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SM Series Steel-Mill Cylinders

Heavy-Duty Hydraulic and Pneumatic



HYDRO-LINE, INC.

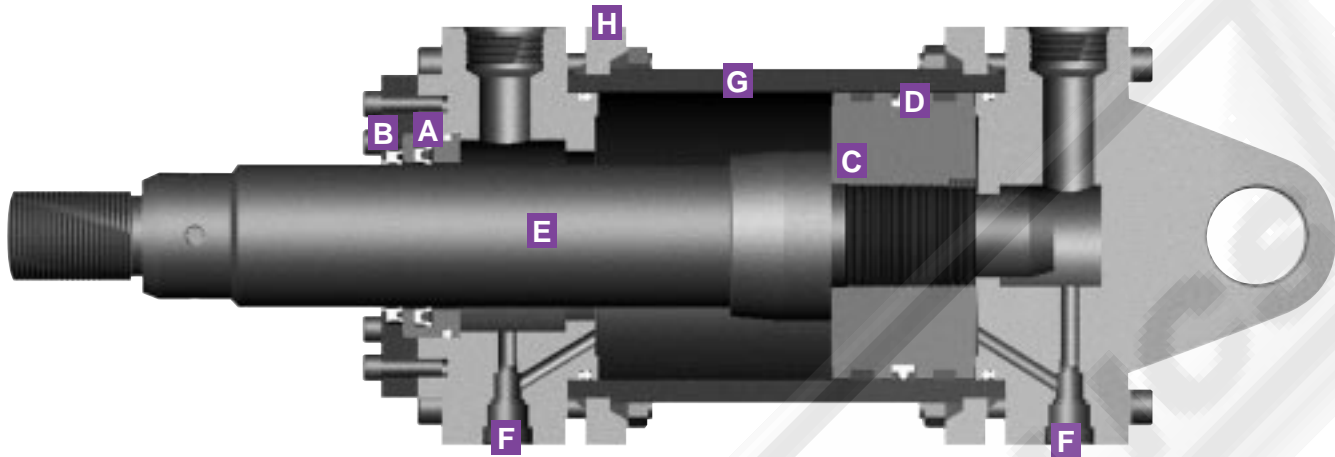
An IMC Company



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SM Design Features



A Heavy Duty Rod Cartridge

- SAE 660 bronze rod cartridge is pilot-fitted into the head and incorporates inboard and outboard bearing areas.
- High durometer double lip rod wiper.
- Metallic rod wiper available as a no charge option.
- Aluminum bronze material available as an option.

B Rod Seal and Wiper

Hydraulic:

- High durometer urethane mechanically loaded rod seal with a double lip rod wiper provides contamination exclusion and abrasion resistance.
- Other rod sealing and wiping systems are available as an option.

Pneumatic:

- High quality nitrile U-cup rod seal and double-lipped wiper.
- Other rod sealing and wiping systems are available as an option.

C Secured Piston

- One piece pilot-fitted ductile iron material.
- Secured to the piston rod by set screws staked in place.
- Steel pistons available as an option with wear bands or bronze overlay.

D Piston Seals

Hydraulic:

- Bi-directional nitrile piston seal with outboard wearbands prevents pressure traps and protects against sidelading.
- Other sealing configurations are available as an option.

Pneumatic:

- High quality nitrile U-cup piston seals.
- Other sealing configurations are available as an option.

E High Yield Piston Rod

- High yield, turned, ground and polished C1045/50 microalloy steel.
- Hard chrome plated a minimum of .001" diametrically.
- Heavier plating available as an option, in addition to various types of stainless steel and chrome over nickel plated rod material.

F Cushions

- Adjustable design allows for smooth deceleration.
- Ball check design allows for a smooth breakaway from cushion.

G High Yield Steel Tubing

Hydraulic:

- High yield strength steel.
- All tubes honed after welding of flanges.
- Chrome-plated bores available as an option.

Pneumatic:

- High yield strength steel.
- Tubes honed & chrome-plated to .001" minimum diametrically after welding fabrication of flanges.
- Heavier plating available as an option.

H Body Flanges

- Steel construction.
- Grade 8 bolts used for assembly with hardened steel washers.
- Hydraulic: Flanges welded to the body tube for maximum strength and durability.
- Pneumatic: Split ring and groove design secures flanges in standard duty applications; welded flanges are available for heavier duty applications.

Specifications

Bore Sizes: 2" through 16"

Pressure Ratings: MSM – 2,000 psi Nominal Hydraulic Service
 HSM – 3,000 psi Nominal Hydraulic Service
 ASM – Pneumatic Service

Commitment to Quality

It is the policy of Hydro-Line, Inc. to design, produce and deliver defect-free products and provide superior services, the first time and every time, that consistently meet the needs of our customers. Our philosophy calls upon every employee to strive for excellence in customer satisfaction through continuous improvement.



Custom Cylinders For Special Applications

Hydro-Line's full line of cylinder products and options fit most customers' application requirements, however, a special cylinder is often required to meet custom specifications. These custom cylinders are often needed to solve difficult application problems, upgrade existing equipment or are designed into new machinery.

Hydro-Line's Sales, Engineering and Manufacturing groups are cylinder specialists and have many years of experience in the interpretation of requirements, design and manufacture of custom cylinder products.



Our capabilities include:

- Bore diameters to 48"
- Stroke lengths to 300"
- Operating pressures to 10,000 psi or higher
- Operating mediums ranging from shop air to nitrogen, or from standard hydraulic fluid to special synthetic fluids
- Tie rod, threaded, bolted, and welded cylinder construction
- Finite element analysis
- Application simulation in our testing laboratories



= Solutions

Hydro-Line would appreciate an opportunity to submit a proposal to solve your application problem or fulfill your current cylinder requirements. Simply copy and complete the Application Data Sheet on page 4 and fax to your authorized Hydro-Line distributor.

