Industrial Cylinder Products

Hydraulic and Pneumatic Cylinders

Catalog 0106-7
(01/11)

Wherever in the world machinery is designed, manufactured or used, Parker is there to meet your hydraulic and pneumatic application requirements – with complete component selection and total systems engineering, worldwide availability and technical assistance.

This catalog contains the information you need to order hydraulic and pneumatic cylinders and accessories. Arranged by product group, it contains complete specifications, dimensions, and ordering information, including technical data and reference material for designers, builders and users of fluid power machinery. No more shuffling through dozens of separate catalogs from dozens of separate suppliers.

And when you're ready to order, call your local Parker distributor for fast delivery and service. Or call your Parker Sales Office see listing on page VI.

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In line with our policy of continuing product improvement, specifications and information contained in this catalog are subject to change.

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⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from the Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having expertise. It is important that you analyze all aspects of your application, including consequences of any failure and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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Parker Actuator Products

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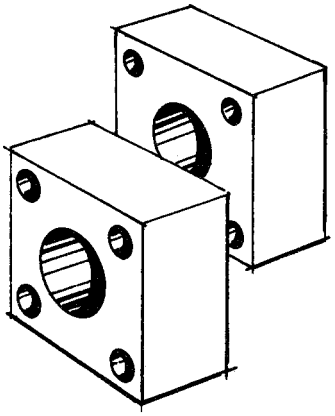
Parker Cylinder

Quality features, proven reliability
Parker cylinders…The Cylinders

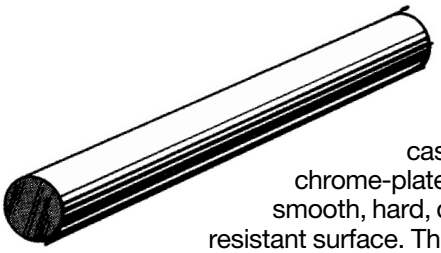
Parker cylinders have proven themselves in the only "test" that matters…the one you give it on the job.

Year after year, in all types of industrial applications, Parker Cylinders give reliability you can count on with minimum maintenance. The benefits to you are increased productivity at lower operating costs.

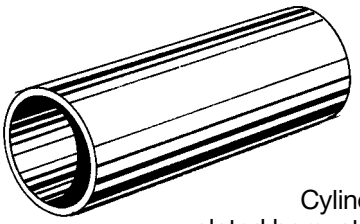
Parker offers an unmatched combination of quality features in the widest selection of industrial cylinders available. All to give you job-matched top performance and proven reliability.



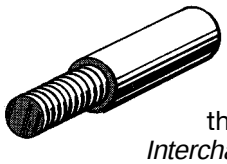
Square Steel heads and caps provide concentricity for mating parts. Both the steel head and cap are bored and grooved to assure concentricity to a common centerline for the cylinder body.



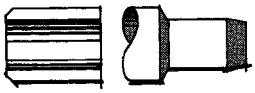
For example, the piston rod is case-hardened and chrome-plated to guarantee a smooth, hard, dent and scratch resistant surface. This increases seal and bearing life, reduces maintenance costs and assures dependable *long-life service.*



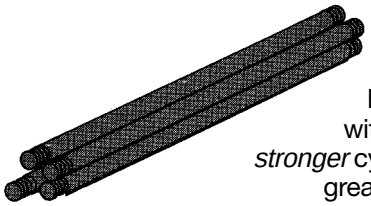
Cylinder bodies Hard chrome plated bore, steel tubing honed to a 15 micro inch finish.



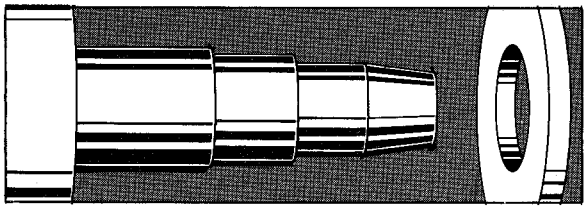
The high strength rod end stud has rolled threads providing threads reducing the possibility of fatigue failure. *Interchangeability*, easy conversion and/or repair of rod ends allow low cost modification or on-the-job repair. Anaerobic adhesive is used to permanently lock the stud to the piston rod.

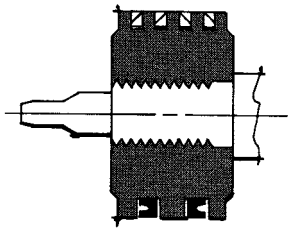


Parker cushions are the *longest* in the industry, providing the finest cushioning control available in a standard cylinder. The floating, self-centering bushing delivers high efficiency by increasing "out-stroke" speed. This all adds up to a no-compromise design that provides longer machine life, safer deceleration and greater reliability. Cushions are furnished when ordered without increasing overall cylinder length.



Tie rods are also high strength material with rolled threads for a *stronger* cylinder assembly and greater product reliability.



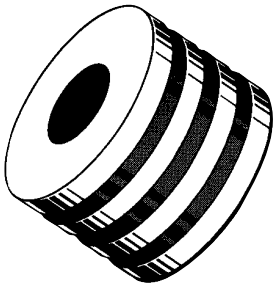


The long, full size piston-to-rod thread *connection* acts as a shock absorber and helps resist side loading. For added strength the piston-to-rod thread increases with the rod diameter thereby increasing the thread strength up to 314% for safety-assured performance in a given bore size.

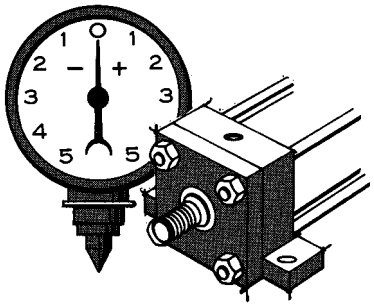
Parker's *new* adjustable, *floating stepped cushion design* is economical and flexible for even the most demanding applications. It provides superior performance in reducing hydraulic shock. Cushioning time is reduced up to 50%, permitting faster machine operating cycles for increased productivity. It reduces machine noise for less downtime and lower maintenance costs.

For additional information – call your local Parker Cylinder Distributor.

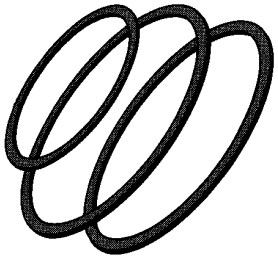
and service are the hallmark of all Preferred Around the World.



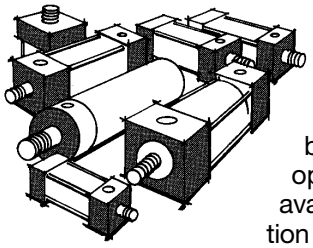
The *one-piece, wide surface*, nodular iron piston reduces bearing loads. The piston is piloted to ensure concentricity. Loctite is used to permanently lock the piston to the rod.



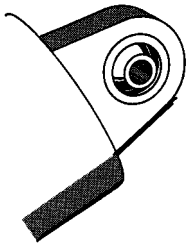
Feature after feature, the Parker story is the same. Parker cylinders are premium quality cylinders and have what it takes to give you the top performance you require. Cylinders designed and engineered for *greater production profitability* to save you unnecessary cost in downtime. To make sure every cylinder is premium quality, we subject each one, not just batch samples to tough inspection and performance tests.



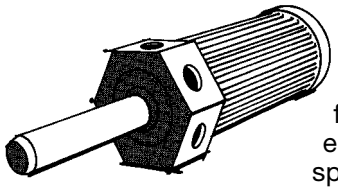
Static O-ring body seals are *pressure energized*, compensating and positive sealing for less maintenance cost and downtime saving oil losses and allowing quick, easy repair.



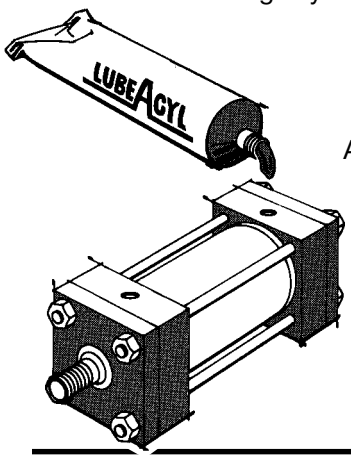
More selection and availability. Parker offers you the largest selection of sizes, bores, strokes, mountings, options, and accessories available. The kind of selection that lets you "customize" cylinders to fit your application. There are over 5 million different cylinders in our standard line alone. Parker's engineering capabilities are backed by over 60 years of manufacturing experience to meet all your cylinder requirements of today…and tomorrow.



Parker spherical bearings virtually eliminate alignment problems normally associated with the use of pivoting cylinders. Spherical bearings simplify difficulties with machine alignment. Even with misalignment of up to 4.5° performance remains satisfactory without creating any excessive cylinder wear.



Specials? Absolutely! Parker has the Sales, Engineering and Manufacturing capability and experience to provide special cylinders to meet your custom specifications and requirements. Let your imagination be your guide. We're ready to give you any technical assistance you might need. We will help turn your ideas into reality by providing special cylinder designs for you to create new machinery…solve a difficult production problem… or improve existing equipment.



Air cylinders are factory pre-lubricated with Parker Lube-A-Cyl for normal operation and provide *millions of trouble-free* cycles. This greatly reduces both operating and maintenance costs.

The best in factory-trained fluidpower technical help is available from your Parker distributor's servicemen who are as close as your phone. They receive intensive training in cylinder design, application and maintenance at Parker facilities and regional training centers. They're always ready, eager and able to service all your cylinder requirements.

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Parker Cylinder

Parker Pneumatic Check Seal Cushion

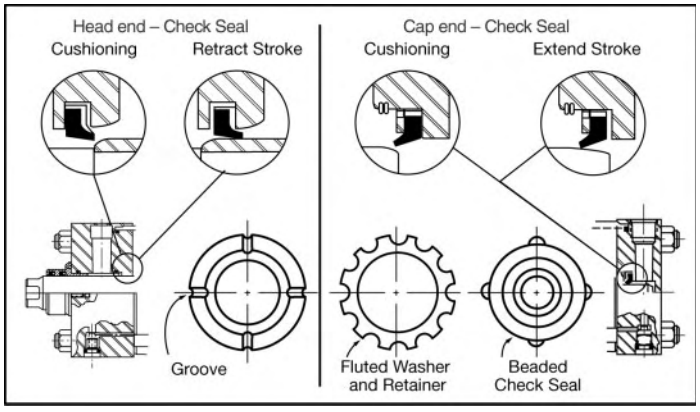
New Series MA air cylinder check seal cushions provides fast response, low wear, and low pressure drop.

Parker engineers have developed a new concept in air cylinder cushions…the "check seal". The new Parker check seal cushion combines the sealing capabilities of a lipseal for efficient capture of air for effective cushioning with check valve action for quick stroke reversal.

The lipseal design also provides "floating cushions" to assure cushion repeatability and long life. At the start of the stroke in each direction, the check valve design allows full fluid flow to piston face with a minimum pressure drop for maximum power stroke.

Additional benefits of the new check seal cushions are increased productivity and top performance for faster cycle time, minimum wear, easy adjustment, and low pressure drop.

The basic cushion design, is optional on the Series "MA" cylinder and is available on either the head end, cap end or both ends without change in envelope or mounting dimensions. A cushion adjusting needle is supplied for easy, precise adjustment on all bore sizes.



At the **head end** of the cylinder, the check seal is assembled into a groove in the central bore of the head, with the groove being slightly wider and larger in diameter than the check seal, so that it floats laterally and radially within predetermined limits. The check seal has four grooves molded into the fact to provide flow passages; the assembly is put together with the lip of the seal facing toward the inside of the cylinder.

A cushion sleeve is mounted on the piston rod, so that as the rod extends, air ahead of the piston flows freely out the head-end port. When the end of the cushion sleeve reaches the lip of the check seal, it seals on the wall of the groove, trapping air for cushioning.

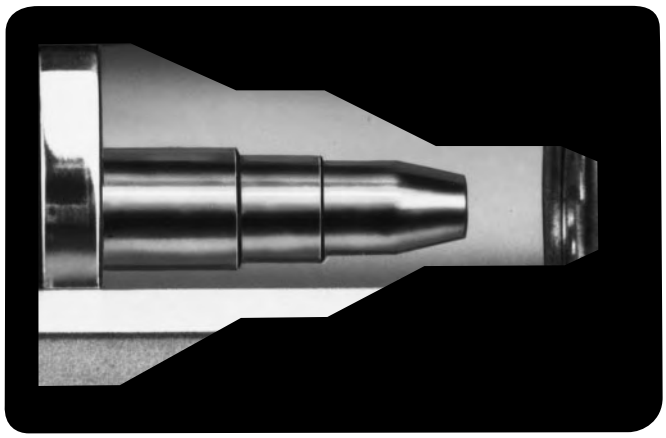
As pressure is applied to the head-end port on retraction, the air forces the seal towards the inside of the cylinder. The air then flows around the O.D. of the seal and through the flutes of the seal washer. Full-flow, quick starts with little or no pressure drop is just one of the major benefits of the design.

At the **cap end** of the cylinder, the check seal is assembled into a cavity in the face of the cap with four beads molded on the O.D. to provide a flow passage. A fluted washer and retaining ring, rather than a groove, and a cushion spear which extends from the rear face of the piston complete the cap end assembly. When the rounded, tapered portion of the cushion spear reaches the lip of the seal, the seal seats against the rear wall of the cavity, trapping air for cushioning.

The configuration of the check-seal lip, and the controlled shape of the cushion sleeve together prevent the lip from rolling over or extruding. A check seal used at both ends provides the benefits of floating cushions with check valve action for maximum cushion effectiveness and quick stroke reversal. This new check-seal design has been tested in millions of cycles, in the lab and in the field.

Series MA cushions are the longest in the industry and are designed for maximum customer benefit.

For additional information – call your local Parker Cylinder Distributor.



the Great Shape

a new cushion design that makes Parker hydraulic cylinders perform even better

- Faster cushioning time
- Reduced hydraulic shock
- Reduced machine noise
- Lower machine maintenance

For Cylinder Division Plant Locations – See Page II.

Parker Cylinder

Hydraulic Cylinder Cushioning:

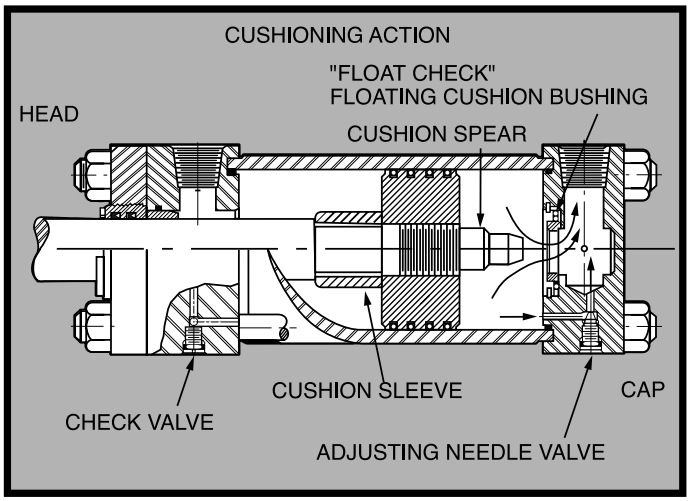
The control of kinetic energy

Moving loads faster with heavy-duty hydraulic cylinders – In today's machinery and machine tools, hydraulic cylinders are required to stop heavy loads at increasingly faster rates. Every second saved can increase productivity and reduce costs. So the machine designer must find ways to operate cylinders as fast as possible.

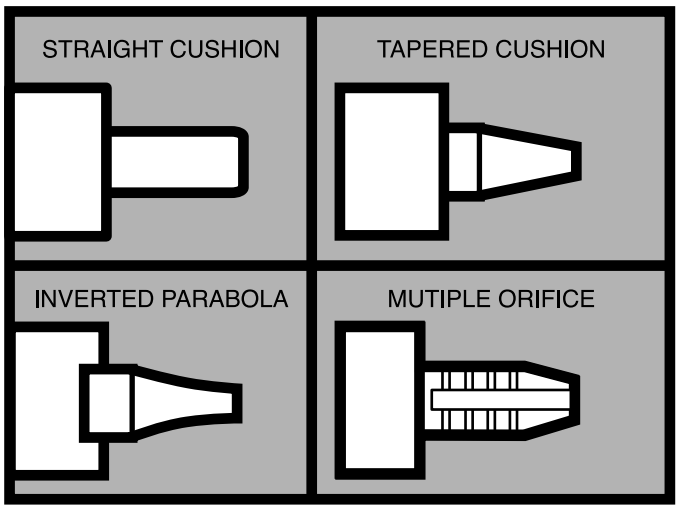
Merely speeding up a cylinder eventually leads to unacceptable hydraulic shock loads. The high inertial forces developed at the end of the stroke must be stopped without damaging the cylinder or the load.

Cushioning to control kinetic energy – One way to maintain a higher average velocity in cylinders is to incorporate cushions at the end of the stroke. These integral deceleration devices are designed to minimize excessive deceleration forces and peak hydraulic pressures which result from a sudden change of velocity.

Ideally, the cushion should achieve constant deceleration by developing constant pressure during the time of deceleration. In hydraulic cylinders, special shaping or contouring of the cushion spear or sleeve has been employed to provide programmed deceleration for the unit.



Design of Cylinder Cushions – In cushioning of hydraulic cylinders, the spear or sleeve closes the main exhaust passage in the cylinder head or cap, confining the fluid between the piston and the head or cap. The trapped fluid is metered at a somewhat controlled rate around the cushion spear and through bypass orifice that is adjusted with a needle valve. In the reverse direction, fluid bypasses the needle valve by means of check valve in the cylinder. The cushion must center itself properly regardless of the piston and bore clearance situation. To facilitate mechanical engagement with the mating orifice, a short taper is used on the leading portion of the cushion spear or sleeve. In addition, the clearance annulus must be concentric so the fluid flow characteristics remain consistent from one stroke to the next. Parker cylinders use floating bushings and floating cushion sleeves to assure concentricity of the flow annuli. Some designs, however, do not provide the floating feature, thereby increasing the chances of eccentricity of mating cushion parts. When cushion parts do not mate concentrically on each cycle, undercushioning or erratic cushioning results.



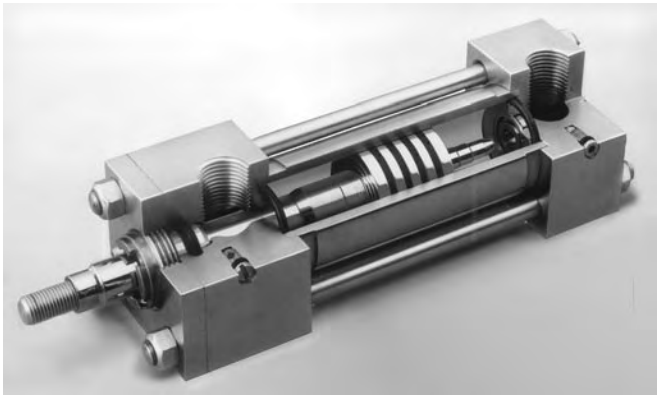
The most common cushion design is a straight spear or sleeve with a fixed clearance. The straight cushion has been used in a broad range of cylinder applications. It is economical to produce, but provides cushioning in a relatively narrow combination of loads and speeds.

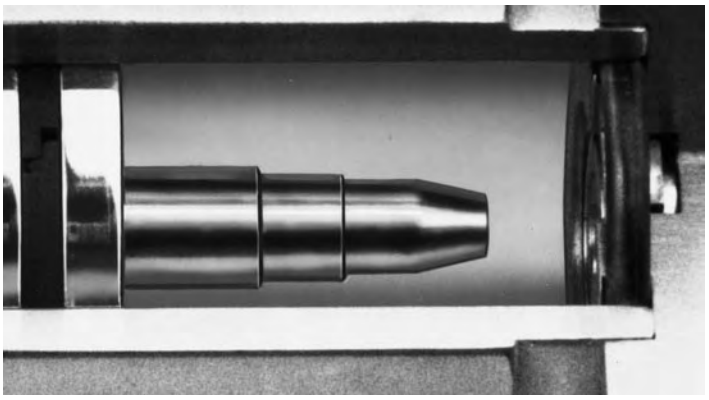
Another common cushion design is the tapered configuration. Most often, it consists of a 1/2 degree taper for 2/3 the length of the cushion stroke, followed by a straight diameter for the last 1/3 of the stroke. Although economical to produce, the tapered cushion normally requires a series of multiple tapers to achieve the desired performance.

In conventional hydraulic cylinders, the theoretical shape for a constant deceleration cushion is an inverted parabola properly sized for the cylinder. This design is extremely expensive to machine, so cannot be economically used on a broad range of products.

Another design, using a series of orifice holes in the cushion sleeve or spear, can also achieve constant deceleration. This multiple orifice or piccolo type cushion is also very expensive to machine and control. As a result, it is only used on specially engineered cylinders.

For additional information – call your local Parker Cylinder Distributor.





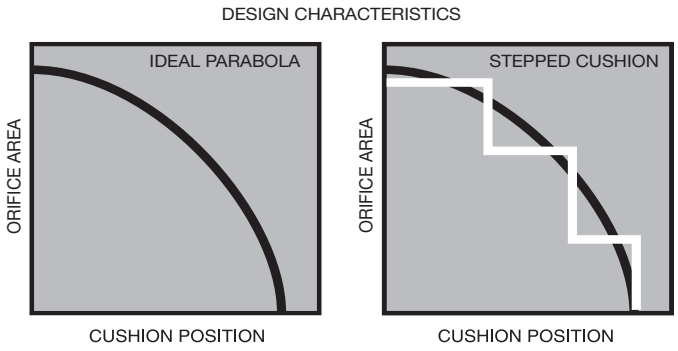
The Stepped Cushion

A new shape with great performance advantages

Stepped cushions combine the best features of known cushion technology – The stepped cushion is a totally new approach in cushioning of hydraulic cylinders. By engineering a new design configuration, Parker has developed a cushion that increases performance over conventional straight and tapered cushions used in heavy duty cylinders.

Advantages of hydraulic cylinders equipped with the Parker stepped cushion include:

- Faster cushioning time
- Reduced internal and external shock
- Reduced machine noise
- Lower machine maintenance

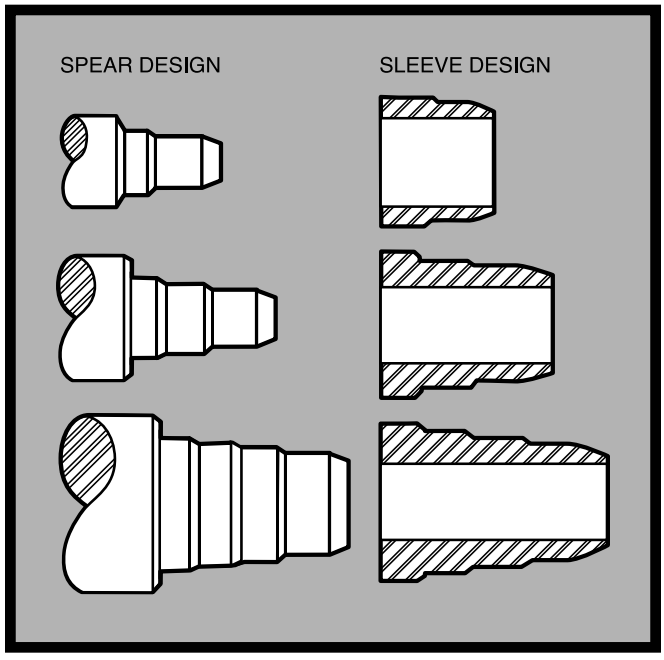


Success of the new design lies in a stepped spear or sleeve which for specific load and velocity conditions, achieves deceleration curves that come very close to the ideal performance curve. The ideal cushioning curve is one which is developed through the use of an inverted parabola cushion which achieves rapid reduction of orifice area near the end of the cushion stroke. With the stepped cushion, a series of steps are calculated to approximate the theoretical orifice area curve. The shape of the cushion allows kinetic energy to be absorbed gradually and smoothly over the entire cushioning stroke.

New standard option in Parker heavy duty hydraulic cylinders – The stepped cushion replaces the straight cushion as a standard option on Parker Series 2H heavy duty hydraulic cylinders. And they're available at the same price as the previous straight cushions.

The new cushions can be supplied at the head end, cap end or on both ends. The cushion spear or sleeve is machined to close tolerances, assuring that the steps provide the proper deceleration characteristics.

Three types of spear and sleeve designs are employed on Series 2H cylinders. They are required, because in analyzing bore sizes to maximize performance, tests showed that more steps were needed for the higher energy absorption common to larger bore cylinders.



Specify the Stepped Cushion to meet demanding performance requirements – Evaluate all the facts about the new stepped cushion from Parker. And consider its performance advantages when you specify heavy duty hydraulic cylinders.

More details are available in the Parker Series 2H Catalog.

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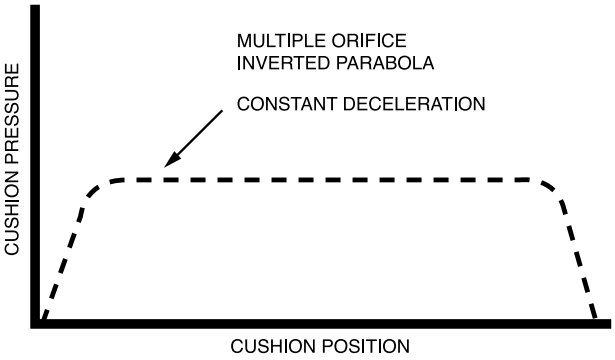
Parker Cylinder

Cushion Performance:

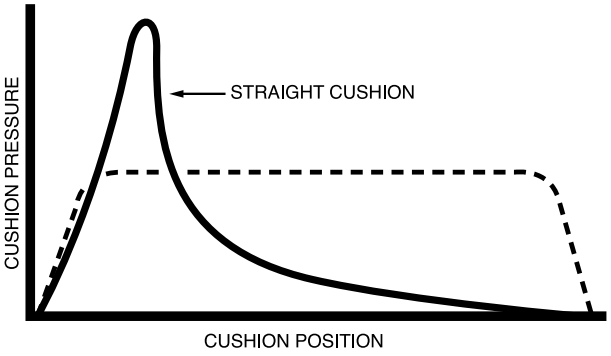
Designing for effective deceleration

Performance of the various cushion designs can be measured by the pressure changes that occur as the cushion stroke takes place. Since cushion pressure is a measure of the retarding force, it shows the resulting deceleration forces.

Pressure curves developed by the various cushion designs demonstrate cushioning performance. The theoretically ideal pressure-stroke curve is a straight line, showing that cushion action had constant pressure characteristics. The total area under the curve represents the kinetic energy absorbed. This constant deceleration curve can be produced with the ideal inverted parabola and multiple orifice cushion designs. However, neither of these designs are economical for most hydraulic cylinder applications in industry today.

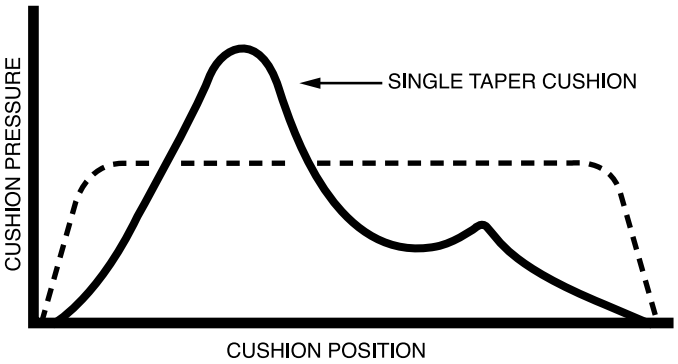


The straight cushion typically develops a very high initial pressure peak. Then, it degrades gradually as the stroke continues with fluid being metered through the fixed clearance annulus. As a result of high peak pressure, the straight cushion produces high shock levels, contributing to machine vibration, noise, and wear.

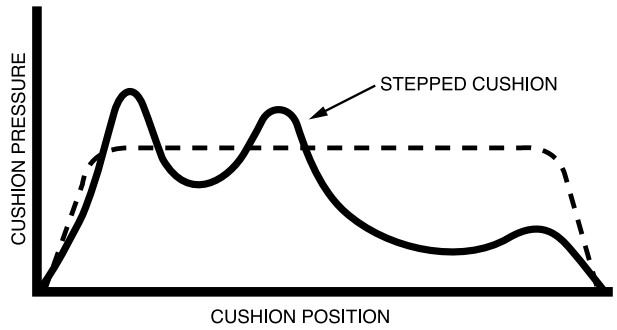


A single taper cushion develops lower initial shock than the straight design, but often delays pressure development, resulting in under cushioning.

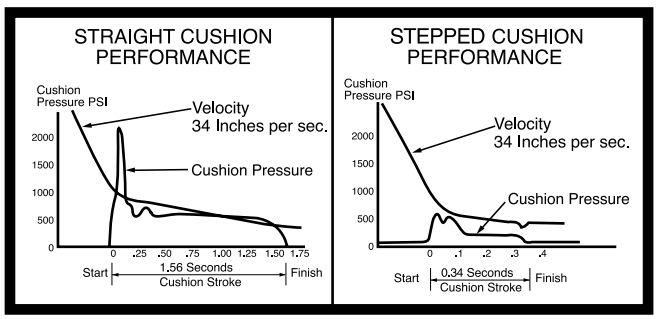
The new Parker stepped cushion design (with a three-step spear) develops three pressure pulses which more closely



approximate the constant deceleration curve. Pressure peaks are lower than those of both the straight and tapered cushions, resulting in significantly lower hydraulic shock.



A comparison of actual pressure traces produced by a stepped cushion versus a straight cushion under the same conditions further demonstrates advantages of the new design. The stepped cushion not only reduces internal and external shock, it also saves time during the cushion stroke. It can reduce shock up to 90% and reduce cushioning time up to 50% — a dramatic performance improvement. As a result, faster machine operating cycles are possible. And lower shock reduces machine noise and maintenance.

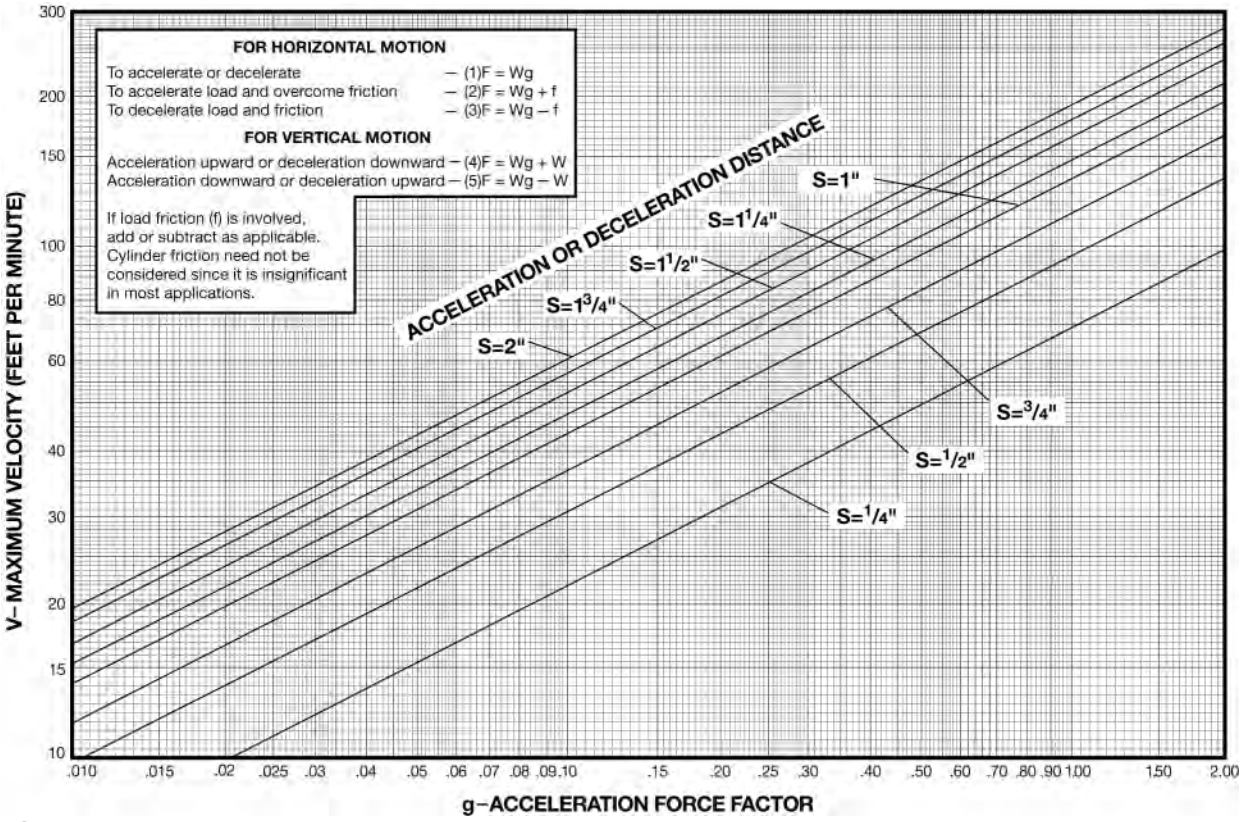


For additional information – call your local Parker Cylinder Distributor.

Acceleration and Deceleration Force Determination

The uniform acceleration force factor chart and the accompanying formula can be used to rapidly determine the forces required to accelerate and decelerate a cylinder load. To determine these forces, the following factors must be known: total weight to be moved, maximum piston speed, distance available to start or stop the weight (load), direction of movement, i.e. horizontal or vertical, and load friction. By use of the known factors and the "g" factor from the chart, the force necessary to accelerate or decelerate a cylinder load may be found by solving the formula (as shown in chart below) applicable to a given set of conditions.

The chart represents ideal conditions and makes no allowance for losses. Possible losses due to leakage past the cushion fits or through the adjustable needle valve result in a .85 efficiency factor for deceleration in cushioning.



Nomenclature

- V = Velocity in feet per minute
- S = Distance in inches
- F = Force in pounds
- W = Weight of load in pounds
- g = Force factor
- f = Friction of load on machine ways in pounds

To determine the force factor "g" from the chart, locate the intersection of the maximum piston velocity line and the line representing the available distance. Project downward to locate "g" on the horizontal axis. To calculate the "g" factor for distances and velocities exceeding those shown on the chart, the following formula can be used:

$$g = \frac{v^2}{s} \times .0000517$$

EXAMPLE: Horizontal motion of a free moving 6,000 pound load is required with a distance of $^1/_2$" to a maximum speed of 120 feet per minute. Formula (1) F = Wg should be used.

F = 6,000 pounds x 1.50 (from chart) = 9,000 pounds

Assuming a maximum available pump pressure of 1,000 pounds p.s.i., a 4" bore cylinder should be selected, operating on push stroke at approximately 750 p.s.i. pressure at the cylinder to allow for pressure losses from the pump to the cylinder.

Assume the same load to be sliding on ways with a coefficient of friction of 0.15. The resultant friction load would be 6,000 x 0.15 = 900 lbs. Formula (2) F = Wg + f should be used.

F = 6,000 pounds x 1.5 (from chart) + 900 = 9,900 lbs.

Again allowing 750 p.s.i. pressure at the cylinder, a 5" bore cylinder is indicated.

EXAMPLE: Horizontal deceleration of a 6,000 pound load is required by using a 1" long cushion in a 5" bore cylinder having a 2" diameter piston rod. Cylinder bore area (19.64 Sq. In.) minus the rod area (3.14 Sq. In.) results in a minor area of 16.5 Sq. In. at head end of cylinder. A 1,000 p.s.i. pump delivering 750 p.s.i. at the cylinder is being used to push the load at 120 feet per minute. Friction coefficient is 0.15 or 900 lbs.

In this example, the total deceleration force is the sum of the force needed to decelerate the 6,000 pound load, and the force required to counteract the thrust produced by the pump.

- W = Load in pounds = 6,000
- S = Deceleration distance in inches = 1"
- V = Maximum piston speed in feet per minute = 120
- g = .74 (from chart)
- f = 900 pounds

Use formula (3) F = Wg -f

(F = Wg – f) = (F = 6,000 x .74 – 900) = 3,540 Pounds

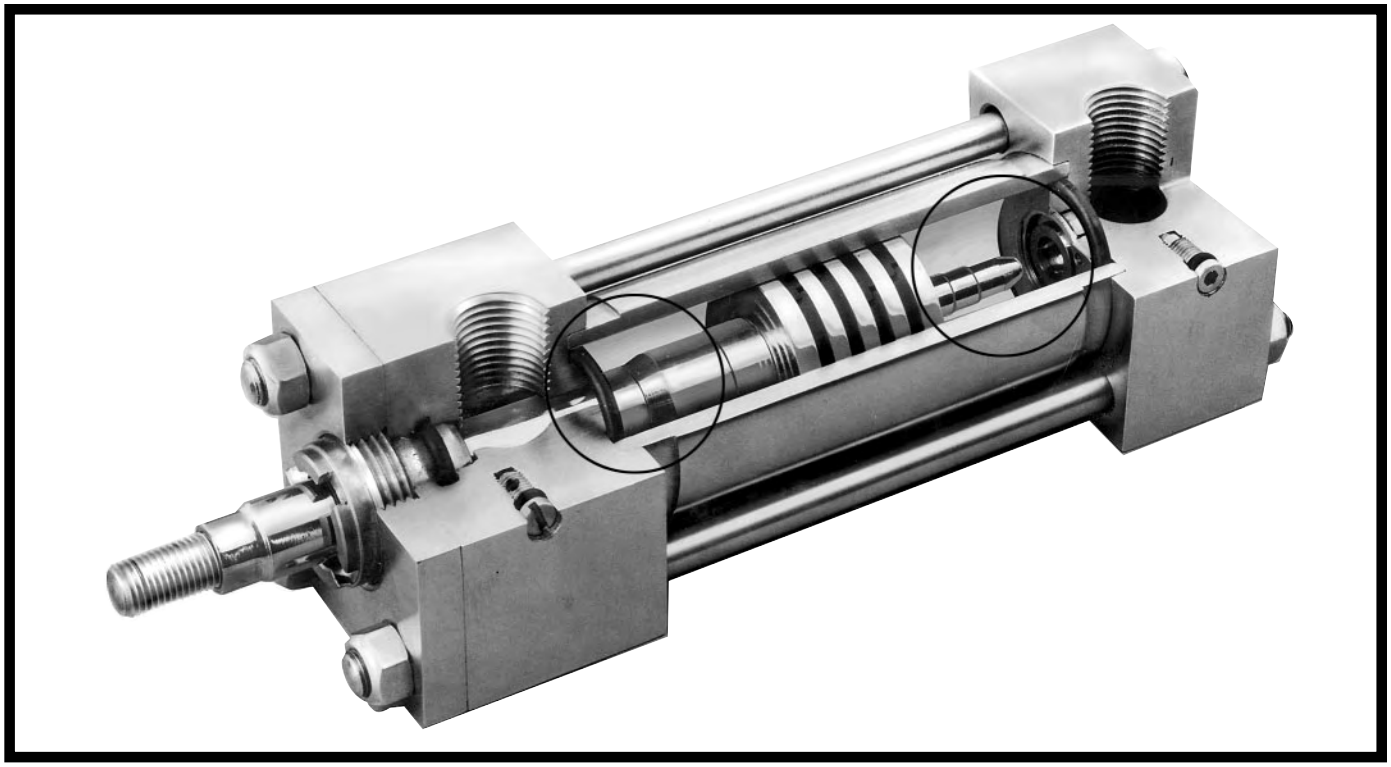
The pump is delivering 750 p.s.i. acting on the 19.64 Sq. In. piston area producing a force (F_2) of 14,730 pounds. This force must be included in our calculations. Thus F + F_2 = 3,540 + 14,730 = 18,270 pounds total force to be decelerated. Correct for cushion delivery of .85 or 18,270 ÷ .85 = 21,495.

The total deceleration force is developed by the fluid trapped between the piston and the head. The fluid pressure is equal to the force (21,495 pounds) divided by the minor area (16.5 Sq. In.) equals 1303 p.s.i. This pressure should not exceed the non-shock rating of the cylinder.

Cushioning practice is to select a "g" factor of between .2 and 1.5.

For Cylinder Division Plant Locations – See Page II.

Specify The Parker Stepped Cushion



For
- reduced shock up to 90%
- less noise
- less maintenance
- cushioning time reduced up to 50%

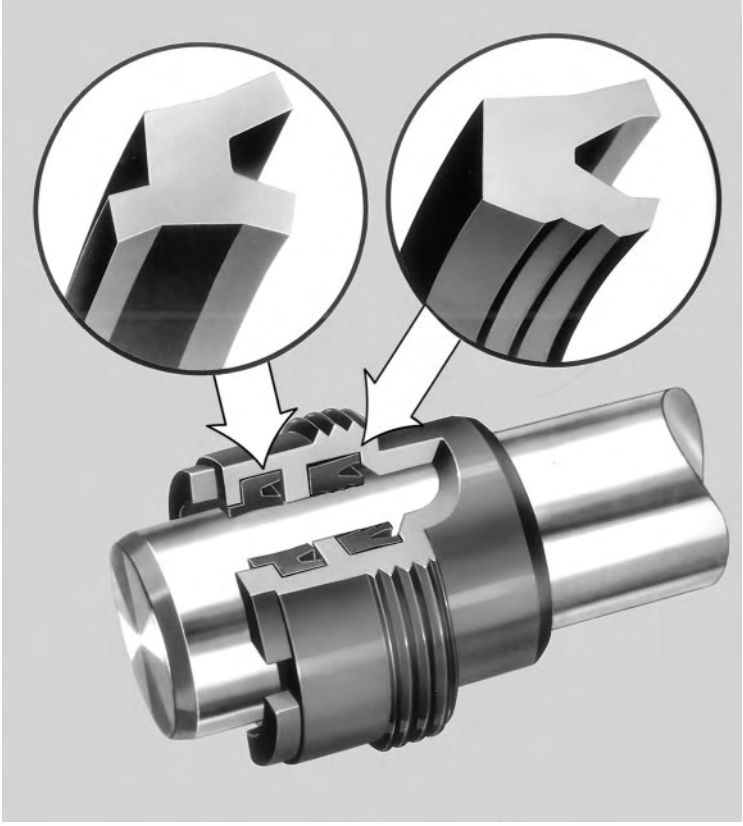
We're In Great Shape To Serve You!

For additional information – call your local Parker Cylinder Distributor.

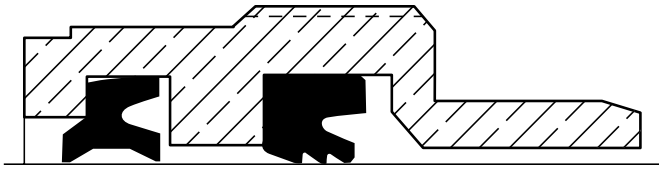
The "Jewel" Gland
An exclusive feature of Parker cylinders

Now with Parker Cylinder's Exclusive TS-2000 Rod Sealing System

• What Is It? • Why Is It Required? • How Does It Work?



What Is It?



The Parker “Jewel” gland cartridge is a combination of elements designed exclusively for sealing fluids when used in conjunction with reciprocating shafts.

Why Is It Required?

Throughout the history of fluid power, the one seemingly insurmountable problem faced by the user of reciprocating hydraulic equipment was a “wet rod”. The problem had been lived with for so many years that the sight of a puddle of oil under the rod end of the cylinder was almost characteristic, and no one seemed to be doing anything about it. With the increase in demand for the advantages of fluid power in such industries as food, medical instruments, etc, plus the increasing costs of maintenance, it became obvious that the old, previously accepted standards were no longer acceptable.

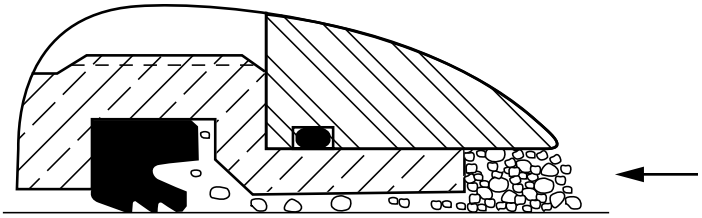
How Does It Work?

The “Jewel” gland assembly consists of the cartridge gland, serrated TS-2000 rod seal, and Wiperseal. Each has a multiple job to perform.

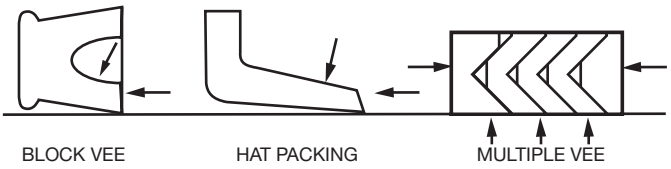
Let’s start from the beginning. The fluid approaches the rod end of the cylinder and tends to follow the rod out. The fluid has a natural tendency to grip the rod (adhesion) with a force depending upon the viscosity (among other factors) of the fluid. Now note that the gland bearing is inboard of the sealing members. This not only keeps the bearing lubricated, which is in itself an important feature, but it also results in an initial shearing of the viscous fluid which occurs as the rod passes through the bearing.

This leading edge of the bearing also acts as a pressure snubber when subjected to high hydraulic shocks from the system, and it tends to tame the pressure variations felt by the TS-2000 rod seal.

The serrated TS-2000 rod seal is a truly pressure compensating *unitary* rod seal. Look for a moment at the conventional seals.

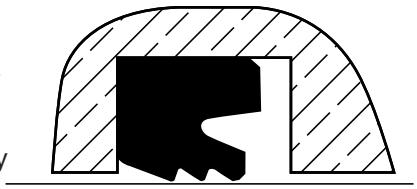


The block vee and hat packing are both low friction type seals and depend upon fine line contact with the rod to effect the seal at a minimum friction value. By scientific optical methods, investigation has indicated this “theory” is short lived as pressure increases. As the pressure increases, the critical edge lifts from the rod, or you might say the line of contact moves away from the pressure.



Essentially, what you now have is an O-ring type contact. The critical shearing edge is gone.

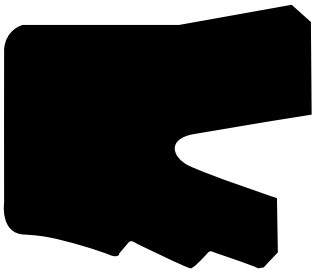
As an example of this, hold a tablet of paper with one edge on the desk. A single sheet of paper will not pass under. Roll the edge of the tablet up and the single sheet easily passes under.



In the compression type packing, (multiple vee) the natural inclination of the maintenance man is to increase the compressive force on the seal gland in an effort to seal off the leak, but this only makes matters worse. The additional friction adds to the wear and the seals quickly wear out and have to be replaced. Multiple vee’s tend to wedge open and throw the point of maximum contact pressure of the seal against the rod, away from the theoretical sealing edge.

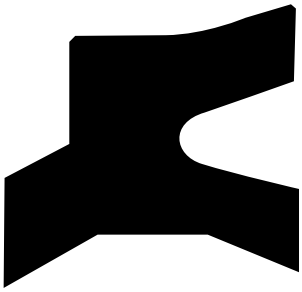
For additional information – call your local Parker Cylinder Distributor.

The serrated TS-2000 rod seal, on the other hand, has three shearing edges on a common lip. As the pressure increases and the line contact moves forward, a “new” shearing edge takes over. The increase in friction with increase in pressure is held to a minimum, yet the sealing qualities of the unitary seal are constant throughout the pressure range.

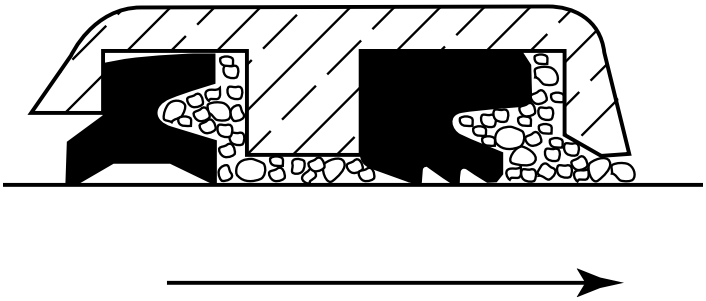


The only fluid adhering to the rod at this point is that very thin layer which is usually “scraped” off the rod on the return stroke by the rugged rod wiper. The solution to this is relatively simple. Don’t let it get out.

We can accomplish this with the Parker developed double-lip Wiperseal. Note the sturdy inner lip. This, in essence, is a scraper. It removes the “last” layer of oil that clings to the bitter end, and traps it between the Wiperseal and TS-2000 rod seal. The rod emerges from the cylinder dry. (Note: “Dry” is a relative term. In our usage, we mean that there is not enough excess oil left on the rod to be scraped off and “collar”. In reality, due to the mirro-structure of the ground, polished and plated surface of the rod, some lubrication remains, which cannot be wiped off.) There is nothing left to be removed by the wiper lip on the return stroke except the dirt and grit which it is designed to remove.



Let’s look at the return stroke now. What happens to the fluid trapped between the Wiperseal and TS-2000 rod seal? (Note the general configuration of the TS-2000 rod seal.)



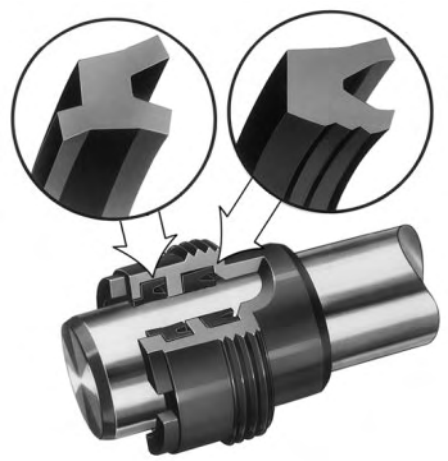
With the rod extending, the seal is rigid, digging in, resisting the motion of the rod. Now look at it from the other direction, with the rod retracting. It is flexible, able to move out of the way and ride over the oil clinging to the rod on the way back. It acts like a built-in check valve. The fluid trapped in the chamber between the seal is thus carried back into the cylinder on the return stroke. In addition to the oil “carried” back, if sufficient oil gets past the TS-2000 on the way out to build up a pressure between the seals, the pressure “pops” the oil back at the end of the stroke in normal applications when pressure in the head end of the cylinder drops to a low value during reversal.

Now, let’s look at the gland in general. The O-ring seal provided for the O.D. of the gland also serves as a prevailing torque locking device, to prevent rotation of the gland when in service.

Realizing that the gland and seal combination is subject to normal wear and will eventually need attention, the gland has been designed to minimize down time and maintenance costs. The threaded design is far superior for several reasons. The snap ring retained type always has some end play. This results in wipeage of the hydraulic fluid past the O.D. sealing ring. The totally retained type requires the cylinder tie rod nuts to be removed and, in reality, the cylinder almost disassembled. With the threaded design, the gland assembly can be removed without disturbing the rest of the cylinder, and yet is securely held during service.

Why Is The Parker "Jewel" The Best Gland On The Market?

Because it is designed with superior oil and water resisting seals of the fully dynamic type. The TS-2000 Rod Seal compensates automatically for pressure, temperature and wear conditions. This feature, coupled with our method of retaining these seals in the gland, results in a practically tamper-proof seal.



