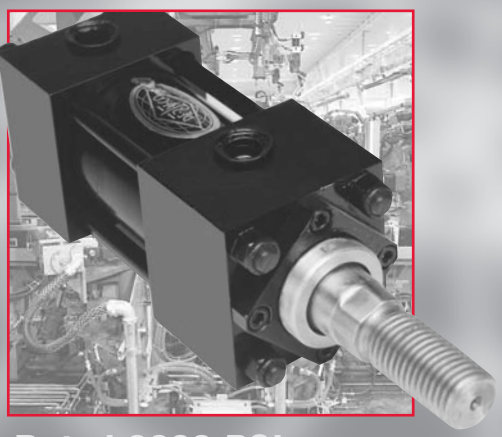
WGB Benjey Cylinders INC.

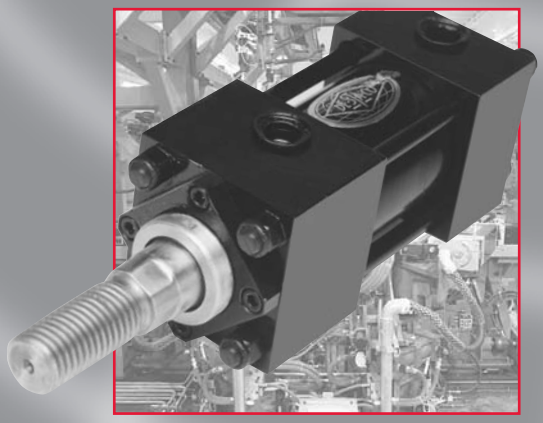
Formerly **DE-STA-CO** Cylinders

2293 Werth Road • Alpena, Michigan 49707
Phone: (800) 942-2957 (WGB-CYLS) • Fax: (866) 942-3297 (WGB-FAXS)

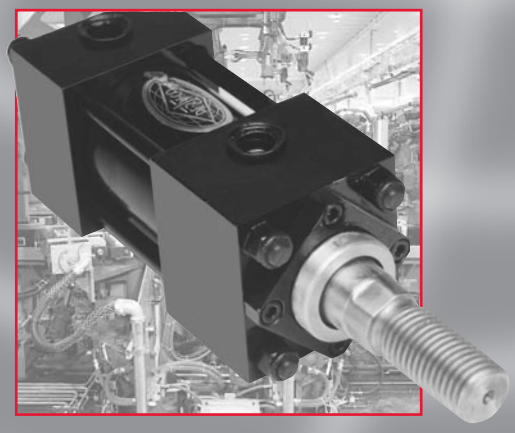
H Series Hydraulic Cylinders



Rated 3000 PSI



Ford HD2 Standard



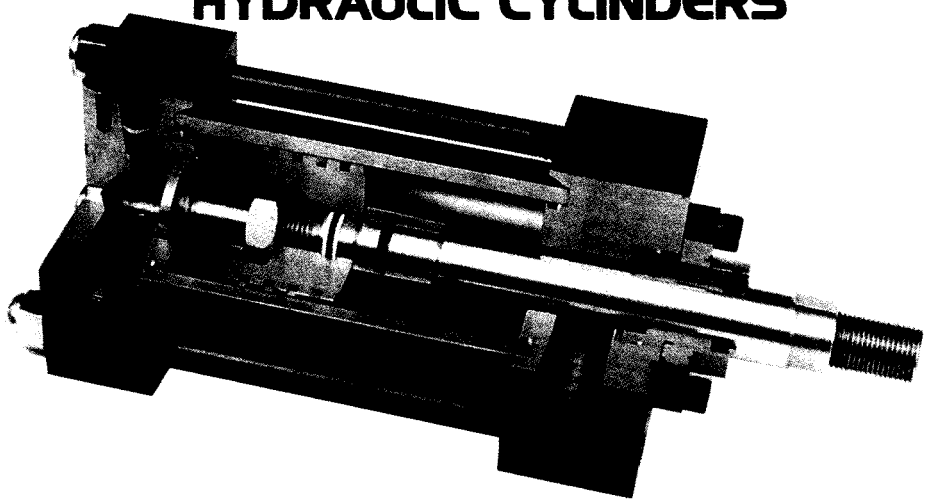
NFPA Industrial, Interchangeable

Your World Wide Provider for Productivity Solutions

H SERIES

(Ford HD2 Standard)

High Pressure Industrial Interchangeable HYDRAULIC CYLINDERS



General Specifications

Pressure Rating --- 3000 psi Heavy Duty Continuous Service.

Industrial Standard --- Meets ANSI B93-15 standards.

Temperature Range -- Buna N seals -10° to + 165°F; Viton above +165°. Consult factory for higher temperature applications.

Operating Fluids -- All petroleum based as well as high water content soluable oil, and emulsion type fire retardant fluids.

Bore Sizes -- 1-1/2" thru 12" cataloged; 14" thru 22" (consult factory).

Rod Sizes -- 5/8" thru 8-1/2" cataloged; 9" thru 16" (consult factory).

Cushions -- Floating type (consult ordering information page two for selection).

Head and Caps -- Machined from precision blocks.

Piston -- Standard is fine grain iron.

Ports -- Standard is SAE straight thread. Other are available.

Piston Rod -- 100,000 psi minimum yield strength steel. Induction hardened to Rc54 ground and polished hard chrome-plated to a 10 micro inch finish.

Tube -- On standard nominal 10-15 micro inch finish.

Tie Rods -- High tensile steel with rolled threads.

Tie Rod Nuts -- Self-locking steel.

Piston Seals -- Soft seals block V or U cups standard. Iron rings available at no extra charge. See order information for other seal types.

H SERIES HYDRAULIC HEAVY DUTY CYLINDERS
Ordering Information

VGBenjey Cylinders INC.
Formerly **DE-STA-CO** Cylinders

ORDER EXAMPLE: H B 28 *C15 4 2 A B 032 ▷▷▷▷▷▷▷▷▷▷▷▷ **EXAMPLE**

H SERIES

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
- G -- Single rod 4/bolt flg
- H -- Dble rod 4/bolt flg
- J - - Manifold

***NOTE:** IF "S" is in the model code, you must use a sequence number assigned by order department.

EXAMPLE:

HB28C15S0001

MOUNTING CODE

MOUNTING STYLE	NFPA STYLE	NON-CUSH	CUSHION HEAD	CUSHION CAP	CUSHION BOTH
NO MOUNT	MXO	01	02	03	04
TIE RODS ext both ends	MX1	05	06	07	08
TIE ROD ext cap end	MX2	09	10	11	12
TIE ROD ext head end	MX3	13	14	15	16
RECT ANGULAR HEAD	ME5	25	26	27	28
RECTANGULAR CAP	ME6	29	30	31	32
HEAD RECT FLANGE	MF1	33	34	35	36
CAP RECT FLANGE	MF2	37	38	39	40
HEAD SQ FLANGE	MF5	41	42	43	44
CAP SQ. FLANGE	MF6	45	46	47	48
CAP FIXED CLEVIS	MP1	49	50	51	52
CAP DETACH CLEVIS	MP2	53	54	55	56
CAP FIXED spherical bearing	MPU3	57	58	59	60
SIDE LUG (FOOT)	MS2	65	66	67	68
CENTER LINE side lug	MS3	69	70	71	27
SIDE TAPPED	MS4	73	74	75	76
END LUG	MS7	77	78	79	80
HEAD TRUNNION	MT1	81	82	83	84
CAP TRUNNION	MT2	85	86	87	88
OVERSIZED INT. TRUNNION	MT3	89	90	91	92
STANDARD INT. TRUNNION	MT4	93	94	95	96

Cylinder Size

BORE SIZE	ROD SIZE	MODEL# CODE
1-1/2"	5/8"	B11
	1"	B13
2"	1"	C13
	1-3/8"	C15
2-1/2"	1"	D13
	1-3/8"	D15
	1-3/4"	D17
3-1/4"	1-3/8"	E15
	1-3/4	E17
	2"	E18
4"	1-3/4"	F17
	2"	F18
	2-1/2"	F20
5"	2"	H18
	2-1/2"	H20
	3"	H21
	3-1/2"	H22
6"	2-1/2"	J20
	3"	J21
	3-1/2"	J22
	4"	J23
8"	3-1/2"	L22
	4"	L23
	5-1/2"	L26
10"	4-1/2"	M24
	5-1/2"	M26
	7"	M27
12"	5-1/2"	U26
	7"	U27
	8"	U28

ROD END

- 1 - Full male
- 2 - Small male
- 3 - Short female
- 4 - INT. male
- 5 - Automotive male
- S - Special See note*

Seal Code

- 1- Buna/piston rings
- 2- Buna lip seals
- 3- Viton/piston rings
- 4- Viton/lip seals
- 5- Glyde ring
- 6- Carboxilated nitrile
- 7- Urethane

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*

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 stroke in inches X 8

HOW TO ORDER:

The new Simplified Ordering method is easy!

1. Select the **SERIES**. **2.** Select the cylinder **STYLE**. **3.** Select **MOUNTING** code. **4.** Select the cylinder **SIZE** code. **5.** Select the **ROD** end **6.** Select the **SEAL** code. **7.** Select the **PORT** Location. **8.** Select the **CUSHION** Location. **9.** Select the **STROKE** code. Put them all together:

Example: H B 28 * C15 4 2 A B 032

*** Insert K when ordering Key Retainer Plate -- see inside back cover**

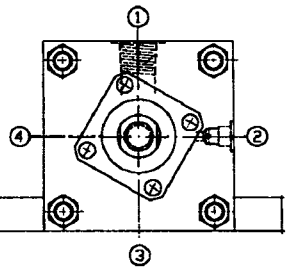
Ford HD2 Series Ordering Information

FORD STANDARD HEAVY DUTY HYDRAULIC CYLINDERS

Feature	Description	Code
Cushion Head	Used only if cushion required	C
Bore	Specify in inches	-
Series	Standard group code used in all HD2 Model Numbers	HD2
Piston Rod Diameter	3/8" through 5-1/2" Refer to diameter column MM, catalog and page 30.	5/8, 1, 1-3/8" 1-3/4, 2, 2-1/2" 3, 3-1/2, 4"
Piston Rod End	Select: Style A - Automostive Make Style IM - Intermediate Male (3-1/2" thru 5-1/2") Style SM - Small Male (SF with stud 5/8" thru 2-1/2") Style SF - Short Female	 A IM SM SF
Mounting Style	Side Lugs Head Rectangle Flange Cap Rectangle Flange Head Square Flange Head Rectangular Cap Rectangular Cap Tie Rods Extended Head Tie Rods Extended Head Trunnion Cap Trunnion Intermediate Fixed Trunnion Cap Fixed Clevis	MS2 MF1 MF2 MF5 ME5 ME6 MX2 MX3 MT1 MT2 MT4 MP1
Stroke	Specify in inches	-
Cushion-Cap	Used only if cushion required	C
Port Type	NPTF Thread Ports SAE Thread Ports	N S
Seal Type	1. - Cast Iron Piston Rings/Buna N Rod Seals 2. - Buna N (Nitrile) throughout 3. - Viton throughout 4. - Cast Iron Piston Rings/Viton Rod Seals	1 2 3 4

EXAMPLE OF MODEL NUMBER

C - 1-1/2 - HD2 - 5/8 - SM - MS2 - 3 - C - S - 1



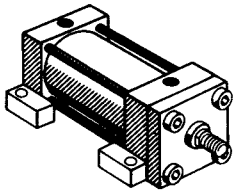
NOTE: Diagram indicates standard Port and Cushion locations.

If Key Extension Required add "K" to mounting style
Example: C - 1-1/2 - HD2 - 5/8 SM - MS2K - 3 - C - S - 1

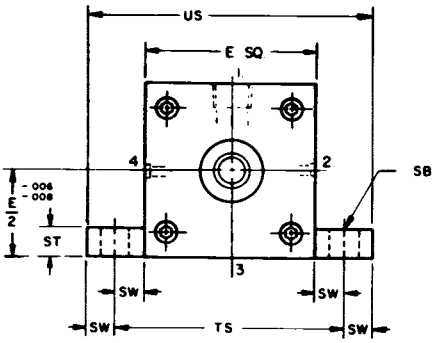
If Double Rod End Cylinder Required add "D" to mounting style.
Example: C - 1-1/2 - HD2 - 5/8 SM - MDS2 - 3 - C - S - 1 (see page 32 & 33).

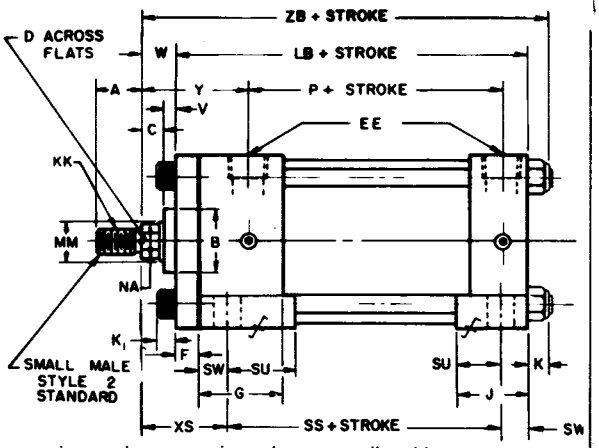
For Special Modifications add "S" at end of model number and specify special feature required.
Example: C - 1-1/2 - HD2 - 5/8 SM - MS2 - 3 - C - S - 1 - S
S= Ports to be at position #2

SIDE LUG



Model MS2
1-1/2"-8" Bore

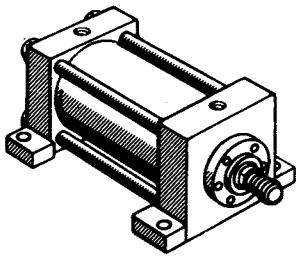




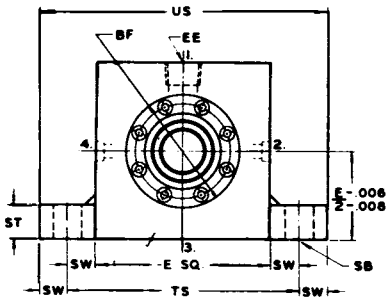
Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

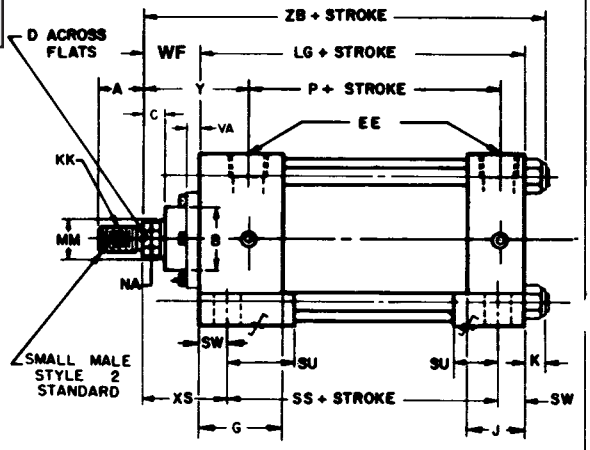
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

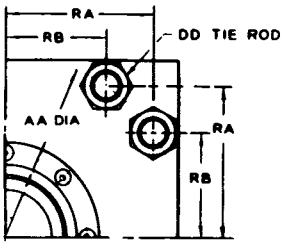
SIDE LUG



Model MS2
10"-12" Bore





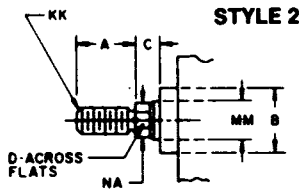


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1 1/4 - 12
12	15 44	6 30	4 45	1-3/8 - 12

The 10" and 12" bore SERIES "HD2/H" Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

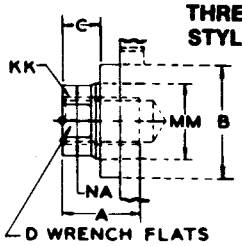
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



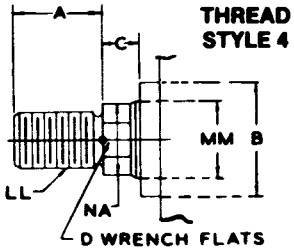
SMALL MALE

THREAD STYLE 3



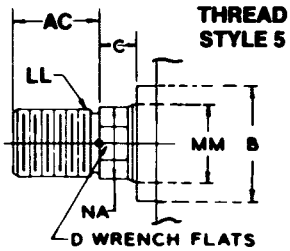
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	J	K	K1	LB	LG	P	SB(BOLT)	SS	ST	SU	SW	TS	US
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	3/8	5	_	2 7/8	3/8	3 7/8	1/2	15/16	3/8	3 1/4	4
2	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 1/4	_	2 7/8	1/2	3 5/8	3/4	1 1/4	1/2	4	5
2 1/2	3 1/2	3/4 16	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 3/8	__	3	3/4	3 3/8	1	1 9/16	11/16	4 7/8	6 1/4
3 1/4	4 1/2	1 1/16 12	3/4	3/4	2	1 3/4	25/32	5/8	6 1/4	__	3 1/2	3/4	4 1/8	1	1 9/16	11/16	5 7/8	7 1/4
4	5	1 1/16 12	3/4	7/8	2	1 3/4	25/32	5/8	6 5/8	__	3 3/4	1	4	1 1/4	2	7/8	6 3/4	8 1/2
5	6 1/2	1 1/16 12	3/4	7/8	2	1 3/4	1	7/8	7 1/8	__	4 1/4	1	4 1/2	1 1/4	2	7/8	8 1/4	10
6	7 1/2	15/16 12	1	1	2 1/4	2 1/4	1 3/32	1	8 3/8	__	4 7/8	1 1/4	5 1/8	1 1/2	2 1/2	1 1/8	9 3/4	12
8	9 1/2	1 7/8 12	1 1/2	1	3	3	1 7/16	1 1/4	10 1/2	__	6 1/8	1 1/2	6 3/4	1 3/4	2 7/8	1 3/8	12 1/4	15
10	12 5/8	__	2	__	3 11/16	3 11/16	1 7/16	__	__	12 1/8	8	1 1/2	8 7/8	2 1/4	3 1/2	1 5/8	15 7/8	19 1/8
12	14 7/8	__	2 1/2	__	4 7/16	4 7/16	1 5/8	__	__	14 1/2	9 3/8	1 1/2	10 1/2	3	4 1/4	2	18 7/8	22 7/8