ONE YEAR LIMITED WARRANTY

One Year Normal Use

Hydro-Line Products are warranted for a period of one year from date of shipment from our plant to be free from defects in workmanship and material under correct use, normal operating conditions and proper applications. This warranty does not extend to goods damaged, or subjected to accident, abuse, or misuse after shipment from our factory, nor to goods altered or repaired by anyone other than authorized Hydro-Line representatives.

Disclaimers

This one year limited warranty is the only warranty extended by Hydro-Line in connection with any sale by Hydro-Line. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, notwithstanding disclosure to Hydro-Line of the product's intended use. An affirmation of fact or promise made on behalf of Hydro-Line shall not be deemed to create an expressed warranty that the goods shall conform to the affirmation of promise; any description of the goods is for the sole purpose of identifying them and shall not be deemed to create an expressed warranty that the goods shall conform to such description; any sample or model is for illustrative purposes only and shall not be deemed to create an expressed warranty that the goods shall conform to the sample or model; and no affirmation or promise, or description, or sample or model, shall be deemed part of the basis of the bargain.

Exclusive Remedy

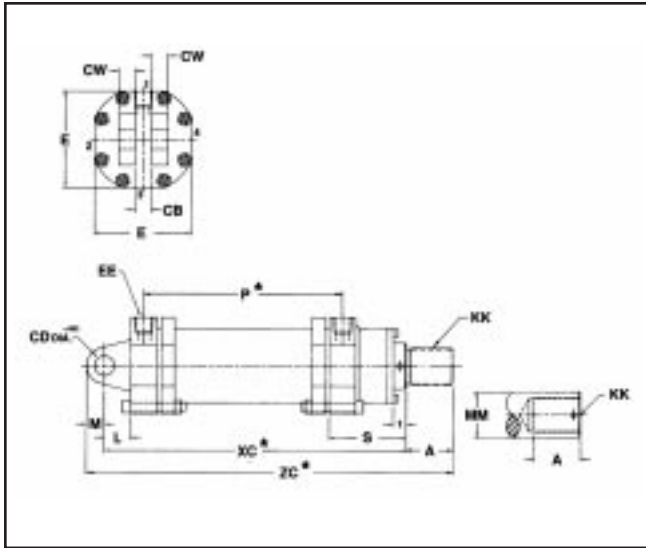
Hydro-Line's obligation upon breach of warranty shall be limited to replacing or

repairing at our option, free of charge, but not including installation, dismantling, reassembling or any other charge, the particular product or part which inspection discloses to have been defective at time of shipment. Inspection may be at the place of installation and use, or at our plant if requested (if returned to us at our expense including lowest transportation cost). Written notice of such defect shall be given by customer to Hydro-Line within 30 days after such defect(s) appear. Written permission for any warranty claim return must be first obtained from authorized Hydro-Line representatives. All returns must be accompanied with a complete written explanation of claimed defects and the circumstances of operational failure. Replacement of cylinders or parts thereof repaired under this warranty shall be warranted under the terms of this warranty for the remainder of the term of the original warranty or for a period of six months after such repair or replacement, whichever is longer. Upon expiration of the warranty, all of Hydro-Line's obligations hereunder shall terminate.

IN NO EVENT SHALL HYDRO-LINE HAVE ANY LIABILITY FOR PAYMENT OF ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR TORT DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, ANY LOSS OF PROFITS, TO THE EXTENT EXCLUSION IS PERMITTED BY LAW.

This warranty states our entire and exclusive liability and buyer's exclusive remedy for any claim of damages in connection with the sale or furnishing of Hydro-Line's products or parts, their design, suitability for use, installations or operation, or for any claimed defects therein. Goods not manufactured by Hydro-Line are furnished subject only to the Manufacturer's warranties, if any, and without warranties, expressed or implied, by Hydro-Line.

MSMCM - 2000 psi



BORE	2	3	4	5	6	8	10	12	14	16
E	3¼	4¾	6⅝	7⅝	8⅞	11¼	15	18	20	22
EE (BSP/NPT)	½	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#8	#12	#12	#16	#20	#20	#24	#24	#32	#32
CB	1¼	1½	2	2½	2½	3	3½	4½	5	6
CD	¾	1	1⅝	1¾	2	2	2½	3	3½	4¼
CW	⅝	¾	1	1¼	1¼	1½	1¾	2¼	2½	3
L	1⅝	1⅝	1⅞	2⅝	2⅝	3⅞	3⅞	4⅞	5	5½
M	¾	1⅝	1¼	1⅝	1⅞	1⅞	2⅞	2⅞	3⅞	4
P*	3⅝	4¼	4½	5⅝	6⅞	7	8⅞	9½	10⅝	11⅝
MM	1	1⅝	1¾	2	2½	3	3½	4¼	5¼	5¼
MM(ALT ROD)	1⅝	2	2½	3½	4¼	5¼	5¼	5¼	7	7
KK	¾-16	1-14	1¼-12	1½-12	1⅞-12	2¼-12	2½-12	3-12	4-12	4-12
KK(ALT ROD)	1-14	1½-12	1⅞-12	2½-12	3-12	4-12	4-12	4-12	5-12	5-12
A	1	1⅝	1¾	2	2½	3	3½	4¼	5¼	5¼
A(ALT ROD)	1⅝	2	2½	3½	4¼	5¼	5¼	5¼	7	7
XC*	8⅞	9¾	10½	12⅞	13¾	15⅞	18⅝	20¾	24⅞	25⅞
XC(ALT ROD)	8½	10⅞	11	13¼	15¼	17⅞	20⅞	21¾	24⅞	26⅞
ZC*	9⅞	12¼	13½	15¾	18⅞	20⅞	24½	27⅞	33⅞	35⅞
ZC(ALT ROD)	10⅞	13¼	14¾	18⅞	21⅞	25⅞	28½	30⅞	35⅞	37⅞
S	3¼	4	4¼	4¾	5⅞	5¾	6⅞	7⅞	8⅞	8⅞
S(ALT ROD)	3⅝	4⅝	4¾	5⅞	6⅞	7⅞	8⅞	8⅞	9⅞	9⅞

