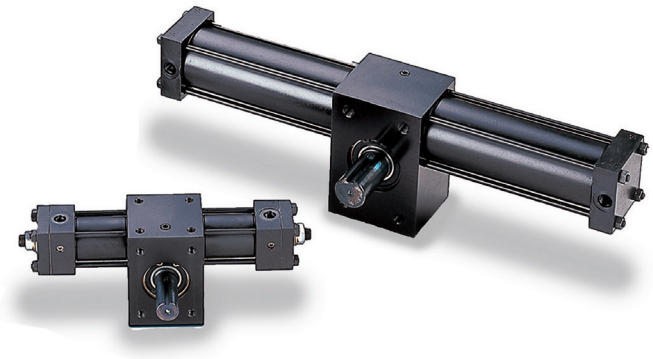
aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Hydraulic Rotary Actuators

HUB, LTR, HTR, M, Tork-Mor Series

Catalog HY03-1800-2US

Parker

ENGINEERING YOUR SUCCESS.

Parker Hannifin is the leading global manufacturer of components and systems designed to control motion, flow and p essure in all types of machinery. Parker is a Fortune 300 corporation listed on the New York Stock Exchange as PH.

Parker offers more than 1,400 product lines that control motion in 1,000 industrial, mobile and aerospace markets. We are the only manufacturer to offer our customers choice of hydraulic, pneumatic, electromechanical and computer motion control solutions.

Furthermore, we have the largest global distribution network in our field, with more than 7,500 distributors serving more than 422,000 customers.

The Pneumatic Division is Parker's primary source for pneumatic valves, prep-air products, linear actuators, and **hydraulic rotary actuators**. Additionally, Pneumatic Division offers products that use electromechanical, pneumatic and hydraulic technologies and has developed a business model that is based totally on customer needs. Pneumatic Division customers can select the level of integration that best meets their needs.

Ordering valve or actuator products from Parker brings with it all of the benefits you have come to expect: quality, solution integrity, worldwide distribution and extensive field and customer support. Add supplier reduction, shorter lead times, simplified ordering and more efficient shipping and you'll agree that Parker's total solution capabilities are designed with your specific application in mind.

Contact Parker Pneumatic Division with your specific equirement, and our engineers will be pleased to work out the details of your design.

Application Engineering Help

Parker Pneumatic provides premier application engineering services to our customers. Our engineers have detailed understanding of our products to help your staff select the appropriate actuator for any application. Parker designs and manufacturers all major types of rotary actuators. Due to this broad base, we can offer the customer the optimum solution. Your engineers can also work independently with our user-friendly catalog and our computer-based analysis and selection tools. The actuators can be sized to meet the specific performance aspects of the application. Additionally, only the Pneumatic Division provides information that allows the engineer to assess life requirements for the actuator. The engineer can precisely select the actuator that will provide the correct level of torque output over the full anticipated duty cycle life of his equipment. This ensures that the customer gets trouble free operation throughout its service life, avoiding expensive, unanticipated downtime. The ability to predict the operational life of the unit allows the customer to institute regularly scheduled preventative maintenance programs, maximizing production uptime. This is an additional value that Parker Pneumatic Division brings to the application.

Alternative Energy

To meet economically viable cost targets ($/kWh) that compare to those of fossil-fuel power supply solutions, solar-power equipment suppliers look for innovative engineering solutions that provide maximum efficiency combined with low cost. Parker has designed and supplied specialized actuators optimized to stringent performance requirements. The highly efficient rack-and-pinion gearing at the heart of actuator systems provides high power at low rotational speeds. The actuator is capable of driving the maximum number of solar panels under high wind conditions at a slow speed, allowing precision tracking of the sun. The low maintenance, stand-alone system has an integrated fluid reservoir and offers variable drive speeds if multiple pumps are used

Steel Industry

This world of extremes presents many unique challenges for equipment used for automating critical processes.

Parker hydraulic rotary actuators are a vital part of the steel making industry. Unlike a cylinder, the hydraulic rotary actuator is completely enclosed in a rugged steel housing that protects critical working elements from the harsh and contaminated environment of the mill.

In addition to a broad, standard line of small actuators suitable for a variety of tasks, Parker's large precision units supply millions of in-lbs of controlling torque to tip and control the ladles of molten steel. Other applications include coil-box actuators and actuators used in walking beam arrangements to move large red-hot structural shapes through cooling beds. Parker also offers the M Series of actuators specifically designed for the mill environment. The M Series offers the high reliability, durability, and ease of maintenance so important to ensuring uninterrupted production.

Boomslewer and Large Actuators

The world's largest hydraulic rotary actuator was supplied to the shipbuilding industry for self-unloading freighters plying the Great Lakes and the oceans of the world. The Boomslewer actuator generates 64 million in-lbs of torque to precisely control and position the ship's 120-meter long cargo-conveyor boom. The actuator housing structure is an integral part of the ship's structure and is designed to absorb the megaton loads induced by the cargo conveyor, the loads caused by the wind, and the ship-listing loads acting on the boom. The actuator has a self-contained reservoir, hydraulic power supply, and control valving, and is manufactured to the exacting requirements of the American Bureau of Shipping and Lloyds.

We have supplied hundreds of these actuators to a variety of domestic and overseas customers around the world during our 40 plus year history. Parker's worldwide support network assures effective communication, provides for successful coordination of technical and business requirements, and guarantees smooth delivery through export and import processes.

Marine and Submerged Applications - Water Control Management

The Pneumatic Division of Parker Hannifin has furnished specialty actuators for submerged and marine operations for 45 years. It supplies the US Military with actuators to automate valves, deploy antennas, open and close torpedo doors and hatches, and to perform other tasks. Most of these actuators are custom-made to meet specific requirements.

Our largest Tork-Mor vane-type actuator operates the pool gates for the Shamu Seaworld attraction. Our HTR and M Series units are used in gantry and boom actuation functions on ships. Our actuators also are built into steering systems on surface ships and into vane control on submersibles.

Some actuators are approved by municipal engineers for use in major metropolitan areas for storm-water, potable-water, and flood-gate control. These actuators are rated for 3000 psi and 300,000 in-lbs of torque, to position 48-in. butterfly valves while submerged to 150 feet in fresh water. These units were equipped with position feedback and sensor packages rated for depth. The rugged reliability of these heavy-duty actuators allows them to absorb the load and shocks of a seismic event.

High Tech Applications

Some of the most demanding actuator requirements come from customers that lead our nation's space program. Parker Pneumatic Division has been a proud supplier of specialty actuators for rotating umbilicals, multi-ton maintenance platforms, and blast doors on launch towers at Kennedy Space Center and the Vandenberg Air Force Base.

Another recent example of the Parker engineering team's diverse capabilities is its work with the engineers specifying equipment for the next-generation neutron-science facility at the Oak Ridge National Laboratory. The Spallation Nuclear Source is where a 2 MW proton beam blasts atoms, and where product safety and reliability are as important as performance and function. Two specialized actuators rated for 3000 psi and generating 3 million in-lbs of torque assure reliable opening and closing of a 75,000-lb steel-protection door on the target hot cell.

Offshore Technology

Parker technology is in demand in the offshore industry in a variety of areas. Actuators of varying sizes and with multiple specialized features provide reliable, effective, and low-cost solutions to the unique world of offshore rigs. Our HTR300 and HTR600 units are used in cable-winch and handling systems on both surface ships and offshore installations. We supply special actuators for large processing valves, some requiring 4 million in-lbs of operating torque.

Electrohydraulic valve actuators in sizes from 1800 in-lbs to 75,000 in-lbs are used regularly in oil-tank vent and shutoff alves, and in precision control of process fluids. We also have the capability to provide certified API 16C actuators that meet the stringent requirements for choke and kill systems within the oil industry.

Mobile Applications - Trucks, Man Lifts

Parker actuators are used in a variety of mobile applications and can be integrated with power units from Parker Oildyne Division and valves from Parker's Hydraulic Valve Division to supply a single-source, drop-in, stand-alone system. Some fire trucks use this system to position ladders for easy access, while some buses and vans use it for deployment of handicap access ramps.

The enclosed, leak-proof piston seals make actuators ideal for applications where holding a load hydraulically is a critical requirement. The safety and reliability of Parker actuators assure precise manipulation of man-lift baskets in the construction industry. Other actuators perform miscellaneous functions on oil-industry process trucks, refuse trucks, mobile X-ray scanner trucks for homeland security, vacuum truck cable reels, and dump truck load covers.

In the mining industry, HTR and M Series units see use in diverse applications, from small mobile-roof bolters to giant tunnel-boring machines requiring 6 million in-lbs of torque. Fork-lift steering and mobile-industrial transporters are examples of actuator applications in the factories. The aircraft industry uses actuators on machines that test A380 front-gear steering and those that dump fire retardant from aircraft-mounted tanks, as well as on gyrating flight simulators.

Process Industry

The processing industry has many operational and environmental situations where actuators must function under adverse loading and severe thermal, shock, or environmental conditions. On rubber-mixer machines, heavy-duty actuators rated at 3000 psi and supplying torques from 75,000 to 300,000 in-lbs not only satisfy high static loads, but accept the punishment of shock loads. In these applications the actuator acts as a damping mechanism that absorbs high-production speeds for door actuation. Many major automotive tire manufacturers specify the 300M Series units as preferred equipment. The units provide the Mill rating, long life, durability, and ease of maintenance that are recognized as providing the best value in the hydraulic rotary-actuator market.

Internal Intensive Mixer courtesy of Kobelco Stewart Bolling, Inc. Hudson, Ohio

Parker Hannifin Corporation
Three Year Extended Warranty

Parker Hannifin Corporation will extend[1] its standard limited warranty on **ALL** Hydraulics Group components to thirty-six (36) months if they are protected by properly installed and maintained[2] Parker hydraulic filters. Components covered by this warranty include all cylinders, valves, and hydraulic components manufactured by Parker in any of our global facilities. This warranty covers Parker components; anywhere in the world you may ship your equipment.

Parker's obligation under this warranty is limited to the replacement or repair of any failed components. The buyer understands that Parker will not be liable for any other costs or damages.

The buyers of quality Parker components and filters benefit by having **ONE** source for all hydraulic needs: **Parker.**

Hydraulics Group

[1] This extended warranty may apply to failures resulting from contamination, but will not cover products that are not properly installed or maintained, or to failures resulting from misapplication, abuse and misuse.

[2] Proper maintenance intervals and procedures, as set out in product manuals, catalogs, or otherwise require verification. Verification methods will be determined and agreed to by Parker and the OEM in advance of the extended warranty taking effect.

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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 Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical 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, specification , designs, availability and pricing, are subject to change by Parker Hannifin Co poration and its subsidiaries at any time without notice.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled "Offer of Sale".

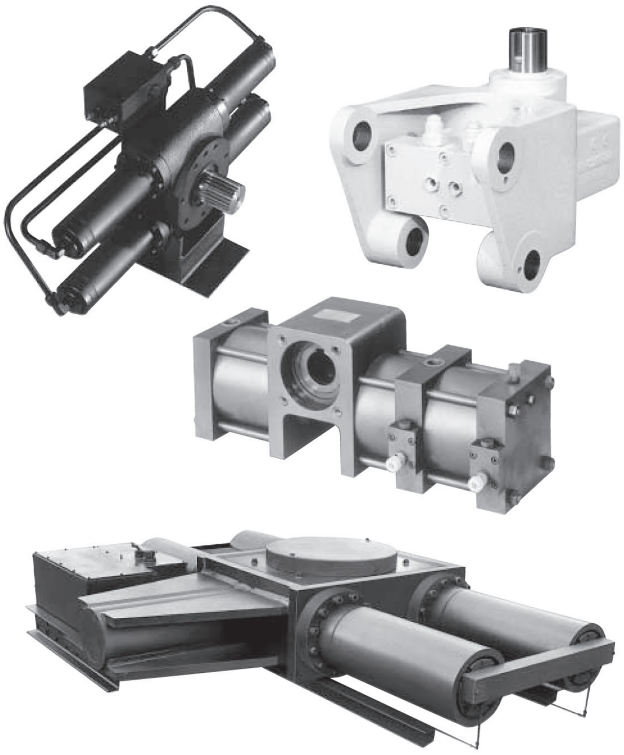
Custom Engineering

Parker offers the broadest range of automation products in the industry, most of them presented as catalog items with standard performance limits and rigidly established dimensions and interfaces. Parker Pneumatic Division can offer much more than this. Parker Pneumatic Division is continuously investing in product improvements and upgrades that bring value to the customer and address specific customer needs. Many of these new ideas and customer inputs are developed from working directly with new customers on custom designed actuators. Our engineering and sales team welcomes your input and looks forward to helping develop products meeting your specific needs. Parker Pneumatic Division is the industry leader in actuator technology. We have invested in the engineering and analytical tools to fully understand the capabilities of our product offerings. We have the team in place and the analysis and technical capabilities to evaluate your special requirements and to work with your engineers to establish an optimum solution.

Rack-and-pinion actuators offer the opportunity for the customer to define and integrate specific feat es or strengths into the actuator housings. If required, special actuator housings can be fabricated from a machined block or a weldment versus the standard cast housing. This special housing can be designed with special dimensional features and strength capabilities to integrate directly into the customer's structure. The actuator assembly thus becomes a drop-in device with precision-machined features defined by the custome , built-in bearing capability, and other critical features in addition to supplying rotary power and positioning. These values are incorporated into one low-cost package the customer can buy, without doubling up on the expense of building similar features into his apparatus.

A summary of other specialty features successfully designed into rack-and-pinion actuator products are as follows:

- Housing and shafting with special materials and features designed to carry high loads.
- Actuator features recognized industry wide for providing durability, long life, and reliability of 99% in 10 million cycles.
- Rotations to 1080°, variety of speeds, special shafting, mounting, and porting accommodations.
- Units with minimal backlash, plus combined linear and rotational motion.
- Units integrated with control-valve packages, and position feedback for total system solutions
- Special materials – titanium, monel, stainless steels, bronzes, composites.
- Compliance to customer specs and agency certifications – ABS, FDA, militar , UL/CE, SAE, and API 16C certification
- Special environments and applications – robotic, submerged, clean room, medical, PC chips, and corrosive atmosphere.



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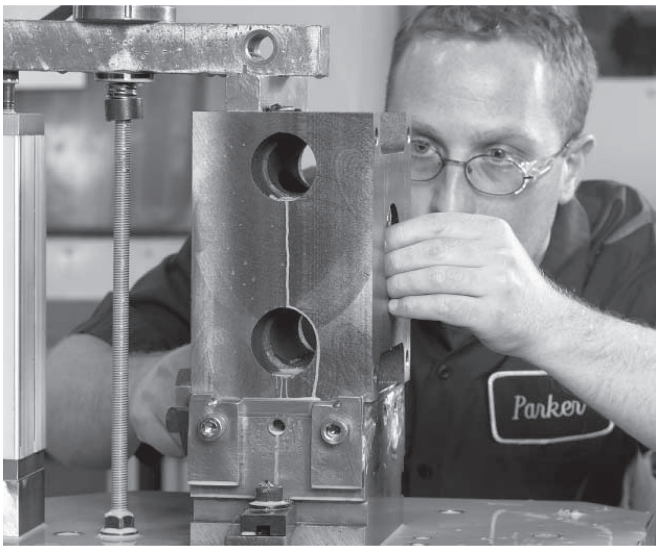
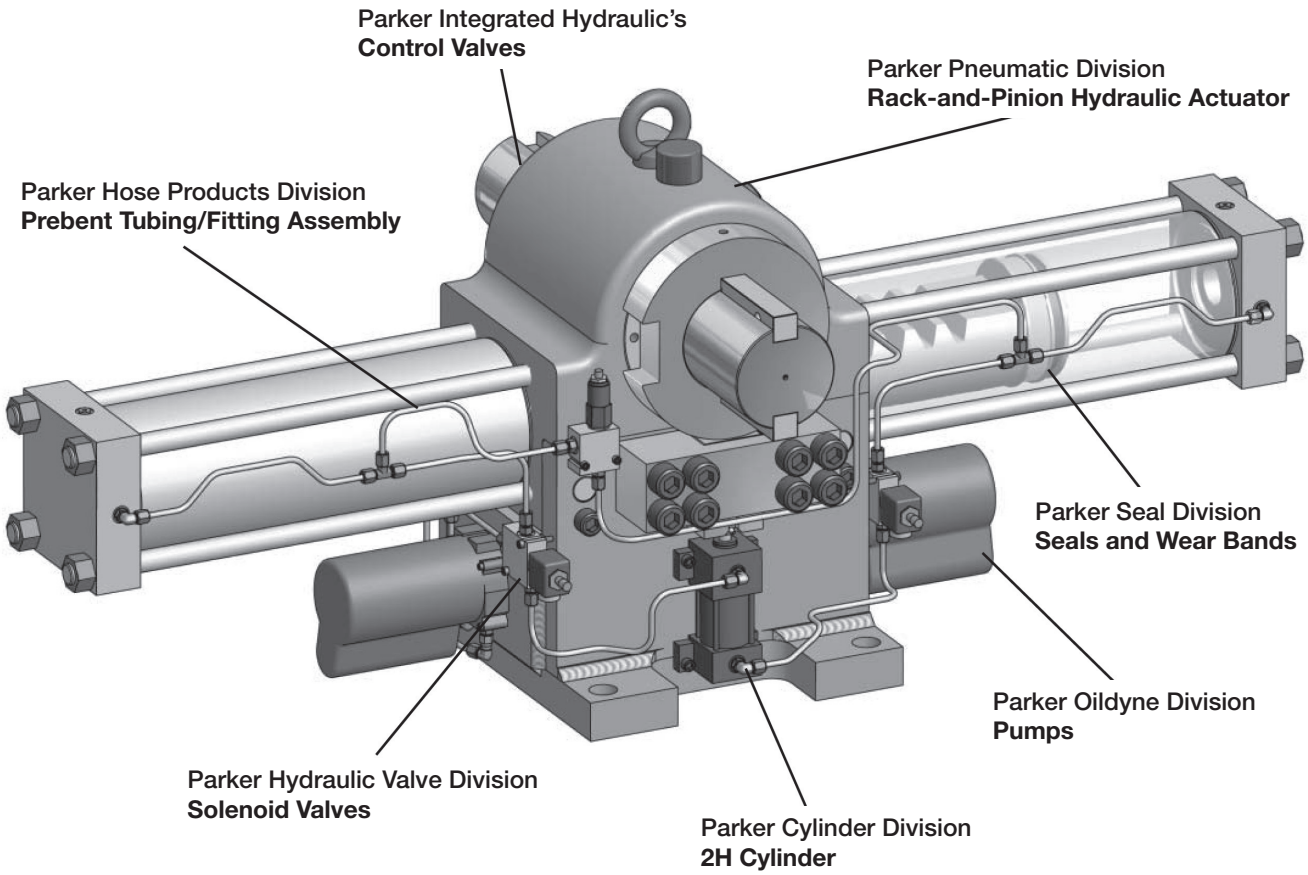
Wadsworth, Ohio
www.parker.com/pneu/rotary

Integrated Hydraulics Packages from Parker Worldwide

Parker is a global corporation having 142 different Divisions and offering thousands of products. Because of the broad spectrum of product in all types of automation technology, we are able to formulate innovative solutions to new or complex problems. We pride ourselves on having the expertise to work as a team with customer's technical personnel, Parker's field systems specialists, and a comprehensive network of distributors. We use these resources to pull together technologies from different Parker Divisions and to offer a fully integrated package to meet the customer's needs.