Look at a cross-section of the "JEWEL." As the rod strokes out from the seal, the rod motion and its friction tend to dynamically flex the inner edge of the TS-2000 rod seal in contact with the rod. This provides a cutting action to shear the oil from the rod, allowing the rod to pass out of the TS-2000 rod seal practically dry. Imagine that some oil wipes past the TS-2000 rod seal as the piston rod strokes out. It won't get far for it is stopped by the inner lip of the Wiperseal and is held between it and the TS-2000 rod seal. As the rod returns, any dirt or foreign matter which has collected on the rod is wiped off by the leading edge, or outer lip of the Wiperseal.

At the same time, any oil which may be trapped between the Wiperseal and the TS-2000 rod seal tends to adhere to the rod; and because of the rod motion, a dynamic flexing action of the TS-2000 rod seal occurs which causes the oil to be returned past the TS-2000 rod seal into the cylinder proper. In other words, we have an automatic check valve that prevents any appreciable amount of oil to leak past the seals, and then returns any that has managed to wipe by the TS-2000 rod seal.

The location of the bearing area of this remarkable gland is unique. Note that the major bearing surface is on the *cylinder* side of the seals. This assures optimum lubrication and cooling of this vital surface by the fluid used in the cylinder.

The O-ring seal on the O.D. of the gland also serves as a prevailing torque locking device to prevent rotation of the gland when in service.

Realizing that even the best gland and seal combination will eventually need attention, Parker-Hannifin engineers have designed the gland to minimize down time and maintenance costs. A threaded gland is more expensive to make than a snap ring retained type. However, we feel that the threaded design is far superior for at least two reasons. First, the snap ring retained type always has some end play. This results in wipeage of the hydraulic fluid past the O.D. sealing ring. Second, the threaded construction is preferred by hydraulic maintenance men. They prefer to unscrew a part rather than to "fish it out" (providing they have managed to locate the tools to remove a snap ring.)

Almost every hydraulic engineer to whom we have shown the "Jewel" has exclaimed…"This makes SENSE!"

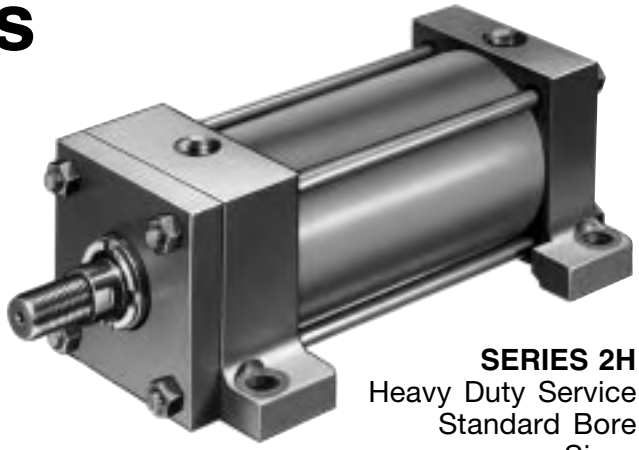
For additional information – call your local Parker Cylinder Distributor.

Hydraulic Cylinders
Index…

B

Hydraulic Cylinders

SERIES HMI
Heavy Duty Service
ISO Bore Sizes 25mm-200mm

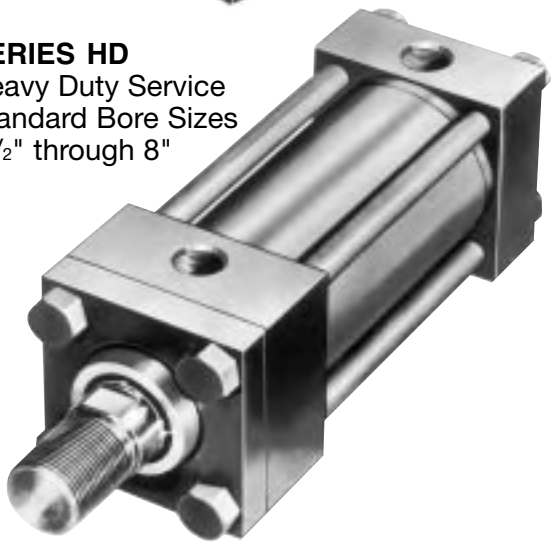


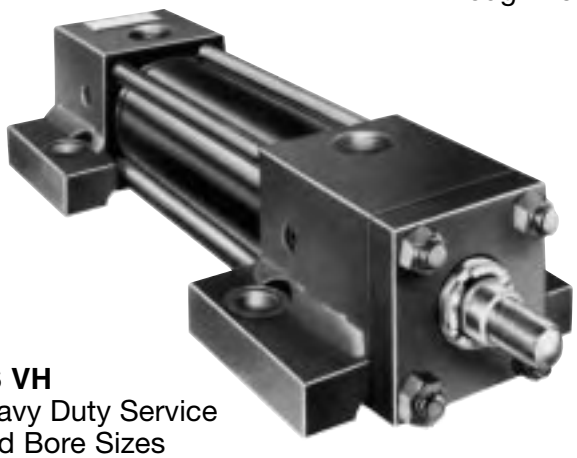
SERIES 2H
Heavy Duty Service
Standard Bore
Sizes
1 1/2" through 6"

SERIES 3L
Medium Duty Service
Standard Bore Sizes
1" through 8"

SERIES 3H
Heavy Duty Service
Bore Sizes
7" through 20"

SERIES HD
Heavy Duty Service
Standard Bore Sizes
1 1/2" through 8"





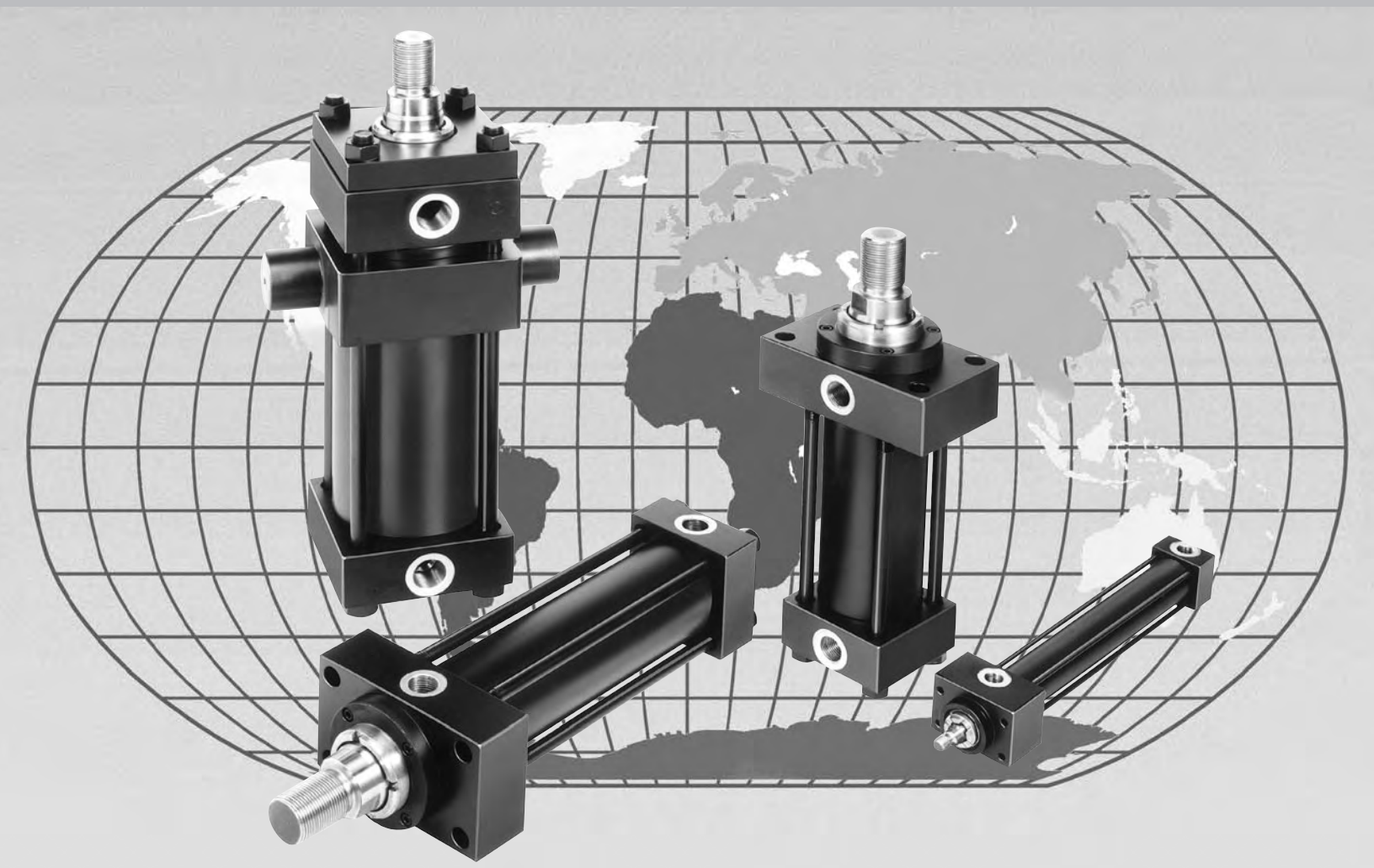
SERIES VH
Very Heavy Duty Service
Standard Bore Sizes
2 1/2" through 8"

For additional information – call your local Parker Cylinder Distributor.

Parker Cylinder

Metric Hydraulic Cylinders
Series HMI

Conforms to ISO 6020/2 (1991)
For working pressures up to 210 bar



Vital Technologies for Motion and Control

For Cylinder Division Plant Locations – See Page II.

Parker Cylinder

Parker Series HMI
Metric Hydraulic Cylinders

As the world leader in the design and manufacture of tie-rod cylinders, Parker Cylinder Division introduces the Parker Series HMI *metric* hydraulic cylinder. Parker's HMI Series cylinders are designed to meet the requirements of ISO 6020/2 (1991), 160 Bar Compact Series. HMI Series cylinders may be used for working pressures up to 210 Bar.

Parker HMI Series cylinders are the true *world standard*, available all over the globe from Parker's worldwide manufacturing facilities. Whether you or your machine are in Europe, Asia, South America, Canada, Mexico, or the United States, you can rely on the engineering expertise, manufacturing experience, and commitment to quality that you've come to expect from the Parker Cylinder Division.

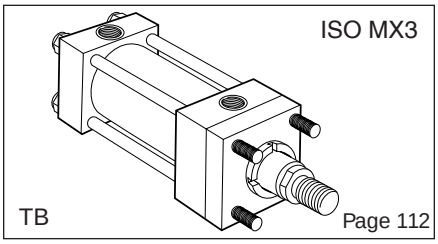
For additional information – call your local Parker Cylinder Distributor.

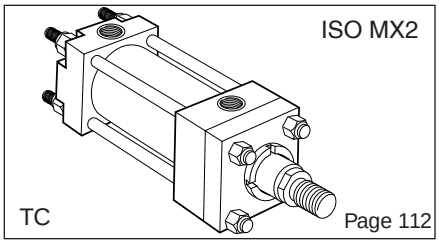
Series HMI Standard Features and Specifications

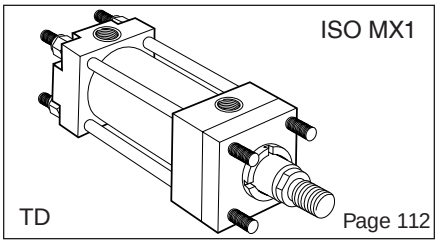
- ISO 6020/2 mounting interchangeable
- 12 standard mounting styles
- Up to 3 rod sizes per bore
- Wide range of mounting accessories
- Up to 3 male and 3 female rod end threads per bore
- Bore sizes – 25mm to 200mm
- Strokes – available in any practical stroke length
- Working pressure up to 210 bar
- Piston rods – 12mm to 140mm
- Single and Double rod designs
- Cushions available at either end
- Temperature Range – -20°C to 150°C depending on seal type
- Seal types to suit a wide variety of operating environments

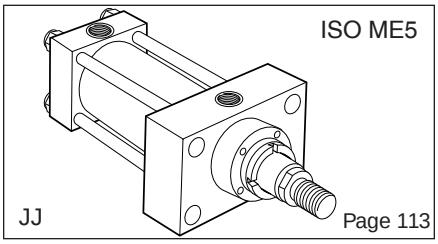
In line with our policy of continuing product improvement, specifications in this catalog are subject to change.

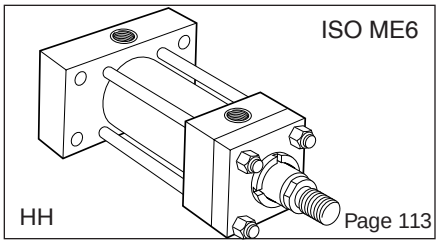
Available Mountings and Where To Find Them

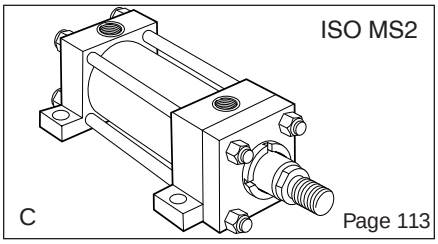


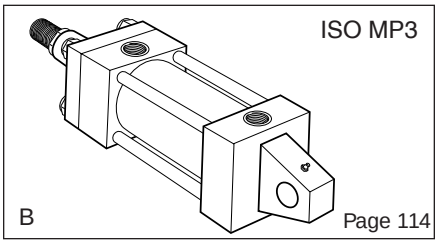


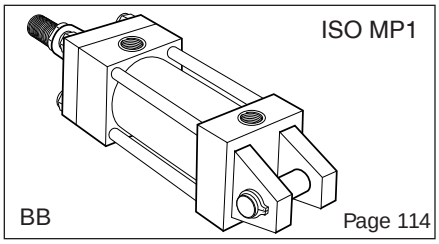


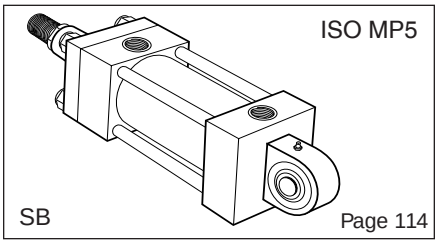


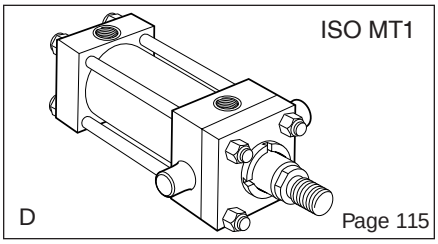


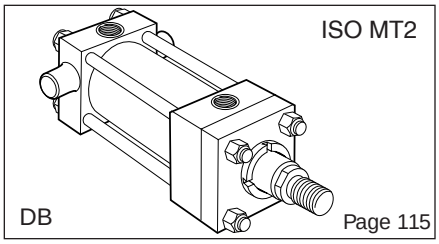


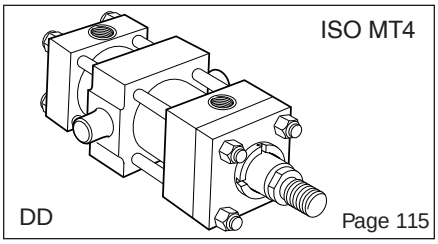












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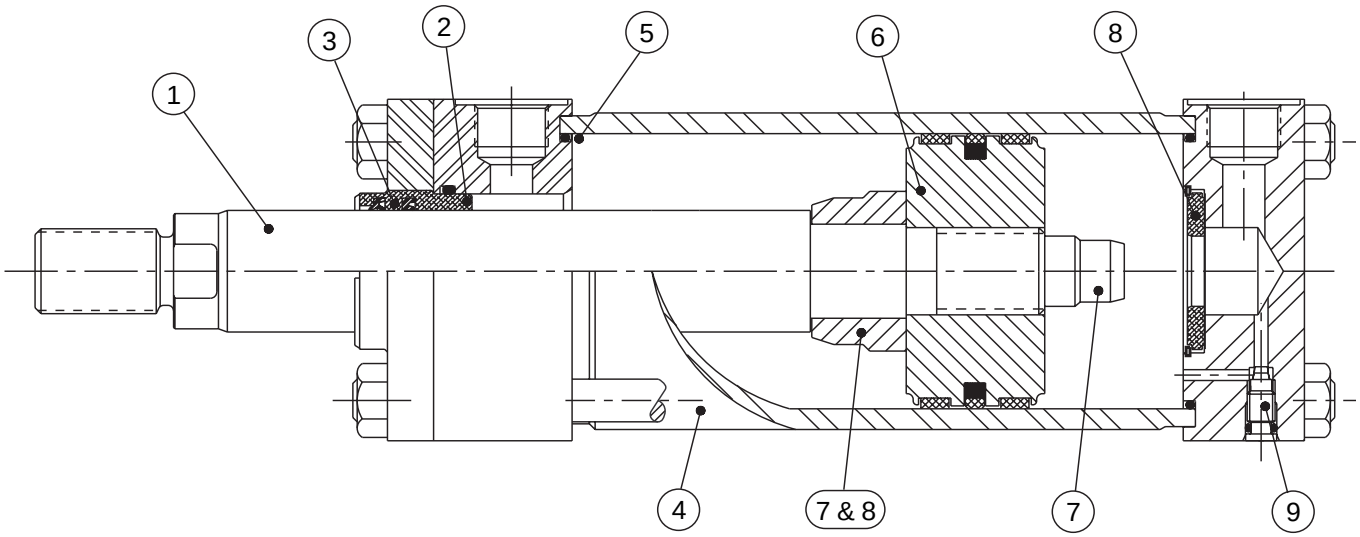
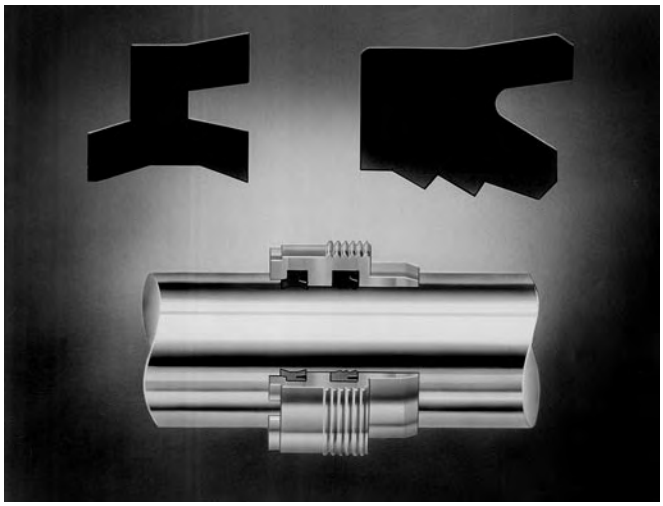


1 Piston Rod

Gland seal life is maximized by manufacturing piston rods from precision ground, high tensile carbon alloy steel, hard chrome plated and polished to 0.2µm max.

2 Parker's 'Jewel' Gland

Continuous lubrication, and therefore longer gland life, are provided by the long bearing surface inboard of the primary seal. The Jewel gland, complete with rod seals, can easily



be removed without dismantling the cylinder, so servicing is quicker – and therefore more economical.

3 Rod Seals

The TS-2000 primary seal has a series of sealing edges which take over successively as pressure increases, providing efficient sealing under all operating conditions. On the return stroke the serrations act as a check valve, allowing the oil adhering to the rod to pass back into the cylinder.

The double lip wiperseal acts as a secondary seal, trapping excess lubricating film in the chamber between the wiper and lip seals. Its outer lip prevents the ingress of dirt into the cylinder, extending the life of gland and seals.

The TS-2000 is manufactured from an enhanced polyurethane, giving efficient retention of pressurized fluid and long service life.

4 Cylinder Body

Strict quality control standards and precision manufacture ensure that all tubes meet rigid standards of straightness, roundness and surface finish. The steel tubing is surface finished to minimize internal friction and prolong seal life.

5 Cylinder Body Seals

To make sure that the cylinder body remains leaktight, even under pressure shock conditions, Parker utilizes pressure-energized body seals.

6 One-Piece Piston

Side loading is resisted by the wide bearing surfaces of the pistons. A long thread engagement secures the piston to the piston rod and, as an added safety feature, pistons are secured by an anaerobic adhesive.

7 Cushioning

Progressive deceleration is available by using profiled cushions at the head and cap – see Section C for details. The head end cushion is self aligning, while the polished cap end spear is an integral part of the piston rod.

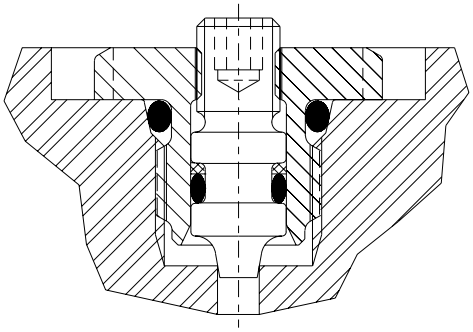
8 Floating Cushion Bushings and Sleeves

Closer tolerances – and therefore more effective cushioning – are permitted by the use of a floating cushion sleeve at the head end of the cylinder, and a floating cushion bushing at the cap end. A slotted cushion sleeve at the head end and the floating bronze cushion bushing in the cap, provide minimum fluid restriction at the start of the return stroke. This allows full pressure to be applied over the entire area of the piston, providing full power and fast cycle times.

For additional information – call your local Parker Cylinder Distributor.

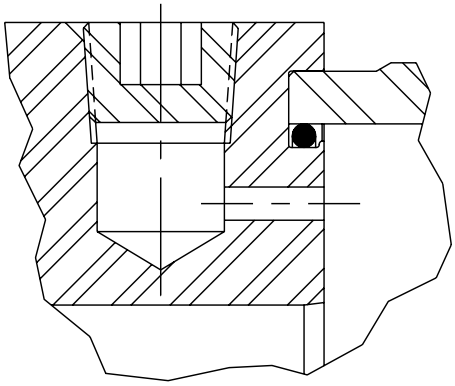
9 Cushion Adjustment

Needle valves are provided at both ends of the cylinder for precise cushion adjustment. 63 mm bores and smaller contain cartridge cushion assembly shown below.



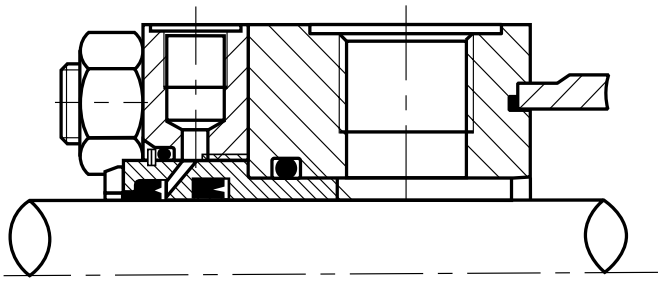
Air Bleeds

Available as an option at both ends, the air bleeds are recessed into the head and cap.

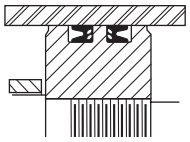


Gland Drains

The accumulation of fluid behind the gland wiperseal of long stroke cylinders, or cylinders with constant back pressure, can be relieved by specifying the option of a gland drain. A port between the wiperseal and primary seal allows fluid to be piped back to a reservoir. By fitting a transparent tube between the port and the reservoir, fluid loss from concealed or inaccessible cylinders can be monitored to provide an early indication of the need for gland servicing. Gland drains are described in greater detail in Section C of this catalog.

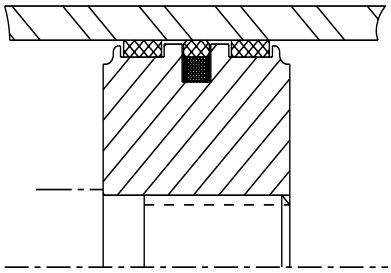


Piston Seals



Standard on 25mm, 32mm and 40mm bore sizes, Parker's Lipseal™ Piston provides zero leakage under static conditions for hydraulic pressures up to 3000 psi. Seals are self-compensating to conform to variations in pressure, mechanical deflection, and wear. Back-up washers prevent extrusion.

Standard on 50mm bore sizes and larger, Parker's B style piston is a single seal design which incorporates two wear strips. This design provides smooth operation, long bearing life, and high load carrying capacity.



Mixed Media Piston Seals

For applications requiring different media on either side of the piston specify Mixed Media Piston Seals with a W piston code. This option is ideal when hydraulic oil is on one side of the piston and air on the opposite side; and it can be equally effective when dissimilar fluids are on either side of the piston. Superior low-friction bi-directional sealing is accomplished by combining an energized filled PTFE seal with a redundant elastomer seal.

Servo Cylinders

Servo cylinders permit fine control of acceleration, velocity and position in applications where very low friction and an absence of stick-slip are required. They may be used in conjunction with integral or external transducers. Servo cylinders combine low friction piston and gland seals with specially selected tubes and rods. For low-friction applications – consult factory.

Seal Classes

To accommodate the many types of fluids and the varying temperature ranges used in industry, Parker offers a range of rod gland, piston and body seals. These are described in detail in Section C of this catalog.

B

ISO Cylinder Mounting Styles and Where to Find Them

The standard range of Parker Series HMI cylinders comprises 12 ISO mounting styles, to suit the majority of applications. General guidance for the selection of ISO cylinders is given below, with dimensional information about each mounting style shown on the following pages. Application-specific mounting information is shown in the mounting information section, Section C of this catalog.

Extended Tie Rods

Cylinders with TB, TC and TD mountings are suitable for straight line force transfer applications, and are particularly useful where space is limited. For compression (push) applications, cap end tie rod mountings are most appropriate; where the major load places the piston rod in tension (pull applications), head end mounting styles should be specified. Cylinders with tie rods extended at both ends may be attached to the machine member from either end, allowing the free end of the cylinder to support a bracket or switch.

Flange Mounted Cylinders

These cylinders are also suitable for use on straight line force transfer applications. Two flange mounting styles are available, offering either a head flange (JJ) or a cap flange (HH). Selection of the correct flange mounting style depends on whether the major force applied to the load will result in compression (push) or tension (pull) stresses on the piston rod. For compression-type applications, the cap mounting style is most appropriate; where the major load places the piston rod in tension, a head mounting should be specified.

Foot Mounted Cylinders

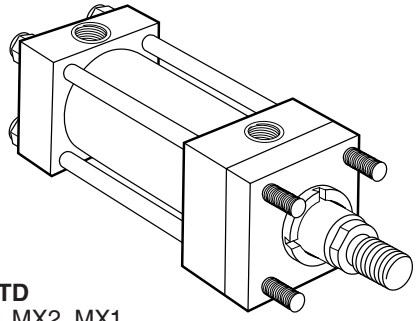
Style C, foot mounted cylinders do not absorb forces on their centerline. As a result, the application of force by the cylinder produces a moment which attempts to rotate the cylinder about its mounting bolts. It is important, therefore, that the cylinder should be firmly secured to the mounting surface and that the load should be effectively guided to avoid side loads being applied to rod gland and piston bearings. A thrust key modification may be specified to provide positive cylinder location.

Pivot Mountings

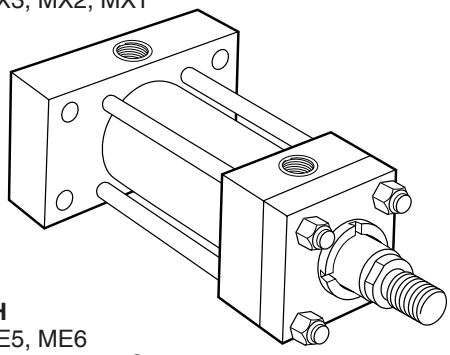
Cylinders with pivot mountings, which absorb forces on their centerlines, should be used where the machine member to be moved travels in a curved path. Pivot mountings may be used for tension (pull) or compression (push) applications. Cylinders using a fixed clevis, styles BB and B, may be used if the curved path of the piston rod travel is in a single plane; for applications where the piston rod will travel in a path on either side of the true plane of motion, a spherical bearing mounting SB is recommended.

Trunnion Mounted Cylinders

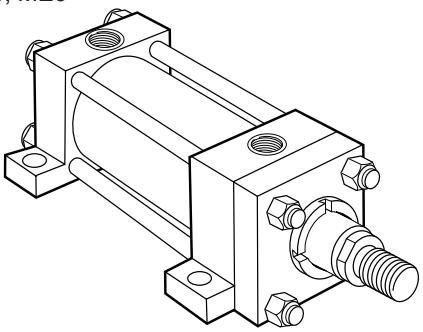
These cylinders, styles D, DB and DD, are designed to absorb force on their centerlines. They are suitable for tension (pull) or compression (push) applications, and may be used where the machine member to be moved travels in a curved path in a single plane. Trunnion pins are designed for shear loads only and should be subjected to minimum bending stresses.



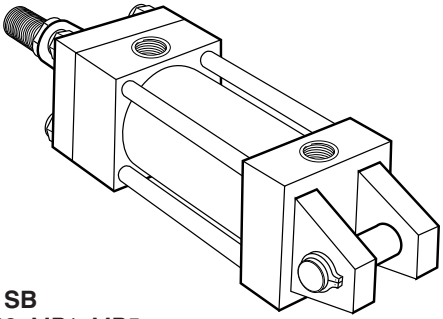
Styles TB, TC, TD
ISO Styles MX3, MX2, MX1 **TB**



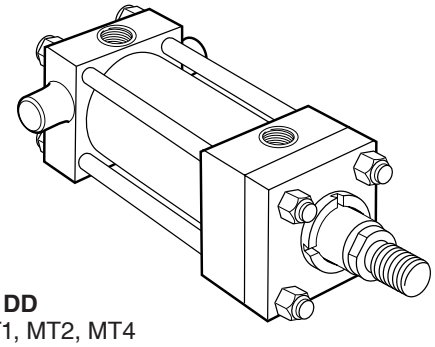
Styles JJ, HH
ISO Styles ME5, ME6 **HH**



Style C
ISO Style MS2 **C**



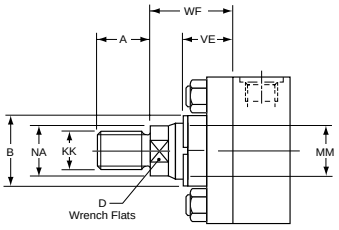
Styles B, BB, SB
ISO Styles MP3, MP1, MP5 **BB**



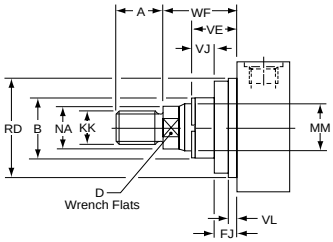
Styles D, DB, DD
ISO Styles MT1, MT2, MT4 **DB**

For additional information – call your local Parker Cylinder Distributor.

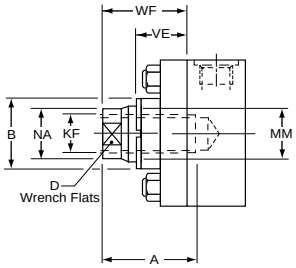
Parker Thread Styles 4 & 7 – All Except JJ Mount



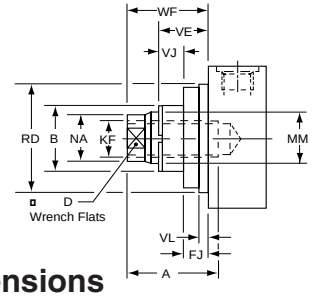
Parker Thread Styles 4 & 7 – JJ Mount



Parker Thread Style 9 – All Except JJ Mount



Parker Thread Style 9 – JJ Mount

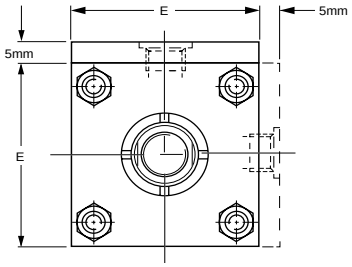


Parker Thread Styles 4 & 7
The smallest diameter rod end thread for each bore size is designated Style 4 when sup-plied with a No.1 rod. When the same rod end thread is supplied with a No. 2 or No. 3 rod, it is designated Style 7.

Parker Thread Style 9 – Short Stroke Cylinders
Style 9 (female) rod ends should not be used on 160mm or 200mm bore cylinders with a stroke of 50mm or less. Please consult the factory, with details of the application.

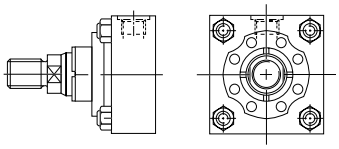
Parker Thread Style 3
Non-standard piston rod ends are designated 'Style 3'. A dimensional sketch or description should accompany the order. Please specify dimensions KK or KF, A, rod stand out WF and thread type.

25 & 32mm Bore Cylinders



5mm extra height applies to port face at head end only.

Gland Retainer – 160 and 200mm Bore
On all 160mm and 200mm bore ISO mounting styles except TB and TD, the gland retainer is separately bolted to the head, as shown.

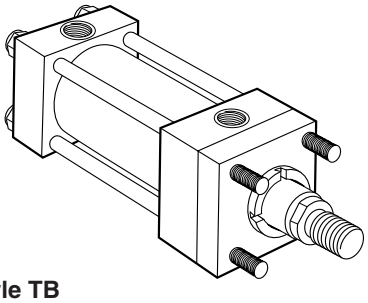


Piston Rod End Dimensions

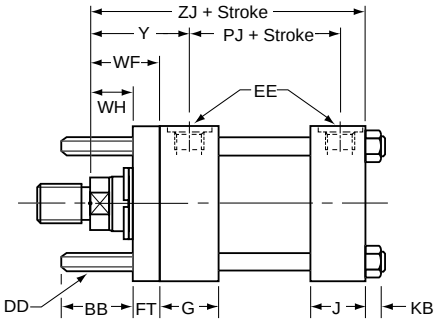
Bore ϕ	Rod No.	MM Rod ϕ	Style 4 KK	Style 4 A	Style 7 KK	Style 7 A	Style 9 KF	Style 9 A	B f9	D	NA	VE	WF	JJ Mount Only VL min	JJ Mount Only RD f8	JJ Mount Only VJ	JJ Mount Only FJ
25	1	12	M10x1.25	14	-	-	M8x1	14	24	10	11	16	25	3	38	6	10
	2	18	M14x1.5	18	M10x1.25	14	M12x1.25	18	30	15	17	16					
32	1	14	M12x1.25	16	-	-	M10x1.25	16	26	12	13	22	35	3	42	12	10
	2	22	M16x1.5	22	M12x1.25	16	M16x1.5	22	34	18	21	22					
40	1	18	M14x1.5	18	-	-	M12x1.25	18	30	15	17	16	35	3	62	6	10
	2	28	M20x1.5	28	M14x1.5	18	M20x1.5	28	42	22	26	22				12	
50	1	22	M16x1.5	22	-	-	M16x1.5	22	34	18	21	22	41	4	74	6	16
	2	36	M27x2	36	M16x1.5	22	M27x2	36	50	30	34	25				9	
	3	28	M20x1.5	28	M16x1.5	22	M20x1.5	28	42	22	26	22				6	
63	1	28	M20x1.5	28	-	-	M20x1.5	28	42	22	26	22	48	4	75	6	16
	2	45	M33x2	45	M20x1.5	28	M33x2	45	60	39	43	29			88	13	
	3	36	M27x2	36	M20x1.5	28	M27x2	36	50	30	34	25				9	
80	1	36	M27x2	36	-	-	M27x2	36	50	30	34	25	51	4	82	5	20
	2	56	M42x2	56	M27x2	36	M42x2	56	72	48	54	29			105	9	
	3	45	M33x2	45	M27x2	36	M33x2	45	60	39	43	29					
100	1	45	M33x2	45	-	-	M33x2	45	60	39	43	29	57	5	92	7	22
	2	70	M48x2	63	M33x2	45	M48x2	63	88	62	68	32			125	10	
	3	56	M42x2	56	M33x2	45	M42x2	56	72	48	54	29				7	
125	1	56	M42x2	56	-	-	M42x2	56	72	48	54	29	57	5	105	9	20
	2	90	M64x3	85	M42x2	56	M64x3	85	108	80	88	32			150	10	22
	3	70	M48x2	63	M42x2	56	M48x2	63	88	62	68	32					
160	1	70	M48x2	63	-	-	M48x2	63	88	62	68	32	57	5	125	10	22
	2	110	M80x3	95	M48x2	63	M80x3	95	133	100	108	32			170	7	25
	3	90	M64x3	85	M48x2	63	M64x3	85	108	80	88	32					
200	1	90	M64x3	85	-	-	M64x3	85	108	80	88	32	57	5	150	10	22
	2	140	M100x3	112	M64x3	85	M100x3	112	163	128	138	32			210	7	25
	3	110	M80x3	95	M64x3	85	M80x3	95	133	100	108	32					

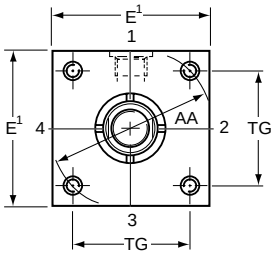
All dimensions are in millimeters unless otherwise stated.

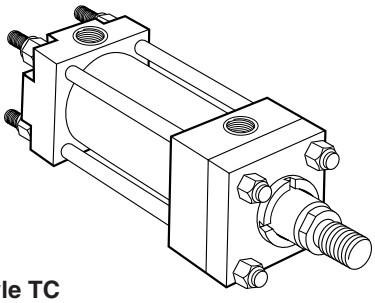
For Cylinder Division Plant Locations – See Page II.



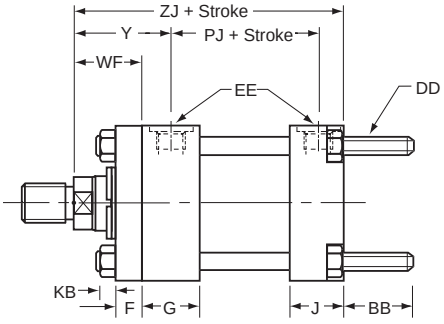
Style TB
Tie Rods Extended Head End
(ISO Style MX3)

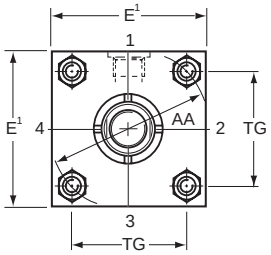


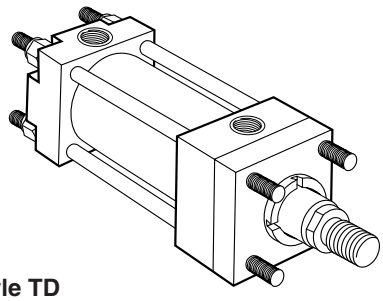




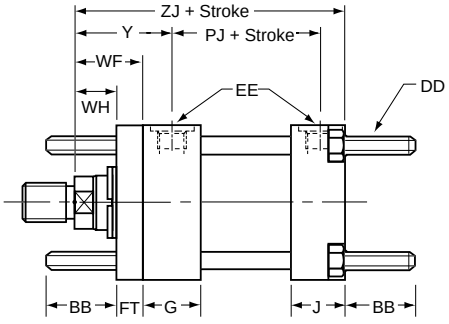
Style TC
Tie Rods Extended Cap End
(ISO Style MX2)

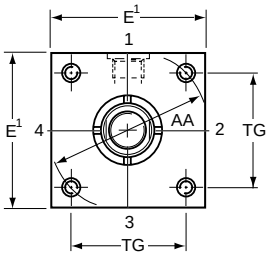






Style TD
Tie Rods Extended Both Ends
(ISO Style MX1)





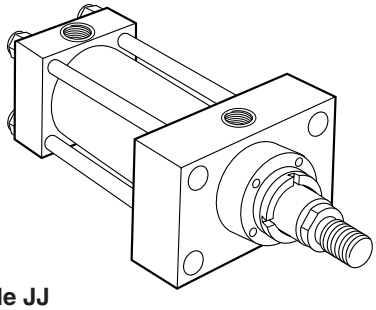
[1]Head depth increased by 5mm to accommodate port on 25mm and 32mm bore cylinders – see page 111

Dimensions – TB, TC & TD See also Rod End Dimensions, page 111

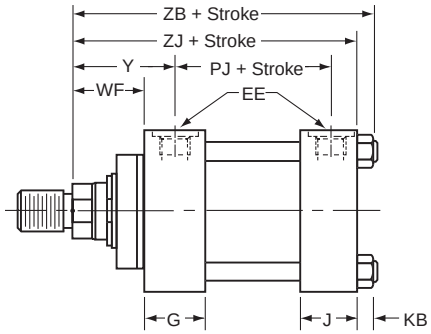
Bore ϕ	AA	BB	DD	E	EE BSP/G inches	F	FT	G	J	KB	TG	WF	WH	Y	+ Stroke	
															PJ	ZJ
25	40	19	M5x0.8	40[1]	1/4	10	10	40	25	4	28.3	25	15	50	53	114
32	47	24	M6x1	45[1]	1/4	10	10	40	25	5	33.2	35	25	60	56	128
40	59	35	M8x1	63	3/8	10	10	45	38	6.5	41.7	35	25	62	73	153
50	74	46	M12x1.25	75	1/2	16	16	45	38	10	52.3	41	25	67	74	159
63	91	46	M12x1.25	90	1/2	16	16	45	38	10	64.3	48	32	71	80	168
80	117	59	M16x1.5	115	3/4	20	20	50	45	13	82.7	51	31	77	93	190
100	137	59	M16x1.5	130	3/4	22	22	50	45	13	96.9	57	35	82	101	203
125	178	81	M22x1.5	165	1	22	22	58	58	18	125.9	57	35	86	117	232
160	219	92	M27x2	205	1	25	25	58	58	22	154.9	57	32	86	130	245
200	269	115	M30x2	245	1-1/4	25	25	76	76	24	190.2	57	32	98	165	299

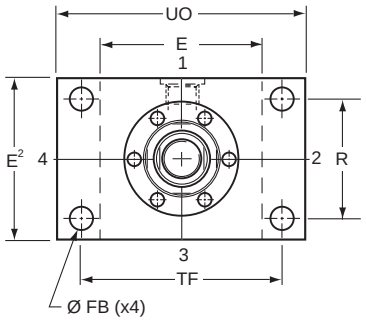
All dimensions are in millimeters unless otherwise stated.

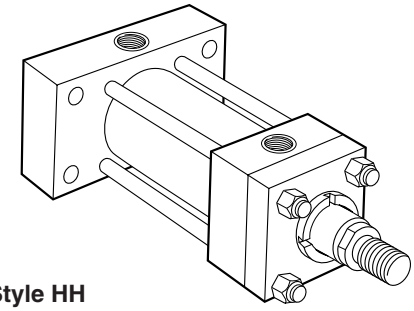
For additional information – call your local Parker Cylinder Distributor.



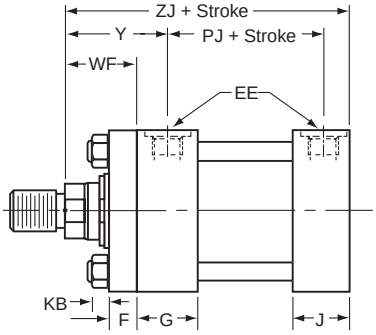
Style JJ
Head Rectangular Flange
(ISO Style ME5)

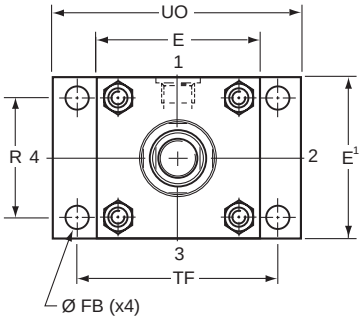


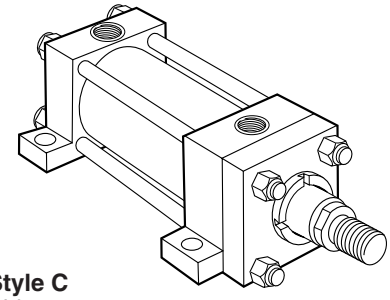




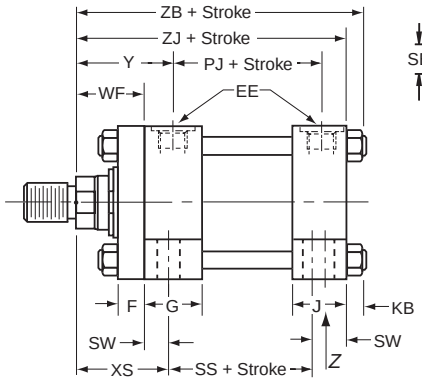
Style HH
Cap Rectangular Flange
(ISO Style ME6)

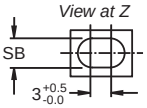




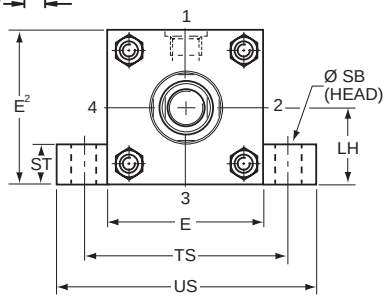


Style C
Side Lugs
(ISO Style MS2)





A thrust key may be used with this mounting style.



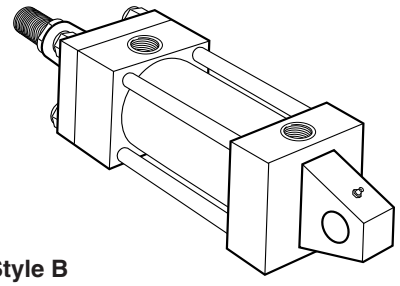
[1]Head depth increased by 5mm to accommodate port on 25mm and 32mm bore cylinders – see page 111.
[2]On 25mm and 32 mm bore C mount and JJ mount cylinders with port in position 2 or 4, head depth E is increased by 5mm in position 1.

Dimensions – JJ, HH & C

See also Rod End Dimensions, page 111

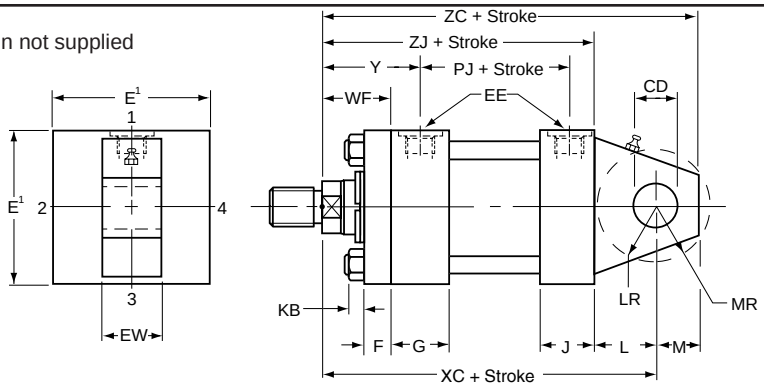
Bore ϕ	E	EE BSP/G inches	F	FB	G	J	KB	LH h10	R	SB	ST	SW	TF	TS	UO	US	WF	XS	Y	+ Stroke			
																				PJ	SS	ZB	ZJ
25	40[1]	1/4	10	5.5	40	25	4	19	27	6.6	8.5	8	51	54	65	72	25	33	50	53	72	121	114
32	45[1]	1/4	10	6.6	40	25	5	22	33	9	12.5	10	58	63	70	84	35	45	60	56	72	137	128
40	63	3/8	10	11	45	38	6.5	31	41	11	12.5	10	87	83	110	103	35	45	62	73	97	166	153
50	75	1/2	16	14	45	38	10	37	52	14	19	13	105	102	130	127	41	54	67	74	91	176	159
63	90	1/2	16	14	45	38	10	44	65	18	26	17	117	124	145	161	48	65	71	80	85	185	168
80	115	3/4	20	18	50	45	13	57	83	18	26	17	149	149	180	186	51	68	77	93	104	212	190
100	130	3/4	22	18	50	45	13	63	97	26	32	22	162	172	200	216	57	79	82	101	101	225	203
125	165	1	22	22	58	58	18	82	126	26	32	22	208	210	250	254	57	79	86	117	130	260	232
160	205	1	25	26	58	58	22	101	155	33	38	29	253	260	300	318	57	86	86	130	129	279	245
200	245	1-1/4	25	33	76	76	24	122	190	39	44	35	300	311	360	381	57	92	98	165	171	336	299

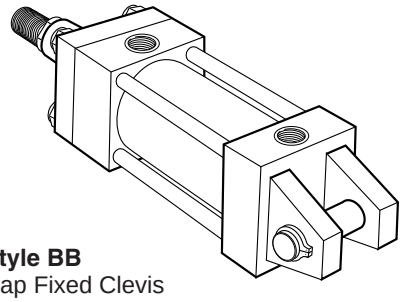
All dimensions are in millimeters unless otherwise stated.