HSMCM - 3000 psi

BORE	3	4	5	6	8	10	12	14	16
E	5	7⅞	8½	10	13	16¼	19½	22	25½
EE (BSP/NPT)	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#12	#12	#16	#20	#20	#24	#24	#32	#32
CB	2	2½	2½	3	4½	5½	6½	8	9½
CD	1⅝	1¾	2	2	3½	4	5	5½	6½
CW	1	1¼	1¼	1½	2¼	2¾	3¼	4	4¾
L	2⅞	3	3⅞	3⅞	5½	5⅞	6¾	7⅞	8¼
M	1¼	1⅝	2	1⅞	4	4½	5½	6	7
P*	6	7	7⅞	8⅞	9¼	10½	11⅞	12¼	13⅝
MM	1¾	2	2½	3	4¼	5	5¾	7	8
MM(ALT ROD)	1¾	2½	3½	4¼	5¾	7	8	9	10
KK	1¼-12	1½-12	1⅞-12	2¼-12	3-12	4-12	4-12	6-8	7-8
KK(ALT ROD)	1½-12	1⅞-12	2½-12	3-12	4-12	5-12	5-12	6-8	7-8
A	1¾	2	2½	3	4¼	5	5¾	7	8
A(ALT ROD)	2	2½	3½	4¼	5¾	7	8	9	10
XC*	15	16⅞	18¾	20¼	23¾	26⅞	28⅞	31⅞	34⅞
XC(ALT ROD)	15	16⅞	18¾	20¼	23¾	26⅞	28⅞	31⅞	34⅞
ZC*	18	20¼	23¼	25⅞	32	35⅞	39⅞	44⅞	49⅞
ZC(ALT ROD)	18¼	20¾	24¼	26⅞	33½	37⅞	41⅞	46⅞	51⅞
S	6½	6⅞	7⅞	8⅞	9	10¼	10	11⅞	12¾
S(ALT ROD)	6½	6⅞	7⅞	8⅞	9	10¼	10	11⅞	12¾

Dimensions shown in purple are mounting dimensions.

★ Add stroke to all starred dimensions.

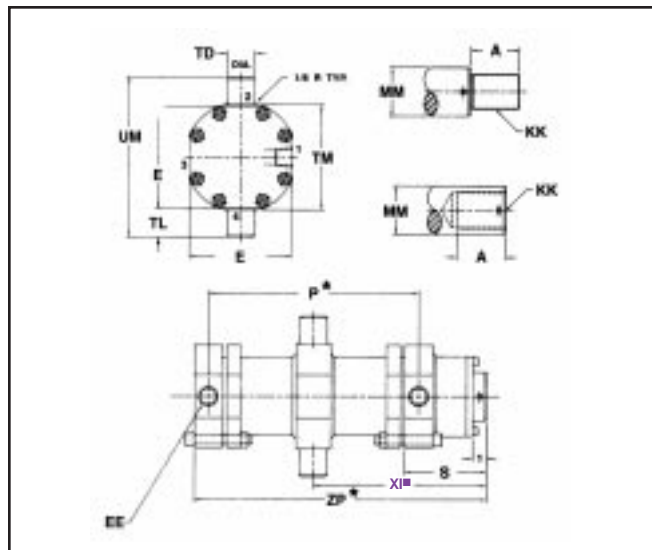
NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

Intermediate Fixed Trunnion Mount

Cylinder Dimensions

2" - 16" bore cylinders

MSMTM - 2000 psi



BORE	2	3	4	5	6	8	10	12	14	16
E	3¼	4¾	6¾	7¾	8¾	11¼	15	18	20	22
EE (BSP/NPT)	½	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#8	#12	#12	#16	#20	#20	#24	#24	#32	#32
TD	1¼	1¾	1¾	2	2¼	2½	3	3½	4½	5
TL	1¼	1¾	1¾	2	2¼	2½	3	3½	4½	5
TM	3¾	5½	6½	7¾	9½	11¾	16½	19	21½	23½
UM	6¼	7¾	10½	11¾	13¾	16¾	22½	26	30½	33½
P★	3½	4¼	4½	5¾	6½	7	8½	9½	10¾	11¾
MM	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
MM(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
KK	¾-16	1-14	1¼-12	1½-12	1¾-12	2¼-12	2½-12	3-12	4-12	4-12
KK(ALT ROD)	1-14	1½-12	1¾-12	2½-12	3-12	4-12	4-12	4-12	5-12	5-12
A	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
A(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
ZP★	6¾	8½	8½	10	11½	12¾	14½	16¾	19¾	20¾
ZP(ALT ROD)	7½	8½	9½	11½	12¾	14¾	16½	17¾	19½	20½
S	3¼	4	4¼	4¾	5½	5¾	6¾	7¾	8¾	8¾
S(ALT ROD)	3½	4¾	4¾	5¾	6¾	7¾	8¾	8¾	9½	9½

HSMTM - 3000 psi

BORE	3	4	5	6	8	10	12	14	16
E	5	7½	8½	10	13	16¼	19½	22	25½
EE (BSP/NPT)	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#12	#12	#16	#20	#20	#24	#24	#32	#32
TD	1½	1¾	2¼	2½	3½	4	5	5½	6½
TL	1¾	2½	2¾	3	4¼	5¼	6¼	6¾	7¼
TM	6½	8¼	9¾	10¾	14½	18	20½	23	26½
UM	9¾	12½	15	16¾	23	28½	33	36½	41
P★	6	7	7½	8½	9½	10½	11¾	12¼	13¾
MM	1¾	2	2½	3	4¼	5	5¾	7	8
MM(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
KK	1¼-12	1½-12	1¾-12	2¼-12	3-12	4-12	4-12	6-8	7-8
KK(ALT ROD)	1½-12	1¾-12	2½-12	3-12	4-12	5-12	5-12	6-8	7-8
A	1¾	2	2½	3	4¼	5	5¼	7	8
A(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
ZP★	12¾	13¾	15½	16¾	18¼	21½	21¾	24¼	26¾
ZP(ALT ROD)	12¾	13¾	15½	16¾	18¼	21½	21¾	24¼	26¾
S	6½	6¾	7¾	8½	9	10½	10	11¾	12¾
S(ALT ROD)	6½	6¾	7¾	8½	9	10½	10	11¾	12¾

