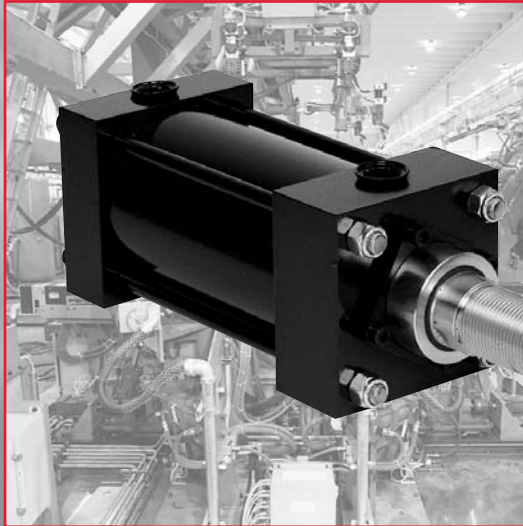


WGB Benjey Cylinders INC.

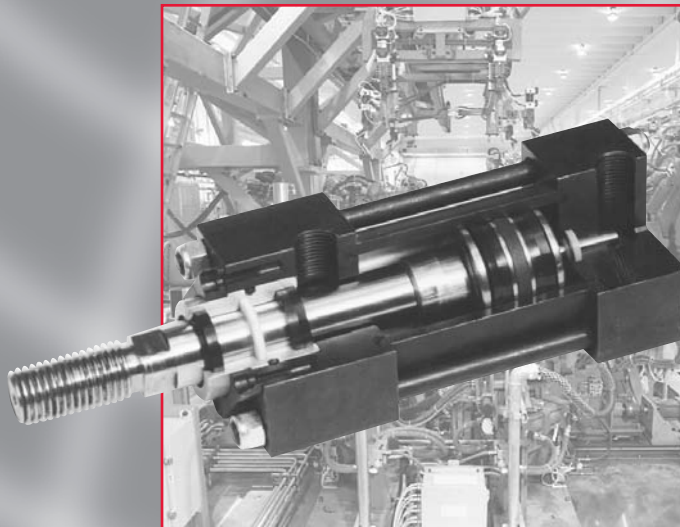
Formerly DE-STA-CO Cylinders

2293 Werth Road • Alpena, Michigan 49707

Phone: (800) 942-2957 (WGB-CYLS) • Fax: (866) 942-3297 (WGB-FAXS)



**A - Series
Standard Pneumatic Cylinders**



**L - Series
Medium Pressure Hydraulic Cylinders**

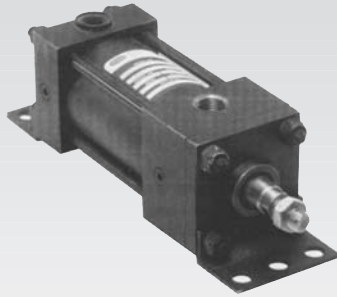
A-L Series Cylinders

Your World Wide Provider for Productivity Solutions

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A-L SERIES



Standard Seals -10°F Through +180°F
 Viton -15°F Through +300°F

General Specifications

A SERIES

NFPA: Heavy Duty Air Service

Ind. Standard: Meets J.I.C. and ANSI B93.15

Pressure Rating: 250 PSI

Temp. Range: Std. Seals -10°F Through +180°F

Oper. Media: Air or inert gas.

Bore Sizes: (1.5" Through 14.0")

Rod Sizes: (5/8" Through 5-1/2")

L SERIES

NFPA: Medium Duty Hydraulic Service

Ind. Standard: Meets J.I.C. and ANSI B93.15

Pressure Rating: 1000 PSI nominal dependent on bore size (see page 35).

Temp. Range: - 10°F Through +300°F

Oper. Media: All hydraulic fluids. Consult factory for seal compatibility.

Bore Sizes: (1.5" Through 8")

Rod Sizes: (5/8" Through 5-1/2")

NEW!

- Improved rod cartridge design incorporates infused matrix coating.
- Improved seal design for longer life.
- Improved wear band design eliminates swelling.

A Air Cylinder / L Hydraulic Cylinder
Ordering Information



Formerly DE-STA-CO Cylinders

SERIES	
A	Air
L	Medium Duty Hydraulic

Order Example: A A 36 * C13 2 2 A B 032

EXAMPLE

CYLINDER STYLE AND PORT TYPE	
A	Single Rod NPTF
B	Single Rod SAE
C	Single Rod Metric
D	Double Rod NPTF
E	Double Rod SAE
F	Double Rod Metric

MOUNTING CODE					
MOUNTING STYLE	NFPA CODE	NON-CUSH	CUSH HEAD	CUSH CAP	CUSH BOTH
NO MOUNT	MX0	01	02	03	04
TIE RODS ext. both ends	MX1	05	06	07	08
TIE RODS ext. cap end	MX2	09	10	11	12
TIE RODS ext. head end	MX3	13	14	15	16
HEAD SQUARE (8-14) bore	ME3	17	18	19	20
CAP SQUARE (8-14) bore	ME4	21	22	23	24
HEAD RECT. flange	MF1	33	34	35	36
CAP RECT. flange	MF2	37	38	39	40
HEAD SQUARE flange	MF5	41	42	43	44
CAP SQUARE flange	MF6	45	46	47	48
CAP FIXED clevis	MP1	49	50	51	52
CAP DETACHABLE clevis	MP2	53	54	55	56
END ANGLE	MS1	61	62	63	64
SIDE LUG (FOOT)	MS2	65	66	67	68
SIDE TAPPED	MS4	73	74	75	76
END LUG	MS7	77	78	79	80
HEAD TRUNNION Note ²	MT1	81	82	83	84
CAP TRUNNION Note ²	MT2	85	86	87	88
STANDARD intermediate trunnion	MT4	93	94	95	96

HOW TO ORDER

- Select series.
- Select style.
- Select mounting.
- Select bore and rod code.
- Select rod end.
- Select seal code.
- Select port location.
- Select cushion.
- Select stroke.

Example:
A A 36 C13 2 2 A B 032

BORE AND ROD CODE								
BORE SIZE	ROD SIZE	CODE	BORE SIZE	ROD SIZE	CODE	BORE SIZE	ROD SIZE	CODE
1-1/2"	5/8"	B11	6"	1-3/8"	J15	10"	1-3/4"	M17
1-1/2"	1"	B13	6"	1-3/4"	J17	10"	2"	M18
2"	5/8"	C11	6"	2"	J18	10"	2-1/2"	M20
2"	1"	C13	6"	2-1/2"	J20	10"	3"	M21
2"	1-3/8"	C15	6"	3"	J21	10"	3-1/2"	M22
2-1/2"	5/8"	D11	6"	3-1/2"	J22	10"	4"	M23
2-1/2"	1"	D13	6"	4"	J23	10"	4-1/2"	M24
2-1/2"	1-3/8"	D15	7"	1-3/8"	K15	10"	5"	M25
2-1/2"	1-3/4"	D17	7"	1-3/4"	K17	10"	5-1/2"	M26
3-1/4"	1"	E13	7"	2"	K18	12"	2"	U18
3-1/4"	1-3/8"	E15	7"	2-1/2"	K20	12"	2-1/2"	U20
3-1/4"	1-3/4"	E17	7"	3"	K21	12"	3"	U21
3-1/4"	2"	E18	7"	3-1/2"	K22	12"	3-1/2"	U22
4"	1"	F13	7"	4"	K23	12"	4"	U23
4"	1-3/8"	F15	8"	1-3/8"	L15	12"	4-1/2"	U24
4"	1-3/4"	F17	8"	1-3/4"	L17	12"	5"	U25
4"	2"	F18	8"	2"	L18	12"	5-1/2"	U26
4"	2-1/2"	F20	8"	2-1/2"	L20	14"	2-1/2"	W20
5"	1"	H13	8"	3"	L21	14"	3"	W21
5"	1-3/8"	H15	8"	3-1/2"	L22	14"	3-1/2"	W22
5"	1-3/4"	H17	8"	4"	L23	14"	4"	W23
5"	2"	H18	8"	4-1/2"	L24	14"	4-1/2"	W24
5"	2-1/2"	H20	8"	5"	L25	14"	5"	W25
5"	3"	H21	8"	5-1/2"	L26	14"	5-1/2"	W26

ROD END	
1	Full Male
2	Small Male
3	Short Female
4	Int. Male
5	Auto Male
S	Special-See Note ¹

SEAL CODE	
1	Standard Rings
2	Standard Cup Seals
3	Viton/Piston Rings
4	Viton/Lip Seals
5	Glyd Ring
6	Carboxilated Nitrile

PORT LOCATION	
A	Pos. #1
B	Pos. #2
C	Pos. #3
D	Pos. #4
E	Pos. #1&2
F	Pos. #1&3
G	Pos. #1&4
H	Pos. #2&3
J	Pos. #2&4
K	Pos. #3&4
S	Special-See Note ¹

CUSHION LOCATION	
A	Pos. #1
B	Pos. #2
C	Pos. #3
D	Pos. #4
N	None

STROKE CODE	
1/8"	001
1"	008
2"	016
3"	024
4"	032
5"	040
10"	080
20"	160
Multiply strokes in inches x 8.	

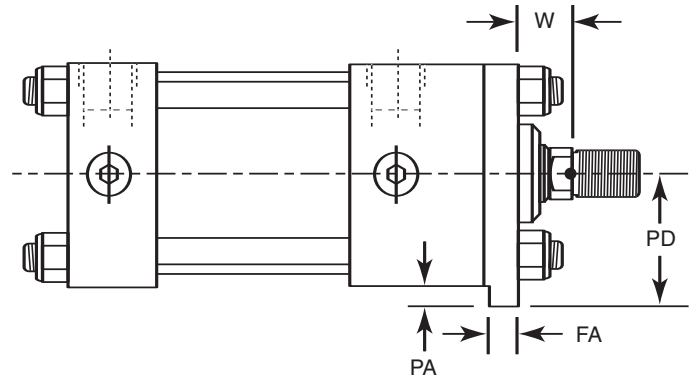
*Insert "K" when ordering Key Retainer Plate.

Note¹: If "S" appears in the model code, you must use a sequence number assigned by the order department. EXAMPLE: AA36C1S000001

Note²: Port and cushions not available at 2 and 4 locations.

1-1/2" through 6" bore, the gland retainer plate can be extended below the mounting side of the cylinder and then fitted into a keyway slot milled into the mating member. Specify "K" after mounting code.

Bore Size	PD for Mounting Styles MS2K, MS4K, MS7K	FA +.000 -.002	PA
1-1/2	1-3/16	0.312	3/16
2	1-7/16		
2-1/2	1-11/16		
3-1/4	2-3/16	0.562	5/16
4	2-9/16		
5	3-1/16		
6	3-5/8	0.687	3/8



MEDIUM DUTY HYDRAULIC L SERIES

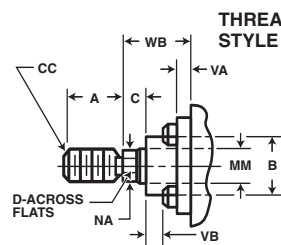
Hydraulic Operating Pressure by Cylinder Bore Size

Bore Size	Maximum P.S.I.
1-1/2	1000
2	1000
2-1/2	1000
3-1/4	750
4	750
5	600
6	600
8	600
10	250
12	250
14	200

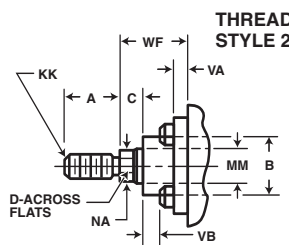
NOMINAL PRESSURE RATING

ROD ENDS

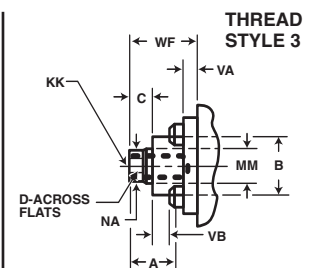
Rod Diameter	CC Thread
5/8	5/8 - 18
1	1 - 14
1-3/8	1-3/8 - 12
1-3/4	1-3/4 - 12
2	2 - 12
2-1/2	2-1/2 - 12
3	3 - 12
3-1/2	3-1/2 - 12
4	4 - 12
4-1/2	4-1/2 - 12
5	5 - 12
5-1/2	5-1/2 - 12



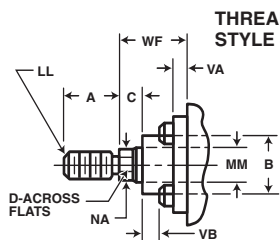
FULL MALE



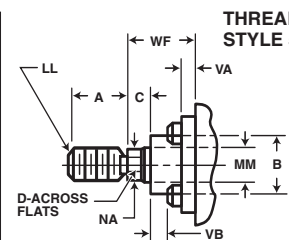
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE

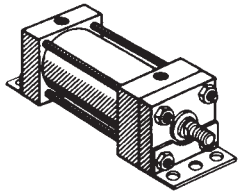


AUTOMOTIVE MALE

End Angle Mount

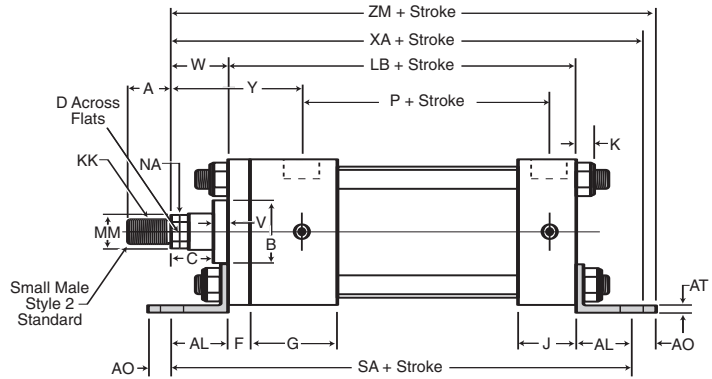
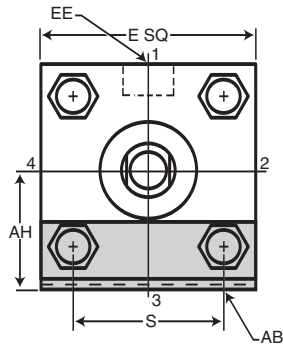
A-L

Side End Angles



Model MS1
1 1/2" – 3 1/4" Bore

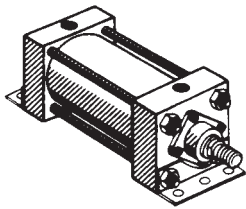
Tie Rod Retained Cartridge



Caution:
Check for interference between rod attachment and mounting angle if necessary. Specify longer than standard 'C' dimension.

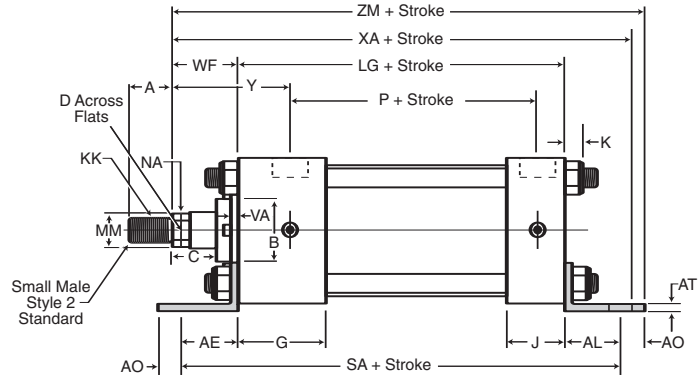
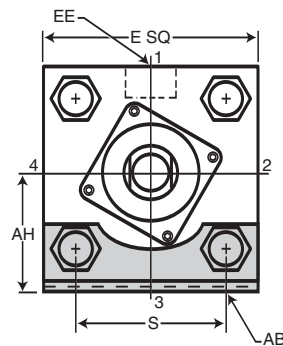
Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

Side End Angles



Model MS1
4" – 14" Bore

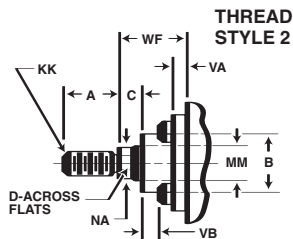
Removable Cartridge



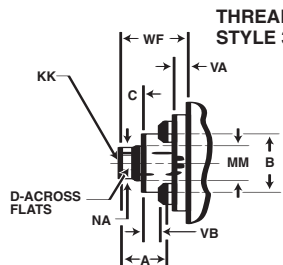
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	AB Bolt	AE	AH	AL	AO	AT	E	EE NPTF	F	G	J	K	LB	LG	P	S	SA
1.500	0.375	N/A	1.188	1.000	0.375	0.125	2.000	0.375	0.375	1.500	1.000	0.328	4.000	3.625	2.313	1.250	6.000
2.000	0.375	N/A	1.438	1.000	0.375	0.125	2.500	0.375	0.375	1.500	1.000	0.359	4.000	3.625	2.313	1.750	6.000
2.500	0.375	N/A	1.625	1.000	0.375	0.125	3.000	0.375	0.375	1.500	1.000	0.359	4.125	3.750	2.438	2.250	6.125
3.250	0.500	N/A	1.938	1.250	0.500	0.125	3.750	0.500	0.625	1.750	1.250	0.469	4.875	4.250	2.688	2.750	7.375
4.000	0.500	1.875	2.250	1.250	0.500	0.125	4.500	0.500	0.625	1.750	1.250	0.469	4.875	4.250	2.688	3.500	7.375
5.000	0.625	2.000	2.750	1.375	0.625	0.188	5.500	0.500	0.625	1.750	1.250	0.609	5.125	4.500	2.938	4.250	7.875
6.000	0.750	2.125	3.250	1.375	0.625	0.188	6.500	0.750	0.750	2.000	1.500	0.609	5.750	5.000	3.188	5.250	8.500
8.000	0.750	1.813	4.250	1.813	0.688	0.250	8.500	0.750	N/A	2.000	1.500	0.766	N/A	5.125	3.313	7.125	8.750
10.000	1.000	2.125	5.313	2.125	0.875	0.250	10.625	1.000	N/A	2.250	2.000	0.891	N/A	6.375	4.188	8.875	10.625
12.000	1.000	2.125	6.375	2.125	0.875	0.375	12.750	1.000	N/A	2.250	2.000	0.891	N/A	6.875	4.688	11.000	11.125
14.000	1.250	2.438	7.375	2.438	1.063	0.375	14.750	1.250	N/A	2.750	2.250	1.000	N/A	8.125	5.625	12.625	13.000