Style B
Cap Fixed Eye
(ISO Style MP3)

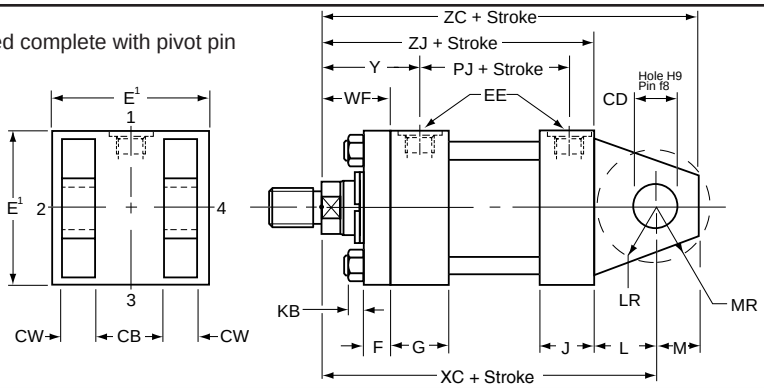
Pivot pin not supplied

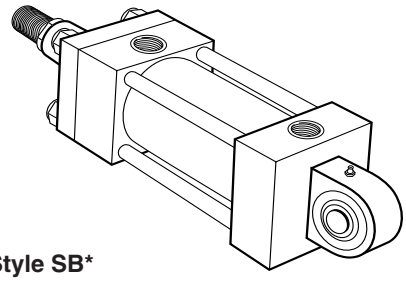




Style BB
Cap Fixed Clevis
(ISO Style MP1)

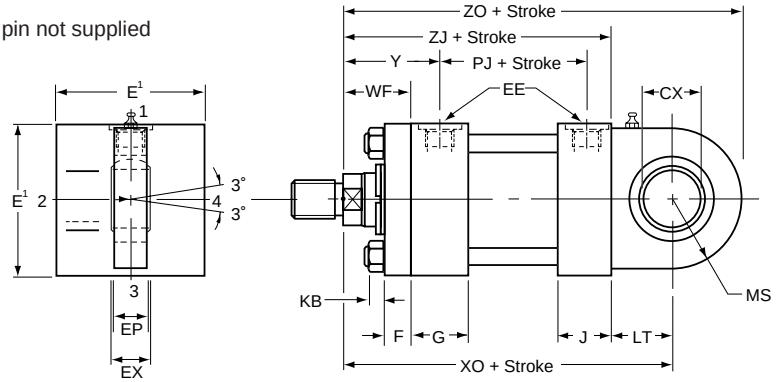
Supplied complete with pivot pin





Style SB*
Cap Fixed Eye
(ISO Style MP5)

Pivot pin not supplied



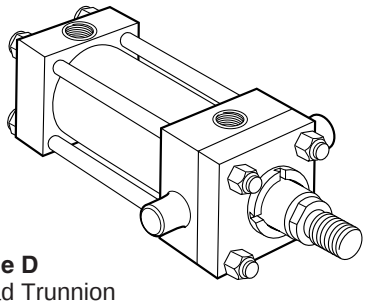
[1]Head depth increased by 5mm to accommodate port on 25mm and 32mm bore cylinders – see page 111
*Parker Style SB is also known as Style SBd under Parker's European model code system

Dimensions – B, BB & SB See also Rod End Dimensions, page 111

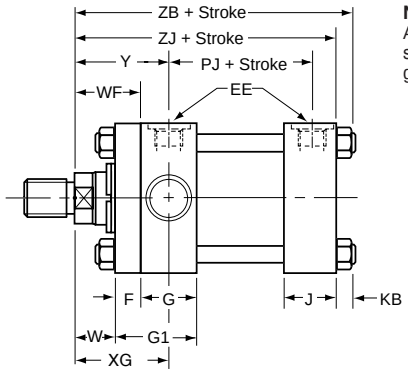
Bore	CB	CD	CW	CX	E	EE	EP	EW	EX	F	G	J	KB	L	LR	LT	M	MR	MS	WF	Y	+ Stroke					
ϕ	A16	H9				BSP/G inches		h14											max			PJ	XC	XO	ZC	ZJ	ZO
25	12	10	6	12-0.008	40[1]	1/4	8	12	10	10	40	25	4	13	12	16	10	12	20	25	50	53	127	130	137	114	150
32	16	12	8	16-0.008	45[1]	1/4	11	16	14	10	40	25	5	19	17	20	12	15	22.5	35	60	56	147	148	159	128	170.5
40	20	14	10	20-0.012	63	3/8	13	20	16	10	45	38	6.5	19	17	25	14	16	29	35	62	73	172	178	186	153	207
50	30	20	15	25-0.012	76	1/2	17	30	20	16	45	38	10	32	29	31	20	25	33	41	67	74	191	190	211	159	223
63	30	20	15	30-0.012	90	1/2	19	30	22	16	45	38	10	32	29	38	20	25	40	48	71	80	200	206	220	168	246
80	40	28	20	40-0.012	115	3/4	23	40	28	20	50	45	13	39	34	48	28	34	50	51	77	93	229	238	257	190	288
100	50	36	25	50-0.012	130	3/4	30	50	35	22	50	45	13	54	50	58	36	44	62	57	82	101	257	261	293	203	323
125	60	45	30	60-0.015	165	1	38	60	44	22	58	58	18	57	53	72	45	53	80	57	86	117	289	304	334	232	384
160	70	56	35	80-0.015	205	1	47	70	55	25	58	58	22	63	59	92	59	59	100	57	86	130	308	337	367	245	437
200	80	70	40	100-0.020	245	1-1/4	57	80	70	25	76	76	24	82	78	116	70	76	120	57	98	165	381	415	451	299	535

All dimensions are in millimeters unless otherwise stated.

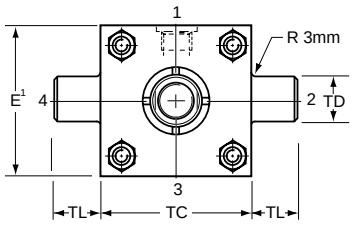
For additional information – call your local Parker Cylinder Distributor.

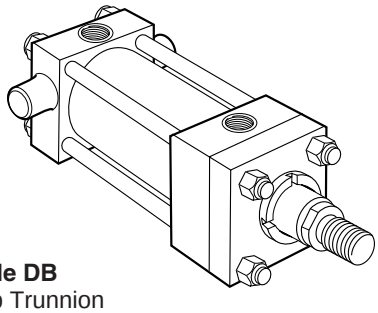


Style D
Head Trunnion
(ISO Style MT1)

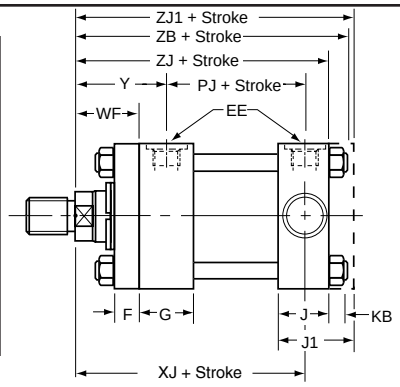


Notes:
A one-piece head and retainer is used on 100mm-200mm bore sizes – G1 dimension. On 160 and 200mm bores, the bolted gland is recessed, with tie rods screwed into the head.

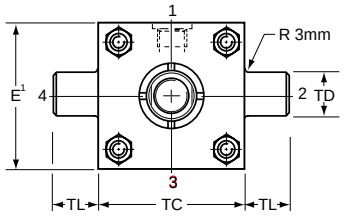


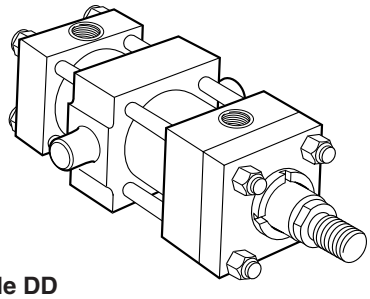


Style DB
Cap Trunnion
(ISO Style MT2)

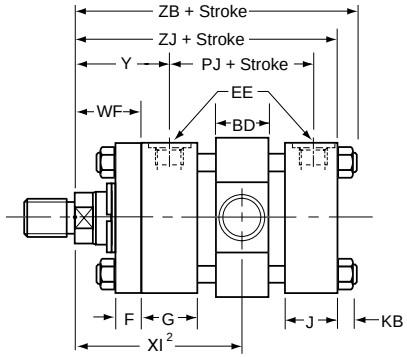


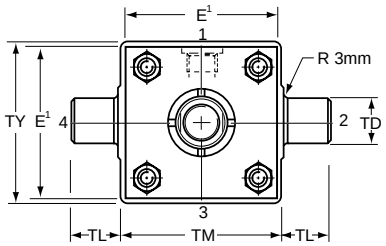
Note:
On 100-200mm bore cylinders, dimension J becomes J1. ZJ1 replaces ZB, and tie rods are screwed directly into the cap.





Style DD
Intermediate Fixed Trunnion
(ISO Style MT4)





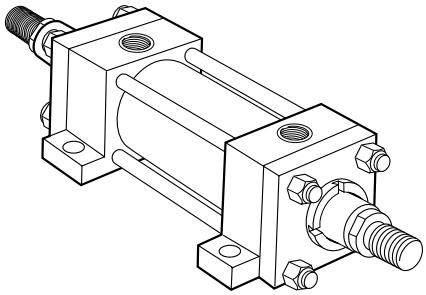
[1]Head depth increased by 5mm to accommodate port on 25mm and 32mm bore cylinders – see page 111
[2]Dimensions to be specified by customer

Dimensions – D, DB & DD

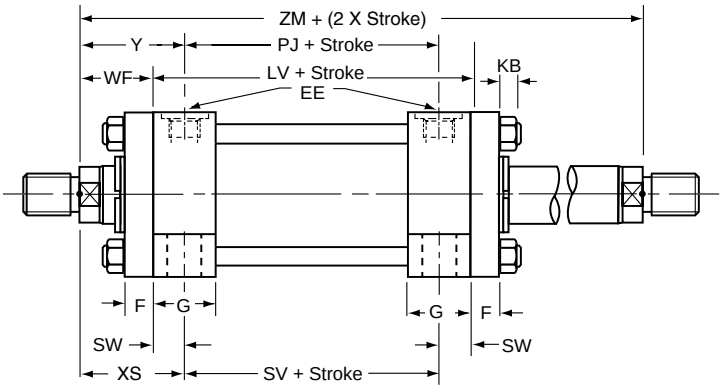
See also Rod End Dimensions, page 111

Bore ϕ	BD	E	EE BSP/G inches	F	G	G1	J	J1	KB	TC	TD f8	TL	TM	TY	W	WF	XG	Y	+ Stroke PJ	+ Stroke XJ	+ Stroke ZJ	+ Stroke ZJ1	+ Stroke ZB	Style DD min stroke	Min XI dim'n
25	20	40[1]	1/4	10	40	-	25	-	4	38	12	10	48	45	-	25	44	50	53	101	114	-	121	10	78
32	25	45[1]	1/4	10	40	-	25	-	5	44	16	12	55	54	-	35	54	60	56	115	128	-	137	10	90
40	30	63	3/8	10	45	-	38	-	6.5	63	20	16	76	76	-	35	57	62	73	134	153	-	166	15	97
50	40	76	1/2	16	45	-	38	-	10	76	25	20	89	89	-	41	64	67	74	140	159	-	176	15	107
63	40	90	1/2	16	45	-	38	-	10	89	32	25	100	95	-	48	70	71	80	149	168	-	185	15	114
80	50	115	3/4	20	50	-	45	50	13	114	40	32	127	127	-	51	76	77	93	168	190	194	212	20	127
100	60	130	3/4	22	50	72	45	58	13	127	50	40	140	140	35	57	71	82	101	187	203	216	225	20	138
125	73	165	1	22	58	80	58	71	18	165	63	50	178	178	35	57	75	86	117	209	232	245	260	25	153
160	90	205	1	25	58	88	58	88	22	203	80	63	215	216	32	57	75	86	130	230	245	275	279	30	161
200	110	245	1-1/4	25	76	108	76	108	24	241	100	80	279	280	32	57	85	98	165	276	299	330	336	30	190

All dimensions are in millimeters unless otherwise stated.



Double Rod Cylinder
Available with Styles TB, TD, JJ, C, D, DD (Style C illustrated)



Mounting Styles and Codes

Double rod cylinders are denoted by a 'K' in the ISO cylinder model code.

Dimensions

To obtain dimensional information for double rod cylinders, first select the desired mounting style by referring to the corresponding single rod model. Dimensions for the appropriate single rod model should be supplemented by those from the table opposite to provide a full set of dimensions.

Minimum Stroke Length – Style 9 Rod End

Where a style 9 (female) piston rod end is required on a double rod cylinder with a stroke of 80mm or less, and a bore of 80mm or above, please consult the factory.

Cushioning

Double rod cylinders can be supplied with cushions at either or both ends. Cushioning requirements should be specified by inserting a 'C' in the ordering code. See cushioning section, Section C of this catalog.

Double Rod Cylinders

For double rod cylinders, specify rod number and rod end symbols for both piston rods. A typical model number for a double rod cylinder would be:

100	K	JJ	HMI	R	E	1	4	M	1	4	M	125	M	11	44

Bore	Rod		Add Stroke			Add 2x Stroke
ϕ	No.	MM ϕ	LV	PJ	SV	ZM
25	1	12	104	53	88	154
	2	18				
32	1	14	108	56	88	178
	2	22				
40	1	18	125	73	105	195
	2	28				
50	1	22	125	74	99	207
	2	36				
	3	28				
63	1	28	127	80	93	223
	2	45				
	3	36				
80	1	36	144	93	110	246
	2	56				
	3	45				
100	1	45	151	101	107	265
	2	70				
	3	56				
125	1	56	175	117	131	289
	2	90				
	3	70				
160	1	70	188	130	130	302
	2	110				
	3	90				
200	1	90	242	160	172	356
	2	140				
	3	110				

All dimensions are in millimeters unless otherwise stated.

For additional information – call your local Parker Cylinder Distributor.

Accessory Selection

Accessories for the rod end of a cylinder are selected by reference to the rod end thread, while the same accessories, when used at the cap end, are selected by cylinder bore size. See tables of part numbers below, and on the following pages.

The rod clevises, plain rod eyes and spherical bearings fitted as accessories to the rod end have the same pin diameters as those used at the cylinder cap ends of the corresponding mounting styles – B, BB and SB – when fitted with the No.1 rod, or the No. 2 or No. 3 rods with Style 7 rod end.

Rod and Cap End Accessories

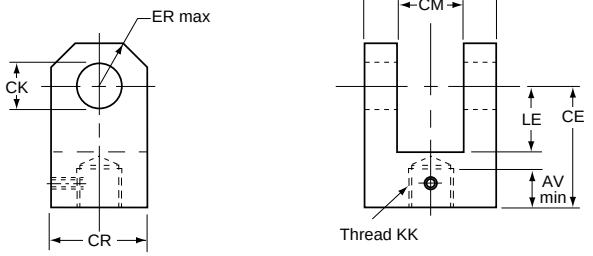
Accessories for the HMI ISO cylinder include:

Rod End
- rod clevis, eye bracket and pivot pin
- plain rod eye, clevis bracket and pivot pin
- rod eye with spherical bearing

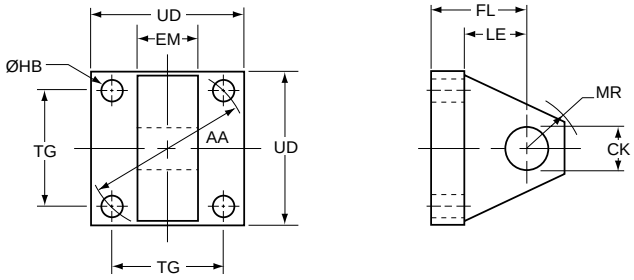
Cap End
- eye bracket for style BB mounting
- clevis bracket for style B mounting
- pivot pin for eye bracket and clevis bracket

Rod Clevis, Eye Bracket and Pivot Pin

Thread KK	Rod Clevis	Eye Bracket	Pivot Pin	Nominal Force kN	Weight kg
M10x1.25	143447	144808	143477	8	0.3
M12x1.25	143448	144809	143478	12.5	0.6
M14x1.5	143449	144810	143479	20	0.8
M16x1.5	143450	144811	143480	32	2.2
M20x1.5	143451	144812	143480	50	2.7
M27x2	143452	144813	143481	80	5.9
M33x2	143453	144814	143482	125	9.4
M42x2	143454	144815	143483	200	17.8
M48x2	143455	144816	143484	320	26.8
M64x3	143456	144817	143485	500	39.0



Rod Clevis



Eye Bracket

All dimensions are in millimeters unless otherwise stated.

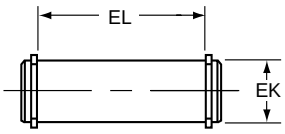
Rod Clevis Dimensions

Part No.	AV	CE	CK H9	CL	CM A16	CR	ER	KK	LE kg	Weight
143447	14	32	10	26	12	20	12	M10x1.25	14	0.08
143448	16	36	12	34	16	32	17	M12x1.25	19	0.25
143449	18	38	14	42	20	30	17	M14x1.5	19	0.32
143450	22	54	20	62	30	50	29	M16x1.5	32	1.0
143451	28	60	20	62	30	50	29	M20x1.5	32	1.1
143452	36	75	28	83	40	60	34	M27x2	39	2.3
143453	45	99	36	103	50	80	50	M33x2	54	2.6
143454	56	113	45	123	60	102	53	M42x2	57	5.5
143455	63	126	56	143	70	112	59	M48x2	63	7.6
143456	85	168	70	163	80	146	78	M64x3	83	13.0

Eye Bracket Dimensions

Part No.	CK H9	EM h13	FL	MR max	LE min	AA	HB	TG	UD
144808	10	12	23	12	13	40	5.5	28.3	40
144809	12	16	29	17	19	47	6.6	33.2	45
144810	14	20	29	17	19	59	9	41.7	65
144811	20	30	48	29	32	74	13.5	52.3	75
144812	20	30	48	29	32	91	13.5	64.3	90
144813	28	40	59	34	39	117	17.5	82.7	115
144814	36	50	79	50	54	137	17.5	96.9	130
144815	45	60	87	53	57	178	26	125.9	165
144816	56	70	103	59	63	219	30	154.9	205
144817	70	80	132	78	82	269	33	190.2	240

Pivot Pin for Clevis Bracket and Plain Rod Eye – Dimensions



Part No.	EK f8	EL	Weight kg
143477	10	29	0.02
143478	12	37	0.05
143479	14	45	0.08
143480	20	66	0.2
143481	28	87	0.4
143482	36	107	1.0
143483	45	129	1.8
143484	56	149	4.2
143485	70	169	6.0

Eye Bracket – Cap End Mounting for Style BB

Bore ϕ	Eye Bracket	Nominal Force kN	Weight kg
25	144808	8	0.2
32	144809	12.5	0.3
40	144810	20	0.4
50	144811	32	1.0
63	144812	50	1.4
80	144813	80	3.2
100	144814	125	5.6
125	144815	200	10.5
160	144816	320	15.0
200	144817	500	20.0

For Cylinder Division Plant Locations – See Page II.

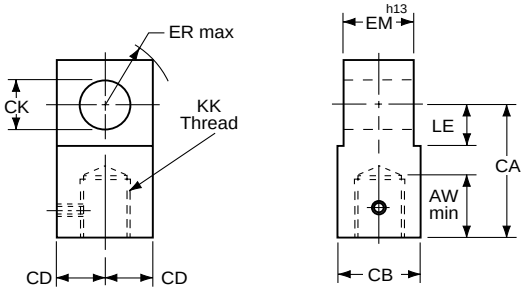
Plain Rod Eye, Clevis Bracket and Pivot Pin

Thread KK	Plain Rod Eye	Clevis Bracket	Pivot Pin	Nominal Force kN	Weight kg
M10x1.25	143457	143646	143477	8	0.5
M12x1.25	143458	143647	143478	12.5	1.0
M14x1.5	143459	143648	143479	20	1.3
M16x1.5	143460	143649	143480	32	3.2
M20x1.5	143461	143649	143480	50	3.8
M27x2	143462	143650	143481	80	6.9
M33x2	143463	143651	143482	125	12.5
M42x2	143464	143652	143483	200	26.0
M48x2	143465	143653	143484	320	47.0
M64x3	143466	143654	143485	500	64.0

Plain Rod Eye/Knuckle Dimensions

Part No.	AW	CA	CB	CD	CK H9	EM h13	ER	KK	LE	Weight kg
143457	14	32	18	9	10	12	12	M10x1.25	13	0.08
143458	16	36	22	11	12	16	17	M12x1.25	19	0.15
143459	18	38	20	12.5	14	20	17	M14x1.5	19	0.22
143460	22	54	30	17.5	20	30	29	M16x1.5	32	0.5
143461	28	60	30	20	20	30	29	M20x1.5	32	1.1
143462	36	75	40	25	28	40	34	M27x2	39	1.5
143463	45	99	50	35	36	50	50	M33x2	54	2.5
143464	56	113	65	50	45	60	53	M42x2	57	4.2
143465	63	126	90	56	56	70	59	M48x2	63	11.8
143466	85	168	110	70	70	80	78	M64x3	83	17.0

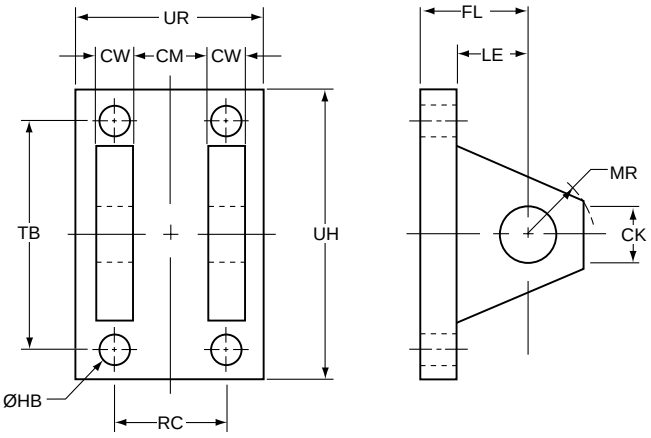
Plain Rod Eye/Knuckle



Clevis Bracket Dimensions

Part No.	CK H9	CM A16	CW	FL	MR max	HB	LE min	RC	TB	UR	UH
143646	10	12	6	23	12	5.5	13	18	47	35	60
143647	12	16	8	29	17	6.6	19	24	57	45	70
143648	14	20	10	29	17	9	19	30	68	55	85
143649	20	30	15	48	29	13.5	32	45	102	80	125
143650	28	40	20	59	34	17.5	39	60	135	100	170
143651	36	50	25	79	50	17.5	54	75	167	130	200
143652	45	60	30	87	53	26	57	90	183	150	230
143653	56	70	35	103	59	30	63	105	242	180	300
143654	70	80	40	132	78	33	82	120	300	200	360

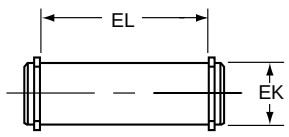
Clevis Bracket



Clevis Bracket – For Style B

Bore ϕ	Clevis Bracket	Nominal Force kN	Weight kg
25	143646	8	0.4
32	143647	12.5	0.8
40	143648	20	1.0
50	143649	32	2.5
63	143649	50	2.5
80	143650	80	5.0
100	143651	125	9.0
125	143652	200	20.0
160	143653	320	31.0
200	143654	500	41.0

Pivot Pin for Clevis Bracket and Plain Rod Eye – Dimensions



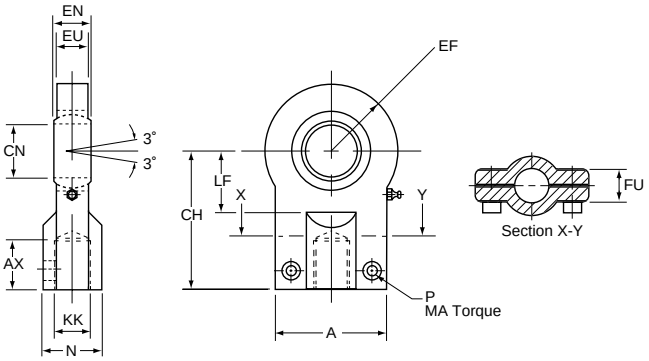
Part No.	EK f8	EL	Weight kg
143477	10	29	0.02
143478	12	37	0.05
143479	14	45	0.08
143480	20	66	0.2
143481	28	87	0.4
143482	36	107	1.0
143483	45	129	1.8
143484	56	149	4.2
143485	70	169	6.0

All dimensions are in millimeters unless otherwise stated.

For additional information – call your local Parker Cylinder Distributor.

Rod Eye with Spherical Bearing, Mounting Bracket and Pivot Pin

Thread KK	Rod Eye with Spherical Bearing	Mounting Bracket and Pivot Pin	Nominal Force kN	Weight kg
M10x1.25	145254	145530	8	0.2
M12x1.25	145255	145531	12.5	0.3
M14x1.5	145256	145532	20	0.4
M16x1.5	145257	145533	32	0.7
M20x1.5	145258	145534	50	1.3
M27x2	145259	145535	80	2.3
M33x2	145260	145536	125	4.4
M42x2	145261	145537	200	8.4
M48x2	145262	145538	320	15.6
M64x3	145263	145539	500	28.0



Rod Eye with Spherical Bearing

All spherical bearings should be re-packed with grease when servicing. In unusual or severe working conditions, consult the factory regarding the suitability of the bearing chosen.

Rod Eye with Spherical Bearing Dimensions

Part No.	A max	AX min	EF max	CH	CN	EN	EU	FU	KK	LF min	N max	MA max Nm	P
145254	40	15	20	42	12 -0.008	10 -.012	8	13	M10x1.25	16	17	10	M6
145255	45	17	22.5	48	16 -0.008	14 -.012	11	13	M12x1.25	20	21	10	M6
145256	55	19	27.5	58	20 -0.012	16 -.012	13	17	M14x1.5	25	25	25	M8
145257	62	23	32.5	68	25 -0.012	20 -.012	17	17	M16x1.5	30	30	25	M8
145258	80	29	40	85	30 -0.012	22 -.012	19	19	M20x1.5	35	36	45	M10
145259	90	37	50	105	40 -0.012	28 -.012	23	23	M27x2	45	45	45	M10
145260	105	46	62.5	130	50 -0.012	35 -.012	30	30	M33x2	58	55	80	M12
145261	134	57	80	150	60 -0.015	44 -.015	38	38	M42x2	68	68	160	M16
145262	156	64	102.5	185	80 -0.015	55 -.015	47	47	M48x2	92	90	310	M20
145263	190	86	120	240	100 -0.020	70 -.020	57	57	M64x3	116	110	530	M24

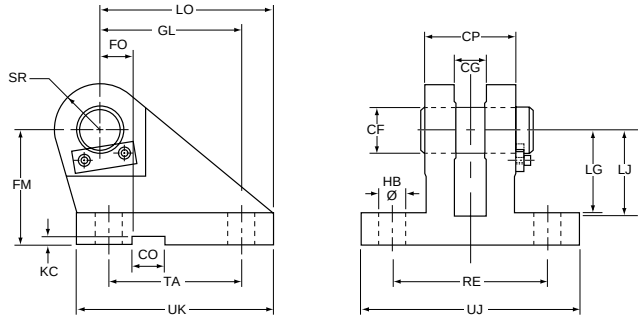
Mounting Bracket and Pivot Pin Dimensions - For Style SB

Part No.	CF K7/h6	CG +0.1, +0.3	CO N9	CP	FM js11	FO js14	GL js13	HB	KC 0, +0 30	LG	LJ	LO	RE js13	SR max	TA js13	UJ	UK
145530	12	10	10	30	40	16	46	9	3.3	28	29	56	55	12	40	75	60
145531	16	14	16	40	50	18	61	11	4.3	37	38	74	70	16	55	95	80
145532	20	16	16	50	55	20	64	14	4.3	39	40	80	85	20	58	120	90
145533	25	20	25	60	65	22	78	16	5.4	48	49	98	100	25	70	140	110
145534	30	22	25	70	85	24	97	18	5.4	62	63	120	115	30	90	160	135
145535	40	28	36	80	100	24	123	22	8.4	72	73	148	135	40	120	190	170
145536	50	35	36	100	125	35	155	30	8.4	90	92	190	170	50	145	240	215
145537	60	44	50	120	150	35	187	39	11.4	108	110	225	200	60	185	270	260
145538	80	55	50	160	190	35	255	45	11.4	140	142	295	240	80	260	320	340
145539	100	70	63	200	210	35	285	48	12.4	150	152	335	300	100	300	400	400

Cap Mounting Bracket and Pivot Pin

Bore ϕ	Mounting Bracket and Pivot Pin	Nominal Force kN	Weight kg
25	145530	8	0.6
32	145531	12.5	1.3
40	145532	20	2.1
50	145533	32	3.2
63	145534	50	6.5
80	145535	80	12.0
100	145536	125	23.0
125	145537	200	37.0
160	145538	320	79.0
200	145539	500	140.0

Mounting Bracket and Pivot Pin



All dimensions are in millimeters unless otherwise stated.

For Cylinder Division Plant Locations – See Page II.

Parker Cylinder

B

How to Order ISO Cylinders

Data Required On All Cylinder Orders

When ordering Series HMI cylinders, be sure to specify each of the following requirements:

(**NOTE:** – Duplicate cylinders can be ordered by giving the SERIAL NUMBER from the nameplate of the original cylinder. Factory records supply a quick, positive identification.)

a) Bore Size

b) Mounting Style
Specify your choice of mounting style – as shown and dimensioned in this catalog. If double rod is required, specify "with double rod."

c) Series Designation ("HMI")

d) Length of Stroke

e) Piston Rod Diameter
Call out rod diameter or rod code number. In Series HMI cylinders, standard rod diameters (Code No. 1) will be furnished if not otherwise specified, unless length of stroke makes the application questionable.

f) Piston Rod End Thread Style
Call out thread style number or specify dimensions. Thread style number 4 will be furnished if not otherwise specified.

g) Cushions (if required)
Specify "Cushion-head end," "Cushion-cap end" or "Cushion-both ends" as required. If cylinder is to have a double rod and only one cushion is required, be sure to specify clearly which end of the cylinder is to be cushioned.

h) Piston
Parker B style pistons are standard. Fluorocarbon also available.

i) Ports
BSP (ISO 228) are standard.

j) Fluid Medium
Series HMI hydraulic cylinders are equipped with seals for use with hydraulic oil. If other than hydraulic oil will be used, consult factory.

ADDITIONAL DATA is required on orders for cylinders with special modifications. For further information, consult factory.

Service Policy

On cylinders returned to the factory for repairs, it is standard policy for the Cylinder Division to make such part replacements as will put the cylinder in as good as new condition. Should the condition of the returned cylinder be such that expenses for repair would exceed the costs of a new one, you will be notified.

Address all correspondence to Service Department at your nearest regional plant listed in the pages of this catalog.

Certified Dimensions

Parker Cylinder Division guarantees that all cylinders ordered from this catalog will be built to dimensions shown. All dimensions are certified to be correct, and thus it is not necessary to request certified drawings.

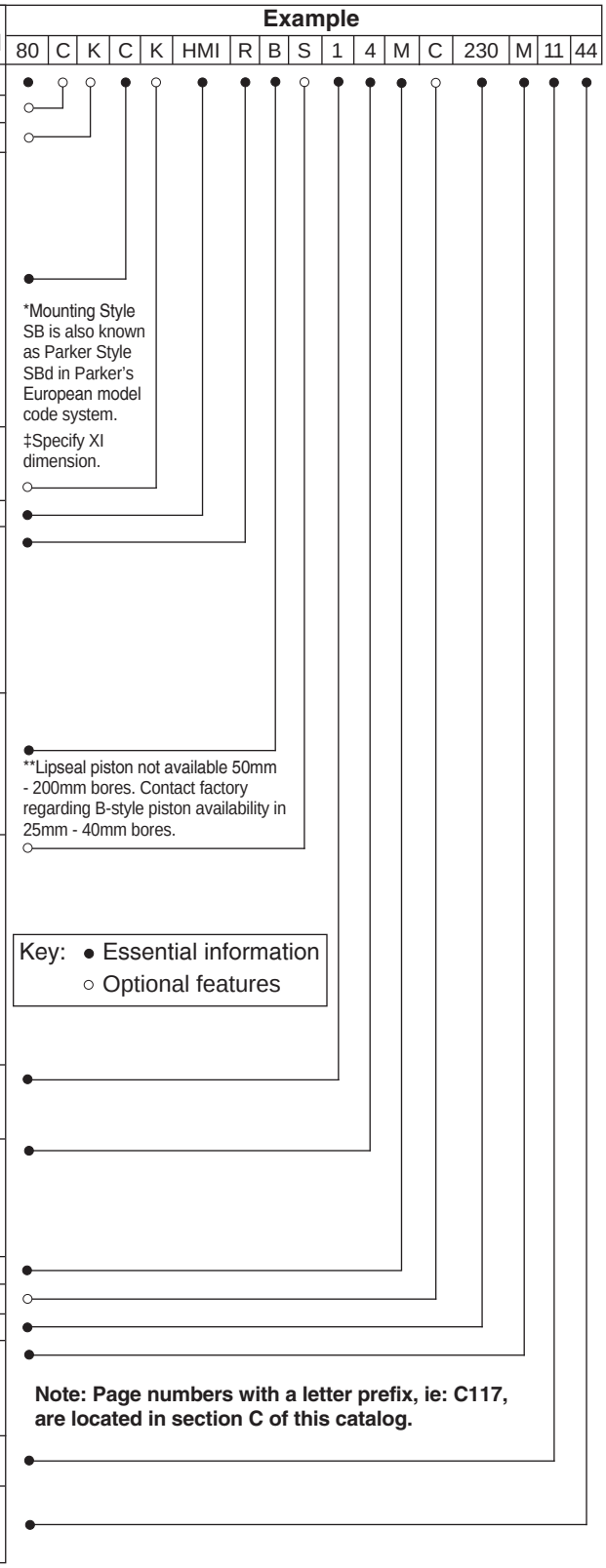
For additional information – call your local Parker Cylinder Distributor.

Series HMI Model Numbers – How to Develop and "Decode" Them

Parker Series HMI cylinders can be completely and accurately described by a model number consisting of coded symbols.

To develop a model number, select only those symbols that represent the cylinder required, and place them in the sequence indicated below.

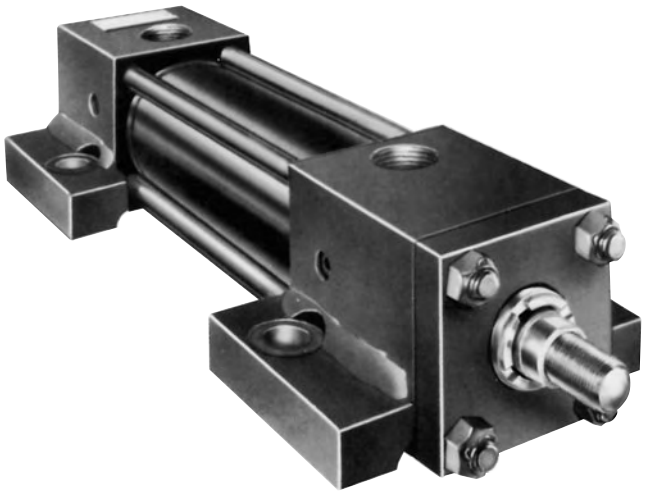
Feature	Description	Page	Symbol
Bore	Millimeters		–
Cushion – Head	If required	C117	C
Double Rod	If required	116	K
Mounting Style	Head Tie Rods Extended	112	TB
	Cap Tie Rods Extended	112	TC
	Both Ends Tie Rods Extended	112	TD
	Head Rectangular	113	JJ
	Cap Rectangular	113	HH
	Side Lugs	113	C
	Cap Fixed Eye	114	B
	Cap Fixed Clevis	114	BB
	Cap Fixed Eye with Spherical Bearing*	114	SB*
	Head Trunnion	115	D
	Cap Trunnion	115	DB
	Intermediate Fixed Trunnion‡	115	DD
Mounting Modifications	Thrust Key for Style C mounting only		
	– Thrust key - 25mm & 32mm bores	C112	P
	– Thrust key - 40mm bore and larger	C112	K
Series	Series name		HMI
Ports	BSP (ISO 228) – standard	C121	R
	BSPT (Taper Thread)	C121	B
	Metric Thread	C121	M
	Metric Thread per ISO 6149	C121	Y
	SAE – Straight Thread O-ring Port	C121	T
	NPTF (Dry Seal Pipe Thread)	C121	U
	SAE – Flange Ports (3000 PSI)	C121	P
Piston	Lipseal™ Piston** (standard 25mm - 40mm bores)	109	L
	B-Style Low Friction filled PTFE seals (standard 50mm - 200mm bores)	109	B
	Mixed Media Low Friction Piston seal (Optional 25mm - 200mm bores)	109	W
Special Features	One or more of the following:		S
	Gland Drain Port	C123	
	Oversize Ports	C120	
	Rod End Bellows	C123	
	Stop Tube	C115	
	Stroke Adjuster	C123	
	Tie Rod Supports	C113	
	Water Service Modifications	C122	
	Or to detailed descriptions or drawings supplied by customer		
Piston Rod Number	Rod No. 1	111	1
	Rod No. 2	111	2
	Rod No. 3	111	3
Piston Rod End	Style 4	111	4
	Style 7	111	7
	Style 9	111	9
	Style 3 (Special) Please supply description or drawing	111	3
Rod Thread	Metric (standard)	111	M
Cushion – Cap	If required	C117	C
Gross Stroke	Millimeters		–
Fluid Medium ISO 6743/4 (1982)	Mineral Oil HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606 Oil, Air, Nitrogen – Group 1	C122	M
	Fluorocarbon – Group 5	C122	D
Port Positions	Head position 1-4	C120	1
	Cap position 1-4	C120	1
Air Bleeds	Head position 1-4	C120	4
	Cap position 1-4	C120	4
	No Air Bleed	C120	00



Note: Page numbers with a letter prefix, ie: C117, are located in section C of this catalog.

B

Series VH
Hydraulic Cylinders



Extra-long Tapered Cushions
Oversize Ports
Meets N.F.P.A. Specifications

Nominal Pressure - 3000 PSI
Standard Bore Sizes - $2^{1}/_{2}$" Through 8"
Piston Rod Diameters - 1" Through $5^{1}/_{2}$"
Fifteen Standard Mounting Styles

Series “VH” very heavy-duty hydraulic cylinders are premium quality cylinders–with operating capacities of 3,000 PSI. They fully meet NFPA standards. And to make sure every cylinder is premium-quality, Parker Hannifin subjects each and every one – not just batch samples – to tough inspection and performance tests.

OTHER SERIES “VH” FEATURES AND SPECIFICATIONS

Ports
Series “VH” ports are two sizes or larger than NFPA standards. Standard location is position 1 as shown in dimensional drawings. Where mountings do not interfere, ports may be located at positions 2, 3, or 4. Ports are not available at positions 2 or 4 on mounting style C, $2^{1}/_{2}$" thru 5" bore cylinders. SAE straight thread O-ring ports will be supplied unless otherwise specified.

Cushions
Cushions on Series “VH” cylinders are 3" long on all sizes except $3^{1}/_{4}$" and 4" bore sized equipped with 2" and $2^{1}/_{2}$" diameter piston rods which are supplied with cushions $2^{13}/_{16}$" long at head end. Self-centering floating cushion sleeve at head end and cushion spear at cap is tapered for $^{2}/_{3}$ its length to give maximum cushioning effect for $^{1}/_{3}$ its length.

Thrust Key
An extended retainer plate, to serve as a thrust key, can be supplied on mounting styles C and F. The thrust key would be the same as used on Parker Hannifin “2H” hydraulic cylinders.

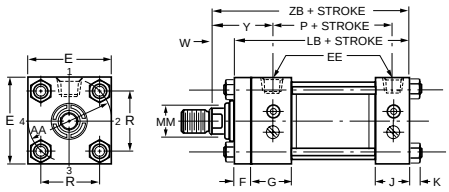
Air Bleeds
When specified, $^{1}/_{8}$" NPTF bleed ports are available at either head or cap end. For design and location, ask for Drawing 81292.

Accessories
Mounting accessories for Series “VH” are the same as used on Parker Hannifin Series 2H hydraulic cylinders. For dimensional data for rod clevis, knuckle, clevis bracket, mounting plate and pivot pin, see the Parker Series 2H section of this catalog.

*See Section C for actual design factors.

For additional information – call your local Parker Cylinder Distributor.

Basic Cylinder Style T
(NFPA Style MX01)

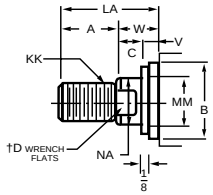


Rod end dimensions

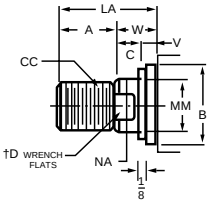
BORE	ROD NO.	ROD DIA.	THREAD		ROD EXTENSIONS AND PILOT DIMENSIONS									BASIC ENVELOPE AND MOUNTING DIMENSIONS							ADD STROKE		
						+.000 -.002									EE								
		MM	CC	KK	A	B	C	D	LA	NA	V	W	Y	E	NPTF◆	SAE°	F	G	J	K	LB	P	ZB
2½	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 7/8	15/16	1/4	3/4	4 1/8	3½	1	16	5/8	3 3/4	3 1/2	7/16	9 3/8	3 1/2	10 9/16
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	4 5/8										11 1/16
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	4 3/8										10 13/16
3¼	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	4 3/16	4½	1 1/4	20	3/4	3 3/4	3 1/2	9/16	9 3/4	4 1/8	11 3/16
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	4 9/16										11 9/16
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	4 7/16										11 7/16
4	1(Std.)	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	4 7/16	5	1 1/4	20	7/8	3 3/4	3 1/2	9/16	10 1/8	4 3/8	11 11/16
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	4 13/16										12 1/16
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	4 9/16										11 13/16
5	1(Std.)	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	4 11/16	6½	1 1/2	24	7/8	4	3 3/4	13/16	11 1/8	5 1/8	13 1/16
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	4 15/16										13 5/16
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	4 15/16										13 5/16
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	4 15/16										13 5/16
6	1(Std.)	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	4 7/8	7½	2	32	1	4 1/4	4 1/4	7/8	12 3/8	6 1/8	14 1/2
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	4 7/8										14 1/2
	3	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	4 7/8										14 1/2
	4	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 3/4	3 3/8	1/4	1 1/4	4 7/8										14 1/2
7	1(Std.)	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	4 3/4	8½	2	32	1	4 1/4	4 1/4	1 1/4	12 1/2	6 1/2	15
	2	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/4	4 7/8	1/4	1 1/4	4 3/4										15
	3	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 3/4	3 3/8	1/4	1 1/4	4 3/4										15
	4	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	4 3/4										15
	5	4 1/4	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	5 3/4	4 3/8	1/4	1 1/4	4 3/4										15
8	1(Std.)	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 3/4	3 3/8	1/4	1 1/4	4 3/4	9½	2 1/2	32	1	4 1/2	4 1/2	1 1/2	13 1/2	7 1/2	16 1/4
	2	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	6 3/4	5 3/8	1/4	1 1/4	4 3/4										16 1/4
	3	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	4 3/4										16 1/4
	4	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	5 3/4	4 3/8	1/4	1 1/4	4 3/4										16 1/4
	5	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/4	4 7/8	1/4	1 1/4	4 3/4										16 1/4

◆ SAE straight thread ports are standard and are indicated by port number. For dimensional information see Section C.
° NPTF ports are available at no extra charge.

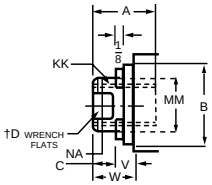
PISTON ROD END THREADS



PARKER THREAD STYLE 4
(NFPA SM)



PARKER THREAD STYLE 8
(NFPA IM)



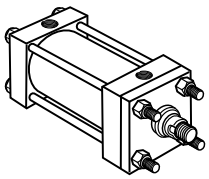
PARKER THREAD STYLE 9
(NFPA SF)

Style 4 Rod Ends recommended for applications where workpiece is secured against rod shoulder. When workpiece is not shouldered, Style 4 Rod Ends are recommended through 2" rod diameter, Style 8 on larger diameters. If rod end is not specified, Style 4 will be furnished.

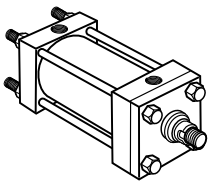
NOTE: Special piston rod end threads, two times length are available on 2½" diameter piston rods and smaller. To order, specify thread Style 42 which has KK thread dia. or Style 82 which has CC thread dia. Other piston rod threads are available. To order, specify Style 3 and give desired dimensions for CC or KK, A and LA. For other specials, send dimensions or sketch.

† On 4½" diameter rods and larger, 4 each .515 diameter spanner wrench holes will be provided.

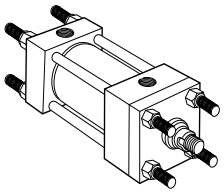
Tie Rod Mounted Styles TB, TC, TD (NFPA Styles MX3, MX2, MX1)



Style TB
(MX3)

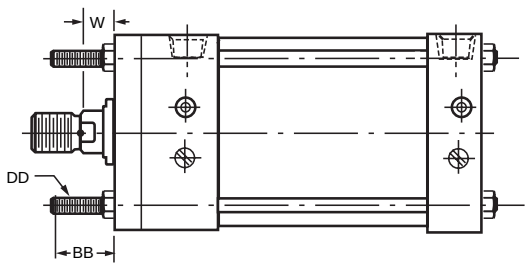


Style TC
(MX2)



Style TD
(MX1)

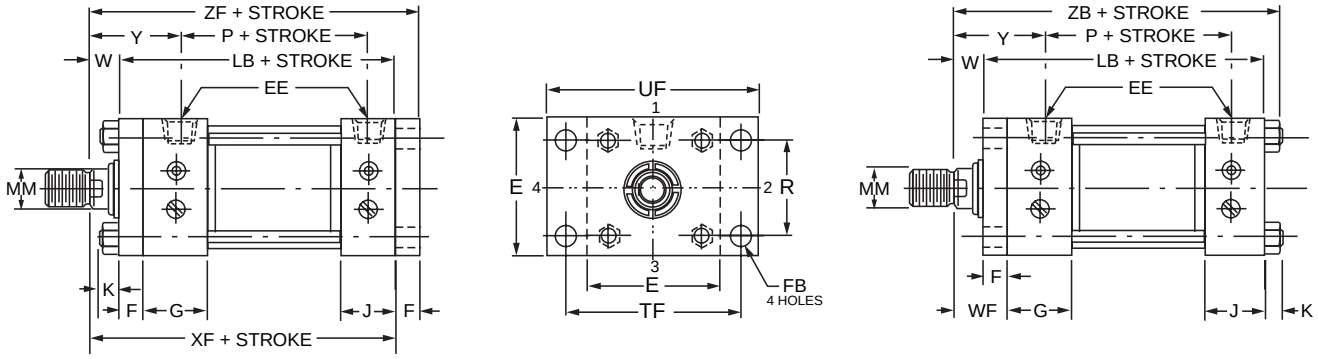
Style TB, Tie Rods Extended, is illustrated at right. Style TC, Cap Tie Rods Extended, and Style TD, Both Ends Tie Rods Extended, can be dimensioned from Style TB drawing.



For Cylinder Division Plant Locations – See Page II.

Flange Mountings

Style H, J, HB, JB



STYLE H (NFPA MF2)

STYLE J (NFPA MF1)

For Style "H" Mount

Bore Size	Max. PSI - Pull* Rod Code 1	2	3	4	5
2 1/2	3000	3000	3000	–	–
3 1/4	3000	3000	3000	–	–
4	3000	3000	3000	–	–
5	2000	3000	2000	2500	–
6	1800	2500	2000	2000	–
7	2000	3000	2000	2500	2800
8	1700	2500	1700	1800	2200

* Maximum pressure rating - pull application

For Style "J" Mount

Bore Size	Max. PSI - Push* Rod Code 1	2	3	4	5
2 1/2	2000	1100	1500	–	–
3 1/4	1800	1300	1400	–	–
4	1800	1300	1700	–	–
5	1300	800	1200	1000	–
6	1200	800	1000	900	–
7	1400	800	1200	1100	1000
8	1100	800	1000	1000	800

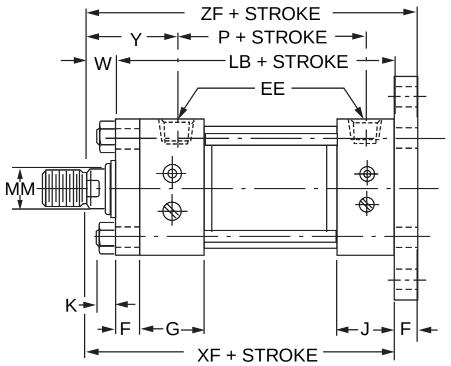
* Maximum pressure rating - push application

Specific Dimensions for Series VH Mounting Styles (in inches)

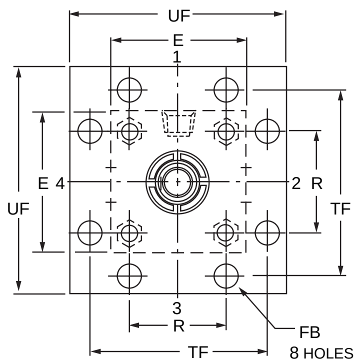
BORE	ROD NO.	ROD DIA.	AA	BB	BD	CB	+.000 CD◆ -.002	CW	DD	+.000 FA -.003	FB	L	+.000 LH -.002	LR	M	MR	ND	NT	PA	PC	PD	PF	R	SB•	ST
2 1/2	1 2 3	1 1 3/4 1 3/8	3.6	1 13/16	1 1/2	1 1/4	.751	5/8	1/2-20	.562	9/16	1 1/4	1.744	15/16	3/4	15/16	9/16 1/2 9/16	5/8-11	5/16	2 3/4	2 1/16	3 1/16	2.55	13/16	1
3 1/4	1 2 3	1 3/8 2 1 3/4	4.6	2 5/16	2	1 1/2	1.001	3/4	5/8-18	.687	11/16	1 1/2	2.244	1 1/4	1	1 3/16	7/8 11/16 7/8	3/4-10	3/8	2 1/2	2 5/8	2 15/16	3.25	13/16	1
4	1 2 3	1 3/4 2 1/2 2	5.4	2 5/16	2	2	1.376	1	5/8-18	.812	11/16	2 1/8	2.494	1 3/4	1 3/8	1 5/8	1 11/16 1	1-8	7/16	2 11/16	2 15/16	2 15/16	3.82	1 1/16	1 1/4
5	1 2 3 4	2 3 1/2 2 1/2 3	7.0	3 3/16	2	2 1/2	1.751	1 1/4	7/8-14	.812	15/16	2 1/4	3.244	2 1/16	1 3/4	2 1/8	1 1/8 1 1 1/8 1 1/8	1-8	7/16	2 15/16	3 11/16	3 3/16	4.95	1 1/16	1 1/4
6	1 2 3 4	2 1/2 4 3 3 1/2	8.1	3 5/8	3	2 1/2	2.001	1 1/4	1-14	.937	1 1/16	2 1/2	3.744	2 5/16	2	2 3/8	1 3/4 1 1/4 1 3/4 1 1/2	1 1/4-7	1/2	3 3/16	4 1/4	3 5/16	5.73	1 5/16	1 1/2
7	1 2 3 4 5	3 5 3 1/2 4 4 1/2	9.3	4 1/8	3	3	2.501	1 1/2	1 1/8-12	.937	1 3/16	3	4.244	2 3/4	2 1/2	2 7/8	1 1/8 1 1/8 1 1/8 1 1/8 1 1/8	1 1/2-6	1/2	2 15/16	4 3/4	3 1/8	6.58	1 9/16	1 3/4
8	1 2 3 4 5	3 1/2 5 1/2 4 4 1/2 5	10.6	4 1/2	3 1/2	3	3.001	1 1/2	1 1/4-12	.937	1 5/16	3 1/4	4.744	3 1/4	2 3/4	3 1/8	1 1/2 1 1/2 1 1/2 1 1/2 1 1/2	1 1/2-6	1/2	2 15/16	5 1/4	3 1/4	7.50	1 9/16	1 3/4

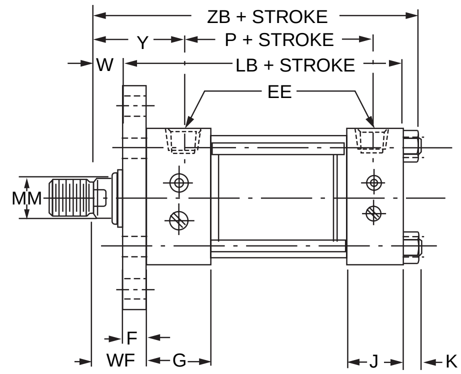
◆ Dimension CD is pin diameter. • Upper surface spotfaced for socket head screws. ◆◆ Dimension to be specified by customer.

For additional information – call your local Parker Cylinder Distributor.

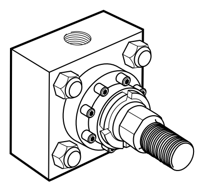


STYLE HB (NFPA MF6)





STYLE JB (NFPA MF5)



For 7" & 8" bores, this style retainer configuration applies to all but J and JB mounts.