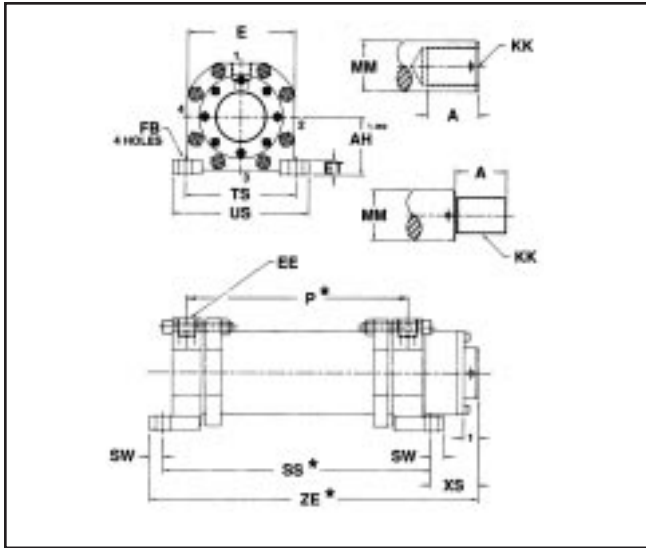
Dimensions shown in purple are mounting dimensions.

★ Add stroke to all starred dimensions.

■ XI dimension customer to specify.

NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

MSMAM - 2000 psi



BORE	2	3	4	5	6	8	10	12	14	16
E	3¼	4¾	6¾	7¾	8¾	11¼	15	18	20	22
EE (BSP/NPT)	½	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#8	#12	#12	#16	#20	#20	#24	#24	#32	#32
AH	1⅞	2¾	3¾	4	4½	5⅞	7¾	9¾	10½	11½
ET	5⁄8	1	7⁄8	1	1¼	1¾	1¾	1¾	2½	2¾
FB	9⁄16	1¼	1¾	1¾	1¾	1¾	1¾	1¾	1¾	2¼
P *	3⅝	4¼	4½	5¾	6½	7	8⅝	9½	10⅝	11⅝
SS *	6	7	7¾	8½	9¾	10⅝	12⅝	14½	19⅞	22⅝
SW	½	5⁄8	¾	7⁄8	1	1½	1¼	1½	1¾	2
TS	4	5⅝	6¾	7¾	8¾	10¾	11	13	16½	18
US	5	6⅞	7⅞	9¾	10¾	13	13½	16	20	22
MM	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
MM(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
KK	¾-16	1-14	1¼-12	1½-12	1¾-12	2¼-12	2½-12	3-12	4-12	4-12
KK(ALT ROD)	1-14	1½-12	1¾-12	2½-12	3-12	4-12	4-12	4-12	5-12	4-12
A	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
A(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
XS	1⅞	1¾	1¾	2½	2	2½	3	3⅞	2¾	1¾
XS(ALT ROD)	1⅞	2½	2¾	3¼	3½	4⅞	4¾	4⅞	3¾	2¾
ZE *	7⅞	9¾	10¾	11½	12⅞	14⅞	16⅞	19⅞	24	26
ZE(ALT ROD)	8⅞	9¾	10⅞	12⅞	14⅞	16⅞	18⅞	20⅞	24¾	26¾

HSMAM - 3000 psi

BORE	3	4	5	6	8	10	12	14	16
E	5	7⅞	8½	10	13	16¼	19½	22	25½
EE (BSP/NPT)	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#12	#12	#16	#20	#20	#24	#24	#32	#32
AH	3¾	4½	5⅞	5¾	7½	9	11	12¾	14
ET	7⁄8	1	1½	1¾	2¼	2½	2¾	3	3½
FB	1⅞	1¾	1¾	1¾	1¾	1¾	2¾	2¾	3¾
P *	6	7	7⅞	8⅞	9¼	10½	11⅞	12¼	13⅞
SS *	11	11½	13⅝	15⅝	16¾	19⅝	20	24	26½
SW	5⁄8	¾	1	1¼	1½	1¾	2¼	2½	3
TS	5¼	7	7½	8	11	13	15	19	21
US	6½	8½	9½	10½	14	17½	21	24	27½
MM	1¾	2	2½	3	4¼	5	5¼	7	8
MM(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
KK	1¼-12	1½-12	1¾-12	2¼-12	3-12	4-12	4-12	6-8	7-8
KK(ALT ROD)	1½-12	1¾-12	2½-12	3-12	4-12	5-12	5-12	6-8	7-8
A	1¾	2	2½	3	4¼	5	5¼	7	8
A(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
XS	3¼	3½	3½	3½	4	4	4	4½	4¼
XS(ALT ROD)	3¼	3½	3½	3½	4	4	4	4½	4¼
ZE *	14⅞	15¾	18⅞	19⅞	22¼	25½	26¼	30⅞	33
ZE(ALT ROD)	14⅞	15¾	18⅞	19⅞	22¼	25½	26¼	30⅞	33

Dimensions shown in purple are mounting dimensions.

★ Add stroke to all starred dimensions.