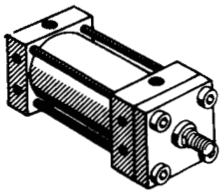
* For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
** For 1 1/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

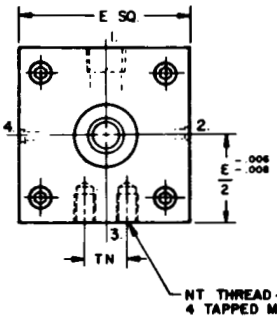
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE													
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	XS	Y	ZB
1 1/2	5/8	7/16 20	1/2 20	3/4	1 3/25	1 1/8	__	3/8	1/2	51/86	1/4	__	5/8	__	1 3/8	2	6 3/32
2	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	__	1/2	7/8	30/31	1/2	_	1	_	1 3/4	2 3/8	6 15/32
	1	3/4 16	7/8	1 1/8	1 22/25	1 1/2	__	1/2	7/8	30/31	1/4	__	3/4	__	1 7/8	2 3/8	6 5/8
	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	_	5/8	1 1/8	1 12/35	3/8	_	1	_	2 1/8	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	_	1/2	7/8	30/31	1/4	_	3/4	_	2 1/16	2 3/8	6 3/4
	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	_	5/8	1 1/8	1 343	3/8	_	1	_	2 5/16	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.783	1/2	_	1 1/4	_	2 9/16	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	1/4	_	7/8	_	2 5/16	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	3/8	_	1 1/8	_	2 9/16	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	2 11/16	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/4	_	1	_	2 3/4	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	2 7/8	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 1/8	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	2 7/8	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 1/8	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	3/8	_	1 3/8	_	3 1/8	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	3/8	_	1 3/8	_	3 1/8	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6 1/2	4 1/4	_	1	3	3.437	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	_	1	3 3/8	3.937	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	1/4	_	1 1/4	_	3 5/8	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	_	1	3 3/8	3.937	1/4	_	1 1/4	_	3 5/8	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	_	1	4 5/8	5.421	1/4	_	1 1/4	_	3 5/8	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	4 9/16	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	4 13/16	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 1/16	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 3/16	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 7/16	6	19 9/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	5 7/16	6	19 9/16

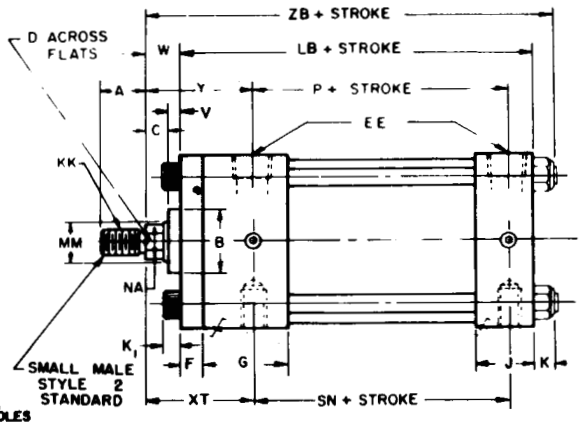
Note: Mounting holes shown are .062 larger than bolt size listed.
*Shaded area not HD2 standard

SIDE TAPPED



Model MS4
1-1/2"-8" Bore



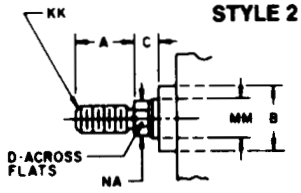


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

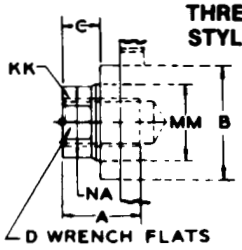
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



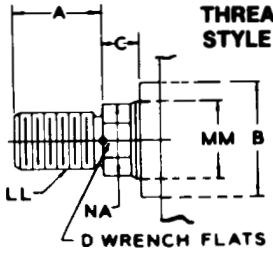
SMALL MALE

THREAD STYLE 3



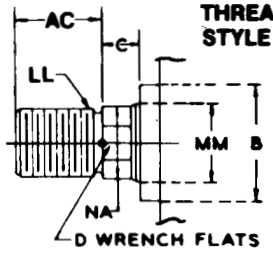
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	J	K	LB	NT	P	SN	TN
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	5	3/8 16	2 7/8	2 7/8	3/4
2	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	5 1/4	1/2 13	2 7/8	2 7/8	15/16
2 1/2	3 1/2	3/4 16	1/2	5/8	1 3/4	1 1/2	5/8	5 3/4	5/8 11	3	3	1 5/16
3 1/4	4 1/2	1 1/16 12	3/4	3/4	2	1 3/4	25/32	6 1/4	3/4 10	3 1/2	3 1/2	1 1/2
4	5	1 1/16 12	3/4	7/8	2	1 3/4	25/32	6 5/8	1 6	3 3/4	3 3/4	2 1/16
5	6 1/2	1 1/16 12	3/4	7/8	2	1 3/4	1	7 1/8	1 8	4 1/4	4 1/4	2 15/16
6	7 1/2	1 5/16 12	1	1	2 1/4	2 1/4	1 3/32	8 3/8	1 1/4 7	4 7/8	5 1/8	3 5/16
8	9 1/2	1 7/8 12	1 1/2	1	3	3	1 7/16	10 1/2	1 1/2 6	6 1/8	6 5/8	4 1/4

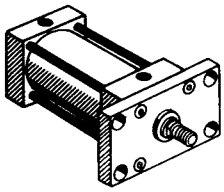
* For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
** For 1 1/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

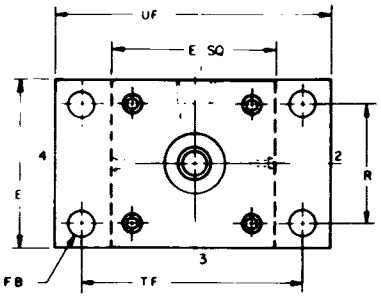
BORE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE											
SIZE	MM	KK	LL	A	AC	B +.000 -.002	C	D	NA	ND	V	W	XT	Y	ZB
1 1/2	5/8	7/16 20	1/2 20	3/4	1 1/2	1 1/8	3/8	1/2	51/86	3/8	1/4	5/8	2	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	1/2	7/8	30/31	3/8	1/2	1	2 3/8	2 3/8	6 15/32
2	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	1/2	7/8	30/31	3/8	1/4	3/4	2 3/8	2 3/8	6 5/8
	1 3/8	1 1/4	1 1/4 12	1 5/8	2 1/2	2	5/8	1 1/8	1 12/35	3/8	3/8	1	2 5/8	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	1/2	7/8	30/31	1/2	1/4	3/4	2 3/8	2 3/8	6 3/4
	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	5/8	1 1/8	1 12/35	1/2	3/8	1	2 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3	2 3/8	3/4	1 1/2	1 45/64	1/2	1/2	1 1/4	2 7/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	5/8	1 1/8	1 12/35	3/4	1/4	7/8	2 3/4	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3	2 3/8	3/4	1 1/2	1 45/64	3/4	3/8	1 1/8	3	3	8 5/32
	2	1 12 12	1 3/4 12	2 1/4	3 1/2	2 16/61	7/8	1 11/16	1 81/85	3/4	3/8	1 1/4	3 1/8	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3	2 3/8	3/4	1 1/2	1 45/64	3/4	1/4	1	3	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3 1/2	2 5/8	7/8	1 11/16	1 81/85	3/4	1/4	1 1/8	3 1/8	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4 1/2	3 1/8	1	2 1/16	2 29/64	3/4	3/8	1 3/8	3 3/8	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3 1/2	2 5/8	7/8	1 11/16	1 81/85	1	1/4	1 1/8	3 1/8	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4 1/2	3 1/8	1	2 1/16	2 29/64	1	3/8	1 3/8	3 3/8	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3 3/4	1	2 5/8	2 15/16	1	3/8	1 3/8	3 3/8	3/38	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6 1/2	4 1/4	1	3	3 7/16	1	3/8	1 3/8	3 3/8	3/38	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4 1/2	3 1/8	1	2 1/16	2 29/64	1 1/8	1/4	1 1/4	3 1/2	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3 3/4	1	2 5/8	2 15/16	1 1/8	1/4	1 1/4	3 1/2	3 1/2	10 23/32
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6 1/2	4 1/4	1	3	3 7/16	1 1/8	1/4	1 1/4	3 1/2	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4 3/4	1	3 3/8	3 15/16	1 1/8	1/4	1 1/4	3 1/2	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6 1/2	4 1/4	1	3	3 7/16	1 1/4	1/4	1 1/4	3 15/16	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4 3/4	1	3 3/8	3 15/16	1 1/4	1/4	1 1/4	3 15/16	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6 1/4	1	4 5/8	5 8/19	1 1/4	1/4	1 1/4	3 15/16	3 15/16	13 3/16

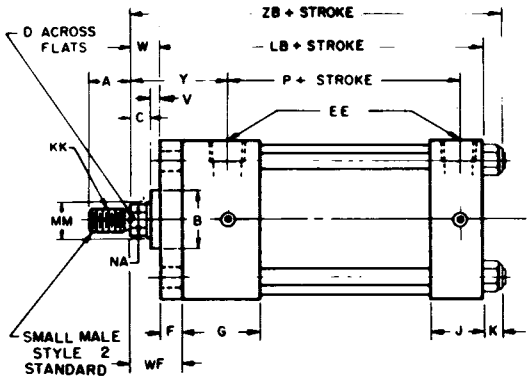
NOTE: Customer mounting holes should by .062 larger than nominal thread size listed
* 1/2" deep Head End

HEAD RECTANGULAR FLANGE



Model MF1
1-1/2"-4" Bore



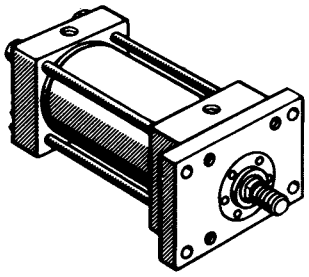


IF HIGHER PRESSURE RATING IS REQUIRED, SEE FLANGE MODELS ON PAGES 12 & 16

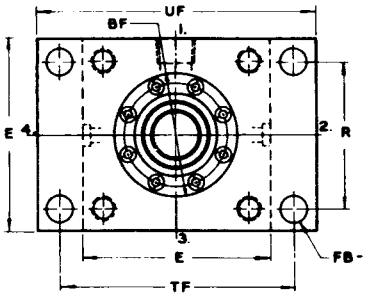
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

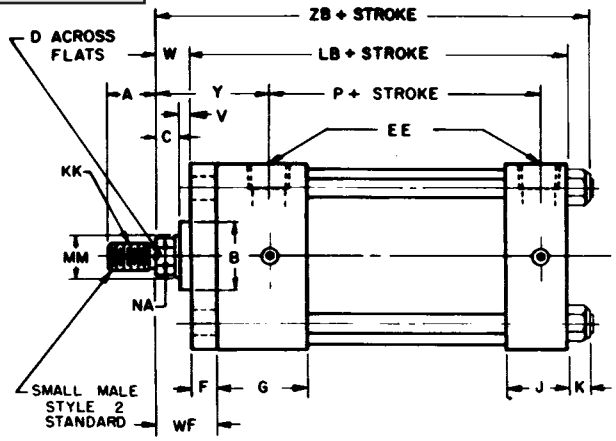
Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

HEAD RECTANGULAR FLANGE



Model MF1
5"-8" Bore





PRESSURE CHART

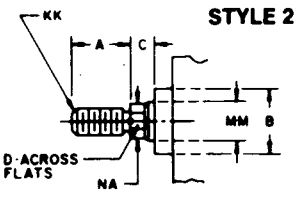
BORE	ROD	MOD.	SEVERE.
	5/8	2470	1480
1-1/2	1	1650	920
	1	2470	1860
2	1-3/8	1470	850
	1	1560	940
2-1/2	1-3/8	1140	610
	1-3/4	730	560

BORE	ROD	MOD.	SEVERE
	1-3/8	1720	1030
3-1/4	1-3/4	1110	670
	2	790	490
	1-3/4	1850	1110
4	2	1710	1030
	2-1/2	1080	650
	2	1700	1020
	2-1/2	1380	830
5	3	1100	660
	3-1/2	810	490

BORE	ROD	MOD.	SEVERE
	2-1/2	1580	950
	3	1350	810
6	3-1/2	1130	680
	4	820	490
	3-1/2	1030	620
	4	880	530
8	4-1/2	770	460
	5	660	400
	5-1/2	550	330

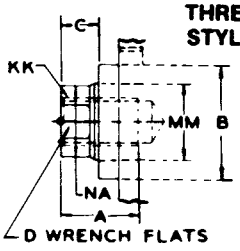
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



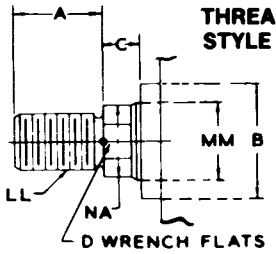
SMALL MALE

THREAD STYLE 3



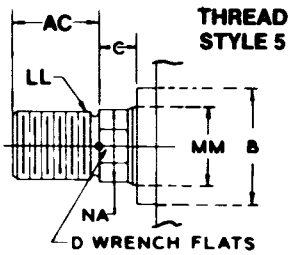
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	FB(BOLT	G	J	K	LB	P	R	TF	UF
1 1/2	2 1/2	1/4 16*	1/2	3/8	3/8	1 3/4	1 1/2	15/32	5	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 1/4	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 3/8	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	3/4	5/8	2	1 3/4	25/32	6 1/4	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	7/8	5/8	2	1 3/4	25/32	6 5/8	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	7/8	7/8	2	1 3/4	1	7 1/8	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	1	1	2 1/4	2 1/4	1 3/32	8 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	1	1 1/4	3	3	1 7/16	10 1/2	6 1/8	7.50	11 13/16	14

NOTE: Mounting holes shown are .062 larger than bolt size listed.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

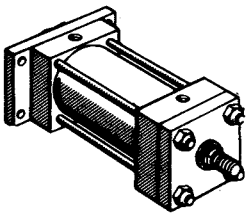
Rod End Dimensions

BORE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE											
SIZE	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	W	WF	Y	ZB
1 1/2	5/8	7/16 20	1/2 20	3/4	1.12	1.124	_	3/8	1/2	.593	1/4	5/8	1	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	1	1 3/8	2 3/8	6 15/32
2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	3/4	1 3/8	2 3/8	6 5/8
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	3/8	1	1 5/8	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	3/4	1 3/8	2 3/8	6 3/4
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	3/8	1	1 5/8	5 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/2	1 1/4	1 7/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	1/4	7/8	1 5/8	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	3/8	1 1/8	1 7/8	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	1 1/4	2	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/4	1	1 7/8	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	1 1/8	2	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	1 3/8	2 1/4	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	21/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	1 1/8	2	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	1 3/8	2 1/4	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	1 3/8	2 1/4	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	1 3/8	2 1/4	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	1/4	1 1/4	21/4	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	1/4	1 1/4	2 1/4	3 1/2	10 23/32
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	1 1/4	2 1/4	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1 1/4	2 1/4	31/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	1 1/4	2 1/4	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1 1/4	2 1/4	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/4	1 1/4	2 1/4	3 15/16	13 3/16

