1 1/4	.75	2.75	2.25	.75	8.88	5.62	1.312	5.88	1.50	2.50	1.12	17.00	19.25

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER							T (THREAD)									
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	W	XS	Y	ZB	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	4.88	-	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.25	-	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.00	2.50	5.56	-	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.38	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.75	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.00	2.50	5.69	-	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	2.25	2.75	5.94	-	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.88	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.12	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.38	2.88	6.50	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.50	3.00	6.62	-	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.88	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.12	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.38	2.88	6.50	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.50	3.00	6.62	-	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.75	3.25	6.88	-	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.06	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.31	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.56	2.88	6.81	-	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.69	3.00	6.94	-	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.94	3.25	7.19	-	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	2.94	3.25	7.19	-	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	2.94	3.25	7.19	-	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.31	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.56	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.69	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.94	3.38	7.69	-	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.94	3.38	7.69	-	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	2.94	3.38	7.69	-	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.94	3.38	7.69	-	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.31	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.56	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.69	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.94	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.94	3.38	7.94	-	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.94	3.38	7.94	-	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	2.94	3.38	7.94	-	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	2.94	3.38	7.94	-	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.75	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.88	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.12	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.12	3.44	9.31	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.12	3.44	9.31	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.12	3.44	9.31	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.12	3.44	9.31	-	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.88	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.12	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.12	3.44	9.81	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.12	3.44	9.81	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.12	3.44	9.81	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.12	3.44	9.81	-	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	3.69	11.19	-	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	3.69	11.19	-	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	3.69	11.19	-	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	3.69	11.19	-	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.

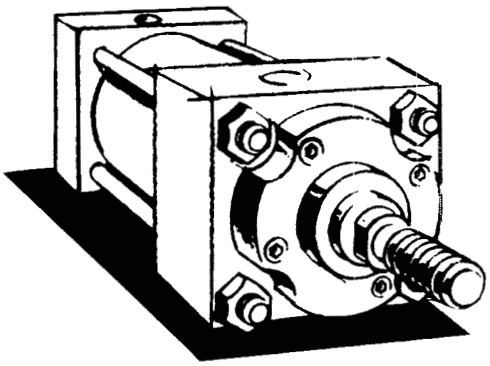
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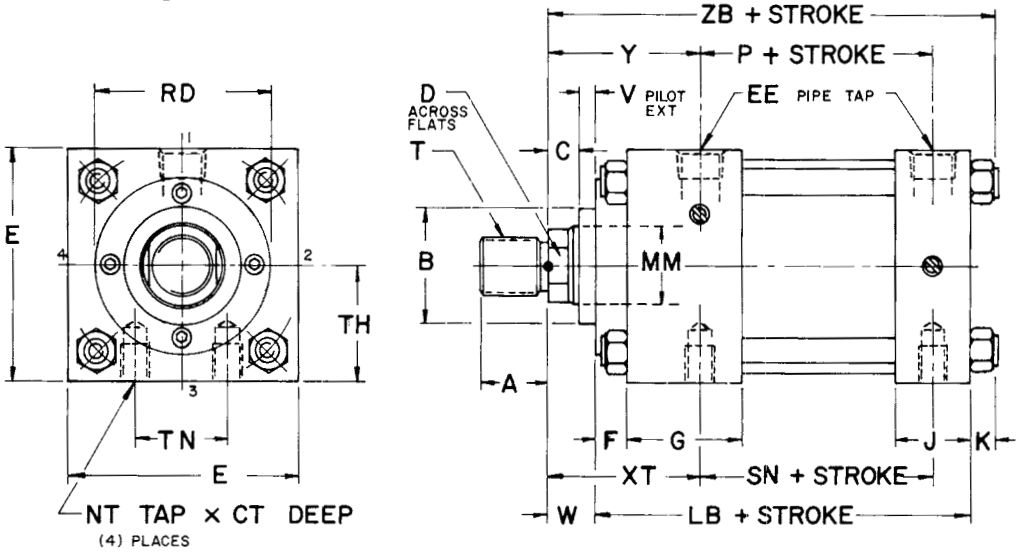
PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MS4

SIDE TAPPED MOUNT





These Dimensions are Constant Regardless of Rod Diameter

BORE	CT	E	TH -.006 -.008	EE (NPTF)	F	G	J	K	LB	NT	P	SN	TN ±.010
1.50	.38	2.00	1.000	3/8	.38	1.50	1.00	.25	4.00	.25-20	2.31	2.25	.62
2.00	.38	2.50	1.250	3/8	.38	1.50	1.00	.31	4.00	.31-18	2.31	2.25	.88
2.50	.50	3.00	1.500	3/8	.38	1.50	1.00	.31	4.12	.38-16	2.44	2.38	1.25
3.25	.50	3.75	1.875	1/2	.62	1.75	1.25	.38	4.88	.50-13	2.69	2.62	1.50
4.00	.75	4.50	2.250	1/2	.62	1.75	1.25	.38	4.88	.50-13	2.69	2.62	2.06
5.00	1.00	5.50	2.750	1/2	.62	1.75	1.25	.44	5.12	.62-11	2.94	2.88	2.69
6.00	1.12	6.50	3.250	3/4	.75	2.00	1.50	.44	5.75	.75-10	3.19	3.12	3.25
8.00	1.12	8.50	4.250	3/4	.75	2.00	1.50	.56	5.88	.75-10	3.31	3.25	4.50
10.00	1.50	10.62	5.312	1	.75	2.25	2.00	.66	7.12	1.00-8	4.19	4.12	5.50
12.00	1.50	12.75	6.375	1	.75	2.25	2.00	.66	7.62	1.00-8	4.69	4.62	7.25
14.00	1.88	14.75	7.375	1 1/4	.75	2.75	2.25	.75	8.88	1.25-7	5.62	5.50	8.38

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER							T (THREAD)									
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	W	XT	Y	ZB	RD**	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.94	1.88	4.88	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	*	2.25	5.25	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.94	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.31	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	*	2.50	5.56	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.94	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.31	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.56	2.50	5.69	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	*	2.75	5.94	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.44	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.69	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.94	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.06	3.00	6.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.44	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.69	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.94	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.06	3.00	6.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.31	3.25	6.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.44	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.69	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.94	2.88	6.81	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.06	3.00	6.94	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.31	3.25	7.19	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	3.31	3.25	7.19	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	3.31	3.25	7.19	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.81	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.06	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	3.38	7.69	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	3.38	7.69	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	3.44	3.38	7.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	3.38	7.69	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.81	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.06	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.44	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.44	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.12	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.25	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.50	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.50	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.50	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.50	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.50	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.25	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.50	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.50	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.50	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.50	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.50	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.81	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.81	3.69	11.19	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.81	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.81	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.81	3.69	11.19	--	150

* Not available in MS4 Mount

**Where RD is not shown, square retainer is used. See section for Retainer Construction.

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.

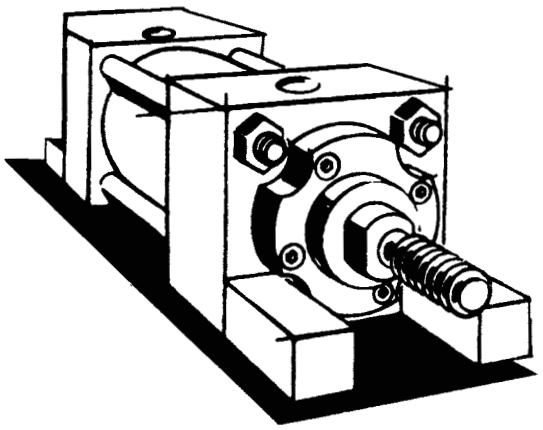
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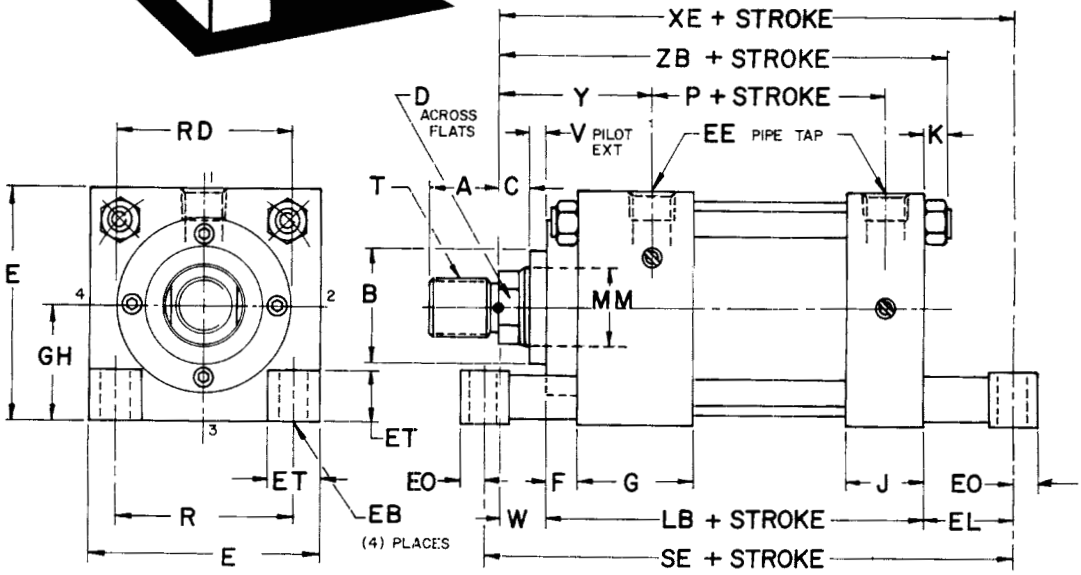
PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MS7

END LUG MOUNT





These Dimensions are Constant Regardless of Rod Diameter

BORE	E	GH -.006 -.008	EB	EE (NPTF)	EL	EO	ET	F	G	J	K	LB	P	R ±.010	SE
1.50	2.00	1.000	.31	3/8	.75	.34	.56	.38	1.50	1.00	.25	4.00	2.31	1.43	5.50
2.00	2.50	1.250	.38	3/8	.94	.31	.62	.38	1.50	1.00	.31	4.00	2.31	1.84	5.88
2.50	3.00	1.500	.38	3/8	1.06	.31	.81	.38	1.50	1.00	.31	4.12	2.44	2.19	6.25
3.25	3.75	1.875	.44	1/2	.88	.38	1.00	.62	1.75	1.25	.38	4.88	2.69	2.76	6.62
4.00	4.50	2.250	.44	1/2	1.00	.38	1.19	.62	1.75	1.25	.38	4.88	2.69	3.32	6.88
5.00	5.50	2.750	.56	1/2	1.06	.50	1.40	.62	1.75	1.25	.44	5.12	2.94	4.10	7.25
6.00	6.50	3.250	.56	3/4	1.00	.50	1.62	.75	2.00	1.50	.44	5.75	3.19	4.88	7.75
8.00	8.50	4.250	.69	3/4	1.12	.62	2.06	.75	2.00	1.50	.56	5.88	3.31	6.44	7.38
10.00	10.62	5.312	.81	1	1.31	.62	2.69	.75	2.25	2.00	.66	7.12	4.19	7.92	9.00
12.00	12.75	6.375	.81	1	1.31	.62	3.28	.75	2.25	2.00	.66	7.62	4.69	9.40	9.50
14.00	14.75	7.375	.94	1 1/4	1.50	.75	3.88	.75	2.75	2.25	.75	8.88	5.62	10.90	11.12

CAUTION: Check for interference between rod attachment and mounting lug. If necessary, specify longer than standard "C" dimension.

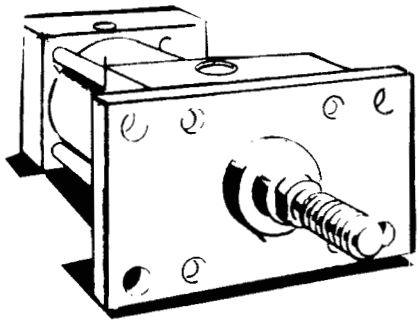
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	XE	Y	ZB	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.38	1.88	4.88	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.75	2.25	5.25	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.56	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.94	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	6.19	2.50	5.56	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.94	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	6.19	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	6.44	2.50	5.69	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	6.69	2.75	5.94	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	6.50	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	6.75	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.00	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.12	3.00	6.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	6.62	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	6.88	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.12	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.25	3.00	6.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	7.50	3.25	6.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	6.94	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	7.19	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.44	2.88	6.81	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.56	3.00	6.94	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	7.81	3.25	7.19	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	7.81	3.25	7.19	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	7.81	3.25	7.19	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	7.62	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	7.88	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	8.00	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	8.25	3.38	7.69	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.25	3.38	7.69	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	8.25	3.38	7.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.25	3.38	7.69	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	7.88	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	8.12	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	8.25	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	8.50	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.50	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.50	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	8.50	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	8.50	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	9.56	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	9.69	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	9.94	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	9.94	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	9.94	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	9.94	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	9.94	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	10.19	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	10.44	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	10.44	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	10.44	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	10.44	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	10.44	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	11.88	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	11.88	3.69	11.19	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	11.88	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	11.88	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	11.88	3.69	11.19	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



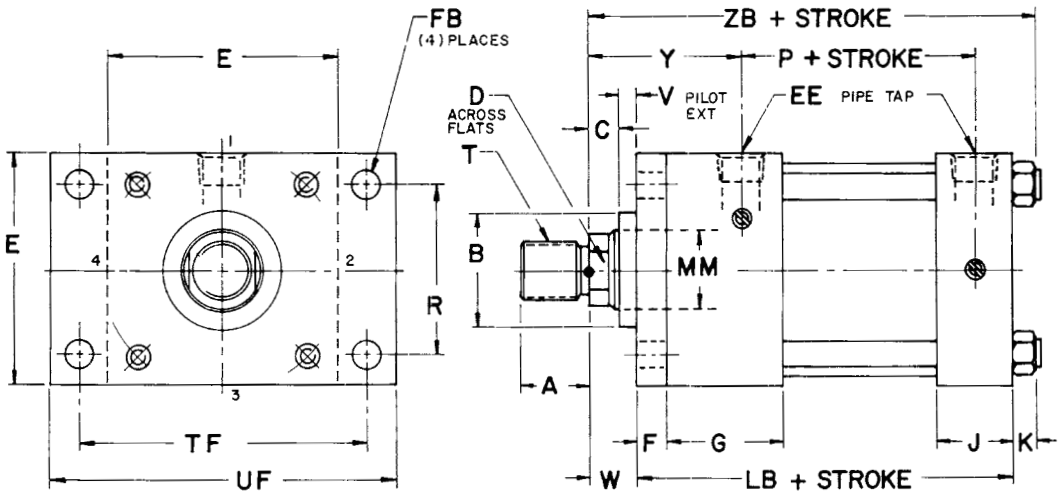
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 6.00"
BORE

MF1

HEAD RECTANGULAR
FLANGE MOUNT



These Dimensions are Constant Regardless of Rod Diameter

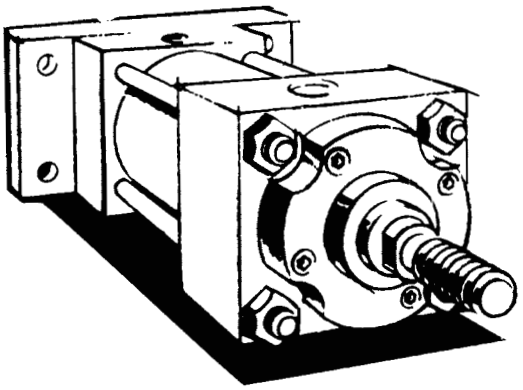
BORE	E	EE (NPTF)	F	FB +.005 −.000	G	J	K	LB	P	R ±.010	TF ±.010	UF
1.50	2.00	3/8	.38	.312	1.50	1.00	.25	4.00	2.31	1.43	2.75	3.38
2.00	2.50	3/8	.38	.375	1.50	1.00	.31	4.00	2.31	1.84	3.38	4.12
2.50	3.00	3/8	.38	.375	1.50	1.00	.31	4.12	2.44	2.19	3.88	4.62
3.25	3.75	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	2.76	4.69	5.50
4.00	4.50	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	3.32	5.44	6.25
5.00	5.50	1/2	.62	.562	1.75	1.25	.44	5.12	2.94	4.10	6.62	7.62
6.00	6.50	3/4	.75	.562	2.00	1.50	.44	5.75	3.19	4.88	7.62	8.62

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	WF	Y	ZB	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	4.88	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.25	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	4.94	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.31	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	1.62	2.50	5.56	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	5.06	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.44	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	1.62	2.50	5.69	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	1.88	2.75	5.94	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.25	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.50	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.62	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.25	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.50	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.62	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.25	3.25	6.88	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.31	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.56	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.81	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.94	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.25	3.25	7.19	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	2.25	3.25	7.19	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	2.25	3.25	7.19	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	1.62	2.75	7.06	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	1.88	3.00	7.31	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.00	3.12	7.44	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.25	3.38	7.69	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.25	3.38	7.69	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	2.25	3.38	7.69	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.25	3.38	7.69	250

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



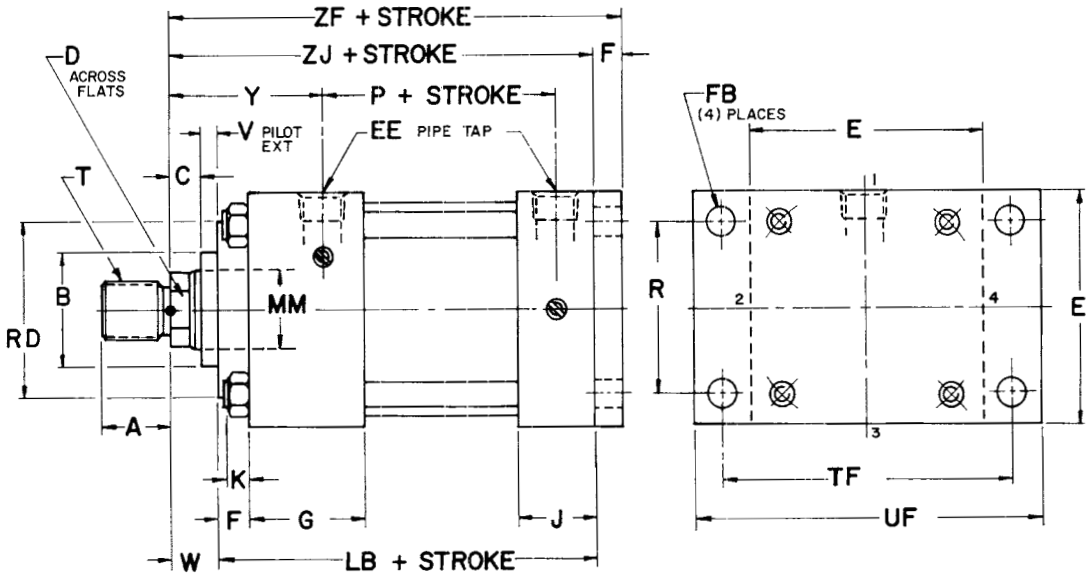
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 6.00" BORE

MF2

CAP RECTANGULAR FLANGE MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	FB +.005 −.000	G	J	K	LB	P	R ± .010	TF ± .010	UF
1.50	2.00	3/8	.38	.312	1.50	1.00	.25	4.00	2.31	1.43	2.75	3.38
2.00	2.50	3/8	.38	.375	1.50	1.00	.31	4.00	2.31	1.84	3.38	4.12
2.50	3.00	3/8	.38	.375	1.50	1.00	.31	4.12	2.44	2.19	3.88	4.62
3.25	3.75	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	2.76	4.69	5.50
4.00	4.50	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	3.32	5.44	6.25
5.00	5.50	1/2	.62	.562	1.75	1.25	.44	5.12	2.94	4.10	6.62	7.62
6.00	6.50	3/4	.75	.562	2.00	1.50	.44	5.75	3.19	4.88	7.62	8.62

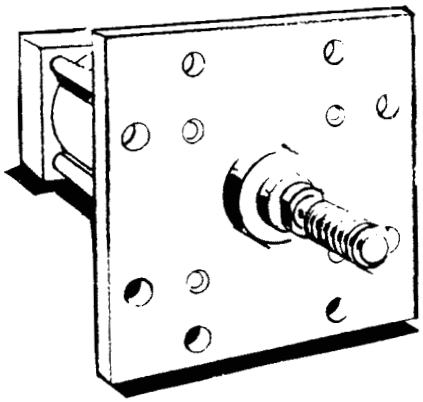
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	ZJ	Y	ZF	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.62	1.88	5.00	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.00	2.25	5.38	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.62	1.88	5.00	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.00	2.25	5.38	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	5.25	2.50	5.62	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.75	1.88	5.12	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.12	2.25	5.50	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	5.38	2.50	5.75	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	5.62	2.75	6.00	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.62	2.38	6.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.88	2.62	6.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.12	2.88	6.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.25	3.00	6.88	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.62	2.38	6.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.88	2.62	6.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.12	2.88	6.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.25	3.00	6.88	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	6.50	3.25	7.12	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.88	2.38	6.50	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	6.12	2.62	6.75	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.38	2.88	7.00	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.50	3.00	7.12	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	6.75	3.25	7.38	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	6.75	3.25	7.38	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	6.75	3.25	7.38	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	6.62	2.75	7.38	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	6.88	3.00	7.62	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	7.00	3.12	7.75	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	7.25	3.38	8.00	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	7.25	3.38	8.00	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	7.25	3.38	8.00	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	7.25	3.38	8.00	--	250