For Style "JB" Mount

Bore Size	Max. PSI - Push*				
	Rod Code				
	1	2	3	4	5
2 1/2	3000	3000	3000	–	–
3 1/4	3000	3000	3000	–	–
4	3000	3000	3000	–	–
5	3000	3000	3000	3000	–
6	3000	2700	3000	2700	–
7	3000	2700	3000	3000	3000
8	3000	2300	2500	2500	2500

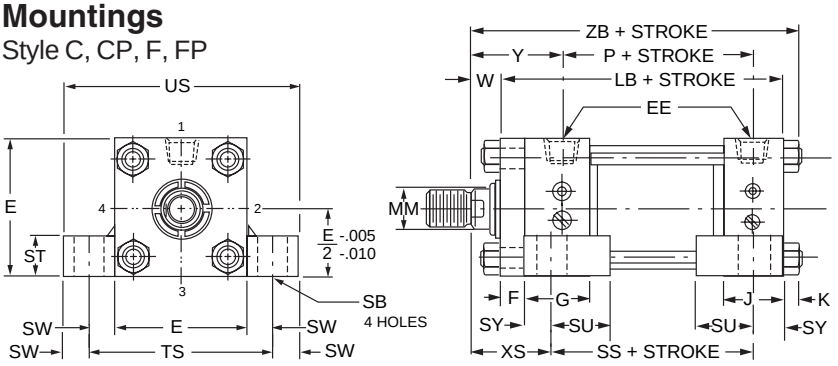
* Maximum pressure rating - push application

B

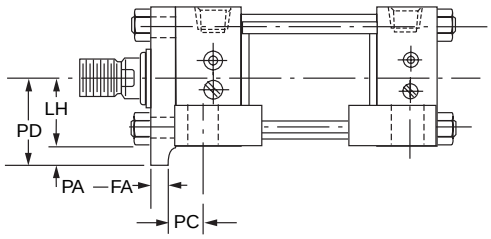
SU	SW	SY	TD +.000 -.001	TF	TL	TM	TN	TS	TY	UF	UM	UT	US	UW	XG	MIN. XI ◆◆	DD MTG. MIN. STK.	XS	XT	add stroke SN	SS	XC	XF	XJ	ZC	ZF
1 9/16	11/16	2 11/16	1.375	4 5/8	1 3/8	4	1 5/16	4 7/8	3 3/4	5 3/8	6 3/4	6 1/4	6 1/4	4 5/8	4 1/4 4 3/4 4 1/2	5 15/16 6 7/16 6 3/16	1/8	4 1/16 4 9/16 4 5/16	4 3/8 4 7/8 4 5/8	3	3 3/8	11 3/8 11 7/8 11 5/8	10 1/8 10 5/8 10 3/8	7 3/8 7 7/8 7 5/8	12 1/8 12 5/8 12 3/8	10 3/4 11 1/4 11
1 9/16	11/16	2 7/16	1.750	5 7/8	1 3/4	5	1 1/2	5 7/8	4 3/4	7 1/8	8 1/2	8	7 1/4	5 13/16	4 3/8 4 3/4 4 5/8	6 7/16 6 13/16 6 11/16	3/8	4 1/16 4 7/16 4 5/16	4 1/2 4 7/8 4 3/4	3 1/2	4 1/8	12 1/8 12 1/2 12 3/8	10 5/8 11 10 7/8	8 8 3/8 8 1/4	13 1/8 13 1/2 13 3/8	11 3/8 11 3/4 11 5/8
2	7/8	2 5/8	1.750	6 3/8	1 3/4	5 1/2	2 1/16	6 3/4	5 1/4	7 5/8	9	8 1/2	8 1/2	6 3/8	4 5/8 5 4 3/4	6 11/16 7 1/16 6 13/16	1/8	4 1/2 4 7/8 4 5/8	4 3/4 5 1/8 4 7/8	3 3/4	4	13 1/4 13 5/8 13 3/8	11 1/8 11 1/2 11 1/4	8 1/2 8 7/8 8 5/8	14 5/8 15 14 3/4	12 12 3/8 12 1/8
2	7/8	2 7/8	1.750	8 3/16	1 3/4	7	2 15/16	8 1/4	6 3/4	9 3/4	10 1/2	10	10	7 3/4	5 5 1/4 5 1/4 5 1/4	7 1/16 7 5/16 7 5/16 7 5/16	0	4 7/8 5 1/8 5 1/8 5 1/8	5 1/8 5 3/8 5 3/8 5 3/8	4 1/4	4 1/2	14 1/2 14 3/4 14 3/4 14 3/4	12 1/4 12 1/2 12 1/2 12 1/2	9 3/8 9 5/8 9 5/8 9 5/8	16 1/4 16 1/2 16 1/2 16 1/2	13 1/8 13 3/8 13 3/8 13 3/8
2 1/2	1 1/8	3 1/8	2.000	9 7/16	2	8 1/2	3 5/16	9 3/4	7 3/4	11 1/4	12 1/2	11 1/2	12	10 3/4	5 3/8 5 3/8 5 3/8 5 3/8	8 1/16 8 1/16 8 1/16 8 1/16	1/4	5 3/8 5 3/8 5 3/8 5 3/8	5 1/2 5 1/2 5 1/2 5 1/2	5 1/8	5 1/8	16 1/8 16 1/8 16 1/8 16 1/8	13 5/8 13 5/8 13 5/8 13 5/8	10 3/8 10 3/8 10 3/8 10 3/8	18 1/8 18 1/8 18 1/8 18 1/8	14 5/8 14 5/8 14 5/8 14 5/8
2 7/8	1 3/8	2 7/8	2.500	10 5/8	2 1/2	9 3/4	3 3/4	11 1/4	8 3/4	12 5/8	14 3/4	13 1/2	14	11 1/2	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	8 1/16 8 1/16 8 1/16 8 1/16 8 1/16	1/8	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	5 5/16 5 5/16 5 5/16 5 5/16 5 5/16	5 7/8	5 3/4	16 3/4 16 3/4 16 3/4 16 3/4 16 3/4	13 3/4 13 3/4 13 3/4 13 3/4 13 3/4	10 7/8 10 7/8 10 7/8 10 7/8 10 7/8	19 1/4 19 1/4 19 1/4 19 1/4 19 1/4	14 3/4 14 3/4 14 3/4 14 3/4 14 3/4
2 7/8	1 3/8	2 7/8	3.000	11 13/16	3	11	4 1/4	12 1/4	9 3/4	14	17	15 1/2	15	13 3/8	5 1/4 5 1/4 5 1/4 5 1/4 5 1/4	8 9/16 8 9/16 8 9/16 8 9/16 8 9/16	1/8	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	5 7/16 5 7/16 5 7/16 5 7/16 5 7/16	6 5/8	6 3/4	18 18 18 18 18	14 3/4 14 3/4 14 3/4 14 3/4 14 3/4	11 3/4 11 3/4 11 3/4 11 3/4 11 3/4	20 3/4 20 3/4 20 3/4 20 3/4 20 3/4	15 3/4 15 3/4 15 3/4 15 3/4 15 3/4

Side Mountings

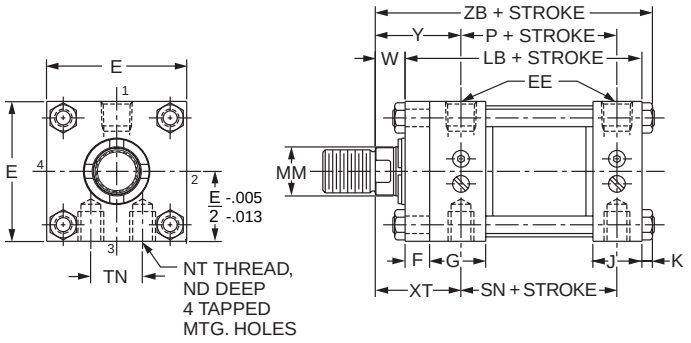
Style C, CP, F, FP



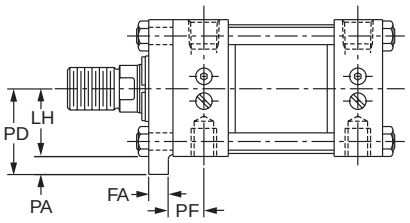
STYLE C (NFPA MS2)



STYLE CP Side Lugs with Thrust Key Modification



STYLE F (NFPA MS4)



STYLE FP Side Tapped with Thrust Key Modification

Specific Dimensions for Series VH Mounting Styles (in inches)

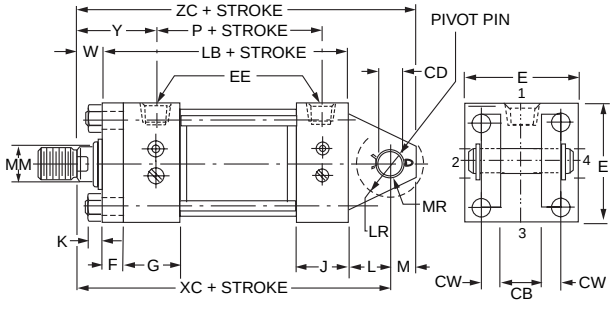
BORE	ROD NO.	ROD DIA.	AA	BB	BD	CB	+.000 CD◆ -.002	CW	DD	+.000 FA -.003	FB	L	+.000 LH -.002	LR	M	MR	ND	NT	PA	PC	PD	PF	R	SB•	ST
2 1/2	1 2 3	1 1 3/4 1 3/8	3.6	1 13/16	1 1/2	1 1/4	.751	5/8	1/2-20	.562	9/16	1 1/4	1.744	15/16	3/4	15/16	9/16 1/2 9/16	5/8-11	5/16	2 3/4	2 1/16	3 1/16	2.55	13/16	1
3 1/4	1 2 3	1 3/8 2 1 3/4	4.6	2 5/16	2	1 1/2	1.001	3/4	5/8-18	.687	11/16	1 1/2	2.244	1 1/4	1	1 3/16	7/8 11/16 7/8	3/4-10	3/8	2 1/2	2 5/8	2 15/16	3.25	13/16	1
4	1 2 3	1 3/4 2 1/2 2	5.4	2 5/16	2	2	1.376	1	5/8-18	.812	11/16	2 1/8	2.494	1 3/4	1 3/8	1 5/8	1 11/16 1	1-8	7/16	2 11/16	2 15/16	2 15/16	3.82	1 1/16	1 1/4
5	1 2 3 4	2 3 1/2 2 1/2 3	7.0	3 3/16	2	2 1/2	1.751	1 1/4	7/8-14	.812	15/16	2 1/4	3.244	2 1/16	1 3/4	2 1/8	1 1/8 1 1 1/8 1 1/8	1-8	7/16	2 15/16	3 11/16	3 3/16	4.95	1 1/16	1 1/4
6	1 2 3 4	2 1/2 4 3 3 1/2	8.1	3 5/8	3	2 1/2	2.001	1 1/4	1-14	.937	1 1/16	2 1/2	3.744	2 5/16	2	2 3/8	1 3/4 1 1/4 1 3/4 1 1/2	1 1/4-7	1/2	3 3/16	4 1/4	3 5/16	5.73	1 5/16	1 1/2
7	1 2 3 4 5	3 5 3 1/2 4 4 1/2	9.3	4 1/8	3	3	2.501	1 1/2	1 1/8-12	.937	1 3/16	3	4.244	2 3/4	2 1/2	2 7/8	1 1/8 1 1/8 1 1/8 1 1/8 1 1/8	1 1/2-6	1/2	2 15/16	4 3/4	3 1/8	6.58	1 9/16	1 3/4
8	1 2 3 4 5	3 1/2 5 1/2 4 4 1/2 5	10.6	4 1/2	3 1/2	3	3.001	1 1/2	1 1/4-12	.937	1 5/16	3 1/4	4.744	3 1/4	2 3/4	3 1/8	1 1/2 1 1/2 1 1/2 1 1/2 1 1/2	1 1/2-6	1/2	2 15/16	5 1/4	3 1/4	7.50	1 9/16	1 3/4

◆ Dimension CD is pin diameter. • Upper surface spotfaced for socket head screws. ◆◆ Dimension to be specified by customer.

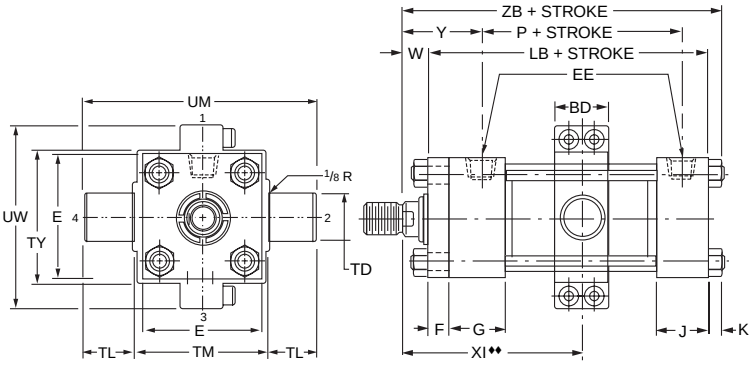
For additional information – call your local Parker Cylinder Distributor.

Pivot Mountings

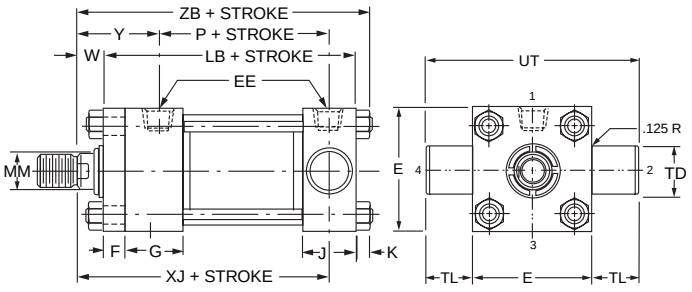
Styles BB, DB, D, DD



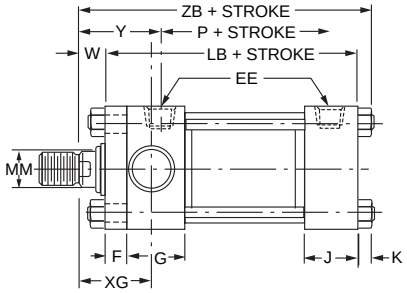
STYLE BB (NFPA MP1)



STYLE DD (NFPA MT4)



STYLE DB (NFPA MT2)

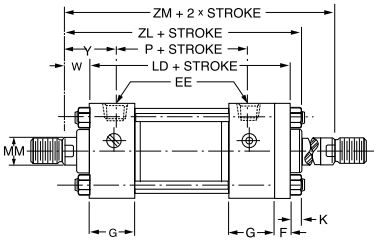


STYLE D (NFPA MT1)

SU	SW	SY	+.000 TD -.001	TF	TL	TM	TN	TS	TY	UF	UM	UT	US	UW	XG	MIN. XI ◆◆	DD MTG. MIN. STK.	XS	XT	ADD STROKE						
																				SN	SS	XC	XF	XJ	ZC	ZF
1 9/16	11/16	2 11/16	1.375	4 5/8	1 3/8	4	1 5/16	4 7/8	3 3/4	5 3/8	6 3/4	6 1/4	6 1/4	4 5/8	4 1/4 4 3/4 4 1/2	5 15/16 6 7/16 6 3/16	1/8	4 1/16 4 9/16 4 5/16	4 3/8 4 7/8 4 5/8	3	3 3/8	11 3/8 11 7/8 11 5/8	10 1/8 10 5/8 10 3/8	7 3/8 7 7/8 7 5/8	12 1/8 12 5/8 12 3/8	10 3/4 11 1/4 11
1 9/16	11/16	2 7/16	1.750	5 7/8	1 3/4	5	1 1/2	5 7/8	4 3/4	7 1/8	8 1/2	8	7 1/4	5 13/16	4 3/8 4 3/4 4 5/8	6 7/16 6 13/16 6 11/16	3/8	4 1/16 4 7/16 4 5/16	4 1/2 4 7/8 4 3/4	3 1/2	4 1/8	12 1/8 12 1/2 12 3/8	10 5/8 11 10 7/8	8 8 3/8 8 1/4	13 1/8 13 1/2 13 3/8	11 3/8 11 3/4 11 5/8
2	7/8	2 5/8	1.750	6 3/8	1 3/4	5 1/2	2 1/16	6 3/4	5 1/4	7 5/8	9	8 1/2	8 1/2	6 3/8	4 5/8 5 4 3/4	6 11/16 7 1/16 6 13/16	1/8	4 1/2 4 7/8 4 5/8	4 3/4 5 1/8 4 7/8	3 3/4	4	13 1/4 13 5/8 13 3/8	11 1/8 11 1/2 11 1/4	8 1/2 8 7/8 8 5/8	14 5/8 15 14 3/4	12 12 3/8 12 1/8
2	7/8	2 7/8	1.750	8 3/16	1 3/4	7	2 15/16	8 1/4	6 3/4	9 3/4	10 1/2	10	10	7 3/4	5 5 1/4 5 1/4 5 1/4	7 1/16 7 5/16 7 5/16 7 5/16	0	4 7/8 5 1/8 5 1/8 5 1/8	5 1/8 5 3/8 5 3/8 5 3/8	4 1/4	4 1/2	14 1/2 14 3/4 14 3/4 14 3/4	12 1/4 12 1/2 12 1/2 12 1/2	9 3/8 9 5/8 9 5/8 9 5/8	16 1/4 16 1/2 16 1/2 16 1/2	13 1/8 13 3/8 13 3/8 13 3/8
2 1/2	1 1/8	3 1/8	2.000	9 7/16	2	8 1/2	3 5/16	9 3/4	7 3/4	11 1/4	12 1/2	11 1/2	12	10 3/4	5 3/8 5 3/8 5 3/8 5 3/8	8 1/16 8 1/16 8 1/16 8 1/16	1/4	5 3/8 5 3/8 5 3/8 5 3/8	5 1/2 5 1/2 5 1/2 5 1/2	5 1/8	5 1/8	16 1/8 16 1/8 16 1/8 16 1/8	13 5/8 13 5/8 13 5/8 13 5/8	10 3/8 10 3/8 10 3/8 10 3/8	18 1/8 18 1/8 18 1/8 18 1/8	14 5/8 14 5/8 14 5/8 14 5/8
2 7/8	1 3/8	2 7/8	2.500	10 5/8	2 1/2	9 3/4	3 3/4	11 1/4	8 3/4	12 5/8	14 3/4	13 1/2	14	11 1/2	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	8 1/16 8 1/16 8 1/16 8 1/16 8 1/16	1/8	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	5 5/16 5 5/16 5 5/16 5 5/16 5 5/16	5 7/8	5 3/4	16 3/4 16 3/4 16 3/4 16 3/4 16 3/4	13 3/4 13 3/4 13 3/4 13 3/4 13 3/4	10 7/8 10 7/8 10 7/8 10 7/8 10 7/8	19 1/4 19 1/4 19 1/4 19 1/4 19 1/4	14 3/4 14 3/4 14 3/4 14 3/4 14 3/4
2 7/8	1 3/8	2 7/8	3.000	11 13/16	3	11	4 1/4	12 1/4	9 3/4	14	17	15 1/2	15	13 3/8	5 1/4 5 1/4 5 1/4 5 1/4 5 1/4	8 9/16 8 9/16 8 9/16 8 9/16 8 9/16	1/8	5 1/8 5 1/8 5 1/8 5 1/8 5 1/8	5 7/16 5 7/16 5 7/16 5 7/16 5 7/16	6 5/8	6 3/4	18 18 18 18 18	14 3/4 14 3/4 14 3/4 14 3/4 14 3/4	11 3/4 11 3/4 11 3/4 11 3/4 11 3/4	20 3/4 20 3/4 20 3/4 20 3/4 20 3/4	15 3/4 15 3/4 15 3/4 15 3/4 15 3/4

For Cylinder Division Plant Locations – See Page II.

DIMENSIONS
DOUBLE ROD CYLINDERS



To obtain dimensioning information on a double rod cylinder, first select the desired mounting style and refer to the corresponding single rod cylinder model shown on the preceding pages. After you have determined all necessary dimensions from that drawing, turn back to this page and supplement those dimensions with additional ones from this drawing and the table at right. These added dimensions provide the additional information needed to completely dimension a double rod cylinder model.

On a double rod cylinder where the two rod ends will be different, be sure to state which rod end is to go at which end of the cylinder.

BORE SIZE	ROD NO.	ROD DIA.	ADD STROKE LD	ADD STROKE ZL	ADD STROKE SN_K	ADD STROKE SS_K	ADD 2X STROKE ZM
2 1/2	1	1	10 1/4	11 7/16	3	3 5/8	11 3/4
	2	1 3/4		11 15/16			12 3/4
	3	1 3/8		11 11/16			12 1/4
3 1/4	1	1 3/8	10 3/4	12 3/16	3 1/2	4 3/8	12 1/2
	2	2		12 9/16			13 1/4
	3	1		12 7/16			13
4	1	1 3/4	11 1/4	12 13/16	3 3/4	4 1/4	13 1/4
	2	2 1/2		13 3/16			14
	3	2		12 15/16			13 1/2
5	1	2	12 1/4	14 3/16	4 1/4	4 3/4	14 1/2
	2	3 1/2		14 7/16			15
	3	2 1/2		14 7/16			15
	4	3		14 7/16			15
6	1	2 1/2	13 3/8	15 1/2	4 7/8	5 1/8	15 7/8
	2	4					
	3	3					
	4	3 1/2					
7	1	3	13 1/2	15 3/4	5 3/8	5 3/4	16
	2	5					
	3	3 1/2					
	4	4					
	5	4 1/2					
8	1	3 1/2	14 1/2	16 13/16	6 1/8	6 3/4	17
	2	5 1/2					
	3	4					
	4	4 1/2					
	5	5					
REPLACES			**LB**	**ZB**	**SN**	**SS**	**—**
ON SINGLE ROD MOUNTING STYLE			**ALL MTG. STYLES**		**F**	**C**	**ALL MTG.**

HOW TO ORDER SERIES VH CYLINDERS

Note: Parker Series VH Cylinders can be completely & accurately described by a model number consisting of coded symbols. To develop a model number select only those symbols that represent the cylinder required and place them in the sequence shown in the chart below.

SERIES VH MODEL NUMBERS—HOW TO DEVELOP THEM—HOW TO DECODE THEM.

	BORE SIZE	CUSHION HEAD END	DOUBLE ROD	MOUNTING STYLE	MOUNTING MOD.	COMBINATION MOUNTING STYLE	SERIES	PISTON	PORTS	COMMON MODIFICATION	SPECIAL MODIFICATIONS	PISTON ROD NO.	ROD END THREAD STYLE NO.	ALTERNATE STANDARD ROD END THD. LENGTH	THREAD TYPE	CUSHION CAP END	STROKE
EXAMPLE	**6**	**C**	**K**	**C**	**P**	**TB**	**VH**		**T**	**V**	**S**	**1**	**4**	**2**	**A**	**C**	**X50**
	Specify 2 1/2" thru 8"	Specify only if Cushion Head End is required	Use only if Double Rod Cyl. is required	Specify mounting style T, TB, TC, TD, F, H, J, BB, C, D, DB, DD, HB, JB.	Specify P-for Thrust Key Mtg. M-for Manifold Ports	Specify any practical mtg. style available	Specify Series VH	For ring type piston no letter req'd. Use K for Hi-load Piston	Specify Port Type req'd. U=NPTF T=S.A.E. P=S.A.E. Flange Ports R=BSP B=BSPT G=Metric Y=metric ISO 6149	If required specify V=Fluoro-carbon Seals F=Nut Retained Piston X=E.P.R. Seals W=Water Service J=High Water Content Fluid See Section C	Specify only if special modifications are required. Do not use symbol "S" for rod end modifications.	Specify rod code no. See chart in Section C for min. Piston rod diameter	Specify Style 4 Small Male Style 8 Intermediate Male Style 9 Short Female Style 3 Special. Specify KK, A, LA or W dim. req'd	Specify only if 2 times Standard Catalog "A" dim. is required	Specify A=UNF W=BSF M=Metric	Specify only if Cushion Cap End is required	Specify in inches. Show symbol "X" just ahead of stk. length.

Class 1 SEALS
Class 1 seals are the seals provided as standard in a cylinder assembly unless otherwise specified. For further information on fluid compatibility on operating limitations of all compounds, see Section C.
For the VH series cylinders the following make-up Class 1 Seals:

Primary Piston Rod Seal—Enhanced Polyurethane
Piston Rod Wiper—Nitrile
Piston Seals—Cast Iron Rings
Option—Nitrile lipseals with polymyte back-up washers
Option—Hi-Load, Filled P.T.F.E. seals with a nitrite expander
O-rings—Nitrile (nitrrile back-up washer when used)

For additional information – call your local Parker Cylinder Distributor.

Parker Cylinder

Hydraulic and Electrohydraulic Actuators

Series 2HX

B

Featuring…

- **Two Valve Manifold Options**
  - **– 7 Standard Bolt-on Manifolds**
  - **– 4 Standard Integral Manifolds**
- **Two Feedback Options**
  - **– LDT**
  - **– LRT**

For Cylinder Division Plant Locations – See Page II.

Parker Cylinder

Parker Series 2HX Actuators…

Bolt-on and Integral Servo/ Proportional/NFPA Valve Manifolds and Two Feedback Options

Series 2HX Electrohydraulic Actuators are specifically designed to meet today's demand for more efficient, low cost actuators that meet your application requirements.

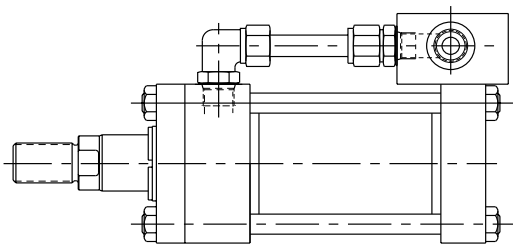
To ensure that every electrohydraulic actuator is premium quality, we subject each and every one – not just batch samples – to tough inspection **and** performance tests. Plus as the world's largest and lowest cost cylinder producer, we offer you the Series 2HX electrohydraulic actuator at the lowest cost that helps you stretch those tight design budgets without sacrificing quality.

Worldwide Distribution

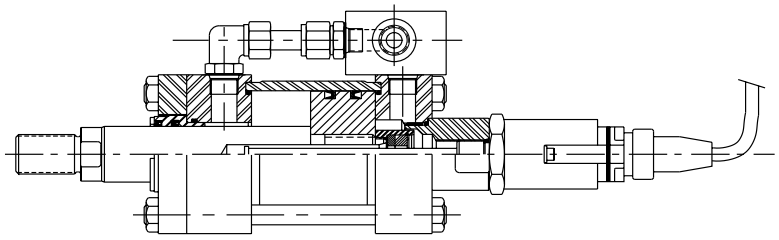
The Parker System is a worldwide network of manufacturing plants and distribution centers for fast, dependable service and delivery. Parker provides you with local sales and technical assistance from hundreds of stocking distributors and regional offices.

Contact Parker Cylinder Division for further assistance or information on designing the Series 2HX electrohydraulic actuator to meet your motion control requirements.

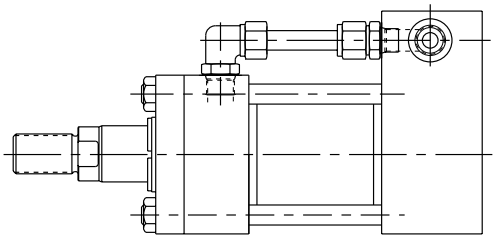
2HX with Bolt-On Manifold



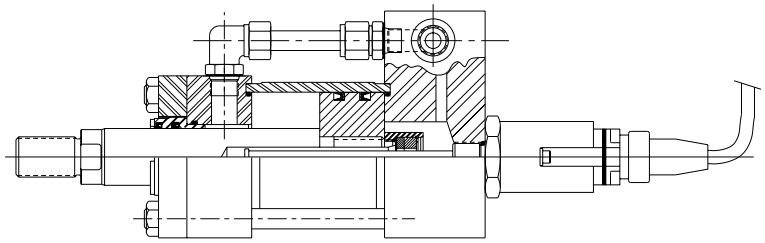
2HX with Bolt-On Manifold and LDT



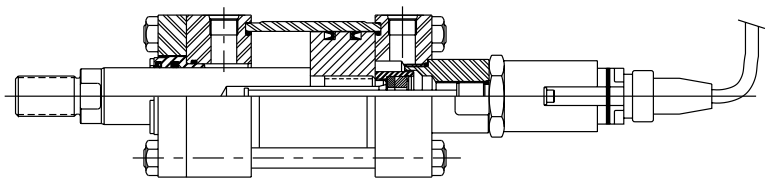
2HX with Intergral Manifold



2HX with Integral Manifold and LDT



2HX with LDT Feedback Only



For additional information – call your local Parker Cylinder Distributor.

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Note: for application information relating to the selection of cylinders based on bore sizes, rod diameters and mounting styles, refer to your current Parker Hydraulic Cylinder Catalog 0106, Section C or consult your Parker distributor.

B

Table A – Available Mounting and Manifold Position

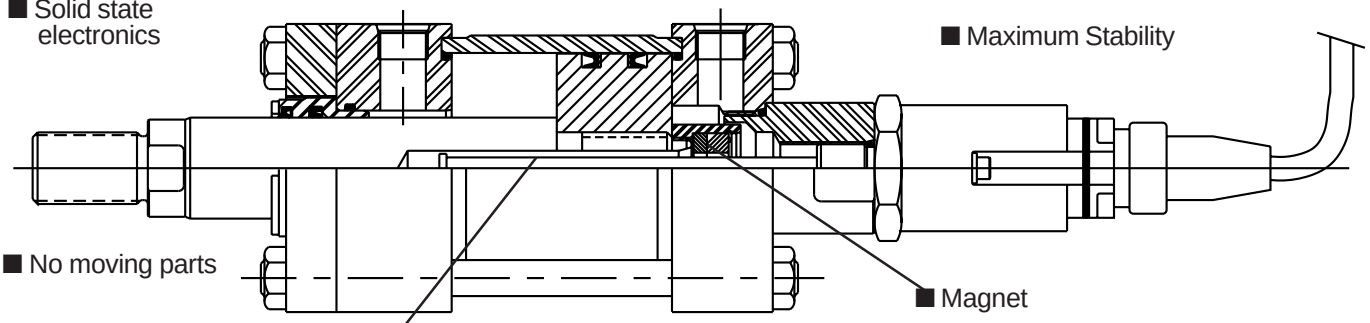
MOUNTING STYLE	DESCRIPTION	BOLT-ON-MANIFOLD MOUNTING POSITION		INTEGRAL MANIFOLD	APPLICABLE FEEDBACK DEVICES
		CAP END[1]	HEAD END[1]	CAP END ONLY	
TB	Head Tie Rods Extended	1,2,3,4	1,2,3,4	1	LRT and LDT†
TC	Cap Tie Rods Extended	1,2,3,4	1,2,3,4	N/A	
TD	Both Ends Tie Rods Extended	1,2,3,4	1,2,3,4	N/A	
J	Head Rectangular Flange	1,2,3,4	CF	1	LRT and LDT
JB	Head Square Flange	1,2,3,4	CF	1	
JJ	Head Rectangular	1,2,3,4	CF	1	
H	Cap Rectangular Flange	CF	1,2,3,4	N/A	LRT
HB	Cap Square Flange	CF	1,2,3,4	N/A	
HH	Cap Rectangular	CF	1,2,3,4	N/A	LRT and LDT†
C	Side Lug	1	1	1	LRT and LDT
E	Centerline Lug	1,3	1,3	N/A	
F	Side Tapped	1;2&4 CF	1;2&4 CF	1	
CB	Side End Angles	1;2&4 CF	1;2&4 CF	N/A	LRT
G	Side End Lugs	1;2&4 CF	1;2&4 CF	N/A	
BB*	Cap Fixed Clevis	CF	1,2,3,4	1	LRT and LDT††
D	Head Trunnion	1,2,3,4	1,3	1	LRT and LDT
DB	Cap Trunnion	1,3	1,2,3,4	N/A	
DD	Intermediate Fixed Trunnion	1,2,3,4	1,2,3,4	1	
SB*	Spherical Bearing	CF	1,2,3,4	1	LRT and LDT††

Note:
* Overhang of Bolt-On-Manifold may affect mounting and application of cylinder, consult factory.
1 If cylinder has cushions, needle and check valve will be located at standard positions.
† LDT Feedback devices extend beyond the face of the cap and may interfere with cap end mounts – consult LDT dimensions in this catalog.
†† When LDT Feedback devices are selected with cap end mounts a false stage cylinder body is required. See dimensions and information on page 194.

N/A = Not Available
CF = Consult Factory

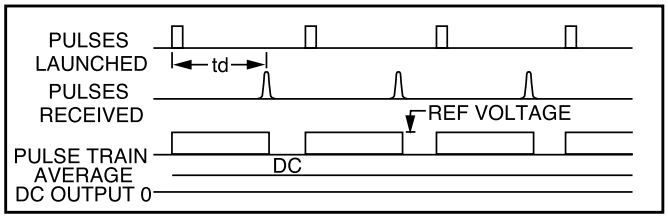
Linear Displacement Transducer Series 2HX-LDT

- Compact design for easy installation
- Infinite Resolution
- Maximum Stability
- Solid state electronics
- No moving parts



Magnetostriction

In a LDT position sensor, a pulse is induced in a specially-designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a movable magnet which passes along the outside of the sensor tube, the other field comes from a current pulse or interrogation pulse launched along the waveguide. The interaction between the two magnetic fields produces a strain pulse, which travels at sonic speed along the waveguide until the pulse is detected at the head of the sensor. The position of the magnet is determined with high precision by measuring the elapsed time between the launching of the electronic interrogation pulse and the arrival of the strain pulse. As a result, accurate non-contact position sensing is achieved with absolutely no wear to the sensing components.



An average of 200 ultrasonic strain pulses are launched for every reading. With so many readings taken for each position, vibration and shock have negligible effect on the readings. The transducer assembly is shielded to eliminate interference caused by electromagnetic fields in the radio frequency range. In addition, static magnetic fields of several hundred gauss must get as close as 3/16" from the protective tube before any interference in transducer operation occurs.

Standard Specifications

Parameter	Specification
Resolution:	*Analog:* Infinite *Digital:* 1 ÷ [gradient x crystal freq. (mHz) x circulation]
Non-Linearity:	±0.02% or ±0.05 mm (±0.002 in.), whichever is greater 0.002 in. is the minimum absolute linearity and varies with sensor model
Repeatability:	Equal to resolution
Hysteresis:	<0.02 mm (0.0008 in.)
Outputs:	*Analog:* Voltage or Current *Digital:* Start/Stop or PWM
Measuring Range:	*Analog:* 25 to 2540 mm (1 to 100 in.) *Digital:* 25 to 7600 mm (1 to 300 in.)
Operating Voltage:	+13.5 to 26.4 Vdc (±0%): Strokes ≤1525 mm (60 in.) +24 Vdc (±10%): Strokes > 1525 mm (60 in.)
Power Consumption:	100 mA
Operating Temperature:	*Head Electronics:* -40 to 85°C (-40 to 185°F) *Sensing Element:* -40 to 105°C (-40 to 221°F)
EMC Test*:	DIN EN 50081-1 (Emissions); DIN EN 50082-2 (Immunity)
Shock Rating:	100 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration Rating:	5 g/10-150 Hz/IEC standard 68-2-6
Adjustability: *(for active sensors only)*	Field adjustable zero and span to 5% of active stroke
Update Time:	*Analog:* ≤1 ms *Digital:* Minimum = [Stroke (specified in inches) + 3] x 9.1 µs
Operating Pressure:	5000 psi static; 10,000 psi spike
Housing Style/ Enclosure:	Aluminum die-cast head, IP 67 stainless steel rod & flange (LH flange: M18 x 1.5 or 3/4-16 UNF-3A)

**EMC test specification does not include sensors with the RB connection style.*

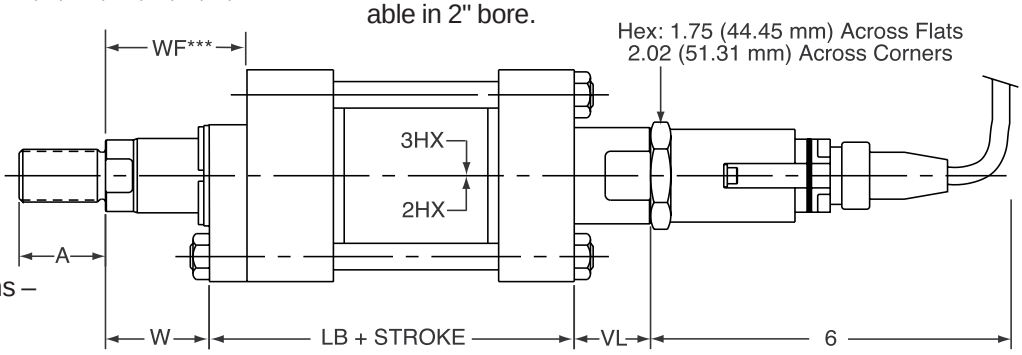
The above specifications for analog sensors are assuming that output ripple is averaged by the measuring device as with any typical analog device. Specifications are subject to change without notice. Consult the factory for specifications critical to your needs.

For additional information – call your local Parker Cylinder Distributor.

Cylinder with Linear Displacement Transducer

Cylinders utilizing LDT feedback are available in the following mounting styles: TB, TC, TD, J, JB, JJ, C, E, F, CB, G, D, DB and DD.

Note: On styles H, HB, BB and SB, consult factory for dimensional changes. Styles F, CB and G are not available in 2" bore.



Basic Series 2HX Cylinders

Style T Mounting

Envelope and Rod End Dimensions – See Table 1

Table 1 – Envelope and Rod End Dimensions

For additional dimensions, consult Series 2H and Series 3H 7" and 8" Bore, of this catalog.

Bore	Rod No.	Rod Dia. mm	A	KK Style 4	CC Style 8	LB Add Stroke	VL	4 to 1 Design Factor (PSI)**
2	1	1	1 1/8	3/4 - 16	7/8 - 14	5 1/4	1 3/8	3000
	2	1 3/8	1 5/8	1-14	1 1/4 - 12	5 1/4	1 3/8	3000
2 1/2	1	1	1 1/8	3/4 - 16	7/8 - 14	5 3/8	1 3/8	1800
	2	1 3/4	2	1 1/4 - 12	1 1/2 - 12	5 3/8	1 3/8	3000
	3	1 3/8	1 5/8	1-14	1 1/4 - 12	5 3/8	1 3/8	3000
3 1/4	1	1 3/8	1 5/8	1-14	1 1/4 - 12	6 1/4	1 1/4	2130
	2	2	2 1/4	1 1/2 - 12	1 3/4 - 12	6 1/4	1 1/4	3000
	3	1 3/4	2	1 1/4 - 12	1 1/2 - 12	6 1/4	1 1/4	3000
4	1	1 3/4	2	1 1/4 - 12	1 1/2 - 12	6 5/8	1 1/4	2580
	2	2 1/2	3	1 7/8 - 12	2 1/4 - 12	6 5/8	1 1/4	3000
	3	2	2 1/4	1 1/2 - 12	1 3/4 - 12	6 5/8	1 1/4	3000
5	1	2	2 1/4	1 1/2 - 12	1 3/4 - 12	7 1/8	1 1/4	2510
	2	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	7 1/8	1 1/4	3000
	3	2 1/2	3	1 7/8 - 12	2 1/4 - 12	7 1/8	1 1/4	3000
	4	3	3 1/2	2 1/4 - 12	2 3/4 - 12	7 1/8	1 1/4	3000
6	1	2 1/2	3	1 7/8 - 12	2 1/4 - 12	8 3/8	1 3/8	3000
	2	4	4	3 - 12	3 3/4 - 12	8 3/8	1 3/8	3000
	3	3	3 1/2	2 1/4 - 12	2 3/4 - 12	8 3/8	1 3/8	3000
	4	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	8 3/8	1 3/8	3000
7*	1	3	3 1/2	2 1/4 - 12	2 3/4 - 12	9 1/2	13/32	3000
	2	5	5	3 1/2 - 12	4 3/4 - 12	9 1/2	13/32	3000
	3	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	9 1/2	13/32	3000
	4	4	4	3 - 12	3 3/4 - 12	9 1/2	13/32	3000
	5	4 1/2	4 1/2	3 1/4 - 12	4 1/4 - 12	9 1/2	13/32	3000
8*	1	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	10 1/2	13/32	3000
	2	5 1/2	5 1/2	4 - 12	5 1/4 - 12	10 1/2	13/32	3000
	3	4	4	3 - 12	3 3/4 - 12	10 1/2	13/32	3000
	4	4 1/2	4 1/2	3 1/4 - 12	4 1/4 - 12	10 1/2	13/32	3000
	5	5	5	3 1/2 - 12	4 3/4 - 12	10 1/2	13/32	3000

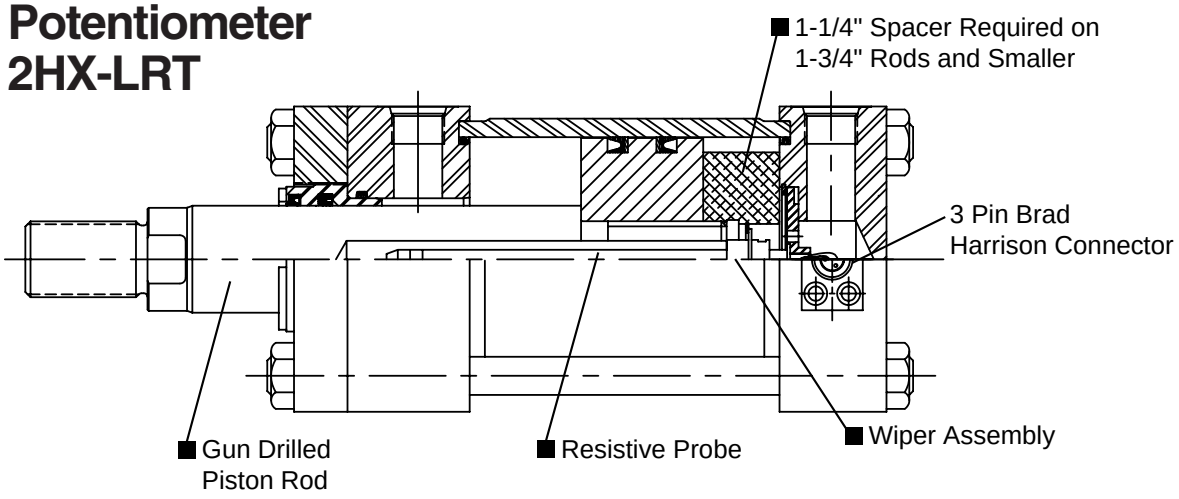
†**Note:** The rod end dimensions shown are based on the use of a linear displacement transducer with a rod end dead zone of 2.5 inches or less. LDT's with longer dead zones require a rod extension. The LDT will be permanently damaged if the proper rod extension is not used. Consult factory if an LDT with longer dead band is going to be used.

**The 4:1 design factor is based on the tensile strength of the piston to rod connection.

*Specify Series 3HX.

***For 7-8" Bore 3HX callout dimension WF.

Linear Potentiometer Series 2HX-LRT

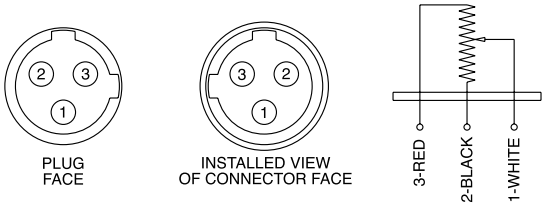


Standard Features

- Available in strokes to 120".
- Unique, easy to apply cylinder position sensing system.
- Infinite resolution, high linearity and repeatability.
- Innovative, resistive element is made of conductive plastic.
- 3 pin Brad Harrison electrical connector available at any cap position not occupied by a port or mount.

How It Works

The Parker LRT is a uniquely designed position sensor that uses a resistive element and wiper assembly to provide an analog output signal of a cylinder's position. The LRT is a dual element type linear potentiometer with two independent elements mounted on either side of a anodized aluminum extrusion. The LRT operates as a voltage divider. This is done by shorting through the extrusion with the wiper assembly. The position of the wiper changes the resistive load proportional to its position along the cylinder stroke. The LRT is energized by applying a voltage across the unit, typically 10 VDC. As the resistive load changes with the cylinder stroke, the output voltage changes proportionally. The output voltage at the end point of the cylinder stroke is dictated by the input voltage applied across the device. The probe is mounted into the cylinder cap and inserted into the gun drilled piston rod. The compactness of the design only adds to the envelope dimensions of cylinders with 1-3/4" rods and smaller. Envelope dimensions of cylinders with larger rods are unaffected.



Pin Chart

Pin Number	On Cable	On LRT	Function
1	Green	White (wiper)	Output
2	Red w/Blk	Black (resistor base)	V-
3	Red w/White	Red (resistor tip. power)	V+

Standard Specifications

Non-Linearity: Less than 0.1% of full scale up to 48" stroke. Less than 1.0% of full scale over 48" stroke.

Repeatability: .001 inch

Input Voltage: Nominal 5-50 Vdc

Operating Temperature Range: -40°F to +160°F*

Cylinder Stroke Length: Up to 120"

Electrical Connector: Brad Harrison 3-pin micro connector interface at pos. #4 standard. (Unless occupied by a port or mount.)

Total Resistance: 800Ω per inch of stroke (±20%) + end resistance.

End Resistance: 800Ω

Maximum Velocity: 30 inches per second

Life Expectancy: Greater that 50 x 10^6 cycles (Based on 1" stroke @ 10 ips)

Fluid Medium: Petroleum based hydraulic fluids

End Voltage Loss: (V source) x 400/stroke x 800

Power Dissipation: supply voltage squared, divided by the total resistance.

The LRT requires a high impedance interface greater than 100K ohms. A maximum of 1 microamp should be required from the LRT.

The accuracy of a given feedback device is a composite of the following factors:

Temperature Coefficient: The shift in output due to temperature change. This is a combination of the effect of temperature on the cylinder, the transducer and the electronics.

These factors which are normally additive refer to the feedback device itself. The performance achieved by a given system depends on the various factors such as system stiffness, valve performance, friction, temperature variation, and backlash in mechanical linkages to the cylinder.

In the case of front flange mounted cylinders, the stretch of the cylinder due to hydraulic pressure changes may affect position repeatability and system performance.

*A high temperature option is offered to 300°F (consult factory).

For additional information – call your local Parker Cylinder Distributor.

Cylinder with Linear Potentiometer Feedback (LRT)

Cylinders utilizing LRT feedback are available in the following mounting styles: TB, TC, TD, J, JB, JJ, C, E, F, CB, G, D, DB, DD, H, HB, HH, BB, SB.

Basic Series 2HX Cylinders

Style T Mounting

Envelope and Rod End Dimensions – See Table 1

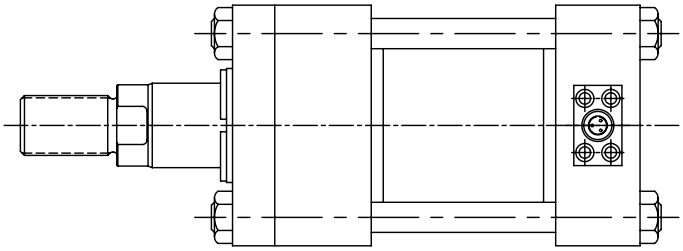


Table 1 – Envelope and Rod End Dimensions

For additional dimensions, consult Series 2H and Series 3H 7" and 8" Bore, of this catalog.

Bore	Rod No.	Rod Dia. mm	A	Thread Sizes KK Style 4	Thread Sizes CC Style 8	†† LB Add Stroke	4 to 1 Design Factor (PSI)**
2	1	1	1 1/8	3/4 - 16	7/8 - 14	6 1/2	3000
	2	1 3/8	1 5/8	1-14	1 1/4 - 12	6 1/2	3000
2 1/2	1	1	1 1/8	3/4 - 16	7/8 - 14	6 5/8	1800
	2	1 3/4	2	1 1/4 - 12	1 1/2 - 12	6 5/8	3000
	3	1 3/8	1 5/8	1-14	1 1/4 - 12	6 5/8	3000
3 1/4	1	1 3/8	1 5/8	1-14	1 1/4 - 12	7 1/2	2130
	2	2	2 1/4	1 1/2 - 12	1 3/4 - 12	6 1/4	3000
	3	1 3/4	2	1 1/4 - 12	1 1/2 - 12	7 1/2	3000
4	1	1 3/4	2	1 1/4 - 12	1 1/2 - 12	7 7/8	2580
	2	2 1/2	3	1 7/8 - 12	2 1/4 - 12	6 5/8	3000
	3	2	2 1/4	1 1/2 - 12	1 3/4 - 12	6 5/8	3000
5	1	2	2 1/4	1 1/2 - 12	1 3/4 - 12	7 1/8	2510
	2	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	7 1/8	3000
	3	2 1/2	3	1 7/8 - 12	2 1/4 - 12	7 1/8	3000
	4	3	3 1/2	2 1/4 - 12	2 3/4 - 12	7 1/8	3000
6	1	2 1/2	3	1 7/8 - 12	2 1/4 - 12	8 3/8	3000
	2	4	4	3 - 12	3 3/4 - 12	8 3/8	3000
	3	3	3 1/2	2 1/4 - 12	2 3/4 - 12	8 3/8	3000
	4	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	8 3/8	3000
7*	1	3	3 1/2	2 1/4 - 12	2 3/4 - 12	9 1/2	3000
	2	5	5	3 1/2 - 12	4 3/4 - 12	9 1/2	3000
	3	3 1/2	3 1/2	2 1/2 - 12	3 3/4 - 12	9 1/2	3000
	4	4	4	3 - 12	3 3/4 - 12	9 1/2	3000
	5	4 1/2	4 1/2	3 1/4 - 12	4 1/4 - 12	9 1/2	3000
8*	1	3 1/2	3 1/2	2 1/2 - 12	3 1/4 - 12	10 1/2	3000
	2	5 1/2	5 1/2	4 - 12	5 1/4 - 12	10 1/2	3000
	3	4	4	3 - 12	3 3/4 - 12	10 1/2	3000
	4	4 1/2	4 1/2	3 1/4 - 12	4 1/4 - 12	10 1/2	3000
	5	5	5	3 1/2 - 12	4 3/4 - 12	10 1/2	3000

††Cylinders with rod sizes less than 2" require the addition of a 1 1/4" spacer on the cap end of the piston to carry the wiper assembly. These LB dimensions reflect the additional length.

†A mini LRT (MLRT) is available for 5/8" rods – consult factory.