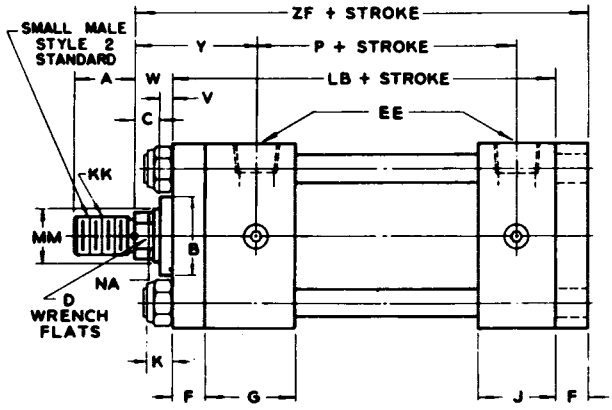
NOTE: Shaded area not HD2 standard

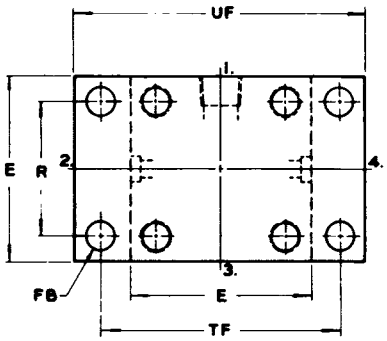
Cap Rectangular Flange Mount Dimensions

CAP RECTANGULAR FLANGE



Model MF2
1-1/2"-4" Bore
With Maximum Oversize Rods



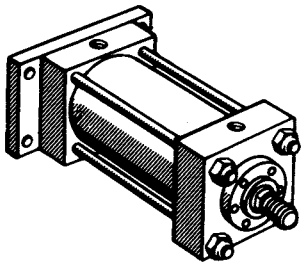


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

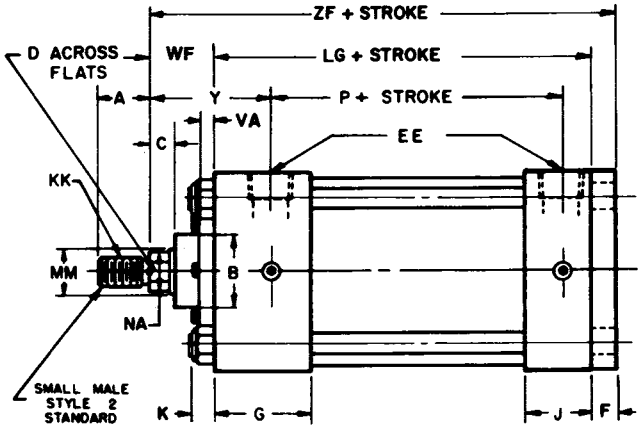
IF HIGHER PRESSURE RATING IS REQUIRED, SEE FLANGE MODELS ON PAGE 14 AND 18

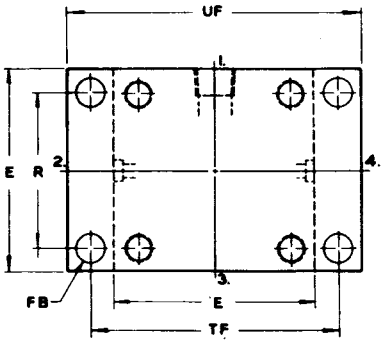
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

CAP RECTANGULAR FLANGE



Model MF2
1-1/2"-8" Bore





PRESSURE CHART

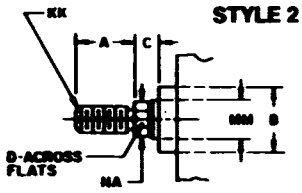
BORE	ROD	MOD.	SEVERE.
	5/8	2470	1480
1-1/2	1	1650	920
	1	2470	1860
2	1-3/8	1470	850
	1	1560	940
2-1/2	1-3/8	1140	610
	1-3/4	730	560

BORE	ROD	MOD.	SEVERE
	1-3/8	1720	1030
3-1/4	1-3/4	1110	670
	2	790	490
	1-3/4	1850	1110
4	2	1710	1030
	2-1/2	1080	650
	2	1700	1020
	2-1/2	1380	830
5	3	1100	660
	3-1/2	810	490

BORE	ROD	MOD.	SEVERE
	2-1/2	1580	950
	3	1350	810
6	3-1/2	1130	680
	4	820	490
	3-1/2	1030	620
	4	880	530
8	4-1/2	770	460
	5	660	400
	5-1/2	550	330

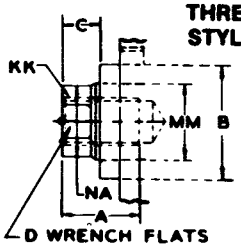
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



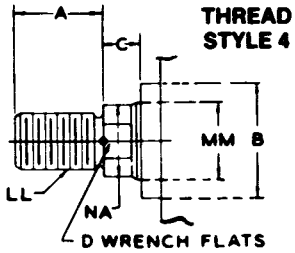
SMALL MALE

THREAD STYLE 3



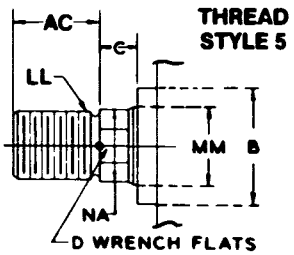
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	FB(BOLT)	G	J	K	LB	LG	P	R	TF	UF
1 1/2	2 1/2	1/4 16*	1/2	3/8	3/8	1 3/4	1 1/2	15/32	5	4 5/8	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 1/4	4 5/8	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 3/8	4 3/4	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	3/4	5/8	2	1 3/4	25/32	6 1/4	5 1/2	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	7/8	5/8	2	1 3/4	25/32	6 5/8	5 1/4	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	7/8	7/8	2	1 3/4	1	_	6 1/4	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	1	1	2 1/4	2 1/4	1 3/32	_	7 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	1	1 1/4	3	3	1 7/16	_	9 1/2	6 1/8	7.50	11 13/16	14

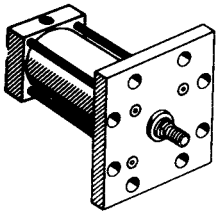
NOTE: Mounting holes shown are .062 larger than bolt size listed.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

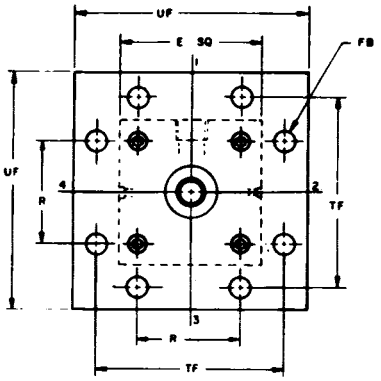
BORE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE												
SIZE	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	Y	ZF
1 1/2	5/8	7/16 20	1/2 20	3/4	1.12	1.124	2 1/8	3/8	1/2	.593	1/4	1/4	_	1	2	6
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	2 3/8	6 3/8
2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	_	1 3/8	2 3/8	6 5/8
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	_	1 3/8	2 3/8	6 3/4
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	3/8	3/8	_	1 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	1/4	3/8	_	1 5/8	2 3/4	7 7/8
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	3/8	_	1 7/8	3	8 1/8
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	3 1/8	8 1/4
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	1/4	3/8	_	1 7/8	3	8 1/2
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	_	2	3 1/8	8 5/8
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 3/8	8 7/8
5	2	1 1/2 12	1 3/4 12	21/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	_	2	3 1/8	9 1/8
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	3/8	_	2 1/4	3 3/8	9 3/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	3/8	_	2 1/4	3 3/8	9 3/8
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	3/8	_	2 1/4	3 3/8	9 3/8
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1/2	-	2 1/4	3 1/2	10 5/8
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	3/8	_	2 1/4	3 15/16	12 3/4
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1/2	_	2 1/4	3 15/16	12 3/4
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/4	1/2	_	2 1/4	3 15/16	12 3/4

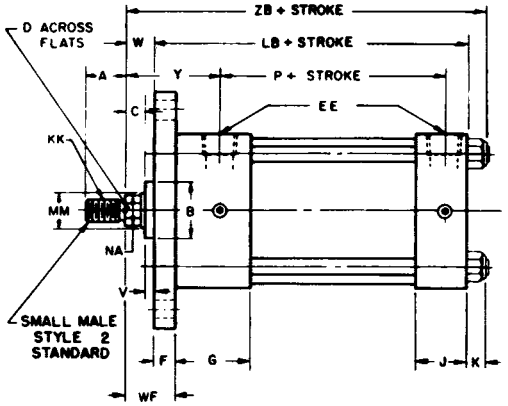
NOTE: Shaded area not HD2 standard

HEAD SQUARE FLANGE



Model MF5
1-1/2"-4" Bore

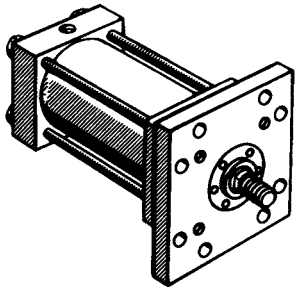




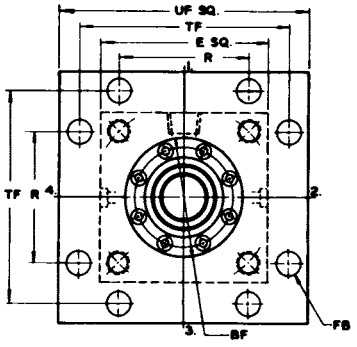
Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

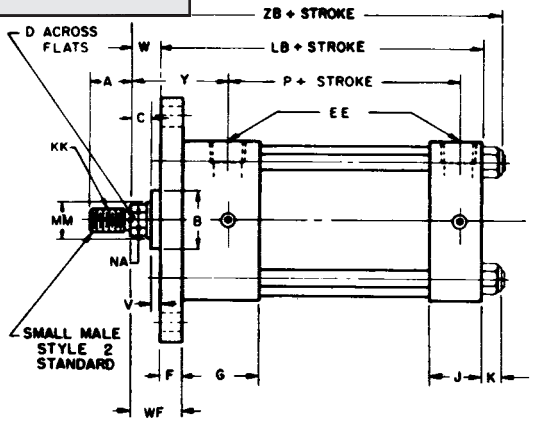
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

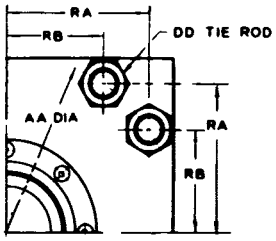
HEAD SQUARE FLANGE



Model MF5
5"-12" Bore





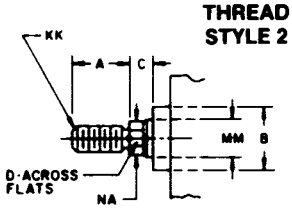


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1-1/4-12
12	15 44	6 30	4.45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

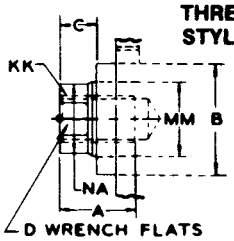
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



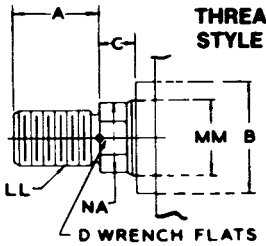
SMALL MALE

THREAD STYLE 3



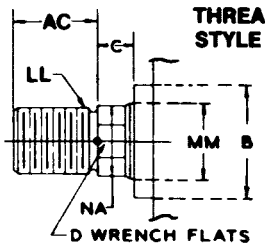
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	FB (BOLT)	G	J	K	LB	P	R	TF	UF
1 1/2	2 1/2	3/4 16*	1/2	3/8	3/8	1 3/4	1 1/2	5/815/32	5	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 1/4	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 3/8	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	3/4	5/8	2	1 3/4	25/32	61/4	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	7/8	5/8	2	1 3/4	25/32	6 5/8	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	7/8	7/8	2	1 3/4	1	7 1/8	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	1	1	2 1/4	2 1/4	1 3/32	8 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	1	1 1/4	3	3	1 7/16	10 1/2	6 1/8	7.50	11 13/16	14
10	12 5/8	_	2	1 11/16	1 3/4	3 11/16	3 11/16	1 7/16	13 13/16	8	9.62	15 7/8	19
12	14 7/8	_	2 1/2	1 15/16	2	4 7/16	4 7/16	1 5/8	16 7/16	9 3/4	11.45	18 1/2	22

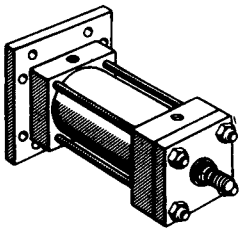
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

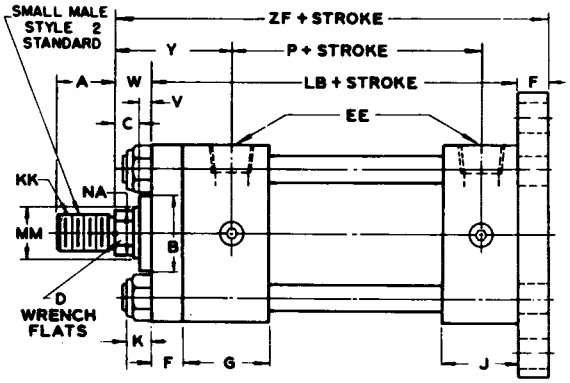
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE											
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	W	WF	Y	ZB
1 1/2	5/8	7/16 20	1/2 20	3/4	1 3/25	1 1/8	2 1/8	3/8	1/2	0.593	1/4	5/8	1	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	__	1/2	7/8	0.968	1/2	1	1 3/8	2 3/8	6 15/32
2	1	3/4 16	7/8	1 1/8	1 22/25	1 1/2	2 21/32	1/2	7/8	0.968	1/4	3/4	1 3/8	2 3/8	6 5/8
	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	_	5/8	1 1/8	1.343	3/8	1	1 5/8	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1 22/25	1 1/2	2 21/32	1/2	7/8	0.968	1/4	3/4	1 3/8	2 3/8	6 3/4
	1 3/8	1 14	1 1/4 12	1 5/8	2 1/2	2	3 5/16	5/8	1 1/8	1 343	3/8	1	1 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.783	1/2	1 1/4	1 7/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	1/4	7/8	1 5/8	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	1 1/8	1 7/8	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	1 1/4	2	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	1/4	1	1 7/8	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	1 1/8	2	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	1 3/8	2 1/4	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	1 1/8	2	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	1 3/8	2 1/4	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	1 3/8	2 1/4	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	1 3/8	2 1/4	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	1/4	1 1/4	2 1/4	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	1/4	1 1/4	2 1/4	3 1/2	10 23/32
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4 1/4	5 9/16	1	3	3.437	1/4	1 1/4	2 1/4	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1 1/4	2 1/4	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	1 1/4	2 1/4	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1 1/4	2 1/4	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	6 1/4	1	4 5/8	5.421	1/4	1 1/4	2 1/4	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	1/4	1/4	2 15/16	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/2	1 1/2	3 3/16	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	3/4	1 3/4	3 7/16	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/4	1 1/4	3 3/16	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	1/2	1 1/2	3 7/16	6	19 9/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	1/2	1 1/2	3 7/16	6	19 9/16

NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard

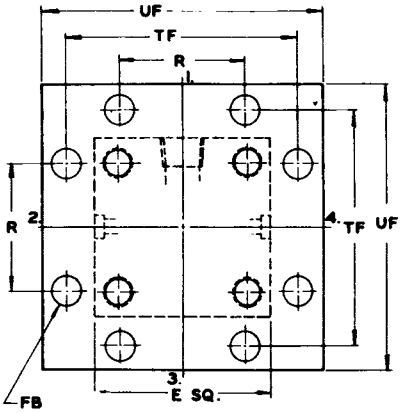
CAP SQUARE FLANGE



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

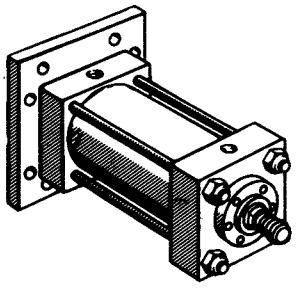


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

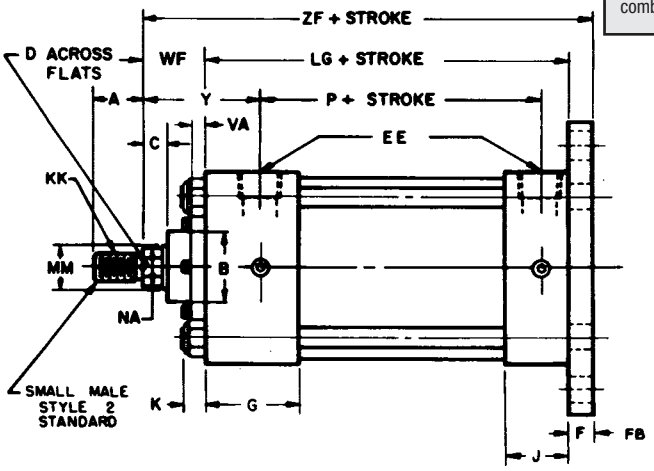


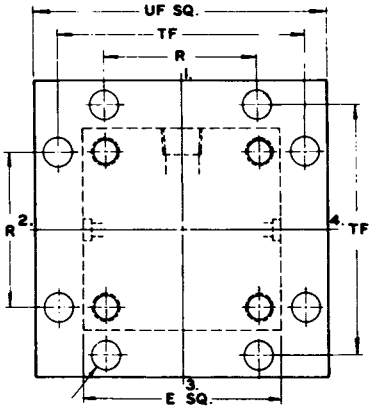
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

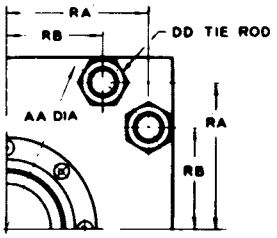
CAP SQUARE FLANGE



Model MF6
1-1/2"-12" Bore



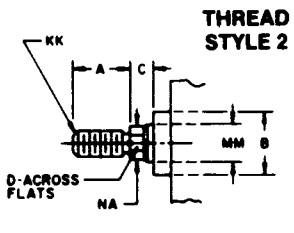




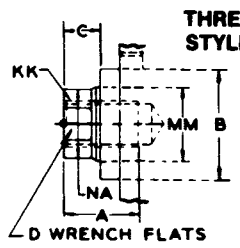
TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3.65	1 1/4–12
12	15 44	6 30	4 45	1-3/8–12

The 10" and 12" bore SERIES ' HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