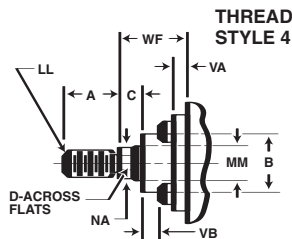
ROD ENDS



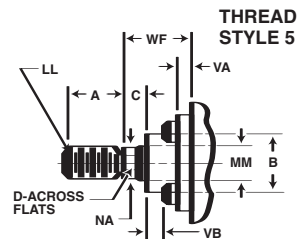
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



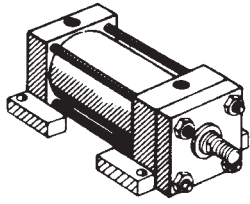
AUTOMOTIVE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-0.002}	C	D	NA	V	VA	VB	W	WF	XA	Y	ZM
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	N/A	N/A	0.625	N/A	5.625	1.875	6.000
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	6.000	2.250	6.375
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	N/A	N/A	0.625	N/A	5.625	1.875	6.000
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	6.000	2.250	6.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.250	2.500	6.625
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	N/A	N/A	0.625	N/A	5.750	1.875	6.125
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	6.125	2.250	6.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.375	2.500	6.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	6.625	2.750	7.000
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.250	N/A	N/A	0.750	N/A	6.875	2.375	7.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.375	N/A	N/A	1.000	N/A	7.125	2.625	7.625
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.500	N/A	N/A	1.250	N/A	7.375	2.875	7.875
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.500	N/A	N/A	1.375	N/A	7.500	3.000	8.000
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	6.875	2.375	7.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.125	2.625	7.625
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.500	N/A	N/A	1.250	N/A	7.375	2.875	7.875
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.500	N/A	N/A	1.375	N/A	7.500	3.000	8.000
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	0.625	N/A	N/A	1.625	N/A	7.750	3.250	8.250
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	7.250	2.375	7.875
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.500	2.625	8.125
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	7.750	2.875	8.375
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.875	3.000	8.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	0.625	N/A	N/A	1.625	N/A	8.125	3.250	8.750
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	0.625	N/A	N/A	1.625	N/A	8.125	3.250	8.750
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	8.125	3.250	8.750	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	8.000	2.750	8.625
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.250	3.000	8.875
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.375	3.125	9.000
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.625	3.375	9.250
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	0.500	N/A	N/A	N/A	2.250	8.625	3.375	9.250
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.500	N/A	N/A	1.500	N/A	8.625	3.375	9.250
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	0.500	N/A	N/A	1.500	N/A	8.625	3.375	9.250
4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.750	4.421	0.500	N/A	N/A	1.500	N/A	8.625	3.375	9.250	
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	8.563	2.750	9.250
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.813	3.000	9.500
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.938	3.125	9.625
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	9.188	3.375	9.875
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	9.188	3.375	9.875
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	9.188	3.375	9.875
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	9.188	3.375	9.875
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.750	4.421	N/A	0.375	0.500	N/A	2.250	9.188	3.375	9.875
10	1.750	1 1/8 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	10.375	3.063	11.250
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	10.500	3.188	11.375
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	10.750	3.438	11.625
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.250	0.500	N/A	2.250	10.750	3.438	11.625
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	10.750	3.438	11.625
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	10.750	3.438	11.625
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.750	4.421	N/A	0.375	0.500	N/A	2.250	10.750	3.438	11.625
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	10.750	3.438	11.625
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	10.750	3.438	11.625	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	11.000	3.188	11.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	11.250	3.438	12.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.750	4.421	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	11.250	3.438	12.125	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	12.813	3.688	13.875
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.250	0.500	N/A	2.250	12.813	3.688	13.875
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	12.813	3.688	13.875
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	12.813	3.688	13.875
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.750	4.421	N/A	0.375	0.500	N/A	2.			

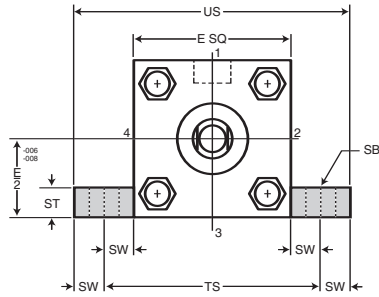
Side Lug Mount

A-L

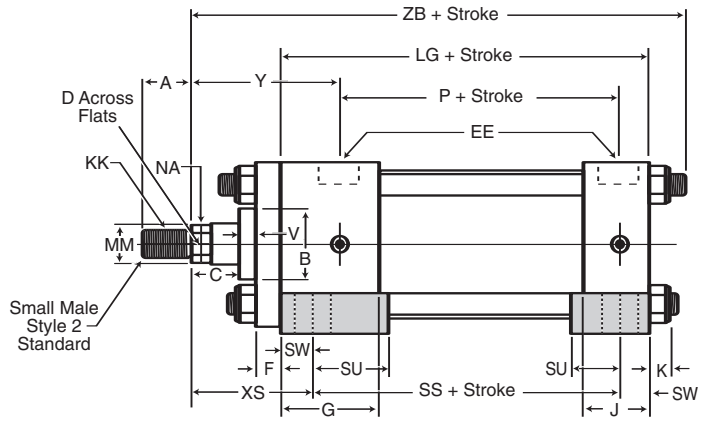
Side Lugs



Tie Rod Retained Cartridge

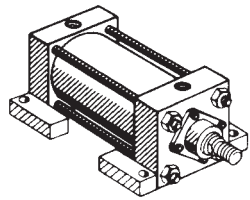


Model MS2
1 1/2" - 2" - 2 1/2"
and 5" bore With
Maximum Oversize
Rods

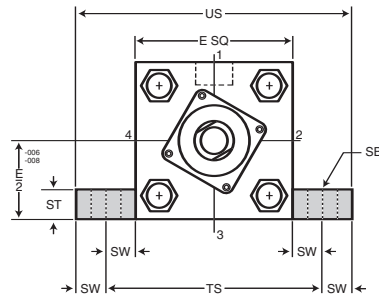


Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

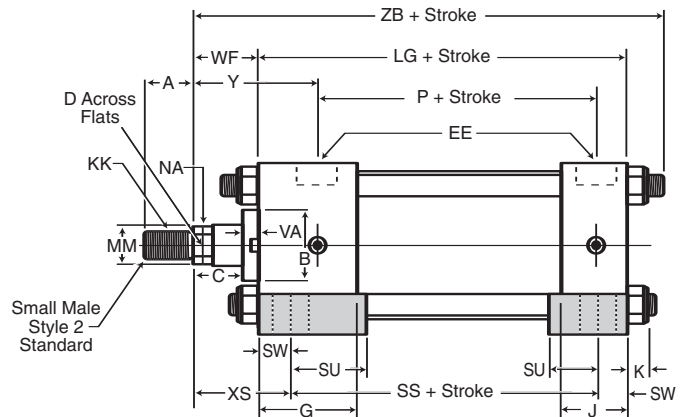
Side Lugs



Removable Cartridge



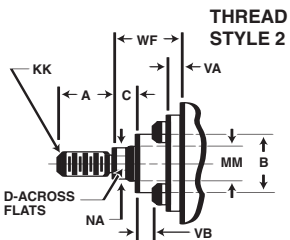
Model MS2
1 1/2" - 14" Bore



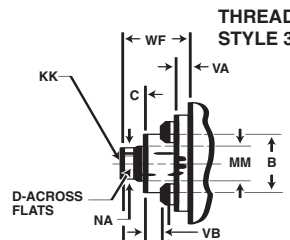
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EE (NPTF)	F	G	J	K	LG	P	SB (BOLT)	SS	ST	SU	SW	TS	US
1.500	2.000	0.375	0.375	1.500	1.000	0.328	3.625	2.313	0.375	2.875	0.500	0.938	0.375	2.750	3.500
2.000	2.500	0.375	0.375	1.500	1.000	0.359	3.625	2.313	0.375	2.875	0.500	0.938	0.375	3.250	4.000
2.500	3.000	0.375	0.375	1.500	1.000	3.359	3.750	2.438	0.375	3.000	0.500	0.938	0.375	3.750	4.500
3.250	3.750	0.500	N/A	1.750	1.250	0.469	4.250	2.688	0.500	3.250	0.750	1.250	0.500	4.750	5.750
4.000	4.500	0.500	N/A	1.750	1.250	0.469	4.250	2.688	0.500	3.250	0.750	1.250	0.500	5.500	6.500
5.000	5.500	0.500	0.625	1.750	1.250	0.609	4.500	2.938	0.750	3.125	1.000	1.563	0.688	6.875	8.250
6.000	6.500	0.750	N/A	2.000	1.500	0.609	5.000	3.188	0.750	3.625	1.000	1.563	0.688	7.875	9.250
8.000	8.500	0.750	N/A	2.000	1.500	0.766	5.125	3.313	0.750	3.750	1.000	1.563	0.688	9.875	11.250
10.000	10.625	1.000	N/A	2.250	2.000	0.891	6.375	4.188	1.000	4.625	1.250	2.000	0.875	12.375	14.125
12.000	12.750	1.000	N/A	2.250	2.000	0.891	6.875	4.688	1.000	5.125	1.250	2.000	0.875	14.500	16.250
14.000	14.750	1.250	N/A	2.750	1.250	1.000	8.125	5.625	1.250	5.875	1.500	2.500	1.125	17.000	19.250

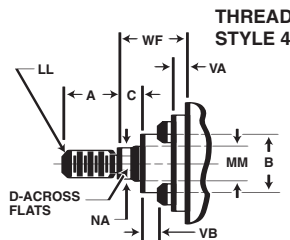
ROD ENDS



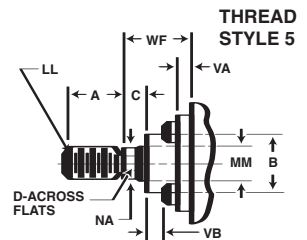
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



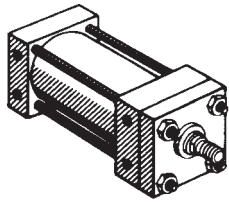
AUTOMOTIVE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-0.002}	C	D	NA	V	VA	VB	W	WF	XS	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.375	1.875	4.950
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	1.750	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.375	1.875	4.980
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	1.750	2.250	5.350
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.000	2.500	5.610
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.375	1.875	5.120
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	1.750	2.250	5.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	0.250	N/A	1.250	1.625	2.000	2.500	5.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.250	2.750	5.980
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	1.875	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.125	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.375	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.500	3.000	6.720
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	1.875	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.125	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.375	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.500	3.000	6.720
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	2.750	3.250	6.970
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.063	2.375	6.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.313	2.625	6.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.563	2.875	6.980
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.688	3.000	7.120
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.375	0.688	N/A	2.250	2.938	3.250	7.360
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	2.938	3.250	7.360
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	2.938	3.250	7.360	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.313	2.750	7.230
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.563	3.000	7.480
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.688	3.125	7.610
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	2.938	3.375	7.860
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	2.938	3.375	7.860
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	2.938	3.375	7.860
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	2.938	3.375	7.860
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.313	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.563	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.688	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	2.938	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	2.938	3.375	8.140	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.750	3.063	9.140
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.875	3.188	9.260
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.125	3.438	9.520
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.125	3.438	9.520	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.875	3.188	9.760
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.125	3.438	10.020
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.125	3.438	10.020	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	3.688	11.380
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	3.688	11.380
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	3.688	11.380
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.								

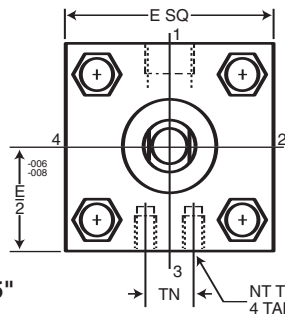
Side Tapped Mount

A-L

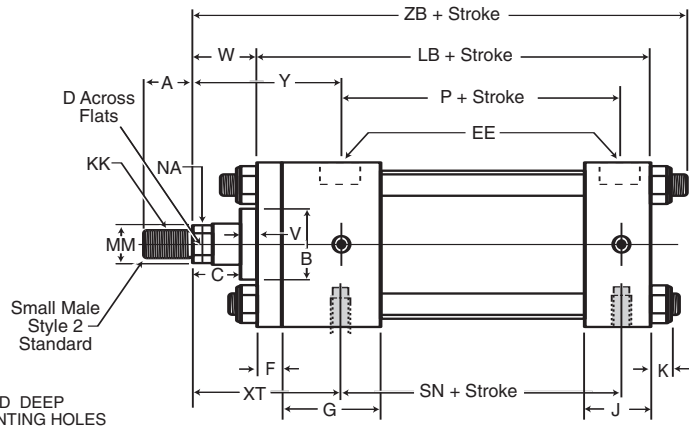
Side Tapped



Tie Rod Retained Cartridge

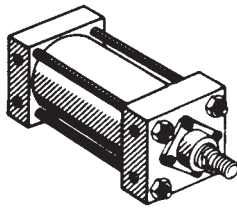


Model MS4
1 1/2" - 2" - 2 1/2" and 5"
Bore With Maximum
Oversize Rods

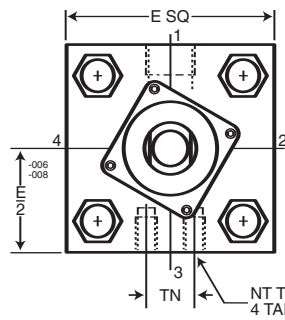


Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

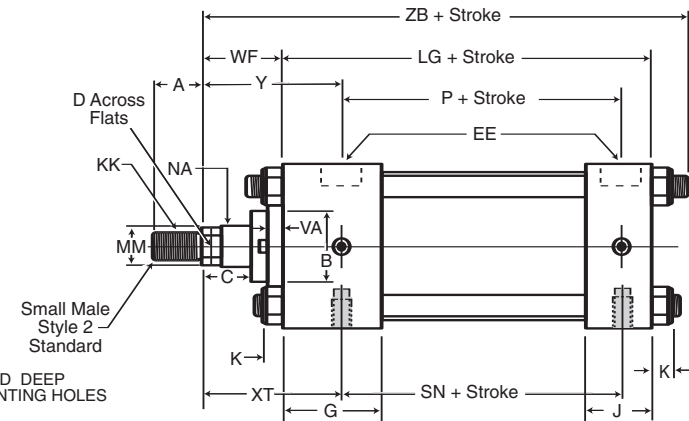
Side Tapped



Removable Cartridge



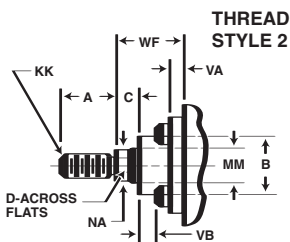
Model MS4
1 1/2" - 14" Bore



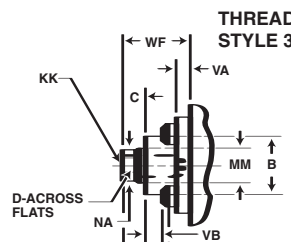
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EE (NPTF)	F	G	J	K	LB	LG	NT	P	SN	TN
1.500	2.000	0.375	0.375	1.500	1.000	0.328	4.000	3.625	1/4 - 20	2.313	2.250	0.625
2.000	2.500	0.375	0.375	1.500	1.000	0.359	4.000	3.625	5/16 - 18	2.313	2.250	0.875
2.500	3.000	0.375	0.375	1.500	1.000	0.359	4.125	3.750	3/8 - 16	2.438	2.375	1.250
3.250	3.750	0.500	N/A	1.750	1.250	0.469	N/A	4.250	1/2 - 13	2.688	2.625	1.500
4.000	4.500	0.500	N/A	1.750	1.250	0.469	N/A	4.250	1/2 - 13	2.688	2.625	2.063
5.000	5.500	0.500	0.625	1.750	1.250	0.609	5.125	4.500	5/8 - 11	2.938	2.875	2.688
6.000	6.500	0.750	N/A	2.000	1.500	0.609	N/A	5.000	3/4 - 10	3.188	3.125	3.250
8.000	8.500	0.750	N/A	2.000	1.500	0.766	N/A	5.125	3/4 - 10	3.313	3.250	4.500
10.000	10.625	1.000	N/A	2.250	2.000	0.891	N/A	6.375	1 - 8	4.188	4.125	5.500
12.000	12.750	1.000	N/A	2.250	2.000	0.891	N/A	6.875	1 - 8	4.688	4.625	7.250
14.000	14.750	1.250	N/A	2.750	2.250	1.000	N/A	8.125	1-1/4 - 7	5.625	5.500	8.375

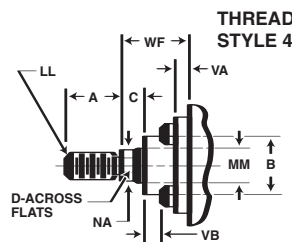
ROD ENDS



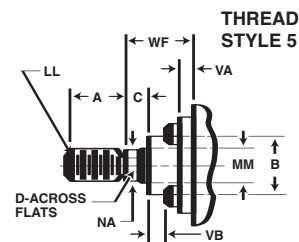
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



AUTOMOTIVE MALE

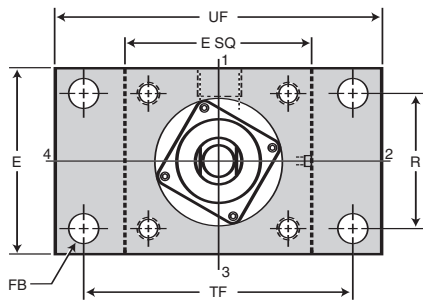
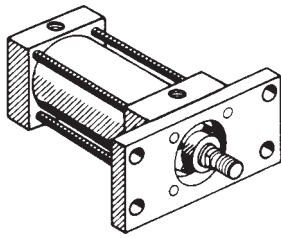
Bore Size	Rod Dia.	Thread			Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
		MM	KK	LL	A	AC	B ^{+.000} _{-.002}	C	D	NA	V	VA	VB	W	WF	XT	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.938	1.875	4.950	0.375
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	N/A	1.000	N/A	2.313	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.938	1.875	4.980	0.375
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.313	2.250	5.350	0.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.563	2.500	5.610	0.313
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.938	1.875	5.120	0.500
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.313	2.250	5.480	0.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	1.625	2.563	2.500	5.730	0.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.813	2.750	5.980	0.375
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.438	2.375	6.090	0.750
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.688	2.625	6.340	0.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.938	2.875	6.590	0.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.063	3.000	6.720	0.500
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.438	2.375	6.090	0.750
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.688	2.625	6.340	0.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.938	2.875	6.590	0.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.063	3.000	6.720	0.750
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.313	3.250	6.970	0.625
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.438	2.375	6.480	0.938
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.688	2.625	6.730	0.938
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.938	2.875	6.980	0.938
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.063	3.000	7.120	0.938
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.313	3.250	7.360	0.938
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	3.313	3.250	7.360	0.938
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.313	3.250	7.360	0.750	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.813	2.750	7.230	1.125
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	3.000	7.480	1.125
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	3.125	7.610	1.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	3.375	7.860	1.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	3.375	7.860	1.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	3.375	7.860	1.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	3.375	7.860	0.875
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.813	2.750	7.520	1.125
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	3.000	7.760	1.125
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	3.125	7.890	1.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	3.375	8.140	1.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	3.375	8.140	1.125	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.125	3.063	9.140	1.500
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.250	3.188	9.260	1.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.500	3.438	9.520	1.500
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.500	3.438	9.520	1.500	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.500	3.188	9.760	1.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.500	3.438	10.020	1.500
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.500	3.438	10.020	1.500	
14	2.500</																	