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



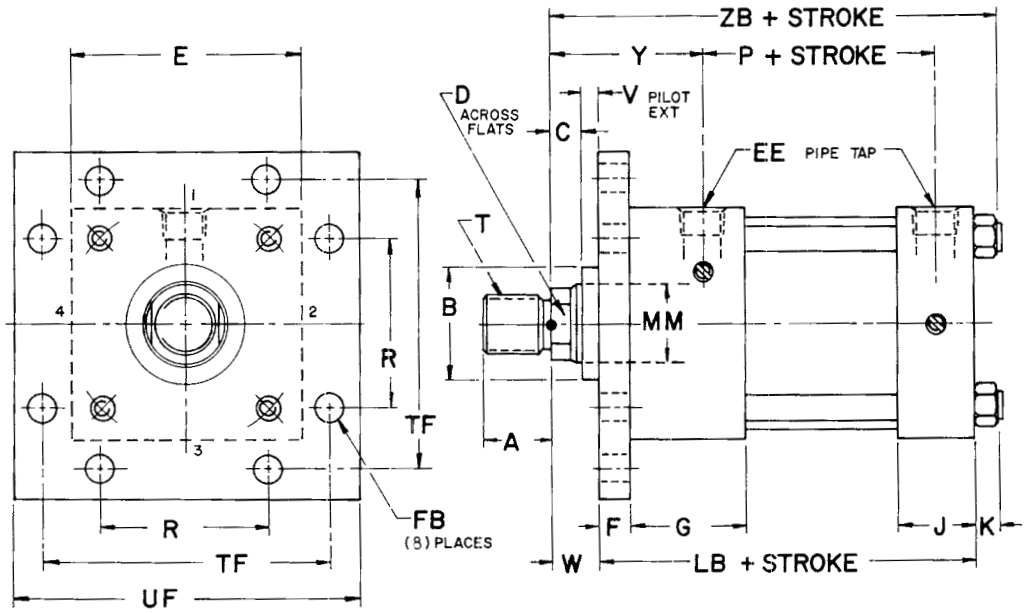
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 6.00"
BORE

MF5

HEAD SQUARE FLANGE
MOUNT



These Dimensions are Constant Regardless of Rod Diameter

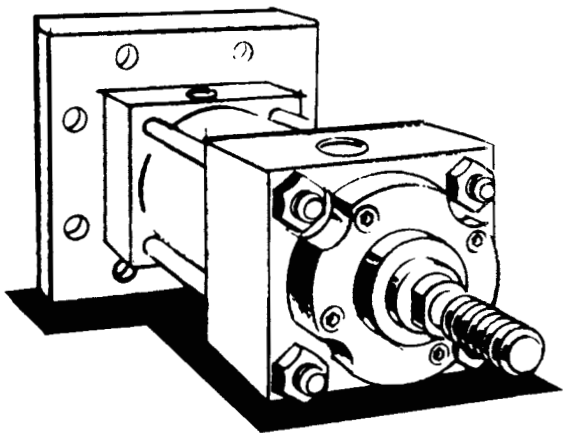
BORE	E	EE (NPTF)	F	FB +.005 -.000	G	J	K	LB	P	R ±.010	TF ±.010	UF
1.50	2.00	3/8	.38	.312	1.50	1.00	.25	4.00	2.31	1.43	2.75	3.38
2.00	2.50	3/8	.38	.375	1.50	1.00	.31	4.00	2.31	1.84	3.38	4.12
2.50	3.00	3/8	.38	.375	1.50	1.00	.31	4.12	2.44	2.19	3.88	4.62
3.25	3.75	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	2.76	4.69	5.50
4.00	4.50	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	3.32	5.44	6.25
5.00	5.50	1/2	.62	.562	1.75	1.25	.44	5.12	2.94	4.10	6.62	7.62
6.00	6.50	3/4	.75	.562	2.00	1.50	.44	5.75	3.19	4.88	7.62	8.62

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER			A	B	C	D	T (THREAD)			V	W	WF	Y	ZB	PSI RATING†
BORE	ROD DIA. CODE	MM ROD DIA.		-.001 -.003			SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF						
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	4.88	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.25	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	4.94	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.31	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	1.62	2.50	5.56	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.00	1.88	5.06	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	1.38	2.25	5.44	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	1.62	2.50	5.69	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	1.88	2.75	5.94	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.25	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.50	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.62	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.25	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.50	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.62	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.25	3.25	6.88	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	1.38	2.38	6.31	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.56	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.81	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.00	3.00	6.94	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	2.25	3.25	7.19	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	2.25	3.25	7.19	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	2.25	3.25	7.19	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	1.62	2.75	7.06	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	1.88	3.00	7.31	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	2.00	3.12	7.44	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	2.25	3.38	7.69	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	2.25	3.38	7.69	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	2.25	3.38	7.69	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	2.25	3.38	7.69	250

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



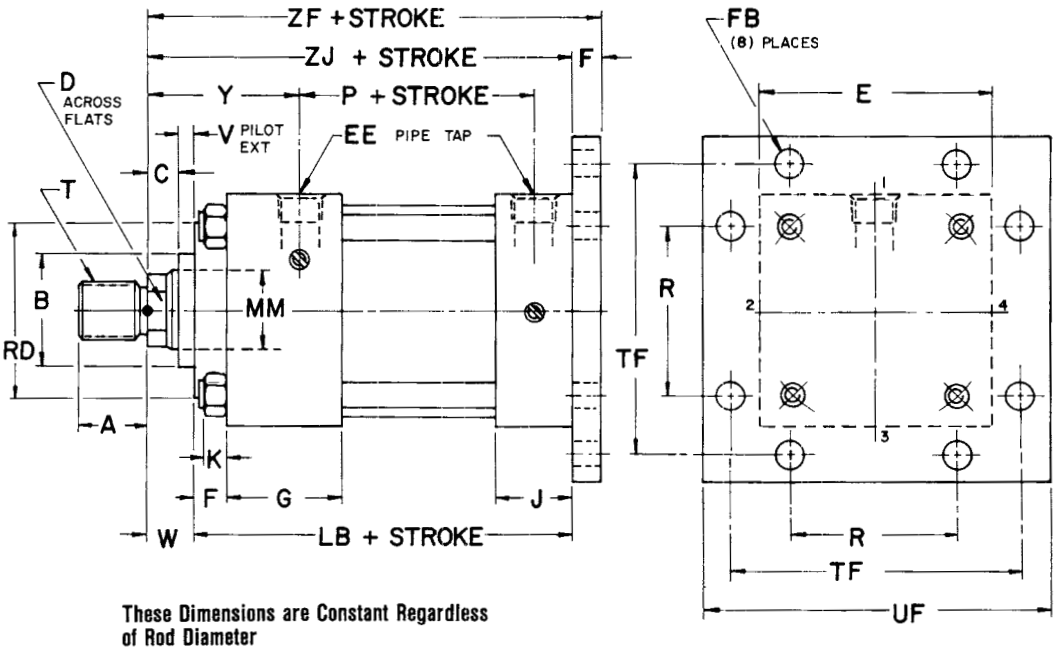
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 6.00"
BORE

MF6

CAP SQUARE
FLANGE MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	FB +.005 -.000	G	J	K	LB	P	R ±.010	TF ±.010	UF
1.50	2.00	3/8	.38	.312	1.50	1.00	.25	4.00	2.31	1.43	2.75	3.38
2.00	2.50	3/8	.38	.375	1.50	1.00	.31	4.00	2.31	1.84	3.38	4.12
2.50	3.00	3/8	.38	.375	1.50	1.00	.31	4.12	2.44	2.19	3.88	4.62
3.25	3.75	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	2.76	4.69	5.50
4.00	4.50	1/2	.62	.438	1.75	1.25	.38	4.88	2.69	3.32	5.44	6.25
5.00	5.50	1/2	.62	.562	1.75	1.25	.44	5.12	2.94	4.10	6.62	7.62
6.00	6.50	3/4	.75	.562	2.00	1.50	.44	5.75	3.19	4.88	7.62	8.62

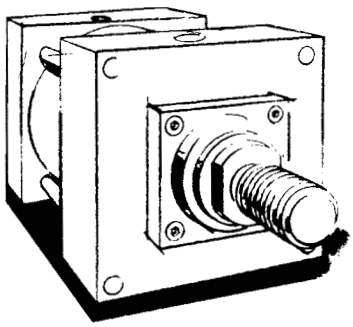
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER			A	B	C	D	T (THREAD)			V	W	ZJ	Y	ZF	RD*	PSI
BORE	ROD DIA. CODE	MM ROD DIA.		-.001 -.003			SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF							RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.62	1.83	5.00	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.00	2.25	5.38	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.62	1.88	5.00	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.00	2.25	5.38	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	5.25	2.50	5.62	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.75	1.88	5.12	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.12	2.25	5.50	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	5.38	2.50	5.75	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	5.62	2.75	6.00	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.62	2.38	6.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.88	2.62	6.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.12	2.88	6.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.25	3.00	6.88	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.62	2.38	6.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.88	2.62	6.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.12	2.88	6.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.25	3.00	6.88	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	6.50	3.25	7.12	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.88	2.38	6.50	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	6.12	2.62	6.75	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	6.38	2.88	7.00	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	6.50	3.00	7.12	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	6.75	3.25	7.38	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	6.75	3.25	7.38	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	6.75	3.25	7.38	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	6.62	2.75	7.38	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	6.88	3.00	7.62	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	7.00	3.12	7.75	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	7.25	3.38	8.00	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	7.25	3.38	8.00	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	7.25	3.38	8.00	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	7.25	3.38	8.00	--	250

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



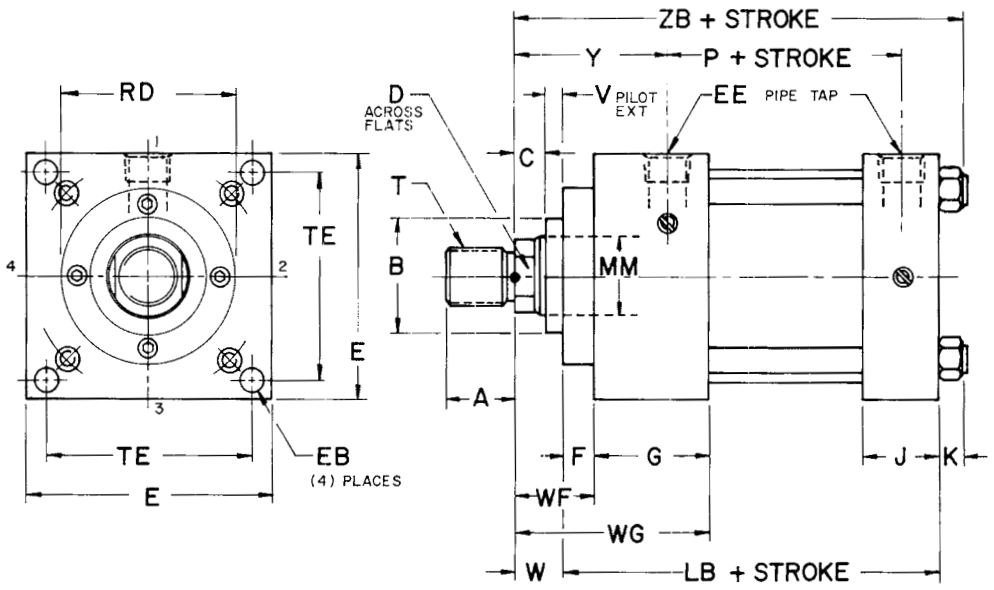
SERIES "3A"

PNEUMATIC CYLINDERS

8.00" - 14.00"
BORE

ME3

HEAD SQUARE MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EB	EE (NPTF)	F	G	J	K	LB	P	TE ± .010
8.00	8.50	.69	3/4	.75	2.00	1.50	.56	5.88	3.31	7.57
10.00	10.62	.81	1	.75	2.25	2.00	.66	7.12	4.19	9.40
12.00	12.75	.81	1	.75	2.25	2.00	.66	7.62	4.69	11.10
14.00	14.75	.94	1 1/4	.75	2.75	2.25	.75	8.88	5.62	12.87

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER							T (THREAD)										
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	WF	WG	W	Y	ZB	RD*	PSI RATING†
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	1.62	3.62	.88	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.88	3.88	1.12	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	2.00	4.00	1.25	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	2.25	4.25	1.50	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	2.25	4.25	1.50	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	2.25	4.25	1.50	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	2.25	4.25	1.50	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	2.25	4.25	1.50	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.88	4.12	1.12	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	2.00	4.25	1.25	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	2.25	4.50	1.50	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	2.25	4.50	1.50	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	2.25	4.50	1.50	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	2.25	4.50	1.50	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	2.25	4.50	1.50	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	2.00	4.25	1.25	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	2.25	4.50	1.50	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	2.25	4.50	1.50	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	2.25	4.50	1.50	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	2.25	4.50	1.50	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	2.25	4.50	1.50	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	2.25	5.00	1.50	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	2.25	5.00	1.50	3.69	11.19	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	2.25	5.00	1.50	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	2.25	5.00	1.50	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	2.25	5.00	1.50	3.69	11.19	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.

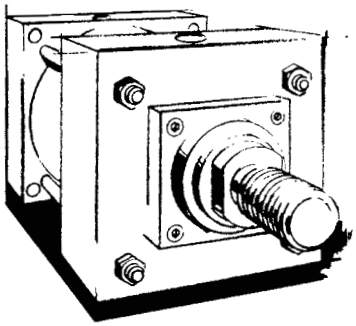
SERIES "3A"

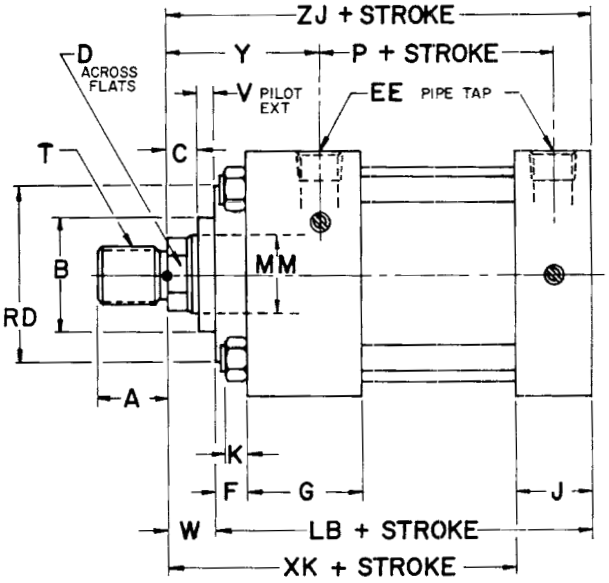
PNEUMATIC CYLINDERS

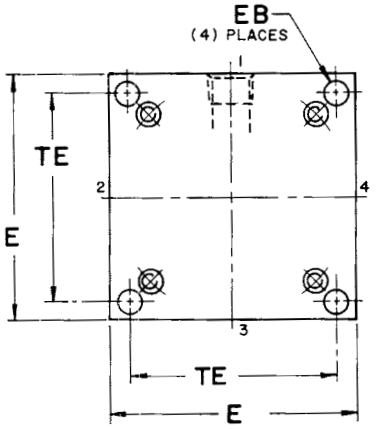
8.00" - 14.00"
BORE

ME4

CAP SQUARE MOUNT







BORE	E	EB	EE (NPTF)	F	G	J	K	LB	P	TE ± .010
8.00	8.50	.69	3/4	.75	2.00	1.50	.56	5.88	3.31	7.57
10.00	10.62	.81	1	.75	2.25	2.00	.66	7.12	4.19	9.40
12.00	12.75	.81	1	.75	2.25	2.00	.66	7.62	4.69	11.10
14.00	14.75	.94	1 1/4	.75	2.75	2.25	.75	8.88	5.62	12.87

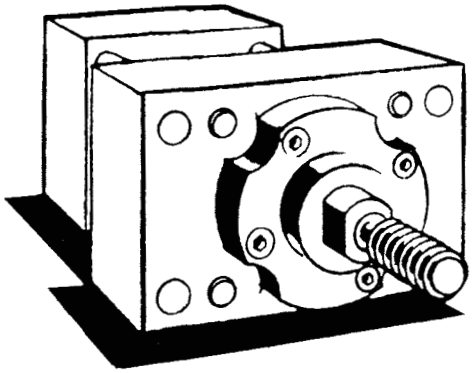
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER							T (THREAD)									
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	W	XK	Y	ZJ	RD*	PSI RATING†
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	5.25	2.75	6.75	4.00	**250**
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	5.50	3.00	7.00	4.00	**250**
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	5.62	3.12	7.12	4.00	**250**
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	5.88	3.38	7.38	5.12	**250**
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	5.88	3.38	7.38	--	**250**
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	5.88	3.38	7.38	--	**250**
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	5.88	3.38	7.38	--	**250**
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	5.88	3.38	7.38	--	**250**
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	6.25	3.06	8.25	4.00	**150**
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	6.38	3.19	8.38	4.00	**150**
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	6.62	3.44	8.62	5.12	**150**
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.62	3.44	8.62	--	**150**
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.62	3.44	8.62	--	**150**
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	6.62	3.44	8.62	--	**150**
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	6.62	3.44	8.62	--	**150**
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	6.88	3.19	8.88	4.00	**150**
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	7.12	3.44	9.12	5.12	**150**
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	7.12	3.44	9.12	--	**150**
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	7.12	3.44	9.12	--	**150**
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	7.12	3.44	9.12	--	**150**
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	7.12	3.44	9.12	--	**150**
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	8.12	3.69	10.38	5.12	**150**
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.12	3.69	10.38	--	**150**
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.12	3.69	10.38	--	**150**
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	8.12	3.69	10.38	--	**150**
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	8.12	3.69	10.38	--	**150**

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



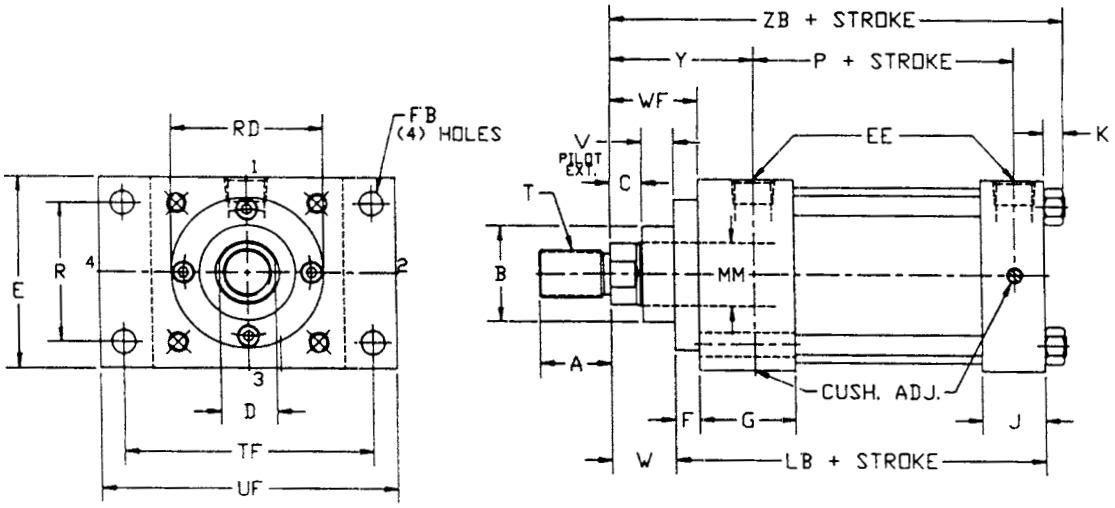
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 6.00"
BORE