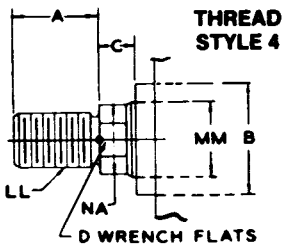
ROD ENDS 1-1/2" to 12" BORES



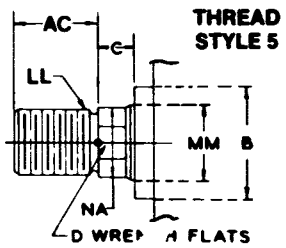
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	FB (BOLT)	G	J	K	LG	P	R	TF	UF
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	4 5/8	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	1/2	1 3/4	1 1/2	5/8	4 5/8	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	1/2	1 3/4	1 1/2	5/8	4 3/4	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	5/8	2	1 3/4	25/32	5 1/2	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	5/8	2	1 3/4	25/32	5 3/4	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	7/8	2	1 3/4	1	6 1/4	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	1	2 1/4	2 1/4	1 3/32	7 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	1 1/4	3	3	1 7/16	9 1/2	6 1/8	7.50	11 13/16	14
10	12 5/8	_	2	1 3/4	3 11/16	3 11/16	1 7/16	12 1/8	8	9.62	15 7/8	19
12	14 7/8	_	2 1/2	2	4 7/16	4 7/16	1 5/8	14 1/2	9 3/4	11.45	18 1/2	22

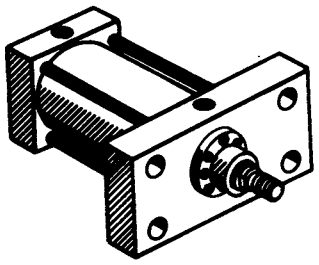
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

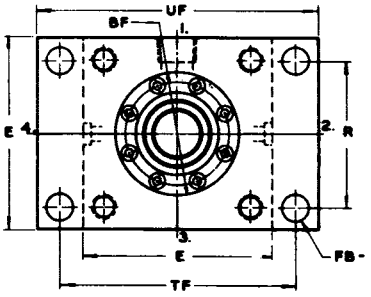
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE												
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	Y	ZF
1 1/2	5/8	7/16 20	1/2 20	0.75	1.12	1.124	2 1/8	3/8	1/2	0.593	1/4	1/4	_	1	2	6
	1	3/4 16	7/8 14	1.125	1.88	1.499	__	1/2	7/8	.968	1/2	_	1	_	2 3/8	6 3/8
2	1	3/4 16	0.875	1.125	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	_	1 3/8	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1.625	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1.125	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	_	1 3/8	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1.625	2.5	1.999	3 5/16	5/8	1 1/8	1.343	3/8	3/8	_	1 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	1/4	3/8	_	1 5/8	3	8 1/8
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	3/8	_	1 7/8	3	8 1/8
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	3 1/8	8 1/4
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	1/4	3/8	_	1 7/8	3	8 1/2
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	_	2	3 1/8	8 5/8
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 3/8	8 7/8
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	_	2	3 1/8	9 1/8
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	3/8	_	2 1/4	3 3/8	9 3/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	3/8	_	2 1/4	3 3/8	9 3/8
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	3/8	_	2 1/4	3 3/8	9 3/8
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	3.5	2 1/2 12	3 1/4 12	3.5	6.5	4.249	5 9/16	1	3	3.437	1/4	3/8	_	2 1/4	3 1/2	10 5/8
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1/2	_	2 1/4	3 1/2	10 5/8
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	3 15/16	12 3/4
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	!	3 3/8	3.937	_	1/2	_	2 1/4	3 15/16	12 3/4
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	2 1/4	3 15/16	123/4
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	5	16 3/4
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 1/4	17
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 1/2	17 1/4
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 3/4	19 5/8
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	6	19 7/8
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	6	19 7/8

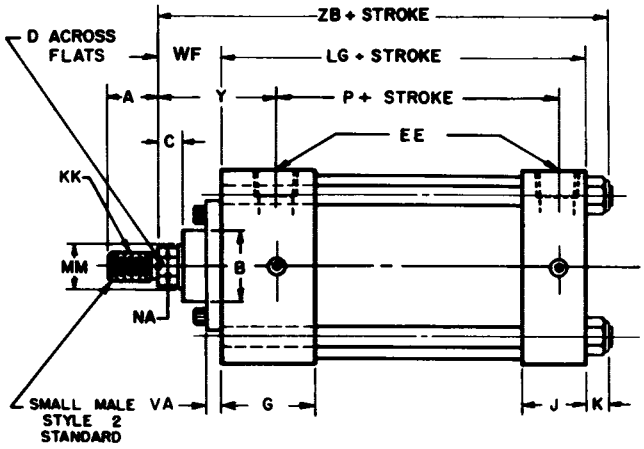
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard

HEAD RECTANGULAR MOUNTING

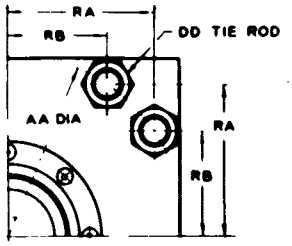


Model ME5
1-1/2"-12" Bore





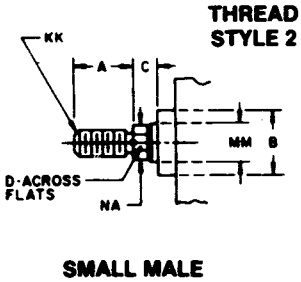
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.



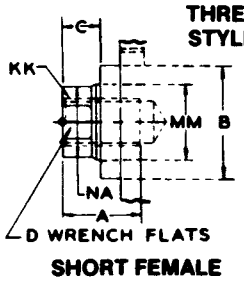
TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1-1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H: Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

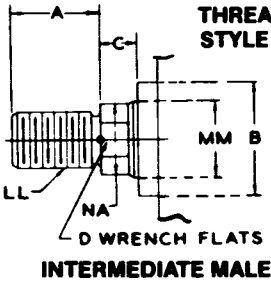
ROD ENDS 1-1/2" to 12" BORES



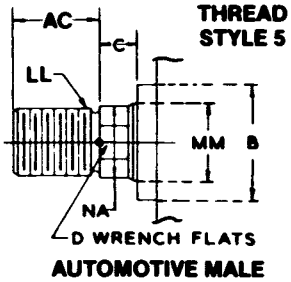
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	FB (BOLT)	G	J	K	LG	P	R	TF	UF
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	4 5/8	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	1/2	1 3/4	1 1/2	5/8	4 5/8	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	1/2	1 3/4	1 1/2	5/8	4 3/4	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	5/8	2	1 3/4	25/32	5 1/2	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	5/8	2	1 3/4	25/32	5 3/4	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	7/8	2	1 3/4	1	6 1/4	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	1	2 1/4	2 1/4	1 3/32	7 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	1 1/4	3	3	1 7/16	9 1/2	6 1/8	7.50	11 13/16	14
10	12 5/8	_	2	1 3/4	3 11/16	3 11/16	1 7/16	12 1/8	8	9.62	15 7/8	19
12	14 7/8	_	2 1/2	2	4 7/16	4 7/16	1 5/8	14 1/2	9 3/4	11.45	18 1/2	22

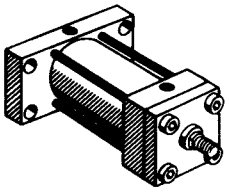
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

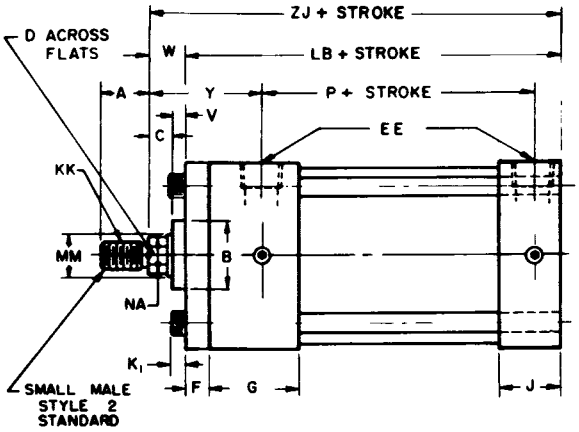
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE										
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	VA	WF	Y	ZB
1 1/2	5/8	7/16 20	1/2 20	0.75	1.12	1.124	2 1/8	3/8	1/2	0.593	1/4	1	2	6 3/32
	1	3/4 16	7/8 14	1.125	1.88	1.499	__	1/2	7/8	.968	_	_	2 3/8	6 15/32
2	1	3/4 16	0.875	1.125	1.88	1.499	2 21/32	1/2	7/8	.968	3/8	1 3/8	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1.625	2.5	1.999	_	5/8	1 1/8	1.343	_	_	2 5/8	6 7/8
2 1/2	1	3/4 16	7/8 14	1.125	1.88	1.499	2 21/32	1/2	7/8	.968	3/8	1 3/8	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1.625	2.5	1.999	3 5/16	5/8	1 1/8	1.343	3/8	1 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2374	_	3/4	1 1/2	1.703	_	_	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	3/8	1 5/8	3	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	1 7/8	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	_	_	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	1 7/8	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	3/8	2	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	_	_	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	3/8	2	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	2 1/4	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	2 1/4	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	2 1/4	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	2 1/4	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	2 1/4	3 1/2	10 23/32
	3.5	2 1/2 12	3 1/4 12	3.5	6.5	4.249	5 9/16	1	3	3.437	3/8	2 1/4	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/2	2 1/4	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	2 1/4	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	!	3 3/8	3.937	1/2	2 1/4	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/2	2 1/4	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	1/2	2 15/16	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/2	3 3/16	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	5/8	3 7/16	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/2	3 3/16	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	5/8	3 7/16	6	19 9/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	5/8	3 7/16	6	19 9/16

NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard

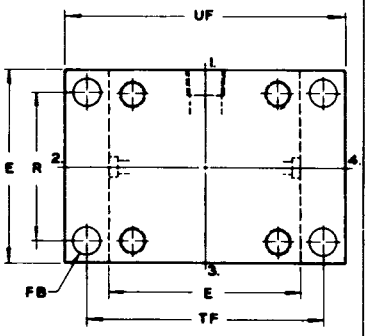
CAP RECTANGULAR MOUNTING



Model ME6
1-1/2"-2-1/2" Bore

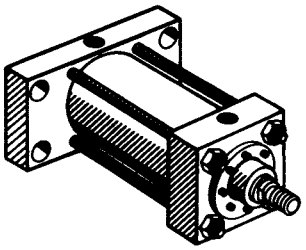


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

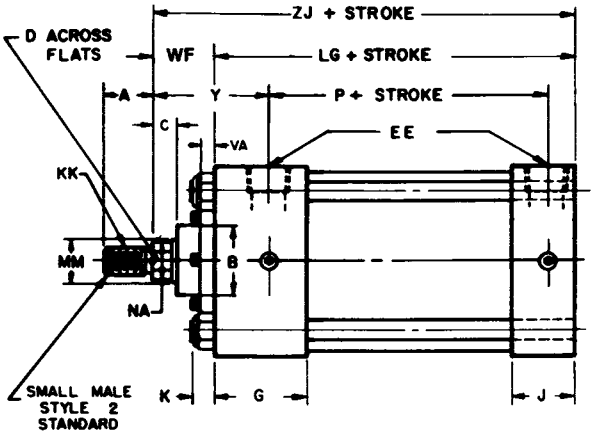


BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

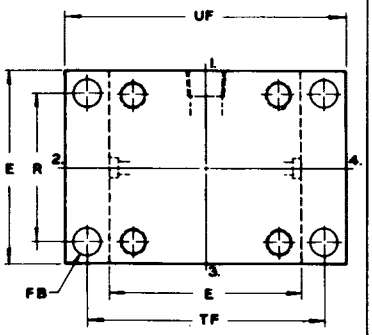
CAP RECTANGULAR MOUNTING

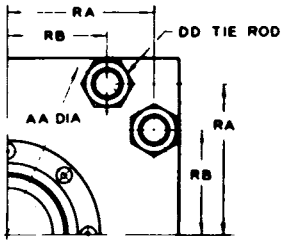


Model ME6
3-1/4" to 12" Bore



3-1/4" & 4" bore max. o'size rods do not have removable cartridge



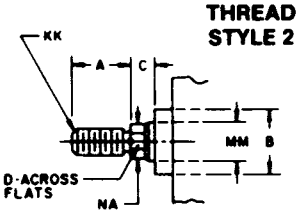


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1 1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES 'HD2/H' Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

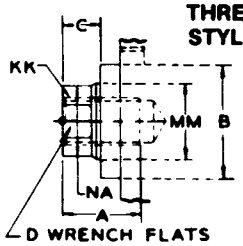
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



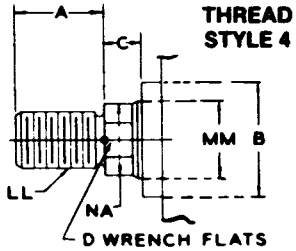
SMALL MALE

THREAD STYLE 3



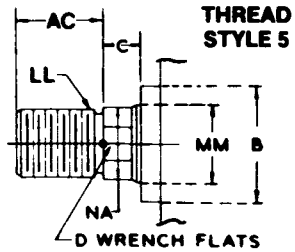
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	FB (BOLT)	G	J	K	LB	LG	P	R	TF	UF
1 1/2	2 1/2	3/4 16*	1/2	3/8	3/8	1 3/4	1 1/2	15/32	5	_	2 7/8	1.63	3 7/16	4 1/4
2	3	3/4 16**	1/2	5/8	1/2	1 3/4	1 1/2	5/8	5 1/4	_	2 7/8	2.05	4 1/8	5 1/8
2 1/2	3 1/2	3/4 16	1/2	3/4	1/2	1 3/4	1 1/2	5/8	5 3/8	_	3	2.55	4 5/8	5 5/8
3 1/4	4 1/2	1 1/16 12	3/4	7/8	5/8	2	1 3/4	25/32	6 1/4	5 1/2	3 1/2	3.25	5 7/8	7 1/8
4	5	1 1/16 12	3/4	_	5/8	2	1 3/4	25/32	6 5/8	5 3/4	3 3/4	3.82	6 3/8	7 5/8
5	6 1/2	1 1/16 12	3/4	_	7/8	2	1 3/4	1	_	6 1/4	4 1/4	4.95	8 3/16	9 3/4
6	7 1/2	1 5/16 12	1	_	1	2 1/4	2 1/4	1 3/32	_	7 3/8	4 7/8	5.73	9 7/16	11 1/4
8	9 1/2	1 7/8 12	1 1/2	_	1 1/4	3	3	1 7/16	_	9 1/2	6 1/8	7.50	11 13/16	14
10	12 5/8	_	2	_	1 3/4	3 11/16	3 11/16	1 7/16	_	12 1/8	8	9.62	15 7/8	19
12	14 7/8	_	2 1/2	_	2	4 7/16	4 7/16	1 5/8	_	14 1/2	9 3/4	11.45	18 1/2	22

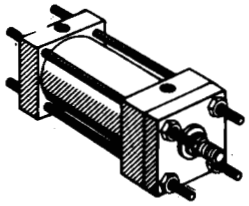
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

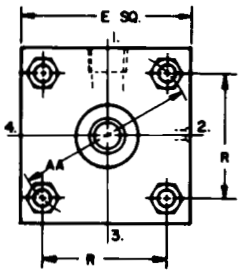
BORE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE												
SIZE	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	Y	ZJ
1 1/2	5/8	7/16 20	1/2 20	3/4	1.12	1.124	_	3/8	1/2	.593	1/4	_	5/8	_	2	6
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	2 3/8	6
2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	2 3/8	6 1/4
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 5/8	6 1/8
2 1/2	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	2 3/8	6 1/8
	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 5/8	6 3/8
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	2 7/8	6 5/8
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	_	3/8	_	1 5/8	2 3/4	7 1/8
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	_	3/8	_	1 7/8	3	7 3/8
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	3 1/8	7 1/2
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	_	3/8	_	1 7/8	3	7 5/8
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	3/8	3/8	_	2	3 1/8	7 3/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	_	_	1 3/8	_	3 3/8	8
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	_	3/8	_	2	3 1/8	8 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	_	3/8	_	2 1/4	3 3/8	8 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	_	3/8	_	2 1/4	3 3/8	8 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	3 3/8	8 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	_	3/8	_	2 1/4	3 1/2	9 5/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	_	3/8	_	2 1/4	3 1/2	9 5/8
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	3 1/2	9 5/8
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	_	1/2	-	2 1/4	3 1/2	9 5/8
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	3 15/16	11 3/4
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	_	1/2	_	2 1/4	3 15/16	11 3/4
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	2 1/4	3 15/16	11 3/4
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	5	15 1/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8	1	4 5/8	5.421	_	1/2	_	3 3/16	5 1/4	15 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 1/2	15 9/16
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8	1	4 5/8	5.421	_	1/2	_	3 3/16	5 3/4	17 11/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	6	17 15/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	-	3 7/16	6	17 15/16

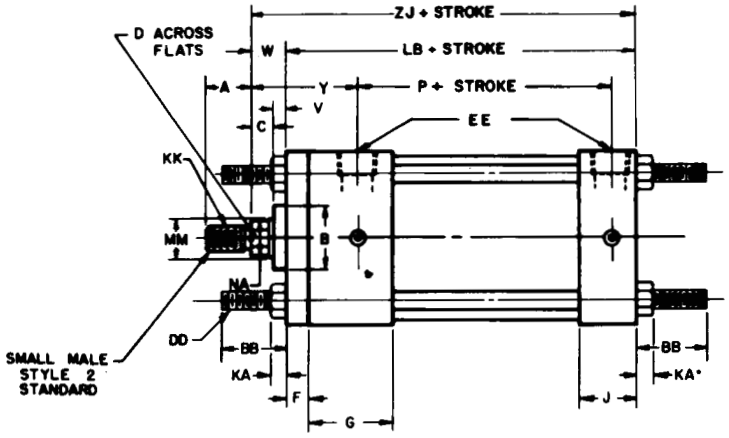
NOTE: Mounting holes shown are .062 larger than bolt size listed. Shaded area not HD2 standard

TIE RODS EXTENDED



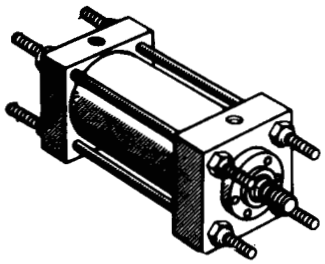
Model MX1 — Both Ends
MX3 — Head End Only
1-1/2"-4" Bore
With Maximum Oversize Rods



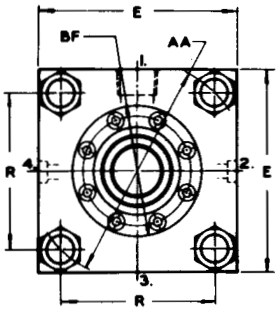


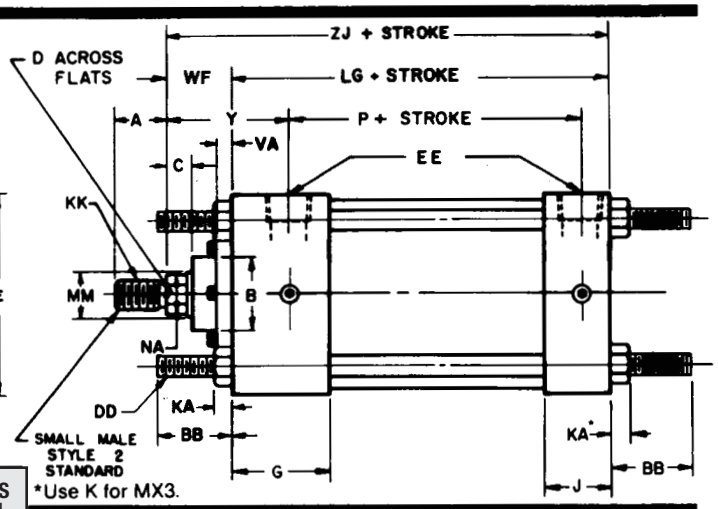
*Use K for MX3.
Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

TIE RODS EXTENDED



Model MX1 — Both Ends
MX3 — Head End Only
1-1/2"-8" Bore

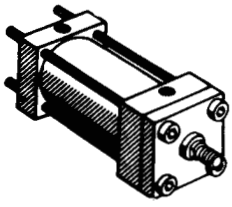




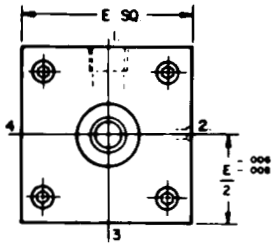
*Use K for MX3.