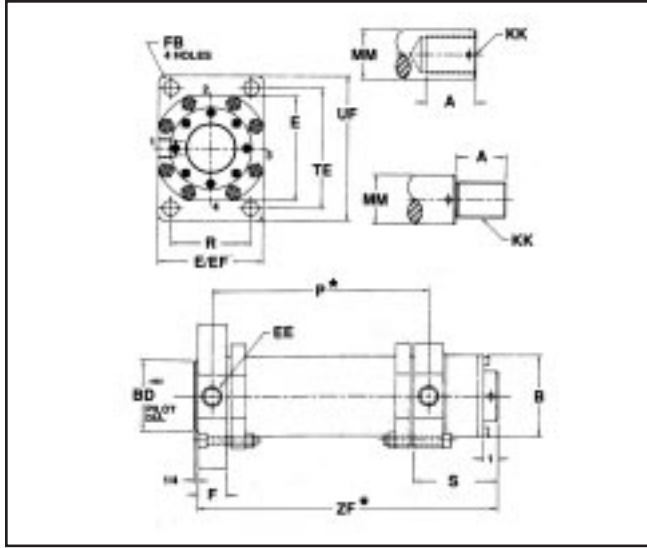
NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

Cap Rectangular Mount

Cylinder Dimensions

2" - 16" bore cylinders

MSMPM - 2000 psi



BORE	2	3	4	5	6	8	10	12	14	16
E	3¼	4¾	6¾	7¾	8¾	11¼	15	18	20	22
EE (BSP/NPT)	½	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#8	#12	#12	#16	#20	#20	#24	#24	#32	#32
EF	3¼	4¾	6¾	7¾	8¾	11¼	15	18	20	22
F	1¾	1¾	1¾	2	2¾	2¾	2¾	2¾	3½	3½
FB	1¾ ₃₂	1¼ ₁₆	1¾ ₁₆	1¼ ₁₆	1¼ ₁₆	1¼ ₁₆	1¼ ₁₆	1¼ ₁₆	2¼ ₁₆	2¼ ₁₆
P*	3½	4¼	4½	5¾	6½	7	8½	9½	10½	11½
R	2½	3¾	4¾	5¾	5¾	8½	11½	14½	16	17½
TE	4¼	5¾	7¼	8½	10¼	12½	15½	17½	20	21
UF	5¾	7¾	8¾	10¼	13¼	15¼	19	21	24	25½
MM	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
MM(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
KK	¾-16	1-14	1½-12	1½-12	1¾-12	2¼-12	2½-12	3-12	4-12	4-12
KK(ALT ROD)	1-14	1½-12	1¾-12	2½-12	3-12	4-12	4-12	4-12	5-12	5-12
A	1	1¾	1¾	2	2½	3	3½	4¼	5¼	5¼
A(ALT ROD)	1¾	2	2½	3½	4¼	5¼	5¼	5¼	7	7
BD	2	3½	4¾	5	6	8	10	12	13	14¼
BD(ALT ROD)	2	3¾	4¾	5	6	8	10	12	13	14¼
ZF*	6¾	8½	8¾	10	11½	12¾	14 ¹⁵ / ₁₆	16 ⁹ / ₁₆	19 ³ / ₁₆	20 ⁹ / ₁₆
ZF(ALT ROD)	7¾	8½	9½	11½	12¾	14¾	16 ¹¹ / ₁₆	17 ⁹ / ₁₆	19 ¹⁵ / ₁₆	20 ¹⁵ / ₁₆
S	3¼	4	4¼	4¾	5½	5¾	6 ⁷ / ₁₆	7 ³ / ₁₆	8 ⁹ / ₁₆	8 ⁹ / ₁₆
S(ALT ROD)	3¾	4¾	4¾	5¾	6¾	7¾	8 ³ / ₁₆	8 ³ / ₁₆	9 ⁵ / ₁₆	9 ⁵ / ₁₆

HSMMPM - 3000 psi

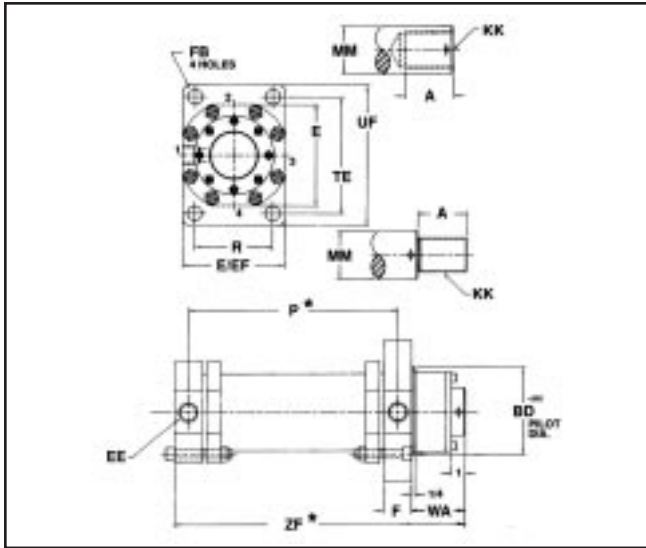
BORE	3	4	5	6	8	10	12	14	16
E	5	7½	8½	10	13	16¼	19½	22	25½
EE (BSP/NPT)	¾	¾	1	1¼	1¼	1½	1½	2	2
EE (SAE)	#12	#12	#16	#20	#20	#24	#24	#32	#32
EF	6¼	8	9¼	10¼	14	17	19½	22	25½
F	2	2	2¾	2¾	3	3¾	3¾	4¾	4¾
FB	1 ⁵ / ₁₆	1 ⁵ / ₁₆	1 ⁹ / ₁₆	1 ¹³ / ₁₆	2 ⁵ / ₈	2 ⁵ / ₈	3 ¹ / ₈	3 ⁵ / ₈	4 ¹ / ₈
P	6	7	7 ¹⁵ / ₁₆	8¾	9¼	10½	11¾	12¼	13¾
R	4½	5½	6	7	9	12	13½	15	17½
TE	6¾	8¾	10½	12¾	16¾	18½	22	25	29
UF	8½	11¼	13½	16¼	21¾	23½	28	32	37
MM	1¾	2	2½	3	4¼	5	5¾	7	8
MM(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
KK	1¼-12	1½-12	1¾-12	2¼-12	3-12	4-12	4-12	6-8	7-8
KK(ALT ROD)	1½-12	1¾-12	2½-12	3-12	4-12	5-12	5-12	6-8	7-8
A	1¾	2	2½	3	4¼	5	5¾	7	8
A(ALT ROD)	2	2½	3½	4¼	5¼	7	8	9	10
BD	3¾	4½	5¾	6½	8¾	10	11½	13	14¼
BD(ALT ROD)	3¾	4½	5¾	6½	8¾	10	11½	13	14¼
ZF	12 ⁹ / ₁₆	13 ⁵ / ₈	15 ⁵ / ₁₆	16 ⁷ / ₁₆	18¼	20 ⁹ / ₁₆	21 ³ / ₈	24 ¹ / ₁₆	26 ³ / ₈
ZF(ALT ROD)	12 ⁹ / ₁₆	13 ⁵ / ₈	15 ⁵ / ₁₆	16 ⁷ / ₁₆	18¼	20 ⁹ / ₁₆	21 ³ / ₈	24 ¹ / ₁₆	26 ³ / ₈
S	6½	6¾	7¾	8 ¹ / ₁₆	9	10 ¹ / ₁₆	10	11 ⁹ / ₁₆	12¾

Dimensions shown in purple are mounting dimensions.