ME5

HEAD FLANGE MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	FB +.005 -.000	G	J	K	LB	P	R ±.010	TF ±.010	UF
1.50	2 00	3/8	38	.312	1 50	1 00	25	4 00	2.31	1 43	2.75	3 38
2.00	2 50	3/8	38	375	1 50	1 00	31	4 00	2 31	1.84	3 38	4 12
2.50	3 00	3/8	38	375	1 50	1 00	31	4 12	2 44	2 19	3 88	4 62
3 25	3 75	1/2	62	438	1 75	1 25	38	4 88	2.69	2.76	4 69	5 50
4.00	4 50	1/2	62	438	1 75	1 25	38	4 88	2 69	3.32	5 44	6 25
5.00	5 50	1/2	62	562	1 75	1 25	44	5 12	2.94	4.10	6 62	7 62
6.00	6 50	3/4	75	562	2 00	1 50	44	5 75	3 19	4 88	7 62	8 62

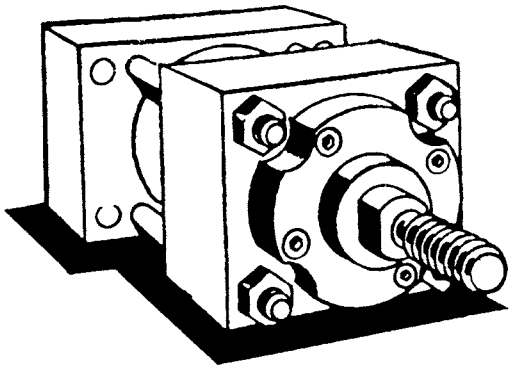
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER								T (THREAD)								
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	RD* ±.005	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	W	WF	Y	ZB	PSI RATING†
1.50	D	62	75	1.125	.38	50	-	44-20	50-20	.44-20	25	.62	1 00	1.88	4.88	250
	F	1 00	1 12	1.500	50	88	-	75-16	88-14	.75-16	.50	1.00	1 38	2 25	5.25	250
2.00	D	62	75	1 125	38	50	2 38	44-20	50-20	.44-20	25	62	1 00	1 88	4.94	250
	F	1 00	1 12	1 500	50	88	2 38	75-16	88-14	.75-16	50	1 00	1 38	2.25	5.31	250
	G	1 38	1 62	2 000	62	1 12	-	1 00-14	1 25-12	1 00-14	62	1.25	1 62	2 50	5.56	250
2.50	D	62	75	1 125	38	50	2 38	44-20	50-20	44-20	.25	62	1 00	1 88	5.06	250
	F	1 00	1 12	1 500	50	88	2 38	75-16	88-14	75-16	50	1 00	1 38	2 25	5.44	250
	G	1 38	1 62	2 000	62	1 12	2 94	1 00-14	1 25-12	1.00-14	62	1 25	1 62	2 50	5.69	250
	H	1 75	2 00	2 375	75	1 50	-	1 25-12	1.50-12	1.25-12	.75	1 50	1.88	2 75	5.94	250
3.25	F	1 00	1 12	1.500	.50	88	3 00	75-16	88-14	.75-16	.25	75	1.38	2 38	6.00	250
	G	1 38	1 62	2.000	.62	1.12	3 00	1 00-14	1.25-12	1.00-14	.38	1.00	1.62	2 62	6.25	250
	H	1 75	2.00	2 375	75	1 50	3 50	1 25-12	1 50-12	1.25-12	.50	1.25	1 88	2.88	6.50	250
	J	2 00	2 25	2.625	.88	1 69	-	1 50-12	1 75-12	1 50-12	.50	1.38	2.00	3 00	6.62	250
4.00	F	1 00	1 12	1 500	.50	.88	3.00	75-16	88-14	.75-16	.25	.75	1 38	2.38	6.00	250
	G	1 38	1 62	2 000	.62	1 12	3 00	1 00-14	1 25-12	1.00-14	.38	1.00	1 62	2.62	6.25	250
	H	1 75	2 00	2.375	75	1 50	3 50	1 25-12	1 50-12	1.25-12	.50	1.25	1 88	2 88	6.50	250
	J	2 00	2 25	2.625	.88	1 69	4 12	1 50-12	1.75-12	1.50-12	.50	1 38	2.00	3 00	6.62	250
	K	2 50	3 00	3.125	1.00	2.06	4 12	1.88-12	2 25-12	1.88-12	.62	1.62	2 25	3 25	6.88	250
5.00	F	1 00	1 12	1.500	50	.88	3 00	75-16	.88-14	.75-16	.25	75	1 38	2 38	6.31	250
	G	1.38	1 62	2.000	.62	1.12	3.00	1 00-14	1.25-12	1.00-14	.38	1.00	1.62	2.62	6.56	250
	H	1 75	2 00	2.375	.75	1 50	3.50	1 25-12	1.50-12	1.25-12	.50	1.25	1.88	2.88	6.81	250
	J	2 00	2.25	2.625	.88	1.69	4 12	1 50-12	1.75-12	1.50-12	.50	1.38	2 00	3 00	6.94	250
	K	2.50	3.00	3.125	1.00	2.06	4.12	1 88-12	2 25-12	1.88-12	.62	1.62	2.25	3 25	7.19	250
	L	3 00	3 50	3.750	1.00	2.62	5 38	2.25-12	2 75-12	2.25-12	.62	1.62	2.25	3.25	7.19	250
	M	3 50	3.50	4.250	1.00	3.00	5 38	2.50-12	3.25-12	2.50-12	.62	1.62	2 25	3.25	7.19	250
6.00	G	1 38	1 62	2.000	.62	1.12	4.00	1 00-14	1 25-12	1.00-14	.25	.88	1.62	2.75	7.06	250
	H	1 75	2 00	2.375	.75	1.50	4 00	1 25-12	1.50-12	1.25-12	.38	1.12	1.88	3.00	7.31	250
	J	2 00	2 25	2.625	.88	1.69	4 00	1 50-12	1.75-12	1.50-12	.38	1.25	2.00	3.12	7.44	250
	K	2 50	3.00	3.125	1.00	2.06	5 25	1 88-12	2.25-12	1.88-12	.50	1.50	2 25	3 38	7.69	250
	L	3.00	3 50	3.750	1.00	2.62	5 25	2 25-12	2.75-12	2.25-12	.50	1.50	2.25	3.38	7.69	250
	M	3 50	3.50	4.250	1.00	3.00	6 25	2 50-12	3.25-12	2.50-12	.50	1 50	2 25	3.38	7.69	250
	N	4.00	4.00	4.750	1.00	3 38	6 25	3 00-12	3.75-12	3.00-12	.50	1.50	2.25	3.38	7.69	250

*Where RD is not shown, MF1 retainer is used. See section for Retainer Construction.

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



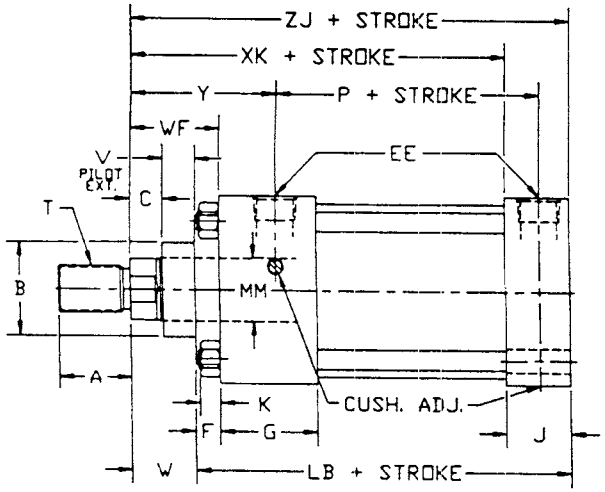
SERIES "3A"

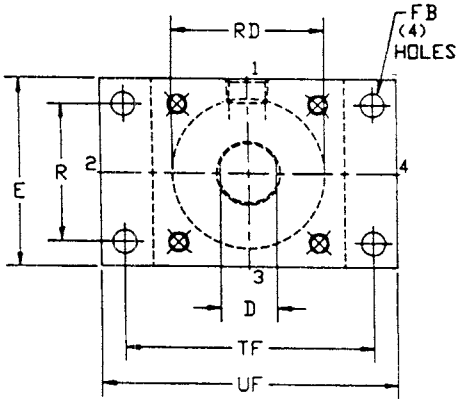
PNEUMATIC CYLINDERS

1.50" - 6.00"
BORE

ME6

CAP FLANGE MOUNT





These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	FB +.005 −.000	G	J	K	LB	P	R ±.010	TF ±.010	UF
1.50	2 00	3/8	.38	.312	1.50	1 00	.25	4.00	2.31	1.43	2.75	3.38
2.00	2 50	3/8	.38	.375	1 50	1 00	31	4.00	2.31	1.84	3.38	4.12
2.50	3.00	3/8	.38	.375	1.50	1.00	31	4.12	2.44	2.19	3.88	4.62
3.25	3 75	1/2	.62	438	1 75	1 25	38	4 88	2.69	2.76	4.69	5.50
4.00	4 50	1/2	62	.438	1 75	1 25	38	4.88	2.69	3.32	5.44	6.25
5.00	5 50	1/2	62	.562	1 75	1 25	44	5.12	2.94	4.10	6.62	7 62
6.00	6.50	3/4	75	.562	2 00	1.50	44	5 75	3.19	4.88	7 62	8.62

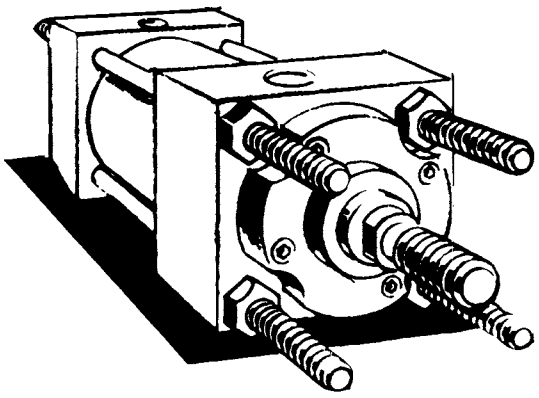
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER			A	B -.001 -.003	C	D	RD*	T (THREAD)			V	W	Y	XK	ZJ	PSI RATING†
BORE	ROD DIA. CODE	MM ROD DIA.						SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF						
1.50	D	.62	.75	1.125	.38	.50	-	44-20	.50-20	.44-20	.25	.62	1.88	3.62	4.62	250
	F	1.00	1.12	1.500	.50	.88	-	.75-16	.88-14	.75-16	.50	1.00	2.25	4.00	5.00	250
2.00	D	.62	.75	1.125	.38	.50	2.38	.44-20	.50-20	.44-20	.25	.62	1.88	3.62	4.62	250
	F	1.00	1.12	1.500	.50	.88	2.38	.75-16	.88-14	.75-16	.50	1.00	2.25	4.00	5.00	250
	G	1.38	1.62	2.000	.62	1.12	-	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	4 25	5.25	250
2.50	D	62	.75	1.125	.38	50	2.38	44-20	.50-20	.44-20	.25	.62	1.88	3.75	4.75	250
	F	1 00	1.12	1.500	.50	.88	2.38	.75-16	.88-14	.75-16	.50	1.00	2 25	4 12	5.12	250
	G	1 38	1.62	2.000	.62	1.12	-	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	4.38	5.38	250
	H	1.75	2.00	2.375	.75	1 50	-	1.25-12	1.50-12	1.25-12	.75	1.50	2.75	4.62	5.62	250
3.25	F	1.00	1.12	1.500	.50	.88	3.00	.75-16	.88-14	.75-16	.25	.75	2.38	4.38	5.62	250
	G	1.38	1.62	2.000	.62	1.12	3.00	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	4.62	5.88	250
	H	1.75	2.00	2.375	.75	1.50	-	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	4.88	6.12	250
	J	2.00	2.25	2.625	.88	1.69	-	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	5.00	6.25	250
4.00	F	1.00	1.12	1.500	.50	.88	3.00	.75-16	.88-14	.75-16	.25	.75	2.38	4.38	5.62	250
	G	1.38	1.62	2.000	.62	1.12	3.00	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	4.62	5.88	250
	H	1.75	2.00	2.375	.75	1.50	-	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	4.88	6.12	250
	J	2 00	2.25	2.625	.88	1.69	-	1 50-12	1.75-12	1.50-12	.50	1.38	3.00	5.00	6.25	250
	K	2.50	3.00	3.125	1.00	2.06	-	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	5.25	6.50	250
5.00	F	1.00	1.12	1.500	.50	.88	3.00	.75-16	.88-14	.75-16	.25	.75	2.38	4.62	5.88	250
	G	1.38	1.62	2.000	.62	1.12	3.00	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	4.88	6.12	250
	H	1.75	2.00	2.375	.75	1.50	-	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	6.12	6.38	250
	J	2.00	2.25	2.625	.88	1.69	-	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	5.25	6.50	250
	K	2.50	3.00	3.125	1.00	2.06	-	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	5.50	6.75	250
	L	3.00	3.50	3.750	1.00	2.62	-	2.25-12	2.75-12	2.25-12	.62	1.62	3.25	5.50	6.75	250
	M	3.50	3.50	4.250	1.00	3.00	-	2.50-12	3.25-12	2.50-12	.62	1.62	3.25	5.50	6.75	250
6.00	G	1.38	1.62	2.000	.62	1.12	4.00	1.00-14	1.25-12	1.00-14	.25	.88	2.75	5.12	6.62	250
	H	1.75	2.00	2.375	.75	1.50	4.00	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	5.38	6.88	250
	J	2.00	2.25	2.625	.88	1.69	4.00	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	5.50	7.00	250
	K	2.50	3.00	3.125	1.00	2.06	-	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	5.75	7.25	250
	L	3.00	3.50	3.750	1.00	2.62	-	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	5.75	7.25	250
	M	3.50	3.50	4.250	1.00	3.00	-	2.50-12	3.25-12	2.50-12	.50	1.50	3.38	5.75	7.25	250
	N	4.00	4.00	4.750	1.00	3.38	-	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	5.75	7.25	250

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†CAUTION: *P.S.I. Ratings shown are HANNA recommended maximum operating pressures.*
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



SERIES "3A"

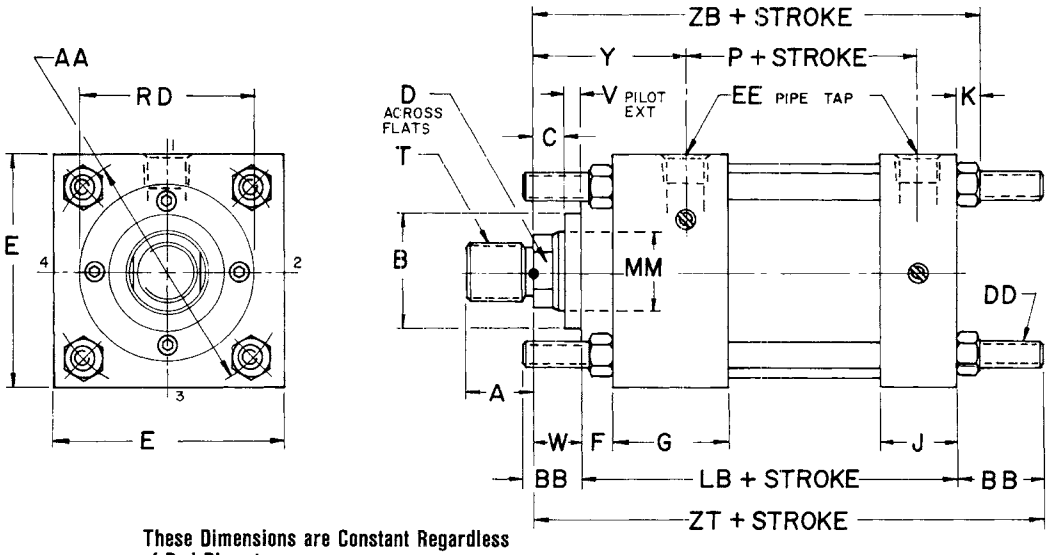
PNEUMATIC CYLINDERS

1.50" - 14.00" BORE

MX0, MX1, MX2, MX3, MX4

TIE ROD MOUNTS

NOTE: Specify Tie Rod Extension, "BB" dimension if other than standard.
MX0 = No Tie Rods Extended
MX1 = 4 Tie Rods Extended Both Ends
MX2 = 4 Tie Rods Extended Cap End
MX3 = 4 Tie Rods Extended Head End
MX4 = 2 Tie Rods Extended Both Ends



These Dimensions are Constant Regardless of Rod Diameter

BORE	AA	BB	DD	E	EE (NPTF)	F	G	J	K	LB	P
1.50	2.02	1.00	.25-28	2.00	3/8	.38	1.50	1.00	.25	4.00	2.31
2.00	2.6	1.12	.31-24	2.50	3/8	.38	1.50	1.00	.31	4.00	2.31
2.50	3.1	1.12	.31-24	3.00	3/8	.38	1.50	1.00	.31	4.12	2.44
3.25	3.9	1.38	.38-24	3.75	1/2	.62	1.75	1.25	.38	4.88	2.69
4.00	4.7	1.38	.38-24	4.50	1/2	.62	1.75	1.25	.38	4.88	2.69
5.00	5.8	1.81	.50-20	5.50	1/2	.62	1.75	1.25	.44	5.12	2.94
6.00	6.9	1.81	.50-20	6.50	3/4	.75	2.00	1.50	.44	5.75	3.19
8.00	9.1	2.31	.62-18	8.50	3/4	.75	2.00	1.50	.56	5.88	3.31
10.00	11.2	2.69	.75-16	10.62	1	.75	2.25	2.00	.66	7.12	4.19
12.00	13.3	2.69	.75-16	12.75	1	.75	2.25	2.00	.66	7.62	4.69
14.00	15.4	3.19	.88-14	14.75	1 1/4	.75	2.75	2.25	.75	8.88	5.62

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	Y	ZB	ZT	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	4.88	5.62	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	5.25	6.00	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	4.94	5.75	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	5.31	6.12	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	5.56	6.38	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	5.06	5.88	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	5.44	6.25	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	5.69	6.50	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	2.75	5.94	6.75	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.00	7.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	6.25	7.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	6.50	7.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	6.62	7.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.00	7.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	6.25	7.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	6.50	7.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	6.62	7.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	6.88	7.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.31	7.69	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	6.56	7.94	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	6.81	8.19	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	6.94	8.31	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	7.19	8.56	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	3.25	7.19	8.56	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	3.25	7.19	8.56	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.75	7.06	8.44	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	7.31	8.69	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	7.44	8.81	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	7.69	9.06	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	7.69	9.06	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	3.38	7.69	9.06	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	7.69	9.06	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.75	7.31	9.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	7.56	9.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	7.69	9.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	7.94	9.69	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	7.94	9.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	7.94	9.69	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	7.94	9.69	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	7.94	9.69	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.06	8.94	10.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	9.06	11.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	9.31	11.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	9.31	11.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	9.31	11.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.44	9.31	11.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.44	9.31	11.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	9.56	11.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	9.81	11.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	9.81	11.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	9.81	11.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.44	9.81	11.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.44	9.81	11.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.69	11.19	13.56	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.69	11.19	13.56	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.69	11.19	13.56	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.69	11.19	13.56	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.69	11.19	13.56	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.

