



CYLINDERS

The responsive solution

In Partnership & Distributed By



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High Pressure Hydraulic

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1.5" to 28"
22 Mounting Styles
Up to 5000 PSI
Steel Construction

JIT Cylinders H Series Catalog

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Just In Time Stocking Levels

Our proactive inventory strategy with reactive responses help maintain product levels that keep your equipment productive with the fastest deliveries of stocked products. Our broad and responsive inventory system has been designed with the end user in mind, not outside shareholders.

Development of the H Series

Each JIT product has been designed by the industry specifically for industry. We don't tell you what you want, we have asked what you want. Product design input has been and still is actively collected from engineers, maintenance professionals and even operators to ensure maximum cylinder effectiveness. Through this on going effort, customers now have access to a product that has been designed:

"By You, For You"

Introduction to Excellence

Engineered products and applications expertise with the assurance that interchangeable parts are available worldwide and backed by expert service. JIT (Just-In-Time) Cylinders designs, manufactures and markets hydraulic, electro-hydraulic, pneumatic and electro-pneumatic components which provide force and motion control for industrial applications. Our components have superior adaptability allowing our engineers to present responsive solutions to maximize performance levels for all unique types of industrial equipment.

Tie Rod Principle

Tie rods are the most compact and versatile design for industrial cylinders. Tie rods are tightened to a high torque value to pre-load the cylinder allowing the body to expand (or breathe) under pressure without undermining performance capability. Welding is not required for standard assembly therefore there are no body distortion or fatigue concentrations.

Product Training

Training is provided to help ensure your systems are working at maximum efficiency via new technologies and best practices.

Performance you expect:

JIT Cylinders have been extensively designed to produce the following competitive advantages:

- * *Longer lifetime of service*
- * *Minimal downtime*
- * *Fast and easy installation*
- * *Simple and affordable repairs*
- * *No special tools required to make repairs.*
- * *Lower operating cost*
- * *More options available*
- * *Expedited deliveries with no extra charges
(Why pay more for **their** inefficiencies?)*
- * *Dedicated service professionals on call*

Large Enough to Make a Difference; Small Enough to Know the Difference

We at JIT Cylinders supply solutions to problems rather than just product configurations. Each day we strive to improve our product performances by developing intelligent actuation capability.

MODEL CODE

2

| H | MP1 | 5" | 10" | 2" | 1 | BE | S | P | S |
|----------|------------|-----------|------------|-----------|----------|-----------|----------|----------|-----------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

1 Model Series

H High Pressure Hydraulic (2500 - 5000 psi)*
 * Pressure rating dependant upon bore and mounting style

2 Mounting Style (Pages 7-20)

| | | | |
|-------------|-----------------------|------------|----------------------|
| MHF | Full Head Flange | MS1 | Angle Foot |
| MCF | Full Cap Flange | MS2 | Side Lugs |
| ME5 | Head Flange | MS3 | Centerline Lug |
| ME6 | Cap Flange | MS4 | Side Tapped |
| MF1 | Rect Head Flange | MS7 | Foot Lug |
| MF2 | Rect Cap Flange | MT1 | Head Trunnion |
| MF5 | Square Head Flange | MT2 | Cap Trunnion |
| MF6 | Square Cap Flange | MT4 | Inter.Fixed Trunnion |
| MP1 | Fixed Cap Clevis | MX0 | No Mount |
| MP2 | Detachable Cap Clevis | MX1 | Extended Both Ends |
| MP3 | Pivot Eye | MX2 | Extended Cap End |
| MPU3 | Self Aligning Eye | MX3 | Extended Head End |

3 Bore Size (1.5" - 28")

4 Stroke (.001" - 360")

5 Rod Diameter (.625" - 12")

6 Rod Threads

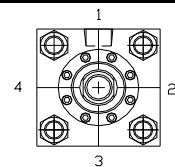
- 1 Small Male
- 2 Oversized Male
- 3 Standard Female
- 4 Safety Coupler
- 5 Special

7 Cushions

NC Non Cushion
RE Rod End
CE Cap Ends
BE Both Ends

8 Port Styles

S SAE
N NPT



9 Seals

P Polyurethane
B Nitrile
V Viton

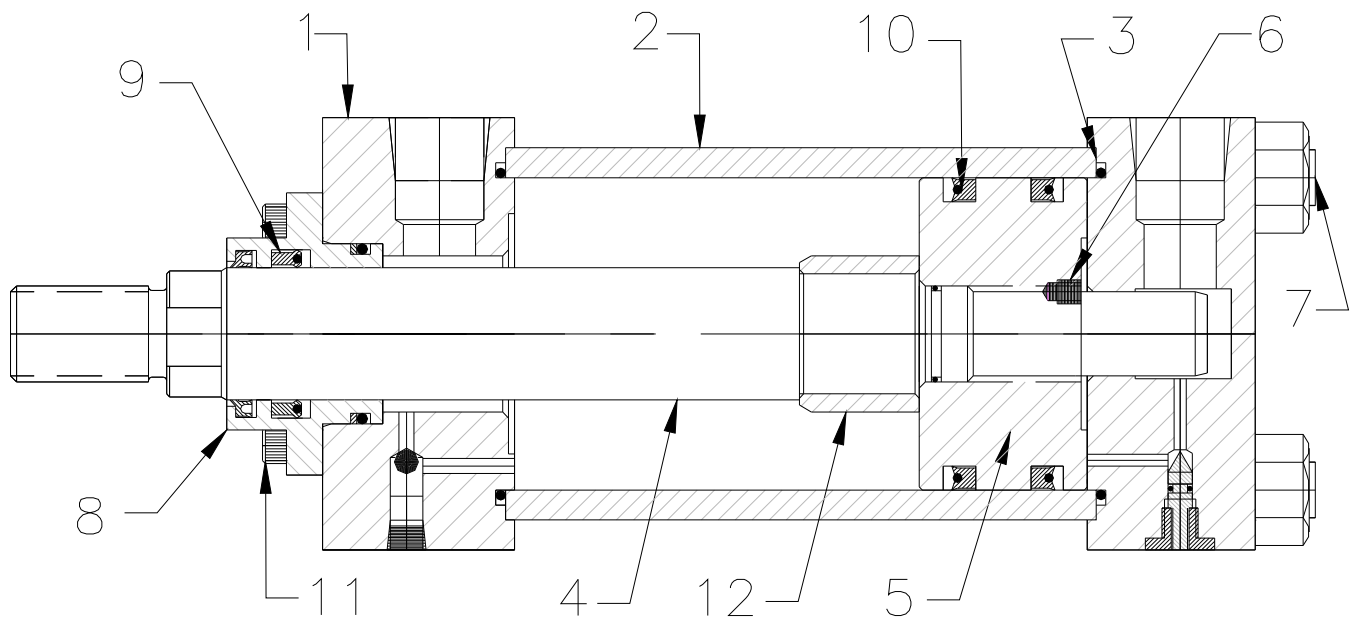
10 Specials

Air Bleeds
 Cast Iron Piston Rings
 Electroless Nickel Plated Cylinders
 Gland Drain
 Key Retainers
 Low Friction Seals
 Metallic Rod Scrapers
 Mixed Mounting Styles
 Non-Rotating Cylinders
 Proximity Switches
 Special, Rotated, or Oversize Ports
 Stainless Steel Construction
 Stop Tube (Indicate Total Gross)
 Tie Rod Extensions

We believe that a corporate strategy should be geared toward increasing the value of customers over the long term. Long-term increases to customer value are not possible without sufficient acceptance and input from the industrial population.

In following with our corporate strategy, each JIT product has been designed by the industry specifically for industry. We don't tell you what you want, we have asked what you want. Product design input has been and still is actively collected from engineers, maintenance professionals and even operators to ensure maximum cylinder effectiveness. Through this on going effort, customers now have access to a product that has been designed:

"By You, For You"



Cylinder Features

One Piece Bolt-On Gland
Full Face Barrel Seal
Solid Cap Cushion Seal
Stepped Cushion Spears

Micro-Adjustable Captive Cushion Needle
100% of Piston Rods Assembled are Pinned
More Porting Configurations in Standard Head
Rod Stock more tolerable to side loads

Wider Piston reduces bearing loads
Tie Rods have rolled threads
Fastest Deliveries
Design Adaptability

Port Size Options

Ports that are smaller than standard can be supplied upon request at no extra charge. When ordering oversized ports, head component modifications may be necessary. If the port cannot be placed directly in the head, a "port boss" will be welded to the head surface. This will not insure that increased flow volume can enter the cylinder without restriction. Cylinders designed to have oversize ports with "full flow" capability may be ordered, but special construction of head and cap may alter basic envelope dimensions.

Superior Sealing Systems

Standard sealing systems have been designed to provide optimum performance across broad velocity and temperature ranges with a variety of fluids.

Advanced Cushioning System

Advanced cushioning system provides excellent acceleration and deceleration profiles that tolerate higher velocity, demanding applications and utilize a zero bypass leakage concept. The self-centering head cushion has been designed for closer tolerances, minimum wear, constant deceleration curve.

| Component | Feature | Advantage | Benefit |
|-----------------------------------|---|---|---|
| 1 End Caps | Head are machined from steel precision blocks to ensure concentricity of the cylinder. | Excellent strength and yield characteristics. Parallel and square surfaces. | Faster more efficient machining. Provides for accurate mountings and positive alignment. |
| 2 Barrel | Damage-resistant heavy wall steel tubing honed to a micro finish bore. | DOM tube processing insures straighter and more concentric barrels. Tube I.D. is finished for low frictional drag and | Steel DOM tubing provides greater impact resistance for durability and long life. |
| 3 Barrel Seal | Pilot fitted and torqued against the surface of a full diameter barrel. | Insures the effectiveness of the O-ring face seal with improved strength. | Provides leak free service with a full barrel diameter. Resists shearing of the o-ring for ID seals. |
| 4 Rod | Piston rods are high yield strength, ground polished and chrome plated. | High yield material composition provides strength and flexibility. Chrome plating provides a smooth surface for effective sealing. | Strength for long life. Flexibility to prevent premature rod breakage. |
| 5 Piston | One piece design machined from ductile iron. Has higher tensile strength, yield, and elongation than standard gray iron. | Wide bearing surface design reduces bearing loads while ensuring stability, concentricity, and parallelism to the barrel. | Piston stability, concentricity, and parallelism ensures smooth operation and consistent sealing for longer life. |
| 6 Piston Rod Engagement | Piston is pilot fitted and secured to the rod by set screws staked in place with an o-ring seal under the piston | Pilot fitting ensures parallelism between the piston and the bore. The set screws with o-ring seal insure the piston to rod connection and prevents leakage under the piston. | Insures smooth operation. Prevents piston from backing off the rod. Prevents leakage at the rod to piston connection. |
| 7 Tie Rods | 100K minimum yield material with rolled threads. | Improved strength in threaded sections. | Rolled threads provide increased strength compared to cut threads. |
| 8 Rod Gland | Unitized, threadless and one piece ductile gland is pilot fitted into a precision bored head to achieve concentricity. Longer than standard inboard bearing surface extends gland life. As specified by maintenance professionals, all glands include jacking screw holes for quick and safe removal. | One-Piece ductile iron rod gland provides 400% longer bearing life than conventional bronze glands. Protects against side loads and removes easily using a common Allen wrench. Longer inboard bearing surface provides for maximum bearing support and wear resistance | Ductile Iron ensures greater gland strength and long life. The one piece, removable gland ensures easy and quick change out for decreased down time. |
| 9 Rod Seals | Mechanically energized, back beveled, rectangular rod seals. Rod wiper provides both wiping and sealing as secondary rod seal. | Provides consistent and even rod coverage, increased compression set resistance, maximum film-breaking ability, with rectangular shape that adds stability to prevent rolling. | The combination of rod seal and wiper provides virtually zero rod seal leakage. |
| 10 Piston Seals | Mechanically energized, lip type polyurethane piston seals, are both tough and extrusion resistant. | Provides consistent and even contact with the bore, good compression set resistance, and stability to prevent rolling. | The combination of polyurethane piston seal and piston ID seal provides virtually zero piston seal leakage. |
| 11 Fasteners | Grade 8 Tie Rod Nuts | Traceability when needed. Consistent quality, high strength. | Increased life, and higher fatigue factor. |
| 12 Cushions | Adjustable floating stepped cushion spears design with solid cap cushion. Micro-Adjustment captured cushion needle with fine threads allows for safe and precise adjustments. | Less shock, quicker cushioning, improved durability. Tight tolerance for the solid cap seal eliminates the need for floating bushings. Fine threads and special tip design allow for precise adjustment over a broad range of operating conditions. | Assures smooth and responsive cushioning with a longer life. Ideal for fast stoking applications. Inner Hex head allows for safe cushion adjustment while under pressure. |

Tie Rod Cylinder Solution

Our cylinder design is the compilation of best practice component concepts gathered from various departments within diverse industries. This cost-efficient design with the versatility to conform to any application criteria has been engineered to satisfy the requirements for optimum response, exceptional performance, and solid reliability. No one understands or meets the critical requirements of industry better than JIT Cylinders. By combining our extensive product and market knowledge with our unequaled technical expertise, we create products that ensure total customer satisfaction.

Non-Standard Modifications

Variations in Construction involving the use of non-standard dimensions, materials, or cylinder feature modifications are available upon request. Clearly describe any requirements that are not identifiable by the Model Code.

Ideal Mounting Applications

Lifting:

MP1 Cap Clevis
MF2 Cap Rectangular Flange
MF6 Cap Square Flange
ME6 Full Cap Flange
MT2 Cap Trunnion
MX2 Cap Extended Tie Rods

Pulling:

MHF Full Head Flange
ME5 Head Flange
MS2 Side Lug
MS4 Side Tapped
MF1 Head Rect Flange
MP1 Cap Clevis
MPU3 Spherical Eye
MT4 Center Trunnion
MT2 Cap Trunnion

Pushing:

MCF Full Cap Flange
ME6 Cap Flange
MS2 Side Lug
MS4 Side Tapped
MP1 Cap Clevis
MPU3 Spherical Eye
MF2 Cap Rectangular Flange
MF6 Cap Square Flange
MT4 Center Trunnion
MT1 Head Trunnion

Pivot Motion:

MP1 Cap Clevis
MPU3 Spherical Eye
MT4 Center Trunnion
MT1 Head Trunnion

Advanced Cushioning System

Special floating stepped cushion spear with solid cap seal and micro-adjustable captured cushion needle help create less operating shocks, improved cushioning speeds, and improved durability with safe and precise adjustments. Tight tolerances for the solid cap seal eliminates the need for floating bushings. Special cushion needle tip design allows for precise adjustment over a broad range of operating conditions.

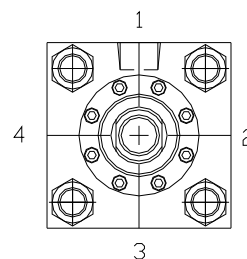
Cushion Lengths

| Bore | Head | Cap |
|------|------|------|
| 1.5 | 1.00 | 1.00 |
| 2.0 | 1.00 | 1.00 |
| 2.5 | 1.00 | 1.00 |
| 3.25 | 1.25 | 1.25 |
| 4.0 | 1.25 | 1.25 |
| 5.00 | 1.25 | 1.25 |
| 6.0 | 1.25 | 1.50 |
| 8.0 | 1.88 | 2.00 |



Standard Port Location

Standard port location (1) is at the top of the cylinder when looking into the rod end. Locations are 1, 2, 3, and 4 clockwise when looking at the cylinder rod end. SAE ports are standard for H series.



Standard Port Sizes

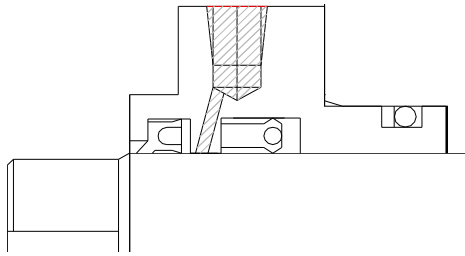
| Bore | SAE Port | Max SAE Port | NPT Port | Max NPT Port |
|------|----------|--------------|----------|--------------|
| 1.50 | 10 | 10 | 1/2 | 3/4 |
| 2.00 | 10 | 12 | 1/2 | 3/4 |
| 2.50 | 10 | 12 | 1/2 | 3/4 |
| 3.25 | 12 | 14 | 3/4 | 1 |
| 4.00 | 12 | 14 | 3/4 | 1 |
| 5.00 | 12 | 14 | 3/4 | 1 |
| 6.00 | 16 | 20 | 1 | 1 1/4 |
| 7.00 | 20 | 24 | 1 1/4 | 1 1/2 |
| 8.00 | 24 | 32 | 1 1/2 | 2 |

Tie Rod Torque

| Bore | Ft. Lb. |
|------|---------|
| 1.5 | 30 |
| 2.0 | 50 |
| 2.5 | 50 |
| 3.3 | 115 |
| 4.0 | 130 |
| 5.0 | 325 |
| 6.0 | 500 |
| 7.0 | 800 |
| 8.0 | 1200 |

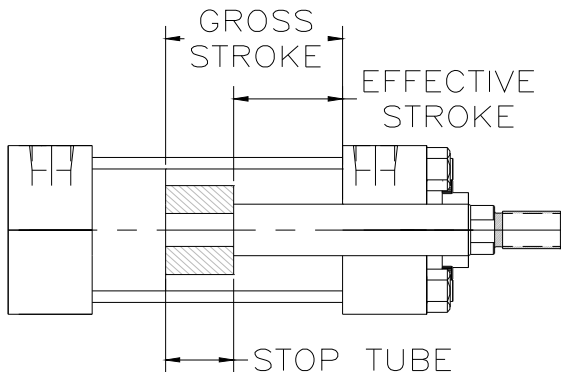
Gland Drain

When not even a drop of external leakage can be tolerated, a gland drain option will provide the signal (predictive maintenance) that the rod seal has worn to the point of replacement preventing the danger of contamination from leakage. The gland drain redirects any accumulated fluid, between the rod seal and wiper, back to the tank. Air models may be modified in the same way to permit lubrication of rod seal and inner bearing surfaces.



Stop Tube

Stop tubes reduce piston and bearing loads on long push stroking cylinders. A stop-tube increases the distance between the piston and rod bearing when the cylinder stroke is fully extended. This increased distance adds structural rigidity and helps prevent rod buckling. When ordering a cylinder with a stop-tube it is essential the stop-tube length, working stroke and total gross stroke be included.



Adjustable Stroke

An integral stroke adjustment (externally adjusted) that is accomplished by the use of a bump rod threaded into the cylinder cap. Seals are incorporated to prevent external leakage, and a lock nut is included.

Stainless Steel Piston Rods

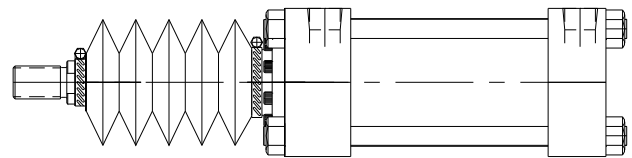
Many applications, especially those subjected to water spray, require the use of stainless steel piston rods. We furnish 17-4 pH hard chrome plated stainless steel, unless otherwise specified, which is considered a superior corrosion-resistant type of stainless steel. The minimum expected yield is 110,000 lb which should be considered with respect to operating pressure and column loading.

Proximity Switch

End of travel limit switches are available that signal rod position for control and safety circuits. The proximity switches for these cylinders are an inductive type switch with a sensing probe that "looks" at the cushion collar or spear providing full extension or full retraction indication.

Rod Boot

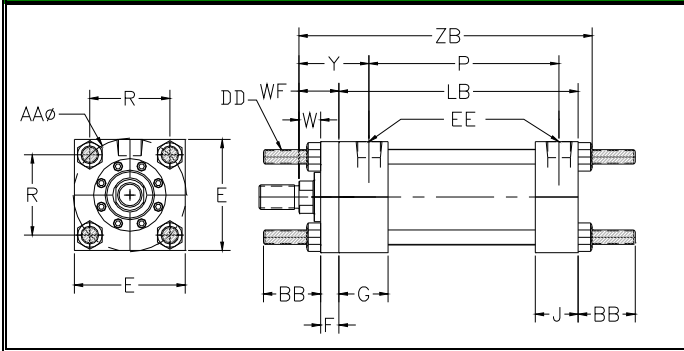
Rod-boots are used to protect the piston rod from harmful effects of severe operating environments. They are available for all cylinders. It is necessary to provide additional piston rod extension to allow space for the compressed rod boot length. The required extension varies with the rod diameter and stroke length.



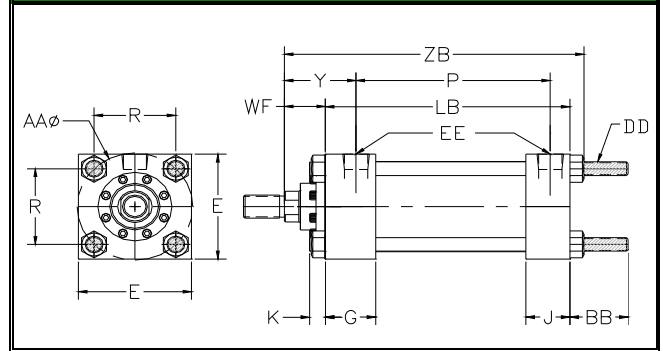
Air Bleed

Usually hydraulic cylinders will bleed themselves of air when ports are vertical, on top. Bleed ports are often desirable to remove entrapped air, for example, when the ports are on the bottom. High performance, high speed or heavy load applications are a few examples where air bleeds are also desirable.

