



**EATON**

## Low Speed, High Torque Motors

Spool Valve: J, H, S, T, and W Series  
Disc Valve: 2,000, 4,000 Compact, Delta, 4,000, 6,000, and 10,000 Series  
VIS: VIS 30, VIS 40, and VIS 45 Series



# Why Eaton Hydraulics?

Eaton Hydraulics is the largest business segment of the Eaton Fluid Power Group and a direct result of Eaton's dedication to leadership in hydraulics for both mobile and industrial applications. Eaton produces not only some of the world's best hydraulic products, but also the best and most complete world-class hydraulic services, systems, and solutions.

## From off-road to industrial.

Eaton provides hydraulics to large on-road and off-road mobile OEMs in the agriculture, construction, mining, marine and lawn and garden markets. Eaton is also a major force in providing hydraulic components and systems to leading industrial OEMs.

From world-class engineering capabilities in system design assistance to comprehensive service and technical support after the sale, Eaton Hydraulics is committed to one clear objective – complete satisfaction with all Eaton products and systems, for both industrial and mobile users.

## Designed to your exacting specifications.

Eaton supports the needs of design engineers with products that meet a range of specifications. According to the functional needs of the vehicle or machine, your engineers can consult with Eaton to determine the exact flow, torque and displacement needs of the required components.

## Global distribution.

With distribution through 2000 distributors with 4000 locations worldwide, Eaton meets your needs for ongoing support as well as easy availability of replacement parts. The Eaton distribution network is ideal for meeting the system and component needs of smaller OEMs, too.

So whether your designs require hydraulics that help turn, shape, mold, lift, dig, or haul, Eaton products and systems are engineered for reliable, continuous performance in the world's most demanding and rigorous applications.

## Remanufactured Products.

Eaton also offers an extensive line of Remanufactured parts and components that meet the same exacting standards as the original products, including:

- Eaton brand medium-duty and heavy-duty piston pumps and motors
- Vickers brand vane cartridge kits for pumps and motors
- Vickers brand piston rotating groups and complete units

We are your source for **authentic** reman products. Our ISO 9001:2000 certified Reman facility stands ready to meet your aftermarket needs.

# World-class brands.

Eaton Hydraulics is comprised of seven key brands:

Aeroquip, Boston, Char-Lynn, Eaton, Hydro-Line, Vickers, and Weatherhead, each with well-established reputations around the world:



Aeroquip brand products serve the industrial, aerospace, and automotive marketplaces. Products include all pressure ranges of hose, fittings, adapters, couplings and other fluid connectors.

## BOSTON®

Boston brand products include a wide variety of transfer hoses used in diverse markets including the chemical, petroleum, material handling, and food industries. Boston also offers coupling and assembly equipment for most hose applications up to 2"; inside diameter.

## Char-Lynn®

Char-Lynn brand products have continued the tradition of being a well-respected line of hydraulic steering units and general-purpose motors; Char-Lynn is also known for its spool-valve, disc-valve, and high performance motors.



Eaton products are known for their excellence in engineering and production and include hydrostatic transmissions, valves, piston and gear pumps and Valve-In-Star™ motors. Eaton brand products are generally more heavily used on mobile equipment.



Hydro-Line industrial cylinder products complement the Hydraulics cylinder business by making available to customers a broader selection of single-source products that can be easily integrated into a complete Eaton system. Industrial cylinders are used by machine and equipment builders to transfer and apply fluid power in applications that range from automobile production to large hydro-electric projects and off-shore drilling platforms.