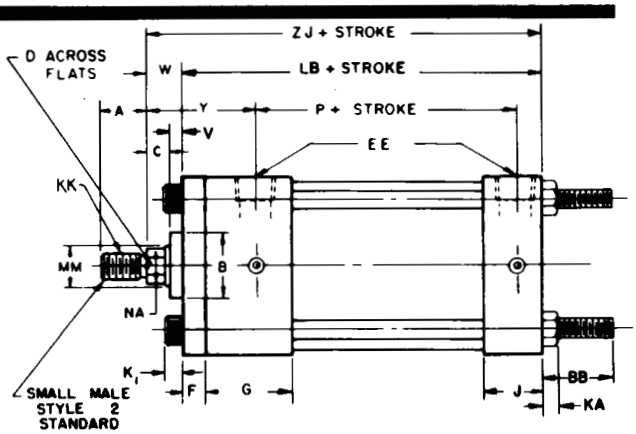
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

TIE RODS EXTENDED



Model MX2
1-1/2"-8" Bore





Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE (SAE)	EE	F	G	J	K	K1	KA	LB	LG	P	R
1-1/2	2.3	1-3/8	3/8-24	2-1/2	3/4-16*	½	3/8	1-3/4	1-1/2	15/32	3/8	21/64	5	4-5/8	2-7/8	1.63
2	2.9	1-13/16	1/2-20	3	3/4-16**	½	5/8	1-3/4	1-1/2	5/8	1/2	7/16	5-1/4	4-5/8	2-7/8	2.05
2-1/2	3.6	1-13/16	1/2-20	3-1/2	3/4-16	½	5/8	1-3/4	1-1/2	5/8	1/2	7/16	5-3/8	4-3/4	3	2.55
3-1/4	4.6	2-5/16	5/8-18	4-1/2	1-1/16-12	¾	3/4	2	1-3/4	25/32	5/8	35/64	6-1/4	5-1/2	3-1/2	3.25
4	5.4	2-5/16	5/8-18	5	1-1/16-12	¾	7/8	2	1-3/4	25/32	5/8	35/64	6-5/8	5-3/4	3-3/4	3.82
5	7.0	3-3/16	7/8-14	6-1/2	1-1/16-12	¾	7/8	2	1-3/4	1	7/8	3/4	7-1/8	6-1/4	4-1/4	4.95
6	8.1	3-5/8	1-14	7-1/2	1-5/16-12	1	1	2-1/4	2-1/4	1-3/32	1	55/64	8-3/8	7-3/8	4-7/8	5.73
8	10.6	4-1/2	1-1/4-12	9-1/2	1-7/8-12	1½	1	3	3	1-7/16	1-1/4	1-1/16	10-1/2	9-1/2	6-1/8	7.50

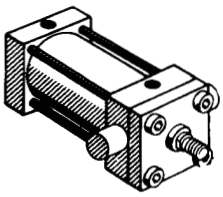
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1⅜" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

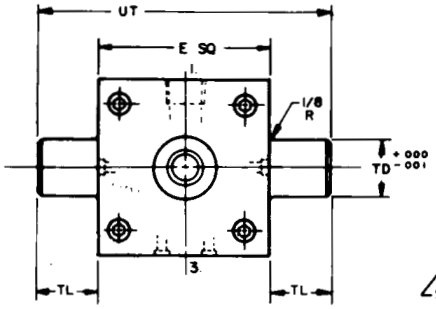
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE												
	MM	KK	LL	A	AC	B +.000 -.062	BF	C	D	NA	V	VA	W	WF	Y	ZJ
1½	5/8	7/16-20	1/2-20	3/4	1.12	1.124	2-1/8	3/8	1/2	.593	1/4	1/4	5/8	1	2	5-5/8
	1	3/4-16	7/8-14	1-1/8	1.88	1.499	–	1/2	7/8	.968	1/2	–	1	–	2-3/8	6
2	1	3/4-16	7/8-14	1-1/8	1.88	1.499	2-21/32	1/2	7/8	.968	1/4	3/8	3/4	1-3/8	2-3/8	6
	1-3/8	1-14	1-1/4-12	1-5/8	2.50	1.999	–	5/8	1-1/8	1.343	3/8	–	1	–	2-5/8	6-1/4
2½	1	3/4-16	7/8-14	1-1/8	1.88	1.499	2-21/32	1/2	7/8	.968	1/4	3/8	3/4	1-3/8	2-3/8	6-1/8
	1-3/8	1-14	1-1/4-12	1-5/8	2.50	1.999	3-5/16	5/8	1-1/8	1.343	3/8	3/8	1	1-5/8	2-5/8	6-3/8
	1-3/4	1-1/4-12	1-1/2-12	2	3.00	2.374	–	3/4	1-1/2	1.703	1/2	–	1-1/4	–	2-7/8	6-5/8
3¼	1-3/8	1-14	1-1/4-12	1-5/8	2.50	1.999	3-5/16	5/8	1-1/8	1.343	1/4	3/8	7/8	1-5/8	2-3/4	7-1/8
	1-3/4	1-1/4-12	1-1/2-12	2	3.00	2.374	3-3/4	3/4	1-1/2	1.703	3/8	3/8	1-1/8	1-7/8	3	7-3/8
	2	1-1/2-12	1-3/4-12	2-1/4	3.50	2.624	–	7/8	1-11/16	1.953	3/8	–	1-1/4	–	3-1/8	7-1/2
4	1-3/4	1-1/4-12	1-1/2-12	2	3.00	2.374	3-3/4	3/4	1-1/2	1.703	1/4	3/8	1	1-7/8	3	7-5/8
	2	1-1/2-12	1-3/4-12	2-1/4	3.50	2.624	4-1/4	7/8	1-11/16	1.953	1/4	3/8	1-1/8	2	3-1/8	7-3/4
	2-1/2	1-7/8-12	2-1/4-12	3	4.50	3.124	–	1	2-1/16	2.453	3/8	–	1-3/8	–	3-3/8	8
5	2	1-1/2-12	1-3/4-12	2-1/4	3.50	2.624	4-1/4	7/8	1-11/16	1.953	1/4	3/8	1-1/8	2	3-1/8	8-1/4
	2-1/2	1-7/8-12	2-1/4-12	3	4.50	3.124	4-5/8	1	2-1/16	2.453	3/8	3/8	1-3/8	2-1/4	3-3/8	8-1/2
	3	2-1/4-12	2-3/4-12	3-1/2	—	3.749	5-1/8	1	2-5/8	2.937	3/8	3/8	1-3/8	2-1/4	3-3/8	8-1/2
	3-1/2	2-1/2-12	3-1/4-12	3-1/2	6.50	4.249	5-9/16	1	3	3.437	3/8	3/8	1-3/8	2-1/4	3-3/8	8-1/2
6	2-1/2	1-7/8-12	2-1/4-12	3	4.50	3.124	4-5/8	1	2-1/16	2.453	1/4	3/8	1-1/4	2-1/4	3-1/2	9-5/8
	3	2-1/4-12	2-3/4-12	3-1/2	—	3.749	5-1/8	1	2-5/8	2.937	1/4	3/8	1-1/4	2-1/4	3-1/2	9-5/8
	3-1/2	2-1/2-12	3-1/4-12	3-1/2	6.50	4.249	5-9/16	1	3	3.437	1/4	3/8	1-1/4	2-1/4	3-1/2	9-5/8
	4	3-12	3-3/4-12	4	—	4.749	6-1/2	1	3-3/8	3.937	1/4	1/2	1-1/4	2-1/4	3-1/2	9-5/8
8	3-1/2	2-1/2-12	3-1/4-12	3-1/2	6.50	4.249	5-9/16	1	3	3.437	1/4	3/8	1-1/4	2-1/4	3-15/16	11-3/4
	4	3-12	3-3/4-12	4	—	4.749	6-1/2	1	3-3/8	3.937	1/4	1/2	1-1/4	2-1/4	3-15/16	11-3/4
	5-1/2	4-12	5-1/4-12	5-1/2	—	6.249	8-1/4	1	4-5/8	5.421	1/4	1/2	1-1/4	2-1/4	3-15/16	11-3/4

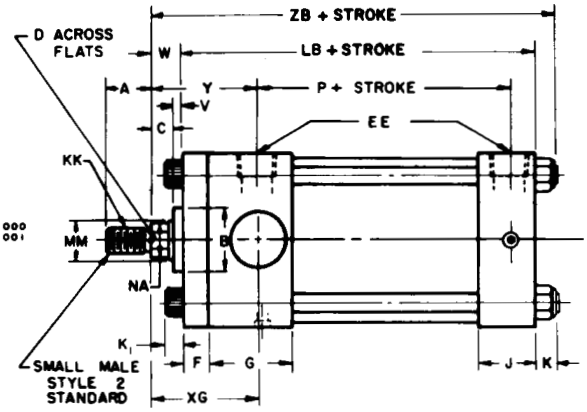
NOTE: Customer mounting holes should be .062 larger than nominal thread size listed.

HEAD TRUNNION



Model MT1
1-1/2"-8" Bore

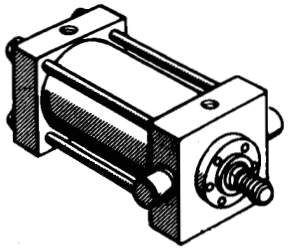




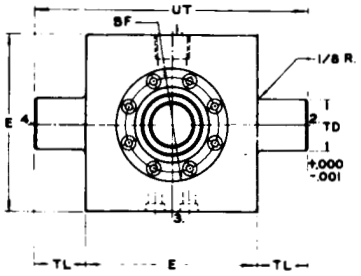
Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

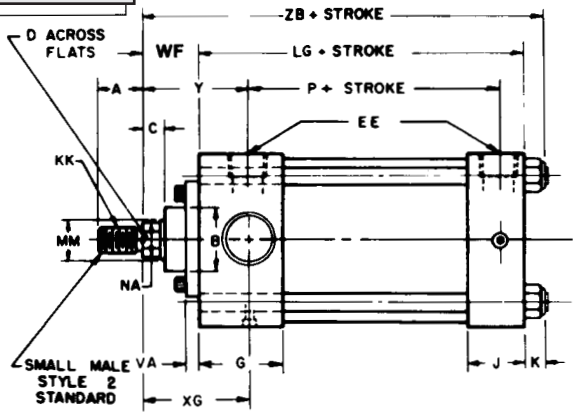
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

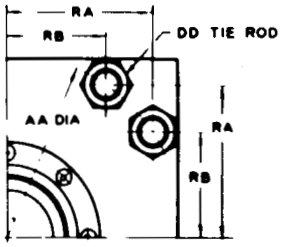
HEAD TRUNNION



Model MT1
10"-12" Bore





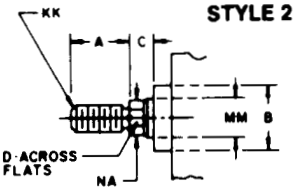


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5.34	3 65	1 1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

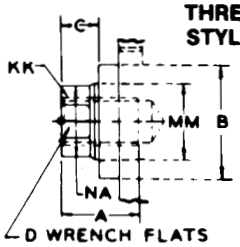
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



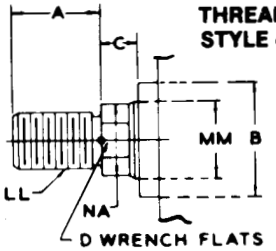
SMALL MALE

THREAD STYLE 3



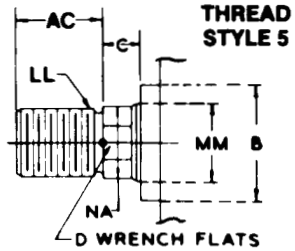
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	J	K	K1	LB	LG	P	TD	TL	UT
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	3/8	5	_	2 7/8	1.000	1	4 1/2
2	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 1/4	_	2 7/8	1.375	1 3/8	5 3/4
2 1/2	3 1/2	3/4 16	1/2	3/4	1 3/4	1 1/2	5/8	1/2	5 3/8	_	3	1.375	1 3/8	6 1/4
3 1/4	4 1/2	1 1/16 12	3/4	7/8	2	1 3/4	25/32	5/8	6 1/4	_	3 1/2	1.750	1 3/4	8
4	5	1 1/16 12	3/4	_	2	1 3/4	25/32	5/8	6 5/8	_	3 3/4	1.750	1 3/4	8 1/2
5	6 1/2	1 1/16 12	3/4	_	2	1 3/4	1	7/8	7 1/8	_	4 1/4	1.750	1 3/4	10
6	7 1/2	1 5/16 12	1	_	2 1/4	2 1/4	1 3/32	1	8 3/8	_	4 7/8	2.000	2	11 1/2
8	9 1/2	1 7/8 12	1 1/2	_	3	3	1 7/16	1 1/4	10 1/2	_	6 1/8	3.000	3	15 1/2
10	12 5/8	_	2	_	3 11/16	3 11/16	1 7/16	_	_	12 1/8	8	3.500	3 1/2	19 5/8
12	14 7/8	_	2 1/2	_	4 7/16	4 7/16	1 5/8	_	_	14 1/2	9 3/4	4.000	4	22 7/8

Shaded area not HD2 standard.

*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.