Tie Rods Extended Both End MX1



Tie Rods Extended Cap End MX2



Centerline Mounting

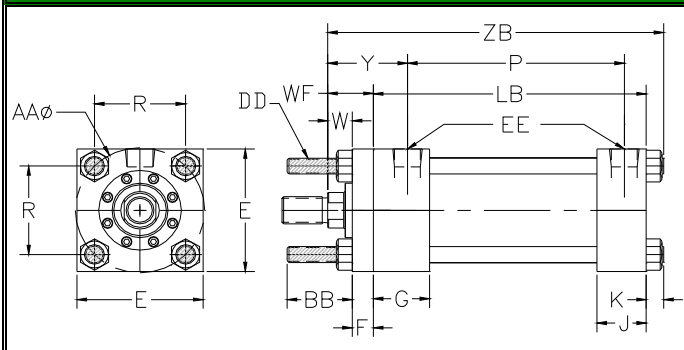
The preferred cylinder installation method, centerline mounting places the mounting bolts in simple tension so that the mounting mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and thus requires accurate cylinder alignment to prevent damage to cylinder working parts. Mounting configurations that provide centerline support are tie-rod mounts, flange mounts, rectangular head and cap cylinders, and centerline lug cylinders.

Recommended Applications

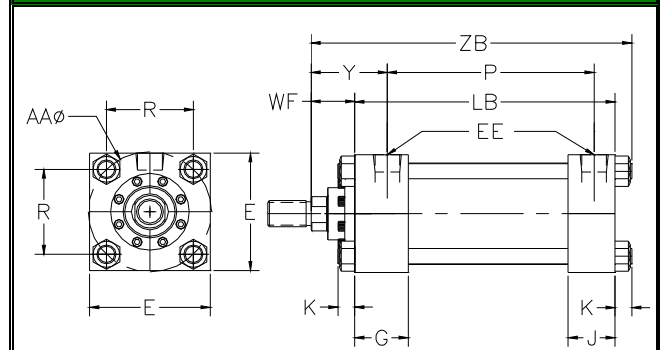
Tie Rod mounts are used for straight line force transfer. (MX3) Head extended tie rods for tension or pull, (MX2) Cap Extended Tie Rods for compression or push, and (MX1) Both Ends Extended Tie Rods for compression and tension.

The mounting surface should be flat and the frame sufficiently rigid to resist bending movements. Force on the rod should be perpendicular to the mounting surface and coincide with the centerline of the rod. For eccentric loads, oversized rods and stop tubes should be considered. Once fitted to the framework, the nuts provided should be correctly torqued.

Tie Rods Extended Rod End MX3

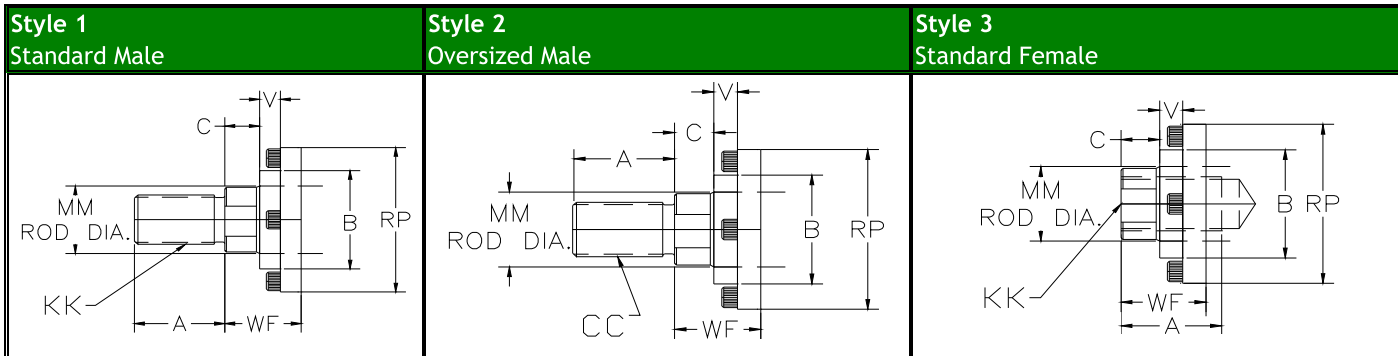


Plain Mount MX0



Tie Rod Mount Dimensions

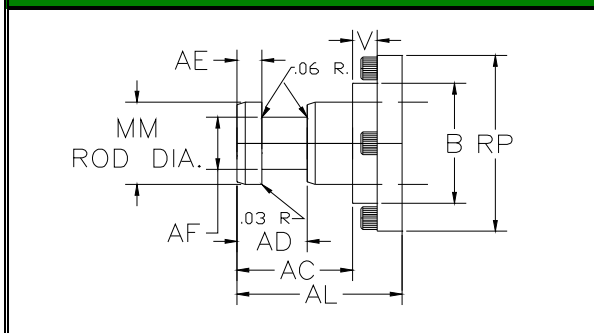
| BORE | E | EE-NPT | EE-SAE | F | G | J | K | AA | BB | DD | R | + Stroke | |
|------|------|--------|--------|------|------|------|------|------|------|----------|------|----------|------|
| 1.50 | 2.50 | 0.50 | 10 | 0.38 | 1.75 | 1.50 | 0.44 | 2.30 | 1.38 | 3/8-24 | 1.63 | 4.63 | 2.78 |
| 2.00 | 3.00 | 0.50 | 10 | 0.63 | 1.75 | 1.50 | 0.56 | 2.90 | 1.81 | 1/2-20 | 2.05 | 4.63 | 2.78 |
| 2.50 | 3.50 | 0.50 | 10 | 0.63 | 1.75 | 1.50 | 0.56 | 3.60 | 1.81 | 1/2-20 | 2.55 | 4.75 | 2.91 |
| 3.25 | 4.50 | 0.75 | 12 | 0.75 | 2.00 | 1.75 | 0.69 | 4.60 | 2.31 | 5/8-18 | 3.25 | 5.50 | 3.50 |
| 4.00 | 5.00 | 0.75 | 12 | 0.88 | 2.00 | 1.75 | 0.69 | 5.40 | 2.31 | 5/8-18 | 3.82 | 5.75 | 3.75 |
| 5.00 | 6.50 | 0.75 | 12 | 0.88 | 2.00 | 1.75 | 0.94 | 7.00 | 3.19 | 7/8-14 | 4.95 | 6.25 | 4.26 |
| 6.00 | 7.50 | 1.00 | 16 | 1.00 | 2.25 | 2.25 | 1.06 | 8.10 | 3.63 | 1-14 | 5.73 | 7.38 | 4.81 |
| 7.00 | 8.50 | 1.25 | 20 | 1.00 | 2.75 | 2.75 | 1.19 | 9.30 | 4.13 | 1 1/8-12 | 6.58 | 8.50 | 5.75 |
| 8.00 | 9.50 | 1.50 | 24 | 1.00 | 3.00 | 3.00 | 1.31 | 10.6 | 4.50 | 1 1/4-12 | 7.50 | 9.50 | 6.25 |



"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4 Self Aligning Coupler



Used with Self-Aligning accessory for fast, close radial alignment.

Style 5 Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

VARIABLE ROD DIMENSIONS

| | Bore | Rod Dia | V | W | Y | WF | RP | + Stroke |
|-------|------|---------|------|------|------|------|------|----------|
| 1.50 | | 0.63 | 0.25 | 0.63 | 2.11 | 1.00 | 2.00 | 6.00 |
| | | 1.00 | 0.50 | 1.00 | 2.48 | 1.38 | 2.38 | 6.38 |
| 2.00 | | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 6.50 |
| | | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 6.75 |
| 2.50 | | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 6.63 |
| | | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 6.88 |
| 3.25 | | 1.75 | 0.50 | 1.25 | 2.98 | 1.88 | 3.38 | 7.13 |
| | | 1.38 | 0.25 | 0.88 | 2.84 | 1.63 | 2.94 | 7.75 |
| 4.00 | | 1.75 | 0.38 | 1.13 | 3.09 | 1.88 | 3.38 | 8.00 |
| | | 2.00 | 0.38 | 1.25 | 3.22 | 2.00 | 3.63 | 8.13 |
| 5.00 | | 1.75 | 0.25 | 1.00 | 3.09 | 1.88 | 3.38 | 8.25 |
| | | 2.00 | 0.25 | 1.13 | 3.22 | 2.00 | 3.63 | 8.38 |
| 6.00 | | 2.50 | 0.38 | 1.38 | 3.47 | 2.25 | 4.19 | 8.63 |
| | | 2.00 | 0.38 | 1.13 | 3.22 | 2.00 | 3.63 | 9.13 |
| 7.00 | | 2.50 | 0.50 | 1.38 | 3.47 | 2.25 | 4.19 | 9.38 |
| | | 3.00 | 0.38 | 1.38 | 3.47 | 2.25 | 4.81 | 9.38 |
| 8.00 | | 3.50 | 0.38 | 1.38 | 3.47 | 2.25 | 5.50 | 9.38 |
| | | 2.50 | 0.25 | 1.25 | 3.63 | 2.25 | 4.19 | 10.63 |
| 9.00 | | 3.00 | 0.25 | 1.25 | 3.63 | 2.25 | 4.81 | 10.63 |
| | | 3.50 | 0.25 | 1.25 | 3.63 | 2.25 | 5.50 | 10.63 |
| 10.00 | | 4.00 | 0.25 | 1.25 | 3.63 | 2.25 | 6.00 | 10.63 |
| | | 3.00 | 0.25 | 1.25 | 3.75 | 2.25 | 4.81 | 10.75 |
| 11.00 | | 3.50 | 0.25 | 1.25 | 3.75 | 2.25 | 5.50 | 10.75 |
| | | 4.00 | 0.25 | 1.25 | 3.75 | 2.25 | 6.00 | 10.75 |
| 12.00 | | 4.50 | 0.25 | 1.25 | 3.75 | 2.25 | 6.69 | 10.75 |
| | | 5.00 | 0.25 | 1.25 | 3.75 | 2.25 | 7.38 | 10.75 |
| 13.00 | | 3.50 | 0.25 | 1.25 | 4.00 | 2.25 | 5.50 | 13.00 |
| | | 4.00 | 0.25 | 1.25 | 4.00 | 2.25 | 6.00 | 13.00 |
| 14.00 | | 4.50 | 0.25 | 1.25 | 4.00 | 2.25 | 6.69 | 13.00 |
| | | 5.00 | 0.25 | 1.25 | 4.00 | 2.25 | 7.38 | 13.00 |
| 15.00 | | 5.50 | 0.25 | 1.25 | 4.00 | 2.25 | 8.07 | 13.00 |

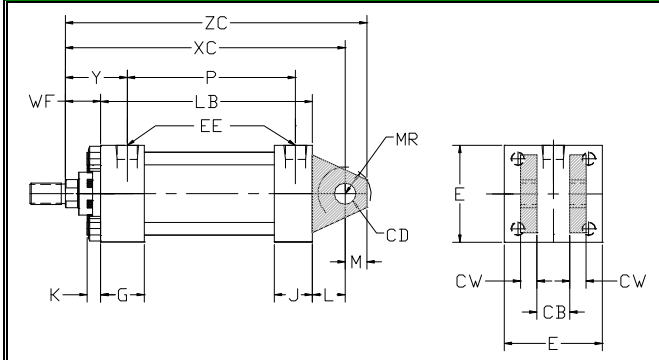
Spanner Wrench Holes

4" rod and larger have spanner wrench holes in place of wrench flats.

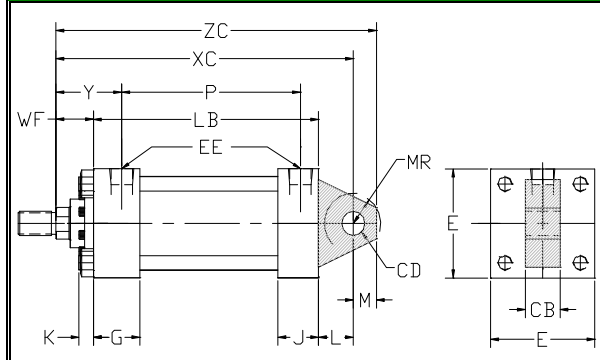
STANDARD ROD DIMENSIONS

| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
|----|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1/2-12 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

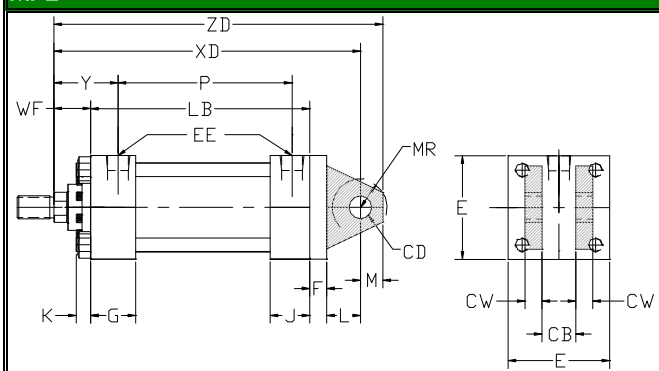
REAR CLEVIS MOUNT MP1



REAR EYE MOUNT MP3



DETACHABLE REAR CLEVIS MOUNT MP2



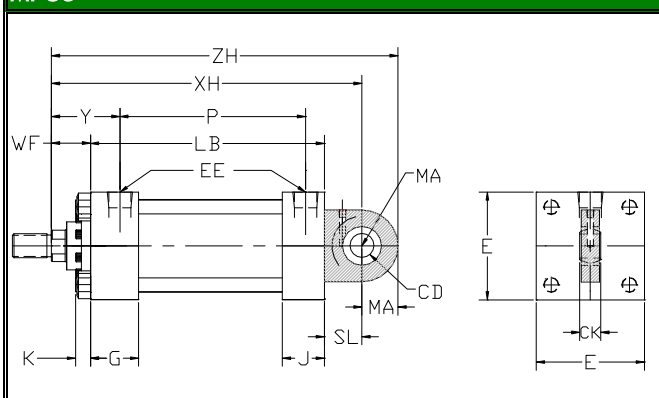
Recommended (Push and Pull Applications)

The centerline of the machine that attaches to the swivel pin must be perpendicular to the centerline of the piston rod and the curved path must be on one plane only. Any misalignment of the cylinder will cause excessive side loading on the gland and piston, which will lead to premature failure.

Clevis Mount Dimensions

| Bore | E | EE-NPT | EE-SAE | G | J | K | L | M | CB | CD | CW | MR | + Stroke | |
|------|------|--------|--------|------|------|------|------|------|------|------|------|------|----------|------|
| 1.50 | 2.50 | 0.50 | 10 | 1.75 | 1.50 | 0.44 | 0.75 | 0.50 | 0.75 | 0.50 | 0.50 | 0.63 | 2.78 | 4.63 |
| 2.00 | 3.00 | 0.50 | 10 | 1.75 | 1.50 | 0.56 | 1.25 | 0.75 | 1.25 | 0.75 | 0.63 | 0.94 | 2.78 | 4.63 |
| 2.50 | 3.50 | 0.50 | 10 | 1.75 | 1.50 | 0.56 | 1.25 | 0.75 | 1.25 | 0.75 | 0.63 | 0.94 | 2.91 | 4.75 |
| 3.25 | 4.50 | 0.75 | 12 | 2.00 | 1.75 | 0.69 | 1.50 | 1.00 | 1.50 | 1.00 | 0.75 | 1.19 | 3.50 | 5.50 |
| 4.00 | 5.00 | 0.75 | 12 | 2.00 | 1.75 | 0.69 | 2.13 | 1.38 | 2.00 | 1.38 | 1.00 | 1.65 | 3.75 | 5.75 |
| 5.00 | 6.50 | 0.75 | 12 | 2.00 | 1.75 | 0.94 | 2.25 | 1.75 | 2.50 | 1.75 | 1.25 | 2.07 | 4.26 | 6.25 |
| 6.00 | 7.50 | 1.00 | 16 | 2.25 | 2.25 | 1.06 | 2.50 | 2.00 | 2.50 | 2.00 | 1.25 | 2.38 | 4.81 | 7.38 |
| 7.00 | 8.50 | 1.25 | 20 | 2.75 | 2.75 | 1.19 | 3.00 | 2.50 | 3.00 | 2.50 | 1.50 | 2.88 | 5.75 | 8.50 |
| 8.00 | 9.50 | 1.50 | 24 | 3.00 | 3.00 | 1.31 | 3.25 | 2.75 | 3.00 | 3.00 | 1.50 | 3.25 | 6.25 | 9.50 |

REAR SPHERICAL ROD EYE MOUNT MPU3



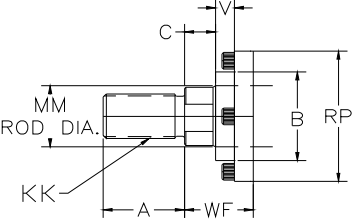
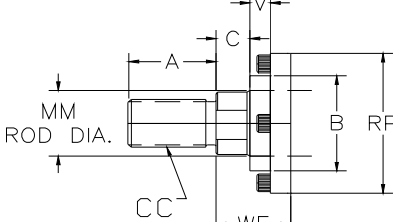
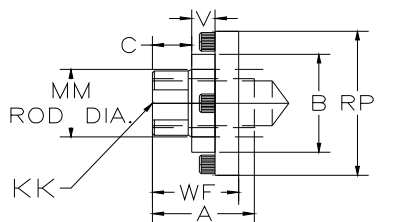
Recommended (Push and Pull Applications)

MPU3 mounts are for applications in which the stroke travels in a curved path in one plane where some misalignment is unavoidable. Care must be exercised to prevent rod buckling in compression applications with long strokes.

MPU3 Dimensions

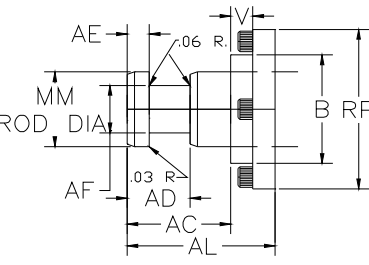
| BORE | SL | CK | MA |
|------|------|------|------|
| 1.50 | 0.81 | 0.44 | 0.75 |
| 2.00 | 1.19 | 0.66 | 1.25 |
| 2.50 | 1.19 | 0.66 | 1.25 |
| 3.25 | 1.56 | 0.88 | 1.50 |

CONSULT FACTORY FOR LARGER BORE SIZES OR CUSTOM APPLICATIONS

| Style 1 Standard Male | Style 2 Oversized Male | Style 3 Standard Female |
|---|---|---|
|  |  |  |

"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

| Style 4 Self Aligning Coupler | VARIABLE ROD DIMENSIONS | | | | | | | + Stroke | | | | |
|---|-------------------------|---------|------|------|------|------|------|----------|-------|-------|-------|-------|
| | Bore | Rod Dia | V | Y | XH | RP | WF | XC | XD | ZC | ZD | ZH |
|  | 1.50 | 0.63 | 0.25 | 2.11 | 6.44 | 2.00 | 1.00 | 6.38 | 6.75 | 6.88 | 7.13 | 7.19 |
| | | 1.00 | 0.50 | 2.48 | 6.81 | 2.38 | 1.38 | 6.75 | 7.13 | 7.25 | 7.50 | 7.56 |
| | 2.00 | 1.00 | 0.25 | 2.48 | 7.19 | 2.38 | 1.38 | 7.25 | 7.88 | 8.00 | 8.50 | 8.44 |
| | | 1.38 | 0.38 | 2.73 | 7.44 | 2.94 | 1.63 | 7.50 | 8.13 | 8.25 | 8.75 | 8.69 |
| | 2.50 | 1.00 | 0.25 | 2.48 | 7.31 | 2.38 | 1.38 | 7.38 | 8.00 | 8.13 | 8.63 | 8.56 |
| | | 1.38 | 0.38 | 2.73 | 7.56 | 2.94 | 1.63 | 7.63 | 8.25 | 8.38 | 8.88 | 8.81 |
| | | 1.75 | 0.50 | 2.98 | 7.81 | 3.38 | 1.88 | 7.88 | 8.50 | 8.63 | 9.13 | 9.06 |
| | 3.25 | 1.38 | 0.25 | 2.84 | 8.69 | 2.94 | 1.63 | 8.63 | 9.38 | 9.63 | 10.13 | 10.19 |
| | | 1.75 | 0.38 | 3.09 | 8.94 | 3.38 | 1.88 | 8.88 | 9.63 | 9.88 | 10.38 | 10.44 |
| | | 2.00 | 0.38 | 3.22 | 9.06 | 3.63 | 2.00 | 9.00 | 9.75 | 10.00 | 10.50 | 10.56 |
| | 4.00 | 1.75 | 0.25 | 3.09 | | 3.38 | 1.88 | 9.75 | 10.63 | 11.13 | 11.50 | |
| | | 2.00 | 0.25 | 3.22 | | 3.63 | 2.00 | 9.88 | 10.75 | 11.25 | 11.63 | |
| | | 2.50 | 0.38 | 3.47 | | 4.19 | 2.25 | 10.13 | 11.00 | 11.50 | 11.88 | |
| | 5.00 | 2.00 | 0.38 | 3.22 | | 3.63 | 2.00 | 10.50 | 11.38 | 12.25 | 12.25 | |
| | | 2.50 | 0.50 | 3.47 | | 4.19 | 2.25 | 10.75 | 11.63 | 12.50 | 12.50 | |
| | | 3.00 | 0.38 | 3.47 | | 4.81 | 2.25 | 10.75 | 11.63 | 12.50 | 12.50 | |
| | 6.00 | 3.50 | 0.38 | 3.47 | | 5.50 | 2.25 | 10.75 | 11.63 | 12.50 | 12.50 | |
| | | 2.50 | 0.25 | 3.63 | | 4.19 | 2.25 | 12.13 | 13.13 | 14.13 | 14.13 | |
| | | 3.00 | 0.25 | 3.63 | | 4.81 | 2.25 | 12.13 | 13.13 | 14.13 | 14.13 | |
| | | 3.50 | 0.25 | 3.63 | | 5.50 | 2.25 | 12.13 | 13.13 | 14.13 | 14.13 | |
| | | 4.00 | 0.25 | 3.63 | | 6.00 | 2.25 | 12.13 | 13.13 | 14.13 | 14.13 | |
| | 7.00 | 3.00 | 0.25 | 3.75 | | 4.81 | 2.25 | 13.75 | 14.75 | 16.25 | 15.75 | |
| | | 3.50 | 0.25 | 3.75 | | 5.50 | 2.25 | 13.75 | 14.75 | 16.25 | 15.75 | |
| | | 4.00 | 0.25 | 3.75 | | 6.00 | 2.25 | 13.75 | 14.75 | 16.25 | 15.75 | |
| | | 4.50 | 0.25 | 3.75 | | 6.69 | 2.25 | 13.75 | 14.75 | 16.25 | 15.75 | |
| | 8.00 | 5.00 | 0.25 | 3.75 | | | 2.25 | 13.75 | 14.75 | 16.25 | 15.75 | |
| | | 3.50 | 0.25 | 4.00 | | 5.50 | 2.25 | 15.00 | 16.00 | 17.75 | 17.00 | |
| | | 4.00 | 0.25 | 4.00 | | 6.00 | 2.25 | 15.00 | 16.00 | 17.75 | 17.00 | |
| | | 4.50 | 0.25 | 4.00 | | 6.69 | 2.25 | 15.00 | 16.00 | 17.75 | 17.00 | |
| | | 5.00 | 0.25 | 4.00 | | | 2.25 | 15.00 | 16.00 | 17.75 | 17.00 | |
| | | 5.50 | 0.25 | 4.00 | | | 2.25 | 15.00 | 16.00 | 17.50 | 17.00 | |

Used with Self-Aligning accessory for fast, close radial alignment.