★ Add stroke to all starred dimensions.

NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

MSMGM - 2000 psi



BORE	2	3	4	5	6	8	10	12	14	16
E	3/4	4/4	6/8	7/8	8/8	11/4	15	18	20	22
EE (BSP/NPT)	1/2	3/4	3/4	1	1 1/4	1 1/4	1 1/2	1 1/2	2	2
EE (SAE)	#8	#12	#12	#16	#20	#20	#24	#24	#32	#32
EF	3/4	4/4	6/8	7/8	8/8	11/4	15	18	20	22
F	1 1/8	1 1/8	1 1/8	2	2 3/8	2 3/8	2 3/4	2 3/4	3 1/8	3 1/8
FB	1 3/32	1 1/16	1 3/16	1 1/16	1 5/16	1 9/16	1 13/16	2 1/16	2 1/16	2 9/16
P *	3 5/8	4 1/4	4 1/2	5 3/8	6 1/8	7	8 5/8	9 1/2	10 5/8	11 5/8
R	2 1/2	3 3/8	4 3/4	5 5/8	5 7/8	8 1/2	11 1/2	14 1/2	16	17 1/2
TE	4 1/4	5 3/4	7 1/4	8 1/2	10 1/4	12 1/2	15 1/2	17 1/2	20	21
UF	5 1/8	7 1/8	8 7/8	10 1/4	13 1/4	15 1/4	19	21	24	25 1/2
MM	1	1 1/8	1 3/4	2	2 1/2	3	3 1/2	4 1/4	5 3/4	5 3/4
MM(ALT ROD)	1 3/8	2	2 1/2	3 1/2	4 1/4	5 3/4	5 3/4	5 3/4	7	7
KK	3/4-16	1-14	1 1/4-12	1 1/2-12	1 7/8-12	2 1/4-12	2 1/2-12	3-12	4-12	4-12
KK(ALT ROD)	1-14	1 1/2-12	1 7/8-12	2 1/2-12	3-12	4-12	4-12	4-12	5-12	5-12
A	1	1 1/8	1 3/4	2	2 1/2	3	3 1/2	4 1/4	5 3/4	5 3/4
A(ALT ROD)	1 3/8	2	2 1/2	3 1/2	4 1/4	5 3/4	5 3/4	5 3/4	7	7
BD	3 1/8	4 5/8	5 5/8	6 3/8	7 1/2	9 1/2	10	12	13	14 1/4
BD(ALT ROD)	3 1/8	4 5/8	5 5/8	6 3/8	7 1/2	9 1/2	10	12	13	14 1/4
WA	1 7/8	2 3/8	2 5/8	2 3/4	2 3/4	3 3/8	3 11/16	4 7/16	5 7/16	5 7/16
WA(ALT ROD)	2 1/4	2 3/4	3 1/8	3 7/8	4 1/4	5 1/2	5 7/16	5 7/16	6 3/16	6 3/16
ZF *	6 3/4	8 1/8	8 5/8	10	11 1/8	12 5/8	14 15/16	16 9/16	19 3/16	20 3/16
ZF(ALT ROD)	7 1/8	8 1/2	9 1/8	11 1/8	12 5/8	14 3/4	16 11/16	17 7/16	19 15/16	20 15/16

HSMGM - 3000 psi

BORE	3	4	5	6	8	10	12	14	16
E	5	7 1/8	8 1/2	10	13	16 1/4	19 1/2	22	25 1/2
EE (BSP/NPT)	3/4	3/4	1	1 1/4	1 1/4	1 1/2	1 1/2	2	2
EE (SAE)	#12	#12	#16	#20	#20	#24	#24	#32	#32
EF	6 1/4	8	9 1/4	10 1/4	14	17	19 1/2	22	25 1/2
F	2 1/4	2 3/4	3	3 1/4	3 3/4	4 1/2	5	5 1/2	6
FB	1 5/16	1 5/16	1 9/16	1 9/16	2 5/8	2 5/8	3 3/8	3 5/8	4 1/8
P *	6	7	7 15/16	8 5/8	9 1/4	10 1/2	11 3/8	12 1/4	13 3/8
R	4 1/2	5 1/2	6	7	9	12	13 1/2	15	17 1/2
TE	6 3/4	8 3/4	10 1/2	12 3/4	16 3/4	18 1/2	22	25	29
UF	8 1/2	11 1/4	13 1/2	16 1/4	21 1/4	23 1/2	28	32	37
MM	1 3/4	2	2 1/2	3	4 1/4	5	5 3/4	7	8
MM(ALT ROD)	2	2 1/2	3 1/2	4 1/4	5 3/4	7	8	7	10
KK	1 1/4-12	1 1/2-12	1 7/8-12	2 1/4-12	3-12	4-12	4-12	6-8	7-8
KK(ALT ROD)	1 1/2-12	1 7/8-12	2 1/2-12	3-12	4-12	5-12	5-12	6-8	7-8
A	1 3/4	2	2 1/2	3	4 1/4	5	5 3/4	7	8
A(ALT ROD)	2	2 1/2	3 1/2	4 1/4	5 3/4	7	8	9	10
BD	4 3/4	6	6 3/4	7 1/2	10	11 1/2	13	14 1/2	15 3/4
BD(ALT ROD)	4 3/4	6	6 3/4	7 1/2	10	11 1/2	13	14 1/2	15 3/4
WA	3 1/2	3 3/4	3 1/2	3 3/4	4 1/4	4 1/2	4	5 1/2	6
WA(ALT ROD)	3 1/2	3 3/4	3 1/2	3 3/4	4 1/4	4 1/2	4	5 1/2	6
ZF *	11 13/16	13	14 7/16	15 3/8	17 1/4	19 1/2	20 3/8	23 1/4	25 3/8
ZF(ALT ROD)	11 13/16	13	14 7/16	15 3/8	17 1/4	19 1/2	20 3/8	23 1/4	25 3/8