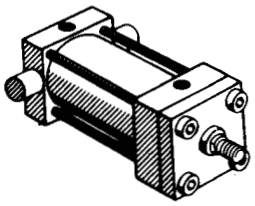
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

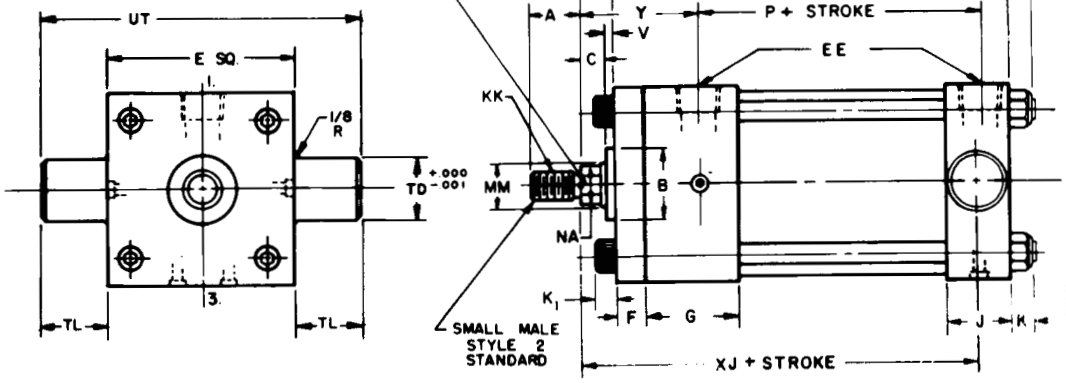
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE													
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	XG	Y	ZB
1.5	5/8	7/16 20	1/2 20	3/4	1.12	1.124	_	3/8	1/2	0.593	1/4	_	5/8	_	1 7/8	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	2 1/4	2 3/8	6 15/32
2	1	3/4 16	0.875	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	2 1/4	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 1/4	2 5/8	6 7/8
2.5	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	2 1/4	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 1/4	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	2 3/4	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	1/4	_	7/8	_	2 5/8	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	3/8	_	1 1/8	_	2 7/8	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	3	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/4	_	1	_	2 7/8	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	3	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 1/4	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	3	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 1/4	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	3/8	_	1 3/8	_	3 1/4	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	3/8	_	1 3/8	_	3 1/4	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	3.5	2 1/2 12	3 1/4 12	3.5	6.50	4.249	_	1	3	3.437	1/4	_	1 1/4	_	3 3/8	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	_	1	3 3/8	3.937	1/4	_	1 1/4	__	3 3/8	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	_	_	1 1/4	_	3 3/4	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	_	!	3 3/8	3.937	_	_	1 1/4	_	3 3/4	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	_	1	4 5/8	5.421	_	_	1 1/4	_	3 3/4	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	4 3/4	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 1/4	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 3/8	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 5/8	6	19 5/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	5 5/8	6	19 9/16

Shaded area not HD2 standard

CAP TRUNNION



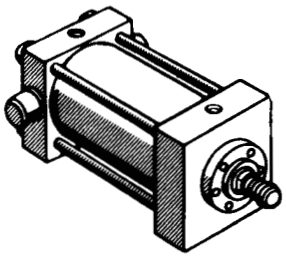
Model MT2
1-1/2"-8" Bore



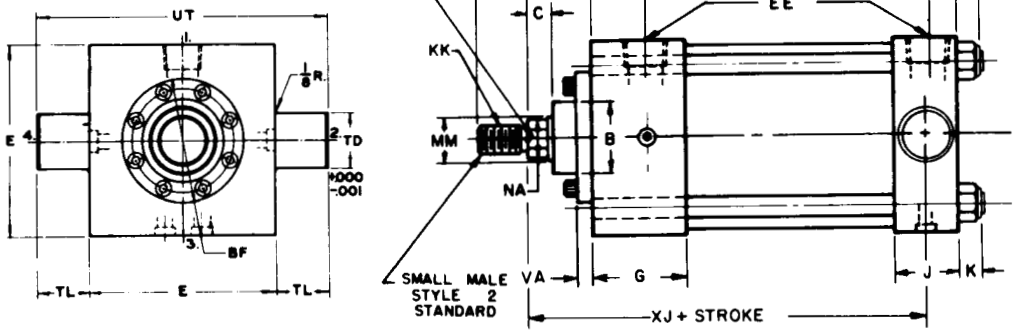
Head end cushions on 1-1/2" 2" & 2 1/2" Bores using maximum oversize rods are non-adjustable.

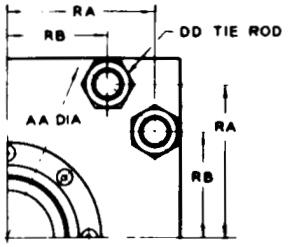
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

CAP TRUNNION



Model MT2
10"-12" Bore



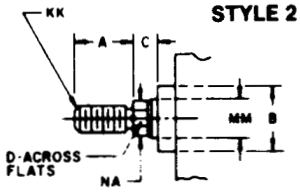


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1-1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

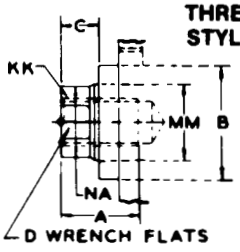
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



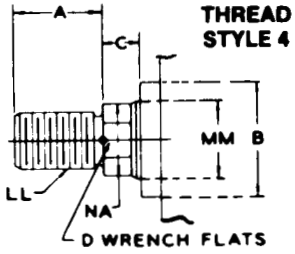
SMALL MALE

THREAD STYLE 3



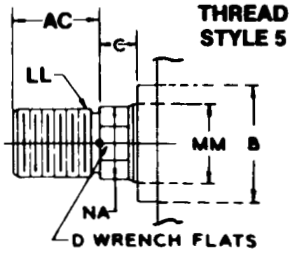
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	J	K	K1	LB	LG	P	TD	TL	UT
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	3/8	5	_	2 7/8	1.000	1	4 1/2
2	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 1/4	_	2 7/8	1.375	1 3/8	5 3/4
2 1/2	3 1/2	3/4 16	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 3/8	_	3	1.375	1 3/8	6 1/4
3 1/4	4 1/2	1 1/16 12	3/4	3/4	2	1 3/4	25/32	5/8	6 1/4	_	3 1/2	1.750	1 3/4	8
4	5	1 1/16 12	3/4	7/8	2	1 3/4	25/32	5/8	6 5/8	_	3 3/4	1.750	1 3/4	8 1/2
5	6 1/2	1 1/16 12	3/4	7/8	2	1 3/4	1	7/8	7 1/8	_	4 1/4	1.750	1 3/4	10
6	7 1/2	1 5/16 12	1	1	2 1/4	2 1/4	1 3/32	1	8 3/8	_	4 7/8	2.000	2	11 1/2
8	9 1/2	1 7/8 12	1 1/2	1	3	3	1 7/16	1 1/4	10 1/2	_	6 1/8	3.000	3	15 1/2
10	12 5/8	_	2	_	3 11/16	3 11/16	1 7/16	_	_	12 1/8	8	3.500	3 1/2	19 5/8
12	14 7/8	_	2 1/2	_	4 7/16	4 7/16	1 5/8	_	_	14 1/2	9 3/4	4.000	4	22 7/8

Shaded area not HD2 standard.

*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.

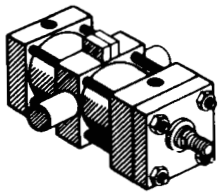
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

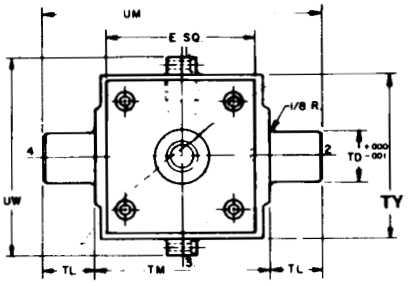
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE													
	MM	KK	LL	A	AC	$B^{+.000}_{-.002}$	BF	C	D	NA	V	VA	W	WF	XJ	Y	ZB
1.5	5/8	7/16 20	1/2 20	3/4	1.12	1.124	_	3/8	1/2	0.593	1/4	_	5/8	_	4 7/8	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	5 1/4	2 3/8	6 15/32
2	1	3/4 16	0.875	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	5 1/4	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	5 1/2	2 5/8	6 7/8
2.5	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	5 3/8	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	5 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	5 7/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	1/4	_	7/8	_	6 1/4	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	3/8	_	1 1/8	_	6 1/2	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	6 5/8	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/4	_	1	_	6 3/4	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	6 7/8	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	7 1/8	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	7 3/8	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	7 5/8	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	3/8	_	1 3/8	_	7 5/8	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	3/8	_	1 3/8	_	7 5/8	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	1/4	_	1 1/4	_	8 1/2	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	1/4	_	1 1/4	_	8 1/2	3 1/2	10 23/32
	3.5	2 1/2 12	3 1/4 12	3.5	6.50	4.249	_	1	3	3.437	1/4	_	1 1/4	_	8 1/2	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	_	1	3 3/8	3.937	1/4	_	1 1/4	__	8 1/2	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	_	_	1 1/4	_	10 1/4	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	_	!	3 3/8	3.937	_	_	1 1/4	_	10 1/4	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	_	1	4 5/8	5.421	_	_	1 1/4	_	10 1/4	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	13 1/4	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	13 1/2	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	13 3/4	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	15 1/2	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	15 3/4	6	19 5/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	15 3/4	6	19 9/16

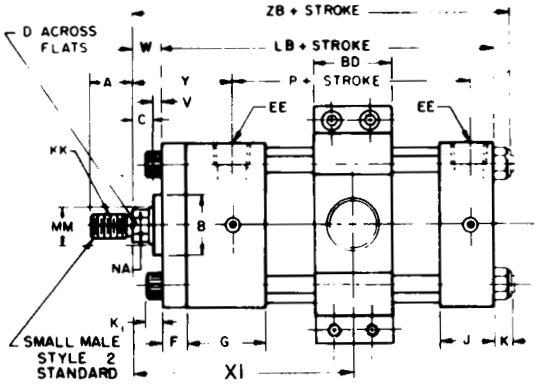
Shaded area not HD2 standard

INTERMEDIATE FIXED TRUNNION



Model MT4
1-1/2"-8" Bore



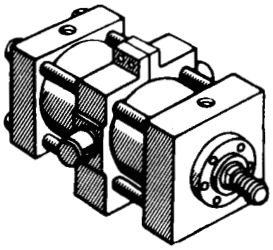


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

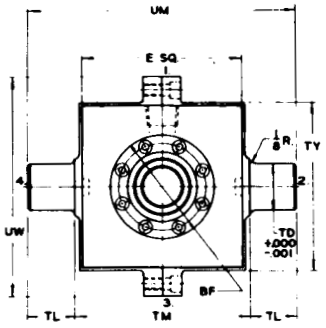
*XI TO BE SPECIFIED BY CUSTOMER. IF NOT SPECIFIED STANDARD POSITION OF TRUNNION IS XI + 1/2 STROKE..

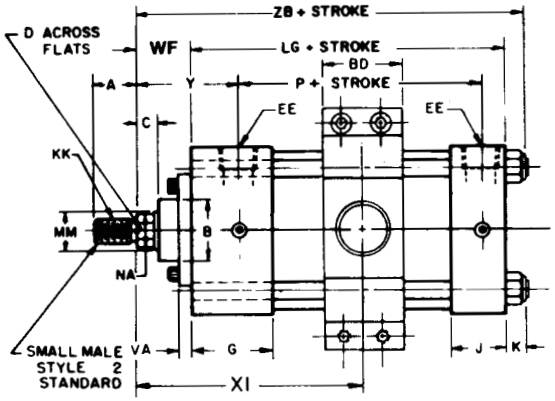
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

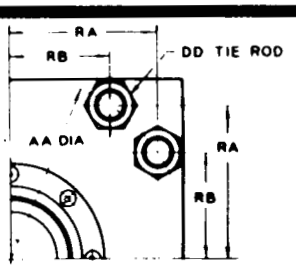
INTERMEDIATE FIXED TRUNNION



Model MT4
10"-12" Bore



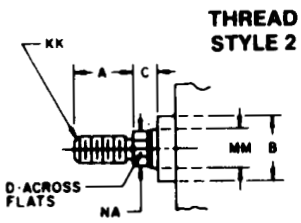




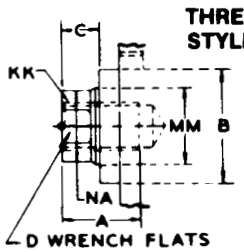
TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1 1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

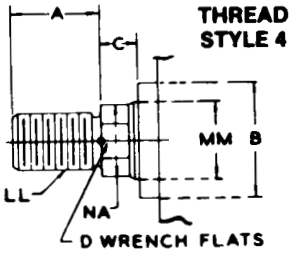
ROD ENDS 1-1/2" to 12" BORES



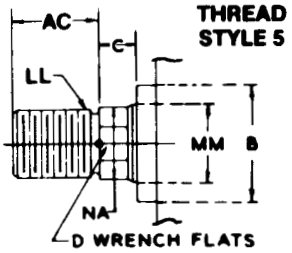
SMALL MALE



SHORT FEMALE



INTERMEDIATE MALE



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	J	K	K1	LB	LG	P	TD	TL	TM	TY	UM	UW
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	3/8	5	_	2 7/8	1.000	1	3	2 3/4	5	4
2	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	1/2	5 1/4	_	2 7/8	1.375	1 3/8	3 1/2	3 1/4	6 1/4	4 3/4
2 1/2	3 1/2	3/4 16	1/2	3/4	1 3/4	1 1/2	5/8	1/2	5 3/8	_	3	1.375	1 3/8	4	3 3/4	6 3/4	5 1/4
3 1/4	4 1/2	1 1/16 12	3/4	7/8	2	1 3/4	25/32	5/8	6 1/4	_	3 1/2	1.750	1 3/4	5	4 3/4	8 1/2	6 3/4
4	5	1 1/16 12	3/4	_	2	1 3/4	25/32	5/8	6 5/8	_	3 3/4	1.750	1 3/4	5 1/2	5 1/4	9	7 1/4
5	6 1/2	1 1/16 12	3/4	_	2	1 3/4	1	7/8	7 1/8	_	4 1/4	1.750	1 3/4	7	6 3/4	10 1/2	9
6	7 1/2	1 5/16 12	1	_	2 1/4	2 1/4	1 3/32	1	8 3/8	_	4 7/8	2.000	2	8 1/2	7 3/4	12 1/2	10 1/4
8	9 1/2	1 7/8 12	1 1/2	_	3	3	1 7/16	1 1/4	10 1/2	_	6 1/8	3.000	3	11	9 3/4	17	12 3/4
10	12 5/8	_	2	_	3 11/16	3 11/16	1 7/16	_	_	12 1/8	8	3.500	3 1/2	14	13	21	17 1/2
12	14 7/8	_	2 1/2	_	4 7/16	4 7/16	1 5/8	_	_	14 1/2	9 3/4	4.000	4	16 1/2	15 1/2	24 1/2	20 3/4

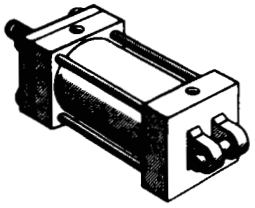
Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

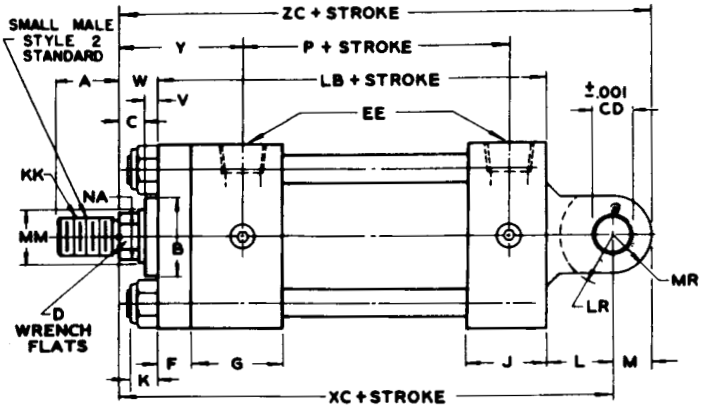
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE													
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	XI	Y	ZB
1.5	5/8	7/16 20	1/2 20	3/4	1.12	1.124	_	3/8	1/2	0.593	1/4	_	5/8	_	3 7/16	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	3 13/16	2 3/8	6 15/32
2	1	3/4 16	0.875	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	3 13/16	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	4 1/16	2 5/8	6 7/8
2.5	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/4	_	3/4	_	3 7/8	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	4 1/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	4 3/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	_	5/8	1 1/8	1.343	1/4	_	7/8	_	4 1/2	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	3/8	_	1 1/8	_	4 3/4	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	4 7/8	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	_	3/4	1 1/2	1.703	1/4	_	1	_	4 7/8	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	5	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	5 1/4	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	1/4	_	1 1/8	_	5 1/4	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	5 1/2	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	3/8	_	1 3/8	_	5 1/2	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	3/8	_	1 3/8	_	5 1/2	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	1/4	_	1 1/4	_	5 15/16	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	_	1	2 5/8	2.937	1/4	_	1 1/4	_	5 15/16	3 1/2	10 23/32
	3.5	2 1/2 12	3 1/4 12	3.5	6.50	4.249	_	1	3	3.437	1/4	_	1 1/4	_	5 15/16	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	_	1	3 3/8	3.937	1/4	_	1 1/4	__	5 15/16	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	_	1	3	3.437	1/4	_	_	2 1/4	7	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	_	!	3 3/8	3.937	1/4	_	_	_	7	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	_	1	4 5/8	5.421	1/4	_	_	_	7	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	9	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8	1	4 5/8	5.421	_	1/2	_	3 3/16	9 1/4	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	9 1/2	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8	1	4 5/8	5.421	_	1/2	_	3 3/16	10 7/16	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	10 11/16	6	19 5/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	10 11/16	6	19 9/16

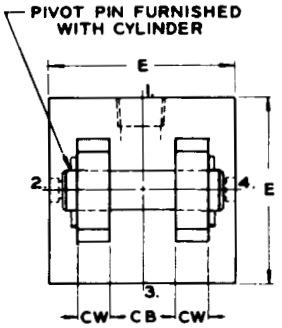
Shaded area not HD2 standard

CAP FIXED CLEVIS



Model MP1
1-1/2"-4" Bore
With Maximum Oversize Rods

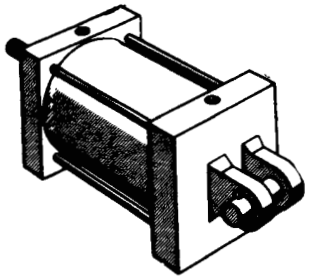




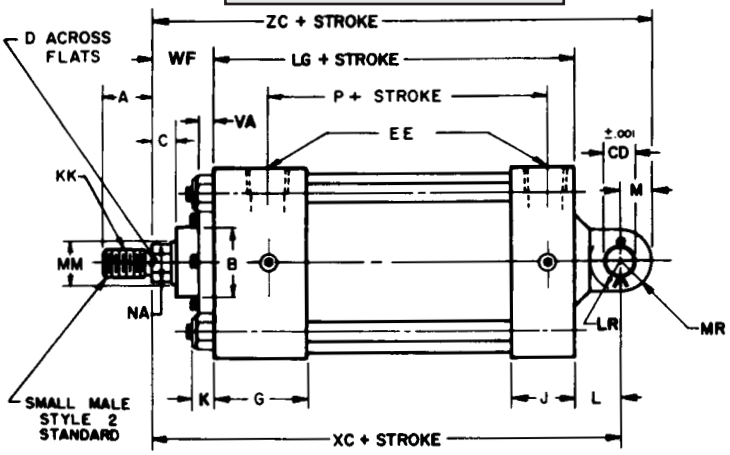
Head end cushions on 1-1/2" - 2" & 2-1/2" Bore using maximum oversize rods are non-adjustable.