Style 5 Special Rod Threads

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

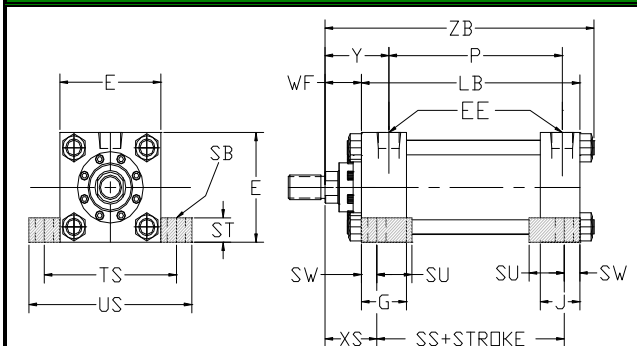
Spanner Wrench Holes

4" rod and larger have spanner wrench holes in place of wrench flats.

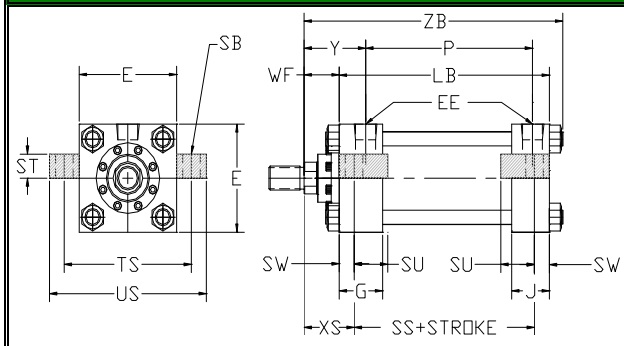
| STANDARD ROD DIMENSIONS | | | | | | | | | | | | |
|-------------------------|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1.13 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

A Foot Mounted cylinder secures the cylinder along its side. Since the mounting surface plane is not centered directly on the line of force, the mounting bolts are subjected to a significant amount of shear stress. With excessive loads, a cylinder should be 'keyed' to absorb shear stress loads allowing mounting bolts to remain in simple tension. Because foot mounts are rigid, they require accurate cylinder alignment.

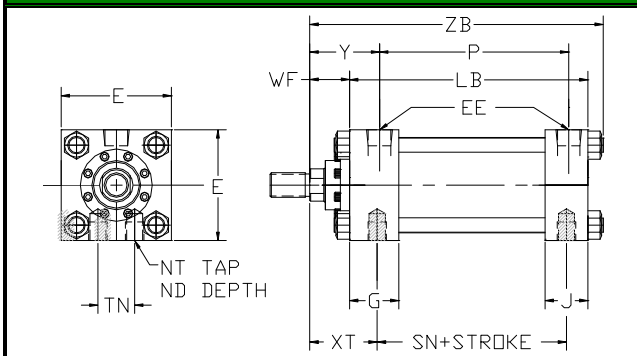
Side Lug Mount MS2



Side Lug Centerline Mount MS3



Side Tapped Mount MS4



Recommended Applications

These mounts are for moving loads along a flat guided surface. The load should be guided to traverse along the centerline of the piston rod. With unsupported loads, the gland will absorb excessive force, therefore an oversized rod and stop tube should be considered. The mounting surface should be flat and parallel to the centerline of the piston rod. The frame on which the cylinder is mounted must be sufficiently rigid to resist bending movements. When mounting the cylinder, high tensile socket head cap screws or hex head bolts should be used, tighten to the manufacture's recommended torque.

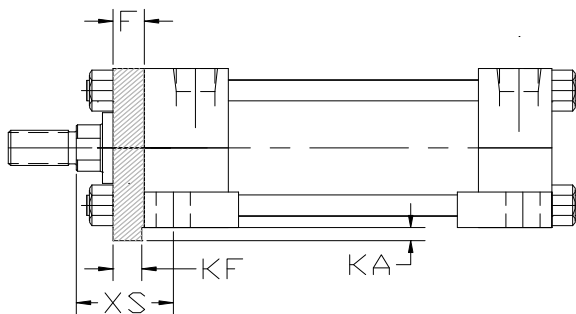
Foot Mount Dimensions

| Bore | E | EE-NPT | EE-SAE | G | SN | J | ND | NT | SB | SS | ST | SU | SW | TS | TN | US |
|------|------|--------|--------|------|------|------|------|---------|------|------|------|------|------|-------|------|-------|
| 1.50 | 2.50 | 0.50 | 10 | 1.75 | 2.88 | 1.50 | 0.38 | 3/8-16 | 0.44 | 3.88 | 0.50 | 0.94 | 0.38 | 3.25 | 0.75 | 4.00 |
| 2.00 | 3.00 | 0.50 | 10 | 1.75 | 2.88 | 1.50 | 0.50 | 1/2-13 | 0.56 | 3.63 | 0.75 | 1.25 | 0.50 | 4.00 | 0.94 | 5.00 |
| 2.50 | 3.50 | 0.50 | 10 | 1.75 | 3.00 | 1.50 | 0.63 | 5/8-11 | 0.81 | 3.38 | 1.00 | 1.56 | 0.69 | 4.88 | 1.31 | 6.25 |
| 3.25 | 4.50 | 0.75 | 12 | 2.00 | 3.50 | 1.75 | 0.75 | 3/4-10 | 0.81 | 4.13 | 1.00 | 1.56 | 0.69 | 5.88 | 1.50 | 7.25 |
| 4.00 | 5.00 | 0.75 | 12 | 2.00 | 3.75 | 1.75 | 1.00 | 1-8 | 1.06 | 4.00 | 1.25 | 2.00 | 0.88 | 6.75 | 2.06 | 8.50 |
| 5.00 | 6.50 | 0.75 | 12 | 2.00 | 4.25 | 1.75 | 1.00 | 1-8 | 1.06 | 4.50 | 1.25 | 2.00 | 0.88 | 8.13 | 2.94 | 10.00 |
| 6.00 | 7.50 | 1.00 | 16 | 2.25 | 5.13 | 2.25 | 1.25 | 1 1/4-7 | 1.31 | 5.13 | 1.50 | 2.50 | 1.13 | 9.75 | 3.31 | 12.00 |
| 7.00 | 8.50 | 1.25 | 20 | 2.75 | 5.88 | 2.75 | 1.50 | 1 1/2-6 | 1.56 | 5.75 | 1.75 | 2.88 | 1.38 | 11.25 | 3.75 | 14.00 |
| 8.00 | 9.50 | 1.50 | 24 | 3.00 | 6.63 | 3.00 | 1.50 | 1 1/2-6 | 1.56 | 6.75 | 1.75 | 2.88 | 1.38 | 12.25 | 4.25 | 15.00 |

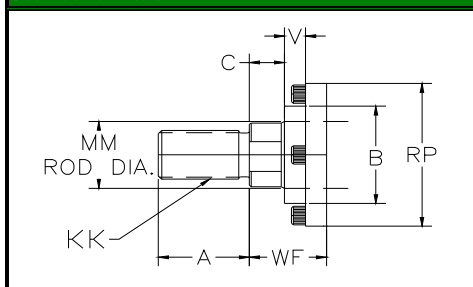
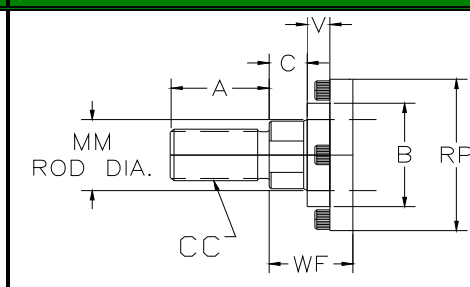
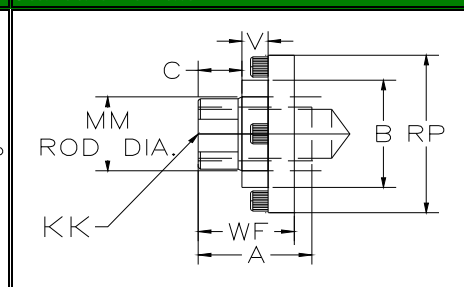
Extended Keyplate for MS2 and MS4 Mounts

Recommended Keyplate Usage

All side mounted cylinders can be supplied with thrust keys. Extending a gland retainer provides a key which fits into a milled slot in the mounting surface assures that the cylinder will not shift in severe service. For high shock applications a keyed side lug mount or keyed tapped mount should always be considered. The keyplate is suitable only for shear loads and only one end should be keyed.

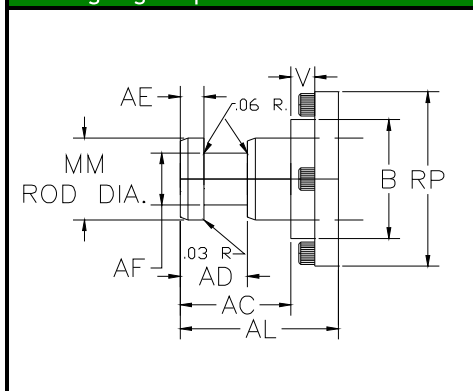


| | Add Stroke | | KeyPlate | | |
|------|------------|------|----------|------|------|
| Bore | P | LB | KA | F | KF |
| 1.50 | 2.78 | 4.63 | 0.19 | 0.38 | 0.31 |
| 2.00 | 2.78 | 4.63 | 0.31 | 0.63 | 0.56 |
| 2.50 | 2.91 | 4.75 | 0.31 | 0.63 | 0.56 |
| 3.25 | 3.50 | 5.50 | 0.38 | 0.75 | 0.69 |
| 4.00 | 3.75 | 5.75 | 0.44 | 0.88 | 0.81 |
| 5.00 | 4.26 | 6.25 | 0.44 | 0.88 | 0.81 |
| 6.00 | 4.81 | 7.38 | 0.50 | 1.00 | 0.94 |
| 7.00 | 5.75 | 8.50 | 0.50 | 1.00 | 0.94 |
| 8.00 | 6.25 | 9.50 | 0.50 | 1.00 | 0.94 |

Style 1
Standard Male**Style 2**
Oversized Male**Style 3**
Standard Female

"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4
Self Aligning Coupler

Used with Self-Aligning accessory for fast, close radial alignment.

Style 5
Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

Spanner Wrench Holes

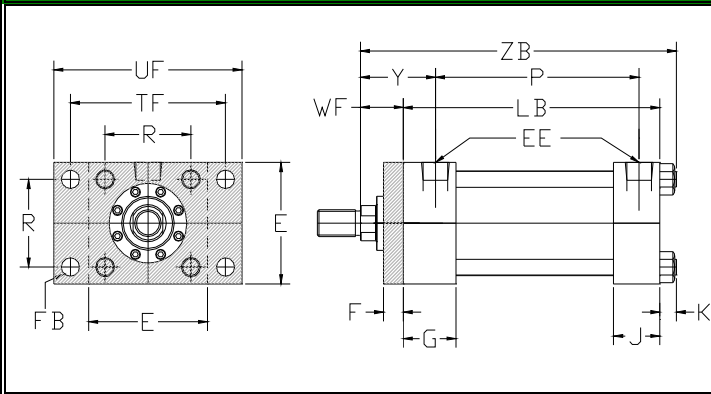
4" rod and larger have spanner wrench holes in place of wrench flats.

Variable Rod Dimensions

| | Bore | Rod Dia | V | W | Y | WF | RP | XS | XT | ZB |
|------|------|---------|------|------|------|------|------|------|-------|----|
| 1.50 | 0.63 | 0.25 | 0.63 | 2.11 | 1.00 | 2.00 | 1.38 | 1.94 | 6.00 | |
| | 1.00 | 0.50 | 1.00 | 2.48 | 1.38 | 2.38 | 1.75 | 2.31 | 6.38 | |
| 2.00 | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 1.88 | 2.31 | 6.50 | |
| | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 2.13 | 2.56 | 6.75 | |
| 2.50 | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 2.06 | 2.31 | 6.63 | |
| | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 2.31 | 2.56 | 6.88 | |
| | 1.75 | 0.50 | 1.25 | 2.98 | 1.88 | 3.38 | 2.56 | 2.81 | 7.13 | |
| 3.25 | 1.38 | 0.25 | 0.88 | 2.84 | 1.63 | 2.94 | 2.31 | 2.56 | 7.75 | |
| | 1.75 | 0.38 | 1.13 | 3.09 | 1.88 | 3.38 | 2.56 | 2.81 | 8.00 | |
| | 2.00 | 0.38 | 1.25 | 3.22 | 2.00 | 3.63 | 2.69 | 2.94 | 8.13 | |
| 4.00 | 1.75 | 0.25 | 1.00 | 3.09 | 1.88 | 3.38 | 2.75 | 2.94 | 8.25 | |
| | 2.00 | 0.25 | 1.13 | 3.22 | 2.00 | 3.63 | 2.88 | 3.06 | 8.38 | |
| | 2.50 | 0.38 | 1.38 | 3.47 | 2.25 | 4.19 | 3.13 | 3.31 | 8.63 | |
| 5.00 | 2.00 | 0.38 | 1.13 | 3.22 | 2.00 | 3.63 | 2.88 | 3.00 | 9.13 | |
| | 2.50 | 0.50 | 1.38 | 3.47 | 2.25 | 4.19 | 3.13 | 3.25 | 9.38 | |
| | 3.00 | 0.38 | 1.38 | 3.47 | 2.25 | 4.81 | 3.13 | 3.25 | 9.38 | |
| | 3.50 | 0.38 | 1.38 | 3.47 | 2.25 | 5.50 | 3.13 | 3.25 | 9.38 | |
| 6.00 | 2.50 | 0.25 | 1.25 | 3.63 | 2.25 | 4.19 | 3.38 | 3.31 | 10.63 | |
| | 3.00 | 0.25 | 1.25 | 3.63 | 2.25 | 4.81 | 3.38 | 3.31 | 10.63 | |
| | 3.50 | 0.25 | 1.25 | 3.63 | 2.25 | 5.50 | 3.38 | 3.31 | 10.63 | |
| | 4.00 | 0.25 | 1.25 | 3.63 | 2.25 | 6.00 | 3.38 | 3.31 | 10.63 | |
| 7.00 | 3.00 | 0.25 | 1.25 | 3.75 | 2.25 | 4.81 | 3.63 | 3.81 | 10.75 | |
| | 3.50 | 0.25 | 1.25 | 3.75 | 2.25 | 5.50 | 3.63 | 3.81 | 10.75 | |
| | 4.00 | 0.25 | 1.25 | 3.75 | 2.25 | 6.00 | 3.63 | 3.81 | 10.75 | |
| | 4.50 | 0.25 | 1.25 | 3.75 | 2.25 | 6.69 | 3.63 | 3.81 | 10.75 | |
| | 5.00 | 0.25 | 1.25 | 3.75 | 2.25 | | 3.63 | 3.81 | 10.75 | |
| 8.00 | 3.50 | 0.25 | 1.25 | 4.00 | 2.25 | 5.50 | 3.63 | 3.94 | 13.00 | |
| | 4.00 | 0.25 | 1.25 | 4.00 | 2.25 | 6.00 | 3.63 | 3.94 | 13.00 | |
| | 4.50 | 0.25 | 1.25 | 4.00 | 2.25 | 6.69 | 3.63 | 3.94 | 13.00 | |
| | 5.00 | 0.25 | 1.25 | 4.00 | 2.25 | | 3.63 | 3.94 | 13.00 | |
| | 5.50 | 0.25 | 1.25 | 4.00 | 2.25 | | 3.63 | 3.94 | 13.00 | |

FRONT RECTANGULAR FLANGE MOUNT

MF1



Recommended Usage

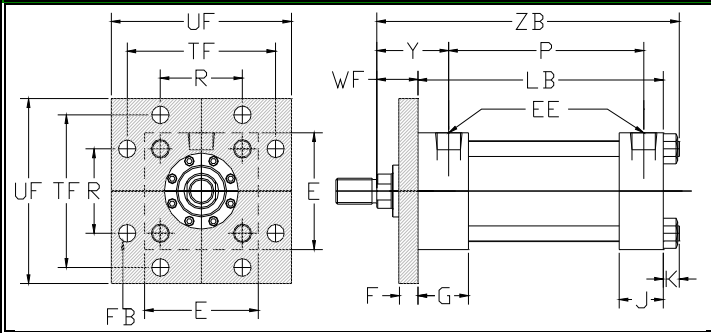
Front flange mounts are designed for straight line force transfer in which the cylinder is used in tension (pull). For pull applications mounting is always recommended on the front of the flange to resist bending moments. For heavy duty applications, the Front Head Flange Mount (ME5) should be considered. The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For sporadic loads, an oversized rod is recommended.

Recommended Mounting Practice

The frame on which the cylinder is mounted must be flat and sufficiently rigid to resist bending movements. High tensile socket head cap screws or hex head bolts should be used to mount the cylinder and tighten to the recommended torque value.

FRONT SQUARE FLANGE MOUNT

MF5



Good Solution

Front Rectangular Flange Mount

While this mount is a widely used one, its use should be restricted to pressures under 1000 psi, short strokes (under 36") and standard rod diameters. Note that the Front Head Flange mount has the same mounting hole pattern.

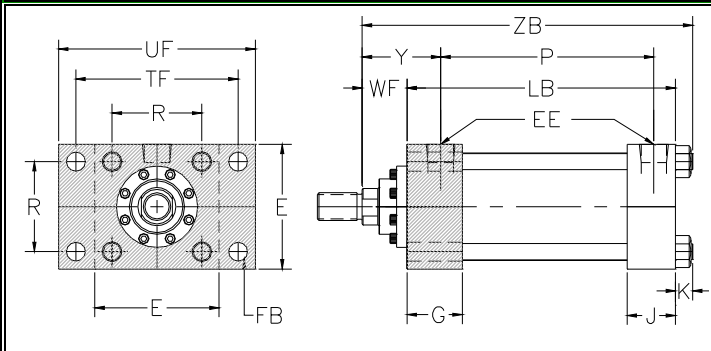
Better Solution

Front Square Flange Mount

Satisfactory for maximum operating pressure and long strokes if properly applied.