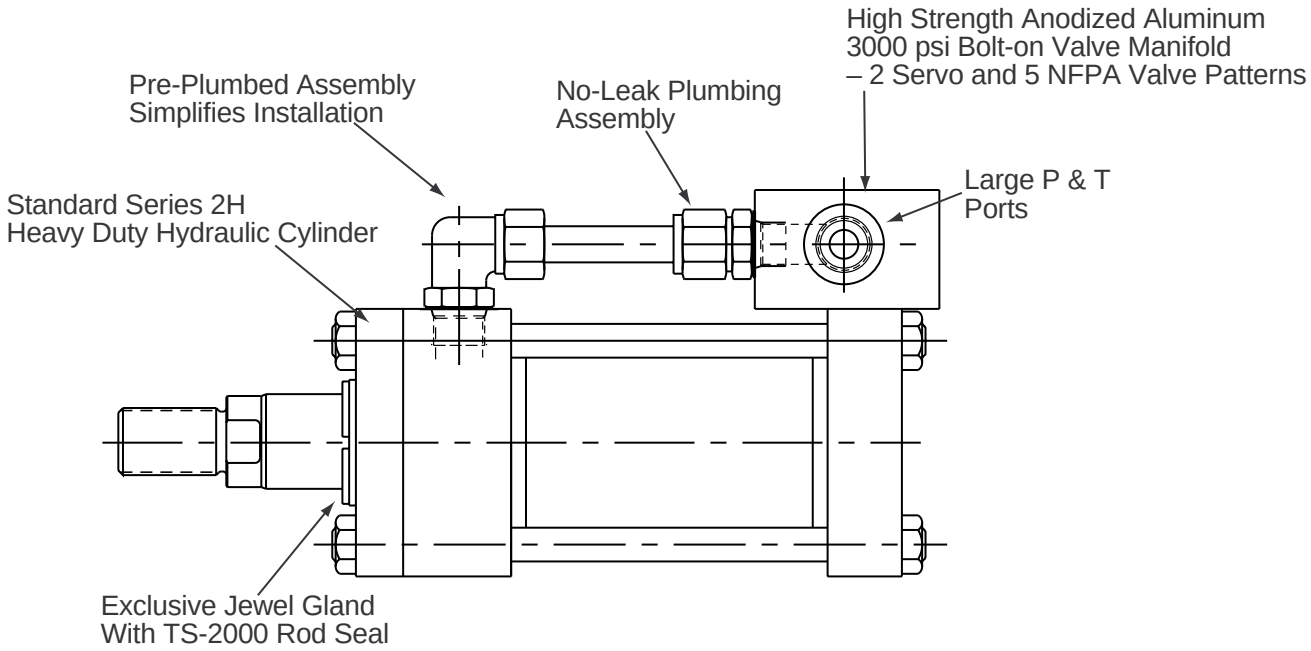
**The 4:1 design factor is based on the tensile strength of the piston to rod connection.

*Specify Series 3HX.

***For 7-8" Bore 3HX callout dimension WF.

For Cylinder Division Plant Locations – See Page II.

Hydraulic Linear Actuator with Bolt-on Servo/NFPA Valve Manifold and Two Feedback Options



Innovative Motion Control

Parker's new Series 2HX is an integrated assembly that eliminates transducer mounting brackets, valve manifolds, plumbing and other items associated with using separate components. The versatility of the Series 2HX allows you to design cost effective actuators for accurate position and velocity control for your specific application.

Features and Benefits

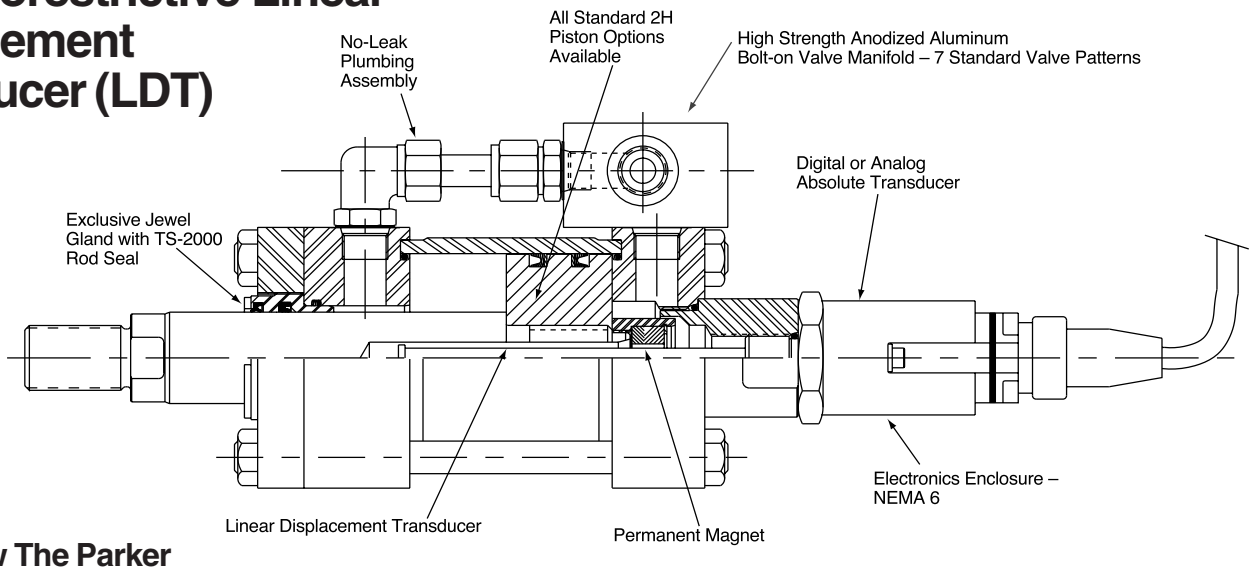
- Minimum hydraulic line runs with closed cylinder and valve coupling
- Simplified machine design with integrated components
- Eliminates the need for limit switches, deceleration valves, shock absorbers, and mechanical linkages in many applications
- Minimum interference with standard mounting dimensions
- Manifold may be mounted on head or cap end at any position not occupied by a mount
- 7 standard valve patterns
- Integral mounted valve eliminates assembly time and fittings.
- Custom manifolds available – consult factory

Custom Options Available

- Low friction rod gland – see the end of this series section.
- Hi-Load Piston
- Protective feedback enclosures
- Intrinsically safe modifications
- Explosion proof linear transducers
- Feedback devices in stock for quick delivery of common stroke lengths
- Closed-loop control for maximum productivity
- Performance-tested actuators
- Complete, tested cylinder/feedback assemblies customized to your needs

For additional information – call your local Parker Cylinder Distributor.

2HX with Bolt-on Manifold and Magnetorestrictive Linear Displacement Transducer (LDT)

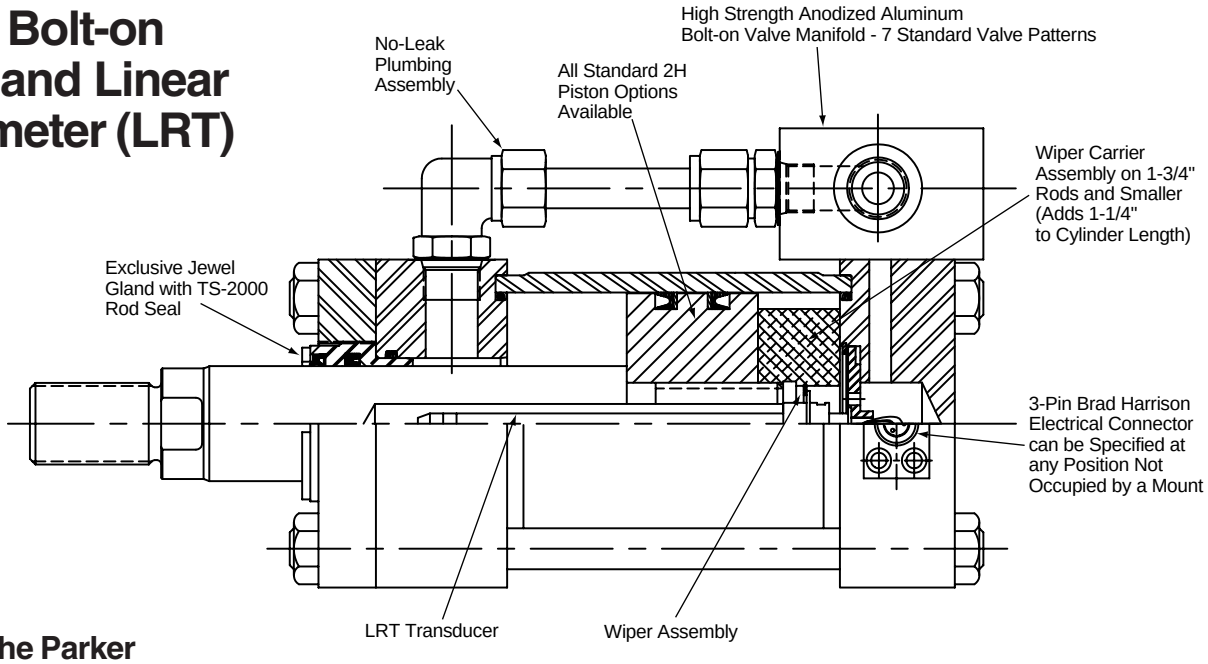


Here's How The Parker LDT Feeds Back Linear Position

The linear displacement transducer is rigidly attached to the cap end of the cylinder, and runs the full stroke length inside a hollow piston rod. A magnet is attached to the cylinder piston. As the piston moves through the stroke, the transducer is able to define the exact position of the magnet by measuring the time interval between the initiation and the return of the strain pulses launched in the transducer wave guide.

For LDT specifications see page 204.

2HX with Bolt-on Manifold and Linear Potentiometer (LRT)



Here's How The Parker LRT Feeds Back Linear Position

The LRT feedback device is essentially a linear potentiometer which provides a cost effective solution for applications where a contacting device is acceptable. The potentiometer is fixed to the rear cap of the cylinder and runs the full length inside a hollow piston rod. The wiper assembly is fixed to the piston. As the piston moves through the stroke, the wiper voltage changes in proportion to the cylinder position.

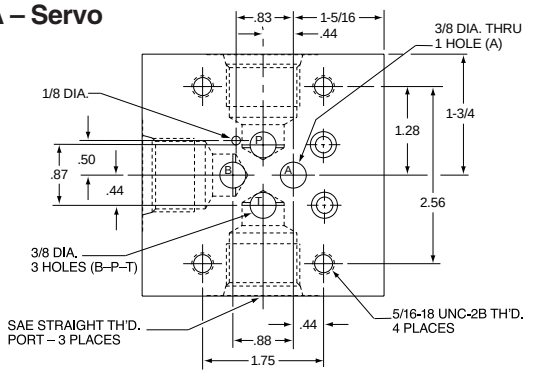
For specifications on the LRT see page 209.

Bolt-on Manifolds

Parker Series 2HX cylinders are available with Bolt-on Manifolds. Manifolds can be mounted on the head or cap end of a Parker Series 2H or 3H cylinders.

Available Bolt-on Manifold Valve Patterns

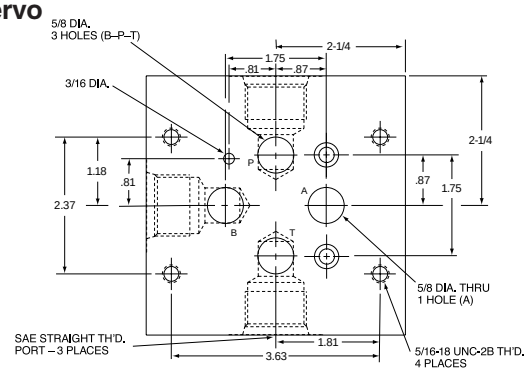
Group A – Servo



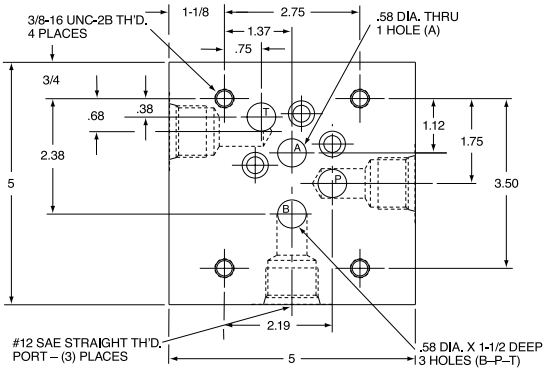
Servo Valve Mount Interchange Chart

Group A	Group D
PARKER BD-15	PARKER BD-30
ATCHLEY 215A-XXX	ATCHLEY 240-XXX
MOOG 62 SERIES	
MOOG 73 SERIES	MOOG 78 SERIES
MOOG 760 SERIES	
PEGASUS M &	PEGASUS 180L
MP SERIES	PEGASUS 180R
VICKERS SM4-20-X-X-10	VICKERS SM4-40-X-X-10

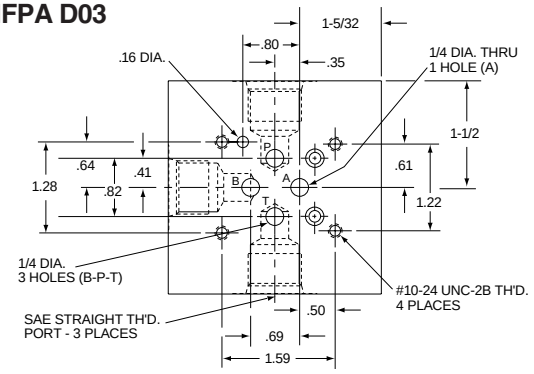
Group D – Servo



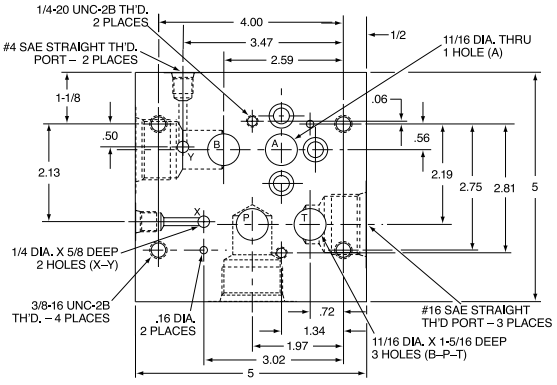
Group J – NFPA D06



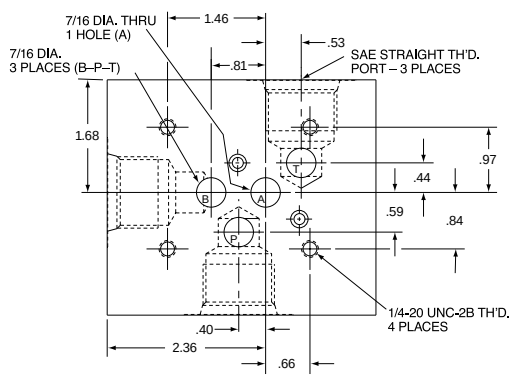
Group G – NFPA D03



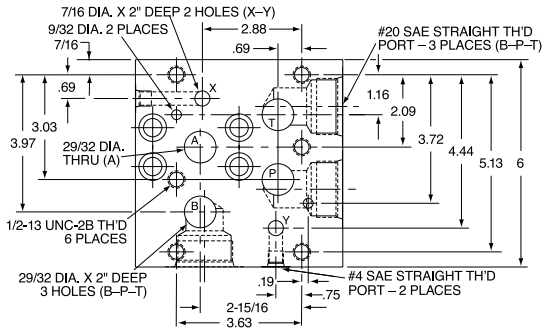
Group K – NFPA D07



Group H – NFPA D05

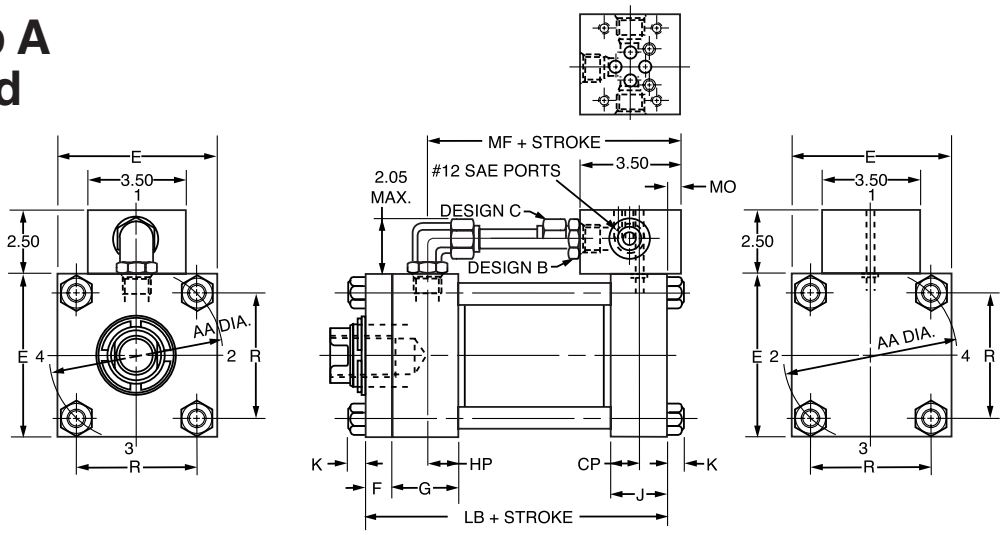


Group M – NFPA D08



For additional information – call your local Parker Cylinder Distributor.

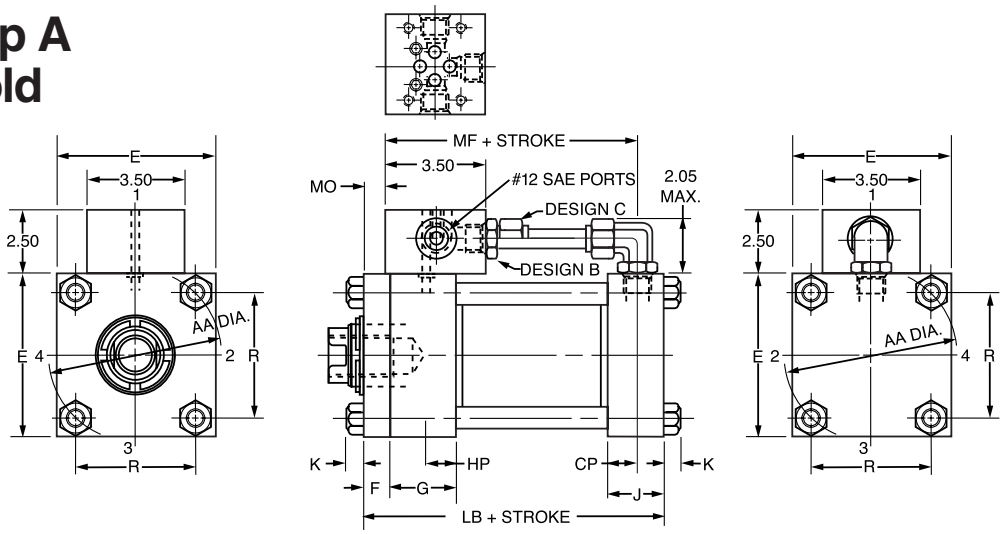
2HX with Group A Bolt-on Manifold Cap End
(Parker BD-15 Servo)



Group A/Parker BD-15 Valve Manifold, Cap End Mounted, Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	.562	3.000	4.187	.750	.750	.625	1.75	1.50	.438	2.9	2.05	5.250	1.625	2.875
2.50	.562	3.500	4.312	.750	.750	.625	1.75	1.50	.438	3.6	2.55	5.375	1.500	2.750
3.25	.468	4.500	4.875	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	.875	2.125
4.00	.468	5.000	5.125	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	.625	1.875
5.00	.468	6.500	5.625	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	.125	1.375
6.00†	.062	7.500	6.187	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	0	.875

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in "Design C" column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

2HX with Group A Bolt-on Manifold Head End
(Parker BD-15 Servo)



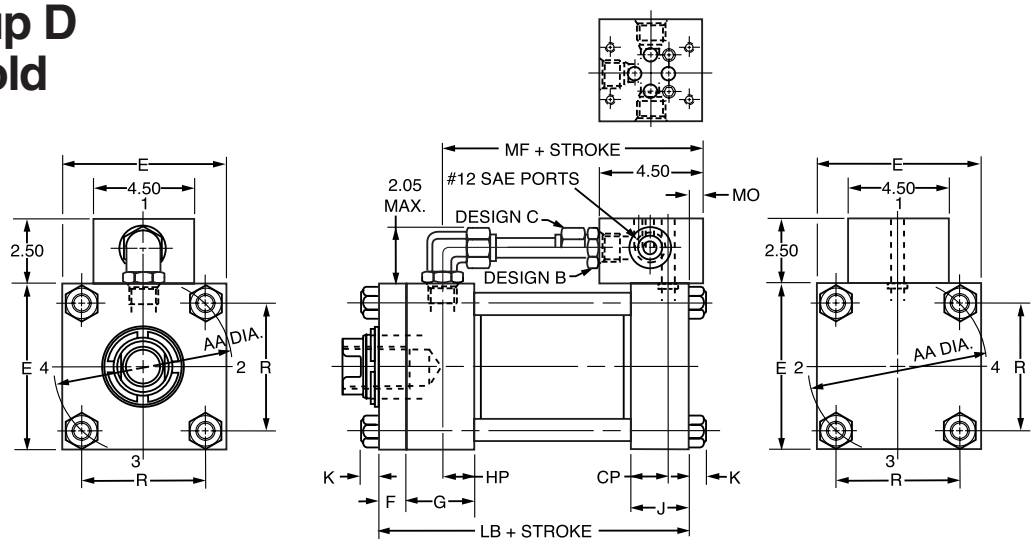
Group A/Parker BD-15 Valve Manifold, Head End Mounted, Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	.312	3.000	4.187	.750	.750	.625	1.75	1.50	.438	2.9	2.05	5.250	1.625	2.875
2.50	.312	3.500	4.312	.750	.750	.625	1.75	1.50	.438	3.6	2.55	5.375	1.500	2.750
3.25	.532	4.500	4.875	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	.875	2.125
4.00	.657	5.000	5.125	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	.625	1.875
5.00	.657	6.500	5.625	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	.125	1.375
6.00†	.938	7.500	6.187	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	0	.875

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in "Design C" column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

For Cylinder Division Plant Locations – See Page II.

2HX with Group D Bolt-on Manifold Cap End

(Parker BD-30 Servo)

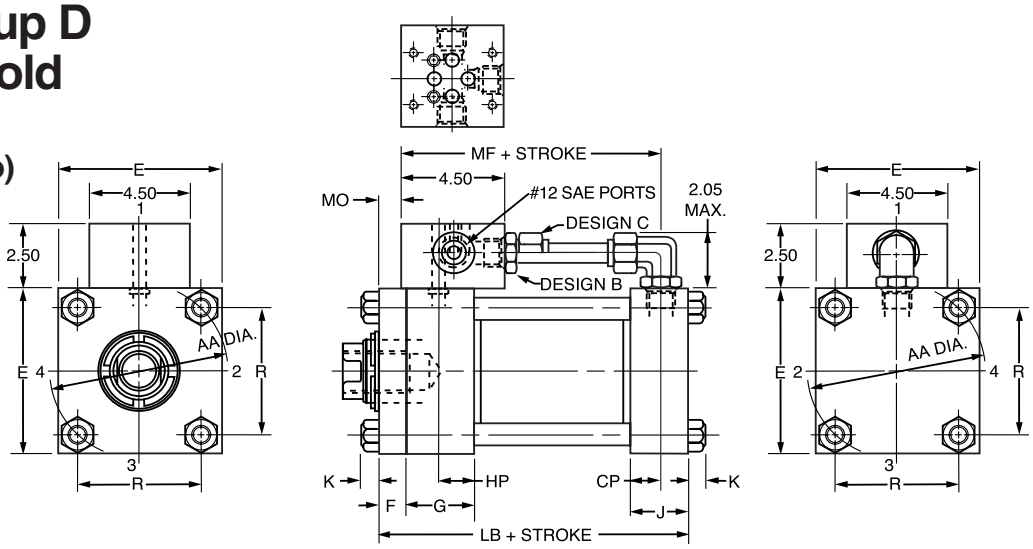


Group D/Parker BD-30 Valve Manifold, Cap End Mounted, Series 2HX Cylinder													Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**F**	**G**	**J**	**K**	**AA**	**R**	**LB**	**Min. Stroke**	**Min. Stroke**
3.25	.531	4.500	4.937	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	1.875	3.125
4.00	.531	5.000	5.187	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	1.625	2.875
5.00	.531	6.500	5.687	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	1.125	2.375
6.00†	.125	7.500	6.250	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	.500	1.750

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.
†Consult Factory for 6" Bore DD Mount.
Standard Operating Pressure is 3000 PSI.

2HX with Group D Bolt-on Manifold Head End

(Parker BD-30 Servo)

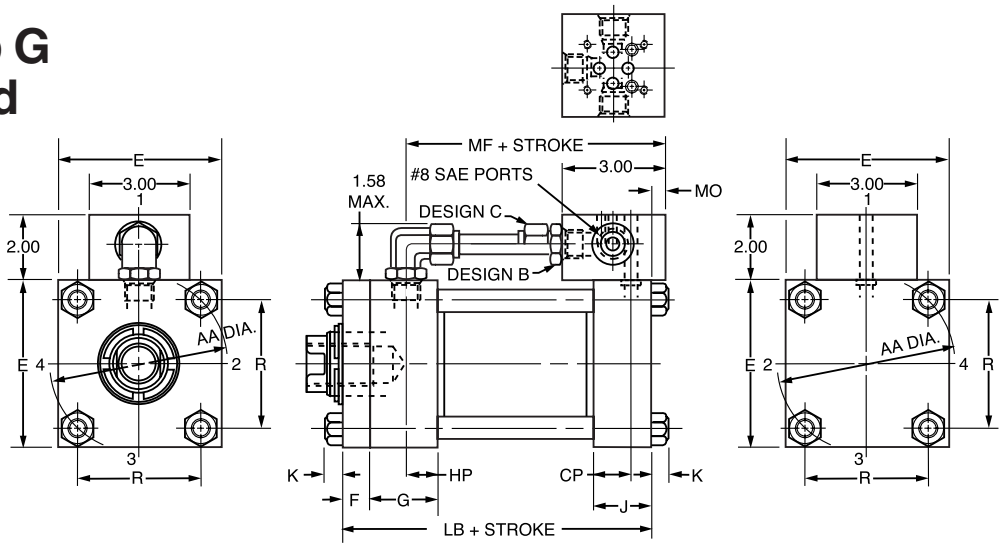


Group A/Parker BD-30 Valve Manifold, Head End Mounted Series 2HX Cylinder													Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**F**	**G**	**J**	**K**	**AA**	**R**	**LB**	**Min. Stroke**	**Min. Stroke**
3.25	.469	4.500	4.937	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	1.875	3.125
4.00	.594	5.000	5.187	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	1.625	2.875
5.00	.594	6.500	5.687	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	1.125	2.375
6.00†	.875	7.500	6.250	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	.500	1.750

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.
†Consult Factory for 6" Bore DD Mount.
Standard Operating Pressure is 3000 PSI.

For additional information – call your local Parker Cylinder Distributor.

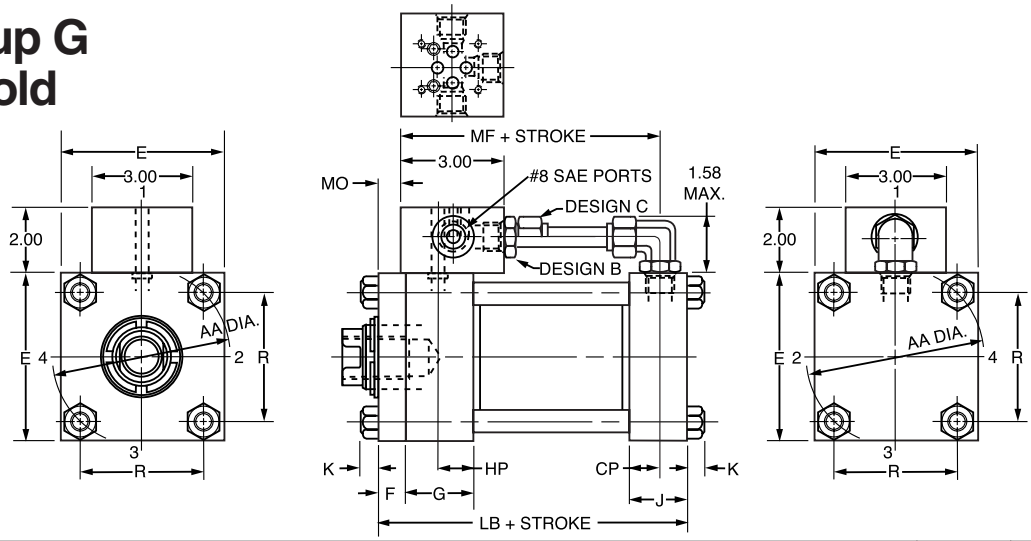
2HX with Group G Bolt-on Manifold Cap End
(NFPA D03)



Group G/NFPA D03 Valve Manifold, Cap End Mounted Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	.406	3.000	4.031	.750	.750	.625	1.75	1.50	.438	2.9	2.05	5.250	.875	1.750
2.50	.406	3.500	4.156	.750	.750	.625	1.75	1.50	.438	3.6	2.55	5.375	.750	1.625
3.25	.312	4.500	4.718	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	.250	1.000
4.00	.312	5.000	4.968	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	0	.750
5.00	.312	6.500	5.468	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	0	.250
6.00†	N/A	7.500	6.031	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	0	0

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

2HX with Group G Bolt-on Manifold Head End
(NFPA D03)

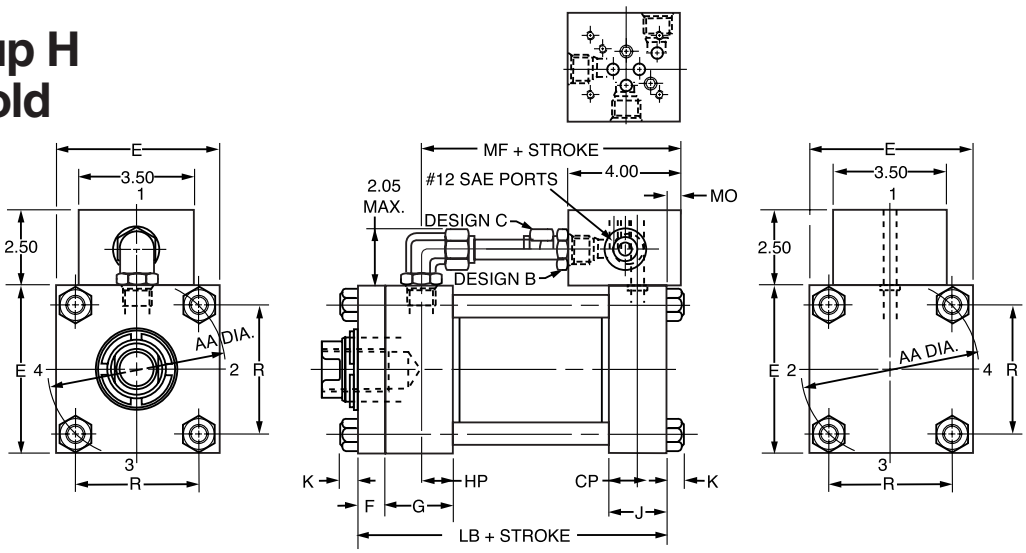


Group G/NFPA D03 Valve Manifold, Head End Mounted, Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	.468	3.000	4.031	.750	.750	.625	1.75	1.50	.438	2.9	2.05	5.250	.875	1.750
2.50	.468	3.500	4.156	.750	.750	.625	1.75	1.50	.438	3.6	2.55	5.375	.750	1.625
3.25	.688	4.500	4.718	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	.250	1.000
4.00	.813	5.000	4.968	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	0	.750
5.00	.813	6.500	5.468	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	0	.250
6.00†	1.109	7.500	6.031	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	0	0

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

For Cylinder Division Plant Locations – See Page II.

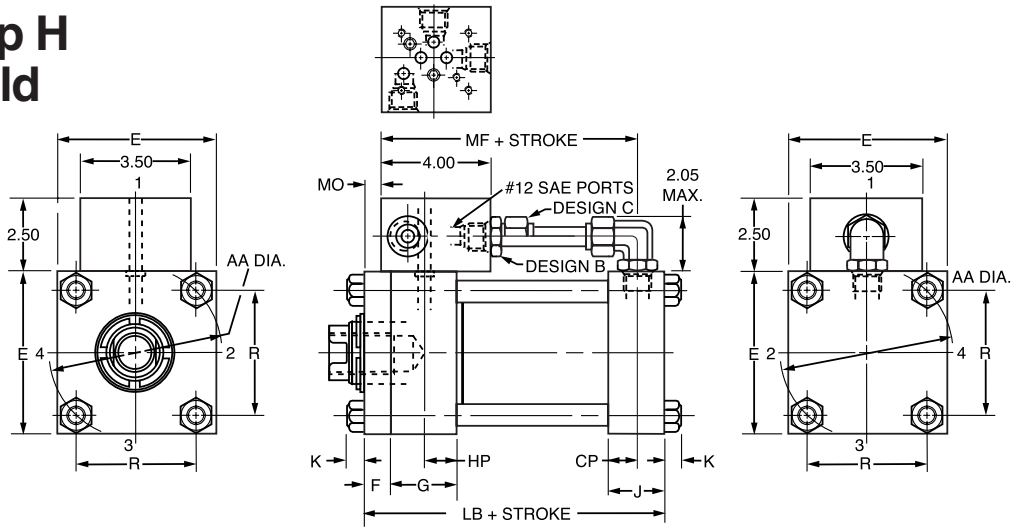
2HX with Group H Bolt-on Manifold Cap End
(NFPA D05)



Group H/NFPA D05 Valve Manifold, Cap End Mounted Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	.891	3.000	4.51	.750	.750	.625	1.750	1.500	.438	2.9	2.05	5.250	1.750	3.000
2.50	.891	3.500	4.64	.750	.750	.625	1.750	1.500	.438	3.6	2.55	5.375	1.625	2.875
3.25	.797	4.500	5.2	.906	.906	.750	2.000	1.750	.562	4.6	3.25	6.250	1.125	2.375
4.00	.797	5.000	5.45	.906	.906	.875	2.000	1.750	.562	5.4	3.82	6.625	.875	2.125
5.00	.797	6.500	5.95	.906	.906	.875	2.000	1.750	.812	7.0	4.95	7.125	.375	1.625
6.00†	.391	7.500	6.51	1.000	1.000	1.000	2.250	2.250	.875	8.1	5.73	8.375	0	1.000

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

2HX with Group H Bolt-on Manifold Head End
(NFPA D05)

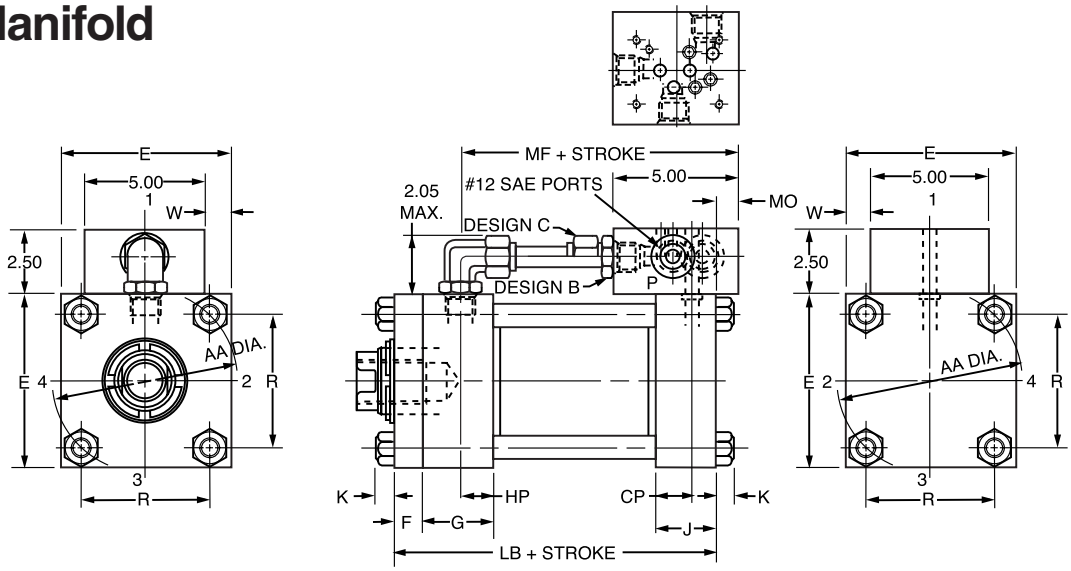


Group H/NFPA D05 Valve Manifold, Head End Mounted Series 2HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	Min. Stroke	Min. Stroke
2.00	0	3.000	4.51	.750	.750	.625	1.75	1.50	.438	2.9	2.05	5.250	1.750	3.000
2.50	0	3.500	4.64	.750	.750	.625	1.75	1.50	.438	3.6	2.55	5.375	1.625	2.875
3.25	.203	4.500	5.20	.906	.906	.750	2.00	1.75	.562	4.6	3.25	6.250	1.125	2.375
4.00	.328	5.000	5.45	.906	.906	.875	2.00	1.75	.562	5.4	3.82	6.625	.875	2.125
5.00	.328	6.500	5.95	.906	.906	.875	2.00	1.75	.812	7.0	4.95	7.125	.375	1.625
6.00†	.609	7.500	6.51	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	8.375	0	1.000

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. †Consult Factory for 6" Bore DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

For additional information – call your local Parker Cylinder Distributor.

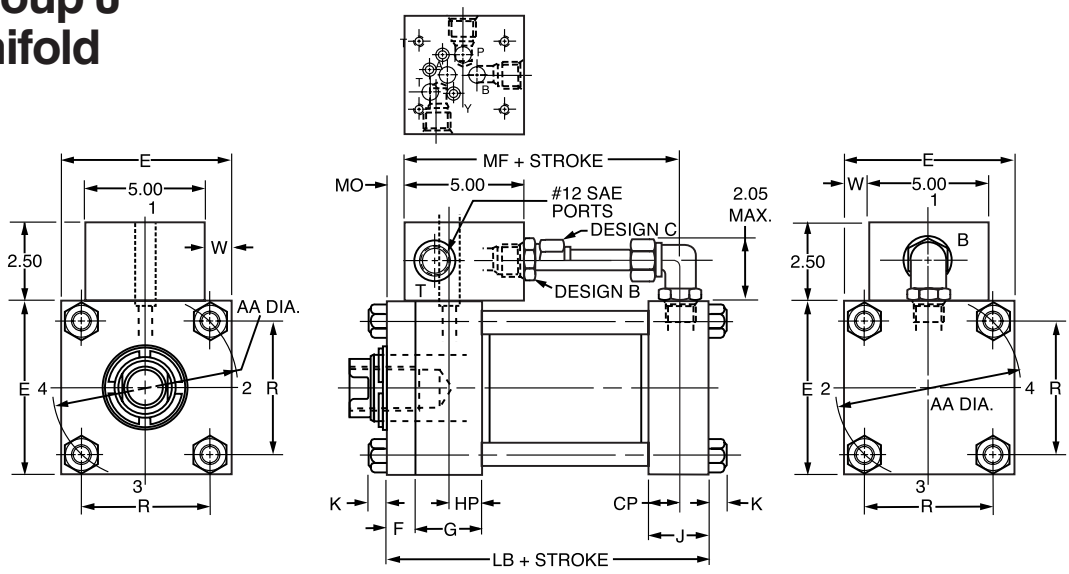
2HX with Group J Bolt-on Manifold Cap End
(NFPA D06)



Group J/NFPA D06 Valve Manifold, Cap End Mounted Series 2HX Cylinder														Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	W	Min. Stroke	Min. Stroke
6.00	.620	7.500	6.745	1.000	1.000	1.000	2.250	2.250	.875	8.100	5.730	8.375	1.250	.625	1.750

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. Consult Factory for DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

2HX with Group J Bolt-on Manifold Head End
(NFPA D06)

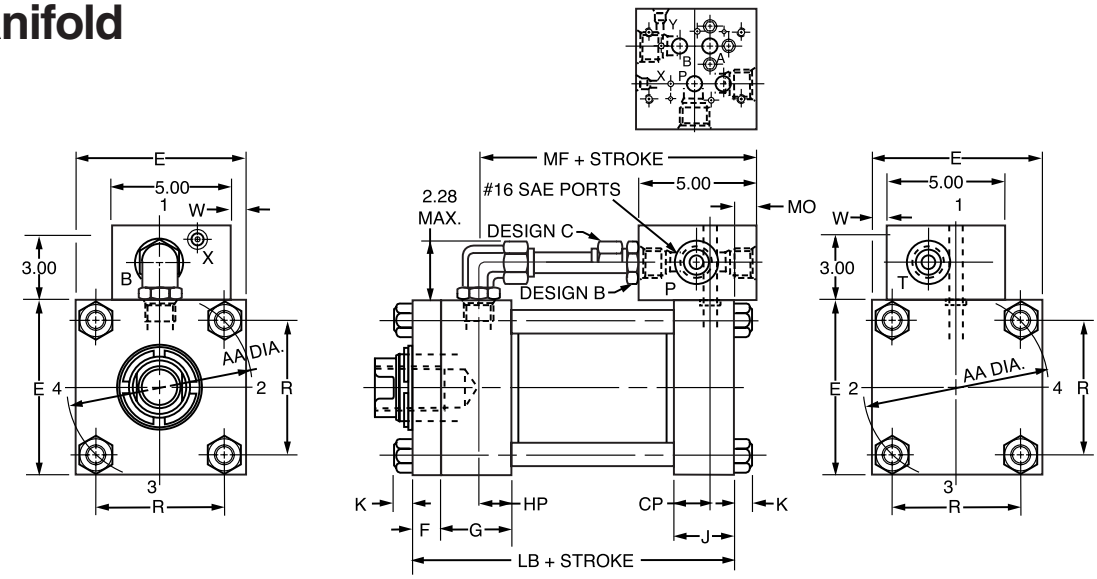


Group J/NFPA D06 Valve Bolt-on Manifold, Head End Mounted, Series 2HX Cylinder														Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	W	LB	Min. Stroke	Min. Stroke
6.00	.380	7.500	6.745	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	1.250	8.375	.625	1.750

Design A (not shown) used only if stroke is shorter than minimum stroke shown for "Design B" on chart; consult factory, engineering required.
*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. Consult Factory for DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

For Cylinder Division Plant Locations – See Page II.

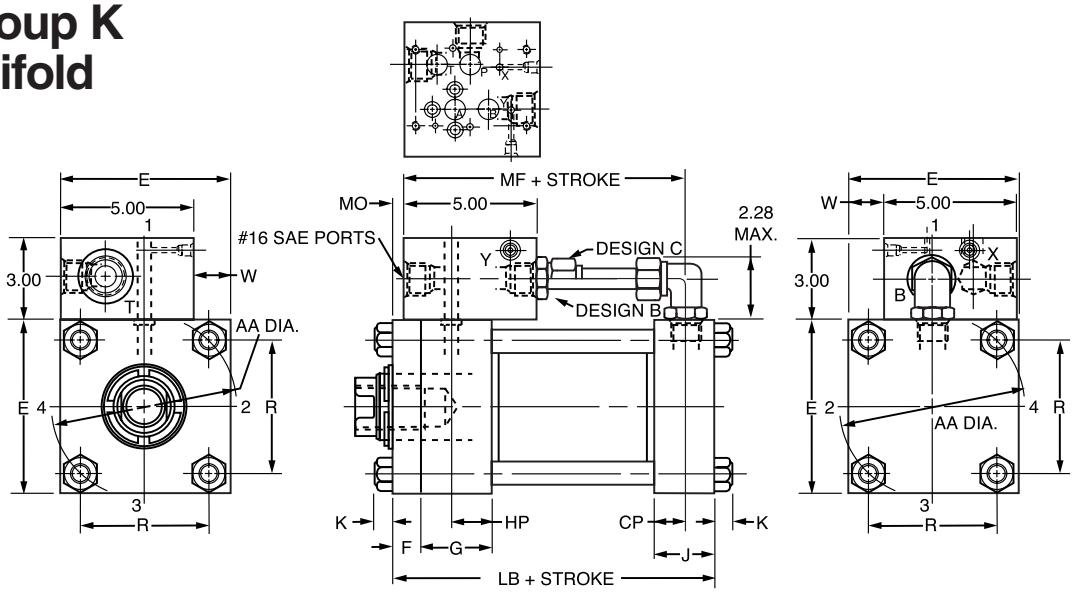
2HX with Group K Bolt-on Manifold Cap End
(NFPA D07)



Group K/NFPA D07 Valve Manifold, Cap End Mounted Series 2HX Cylinder														Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	LB	W	Min. Stroke	Min. Stroke
6.00	.590	7.500	6.715	1.000	1.000	1.000	2.250	2.250	.875	8.100	5.730	8.375	.435	1.104	2.285

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. Consult Factory for DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

2HX with Group K Bolt-on Manifold Head End
(NFPA D07)

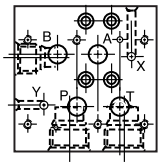


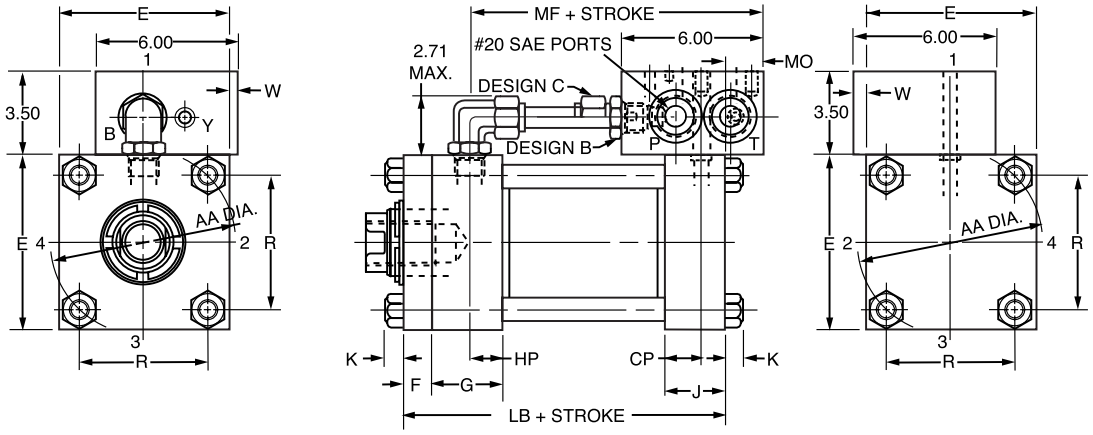
Group J/NFPA D07 Valve Bolt-on Manifold, Head End Mounted, Series 2HX Cylinder														Design B*	Design C*
Bore	MO	E	MF	CP	HP	F	G	J	K	AA	R	W	LB	Min. Stroke	Min. Stroke
6.00	.410	7.500	6.715	1.000	1.000	1.000	2.25	2.25	.875	8.1	5.73	2.065	8.375	1.104	2.285

Design A (not shown) used only if stroke is shorter than minimum stroke shown for "Design B" on chart; consult factory, engineering required.
*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart. Consult Factory for DD Mount.
*Design C used only for strokes in “Design C” column on chart and greater strokes. Standard Operating Pressure is 3000 PSI.

For additional information – call your local Parker Cylinder Distributor.

2HX with Group M Bolt-on Manifold Cap End
(NFPA D08)

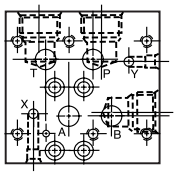


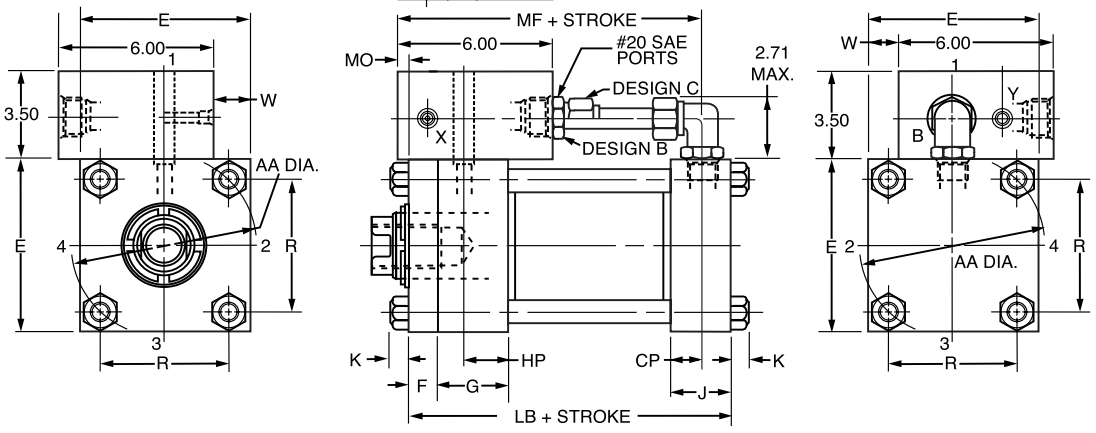


Group M/NFPA D08 Valve Manifold, Cap End Mounted Series 2HX Cylinder														Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**F**	**G**	**J**	**K**	**AA**	**R**	**LB**	**W**	**Min. Stroke**	**Min. Stroke**
6.00	1.566	7.500	7.816	1.286	1.125	1.000	2.250	2.250	.875	8.100	5.730	8.375	.250	1.75	3.00

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.
Consult Factory for DD Mount.
Standard Operating Pressure is 3000 PSI.

2HX with Group M Bolt-on Manifold Head End
(NFPA D08)





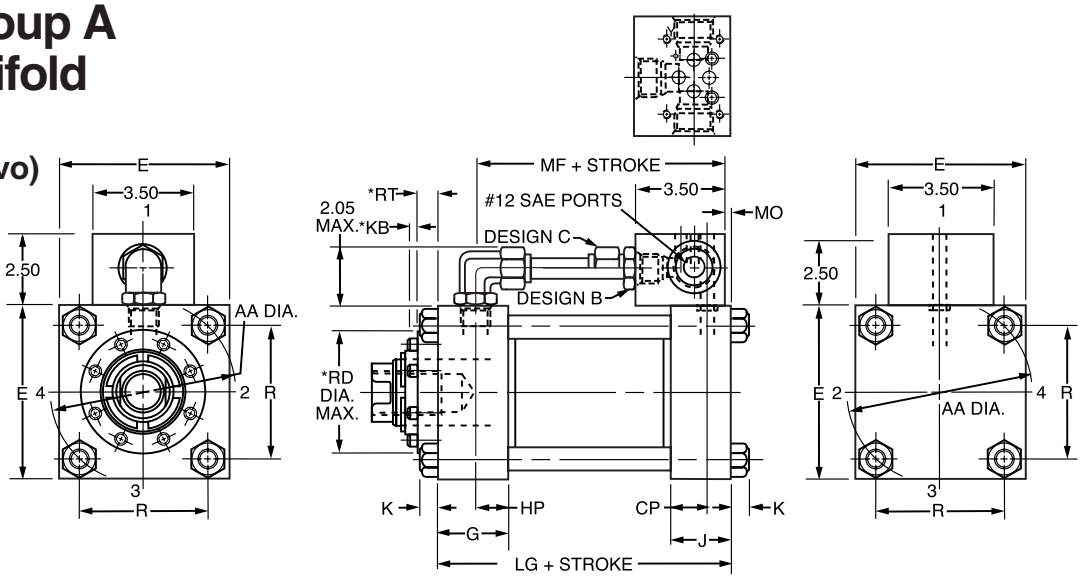
Group M/NFPA D08 Valve Bolt-on Manifold, Head End Mounted, Series 2HX Cylinder														Design B*	Design C*
Bore	**MO△**	**E**	**MF**	**CP**	**HP**	**F**	**G**	**J**	**K**	**AA**	**R**	**W†**	**LB**	**Min. Stroke**	**Min. Stroke**
6.00	.500	7.500	7.813	1.188	1.220	1.000	2.25	2.25	.875	8.1	5.73	1.755	8.375	1.75	3.00

Design A (not shown) used only if stroke is shorter than minimum stroke shown for "Design B" on chart; consult factory, engineering required.
*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.
△BOM will overhang past head face.
Consult Factory for DD Mount.
Standard Operating Pressure is 3000 PSI.
†BOM will overhang past head face.