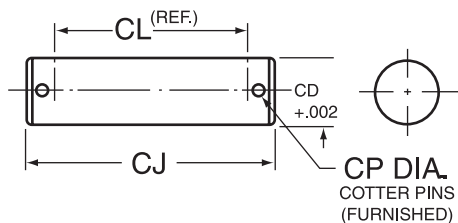
Dimensions shown in purple are mounting dimensions.

* Add stroke to all starred dimensions.

NOTE: Overall length dimensions that require addition of stroke may vary from dimensions shown, due to manufacturing tolerances.

Cylinder Mounting Accessories

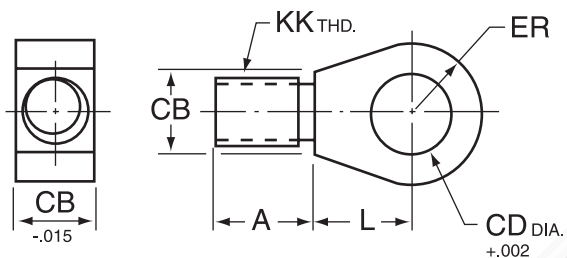
Pivot Pin



Part No.	CD	CJ	CL	CP
PP-075	.750	3 ¹ / ₄	2 ¹ / ₂	3 ³ / ₁₆
PP-125	1.250	3 ³ / ₄	3	3 ³ / ₁₆
PP-137	1.375	4	3 ¹ / ₄	3 ³ / ₁₆
PP-150	1.500	4 ³ / ₄	3 ³ / ₄	1 ¹ / ₄
PP-175	1.750	5 ¹ / ₂	4 ¹ / ₂	1 ¹ / ₄
PP-200	2.000	7	6	1 ¹ / ₄
PP-250	2.500	8	7	1 ¹ / ₄
PP-300	3.000	10 ¹ / ₂	9	3 ³ / ₈
PP-350	3.500	11 ¹ / ₂	10	3 ³ / ₈
PP-425	4.250	13 ¹ / ₂	12	3 ³ / ₈

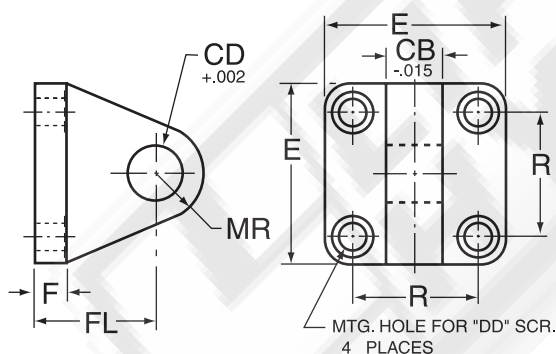
- Pivot pins are furnished with clevis mounted cylinders.
- Pivot pins must be ordered as a separate item if to be used with female eye, female clevis, standard eye bracket and clevis bracket. They are included only with swivel eye bracket.
- $CL = (2 \times CW) + CB$

Male Eye



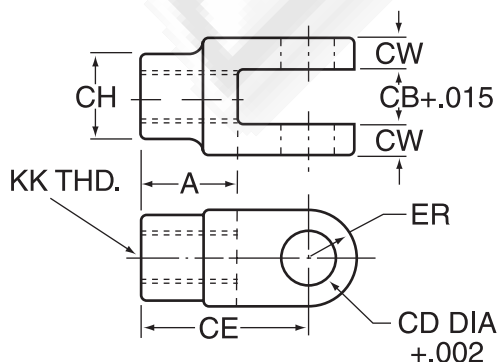
Part No.	A	CB	CD	ER	KK	L
ME-075	7 ¹ / ₈	1 ¹ / ₄	.752	5 ¹ / ₈	3/4-16	7 ¹ / ₈
ME-125	1 ¹ / ₄	1 ¹ / ₂	1.252	1 ¹ / ₈	1-14	1 ³ / ₈
ME-137	1 ⁵ / ₈	2	1.377	1 ¹ / ₄	1 ¹ / ₄ -12	1 ¹ / ₂
ME-150	1 ⁷ / ₈	2 ¹ / ₄	1.502	1 ³ / ₈	1 ¹ / ₂ -12	1 ⁵ / ₈
ME-175	2 ³ / ₈	2 ³ / ₄	1.752	1 ⁵ / ₈	1 ⁷ / ₈ -12	1 ⁷ / ₈
ME-200	2 ⁷ / ₈	3 ¹ / ₄	2.002	1 ⁷ / ₈	2 ¹ / ₄ -12	2 ¹ / ₈
ME-250	3 ³ / ₈	3 ³ / ₄	2.502	2 ³ / ₈	2 ¹ / ₂ -12	2 ⁵ / ₈
ME-300	4	4 ¹ / ₂	3.002	2 ⁷ / ₈	3-12	3 ¹ / ₈
ME-350	5 ¹ / ₂	6	3.502	3 ³ / ₈	4-12	3 ⁵ / ₈
ME-425	6 ¹ / ₂	7 ¹ / ₂	4.252	4	5-12	4 ¹ / ₄