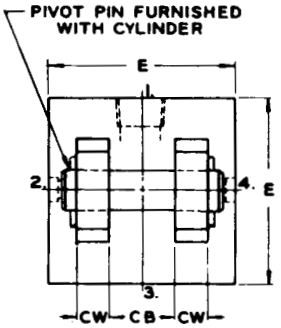
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

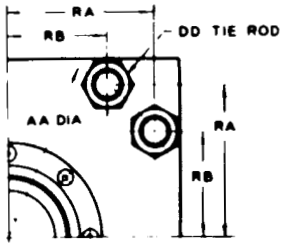
CAP FIXED CLEVIS



Model MP1
1-1/2"-12" Bore





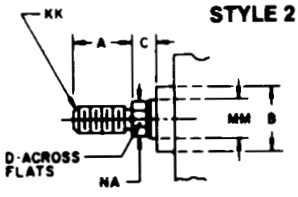


TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1-1/4-12
12	15 44	6 30	4 45	1-3/8-12

The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4.

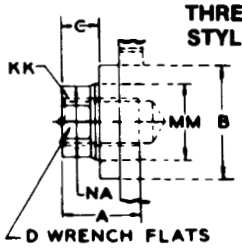
ROD ENDS 1-1/2" to 12" BORES

THREAD STYLE 2



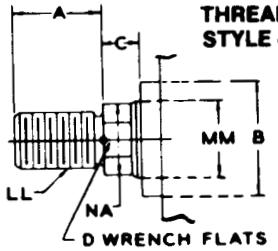
SMALL MALE

THREAD STYLE 3



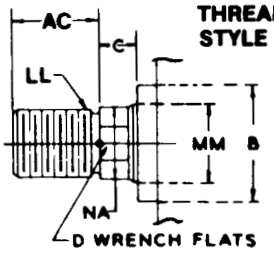
SHORT FEMALE

THREAD STYLE 4



INTERMEDIATE MALE

THREAD STYLE 5



AUTOMOTIVE MALE

Envelope and Mounting Dimensions

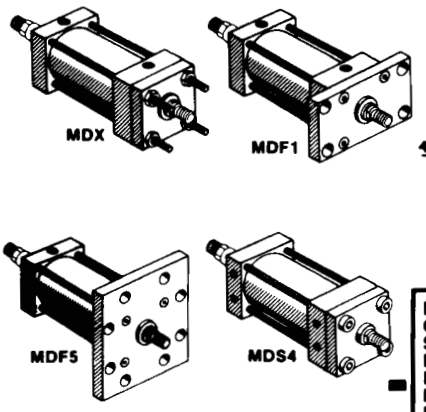
BORE	CB	CD	CW	E	EE(SAE)	EE	F	G	J	K	L	LB	LG	LR	M	MR	P
1 1/2	3/4	.500	1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	1 1/2	15/32	3/4	5	_	9/16	1/2	1/2	2 7/8
2	1 1/4	.750	5/8	3	3/4 16**	1/2	5/8	1 3/4	1 1/2	5/8	1 1/4	5 1/4	_	15/16	3/4	3/4	2 7/8
2 1/2	1 1/4	.750	5/8	3 1/2	3/4 16	1/2	5/8	1 3/4	1 1/2	5/8	1 1/4	5 3/8	_	15/16	3/4	3/4	3
3 1/4	1 1/2	1.000	3/4	4 1/2	1 1/16 12	3/4	3/4	2	1 3/4	25/32	1 1/2	6 1/4	_	1 3/16	1	1	3 1/2
4	2	1.375	1	5	1 1/16 12	3/4	7/8	2	1 3/4	25/32	2 1/8	6 5/8	_	1 3/4	1 3/8	1 3/8	3 3/4
5	2 1/2	1.750	1 1/4	6 1/2	1 1/16 12	3/4	_	2	1 3/4	1	2 1/4	_	6 1/4	1 13/16	1 3/4	1 3/4	4 1/4
6	2 1/2	2.000	1 1/4	7 1/2	1 5/16 12	1	_	2 1/4	2 1/4	3 3/32	2 1/2	_	9 1/2	2 7/8	2 3/4	2 3/4	6 1/8
8	3	3	1 1/2	9 1/2	1 7/8 12	1 1/2	_	3	3	1 7/16	3 1/4	_	9 1/2	2 7/8	2 3/4	2 3/4	6 1/8
10	4	3.500	2	12 5/8	_	2	_	3 11/16	3 11/16	1 7/16	4	_	12 1/8	3 3/4	3 1/2	3 1/2	8
12	4 1/2	4.000	2 1/4	14 7/8	_	2 1/2	_	4 7/16	4 7/16	1 5/8	4 1/2	_	12 1/2	4 1/4	4	4	9 3/8

Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

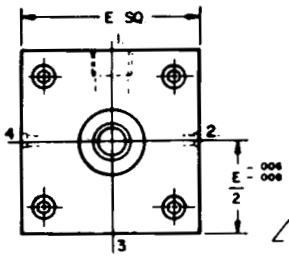
Rod End Dimensions

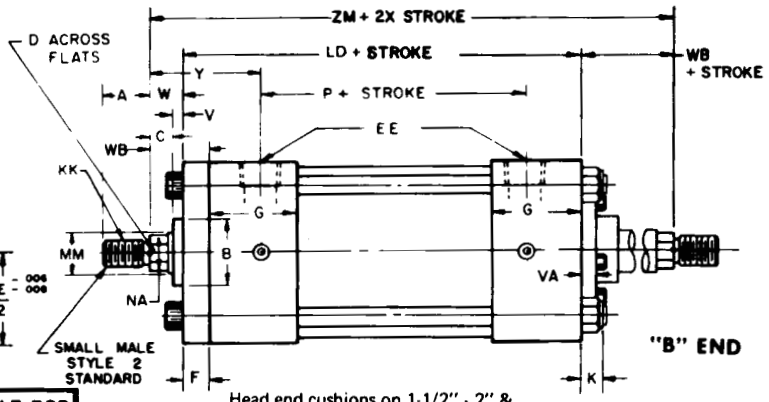
BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE													
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	XC	Y	ZC
1.5	5/8	7/16 20	1/2 20	3/4	1.12	1.124	2 1/8	3/8	1/2	0.593	_	1/4	_	1	6 3/8	2	6 3/32
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	6 3/4	2 3/8	6 15/32
2	1	3/4 16	0.875	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	_	3/8	_	1 3/8	7 1/4	2 3/8	6 5/8
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	7 1/2	2 5/8	6 7/8
2.5	1	3/4 16	7/8 14	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	_	3/8	_	1 3/8	7 3/8	2 3/8	6 3/4
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	3 5/16	5/8	1 1/8	1.343	_	3/8	_	1 5/8	7 5/8	2 5/8	7
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	7 7/8	2 7/8	7 1/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	_	3/8	_	1 5/8	8 5/8	2 3/4	7 29/32
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	_	3/8	_	1 7/8	8 7/8	3	8 5/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	_	_	1 1/4	_	9	3 1/8	8 9/32
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	_	3/8	_	1 7/8	9 3/4	3	8 13/32
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	_	3/8	_	2	9 7/8	3 1/8	8 17/32
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	10 1/8	3 3/8	8 25/32
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	_	3/8	_	2	10 1/2	3 1/8	9 1/4
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	_	3/8	_	2 1/4	10 3/4	3 3/8	9 1/2
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	_	_	_	2 1/4	10 3/4	3 3/8	9 1/2
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	10 3/4	3 3/8	9 1/2
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	_	3/8	_	2 1/4	12 1/8	3 1/2	10 23/32
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	_	3/83/8	_	2 1/4	12 1/8	3 1/2	10 23/32
	3.5	2 1/2 12	3 1/4 12	3.5	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	12 1/8	3 1/2	10 23/32
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	_	1/2	_	2 1/4	12 1/8	3 1/2	10 23/32
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	_	3/8	_	2 1/4	15	3 15/16	13 3/16
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	!	3 3/8	3.937	_	1/2	_	2 1/4	15	3 15/16	13 3/16
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	2 1/4	15	3 15/16	13 3/16
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	19 1/16	5	16 1/2
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	19 5/16	5 1/4	16 3/4
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	19 9/16	5 1/2	17
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	22 3/16	5 3/4	19 5/16
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	22 3/16	6	19 5/16
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	22 7/16	6	19 9/16

Shaded area not HD2 standard



1½" to 8" BORE SIZES



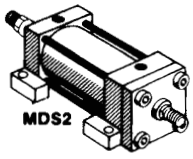


Head end cushions on 1-1/2" - 2" & 2-1/2" Bores using maximum oversize rods are non-adjustable.

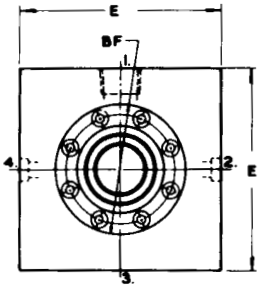
NOTE: THE BASIC DOUBLE ROD CYLINDER DIMENSIONS ARE SHOWN ON THIS AND FACING PAGE. FOR SPECIFIC MOUNTING DIMENSIONS, REFER TO PAGES FOR SINGLE ROD CYLINDER. EXCEPTION MDS2 "SS".

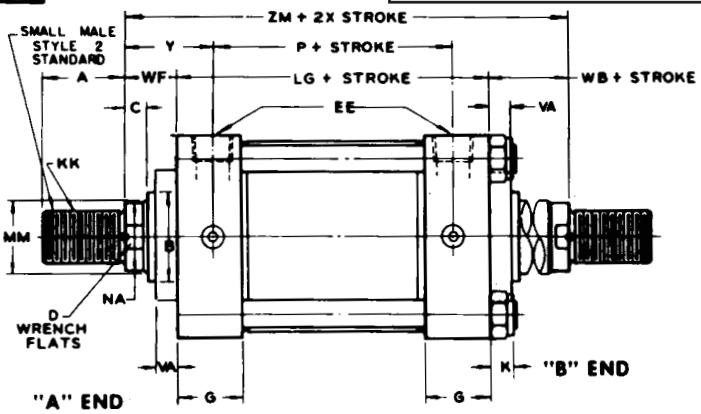
"A" END

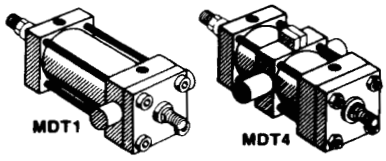
BEFORE DETERMINING DIMENSIONS
See chart on page 32 for cylinder rod combinations that have removable cartridges.

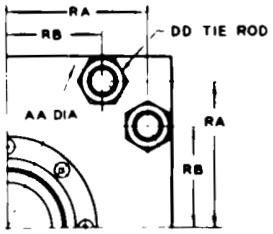


10" to 12" BORE SIZES





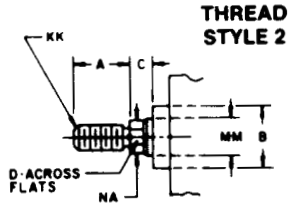


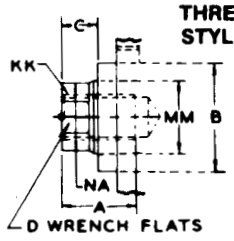


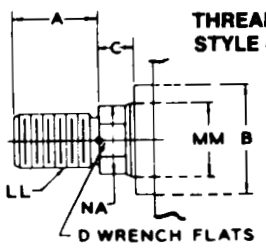
TIE ROD LAYOUT INFORMATION				
BORE SIZE	AA	RA	RB	DD
10	12 94	5 34	3 65	1 1/4-12
12	15 44	6 30	4 45	1 3/8-12

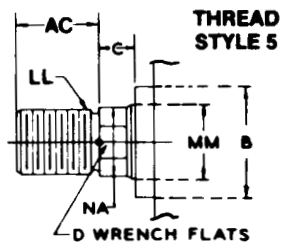
The 10" and 12" bore SERIES " HD2/H Hydraulic Cylinder is furnished with 8 Tie Rods instead of 4

ROD ENDS 1-1/2" to 12" BORES









Envelope and Mounting Dimensions

BORE	E	EE(SAE)	EE	F	G	K	LD	LG	P	SS
1 1/2	2 1/2	3/4 16*	1/2	3/8	1 3/4	15/32	5 1/4	_	2 7/8	4 1/8
2	3	3/4 16**	1/2	5/8	1 3/4	5/8	5 1/2	_	2 7/8	3 7/8
2 1/2	3 1/2	3/4 16	1/2	5/8	1 3/4	5/8	5 5/8	_	3	3 5/8
3 1/4	4 1/2	1 1/16 12	3/4	3/4	2	25/32	6 1/2	_	3 1/2	4 3/8
4	5	1 1/16 12	3/4	7/8	2	25/32	6 7/8	_	3 3/4	4 1/4
5	6 1/2	1 1/16 12	3/4	7/8	2	1	7 3/8	_	4 1/4	4 3/4
6	7 1/2	1 5/16 12	1	1	2 1/4	1 3/32	8 3/8	_	4 7/8	5 1/8
8	9 1/2	1 7/8 12	1 1/2	1	3	1 7/16	10 1/2	_	6 1/8	6 3/4
10	12 5/8	_	2	_	3 11/16	1 7/16	_	12 1/8	8	8 7/8
12	14 7/8	_	2 1/2	_	4 7/16	1 5/8	_	14 1/2	9 3/4	10 1/2

Shaded area not HD2 standard.
*For 1" Rod Diameter the SAE Head Port Thread is 9/16-18.
**For 1 3/8" Rod Diameter the SAE Head Port Thread is 9/16-18.

Rod End Dimensions

BORE SIZE	ROD DIA.	THREAD		ROD END DIMENSIONS AND ENVELOPE DIMENSIONS AFFECTED BY ROD SIZE												
	MM	KK	LL	A	AC	B +.000 -.002	BF	C	D	NA	V	VA	W	WF	Y	ZC
1.5	5/8	7/16 20	1/2 20	3/4	1.12	1.124	2 1/8	3/8	1/2	0.593	1/4	1/4	5/8	1	2	6 7/8
	1	3/4 16	7/8 14	1 1/8	1.88	1.499	_	1/2	7/8	.968	1/2	_	1	_	2 3/8	7 5/8
2	1	3/4 16	0.875	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	3/4	1 3/8	2 3/8	7 5/8
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	_	5/8	1 1/8	1.343	3/8	_	1	_	2 5/8	8 1/8
2.5	1	3/4 16	7/8 14	1 1/8	1.88	1.499	2 21/32	1/2	7/8	.968	1/4	3/8	3/4	1 3/8	2 3/8	7 3/4
	1.375	1 14	1 1/4 12	1 5/8	2.5	1.999	3 5/16	5/8	1 1/8	1.343	3/8	3/8	1	1 5/8	2 5/8	8 1/4
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2 374	_	3/4	1 1/2	1.703	1/2	_	1 1/4	_	2 7/8	8 3/4
3 1/4	1 3/8	1 14	1 1/4 12	1 5/8	2.50	1.999	3 5/16	5/8	1 1/8	1.343	1/4	3/8	7/8	1 5/8	2 3/4	9
	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	3/8	3/8	1 1/8	1 7/8	3	9 1/2
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	_	7/8	1 11/16	1.953	3/8	_	1 1/4	_	3 1/8	9 3/4
4	1 3/4	1 1/4 12	1 1/2 12	2	3.00	2.374	3 3/4	3/4	1 1/2	1.703	1/4	3/8	1	1 7/8	3	9 3/4
	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	1 1/8	2	3 1/8	10
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	_	1	2 1/16	2.453	3/8	_	1 3/8	_	3 3/8	10 1/2
5	2	1 1/2 12	1 3/4 12	2 1/4	3.50	2.624	4 1/4	7/8	1 11/16	1.953	1/4	3/8	1 1/8	2	3 1/8	10 1/2
	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	3/8	3/8	1 3/8	2 1/4	3 3/8	11
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	3/8	3/8	1 3/8	2 1/4	3 3/8	11
	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	3/8	3/8	1 3/8	2 1/4	3 3/8	11
6	2 1/2	1 7/8 12	2 1/4 12	3	4.50	3.124	4 5/8	1	2 1/16	2.453	1/4	3/8	1 1/4	2 1/4	3 1/2	11 7/8
	3	2 1/4 12	2 3/4 12	3 1/2	_	3.749	5 1/8	1	2 5/8	2.937	1/4	3/8	1 1/4	2 1/4	3 1/2	11 7/8
	3.5	2 1/2 12	3 1/4 12	3.5	6.50	4.249	5 9/16	1	3	3.437	1/4	3/8	1 1/4	2 1/4	3 1/2	11 7/8
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	1	3 3/8	3.937	1/4	1/2	1 1/4	2 1/4	3 1/2	11 7/8
8	3 1/2	2 1/2 12	3 1/4 12	3 1/2	6.50	4.249	5 9/16	1	3	3.437	1/4	3/8	_	2 1/4	3 15/16	14
	4	3 12	3 3/4 12	4	_	4.749	6 1/2	!	3 3/8	3.937	1/4	1/2	_	2 1/4	3 15/16	14
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	1/4	1/2	_	2 1/4	3 15/16	14
10	4 1/2	3 1/4 12	4 1/4 12	4 1/2	_	5.249	7	1	3 7/8	4.421	_	1/2	_	2 15/16	5	14
	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 1/4	18 1/2
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	5 1/2	19
12	5 1/2	4 12	5 1/4 12	5 1/2	_	6.249	8 1/4	1	4 5/8	5.421	_	1/2	_	3 3/16	5 3/4	20 7/8
	7	5 12	6 8	7	_	7.749	9 3/4	1	6	6.920	_	5/8	_	3 7/16	6	21 3/8
	8 1/2	6 8	7 8	8 1/2	_	9.249	11	1	7 1/4	8.420	_	5/8	_	3 7/16	6	21 3/8