For Cylinder Division Plant Locations – See Page II.

3HX with Group A Bolt-on Manifold Cap End

(Parker BD-15 Servo)



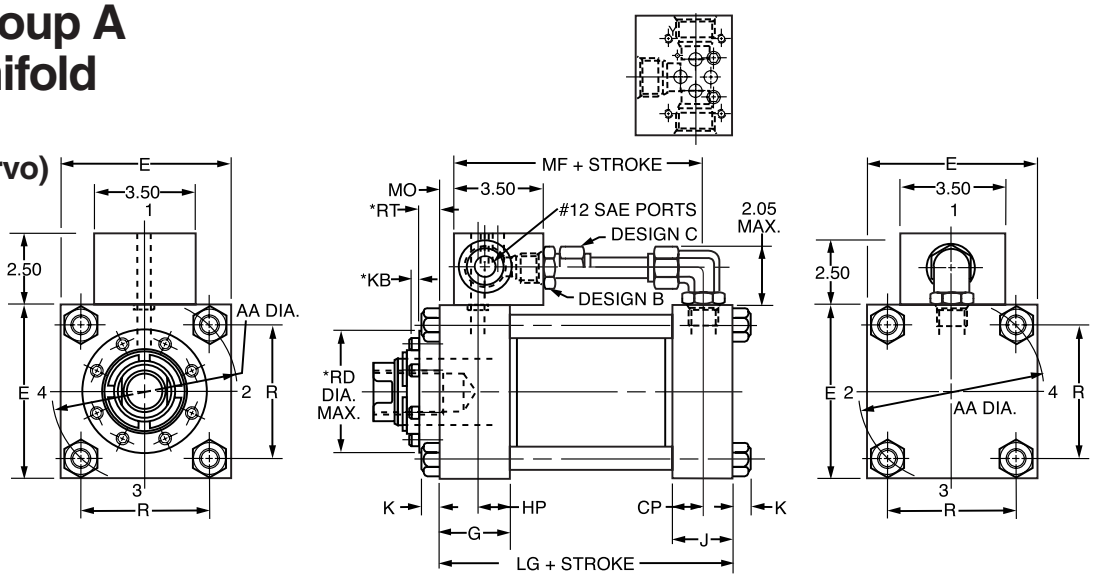
Group A/Parker BD-15 Valve Manifold, Cap End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**	**Min. Stroke**	**Min. Stroke**
7.00	.188	8.500	6.813	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	.375
8.00	.313	9.500	7.563	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	N/A	0

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group A Bolt-on Manifold Head End

(Parker BD-15 Servo)



Group A/Parker BD-15 Valve Manifold, Head End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**	**Min. Stroke**	**Min. Stroke**
7.00	.188	8.500	6.813	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	.375
8.00	.313	9.500	7.563	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	N/A	0

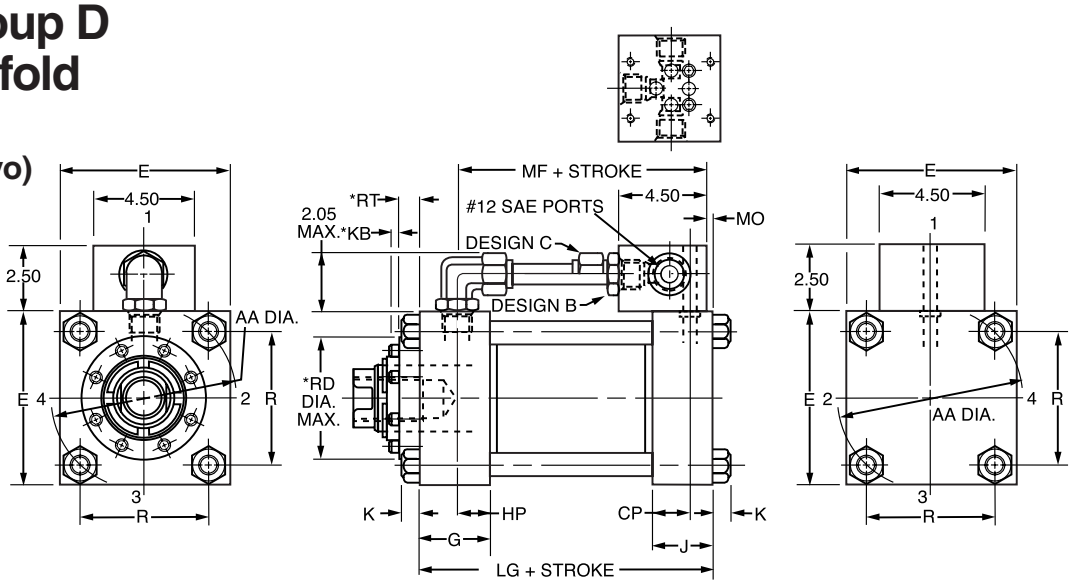
*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For additional information – call your local Parker Cylinder Distributor.

3HX with Group D Bolt-on Manifold Cap End

(Parker BD-30 Servo)



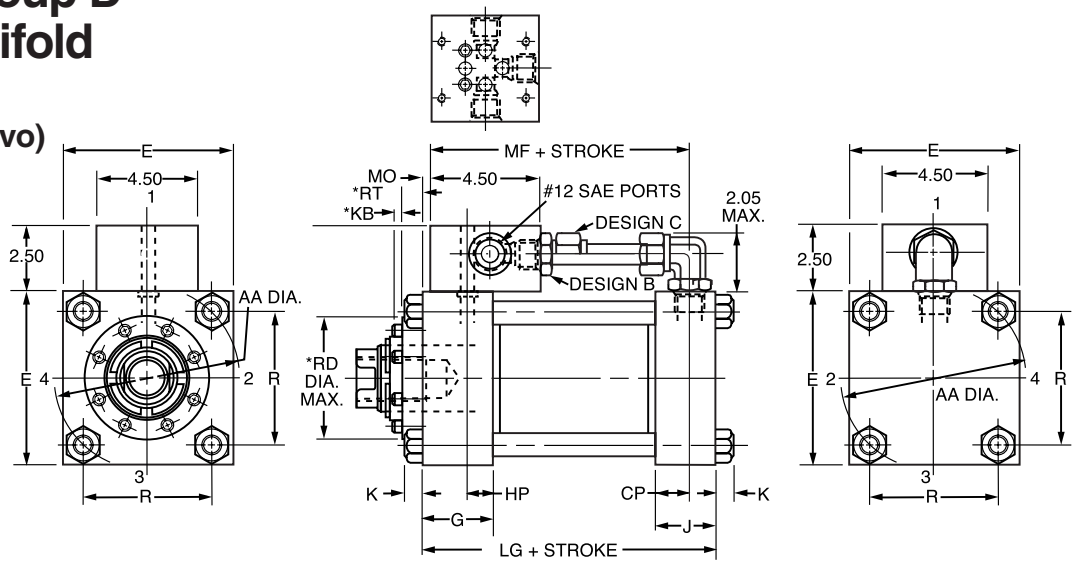
Group D/Parker BD-30 Valve Manifold, Cap End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	Min. Stroke	Min. Stroke
7.00	.125	8.500	6.875	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	1.250
8.00	.250	9.500	7.625	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	0	.500

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group D Bolt-on Manifold Head End

(Parker BD-30 Servo)



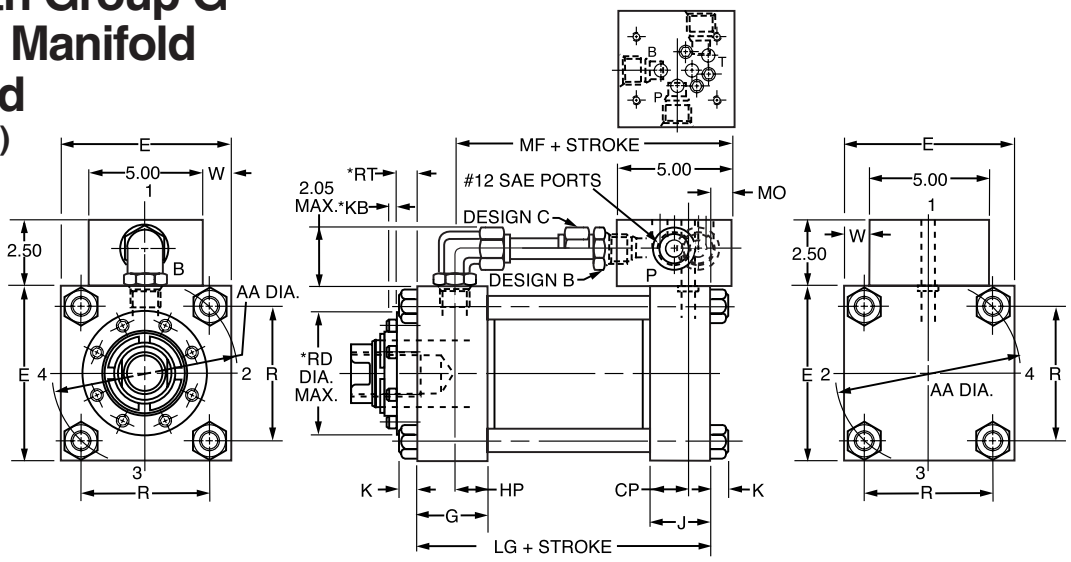
Group D/Parker BD-30 Valve Manifold, Head End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	Min. Stroke	Min. Stroke
7.00	.125	8.500	6.875	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	1.250
8.00	.250	9.500	7.625	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	0	.500

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For Cylinder Division Plant Locations – See Page II.

3HX with Group G Bolt-on Manifold Cap End
(NFPA D03)

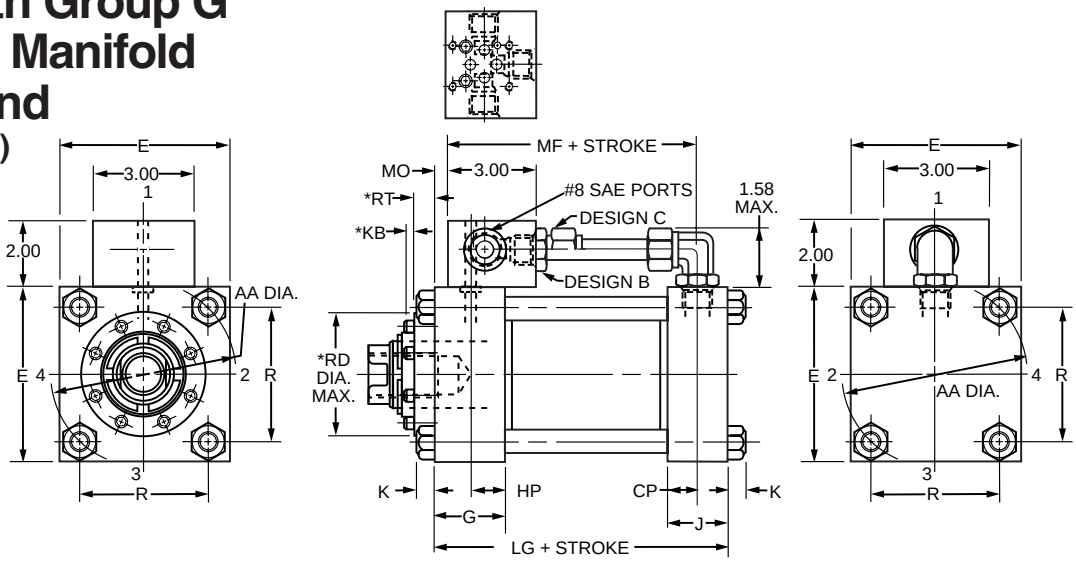


Group G/NFPA D03 Valve Manifold, Cap End Mounted Series 3HX Cylinder											
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**
7.00	.344	8.500	6.656	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50
8.00	.469	9.500	7.406	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50

*Design B used only if stroke falls in between “Design B” and “Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group G Bolt-on Manifold Head End
(NFPA D03)



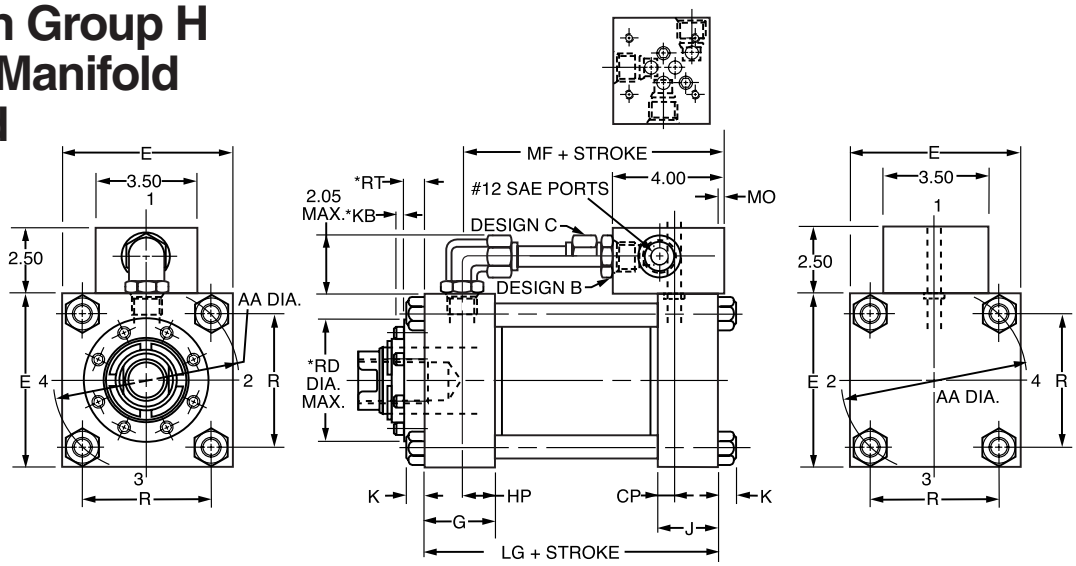
Group G/NFPA D03 Valve Manifold, Head End Mounted Series 3HX Cylinder											
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**
7.00	.344	8.500	6.656	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50
8.00	.469	9.500	7.406	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50

*Design B used only if stroke falls in between “Design B” and ‘Design C” min. stroke columns on chart.
*Design C used only for strokes in “Design C” column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For additional information – call your local Parker Cylinder Distributor.

3HX with Group H Bolt-on Manifold Cap End
(NFPA D05)

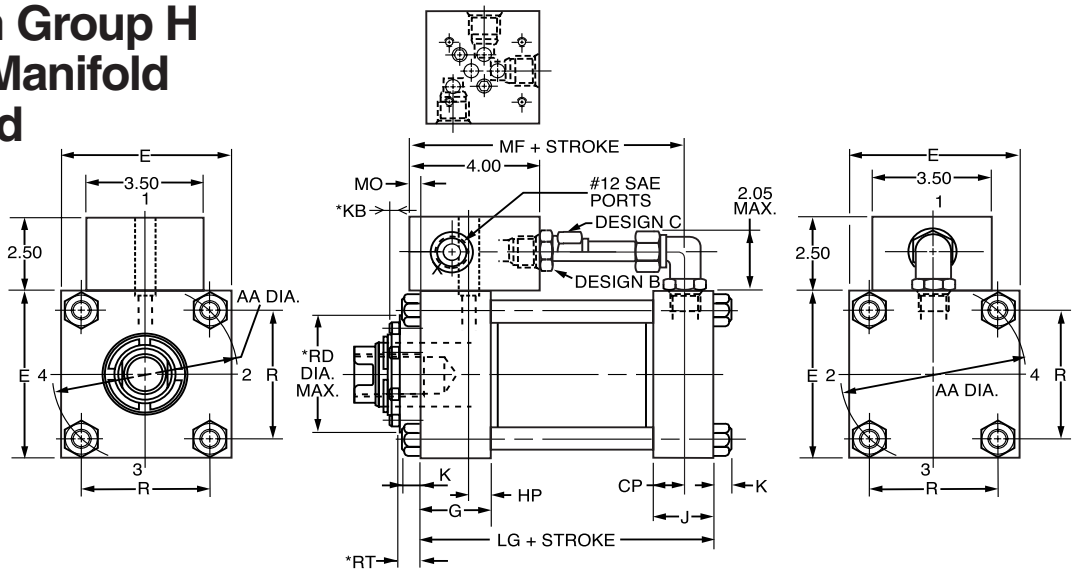


Group H/NFPA D05 Valve Manifold, Cap End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	Min. Stroke	Min. Stroke
7.00	.141△	8.500	7.141	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	.50
8.00	.016△	9.500	7.891	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	N/A	0

△BOM will overhang cap face
*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group H Bolt-on Manifold Head End
(NFPA D05)



Group H/NFPA D05 Valve Manifold, Head End Mounted Series 3HX Cylinder												Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	Min. Stroke	Min. Stroke
7.00	.141△	8.500	7.141	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	0	.50
8.00	.016△	9.500	7.891	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	N/A	0

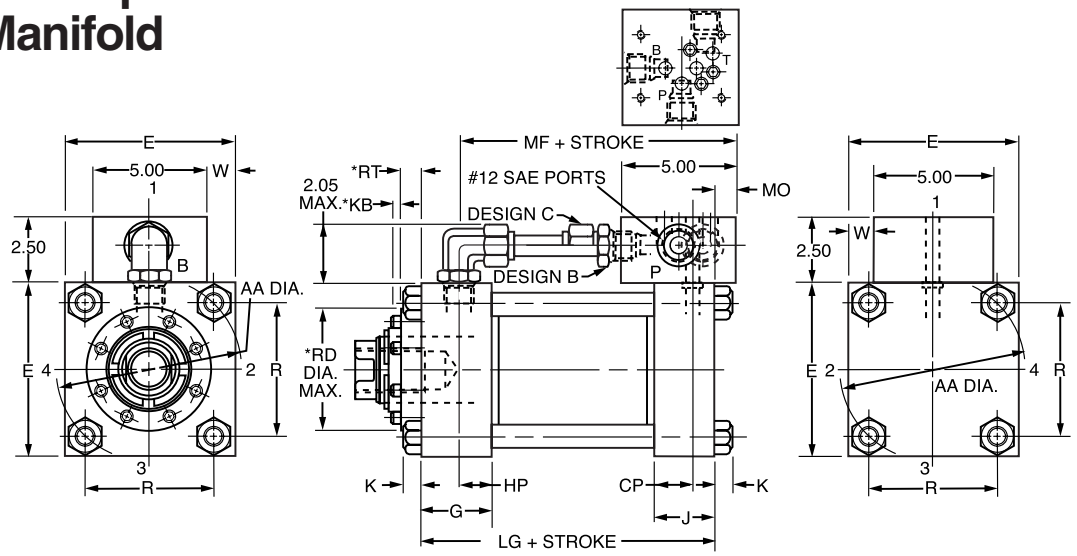
△BOM will overhang cap face
*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For Cylinder Division Plant Locations – See Page II.

B

3HX with Group J Bolt-on Manifold Cap End
(NFPA D06)

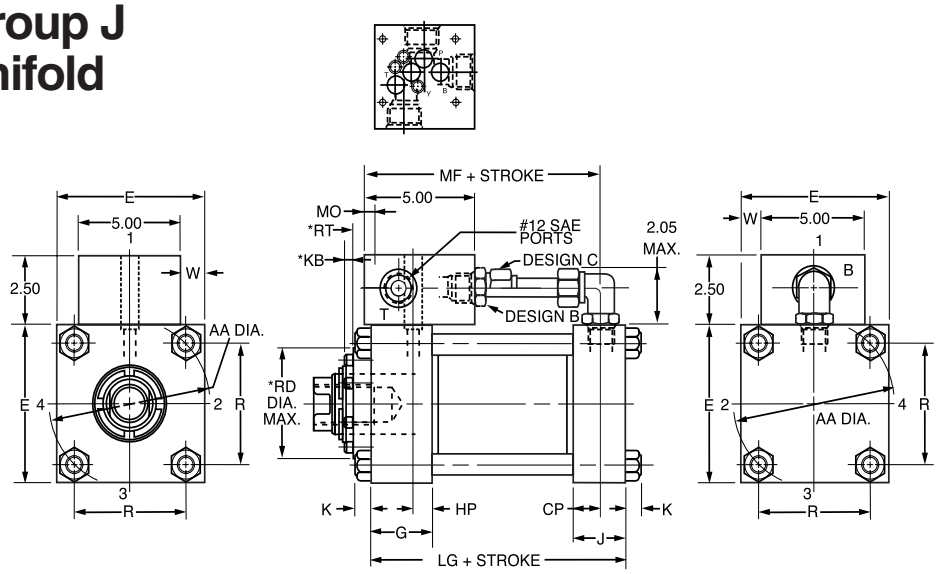


Group J/NFPA D06 Valve Manifold, Cap End Mounted Series 3HX Cylinder													Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**	**W**	**Min. Stroke**	**Min. Stroke**
7.00	.375△	8.500	7.375	1.250	1.250	2.750	2.750	1.000	9.300	6.580	8.500	1.750	.25	1.125
8.00	.250△	9.500	8.125	1.375	1.375	3.000	3.000	1.062	10.600	7.500	9.500	2.250	0	.375

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past cap face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group J Bolt-on Manifold Head End
(NFPA D06)



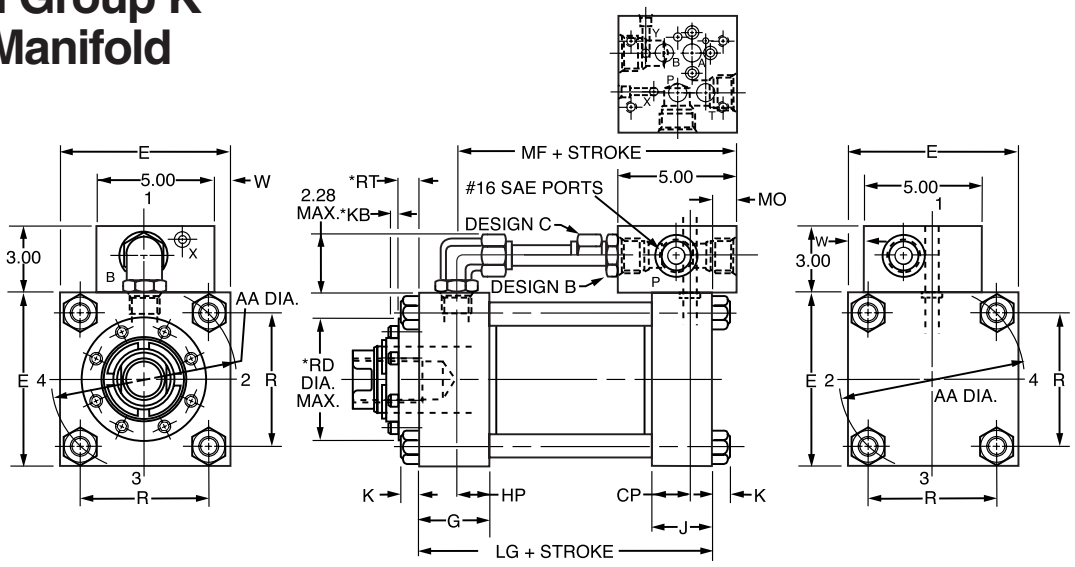
Group J/NFPA D06 Valve Bolt-on Manifold, Head End Mounted, Series 3HX Cylinder													Design B*	Design C*
Bore	**MO**	**E**	**MF**	**CP**	**HP**	**G**	**J**	**K**	**AA**	**R**	**LG**	**W**	**Min. Stroke**	**Min. Stroke**
7.00	.375△	8.500	7.375	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	1.75	.250	1.125
8.00	.250△	9.500	8.125	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	2.25	0	.375

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past head face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For additional information – call your local Parker Cylinder Distributor.

3HX with Group K Bolt-on Manifold Cap End
(NFPA D07)

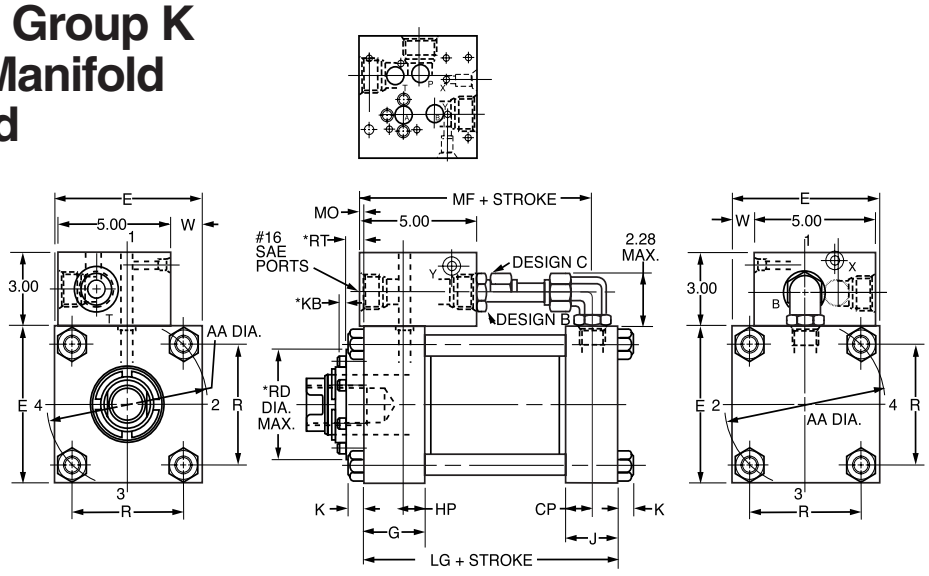


Group K/NFPA D07 Valve Manifold, Cap End Mounted Series 3HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	W	Min. Stroke	Min. Stroke
7.00	.344△	8.500	7.344	1.250	1.250	2.750	2.750	1.000	9.300	6.580	8.500	.935	.750	1.750
8.00	.219△	9.500	8.094	1.375	1.375	3.000	3.000	1.062	10.600	7.500	9.500	1.435	0	1.000

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past cap face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group K Bolt-on Manifold Head End
(NFPA D07)



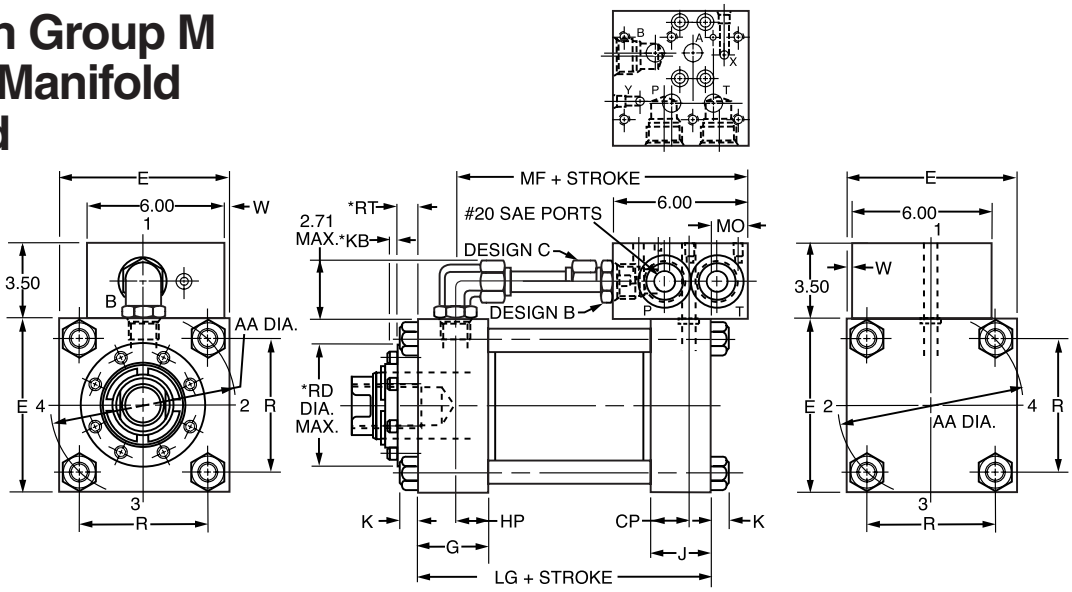
Group K/NFPA D07 Valve Bolt-on Manifold, Head End Mounted, Series 3HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	W	Min. Stroke	Min. Stroke
7.00	.344△	8.500	7.344	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	2.565	.750	1.75
8.00	.219△	9.500	8.094	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	3.065	0	1.000

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past head face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For Cylinder Division Plant Locations – See Page II.

3HX with Group M Bolt-on Manifold Cap End
(NFPA D08)

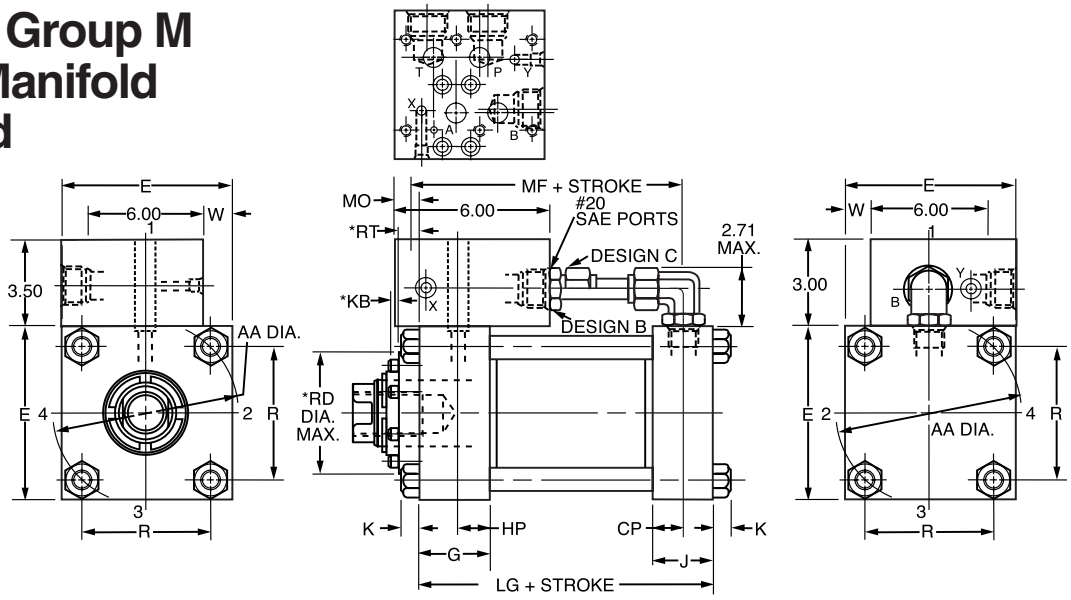


Group M/NFPA D08 Valve Manifold, Cap End Mounted Series 3H Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	W	Min. Stroke	Min. Stroke
7.00	1.031△	8.500	8.031	1.250	1.250	2.750	2.750	1.000	9.300	6.580	8.500	.250	1.375	2.625
8.00	.906△	9.500	8.781	1.375	1.375	3.000	3.000	1.062	10.600	7.500	9.500	.750	.625	1.938

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past cap face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

3HX with Group M Bolt-on Manifold Head End
(NFPA D08)



Group M/NFPA D08 Valve Bolt-on Manifold, Head End Mounted, Series 3HX Cylinder													Design B*	Design C*
Bore	MO	E	MF	CP	HP	G	J	K	AA	R	LG	W	Min. Stroke	Min. Stroke
7.00	1.031△	8.500	8.031	1.250	1.250	2.75	2.75	1.000	9.3	6.58	8.50	2.250	1.375	2.625
8.00	.906△	9.500	8.781	1.375	1.375	3.00	3.00	1.062	10.6	7.50	9.50	2.750	.625	1.938

*Design B used only if stroke falls in between "Design B" and "Design C" min. stroke columns on chart.
*Design C used only for strokes in "Design C" column on chart and greater strokes.
△BOM will overhang past head face.

*See Parker Series 3H for dimensions.
Standard Operating Pressure is 3000 PSI.
Consult Factory for DD Mount.

For additional information – call your local Parker Cylinder Distributor.

Series 2HX and 3HX Mounting Dimensions

The Parker Series 2HX and 3HX Bolt-on Manifold option does not affect the standard envelope and mounting dimensions of the base Parker Series 2H or 3H Heavy Duty Hydraulic Cylinder except where noted on previous pages of this catalog. All standard Parker Series 2H and 3H mounting styles are available with the Series 2HX and 3HX Bolt-on Manifold option. For base cylinder dimensions refer to the Parker Series 2H and 3H sections of the Parker Actuator Catalog.

Series 2HX and 3HX Bolt-on Manifolds may be specified at any head or cap position which does not interfere with the mounting style selected. For available manifold mounting positions see Table A on page B-165. Manifold position must be specified when ordering.

For Parker mounting style DD refer to the minimum and maximum XI dimensions in Table 1 and Table 2 below.

Consult Factory for 6" Bore 2HX and 7"-8" Bore 3HX with Style DD Mounts.

Table 1 – Head End Mounted Bolt-on Manifold Maximum and Minimum 'XI' Location for Style DD Mounts

Series	Bore	MX	MN Bolt-on Manifold						
			Group A	Group D	Group G	Group H	Group J	Group K	Group M
2HX	2	3	4.563	N/A	4.219	4.734	N/A	N/A	N/A
	2.5	3.125	4.563	N/A	4.219	4.734	N/A	N/A	N/A
	3.25	3.5	5.032	5.969	4.688	5.203	N/A	N/A	N/A
	4	3.875	5.156	6.094	4.813	5.328	N/A	N/A	N/A
	5	4.375	5.156	6.094	4.813	5.328	N/A	N/A	N/A
	6	CONSULT FACTORY							
3HX	7	CONSULT FACTORY							
	8	CONSULT FACTORY							
3LX	2	2.25	N/A	N/A	3.906	N/A	N/A	N/A	N/A
	2.5	2.375	N/A	N/A	3.906	N/A	N/A	N/A	N/A
	3.25	2.625	4.875	N/A	4.531	5.047	N/A	N/A	N/A
	4	2.625	4.875	N/A	4.531	5.047	N/A	N/A	N/A
	5	2.875	4.875	N/A	4.531	5.047	N/A	N/A	N/A
	6	3	5.375	6.313	5.031	5.547	N/A	N/A	N/A
	8	3.125	5.375	6.313	5.031	5.547	N/A	N/A	N/A

Maximum and Minimum 'XI' Location

2H & 3L Series
Min. 'XI' = W + MN
Max. 'XI' = W + MX + Stroke

3H Series
Min. 'XI' = WF + MN
Max. 'XI' = W + MX + Stroke

Table 2 – Cap End Mounted Bolt-on Manifold Maximum and Minimum 'XI' Location for Style DD Mounts

Series	Bore	MN	MX Bolt-on Manifold						
			Group A	Group D	Group G	Group H	Group J	Group K	Group M
2HX	2	3.125	1.562	N/A	1.906	1.391	N/A	N/A	N/A
	2.5	3.125	1.687	N/A	2.031	1.516	N/A	N/A	N/A
	3.25	3.75	2.218	1.281	2.563	2.047	N/A	N/A	N/A
	4	3.875	2.593	1.656	2.938	2.422	N/A	N/A	N/A
	5	3.875	3.093	2.156	3.438	2.922	N/A	N/A	N/A
	6	CONSULT FACTORY							
3HX	7	CONSULT FACTORY							
	8	CONSULT FACTORY							
3LX	2	2.625	N/A	N/A	0.969	N/A	N/A	N/A	N/A
	2.5	2.625	N/A	N/A	1.094	N/A	N/A	N/A	N/A
	3.25	3.375	1.125	N/A	1.469	0.953	N/A	N/A	N/A
	4	3.375	1.125	N/A	1.469	0.953	N/A	N/A	N/A
	5	3.375	1.375	N/A	1.719	1.203	N/A	N/A	N/A
	6	4	1.625	0.687	1.969	1.453	N/A	N/A	N/A
	8	4	1.75	0.812	2.093	1.578	N/A	N/A	N/A

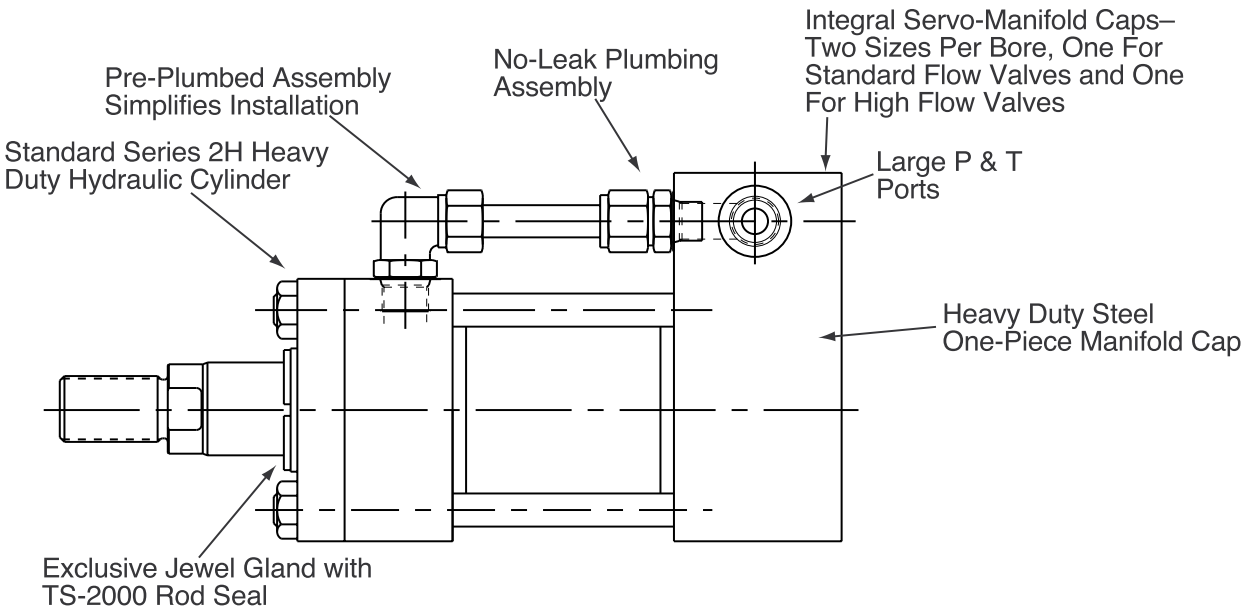
Maximum and Minimum 'XI' Location

2H & 3L Series
Min. 'XI' = W + MN
Max. 'XI' = W + MX + Stroke

3H Series
Min. 'XI' = WF + MN
Max. 'XI' = W + MX + Stroke

For Cylinder Division Plant Locations – See Page II.

Hydraulic Linear Actuator with Integral Servo/NFPA Valve Manifold and Two Feedback Options



Innovative Motion Control

Parker's new Series 2HX is an integrated assembly that eliminates transducer mounting brackets, valve manifolds, plumbing and other items associated with using separate components. The versatility of the Series 2HX allows you to design an actuator for accurate position and velocity control for your specific application.

Features and Benefits

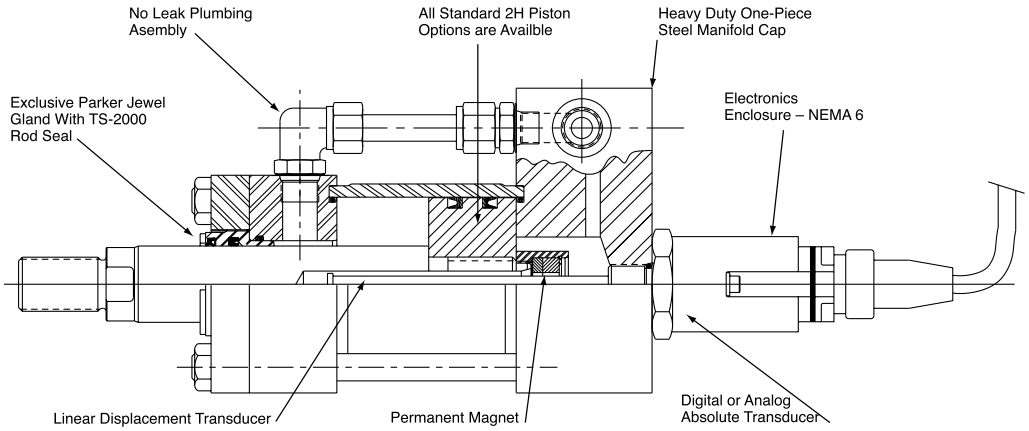
- Minimum hydraulic line runs with close cylinder and valve coupling.
- Simplified machine design with integrated components.
- Eliminates need for limit switches, deceleration valves, shock absorbers, and mechanical linkages in many applications.
- Minimum interference with standard mounting dimensions.
- Blank manifold caps can be machined to meet customer valve mounting specifications.
- Integral mounted valve eliminates assembly time and fittings.
- Custom supplied servo valve and equivalent feedback device can be integrated into the cylinder.

Custom Options Available

- Low friction rod gland – see page 211 for specifications.
- Low friction piston – see page C34 for specifications.
- Protective feedback enclosures.
- Intrinsically safe modifications.
- Explosion proof linear transducers.
- Feedback devices in stock for quick delivery of common stroke lengths.
- Closed-loop control for maximum productivity.
- Performance-tested actuators.
- Complete, tested cylinder/feedback assemblies customized to your needs.

For additional information – call your local Parker Cylinder Distributor.

2HX with Integral Valve Manifold and Magnetorestrictive Linear Displacement Transducer (LDT)

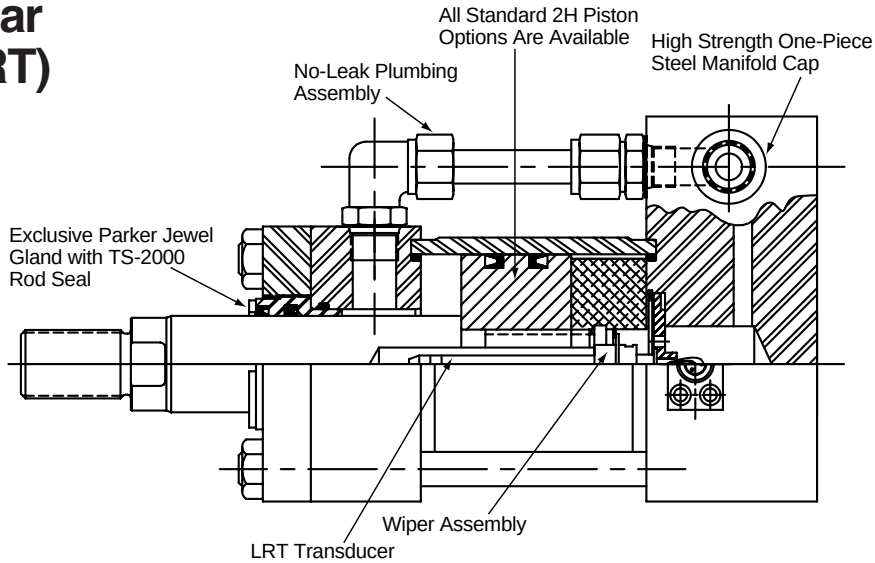


Here's How The Parker LDT Feeds Back Linear Position

The linear displacement transducer is rigidly attached to the cap end of the cylinder, and runs the full stroke length inside a hollow piston rod. A magnet is attached to the cylinder piston. As the piston moves through the stroke, the transducer is able to define the exact position of the magnet by measuring the time interval between the initiation and the return of strain pulses launched in the transducer wave guide.

For LDT specifications see page 204.

2HX with Integral Valve Manifold and Linear Potentiometer (LRT)



Here's How The Parker LRT Feeds Back Linear Position

The LRT feedback device is essentially a linear potentiometer which provides a cost effective solution for applications where a contacting device is acceptable. The potentiometer is fixed to the rear cap of the cylinder and runs the full length inside a hollow piston rod. The wiper assembly is fixed to the piston. As the piston moves through the stroke, the wiper voltage changes in proportion to the cylinder position.

For specifications on the LRT see page 209.

Integral Manifolds

Parker Series 2HX cylinders are available with integral valve mounts. There are four standard patterns available. All Integral Valve Patterns will be supplied on the cap end at position #1. Special Valve Patterns may be supplied — consult factory. Integral Valve Mounts are available on 2" through 5" Bores.

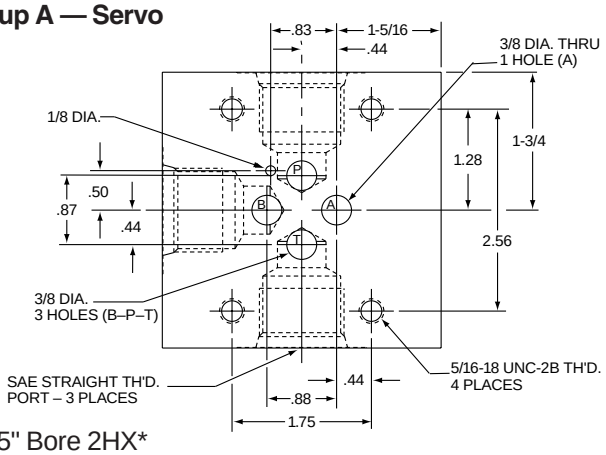
Servo Valve Mounting Interchange Chart

(All Valves in Each Group Have Interchangeable Mounts)

Group A	Group D
Parker BD-15	Parker BD-30
Atchley 215A-XXX	Atchley 240-XXX
MOOG 62 Series MOOG 73 Series MOOG 760 Series	MOOG 78 Series
Pegasus M & MP Series	Pegasus 180L Pegasus 180R
Vickers SM4-20-X-X-10	Vickers SM4-40-X-X-10

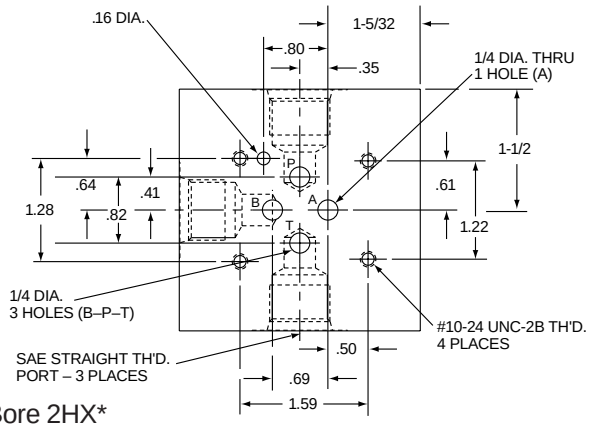
Standard Integral Valve Patterns

Group A — Servo



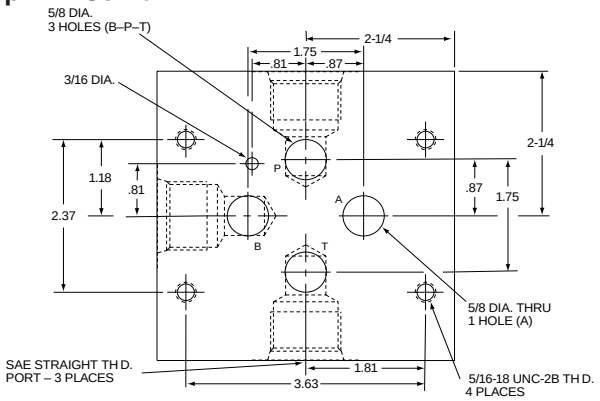
2" - 5" Bore 2HX*

Group G — NFPA DO3



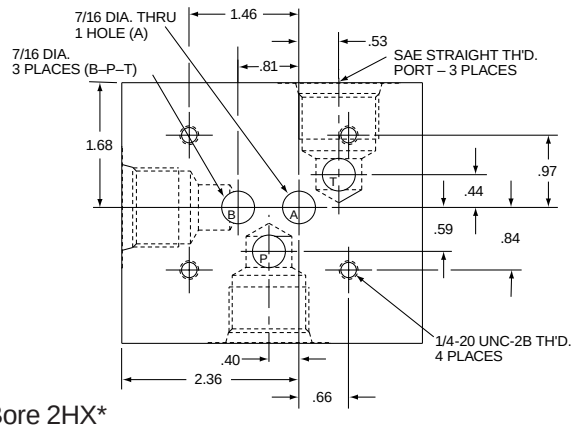
2" - 5" Bore 2HX*

Group D — Servo



2" - 5" Bore 2HX*

Group H — NFPA DO5



2" - 5" Bore 2HX*

*Note: For Integral Manifolds on larger bore sizes consult factory.

For additional information – call your local Parker Cylinder Distributor.

2HX with Integral Manifold — General Information

Bore & Rod Diameters

Standard bore and rod diameters for electro-hydraulic actuators are shown on the following pages of this catalog. Other sizes can be supplied as specials on request.

For heavy-duty or high-cycling applications, the use of a larger rod diameter is recommended. Refer to Section C, page 96 for proper sizing of piston rods.

Stroke Length

If an integrally mounted position transducer is specified, the maximum stroke length will normally be limited by the type of transducer.

Stop Tube

An internal stop tube (piston spacer) is recommended in cases where the combination of stroke length and mounting style option could result in excessive bearing loads on the piston or rod gland. Please refer to Section C of this catalog.

A stop tube may also be used to eliminate the need for an extended rod end with the LDT Model.

Mounting Styles

Mounting styles available as standard on 2HX integral manifold actuators are shown in this catalog. If other mountings are required, please consult factory.

Cushioning

On cylinders fitted with integral feedback, cushioning is available as a standard option at both ends. Double rod (equal area) cylinders can have the normal cushion option at both ends.

Pressure Ratings

Series 2HX integral manifold actuators have a nominal working pressure of 3000 psi. Recommended maximum working pressures for 2HX integral manifold actuators with Feedback option (LDT or LRT) are given below. These pressure ratings are given as a guide for typical applications. For applications involving high cycle rates, high frequencies or shock loads, please consult factory.