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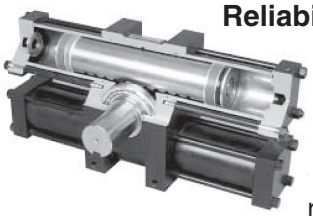
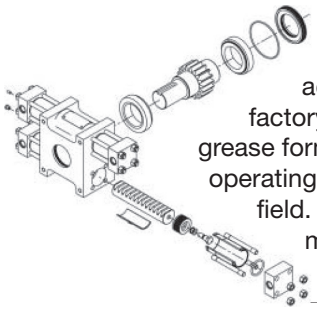
Gears Materials Options and Hardness

Pneumatic Division has extensive experience in rack-and-pinion gear rotary actuator technology that can be quickly applied to satisfy specific customer needs. All gears a e designed to provide long life and durability. Standard gears and racks are fabricated from thru-hardened alloy steel selected and specified in acco dance with the American Gear Manufacturers Quality Class 6-10. High-quality alloy steel is rigorously inspected to achieve compliance with the AGMA quality class. Each actuator size has gearing incorporated that achieves the rated torque without breakage. Data is presented for every size of actuator gearset to allow proper selection for long production-cycle life without adverse wear out. Gearing can also be custom designed to achieve specific loading and life characteristics. Options include improved materials, surface treatments for high hardness and extended wear under extreme loads and speeds, specialized lubricants, and others.



Reliability, Durability Features

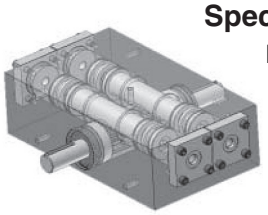
Pneumatic Division manufactures a wide variety of rotary and linear actuators. The HTR Series heavy-duty hydraulic rack-and-pinion rotary actuators are recognized for rugged durability and life. These are used extensively in a wide variety of applications where high reliability is considered of key importance to maintaining production-line output without downtime, or to achieving mission-critical functionality. These actuators utilize time-proven design concepts and materials to produce a product unique in the industry. Their large tapered-roller bearings support high external radial and thrust loads. The tie-rod cylinder construction complies with NFPA heavy-duty, Series 2H certification requirements. The gearing is manufactured to AGMA standards. Proprietary analysis programs are employed to demonstrate reliability rates of 99% in 10 million cycles in special cases, as requested by customers. The analyses results have been incorporated into this catalog (pages 4 and 5 of selection guide in introduction section), and offer the customer the ability to easily select actuators meeting both performance and durability requirements.



Lubrication

Each hydraulic rotary actuator is greased at the factory using specialized gear grease formulated for the typical operating conditions seen in the field. The type of g ease is a multipurpose, extra pressure (EP) lithium-based grease containing molybdenumdisulfide as a solid lubricant. At the factor , the rolling-element bearings are packed at assembly and the gear case is filled to app oximately 75% full. At normal speeds and operation within the life rating of the actuator, the unit will provide trouble-free service without the need for additional lubrication. If the unit is disassembled for standard seal maintenance, it will need to be repacked and relubricated.

The gear housing is equipped with a relief valve that is set to vent pressure from the gear case in the event of piston-seal bypass prior to seal maintenance. The vent relief provides a visual indication that seal maintenance is required since some grease will be forced through the vent fitting



Specialty Housings

Rack and pinion actuators offer the opportunity for the customer to define and integrate specific featu es or strengths into the actuator housing. If required, special actuator housings can be fabricated from a machined block or a weldment versus our standard cast housing. Special housings can be designed with dimensional features and strength capabilities integrated directly into the customer's structure. Thus, in addition to supplying the rotary power and positioning function, the actuator assembly thus becomes a drop-in device with precision machining features defined by the custome , built in bearing capability, and other critical features. These values can be incorporated as one low cost package for the customer, without adding additional expense by building similar features into the apparatus.

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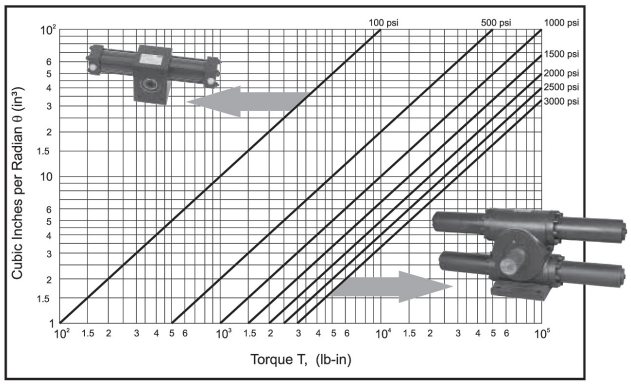
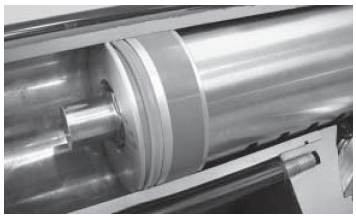
Efficien y

The most efficient actuator type is the rack-and-pinion. The efficiency of this spu -gear actuator is very high, typically in the low-to-mid 90th percentile. This offers advantages for the overall hydraulics system size since the actuator displacements are minimized and the size of the required Hydraulic Power Unit (HPU) pump, motor, and reservoir can be minimized. This means less cost for the customer. Additionally, system inefficiency is important in applications with high-speed production cycles since the inefficiency p oduces rapid heating of the fluid. o control this, a heat-exchange system is required, adding cost and complexity to the application. Vane-type actuators have efficiencies at app oximately 70%, and helical style actuators are only about 55% efficient





Seals

Pneumatic Division is continuously investing in product improvements and upgrades that bring increased value to the customer. Our most recent improvement is on the dynamic piston seal where we see the highest wear and interaction with the working fluid. The new single lip piston seal is a Parker proprietary 90 Shore A hardness polyurethane. This material provides extended temperature capability, excellent resistance to compression set and high rebound characteristics.

The new pinion shaft seals are capable of longer life at higher pressure. These seals traditionally have been o-rings that seal effectively at low delta pressures in the grease-packed gear case. However, in the event of piston-seal wear over time, hydraulic pressure leakage to the gear case, can cause case pressures of 650 psi. The single lip of the o-ring in this dynamic application has limited life. We have incorporated dual lobed seal technology at this interface as well. The new seal fits into the same grooves, but operates at a lower compression squeeze than the equivalent o-ring. The dual-lobed seal thus sees less wear from the pinion shaft during its dynamic life and operates more effectively at the higher pressure during piston-seal bypass.

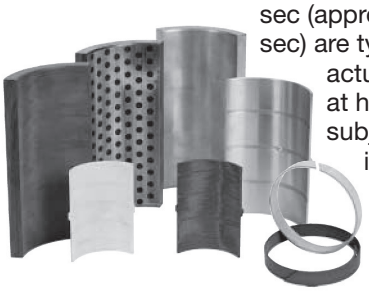
Specialty Coatings

All units from the Parker Pneumatic Division come from the factory with a standard corrosion protection coating of black waterborne acrylic polymer paint. This coating complies with various ASTM standards for solvent, impact, and chemical resistance, as well as, salt spray.

Parker also offers specialty treatments suitable for different environments such as sea or fresh water, high humidity and temperatures, or corrosive fluids encountered in various processing industries. Alternatively, Parker fabricates actuators entirely from stainless steel when this highest level of protection is required. Specialty protective processes may be selected based on coordination with the Parker engineering department.

Wear Bands and Rack Bearings

Most actuator applications operate at fairly low velocities. For example, speeds up to one radian/sec (approximately 60 degrees/sec) are typical. However, some actuators require operation at higher speeds. This subjects the critical surfaces in the unit to high sliding velocities and contact loads that can lead to fast and catastrophic failure of the unit if not properly considered.



Parker understands the engineering specifics within the actuator and has developed proprietary analytical tools that allow us to examine the customer's special operating conditions and make recommendations regarding them. We can offer options for the wear-band materials and the rack-bearing materials, as well as, configurations to satisfy higher speeds and loads. Options that we have successfully applied include rack bearings made of premium bronze, composite, and pre-lubricated graphite. Similarly we can offer premium wear-band materials or composite wear bands, depending on the application requirements.

Factory Acceptance Testing

Every Parker rotary actuator undergoes several test sequences prior to shipment from the factory. Each lot of actuators has test documentation completed and kept on file. Specific additional testing, if equired, by the customer can be quoted and done, with QC documentation packages supplied, if required. Each unit is marked with a nameplate having model number, pressure rating, serial number, and date code that must remain on the unit to maintain the warranty.

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Fax completed form to (330) 334-3335 or email pdnapps@parker.com

CONTACT INFORMATION:

Name: _____ **Phone Number:** _____

Company: _____ **Fax Number:** _____

Address: _____

APPI ICATION DETAIl S:

1. **Torque Requirement:** _____ **in-lb.**
2. **Operating Pressure:** _____ **psi**
3. **Requirement Rotation:** _____ ° (i.e. 90°, 180° etc.)
4. **Cycle Time:** _____ **sec.** (Time to complete rotation in one direction.)
5. **End of Stroke Options Required:** _____ (i.e. Cushions, Stroke Adjusters)
6. **Bearing Support Required** - Include weight of external load and direction in which it will be applied. (i.e. radial, thrust)

   _____
7. **Operating Temperature:** _____ **°F**
8. **Type of Fluid Used:** _____
9. **Brief Description of Application** (If needed, sketch can be submitted using the space provided at the bottom of this page.)

   _____

ACTUATOR DETAIl S:

1. **Type of Mounting Style Preferred:** _____
2. **Type of Shaft Connection Preferred:** _____
3. **Any Special Options Desired?** _____

   _____

Sk ETCH:

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Introduction

Rack & Pinion Actuators

Vane Style Actuators

Sensors & Feedback

Engineering Guidelines

Service Bulletins

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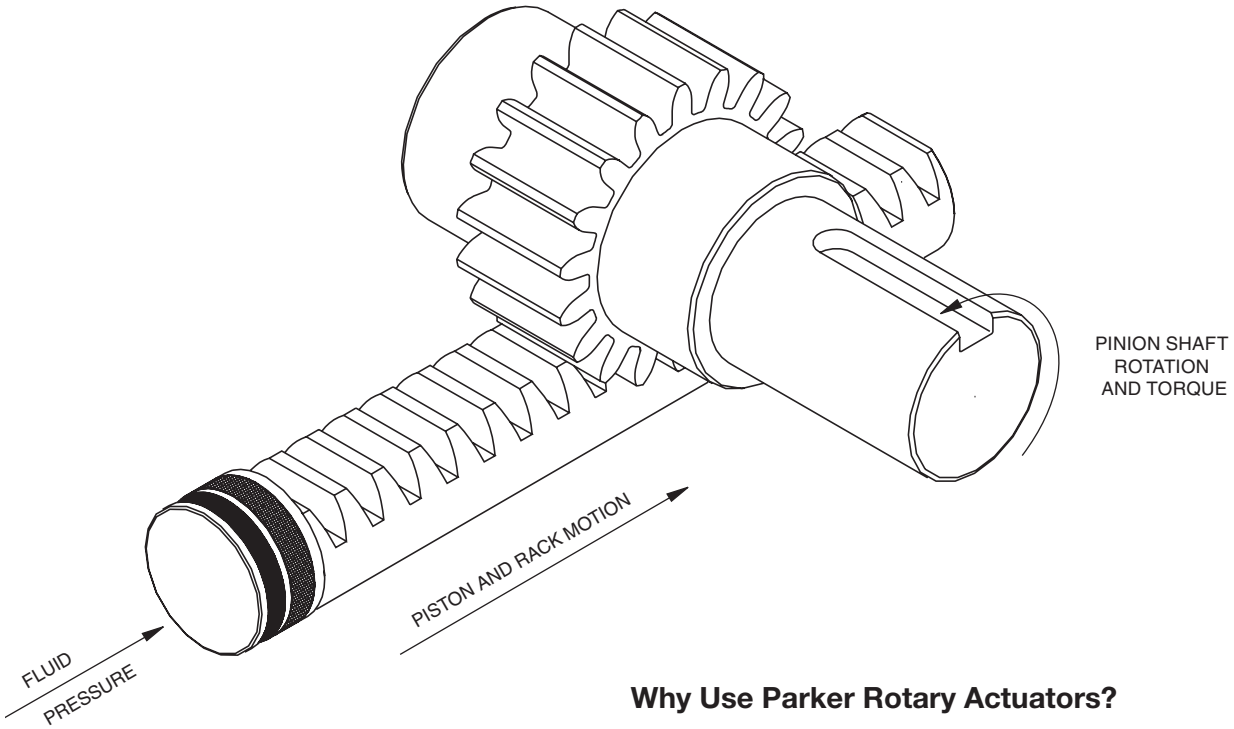
Parker . . .
l eading the Industry

Parker leads the industry in development of new and innovative features to make rack and pinion rotary actuators more reliable, efficient and safe. With a firm commitment to p oduct quality and design research, Parker rotary actuators are continually being improved so that you can enjoy benefits such as long service life and increased productivity.

What Is a Rack & Pinion Rotary Actuator?

Parker rotary actuators convert fluid power into otary motion for a wide variety of industrial applications. Pressurized fluid is applied to a ci cular piston inside a cylinder which pushes a rack across the pinion gear. This action turns the shaft, generating rotary motion. This motion is transferred through the shaft to the machinery for applications such as upending, turning, roll-over, tilting, indexing, transferring, mixing, valve operating, tensioning and clamping.



Where Can Parker Rack & Pinion Actuators Be Used?

- Material Handling
- Machine Tool
- Primary Metals
- Rubber and Plastics Machinery
- Mobile Equipment
- Robotics
- Packaging
- Valve Actuation
- Multi-Process Industry
- Cranes and Hoists
- Mining and Oil Field Equipment
- Military
- Commercial Marine

Why Use Parker Rotary Actuators?

- Provides uniform torque in both directions.
- Simple design.
- Wide range of sizes.
- High torque output in a small package size.
- More efficient operation and longer time between servicing.
- Performs under the most adverse ambient conditions.
- No external linkage needed for rotary motion.
- Good load holding capability with no drift.
- Optional cushions can stop inertial loads*.
- Rotation can be specified to fit exact application need
- Will support radial and thrust loads.

* Within actuator limits.