Head Rectangular Flange Mount Head Square Mount

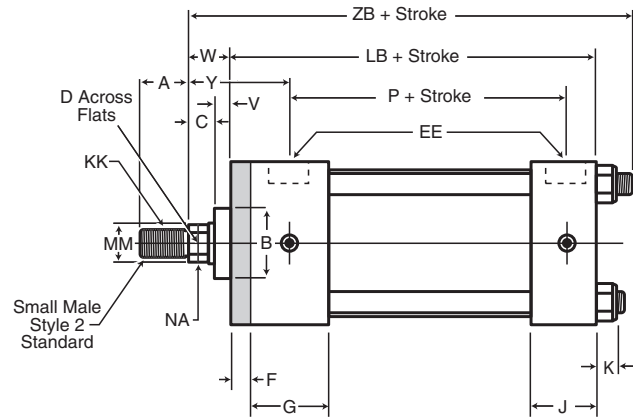
A-L

Head Rectangular Flange

Removable Cartridge



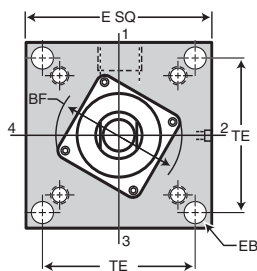
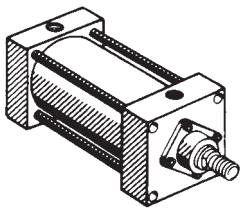
Model MF1
1 1/2" - 6" Bore



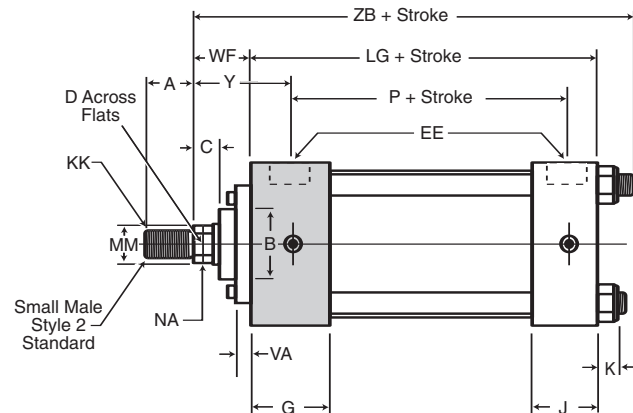
Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

Head Square

Removable Cartridge



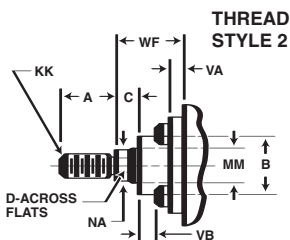
Model ME3
8" - 14" Bore



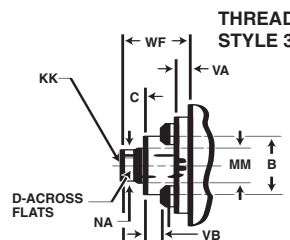
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EB (BOLT)	EE (NPTF)	F	FB (BOLT)	G	J	K	LB	LG	P	R	TE	TF	UF
1.500	2.000	N/A	0.375	0.375	0.250	1.500	1.000	0.328	4.000	N/A	2.313	1.430	N/A	2.750	3.375
2.000	2.500	N/A	0.375	0.375	0.313	1.500	1.000	0.359	4.000	N/A	2.313	1.840	N/A	3.375	4.125
2.500	3.000	N/A	0.375	0.375	0.313	1.500	1.000	0.359	4.125	N/A	2.438	2.190	N/A	3.875	4.625
3.250	3.750	N/A	0.500	0.625	0.375	1.750	1.250	0.469	4.875	N/A	2.688	2.760	N/A	4.688	5.500
4.000	4.500	N/A	0.500	0.625	0.375	1.750	1.250	0.469	4.875	N/A	2.688	3.320	N/A	5.438	6.250
5.000	5.500	N/A	0.500	0.625	0.500	1.750	1.250	0.609	5.125	N/A	2.938	4.100	N/A	6.625	7.625
6.000	6.500	N/A	0.750	0.750	0.500	2.000	1.500	0.609	5.750	N/A	3.188	4.880	N/A	7.625	8.625
8.000	8.500	0.625	0.750	N/A	N/A	2.000	1.500	0.766	N/A	5.125	3.313	N/A	7.570	N/A	N/A
10.000	10.625	0.750	1.000	N/A	N/A	2.250	2.000	0.891	N/A	6.375	4.188	N/A	9.400	N/A	N/A
12.000	12.750	0.750	1.000	N/A	N/A	2.250	2.000	0.891	N/A	6.875	4.688	N/A	11.100	N/A	N/A
14.000	14.750	0.875	1.250	N/A	N/A	2.750	2.250	1.000	N/A	8.125	5.625	N/A	12.870	N/A	N/A

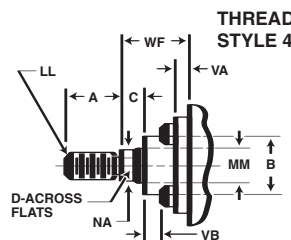
ROD ENDS



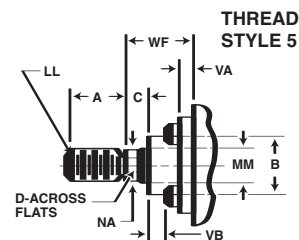
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



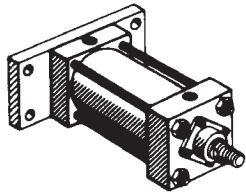
AUTOMOTIVE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-0.002}	BF	C	D	NA	V	VA	VB	W	WF	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	N/A	0.375	0.500	0.593	0.250	N/A	N/A	0.625	N/A	1.875	4.950
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	N/A	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	N/A	0.375	0.500	0.593	0.250	N/A	0.188	0.625	N/A	1.438	4.980
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	N/A	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	5.350
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	N/A	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.610
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	2.468	0.375	0.500	0.593	0.250	N/A	0.188	0.625	N/A	1.875	5.120
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.468	0.500	0.875	0.968	0.500	N/A	0.375	1.000	N/A	2.250	5.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	N/A	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	N/A	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.750	5.980
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	0.250	N/A	N/A	0.750	N/A	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	0.375	N/A	N/A	1.000	N/A	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	N/A	0.750	1.500	1.703	0.500	N/A	N/A	1.250	N/A	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	N/A	0.875	1.688	1.953	0.500	N/A	N/A	1.375	N/A	3.000	6.720
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	0.250	N/A	N/A	0.750	N/A	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	0.375	N/A	N/A	1.000	N/A	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	0.500	N/A	N/A	1.250	N/A	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	0.500	N/A	N/A	1.375	N/A	3.000	6.720
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	0.625	N/A	N/A	1.625	N/A	3.250	6.970
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	0.250	N/A	N/A	0.750	N/A	2.375	6.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	0.375	N/A	N/A	1.000	N/A	2.625	6.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	0.500	N/A	N/A	1.250	N/A	2.875	6.980
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	0.500	N/A	N/A	1.375	N/A	3.000	7.120
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	N/A	1.000	2.063	2.453	0.625	N/A	N/A	1.625	N/A	3.250	7.360
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	N/A	1.000	2.625	2.937	0.625	N/A	N/A	1.625	N/A	3.250	7.360
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	N/A	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.250	7.360	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	0.250	N/A	N/A	0.875	N/A	2.750	7.230
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	0.375	N/A	N/A	1.125	N/A	3.000	7.480
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.312	0.875	1.688	1.953	0.375	N/A	N/A	1.250	N/A	3.125	7.610
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	0.500	N/A	N/A	1.500	N/A	3.375	7.860
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	N/A	1.000	2.625	2.937	0.500	N/A	N/A	1.500	N/A	3.375	7.860
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	N/A	1.000	3.000	3.437	0.500	N/A	N/A	1.500	N/A	3.375	7.860
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	N/A	1.000	3.375	3.937	0.500	N/A	N/A	1.500	N/A	3.375	7.860
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	8.140
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	8.140
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.375	8.140	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	9.140
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	7.735	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	9.260
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	9.520
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	9.520
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.002	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	9.520
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	9.520
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	7.250	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	9.520
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.250	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	9.520
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	9.520	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	9.760
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	10.020
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	10.020
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	10.020
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	10.020
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	10.020
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	10.020
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	10.020	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.688	11.380
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.688	11.380
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.062	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.688	11.380
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.688	11.380
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A												

Cap Rectangular Flange Mount Cap Square Mount

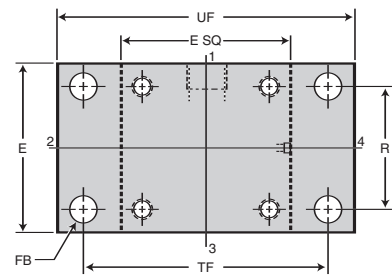
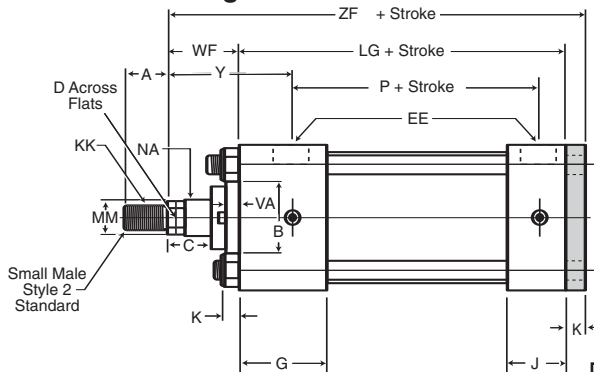
A-L

Cap Rectangular Flange



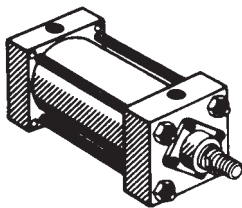
Model MF2
1 1/2" - 6" Bore

Removable Cartridge



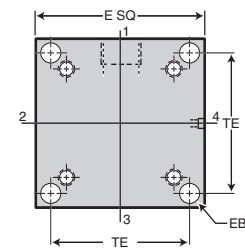
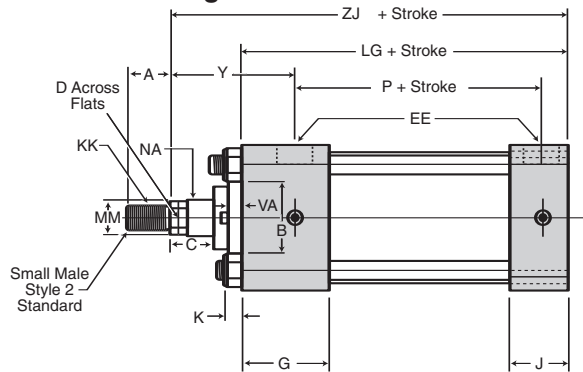
Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

Cap Square

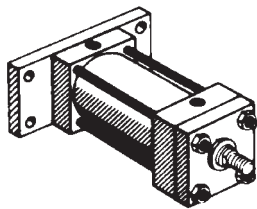


Model ME4
8" - 14" Bore

Removable Cartridge

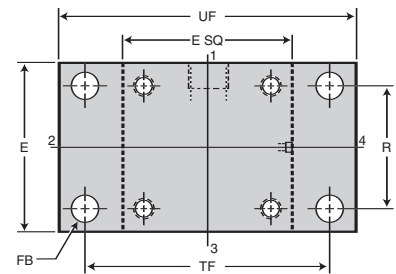
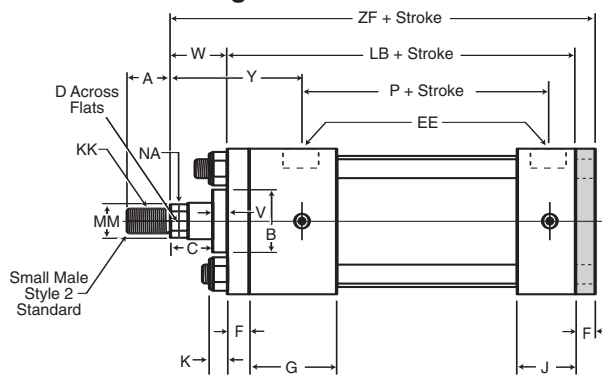


Cap Rectangular Flange



Model MF2
1 1/2" - 2" - 2 1/2" and
5" Bore With Maximum
Oversize Rods

Tie Rod Retained Cartridge



ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EB (BOLT)	EE (NPTF)	F	FB (BOLT)	G	J	K	LB	LG	P	R	TE	TF	UF
1.500	2.000	N/A	0.375	0.375	0.250	1.500	1.000	0.328	4.000	3.625	2.313	1.430	N/A	2.750	3.375
2.000	2.500	N/A	0.375	0.375	0.313	1.500	1.000	0.359	4.000	3.625	2.313	1.840	N/A	3.375	4.125
2.500	3.000	N/A	0.375	0.375	0.313	1.500	1.000	0.359	4.125	3.750	2.438	2.190	N/A	3.875	4.625
3.250	3.750	N/A	0.500	0.625	0.375	1.750	1.250	0.469	N/A	4.250	2.688	2.760	N/A	4.688	5.500
4.000	4.500	N/A	0.500	0.625	0.375	1.750	1.250	0.469	N/A	4.250	2.688	3.320	N/A	5.438	6.250
5.000	5.500	N/A	0.500	0.625	0.500	1.750	1.250	0.609	5.125	4.500	2.938	4.100	N/A	6.625	7.625
6.000	6.500	N/A	0.750	0.750	0.500	2.000	1.500	0.609	N/A	5.000	3.188	4.880	N/A	7.625	8.625
8.000	8.500	0.625	0.750	N/A	N/A	2.000	1.500	0.766	N/A	5.125	3.313	N/A	7.570	N/A	N/A
10.000	10.625	0.750	1.000	N/A	N/A	2.250	2.000	0.891	N/A	6.375	4.188	N/A	9.400	N/A	N/A
12.000	12.750	0.750	1.000	N/A	N/A	2.250	2.000	0.891	N/A	6.875	4.688	N/A	11.100	N/A	N/A
14.000	14.750	0.875	1.250	N/A	N/A	2.750	2.250	1.000	N/A	8.125	5.625	N/A	12.870	N/A	N/A

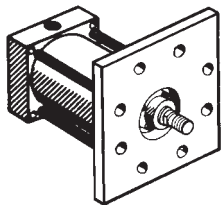
Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-.002}	C	D	NA	V	VA	VB	W	WF	Y	ZF	ZJ
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	n/a	0.250	0.188	N/A	1.000	1.875	5.000	N/A
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	5.375	N/A
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.875	5.000	N/A
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	5.375	N/A
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.625	N/A
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.875	5.125	N/A
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	5.500	N/A
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.750	N/A
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.750	6.000	N/A
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	6.250	N/A
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.500	N/A
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	6.750	N/A
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	6.875	N/A
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	6.250	N/A
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.500	N/A
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	6.750	N/A
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	6.875	N/A
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	7.125	N/A
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	6.500	N/A
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.750	N/A
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	7.000	N/A
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	7.125	N/A
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	7.375	N/A
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	3.250	7.375	N/A
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	0.875	1.625	2.750	7.375	N/A
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	7.625	N/A
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	7.750	N/A
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	8.000	N/A
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	8.000	N/A
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	8.000	N/A
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.750	N/A	6.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	N/A	7.000
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	N/A	7.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	N/A	7.375
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	N/A	7.375
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	N/A	7.375
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	N/A	7.375
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	N/A	7.375
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	N/A	8.250
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	N/A	8.375
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	N/A	8.625
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	N/A	8.625
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	N/A	8.625
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	N/A	8.625
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	N/A	8.625
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	N/A	8.625
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	N/A	8.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	N/A	9.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	N/A	9.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	N/A	9.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	N/A	9.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	N/A	9.125
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.688	N/A	10.375
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.688	N/A	10.375
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.688	N/A	10.375
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.688	N/A	10.375
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.688	N/A	10.375
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.688	N/A	10.375

NOTE: Mounting holes shown are .062 larger than bolt size listed.