Parker Series 2HX Pressure Ratings

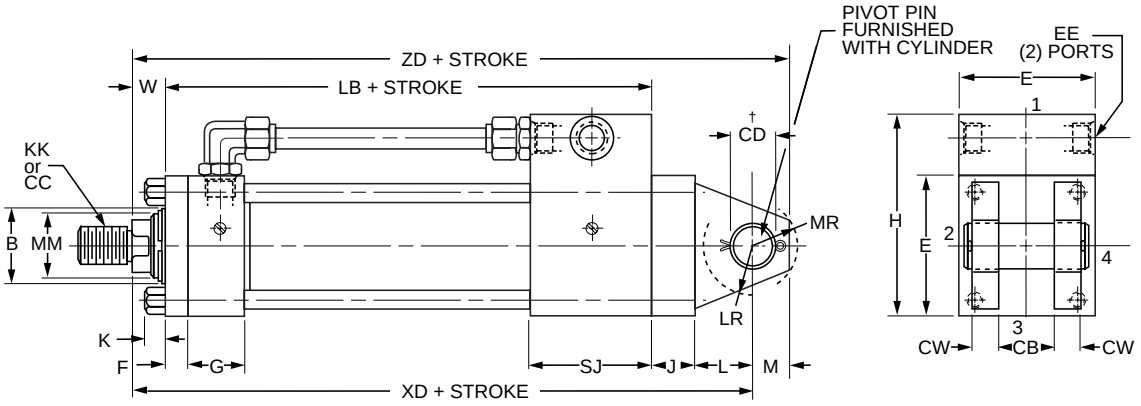
Bore	Rod No.	Rod Dia. MM	4 to 1 Design Factor (PSI)*
2	1	1	3000†
	2	1 3/8	3000
2 1/2	1	1	1800†
	2	1 3/4	3000
	3	1 3/8	3000
3 1/4	1	1 3/8	2130
	2	2	3000
	3	1 3/4	3000
4	1	1 3/4	2580
	2	2 1/2	3000
	3	2	3000
5	1	2	2510
	2	3 1/2	3000
	3	2 1/2	3000
	4	3	3000

*The 4 to 1 design factor is based on the tensile strength of the piston to rod connection.

†A mini LRT (MLRT) is available for 1" Rods – Consult Factory.

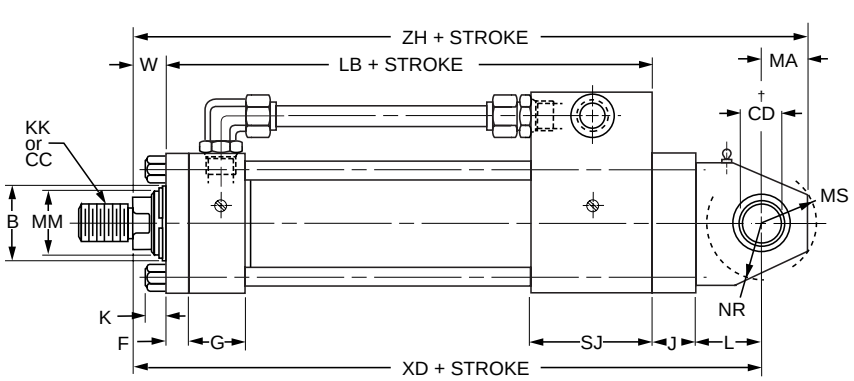
Cap Fixed Clevis

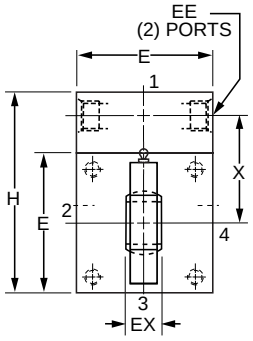
Style BB with No Feedback



Cap Spherical Bearing

Style SB with No Feedback



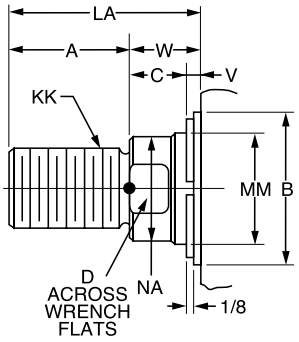


SB	Pressure Rating
2"	2200
2½"	1450
3¼"	1500
4	1850
5"	2000

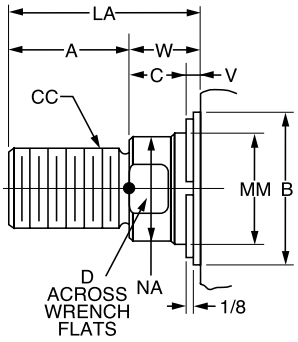
Pressure rating is for maximum life of cylinder and bearing based on dynamic load of commercial bearing.

Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	E	SAE EE *	SAE EE **	F	G	H *	H **	J	K	L	M	X *	X **	LR	MR	CB	CW	+.000 -.002 CD†	EX	MA	MS	NR	LB Add Stroke *	LB Add Stroke **	SJ *	SJ **
2	3	10	NA	5/8	1 3/4	4 7/8	NA	1 1/2	7/16	1 1/4	3/4	1 7/8	NA	1	15/16	1 1/4	5/8	.751	21/32	1	1 3/8	1	6 5/8	8 1/8	2 7/8	NA
2 1/2	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	1 1/2	7/16	1 1/4	3/4	2 1/4	3.04	15/16	15/16	1 1/4	5/8	.751	21/32	1	1 3/8	1	6 3/4	8 1/4	2 7/8	4 3/8
3 1/4	4 1/2	12	12	3/4	2	6 5/8	6 5/8	1 1/2	9/16	1 1/2	1	2 3/4	3.54	1 1/4	1 3/16	1 1/2	3/4	1.001	7/8	1 1/4	1 11/16	1 1/4	7 3/8	8 7/8	2 7/8	4 3/8
4	5	12	12	7/8	2	7 1/8	7 1/8	1 3/4	9/16	2 1/8	1 3/8	3 1/8	3.125	1 3/4	1 5/8	2	1	1.376	1 3/16	1 7/8	2 7/16	1 5/8	9 1/4	9 1/4	4 3/8	4 3/8
5	6 1/2	12	12	7/8	2	8 5/8	8 5/8	1 3/4	13/16	2 1/4	1 3/4	3 5/8	3.625	2 1/16	2 1/8	2 1/2	1 1/4	1.751	1 17/32	2 1/2	2 7/8	2 1/16	9 3/4	9 3/4	4 3/8	4 3/8

†Dimension CD is pin diameter.
*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

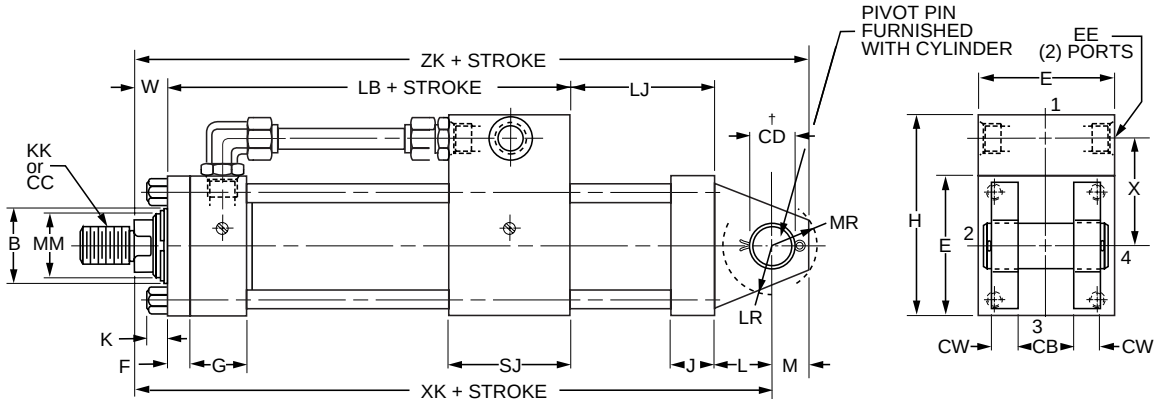
Table 2 — Rod End and Envelope Dimensions

Bore	Rod No.	Rod Dia. MM	Thread CC	Thread KK	A	+.000 -.002 B	C	D	LA	NA	V	W	Add Stroke XD *	Add Stroke XD **	Add Stroke ZD *	Add Stroke ZD **	Add Stroke ZH *	Add Stroke ZH **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	10 3/8	11 7/8	11 1/8	12 5/8	11 3/8	12 7/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	10 3/4	12 1/14	11 1/2	13	11 3/4	13 1/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	10 1/2	12	11 1/4	12 3/4	11 1/2	13
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	11 1/4	12 3/4	12 1/4	13 3/4	12 1/2	14
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	11 5/8	13 1/8	12 5/8	14 1/8	12 7/8	14 3/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	11 1/2	13	12 1/2	14	12 3/4	14 1/4
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	14 1/8	14 1/8	15 1/2	15 1/2	16	16
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	14 1/2	14 1/2	15 7/8	15 7/8	16 3/8	16 3/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	14 1/4	14 1/4	15 5/8	15 5/8	16 1/8	16 1/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	14 7/8	14 7/8	16 5/8	16 5/8	17 3/8	17 3/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	15 1/8	15 1/8	16 7/8	16 7/8	17 5/8	17 5/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	15 1/8	15 1/8	16 7/8	16 7/8	17 5/8	17 5/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	15 1/8	15 1/8	16 7/8	16 7/8	17 5/8	17 5/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

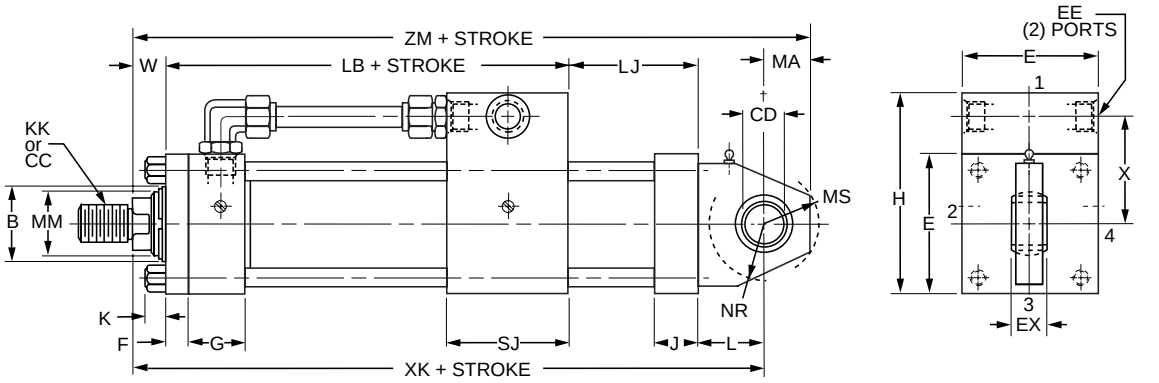
Cap Fixed Clevis

Style BB with LDT and LRT Feedback



Cap Spherical Bearing

Style SB with LDT and LRT Feedback

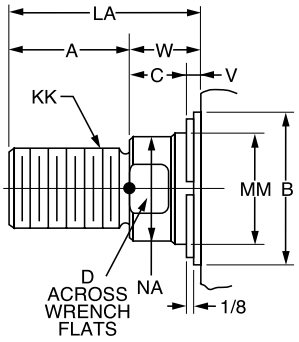


SB	Pressure Rating
2"	2200
2½"	1350
3¼"	1350
4"	1400
5"	1800

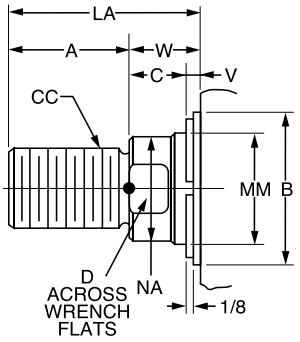
Pressure rating is for maximum life of cylinder and bearing based on dynamic load of commercial bearing.

Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	E	SAE EE *	SAE EE **	F	G	H *	H **	J	K	L	M	X *	X **	LR	MR	CB	CW	+.000 -.002 CD†	EX	MA	MS	NR	LB Add Stroke *	LB Add Stroke **	SJ *	SJ **	LJ††
2	3	10	NA	5/8	1 3/4	4 7/8	NA	1 1/2	7/16	1 1/4	3/4	1 7/8	NA	1	15/16	1 1/4	5/8	.751	21/32	1	1 3/8	1	6 5/8	NA	2 7/8	NA	5 1/2
2 1/2	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	1 1/2	7/16	1 1/4	3/4	2 1/4	3.04	15/16	15/16	1 1/4	5/8	.751	21/32	1	1 3/8	1	6 3/4	8 1/4	2 7/8	4 3/8	5 1/2
3 1/4	4 1/2	12	12	3/4	2	6 5/8	6 5/8	1 1/2	9/16	1 1/2	1	2 3/4	3.54	1 1/4	1 3/16	1 1/2	3/4	1.001	7/8	1 1/4	1 11/16	1 1/4	7 3/8	8 7/8	2 7/8	4 3/8	5 1/2
4	5	12	12	7/8	2	7 1/8	7 1/8	1 3/4	9/16	2 1/8	1 3/8	3 1/8	3.125	1 3/4	1 5/8	2	1	1.376	1 3/16	1 7/8	2 7/16	1 5/8	9 1/4	9 1/4	4 3/8	4 3/8	5 3/4
5	6 1/2	12	12	7/8	2	8 5/8	8 5/8	1 3/4	13/16	2 1/4	1 3/4	3 5/8	3.625	2 1/16	2 1/8	2 1/2	1 1/4	1.751	1 17/32	2 1/2	2 7/8	2 1/16	9 3/4	9 3/4	4 3/8	4 3/8	5 3/4

†Dimension CD is pin diameter.
*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.
††"RO" style integral cable only on LDT.
For RB style connection on LDT consult factory for LJ, ZK, XK dimensions.
Velocity of LRT actuators must not exceed 30 ips.

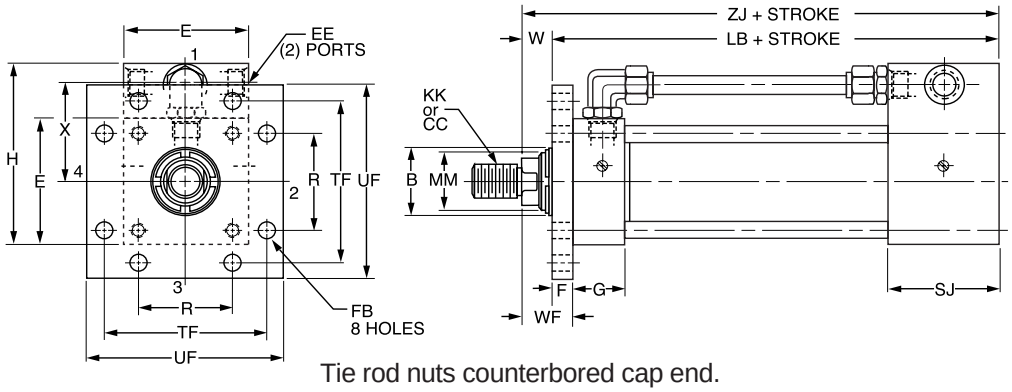
Table 2 — Rod End and Envelope Dimensions

Bore	Rod No.	Rod Dia. MM	Thread CC	Thread KK	A	+.000 -.002 B	C	D	LA	NA	V	W	Add Stroke XK *	Add Stroke XK **	Add Stroke ZK *	Add Stroke ZK **	Add Stroke ZM *	Add Stroke ZM **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	14 3/8	15 7/8	15 1/8	16 5/8	15 3/8	16 7/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	14 3/4	16 1/14	15 1/2	17	15 3/4	17 1/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	14 1/2	16	15 1/4	16 3/4	15 1/2	17
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	15 1/4	16 3/4	16 1/4	17 3/4	16 1/2	18
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	15 5/8	17 1/8	16 5/8	18 1/8	16 7/8	18 3/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	15 1/2	17	16 1/2	18	16 3/4	18 1/4
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	18 1/8	18 1/8	19 1/2	19 1/2	20	20
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	18 1/2	18 1/2	19 7/8	19 7/8	20 3/8	20 3/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	18 1/4	18 1/4	19 5/8	19 5/8	20 1/8	20 1/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	18 7/8	18 7/8	20 5/8	20 5/8	21 3/8	21 3/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	19 1/8	19 1/8	20 7/8	20 7/8	21 5/8	21 5/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	19 1/8	19 1/8	20 7/8	20 7/8	21 5/8	21 5/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	19 1/8	19 1/8	20 7/8	20 7/8	21 5/8	21 5/8

Note: Electrical port or connector will be provided at position 1 of rear cap.
Mounting styles BB, B, SB with analog LDT feedback require the use of Analog Output Module (AOM).
*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

Head Square Flange

Style JB — All Feedback Types



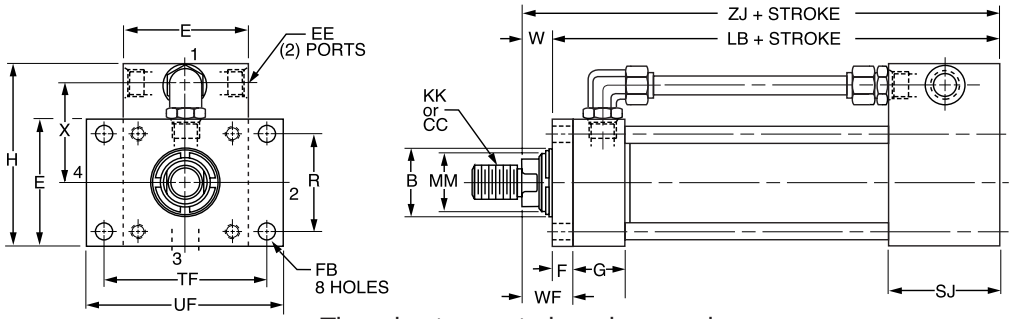
Tie rod nuts counterbored cap end.

Head Rectangular Flange

Style J — All Feedback Types

Bore Size	Max. PSI — Push* Rod Code 1	2	3	4	5
1 1/2	2500	1500	—	—	—
2	2500	1500	—	—	—
2 1/2	2500	1500	1900	—	—
3 1/4	2500	1500	2100	—	—
4	2500	1500	1800	—	—
5	2200	750	1650	1200	—

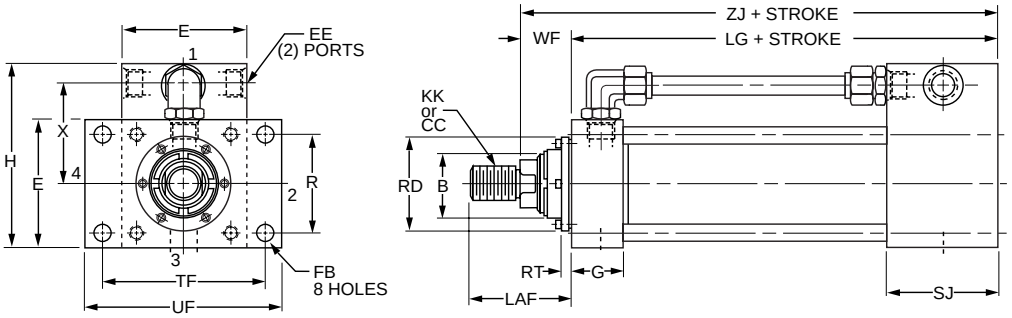
*Maximum pressure rating — push application.



Tie rod nuts counterbored cap end.

Head Rectangular

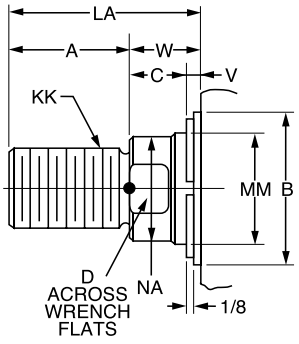
Style JJ — All Feedback Types



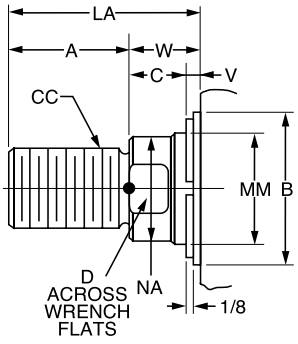
Tie rod nuts counterbored cap end.

Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	E	SAE EE *	SAE EE **	F	G	H *	H **	K	R	X *	X **	FB	TF	UF	LB Add Stroke *	LB Add Stroke **	LG Add Stroke *	LG Add Stroke **	SJ *	SJ **
2	3	10	NA	5/8	1 3/4	4 7/8	NA	7/16	2.05	1 7/8	NA	9/16	4 1/8	5 1/8	6 5/8	NA	6	NA	2 7/8	NA
2 1/2	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	7/16	2.55	2 1/4	3.04	9/16	4 5/8	5 5/8	6 3/4	8 1/4	6 1/8	7 5/8	2 7/8	4 3/8
3 1/4	4 1/2	12	12	3/4	2	6 5/8	6 5/8	9/16	3.25	2 3/4	3.54	11/16	5 7/8	7 1/8	7 3/8	8 7/8	6 5/8	8 1/8	2 7/8	4 3/8
4	5	12	12	7/8	2	7 1/8	7 1/8	9/16	3.82	3 1/8	3.125	11/16	6 3/8	7 5/8	9 1/4	9 1/4	8 3/8	8 3/8	4 3/8	4 3/8
5	6 1/2	12	12	7/8	2	8 5/8	8 5/8	13/16	4.95	3 5/8	3.625	15/16	8 3/16	9 3/4	9 3/4	9 3/4	8 7/8	8 7/8	4 3/8	4 3/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H. Velocity of LRT actuators must not exceed 30 ips.

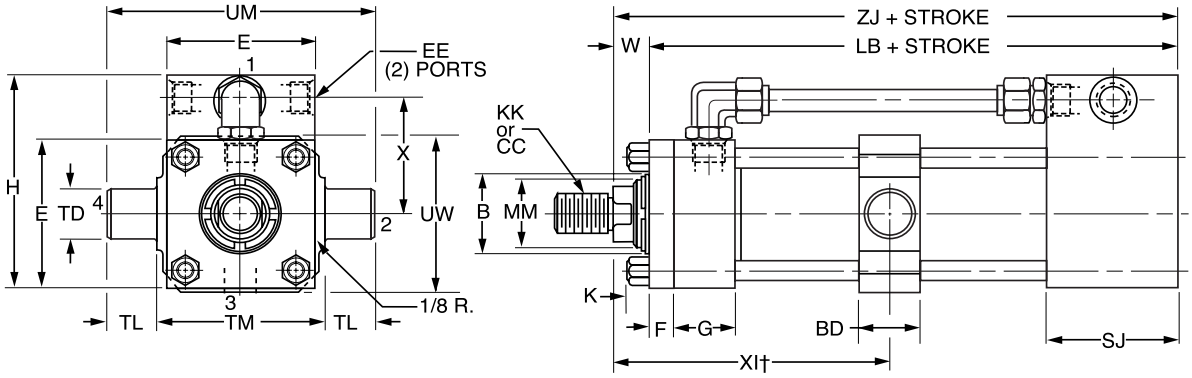
Table 2 — Rod End and Envelope Dimensions

Bore	Rod No.	Rod Dia. MM	Thread CC	Thread KK	A	+.000 -.002 B	C	D	LA	LAF	NA	V	W	Max. RD	RT	WF	ZJ Add Stroke *	ZJ Add Stroke **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	1 5/8	7 5/8	9 1/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	3 7/8	1 11/16	1/2	1 1/4	3 1/2	3/8	1 7/8	8	9 1/2
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	1 5/8	7 3/4	9 1/4
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	3 1/4	1 5/16	1/4	7/8	3	3/8	1 5/8	8 1/4	9 3/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	4 1/4	1 15/16	3/8	1 1/4	4	5/8	2	8 5/8	10 1/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	3 7/8	1 11/16	3/8	1 1/8	3 1/2	3/8	1 7/8	8 1/2	10
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	3 7/8	1 11/16	1/4	1	3 1/2	3/8	1 7/8	10 1/4	10 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	2 1/4	10 5/8	10 5/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	2	10 3/8	10 3/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	2	10 7/8	10 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	5 3/4	3 3/8	3/8	1 3/8	5 3/4	5/8	2 1/4	11 1/8	11 1/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	2 1/4	11 1/8	11 1/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	5 3/4	2 7/8	3/8	1 3/8	5 1/4	5/8	2 1/4	11 1/8	11 1/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H. Velocity of LRT actuators must not exceed 30 ips.

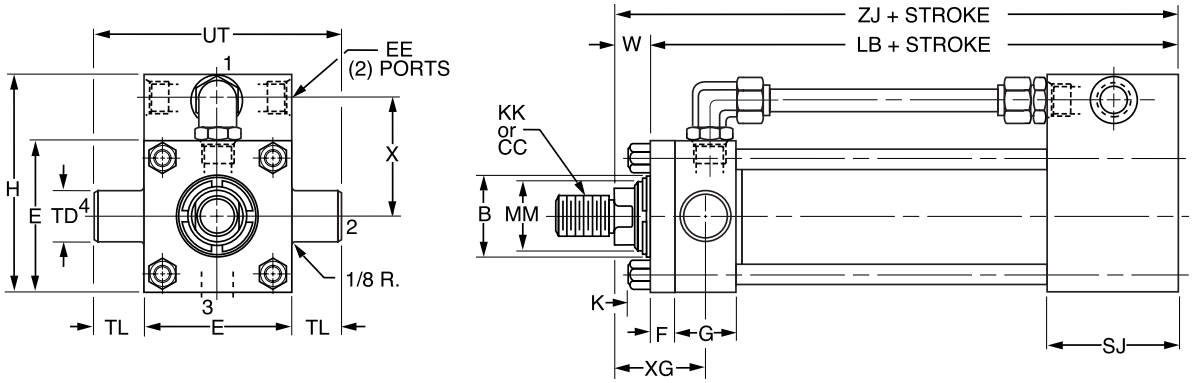
Intermediate Trunnion

Style DD — All Feedback Types



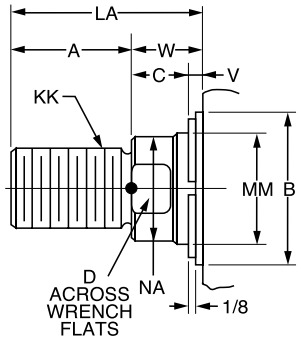
Head Trunnion

Style D — All Feedback Types

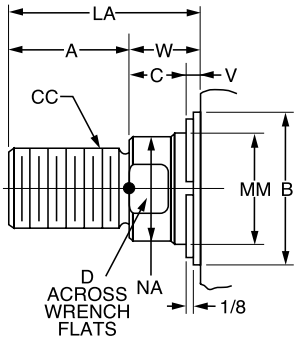


Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	BD	E	SAE EE *	SAE EE **	F	G	H *	H **	K	X *	X **	+.000 -.001 TD	TL	TM	UW	UM	UT	LB Add Stroke *	LB Add Stroke **	SJ *	SJ **
2	1 1/2	3	10	NA	5/8	1 3/4	4 7/8	NA	7/16	1 7/8	NA	1.375	1 3/8	3 1/2	4 1/8	6 1/4	5 3/4	6 5/8	NA	2 7/8	NA
2 1/2	1 1/2	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	7/16	2 1/4	3.04	1.375	1 3/8	4	4 5/8	6 3/4	6 1/4	6 3/4	8 1/4	2 7/8	4 3/8
3 1/4	2	4 1/2	12	12	3/4	2	6 5/8	6 5/8	9/16	2 3/4	3.54	1.750	1 3/4	5	5 13/16	8 1/2	8	7 3/8	8 7/8	2 7/8	4 3/8
4	2	5	12	12	5/8	2	7 1/8	7 1/8	9/16	3 1/8	3.125	1.750	1 3/4	5 1/2	6 3/8	9	8 1/2	9 1/4	9 1/4	4 3/8	4 3/8
5	2	6 1/2	12	12	7/8	2	8 5/8	8 5/8	13/16	3 5/8	3.625	1.750	1 3/4	7	7 3/4	10 1/2	10	9 3/4	9 3/4	4 3/8	4 3/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H. Velocity of LRT actuators must not exceed 30 ips.

Table 2 — Rod End and Envelope Dimensions

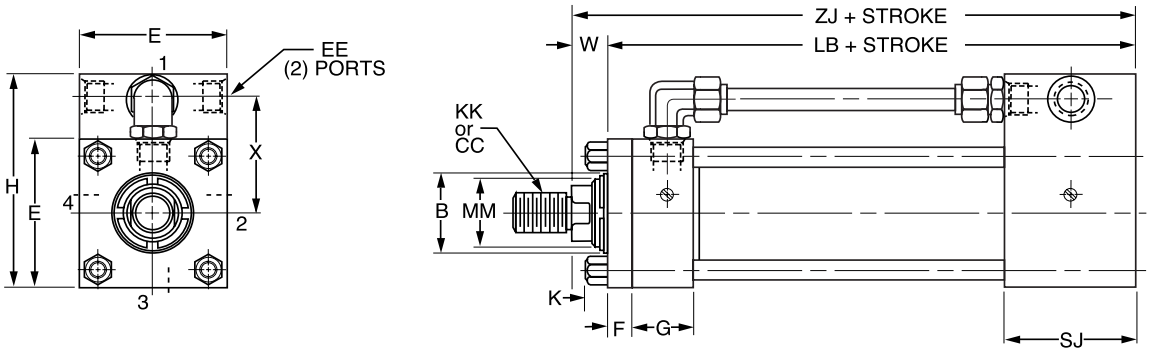
Bore	Rod No.	Rod Dia. MM	Thread CC	Thread KK	A	+.000 -.002 B	C	D	LA	NA	V	W	XG	Min. XI†	ZJ Add Stroke *	ZJ Add Stroke **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	7 5/8	9 1/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 3/4	4 7/16	8	9 1/2
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	7 3/4	9 1/4
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 5/8	4 11/16	8 1/4	9 3/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3	5 1/16	8 5/8	10 1/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	2 7/8	4 15/16	8 1/2	10
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	2 7/8	4 15/16	10 1/4	10 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	10 5/8	10 5/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	10 3/8	10 3/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	9 7/8	10 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	3 1/4	5 5/16	11 1/8	11 1/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	11 1/8	11 1/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 1/4	5 5/16	11 1/8	11 1/8

†Dimension XI to be specified by customer.
*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
** For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

B

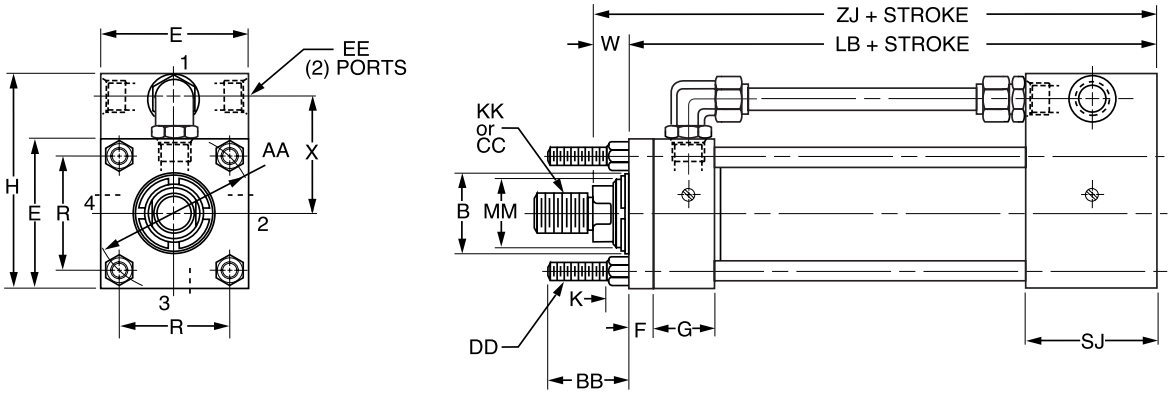
No Mount

Style T — All Feedback Types



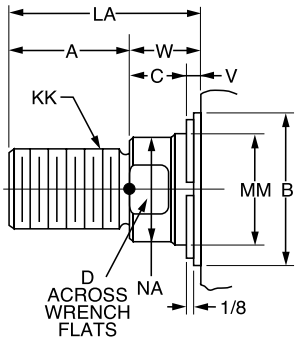
Tie Rods Extended Head End

Style TB — All Feedback Types

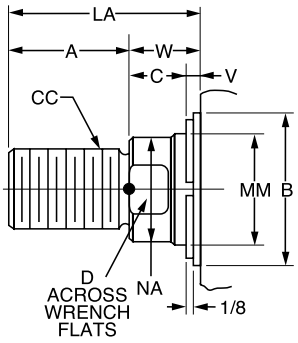


Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	AA	BB	DD	E	SAE EE *	SAE EE **	F	G	H *	H **	K	R	X *	X **	LB Add Stroke *	LB Add Stroke **	SJ *	SJ **
2	2.90	1 13/16	1/2-20	3	10	NA	5/8	1 3/4	4 7/8	NA	7/16	2.05	1 7/8	NA	6 5/8	NA	2 7/8	NA
2 1/2	3.60	1 13/16	1/2-20	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	7/16	2.55	2 1/4	3.04	6 3/4	8 1/4	2 7/8	4 3/8
3 1/4	4.60	2 5/16	5/8-18	4 1/2	12	12	3/4	2	6 5/8	6 5/8	9/16	3.25	2 3/4	3.54	7 3/8	8 7/8	2 7/8	4 3/8
4	5.40	2 5/16	5/8-18	5	12	12	7/8	2	7 1/8	7 1/8	9/16	3.82	3 1/8	3.125	9 1/4	9 1/4	4 3/8	4 3/8
5	7.00	3 3/16	7/8-14	6 1/2	12	12	7/8	2	8 5/8	8 5/8	13/16	4.95	3 5/8	3.625	9 3/4	9 3/4	4 3/8	4 3/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H. Velocity of LRT actuators must not exceed 30 ips.

Table 2 — Rod End and Envelope Dimensions

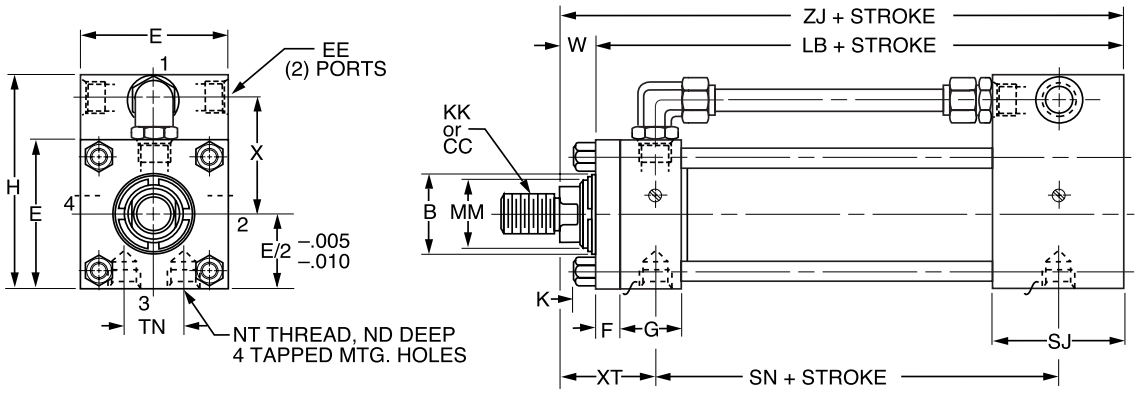
Bore	Rod No.	Rod Dia. MM	Thread CC	Thread KK	A	+.000 -.002 B	C	D	LA	NA	V	W	ZJ Add Stroke *	ZJ Add Stroke **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	7 5/8	9 1/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	8	9 1/2
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	7 3/4	9 1/4
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	8 1/4	9 3/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	8 5/8	10 1/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	8 1/2	10
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	10 1/4	10 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	10 5/8	10 5/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	10 3/8	10 3/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	9 7/8	10 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	11 1/8	11 1/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	11 1/8	11 1/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	11 1/8	11 1/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

B

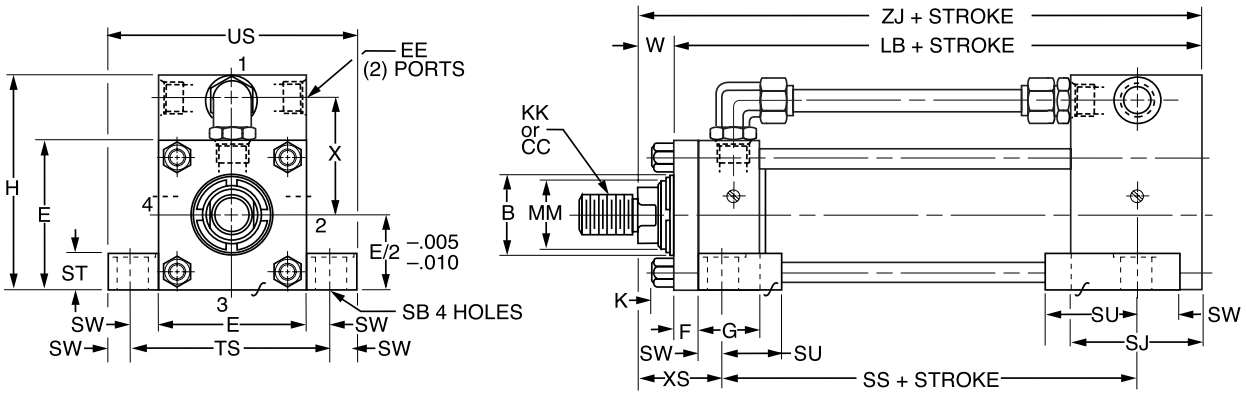
Side Tapped

Style F — All Feedback Types



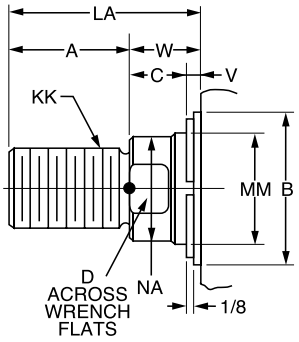
Side Lugs

Style C — All Feedback Types

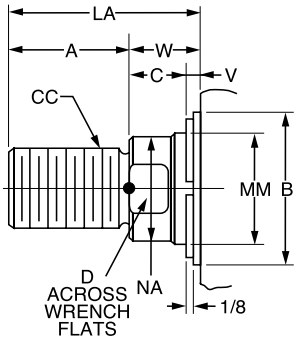


Rod End Dimensions — See Table 2

Thread Style 4
(NFPA Style SM)



Thread Style 8
(NFPA Style IM)



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

For additional information – call your local Parker Cylinder Distributor.

Table 1 — Envelope and Mounting Dimensions

Bore	E	SAE EE *	SAE EE **	F	G	H *	H **	J	K	X *	X **	NT	SB†	ST	SU	SW	TN	TS	US	LB Add Stroke *	LB Add Stroke **	SJ *	SJ **	Add Stroke SS	Add Stroke SN
2	3	10	NA	5/8	1 3/4	4 7/8	NA	1 1/2	7/16	1 7/8	NA	1/2-13	9/16	3/4	1 1/4	1/2	15/16	4	5	6 5/8	NA	2 7/8	NA	3 5/8	2 7/8
2 1/2	3 1/2	10	12	5/8	1 3/4	5 3/8	5 5/8	1 1/2	7/16	2 1/4	3.04	5/8-11	13/16	1	1 9/16	11/16	15/16	4 7/8	6 1/4	6 3/4	8 1/4	2 7/8	4 3/8	3 3/8	3
3 1/4	4 1/2	12	12	3/4	2	6 5/8	6 5/8	1 1/2	9/16	2 3/4	3.54	3/4-10	13/16	1	1 9/16	11/16	1 1/2	5 7/8	7 1/4	7 3/8	8 7/8	2 7/8	4 3/8	4 1/8	3 1/2
4	5	12	12	7/8	2	7 1/8	7 1/8	1 3/4	9/16	3 1/8	3.125	1-8	1 1/16	1 1/4	2	7/8	2 1/16	6 3/4	8 1/2	9 1/4	9 1/4	4 3/8	4 3/8	4	3 3/4
5	6 1/2	12	12	7/8	2	8 5/8	8 5/8	1 3/4	13/16	3 5/8	3.625	1-8	1 1/16	1 1/4	2	7/8	2 15/16	8 1/4	10	9 3/4	9 3/4	4 3/8	4 3/8	4 1/2	4 1/4

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H. Velocity of LRT actuators must not exceed 30 ips.
† Upper surface spot faced for socket head screws.

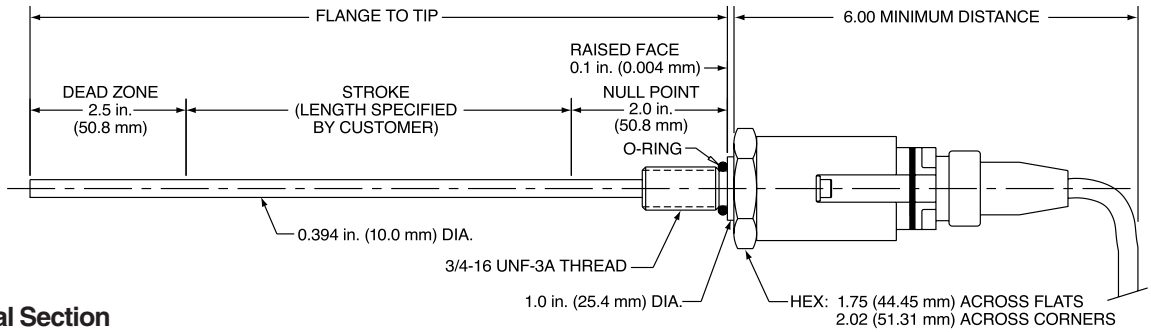
Table 2 — Rod End and Envelope Dimensions

Bore	Rod No.	Rod Dia. MM	Thread Style 8 CC	Thread Style 4 & 9 KK	A	+.000 -.002 B	C	D	LA	NA	V	W	ND	XS	XT	ZJ Add Stroke *	ZJ Add Stroke **
2	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	7/16	2 1/8	2 5/8	7 5/8	9 1/8
2 1/2	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	1/2	2 9/16	2 7/8	8	9 1/2
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 5/8	1 5/16	3/8	1	1/2	2 5/16	2 5/8	7 3/4	9 1/4
3 1/4	1	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	11/16	2 5/16	2 3/4	8 1/4	9 3/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	11/16	2 11/16	3 1/8	8 5/8	10 1/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	11/16	2 9/16	3	8 1/2	10
4	1	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3	1 11/16	1/4	1	11/16	2 3/4	3	10 1/4	10 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	11/16	3 1/8	3 3/8	10 5/8	10 5/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	11/16	2 7/8	3 1/8	10 3/8	10 3/8
5	1	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	1	2 7/8	3 1/8	9 7/8	10 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	4 7/8	3 3/8	3/8	1 3/8	1	3 1/8	3 3/8	11 1/8	11 1/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	1	3 1/8	3 3/8	11 1/8	11 1/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	1	3 1/8	3 3/8	11 1/8	11 1/8

*For lower flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group A, G.
**For higher flow valves — see Standard Integral Valve Patterns in this 2HX Section, Group D, H.

Transducer

LDT Technical Specifications

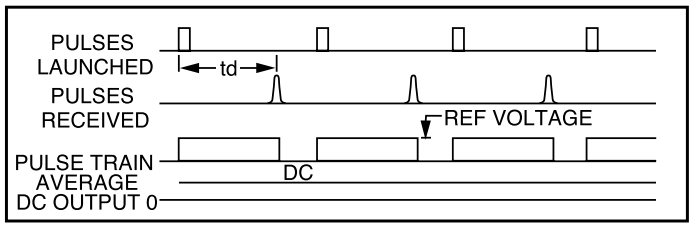


LDT Technical Section

The 2HX-LDT Actuator is the most versatile actuator that we offer. Utilizing the Temposonics LH™ feedback device, there are three distinct outputs available to suit most applications. Velocity is limited primarily by the limits of mechanical components outside of the actuator, although position update time can affect the system ramp-down. The 2HX-LDT Actuator is the industry favorite in tough, rugged machinery applications. A key advantage is the absolute position output which is not lost if there is a power failure.

Magnetostriction

In a LDT position sensor, a pulse is induced in a specially-designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a movable magnet which passes along the outside of the sensor tube, the other field comes from a current pulse or interrogation pulse launched along the waveguide. The interaction between the two magnetic fields produces a strain pulse, which travels at sonic speed along the waveguide until the pulse is detected at the head of the sensor. The position of the magnet is determined with high precision by measuring the elapsed time between the launching of the electronic interrogation pulse and the arrival of the strain pulse. As a result, accurate non-contact position sensing is achieved with absolutely no wear to the sensing components.



An average of 200 ultrasonic strain pulses are launched for every reading. With so many readings taken for each position, vibration and shock have negligible effect on the readings. The transducer assembly is shielded to eliminate interference caused by electromagnetic fields in the radio frequency range. In addition, static magnetic fields of several hundred gauss must get as close as $^{3}/_{16}$" from the protective tube before any interference in transducer operation occurs.

Features

- High immunity to shock and vibration
- Replaceable sensing element
- Single voltage input +13 to 26.4Vdc
- 3000 psi operating pressure
- Multiple outputs from on-board electronics
- Easy installation and maintenance
- Standard strokes up to 100" (analog), 120" (digital)
- Includes 5' extension cable with RB connector standard

If cylinder includes false stage enclosure, LDT will be supplied with RO Integral Pigtail Cable (5' length). Refer to pages 194 and 195 for “LJ” and “E” dimensions.

Feedback Accuracy

The accuracy of a given feedback device is a composite of a number of factors, the most important of which are:

Resolution – The smallest movement of the device that will produce a measurable output.

Non-Linearity – The deviation of the signal from a straight line output.

Repeatability – The maximum deviation of output signal for repeated positioning to a fixed point.

Hysteresis – The deviation of the signal when approaching a fixed point from opposite directions.

Temperature Coefficient – The shift in output due to temperature change. This is a combination of the effect of temperature on the cylinder, the transducer and the electronics.

These factors which are normally additive refer to the feedback device itself. The performance achieved by a given system depends on the various factors such as system stiffness, valve performance, friction, temperature variation, and backlash in mechanical linkages to the cylinder.

In the case of front flange mounted cylinders, the stretch of the cylinder due to hydraulic pressure changes may affect position repeatability and system performance.

For additional information – call your local Parker Cylinder Distributor.

Standard Specifications

Parameter	Specification
Resolution:	*Analog:* Infinite *Digital:* 1 ÷ [gradient x crystal freq. (mHz) x circulation]
Non-Linearity:	±0.02% or ±0.05 mm (±0.002 in.), whichever is greater 0.002 in. is the minimum absolute linearity and varies with sensor model
Repeatability:	Equal to resolution
Hysteresis:	<0.02 mm (0.0008 in.)
Outputs:	*Analog:* Voltage or Current *Digital:* Start/Stop or PWM
Measuring Range:	*Analog:* 25 to 2540 mm (1 to 100 in.) *Digital:* 25 to 7600 mm (1 to 300 in.)
Operating Voltage:	+13.5 to 26.4 Vdc (±0%): Strokes ≤1525 mm (60 in.) +24 Vdc (±10%): Strokes > 1525 mm (60 in.)
Power Consumption:	100 mA
Operating Temperature:	*Head Electronics:* -40 to 85°C (-40 to 185°F) *Sensing Element:* -40 to 105°C (-40 to 221°F)
EMC Test*:	DIN EN 50081-1 (Emissions); DIN EN 50082-2 (Immunity)
Shock Rating:	100 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration Rating:	5 g/10-150 Hz/IEC standard 68-2-6
Adjustability: *(for active sensors only)*	Field adjustable zero and span to 5% of active stroke
Update Time:	*Analog:* ≤1 ms *Digital:* Minimum = [Stroke (specified in inches) + 3] x 9.1 µs
Operating Pressure:	5000 psi static; 10,000 psi spike
Housing Style/ Enclosure:	Aluminum die-cast head, IP 67 stainless steel rod & flange (LH flange: M18 x 1.5 or 3/4-16 UNF-3A)

**EMC test specification does not include sensors with the RB connection style.*

The above specifications for analog sensors are assuming that output ripple is averaged by the measuring device as with any typical analog device. Specifications are subject to change without notice. Consult the factory for specifications critical to your needs.

***Note:** LDT comes standard with an RB style connector and 5' extension cable. If cylinder includes style A protective enclosure, LDT will be supplied with RO Integral Pigtail Cable (5' length).*

***Note:** Velocity output or velocity and position output requires use of an AOM.*

LDT Output Options

The LDT utilizes on-board electronics contained in the sensor head to generate several absolute output options. The required output must be specified at the time of order. In applications where it is desirable to locate the output electronics in a remote location, or where the sensor head is not accessible, an optional Analog Output Module (AOM) is available. The standard outputs for each option are listed below.

Standard LDT Outputs

- Analog Position (absolute)
  0 to +10V DC or +10 to 0V DC
  4 to 20mA or 20 to 4mA (grounded)
  0 to 20mA or 20 to 0mA (grounded)
- Digital Position (absolute)
  Differential Start/Stop
  PWM Pulse Duration
- Neuter (For use with AOM)
  Single Pulse Square Wave

Note: Velocity output or velocity and position output requires use of an AOM.

Analog Output Module: AOM Option

The Analog Output Module provides an absolute analog displacement or optional velocity output signal. It contains the electronics to send the interrogation pulse to the LDT and receive the return pulse from the LDT. The AOM is mounted separately from the LDT and comes standard with strain relief connectors. Optional MS connectors are available.

Note: An LDT with Neuter output is required for use with an AOM. AOM is recommended to allow adjustment for cap mounting styles B, BB and SB.

Optional metal MS connectors are only available for connection to the AOM. The connection at the probe requires an MS-style connector. For applications requiring true MS connectors at the probe, consult factory.

AOM Output Specifications

Displacement Outputs:

Voltage

0 to 10V DC — forward and reverse acting (forward standard)
0 to -10V DC — forward and reverse acting
-10 to +10V DC — forward and reverse acting
0 to +5V DC — forward and reverse acting
-5 to +5V DC — forward and reverse acting

Current

4 to 20 mA grounded (forward and reverse)
4 to 20 mA ungrounded (forward and reverse)

Velocity Outputs:

inches/second = ±10V DC
(1 to 400 in/sec)

Power Supply:

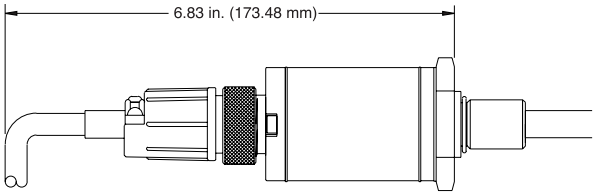
+24V DC standard
±15V DC optional

For Cylinder Division Plant Locations – See Page II.

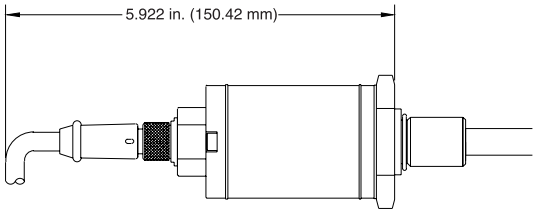
LDT Connector Options

The LDT is available with three standard Connector Options as shown below. The style RB connector with a 5' extension cable is standard except for BB and SB mounting styles. RO style connector is standard for BB and SB mounting styles with a false stage enclosure. Please specify the connector option at the time of order.