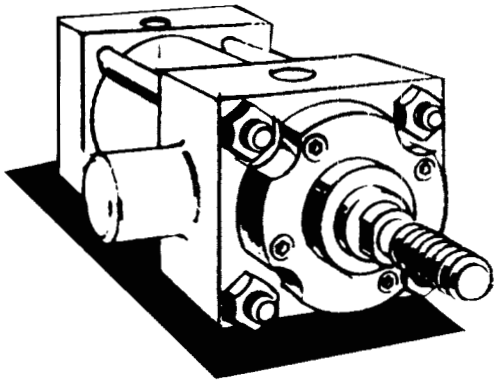
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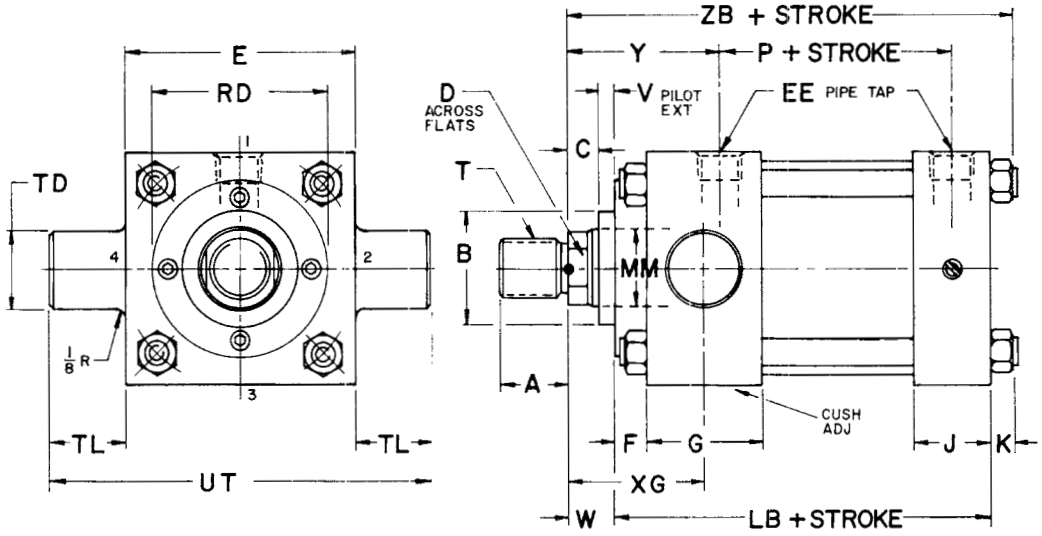
PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MT1

HEAD TRUNNION MOUNT





These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	G	J	K	LB	P	TD +.000 -.002	TL	UT
1.50	2.00	3/8	.38	1.50	1.00	.25	4.00	2.31	1.000	1.00	4.00
2.00	2.50	3/8	.38	1.50	1.00	.31	4.00	2.31	1.000	1.00	4.50
2.50	3.00	3/8	.38	1.50	1.00	.31	4.12	2.44	1.000	1.00	5.00
3.25	3.75	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	5.75
4.00	4.50	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	6.50
5.00	5.50	1/2	.62	1.75	1.25	.44	5.12	2.94	1.000	1.00	7.50
6.00	6.50	3/4	.75	2.00	1.50	.44	5.75	3.19	1.375	1.38	9.25
8.00	8.50	3/4	.75	2.00	1.50	.56	5.88	3.31	1.375	1.38	11.25
10.00	10.62	1	.75	2.25	2.00	.66	7.12	4.19	1.750	1.75	14.12
12.00	12.75	1	.75	2.25	2.00	.66	7.62	4.69	1.750	1.75	16.25
14.00	14.75	1 1/4	.75	2.75	2.25	.75	8.88	5.62	2.000	2.00	18.75

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

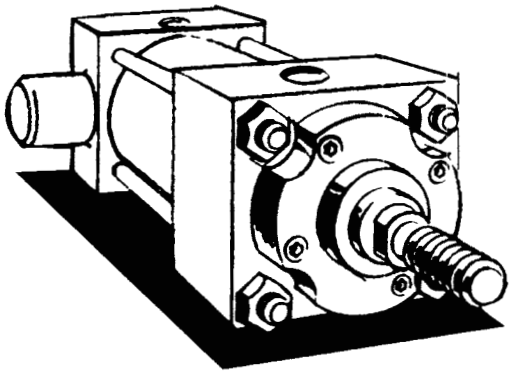
NOTE: Align and mount pillow blocks to avoid bending moments in Trunions.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	XG	Y	ZB	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.75	1.88	4.88	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.12	2.25	5.25	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.75	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.12	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.38	2.50	5.56	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.75	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.12	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.38	2.50	5.69	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	2.62	2.75	5.94	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.25	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.50	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.75	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.88	3.00	6.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.25	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.50	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.75	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.88	3.00	6.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.12	3.25	6.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.25	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.50	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.75	2.88	6.81	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	2.88	3.00	6.94	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.12	3.25	7.19	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	3.12	3.25	7.19	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	3.12	3.25	7.19	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.62	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.88	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.00	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.25	3.38	7.69	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.25	3.38	7.69	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	3.25	3.38	7.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.25	3.38	7.69	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.62	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	2.88	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.00	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.25	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.25	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.25	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.25	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.25	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.62	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.62	3.69	11.19	5.12	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.62	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.62	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.62	3.69	11.19	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



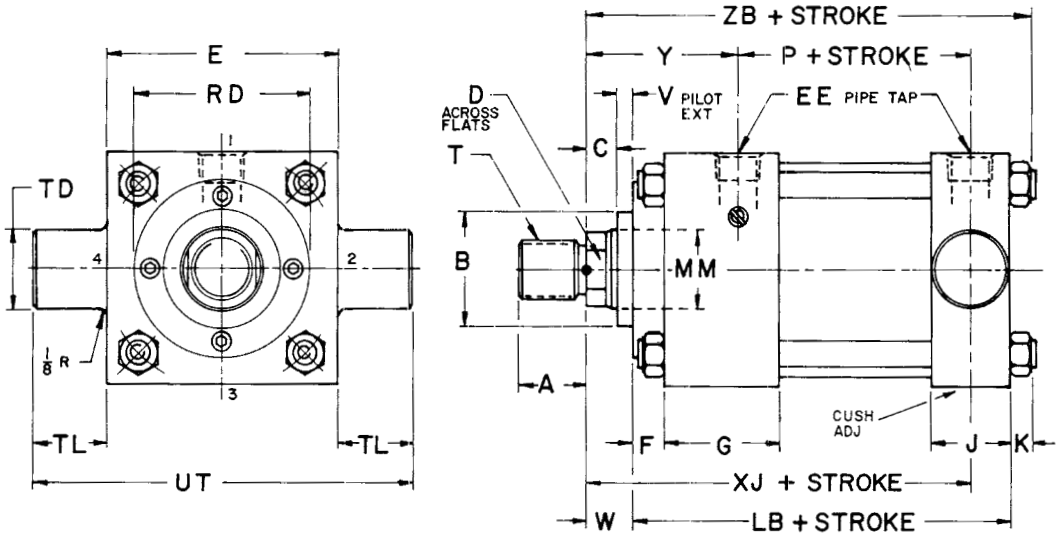
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MT2

CAP TRUNNION MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	E	EE (NPTF)	F	G	J	K	LB	P	TD +.000 -.002	TL	UT
1.50	2.00	3/8	.38	1.50	1.00	.25	4.00	2.31	1.000	1.00	4.00
2.00	2.50	3/8	.38	1.50	1.00	.31	4.00	2.31	1.000	1.00	4.50
2.50	3.00	3/8	.38	1.50	1.00	.31	4.12	2.44	1.000	1.00	5.00
3.25	3.75	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	5.75
4.00	4.50	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	6.50
5.00	5.50	1/2	.62	1.75	1.25	.44	5.12	2.94	1.000	1.00	7.50
6.00	6.50	3/4	.75	2.00	1.50	.44	5.75	3.19	1.375	1.38	9.25
8.00	8.50	3/4	.75	2.00	1.50	.56	5.88	3.31	1.375	1.38	11.25
10.00	10.62	1	.75	2.25	2.00	.66	7.12	4.19	1.750	1.75	14.12
12.00	12.75	1	.75	2.25	2.00	.66	7.62	4.69	1.750	1.75	16.25
14.00	14.75	1 1/4	.75	2.75	2.25	.75	8.88	5.62	2.000	2.00	18.75

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

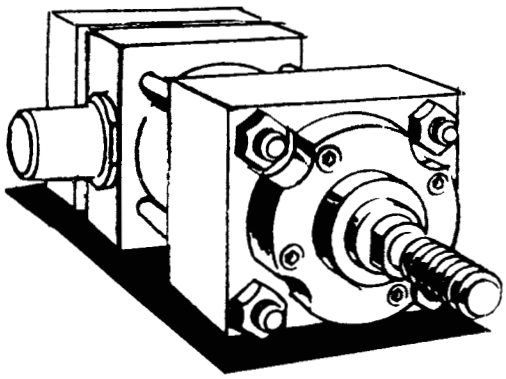
NOTE: Align and mount pillow blocks to avoid bending moments in Trunions.

Dimensions are Affected by the Rod Diameter

CYLINDER			A	B -.001 -.003	C	D	T (THREAD)			V	W	XJ	Y	ZB	RD*	PSI RATING†
BORE	ROD DIA. CODE	MM ROD DIA.					SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF							
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.12	1.88	4.88	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	4.50	2.25	5.25	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.12	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	4.50	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	4.75	2.50	5.56	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	4.25	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	4.62	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	4.88	2.50	5.69	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	5.12	2.75	5.94	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.00	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.25	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	5.50	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	5.62	3.00	6.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.00	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.25	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	5.50	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	5.62	3.00	6.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	5.88	3.25	6.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	5.25	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	5.50	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	5.75	2.88	6.81	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	5.88	3.00	6.94	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	6.12	3.25	7.19	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	6.12	3.25	7.19	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	6.12	3.25	7.19	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	5.88	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	6.12	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	6.25	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	6.50	3.38	7.69	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.50	3.38	7.69	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	6.50	3.38	7.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.50	3.38	7.69	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	6.00	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	6.25	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	6.38	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	6.62	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.62	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.62	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	6.62	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	6.62	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	7.25	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	7.38	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	7.62	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	7.62	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	7.62	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	7.62	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	7.62	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	7.88	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	8.12	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.12	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.12	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	8.12	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	8.12	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	9.25	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	9.25	3.69	11.19	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	9.25	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	9.25	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	9.25	3.69	11.19	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



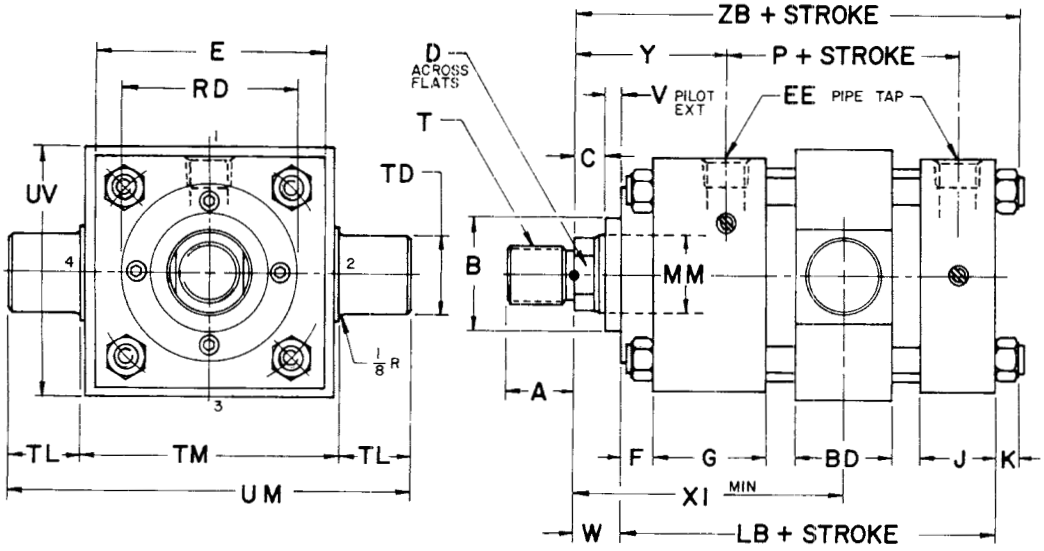
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MT4

INTERMEDIATE FIXED
TRUNNION MOUNT



BZ = MIN. STROKE

These Dimensions are Constant Regardless of Rod Diameter

BORE	BD	BZ MIN. STROKE	E	EE (NPTF)	F	G	J	K	LB	P	TD +.000 -.002	TL	TM	UM	UV
1.50	1.25	.12	2.00	3/8	.38	1.50	1.00	.25	4.00	2.31	1.000	1.00	2.50	4.50	2.50
2.00	1.50	.38	2.50	3/8	.38	1.50	1.00	.31	4.00	2.31	1.000	1.00	3.00	5.00	3.00
2.50	1.50	.25	3.00	3/8	.38	1.50	1.00	.31	4.12	2.44	1.000	1.00	3.50	5.50	3.50
3.25	2.00	.75	3.75	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	4.50	6.50	4.25
4.00	2.00	.75	4.50	1/2	.62	1.75	1.25	.38	4.88	2.69	1.000	1.00	5.25	7.25	5.00
5.00	2.00	.50	5.50	1/2	.62	1.75	1.25	.44	5.12	2.94	1.000	1.00	6.25	8.25	6.00
6.00	2.00	1.00	6.50	3/4	.75	2.00	1.50	.44	5.75	3.19	1.375	1.38	7.62	10.38	7.00
8.00	2.50	.88	8.50	3/4	.75	2.00	1.50	.56	5.88	3.31	1.375	1.38	9.75	12.50	9.50
10.00	3.00	.88	10.62	1	.75	2.25	2.00	.66	7.12	4.19	1.750	1.75	12.00	15.50	11.75
12.00	3.00	.38	12.75	1	.75	2.25	2.00	.66	7.62	4.69	1.750	1.75	14.00	17.50	13.75
14.00	3.50	.38	14.75	1 1/4	.75	2.75	2.25	.75	8.88	5.62	2.000	2.00	16.25	20.25	16.00

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

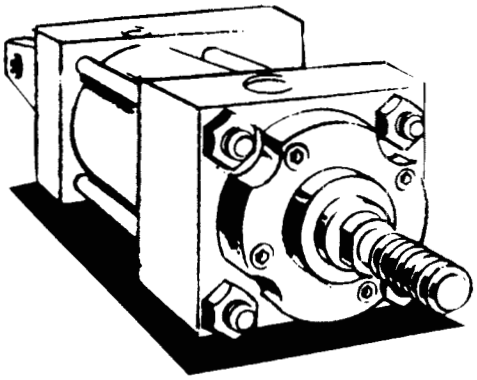
NOTE: Align and mount pillow blocks to avoid bending moments in Trunions.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	XI (MIN.)	Y	ZB	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	3.12	1.88	4.88	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	3.50	2.25	5.25	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	3.25	1.88	4.94	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	3.62	2.25	5.31	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	3.88	2.50	5.56	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	3.25	1.88	5.06	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	3.62	2.25	5.44	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	3.88	2.50	5.69	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	4.12	2.75	5.94	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	4.12	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	4.38	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	4.62	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	4.75	3.00	6.62	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	4.12	2.38	6.00	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	4.38	2.62	6.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	4.62	2.88	6.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	4.75	3.00	6.62	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	5.00	3.25	6.88	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	4.12	2.38	6.31	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	4.38	2.62	6.56	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	4.62	2.88	6.81	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	4.75	3.00	6.94	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	5.00	3.25	7.19	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	5.00	3.25	7.19	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	5.00	3.25	7.19	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	4.88	2.75	7.06	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	5.12	3.00	7.31	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	5.25	3.12	7.44	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	5.50	3.38	7.69	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	5.50	3.38	7.69	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	5.50	3.38	7.69	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	5.50	3.38	7.69	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	4.88	2.75	7.31	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	5.12	3.00	7.56	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	5.25	3.12	7.69	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	5.50	3.38	7.94	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	5.50	3.38	7.94	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	5.50	3.38	7.94	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	5.50	3.38	7.94	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	5.50	3.38	7.94	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	5.62	3.06	8.94	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	5.75	3.19	9.06	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	6.00	3.44	9.31	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.00	3.44	9.31	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.00	3.44	9.31	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	6.00	3.44	9.31	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	6.00	3.44	9.31	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	5.75	3.19	9.56	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	6.00	3.44	9.81	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.00	3.44	9.81	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.00	3.44	9.81	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	6.00	3.44	9.81	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	6.00	3.44	9.81	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	6.75	3.69	11.19	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	6.75	3.69	11.19	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	6.75	3.69	11.19	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	6.75	3.69	11.19	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	6.75	3.69	11.19	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



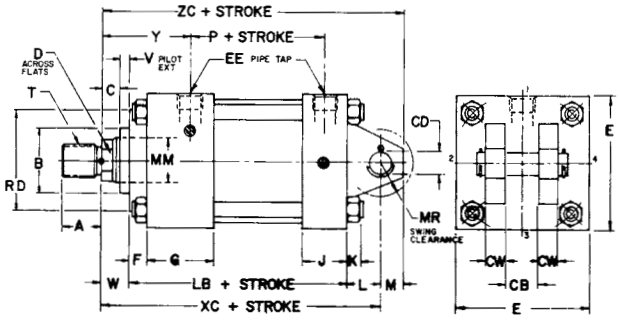
SERIES "3A"

PNEUMATIC CYLINDERS

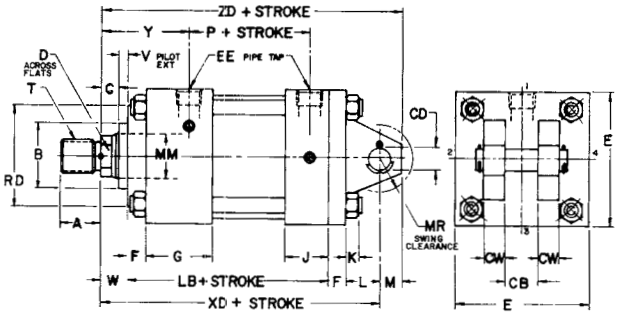
1.50" - 14.00" BORE

MP1 — CAP FIXED CLEVIS MOUNT

MP2 — DETACHABLE CAP CLEVIS MOUNT



MP1



MP2

(1.50" thru 6.00" only)

Pivot pin furnished with unit.

NOTE: 1.50", 2.00", and 3.25" BORES HAVE TAPPED CAP OR CLEVIS BRACKET.

These Dimensions are Constant Regardless of Rod Diameter

BORE	CB +.016 +.047	CD	CW	E	EE (NPTF)	F	G	J	K	L	LB	M	MR	P	BORE
1.50	.750	.500	.50	2.00	3/8	.38	1.50	1.00	.25	.75	4.00	.50	.62	2.31	1.50
2.00	.750	.500	.50	2.50	3/8	.38	1.50	1.00	.31	.75	4.00	.50	.62	2.31	2.00
2.50	.750	.500	.50	3.00	3/8	.38	1.50	1.00	.31	.75	4.12	.50	.62	2.44	2.50
3.25	1.250	.750	.62	3.75	1/2	.62	1.75	1.25	.38	1.25	4.88	.75	1.12	2.69	3.25
4.00	1.250	.750	.62	4.50	1/2	.62	1.75	1.25	.38	1.25	4.88	.75	1.12	2.69	4.00
5.00	1.250	.750	.62	5.50	1/2	.62	1.75	1.25	.44	1.25	5.12	.75	1.12	2.94	5.00
6.00	1.500	1.000	.75	6.50	3/4	.75	2.00	1.50	.44	1.50	5.75	1.00	1.38	3.19	6.00
8.00	1.500	1.000	.75	8.50	3/4	.75	2.00	1.50	.56	1.50	5.88	1.00	1.38	3.31	8.00
10.00	2.000	1.375	1.00	10.62	1	.75	2.25	2.00	.66	2.12	7.12	1.38	2.00	4.19	10.00
12.00	2.500	1.750	1.25	12.75	1	.75	2.25	2.00	.66	2.25	7.62	1.75	2.12	4.69	12.00
14.00	2.500	2.000	1.25	14.75	1 1/4	.75	2.75	2.25	.75	2.50	8.88	2.00	2.38	5.62	14.00

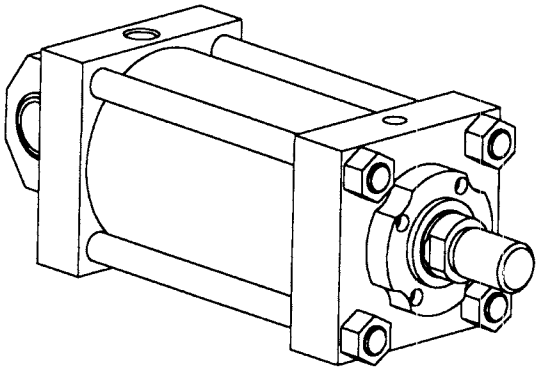
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	XC	XD	Y	ZC	ZD	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.38	5.75	1.88	5.88	6.25	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.75	6.12	2.25	6.25	6.62	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.38	5.75	1.88	5.88	6.25	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.75	6.12	2.25	6.25	6.62	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	6.00	6.38	2.50	6.50	6.88	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	5.50	5.88	1.88	6.00	6.38	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	5.88	6.25	2.25	6.38	6.75	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	6.12	6.50	2.50	6.62	7.00	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	6.38	6.75	2.75	6.88	7.25	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	6.88	7.50	2.38	7.62	8.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	7.12	7.75	2.62	7.88	8.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.38	8.00	2.88	8.12	8.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.50	8.12	3.00	8.25	8.88	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	6.88	7.50	2.38	7.62	8.25	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	7.12	7.75	2.62	7.88	8.50	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.38	8.00	2.88	8.12	8.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.50	8.12	3.00	8.25	8.88	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	7.75	8.38	3.25	8.50	9.12	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	7.12	7.75	2.38	7.88	8.50	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	7.38	8.00	2.62	8.12	8.75	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	7.62	8.25	2.88	8.38	9.00	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	7.75	8.38	3.00	8.50	9.12	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	8.00	8.62	3.25	8.75	9.38	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	8.00	8.62	3.25	8.75	9.38	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	8.00	8.62	3.25	8.75	9.38	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	8.12	8.88	2.75	9.12	9.88	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	8.38	9.12	3.00	9.38	10.12	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	8.50	9.25	3.12	9.50	10.25	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	8.75	9.50	3.38	9.75	10.50	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.75	9.50	3.38	9.75	10.50	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	8.75	9.50	3.38	9.75	10.50	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.75	9.50	3.38	9.75	10.50	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	8.25	--	2.75	9.25	--	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	8.50	--	3.00	9.50	--	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	8.62	--	3.12	9.62	--	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	8.88	--	3.38	9.88	--	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	8.88	--	3.38	9.88	--	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	8.88	--	3.38	9.88	--	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	8.88	--	3.38	9.88	--	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	8.88	--	3.38	9.88	--	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	10.38	--	3.06	11.75	--	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	10.50	--	3.19	11.88	--	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	10.75	--	3.44	12.12	--	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	10.75	--	3.44	12.12	--	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	10.75	--	3.44	12.12	--	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	10.75	--	3.44	12.12	--	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	10.75	--	3.44	12.12	--	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	11.12	--	3.19	12.88	--	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	11.38	--	3.44	13.12	--	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	11.38	--	3.44	13.12	--	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	11.38	--	3.44	13.12	--	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	11.38	--	3.44	13.12	--	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	11.38	--	3.44	13.12	--	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	12.88	--	3.69	14.88	--	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	12.88	--	3.69	14.88	--	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	12.88	--	3.69	14.88	--	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	12.88	--	3.69	14.88	--	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	12.88	--	3.69	14.88	--	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