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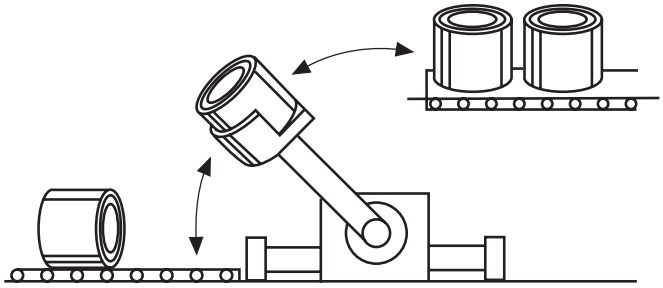
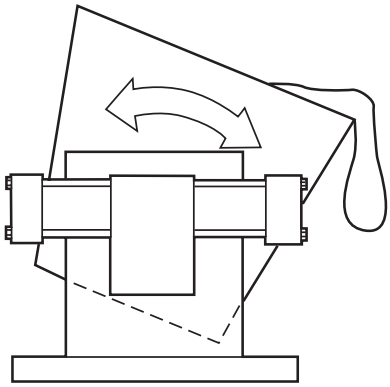
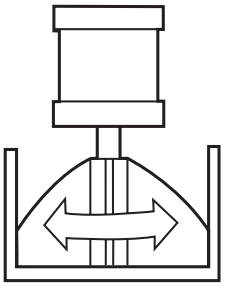


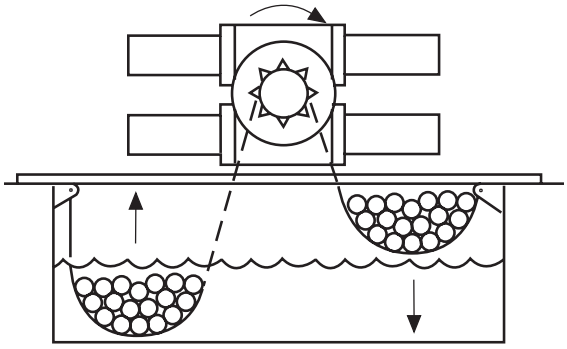
Transfer
(Upending/Downending)



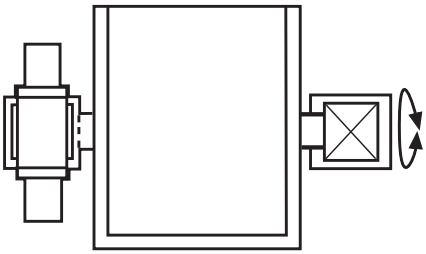
Unloading/Dumping

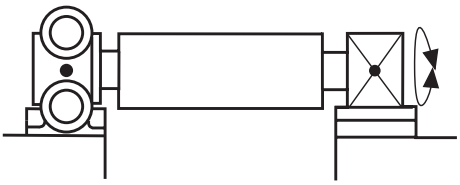


Mixing

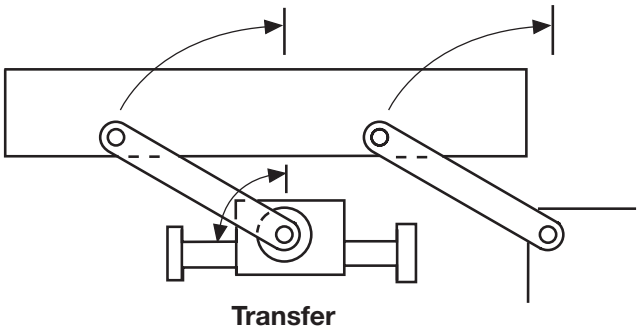


Tube Pickling Drive Conveyor

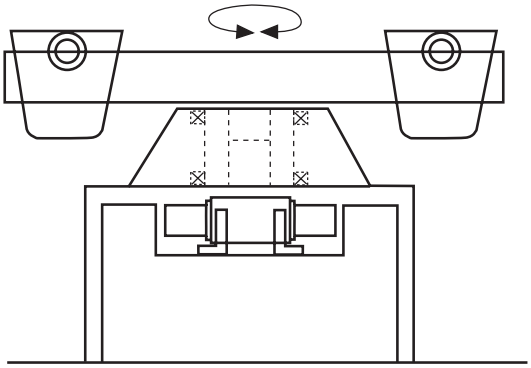




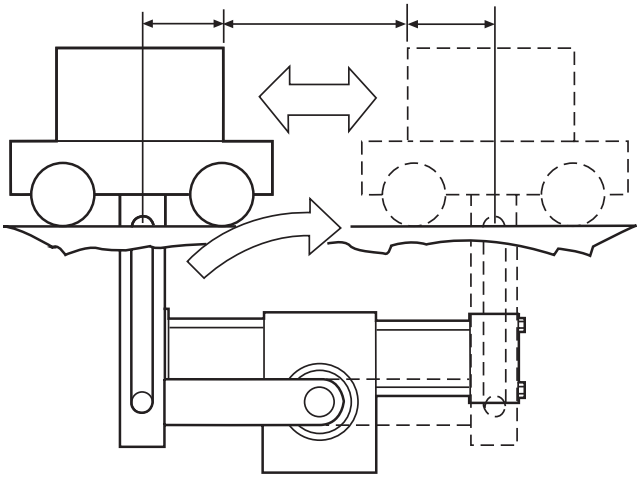
Welding Frame Rollover



Transfer
(I ifting/Feeding)



I adle Turret



Harmonic Drive

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A rack and pinion rotary actuator consists of a housing with bearings, a rack and pinion gear rotary group and hydraulic cylinder parts. The cylinder pistons drive the rack gear across the pinion gear to generate torque at some rotational velocity. Gear tooth life is well understood and with the help of the AGMA 2001-B88 calculation model, we can make gear train life estimates. The following tables suggest a relationship between a desired total torque value and a desired durability cycle life.

Durability Cycle Life

A gear tooth can break either when overloaded or by load induced metal fatigue. The tooth overload failure mode is obvious. Parker historically uses the "bending stress" criteria to establish torque ratings. Tooth bending capability remains a useful criteria. Parker proposes to broaden the selection criteria by publishing torque versus durability life guidelines and suggestions.

Parker Pneumatic Division has generated the following tables as an actuator selection aid. We suggest actuator selection begin with the consideration of both torque and desired durability life. Use these tables to discover possible candidate HUB, LTR, HTR and Mill type actuators for consideration.

How to Use

These suggestions are made not respective of the available operational pressure. Select the desired total torque requirements on the left hand column. Then select the desired durability cycle life column. In that square, find an actuator suggestion that should meet both the gear train durability and cycle life criteria. An actuator with greater capabilities than the one suggested should satisfy the same criteria. For example, if the block suggests an LTR151 for the given torque and durability life, then an LTR152 is also suitable as would be an HTR1.8 or any actuator larger than the LTR151.

Caution: These charts are intended as a guide only. Refer to actual product data in the catalog before specifying an actuator. Factors such as bearing loads and shock loads may influence actuator selection. It is not feasible for any catalog to note, describe and anticipate all product limitations. It is incumbent upon the OEM or user to qualify any particular product for each and every application.

NOTE: Consult factory for gear train life information if:
HUB system pressure exceeds 1750 psig
LTR system pressure exceeds 750 psig
HTR system pressure exceeds 1750 psig
M system pressure exceeds 2250 psig

Completely fill out the "Application Fax" and submit the form prior to contact with the factory.

Torque vs Durability Cycle l ife*
Torques from 200 to 1100 in-lb

Torque level in-lb	Nm	10 thousand cycles nominal life	100 thousand cycles nominal life	1 million cycles nominal life	10 million cycles nominal life
1100	124	LTR151	HTR1.8 or HUB018	HTR3.7	LTR152
1000	113	LTR151	HTR1.8 or HUB018	HTR1.8 or HUB018	LTR152
900	102	LTR151 or HTR.9	LTR151	HTR1.8 or HUB018	HTR3.7
800	90	HTR.9	LTR151	HTR1.8 or HUB018	HTR1.8 or HUB018
700	79	LTR102 or HTR.9	LTR151	LTR151	HTR1.8 or HUB018
600	68	LTR102 or HTR.9	LTR102 or HTR.9	LTR151	LTR151
500	57	LTR102 or HTR.9	LTR102 or HTR.9	LTR102 or HTR.9	LTR151
400	45	LTR101	LTR102 or HTR.9	LTR102 or HTR.9	LTR102 or HTR.9
300	34	LTR101	LTR101	LTR102 or HTR.9	LTR102 or HTR.9
200	23	LTR101	LTR101	LTR101	LTR101

*Durability life estimates based on AGMA 2001-B88 gear life model for pitting resistance.

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Torque vs Durability Cycle l ife*
Torques from 2000 to 10000 in-lb

Torque level in-lb	Nm	10 thousand cycles nominal life	100 thousand cycles nominal life	1 million cycles nominal life	10 million cycles nominal life
10000	1130	HTR10, LTR321 or HUB100	LTR322	HTR30/45	HTR30/45
9000	1017	HTR10 or HUB100	HTR15/22	HTR30/45	HTR30/45
8000	904	HTR10, LTR252 or HUB100	HTR15/22	LTR322	HTR30/45
7000	791	HTR7.5 or HUB075	HTR10 or HUB100	HTR15/22	HTR30/45
6000	678	LTR321/252	HTR10 or HUB100	HTR15/22	HTR30/45
5000	565	HTR5 or LTR202/252	LTR202/321	HTR10 or HUB100	HTR15/22
4000	452	LTR202/251	LTR202/321	LTR202/321	HTR10 or HUB100
3000	339	HTR3.7 or LTR251	HTR5	LTR202/321	LTR321
2000	226	HTR1.8 or LTR152	HTR1.8/3.7 or LTR152	LTR101/251/152 or HTR5	LTR201/251/152

Torque vs Durability Cycle l ife*
Torques from 15000 to 100000 in-lb

Torque level in-lb	Nm	10 thousand cycles nominal life	100 thousand cycles nominal life	1 million cycles nominal life	10 million cycles nominal life
100000	11300	150M or HTR150	150M	150M	150M or HTR300
90000	10170	150M or HTR150	150M	150M	150M or HTR300
80000	9040	150M or HTR150	150M	150M	150M or HTR300
70000	7910	75M or HTR75	75M	150M	150M or HTR300
60000	6780	75M or HTR75	75M or HTR150	75M or HTR150	150M or HTR300
50000	5650	75M or HTR75	75M or HTR150	75M or HTR150	75M or HTR150
40000	4520	75M or HTR75	75M or HTR150	75M or HTR150	75M or HTR150
30000	3390	HTR30	HTR75	75M or HTR150	75M or HTR150
20000	2260	HTR30/45 or LTR322	HTR30/45	HTR75	HTR75
15000	1695	HTR15/22 or LTR322	HTR30/45	HTR30/45	HTR30/45

Torque vs Durability Cycle l ife*
Torques from 100000 to 600000 in-lb

Torque level in-lb	Nm	10 thousand cycles nominal life	100 thousand cycles nominal life	1 million cycles nominal life	10 million cycles nominal life
600000	67764	600M or HTR600		Consult factory.	
500000	56470	600M or HTR600	600M		
400000	45176	600M or HTR600	600M	600M	
300000	33882	300M or HTR600	600M or HTR600	600M	600M
200000	22588	300M or HTR300	300M	600M or HTR600	600M or HTR600
100000	11300	150M or HTR150	150M or HTR300	150M or HTR300	150M or HTR300

*Durability life estimates based on AGMA 2001-B88 gear life model for pitting resistance.

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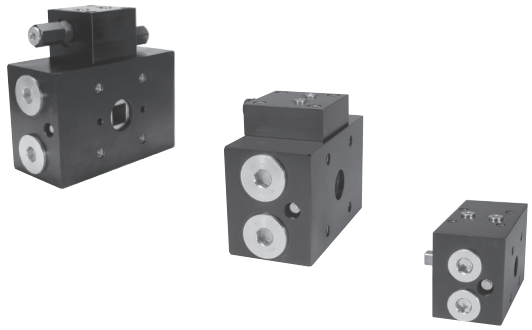
HUB Series

The Hydraulic Unibody Series (HUB) actuator is designed to perform in the harshest environmental conditions. Built with a hard coat anodized housing and through hardened, high strength alloy steel pinion and racks, this product is ideal for numerous applications where weather can be a factor. The HUB Series is designed with several add-on valve modules for lower overall integration costs, as well as, an increase in product performance. Multiple feedback and visual indication options are also available.

- Rack and pinion design provides excellent efficiency characteristics and minimizes HPU Size
- Direct mounting design to numerous process valves allows for minimal integration cost
- Integrated valve modules options are available for increased performance and reduced plumbing cost
  - Cross-over vent module - allows for flow between both cylinder ports.
  - Counter-balance valve module with Cross-over vent - designed for load holding in both directions and preventing a run-away load situation from occurring. Also allows for flow between both cylinder ports.
  - D03 Solenoid ready module - manifold block directly mounted to actuator for reduced plumbing and increase in performance
- Numerous linear and positional feedback and visual indication options available
- Environmentally rugged for reliable performance in harsh conditions



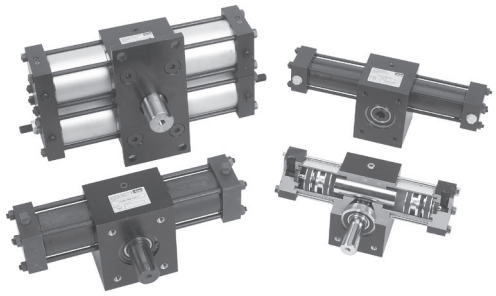
Operating information

Maximum operating pressure:	3000 PSI (207 bar)
Standard rotation:	90°
Rotational tolerance:	-0°, +2°
Output torques @:	3000 PSI (207 bar) 1800 in-lb to 10,000 in-lb
Maximum breakaway pressure:	70 PSIG (4.8 bar)
Mounting orientation:	unrestricted
Operating temperature range: Nitrile seals	 -40°F to 180°F (-40°C to 82°C)
Standard timing:	12:00 position at midstroke. See pages A12 through A15 for details.
Recommended filtration	ISO class 17/14 or cleaner

I TR Series

The LTR Series provides superior performance in low pressure hydraulic applications found in packaging, material handling, machine tool and automated assembly industries.

Sealed ball bearings and floating pistons ensu e low breakaway pressure and smooth operation. PolyPak piston seals and wearbands eliminate leakage and cylinder scoring. Alloy steel racks and pinions provide the strength and resilience for minimum downtime. A broad offering of options provides unmatched flexibility in design and application. These include cushions, stroke adjusters, flow cont ols, and position sensors, as well as application matched shaft, mounting, porting and seal variations. Three position and antibacklash units are also available.



Operating information

Output Torques	1000 psi (69 bar): 395 in-lb to 22,813 in-lb
Nominal pressure:	1000 PSIG (69 bar) (3L cylinder pressure ratings apply)
Operating temperature range: Nitrile seals Fluorocarbon seals	 -40°F to 180°F (-40°C to 82°C) -5°F to 250°F (-21°C to 121°C)
Standard rotations:	90°, 180°, 270°, 360°, 450°
Rotational tolerance	-0°, +2°
Breakaway pressure:	30 PSIG (2 bar) maximum
Mounting orientation:	unrestricted
Standard timing:	Keyway in 12:00 position at midstroke
Recommended filtration	ISO class 17/14 or better

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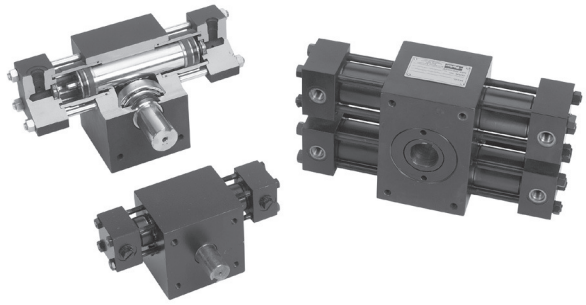
HTR Series

When durability, performance, and reliability are required in the most demanding industrial applications, specify the HTR Series actuator. This series is designed for medium duty service found in machine tool, transfer line, material handling and other critical applications.

Through hardened alloy steel pinion and racks, supported by large capacity tapered roller bearings in a ductile iron housing, ensure long life, even with externally applied radial and thrust loads. The heavy duty Wear-Pak pistons are equipped with self-energizing deep PolyPak piston seals and a rugged wear band for long life operation. Standard NFPA cylinder construction allows for a wide variety of rotation options, complementing the broad offering of shaft and mounting styles.



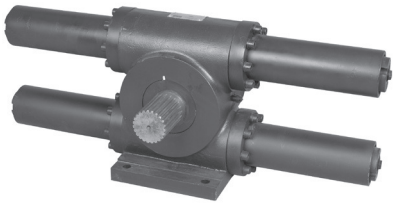
Operating information

Output torques @	
3000 PSI (207 bar):	900 in-lb to 600,000 in-lb (Larger output torques available upon request)
Maximum operating pressure:	3000 PSI (207 bar) non-shock
except HTR22/45:	2000 PSI (138 bar) non-shock
Operating temperature range:	
Nitrile seals	-40°F to 180°F (-40°C to 82°C)
Fluorocarbon seals	-20°F to 250°F (-29°C to 121°C)
Standard rotations:	90°, 180°, 360°, 450°
Rotational tolerance:	-0°, +2°
Maximum breakaway pressure:	70 PSIG (4.8 bar)
Mounting orientation:	Unrestricted
Standard timing:	Keyway in 12:00 position at midstroke
Recommended filtration:	ISO class 17/14 or better

M Series

Designed to meet steel mill specifications, these non tie od rotary actuators incorporate a range of exclusive features designed to provide durability and dependability in the most arduous operating environment.

Wear band pistons on both ends and bronze bearings under the center of the alloy steel rack provide critical support while helping to prevent scoring or galling of the cylinder tubes. Large diameter tapered roller bearings support the pinion, allowing the unit to absorb high external loads. PolyPak seals provide long life operation and, for ease of maintenance, can be changed without removing the actuator from the installation.



Operating information

Output torques @	
3000 PSI (207 bar):	75,000 in-lb to 50,000,000 in-lb
Maximum operating pressure:	3000 PSI (207 bar)
Operating temperature range:	
Nitrile seals	-40°F to 180°F (-40°C to 82°C)
Fluorocarbon seals	-20°F to 250°F (-29°C to 121°C)
Standard rotations:	90°, 180°, 360°, 450°
Rotational tolerance:	-0°, +2°
Maximum breakaway pressure:	75 psi (5 bar)
Mounting orientation:	Unrestricted
Standard timing:	Keyway in 12:00 position at midstroke
Housing:	
Heavy duty	Ductile iron (units up to 1000M)
Steel	Weldments (units larger than 1000M)

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Parker . . . l eading the Industry

Parker combines many years of vane actuator experience with innovative product design to lead the industry in the development of reliable and efficient rotary actuators. When you specify Parker rotary vane actuators, you can rely on reduced maintenance costs and increased productivity.

Why Use Parker Vane Style Rotary Actuators?

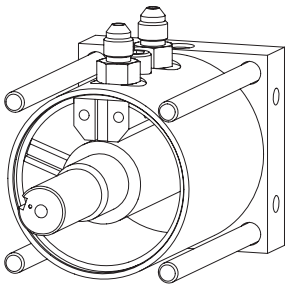
- High torque output in a small package size
- Very economical for OEM applications
- Zero backlash allows precise positioning
- Provides uniform torque in both directions
- Simplicity of design
- Washdown compatible
- Performs under the most adverse ambient conditions
- Cleanroom compatible
- Guaranteed zero external leakage
- Will support radial and thrust loads
- Wide range of sizes

Where Can Parker Vane Style Rotary Actuators Be Used?