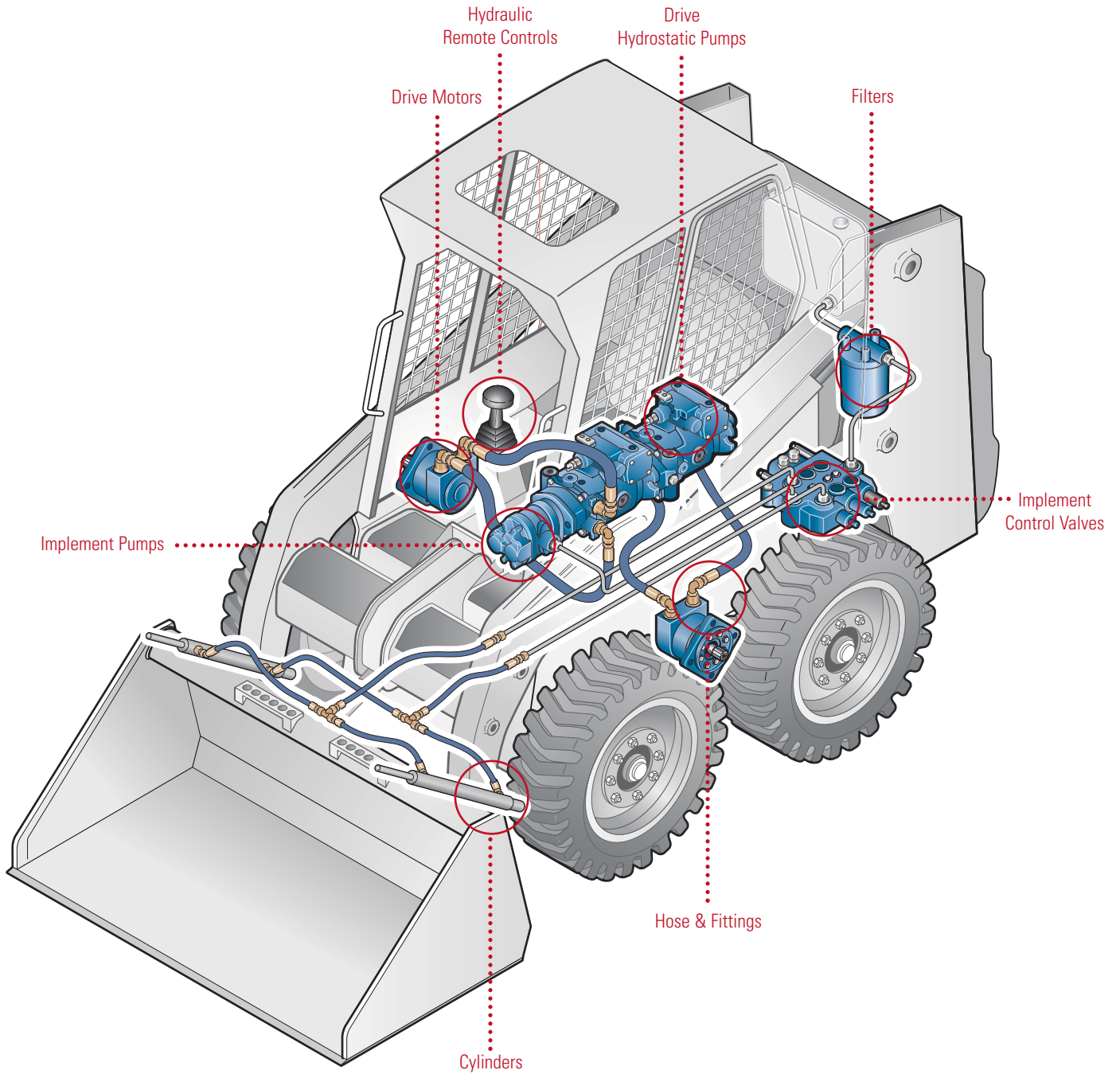


Vickers has long been a pioneer in providing systems and components including vane pumps, piston pumps, valves, cylinders and filtration products to the industrial, aerospace, marine and defense industries.

## WEATHERHEAD®

Weatherhead brand products consist of hydraulic hose, hose ends and assembly equipment, tube fittings, and a full range of support accessories. Weatherhead products are supplied to users in industries including construction, mining, agriculture, and truck and bus.

# Mobile Products and Capabilities



Lift. Dig. Haul...day in and day out. This is the work of Eaton Hydraulics products and systems. Engineered for reliable, continuous performance in the world's most rigorous applications.

Long recognized as a global leader, today Eaton is more powerful than ever. Now with an even wider range of reliable world-class products to serve virtually any mobile vehicle.

So whether you're specifying a single product, or an entire hydraulic system, make Eaton your global source for the fluid power products that'll move your world.



## Mobile Applications

### Agricultural

Eaton pumps, motors, transmissions, valves, cylinders, and controls, as well as hose and fittings, are ruggedly designed, and provide reliable performance in agricultural environments.