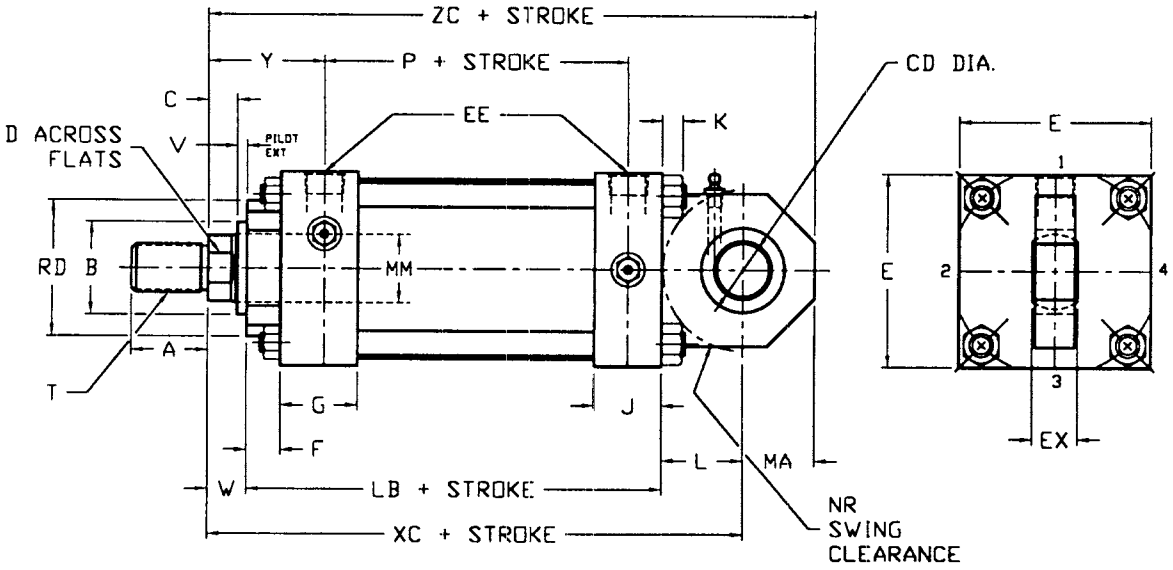
SERIES "3A"

PNEUMATIC CYLINDERS

1.50" - 14.00" BORE

MPU3

SPHERICAL BEARING MOUNT



These Dimensions are Constant Regardless of Rod Diameter

BORE	CD -0.0005	E	EE NPTF	EX	F	G	J	K	L	LB	MA	NR	P
1.50	0 5000	2.00	3/8	0.44	0.38	1.50	1.00	0 25	0.75	4.00	0.75	0.62	2.31
2.00	0.5000	2.50	3/8	0.44	0.38	1.50	1.00	0.31	0.75	4.00	0 75	0.62	2.31
2.50	0.5000	3.00	3/8	0.44	0.38	1.50	1.00	0.31	0.75	4.12	0.75	0.62	2.44
3.25	0.7500	3 75	1/2	0.66	0.62	1.75	1.25	0.38	1.25	4.88	1.25	1.00	2.69
4.00	0.7500	4 50	1/2	0.66	0.62	1.75	1.25	0.38	1.25	4.88	1.25	1 00	2.69
5.00	0 7500	5.50	1/2	0.66	0.62	1.75	1.25	0.44	1.25	5 12	1.25	1.00	2.94
6.00	1.0000	6 50	3/4	0.88	0.75	2.00	1.50	0.44	1.50	5.75	1 50	1.25	3.19
8.00	1 0000	8 50	3/4	0 88	0.75	2 00	1 50	0.56	1 50	5.88	1 50	1.25	3 31
10.00	1.3750	10.62	1	1 19	0.75	2 25	2.00	0.66	2 12	7.12	1 88	1.62	4 19
12.00	1 7500	12.75	1	1 53	0.75	2.25	2.00	0 66	2.25	7.62	2 25	2.06	4.69
14.00	2 0000	14 75	1-1/4	1.75	0 75	2 75	2.25	0.75	2.50	8.88	2.50	2.38	5.62

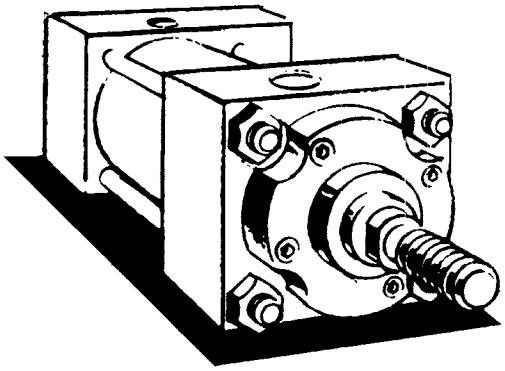
NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER								T(THREAD)								
BORE	ROD DIA. CODE	MM ROD DIA.	A	B -0.001 -0.003	C	D	RD*	SMALL MALE SM	INTER-MEDIATE MALE IM	SHORT FEMALE SF	V	W	XC	Y	ZC	PSI RATING†
	D	0.62	0.75	1.125	0.38	0.50	–	.44-20	.50-20	.44-20	0.25	0.62	5.38	1.88	6.12	250
1.50	F	1.00	1.12	1.500	0.50	0.88	–	.75-16	.88-14	.75-16	0.50	1.00	5.75	2.25	6.50	250
	D	0.62	0.75	1.125	0.38	0.50	2.38	.44-20	.50-20	.44-20	0.25	0.62	5.38	1.88	6.12	250
2.00	F	1.00	1.12	1.500	0.50	0.88	2.38	.75-16	.88-14	.75-16	0.50	1.00	5.75	2.25	6.50	250
	G	1.38	1.62	2.000	0.62	1.12	–	1.00-14	1.25-12	1.00-14	0.62	1.25	6.00	2.50	6.75	250
	D	0.62	0.75	1.125	0.38	0.50	2.38	.44-20	.50-20	44-20	0.25	0.62	5.50	1.88	6.25	250
2.50	F	1.00	1.12	1.500	0.50	0.88	2.38	.75-16	.88-14	75-16	0.50	1.00	5.88	2.25	6.62	250
	G	1.38	1.62	2.000	0.62	1.12	–	1.00-14	1.25-12	1.00-14	0.62	1.25	6.12	2.50	6.88	250
	H	1.75	2.00	2.375	0.75	1.50	–	1.25-12	1.50-12	1.25-12	0.75	1.50	6.38	2.75	7.12	250
	F	1.00	1.12	1.500	0.50	0.88	3.00	.75-16	.88-14	.75-16	0.25	0.75	6.88	2.38	8.12	250
3.25	G	1.38	1.62	2.000	0.62	1.12	3.00	1.00-14	1.25-12	1.00-14	0.38	1.00	7.12	2.62	8.38	250
	H	1.75	2.00	2.375	0.75	1.50	–	1.25-12	1.50-12	1.25-12	0.50	1.25	7.38	2.88	8.62	250
	J	2.00	2.25	2.625	0.88	1.69	–	1.50-12	1.75-12	1.50-12	0.50	1.38	7.50	3.00	8.75	250
	F	1.00	1.12	1 500	0.50	0.88	3.00	.75-16	.88-14	.75-16	0.25	0.75	6.88	2.38	8.12	250
	G	1.38	1.62	2.000	0.62	1.12	3.00	1.00-14	1.25-12	1.00-14	0.38	1.00	7.12	2.62	8.38	250
4.00	H	1.75	2.00	2.375	0.75	1.50	–	1.25-12	1.50-12	1.25-12	0.50	1.25	7.38	2.88	8.62	250
	J	2.00	2.25	2.625	0.88	1.69	–	1.50-12	1.75-12	1.50-12	0.50	1.38	7.50	3.00	8.75	250
	K	2.50	3.00	3.125	1.00	2.06	–	1.88-12	2.25-12	1.88-12	0.62	1.62	7.75	3.25	9.00	250
	F	1.00	1.12	1.500	0.50	0.88	3.00	.75-16	.88-14	.75-16	0.25	0.75	7.12	2.38	8.38	250
	G	1.38	1.62	2.000	0.62	1.12	3.00	1.00-14	1.25-12	1.00-14	0.38	1.00	7.38	2.62	8.62	250
	H	1.75	2.00	2.375	0.75	1.50	–	1.25-12	1.50-12	1.25-12	0.50	1.25	7.62	2.88	8.88	250
5.00	J	2.00	2.25	2.625	0.88	1.69	–	1.50-12	1.75-12	1.50-12	0.50	1.38	7.75	3.00	9.00	250
	K	2.50	3.00	3.125	1.00	2.06	–	1.88-12	2.25-12	1.88-12	0.62	1.62	8.00	3.25	9.25	250
	L	3.00	3.50	3.750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.62	1.62	8.00	3.25	9.25	250
	M	3.50	3.50	4.250	1.00	3.00	–	2.50-12	3.25-12	2.50-12	0.62	1.62	8.00	3.25	9.25	250
	G	1.38	1.62	2.000	0.62	1.12	4.00	1.00-14	1.25-12	1.00-12	0.25	0.88	8.12	2.75	9.62	250
	H	1 75	2 00	2.375	0.75	1.50	4.00	1.25-12	1.50-12	1.25-12	0.38	1.12	8.38	3.00	9.88	250
	J	2.00	2.25	2 625	0.88	1.69	4.00	1.50-12	1.75-12	1.50-12	0.38	1.25	8.50	3.12	10.00	250
6.00	K	2.50	3.00	3.125	1.00	2.06	–	1.88-12	2.25-12	1.88-12	0.50	1.50	8.75	3.38	10.25	250
	L	3.00	3.50	3.750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.50	1.50	8.75	3.38	10.25	250
	M	3.50	3.50	4.250	1.00	3.00	–	2.50-12	3.25-12	2.50-12	0.50	1.50	8.75	3.38	10.25	250
	N	4.00	4.00	4.750	1.00	3.38	–	3.00-12	3.75-12	3.00-12	0.50	1.50	8.75	3.38	10.25	250
	G	1.38	1.62	2.000	0.62	1.12	4.00	1.00-14	1.25-12	1.00-14	0.25	0.88	8.25	2.75	9.75	250
	H	1.75	2.00	2.375	0.75	1.50	4.00	1.25-12	1.50-12	1.25-12	0.38	1.12	8.50	3.00	10.00	250
	J	2.00	2.25	2.625	0.88	1.69	4.00	1.50-12	1.75-12	1.50-12	0.38	1.25	8.62	3.12	10.12	250
8.00	K	2.50	3.00	3.125	1.00	2.06	5.12	1.88-12	2.25-12	1.88-12	0.50	1.50	8.88	3.38	10.38	250
	L	3.00	3.50	3.750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.50	1.50	8.88	3.38	10.38	250
	N	4.00	4.00	4.750	1.00	3.38	–	3.00-12	3.75-12	3.00-12	0.50	1.50	8.88	3.38	10.38	250
	R	5 00	5.00	5.750	1.00	4.25	–	3.50-12	4.75-12	3.50-12	0.50	1.50	8.88	3.38	10.38	250
	S	5.50	5.50	6.250	1.00	4.62	–	4.00-12	5.25-12	4.00-12	0.50	1.50	8.88	3.38	10.38	250
	H	1 75	2.00	2.375	0.75	1.50	4.00	1.25-12	1.50-12	1.25-12	0.38	1.12	10.38	3.06	12.25	150
	J	2.00	2.25	2.625	0.88	1.69	4.00	1.50-12	1.75-12	1.50-12	0.38	1.25	10.50	3.19	12.38	150
	K	2.50	3.00	3.125	1.00	2.06	5.12	1.88-12	2.25-12	1.88-12	0.50	1.50	10.75	3.44	12.62	150
10.00	L	3.00	3.50	3.750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.50	1.50	10.75	3.44	12.62	150
	N	4.00	4.00	4.750	1.00	3.38	–	3.00-12	3.75-12	3.00-12	0.50	1.50	10.75	3.44	12.62	150
	R	5.00	5.00	5.750	1.00	4.25	–	3.50-12	4.75-12	3.50-12	0.50	1.50	10.75	3.44	12.62	150
	S	5.50	5.50	6.250	1.00	4.62	–	4.00-12	5.25-12	4.00-12	0.50	1.50	10.75	3.44	12.62	150
	J	2.00	2 25	2.625	0.88	1.69	4.00	1.50-12	1.75-12	1.50-12	0.38	1.25	11.12	3.19	13.38	150
	K	2.50	3.00	3.125	1.00	2.06	5.12	1.88-12	2.25-12	1.88-12	0.50	1.50	11.38	3.44	13.62	150
12.00	L	3 00	3 50	3 750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.50	1.50	11.38	3.44	13.62	150
	N	4.00	4.00	4.750	1.00	3.38	–	3.00-12	3.75-12	3.00-12	0.50	1.50	11.38	3.44	13.62	150
	R	5.00	5.00	5.750	1.00	4.25	–	3.50-12	4.75-12	3.50-12	0.50	1.50	11.38	3.44	13.62	150
	S	5 50	5.50	6.250	1.00	4.62	–	4.00-12	5.25-12	4.00-12	0.50	1.50	11.38	3.44	13.62	150
	K	2 50	3.00	3.125	1.00	2.12	5.12	1.88-12	2.25-12	1.88-12	0.50	1.50	12.88	3.69	15.38	150
	L	3.00	3.50	3 750	1.00	2.62	–	2.25-12	2.75-12	2.25-12	0.50	1.50	12.88	3.69	15.38	150
14.00	N	4.00	4.00	4.750	1.00	3.38	–	3.00-12	3.75-12	3.00-12	0.50	1.50	12.88	3.69	15.38	150
	R	5.00	5.00	5.750	1.00	4 25	–	3.50-12	4.75-12	3.50-12	0.50	1.50	12.88	3.69	15.38	150
	S	5.50	5.50	6.250	1.00	4.62	–	4.00-12	5.25-12	4.00-12	0.50	1.50	12.88	3.69	15.38	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

†CAUTION: P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.



SERIES "3A"

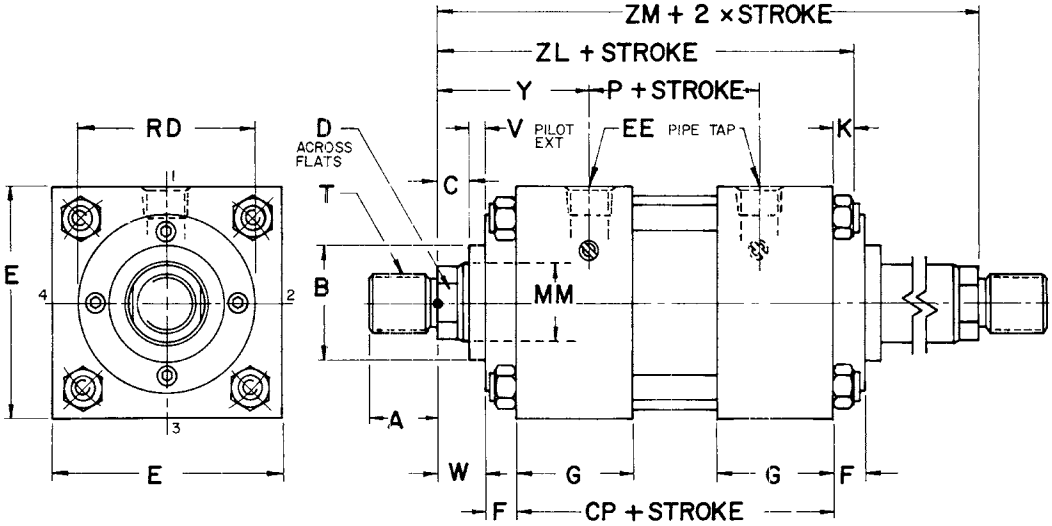
PNEUMATIC CYLINDERS

1.50" - 14.00"
BORE

MX0-D

* DOUBLE ROD END

* Available in MS2, MS3, MS4, MS7, MF1, MF5, ME3, MT1 and MT4. See single rod pages for mounting dimensions.



These Dimensions are Constant Regardless of Rod Diameter

BORE	CP	E	EE (NPTF)	F	G	K	P	BORE
1.50	4.12	2.00	3/8	.38	1.50	.25	2.31	1.50
2.00	4.12	2.50	3/8	.38	1.50	.31	2.31	2.00
2.50	4.25	3.00	3/8	.38	1.50	.31	2.44	2.50
3.25	4.75	3.75	1/2	.62	1.75	.38	2.69	3.25
4.00	4.75	4.50	1/2	.62	1.75	.38	2.69	4.00
5.00	5.00	5.50	1/2	.62	1.75	.44	2.94	5.00
6.00	5.50	6.50	3/4	.75	2.00	.44	3.19	6.00
8.00	5.62	8.50	3/4	.75	2.00	.56	3.31	8.00
10.00	6.62	10.62	1	.75	2.25	.66	4.19	10.00
12.00	7.12	12.75	1	.75	2.25	.66	4.69	12.00
14.00	8.62	14.75	1 1/4	.75	2.75	.75	5.62	14.00

NOTE: Dimensions are nominal except where specifically toleranced. Tolerances on "Plus Stroke" dimensions will vary slightly from dimensions shown due to manufacturing tolerances and tube compression.

Dimensions are Affected by the Rod Diameter

CYLINDER BORE	ROD DIA. CODE	MM ROD DIA.	A	B -.001 -.003	C	D	T (THREAD) SMALL MALE SM	T (THREAD) INTER-MEDIATE MALE IM	T (THREAD) SHORT FEMALE SF	V	W	Y	ZL	ZM	RD*	PSI RATING†
1.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	5.75	6.12	--	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	6.12	6.88	--	250
2.00	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	5.44	6.12	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	5.81	6.88	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	6.44	7.38	--	250
2.50	D	.62	.75	1.125	.38	.50	.44-20	.50-20	.44-20	.25	.62	1.88	5.56	6.25	2.38	250
	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.50	1.00	2.25	5.94	7.00	2.38	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.62	1.25	2.50	6.56	7.50	--	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.75	1.50	2.75	6.81	8.00	--	250
3.25	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.50	7.50	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	6.75	8.00	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	7.62	8.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	7.75	8.75	--	250
4.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.50	7.50	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	6.75	8.00	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	7.62	8.50	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	7.75	8.75	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	8.00	9.25	--	250
5.00	F	1.00	1.12	1.500	.50	.88	.75-16	.88-14	.75-16	.25	.75	2.38	6.81	7.75	3.00	250
	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.38	1.00	2.62	7.06	8.25	3.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.50	1.25	2.88	7.94	8.75	--	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.50	1.38	3.00	8.06	9.00	--	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.62	1.62	3.25	8.31	9.50	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.62	1.62	3.25	8.31	9.50	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.62	1.62	3.25	8.31	9.50	--	250
6.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.75	7.56	8.75	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	7.81	9.25	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	7.94	9.50	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	8.94	10.00	--	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	8.94	10.00	--	250
	M	3.50	3.50	4.250	1.00	3.00	2.50-12	3.25-12	2.50-12	.50	1.50	3.38	8.94	10.00	---	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	8.94	10.00	--	250
8.00	G	1.38	1.62	2.000	.62	1.12	1.00-14	1.25-12	1.00-14	.25	.88	2.75	7.81	8.88	4.00	250
	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.00	8.06	9.38	4.00	250
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.12	8.19	9.62	4.00	250
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.38	8.44	10.12	5.12	250
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.38	8.44	10.12	--	250
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.38	8.44	10.12	--	250
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.38	8.44	10.12	--	250
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.38	8.44	10.12	--	250
10.00	H	1.75	2.00	2.375	.75	1.50	1.25-12	1.50-12	1.25-12	.38	1.12	3.06	9.16	10.38	4.00	150
	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	9.28	10.62	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	9.53	11.12	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	9.53	11.12	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	9.53	11.12	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.44	9.53	11.12	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.44	9.53	11.12	--	150
12.00	J	2.00	2.25	2.625	.88	1.69	1.50-12	1.75-12	1.50-12	.38	1.25	3.19	9.78	11.12	4.00	150
	K	2.50	3.00	3.125	1.00	2.06	1.88-12	2.25-12	1.88-12	.50	1.50	3.44	10.03	11.62	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.44	10.03	11.62	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.44	10.03	11.62	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.44	10.03	11.62	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.44	10.03	11.62	--	150
14.00	K	2.50	3.00	3.125	1.00	2.12	1.88-12	2.25-12	1.88-12	.50	1.50	3.69	11.62	13.12	5.12	150
	L	3.00	3.50	3.750	1.00	2.62	2.25-12	2.75-12	2.25-12	.50	1.50	3.69	11.62	13.12	--	150
	N	4.00	4.00	4.750	1.00	3.38	3.00-12	3.75-12	3.00-12	.50	1.50	3.69	11.62	13.12	--	150
	R	5.00	5.00	5.750	1.00	4.25	3.50-12	4.75-12	3.50-12	.50	1.50	3.69	11.62	13.12	--	150
	S	5.50	5.50	6.250	1.00	4.62	4.00-12	5.25-12	4.00-12	.50	1.50	3.69	11.62	13.12	--	150

*Where RD is not shown, square retainer is used. See section for Retainer Construction.