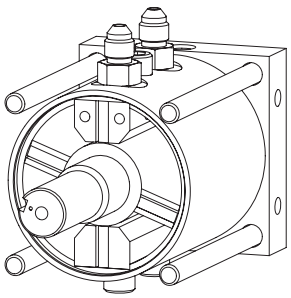
- Material Handling
- Machine Tool
- Rubber and Plastics Machinery
- Robotics
- Packaging
- Valve Actuation
- Food Processing
- Electronics Manufacturing
- Conveyors

How Do Vane Actuators Work?

Parker vane actuators provide the maximum amount of output torque from the smallest possible envelope size. They convert fluid p essure into rotary motion for a wide variety of industrial applications. Two basic styles are available. Single vane models have a maximum rotation of 280°, while the double vane units produce twice the torque output from identical envelope dimensions and have a maximum rotation of 100°.



Single Vane



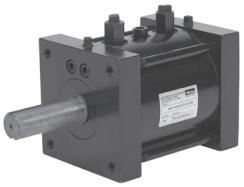
Double Vane

A short cylindrical chamber encloses a vane attached to a central shaft. Pressure is applied through a stationary barrier (stator) within the body to one side of the vane. The opposite side of the vane is connected to exhaust through the stator. This pressure overcomes seal friction and produces rotation of the vane and central shaft. Due to vane actuator design, there will always be some internal bypass in these units and therefore they should not be used as a brake to support loads.

Tork-Mor Series

Tork-Mor Series actuators are produced in eighteen sizes generating up to 145,000 in-lb of torque at rated pressure. Capable of providing full torque instantly in either direction, they operate at pressures up to 1000 psi. The Tork-Mor Series can be mounted in any axis using a wide variety of standard or optional mountings.

Proven reliable through many years of field service, the Tork-Mor Series incorporates many quality features including precision ball bearings to provide shaft support, externally removable gland for ease of seal replacement and cylinders honed to a 10 micro inch finish to ensu e long seal life.



Operating information

Output torques @ 500 PSI (35 bar):	800 in-lb to 145,000 in-lb
Maximum operating pressure:	1000 PSI (69 bar) hydraulic
Operating temperature range:	
Nitrile seals	-40°F to 180°F (-40°C to 82°C)
Fluorocarbon seals	-20°F to 250°F (-29°C to 121°C)
Rotations:	
S Models	280°
DS Models	100°
Rotational tolerance:	±1°
Maximum allowable drainline pressure:	50 PSIG (3.4 bar) hydraulic
Mounting orientation:	Unrestricted
Standard timing:	Keyway in 12:00 position at midstroke
Recommended filtration:	ISO class 17/14 or better

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HUB Series - Hydraulic Unibody
Hydraulic Rack & Pinion Rotary Actuators

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			Product Series				
	Market/Segment	**Typical Application(s)**	**HUB**	**LTR**	**HTR**	**M**	**Tork-Mor**
Market Segments/Applications	Aerospace	Water bomb, tank door actuation		●			
	Aggregate	Granite block rollover			●		
	Aluminum	Automation				●	
	Automation	Mounting, Processing, Flood gate actuation, End of arm tooling	●	●	●		●
	Automotive	Automation, Clamping, Tube bending			●		●
	Conveyor	Swing & rotate		●	●		●
	Entertaining	Pool gate actuation, Robotic joint motion					●
	Fluid Management & Flow Control	Power plants			●	●	
	Industrial	Automation, Clamping					●
	Machine Builders	End of arm tooling			●		
	Marine/Offshore	Boomslewer, Submersible			●	●	
	Mining	Mobile longhole drilling, Tunnel boring	●		●	●	
	Mobile	Fire truck ladder rotation, Aerial lift basket, X-ray boom rotation, Forklift handling & storage, Refuse tippers	●	●	●	●	
	Nuclear	Door actuation				●	
	Oil & Gas	Process valve actuation	●		●		
	Oil Industry Machinery	Clamping, Lockout	●				●
	Paper & Pulp	Walking beam				●	
	Plastics	Blow molding, Injection molding			●		●
	Rubber	Mixing			●	●	
	Solar	Panel rotation			●		
	Space	Rocket launch tower				●	
	Steel & Casting	Ladle Tilt, Coil Box, Steel Booming, Pipe fabrication			●	●	●
	Testing Equipment	Flight Simulators, Cycle loading, Tensile test Machines			●		●
	Transportation	Bus wheelchair ramp		●			
	Water Management	Valve Actuation	●		●		
	Welding	Weld gun indexing, Clamping					●

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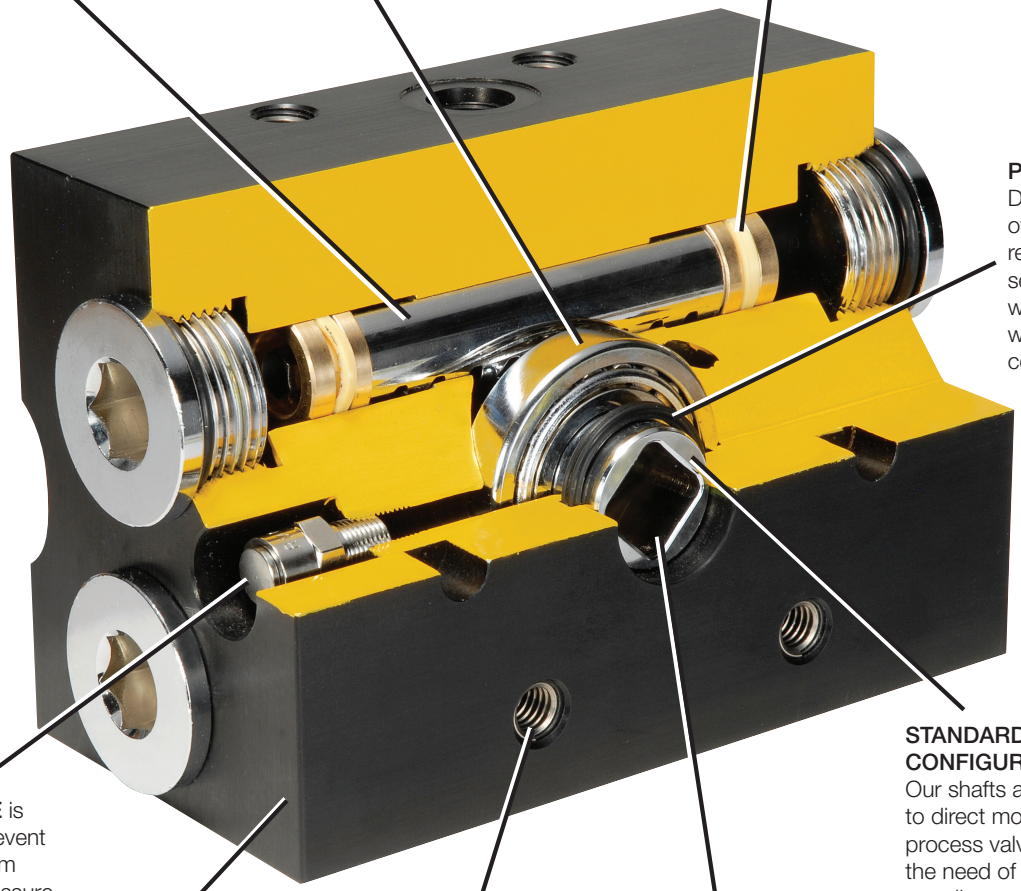
HUB Series

WEAR BANDS (HUB075 & HUB100)
Filled PTFE bands (std) precisely position pistons and prevent side loading from scoring cylinder bores.

PISTON SEALS
Piston lip seals made from abrasion resistant 4300 polyurethane for reliable service. These seals offer a wide temperature range so that this product may be used in a wide variety of applications. Piston seals can be inspected and replaced without disconnecting the load from the shaft. (Employ proper safety practices to prevent damage to people or equipment.)

TAPERED ROLLER BEARINGS are designed to support large external axial and radial loads applied to the shaft.

RACK & PINION made from through hardened, high strength alloy steels for long and durable service life.



PINION SEALS
Dual lobed seal of abrasion resistant materials seals effectively with minimum wear at dynamic conditions.

STANDARD SHAFT CONFIGURATIONS
Our shafts are designed to direct mount to various process valves without the need of additional coupling.

RELIEF VALVE is designed to prevent the housing from seeing high pressure due to piston seal bypass.

SHAFT ORIENTATION
Mid stroke at 12:00 position is standard.

HOUSING
Anodized aluminum housing is designed to minimize external fitting and plumbing connections and rugged enough for the harsh outside environment.

THREADED MOUNTING HOLES
Our standard mounting uses four tapped holes re-inforced with stainless steel inserts on the customer mounting face of the housing. Both inch and metric (ISO 5211) are available and provide direct mounting to a wide range of process valves.

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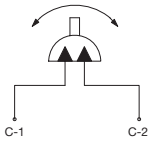
HUB Series



SAE #6 ports - pages A10 & A11 for additional information

Torque output (in-lb)	Imperial/ Metric	Mounting pattern	Shaft size (female square)	Feedback	Visual indication	Part number
1,800	Imperial	3.25"	.625"	None	None	**HUB018-090ZZ-A1B12BZZA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D12BZZA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F12BZZA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C12BZZA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E12BZZA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J12BZZA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L12BZZA**
1,800	Imperial	3.25"	.625"	None	Line on shaft	**HUB018-090ZZ-A1B12BZAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D12BZAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F12BZAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C12BZAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E12BZAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J12BZAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L12BZAA**
1,800	Imperial	3.25"	.625"	Rotary Linear Potentiometer (RLPO)*	Line on shaft	**HUB018-090ZZ-A1B12BAAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D12BAAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F12BAAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C12BAAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E12BAAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J12BAAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L12BAAA**
1,800	Imperial	3.25"	.625"	StoneL*	Green on/ Red off	**HUB018-090ZZ-A1B12BCCA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D12BCCA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F12BCCA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C12BCCA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E12BCCA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J12BCCA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L12BCCA**

* Additional feedback information on pages A21 thru A26.

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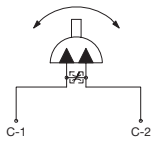

SAE #6 ports with cross-over vent module - pages A10, A11 & A18 for additional information

Torque output (in-lb)	Imperial/ Metric	Mounting pattern	Shaft size (female square)	Feedback	Visual indication	Part number
1,800	Imperial	3.25"	.625"	None	None	**HUB018-090ZZ-A1B1BBZZA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1BBZZA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1BBZZA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1BBZZA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1BBZZA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1BBZZA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1BBZZA**
1,800	Imperial	3.25"	.625"	None	Line on shaft	**HUB018-090ZZ-A1B1BBZAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1BBZAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1BBZAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1BBZAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1BBZAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1BBZAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1BBZAA**
1,800	Imperial	3.25"	.625"	Rotary Linear Potentiometer (RLPO)*	Line on shaft	**HUB018-090ZZ-A1B1BBAAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1BBAAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1BBAAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1BBAAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1BBAAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1BBAAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1BBAAA**
1,800	Imperial	3.25"	.625"	StoneL*	Green on/ Red off	**HUB018-090ZZ-A1B1BBCCA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1BBCCA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1BBCCA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1BBCCA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1BBCCA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1BBCCA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1BBCCA**

* Additional feedback information on pages A21 thru A26.

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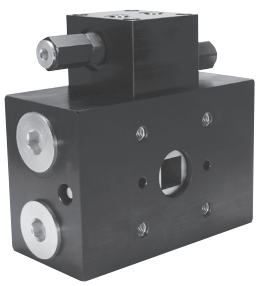

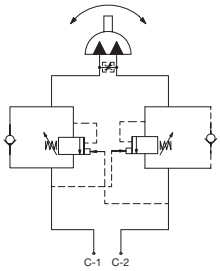

SAE #6 ports with counter-balance valve module - pages A10, A11 & A19 for additional information

Torque output (in-lb)	Imperial/ Metric	Mounting pattern	Shaft size (female square)	Feedback	Visual indication	Part number
1,800	Imperial	3.25"	.625"	None	None	**HUB018-090ZZ-A1B1DBZZA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1DBZZA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1DBZZA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1DBZZA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1DBZZA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1DBZZA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1DBZZA**
1,800	Imperial	3.25"	.625"	None	Line on shaft	**HUB018-090ZZ-A1B1DBZAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1DBZAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1DBZAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1DBZAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1DBZAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1DBZAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1DBZAA**
1,800	Imperial	3.25"	.625"	Rotary Linear Potentiometer (RLPO)*	Line on shaft	**HUB018-090ZZ-A1B1DBAAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1DBAAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1DBAAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1DBAAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1DBAAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1DBAAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1DBAAA**
1,800	Imperial	3.25"	.625"	StoneL*	Green on/ Red off	**HUB018-090ZZ-A1B1DBCCA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1D1DBCCA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1F1DBCCA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6C1DBCCA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6E1DBCCA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6J1DBCCA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6L1DBCCA**

* Additional feedback information on pages A21 thru A26.

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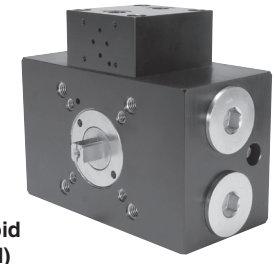
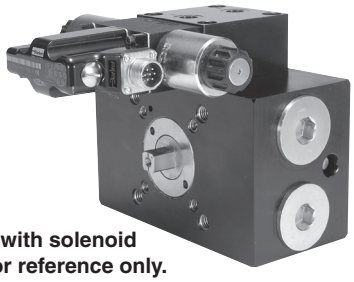
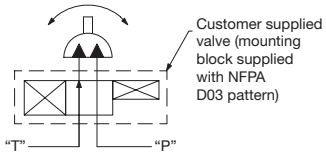


Without solenoid valve (standard)



Shown with solenoid valve for reference only.



SAE #6 ports with D03 directional control valve ready - pages A10, A11 & A20 for additional information

Torque output (in-lb)	Imperial/ Metric	Mounting pattern	Shaft size (female square)	Feedback	Visual indication	Part number
1,800	Imperial	3.25"	.625"	None	None	**HUB018-090ZZ-A1BA2BZZA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1DA2BZZA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1FA2BZZA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6CA2BZZA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6EA2BZZA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6JA2BZZA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6LA2BZZA**
1,800	Imperial	3.25"	.625"	None	Line on shaft	**HUB018-090ZZ-A1BA2BZAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1DA2BZAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1FA2BZAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6CA2BZAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6EA2BZAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6JA2BZAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6LA2BZAA**
1,800	Imperial	3.25"	.625"	Rotary Linear Potentiometer (RLPO)*	Line on shaft	**HUB018-090ZZ-A1BA2BAAA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1DA2BAAA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1FA2BAAA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6CA2BAAA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6EA2BAAA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6JA2BAAA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6LA2BAAA**
1,800	Imperial	3.25"	.625"	StoneL*	Green on/ Red off	**HUB018-090ZZ-A1BA2BCCA**
7,500	Imperial	5.00"	.875"			**HUB075-090ZZ-B1DA2BCCA**
10,000	Imperial	5.00"	1.125"			**HUB100-090ZZ-B1FA2BCCA**
1,800	Metric	70 mm	11 mm			**HUB018-090ZZ-K6CA2BCCA**
1,800	Metric	70 mm	14 mm			**HUB018-090ZZ-K6EA2BCCA**
7,500	Metric	102 mm	22 mm			**HUB075-090ZZ-L6JA2BCCA**
10,000	Metric	140 mm	27 mm			**HUB100-090ZZ-N6LA2BCCA**

* Additional feedback information on pages A21 thru A26.

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HUB	075	-	090	Z	Z	-	B	1D	12	B	A	A	A

Rotary Actuator Series	
HUB	Hydraulic Unibody

Torque Output at 3000 PSI	
018	1,800 in-lb - .875 in bore (double rack)
075	7,500 in-lb - 1.5 in bore (double rack)
100	10,000 in-lb - 1.5 in bore (double rack)

Degrees Rotation	
090	90 Degrees

Cushion	
Z	None (std)

Stroke Adjusters	
Z	None (std)

Process Valve Mounting Pattern	
A	3.25 in (018 only), Imperial
B	5.00 in (075 and 100 only), Imperial
K	70 mm (018 only), Metric
L	102 mm (075 only), Metric
N	140 mm (100 only), Metric

See **TABLE 1** for proper combinations, additional information on page A16.

Shaft Configuration & Si e	
1B	.625 in female square (018 only), Imperial
1D	.875 in female square (075 only), Imperial
1F	1.125 in female square (100 only), Imperial
6C	11 mm female square (018 only), Metric
6E	14 mm female square (018 only), Metric
6J	22 mm female square (075 only), Metric
6L	27 mm female square (100 only), Metric

See **TABLE 1** for proper combinations, additional information on page A17.

Port Type or Direct Mount Valve Modules	
12	SAE #6 straight thread
1B	SAE #6 straight thread with cross-over vent valve
1D	SAE #6 straight thread with counter-balance valve (pilot ratio 7:1)
A2	SAE #6 straight thread with D03 directional control valve ready (valve not included)

See **TABLE 2** for valves included with each option, additional information on pages A18 thru A20.

Seals	
B	4300 Polyurethane

Feedback	
A	Rotary linear potentiometer (RLPO), 0-40 VDC, position right (standard)
B	Rotary linear potentiometer (RLPO), 0-40 VDC, position left
C	StoneL, SST dual module
D	StoneL, 4-20 mA position transmitter
E	StoneL, SST dual module & 4-20 mA position transmitter
Z	No feedback

See **TABLE 3** for proper combinations, additional information on pages A21 thru A26.