Head Square Flange Mount Cap Square Flange Mount

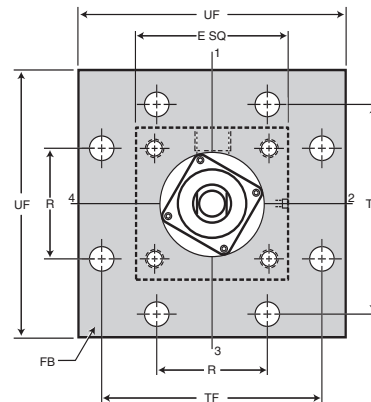
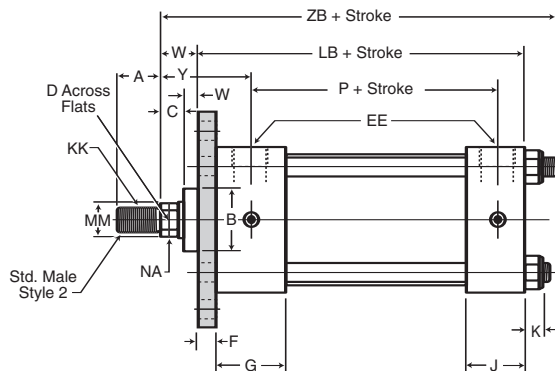
A-L

Head Square Flange



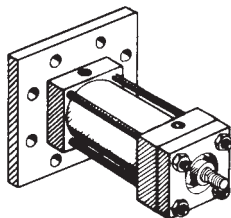
Model MF5
1 1/2" - 6" Bore

Removable Cartridge



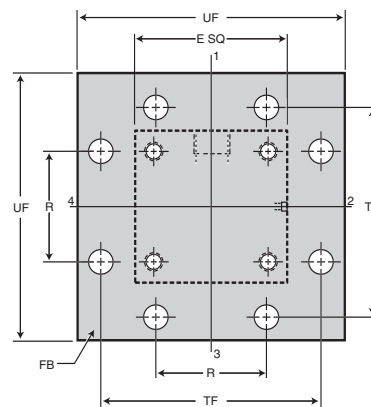
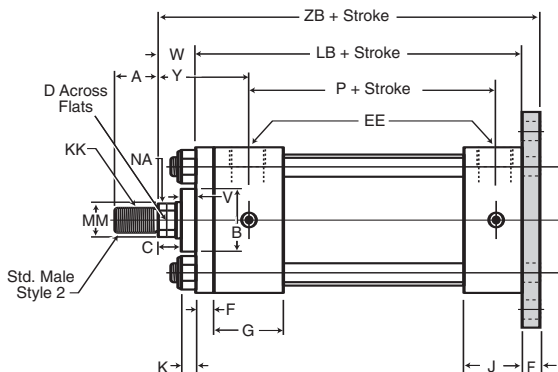
Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

Cap Square Flange

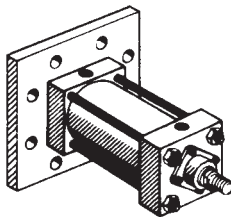


Model MF6
1 1/2" - 2" - 2 1/4"
and 5" Bore With
Maximum Oversize
Rods

Tie Rod Retained Cartridge

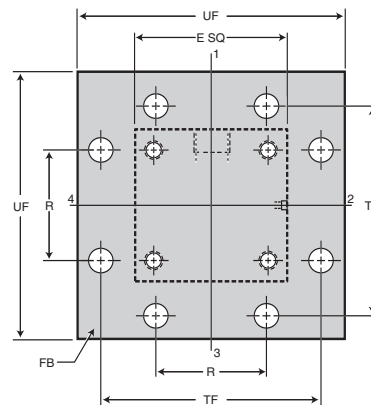
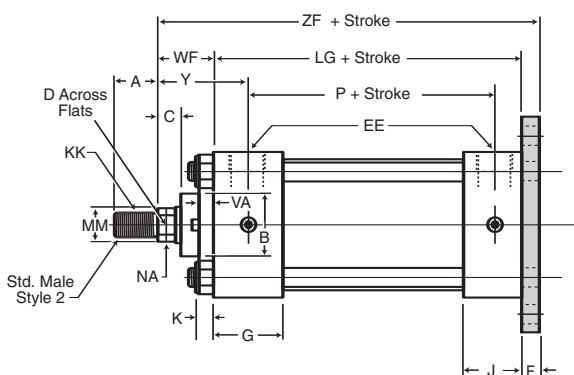


Cap Square Flange



Model MF6
1 1/2" - 6" Bore

Removable Cartridge



ENVELOPE AND MOUNTING DIMENSIONS

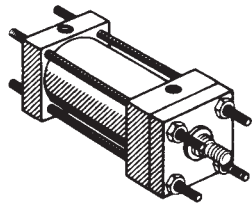
Bore Size	E	EE (NPTF)	F	FB (BOLT)	G	J	K	LB	LG	P	R	TF	UF
1.500	2.000	0.375	0.375	0.250	1.500	1.000	0.328	4.000	3.625	2.313	1.430	2.750	3.375
2.000	2.500	0.375	0.375	0.313	1.500	1.000	0.359	4.000	3.625	2.313	1.840	3.375	4.125
2.500	3.000	0.375	0.375	0.313	1.500	1.000	0.359	4.125	3.750	2.438	2.190	3.875	4.625
3.250	3.750	0.500	0.625	0.375	1.750	1.250	0.469	4.875	4.250	2.688	2.760	4.688	5.500
4.000	4.500	0.500	0.625	0.375	1.750	1.250	0.469	4.875	4.250	2.688	3.320	5.438	6.250
5.000	5.500	0.500	0.625	0.500	1.750	1.250	0.609	5.125	4.500	2.938	4.100	6.625	7.625
6.000	6.500	0.750	0.750	0.500	2.000	1.500	0.609	5.750	5.000	3.188	4.880	7.625	8.625

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-0.002}	C	D	NA	V	VA	VB	W	WF	Y	ZB	ZF
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	0.250	0.188	0.625	1.000	1.875	4.950	5.000
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	5.330	5.375
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	0.250	0.188	0.625	1.000	1.875	4.980	5.000
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.988	0.500	0.250	0.375	1.000	1.375	2.250	5.350	5.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.610	5.625
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	0.250	0.250	0.188	0.625	1.000	1.875	5.120	5.125
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	0.250	0.375	1.000	1.375	2.250	5.480	5.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.730	5.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.750	5.980	6.000
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.250	0.250	0.375	0.750	1.375	2.375	6.090	6.250
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.375	0.250	0.500	1.000	1.625	2.625	6.340	6.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.500	0.250	0.563	1.250	1.875	2.875	6.590	6.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.500	0.250	0.563	1.375	2.000	3.000	6.720	6.875
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.250	0.250	0.375	0.750	1.375	2.375	6.090	6.250
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.375	0.250	0.500	1.000	1.625	2.625	6.340	6.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.500	0.250	0.563	1.250	1.875	2.875	6.590	6.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.500	0.250	0.563	1.375	2.000	3.000	6.720	6.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	0.625	0.250	0.688	1.625	2.250	3.250	6.970	7.125
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.250	0.250	0.375	0.750	1.375	2.375	6.480	6.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.375	0.250	0.500	1.000	1.625	2.625	6.730	6.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.500	0.250	0.563	1.250	1.875	2.875	6.980	7.000
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.500	0.250	0.563	1.375	2.000	3.000	7.120	7.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	0.625	0.250	0.688	1.625	2.250	3.250	7.360	7.375
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	0.625	0.375	0.688	1.625	2.250	3.250	7.360	7.375
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.250	7.360	7.375	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.250	0.250	0.375	0.875	1.625	2.750	7.230	7.375
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	0.375	0.250	0.563	1.125	1.875	3.000	7.480	7.625
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	0.375	0.250	0.563	1.250	2.000	3.125	7.610	7.750
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	0.500	0.250	0.688	1.500	2.250	3.375	7.860	8.000
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	0.500	0.375	0.500	1.500	2.250	3.375	7.860	8.000
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.500	0.375	0.500	1.500	2.250	3.375	7.860	8.000
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	0.500	0.375	0.500	1.500	2.250	3.375	7.860	8.000

Tie Rods Extended Mount

A-L

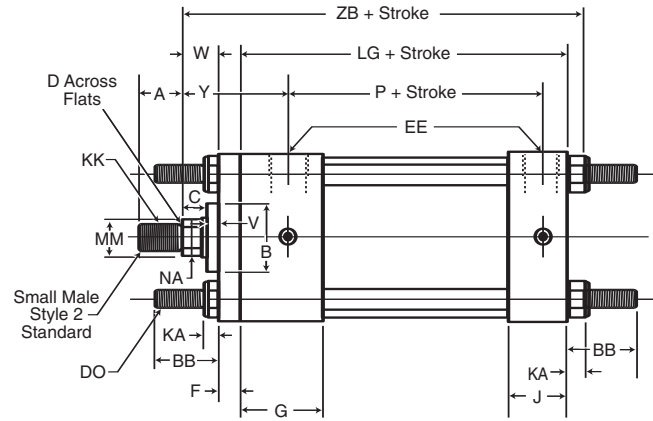
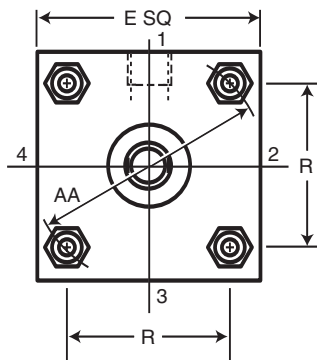
Tie Rods Extended



Model MX1
1 1/2" - 2" - 2 1/2"
and 5" Bore Max. O'
Size Rods

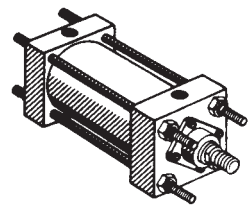
Tie Rods Can Be Extended.
Both Ends - Model MX1
Cap End - Model MX2
Head End - Model MX3

Tie Rod Retained Cartridge



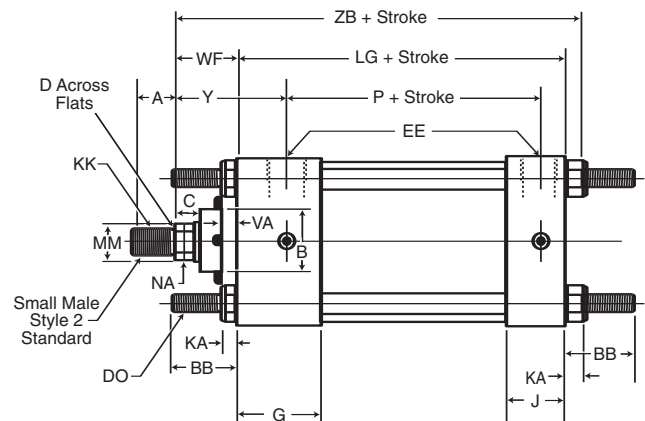
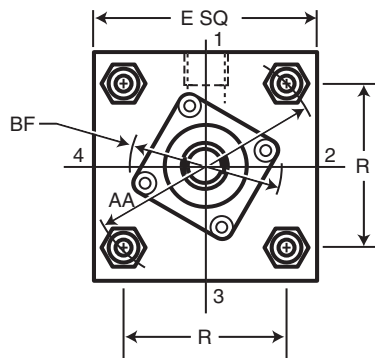
Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

Tie Rods Extended



Model MX1
1 1/2" - 14" Bore

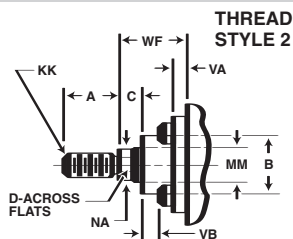
Removable Cartridge



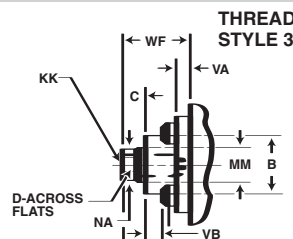
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	AA	BB	DD	E	EE (NPTF)	F	G	J	LG	P	R	KA
1.500	2.020	1.000	1/4 - 28	2.000	0.375	0.375	1.500	1.000	3.625	2.313	1.430	0.218
2.000	2.600	1.125	5/16 - 24	2.500	0.375	0.375	1.500	1.000	3.625	2.313	1.840	0.265
2.500	3.100	1.125	5/16 - 24	3.000	0.375	0.375	1.500	1.000	3.750	2.438	2.190	0.265
3.250	3.900	1.375	3/8 - 24	3.750	0.500	N/A	1.750	1.250	4.250	2.688	2.760	0.328
4.000	4.700	1.375	3/8 - 24	4.500	0.500	N/A	1.750	1.250	4.250	2.688	3.320	0.328
5.000	5.800	1.813	1/2 - 20	5.500	0.500	0.625	1.750	1.250	4.500	2.938	4.100	0.438
6.000	6.900	1.813	1/2 - 20	6.500	0.750	N/A	2.000	1.500	5.000	3.188	4.880	0.438
8.000	9.100	2.313	5/8 - 18	8.500	0.750	N/A	2.000	1.500	5.125	3.313	6.440	0.547
10.000	11.200	2.688	3/4 - 16	10.625	1.000	N/A	2.250	2.000	6.375	4.188	7.920	0.641
12.000	13.300	2.688	3/4 - 16	12.750	1.000	N/A	2.250	2.000	6.875	4.688	9.400	0.641
14.000	15.400	3.188	7/8 - 14	14.750	1.250	N/A	2.750	2.250	8.125	5.625	10.900	0.750

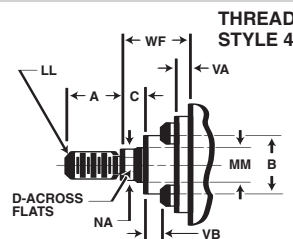
ROD ENDS



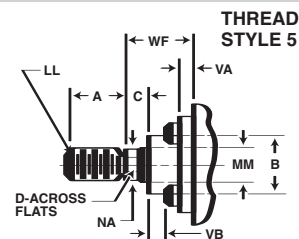
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



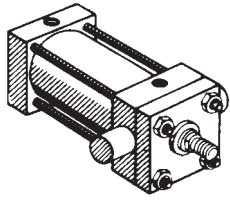
AUTOMOTIVE MALE

Bore Size	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
		KK	LL	A	AC	B ^{+0.000} _{-.002}	BF	C	D	NA	V	VA	VB	W	WF	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	N/A	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.875	4.840
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	N/A	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	5.220
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	N/A	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.875	4.890
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	N/A	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	5.260
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	N/A	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.520
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	2.468	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.875	5.020
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.468	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	5.390
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	N/A	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	5.640
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	N/A	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.750	5.890
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	5.950
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.200
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	N/A	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	6.450
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	N/A	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	6.580
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	5.950
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.200
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	6.450
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	6.580
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	6.830
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.375	6.310
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.625	6.560
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	6.810
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	6.940
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	N/A	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	7.190
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	N/A	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	3.250	7.190
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	N/A	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.250	7.190	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.750	7.060
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	7.310
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	7.440
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	7.690
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	N/A	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	7.690
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	N/A	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	7.690
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	N/A	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	7.690
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.750	7.300
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	7.550
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	7.670
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	7.920
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	7.920
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	7.920
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	7.920
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	7.920
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.375	7.920
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.375	7.920	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	8.890
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	9.020
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	9.260
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	9.260
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.062	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	9.260
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	9.260
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	7.250	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	9.260
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.250	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	9.260
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	9.260	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	9.520
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	9.760
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	9.760
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	9.760
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	9.760
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	9.760
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	9.760
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	9.760	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.688	11.120
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.688	11.120
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.062	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.688	11.120
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.688	

Head Trunnion Mount

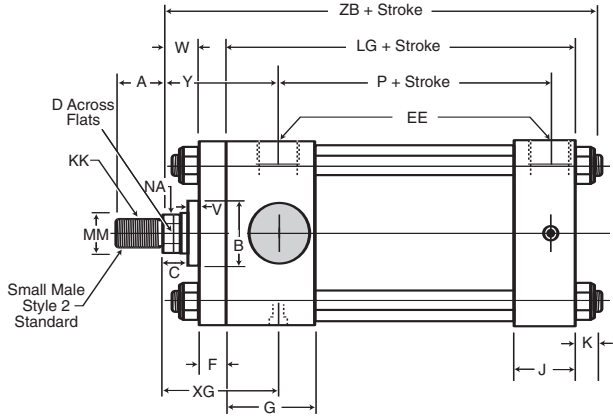
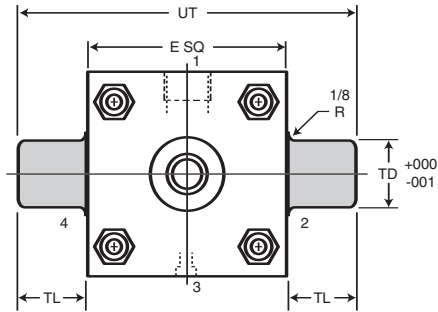
A-L

Head Trunnion



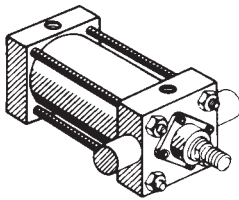
Model MT1
1 1/2" - 2" - 2 1/2" and
5" Bore With Maximum
Oversize Rods

Tie Rod Retained Cartridge



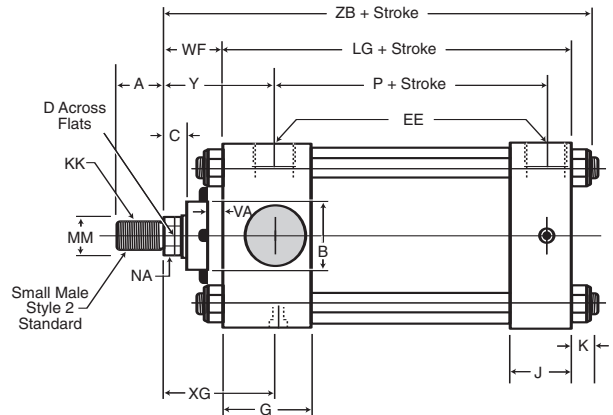
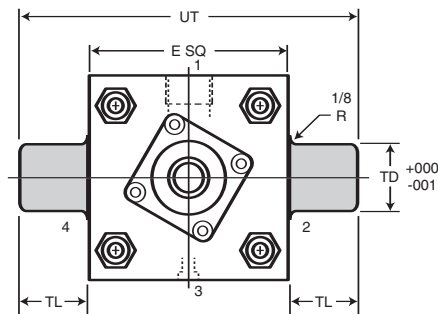
Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

Head Trunnion



Model MT1
1 1/2" - 14" Bore

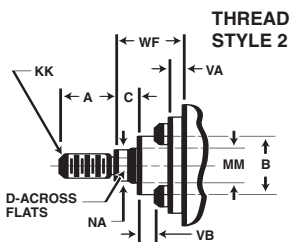
Removable Cartridge



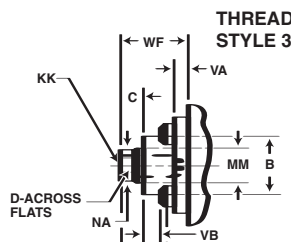
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EE (NPTF)	F	G	J	K	LG	P	TD	TL	UT
1.500	2.000	0.375	0.375	1.500	1.000	0.328	3.625	2.313	1.000	1.000	4.000
2.000	2.500	0.375	0.375	1.500	1.000	0.359	3.625	2.313	1.000	1.000	4.500
2.500	3.000	0.375	0.375	1.500	1.000	0.359	3.750	2.438	1.000	1.000	5.000
3.250	3.750	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	5.750
4.000	4.500	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	6.500
5.000	5.500	0.500	0.625	1.750	1.250	0.609	4.500	2.938	1.000	1.000	7.500
6.000	6.500	0.750	N/A	2.000	1.500	0.609	5.000	3.188	1.375	1.375	9.250
8.000	8.500	0.750	N/A	2.000	1.500	0.766	5.125	3.313	1.375	1.375	11.250
10.000	10.625	1.000	N/A	2.250	2.000	0.891	6.375	4.188	1.750	1.750	14.125
12.000	12.750	1.000	N/A	2.250	2.000	0.891	6.875	4.688	1.750	1.750	16.250
14.000	14.750	1.250	N/A	2.750	2.250	1.000	8.125	5.625	2.000	2.000	18.750