### Construction

In demanding construction applications – where uptime is of major importance – Eaton hydraulic components provide the necessary functionality and durability.

### Material Handling

Eaton hydraulic systems provide precise control and the solutions required for material handling use.

### Utility

With a large range of products and solutions, Eaton is the desired supplier of hydraulic components and hydraulic systems to a large range of utility vehicles.

### Forestry

In forestry applications, one of the most extreme applications around, Eaton hydraulics are the reliable answer for control, power, and durability.

### Mining

Eaton is the preferred choice for many of the auxiliary systems on mining equipment. Eaton products can handle the harsh environments and the rigorous duty cycles, and can survive the tough applications.

### Earthmoving

From propel motors and swing drives to auxiliary work systems, Eaton has many solutions to the demanding requirements of earthmoving applications.

### Truck and Bus

Eaton hose and fittings and Eaton fan drive systems set a standard for truck and bus applications.

## Highlights



### Remanufactured Products

- We offer a complete line of Eaton remanufactured medium and heavy-duty pumps and motors to provide cost effective replacement options.
- Our remanufactured products must meet the same rigid specifications as our new products.
- Don't take chances by using look-alike replacement parts. Keep your vehicles running with authentic Eaton Remanufactured product from the original source – Eaton.



### STC® Connectors

- Broadest range of threadless connectors in the industry!
- Eaton patented Snap-To-Connect™ technology has been extremely successful in various rigorous mobile applications.
- Direct porting options reduce number of connections.
- STC fittings or formed design for tube applications.



### Series 5 Steering Control Unit

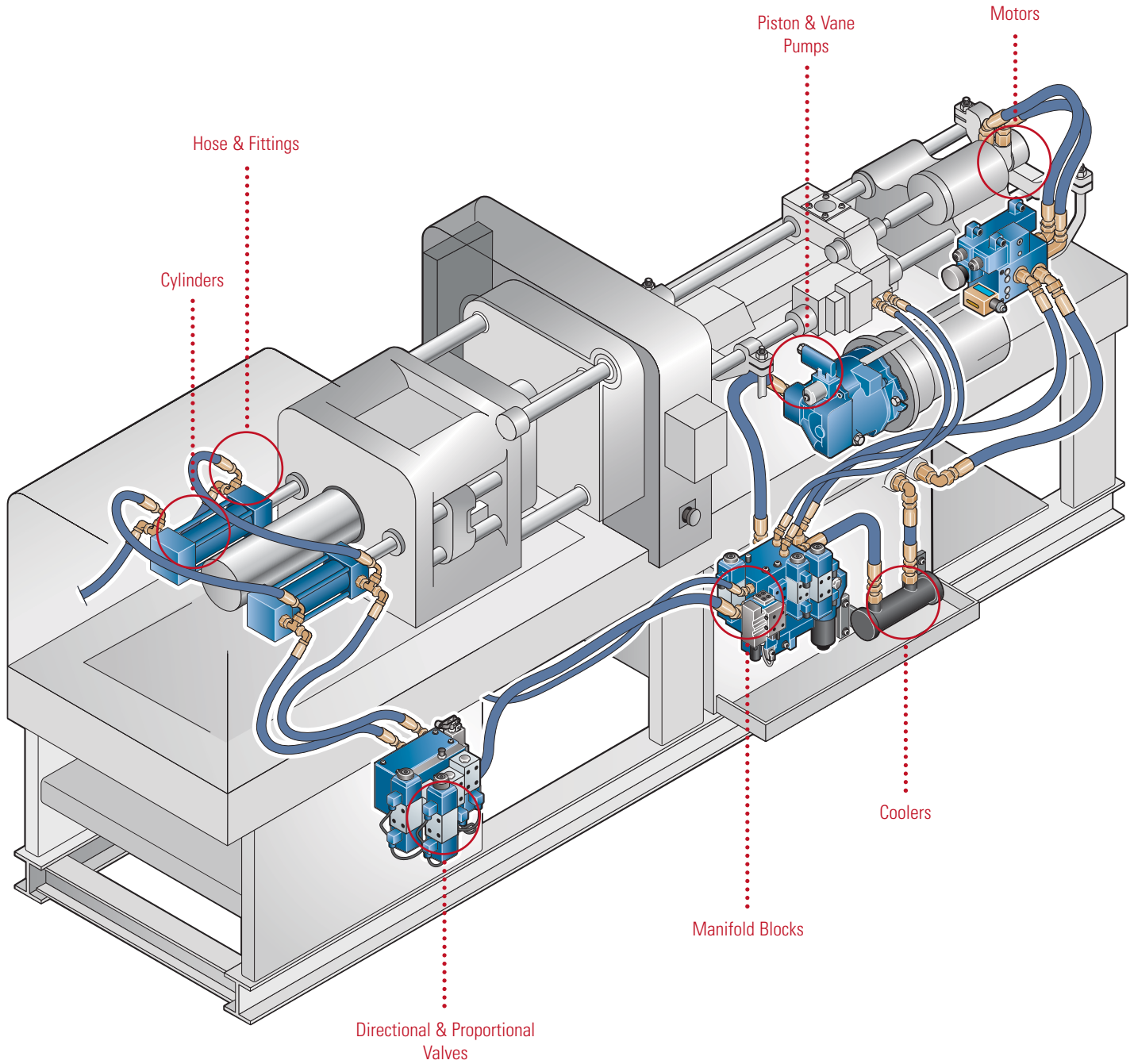
- Compact design and installation flexibility.
- Offering a variety of choices in mounting, port locations, configurations, and valve functionality.
- Provides lower pressure drop than competitive units.