FRONT HEAD FLANGE MOUNT

ME5



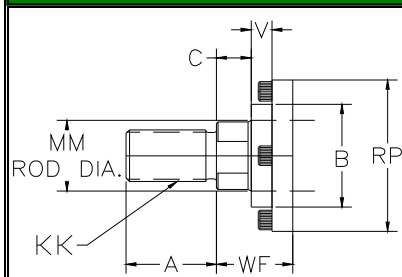
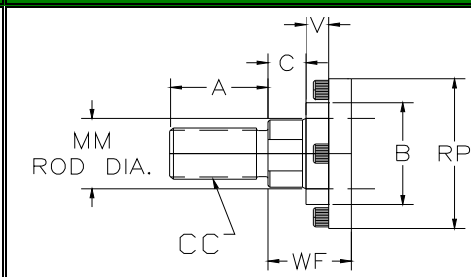
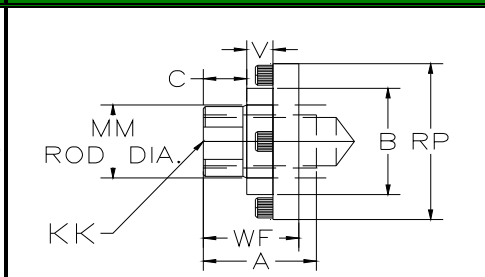
Best Solution

Front Head Flange Mount

Highly recommended flange mounting. With this style, the cylinder can be mounted on the back face of the flange desired. This mount is used extensively on high tonnage presses and other heavy duty applications. We highly recommend that consideration be given to the use of a Style 5 rod end and Self-Aligning Coupler to achieve correct radial alignment.

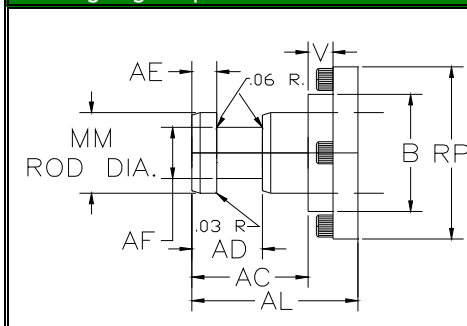
Front Flange Mount Dimensions

| Bore | E | EE-NPT | EE-SAE | F | FB | G | J | UF | K | R | TF | + Stroke | |
|------|------|--------|--------|------|------|------|------|-------|------|------|-------|----------|------|
| | | | | | | | | | | | | LB | P |
| 1.50 | 2.50 | 0.50 | 10 | 0.38 | 0.44 | 1.75 | 1.50 | 4.25 | 0.44 | 1.63 | 3.44 | 4.63 | 2.78 |
| 2.00 | 3.00 | 0.50 | 10 | 0.63 | 0.56 | 1.75 | 1.50 | 5.13 | 0.56 | 2.05 | 4.13 | 4.63 | 2.78 |
| 2.50 | 3.50 | 0.50 | 10 | 0.63 | 0.56 | 1.75 | 1.50 | 5.63 | 0.56 | 2.55 | 4.63 | 4.75 | 2.91 |
| 3.25 | 4.50 | 0.75 | 12 | 0.75 | 0.69 | 2.00 | 1.75 | 7.13 | 0.69 | 3.25 | 5.88 | 5.50 | 3.50 |
| 4.00 | 5.00 | 0.75 | 12 | 0.88 | 0.69 | 2.00 | 1.75 | 7.63 | 0.69 | 3.82 | 6.38 | 5.75 | 3.75 |
| 5.00 | 6.50 | 0.75 | 12 | 0.88 | 0.94 | 2.00 | 1.75 | 9.75 | 0.94 | 4.95 | 8.19 | 6.25 | 4.26 |
| 6.00 | 7.50 | 1.00 | 16 | 1.00 | 1.06 | 2.25 | 2.25 | 11.25 | 1.06 | 5.73 | 9.44 | 7.38 | 4.81 |
| 7.00 | 8.50 | 1.25 | 20 | 1.00 | 1.19 | 2.75 | 2.75 | 12.63 | 1.19 | 6.58 | 10.63 | 8.50 | 5.75 |
| 8.00 | 9.50 | 1.50 | 24 | 1.00 | 1.31 | 3.00 | 3.00 | 14.00 | 1.31 | 7.50 | 11.19 | 9.50 | 6.25 |

Style 1
Standard Male

Style 2
Oversized Male

Style 3
Standard Female


"KK" or "CC" male thread ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4
Self Aligning Coupler


Used with Self-Aligning accessory for fast, close radial alignment.

Style 5
Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

VARIABLE ROD DIMENSIONS

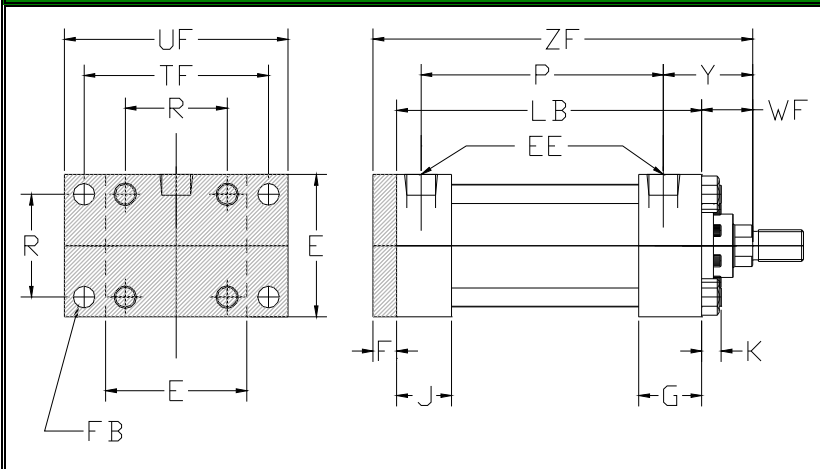
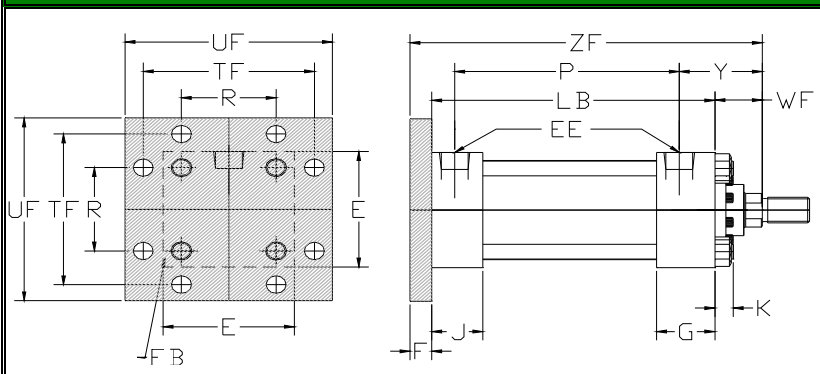
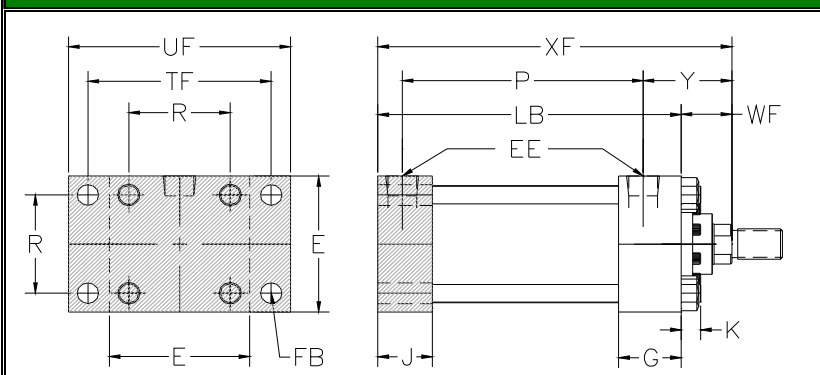
| Bore | Rod Dia | V | W | Y | WF | RP | + Stroke |
|-------|---------|------|------|------|------|------|----------|
| 1.50 | 0.63 | 0.25 | 0.63 | 2.11 | 1.00 | 2.00 | 6.00 |
| | 1.00 | 0.50 | 1.00 | 2.48 | 1.38 | 2.38 | 6.38 |
| 2.00 | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 6.50 |
| | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 6.75 |
| 2.50 | 1.00 | 0.25 | 0.75 | 2.48 | 1.38 | 2.38 | 6.63 |
| | 1.38 | 0.38 | 1.00 | 2.73 | 1.63 | 2.94 | 6.88 |
| 3.25 | 1.75 | 0.50 | 1.25 | 2.98 | 1.88 | 3.38 | 7.13 |
| | 1.38 | 0.25 | 0.88 | 2.84 | 1.63 | 2.94 | 7.75 |
| 4.00 | 1.75 | 0.38 | 1.13 | 3.09 | 1.88 | 3.38 | 8.00 |
| | 2.00 | 0.38 | 1.25 | 3.22 | 2.00 | 3.63 | 8.13 |
| 5.00 | 1.75 | 0.25 | 1.00 | 3.09 | 1.88 | 3.38 | 8.25 |
| | 2.00 | 0.25 | 1.13 | 3.22 | 2.00 | 3.63 | 8.38 |
| 6.00 | 2.50 | 0.38 | 1.38 | 3.47 | 2.25 | 4.19 | 8.63 |
| | 2.00 | 0.38 | 1.13 | 3.22 | 2.00 | 3.63 | 9.13 |
| 7.00 | 2.50 | 0.50 | 1.38 | 3.47 | 2.25 | 4.19 | 9.38 |
| | 3.00 | 0.38 | 1.38 | 3.47 | 2.25 | 4.81 | 9.38 |
| 8.00 | 3.50 | 0.38 | 1.38 | 3.47 | 2.25 | 5.50 | 9.38 |
| | 2.50 | 0.25 | 1.25 | 3.63 | 2.25 | 4.19 | 10.63 |
| 9.00 | 3.00 | 0.25 | 1.25 | 3.63 | 2.25 | 4.81 | 10.63 |
| | 3.50 | 0.25 | 1.25 | 3.63 | 2.25 | 5.50 | 10.63 |
| 10.00 | 4.00 | 0.25 | 1.25 | 3.63 | 2.25 | 6.00 | 10.63 |
| | 3.00 | 0.25 | 1.25 | 3.75 | 2.25 | 4.81 | 10.75 |
| 11.00 | 3.50 | 0.25 | 1.25 | 3.75 | 2.25 | 5.50 | 10.75 |
| | 4.00 | 0.25 | 1.25 | 3.75 | 2.25 | 6.00 | 10.75 |
| 12.00 | 4.50 | 0.25 | 1.25 | 3.75 | 2.25 | 6.69 | 10.75 |
| | 5.00 | 0.25 | 1.25 | 3.75 | 2.25 | | 10.75 |
| 13.00 | 3.50 | 0.25 | 1.25 | 4.00 | 2.25 | 5.50 | 13.00 |
| | 4.00 | 0.25 | 1.25 | 4.00 | 2.25 | 6.00 | 13.00 |
| 14.00 | 4.50 | 0.25 | 1.25 | 4.00 | 2.25 | 6.69 | 13.00 |
| | 5.00 | 0.25 | 1.25 | 4.00 | 2.25 | | 13.00 |
| 15.00 | 5.50 | 0.25 | 1.25 | 4.00 | 2.25 | | 13.00 |
| | | | | | | | |

STANDARD ROD DIMENSIONS

| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
|----|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1/2-12 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

Spanner Wrench Holes

4" rod and larger have spanner wrench holes in place of wrench flats.

REAR RECTANGULAR FLANGE MOUNT**MF2****REAR SQUARE FLANGE MOUNT****MF6****REAR HEAD FLANGE MOUNT****ME6****Recommended Usage**

Rear flange mounts are designed for straight line force transfer in which the cylinder is used in compression (push). For push applications mounting is always recommended on the back of the flange to resist bending moments. For heavy duty applications, the Rear Head Flange Mount (ME6) should be considered. The force of the load should be perpendicular to the mounting surface and parallel to the centerline of the piston rod. For sporadic loads, an oversized rod is recommended.

Recommended Mounting Practice

The frame on which the cylinder is mounted must be flat and sufficiently rigid to resist bending movements. High tensile socket head cap screws or hex head bolts should be used to mount the cylinder and tighten to the recommended torque value.

Good Solution**Rear Rectangular Flange Mount**

While this mount is a widely used one, its use should be restricted to pressures under 1000 psi, short strokes (under 36") and standard rod diameters. Note that the Rear Head Flange mount has the same mounting hole pattern.

Better Solution**Rear Square Flange Mount**

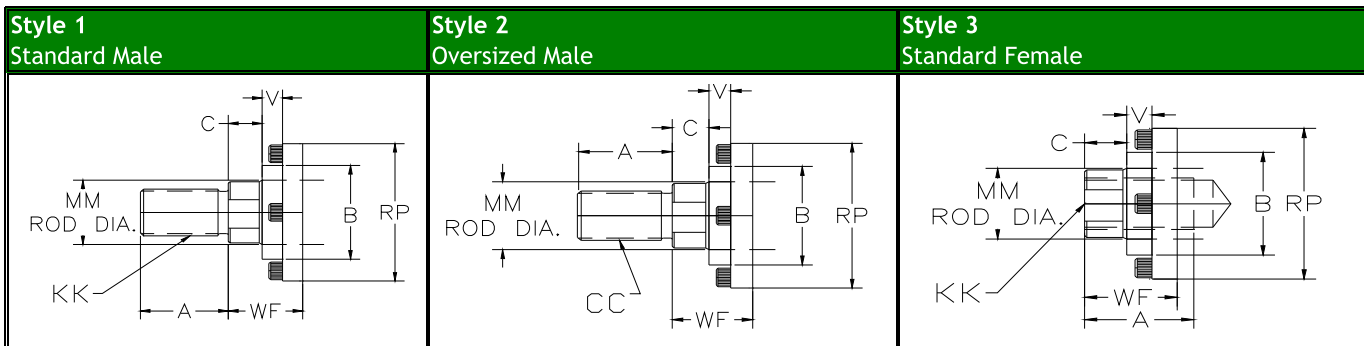
Satisfactory for maximum operating pressure and long strokes if properly applied.

Best Solution**Rear Head Flange Mount**

Highly recommended flange mounting that can be mounted on the back face. This mount is used extensively on high tonnage presses and other heavy duty applications. We recommend that consideration be given to the use of a Self-Aligning Coupler to achieve correct radial alignment.

Rear Flange Mount Dimensions

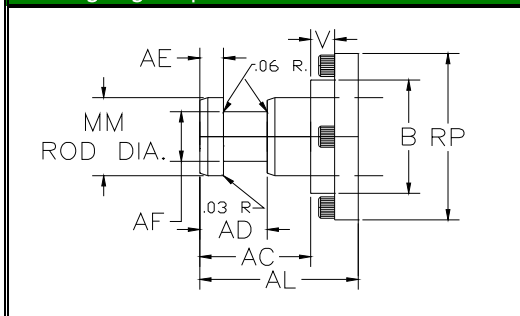
| Bore | E | EE-NPT | EE-SAE | F | FB | G | J | UF | K | R | TF | + Stroke | |
|------|------|--------|--------|------|------|------|------|-------|------|------|-------|----------|------|
| | | | | | | | | | | | | LB | P |
| 1.50 | 2.50 | 0.50 | 10 | 0.38 | 0.44 | 1.75 | 1.50 | 4.25 | 0.44 | 1.63 | 3.44 | 4.63 | 2.78 |
| 2.00 | 3.00 | 0.50 | 10 | 0.63 | 0.56 | 1.75 | 1.50 | 5.13 | 0.56 | 2.05 | 4.13 | 4.63 | 2.78 |
| 2.50 | 3.50 | 0.50 | 10 | 0.63 | 0.56 | 1.75 | 1.50 | 5.63 | 0.56 | 2.55 | 4.63 | 4.75 | 2.91 |
| 3.25 | 4.50 | 0.75 | 12 | 0.75 | 0.69 | 2.00 | 1.75 | 7.13 | 0.69 | 3.25 | 5.88 | 5.50 | 3.50 |
| 4.00 | 5.00 | 0.75 | 12 | 0.88 | 0.69 | 2.00 | 1.75 | 7.63 | 0.69 | 3.82 | 6.38 | 5.75 | 3.75 |
| 5.00 | 6.50 | 0.75 | 12 | 0.88 | 0.94 | 2.00 | 1.75 | 9.75 | 0.94 | 4.95 | 8.19 | 6.25 | 4.26 |
| 6.00 | 7.50 | 1.00 | 16 | 1.00 | 1.06 | 2.25 | 2.25 | 11.25 | 1.06 | 5.73 | 9.44 | 7.38 | 4.81 |
| 7.00 | 8.50 | 1.25 | 20 | 1.00 | 1.19 | 2.75 | 2.75 | 12.63 | 1.19 | 6.58 | 10.63 | 8.50 | 5.75 |
| 8.00 | 9.50 | 1.50 | 24 | 1.00 | 1.31 | 3.00 | 3.00 | 14.00 | 1.31 | 7.50 | 11.19 | 9.50 | 6.25 |



"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4 Self Aligning Coupler



Used with Self-Aligning accessory for fast, close radial alignment.

Style 5 Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

VARIABLE ROD DIMENSIONS

| Bore | Rod Dia | V | W | Y | RP | WF | + Stroke ZF |
|------|---------|------|------|------|------|------|----------------|
| 1.50 | 0.63 | 0.25 | 0.63 | 2.11 | 2.00 | 1.00 | 6.00 |
| | 1.00 | 0.50 | 1.00 | 2.48 | 2.38 | 1.38 | 6.38 |
| 2.00 | 1.00 | 0.25 | 0.75 | 2.48 | 2.38 | 1.38 | 6.63 |
| | 1.38 | 0.38 | 1.00 | 2.73 | 2.94 | 1.63 | 6.88 |
| 2.50 | 1.00 | 0.25 | 0.75 | 2.48 | 2.38 | 1.38 | 6.75 |
| | 1.38 | 0.38 | 1.00 | 2.73 | 2.94 | 1.63 | 7.00 |
| | 1.75 | 0.50 | 1.25 | 2.98 | 3.38 | 1.88 | 7.25 |
| 3.25 | 1.38 | 0.25 | 0.88 | 2.84 | 2.94 | 1.63 | 7.88 |
| | 1.75 | 0.38 | 1.13 | 3.09 | 3.38 | 1.88 | 8.13 |
| | 2.00 | 0.38 | 1.25 | 3.22 | 3.63 | 2.00 | 8.25 |
| 4.00 | 1.75 | 0.25 | 1.00 | 3.09 | 3.38 | 1.88 | 8.50 |
| | 2.00 | 0.25 | 1.13 | 3.22 | 3.63 | 2.00 | 8.63 |
| | 2.50 | 0.38 | 1.38 | 3.47 | 4.19 | 2.25 | 8.88 |
| 5.00 | 2.00 | 0.38 | 1.13 | 3.22 | 3.63 | 2.00 | 9.13 |
| | 2.50 | 0.50 | 1.38 | 3.47 | 4.19 | 2.25 | 9.38 |
| | 3.00 | 0.38 | 1.38 | 3.47 | 4.81 | 2.25 | 9.38 |
| | 3.50 | 0.38 | 1.38 | 3.47 | 5.50 | 2.25 | 9.38 |
| 6.00 | 2.50 | 0.25 | 1.25 | 3.63 | 4.19 | 2.25 | 10.63 |
| | 3.00 | 0.25 | 1.25 | 3.63 | 4.81 | 2.25 | 10.63 |
| | 3.50 | 0.25 | 1.25 | 3.63 | 5.50 | 2.25 | 10.63 |
| | 4.00 | 0.25 | 1.25 | 3.63 | 6.00 | 2.25 | 10.63 |
| 7.00 | 3.00 | 0.25 | 1.25 | 3.75 | 4.81 | 2.25 | 11.75 |
| | 3.50 | 0.25 | 1.25 | 3.75 | 5.50 | 2.25 | 11.75 |
| | 4.00 | 0.25 | 1.25 | 3.75 | 6.00 | 2.25 | 11.75 |
| | 4.50 | 0.25 | 1.25 | 3.75 | 6.69 | 2.25 | 11.75 |
| | 5.00 | 0.25 | 1.25 | 3.75 | | 2.25 | 11.75 |
| 8.00 | 3.50 | 0.25 | 1.25 | 4.00 | 5.50 | 2.25 | 12.75 |
| | 4.00 | 0.25 | 1.25 | 4.00 | 6.00 | 2.25 | 12.75 |
| | 4.50 | 0.25 | 1.25 | 4.00 | 6.69 | 2.25 | 12.75 |
| | 5.00 | 0.25 | 1.25 | 4.00 | | 2.25 | 12.75 |
| | 5.50 | 0.25 | 1.25 | 4.00 | | 2.25 | 12.75 |

Spanner Wrench

Holes

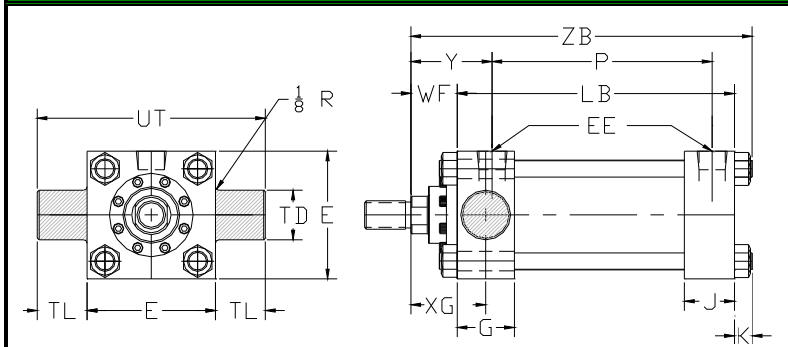
4" rod and larger have spanner wrench holes in place of wrench flats.