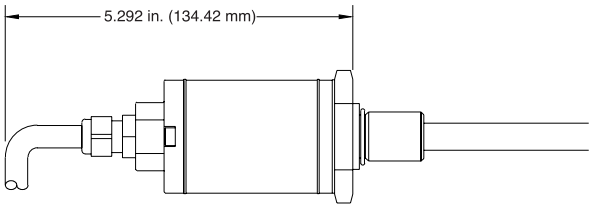
Style RB — Connector with Cable



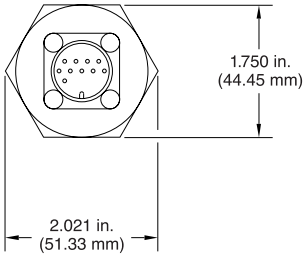
Style RG – Connector with Cable



Style RO — Integral Pigtail Cable



Hex Dimensions



TOP VIEW

Table A — LDT Wiring with RB* Style Connector and Cable

For Temposonics LH™		Pulse-Duration Output (External Interrogation)	Pulse-Duration Output (Internal Interrogation)	Start/Stop Output	Neuter Output	Analog Output (Voltage or Current)	
Pin No.	Wire Color Solid Leads (Note 2)	Function	Function	Function	Function	Function	Function
1	White	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground
2	Brown	Frame Ground	Frame Ground	Frame Ground	Frame Ground	Frame Ground	Frame Ground
3	Gray	(-) Gate	(-) Gate	(-) Gate	—	0 - 10 Vdc Return	Current Return
4	Pink	(+) Gate	(+) Gate	(+) Gate	—	0 to 10 Vdc	4 to 20 mA or 0 to 20 mA or 20 to 4mA or 20 to 0 mA *(See Figure A-1)*
5	Red	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc
6	Blue	—	—	—	—	—	—
7	Black	—	—	—	Signal Return	10 to 0 Vdc	—
8	Violet	—	—	—	Signal Output	10 - 0 Vdc Return	—
9	Yellow	(+) Interrogation (Note 4)	—	(+) Interrogation	(+) Interrogation (Note 3)	—	—
10	Green	(-) Interrogation (Note 4)	—	(-) Interrogation	(+) Interrogation (Note 3)	—	—

Notes for Table A:

1. Interrogation pulse: 1 to 4 microseconds maximum pulse duration.
2. **WARNING:** For single-ended interrogation, the unused interrogation lead must be connected to DC ground.
3. When using a Temposonics LH™ position sensor with a pulse-width-modulated output (w/external interrogation) or Start/Stop output, it is recommended that both the positiive and negative interrogations leads are connected to a differentiated driving source to produce a differential interrogation signal.
4. **Important:** Frame ground should always be connected. When using MT, M, FT or F extension cables frame ground is the BROWN wire.

* RB style connectors are supplied as standard on all LDT's unless specified otherwise.

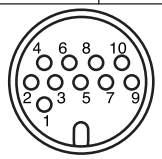


Figure A-1 — LDT Pin Diagram

For additional information – call your local Parker Cylinder Distributor.

Table B: LDT Wiring with Integral Pigtail Cable*

	Pulse-Duration Output (External Interrogation)	Pulse-Duration Output (Internal Interrogation)	Start/Stop Output	Neuter Output	Analog Output (Voltage or Current)	
Integral Cable Color Code	Function	Function	Function	Function	Function (Voltage)	Function (Current)
White	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground
Drain Wire	Frame Ground	Frame Ground	Frame Ground	Frame Ground	Frame Ground	Frame Ground
Gray	(-) Gate	(-) Gate	(-) Gate	Signal Return	0 - 10 Vdc Return	4 to 20 mA Out
Pink	(+) Gate	(+) Gate	(+) Gate	Signal Output	0 to 10 Vdc	Return *(See Figure B-1)*
Red	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc	+13.5 to 26.4 Vdc
Yellow	(+) Interrogation (Note 3)	—	(+) Interrogation (Note 3)	(+) Interrogation (Note 2)	10 to 0 Vdc	
Green	(-) Interrogation (Note 3)	—	(-) Interrogation (Note 3)	(-) Interrogation (Note 2)	10 - 0 Vdc Return	

Notes for Table A:
1. Interrogation pulse: 1 to 4 microseconds maximum pulse duration.
2. **Warning:** For single-ended interrogation, the unused interrogation lead must be connected to DC ground.
3. When replacing a Temposonics II™ position sensor with a pulse-duration output (with external interrogation) or a Start/Stop output, it is recommended that both the positive and negative interrogation leads are connected to a differentiated driving source to produce a differential interrogation signal.
4. **Important:** Frame ground should always be connected.

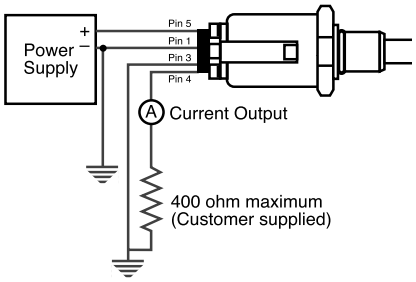


Figure B-1 —
LDT with Current Output

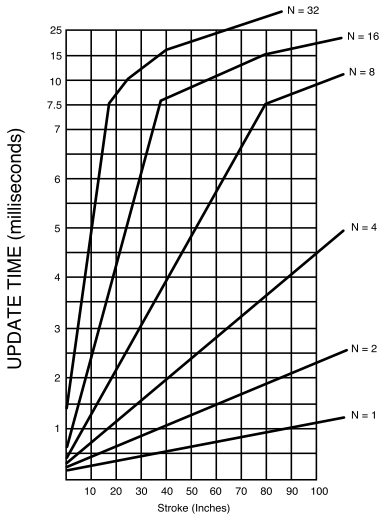
Note: Style RO Integral Pigtail Cables are supplied as standard on LDTs used with styles A and F protective enclosures.

B

Digital Output Signal (PWM)

The Digital Output Electronics mounted in the head of the LDT provides the interrogation pulse to the probe. The pulse is reflected to the Digital Output Electronics by the magnet which strokes along the length of the transducer.

Figure 1. Update time (ms) = [(4.5 + stroke) inches x 0.01086 ms] x N



The LDT with PWM Digital Output provides a 5 Vdc TTL compatible pulse with modulated square wave signal which can be transmitted to a digital counter card, Parker PMC Motion Controller, or various other customer supplied devices. The amount of time, in milliseconds, that the output is “Hi,” or near 5 volts, is directly proportional to the position of the cylinder piston. This time can also be called the “width” of the square wave in milliseconds. Besides being proportional to the position of the cylinder piston, this width can be controlled by varying the signal sampling rate (called “recirculations”). The advantage of increasing the recirculations is in improved resolution. The sacrifice is in update time and maximum stroke length. Figure 1 shows the relationship of recirculations, minimum update time, and stroke length. Figure 2 shows the relationship of recirculations, resolution, and stroke.

We recommend the TTL interface for most LDT applications requiring digital feedback; many electronic controllers are equipped to utilize this output. BCD and natural binary outputs are available — consult factory.

Figure 2 —
Recirculations, Resolutions and Stroke Length

Term Base = 28 Megahertz Clock					
Recirculations	1	2	4	8	15
Resolution (inches/pulse)	0.004	0.002	0.001	0.0005	0.00035
Maximum stroke (inches)	258	127	61	28	12

Parker Series 2HX with LDT and Analog Output Module (AOM)

Wiring Connections and Analog Output Module Dimensions

An electrical Noise Filter and Low Ripple Output Filter are standard.

Analog Output Module

Shown with strain relief cable connectors.
Refer to Installation Bulletin 1170-TSD-2 for more detailed wiring information.

Terminal Block Connections

Terminal Block 1 — Output Signal Connections

TB1-A Displacement Output (+)
TB1-B Displacement Output (-)
TB1-C Velocity (+) (Optional)
TB1-D Velocity (-) (Optional)
TB1-E Reserved for Options
TB1-F Reserved for Options
TB1-G Reserved for Options
Note: For the optional pin assignments refer to the label inside the module.

Terminal Block 2 — Transducer Connections (LDT with Neuter Output)

Terminal	Pre-1995 Cable Colors	1995 Cable Colors	Function
TB2-B	White/Blue Stripe	White	DC Ground
	Blue/White Stripe	Brown	Frame
	White/Brown Stripe	Black	Return
	Gray/White Stripe	Green	DC Ground
TB2-C	Brown/White Stripe	Violet	Return Pulse Output
TB2-E	White/Gray Stripe	Yellow	Interrogation Pulse
TB2-F	White/Green Stripe	Red	VCC (12 Vdc)

Note: Cable must be grounded at or near AOM.
Note: The Transducer is supplied with a pre-wired cable.

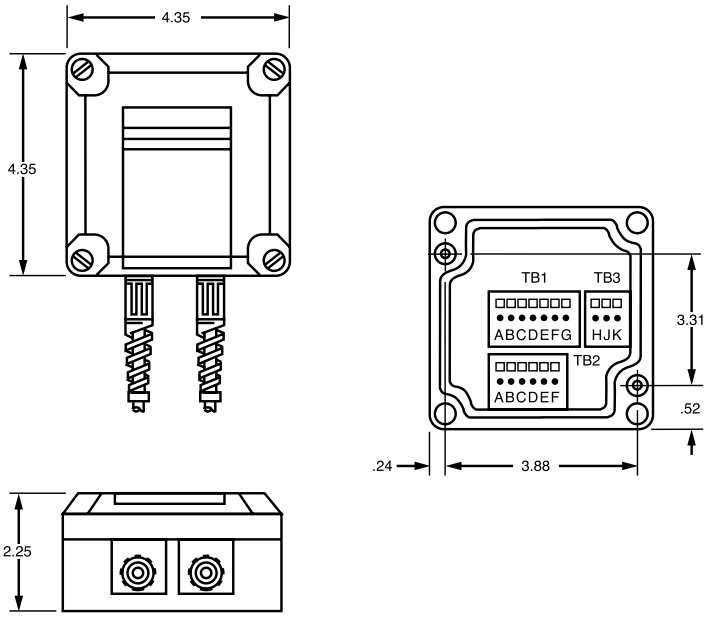
Terminal Block 3 — Power Supply Connections

TB3-H +15 Vdc
TB3-J -15 Vdc
TB3-K DC Common

Mounting

(2) Socket Hex Cap Screws
#10-32 UNF-2A Thread

Max. distance from transducer - 250 ft.

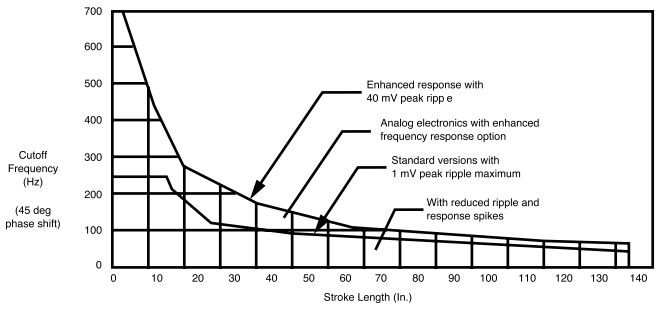


Note: AOMs require the use of an LDT with Neuter Output.

Frequency Response

Analog Systems

The analog output module produces a DC output signal with an AC ripple component. The group shown illustrates the following relationship between frequency response and AC ripple.



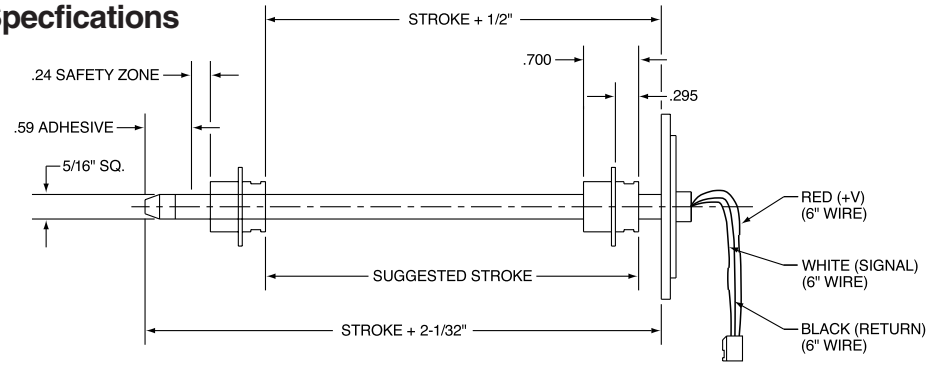
Ripple Magnitude and Frequency Response

It shows that the AC ripple fundamental frequency is related to stroke length. For shorter strokes, this frequency is usually beyond the response capability of the analog control loop. Notice that the ripple frequency equals the frequency of the interrogation pulse.

It shows how the magnitude of the ripple is related to frequency response. You can enhance response by allowing the ripple to increase. Alternatively, you can use a low level of ripple, with reduced response, for applications where response is less critical, such as required for A/D converters with high resolution. Unless specified, the response will be on the 1 mV curve.

For additional information – call your local Parker Cylinder Distributor.

Transducer
LRT Technical Specfications



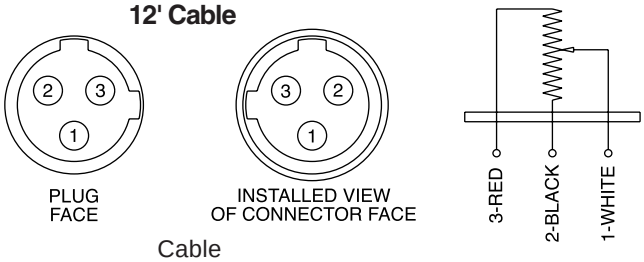
Standard Features

- Available in strokes to 120".
- Unique, easy to apply cylinder position sensing system.
- Infinite resolution, high linearity and repeatability.
- Innovative, resistive element is made of conductive plastic.
- 3 pin Brad Harrison electrical connector available at any cap position not occupied by a port or mount.

How It Works

The Parker LRT is a uniquely designed position sensor that uses a resistive element and wiper assembly to provide an analog output signal of a cylinder's position. The LRT is a dual element type linear potentiometer with two independent elements mounted on either side of an anodized aluminum extrusion. The LRT operates as a voltage divider. This is done by shorting through the extrusion with the wiper assembly. The position of the wiper changes the resistive load proportional to its position along the cylinder stroke. The LRT is energized by applying a voltage across the unit, typically 10 VDC. As the resistive load changes with the cylinder stroke, the output voltage changes proportionally. The output voltage at the end point of the cylinder stroke is dictated by the input voltage applied across the device. The probe is mounted into the cylinder cap and inserted into the gun drilled piston rod. The compactness of the design only adds to the envelope dimensions of cylinders with 1-3/4" rods and smaller. Envelope dimensions of cylinders with larger rods and integral cap style cylinders are unaffected.

12' Cable



Cable
#0854430012

Standard Specifications

Non-Linearity: Less than 0.1% of full scale up to 48" stroke. Less than 1.0% of full scale over 48" stroke.

Repeatability: .001 inch

Input Voltage: Nominal 5-50 Vdc

Operating Temperature Range: -40°F to +160°F*

Cylinder Stroke Length: Up to 120"

Electrical Connector: Brad Harrison 3-pin micro connector interface at position #4 standard.

Total Resistance: 800 per inch of stroke (±20%) + end resistance.

End Resistance: 800

Maximum Velocity: 30 inches per second

Life Expectancy: Greater that 50 x 10^6 cycles (Based on 1" stroke @ 10 ips)

Fluid Medium: Petroleum based hydraulic fluids. May not be used with water based or high water content fluids.

End Voltage Loss: (V source) x (400/stroke x 800)

Power Dissipation: supply voltage squared, divided by the total resistance.

The LRT requires a high impedance interface greater than 100K ohms. A maximum of 1 microamp should be required from the LRT.

The accuracy of a given feedback device is a composite of the following factors:

Temperature Coefficient: The shift in output due to temperature change. This is a combination of the effect of temperature on the cylinder, the transducer and the electronics.

These factors which are normally additive refer to the feedback device itself. The performance achieved by a given system depends on the various factors such as system stiffness, valve performance, friction, temperature variation, and backlash in mechanical linkages to the cylinder.

In the case of front flange mounted cylinders, the stretch of the cylinder due to hydraulic pressure changes may affect position repeatability and system performance.

*A high temperature option is offered to 300°F (consult factory).

Pin Chart

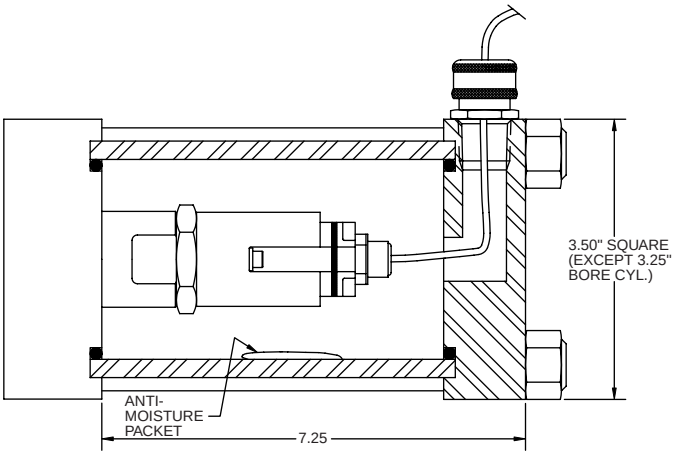
Pin Number	On Cable	On LRT	Function
1	Green	White (wiper)	Ouput
2	Red w/Blk	Black (resistor base)	V-
3	Red w/White	Red (resistor tip. power)	V+

B

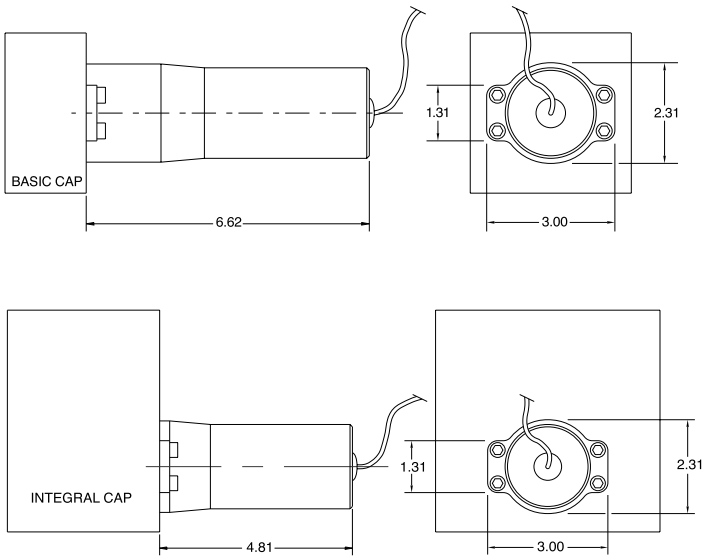
Protective Enclosures for Feedback Devices

Style A — For LDT and LRT, all bore sizes. Extra heavy-duty enclosure consisting of cylinder body tube and end cap. Consult factory for dimensions. Connector type must be specified.

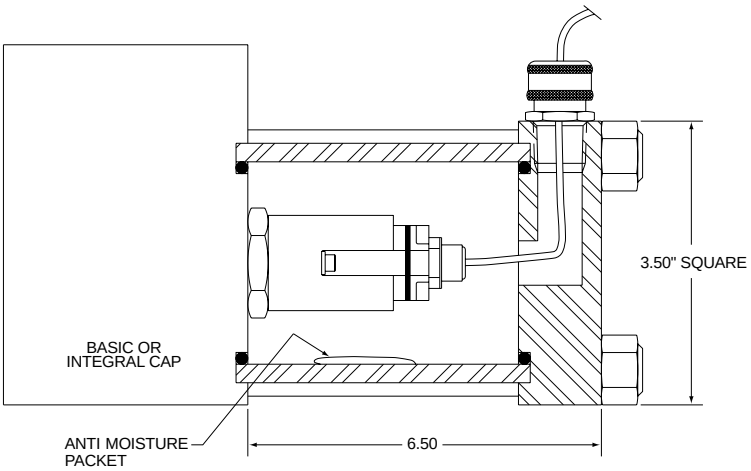
Note: Since this design uses common tie rods, the actuator must be disassembled to service or install feedback devices.



Style D — For LDT Basic and Intergral Cap. Specify connector type (not available on 2" bore).



Style F — For LDT and LRT
For 4" bore and larger only.
Use Style A for $2^1/_2$" and $3^1/_4$" bore.



Intrinsically Safe LDT
An intrinsically safe system is a system approved by Factory Mutual as intrinsically safe for use in Class I, Division I, Group A, B, C, or D hazardous locations. The system requires approved safety barriers and a 6 wire LDT. Consult factory for detailed information.

Explosion Proof LDT
Factory Mutual Approved

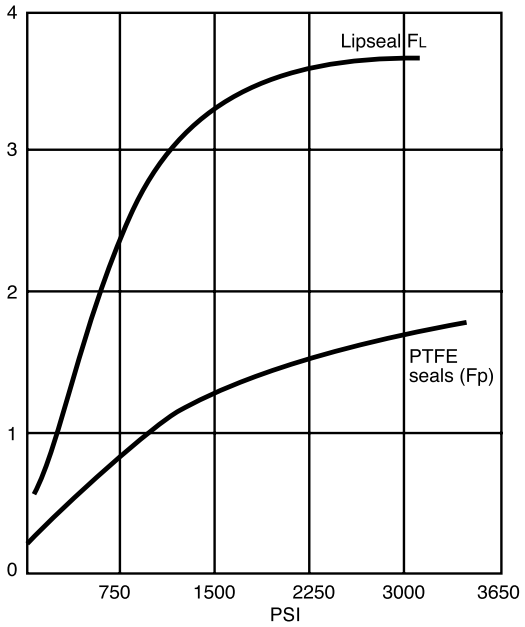
For additional information – call your local Parker Cylinder Distributor.

Gland Drain

Available for high speed applications is a gland drain fitted with the low friction option to prevent pressure buildup between the seals, and must be piped back to tank independent of the return line. If an independent drain line is not possible, alternative designs can be supplied.

Seal Friction

Seal friction under a given set of working conditions is not easily calculated due the multiplicity of variables involved. The following graph is offered as a guide for use in performance calculations, but for critical applications measurements should be made under simulated or actual working conditions.



Calculation of Running Friction

The seal friction attributable to the cylinder is calculated as the sum of the friction due to the individual sealing elements = (wiper seal friction + rod seal friction + piston seal friction), using the following formulae:

Seal Option:	**Formula:**
Lipseal Rod + Piston	$12d + 12F_Ld + 24F_LD$
Lipseal Rod w/ Low Friction Piston	$12d + 12F_Ld + 12F_pD$
Low Friction Rod + Piston	$12d + 30F_pd + 6F_pD$

Where: d = rod dia. (in.) D = bore dia. (in.)

F_L = friction factor for lipseals (F_L)

F_p = friction factor for PTFE (F_p)

Breakaway Friction

Breakaway friction may be calculated by applying the following correction factors:

Correction factors:	
Lipseals:	$F_L \times 1.5$
Low Friction:	$F_p \times 1.0$

Sample Calculation

2HX cylinder with 3.25 dia. bore + 1.75 dia. piston rod with low friction seals at 1500 psi.

Running Friction Calculation

Friction (lbs. force) $\cong 12d + 30F_pd + 6F_pD$

Friction (lbs. force) $\cong 12\ (1.75) + 30\ (1.3 \times 1.75) + 6\ (1.3 \times 3.25)$

Friction (lbs. force) $\cong 115$

Breakaway Friction Calculation

$F_p \times 1.0 \cong F_p$

Based on zero pressure:

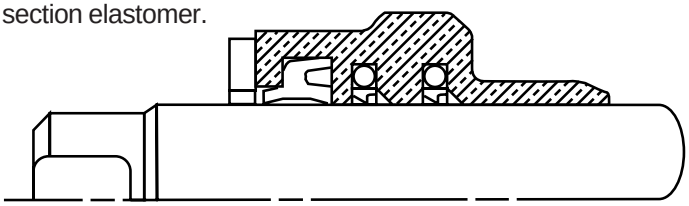
Friction (lbs. force) $\cong 12d + 30F_pd + 6F_pD$

Friction (lbs. force) $\cong 12\ (1.75) + 30\ (1.3 \times 1.75) + 6\ (1.3 \times 3.25)$

Friction (lbs. force) $\cong 43$

Low Friction Gland

Below is a cross-sectional representation of a Parker Series 2HX low friction gland. The dual step seals are of a bronze-filled PTFE material. The expanders are a square cross section elastomer.



Operating Temperature Danger

The piston to piston-rod threaded connection is secured with an anaerobic adhesive which is temperature sensitive. Operation of the cylinder outside of the following guidelines can cause the piston rod to unthread itself from the piston. Cylinders ordered with standard seals are assembled with anaerobic adhesive with a maximum temperature rating of +165°F. Cylinders ordered with Fluorocarbon seals are assembled with an anaerobic adhesive with a maximum temperature rating of +250°F. When cylinders are intended for use above +250°F, a pinned piston to piston-rod connection must be specified. Consult factory for details.

Consult factory for the compatibility of Fluorocarbon with specific hydraulic fluids.

Fluid Compatibility

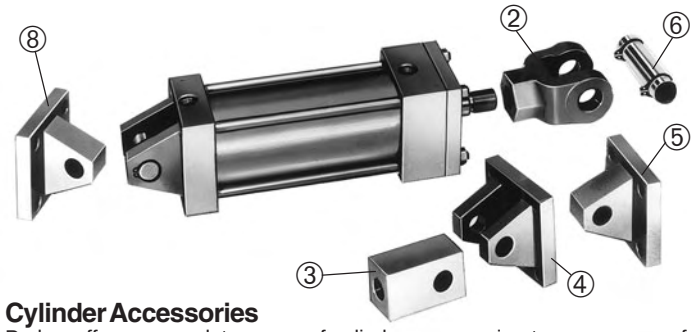
Parker Series 2HX actuators are equipped with seals and materials compatible with petroleum base hydraulic oils. For other fluids, consult factory.

How to Order Low Friction Rod Gland

Place an “S” in the “special” position in the model number and specify “Low Friction Rod Gland.”

B

Series 2HX
Electrohydraulic Actuators



Cylinder Accessories

Parker offers a complete range of cylinder accessories to assure you of greatest versatility in present or future cylinder applications.

Rod End Accessories

Accessories offered for the rod end of the cylinder include Rod Clevis, Eye Bracket, Knuckle, Clevis Bracket and Pivot Pin. To select the proper part number for any desired accessory, refer to Chart A below and look opposite the thread size of the rod end as indicated in the first column. The Pivot Pins, Eye Brackets and Clevis Brackets are listed opposite the thread size which their mating Knuckles or Clevises fit.

Chart A

Thread Size	Mating Parts			Mating Parts			Alignment Coupler
	Rod Clevis	Eye Bracket	Pin	Knuckle	Clevis Bracket	Pin	
5/16-24	51221	74077	—	74075	74076	74078	134757 0031
7/16-20	50940	69195	68368	69089	69205	68368	134757 0044
1/2-20	50941	69195	68368	69090	69205	68368	134757 0050
3/4-16	50942	69196	68369	69091	69206	68369	134757 0075
3/4-16	133284	69196	68369	69091	69206	68369	134757 0075
7/8-14	50943	*85361	68370	69092	69207	68370	134757 0088
1-14	50944	*85361	68370	69093	69207	68370	134757 0100
1-14	133285	*85361	68370	69093	69207	68370	134757 0100
1 1/4-12	50945	69198	68371	69094	69208	68371	134757 0125
1 1/4-12	133286	69198	68371	69094	69208	68371	134757 0125
1 1/2-12	50946	*85362	68372	69095	69209	68372	133739 0150
1 3/4-12	50947	*85363	68373	69096	69210	69215	133739 0175
1 7/8-12	50948	*85363	68373	69097	69210	69215	133739 0188
2 1/4-12	50949	*85364	68374	69098	69211	68374	Consult Factory
2 1/2-12	50950	*85365	68375	69099	69212	68375	
2 3/4-12	50951	*85365	68375	69100	69213	69216	
3 1/4-12	50952	73538	73545	73536	73542	73545	
3 1/2-12	50953	73539	73547	73437	73542	73545	
4-12	50954	73539	73547	73438	73543	82181	
4 1/2-12	—	—	—	73439	73544	73547	

*Cylinder accessory dimensions conform to NFPA recommended standard NFPA/T3.6.8 R1-1984, NFPA recommended standard fluid power systems — cylinder — dimensions for accessories for cataloged square head industrial types. Parker adopted this standard in April, 1985. Eye Brackets or Mounting Plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style Eye Brackets or Mounting Plates consult Drawing #144805 or previous issues of this catalog.

Accessory Load Capacity

The various accessories on this and the following page have been load rated for your convenience. The load capacity in lbs., shown on the opposite page is the recommended maximum load for that accessory based on a 4:1 design factor in tension. (Pivot pin is rated in shear.) Before specifying, compare the actual load or the tension (pull) force at maximum operating pressure of the cylinder with the load capacity of the accessory you plan to use. If load or pull force of cylinder exceeds load capacity of accessory, consult factory.

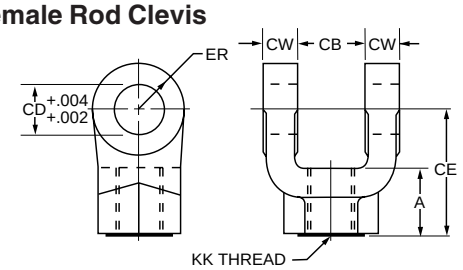
Chart B

Mtg. Plate Part No.	Series 2HX Bore Size
69195	1 1/2"
69196	2", 2 1/2"
*85361	3 1/4"
69198	4"
*85362	5"
*85363	6"
*85364	7"
*85365	8"

Mounting Plates

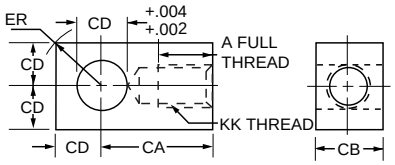
Mounting Plates for Style BB (clevis mounted) cylinders are offered. To select proper part number for your application, refer to Chart B to above right.

② Female Rod Clevis



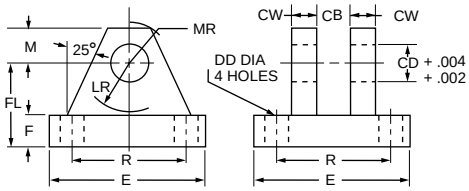
Order to fit thread size.

③ Knuckle (Female Rod Eye)



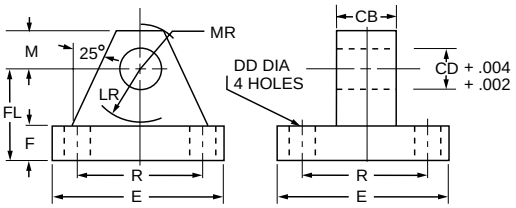
Order to fit thread size.

④ Clevis Bracket for Knuckle



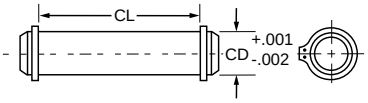
Order to fit Knuckle.

⑧ Mounting Plate or ⑤ Eye Bracket



1. When used to mate with the Rod Clevis, select from Chart A.
2. When used to mount the Style BB cylinders, select from the Mounting Plate Selection Table. See Chart B at lower left.

⑥ Pivot Pin



1. Pivot Pins are furnished with Clevis Mounted Cylinders as standard.
2. Pivot Pins are furnished with (2) Retainer Rings.
3. Pivot Pins must be ordered as separate item if to be used with Knuckles, Rod Clevises, or Clevis Brackets.

For additional information – call your local Parker Cylinder Distributor.

	Female Rod Clevis Part Number																		
	51221†	50940	50941	50942	133284	50943	50944	133285	50945	133286	50946	50947	50948	50949	50950	50951	50952	50953	50954
A	13/16	3/4	3/4	1 1/8	1 1/8	1 5/8	1 5/8	1 5/8	1 7/8	2	2 1/4	3	3	3 1/2	3 1/2	3 1/2	3 1/2‡†	4‡†	4‡†
CB	11/32	3/4	3/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2 1/2	2 1/2	2 1/2	3	3	3	4	4 1/2	4 1/2
CD	5/16	1/2	1/2	3/4	3/4	1	1	1	1 3/8	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4	4
CE	2 1/4	1 1/2	1 1/2	2 1/8	2 3/8	2 15/16	2 15/16	3 1/8	3 3/4	4 1/8	4 1/2	5 1/2	5 1/2	6 1/2	6 3/4	6 3/4	7 3/4	8 13/16	8 13/16
CW	13/64	1/2	1/2	5/8	5/8	3/4	3/4	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2 1/4	2 1/4
ER	19/64	1/2	1/2	3/4	3/4	1	1	1	1 3/8	1 3/8	1 3/4	2	2	2 1/2	2 3/4	2 3/4	3 1/2	4	4
KK	5/16-24	7/16-20	1/2-20	3/4-16	3/4-16	7/8-14	1-14	1-14	1 1/4-12	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 1/2-12	2 3/4-12	3 1/4-12	3 1/2-12	4-12
Load Capacity Lbs. ⊖	2600	4250	4900	11200	11200	18800	19500	19500	33500	33500	45600	65600	65600	98200	98200	98200	156700	193200	221200

	Knuckle Part Number																
	74075	69089	69090	69091	69092	69093	69094	69095	69096	69097	69098	69099	69100	73536	73437	73438	73439
A	3/4	3/4	3/4	1 1/8	1 1/8	1 5/8	2	2 1/4	2 1/4	3	3 1/2	3 1/2	3 5/8	4 1/2	5	5 1/2	5 1/2
CA	1 1/2	1 1/2	1 1/2	2 1/16	2 3/8	2 13/16	3 7/16	4	4 3/8	5	5 13/16	6 1/8	6 1/2	7 5/8	7 5/8	9 1/8	9 1/8
CB	7/16	3/4	3/4	1 1/4	1 1/2	1 1/2	2	2 1/2	2 1/2	2 1/2	3	3	3 1/2	4	4	4 1/2	5
CD	7/16	1/2	1/2	3/4	1	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	3 1/2	4	4
ER	19/32	23/32	23/32	1 1/16	1 7/16	1 7/16	1 31/32	2 1/2	2 27/32	2 27/32	3 9/16	4 1/4	4 1/4	4 31/32	4 31/32	5 11/16	5 11/16
KK	5/16-24	7/16-20	1/2-20	3/4-16	7/8-14	1-14	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 1/2-12	2 3/4-12	3 1/4-12	3 1/2-12	4-12	4 1/2-12
Load Capacity Lbs. ⊖	3300	5000	5700	12100	13000	21700	33500	45000	53500	75000	98700	110000	123300	161300	217300	273800	308500

	Clevis Bracket for Knuckle Part Number												
	74076	69205	69206	69207	69208	69209	69210	69211	69212	69213	73542	73543	73544
CB	15/32	3/4	1 1/4	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	4	4 1/2	5
CD	7/16	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3	3 1/2	4	4
CW	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2
DD	17/64	13/32	17/32	21/32	21/32	29/32	1 1/16	1 3/16	1 5/16	1 5/16	1 13/16	2 1/16	2 1/16
E	2 1/4	3 1/2	5	6 1/2	7 1/2	9 1/2	12 3/4	12 3/4	12 3/4	12 3/4	15 1/2	17 1/2	17 1/2
F	3/8	1/2	5/8	3/4	7/8	7/8	1	1	1	1	1 11/16	1 15/16	1 15/16
FL	1	1 1/2	1 7/8	2 1/4	3	3 5/8	4 1/4	4 1/2	6	6	6 11/16	7 11/16	7 11/16
LR	5/8	3/4	1 3/16	1 1/2	2	2 3/4	3 3/16	3 1/2	4 1/4	4 1/4	5	5 3/4	5 3/4
M	3/8	1/2	3/4	1	1 3/8	1 3/4	2 1/4	2 1/2	3	3	3 1/2	4	4
MR	1/2	5/8	29/32	1 1/4	1 21/32	2 7/32	2 25/32	3 1/8	3 19/32	3 19/32	4 1/8	4 7/8	4 7/8
R	1.75	2.55	3.82	4.95	5.73	7.50	9.40	9.40	9.40	9.40	12.00	13.75	13.75
Load Capacity Lbs. ⊖	3600	7300	14000	19200	36900	34000	33000	34900	33800	36900	83500	102600	108400

	Eye Bracket and Mounting Plate Part Number										
	74077	69195	69196	85361*	69198	85362*	85363*	85364*	85365*	73538	73539
CB	5/16	3/4	1 1/4	1 1/2	2	2 1/2	2 1/2	3	3	4	4 1/2
CD	5/16	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
DD	17/64	13/32	17/32	21/32	21/32	29/32	1 1/16	1 3/16	1 5/16	1 13/16	2 1/16
E	2 1/4	2 1/2	3 1/2	4 1/2	5	6 1/2	7 1/2	8 1/2	9 1/2	12 5/8	14 7/8
F	3/8	3/8	5/8	7/8	7/8	1 1/8	1 1/2	1 3/4	2	1 11/16	1 15/16
FL	1	1 1/8	1 7/8	2 3/8	3	3 3/8	4	4 3/4	5 1/4	5 11/16	6 7/16
LR	5/8	3/4	1 1/4	1 1/2	2 1/8	2 1/4	2 1/2	3	3 1/4	4	4 1/2
M	3/8	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	2 3/4	3 1/2	4
MR	1/2	9/16	7/8	1 1/4	1 5/8	2 1/8	2 7/16	3	3 1/4	4 1/8	5 1/4
R	1.75	1.63	2.55	3.25	3.82	4.95	5.73	6.58	7.50	9.62	11.45
Load Capacity Lbs. ⊖	1700	4100	10500	20400	21200	49480	70000	94200	121900	57400	75000

	Pivot Pin Part Number													
	74078	68368	68369	68370	68371	68372	68373	69215	68374	68375	69216	73545	82181	73547•
CD	7/16	1/2	3/4	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4	4
CL	1 5/16	1 7/8	2 5/8	3 1/8	4 1/8	5 3/16	5 3/16	5 11/16	6 3/16	6 1/4	6 3/4	8 1/4	8 5/8	9
Shear Capacity Lbs.⊖	6600	8600	19300	34300	65000	105200	137400	137400	214700	309200	309200	420900	565800	565800

*Cylinder accessory dimensions conform to NFPA recommended standard NFPA/T3.6.8 R1-1984, NFPA recommended standard fluid power systems — cylinder — dimensions for accessories for cataloged square head industrial types. Parker adopted this standard in April, 1985. Eye Brackets or Mounting Plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style Eye Brackets or Mounting Plates consult Drawing #144805 or previous issues of this catalog.

⊖ See Accessory Load Capacity note on previous page.

•These sizes supplied with cotter pins.

†Includes Pivot Pin.

Consult appropriate cylinder rod end dimensions for compatibility.

For Cylinder Division Plant Locations – See Page II.

How to Order

Parker Series 2HX cylinders can be completely described by a model number consisting of coded symbols of digits and letters used in a prescribed sequence. To develop a model number, select only those symbols that represent the cylinder required, and place them in the sequence indicated by the example in Table A opposite. The example makes use of all places, although many model numbers will not require them all, as in the case where cushioning, double rod, or special modifications are not required. For additional cylinder specifications and dimensions see Parker Series 2H section.

When a Series 2HX actuator is ordered the following information must be developed.

1) The basic actuator model number including 2HX under Series as shown in Table A opposite.

2) If a rod extension is required, specify rod end thread Style 3.

3) A six digit code describing the valve and feedback type if any, and the supplier (Parker or customer).

4) If an actuator is to accept a D03, D05, D06, D07, or D08 pattern valve no additional information is necessary. If an actuator is to accept a servo valve or include any valve furnished by Parker, a manufacturer and model number should be supplied below the five digit code.

5) If a cylinder is to include a feedback device the following information must be called out below the six digit code:

Linear Displacement Transducer (LDT)

Analog Position

1) Position Output Signal and connection type (RB, RO)

2) Electrical Cable Length (from probe if integral cable)

3) Cable Length to AOM (if AOM specified)

Analog Position and Velocity

1) Position Output Signal

2) Velocity Output Signal and maximum piston velocity for calibration in inches per second

3) Electrical Cable Length to AOM

Digital Position

1) Specify Pulse Duration Output only (Specify Internal or External Interrogation and the number of circulations)

2) Data Ready Line

3) Update Time

Linear Potentiometer (LRT)

1) Electrical connector position 1-4 cap end

2) Gross and net stroke if 1.75" rod dia. or smaller

Other Feedback Device

1) Device Type, Manufacturer, and Model Number

2) Output Signal

Integral Manifold Option

The integral manifold option is only available with the Parker Series 2HX 2" through 5" bores. All integral manifolds are available at the cap end position #1 only. For special integral manifolds for Parker Series 3LX and 3HX — consult factory.

Bolt-On Manifold Option

The bolt-on manifold option is available with Parker Series 2HX, 3LX and 3HX. Manifolds may be located on either the head or cap end at any position that does not interfere with mounting. For manifolds available by bore size, see the dimensions section of the catalog.

Feedback Option

Parker Series 2HX, 3LX, and 3HX actuators may be ordered prepared for a feedback device or prepared for and supplied with a feedback device. The Parker LRT option may only be ordered installed at the factory. See the ordering code on the opposite page. Parker's standard LDT option is a Temposonics™ LH position sensor. To specify another manufacturer's magneto-restrictive position sensor place an "S" in the cylinder model code and specify the manufacturer's name and model number. Parker will install any other type and brand of feedback specified by the customer as long as it is reasonably designed to fit into an NFPA type cylinder — consult factory.

For additional information – call your local Parker Cylinder Distributor.

2HX Series Model Codes

The Parker 2HX Series model code is based on the standard Parker 2H Series model code system. The common modifications available for the Parker 2H are available with the Parker 2HX configuration as long as the modifications do not interfere with the Valve and Feedback options selected. The Bolt-On Manifold and Feedback options described in this catalog and outlined below are available with the Parker 3L Series medium-duty hydraulic cylinder and with the Parker 3H Series (7" and 8" bore) heavy-duty hydraulic cylinder. Specify "3LX" and "3HX" respectively in the model code described below. Integral manifolds are **not** available as standard for the 3LX and 3HX.

Table A — Basic Model Numbers

Bore Size	Cushion Head End	Double Rod	Mounting Style	Mounting Modification	Series	Piston	Ports	Common Modifications	Special Modifications	Piston Rod Number	Rod End Thread Style	Thread Type	Cushion Cap End	Stroke
4.00	C	—	TC	P	2HX	L	T	V*	S	1	4	A	—	X24.00
Specify. Consult dimension tables for available bore sizes. Also see Parker Series 2H.	Specify only if cushion Head End is required.	Consult factory for double rod cylinders.	Specify Mounting Style. Consult dimension tables for available mounting styles. Also see Parker Series 2H.	Specify P- for thrust key mounting. *ONLY IF REQUIRED.	Specify Series 2HX for 2"-6" bores, 3HX for 7" and 8" bores, 3LX for medium-duty 2" - 6" bores.	Use L for Lipseal Piston. Use K for Hi-Load Piston. Use C for ring type piston.	Specify "T" for SAE straight thread ports. (all manifolds) Optional ports available without manifolds (see 2H).	If required specify V = Viton Seals E = EPR Seals. Consult Section C, page 83 for fluid compatability information.	Specify an "S" for all special modifications not called out in the six digit code below.	Specify rod code number. Consult dimension tables for available rod diameters and section C, page 96 for rod buckling consider-ations.	Specify Style 4, Small Male. Style 8, Intermediate Male. Style 3, Special. Specify KK, A, LA or W dimension required.	Specify A = UNF W = BSF M = Metric	Cap End Cushions are not available with LDT or LRT feedback. Specify C for cap cushion with no feedback.	Specify in inches. Show symbol "x" just ahead of stroke length.

Table B — Valve and Feedback Codes (Required for 2HX Ordering)

Valve Manifold	Valve Pattern Group	Valve Location	Feedback Option	Feedback Furnished	Feedback Protective Enclosures
N = None	N = Not applicable	N = Not Applicable	N = None	N = Not Applicable	N = Not Applicable
B = Bolt-On*	A = Servo Group A††	H = Head	C = LDT•	1 = Prepare to accept	A = False Stage
I = Integral**	D = Servo Group D††	C = Cap	F = LRT••	2 = Included	D = Light Duty
	G = D03 (Group G)		X = Other***		F = Medium Duty
	H = D05 (Group H)		(Please specify)***		
	J = D06 (Group J)†				
	K = D07 (Group K)†		B = BALLUFF		
	M = D08 (Group M)†				
	X = Other***				
	(Please Specify)***				

* Bolt-On Manifolds will be located at position #1 unless an "S" is placed in the cylinder model code and the mounting position is indicated. Bolt-On Manifolds may be positioned on either the head or cap end at any location not occupied by a mount or port or cushion.
** Integral Manifolds are only available at cap end position #1.
*** When selecting "other" an "S" must be placed in the model code and the valve or feedback device must be specified by the customer.
† Valve patterns D06 (Group J), D07 (Group K), and D08 (Group M) are *only* available as Bolt-On Manifolds. Consult factory for DD Mounts.
†† See Valve group table on page 154 & 174 for Servo Valve mounting pattern descriptions.
• When an LDT is to be supplied by the customer, Parker prepares the actuator with an SAE port, magnet, and gun drilled to accept a 2.5" dead zone LDT.
•• LRTs can *only* be installed by Parker at the factory. Electrical connector will be at position #4 standard.

Example 1: Actuator with LDT feedback only (2.5" dead band LDT), and 0 to 10 VDC grounded output with 15 foot electrical cable.

2.50" C-2HXT 34 x 12.000"
NNNC2N
1) 0 to 10 VDC
2) 15 foot electrical cord

Example 2: Actuator to **accept** a BD-30 servo valve and to **include** analog LDT with velocity output, 15 ips max velocity, low friction seals and extra-heavy-duty enclosure. Cushioned head end.

6.0 CC 2HX TS 14 A x 60
BDCC2A
Low friction piston and rod seals
Velocity calibration: +10 VDC = 15 ips extending

For Cylinder Division Plant Locations – See Page II.

B

Parker TS-2000 seal designed to eliminate cylinder rod seal leakage.

Parker Series 2H Heavy Duty and Series 3L Medium Duty Hydraulic Cylinders with the TS-2000 seal offers positive protection against cylinder rod leakage under the most demanding applications.

The TS-2000 seal is the product of countless hours of research, development and extensive field testing and is only available on Parker Cylinders.

Based on the popular Parker Serrated Lipseal rod design, the TS-2000 incorporates the pressure-compensated, uni-directional characteristics of a U-cup with the multiple edge sealing effectiveness of compression-type stacked-packings.

The goal for the Parker team was to design a rod seal suitable for all types of applications, regardless of pressure profile. It had to be composed of a material that would not react chemically with hydraulic fluids. And it had to produce better and more reliable "dry rod" performance than the standard serrated lip-seal design in a broad range of applications.

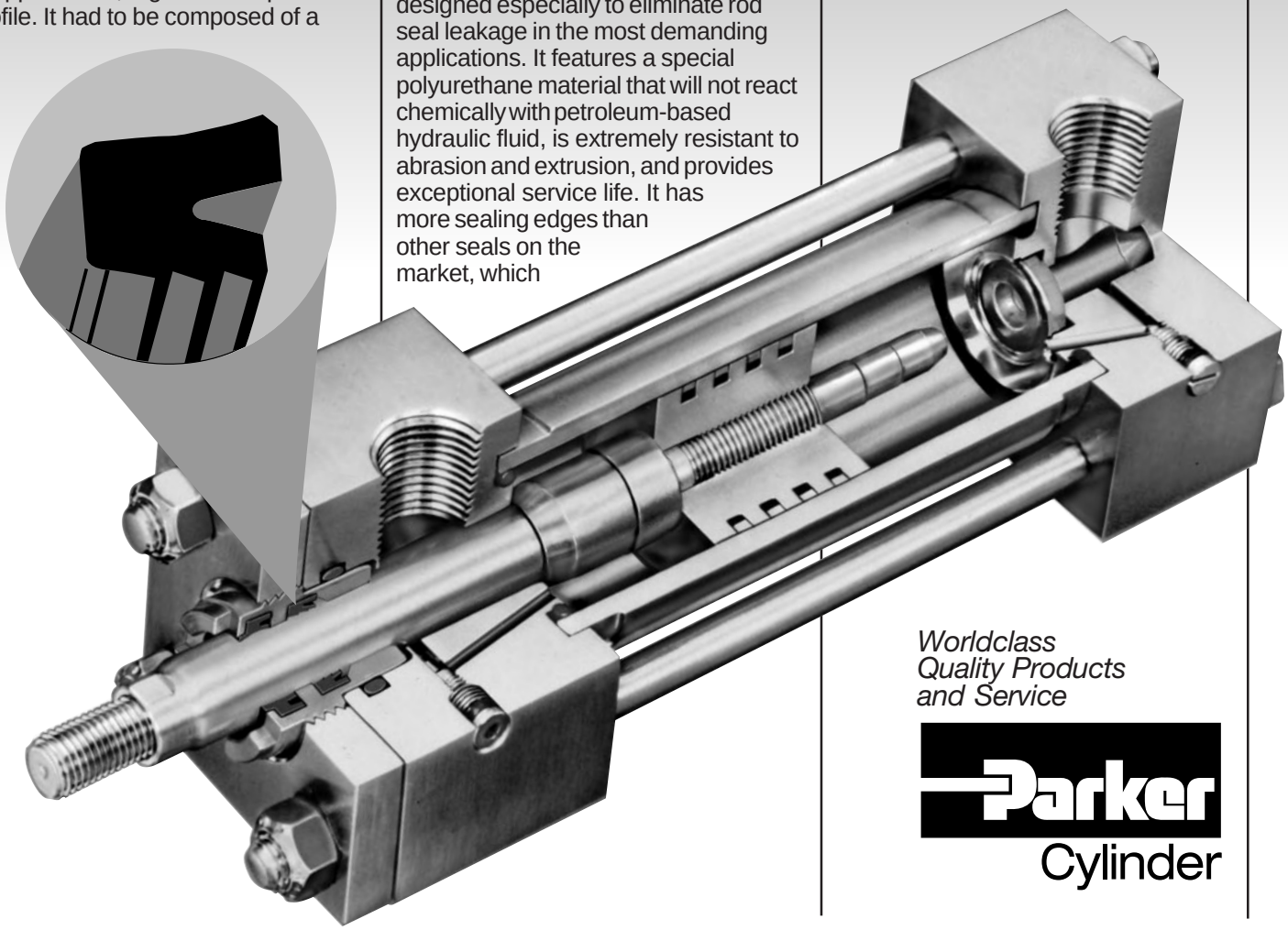
"Jewel" gland with wiperseal and TS-2000 cylinder rod seal.

The result is the TS-2000 seal, designed especially to eliminate rod seal leakage in the most demanding applications. It features a special polyurethane material that will not react chemically with petroleum-based hydraulic fluid, is extremely resistant to abrasion and extrusion, and provides exceptional service life. It has more sealing edges than other seals on the market, which in turn produces "dry rod" performance. The seal geometry was refined for maximum stability in the groove and has excellent performance characteristics throughout a broad range of pressures and piston rod velocities.

The Parker design team was successful!

TS-2000 rod seal has not failed in any of the test applications in the lab or on the job, no matter how tough or demanding.

For more information on the TS-2000 call or write your local Parker distributor or Parker Hannifin Corporation, Cylinder Division, 500 S. Wolf Road, Des Plaines, IL 60016, 847-298-2400.



Worldclass Quality Products and Service

Parker Cylinder

For additional information – call your local Parker Cylinder Distributor.