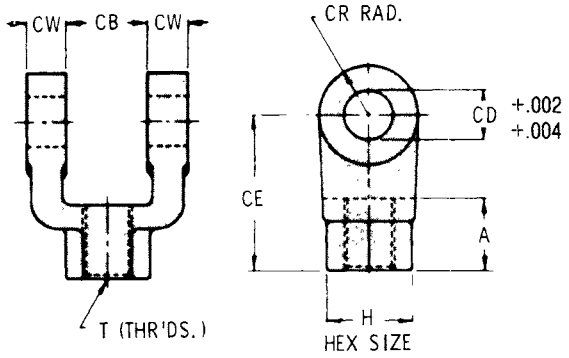
†**CAUTION:** P.S.I. Ratings shown are HANNA recommended maximum operating pressures.
Check Stroke Limitation Data section which may reduce maximum operating pressure.
Check Stop Tube Data section to determine if stop tube is required.

MOUNTING ACCESSORIES

These are standard accessories matched to bore size and piston rod code. The Mounting Bracket fits the cap end of Model MP1. The Bracket also fits the piston Rod Clevis with the same number (i.e. B-7 Bracket fits V-7 Rod Clevis). The pin is furnished with Model MP1 and fits the bracket, however, specify if additional pins are required. Pins also fit rod clevis and rod eyes. If you require accessories other than standard for that bore size or piston rod, specify the item number on your order.

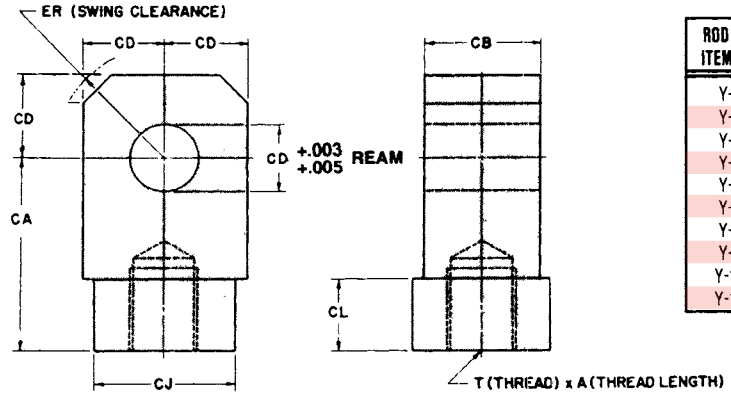
***CAUTION:**
Accessory load rating may be lower than maximum force available from cylinder. Accessories load ratings are in pounds. Before specifying, compare maximum operating pull force in pounds developed by cylinder with load rating of accessory. Accessory load rating is the maximum recommended operating load for that accessory.

Rod Clevis



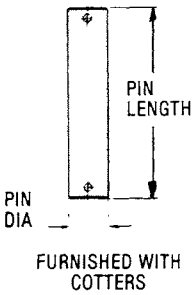
ROD CLEVIS ITEM NO.	PISTON ROD CODE	A	CB	CD	CE	CR	CW	H	T	*LBS. CAPACITY
V-1	D	.75	.75	.50	1.50	.62	.50	1.00	.44-20	5,360
V-2	F	1.12	1.25	.75	2.38	.88	.62	1.25	.75-16	14,000
V-3	G	1.62	1.50	1.00	3.12	1.12	.75	1.75	1.00-14	22,500
V-4	H	2.00	2.00	1.37	4.12	1.62	1.00	2.00	1.25-12	41,250
V-5	J	2.25	2.50	1.75	4.50	2.00	1.25	2.75	1.50-12	57,000
V-6	K	3.00	2.50	2.00	5.50	2.25	1.25	3.00	1.88-12	75,000
V-7	L	3.50	3.00	2.50	6.50	2.88	1.50	3.50	2.25-12	112,500
V-8	M	3.50	3.00	3.00	6.75	3.12	1.50	3.88	2.50-12	135,000
V-10	P	4.50	4.00	3.50	8.50	3.88	2.00	5.00	3.25-12	210,000
V-12	S	5.50	4.50	4.00	10.00	4.38	2.25	6.19	4.00-12	270,000

Rod Eye



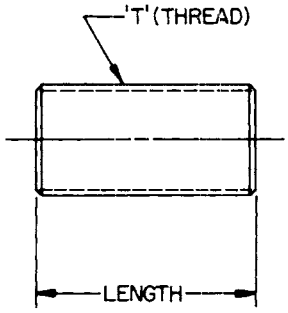
ROD EYE ITEM NO.	PISTON ROD CODE	A	CA	CB	CD	CJ DIA.	CL	ER	T	*LBS. CAPACITY
Y-1	D	.75	1.50	.75	.50	-	-	.75	44-20	5,060
Y-2	F	1.12	2.06	1.25	.75	-	-	1.12	.75-16	12,500
Y-3	G	1.62	2.81	1.50	1.00	-	-	1.44	1.00-14	20,250
Y-4	H	2.00	3.44	2.00	1.37	-	-	2.00	1.25-12	37,000
Y-5	J	2.25	4.00	2.50	1.75	-	-	2.50	1.50-12	59,000
Y-6	K	3.00	5.00	2.50	2.00	3.25	2.50	2.88	1.88-12	67,500
Y-7	L	3.50	5.81	3.00	2.50	4.00	2.81	3.56	2.25-12	101,250
Y-8	M	3.50	6.12	3.00	3.00	5.00	2.50	4.25	2.50-12	121,500
Y-10	P	4.50	7.62	4.00	3.50	6.12	3.50	5.00	3.25-12	189,000
Y-12	S	5.50	9.12	4.50	4.00	7.00	4.50	5.75	4.00-12	243,000

Pin



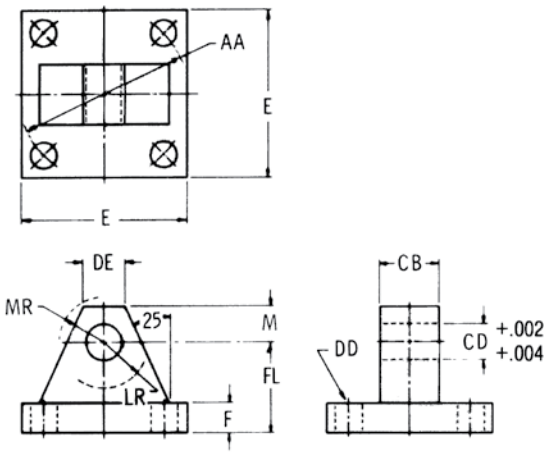
PIN ITEM NO.	LENGTH	DIAMETER	*LBS. CAPACITY
P1	2.28	.50	6,125
P2	3.09	.75	13,800
P3	3.60	1.00	24,500
P4	4.66	1.37	46,500
P5	5.66	1.75	75,150
P6	5.72	2.00	98,150
P7	6.94	2.50	153,400
P8	7.19	3.00	220,900
P10	9.31	3.50	300,650
P12	10.31	4.00	307,850

Piston Rod Stud



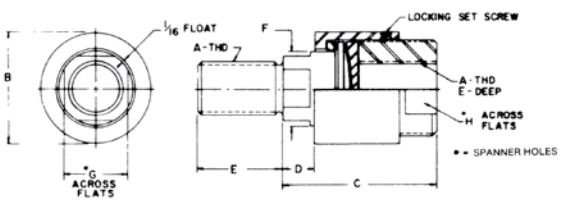
ITEM NO.	T	LENGTH
Stud 1	.44-20	1.50
Stud 2	.75-16	2.25
Stud 3	1.00-14	3.25
Stud 4	1.25-12	4.00
Stud 5	1.50-12	4.50

Brackets



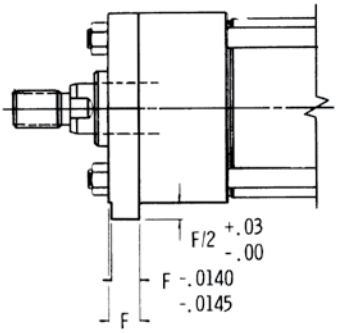
BORE DIA.	BRACKET ITEM	AA	CB	CD	DD	DE	E	F	FL	LR	M	MR	*LBS. CAPACITY
1.50, 2 00 2 50	B-1	2.30	.75	500	.44	.56	2.50	.38	1.12	.62	50	.62	2,500
3.25, 4 00 5 00	B-2	3 60	1 25	750	.56	.88	3 50	62	1.88	.88	75	.88	6,300
6 00 8.00	B-3	4 60	1.50	1.000	.69	1 38	4.50	.75	2.25	1 25	1 00	1.25	10,000
10.00	B-4	5.40	2.00	1.375	.69	1.75	5.00	88	3.00	1.75	1.38	1 75	19,250
12.00	B-5	7.00	2.50	1.750	94	2.25	6.50	.88	3 12	2 12	1.75	2.12	21,200
14.00	B-6	8.10	2.50	2.000	1.06	2.56	7.50	1.00	3.50	2 38	2.00	2.38	24,500
—	B-7	9.30	3.00	2 500	1 19	3.12	8.50	1.00	4.00	2.94	2.50	2.94	25,000
—	B-8	10 60	3.00	3.000	1.31	3.25	9 50	1.00	4.25	3 19	2 75	3.19	22,500
—	B-10	13.60	4 00	3.500	1 81		12.62	1.69	7 25	3 62	3.50	3.62	58,500
—	B-12	16.19	4.50	4.000	2.06		14.88	1 94	7.75	4 12	4.00	4.12	73,250

Linear Alignment Coupler



PART NO.	A	B	C	D	E	F	G	H	MAX. PULL LOAD
S-1	7/16 - 20	1-1/4	2	1/2	3/4	5/8	1/2	13/16	2,535
S-2	3/4 - 16	1-3/4	2-5/16	1/2	1-1/8	31/32	13/16	1-1/8	8,750
S-3	1 - 14	2-1/2	2-15/16	17/32	1-5/8	1-11/32	1-5/32	1-5/8	16,125
S-4	1-1/4 - 12	2-1/2	2-15/16	17/32	1-5/8	1-11/32	1-5/32	1-5/8	19,600
S-5	1-1/2 - 12	3-1/4	4-3/8	7/8	2-1/4	1-31/32	1-3/4	2-3/8	34,000
S-6	1-7/8 - 12	3-3/4	5-5/8	1	3	2-15/32	—	—	41,250

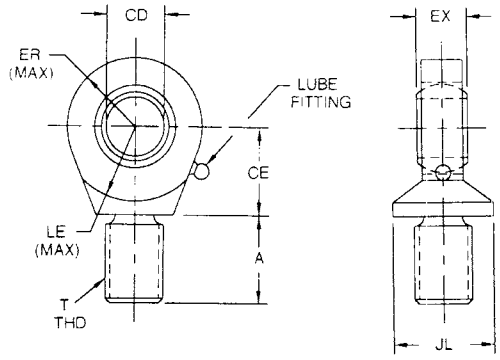
Thrust Key



Thrust keys are available on most side type mountings. Please refer to model dimension charts for F dimensions.
A thrust key eliminates the need for fitted bolts or external keys. It adds extra rigidity to your cylinder mounting when the key is fitted to a keyway milled into your mounting surface.

Spherical Rod Eyes

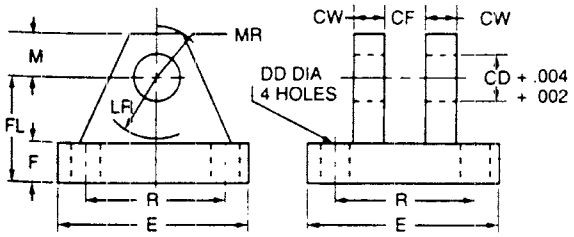
Order to fit Piston Rod thread size.



ROD EYE ITEM NO.	CD -0.0005	A	CE	EX	ER	LE	T	JL	*LBS. CAPACITY
SBY-1	0 5000	69	88	.44	88	.75	44-20	.88	2,644
SBY-2	0 7500	1 00	1.25	.66	1.25	1.06	75-16	1.31	9,441
SBY-3	1.0000	1 50	1.88	88	1 38	1.44	1 00-14	1.50	16,860
SBY-4	1.3750	2.00	2.13	1 19	1.81	1 88	1.25-12	2 00	28,562
SBY-5	1 7500	2 13	2.50	1 53	2 19	2.13	1 50-12	2.25	43,005
SBY-6	2 0000	2 88	2 75	1.75	2.63	2 50	1.88-12	2 75	70,193

Spherical Clevis Brackets

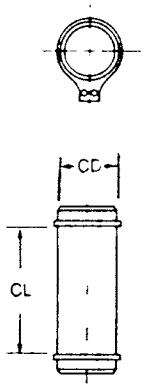
Order to fit Mounting Plate or Rod Eye.



BRACKET ITEM	E	F	M	R	CD	CF	CW	DD	FL	LR	MR	*LBS. CAPACITY
SBB-1	3.00	.50	.50	2.05	0.500	44	50	.41	1.50	94	.62	5,770
SBB-2	3 75	62	88	2.76	0.750	66	62	.53	2.00	1 38	1 00	9,450
SBB-3	5 50	.75	1.00	4 10	1.000	.88	75	.53	2.50	1 69	1.19	14,300
SBB-4	6 50	88	1 38	4.95	1 375	1 19	1 00	.66	3.50	2 44	1.62	20,322
SBB-5	8 50	1 25	1.75	6 58	1 750	1 53	1 25	91	4 50	2 88	2 06	37,800
SBB-6	10.62	1.50	2.00	7.92	2 000	1 75	1 50	.91	5 00	3 31	2.38	50,375

Pivot Pins

Pivot Pins are furnished with two retainer rings.



PIN ITEM NO.	CD	CL	*LBS. CAPACITY
SBP-1	.4997-.0004	1.56	8,600
SBP-2	.7497-.0005	2.03	19,300
SBP-3	.9997-.0005	2.50	34,300
SBP-4	1 3746-.0006	3 31	65,000
SBP-5	1 7496-.0006	4 22	105,200
SBP-6	1 9996-.0007	4.94	137,400

***CAUTION**
Accessory load rating may be lower than maximum force available from cylinder. Accessories load ratings are in pounds. Before specifying, compare maximum operating pull force in pounds developed by cylinder with load rating of accessory. Accessory load rating is the maximum recommended operating load for that accessory.

DESCRIPTION	PAGE
Port Size and Location	167
Retainer Plate Construction	168
Force Chart	169
Stroke Limitation Data	170
Stop Tube Data	171
Cylinder Cushions	172

PIPE PORT SIZE & LOCATION

Numbers 1, 2, 3 and 4 around end view of cylinder drawings are for describing optional pipe port locations Position 1 is standard. In many cases ports can be positioned at 2, 3 or 4 by rotating the heads at assembly. In other cases where it is undesirable to rotate the heads because of corresponding rotation of cylinder mountings, additional ports can usually be placed at positions 2, 3 or 4. Orders or inquiries should state port locations for rod and cap end heads, if other than standard. When changing port locations, careful attention should be paid to clearance between pipes, cylinder mountings, and the heads of any mounting screws.

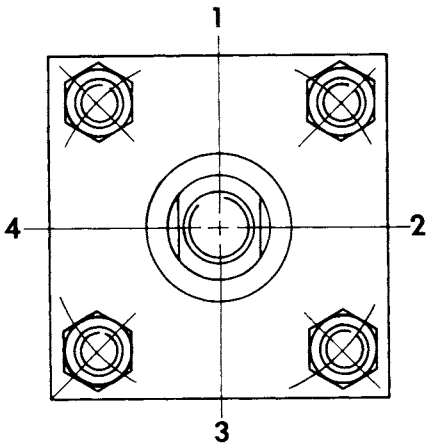
Standard N. P. T. dryseal ports will be supplied at position 1. Orders should state pipe port locations if other than standard. S. A. E. straight thread ports and bossed ports are available. Refer to the charts below to select the appropriate port.

SERIES "3A" OPTIONAL PORTING

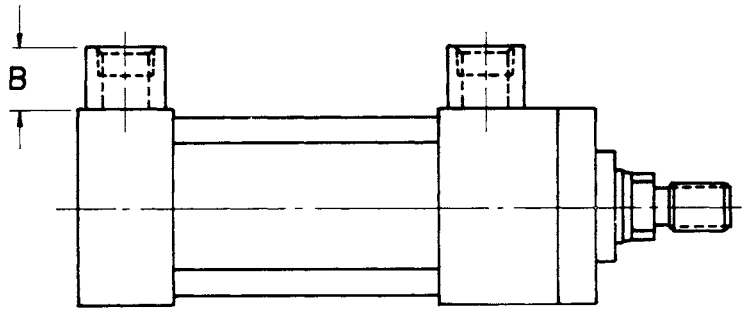
BORE	STANDARD NPT PORT	OVERSIZE BOSSED NPT*	DIM B	STANDARD SAE PORT	OVERSIZE* BOSSED SAE
1.50	3/8	1/2	15/16	9/16-18	7/8-14
2.00	3/8	1/2	15/16	9/16-18	7/8-14
2.50	3/8	1/2	15/16	9/16-18	7/8-14
3.25	1/2	3/4	15/16	7/8-14	1 1/16-12
4.00	1/2	3/4	15/16	7/8-14	1 1/16-12
5.00	1/2	3/4	15/16	7/8-14	1 1/16-12
6.00	3/4	1	1-1/8		1 5/16-12
8.00	3/4	1	1-1/8	1 1/16-12	1 5/16-12
10.00	1	1-1/4	1-1/4	1 5/16-12	1 5/8-12
12.00	1	1-1/4	1-1/4	1 5/16-12	1 5/8-12
14.00	1-1/4	1-1/2	1-1/2	1 5/8-12	1 7/8-12

*Available at Position #5, rear face blind end

PIPE PORT NUMBERING AND POSITIONING



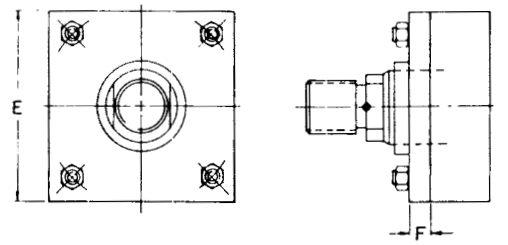
Postion location for both the Front Head and Blind Head is determined by viewing the cylinder at the Rod End.