STANDARD ROD DIMENSIONS

| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
|----|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1 1/2-12 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

ROD END TRUNNION MOUNT

MT1



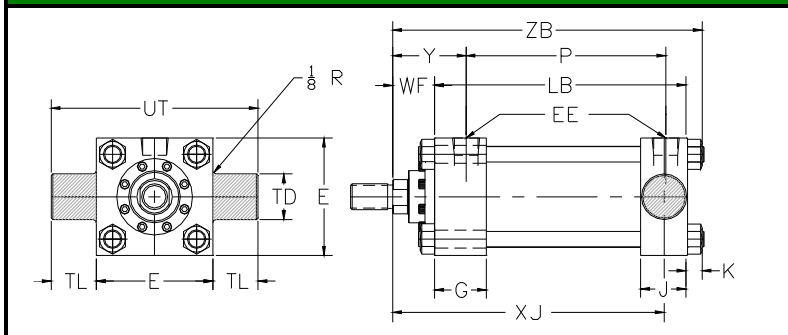
Recommended Usage

Rod and Cap End Trunnion Mount (MT1 and MT2)

Cap and Head Trunnion mounts can be used in both compression (push) and tension (pull). Head Trunnion Mounts (MT1) provide longer maximum strokes than Cap Trunnion Mounts (MT2), when used in compression. These mounts are for use in applications in which the stroke travels in a curved path within one plane.

CAP END TRUNNION MOUNT

MT2



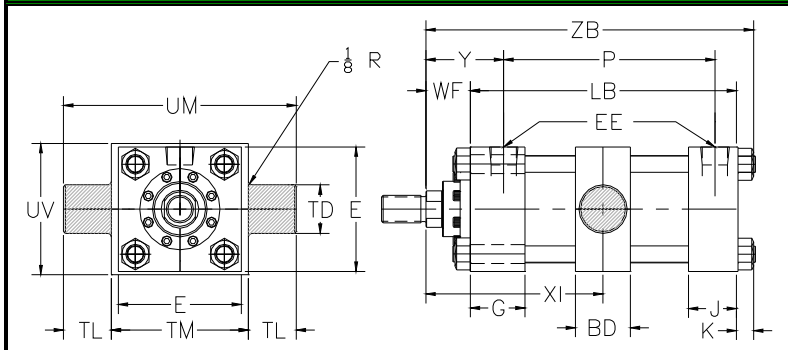
Recommended Mounting Practices

Attention should be given to proper mounting of trunnion cylinders. It is recommended that rigidly mounted pillow blocks with bearings at least as long as the trunnion pins be used and be installed as close to the trunnion shoulder as possible, to prevent an "egging" effect on the mating part.

Note that pins are designed for shear loads only, not bending loads. Lubrication should be provided to the pins.

CENTER TRUNNION MOUNT

MT4



Recommended Usage

Center Trunnion Mount (MT4)

Center Trunnion mounts can be used in both compression (push) and tension (pull) and is designed for longer stroke applications in which the travel is in a curved path within one plane.

In horizontal applications to balance loads, the recommended XI dimension (rod shoulder to centerline of trunnion pin) equals 1/2 the stroke. For other recommendations refer to the MT1 and MT2 mounts above.

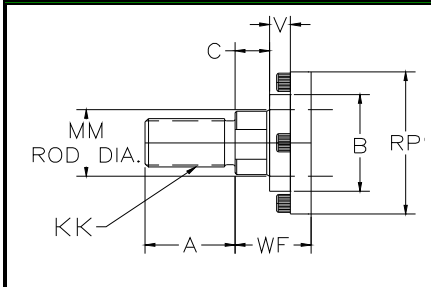
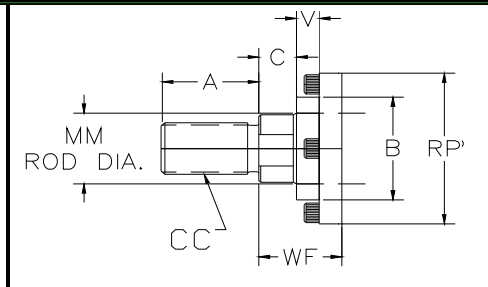
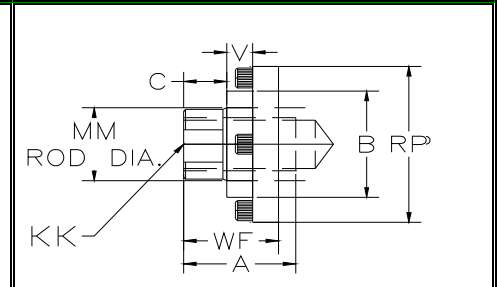
Customer must specify "XI" dimension.

Centerline Lug Mount Dimensions

| BORE | E | EE-NPT | EE-SAE | G | J | K | UM | UV | TD | TL | UT | BD | TM | + Stroke | |
|------|------|--------|--------|------|------|------|-------|------|------|------|-------|------|------|----------|------|
| | | | | | | | | | | | | | | LB | P |
| 1.50 | 2.50 | 0.50 | 10 | 1.75 | 1.50 | 0.44 | 5.00 | 2.75 | 1.00 | 1.00 | 4.50 | 1.25 | 3.00 | 4.63 | 2.78 |
| 2.00 | 3.00 | 0.50 | 10 | 1.75 | 1.50 | 0.56 | 6.25 | 3.25 | 1.38 | 1.38 | 5.75 | 1.50 | 3.50 | 4.63 | 2.78 |
| 2.50 | 3.50 | 0.50 | 10 | 1.75 | 1.50 | 0.56 | 6.75 | 3.75 | 1.38 | 1.38 | 6.25 | 1.50 | 4.00 | 4.75 | 2.91 |
| 3.25 | 4.50 | 0.75 | 12 | 2.00 | 1.75 | 0.69 | 8.50 | 4.75 | 1.75 | 1.75 | 8.00 | 2.00 | 5.00 | 5.50 | 3.5 |
| 4.00 | 5.00 | 0.75 | 12 | 2.00 | 1.75 | 0.69 | 9.00 | 5.25 | 1.75 | 1.75 | 8.50 | 2.00 | 5.50 | 5.75 | 3.75 |
| 5.00 | 6.50 | 0.75 | 12 | 2.00 | 1.75 | 0.94 | 10.50 | 6.75 | 1.75 | 1.75 | 10.00 | 2.00 | 7.00 | 6.25 | 4.26 |
| 6.00 | 7.50 | 1.00 | 16 | 2.25 | 2.25 | 1.06 | 12.50 | 7.75 | 2.00 | 2.00 | 11.50 | 3.00 | 8.50 | 7.38 | 4.81 |
| 7.00 | 8.50 | 1.25 | 20 | 2.75 | 2.75 | 1.19 | | | 2.50 | 2.50 | 13.50 | | | 8.50 | 5.75 |
| 8.00 | 9.50 | 1.50 | 24 | 3.00 | 3.00 | 1.31 | | | 3.00 | 3.00 | 15.50 | | | 9.50 | 6.25 |

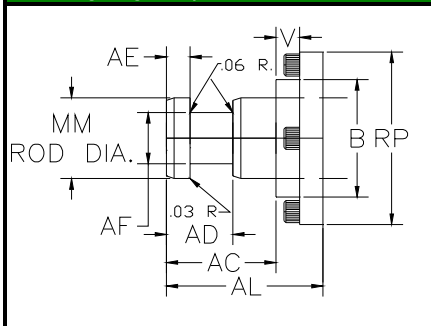
Caution:

Trunnion mount cylinders in bore sizes 5" through 8" with oversized piston rods should not be used over 2,000 psi. If your application demands higher pressure, consult the factory.

Style 1
Standard Male**Style 2**
Oversized Male**Style 3**
Standard Female

"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4
Self Aligning Coupler

Used with Self-Aligning accessory for fast, close radial alignment.

Style 5
Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Spanner Wrench Holes

4" rod and larger have spanner wrench holes in place of wrench flats.

VARIABLE ROD DIMENSIONS

| | Bore | Rod Dia | V | Y | WF | RP | XG | Minimum | + Stroke | |
|------|------|---------|------|------|------|------|------|---------|----------|-------|
| 1.50 | | 0.63 | 0.25 | 2.11 | 1.00 | 2.00 | 1.88 | 3.38 | 6.00 | 4.875 |
| | | 1.00 | 0.50 | 2.48 | 1.38 | 2.38 | 2.25 | 3.75 | 6.38 | 5.25 |
| 2.00 | | 1.00 | 0.25 | 2.48 | 1.38 | 2.38 | 2.25 | 3.88 | 6.50 | 5.25 |
| | | 1.38 | 0.38 | 2.73 | 1.63 | 2.94 | 2.50 | 4.13 | 6.75 | 5.5 |
| 2.50 | | 1.00 | 0.25 | 2.48 | 1.38 | 2.38 | 2.25 | 3.88 | 6.63 | 5.375 |
| | | 1.38 | 0.38 | 2.73 | 1.63 | 2.94 | 2.50 | 4.13 | 6.88 | 5.625 |
| | | 1.75 | 0.50 | 2.98 | 1.88 | 3.38 | 2.75 | 4.38 | 7.13 | 5.875 |
| 3.25 | | 1.38 | 0.25 | 2.84 | 1.63 | 2.94 | 2.63 | 4.63 | 7.75 | 6.25 |
| | | 1.75 | 0.38 | 3.09 | 1.88 | 3.38 | 2.88 | 4.88 | 8.00 | 6.5 |
| | | 2.00 | 0.38 | 3.22 | 2.00 | 3.63 | 3.00 | 5.00 | 8.13 | 6.625 |
| 4.00 | | 1.75 | 0.25 | 3.09 | 1.88 | 3.38 | 2.88 | 4.88 | 8.25 | 6.75 |
| | | 2.00 | 0.25 | 3.22 | 2.00 | 3.63 | 3.00 | 5.00 | 8.38 | 6.875 |
| | | 2.50 | 0.38 | 3.47 | 2.25 | 4.19 | 3.25 | 5.25 | 8.63 | 7.125 |
| 5.00 | | 2.00 | 0.38 | 3.22 | 2.00 | 3.63 | 3.00 | 5.00 | 9.13 | 7.375 |
| | | 2.50 | 0.50 | 3.47 | 2.25 | 4.19 | 3.25 | 5.25 | 9.38 | 7.625 |
| | | 3.00 | 0.38 | 3.47 | 2.25 | 4.81 | 3.25 | 5.25 | 9.38 | 7.625 |
| 6.00 | | 3.50 | 0.38 | 3.47 | 2.25 | 5.50 | 3.25 | 5.25 | 9.38 | 7.625 |
| | | 2.50 | 0.25 | 3.63 | 2.25 | 4.19 | 3.38 | 6.00 | 10.63 | 8.375 |
| | | 3.00 | 0.25 | 3.63 | 2.25 | 4.81 | 3.38 | 6.00 | 10.63 | 8.375 |
| | | 3.50 | 0.25 | 3.63 | 2.25 | 5.50 | 3.38 | 6.00 | 10.63 | 8.375 |
| 7.00 | | 4.00 | 0.25 | 3.63 | 2.25 | 6.00 | 3.38 | 6.00 | 10.63 | 8.375 |
| | | 3.00 | 0.25 | 3.75 | 2.25 | 4.81 | 3.63 | 6.56 | 10.75 | 9.375 |
| | | 3.50 | 0.25 | 3.75 | 2.25 | 5.50 | 3.63 | 6.56 | 10.75 | 9.375 |
| | | 4.00 | 0.25 | 3.75 | 2.25 | 6.00 | 3.63 | 6.56 | 10.75 | 9.375 |
| | | 4.50 | 0.25 | 3.75 | 2.25 | 6.69 | 3.63 | 6.56 | 10.75 | 9.375 |
| 8.00 | | 5.00 | 0.25 | 3.75 | 2.25 | | 3.63 | 6.56 | 10.75 | 9.375 |
| | | 3.50 | 0.25 | 4.00 | 2.25 | 5.50 | 3.75 | 7.06 | 13.00 | 10.25 |
| | | 4.00 | 0.25 | 4.00 | 2.25 | 6.00 | 3.75 | 7.06 | 13.00 | 10.25 |
| | | 4.50 | 0.25 | 4.00 | 2.25 | 6.69 | 3.75 | 7.06 | 13.00 | 10.25 |
| | | 5.00 | 0.25 | 4.00 | 2.25 | | 3.75 | 7.06 | 13.00 | 10.25 |
| | | 5.50 | 0.25 | 4.00 | 2.25 | | 3.75 | 7.06 | 13.00 | 10.25 |

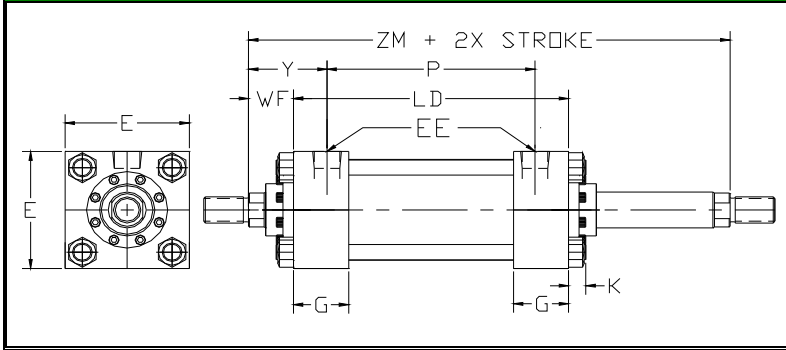
Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

STANDARD ROD DIMENSIONS

| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
|----|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1/2-12 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

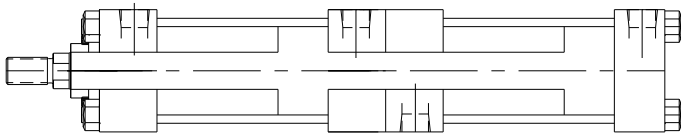
Double Rod End DRE



Double Rod End Mount Dimensions

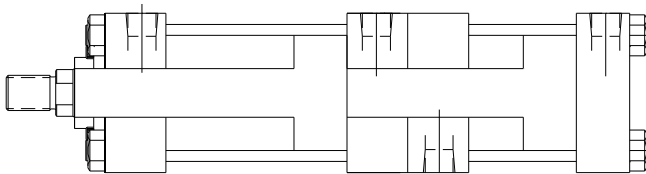
| Bore | E | EE-NPT | EE-SAE | G | K | + Stroke | |
|------|------|--------|--------|------|------|----------|------|
| | | | | | | P | LD |
| 1.50 | 2.50 | 0.50 | 10 | 1.75 | 0.44 | 2.66 | 4.88 |
| 2.00 | 3.00 | 0.50 | 10 | 1.75 | 0.56 | 2.66 | 4.88 |
| 2.50 | 3.50 | 0.50 | 10 | 1.75 | 0.56 | 2.79 | 5.00 |
| 3.25 | 4.50 | 0.75 | 12 | 2.00 | 0.69 | 3.31 | 5.75 |
| 4.00 | 5.00 | 0.75 | 12 | 2.00 | 0.69 | 3.56 | 6.00 |
| 5.00 | 6.50 | 0.75 | 12 | 2.00 | 0.94 | 4.06 | 6.50 |
| 6.00 | 7.50 | 1.00 | 16 | 2.25 | 1.06 | 4.63 | 7.38 |
| 7.00 | 8.50 | 1.25 | 20 | 2.75 | 1.19 | 5.50 | 8.50 |
| 8.00 | 9.50 | 1.50 | 24 | 3.00 | 1.31 | 6.00 | 9.50 |

Tandem Cylinders



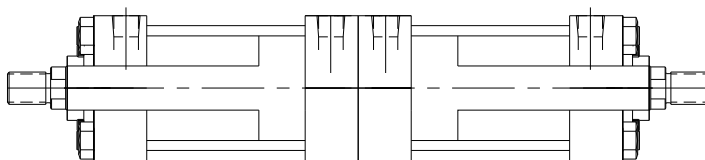
Two pistons connected to a common rod, resulting in twice the force of a single cylinder. This is an economical way to multiply force without increasing bore size or operating pressure.

Multi-Stage Cylinders



Multi-Stage cylinders offer multiple, positive strokes by pressurizing one cylinder, the other or both. The single rod end cylinder configuration includes independent, double acting rod assemblies facing in the same direction to provide multiple stroke positions or to boost output force by controlling actuating sequence.

Duplex or Back to Back Cylinders



Back to Back Cylinders - Independent double acting cylinders connected by common tie rods with piston rods facing opposite directions form a unit capable of multiple stroke positions constructed from standard components.

Recommended Applications for DRE

Double Rod End cylinders are specified for many applications, some of which include:

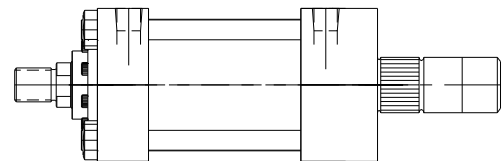
1. Simultaneous push and pull requirements
2. Both rod ends are fixed and the cylinder moves, such as on a machine slide
3. One rod serves to indicate position or to trip switches
4. Double rod end cylinders have rod bearings at each end and therefore offers greater resistance to deflection and side loading
5. Double rod end cylinders have the same effective piston area and volume when same rod diameter is specified

When the rod ends of a double rod end cylinder are not the same, be certain to identify which end is which in relation to the mount.

Water Service

When using water as an operating medium, corrosion-resistant plating is applied to heads, caps and pistons. Stainless steel piston rods with hard chrome plating is highly recommended. When using a stainless steel piston rod, special consideration must be given to the maximum operating pressure and speed conditions due to the material tensile strength.

Integral Shock Absorber



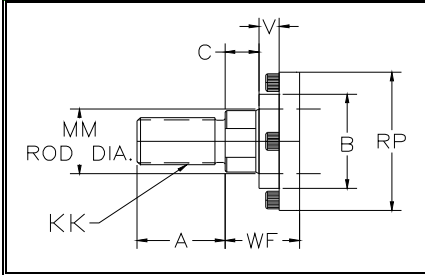
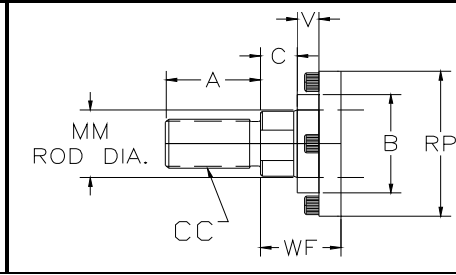
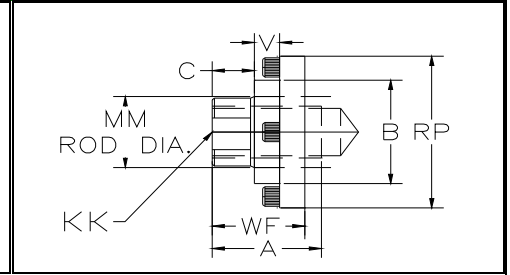
When piston speeds exceed even special cushion capabilities, integral shock absorbers help control the loads.

Pressure Intensifier

A pressure intensifier amplifies the available line pressure in order to perform work requiring much higher pressure. It operates a hydraulic cylinder without the need for a hydraulic power unit.

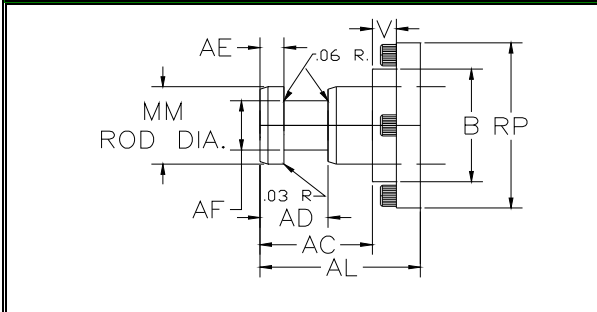
Air-Oil Tanks

Used as a source of oil to compensate for any loss in a hydraulic system. They provide hydraulic pressure to return the cylinder to its starting position and an outlet for entrapped air in the hydraulic system. The Air-Oil Tank contains air on top of oil. The air is under line pressure from the same source as the air used to operate the booster. A sight-gauge is mounted on the of JIT Air-Oil tanks so that the level of oil in reserve can be readily observed. When required, hydraulic fluid may be added through a port in the top of the tank after shutting off air pressure.

Style 1
Standard Male**Style 2**
Oversized Male**Style 3**
Standard Female

"KK" or "CC" male thread rod ends provide a shoulder surface against which the mounting accessory can be secured at assemble. These rod ends are recommended for use when design permits.

Female thread used with male accessories.

Style 4
Self Aligning Coupler

Used with Self-Aligning accessory for fast, close radial alignment.

Style 5
Special

Special rod ends made to suit customer requirements are available. Submit dimensional sketch or accurate description when desired.

Important Note:

Style 1 Rod End is standard and will be supplied unless otherwise specified. Alternate styles 2, 3, and 4 are available at no extra charge. Additional "WF" and "A" can be supplied at an additional charge.