Visual Indication	
A	Line on shaft (standard)
C	Color indicator (green on / red off)
Z	No feedback

See **TABLE 3** for proper combinations, additional information on pages A21 thru A26.

Engineering Level	
A	Current engineering level

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How to build a Unibody - easy as 1, 2, 3 ..... HUB075-090ZZ-B1D12BAAA

1. **All white font digits** of the HUB part number above are fixed and **never change**
2. To make the proper selection for the remaining digits **refer to the Tables below** that match the digit color.
3. Each table will show **only** the possible combinations of digits that can be placed together.

HUB 075 -090ZZ- B 1D 12 B A A A

TABLE 1

SHAFT CONFIGURATION & SIZE		PROCESS VALVE MOUNTING PATTERN		
		HUB018	HUB075	HUB100
		A	B	
		3.25 in	5.00 in	
1B	.625 in	●		
1D	.875 in		●	
1F	1.125 in			●
		K	L	N
		70 mm	102 mm	140 mm
6C	11 mm	●		
6E	14 mm	●		
6J	22 mm		●	
6L	27 mm			●

HUB075: B = 5.00 in

1D .875

TABLE 2

PORT TYPE		DIRECT MOUNT VALVE MODULES			
		Thread ports only	Cross-over vent valve included	Counter-balance valve included	Solenoid valve ready included
12	SAE #6 straight thread	●			
1B	SAE #6 straight thread with cross-over vent valve		●		
1D	SAE #6 straight thread with counter-balance valve (pilot ratio 7:1)		●	●	
A2	SAE #6 straight thread with D03 directional control valve ready (valve not incl)				●

12 SAE #6 straight thread,

TABLE 3

FEEDBACK		VISUAL INDICATION		
		A Line on shaft	C Color indicator (green on / red off)	Z No visual indication
A	Rotary Linear Potentiometer (RLPO), 0-40 VDC, position right (standard)	●		
B	Rotary Linear Potentiometer (RLPO), 0-40 VDC, position left	●		
C	StoneL, SST dual module		●	
D	StoneL, 4-20 mA position transmitter		●	
E	StoneL, SST dual module & 4-20 mA position transmitter		●	
Z	No feedback	●	●	●

A Rotary Linear Potentiometer (RLPO), 0-40 VDC, position right (standard)

A Line on shaft

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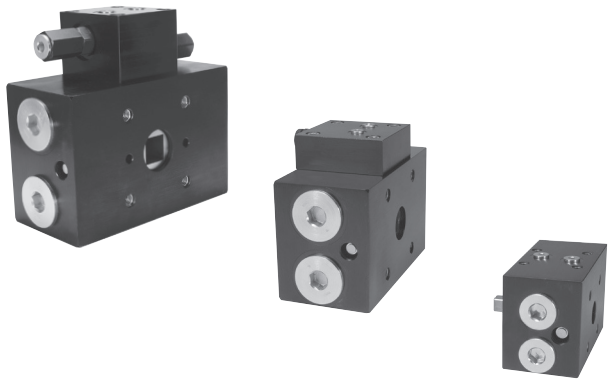
The Hydraulic Unibody Series (HUB) actuator is a single piece housing/cylinder design that is able to perform in the harshest environmental conditions. Built with a hard coat anodized housing and through hardened, high strength alloy steel pinion and racks, this product is ideal for numerous applications where weather can be a factor. The HUB Series is designed with several add-on valve modules for lower overall integration costs, as well as, an increase in product performance. Multiple feedback and visual indication options are also available.

- Rack and pinion design provides excellent efficiency characteristics and minimizes HPU Size
- Direct mounting design to numerous process valves allows for minimal integration cost
- Integrated valve module options are available for increased performance and reduced plumbing cost
  - Cross-over vent module - allows for flow between both cylinder ports, thus allowing free rotation.
  - Counter-balance valve module with Cross-over vent - designed for load holding in both directions and preventing a run-away load situation from occurring. Also allows for flow between both cylinder ports.
  - D03 Solenoid ready module - manifold block directly mounted to actuator for reduced plumbing and increase in performance
- Numerous linear and positional feedback and visual indication options available
- Environmentally rugged for reliable performance in harsh conditions



Operating information

Maximum operating pressure:	3000 PSI (207 bar)
Standard rotation:	90°
Rotational tolerance:	-0°, +2°
Output torques @:	3000 PSI (207 bar) 1800 in-lb to 10,000 in-lb
Maximum breakaway pressure:	70 PSIG (4.8 bar)
Mounting orientation:	unrestricted
Operating temperature range: Nitrile seals	 -40°F to 180°F (-40°C to 82°C)
Standard timing:	12:00 position at midstroke. See pages A12 through A15 for details.
Recommended filtration	ISO class 17/14 or cleaner

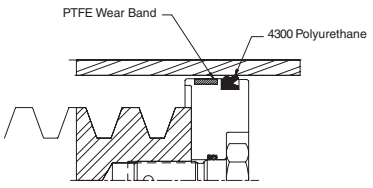
Output Torque Table

Double Rack Model	Maximum Pressure Rating PSI (bar)	Actual Output Torque in-lb (Nm) at Specified P essure 1000 PSI (69 bar)	2000 PSI (138 bar)	3000 PSI (207 bar)	Gear Train Rating Durability (1) in-lb (2)	PSID (3)	Maximum Angular Backlash Minutes	Standard Rotation Degrees	Displacement in³ (cm³)	Standard Unit Weight lb (kg)
HUB018	3000 (207)	600 (68)	1200 (136)	1800 (203)	850	1420	45	90	1.13 (19)	10 (4.5)
HUB075	3000 (207)	2500 (283)	5000 (565)	7500 (848)	3330	1350	40	90	4.86 (79)	23 (10.4)
HUB100	3000 (207)	3300 (373)	6600 (746)	10000 (1130)	5725	1720	30	90	6.25 (102)	29 (13.2)

1. The durability is defined as the capacity of the gear set to suppo t the stated load without fatigue related gear surface damage. Use the durability rating for high production duty of 1 million cycles and/or high speed applications (180° in less than three seconds or more than one cycle per minute).
2. Durability rated output torque.
3. Pressure differential between the inlet and outlet ports (non shock).

Seal Materials

Effective filtration is vital to the long life and satisfactory performance of a rotary actuator. If the piston seals of a rack and pinion rotary are worn or damaged, fluid which leaks past the piston will enter the gear housing. In the event of internal leakage into the gear housing, the pressure relief valve protects the shaft seal.



Seal class	Seal type	Wear ring type	Fluid medium	Temperature range	Pressure range	Filtration
Standard type 1	4300 Polyurethane U-cup	Filled PTFE	General purpose, Petroleum-based fluid	-40°F to 180°F (-40°C to 82°C)	3000 PSI 207 bar	Minimum ISO class 17/14 Cleanliness level

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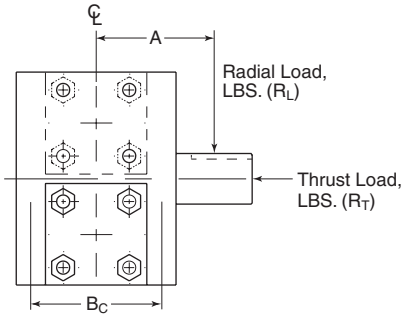
Bearing Load Capacities



Dynamic [1] Bearing Load Capacities vs. Operating Pressure

Model	Radial Load (lbs.) R_L (per bearing) @ 1000 PSID (69 bar)	2000 PSID (138 bar)	3000 PSID (207 bar)	Thrust Load (lbs.) R_T @ 1000 PSID (69 bar)	2000 PSID (138 bar)	3000 PSID (207 bar)	Bearing Centers (B_C)	Overhung Moment (in-lb) R_L x ($A+B_C/2$) @ 1000 PSID (69 bar)	2000 PSID (138 bar)	3000 PSID (207 bar)
HUB018	4030 (278)	4030 (278)	4030 (278)	2790 (192)	2790 (192)	2790 (192)	0.62	2499 (172)	2499 (172)	2499 (172)
HUB075	6750 (465)	6750 (465)	6750 (465)	3830 (264)	3830 (264)	3830 (264)	106	7155 (493)	7155 (493)	7155 (493)
HUB100	8560 (590)	8560 (590)	8560 (590)	4460 (308)	4460 (308)	4460 (308)	1.02	8731 (602)	8731 (602)	8731 (602)

NOTES: 1. Static bearing load capacities = dynamic valves x 1.5
2. Values listed are "Bearing" moment capacities. Standard male shaft sizes do not provide 4:1 design factor at these operating conditions. Larger shaft sizes are available. Consult factory for further details.

Lubrication

Low speed, high torque applications typically require class 5 or class 6 lubrication provisions. Parker rotary actuators are assembled with TEXACO MOLYTEX EP (2) extreme pressure grease. This grease should be replaced with each major overhaul.

Base Kit Ordering Information

PSK-HUB018 - **10** **1** **P**

	Basic Kit Size
PSK-HUB018	HUB018 basic kit number
PSK-HUB075	HUB075 basic kit number
PSK-HUB100	HUB100 basic kit number

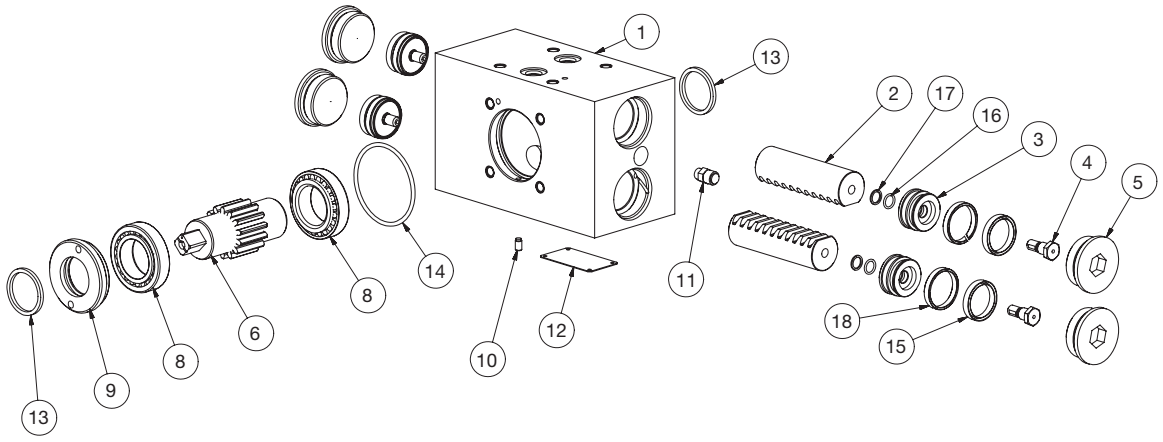
	Kit Number
10	Base actuator

	Kit Type
1	Seal kit

	Label Suffi
P	Parker North America

Item #	Description	Qty	Item #	Description	Qty
1	Housing	1	11	Relief Valve	1
2	Rack	2	12	Name Plate	1
3*	Piston (018 only)	4	13*	Quad Ring	2
4*	Rack Bolt	4	14*	O-ring	1
5	Plug, SAE	4	15*	Piston Seal	4
6	Pinion	1	16*	O-ring	4
8	Bearing	2	17*	Back-up Ring	4
9	Bearing Cap	1	18*	Wear Band (075 & 100 only)	4
10	SHSS	1			

* Items included in seal kit.



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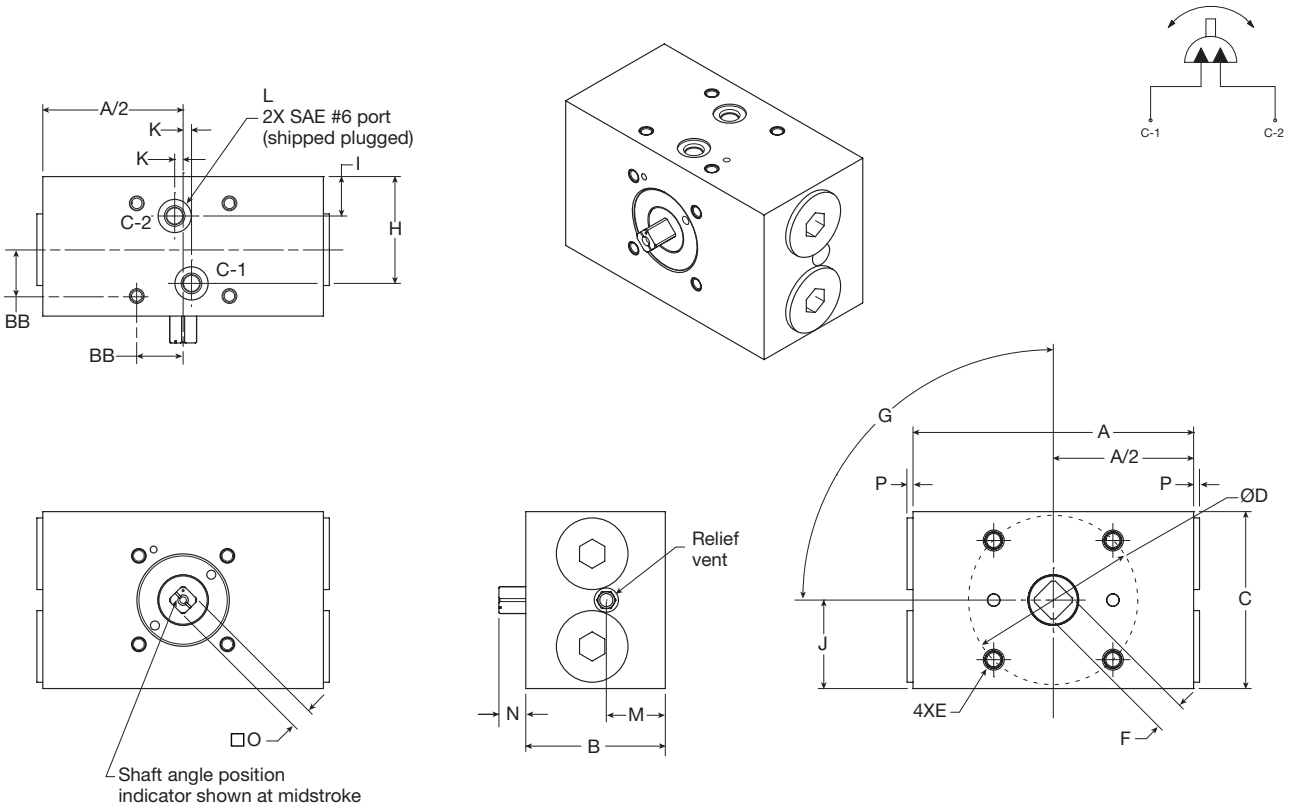
HUB Series

SAE #6 ports



HUB075 series shown above.

Dimensions, inch (mm)

Model	A	B	C	D	E †	F	D	E †	F	G	H	I	J
HUB018	6.18 (156.9)	3.20 (81.3)	4.13 (104.9)	3.250	3/8-16 X .56 Deep	.625 Nominal	70	M8 X 12 Deep	11 or 14mm	90°	2.39 (6.07)	1.01 (25.6)	1.81 (46.05)
HUB075	8.33 (211.6)	4.14 (105.2)	5.25 (133.4)	5.000	1/2-13 X .50 Deep	.875 Nominal	102	M10 X 15 Deep	22mm	90°	3.17 (80.5)	1.17 (29.7)	2.63 (66.80)
HUB100	9.50 (241.3)	4.14 (105.2)	6.00 (152.4)	5.000	1/2-13 X .50 Deep	1.13 Nominal	140	M16 X 24 Deep	27mm	90°	3.17 (80.5)	1.17 (29.7)	3.00 (76.20)

Model	K	L	M	N	O	P	BB
HUB018	0.25 (6.4)	SAE #6	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.125 (28.6)
HUB075	0.25 (6.4)	SAE #6	0.87 (22.1)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.375 (34.9)
HUB100	0.25 (6.4)	SAE #6	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.375 (34.9)

Imperial housings and shafts only.
Metric housing and shafts only.

† Thread depth is for Helicoil hole depth may be longer.

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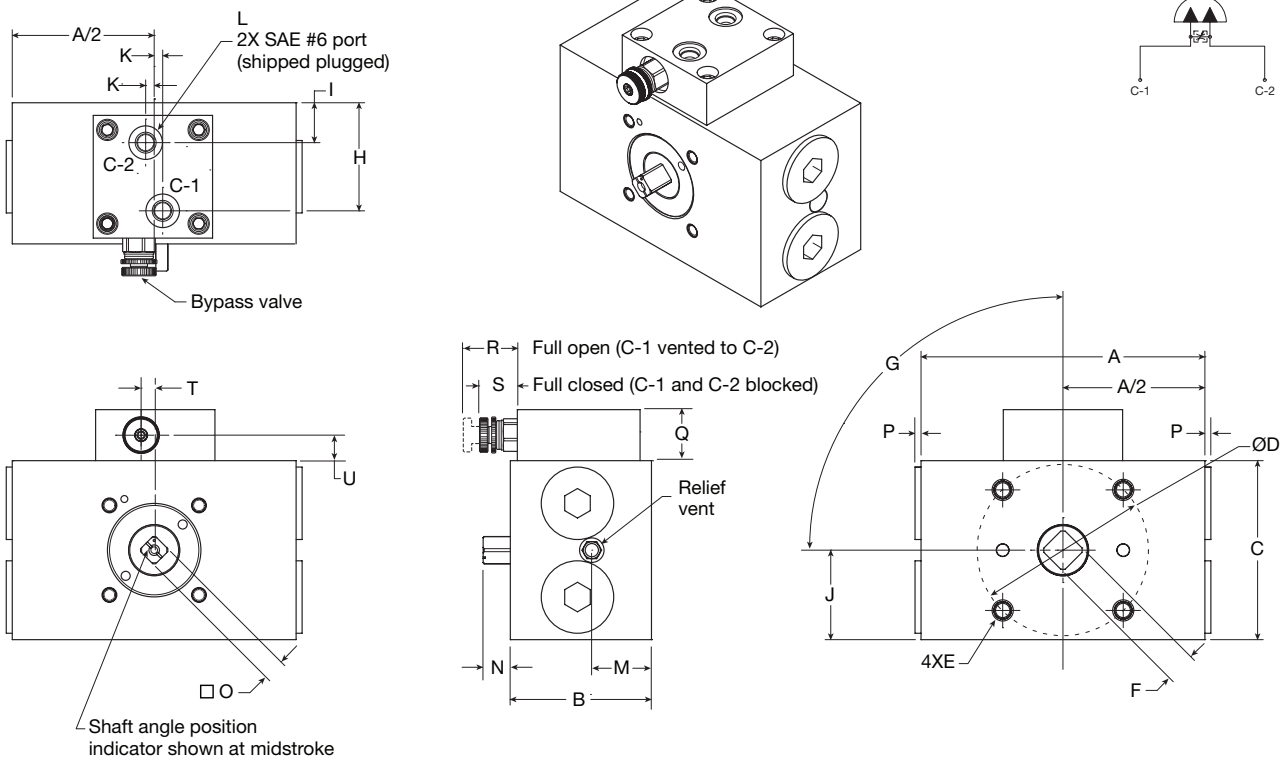
HUB Series

SAE #6 ports with cross-over vent module



HUB075 series shown above.