Shaded area not HD2 standard

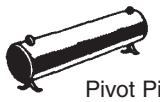
Optional Mounting Accessories


Female Rod Clevis


Rod Eye


Eye Bracket

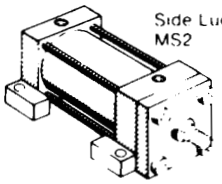

Clevis Bracket

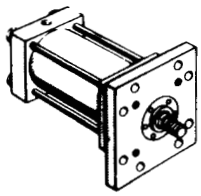

Pivot Pin with Ret Pins

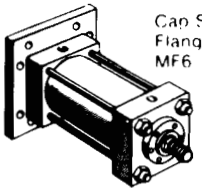
	ROD SIZE THREAD	5/8 7/16 – 20	1 3/4 – 16	1-3/8 1 – 14	1-3/4 1-1/4 – 12	2 1-1/2 – 12	2-1/2 1-7/8 – 12	3-1/2 2-1/2 – 12	4-1/2 3-1/4 – 12	5-1/2 4 – 12
ROD END	Female Rod Clevis	BDC-05	BDC-07	BDC-10	BDC-13	BDC-17	BDC-20	BDC-30	BDC-35	BDC-40
	Rod Eye	BDE-05	BDE-07	BDE-10	BDE-13	BDE-17	BDE-20	BDE-30	BDE-35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

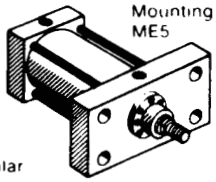
Mounting Styles and Ordering Notes

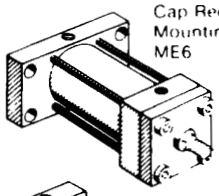
Available in all bore and rod combinations

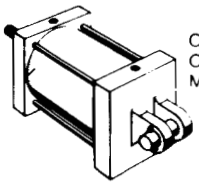

Side Lug MS2

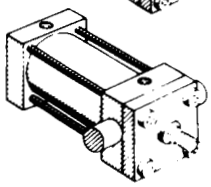

Head Square Flange MF5

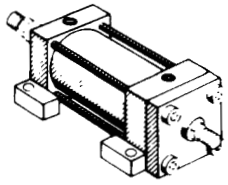

Cap Square Flange MF6


Head Rectangular Mounting ME5


Cap Rectangular Mounting ME6


Cap Fixed Clevis MP1
Pivot pin included


Trunnion Mounts
Head MT1
Cap MT2
Intermediate Fixed MT4

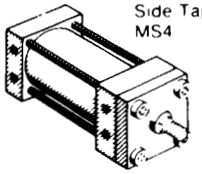


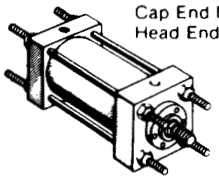
Double End Construction

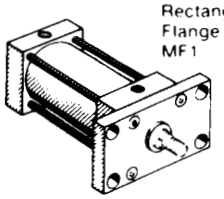
Available in all bore and rod combinations in the following mounting styles: MDS2, MDF5, MDT1, MDT4, and MDE5.

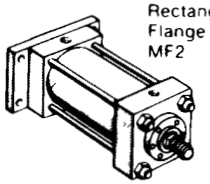
Available through 8" bore: MDS4, MDF1, MDX1, and MDX3.

Available in all bore and rod combinations through 8" bore


Side Tapped MS4


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


Head Rectangular Flange MF1


Cap Rectangular Flange MF2

Rod Bearing Cartridges

R Removable Cartridge

T Tie Rod Retained Cartridge

* MF1, MF2, MS4, MX1, MX2 and MX3 not available in these sizes

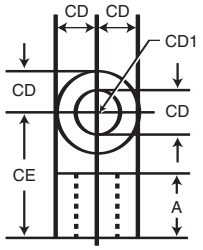
** Cushions are non-adjustable on head end only

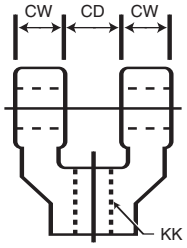
BORE	ROD DIA.	ME5, MT1, MF1, MT2, MF5, MT4, MS2, MX2, MS4	ME6	MF2, MX1, MF6, MX3, MP1
1-1/2	5/8 1 **	R R	R R	R T
2	1 1-3/8 **	R R	R R	R T
2-1/2	1 1-3/8 1-3/4 **	R R R	R R R	R R T
3-1/4	1-3/8 1-3/4 2	R R R	R R T	R R T
4	1-3/4 2 2-1/2	R R R	R R T	R R T
5	2 – 3-1/2	R	R	R
6	2-1/2 – 4	R	R	R
8	3-1/2, 4, 5-1/2	R	R	R
10	4-1/2, 5-1/2, 7	R*	R	R*
12	5-1/2, 7, 8-1/2	R*	R	R*

Rod Clevis

Order to fit thread size of piston rod.

Pin must be ordered separately.

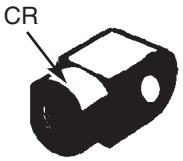




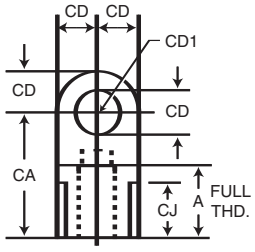
DIMENSION IN INCHES								
Part Number	**Rod Dia.**	**Thread Size KK**	**A (MIN)**	**CB**	**CD**	**CE**	**CW**	**CD1 (MAX)**
BDC-05	5/8	7/16 – 20	3/4	3/4	1/2	1-1/2	1/2	1/2
BDC-07	1	3/4 – 16	1-1/8	1-1/4	3/4	2-3/8	5/8	3/4
BDC-10	1-3/8	1 – 14	1-5/8	1-1/2	1	3-1/8	3/4	1
BDC-13	1-3/4	1-1/4 – 12	2	2	1-3/8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

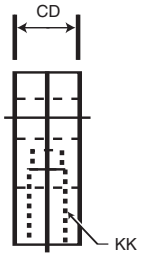
Rod Eye

Order to fit thread size of piston rod.

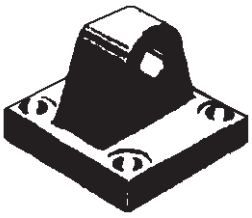


Pin must be ordered separately.



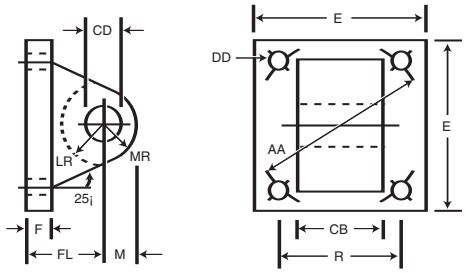


DIMENSION IN INCHES									
Part Number	**Rod Dia.**	**Thread Size KK**	**A (MIN)**	**CA**	**CB**	**CD**	**CJ**	**CD1**	**CR**
BDE-05	5/8	7/16 – 20	3/4	1-1/2	3/4	1/2	11/16	1/2	1
BDE-07	1	3/4 – 16	1-1/8	2-1/16	1-1/4	3/4	3/4	3/4	1-1/2
BDE-10	1-3/8	1 – 14	1-5/8	2-13/16	1-1/2	1	-	1	-
BDE-13	1-3/4	1-1/4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



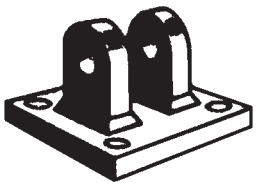
Eye Bracket

EYE BRACKETS



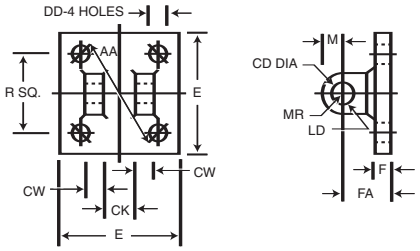
Part #	CB	CD	DD	E	F	FL	LR	M	MR	R
BDEB-05	3/4	1/2	13/32	2-1/2	3/8	1-1/8	3/4	1/2	9/16	1.62
BDEB-07	1-1/4	3/4	17/32	3-1/2	5/8	1-7/8	1-1/4	3/4	7/8	2.56
BDEB-10	1-1/2	1	21/32	4-1/2	3/4	2-1/4	1-1/2	1	1-1/4	3.25
BDEB-13	2	1-3/8	21/32	5	7/8	3	2-1/8	1-3/8	1-5/8	3.81
BDEB-17	2-1/2	1-3/4	29/32	6-1/2	7/8	3-1/8	2-1/4	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

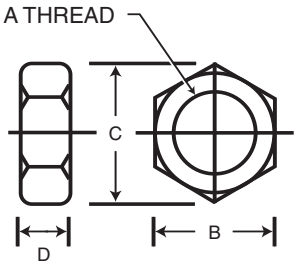


Part #	AA	BA	CB	CD	CW	DD	E	F	FL	LR	M	MR
BDCB-05	2.3	1.63	.765	1/2	1/5	3/8–24	2-1/2	3/8	1-1/8	1/2	1/2	9/16
BDCB-07	3.6	2.56	1.285	3/4	5/8	1/2–20	3-1/2	5/8	1-7/8	1-1/16	3/4	1-1/16
BDCB-10	4.6	3.25	1.515	1	3/4	5/8–18	4-1/2	3/4	2-1/4	1-1/4	1	1-1/8
BDCB-13	5.4	3.81	2.032	1-3/8	1	5/8–18	5	7/8	3	1-7/8	1-3/8	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

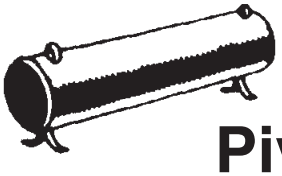
MATERIAL: 05 thru 20, Ductile Iron Casting

Jam Nut

Note: Order by thread size.

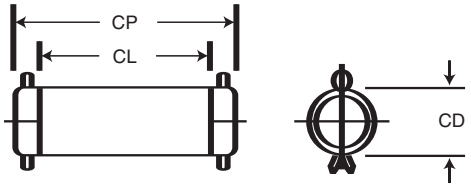


	DIMENSION IN INCHES			
Part Number	**Thd A**	**B**	**C**	**D**
7/16-20-JN	7/16 – 20	11/16	25/32	1/4
1/12-20-JN	1/2 – 20	3/4	55/64	5/16
5/8-18-JN	5/8 – 18	15/16	1-3/32	3/8
3/4-16-JN	3/4 – 16	1-1/8	1-1/4	27/64
7/8-14-JN	7/8 – 14	1-5/16	1-15/32	31/64
1-14-JN	1 – 14	1-1/2	1-11/16	35/64
1 1/4-12-JN	1-1/4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



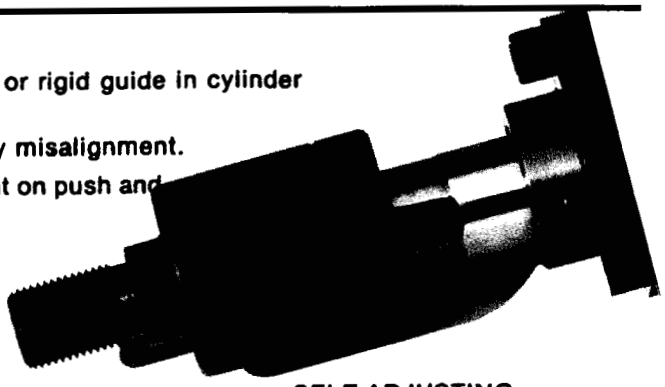
Pivot pins must be ordered as separate parts to fit matching clevis eye or bracket.

			INCHES		
Bore Sizes	**Rod Dia**	**Part Number**	**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

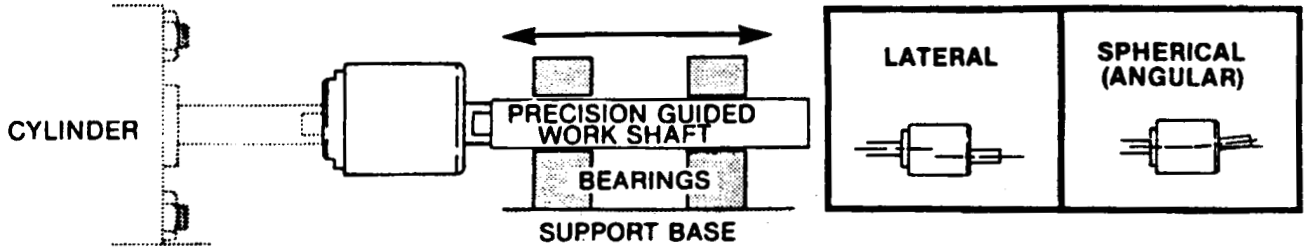
SELF ALIGNING ROD COUPLER

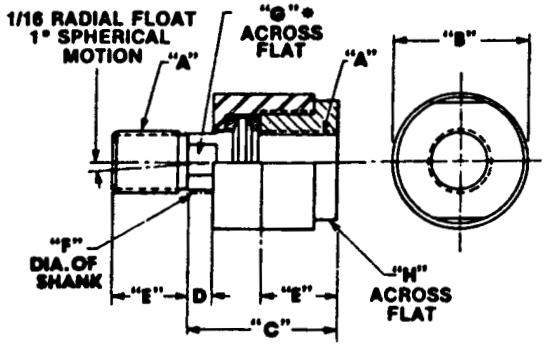
VGBenjey Cylinders
Formerly **DE-STA-CO** Cylinders

- 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.



SELF-ADJUSTING





MODEL NO.	"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	1/4	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 1/4	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

THEORETICAL PUSH AND PULL FOR HYDRAULIC CYLINDERS

PUSH FORCE AND DISPLACEMENT

CYL. BORE SIZE (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	.785	20	39	51	65	79	196	392	785	1570	2355	.00340
1½	1.767	44	88	115	142	177	443	885	1770	3540	5310	.00765
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	.0136
2½	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	.0213
3¼	8.30	208	415	540	664	830	2075	4150	8300	16600	24900	.0359
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	0544
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	.0850
6	28.27	707	1414	1838	2262	2827	7068	14135	28270	56540	84810	.1224
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	.1666
8	50.27	1257	2513	3268	4022	5027	12568	25135	50270	100540	150810	.2176
10	78.54	1964	3927	5105	6283	7854	19635	39270	78540	157080	235620	.3400
12	113.10	2828	5655	7352	9048	11310	28275	56550	113100	226200	339300	.4896
14	153.94	3849	7697	10006	12315	15394	38485	76970	153940	307880	461820	.6664

DEDUCTIONS FOR PULL FORCE AND DISPLACEMENT

PISTON ROD DIA. (INCHES)	PISTON ROD AREA (SQ. IN.)	PISTON ROD DIAMETER FORCE IN POUNDS AT VARIOUS PRESSURES To determine Cylinder Pull Force or Displacement, deduct the following Force or Displacement corresponding to Rod Size, from selected Push Stroke Force or Displacement corresponding to Bore Size in table above										DISPLACEMENT PER INCH OF STROKE (GALLONS)
		25	50	65	80	100	250	500	1000	2000	3000	
½	.196	5	10	13	16	20	49	98	196	392	588	.0009
⅝	.307	8	15	20	25	31	77	154	307	614	921	.0013
1	.785	20	39	51	65	79	196	392	785	1570	2355	.0034
1⅜	1.49	37	75	97	119	149	373	745	1490	2980	4470	.0065
1¾	2.41	60	121	157	193	241	603	1205	2410	4820	7230	.0104
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	.0136
2½	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	.0213
3	7.07	177	354	460	566	707	1767	3535	7070	14140	21210	.0306
3½	9.62	241	481	625	770	962	2405	4810	9620	19240	28860	.0416
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	.0544
4½	15.90	398	795	1033	1272	1590	3975	7950	15900	31800	47708	.0688
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	.0850
5½	23.76	594	1188	1544	1901	2376	5940	11880	23760	47520	71280	.1028
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	.1666
8½	56.75	1419	2838	3689	4540	5675	14187	28375	56750	113500	170250	.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.

KITS

WGBenjey Cylinders INC.
Formerly **DE-STA-CO** Cylinders

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 seal cartridge.

EXAMPLE: RS1K36E16H2

R	S	1	K	36	E16	H	2
C-Cylinders P - Piston R - Rod	R- Repair S - Seal	1 - Single Rod 2 - Double Rod	KITS	Mounting Code	Bore & Rod Code	Cylinder Series	Seal Code

REFER TO ORDER INFORMATION ON PAGE TWO

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 distributor for information on ordering piston and rod assemblies.

HD2 ASSEMBLY TORQUES (FT. LBS.)

Bore	Tie Rod	Removeable Retainer
1-1/2	22	6.5
2	55	12
2-1/2	55	12
3-1/4	110	22
4	110	22
5	300	22
6	450	22
8	780	4.00 ROD (35) 5.50 ROD (55)
10	CONSULT FACTORY	
12		

■ **TORQUE FOR FULL ROD RETAINERS USE TIE ROD TORQUE VALUES**

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.

WGBenjey INC. Cylinders

Formerly **DE-STA-CO** Cylinders

2293 Werth Road • Alpena, Michigan 49707

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