Four Full-Wrench-Flats

Cylinders can be produced with four full-wrench-flats for convenience during cylinder installation or replacement, as well as, a time and money saver. The flat is positioned for a good wrench hold using normal tools.

| VARIABLE ROD DIMENSIONS | | | | | | + Stroke |
|-------------------------|----------|------|------|------|------|----------|
| BORE | ROD DIA. | V | Y | WF | RP | ZM |
| 1.50 | 0.63 | 0.25 | 2.11 | 1.00 | 2.00 | 6.88 |
| | 1.00 | 0.50 | 2.48 | 1.38 | 2.38 | 7.63 |
| 2.00 | 1.00 | 0.25 | 2.48 | 1.38 | 2.38 | 7.63 |
| | 1.38 | 0.38 | 2.73 | 1.63 | 2.94 | 8.13 |
| 2.50 | 1.00 | 0.25 | 2.48 | 1.38 | 2.38 | 7.75 |
| | 1.38 | 0.38 | 2.73 | 1.63 | 2.94 | 8.25 |
| | 1.75 | 0.50 | 2.98 | 1.88 | 3.38 | 8.75 |
| 3.25 | 1.38 | 0.25 | 2.84 | 1.63 | 2.94 | 9.00 |
| | 1.75 | 0.38 | 3.09 | 1.88 | 3.38 | 9.50 |
| | 2.00 | 0.38 | 3.22 | 2.00 | 3.63 | 9.75 |
| 4.00 | 1.75 | 0.25 | 3.09 | 1.88 | 3.38 | 9.75 |
| | 2.00 | 0.25 | 3.22 | 2.00 | 3.63 | 10.00 |
| | 2.50 | 0.38 | 3.47 | 2.25 | 4.19 | 10.50 |
| 5.00 | 2.00 | 0.38 | 3.22 | 2.00 | 3.63 | 10.50 |
| | 2.50 | 0.50 | 3.47 | 2.25 | 4.19 | 11.00 |
| | 3.00 | 0.38 | 3.47 | 2.25 | 4.81 | 11.00 |
| 6.00 | 3.50 | 0.38 | 3.47 | 2.25 | 5.50 | 11.00 |
| | 2.50 | 0.25 | 3.63 | 2.25 | 4.19 | 11.88 |
| | 3.00 | 0.25 | 3.63 | 2.25 | 4.81 | 11.88 |
| 7.00 | 3.50 | 0.25 | 3.63 | 2.25 | 5.50 | 11.88 |
| | 4.00 | 0.25 | 3.63 | 2.25 | 6.00 | 11.88 |
| | 4.50 | 0.25 | 3.63 | 2.25 | 6.69 | 11.88 |
| 8.00 | 5.00 | 0.25 | 3.63 | 2.25 | 7.38 | 11.88 |
| | 3.50 | 0.25 | 4.00 | 2.25 | 5.50 | 14.00 |
| | 4.00 | 0.25 | 4.00 | 2.25 | 6.00 | 14.00 |
| | 4.50 | 0.25 | 4.00 | 2.25 | 6.69 | 14.00 |
| | 5.00 | 0.25 | 4.00 | 2.25 | 7.38 | 14.00 |
| | 5.50 | 0.25 | 4.00 | 2.25 | 8.07 | 14.00 |

Spanner Wrench**Holes**

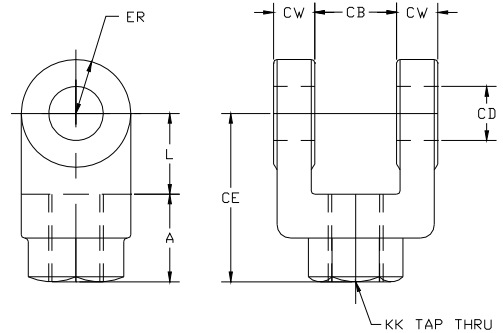
4" rod and larger have spanner wrench holes in place of wrench flats.

STANDARD ROD DIMENSIONS

| | 0.63 | 1.00 | 1.38 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
|----|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | 0.75 | 1.13 | 1.63 | 2.00 | 2.25 | 3.00 | 3.50 | 3.50 | 4.00 | 4.50 | 5.00 | 5.50 |
| B | 1.12 | 1.50 | 2.00 | 2.37 | 2.62 | 3.12 | 3.75 | 4.25 | 4.75 | 5.25 | 5.75 | 6.25 |
| C | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| D | 0.50 | 0.88 | 1.13 | 1.50 | 1.69 | 2.06 | 2.63 | 3.00 | 3.38 | 3.88 | 3.88 | 4.38 |
| KK | 7/16-20 | 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 | 3 1/4-12 | 3 1/2-12 | 4-12 |
| CC | 1/2-20 | 7/8-14 | 1 1/4-12 | 1 1/2-12 | 1 3/4-12 | 2 1/4-12 | 2 3/4-12 | 3 1/4-12 | 3 3/4-12 | 4 1/4-12 | 4 3/4-12 | 5 1/4-12 |
| AC | 1.13 | 1.63 | 1.75 | 2.00 | 2.63 | 3.25 | 3.63 | 4.38 | 4.50 | 5.25 | 5.38 | 6.25 |
| AD | 0.63 | 0.94 | 1.06 | 1.31 | 1.69 | 1.94 | 2.44 | 2.69 | 2.69 | 3.19 | 3.19 | 3.94 |
| AE | 0.25 | 0.38 | 0.38 | 0.50 | 0.63 | 0.75 | 0.88 | 1.00 | 1.00 | 1.50 | 1.50 | 1.88 |
| AF | 0.38 | 0.69 | 0.88 | 1/2-12 | 1.38 | 1.75 | 2.25 | 2.50 | 3.00 | 3.50 | 3.88 | 4.38 |
| AL | 1.75 | 2.50 | 2.75 | 3.13 | 3.75 | 4.50 | 4.88 | 5.63 | 5.75 | 6.50 | 6.63 | 7.50 |

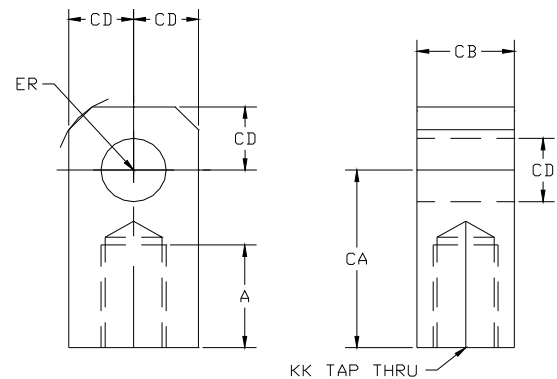
Rod Clevis

| Part No | Rod Dia | KK | CD | CB | CW | CE | A | ER |
|---------|---------|----------|------|------|------|-------|------|------|
| RC044 | 5/8 | 7/16-20 | 0.50 | 0.77 | 0.50 | 1.50 | 0.75 | 0.50 |
| RC050 | 5/8 | 1/2-20 | 0.50 | 0.77 | 0.50 | 1.50 | 0.75 | 0.50 |
| RC075 | 1 | 3/4-16 | 0.75 | 1.27 | 0.63 | 2.38 | 1.13 | 0.75 |
| RC087 | 1 | 7/8-14 | 1.00 | 1.52 | 0.75 | 2.94 | 1.63 | 1.00 |
| RC100 | 1 3/8 | 1-14 | 1.00 | 1.52 | 0.75 | 3.13 | 1.63 | 1.00 |
| RC125 | 1 3/8 | 1 1/4-12 | 1.38 | 2.03 | 1.00 | 4.13 | 2.00 | 1.38 |
| RC150 | 2 | 1 1/2-12 | 1.75 | 2.53 | 1.25 | 4.50 | 2.25 | 1.75 |
| RC175 | 2 | 1 3/4-12 | 2.00 | 2.53 | 1.25 | 5.50 | 3.00 | 2.00 |
| RC187 | 2 1/2 | 1 7/8-12 | 2.00 | 2.53 | 1.25 | 5.50 | 3.00 | 2.00 |
| RC225 | 3 | 2 1/4-12 | 2.50 | 3.03 | 1.50 | 6.50 | 3.50 | 2.50 |
| RC250 | 3 1/2 | 2 1/2-12 | 3.00 | 3.03 | 1.50 | 6.75 | 3.50 | 2.75 |
| RC275 | 4 | 3-12 | 3.50 | 4.03 | 2.00 | 8.50 | 4.50 | 3.50 |
| RC325 | 4 1/2 | 3 1/4-12 | 3.50 | 4.03 | 2.00 | 8.50 | 4.50 | 3.50 |
| RC350 | 5 | 3 1/2-12 | 3.50 | 4.03 | 2.00 | 8.50 | 4.50 | 3.50 |
| RC400 | 5 1/2 | 4-12 | 4.00 | 4.53 | 2.25 | 10.00 | 5.50 | 4.00 |



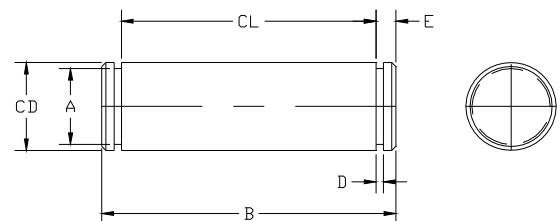
Rod Eye

| Part No | Rod Dia | KK | CD | CB | CA | A | ER |
|---------|---------|----------|------|------|------|------|------|
| FE044 | 5/8 | 7/16-20 | 0.50 | 0.75 | 1.50 | 0.75 | 0.63 |
| FE050 | 5/8 | 1/2-20 | 0.50 | 0.75 | 1.50 | 0.75 | 0.63 |
| FE075 | 1 | 3/4-16 | 0.75 | 1.25 | 2.06 | 1.13 | 0.88 |
| FE087 | 1 | 7/8-14 | 1.00 | 1.50 | 2.38 | 1.13 | 1.44 |
| FE100 | 1 | 1-14 | 1.00 | 1.50 | 2.81 | 1.63 | 1.19 |
| FE125 | 1 3/8 | 1 1/4-12 | 1.38 | 2.00 | 3.44 | 2.00 | 1.56 |
| FE150 | 1 3/4 | 1 1/2-12 | 1.75 | 2.50 | 4.00 | 2.25 | 2.00 |
| FE175 | | 1 3/4-12 | 2.00 | 2.50 | 4.38 | 2.25 | 2.88 |
| FE187 | 2 1/2 | 1 7/8-12 | 2.00 | 2.50 | 5.00 | 3.00 | 2.50 |
| FE225 | 2 1/2 | 2 1/4-12 | 2.50 | 3.00 | 5.81 | 3.50 | 2.81 |
| FE250 | 3 1/2 | 2 1/2-12 | 3.00 | 3.00 | 6.13 | 3.50 | 3.25 |
| FE275 | 4 | 3-12 | 3.50 | 4.00 | 7.63 | 4.50 | 3.88 |
| FE325 | 4 1/2 | 3 1/4-12 | 3.50 | 4.00 | 7.63 | 4.50 | 3.88 |
| FE350 | 5 | 3 1/2-12 | 3.50 | 4.00 | 7.63 | 5.00 | 3.88 |
| FE400 | 5 1/2 | 4-12 | 4.00 | 4.50 | 9.13 | 5.50 | 4.44 |



Pivot Pin

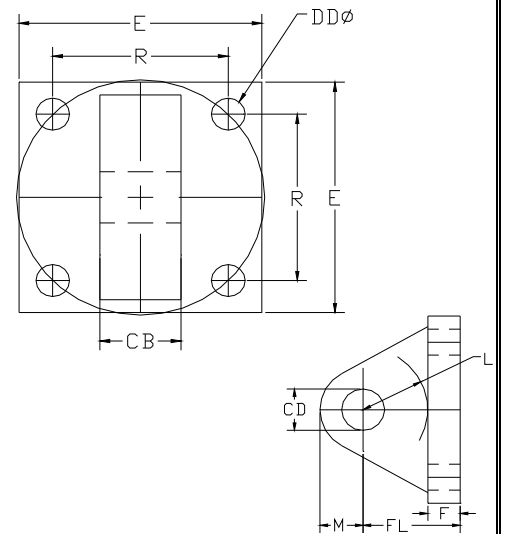
| Part No. | CL | CD | A | D | E | CL | B |
|----------|------|------|------|------|------|------|------|
| PP050 | 1.88 | 0.50 | 0.47 | 0.04 | 0.11 | 1.88 | 2.09 |
| PP075 | 2.63 | 0.75 | 0.70 | 0.05 | 0.13 | 2.63 | 2.88 |
| PP100 | 3.13 | 1.00 | 0.94 | 0.05 | 0.13 | 3.13 | 3.38 |
| PP138 | 4.19 | 1.38 | 1.29 | 0.06 | 0.15 | 4.19 | 4.49 |
| PP175 | 5.19 | 1.75 | 1.89 | 0.07 | 0.18 | 5.19 | 5.55 |
| PP200 | 5.19 | 2.00 | 2.36 | 0.09 | 0.22 | 5.19 | 5.55 |
| PP250 | 6.19 | 2.50 | 2.84 | 0.10 | 0.27 | 6.19 | 6.63 |
| PP300 | 6.25 | 3.00 | 3.32 | 0.12 | 0.36 | 6.25 | 6.78 |
| PP350 | 8.13 | 3.50 | 3.79 | 0.12 | 0.36 | 8.13 | 8.85 |
| PP400 | 9.13 | 4.00 | 4.00 | 0.00 | 0.00 | 9.13 | 9.85 |



Pivot Pin furnished with (2) retainers.

Eye Bracket (High Pressure Hydraulic)

| Part | H | Dimensions | | | | | | | | |
|--------|---------|------------|------|------|------|------|------|------|------|------|
| Number | Series | CD | CB | DD | E | F | FL | LR | M | R |
| EB050 | 1.50 | 0.50 | 0.75 | 0.41 | 2.50 | 0.38 | 1.13 | 0.75 | 0.50 | 1.63 |
| EB075 | 2.0-2.5 | 0.75 | 1.25 | 0.53 | 3.50 | 0.63 | 1.88 | 1.25 | 0.75 | 2.56 |
| EB100 | 3.25 | 1.00 | 1.50 | 0.66 | 4.50 | 0.75 | 2.25 | 1.50 | 1.00 | 3.25 |
| EB138 | 4.00 | 1.38 | 2.00 | 0.66 | 5.00 | 0.88 | 3.00 | 2.13 | 1.38 | 3.81 |
| EB175 | 5.00 | 1.75 | 2.50 | 0.91 | 6.50 | 0.88 | 3.13 | 2.25 | 1.75 | 4.95 |
| EB200 | 6.00 | 2.00 | 2.50 | 1.06 | 7.50 | 1.00 | 3.50 | 2.50 | 2.00 | 5.75 |
| EB250 | 7.00 | 2.50 | 3.00 | 1.19 | 8.50 | 1.00 | 4.00 | 3.00 | 2.50 | 6.59 |
| EB300 | 8.00 | 3.00 | 3.00 | 1.31 | 9.50 | 1.00 | 4.25 | 3.25 | 3.00 | 7.50 |

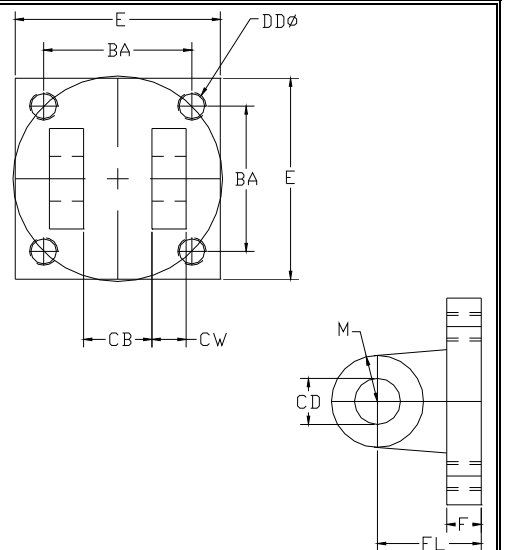


Eye Bracket (Air and Medium Pressure Hydraulic)

| Part | A & LH | Dimensions | | | | | | | | |
|--------|---------|------------|------|------|------|------|------|------|------|------|
| Number | Series | CD | CB | DD | E | F | FL | LR | M | R |
| EB050 | 1.5-2.5 | 0.50 | 0.75 | 0.41 | 2.50 | 0.38 | 1.13 | 0.75 | 0.50 | 1.63 |
| EB075 | 3.25-5 | 0.75 | 1.25 | 0.53 | 3.50 | 0.63 | 1.88 | 1.25 | 0.75 | 2.56 |
| EB100 | 6-8 | 1.00 | 1.50 | 0.66 | 4.50 | 0.75 | 2.25 | 1.50 | 1.00 | 3.25 |

Clevis Bracket (High Pressure Hydraulic)

| Part | H | Dimensions | | | | | | | | |
|--------|---------|------------|------|------|------|----------|------|------|------|------|
| Number | Series | CD | CB | BA | CW | DD | E | F | FL | M |
| CB050 | 1.50 | 0.50 | 0.77 | 1.63 | 0.50 | 3/8-24 | 2.50 | 0.38 | 1.13 | 0.50 |
| CB075 | 2.0-2.5 | 0.75 | 1.27 | 2.56 | 0.63 | 1/2-20 | 3.50 | 0.63 | 1.88 | 0.75 |
| CB100 | 3.25 | 1.00 | 1.52 | 3.25 | 0.75 | 5/8-18 | 4.50 | 0.75 | 2.25 | 1.00 |
| CB138 | 4.00 | 1.38 | 2.03 | 3.81 | 1.00 | 5/8-18 | 5.00 | 0.88 | 3.00 | 1.38 |
| CB175 | 5.00 | 1.75 | 2.53 | 4.94 | 1.25 | 7/8-14 | 6.50 | 0.88 | 3.13 | 1.75 |
| CB200 | 6.00 | 2.00 | 2.53 | 5.75 | 1.25 | 1-14 | 7.50 | 1.00 | 3.50 | 2.00 |
| CB250 | 7.00 | 2.50 | 3.03 | 6.59 | 1.50 | 1 1/8-12 | 8.50 | 1.00 | 4.00 | 2.50 |
| CB300 | 8.00 | 3.00 | 3.03 | 7.50 | 1.50 | 1 1/4-12 | 9.50 | 1.00 | 4.25 | 2.75 |

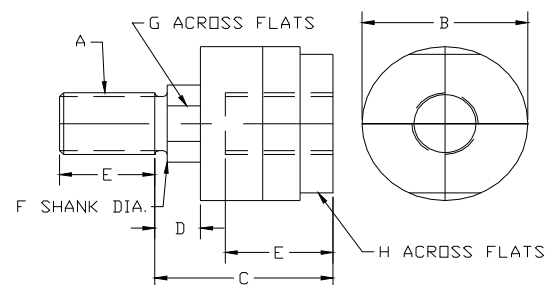


Clevis Bracket (Air and Medium Pressure Hydraulic)

| Part | A & LH | Dimensions | | | | | | | | |
|--------|---------|------------|------|------|------|--------|------|------|------|------|
| Number | Series | CD | CB | BA | CW | DD | E | F | FL | M |
| CB050 | 1.5-2.5 | 0.50 | 0.77 | 1.63 | 0.50 | 3/8-24 | 2.50 | 0.38 | 1.13 | 0.50 |
| CB075 | 4-12 | 0.75 | 1.27 | 2.56 | 0.63 | 1/2-20 | 3.50 | 0.63 | 1.88 | 0.75 |
| CB100 | 6-8 | 1.00 | 1.52 | 3.25 | 0.75 | 5/8-18 | 4.50 | 0.75 | 2.25 | 1.00 |

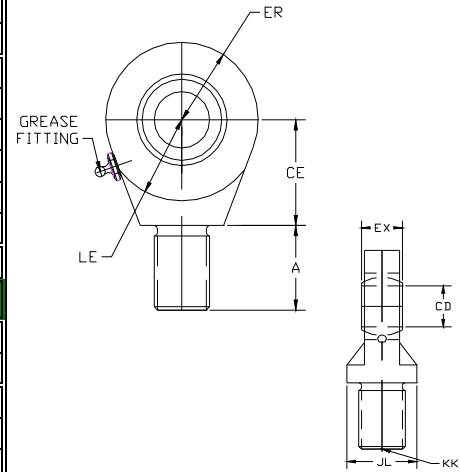
ALIGNMENT COUPLER

| Part | DIMENSIONS | | | | | | | |
|--------|------------|------|------|------|------|------|------|------|
| Number | A | B | C | D | E | F | G | H |
| AC044 | 7/16-20 | 1.25 | 2.00 | 0.50 | 0.75 | 0.63 | 0.56 | 1.13 |
| AC050 | 1/2-20 | 1.25 | 2.00 | 0.50 | 0.75 | 0.63 | 0.56 | 1.13 |
| AC075 | 3/4-16 | 1.75 | 2.31 | 0.31 | 1.13 | 0.97 | 0.88 | 1.50 |
| AC087 | 7/8-14 | 1.75 | 2.31 | 0.31 | 1.13 | 0.97 | 0.88 | 1.50 |
| AC100 | 1-14 | 2.50 | 2.94 | 0.50 | 1.63 | 1.38 | 1.25 | 2.25 |
| AC125 | 1 1/4-12 | 2.50 | 2.94 | 0.50 | 1.63 | 1.38 | 1.25 | 2.25 |
| AC150 | 1 1/2-12 | 3.25 | 4.38 | 0.81 | 2.25 | 1.75 | 1.50 | 3.00 |
| AC175 | 1 3/4-12 | 3.25 | 4.38 | 0.81 | 2.25 | 1.75 | 1.50 | 3.00 |
| AC187 | 1 7/8-12 | 3.75 | 5.44 | 0.69 | 3.00 | 2.25 | 1.88 | 3.50 |
| AC225 | 2 1/4-12 | 6.75 | 6.38 | 3.25 | 3.50 | 2.75 | 2.38 | 2.88 |
| AC250 | 2 1/2-12 | 7.00 | 6.50 | 4.00 | 3.50 | 3.25 | 2.88 | 3.38 |