Dimensions, inch (mm)

Model	A	B	C	D	E†	F	D	E†	F	G	H	I	J
HUB018	6.18 (156.9)	3.20 (81.3)	4.13 (104.9)	3.250	3/8-16 X .56 Deep	.625 Nominal	70	M8 X 12 Deep	11 or 14mm	90°	2.30 (58.42)	1.01 (25.65)	1.83 (46.48)
HUB075	8.33 (211.6)	4.14 (105.2)	5.25 (133.4)	5.000	1/2-13 X .50 Deep	.875 Nominal	102	M10 X 15 Deep	22mm	90°	3.17 (80.5)	1.17 (29.7)	2.63 (66.80)
HUB100	9.50 (241.3)	4.14 (105.2)	6.00 (152.4)	5.000	1/2-13 X .50 Deep	1.13 Nominal	140	M16 X 24 Deep	27mm	90°	3.17 (80.5)	1.17 (29.7)	3.00 (76.20)

Model	K	L	M	N	O	P	Q	R	S	T	U
HUB018	0.25 (6.4)	SAE #6	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.50 (38.1)	1.45 (36.8)	1.25 (31.7)	0.38 (9.6)	0.75 (19.1)
HUB075	0.25 (6.4)	SAE #6	0.87 (22.1)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.50 (38.1)	1.45 (36.8)	1.25 (31.7)	0.42 (10.67)	0.75 (19.1)
HUB100	0.25 (6.4)	SAE #6	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.50 (38.1)	1.45 (36.8)	1.25 (31.7)	0.42 (10.67)	0.75 (19.1)

Imperial housings and shafts only.
Metric housing and shafts only.

† Thread depth is for Helicoil hole depth may be longer.

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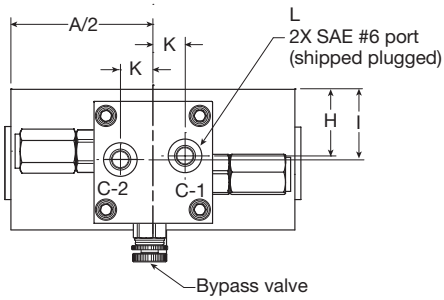
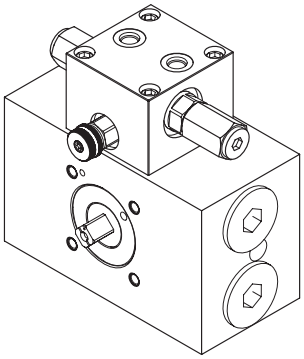
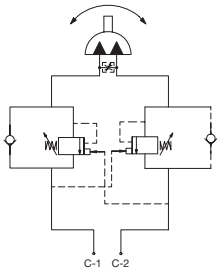
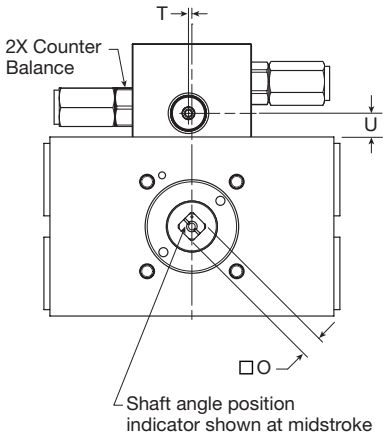
HUB Series

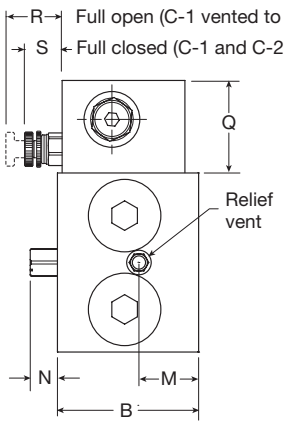
SAE #6 ports with counter-balance valve module

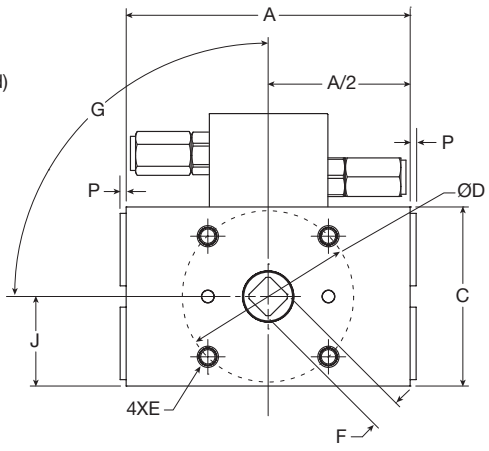












HUB075 series shown above.

Dimensions, units (mm)

Model	A	B	C	D	E†	F	D	E†	F	G	H	I	J	K	L
HUB018	6.18 (156.9)	3.20 (81.3)	4.13 (104.9)	3.250	3/8-16 X .56 Deep	.625 Nominal	70	M8 X 12 Deep	11 or 14mm	90°	1.53 (38.9)	1.66 (42.16)	1.81 (45.97)	0.68 (17.27)	SAE #6
HUB075	8.33 (211.6)	4.14 (105.2)	5.25 (133.4)	5.000	1/2-13 X .50 Deep	.875 Nominal	102	M10 X 15 Deep	22mm	90°	1.97 (50.0)	2.07 (52.6)	2.63 (66.80)	0.80 (20.3)	SAE #6
HUB100	9.50 (241.3)	4.14 (105.2)	6.00 (152.4)	5.000	1/2-13 X .50 Deep	1.13 Nominal	140	M16 X 24 Deep	27mm	90°	1.97 (50.0)	2.07 (52.6)	3.00 (76.20)	0.80 (20.3)	SAE #6

Model	M	N	O	P	Q	R	S	T	U
HUB018	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	2.73 (69.3)	1.45 (36.8)	1.25 (31.7)	0.1 (2.5)	0.80 (20.3)
HUB075	0.87 (22.1)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	2.73 (69.3)	1.45 (36.8)	1.25 (31.7)	0.1 (2.5)	0.69 (17.5)
HUB100	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	2.73 (69.3)	1.45 (36.8)	1.25 (31.7)	0.1 (2.5)	0.69 (17.5)

Imperial housings and shafts only.

Metric housing and shafts only.

† Thread depth is for Helicoil hole depth may be longer.

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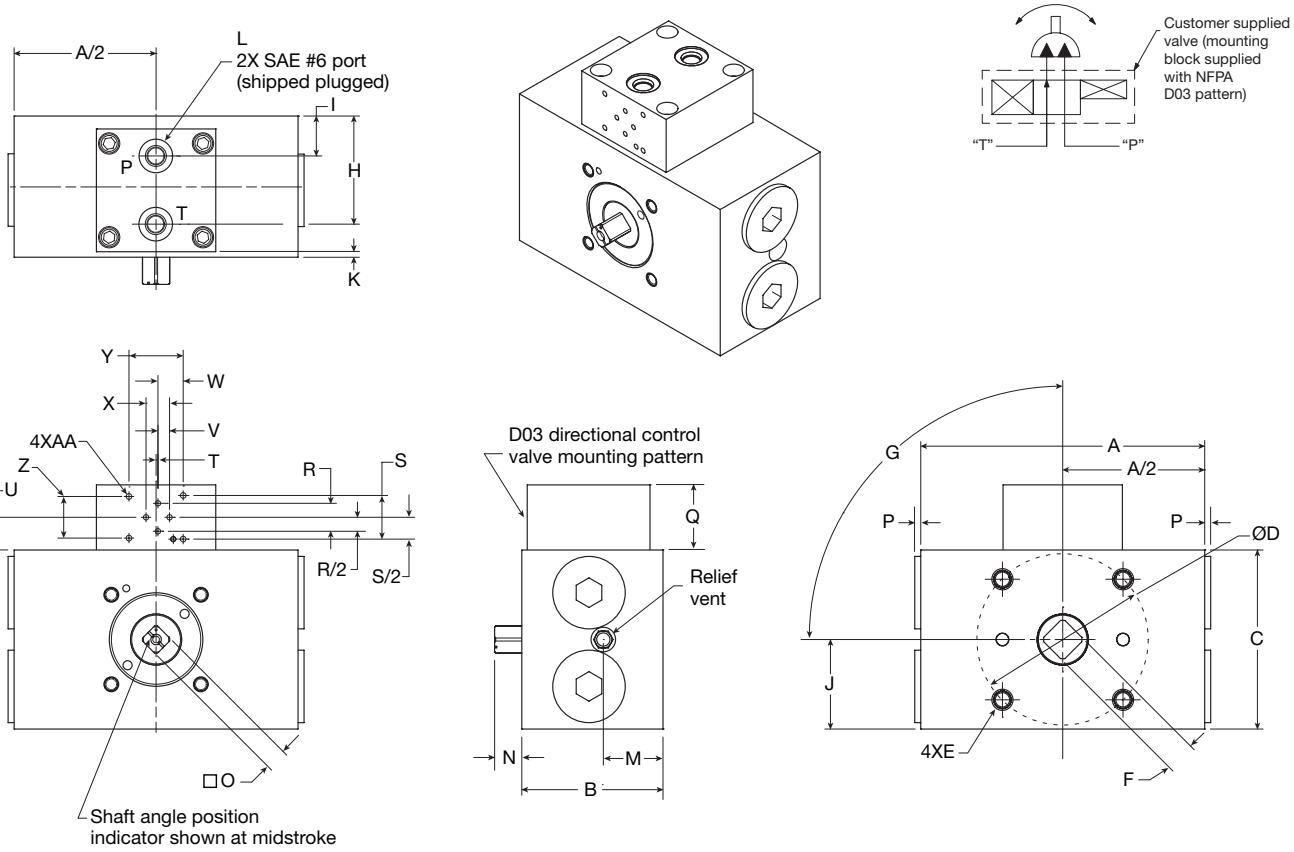
HUB Series

SAE #6 ports with D03 directional control valve ready



HUB075 series shown above.

Dimensions, inches (mm)

Model	A	B	C	D	E†	F	D	E†	F	G	H	I	J	K	L
HUB018	6.18 (156.9)	3.20 (81.3)	4.13 (104.9)	3.250	3/8-16 X .56 Deep	.625 Nominal	70	M8 X 12 Deep	11 or 14mm	90°	2.4 (60.96)	1.0 (25.40)	3.09 (78.5)	0.1 (2.54)	SAE #6
HUB075	8.33 (211.6)	4.14 (105.2)	5.25 (133.4)	5.000	1/2-13 X .50 Deep	.875 Nominal	102	M10 X 15 Deep	22mm	90°	3.2 (81.3)	1.2 (30.48)	4.16 (105.7)	0.1 (2.54)	SAE #6
HUB100	9.50 (241.3)	4.14 (105.2)	6.00 (152.4)	5.000	1/2-13 X .50 Deep	1.13 Nominal	140	M16 X 24 Deep	27mm	90°	3.2 (81.3)	1.2 (30.48)	4.75 (120.6)	0.1 (2.54)	SAE #6

Model	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
HUB018	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	2.10 (53.3)	0.82 (20.8)	1.28 (35.5)	0.055 (1.39)	0.95 (24.1)	0.34 (8.63)	0.74 (18.8)	0.69 (17.5)	1.59 (40.4)	1.22 (30.99)	M5 X 10mm Deep
HUB075	0.87 (22.1)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.90 (48.3)	0.82 (20.8)	1.28 (35.5)	0.055 (1.39)	0.95 (24.1)	0.34 (8.63)	0.74 (18.8)	0.69 (17.5)	1.59 (40.4)	1.22 (30.99)	M5 X 10mm Deep
HUB100	0.80 (20.3)	0.8 (20.3)	0.63 (16.0)	0.2 (5.1)	1.90 (48.3)	0.82 (20.8)	1.28 (35.5)	0.055 (1.39)	0.95 (24.1)	0.34 (8.63)	0.74 (18.8)	0.69 (17.5)	1.59 (40.4)	1.22 (30.99)	M5 X 10mm Deep

Imperial housings and shafts only.
Metric housing and shafts only.
Reference only - see D03 specifications for exact dimensions

† Thread depth is for Helicoil hole depth may be longer.

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Unibody Process Valve Mounting Table

	Unibody Size (4,5,6)	Process Valve & Shaft Config (14, 15, 16)	Process Valve							Pattern Size	Mounting Hole Dia	Shaft Configuratio	Female (Square or DD) Size
			ABZ	WECO	SPM	Demco	VDI/VDE 3845 ISO 5211	Fisher	Econosto				
Imperial	018	A1B		X	X					3.250	3/8-16	Female Square	0.625
		A2A	X									Female DD	0.563 x 0.375
		A2B				X							0.625 x 0.375
		A2C	X										0.625 x 0.438
		A2F				X							0.838 x 0.500
	075	B1D		X	X					5.000	1/2-13	Female Square	0.875
		B2F				X						Female DD	0.838 x 0.500
		B2G	X										0.875 x 0.625
		B2H				X							0.963 x 0.625
	100	B1F		X	X					5.000	1/2-13	Female Square	1.13
		B2J				X						Female DD	1.338 x 0.75
Metric	018	J6C					X			50	M6	Female Square	11
		J6E					X						14
		K6C					X	X		70	M8		11
		K6E					X	X	X				14
		K7E					X					Female DD	18.1 x 14.0
	075	L6C						X		102	M10	Female Square	11
		L6E					X	X					14
		L6G					X						17
		L6H					X	X					19
		L6J					X	X	X				22
		L7J					X					Female DD	28.2 x 22.0
		M6E						X		125	M12	Female Square	14
		M6G					X						17
		M6H					X	X					19
		M6J					X	X					22
	100	N6H						X		140	M16	Female Square	19
		N6J					X	X					22
		N6L					X	X					27
		N7L					X					Female DD	36.2 x 27.0
		R6H						X		165	M20	Female Square	19
		R6J						X					22
		R6L					X	X					27

Others available upon request.
For additional process valves not shown, consult factory for proper mounting considerations.

Part numbers are standard.

These options are available upon request. Consult factory for additional information, pricing and leadtime.