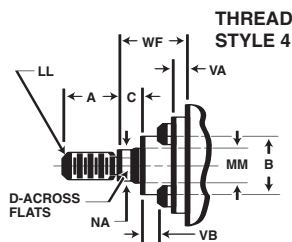
ROD ENDS



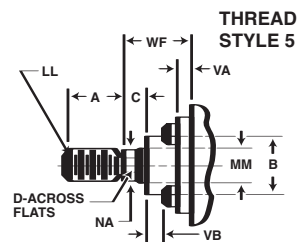
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



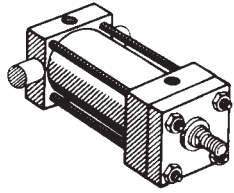
AUTOMOTIVE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-.002}	C	D	NA	V	VA	VB	W	WF	XG	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.750	1.875	4.950
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.125	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.750	1.875	4.980
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.125	2.250	5.350
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.375	2.500	5.610
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	1.750	1.875	5.120
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.125	2.250	5.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.375	2.500	5.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.625	2.750	5.980
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.500	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.750	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.875	3.000	6.720
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.500	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.750	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.875	3.000	6.720
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.125	3.250	6.970
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	2.250	2.375	6.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	2.500	2.625	6.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.750	2.875	6.980
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	2.875	3.000	7.120
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.125	3.250	7.360
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	3.125	3.250	7.360
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.125	3.250	7.360	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.625	2.750	7.230
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	3.000	7.480
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	3.125	7.610
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	3.375	7.860
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.250	3.375	7.860
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.250	3.375	7.860
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.250	3.375	7.860
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.625	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	2.875	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.000	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.250	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.250	3.375	8.140	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	3.063	9.140
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	3.188	9.260
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	3.438	9.520
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
	5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.375	3.438	9.520
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	3.188	9.760
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	3.438	10.020
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
	5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.375	3.438	10.020
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.625	3.688	11.380
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.625	3.688	11.380
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.625	3.688	11.380
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937								

Cap Trunnion Mount

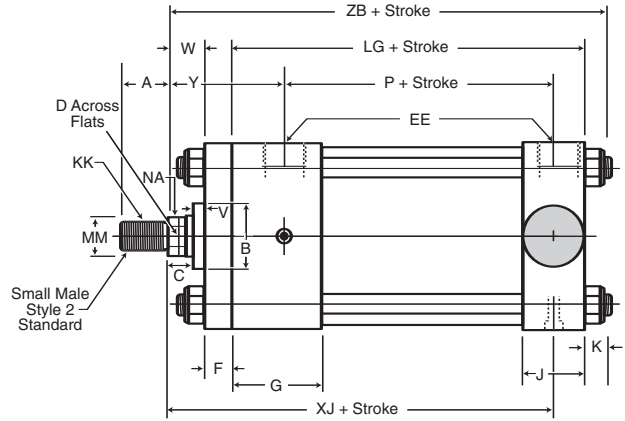
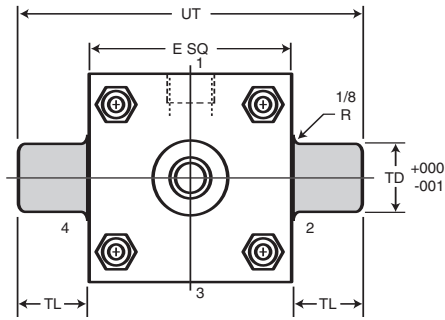
A-L

Cap Trunnion



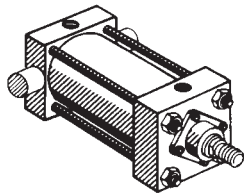
Model MT2
1 1/2" - 2" - 2 1/2"
and 5" Bore With
Maximum Oversize
Rods

Tie Rod Retained Cartridge



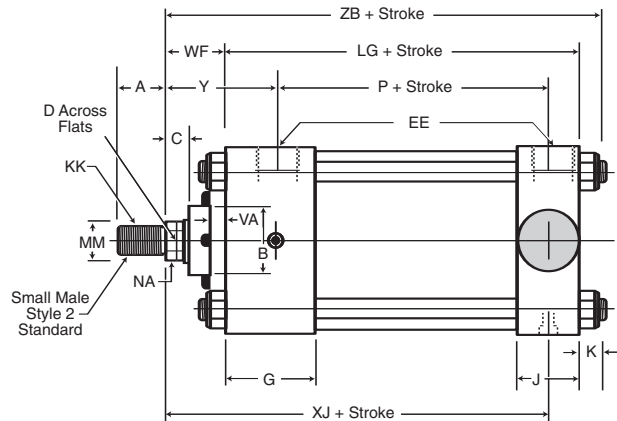
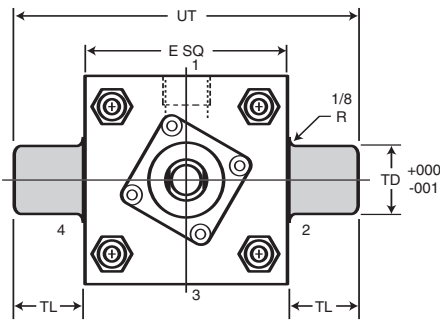
Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

Cap Trunnion



Model MT2
1 1/2" - 14" Bore

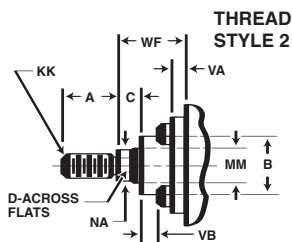
Removable Cartridge



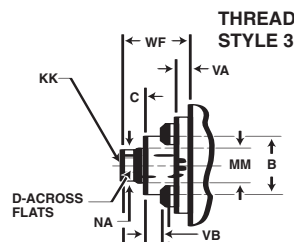
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EE (NPTF)	F	G	J	K	LG	P	TD	TL	UT
1.500	2.000	0.375	0.375	1.500	1.000	0.328	3.625	2.313	1.000	1.000	4.000
2.000	2.500	0.375	0.375	1.500	1.000	0.359	3.625	2.313	1.000	1.000	4.500
2.500	3.000	0.375	0.375	1.500	1.000	0.359	3.750	2.438	1.000	1.000	5.000
3.250	3.750	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	5.750
4.000	4.500	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	6.500
5.000	5.500	0.500	0.625	1.750	1.250	0.609	4.500	2.938	1.000	1.000	7.500
6.000	6.500	0.750	N/A	2.000	1.500	0.609	5.000	3.188	1.375	1.375	9.250
8.000	8.500	0.750	N/A	2.000	1.500	0.766	5.125	3.313	1.375	1.375	11.250
10.000	10.625	1.000	N/A	2.250	2.000	0.891	6.375	4.188	1.750	1.750	14.125
12.000	12.750	1.000	N/A	2.250	2.000	0.891	6.875	4.688	1.750	1.750	16.250
14.000	14.750	1.250	N/A	2.750	2.250	1.000	8.125	5.625	2.000	2.000	18.750

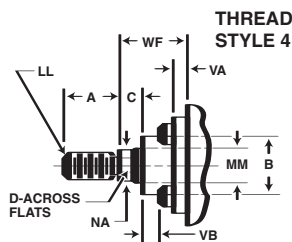
ROD ENDS



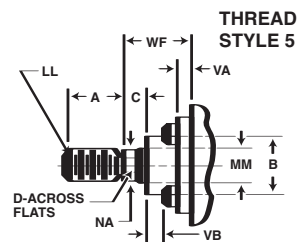
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



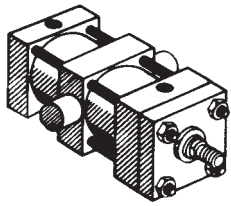
AUTOMOTIVE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-.002}	C	D	NA	V	VA	VB	W	WF	XJ	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	4.125	1.875	4.950
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	4.250	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	4.125	1.875	4.980
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	4.250	2.250	5.350
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	4.750	2.500	5.610
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	4.250	1.875	5.120
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	4.625	2.250	5.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	4.875	2.500	5.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	5.125	2.750	5.980
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	5.000	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	5.250	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	5.500	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	5.625	3.000	6.720
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	5.000	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	5.250	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	5.500	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	5.625	3.000	6.720
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	5.875	3.250	6.970
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	5.250	2.375	6.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	5.500	2.625	6.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	5.750	2.875	6.980
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	5.875	3.000	7.120
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	6.125	3.250	7.360
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	6.125	3.250	7.360
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	6.125	3.250	7.360	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	6.000	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	6.250	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	6.375	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	6.625	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140	
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140	
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	6.000	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	6.250	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	6.375	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	6.625	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	6.625	3.375	8.140	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	7.250	3.063	9.140
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.375	3.188	9.260
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	7.625	3.438	9.520
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
	5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	7.625	3.438	9.520
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.875	3.188	9.760
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.125	3.438	10.020
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
	5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	8.125	3.438	10.020
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A							

Intermediate Fixed Trunnion Mount

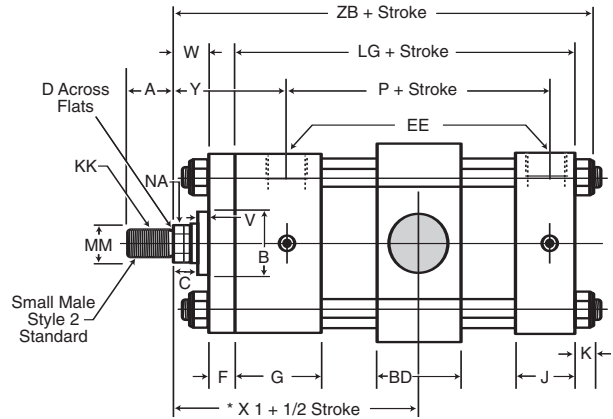
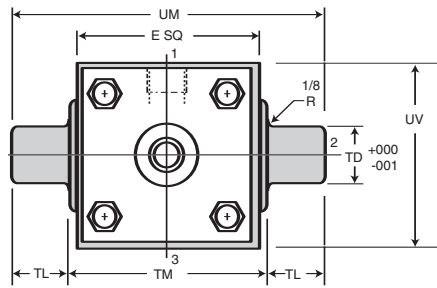
A-L

Intermediate Fixed Trunnion



Model MT4
1 1/2" - 2" - 2 1/2"
and 5" Bore With
Maximum Oversize
Rods

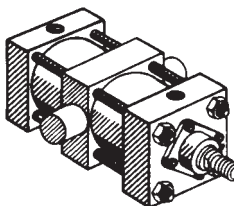
Tie Rod Retained Cartridge



Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

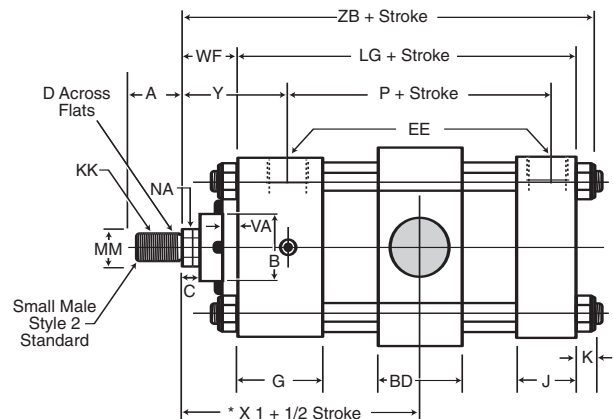
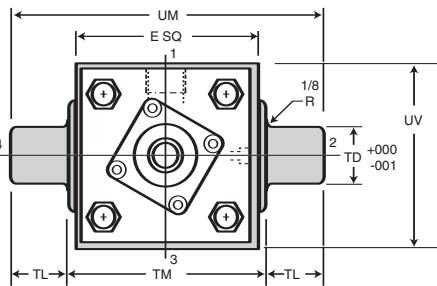
*XI to be specified by customer. If not specified standard position of trunnion is XI + 1/2 Stroke.

Intermediate Fixed Trunnion



Model MT4
1 1/2" - 14" Bore

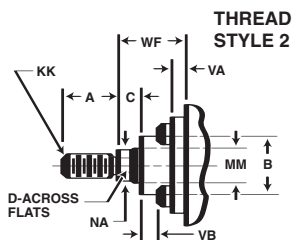
Removable Cartridge



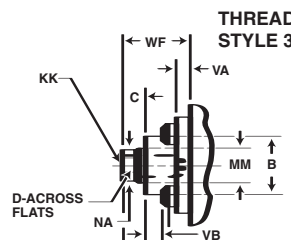
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	BD	E	EE (NPTF)	F	G	J	K	LG	P	TD	TL	TM	UM	UV	MIN STROKE
1.500	1.250	2.000	0.375	0.375	1.500	1.000	0.328	3.625	2.313	1.000	1.000	2.500	4.500	2.500	6.000
2.000	1.500	2.500	0.375	0.375	1.500	1.000	0.359	3.625	2.313	1.000	1.000	3.000	5.000	3.000	2.000
2.500	1.500	3.000	0.375	0.375	1.500	1.000	0.359	3.750	2.438	1.000	1.000	3.500	5.500	3.500	2.000
3.250	2.000	3.750	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	4.500	6.500	4.250	4.000
4.000	2.000	4.500	0.500	N/A	1.750	1.250	0.469	4.250	2.688	1.000	1.000	5.250	7.250	5.000	4.000
5.000	2.000	5.500	0.500	0.625	1.750	1.250	0.609	4.500	2.938	1.000	1.000	6.250	8.250	6.000	6.000
6.000	2.500	6.500	0.750	N/A	2.000	1.500	0.609	5.000	3.188	1.375	1.375	7.625	10.375	7.000	2.000
8.000	2.500	8.500	0.750	N/A	2.000	1.500	0.766	5.125	3.313	1.375	1.375	9.750	12.500	9.500	6.000
10.000	3.000	10.625	1.000	N/A	2.250	2.000	0.891	6.375	4.188	1.750	1.750	12.000	15.500	11.750	6.000
12.000	3.000	12.750	1.000	N/A	2.250	2.000	0.891	6.875	4.688	1.750	1.750	14.000	17.500	13.750	6.000
14.000	3.500	14.750	1.250	N/A	2.750	2.250	1.000	8.125	5.625	2.000	2.000	16.250	20.250	16.000	6.000

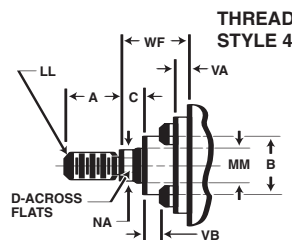
ROD ENDS



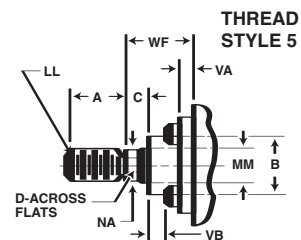
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



AUTOMOTIVE MALE

A-L

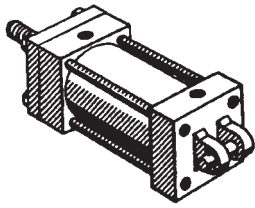
Intermediate Fixed Trunnion Mount

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} / _{-0.002}	C	D	NA	V	VA	VB	W	WF	XI	Y	ZB
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	3.063	1.875	4.950
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	3.438	2.250	5.330
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	3.063	1.875	4.980
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	3.438	2.250	5.350
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	3.063	2.500	5.610
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	3.125	1.875	5.120
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	3.500	2.250	5.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	3.750	2.500	5.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	4.000	2.750	5.980
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	3.750	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	4.000	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	4.250	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	4.375	3.000	6.720
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	3.875	2.375	6.090
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	4.000	2.625	6.340
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	4.250	2.875	6.590
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	4.375	3.000	6.720
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	4.625	3.250	6.970
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	3.875	2.375	6.480
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	4.125	2.625	6.730
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	4.375	2.875	6.980
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	4.500	3.000	7.120
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	4.750	3.250	7.360
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	4.750	3.250	7.360
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	4.750	3.250	7.360	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	4.375	2.750	7.230
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	4.625	3.000	7.480
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	4.750	3.125	7.610
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	5.000	3.375	7.860
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	5.000	3.375	7.860
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	5.000	3.375	7.860
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	5.000	3.375	7.860
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	4.438	2.750	7.520
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	4.688	3.000	7.760
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	4.813	3.125	7.890
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	5.063	3.375	8.140
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	5.063	3.375	8.140	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	5.188	3.063	9.140
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	5.313	3.188	9.260
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	5.563	3.438	9.520
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	5.563	3.438	9.520	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	5.563	3.188	9.760
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	5.813	3.438	10.020
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	5.813	3.438	10.020	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	6.563	3.688	11.380
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	6.563	3.688	11.380
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	6.563	3.688	11.380
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937								