SELF-ALIGNING ROD EYE (High Pressure Hydraulic)

| Part | H | DIMENSIONS | | | | | | | |
|--------|---------|------------|------|------|------|------|------|------|------|
| Number | Series | KK | A | CD | CE | EX | ER | LE | JL |
| SAE044 | 1.50 | 7/16-20 | 0.69 | 0.50 | 0.88 | 0.44 | 0.88 | 0.75 | 0.88 |
| SAE075 | 2.0-2.5 | 3/4-16 | 1.00 | 0.75 | 1.25 | 0.03 | 1.25 | 1.06 | 1.31 |
| SAE100 | 3.25 | 1-14 | 1.50 | 1.00 | 1.88 | 0.88 | 1.38 | 1.44 | 1.50 |
| SAE125 | 4.00 | 1 1/4-12 | 2.00 | 1.38 | 2.13 | 1.19 | 1.81 | 1.88 | 2.00 |
| SAE150 | 5.00 | 1 1/2-12 | 2.13 | 1.75 | 2.50 | 1.53 | 2.19 | 2.13 | 2.25 |
| SAE187 | 6.00 | 1 7/8-12 | 2.88 | 2.00 | 2.75 | 1.75 | 2.63 | 2.50 | 2.75 |

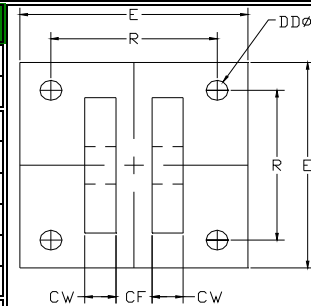


SELF-ALIGNING ROD EYE (Pneumatic and Low Pressure Hydraulic)

| Part | A & LH | DIMENSIONS | | | | | | | |
|--------|---------|------------|------|------|------|------|------|------|------|
| Number | Series | KK | A | CD | CE | EX | ER | LE | JL |
| SAE044 | 1.5-2.5 | 7/16-20 | 0.69 | 0.50 | 0.88 | 0.44 | 0.88 | 0.75 | 0.88 |
| SAE075 | 3.25-5 | 3/4-16 | 1.00 | 0.75 | 1.25 | 0.03 | 1.25 | 1.06 | 1.31 |
| SAE100 | 6-8 | 1-14 | 1.50 | 1.00 | 1.88 | 0.88 | 1.38 | 1.44 | 1.50 |

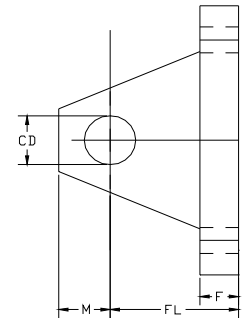
SELF-ALIGNING CLEVIS BRACKET

| Part | H | DIMENSIONS | | | | | | | | |
|--------|---------|------------|-------|------|------|------|------|------|------|------|
| Number | Series | CD | E | F | M | R | CF | CW | DD | FL |
| SCB050 | 1.50 | 0.50 | 3.00 | 0.50 | 0.50 | 2.05 | 0.44 | 0.50 | 0.41 | 1.50 |
| SCB075 | 2.0-2.5 | 0.75 | 3.75 | 0.62 | 0.88 | 2.76 | 0.66 | 0.62 | 0.53 | 2.00 |
| SCB100 | 3.25 | 1.00 | 5.50 | 0.75 | 1.00 | 4.10 | 0.88 | 0.75 | 0.53 | 2.50 |
| SCB125 | 4.00 | 1.38 | 6.50 | 0.88 | 1.38 | 4.95 | 1.19 | 1.00 | 0.66 | 3.50 |
| SCB150 | 5.00 | 1.75 | 8.50 | 1.25 | 1.75 | 6.58 | 1.53 | 1.25 | 0.91 | 4.50 |
| SCB187 | 6.00 | 2.00 | 10.62 | 1.50 | 2.00 | 7.92 | 1.75 | 1.50 | 0.91 | 5.00 |



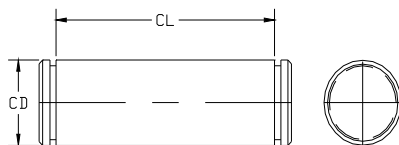
SELF-ALIGNING CLEVIS BRACKET

| Part | A & LH | DIMENSIONS | | | | | | | | |
|--------|--------|------------|-------|------|------|------|------|------|------|------|
| Number | Series | CD | E | F | M | R | CF | CW | DD | FL |
| SCB050 | 3-12 | 0.50 | 3.00 | 0.50 | 0.50 | 2.05 | 0.44 | 0.50 | 0.41 | 1.50 |
| SCB075 | 3.25-5 | 0.75 | 3.75 | 0.62 | 0.88 | 2.76 | 0.66 | 0.62 | 0.53 | 2.00 |
| SCB100 | 6-8 | 1.00 | 5.50 | 0.75 | 1.00 | 4.10 | 0.88 | 0.75 | 0.53 | 2.50 |
| SCB125 | 4-12 | 1.38 | 6.50 | 0.88 | 1.38 | 4.95 | 1.19 | 1.00 | 0.66 | 3.50 |
| SCB150 | | 1.75 | 8.50 | 1.25 | 1.75 | 6.58 | 1.53 | 1.25 | 0.91 | 4.50 |
| SCB187 | | 2.00 | 10.62 | 1.50 | 2.00 | 7.92 | 1.75 | 1.50 | 0.91 | 5.00 |



SA PIVOT PINS

| Part | H | A & LH | DIMENSIONS | |
|---------|---------|---------|------------|------|
| Number | Series | Series | CD | CL |
| PP050SA | 1.50 | 1.5-2.5 | 0.500 | 1.56 |
| PP075SA | 2.0-2.5 | 3.25-5 | 0.750 | 2.03 |
| PP100SA | 3.25 | 6-8 | 1.000 | 2.50 |
| PP138SA | 4.00 | | 1.374 | 3.31 |
| PP175SA | 5.00 | | 1.750 | 4.22 |
| PP200SA | 6.00 | | 2.000 | 4.94 |



Pivot Pin furnished with (2) retainers.



The JIT Certified Guarantee

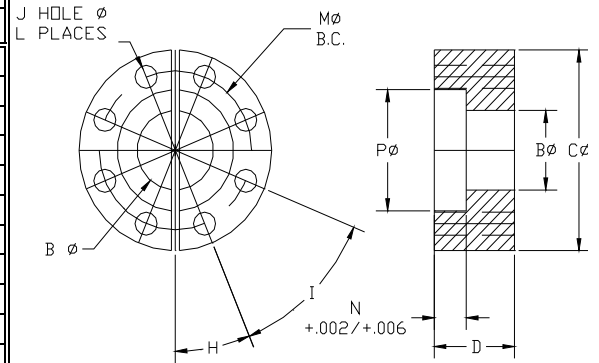
We guarantee that all cylinders ordered from this catalog will be built to the exact dimensions specified. All dimensions have been certified to be correct, and thus it is not necessary to request certified drawings

Safety Coupler

Safety Couplers create a stronger connection than a standard threaded rod end and provide closer radial alignment making installation quicker and results in less wear of component parts by allowing for radial misalignment. Some additional Safety Coupler advantages include:

1. Faster close radial alignment important for long cylinder life
2. Less critical rod end to machine attachment
3. Use with any JIT cylinder with 5/8" or larger rod diameter
4. Use with no extra cost JIT Style 4 rod end
5. Faster cylinder installation and removal
6. Better force distribution on push and pull strokes
7. For use with fixed mount cylinders

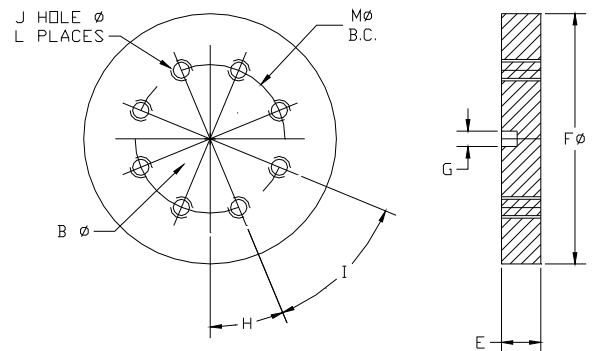
| Part No. | Rod Dia | Dimensions | | | | | | | | | |
|----------|---------|------------|------|------|-------|-----|------|----|------|------|------|
| | | B | C | D | H | I | J | L | M | N | P |
| SC062 | 0.63 | 0.41 | 1.50 | 0.56 | 45° | 90° | 0.22 | 4 | 1.13 | 0.25 | 0.66 |
| SC100 | 1.00 | 0.75 | 2.00 | 0.88 | 30° | 60° | 0.28 | 6 | 1.50 | 0.38 | 1.06 |
| SC138 | 1.38 | 0.94 | 2.50 | 1.00 | 30° | 60° | 0.34 | 6 | 2.00 | 0.38 | 1.44 |
| SC175 | 1.75 | 1.19 | 3.00 | 1.25 | 22.5° | 45° | 0.34 | 8 | 2.38 | 0.50 | 1.81 |
| SC200 | 2.00 | 1.44 | 3.50 | 1.63 | 15° | 30° | 0.41 | 12 | 2.69 | 0.63 | 2.06 |
| SC250 | 2.50 | 1.88 | 4.00 | 2.88 | 15° | 30° | 0.41 | 12 | 3.19 | 0.75 | 2.63 |
| SC300 | 3.00 | 2.38 | 5.00 | 2.38 | 15° | 30° | 0.53 | 12 | 4.00 | 0.88 | 3.13 |
| SC350 | 3.50 | 2.63 | 5.88 | 2.63 | 15° | 30° | 0.66 | 12 | 4.69 | 1.00 | 3.63 |
| SC400 | 4.00 | 3.13 | 6.38 | 2.63 | 15° | 30° | 0.66 | 12 | 5.19 | 1.00 | 4.13 |
| SC450 | 4.50 | 3.63 | 6.88 | 3.13 | 15° | 30° | 0.66 | 12 | 5.69 | 1.50 | 4.63 |
| SC500 | 5.00 | 4.00 | 7.38 | 3.13 | 15° | 30° | 0.66 | 12 | 6.19 | 1.50 | 5.13 |
| SC550 | 5.50 | 4.50 | 8.25 | 3.88 | 15° | 30° | 0.78 | 12 | 6.88 | 1.88 | 5.63 |



Weld Plate

Also available as a convenient accessory (optional at extra cost) is a Weld Plate to match each Safety Coupler. The Weld Plate provides the perfect answer to customers who prefer to weld a pre-drilled and tapped, properly sized plate to the machine, rather than laying out, drilling and tapping each hole in the machine. The Weld Plate is equipped with an accurately drilled locator pin hole to facilitate fast, close tolerance positioning. Advantages of our Safety Coupler option include:

| Part No. | Size | E | F | G | H | I | K | L | M |
|----------|------|------|------|------|-------|-----|---------|----|------|
| WP062 | 0.63 | 0.50 | 2.00 | 0.25 | 45° | 90° | 10-24 | 4 | 1.13 |
| WP100 | 1.00 | 0.50 | 2.50 | 0.25 | 30° | 60° | 1/4-20 | 6 | 1.50 |
| WP137 | 1.38 | 0.63 | 3.00 | 0.25 | 30° | 60° | 5/16-18 | 6 | 2.00 |
| WP175 | 1.75 | 0.63 | 4.00 | 0.25 | 22.5° | 45° | 5/16-18 | 8 | 2.38 |
| WP200 | 2.00 | 0.75 | 4.00 | 0.38 | 15° | 30° | 3/8-16 | 12 | 2.69 |
| WP250 | 2.50 | 0.75 | 4.50 | 0.38 | 15° | 30° | 3/8-16 | 12 | 3.19 |
| WP300 | 3.00 | 1.00 | 5.50 | 0.38 | 15° | 30° | 1/2-13 | 12 | 4.00 |
| WP350 | 3.50 | 1.00 | 7.00 | 0.38 | 15° | 30° | 5/8-11 | 12 | 4.69 |
| WP400 | 4.00 | 1.00 | 7.00 | 0.38 | 15° | 30° | 5/8-11 | 12 | 5.19 |
| WP450 | 4.50 | 1.00 | 8.00 | 0.38 | 15° | 30° | 5/8-11 | 12 | 5.69 |
| WP500 | 5.00 | 1.00 | 8.00 | 0.38 | 15° | 30° | 5/8-11 | 12 | 6.19 |
| WP550 | 5.50 | 1.25 | 9.00 | 0.38 | 15° | 30° | 3/4-10 | 12 | 6.88 |



SEAL REPLACEMENT

Our gland design allows all rod seals, wipers, 'O' rings, and back-up washers to be easily removed from every standard gland regardless of rod size. Note that Gland Seal Kits have all seals properly loaded into a JIT Cylinders gland.

Polyurethane

Polyurethane seals are standard on H series cylinders.

Nitrile

Nitrile seals can be supplied for any bore size. The recommended operating temperature range is 10 degrees F.(23 degrees C.) to +165 degrees F. (+74 degrees C).

Viton Seals

Viton seals can be supplied for any bore size. Viton is suitable for higher temperature requirements within a range of 10 degrees F. (23 degrees C) to +250 degrees F. (+121 degrees C).

Custom Sealing Solution

JIT Cylinders designs and supplies sealing solutions for the most demanding applications. From exotic operating mediums to extremely high or low temperatures and pressures, we can design and manufacture cylinders that can operate effectively within almost any environment. Contact our engineering department to discuss your unique applications as we strive to supply responsive solutions to solve your application requirements.

High Pressure Hydraulic Seal Kits

| Rod Diameter | Standard | | Viton | |
|-----------------|-----------|--------------|-----------|--------------|
| | Gland Kit | Rod Seal Kit | Gland Kit | Rod Seal Kit |
| 0.625 | KHG06 | KHR06 | KHGV06 | KHRV06 |
| 1 | KHG10 | KHR10 | KHGV10 | KHRV10 |
| 1.375 | KHG13 | KHR13 | KHGV13 | KHRV13 |
| 1.75 | KHG17 | KHR17 | KHGV17 | KHRV17 |
| 2 | KHG20 | KHR20 | KHGV20 | KHRV20 |
| 2.5 | KHG25 | KHR25 | KHGV25 | KHRV25 |
| 3 | KHG30 | KHR30 | KHGV30 | KHRV30 |
| 3.5 | KHG35 | KHR35 | KHGV35 | KHRV35 |
| 4 | KHG40 | KHR40 | KHGV40 | KHRV40 |
| 4.5 | KHG45 | KHR45 | KHGV45 | KHRV45 |

| Barrel Bore | Standard | Viton |
|----------------|------------|------------|
| | Piston Kit | Piston Kit |
| 1.5 | KHP15 | KHPV15 |
| 2 | KHP20 | KHPV20 |
| 2.5 | KHP25 | KHPV25 |
| 3.25 | KHP32 | KHPV32 |
| 4 | KHP40 | KHPV40 |
| 5 | KHP50 | KHPV50 |
| 6 | KHP60 | KHPV60 |
| 7 | KHP70 | KHPV70 |
| 8 | KHP80 | KHPV80 |

Contents of Each Seal Kit

| Gland Seal Kit |
|-----------------|
| Gland |
| Rod Seal |
| Rod Wiper |
| Gland O.D. Seal |
| O.D. Backup |

| Rod Seal Kit |
|-----------------|
| Rod Seal |
| Rod Wiper |
| Gland O.D. Seal |
| O.D. Backup |

| Piston Seal Kit |
|------------------|
| Piston Seals (2) |
| Barrel Seals (2) |

Warranty

JIT Cylinders, Inc. warrants every product of its manufacture to be of proper materials and first class workmanship. We agree to repair or replace, F.O.B. factory, but not to remove or install in the field, any perishable soft goods such as seals, which fail within a six-month period after shipment, normal wear accepted. We warrant for one year from date of shipment, all other parts which fail because of defective materials or workmanship. JIT assumes no responsibility for work done or expenses incurred, in the field, pertaining to such repairs or replacements, except upon written authority from our home office. Components not produced by JIT are subject only to the warranty extended to JIT by their respective manufacturer. When orders have been correctly filled, there shall be no returns without JIT's approval. Such returns will be subject to a restocking charge.

Return Goods Authorization (RGA)

All returns to JIT Cylinders must be accompanied with a Return Goods Authorization Number. A Return Goods Authorization Number may be obtained by contacting the plant. JIT Cylinders will inquire into why the return is being made and a number will be assigned at that time. Paperwork will be completed by JIT Cylinders giving details of the return from the information supplied by the customer or distributor. At the time the return is received the RGA number will be matched to the proper paperwork. This allows entry of the return without further questions or delays.

Quality Excellence Policy

We at JIT Cylinders are committed to serving the needs of our customers, as our name implies, Just-In-Time. We are committed to providing products and services which meet application requirements and are engineered for superior performance and reliability. We will achieve this through quality excellence in everything we do. Each task must be performed in conformance to requirements, and systems must be established which assure error-free performance in every area of manufacture. We understand that "quality excellence" depends on the personal performance of each employee. Because of this the entire management team and each member of manufacturing is dedicated and personally involved in the quality improvement process. We are dedicated to a policy of providing quality products and services that fully satisfy our customers' needs. We subscribe to the following quality absolutes:

Quality is defined as 100 percent conformance to requirements.

Our performance goal is to achieve error-free work in all functional areas.

Our system for causing quality is prevention.

We will track our progress in achieving total quality by measuring the price of non-conformance (waste).

Our primary objective will be continuous improvement.

100% Tested and Inspected!

Cylinders are first cycled at low pressure to remove air from the system and checked for proper mechanical action. During this procedure rod extension and stroke are measured. Test pressure is applied to cap and head ports in turn and under static pressure all joints are examined for leakage. Air lines are then fitted to cap and head in turn. The hydraulic fitting is removed from the non-pressurized port and a visual inspection made for air bubbles to indicate any piston seal leakage.

In addition, every cylinder is examined for:

Dimensional accuracy.

Proper unit switch actuation (if applicable).

Visual inspection for freedom of defects.

Proper assembly orientation.