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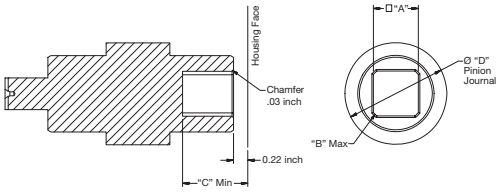
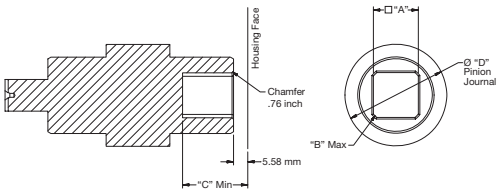
Shaft Options

Female Square (Imperial) – Option 1



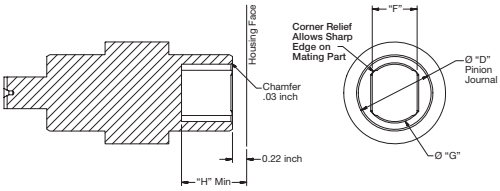
Unibody Size (4,5,6)	Shaft Config & Size (14, 15, 16)	A (inch)		B (inch)	C (inch)	D (inch)	
		Dim	Tol			Dim	Tol
018	A1B	0.625	+.005 / +.007	0.06	1.32	0.999	+0 / -.001
075	B1D	0.875	+.005 / +.007	0.04	1.42	1.499	+0 / -.001
100	B1F	1.125	+.005 / +.007	0.04	1.42	1.780	+0 / -.001

Female Square (Metric) – Option 6



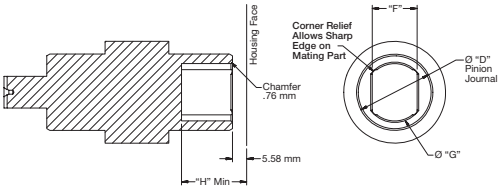
Unibody Size (4,5,6)	Shaft Config & Size (14, 15, 16)	A (mm)		B (mm)	C (mm)	D (inch)	
		Dim	Tol			Dim	Tol
018	K6C	11	+.13 / +.18	1.0	23.6	0.999	+0 / -.001
	K6D	12	+.13 / +.18	1.0	26.0	0.999	+0 / -.001
	K6E	14	+.13 / +.18	1.1	29.0	0.999	+0 / -.001
	K6F	16	+.13 / +.18	1.1	29.0	0.999	+0 / -.001
075	L6C	11	+.13 / +.18	1.0	23.6	1.499	+0 / -.001
	L6E	14	+.13 / +.18	1.1	29.0	1.499	+0 / -.001
	L6G	17	+.13 / +.18	1.1	29.0	1.499	+0 / -.001
	L6H	19	+.13 / +.18	1.2	29.0	1.499	+0 / -.001
	L6J	22	+.13 / +.18	1.4	31.0	1.499	+0 / -.001
100	N6H	19	+.13 / +.18	1.2	29.0	1.780	+0 / -.001
	N6J	22	+.13 / +.18	1.4	31.0	1.780	+0 / -.001
	N6L	27	+.13 / +.18	1.4	32.6	1.780	+0 / -.001
	R6H	19	+.13 / +.18	1.2	29.0	1.780	+0 / -.001
	R6J	22	+.13 / +.18	1.4	31.0	1.780	+0 / -.001
	R6L	27	+.13 / +.18	1.4	32.6	1.780	+0 / -.001

Female Double D (Imperial) – Option 2



Unibody Size (4,5,6)	Shaft Config & Size (14, 15, 16)	F (inch)		G (inch)		H (inch)	D (inch)	
		Dim	Tol	Dim	Tol		Dim	Tol
018	A2A	0.375	+.003 / +.005	0.500	+.005 / +.007	1.32	0.999	+0 / -.001
	A2B	0.375	+.003 / +.005	0.563	+.005 / +.007	1.32	0.999	+0 / -.001
	A2C	0.375	+.003 / +.005	0.625	+.005 / +.007	1.32	0.999	+0 / -.001
	A2D	0.438	+.003 / +.005	0.625	+.005 / +.007	1.32	0.999	+0 / -.001
	A2F	0.500	+.003 / +.005	0.838	+.005 / +.007	1.32	0.999	+0 / -.001
075	B2F	0.500	+.003 / +.005	0.838	+.005 / +.007	1.40	1.499	+0 / -.001
	B2G	0.625	+.003 / +.005	0.875	+.005 / +.007	1.40	1.499	+0 / -.001
	B2H	0.625	+.003 / +.005	0.963	+.005 / +.007	1.40	1.499	+0 / -.001
100	B2H	0.625	+.003 / +.005	0.963	+.005 / +.007	1.40	1.780	+0 / -.001
	B2J	0.750	+.003 / +.005	1.338	+.005 / +.007	1.40	1.780	+0 / -.001

Female Double D (Metric) – Option 7



Unibody Size (4,5,6)	Shaft Config & Size (14, 15, 16)	F (mm)		G (mm)		H (mm)	D (inch)	
		Dim	Tol	Dim	Tol		Dim	Tol
018	K7E	14	+.08 / +.13	18.1	+.13 / +.18	25.6	0.999	+0 / -.001
075	L7J	22	+.08 / +.13	28.2	+.13 / +.18	39.6	1.499	+0 / -.001
100	N7L	27	+.08 / +.13	36.2	+.13 / +.18	48.6	1.780	+0 / -.001

Others available upon request.
Customer is responsible for proper sizing and selection of mating shaft.

Part numbers are standard.

These options are available upon request. Consult factory for additional information, pricing and leadtime.

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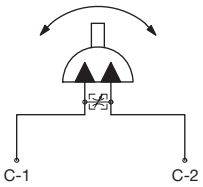
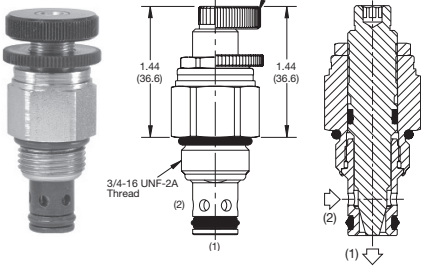
Technical Data

The HUB Cross-over module is designed to allow free flow between ports C-1 and C-2 when open. This module can be ordered at the same time as the base actuator (as one finished good part number) or later with an upgrade kit. Similar to the HUB actuator, this module is designed with a hard coat anodized housing that is reliable in harsh environmental conditions. This module also utilizes Parker's proven needle valve cartridge product from Hydraulic Cartridge Systems Division.



Cartridge Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Fine adjustment needle with locking nut
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- All external parts zinc plated



Operating information

Maximum operating pressure:	3000 PSI (207 bar)
Cartridge material:	All parts steel, operating parts hardened steel
Operating temperature range:	-40°F to 180°F (-45°C to 82°C)
Fluid compatibility / viscosity:	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration:	ISO code 16/13 SAE Class 4 or better

Kit Ordering Information

PSK-HUB018 - **20** **2** **P**

	Basic Kit Size
PSK-HUB018	HUB018 basic kit number
PSK-HUB075	HUB075, HUB100 basic kit number

	Kit Number
20	Cross-over valve

	Kit Type
2*	Replacement kit
4	Upgrade kit

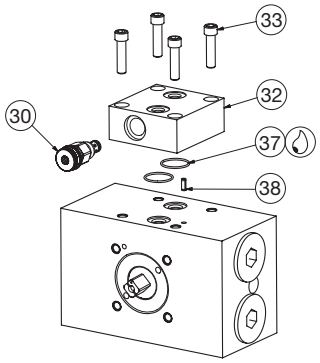
* Only available with basic kit size PSK-HUB018

	Label Suffi
P	Parker North America

SEE TABLE FOR ALL POSSIBLE KIT COMBINATIONS

Cross-over Vent Module Kit Table			ORIGINAL ACTUATOR PURCHASED			
			12	1B	1D	A2
			Base unit	with Cross-over module	with C-balance module	with Sol ready module
HUB Kit Number & Type	202	Cross-over Valve Replacement Kit		30	30	
	204	Cross-over Valve Upgrade Kit	30, 32, 33 (4), 37 (2), 38			

Item numbers and quantities included in each kit.



Item #	Description	Qty
30	Cross-over vent valve	1
32A	Cross-over vent block, size 018	1
32B	Cross-over vent block, size 075, 100	1
33	Cap screw	4
37	O-ring	2
38	3/16 x 3/4, SS spring pin	1

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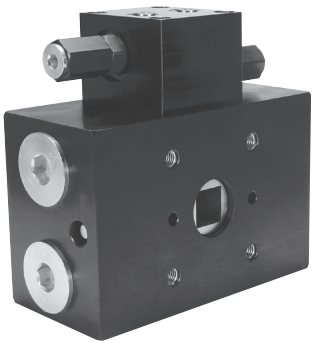
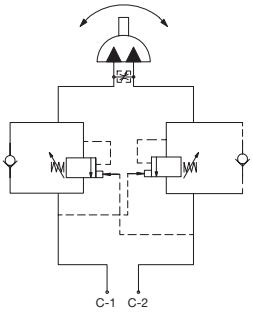
Technical Data

The HUB Counter-balance module with Cross-over vent is designed for load holding in both directions of actuation and prevents a run-away load situation from occurring. This module is available as part of a finish good actuator or can be integrated in the field with an upgrade kit. As with all other HUB options, this module is designed with a hard coat aluminum housing for durability in harsh conditions.

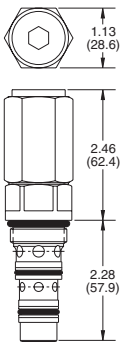
The Counter-balance module also includes the cross-over functionality that was described on pages A18-A19. Similarly, this module allows free flow between ports C-1 and C-2 of the actuator when the needle valve is backed out. This module also incorporates Parker's proven valve technology from Hydraulic Cartridge Systems Division for the counter-balance valve.

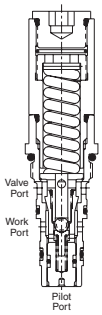




Cartridge Features

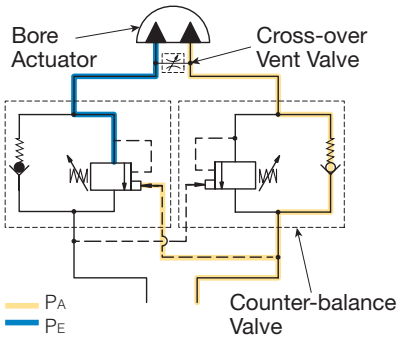
- Conical Poppet design provides longer metering stroke for stable operation
- Hardened seat provides reliable load holding
- Tamper resistant cap for added safety and security
- All external parts zinc plated
- Non-vented Counter-balance with adjustability



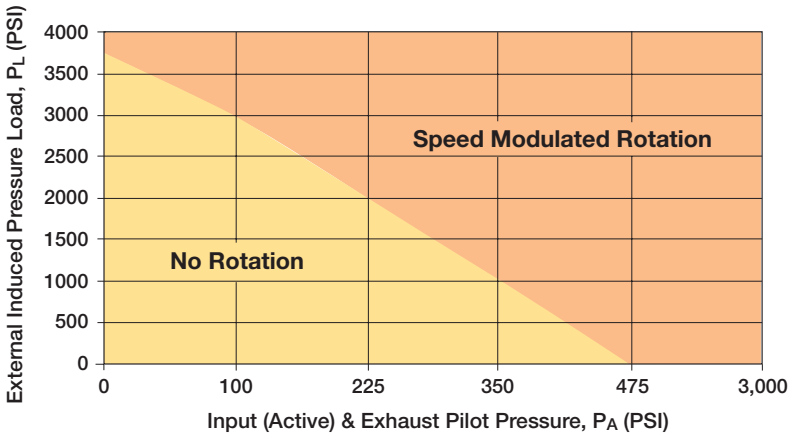


Operating information

Maximum operating pressure:	3000 PSI (207 bar)
Leakage at 150 SSU (32 cSt):	5 drops/min. (.33 cc/mm) @ 80% of thermal crack pressure
Cartridge material:	All parts steel, operating parts hardened steel
Operating temperature range: Nitrile	-40°F to 180°F (-45°C to 82°C)
Fluid compatibility / viscosity:	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration:	ISO code 16/13 SAE Class 4 or better



Movement of actuator with counter-balance valves



P_A Input (active) & exhaust pilot pressure (psi)
P_E Sum of pressures in exhaust chamber (psi)
P_L External induced pressure load (psi)
P_R Reaction pressure in exhaust chamber from P_A (psi)

$P_R = P_A - P_{friction}$
$P_E = P_L + P_R$

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Counter-balance Module Kit Ordering Information

PSK-HUB018 - 30 2 P

	Basic Kit Size
PSK-HUB018	HUB018 basic kit number
PSK-HUB075	HUB075, HUB100 basic kit number

	Kit Number
30	Counter-balance valve

	Kit Type
2*	Replacement kit
4	Upgrade kit

*Only available with basic kit size PSK-HUB018

	Label Suffi
P	Parker North America

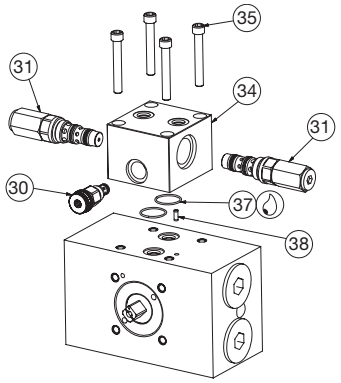
SEE TABLE FOR ALL POSSIBLE KIT COMBINATIONS

Item #	Description	Qty
30	Cross-over vent valve	1
31	Counter-balance valve	2
34A	Cross-over / Counter-balance valve block, size 018	1
34B	Cross-over / Counter-balance valve block, size 075, 100	1
35	Cap screw	4
37	O-ring	2
38	3/16 x 3/4, SS spring pin	1

Counter-balance Valve Module Kit Table

HUB Kit Number & Type			ORIGINAL ACTUATOR PURCHASED 12 Base unit	1B with Cross-over module	1D with C-balance module	A2 with Sol ready module
	302	Counter-balance valve replacement kit			31 (1)	
	304	Counter-balance valve upgrade kit	30, 31 (2), 34, 35 (4), 37 (2), 38			

Item numbers and quantities included in each kit.

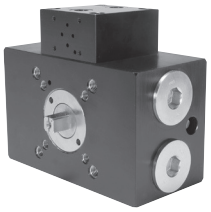


D03 Directional Control Valve Ready
Technical Data

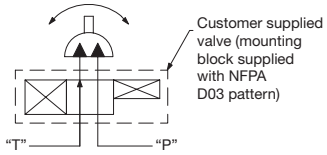
The HUB solenoid ready module is a hard coated anodized aluminum block that allows for D03 valves to be mounted directly to the actuator. This option is ideal for applications with limited available space. The reduced plumbing required is also a cost savings during integration. Similar to the HUB's other options, this module can be ordered as part of the original actuator or added on later with an upgrade kit.

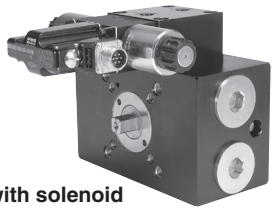
Operating information

Maximum operating pressure:	3000 PSI (207 bar)
Mounting orientation:	Unrestricted
Operating temperature range:	-40°F to 180°F (-45°C to 82°C)



Without solenoid valve (standard)





Shown with solenoid valve for reference only.

D03 Directional Control Valve Ready Kit Ordering Information

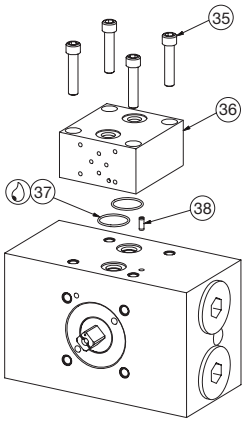
PSK-HUB018 - 40 4 P

	Basic Kit Size
PSK-HUB018	HUB018 basic kit number
PSK-HUB075	HUB075 & HUB100 basic kit number

	Kit Number
40	D03 directional control valve ready

	Kit Type
4	Upgrade kit

	Label Suffi
P	Parker North America



Item #	Description	Qty
35	Cap screw	4
36A	Solenoid block, size 018	1
36B	Solenoid block, size 075, 100	1
37	O-ring	2
38	3/16 x 3/4, SS spring pin	1

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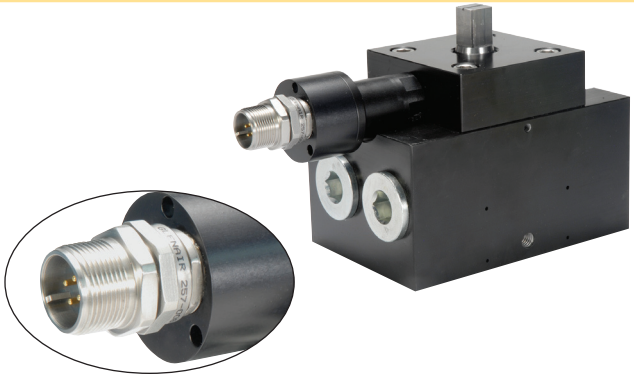
Rotary Linear Potentiometer Feedback

0-40 VDC linear position feedback (RLPO)

Parker's 0-40 VDC linear position feedback solution is accurate, reliable, and designed to handle the harshest environmental conditions. The robust hard coat anodized aluminum construction and electroless nickel plated (ENP) steel components make this feedback option ideal for use in corrosive outside environments. With a low profile design, this solution is perfect for applications where space is a premium.

- **Environmentally rugged –** Hard coat anodized aluminum module and electroless nickel plated (ENP) steel components that are designed to withstand the harshest environmental conditions.
- **Direct mounting to output shaft –** Cam coupled design provides precision rotation position for accurate feedback.
- **Low profile design -** Clearance above the actuator is critical in many systems. The Parker RLPO feedback module has a less than 2" height requirement.
- **Redundancy capabilities for additional safety requirements –** Additional plugged port located opposite the RLPO unit that can be used for a second RLPO unit.



Potentiometer Linear Motion

Compact linear motion potentiometer features long life with high resolution conductive plastic element. Shaft spring to ensure the shaft is fully extracted for repeatability and reliability.

Operating information

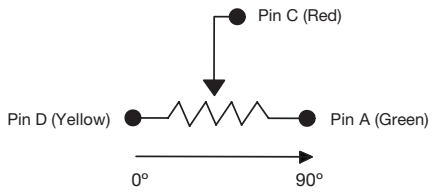
Operating temperature range:	-13°F to 221°F (-25°C to 105°C)
Storage temperature:	-40°F to 257°F (-40°C to 125°C)
IP protection grade	IP67
Connector material:	Stainless steel
Connector type:	4 pin w/ 7/8-20 UNEF (based on MIL-DTL-5015)

Specification

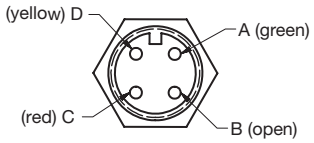
Electrical	
Resistance values	10 K ohms
Resistance tolerance (standard)	± 15%
Linearity tolerance (standard)	± 2%
Resolution	Essentially infinite (<0.01 mm
Output smoothness	< 0.1% against input voltage
Power @ 40°	0.2W
Temperature coefficient of elemen	40 ppm/K
Contact resistance variation	< 2%
Insulation resistance	> 1,000 Mohm @ 500 VDC
Dielectric strength	1 minute @ 500 VAC
Maximum wiper current	1mA
Recommended wiper current	< 1µA

Mechanical	
Mechanical stroke (mm)	7.0
Life expectancy, shaft cycles	20 million
Vibration	15 g/10 Hz to 2,000 Hz
Shock	50 g/11ms

Wiring Diagram



Receptacle Pin Layout



Typical valve position	Resistance (KΩ) Pin D - common Pin A - positive Across D to C	Pin D - positive Pin A - common Across A to C
0°	7.2	2.9
90°	1	9.2

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StoneL®
Valve Communication Solutions

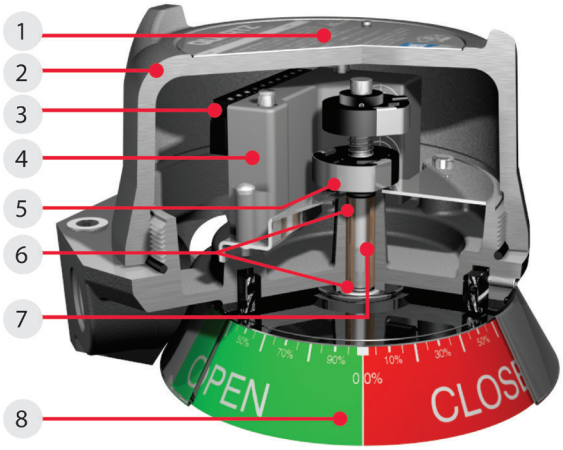
Quartz

Dual module solid state or 4-20 mA position feedback

The StoneL Quartz series is durable, corrosion-resistant, and versatile, making it ideal for most of your process valve monitoring requirements. The robust epoxy coated anodized aluminum construction makes this platform extremely durable and well suited for use in corrosive, heavy wash down environments. This versatile platform adapts to a wide variety of valve systems. The QX explosion proof version is offered as the standard that will be provided from the factory fully mounted and positioned. Nonincendive and intrinsically options are available upon request.