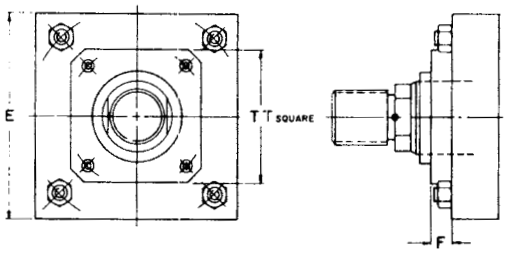
RETAINER PLATE CONSTRUCTION

ROD END STYLES SERIES "3A"

SQUARE RETAINER CONSTRUCTION

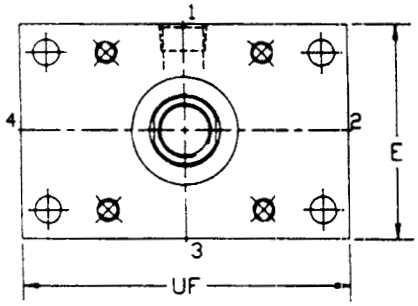


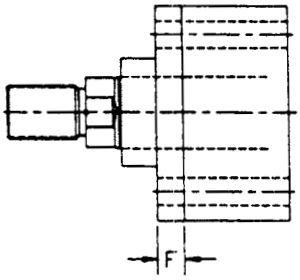
BORE	RODS
1.50	D, F
2.00	G
2.50	G, H
3.25	H, J
4.00	H, J, K
5.00	H, J, K, L, M
6.00	K, L, M, N



BORE	ROD	TT
8.00 THRU 14.00	L, N	5.50
	R, S	7.00

ME5 RETAINER CONSTRUCTION

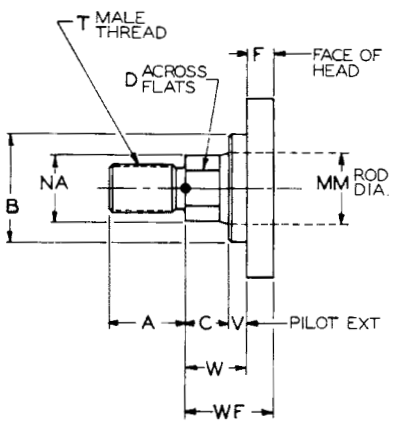




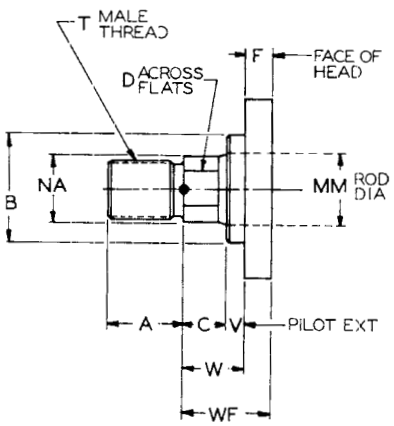
BORE	ROD DIA.
1.50	D (.62) & F (1.00)
2.00	G (1.38)
2.50	H (1.75)
3.25	J (2.00)

STANDARD ROD END STYLES

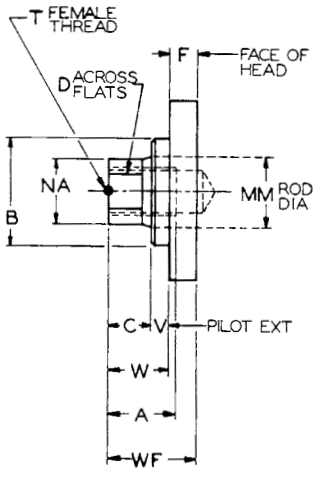
SMALL MALE THREAD



INTERMEDIATE MALE THREAD



SHORT FEMALE THREAD



NOTE: Dimension "NA" is the rod diameter minus .030" (.62" & 1.00" rods), minus .062" (1.38" to 5.50" rods).

For actual dimensions, see mounting style page desired.

FORCE CHART

1.50" THROUGH 14.00" CYLINDER CAPACITY

NOTE: Cylinder ratings may be lower than pressures shown in force charts. Consult mounting page, stroke limitation data and any accessory capacities if used to determine maximum permissible operating pressure.

CYL BORE DIA	ROD CODE		PISTON ROD DIA	CYL WORK ACTION	WORK AREA SQ. IN	PNEUMATIC PRESSURE 50	70	90	100	150	FLUID REQUIRED PER INCH OF STROKE CU FT
				PUSH	1.77	89	124	160	177	266	.00102
1.50	PDQ	D	62		1.46	73	102	131	146	219	.00084
		F	1.00		.98	49	69	88	98	147	.00057
				PUSH	3.14	157	220	283	314	471	.00182
2.00	PDQ	D	62	P	2.83	142	198	255	283	424	.00164
		F	1.00	U	2.36	118	165	212	236	354	.00136
		G	1.38	L	1.66	83	116	149	166	249	.00096
				PUSH	4.91	245	344	442	491	736	.00284
	PDQ	D	62	P	4.60	230	322	414	460	690	.00266
2.50		F	1.00	U	4.13	206	289	372	413	620	.00239
		G	1.38	L	3.43	172	240	309	343	515	.00198
		H	1.75	L	2.50	125	175	225	250	375	.00145
				PUSH	8.29	414	580	746	829	1244	.00480
	PDQ	F	1.00	P	7.51	375	525	676	751	1126	.00435
3.25	PDQ	G	1.38	U	6.81	340	477	613	681	1022	.00394
		H	1.75	L	5.88	294	412	529	588	882	.00341
		J	2.00	L	5.15	258	360	464	515	772	.00298
				PUSH	12.57	628	880	1131	1257	1886	.00727
	PDQ	F	1.00	P	11.78	589	825	1060	1178	1767	.00682
	PDQ	G	1.38	U	11.08	554	776	997	1108	1662	.00641
4.00		H	1.75	L	10.15	508	710	914	1015	1522	.00588
		J	2.00	L	9.43	472	660	849	943	1416	.00545
		K	2.50		7.66	383	536	689	766	1149	.00443
				PUSH	19.64	982	1375	1768	1964	2946	.01136
	PDQ	F	1.00	P	18.85	942	1319	1696	1885	2827	.01091
		G	1.38		18.15	908	1270	1633	1815	2722	.01050
		H	1.75	U	17.22	861	1205	1550	1722	2583	.00997
5.00		J	2.00		16.50	825	1155	1485	1650	2475	.00954
		K	2.50	L	14.73	737	1031	1326	1473	2210	.00852
		L	3.00	L	12.57	628	880	1131	1257	1885	.00727
		M	3.50		10.02	501	701	902	1002	1503	.00580
				PUSH	28.27	1413	1979	2544	2827	4240	.01636
	PDQ	G	1.38	P	26.79	1339	1875	2411	2679	4018	.01550
		H	1.75		25.86	1293	1810	2327	2586	3879	.01497
		J	2.00	U	25.13	1256	1759	2262	2513	3770	.01454
6.00		K	2.50		23.36	1168	1635	2102	2336	3504	.01352
		L	3.00	L	21.20	1060	1484	1908	2120	3180	.01227
		M	3.50	L	18.65	933	1306	1678	1865	2798	.01079
		N	4.00		15.70	785	1099	1413	1570	2355	.00909
				PUSH	50.26	2513	3518	4523	5026	7539	.02909
		G	1.38		48.78	2439	3415	4390	4878	7317	.02823
		H	1.75	P	47.85	2392	3350	4306	4785	7178	.02770
		J	2.00		47.12	2356	3298	4241	4712	7068	.02727
8.00		K	2.50	U	43.35	2268	3174	4082	4535	6804	.02625
		L	3.00		43.19	2160	3023	3887	4319	6478	.02500
		N	4.00	L	37.69	1884	2638	3392	3769	5655	.02182
		R	5.00	L	30.62	1531	2143	2756	3062	4593	.01773
		S	5.50		26.50	1325	1855	2385	2650	3975	.01534
				PUSH	78.54	3927	5498	7069	7854	11781	.04545
		H	1.75		76.13	3806	5329	6852	7613	11420	.04406
		J	2.00	P	75.40	3770	5279	6787	7540	11310	.04363
		K	2.50		73.63	3681	5154	6627	7363	11044	.04261
10.00		L	3.00	U	71.47	3573	5003	6432	7147	10720	.04136
		N	4.00		65.97	3298	4618	5937	6597	9896	.03818
		R	5.00	L	58.90	2945	4123	5301	5890	8835	.03409
		S	5.50		54.78	2739	3835	4930	5478	8217	.03170
				PUSH	113.10	5655	7917	10179	11310	16965	.06545
		J	2.00	P	109.96	5498	7697	9896	10996	16494	.06363
		K	2.50		108.19	5409	7573	9737	10819	16228	.06261
12.00		L	3.00	U	106.03	5302	7422	9543	10603	15904	.06136
		N	4.00	L	100.53	5026	7037	9048	10053	15080	.05818
		R	5.00		93.47	4673	6543	8412	9347	14020	.05409
		S	5.50	L	89.34	4467	6254	8041	8934	13401	.05170
				PUSH	153.94	7697	10776	13855	15394	23091	.0891
		K	2.50	P	149.03	7452	10432	13413	14903	22355	.0862
		L	3.00		146.87	7344	10281	13218	14687	22031	.0850
14.00		N	4.00	U	141.37	7068	9896	12723	14137	21205	.0818
		R	5.00	L	143.30	6715	9401	12087	13430	20145	.0777
		S	5.50	L	130.18	6509	9113	11716	13018	19527	.0753

STROKE LIMITATION DATA

The rod diameter has to be capable of withstanding any compressive force developed by the cylinder working against the load. A piston rod diameter with adequate column strength to handle the compressive force of the application can be selected from the convenient pre-calculated chart below.

NOTE: See application figures on next page.

To use this chart find the force value, developed by the application, in the left column. Next, select the figure which resembles your application and then multiply "D" times the factor given in that figure. Finally, opposite the corresponding force value, find the value of "L" which is equal to, or greater than, the figure derived from factoring "D". Directly above is the rod diameter which is capable of withstanding the forces developed in the application.

EXAMPLE: Cylinder Bore = 4.00" Operating PSI = 250
Force Value 3140 lbs.
Application - Resembles Fig. 2 - Foot Lug Mtg.
Stroke = 40"
"L" = 0.7 x 40; L = 28"
Correct Rod Diameter = 1.00"

The total force is 3140 lbs., and the value of "L" is 28 inches in this application. The smallest diameter rod capable of handling this situation is 1.00 inches.

If a stop tube is required for the application be sure to include the stop tube length when determining the length of "D".

FORCE VALUE	VALUE OF "L" IN INCHES PISTON ROD DIAMETER												
in pounds	.62	1.00	1.38	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	7.00
100	66												
200	47												
400	33	85											
600	27	70	132										
800	24	60	114	184									
1000	21	54	102	165	215								
1300	18	47	90	145	188								
1700	16	41	78	127	165	258							
2100	14	37	71	114	149	232							
2500	13	34	65	104	136	213	304						
3000	12	31	58	95	124	192	280	381					
4000	10	27	51	83	108	162	242	330	430				
5000	9	24	46	74	96	150	217	295	385				
6000	8	22	42	67	89	137	198	269	352	443			
8000	7	19	36	58	76	119	172	233	305	384	475		
10000		17	32	52	68	106	153	209	273	344	426	514	
12000		15	29	48	62	97	139	190	249	314	328	468	761
16000		13	26	42	54	84	121	165	215	272	316	407	659
20000			23	38	48	75	109	148	193	243	301	365	590
30000			18	31	39	61	89	120	153	198	245	297	481
40000				27	34	53	77	104	136	172	213	257	417
50000				23	31	48	69	93	122	153	190	230	373
60000				21	28	44	63	85	111	140	174	210	340
80000					24	38	54	74	96	122	143	192	295
100000						34	48	66	86	109	132	163	264
120000						31	44	60	79	100	121	142	240
140000							41	56	73	92	112	135	223
160000							38	52	63	86	105	129	209
200000								47	61	77	93	115	187
250000								42	54	69	84	103	167
300000													152
350000													141
400000													131
500000													118

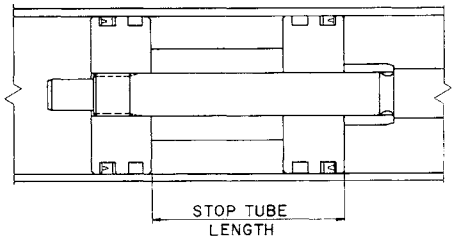
If a stop tube is required for the application be sure to include the stop tube length when determining the length of "D".

STOP TUBE DATA

Long stroke cylinders can be subjected to a buckling action and excessive bearing wear due to the weight of the exposed rod. To reduce wear a stop tube is recommended.

All cylinders cushioned and non-cushioned are supplied with the double piston construction. General construction of cylinder stop tube is illustrated below.

"3A" CONSTRUCTION



"3A" SERIES MINIMUM STOP TUBE LENGTHS
1.50 BORE 1.12 LG.
2.00 BORE 1.12 LG.
2.50 BORE 1.25 LG.
3.25 BORE 1.25 LG.
4.00 BORE 1.25 LG.
5.00 BORE 1.50 LG.
6.00 BORE 1.50 LG.
8.00 BORE 1.62 LG.
10.00 BORE 2.12 LG.
12.00 BORE 2.62 LG.
14.00 BORE 3.12 LG.

ROD END CONNECTION	
FIXED & WELL GUIDED	FIG 1 D "L" = 0.5 X D
PIVOTED AND WELL GUIDED	FIG. 2 D "L" = 0.7 X D
SUPPORTED NOT WELL GUIDED	FIG 3 D "L" = 2 X D
PIVOTED AND WELL GUIDED	FIG 4 D "L" = 0.7XD FOR LONG STROKE SUPPORT HEAD HEAD NOT SUPPORTED D "L" = D
	FIG 5 D "L" = 0.7 X D
	FIG 6 D "L" = D
	FIG 7 D "L" = D
	D D FIG 8 "L" = D

To determine if a stop tube is required, find the total value of "L" using the stroke limitation chart. Compare this value with the stop tube chart. If the value of "L" exceeds 40 inches, you can find the recommendation for stop tube length at the bottom of the chart.

EXAMPLE PROBLEM:
Cylinder Model MP1-3A-NC-4-27-KSM-1A
Accessory - V-6 Clevis
Pressure - 250 PSI
Clevis Mount - Horizontal

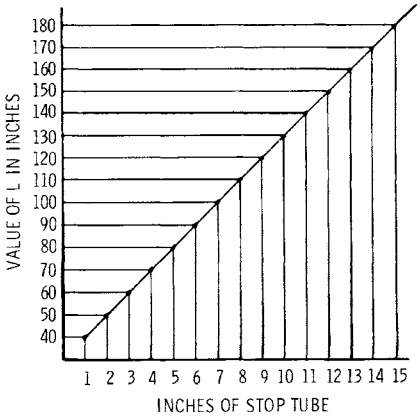
From the description, the cylinder falls into Fig. 8. To determine the value of "L":

ADD:	MP1	"XC" Dimension	7-3/4"
	V-6	"CE" Dimension	5-1/2"
	Two times stroke (2 x 27)		54"
	Total Value of "L"		67-1/4"

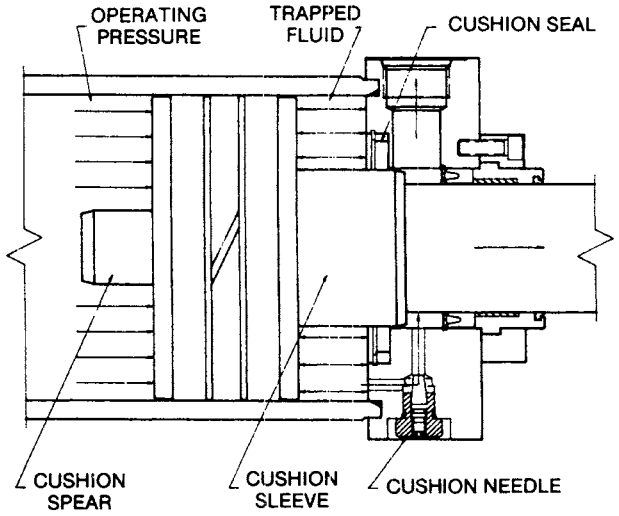
Looking this up on the chart, you'll find a recommended stop tube length of 4 inches.

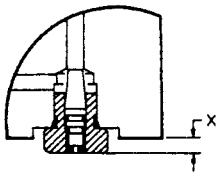
The amount of stop tube will increase the stroke-plus dimensions of the cylinder by the same value. Add length of the stop tube to the value of "L" and recheck column strength on stroke limitation chart.

STOP TUBE CHART



CYLINDER CUSHION





NOTE: Cushion needle extends beyond the edge of head on the following:

	F.H.	B.H.
Bore	X	X
1.50	.235	.195
2.00	.235	.195
2.50	.235	.195
3.25	.125	.085

Cushions in cylinders are primarily intended to protect the cylinder from damaging impacts at the ends of the stroke. Properly selected and adjusted cushions may also reduce noise, reduce loading damage, may increase machine output.

As a general guide line, the use of pneumatic cushions should be considered whenever the velocity of the piston approaches 20 to 25 feet per minute. When piston velocity exceeds 35 to 40 feet per minute, the amount of energy being generated will usually demand the use of cushions to decelerate the piston. Cushions should also be seriously considered when a large mass imparts inertia loading to the cylinder.

Cushions work by trapping a volume of fluid at the end of the stroke to create a back pressure which resists the force being exerted on the working side of the piston. As shown above, this back pressure is developed wher the cushion sleeve or spear enters into the cushion seal and the fluid is bled down through the orifice at the cushion seal and past the cushion adjustment needle. The back pressure developed must be sufficient to resist the force developed by the application. To determine if a suitable cushion can be provided in the cylinder selected for the application calculate the total energy which must be absorbed, as outlined below, and compare with the cushion capacity listed in the cushion capacity table.

NOTE: On Series "3A", Cushions are not available on the Head End of 1.50" Bore (F) Rod, 2.00" Bore (G) Rod and 2.50" Bore (H) Rod.

DETERMINING ENERGY OF THE APPLICATION

Things to consider:
1. Kinetic energy.
2. Propelling energy (including gravity).

I. To solve for kinetic energy:
$0.1865 \times W \times V^2 = K.E.$
W = Weight of the entire moving mass (pounds) (include cylinder piston rod in the mass figure)
V = Velocity at entering the cushion (feet/sec.)
K.E. = Kinetic Energy (inch pounds).

II. To solve for propelling energy:
$F \times S = P_1$
F = Force exerted by the cylinder (Piston Area x PSI at relief valve setting).
S = Cushion length (inches)
P_1 = Propelling Energy (inch pounds).

III. Gravity effects must also be considered if the cylinder is mounted in a vertical plane. If the mass is moving down into the cylinder cushion, the energy due to gravity must be added to the propelling energy, P_1. If the mass is moving into the cushion, the gravity is negative and this may be subtracted from the propelling energy, P_1.

To solve for propelling energy due to gravity:
$W \times S = P_2$
W = Weight of moving mass
S = Length of cushion
P_2* = Propelling energy due to gravity (inch pounds).

If the load is horizontal, the effect of gravity is zero and will not affect the total propelling energy.

TOTAL ENERGY IS:
$K.E. + P_1 \pm P_2$*
K.E. = Total Kinetic Energy Formula I.
P_1 = Total Propelling Energy Formula II.
P_2 = Gravity Propelling Energy Formula III.

*Add if gravity is positive -
Subtract if gravity is negative -
Disregard if cylinder travel is horizontal.

CUSHION CAPACITY CHART

SERIES "3A" CUSHION CAPACITIES

BORE	ROD DIA.	HEAD END		CAP END	
		CUSHION LENGTH	CAPACITY (IN.-LBS.)	CUSHION LENGTH	CAPACITY (IN.-LBS.)
1.50	.62 1.00	.62 N/A	144 N/A	.50	150
2.00	.62 1.00 1.38	.62 .62 N/A	245 245 N/A	.50	270
2.50	.62 1.00 1.38 1.75	.62 .62 .62 N/A	435 435 356 N/A	.50	425
3.25	1.20 1.38 1.75 2.00	.81 .81 .81 .81	945 945 645 645	.61	850
4.00	1.00 1.38 1.75 2.00 2.50	.81 .81 .81 .81 .81	1,550 1,550 1,250 1,250 1,250	.61	1,305
5.00	1.00 1.38 1.75 2.00 2.50 3.00 3.50	.81 .81 .81 .81 .81 .81 .81	2,555 2,555 2,250 2,250 2,015 1,320 1,320	.61	2,060
6.00	1.38 1.75 2.00 2.50 3.00 3.50 4.00	.81 .81 .81 .81 .81 .81 .81	3,780 3,475 3,475 3,240 2,595 2,595 2,170	.73	3,535
8.00	1.38 1.75 2.00 2.50 3.00 4.00 5.00 5.50	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	8,510 8,140 8,140 7,850 7,050 6,525 4,545 4,545	.81	7,040
10.00	1.75 2.00 2.50 3.00 4.00 5.00 5.50	1.00 1.00 1.00 1.00 1.00 1.00 1.00	7,850 7,850 7,675 7,200 6,885 5,695 5,695	1.31	10,720
12.00	2.00 2.50 3.00 4.00 5.00 5.50	1.00 1.00 1.00 1.00 1.00 1.00	11,480 11,305 10,825 10,510 9,325 9,325	1.03	12,056
14.00	2.50 3.00 4.00 5.00 5.50	1.00 1.00 1.00 1.00 1.00	15,595 15,115 14,800 13,610 13,610	1.28	20,471

TYPICAL APPLICATION PROBLEM

You have tentatively chosen an "3A" Series cylinder with a 3-1/4" bore to move a 50 pound mass horizontally at 3 feet per second. The system relief valve setting is 80 psi. The cylinder is equipped with the standard 1.00" diameter piston rod and the effective cushion stroke or length is .81 inch.