Eye Bracket



Part No.	CB	CD	DD	E	F	FL	MR	R
EB-075	1	.752	3 ³ / ₈	3	9 ¹ / ₁₆	1 ³ / ₄	5 ¹ / ₈	2 ¹ / ₄
EB-125	1 ¹ / ₄	1.252	5 ¹ / ₈	5	15 ¹ / ₁₆	3	1 ¹ / ₈	3 ³ / ₄
EB-137	1 ¹ / ₄	1.377	3 ³ / ₄	6	13 ¹ / ₁₆	3 ⁷ / ₈	1 ¹ / ₄	4 ¹ / ₂
EB-150	1 ¹ / ₄	1.502	1	7	17 ¹ / ₁₆	4 ⁵ / ₈	1 ³ / ₈	5
EB-175	1 ¹ / ₂	1.752	1 ¹ / ₄	8 ¹ / ₄	11 ¹ / ₁₆	5 ⁵ / ₈	1 ⁵ / ₈	6
EB-200	3	2.002	1 ¹ / ₂	10	11 ¹⁵ / ₁₆	6 ⁷ / ₈	1 ⁷ / ₈	7 ¹ / ₄
EB-250	3 ¹ / ₂	2.502	1 ³ / ₄	13 ¹ / ₄	23 ¹ / ₁₆	8 ³ / ₄	2 ³ / ₈	10
EB-300	4 ¹ / ₂	3.002	2	15 ³ / ₄	27 ¹ / ₁₆	10 ¹ / ₄	2 ⁷ / ₈	12
EB-350	5	3.502	2	18	27 ¹ / ₁₆	11 ¹ / ₄	3 ³ / ₈	14 ¹ / ₄
EB-425	6	4.252	2 ¹ / ₂	20 ¹ / ₂	21 ¹⁵ / ₁₆	12 ¹ / ₂	4	16

Female Clevis



Part No.	A	CB	CD	CE	CH	CW	ER	KK
FC-075	1 ¹ / ₈	1	.752	2	1 ¹ / ₈	3 ³ / ₄	5 ¹ / ₈	3/4-16
FC-125	1 ¹ / ₂	1 ¹ / ₄	1.252	2 ⁷ / ₈	2	7 ¹ / ₈	1 ¹ / ₈	1-14
FC-137	1 ⁷ / ₈	1 ¹ / ₄	1.377	3 ³ / ₈	2 ¹ / ₄	1	1 ¹ / ₄	1 ¹ / ₄ -12
FC-150	2 ¹ / ₈	1 ¹ / ₄	1.502	3 ³ / ₄	2 ¹ / ₂	1 ¹ / ₄	1 ³ / ₈	1 ¹ / ₂ -12
FC-175	2 ⁵ / ₈	1 ¹ / ₂	1.752	4 ¹ / ₂	3	1 ¹ / ₂	1 ⁵ / ₈	1 ⁷ / ₈ -12
FC-200	3 ¹ / ₈	3	2.002	5 ¹ / ₄	3 ¹ / ₂	1 ¹ / ₂	1 ⁷ / ₈	2 ¹ / ₄ -12
FC-250	3 ⁵ / ₈	3 ¹ / ₂	2.502	6 ¹ / ₄	4	1 ³ / ₄	2 ³ / ₈	2 ¹ / ₂ -12
FC-300	4 ³ / ₈	4 ¹ / ₂	3.002	7 ¹ / ₂	5	2 ¹ / ₄	2 ⁷ / ₈	3-12
FC-350	5 ⁷ / ₈	5	3.502	9 ¹ / ₂	6	2 ¹ / ₂	3 ³ / ₈	4-12
FC-425	7 ¹ / ₄	6	4.252	11 ¹ / ₂	7 ¹ / ₂	3	4	5-12

HYDRO-LINE Actuation Products



- N5 SERIES CYLINDERS**
- NFPA interchangeable
 - **N5** – 3000 psi nominal hydraulic
 - **AN5** – to 250 psi very heavy-duty pneumatic
 - **LAN5** – to 250 psi very heavy-duty pneumatic – permanently lubricated
 - All steel construction



- R5 SERIES CYLINDERS**
- NFPA interchangeable
 - **A5/R5** – to 250 psi pneumatic
 - **LA5/LR5** – to 250 psi pneumatic – permanently lubricated
 - **HA5** – to 400 psi hydraulic
 - **HR5** – 1500 psi nominal hydraulic



- Q5 SERIES CYLINDERS**
- NFPA interchangeable
 - **Q5** – to 250 psi pneumatic
 - **LQ5** – to 250 psi pneumatic – permanently lubricated
 - **HQ5** – to 400 psi hydraulic
 - Aluminum construction



- HM SERIES CYLINDERS**
- Conform to international metric specifications ISO 6020/2 and DIN 24 554
 - 25 mm to 200 mm bore sizes
 - 210 BAR nominal hydraulic
 - All steel construction



- ROCKFORD SERIES CYLINDERS**
- ASAE interchangeable agricultural cylinders
 - **Rockford 2500**–2500 psi hydraulic
 - **Rockford 3000**–3000 psi hydraulic



- ELECTRONIC FEEDBACK CYLINDERS**
- Hydraulic or pneumatic cylinders which incorporate cylinder position sensing and feedback throughout the stroke. Available in N5, R5, A5, Q5, HM, HW, SM or special cylinders.



- SERIES 20/30 BOOSTERS**
- Standard series to 5000 psi output
 - Custom designs to 20,000 psi

T SERIES AIR/OIL TANKS

- All steel construction

QT SERIES AIR/OIL TANKS

- Aluminum end caps and translucent tubing



- V5 SERIES CYLINDERS**
- NFPA Interchangeable
 - To 200 psi pneumatic
 - Aluminum construction



- HW SERIES CYLINDERS**
- Welded construction
 - 3000 psi nominal hydraulic



- TSAVER CYLINDERS**
- Threaded body construction
 - To 200 psi pneumatic
 - To 1000 psi nominal hydraulic



- SM SERIES CYLINDERS**
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 - **MSM**–2000 psi nominal hydraulic
 - **HSM**–3000 psi nominal hydraulic
 - **ASM**–Pneumatic



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