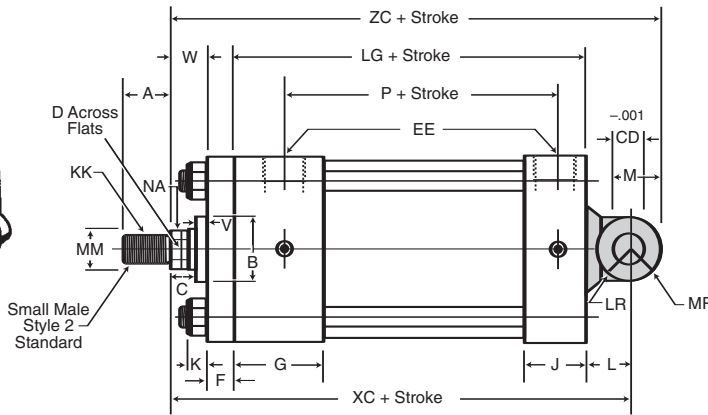
Cap Fixed Clevis Mount

A-L

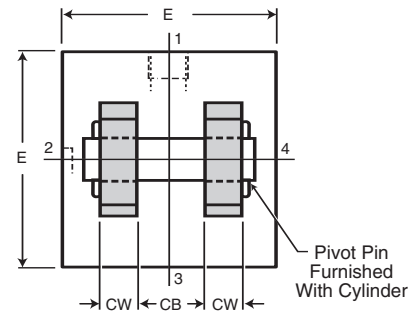
Cap Fixed Clevis



Model MP1
1 1/2" - 2" - 2 1/2"
and 5" Bore With
Maximum Oversize
Rods

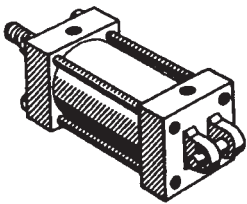


Tie Rod Retained Cartridge

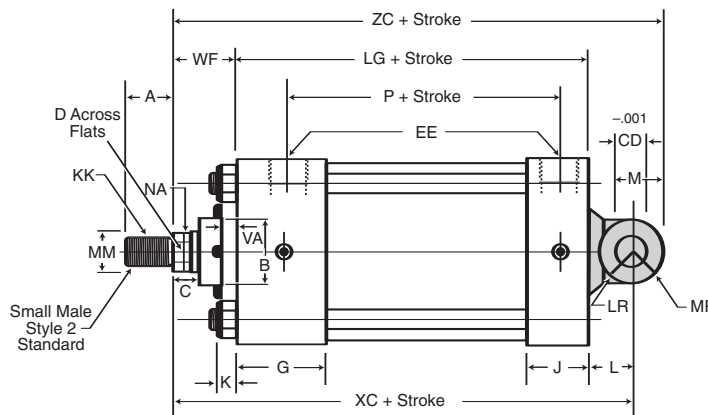


Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

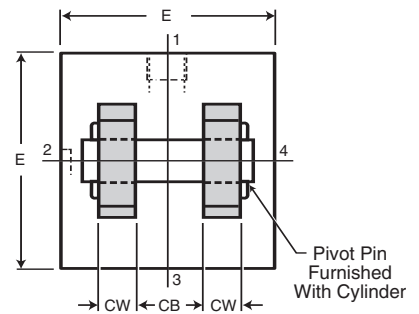
Cap Fixed Clevis



Model MP1
1 1/2" - 14" Bore



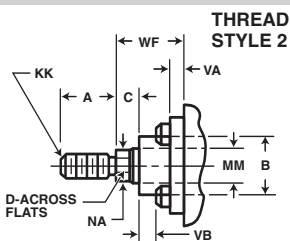
Removable Cartridge



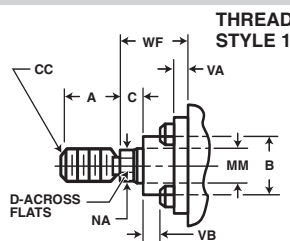
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	CB	CD (PIN DIM)	CW	E	EE (NPTF)	F	G	J	K	L	LG	LR	M	MR	P
1.500	0.750	0.500	0.500	2.000	0.375	0.375	1.500	1.000	0.328	0.750	3.625	0.563	0.500	0.500	2.313
2.000	0.750	0.500	0.500	2.500	0.375	0.375	1.500	1.000	0.359	0.750	3.625	0.563	0.500	0.500	2.313
2.500	0.750	0.500	0.500	3.000	0.375	0.375	1.500	1.000	0.359	0.750	3.750	0.563	0.500	0.500	2.438
3.250	1.250	0.750	0.625	3.750	0.500	N/A	1.750	1.250	0.469	1.250	4.250	1.000	0.750	0.750	2.688
4.000	1.250	0.750	0.625	4.500	0.500	N/A	1.750	1.250	0.469	1.250	4.250	1.000	0.750	0.750	2.688
5.000	1.250	0.750	0.625	5.500	0.500	0.625	1.750	1.250	0.609	1.250	4.500	1.000	0.750	0.750	2.938
6.000	1.500	1.000	0.750	6.500	0.750	N/A	2.000	1.500	0.609	1.500	5.000	1.250	1.000	1.000	3.188
8.000	1.500	1.000	0.750	8.500	0.750	N/A	2.000	1.500	0.766	1.500	5.125	1.250	1.000	1.000	3.313
10.000	2.000	1.375	1.000	10.625	1.000	N/A	2.250	2.000	0.891	2.125	6.375	1.813	1.375	1.375	4.188
12.000	2.500	1.750	1.250	12.750	1.000	N/A	2.250	2.000	0.891	2.250	6.875	1.875	1.750	1.750	4.688
14.000	2.500	2.000	1.250	14.750	1.250	N/A	2.750	2.250	1.000	2.500	8.125	2.063	2.000	2.000	5.625

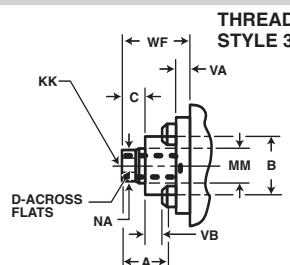
ROD ENDS



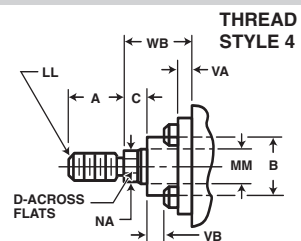
SMALL MALE



FULL MALE



SHORT FEMALE



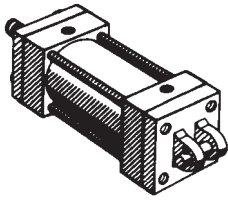
INTERMEDIATE MALE

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-.002}	C	D	NA	V	VA	VB	W	WF	XC	Y	ZC
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.375	1.875	5.875
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	5.750	2.250	6.250
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.375	1.875	5.875
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	5.750	2.250	6.250
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.000	2.500	6.500
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.500	1.875	6.000
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	5.875	2.250	6.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.125	2.500	6.625
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	6.375	2.750	6.875
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	6.875	2.375	7.625
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.125	2.625	7.875
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	7.375	2.875	8.125
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.500	3.000	8.250
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	6.875	2.375	7.625
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.125	2.625	7.875
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	7.375	2.875	8.125
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.500	3.000	8.250
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	7.750	3.250	8.500
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	7.125	2.375	7.875
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.375	2.625	8.125
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	7.625	2.875	8.375
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	7.750	3.000	8.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.000	3.250	8.750
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	8.000	3.250	8.750
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	8.000	3.250	8.750	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	8.125	2.750	9.125
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.375	3.000	9.375
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.500	3.125	9.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.750	3.375	9.750
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	8.750	3.375	9.750
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	8.750	3.375	9.750
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	8.750	3.375	9.750
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	8.250	2.750	9.250
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.500	3.000	9.500
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.625	3.125	9.625
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.875	3.375	9.875
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	5.063	3.375	9.875	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	10.375	3.063	11.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	10.500	3.188	11.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	10.750	3.438	12.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.250	0.500	N/A	2.250	10.750	3.438	12.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	10.750	3.438	12.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	10.750	3.438	12.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	10.750	3.438	12.125
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	10.750	3.438	12.125
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	10.750	3.438	12.125	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	11.125	3.188	12.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	11.375	3.438	13.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
	5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	11.375	3.438	13.125
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	12.875	3.688	14.875
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.250	0.500	N/A	2.250	12.875	3.688	14.875
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	12.875	3.688	14.875
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1										

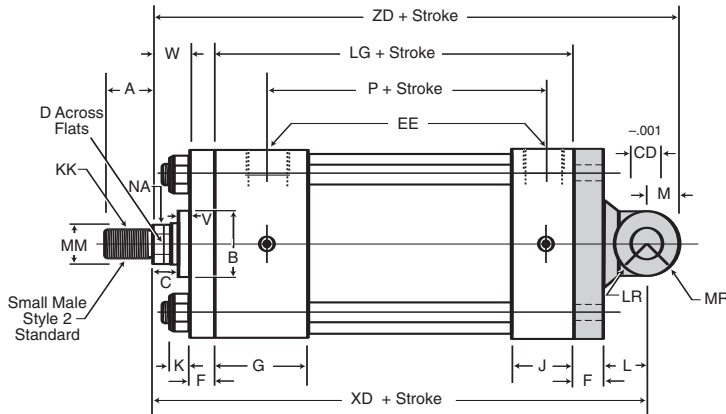
Cap Detachable Clevis Mount

A-L

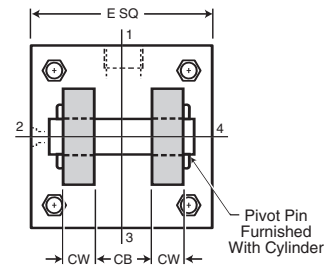
Cap Detachable Clevis



Model MP2
1 1/2" - 2" - 2 1/2"
and 5" Bore With
Maximum Oversize
Rods

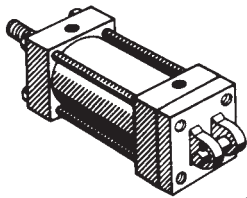


Tie Rod Retained Cartridge

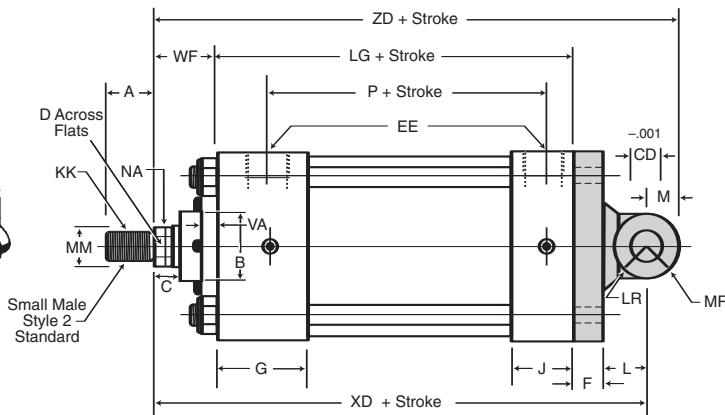


Before Determining Dimensions:
See chart on page 30 for cylinder
rod combinations that have remov-
able cartridges.

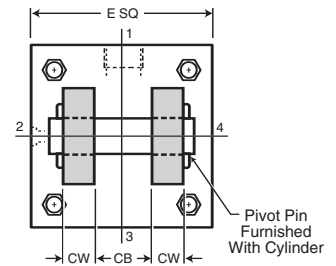
Cap Detachable Clevis



Model MP2
1 1/2" - 6" Bore



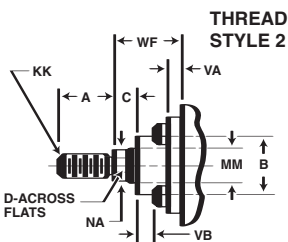
Removable Cartridge



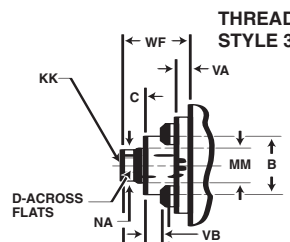
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	CB	CD (PIN DIA)	CW	E	EE (NPTF)	F	G	J	K	L	LG	LR	M	MR	P
1.500	0.750	0.500	0.500	2.000	0.375	0.375	1.500	1.000	0.328	0.750	3.625	0.563	0.500	0.500	2.313
2.000	0.750	0.500	0.500	2.500	0.375	0.375	1.500	1.000	0.359	0.750	3.625	0.563	0.500	0.500	2.313
2.500	0.750	0.500	0.500	3.000	0.375	0.375	1.500	1.000	0.359	0.750	3.750	0.563	0.500	0.500	2.313
3.250	1.250	0.750	0.625	3.750	0.500	0.625	1.750	1.250	0.469	1.250	4.250	1.000	0.750	0.750	2.688
4.000	1.250	0.750	0.625	4.500	0.500	0.625	1.750	1.250	0.469	1.250	4.250	1.000	0.750	0.750	2.688
5.000	1.250	0.750	0.625	5.500	0.500	0.625	1.750	1.250	0.609	1.250	4.500	1.000	0.750	0.750	2.938
6.000	1.500	1.000	0.750	6.500	0.750	0.750	2.000	1.500	0.609	1.500	5.000	1.250	1.000	1.000	3.188

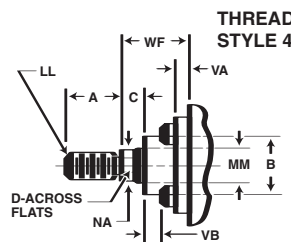
ROD ENDS



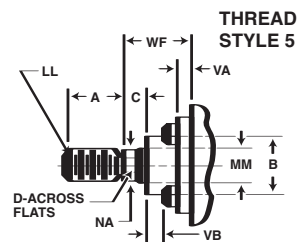
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE

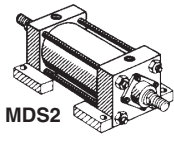
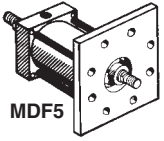
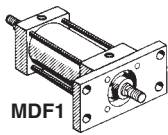
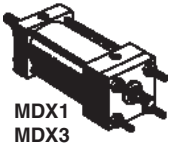


AUTOMOTIVE MALE

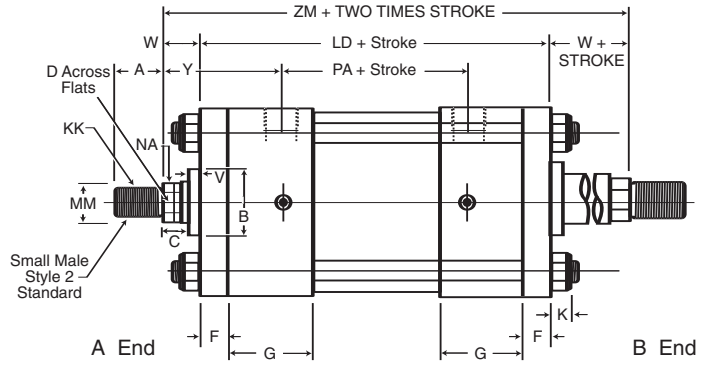
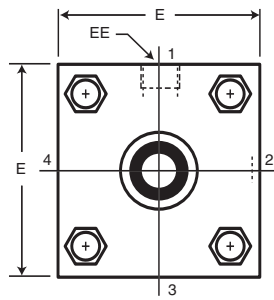
Bore Size	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
		KK	LL	A	AC	B ^{+0.000} _{-0.002}	C	D	NA	V	VA	VB	W	WF	XD	Y	ZD
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.750	1.875	6.250
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	6.125	2.250	6.625
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.750	1.875	6.250
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	6.125	2.250	6.625
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.375	2.500	6.875
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	0.375	0.500	0.593	N/A	0.250	0.188	N/A	1.000	5.875	1.875	6.375
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.988	N/A	0.250	0.375	N/A	1.375	6.250	2.250	6.750
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	6.500	2.500	7.000
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	6.750	2.750	7.250
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	7.500	2.375	8.250
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.750	2.625	8.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.000	2.875	8.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.125	3.000	8.875
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	7.500	2.375	8.250
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	7.750	2.625	8.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.000	2.875	8.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.125	3.000	8.875
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.375	3.250	9.125
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	0.500	0.875	0.968	N/A	0.250	0.375	N/A	1.375	7.750	2.375	8.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.500	N/A	1.625	8.000	2.625	8.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	8.250	2.875	9.000
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	8.375	3.000	9.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.250	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	8.625	3.250	9.375
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.688	N/A	2.250	8.625	3.250	9.375
6	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	8.625	3.250	9.375
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	8.875	2.750	9.875
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	9.125	3.000	10.125
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	9.250	3.125	10.250
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	9.500	3.375	10.500
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	9.500	3.375	10.500
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	9.500	3.375	10.500
4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	9.500	3.375	10.500	

Double Rod End Cylinders

A-L

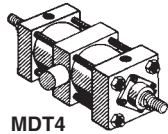
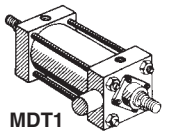
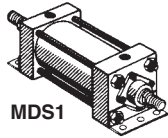
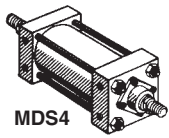


Tie Rod Retained Cartridge

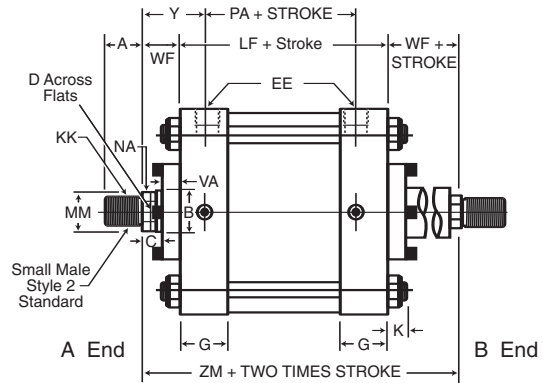
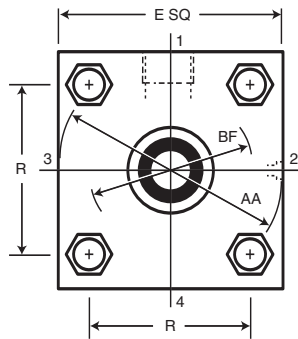


Before Determining Dimensions:
See chart on page 30 for cylinder rod combinations that have removable cartridges.

Note: The basic double rod cylinder dimensions are shown on this and facing page. For specific rod combinations that have removable cartridges, refer to pages for single rod cylinder. **Exception:** MDS1, SA and MDS2, SS.