Kinetic Energy:
$0.1865 \times 50 \text{ lbs.} \times (3)^2$
$9.32 \times 9 = 84 \text{ in. lbs.}$
Propelling Energy:
$8.29 \times 80 \times .81 = 537$
Total Application Energy:
$84 + 537 = 621 \text{ in. lbs.}$

The total energy seen by the cushion in this application is 621 inch pounds. By referring to the cushion capacity chart shown above, we find the standard 3-1/4" bore "3A" Series cushion can adequately handle the energy. If the energy developed exceeds the capacity of the standard cushion consider use of supercushions or changes in the pneumatic circuit which will reduce the amount of energy the cushions must absorb. (Supercushions have the same physical appearance as the standard cushion described above, except that the effective cushion length is doubled. An additional head or cap on both are added to accommodate the longer cushion sleeve or spear. The overall length of the cylinder body changes accordingly. Capacities of supercushions are double those shown in the cushion capacity chart.)

If in doubt about selecting a cushion, consult the factory with detailed application information and a recommendation will be made.

Caution: Cushion adjustment needles require only about one to one and one-half turn adjustment. Do not unscrew beyond the point at which the head of the screw is flushed with the surface of the head or cap.

INSTALLATION, OPERATION AND MAINTENANCE DATA

STORAGE:

If cylinders are to be stored before use, make sure the piston rod is fully retracted. Any portion of the rod that is exposed should be coated with a lubricant. Cylinders in storage should always be fully protected against the elements or other adverse conditions.

INSTALLATION:

The pipe ports of cylinders are sealed with plastic plugs. The plugs protect the precision internal parts by sealing out damaging dirt and grit. Do not remove port plugs until ready to connect piping. To protect cylinders, clean all pipes and pipe fittings of dirt, scale, and thread chips. A filter is recommended to keep operating air free of foreign matter.

Accurate mounting and alignment are essential to proper cylinder performance. By eliminating side loading, packing and bearing life will be extended. Mounting surfaces should be straight; bearings for pin and trunnion mounting must be in line.

OPERATION:

Needle valves in cylinder head and cap of adjustable cushioned cylinders permit regulation of cushioning effect. Adjust needle valve using an Allen wrench, rotating clockwise to increase cushioning, and counter-clockwise to decrease cushioning effect. Speed control valves are essential for obtaining the best cushioning operation. A proper balance of cushion needle and flow control valve adjustment should result in a smooth stop with no bouncing.

MAINTENANCE:

Parts which may need replacement in the course of normal use are the rod wiper, rod seal and piston seals.

The need for replacement of rod seal will become evident through the escaping of air around the gland.

To replace rod wiper or rod seal, remove the gland from the cylinder. Remove worn rod wiper and rod seal. To reassemble, slip new rod wiper and rod seal into grooves. Care should be exercised not to nick the lips of the seals. Be sure to retorque gland screws to the specified torque for the cylinder. (See torque chart).

To replace **Series 3A** piston seals, cut the old seals and remove them. Carefully work the new U-cup seals into the grooves. Care should be exercised not to nick the lips of the seals.

To replace **Series 3AN** piston seals, cut the old piston seal, and remove it and the old O-ring from the groove. Install new O-ring. Next, slightly stretch the Teflon piston seal and work it into the groove. Replace wear strip. Carefully insert the ram assembly into the tube. This will assure the Teflon seal is reshaped equally.

It is recommended that new O-rings be installed each time the cylinder is disassembled for maintenance. This applies to tube and gland O-rings. The cushion needle valve O-rings should also be replaced if these parts are disassembled. When reassembling, be sure to apply proper tie rod torque. (See torque chart).

If the cushion action of the cylinder fails, check the cushion float sealing. Check to determine if the bronze ring has been worn on its internal diameter, and if foreign particles have become lodged between the face of the ring and the cylinder head recess face. A free play of the ring, both radially and axially, is normal to allow for centering and cushion float action.

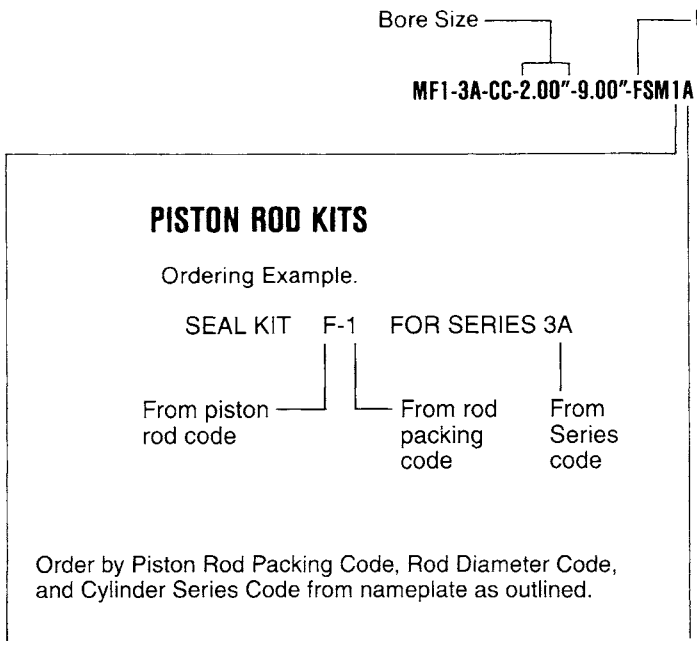
If the cylinder fails to perform the job for which it is ordered, check the following items: 1. That the correct cylinder diameter has been chosen to do the job required. 2. That there is adequate line pressure at the cylinder, under both static and dynamic conditions. 3. That the piston rod is aligned correctly with the load it is pushing or pulling. 4. That the piston packings or the piston rod packings are not worn, allowing pressure to escape.

Replacement parts can be furnished quickly if you will indicate the serial number of the cylinder as shown on the nameplate, and the part name and number, as shown on the drawing. The cylinder illustrated is for reference purposes only, and does not represent any particular model.

SEAL KITS

All cylinders are fully field identifiable, including packing option codes.

NAMEPLATE CODE EXAMPLE



PISTON ROD KITS

Ordering Example.

SEAL KIT F-1 FOR SERIES 3A

From piston rod code — From rod packing code — From Series code

Order by Piston Rod Packing Code, Rod Diameter Code, and Cylinder Series Code from nameplate as outlined.

1 (STANDARD)
Temperature Range -20° F to +200° F
Buna-N O-Rings, Polyurethane Rod Packing and Polyurethane Rod Wiper.*

2 (OPTIONAL)
Temperature Range -20° F to +200° F
Buna-N O-Rings, Buna-N Multiple Lip Rod Packing, Polyurethane Rod Wiper.*

3 (OPTIONAL)
Temperature Range -20° F to +400° F
Viton O-Rings, Viton Rod Packing, Teflon Rod Wiper.

*Teflon Rod Wiper recommended for Series 3AN.

PISTON PACKING KITS

Ordering Example:

SEAL KIT A-2.00 FOR SERIES 3A

From piston packing code — Bore size — From Series code

Order by Piston Packing Code, Bore Size and Cylinder Series Code from nameplate as outlined.

A (3A STANDARD)
Temperature Range -20° F to +200° F
Buna-N U-Cups, Teflon Back-Up Washers, Buna-N Tube Seals.

B (3A OPTIONAL)
Temperature Range -20° F to +400° F
Viton U-Cups, Teflon Back-Up Washers, Viton Tube Seals.

G (3AN STANDARD, 3A OPTIONAL)
Temperature Range -20° F to +200° F
Piston Wear Strip(s), Filled Teflon Seal w/Buna-N Expander, Buna-N Tube Seals.

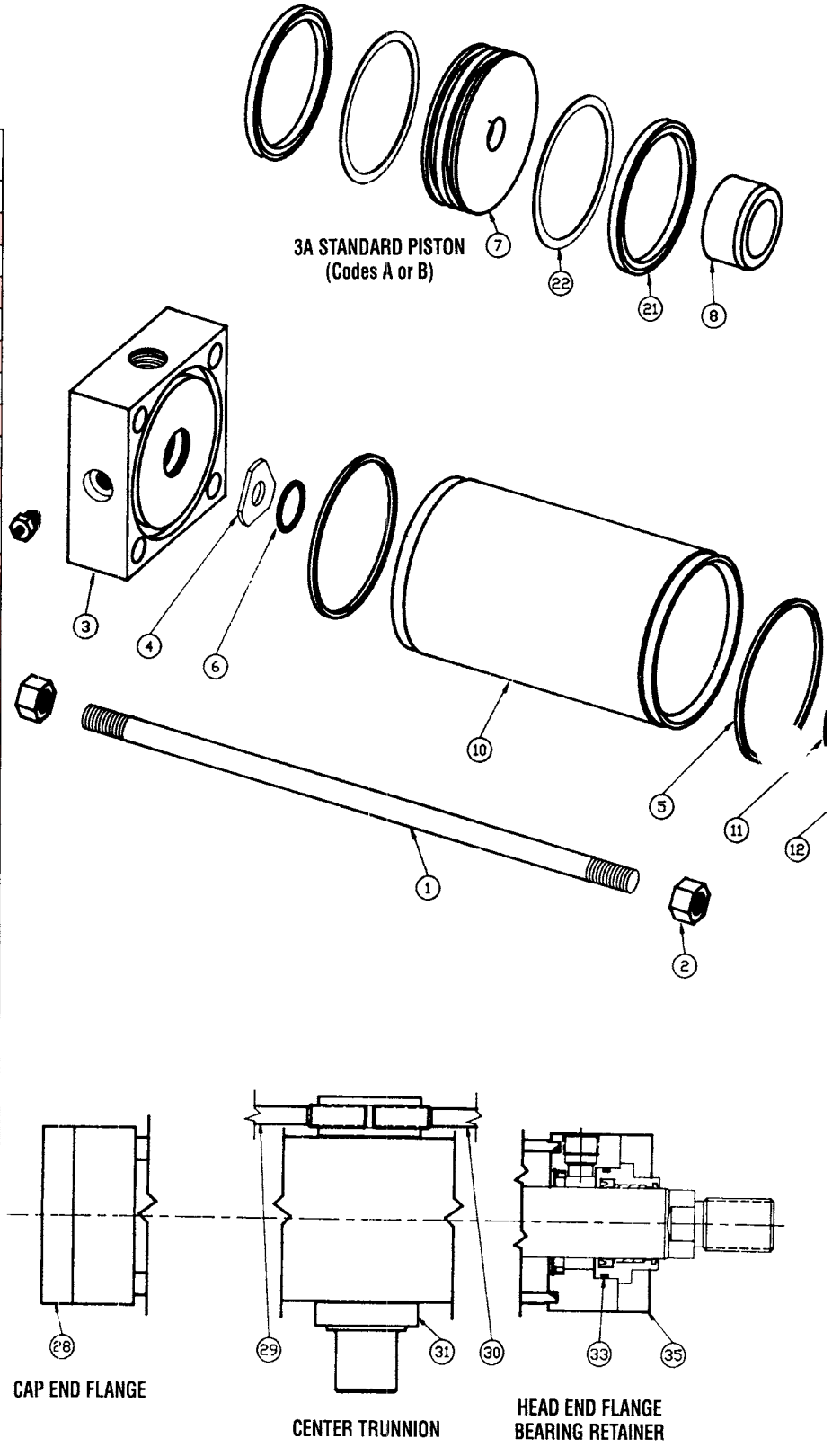
H (3A, 3AN OPTIONAL)
Temperature Range -20° F to +400° F
Piston Wear Strip(s), Filled Teflon Seal w/Viton Expander, Viton Tube Seals.

PARTS LIST

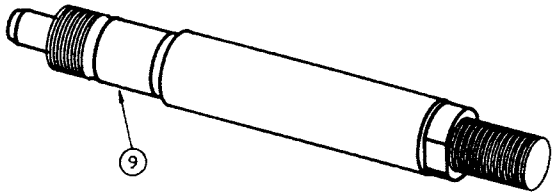
When ordering replacement parts, identify Model Number, Serial Number and Part Number, as shown below.

PART NO.	NO. REQ'D.	DESCRIPTION
1	**	Tie Rod
2	**	Tie Rod Nut
3	1	Cap
4	1	Cap Cushion Float
5	2	O-Ring (Tube)
6	1	Cap Retaining Ring
7	1	3A Standard Piston
8	1	Cushion Sleeve
9	1	Piston Rod
10	1	Tube
11	1	Head Cushion Retaining Ring
12	1	Head Cushion Float
13	1	Packing Retaining Ring
14	1	Rod Washer
15	1	Rod Packing
16	1	Front Head
17	1	Retainer Plate
18	1	Gland Assembly
19	1	Rod Wiper
20	2	Cushion Needle
21	2	Piston U-Cup
22	2	Back-Up (1.50–4.00" Bores)
24	1	Filled Teflon Seal with Buna Expander
25	1	Wear Strip
26	4/8	Gland Screw
27	1	3AN Standard Piston
28	1	Cap End Flange
29	**	Cap End Tie Rod
30	**	Head End Tie Rod
31	1	Center Trunnion Band
33	1	O-Ring (Gland)
35	1	Front Flange
36	1	Detachable Clevis

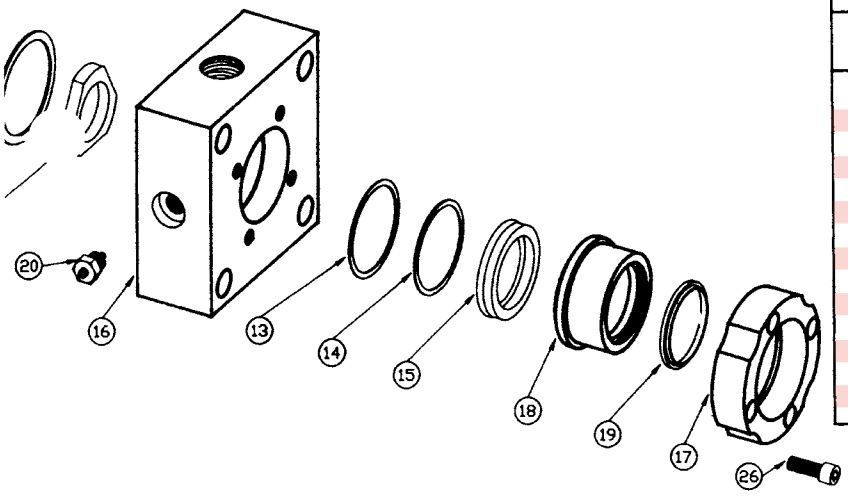
** As required



FASTENER TORQUES

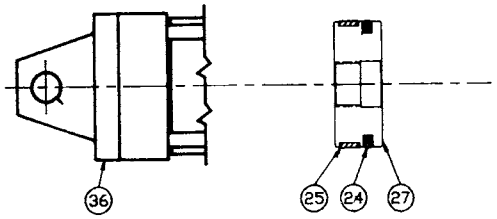


3A & 3AN SERIES TIE ROD TORQUE			
BORE	SIZE	TORQUE	TORQUE MX1, 2, 3, 4
1.5	.25-28	8 ft-lbs.	8 ft-lbs.
2.0	.31-24	14	14
2.5	.31-24	14	14
3.25	.38-24	25	28
4.00	.38-24	25	28
5.00	.50-20	35	48
6.00	.50-20	35	48
8.00	.62-18	85	115
10.00	.75-16	130	170
12.00	.75-16	130	170
14.00	.875-14	230	375



3A & 3AN SERIES GLAND SCREW TORQUES			
BORE	ROD	SCREW SIZE	TORQUE
1.5	ALL	—	—
2.0	ALL	#10-32	4 ft-lbs.
2.5	ALL	#10-32	4
3.25	ALL	#10-32	4
4.00	ALL	#10-32	4
5.00	ALL	#10-32	4
6.00	ALL	.25-28	10
8.00	GHJ	.25-28	10
8.00	KLNRS	.38-24	42
10.00	HJ	.25-28	10
10.00	KLNRS	.38-24	42
12.00	J	.25-28	10
12.00	KLNRS	.38-24	42
14.00	ALL	.38-24	42

CYLINDER WEIGHTS



DETACHABLE CLEVIS

3AN STANDARD PISTON
3A OPTIONAL PISTON
(Codes G or H)

3A & 3AN SERIES		
CYLINDER BORE	BASE WEIGHT AT ZERO STROKE	WEIGHT PER INCH OF STROKE
1.50	5 lbs.	.4 lbs.
2.00	6.5	.5
2.50	10	.6
3.25	20	.9
4.00	27	1.0
5.00	40	1.2
6.00	68	1.6
8.00	102	2.0
10.00	198	2.5
12.00	297	4.0
14.00	486	4.8

OPTIONS

Hanna offers a wide variety of modifications and options to our Standard 3A and 3AN Product Lines. Please contact your authorized Distributor for more information.

SERIES 3A & 3AN

Stroke Adjustable Cylinders
Metallic Rod Scrapers
Super Cushions
Spring Return Cushions
Stainless Steel Piston Rods
Epoxy Painting Full Face
Rod Boots
Heavy Chrome Plated Piston Rods
Intermediate Center Supports
Tightened Stroke Tolerance
Retainer Plates
MP3 Mount
MS1 Mount
Self Aligning Rode End Couplings
Tandem Mounted Cylinders

Contact factory for other special options.

HOW TO ORDER

MF1 * 3A-CC-2.00"-9.00"-FSM1A

MOUNTING STYLE

Side Lugs	MS2
Centerline Lugs	MS3
Side Tapped	MS4
Head Square Flange	MF5
Cap Square Flange	MF6
Head Trunnion	MT1
Cap Trunnion	MT2
Intermediate Fixed Trunnion	MT4
Head Rectangular Flange	MF1
Cap Rectangular Flange	MF2
Head Square	ME3
Cap Square	ME4
Head Flange	ME5
Cap Flange	ME6
Tie-Rods	MX0,MX1,MX2, MX3,MX4
Side End Lugs	MS7
Cap Fixed Clevis	MP1
Cap Detatchable Clevis	MP2
Spherical Bearing	MPU3
Double Rod (Available in most mounting styles)	MX0-D

Double Rod End ..... D
(Specify only if required)

SERIES

Pneumatic .. 3A
Non-Lube ... 3AN†

CUSHION

Non-Cushion	NC
Cushion, Both Ends*	CC
Cushion, Cap End Only	CB
Cushion, Head End Only*	CR

***Cushion on Head End of 1.50" Bore (F) Rod, 2.00" Bore (G) Rod and 2.50" Bore (H) Rod are not available.**

BORE SIZE
(Specify)

STROKE
(Specify)

ROD DIAMETER
(Specify Piston Rod Code from dimensional chart)

ROD END STYLE

Small Male	SM
Intermediate Male	IM
Short Female	SF*
Alternate Male (Specify)	AL
Alternate Female (Specify)	AF
Special (Specify)	SP

***Specify rod stud if required—up thru 2" diameter piston rod.**

PISTON ROD PACKING, GLAND O-RING, ROD WIPER

STANDARD—Polyurethane Packing, Buna O-Ring, Polyurethane Wiper ... 1

OPTIONAL —Buna Packing, O-Ring, Polyurethane Wiper ... 2

OPTIONAL —Viton Packing, Viton O-Ring, Teflon Wiper 3

PISTON PACKING AND TUBE SEALS

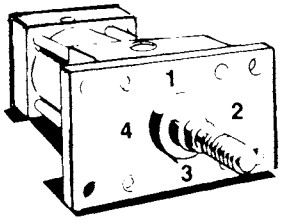
STANDARD —Buna Packings with Teflon Back-Ups, Buna Tube Seals ... A

OPTIONAL —Viton Packings with Teflon Back-Ups, Viton Tube Seals ... B

OPTIONAL —Wear Strips, Filled Teflon Seal with Buna Expander, Buna Tube Seals ..... G

OPTIONAL —Wear Strips, Filled Teflon Seal with Viton Expander, Viton Tube Seals ..... H

NOTE: Cushion needles furnished with viton seals.



When ordering a stop tube, specify actual (working) stroke and nominal stroke. State length of stop tube.

†Must be ordered with G or H piston code.

Port location: if other than position 1, must be specified. Mounting accessories must be specified if required.

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