| Mounting Description | NFPA Code | NFPA/JIC CYLINDER MANUFACTURERS SERIES IDENTIFICATION | | | | | | | | | | |
|-----------------------------|-----------|---|--------|--------|--------|------------|---------|---------|--------|-----------|-------|--------|
| | | JIT Series | Parker | Atlas | Miller | Hydro-Line | Vickers | Sheffer | Ortman | Milwaukee | Hanna | Lynair |
| PLAIN NO TIE ROD EXTENSION | MXO | A 250 psi | 2A-T | A-NMO | A-50 | R2K | E-24 | A-NX | 7KO | A-11 | A-MXO | A-MXO |
| | | LH 1500 psi | 3L-T | L-NMO | J-50 | HR2K | F-24 | MH-NX | 7LO | LH-11 | L-MXO | LH-MXO |
| | | H 3000 psi | 2H-T | H-NMO | H-50 | N2K | TZ-24 | HH-NX | 3THO | H-11 | H-MXO | H-MXO |
| SIDE TAPPED | MS4 | A 250 psi | 2A-F | A-FS | A-74 | R2B | E-02 | A-SF | 7KH | A-41 | A-MS4 | A-G |
| | | LH 1500 psi | 3L-F | L-FS | J-74 | HR2B | F-02 | MH-SF | 7LH | LH-41 | L-MS4 | LH-G |
| | | H 3000 psi | 2H-F | H-FS | H-74 | N2B | TZ-02 | HH-SF | 3THH | H-41 | H-MS4 | H-G |
| SIDE LUGS | MS2 | A 250 psi | 2A-C | A-SL | A-72 | R2A | E-01 | A-SL | 7KJ | A-42 | A-MS2 | A-A |
| | | LH 1500 psi | 3L-C | L-SL | J-72 | HR2A | F-01 | MH-SL | 7LJ | LH-42 | L-MS2 | LH-A |
| | | H 3000 psi | 2H-C | H-SL | H-72 | N2A | TZ-01 | HH-SL | 3THJ | H-42 | H-MS2 | H-A |
| CENTERLINE LUGS | MS3 | A 250 psi | 2A-E | A-CL | A-73 | R2H | | A-CL | 7KK | A-51 | A-MS3 | A-K |
| | | LH 1500 psi | 3L-E | L-CL | J-73 | HR2H | | MH-CL | 7LK | LH-51 | L-MS3 | LH-K |
| | | H 3000 psi | 2H-E | H-CL | H-73 | N2H | TZ-19 | HH-CL | 3THK | H-51 | H-MS3 | H-K |
| SIDE END LUGS | MS7 | A 250 psi | 2A-G | A-FM2 | A-77 | R2E | E-25 | A-EL | 7KCC | A-43 | A-MS7 | A-J |
| | | LH 1500 psi | 3L-G | L-FM2 | J-77 | HR2E | F-25 | MH-EL | 7LCC | LH-43 | L-MS7 | LH-J |
| | | H 3000 psi | 2H-G | H-FM2 | H-77 | N2E | | HH-EL | 3THCC | H-43 | H-MS7 | H-J |
| HEAD RECTANGULAR FLANGE | MF1 | A 250 psi | 2A-J | A-REF2 | A-61 | R2F | E-07 | A-FF | 7KB | A-31 | A-MF1 | A-C |
| | | LH 1500 psi | 3L-J | L-REF2 | J-61 | HR2F | F-07 | MH-FF | 7LB | LH-31 | L-MF1 | LH-C |
| | | H 3000 psi | 2H-J | H-REF2 | H-61 | N2F | TZ-07 | HH-FF | 3THB | H-31 | H-MF1 | H-C |
| HEAD SQUARE | ME3 | A 250 psi | 2A-JB | A-REF | A-63 | R2J | E-07 | A-FH | 7KQQ | A-21 | A-ME3 | A-C |
| | | LH 1500 psi | 3L-JB | L-REF | J-63 | HR2J | F-07 | MH-FH | 7LQQ | LH-21 | L-ME3 | LH-C |
| | | H 3000 psi | 2H-JB | H-REF | H-63 | N2J | TZ-07 | HH-FH | 3THQQ | H-21 | H-ME3 | H-C |
| CAP RECTANGULAR FLANGE | MF2 | A 250 psi | 2A-H | A-BEF2 | A-62 | R2R | E-12 | A-RF | 7KA | A-32 | A-FM2 | A-D |
| | | LH 1500 psi | 3L-H | L-BEF2 | J-62 | HR2R | F-12 | MH-RF | 7LA | LH-32 | L-FM2 | LH-D |
| | | H 3000 psi | 2H-H | H-BEF2 | H-62 | N2R | TZ-12 | HH-RF | 3THA | H-32 | H-FM2 | H-D |
| CAP SQUARE | ME4 | A 250 psi | 2A-HB | A-BEF | A-64 | R2P | | A-RH | 7KPP | | A-ME4 | A-D |
| | | LH 1500 psi | 3L-HB | L-BEF | J-64 | HR2P | | MH-RH | 7LPP | | L-ME4 | LH-D |
| | | H 3000 psi | 2H-HB | H-BEF | H-64 | N2P | | HH-RH | 3THPP | | H-ME4 | H-D |
| HEAD SQUARE FLANGE | MF5 | A 250 psi | 2A-JB | A-REF1 | | R2J | E-08 | A-FRX | 7KBB | A-21 | A-MF5 | A-P |
| | | LH 1500 psi | 3L-JB | L-REF1 | J-65 | HR2J | F-08 | MH-FRX | 7LBB | LH-21 | L-MF5 | LH-P |
| | | H 3000 psi | 2H-JB | H-REF1 | H-65 | N2J | TZ-08 | HH-FRX | 3THBB | H-21 | H-MF5 | H-P |
| CAP SQUARE FLANGE | MF6 | A 250 psi | 2A-HB | A-BEF1 | | R2S | E-13 | A-RFX | 7KAA | A-22 | A-MF6 | A-R |
| | | LH 1500 psi | 3L-HB | L-BEF1 | J-66 | HR2S | F-13 | MH-RFX | 7LAA | LH-22 | L-MF6 | LH-R |
| | | H 3000 psi | 2H-HB | H-BEF1 | H-66 | N2S | TZ-13 | HH-RFX | 3THAA | H-22 | H-MF6 | H-R |
| BOTH ENDS TIE RODS EXTENDED | MX1 | A 250 psi | 2A-TD | A-NM1 | A-51 | R2L | E-23 | A-BX | 7KL | A-10 | A-MX1 | A-L |
| | | LH 1500 psi | 3L-TD | L-NM1 | J-51 | HR2L | F-23 | MH-BX | 7LL | LH-10 | L-MX1 | LH-L |
| | | H 3000 psi | 2H-TD | H-NM1 | H-51 | N2L | TZ-23 | HH-BX | 3THL | H-10 | H-MX1 | H-L |
| HEAD TIE RODS EXTENDED | MX3 | A 250 psi | 2A-TB | A-NM3 | A-53 | R2M | E-22 | A-FX | 7KM | A-12 | A-MX3 | A-L |
| | | LH 1500 psi | 3L-TB | L-NM3 | J-53 | HR2M | F-22 | MH-FX | 7LM | LH-12 | L-MX3 | LH-L |
| | | H 3000 psi | 2H-TB | H-NM3 | H-53 | N2M | TZ-22 | HH-FX | 3THM | H-12 | H-MX3 | H-L |
| CAP TIE RODS EXTENDED | MX2 | A 250 psi | 2A-TC | A-NM2 | A-52 | R2N | E-21 | A-RX | 7KN | A-13 | A-MX2 | A-L |
| | | LH 1500 psi | 3L-TC | L-NM2 | J-52 | HR2N | F-21 | MH-RX | 7LN | LH-13 | L-MX2 | LH-L |
| | | H 3000 psi | 2H-TC | H-NM2 | H-52 | N2N | TZ-21 | HH-RX | 3THN | H-13 | H-MX2 | H-L |
| HEAD TRUNNION | MT1 | A 250 psi | 2A-D | A-TM1 | A-81 | R2U | E-35 | A-TF | 7KER | A-71 | A-MT1 | A-E |
| | | LH 1500 psi | 3L-D | L-TM1 | J-81 | HR2U | F-35 | MH-TF | 7LER | LH-71 | L-MT1 | LH-E |
| | | H 3000 psi | 2H-D | H-TM1 | H-81 | N2U | TZ-35 | HH-TF | 3THER | H-71 | H-MT1 | H-E |
| CAP TRUNNION | MT2 | A 250 psi | 2A-DB | A-TM2 | A-82 | R2W | E-16 | A-TR | 7KEB | A-72 | A-MT2 | A-F |
| | | LH 1500 psi | 3L-DB | L-TM2 | J-82 | HR2W | F-16 | MH-TR | 7LEB | LH-72 | L-MT2 | LH-F |
| | | H 3000 psi | 2H-DB | H-TM2 | H-82 | N2W | TZ-16 | HH-TR | 3THEB | H-72 | H-MT2 | H-F |
| INTERMEDIATE FIXED TRUNNION | MT4 | A 250 psi | 2A-DD | A-TM3 | | R2TT | E-14 | A-T | 7KE | A-73 | A-MT4 | A-N |
| | | LH 1500 psi | 3L-DD | L-TM3 | | HR2TT | F-14 | MH-T | 7LE | LH-73 | L-MT4 | LH-N |
| | | H 3000 psi | 2H-DD | H-TM3 | | N2TT | TZ-14 | HH-T | 3THE | H-73 | H-MT4 | H-N |
| CAP FIXED CLEVIS | MP1 | A 250 psi | 2A-BB | A-PB2 | A-84 | R2C | E-10 | A-C | 7KG | A-61 | A-MP1 | A-B |
| | | LH 1500 psi | 3L-BB | L-PB2 | J-84 | HR2C | F-10 | MH-C | 7LG | LH-61 | L-MP1 | LH-B |
| | | H 3000 psi | 2H-BB | H-PB2 | H-84 | N2C | TZ-10 | HH-C | 3THG | H-61 | H-MP1 | H-B |
| CAP DETACHABLE CLEVIS | MP2 | A 250 psi | 2A-BC | A-MP2 | A-86 | R2DC | | | | | | A-BR |
| | | LH 1500 psi | 3L-BC | L-MP2 | J-86 | HR2DC | | | | | | LH-BR |
| | | H 3000 psi | 2H-BC | H-MP2 | H-86 | N2DC | | | | | | |
| CAP SELF-ALIGNING EYE | MPU3 | A 250 psi | 2A-SB | A-SA | | | | | 7KS | A-62 | | A-UB |
| | | LH 1500 psi | 3L-SB | L-SA | | | | | 7LS | LH-62 | | LH-UB |
| | | H 3000 psi | 2H-SB | H-SA | | | | | 3THS | H-62 | | H-UB |
| END FOOT MOUNTS | MS1 | A 250 psi | 2A-CB | A-FM1 | | | | A-FB | | | | A-W |
| | | LH 1500 psi | 3L-CB | L-FM1 | | | | MH-FB | | | | LH-W |
| | | H 3000 psi | 2H-CB | H-FM1 | | | TZ-01 | HH-FB | | | | H-W |
| CAP FIXED EYE | MP3 | A 250 psi | | A-PB1 | | | | | | | | A-BX |
| | | LH 1500 psi | | L-PB1 | | | | | | | | LH-BX |
| | | H 3000 psi | | H-PB1 | | | | | | | | H-BX |
| SOLID FLANGE HEAD END | ME5 | A 250 psi | 2A-JB | | A-63 | R2G | | A-FHF | | A-21 | ME3-A | |
| | | LH 1500 psi | 3L-JB | | J-63 | HR2G | | MH-FHF | | | ME3-L | |
| | | H 3000 psi | 2H-JJ | H-ME5 | H-67 | N2G | TZ-09 | HH-FHF | | H-35 | MF7-H | H-X |
| SOLID FLANGE CAP END | ME6 | A 250 psi | 2A-HB | | A-64 | R2P | | A-RHF | | A-32 | ME4-A | |
| | | LH 1500 psi | 3L-HB | | J-64 | HR2P | | MH-RHF | | | ME4-L | |
| | | H 3000 psi | 2H-HH | H-ME6 | H-68 | N2P | | HH-RHF | | H-36 | MF9-H | H-T |

| Maximum Pressure Ratings | | | |
|--------------------------|--------------------|-------------------|---------------------------|
| Bore Size | Heavy Duty Service | Max Shock Service | 3:1 Safety Factor (Yeild) |
| 1.5 | 3,000 | 5,000 | 3,612 |
| 2.0 | 3,000 | 5,000 | 3,085 |
| 2.5 | 3,000 | 5,000 | 3,412 |
| 3.25 | 3,000 | 5,000 | 2,783 |
| 4.0 | 3,000 | 5,000 | 2,842 |
| 5.0 | 3,000 | 5,000 | 2,667 |
| 6.0 | 3,000 | 5,000 | 2,778 |
| 7.0 | 3,000 | 5,000 | 2,760 |
| 8.0 | 3,000 | 5,000 | 2,558 |

| H Series Cylinder Weight Chart | | | | | | | |
|--------------------------------|----------|-------------|------------------------|-----------|----------|-------------|------------------------|
| Bore Size | Rod Dia. | Zero Stroke | Add per Inch of Stroke | Bore Size | Rod Dia. | Zero Stroke | Add per Inch of Stroke |
| 1.5 | 0.625 | 9.0 | 0.50 | 4.0 | 2.5 | 58.0 | 3.2 |
| | 1.0 | 9.3 | 0.60 | 5.0 | 2.0 | 82.0 | 3.4 |
| 2.0 | 1.0 | 13.2 | 0.80 | | 3.5 | 86.0 | 5.2 |
| | 1.375 | 17.1 | 1.00 | 6.00 | 2.50 | 133.0 | 5.2 |
| 2.5 | 1.0 | 19.5 | 1.10 | | 4.0 | 140.0 | 7.3 |
| | 1.75 | 25.5 | 1.50 | 7.0 | 3.0 | 242.0 | 6.7 |
| 3.25 | 1.375 | 41.0 | 1.80 | | 5.0 | 253.0 | 10.3 |
| | 2.0 | 46.0 | 2.20 | 8.0 | 3.5 | 276.0 | 9.0 |
| 4.0 | 1.75 | 53.0 | 2.50 | | 5.5 | 309.0 | 13.0 |

| Output Forces at Specific Input Pressures | | | | | | | | | | | | | | | | | |
|---|---------|-----------|-----------|---|--------|----------|--------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|
| Bore | Rod Dia | Push Area | Pull Area | Forces in Pounds at Various Pressures (PSI) | | | | | | | | | | | | | |
| | | | | 500 PSI | | 1000 PSI | | 1500 PSI | | 2000 PSI | | 3000 PSI | | 4000 PSI | | 5000 PSI | |
| | | | | Push | Pull | Push | Pull | Push | Pull | Push | Pull | Push | Pull | Push | Pull | Push | Pull |
| 1.50 | 0.63 | 1.77 | 1.46 | 883 | 730 | 1,767 | 1,460 | 2,650 | 2,190 | 3,534 | 2,920 | 5,301 | 4,380 | 7,068 | 5,840 | 8,835 | 7,300 |
| | 1.00 | | 0.98 | | 491 | | 982 | | 1,473 | | 1,964 | | 2,946 | | 3,928 | | 4,910 |
| 2.00 | 1.00 | 3.14 | 2.36 | 1,570 | 1,180 | 3,140 | 2,360 | 4,710 | 3,540 | 6,280 | 4,720 | 9,420 | 7,080 | 12,560 | 9,440 | 15,700 | 11,800 |
| | 1.38 | | 1.66 | | 830 | | 1,660 | | 2,490 | | 3,320 | | 4,980 | | 6,640 | | 8,300 |
| 2.50 | 1.00 | 4.91 | 4.12 | 2,455 | 2,060 | 4,910 | 4,120 | 7,365 | 6,180 | 9,820 | 8,240 | 14,730 | 12,360 | 19,640 | 16,480 | 24,550 | 20,600 |
| | 1.38 | | 3.43 | | 1,715 | | 3,430 | | 5,145 | | 6,860 | | 10,290 | | 13,720 | | 17,150 |
| | 1.75 | | 2.51 | | 1,255 | | 2,510 | | 3,765 | | 5,020 | | 7,530 | | 10,040 | | 12,550 |
| 3.25 | 1.38 | 8.30 | 6.82 | 4,150 | 3,410 | 8,300 | 6,820 | 12,450 | 10,230 | 16,600 | 13,640 | 24,900 | 20,460 | 33,200 | 27,280 | 41,500 | 34,100 |
| | 1.75 | | 5.90 | | 2,950 | | 5,900 | | 8,850 | | 11,800 | | 17,700 | | 23,600 | | 29,500 |
| | 2.00 | | 5.16 | | 2,580 | | 5,160 | | 7,740 | | 10,320 | | 15,480 | | 20,640 | | 25,800 |
| 4.00 | 1.75 | 12.57 | 10.17 | 6,285 | 5,085 | 12,570 | 10,170 | 18,855 | 15,255 | 25,140 | 20,340 | 37,710 | 30,510 | 50,280 | 40,680 | 62,850 | 50,850 |
| | 2.00 | | 9.43 | | 4,715 | | 9,430 | | 14,145 | | 18,860 | | 28,290 | | 37,720 | | 47,150 |
| | 2.50 | | 7.66 | | 3,830 | | 7,660 | | 11,490 | | 15,320 | | 22,980 | | 30,640 | | 38,300 |
| 5.00 | 2.00 | 19.64 | 16.50 | 9,820 | 8,250 | 19,640 | 16,500 | 28,460 | 24,750 | 39,280 | 33,000 | 58,920 | 49,500 | 78,560 | 66,000 | 98,200 | 82,500 |
| | 2.50 | | 14.73 | | 7,365 | | 14,730 | | 22,095 | | 29,460 | | 44,190 | | 58,920 | | 73,650 |
| | 3.00 | | 12.57 | | 6,285 | | 12,570 | | 18,855 | | 25,140 | | 37,710 | | 50,280 | | 62,850 |
| | 3.50 | | 10.02 | | 5,010 | | 10,020 | | 15,030 | | 20,040 | | 30,060 | | 40,080 | | 50,100 |
| 6.00 | 2.50 | 28.27 | 23.36 | 14,135 | 11,680 | 28,270 | 23,360 | 42,405 | 35,040 | 56,540 | 46,720 | 84,810 | 70,080 | 113,080 | 93,440 | 141,350 | 116,800 |
| | 3.00 | | 21.20 | | 10,600 | | 21,200 | | 31,800 | | 42,400 | | 63,600 | | 84,800 | | 106,000 |
| | 3.50 | | 18.65 | | 9,325 | | 18,650 | | 27,975 | | 37,300 | | 55,950 | | 74,600 | | 93,250 |
| | 4.00 | | 15.70 | | 7,850 | | 15,700 | | 23,550 | | 31,400 | | 47,100 | | 62,800 | | 78,500 |
| 7.00 | 3.00 | 38.49 | 31.42 | 19,245 | 15,710 | 38,490 | 31,420 | 57,735 | 47,130 | 76,980 | 62,840 | 115,470 | 94,260 | 153,960 | 125,680 | 192,450 | 157,100 |
| | 3.50 | | 28.87 | | 14,435 | | 28,870 | | 43,305 | | 57,740 | | 86,610 | | 115,480 | | 144,350 |
| | 4.00 | | 25.92 | | 12,960 | | 25,920 | | 38,880 | | 51,840 | | 77,760 | | 103,680 | | 129,600 |
| | 4.50 | | 22.59 | | 11,295 | | 22,590 | | 33,885 | | 45,180 | | 67,770 | | 90,360 | | 112,950 |
| | 5.00 | | 18.85 | | 9,425 | | 18,850 | | 28,275 | | 37,700 | | 56,550 | | 75,400 | | 94,250 |
| 8.00 | 3.50 | 50.27 | 40.65 | 25,135 | 20,325 | 50,270 | 40,650 | 75,405 | 60,975 | 100,540 | 81,300 | 150,810 | 121,950 | 201,080 | 162,600 | 251,350 | 203,250 |
| | 4.00 | | 37.70 | | 18,850 | | 37,700 | | 56,550 | | 75,400 | | 113,100 | | 150,800 | | 188,500 |
| | 4.50 | | 34.37 | | 17,185 | | 34,370 | | 51,555 | | 68,740 | | 103,110 | | 137,480 | | 171,850 |
| | 5.00 | | 30.63 | | 15,315 | | 30,630 | | 45,945 | | 61,260 | | 91,890 | | 122,520 | | 153,150 |
| | 5.50 | | 26.51 | | 13,255 | | 26,510 | | 39,765 | | 53,020 | | 79,530 | | 106,040 | | 132,550 |
| 10.0 | 4.50 | 78.54 | 62.64 | 39,270 | 31,320 | 78,540 | 62,640 | 117,810 | 93,960 | 157,080 | 125,280 | 235,620 | 187,920 | 314,160 | 250,560 | 392,700 | 313,200 |
| | 5.00 | | 58.90 | | 29,450 | | 58,900 | | 88,350 | | 117,800 | | 176,700 | | 235,600 | | 294,500 |
| | 5.50 | | 54.78 | | 27,390 | | 54,780 | | 82,170 | | 109,560 | | 164,340 | | 219,120 | | 273,900 |
| | 7.00 | | 40.05 | | 20,025 | | 40,050 | | 60,075 | | 80,100 | | 120,150 | | 160,200 | | 200,250 |
| 12.0 | 5.50 | 113.1 | 89.34 | 56,550 | 44,670 | 113,100 | 89,340 | 169,650 | 134,010 | 226,200 | 178,680 | 339,300 | 268,020 | 452,400 | 357,360 | 565,500 | 446,700 |
| | 7.00 | | 74.61 | | 37,305 | | 74,610 | | 111,915 | | 149,220 | | 223,830 | | 298,440 | | 373,050 |
| | 8.00 | | 62.83 | | 31,415 | | 62,835 | | 94,245 | | 125,660 | | 188,490 | | 251,320 | | 314,150 |

With over a century of manufacturing experience, consistent quality delivered on time is our guarantee. Being a 100% employee-owned company enhances the motivation of every JIT employee. Every employee understands their unique vital role toward earning and retaining long term customers.

JIT Cylinders is an employee owned company that does not make decisions based on stockholder value. We make decisions based on what our customer's value. Our goal is not to simply retain customers, we strive to continuously earn our customers by exceeding their expectations in terms of value, service, quality and delivery. Each day we compete for long term customers and are succeeding by nurturing a corporate culture that encourages and motivates our:

- *customer service managers to not answer phones, but service customers*
- *machinists to not 'cut chips', but deliver on-time quality*
- *engineers to not design, but innovate market driven products*
- *sales managers to not sell, but offer economical best practice solutions*

Our goal at JIT Cylinders is to achieve best-practice leadership in all processes. From our paperless manufacturing floor to our instant 24 hour support, we at JIT Cylinders are in business to serve customers and subscribe to the belief that our success will only follow the success of our customers.

Employee participation in quality-oriented teams also contribute to our quality manufacturing. Teams meet regularly to discuss better, faster, leaner and more economical ways to produce products and streamline manufacturing and sales operations. Our customers benefit from an improved product selection that is manufactured more efficiently.

Product quality is further enhanced by our continuing investment in capital equipment. Substantial expenditures have been made for flexible unmanned machining centers, computers on the manufacturing floor, CNC and NC machining centers, advanced material handling equipment, and testing stands.

The combination of dedicated, motivated and skilled employees coupled with state-of-the-art automated equipment and ample manufacturing capacity, results in a competitively priced, high-quality cylinder delivered on-time to customers worldwide.

Leadership in Innovation Unequaled Integrity of Design

In keeping pace with tomorrow, JIT Cylinders Research and Development Division believes that distinguishing itself through innovation is an essential factor for continued success. The objective of each project strives to exceed current and future application requirements.

Substantial investments are made to strengthen JIT Cylinders high-technology systems capabilities. Key initiatives are focused toward combining electronic controls, and new structural materials with environmental friendly mediums to improve productivity, energy savings, operator efficiency and comfort.

A commitment to quality engineering, research, and product development remains our principal focus.



"At JIT (Just-In-Time) Cylinders,

we supply

cylinder solutions for today and tomorrow's industrial applications. Being 100% employee owned

we work

as a unified team to exceed our customers' requirements. Through this motivational approach,

we deliver

innovative and responsive cylinder application solutions. At the same time,

we support

your engineering, design and manufacturing teams. Though this approach

we build

our leadership and strengthen our business to ensure

we create

long term partnerships."