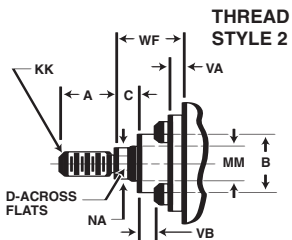
Removable Cartridge



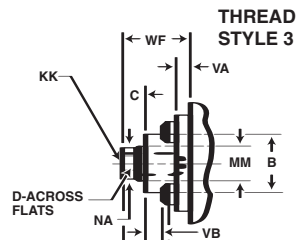
ENVELOPE AND MOUNTING DIMENSIONS

Bore Size	E	EE (NPTF)	F	G	K	LD	LF	PA	SA	SS
1.500	2.000	0.375	0.375	1.500	0.328	4.875	4.125	2.375	6.875	3.375
2.000	2.500	0.375	0.375	1.500	0.359	4.875	4.125	2.375	6.875	3.375
2.500	3.000	0.375	0.375	1.500	0.359	5.000	4.250	2.500	7.000	3.500
3.250	3.750	0.500	0.625	1.750	0.469	6.000	4.750	2.750	8.500	3.750
4.000	4.500	0.500	0.625	1.750	0.469	6.000	4.750	2.750	8.500	3.750
5.000	5.500	0.500	0.625	1.750	0.609	6.250	5.000	3.000	9.000	3.625
6.000	6.500	0.750	0.750	2.000	0.609	7.000	5.500	3.250	9.750	4.125
8.000	8.500	0.750	N/A	2.000	0.766	N/A	5.625	3.375	9.250	4.250
10.000	10.625	1.000	N/A	2.250	0.891	N/A	6.625	4.250	10.875	4.875
12.000	12.750	1.000	N/A	2.250	0.891	N/A	7.125	4.750	11.375	5.375
14.000	14.750	1.250	N/A	2.750	1.000	N/A	8.625	5.750	13.500	6.375

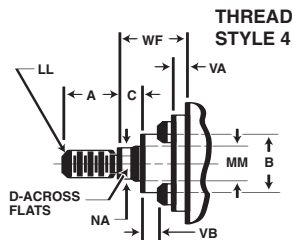
ROD ENDS



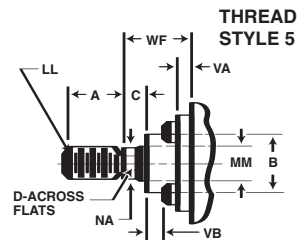
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE








AUTOMOTIVE MALE

A-L

Double Rod End Cylinders

Bore Size	Rod Dia.	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
	MM	KK	LL	A	AC	B ^{+0.000} _{-0.002}	BF	C	D	NA	V	VA	VB	W	WF	Y	ZM
1 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	1.968	0.375	0.500	0.593	N/A	0.250	0.188	0.625	1.000	1.875	6.125
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	N/A	0.500	0.875	0.968	0.500	N/A	N/A	1.000	N/A	2.250	6.875
2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	1.968	0.375	0.500	0.593	N/A	0.250	0.188	0.625	1.000	1.875	6.125
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.468	0.500	0.875	0.968	N/A	0.250	0.375	1.000	1.375	2.250	6.875
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	N/A	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	7.375
2 1/2	0.625	7/16 - 20	1/2 - 20	0.750	1.125	1.124	2.468	0.375	0.500	0.593	N/A	0.250	0.188	0.625	1.000	1.875	6.250
	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.468	0.500	0.875	0.968	N/A	0.250	0.375	1.000	1.375	2.250	7.000
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	0.625	N/A	N/A	1.250	N/A	2.500	7.500
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.500	2.374	N/A	0.750	1.500	1.703	0.750	N/A	N/A	1.500	N/A	2.750	8.000
3 1/4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	0.750	1.375	2.375	7.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	1.000	1.625	2.625	8.000
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	1.250	1.875	2.875	8.500
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	1.375	2.000	3.000	8.750
4	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	0.750	1.375	2.375	7.500
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	1.000	1.625	2.625	8.000
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	1.250	1.875	2.875	8.500
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	1.375	2.000	3.000	8.750
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	1.625	2.250	3.250	9.250
5	1.000	3/4 - 16	7/8 - 14	1.125	1.875	1.499	2.968	0.500	0.875	0.968	N/A	0.250	0.375	0.750	1.375	2.375	7.750
	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	2.968	0.625	1.125	1.343	N/A	0.250	0.500	1.000	1.625	2.625	8.250
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	1.250	1.875	2.875	8.750
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	1.375	2.000	3.000	9.000
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	1.625	2.250	3.250	9.500
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.688	1.625	2.250	3.250	9.500
3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	0.625	N/A	N/A	1.625	N/A	3.250	9.500	
6	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	N/A	0.250	0.438	0.875	1.625	2.750	8.750
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	N/A	0.250	0.563	1.125	1.875	3.000	9.250
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.312	0.875	1.688	1.953	N/A	0.250	0.563	1.250	2.000	3.125	9.500
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	1.500	2.250	3.375	10.000
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	1.500	2.250	3.375	10.000
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	1.500	2.250	3.375	10.000
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	1.500	2.250	3.375	10.000
8	1.375	1 - 14	1 1/4 - 12	1.625	2.500	1.999	3.625	0.625	1.125	1.343	N/A	0.250	0.438	N/A	1.625	2.750	8.875
	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.625	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.000	9.375
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.125	9.625
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.375	10.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.375	10.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.375	10.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.375	10.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.375	10.125
5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.375	10.125	
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.375	10.125	
10	1.750	1 1/4 - 12	1 1/2 - 12	2.000	3.000	2.374	3.735	0.750	1.500	1.703	N/A	0.250	0.563	N/A	1.875	3.063	10.375
	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	3.735	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	10.625
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	11.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	11.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.002	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	11.125
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.062	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	11.125
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	7.250	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	11.125
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.250	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	11.125
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	11.125	
12	2.000	1 1/2 - 12	1 3/4 - 12	2.250	3.500	2.624	4.312	0.875	1.688	1.953	N/A	0.250	0.563	N/A	2.000	3.188	11.125
	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	4.312	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.438	11.625
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.562	1.000	2.625	2.937	N/A	0.375	0.500	N/A	2.250	3.438	11.625
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	5.562	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.438	11.625
	4.000	3 - 12	3 3/4 - 12	4.000	N/A	4.749	6.750	1.000	3.375	3.937	N/A	0.375	0.500	N/A	2.250	3.438	11.625
	4.500	3 1/4 - 12	4 1/4 - 12	4.500	N/A	5.249	6.750	1.000	3.875	4.421	N/A	0.375	0.500	N/A	2.250	3.438	11.625
	5.000	3 1/2 - 12	4 3/4 - 12	5.000	N/A	5.749	7.750	1.000	4.250	4.921	N/A	0.375	0.500	N/A	2.250	3.438	11.625
5.500	4 - 12	5 1/4 - 12	5.500	N/A	6.249	7.750	1.000	4.625	5.421	N/A	0.375	0.500	N/A	2.250	3.438	11.625	
14	2.500	1 7/8 - 12	2 1/4 - 12	3.000	4.500	3.124	5.000	1.000	2.063	2.453	N/A	0.250	0.688	N/A	2.250	3.688	13.125
	3.000	2 1/4 - 12	2 3/4 - 12	3.500	N/A	3.749	5.000	1.000	2.625	2.937	N/A	0.250	0.500	N/A	2.250	3.688	13.125
	3.500	2 1/2 - 12	3 1/4 - 12	3.500	N/A	4.249	6.062	1.000	3.000	3.437	N/A	0.375	0.500	N/A	2.250	3.688	

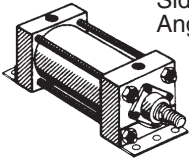
Optional Mounting Accessories – Also See Pages 31-34

										
	Female Rod Clevis	Rod Eye	Eye Bracket	Clevis Bracket	Pivot Pin with Cotter Pins					
	ROD SIZE THREAD	5/8 7/16 – 20	1 3/4 – 16	1-3/8 1 – 14	1-3/4 1-1/4 – 12	2 1-1/2 – 12	2-1/2 1-7/8 – 12	3-1/2 2-1/2 – 12	4-1/2 3-1/4 – 12	5-1/2 4 – 12
ROD END	Female Rod Clevis	BDC-05	BDC-07	BDC-10	BDC-13	BDC-17	BDC-20	BDC-30	BDC-35	BDC-40
	Rod Eye	BDE-05	BDE-07	BDE-10	BDE-13	BDE-17	BDE-20	BDE-30	BDE-35	BDE-40
	Eye Bracket	BDEB-05	BDEB-07	BDEB-10	BDEB-13	BDEB-17	BDEB-20	BDEB-30	BDEB-35	BDEB-40
	Clevis Bracket	BDCB-05	BDCB-07	BDCB-10	BDCB-13	BDCB-17	BDCB-20	BDCB-30	BDCB-35	BDCB-40
	Pivot Pin w/Cotter Pins	BDP-05H	BDP-07H	BDP-10H	BDP-13H	BDP-17H	BDP-20H	BDP-30H	BDP-35H	BDP-40H
CAP END	BORE SIZE	1-1/2, 2, 2-1/2	3-1/4, 4, 5	6, 8	10	12	14			
	Eye Bracket	BDEB-05	BDEB-07	BDEB-10	BDEB-13	BDEB-17	BDEB-20			
	Pivot Pin w/Cotter Pins	BDP-05H	BDP-07H	BDP-10H	BDP-13H	BDP-17H	BDP-20H			

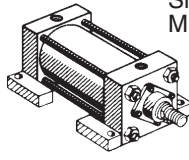
NOTE: Pivot Pin w/Cotter Pins supplied with MP1 and MP2 cylinder assemblies.

Mounting Styles and Ordering Notes

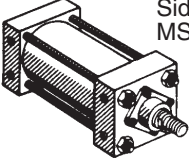
Available in all bore and rod combinations



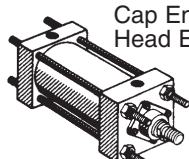
Side End Angles MS1



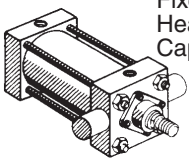
Side Lug MS2



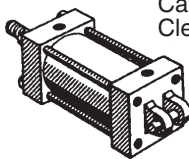
Side Tapped MS4



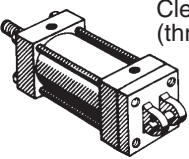
Tie Rods Extended Both Ends MX1
Cap End MX2
Head End MX3



Intermediate Trunnion Mounts
Fixed MT4
Head MT1
Cap MT2

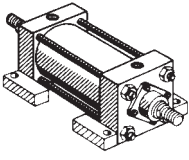


Cap Fixed Clevis MP1
Pivot Pin Included



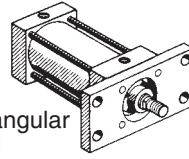
Cap Detachable Clevis MP2
(thru 6" bore)
Pivot Pin Included

Double End Construction

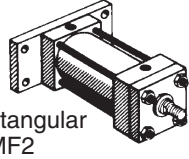


Available in all bore and rod combinations in the following mounting styles: MDS1, MDS2, MDS4, MDX1, MDX3, MDT1, MDT4, and MDF1 (1 1/2" – 6"). MDF5 (1 1/2" – 6" and MDE3 (8" – 14").

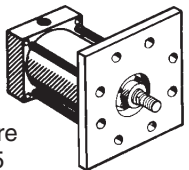
Available in all bore and rod combinations thru 6" bore. 8" – 14" bore supplied as Head Square (ME3) and Cap Square (ME4) mounts.



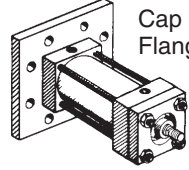
Head Rectangular Flange MF1



Cap Rectangular Flange MF2



Head Square Flange MF5



Cap Square Flange MF6

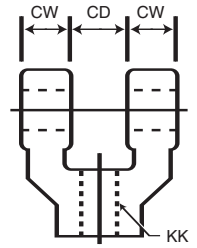
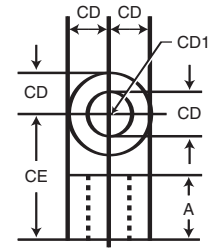
ROD BEARING CARTRIDGES					
R = Removable Cart. T = Tie Rod Retained Cart.					
*MF5, MF6, MF2 and MP2 not available in these bore sizes					
** Cushions not adjustable on head end.					
BORE	ROD DIA	MX1, MX3, MS4, MF6 MT2, MP2, MX2, MS2 MF2, MT1, MT4, MP1	MF1 MF5	MS1	ME3 ME4
1-1/2	5/8	R	T	T	N/A
	1**	T	T	T	N/A
2	5/8	R	T	T	N/A
	1**	R	T	T	N/A
	1-3/8	T	T	T	N/A
2-1/2	5/8	R	R	T	N/A
	1	R	R	T	N/A
	1-3/8**	T	T	T	N/A
	1-3/4**	T	T	T	N/A
3-1/4	1	R	R	T	N/A
	1-3/8	R	R	T	N/A
	1-3/4***-2	R	T	T	N/A
4	1 – 1-3/8	R	R	R	N/A
	1-3/4 – 2	R	R	T	N/A
	2-1/2**	R	R	T	N/A
	3-1/2**	T	T	T	N/A
5	1 – 2	R	R	R	N/A
	2-1/2** – 3**	R	T	T	N/A
	3-1/2**	T	T	T	N/A
6	1-3/8 – 2-1/2	R	R	R	N/A
	3 – 4	R	T	T	N/A
8	1-3/8 – 4-1/2	R	N/A	R	R
	5** – 5-1/2**	R	N/A	N/A	R
10*	1-3/4 – 5-1/2	R	N/A	R	R
12*	2 – 5-1/2	R	N/A	R	R
14*	2-1/2 – 5-1/2	R	N/A	R	R

Rod Clevis

Order to fit thread size of piston rod.



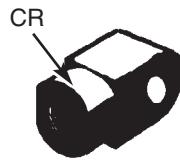
Pin must be ordered separately.



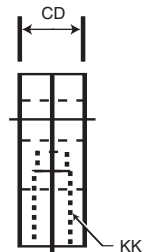
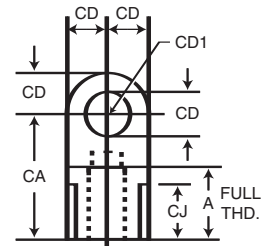
DIMENSION IN INCHES								
Part Number	Rod Dia.	Thread Size KK	A (MIN)	CB	CD	CE	CW	CD1 (MAX)
BDC-05	5/8	7/16 - 20	3/4	3/4	1/2	1-1/2	1/2	1/2
BDC-07	1	3/4 - 16	1-1/8	1-1/4	3/4	2-3/8	5/8	3/4
BDC-10	1-3/8	1 - 14	1-5/8	1-1/2	1	3-1/8	3/4	1
BDC-13	1-3/4	1-1/4 - 12	2	2	1-3/8	4-1/8	1	1-1/4
BDC-17	2	1-1/2 - 12	2-1/4	2-1/2	1-3/4	4-1/2	1-1/4	1-3/4
BDC-20	2-1/2	1-7/8 - 12	3	2-1/2	2	5-1/2	1-1/4	2
BDC-30	3-1/2	2-1/2 - 12	3-1/2	3	3	6-3/4	1-1/2	2-3/4
BDC-35	4-1/2	3-1/4 - 12	4-1/2	4	3-1/2	8-1/2	2	3-1/2
BDC-40	5-1/2	4 - 12	5-1/2	4-1/2	4	10	2-1/4	4

Rod Eye

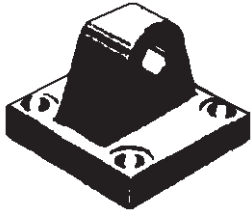
Order to fit thread size of piston rod.



Pin must be ordered separately.

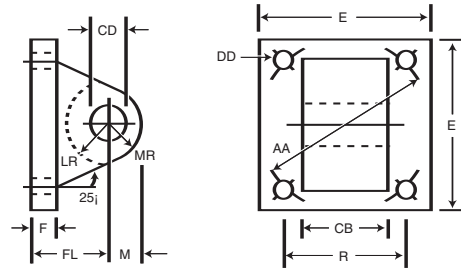


DIMENSION IN INCHES									
Part Number	Rod Dia.	Thread Size KK	A (MIN)	CA	CB	CD	CJ	CD1	CR
BDE-05	5/8	7/16 - 20	3/4	1-1/2	3/4	1/2	11/16	1/2	1
BDE-07	1	3/4 - 16	1-1/8	2-1/16	1-1/4	3/4	3/4	3/4	1-1/2
BDE-10	1-3/8	1 - 14	1-5/8	2-13/16	1-1/2	1	-	1	-
BDE-13	1-3/4	1-1/4 - 12	2	3-7/16	2	1-3/8	-	1-3/8	-
BDE-17	2	1-1/2 - 12	2-1/4	4	2-1/2	1-3/4	-	1-3/4	-
BDE-20	2-1/2	1-7/8 - 12	3	5	2-1/2	2	-	2	-
BDE-30	3-1/2	2-1/2 - 12	3-1/2	6-1/8	3	3	-	2-3/4	-
BDE-35	4-1/2	3-1/4 - 12	4-1/2	7-5/8	4	3-1/2	-	3-1/2	-
BDE-40	5-1/2	4 - 12	5-1/2	9-1/8	4-1/2	4	-	4	-



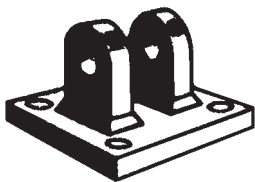
Eye Bracket

EYE BRACKETS



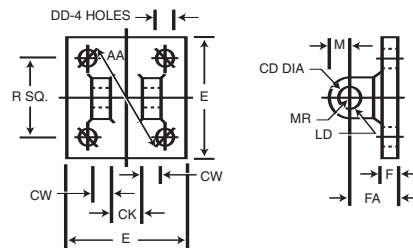
Part #	CB	CD	DD	E	F	FL	LR	M	MR	R
BDEB-05	3/4	1/2	13/32	2-1/2	3/8	1-1/8	3/4	1/2	9/16	1.62
BDEB-07	1-1/4	3/4	17/32	3-1/2	5/8	1-7/8	1-1/4	3/4	7/8	2.56
BDEB-10	1-1/2	1	21/32	4-1/2	3/4	2-1/4	1-1/2	1	1-1/4	3.25
BDEB-13	2	1-3/8	21/32	5	7/8	3	2-1/8	1-3/8	1-5/8	3.81
BDEB-17	2-1/2	1-3/4	29/32	6-1/2	7/8	3-1/8	2-1/4	1-3/4	2-1/8	4.95
BDEB-20	2-1/2	2	1-1/16	7-1/2	1	3-1/2	2-1/2	2	2-7/16	5.75
BDEB-25	3	2-1/2	1-3/16	8-1/2	1	4	3	2-1/2	3	6.59
BDEB-30	3	3	1-5/16	9-1/2	1	4-1/4	3-1/4	3	3-1/4	7.50
BDEB-35	4	3-1/2	1-13/16	12-5/8	1-11/16	5-11/16	4	3-1/2	41/8	9.62
BDEB-40	4-1/2	4	2-1/16	14-7/8	1-15/16	6-7/16	4-1/2	4	5-1/4	11.50

MATERIAL: 05 thru 10, 1144 Steel Forging; 13 thru 40, Ductile Iron Casting



Clevis Bracket

CLEVIS BRACKETS

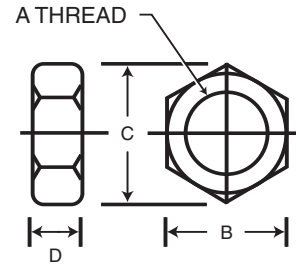


Part #	AA	BA	CB	CD	CW	DD	E	F	FL	LR	M	MR
BDCB-05	2.3	1.63	.765	1/2	1/5	3/8-24	2-1/2	3/8	1-1/8	1/2	1/2	9/16
BDCB-07	3.6	2.56	1.285	3/4	5/8	1/2-20	3-1/2	5/8	1-7/8	1-1/16	3/4	1-1/16
BDCB-10	4.6	3.25	1.515	1	3/4	5/8-18	4-1/2	3/4	2-1/4	1-1/4	1	1-1/8
BDCB-13	5.4	3.81	2.032	1-3/8	1	5/8-18	5	7/8	3	1-7/8	1-3/8	1-3/4
BDCB-17	7.0	4.95	2.531	1-3/4	1-1/4	7/8-14	6-1/2	7/8	3-1/8	2	1-3/4	1-7/8
BDCB-20	8.1	5.75	2.531	2	1-1/4	1-14	7-1/2	1	3-1/2	2-1/8	2	2-1/8
BDCB-25	9.3	6.59	3.032	2-1/2	1-1/2	1-1/8-12	8-1/2	1	4	2-5/8	2-1/2	2-1/2
BDCB-30	10.6	7.50	3.032	3	1-1/2	1-1/4-12	9-1/2	1	4-1/4	2-7/8	2-3/4	2-3/4
BDCB-35	13.6	9.62	4.032	3-1/2	2	1-3/4-12	12-5/8	1-11/16	5-11/16	3-5/8	3-1/2	3-1/2
BDCB-40	16.2	11.50	4.532	4	2-1/4	2-12	14-7/8	1-15/16	6-7/16	4	4	4

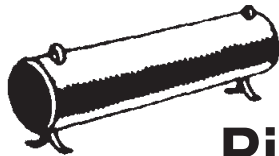
MATERIAL: 05 thru 20, Ductile Iron Casting

Jam Nut

Note: Order by thread size.