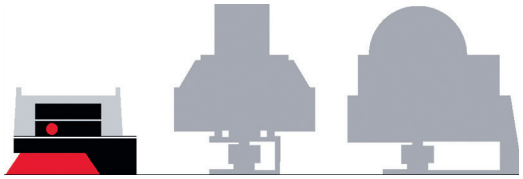
The explosion-proof, water tight and corrosion-resistant enclosure is approved for use in div. 1/zone 1 hazardous areas.

1. **Enclosure optimized for environment –** Explosion proof, water tight and corrosion resistant cover
2. **Rapid enclosure access –** Screw-on cover allows quick enclosure access, saving you valuable maintenance and set-up time. The cover provides a vapor tight seal and allows entry to internal components in less than five seconds
3. **Faster wiring –** Pre-wired and labeled terminal strip enables quick, convenient attachment of field wi es.
4. **Wide variety of switching & communication –** Dual module sensors and communication standard, as well as, continuous signal output available in a 4 to 20 mA position transmitter.
5. **Quick set cams are easy to adjust –** Touch and tune switch settings allow you to make adjustments in seconds without the use of tools.
6. **Dual shaft o-ring seals eliminate corrosion –** Top inner and bottom outer shaft o-rings seal the drive bushing from both external corrosives and internal contaminants that enter the enclosure.
7. **Special drive bushing assures long cycle life –** The oil impregnated bronze bushing maintains smooth operation and eliminates the potential for shaft seizure due to actuator shaft eccentricity.
8. **Space saving visual indication –** Visual indicator offers excellent view ability without sacrificing accessibility or adding to space requirements.



Space saving low profile design

Clearance above the actuator is critical in complex piping systems. The Quartz series clearly displays valve position and encloses all electrical components in an explosion proof compartment with less than 5” clearance requirement.



For more information regarding this product series please visit StoneL’s website – ***www.StoneL.com***

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StoneL Valve Communication

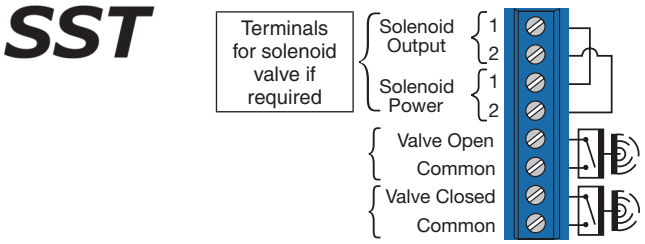
Dual module system

The Quartz series is available with the dual module as one of its various configurations. Two solid state sensors and/or communications and other electronics are sealed in for the ultimate in reliability and convenience.

Specifications - Switching and sensors

SST switching sensors (C)	
Configuration	(2) SST solid state sensors Wire termination for one solenoid
Operation	NO/NC (cam selectable)
Maximum current inrush	2.0 amps @ 125 VAC / VDC
Maximum current continuous	0.3 amps @ 125 VAC / VDC
Minimum on current	2.0 mA
Maximum leakage current	0.5 mA
Voltage range	8 to 125 VDC 24 to 125 VAC
Maximum voltage drop	6.5 volts @ 10 mA 7.0 volts @ 100 mA

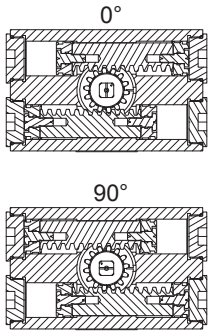
Wiring diagram (C)



Visual Indicators

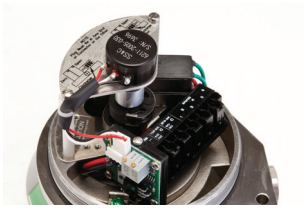
Available with the Quartz Series or as a stand-alone unit. Clearly view valve position status from up to 75 feet. The indicator's rugged polycarbonate construction makes it resistant to physical damage and tolerant to most corrosives.

0°	90°
RED CLOSED	GREEN OPEN

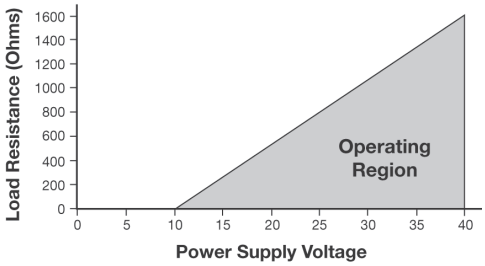


Position transmitter - 4 to 20 mA

Position transmitters provide a precise 4 to 20 mA signal on a two-wire DC loop. Control valves and dampers are accurately monitored through their range of travel offering assurance of exact valve position at all times.



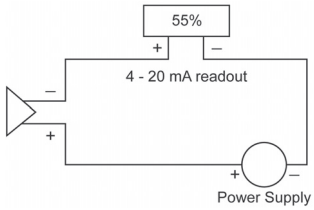
Load Curve



Specifications - Position transmitter

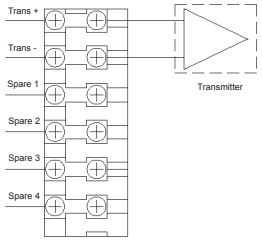
Position transmitter (D, E)	
Output	2-wire 4 to 20 mA
Supply source	10 to 40 VDC
Span range	35° to 270° (adjustable) Consult factory for special requirements
Maximum loading	700 ohmn @ 24 VDC
Linearity error	+/- 0.85" maximum
Cycle life	2 million rotations
Vibration tolerance	Acceptable

Electrical schematic

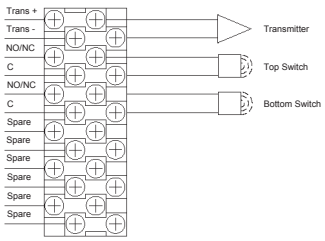


Wiring diagram (D, E)

Position Transmitter



Position Transmitter and Switches



For more information regarding this product series please visit StoneL's website – ***www.StoneL.com***

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Feedback Options Table		A, B	C	D	E
					
Description		RLPO Potentiometer	StoneL Quartz, SST dual module	StoneL Quartz, 4-20 mA position transmitter	StoneL Quartz, SST dual module with 4-20 mA position transmitter
Replacement kit part numbers (SENSOR ONLY)		PSK-HUB018-502P	PSK-HUB018-512P	PSK-HUB018-522P	PSK-HUB018-532P
Upgrade kit part numbers - conversion from an existing actuator with no feedback to one with feedback			PSK-HUB018-514P	PSK-HUB018-524P	PSK-HUB018-534P
			PSK-HUB075-514P	PSK-HUB075-524P	PSK-HUB075-534P
			PSK-HUB100-514P	PSK-HUB100-524P	PSK-HUB100-534P
Max electrical load		0.2W @ 70°C	0.3A @ 125 VAC/VDC	700 Ohms @ 24 VDC	Same option as C & D
Sensor technology		Potentiometer	Solid State Sensors	Potentiometer	Solid State Sensors with Potentiometer
Input		10-40 VDC	8-125 VDC, 24-125 VAC	10-40 VDC	Same option as C & D
Output		0-40V range (FRP)	EOS	4-20 mA signal on two wire DC loop (FRP)	Same option as C & D
Connection		4 pin, 7/8"-20 UNEF	Terminal block thru 3/4" & 1/2" NPT conduit holes		
Approvals / Compliance Standards	IP67	●	●	●	●
	Intrinsically safe			●	
	Explosion proof		●	●	●
	Other	NEMA 4, 4X & 6	NEMA 4, 4X & 6	NEMA 4, 4X & 6	NEMA 4, 4X & 6
Temp Range		-13°F to 221°F (-25°C to 105°C)	-40°F to 176°F (-40°C to 80°C)	-40°F to 176°F (-40°C to 80°C)	-40°F to 176°F (-40°C to 80°C)
Visual Indication Options Available with each Feedback Option	Line on shaft	●			
	green on/ red off	Consult factory	●	●	●

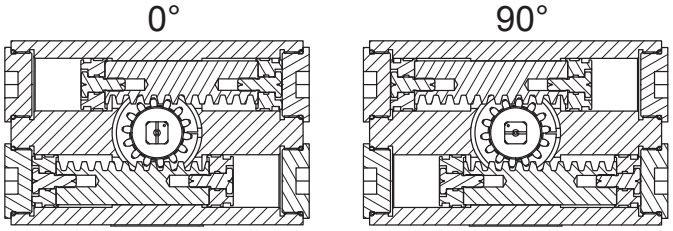
Note: Cables are not available for purchase.

FRP = Full Range Position

EOS = End of Stroke

Visual Indicator Options Table		C
		
Description		Color indicator
Replacement kit part number (VISUAL INDICATOR ONLY)		PSK-HUB018-702P*
Upgrade kit part numbers - conversion from an existing actuator with no visual indicator to one with visual indicator		PSK-HUB018-704P
		PSK-HUB075-704P
		PSK-HUB100-704P

*Visual indicator replacement kit does not include bracket or hardware.



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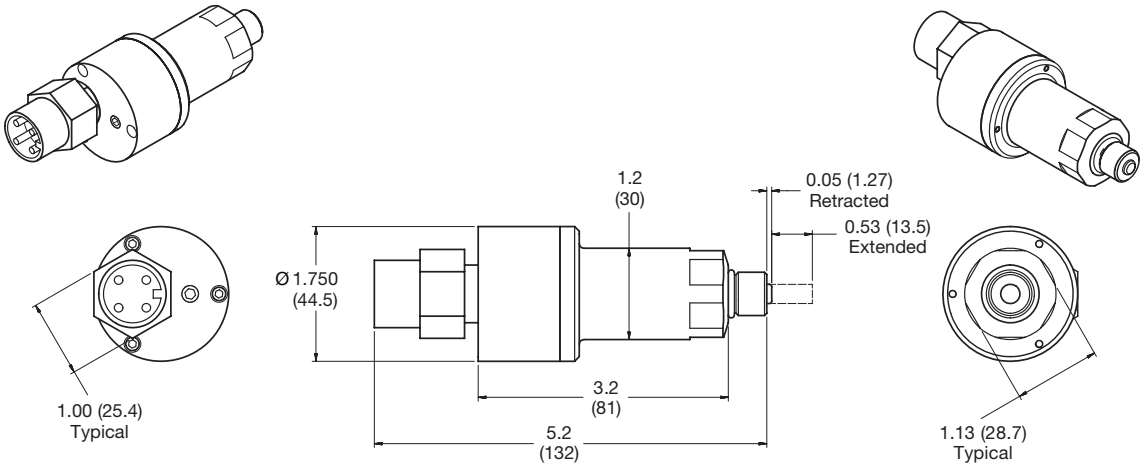
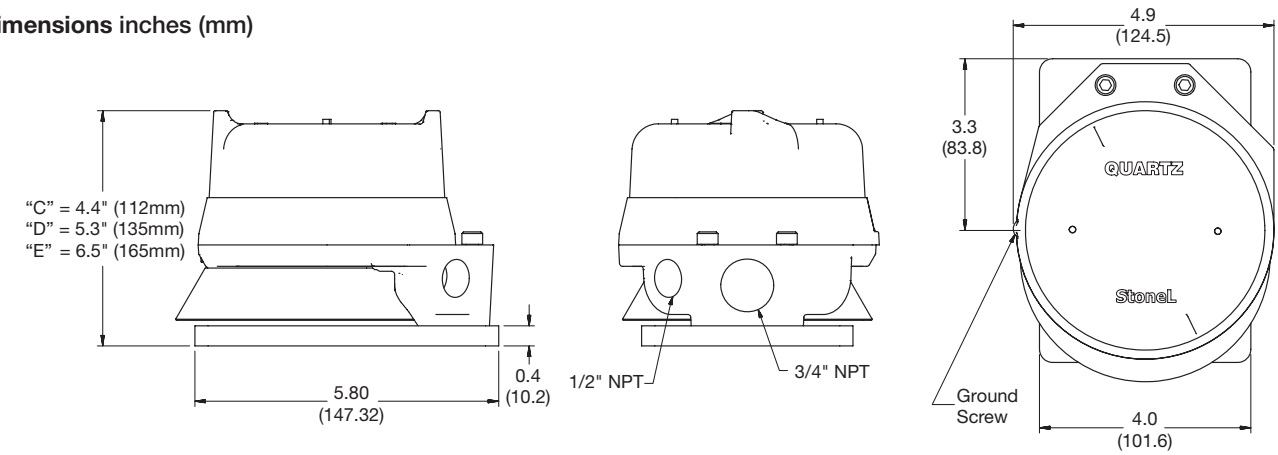
Rotary Linear Potentiometer
(Feedback option A & B)



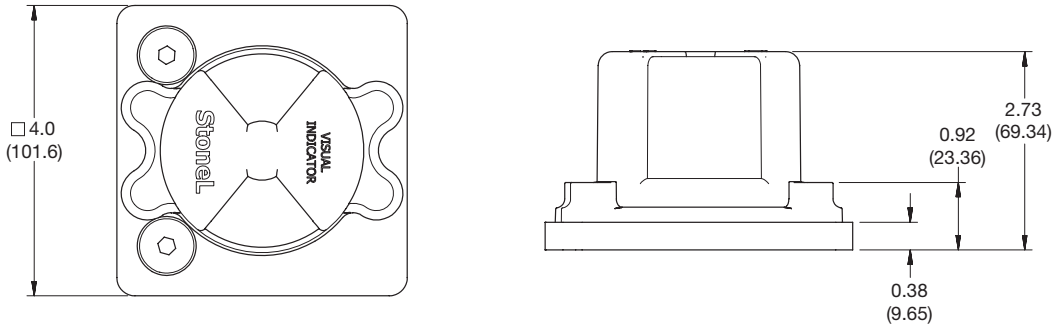
StoneL - Quartz
(Feedback option C, D & E)

Dimensions inches (mm)



NOTE: Cover height varies based on model number.

StoneL - stand alone visual indicator
(Visual Indication option C)



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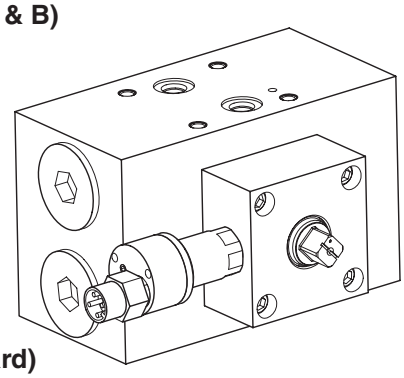
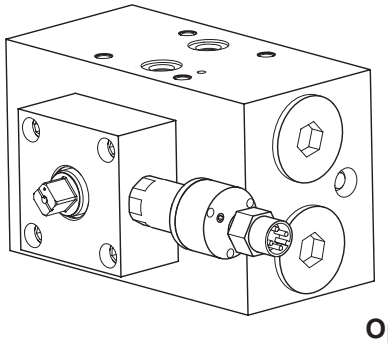
Rotary Linear Potentiometer
(Feedback option A & B)

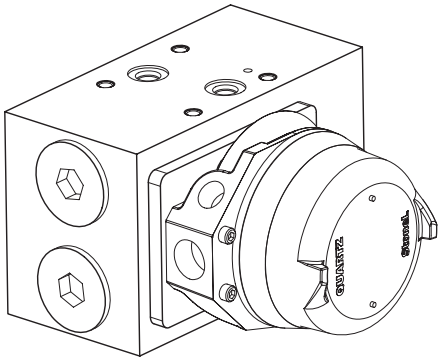


Option A (Standard)

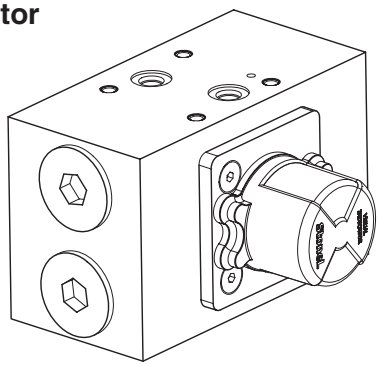


Option B

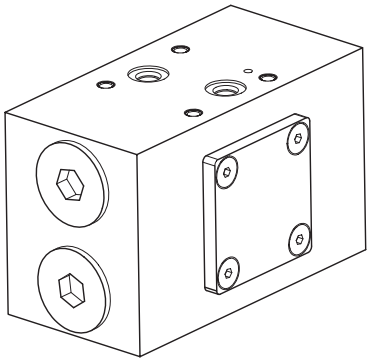
StoneL - Quartz
(Feedback option C, D & E)



StoneL Stand Alone Visual Indicator
(Feedback option Z and Visual indicator option C)



No Visual Indicator
(Feedback option Z and Visual indicator option Z)



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