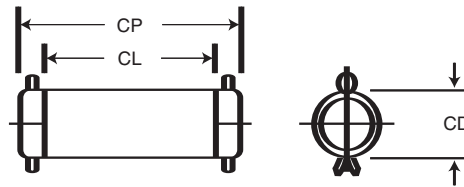


Part Number	DIMENSION IN INCHES			
	Thd A	B	C	D
7/16-20-JN	7/16 – 20	11/16	25/32	1/4
1/12-20-JN	1/2 – 20	3/4	55/64	5/16
5/8-18-JN	5/8 – 18	15/16	1-3/32	3/8
3/4-16-JN	3/4 – 16	1-1/8	1-1/4	27/64
7/8-14-JN	7/8 – 14	1-5/16	1-15/32	31/64
1-14-JN	1 – 14	1-1/2	1-11/16	35/64
1 1/4-12-JN	1-1/4 – 12	1-7/8	2-1/8	23/32
1 1/2-12-JN	1-1/2 – 12	2-1/4	2-17/32	27/32
1 3/4-12-JN	1-3/4 – 12	2-5/8	2-15/16	31/32
1 7/8-12-JN	1-7/8 – 12	2-15/16	3-5/16	1-1/32
2-12-JN	2 – 12	3-1/8	3-5/8	1-1/8
2 1/4-12-JN	2-1/4 – 12	3-1/8	3-5/8	1-1/8
2 1/2-12-JN	2-1/2 – 12	3-3/4	4-1/2	1-1/2



Pivot Pin

with Cotter Pins

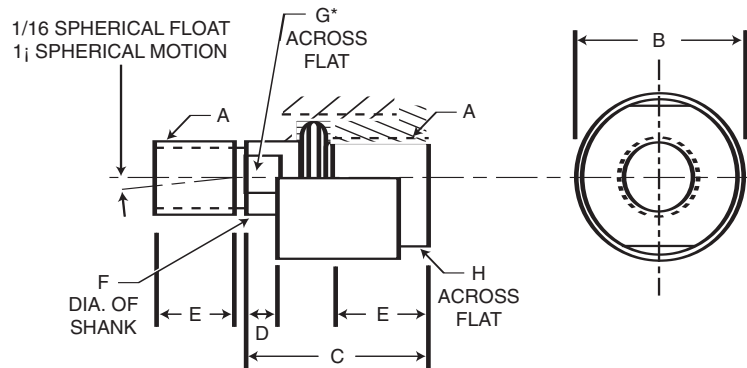
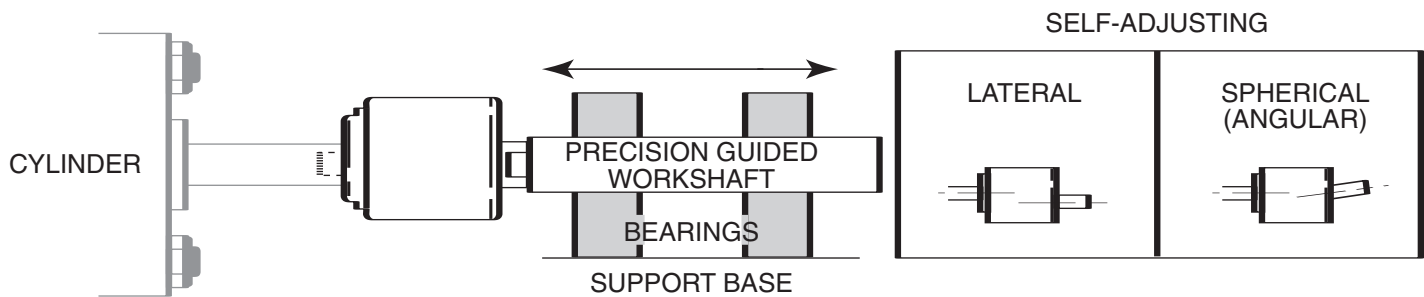
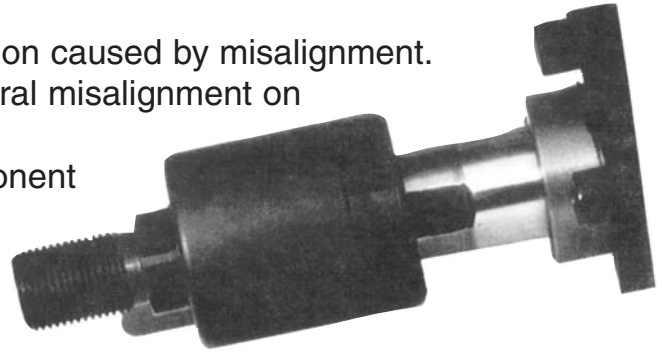


Pivot pins must be ordered as separate parts to fit matching clevis eye or bracket.

Bore Sizes	Rod Dia	Part Number	INCHES		
			CD	CL	CP
1-1/2	5/8	BDP-05H	1/2	1-29/32	2-5/32
2 – 2-1/2	1	BDP-07H	3/4	2-23/32	3
3-1/4	1-3/8	BDP-10H	1	3-1/32	3-5/16
4	1-3/4	BDP-13H	1-3/8	4	4-13/32
5	2	BDP-17H	1-3/4	5	5-5/8
6	2-1/2	BDP-20H	2	5	5-5/8
8	3-1/2	BDP-30H	3	6	6-3/4
10	4-1/2	BDP-35H	3-1/2	8	9-1/8
12	5-1/2	BDP-40H	4	9	10-1/8

SELF-ALIGNING ROD COUPLER

- Eliminates expensive precision machining for mounting fixed or rigid guide in cylinder for slide applications.
- Increases cylinder efficiency by eliminating friction caused by misalignment.
- Compensates for 1° angular error and 1/32 lateral misalignment on push and pull stroke.
- Greater reliability – reduces cylinder and component wear.
- Simplifies alignment problems in the field.
- Manufactured from high tensile and hardened steel components.



Model Number	A	B	C	D	E	F	G	H	Max. Pull at Yield
*SARC0250F	1/4 – 28	7/8	1-1/4	1/4	5/8	5/16	3/16	3/4	6,000
*SARC0312F	5/16 – 24	7/8	1-1/4	1/4	5/8	5/16	3/16	3/4	8,300
*SARC0375F	3/8 – 24	7/8	1-1/4	1/4	5/8	5/16	5/16	3/4	8,300
*SARC0375C	3/8 – 16	7/8	1-1/4	1/4	5/8	5/16	5/16	3/4	5,000
SARC0437F	7/16 – 20	1/14	2	1/2	3/4	5/8	1/2	1	10,000
SARC0500F	1/2 – 20	1-1/4	2	1/2	3/4	5/8	1/2	1	14,000
SARC0500C	1/2 – 13	1-1/4	2	1/2	3/4	5/8	1/2	1	14,000
SARC0625F	5/8 – 18	1-1/4	2	1/2	3/4	5/8	1/2	1	19,000
SARC0750F	3/4 – 16	1-3/4	2-5/16	1/2	1-1/8	31/32	13/16	1-1/2	34,000
SARC0750C	3/4 – 10	1-3/4	2-5/16	1/2	1-1/8	31/32	13/16	1-1/2	34,000
SARC0875F	7/8 – 14	1-3/4	2-5/16	1/2	1-1/8	31/32	13/16	1-1/2	39,000
SARC1000F	1 – 14	2-1/2	2-15/16	1/2	1-5/8	1-3/8	1-5/32	2-1/4	64,000
SARC1000C	1 – 8	2-1/2	2-15/16	1/2	1-5/8	1-3/8	1-5/32	2-1/4	64,000
SARC1250F	1-1/4 – 12	2-1/2	2-15/16	1/2	1-5/8	1-3/8	1-5/32	2-1/4	78,000
SARC1375F	1-3/8 – 12	2-1/2	2-15/16	1/2	1-5/8	1-3/8	1-5/32	2-1/4	78,000
SARC1500F	1-1/2 – 12	3-1/4	4-3/8	13/16	2-1/4	1-3/4	1-1/2	3	134,000
SARC1750F	1-3/4 – 12	3-1/4	4-3/8	13/16	2-1/4	1-3/4	1-1/2	3	134,000

CYLINDER AND ACCESSORY WEIGHTS

CYLINDER WEIGHTS

A & L Series

Cylinder Bore	Base Weight (Zero Stroke)	Add Per Inch Of Stroke
1-1/2	4.0 #	.31 #
2	6.0 #	.42 #
1-1/2	10.0 #	.48 #
3-1/4	19.0 #	.83 #
4	27.0 #	.91 #
5	41.0 #	1.03 #

Cylinder Bore	Base Weight (Zero Stroke)	Add Per Inch Of Stroke
6	66.0 #	1.42 #
8	100.0 #	1.85 #
10	197.0 #	2.43 #
12	298.0 #	3.61 #
14	485.0 #	4.64 #

Correct within 10% for all mounts.

ACCESSORY WEIGHTS

Pivot Pin		Female Clevis		Female Eye	
Part No.	Wt. in lbs.	Part No.	Wt. in lbs.	Part No.	Wt. in lbs.
BDP-05H	.13	BDC-05	.30	BDE-05	.30
BDP-07H	.39	BDC-07	1.00	BDE-07	1.00
BDP-10H	.83	BDC-10	3.00	BDE-10	2.00
BDP-13H	2.00	BDC-13	6.00	BDE-13	6.00
BDP-17H	4.10	BDC-17	10.00	BDE-17	11.00
BDP-20H	5.37	BDC-20	15.00	BDE-20	19.00
BDP-30H	14.28	BDC-30	30.00	BDE-30	45.00
BDP-35H	26.25	BDC-35	42.00	BDE-35	60.00
BDP-45H	37.85	BDC-40	65.00	BDE-40	80.00
		BDC-06-S	.30	BDE-06-S	.30
		BDC-07-7/8	1.00	BDE-08-S	1.00
		BDC-15-S	3.00	BDE-15-S	2.00
		BDC-18-S	6.00	BDE-18-S	6.00
		BDC-19-S	10.00	BDE-19-S	11.00
		BDC-50-S	15.00	BDE-50-S	19.00

Clevis Bracket		Eye Bracket		Self-Aligned Rod Coupler	
Part No.	Wt. in lbs.	Part No.	Wt. in lbs.	Part No.	Wt. in lbs.
DCB-050	.63	BDEB-05	.63	SARC0437F	.50
DCB-075	2.00	BDEB-07	2.00	SARC0750F	1.00
DCB-100	6.00	BDEB-10	6.00	SARC1000F	2.00
DCB-138	12.00	BDEB-13	12.00	SARC1250F	4.00
DCB-175	20.00	BDEB-17	20.00	SARC1500F	6.00
DCB-200	27.00	BDEB-20	27.00	SARC1750F	9.00
DCB-300	51.00	BDEB-30	51.00		
DCB-350	100.00	BDEB-35	100.00		
DCB-400	170.00	BDEB-40	170.00		

Our kits are designed to replace the original seals and the hard material parts that may wear out. They can be ordered by using the coding system (shown below). The coding system is designed so that you may easily select the type of materials that suit your needs as well as the type of kits required to complete repairs.

There are two (2) types of kits available:

- 1. Repair Kits 2. Seal Kits**

Repair Kits: Include all seals for the cylinder rod cushion inserts as well as all bearing wear band material and rod cartridge.

Seal Kits: Include all seals for the cylinder, cylinder rod. They **DO NOT** include bearing wear bands or rod cartridge.

EXAMPLE: RS1K36F15A2

R	S	1	K
C Cylinder	R Repair	1 Single Rod	KITS
P Piston	S Seal	2 Double Rod	
R Rod			

36	F15	A	2
Mounting Code	Bore and Rod Code	Cylinder Series	Seal Code

Refer to order information on page two.

De-Sta-Co Cylinders – Parts

Individual parts may be ordered by using the cylinder model number or cylinder serial number.

Parts are defined as any machined part that is not part of a kit such as piston rod assembly, heads, caps, cylinder tubes and tie rods.

PISTON RODS AND PISTONS will only be sold as an assembled part. Please contact your De-Sta-Co Cylinders distributor for information on ordering piston and rod assemblies.

A-L Assembly Torques (ft. lbs.)

Bore	Tie Rod	Rod Size	Retainer
1-1/2	10	5/8	7.5
2	15	1	19
2-1/2	15	1-3/8	19
3-1/4	30	1-3/4	38
4	30	2	38
5	60	2-1/2	38
6	60	3-1/2	70
8	120	4	70
10	150	5	110
12	175	5-1/2	110
14	275	contact factory	contact factory

Torque for full rod retainers, use tie rod torque values.

Theoretical Push and Pull for All Cylinders

Push Force and Displacement

Cyl Bore (inches)	Piston Area (sq. in.)	Cylinder Push Stroke Force in Pounds At Various Pressures										Displacement per Inch of Stroke (gallons)
		25	50	65	80	100	250	500	1000	2000	3000	
1-1/2	1.767	44	88	115	142	177	443	885	1770	3540	5310	0.00765
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	0.0136
2-1/2	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	0.0213
3-1/4	8.30	208	415	540	664	830	2075	4150	8300	16600	24900	0.0359
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	0.0544
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	0.0850
6	28.27	707	1414	1838	2262	2827	7068	14135	28270	56540	84810	0.1224
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	0.1666
8	50.27	1257	2513	3268	4022	5027	12568	25135	50270	100540	150810	0.2176
10	78.54	1964	3927	5105	6283	7854	19635	39270	78540	157080	235820	0.3400
12	113.10	2828	5655	7352	9048	11310	28275	56550	113100	226200	339300	0.4896
14	153.94	3849	7697	10006	12315	15394	38485	76970	153940	307880	461820	0.6664

Deductions for Pull Force and Displacement

Piston Rod (inches)	Piston Rod (sq. in.)	Piston Rod Diameter Force in Pounds at Various Pressures To determine cylinder PULL force or displacement, deduct the following forces or displacement corresponding to rod size, from selected PUSH stroke force of displacement corresponding to bore size in table above.										Displacement per Inch of Stroke (gallons)
		25	50	65	80	100	250	500	1000	2000	3000	
5/8	0.307	8	15	20	25	31	77	154	307	614	921	0.0013
1	0.785	20	39	51	65	79	196	392	785	1570	2355	0.0034
1-3/8	1.49	37	75	97	119	149	373	745	1490	2980	4470	0.0065
1-3/4	2.41	60	121	157	193	241	603	1205	2410	4820	7230	0.0104
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	0.0136
2-1/2	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	0.0213
3	7.07	177	354	460	566	707	1767	3535	7070	14140	21210	0.0306
3-1/2	9.62	241	481	625	770	962	2405	4810	9620	19240	28860	0.0416
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	0.0544
4-1/2	15.90	398	795	1033	1272	1590	3975	7950	15900	31800	47708	0.0688
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	0.0850
5-1/2	23.76	594	1188	1544	1901	2376	5940	11880	23760	47520	71280	0.1028
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	0.1666
8-1/2	56.75	1419	2838	3689	4540	5675	14187	28375	56750	113500	170250	0.2455

General Formula

The cylinder output forces are derived from the formula $F = P \times A$, where:

F = Force in pounds;

P = Pressure at the cylinder in pounds per square inch, gauge;

A = Effective area of cylinder piston in square inches.

LIMITED EXPRESS WARRANTY

W.G. Benjey, Inc., herein supplies only a LIMITED EXPRESS WARRANTY for all products the company manufactures or assembles for a period of one year from the date of manufacture as follows:

It will only repair or replace any parts which its inspection proves to be defective in material or workmanship occurring within twelve (12) months from its date of delivery to its original purchaser when the product has been used under conditions in which it was designed to operate. We will not accept any charges for removal, installation, assembly or any other charges in connection with replacement or repair of the product(s). No warranty is extended against corrosion, erosion or chemical attack, and the liability of the company under this warranty for loss or damage of any nature, whether based on contract or tort, shall not exceed the purchase price of the equipment manufactured by the company. The company shall not be liable for any consequential, contingent, punitive or incidental damages. At our option, we retain the right to have the product(s) repaired on site or returned to our manufacturing plant for our inspection, repair and testing of the units. All product(s) under warranty, which are alleged to be defective, are to be returned to the factory freight prepaid. A complete explanation is required of the alleged defects and circumstances of such claimed failure.

REPRESENTATIONS

If manufacturer representatives or other persons or entities in soliciting a sale of our product have made oral or written statements about the merchandise described in this contract or the literature of the company or its statements, such statements do not constitute warranties, shall not be relied on by the buyer, and are not part of this contract of sale. The entire contract is embodied in this writing except as to engineering details and specifications. This writing constitutes the final expression of the parties' agreement, and it is a complete and exclusive statement of the terms of that agreement.

LIMITATION OF REMEDY

The parties agree that the purchaser's sole and exclusive remedy against the seller shall be for the repair or replacement of defective parts as provided herein. The purchaser agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, lost incidental or consequential loss) shall be available to purchaser. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as the seller is willing and able to repair or replace defective parts in the prescribed manner.

EXCLUSION OF WARRANTIES

The parties agree that the implied warranties of merchantability and fitness for a particular purpose are excluded from this transaction and shall not apply to the goods sold.

The above limited warranty is in lieu of any other warranties including any implied warranty of merchantability of fitness for a particular purpose. The company neither assumes nor authorizes any other person to assume for it any other liability in connection with the products hereby purchased.

The logo for WGBenjey Cylinders features the letters 'WGB' in a large, outlined, sans-serif font. To the right, 'Benjey' is written in a bold, italicized, red sans-serif font with a white outline, and 'Cylinders' is in a similar bold, italicized, red sans-serif font with a white outline. A small 'INC.' is written in a smaller, red, sans-serif font below 'Benjey'.

Formerly **DE-STA-CO** Cylinders

2293 Werth Road • Alpena, Michigan 49707

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