### 420 Series Open Circuit Piston Pumps

- Eaton brand medium pressure pumps for mobile applications.
- Compact design provides high flow options in smaller package.
- Simple two-piece housing allows easy conversion of pump rotation.
- Four displacements in a common package allow optimized flow from the same size pump.
- Mounting and shaft options conform to SAE B and C specifications.
- SAE and Metric Porting provided in Tube and Flange styles.
- Thru-drive SAE A & SAE B rear pads allow tandem combinations with fixed or variable pumps.





Cut. Groove. Bore...day in and day out. This is the work of Eaton Hydraulics products and systems. Engineered for reliable, continuous performance in the world's most demanding applications. Long recognized as a global leader, today Eaton is more powerful than ever. Now with an even wider range of reliable world-class products to serve virtually any industrial application.

So whether you're specifying a single product, or an entire hydraulic system, make Eaton your global source for the fluid power products that'll keep you up and running.



## Industrial Applications

### Machine Tools Metal Cutting and Metal Forming

Eaton Hydraulics enable machinery to deliver high productivity and consistent accuracy for metal cutting machinery.

High pressure and flow components – piston pumps, cylinders and cartridge valves, provide the muscle and control required for metal forming machinery.

### Molding Plastics Injection, Rubber, Blow and Die Cast

Strong application support coupled with a full range of hydraulic products – wide range of cylinders, vane and piston pumps, cartridge valves and manifolds – provides you with a single source solution.

### Primary Metals Steelworks

Eaton high pressure pumps, cylinders and valves are the ideal components for delivering the muscle required in these rugged applications.

We can handle the heat and provide long life in mill environments.

### Automotive Engine and Transmission Plants

Eaton products are trusted and specified by the world's leading automakers.

You can count on Eaton aftermarket support anywhere in the world.

### Power Generation Thermal, Hydro and Wind

Eaton specialized products provide reliable operation with minimal routine maintenance.

Whether you build hydro-electric plants or wind turbines, Eaton has the specific solution for your needs.

### Port Machinery Ship to Shore Cranes and Container Handlers

Eaton understands the fast paced action of dockyards.

You can rely on Eaton components to provide high productivity with maximum efficiency.

### Entertainment Motion Systems

Eaton Hydraulics provide a natural look and feel to amusement park creature motions.

High masses and inertias developed on rides, are controlled with accuracy and simplicity.

## Highlights

### Open Circuit Piston Pumps



#### PVM

- Designed as a quiet, medium pressure pump for industrial applications.
- The cradle swashplate design pumps were created with low noise in mind.
- Design features reduce both the structure-borne and fluid-borne noise levels to market leading levels.

### Remanufactured Products

- We offer a broad selection of the most popular Vickers remanufactured vane cartridge kits and piston units and rotating groups to provide cost effective replacement options.
- Our remanufactured products must meet the same rigid specifications as our new products.



- Don't take chances by using look-alike replacement parts. Keep your machines running with authentic Eaton Remanufactured product from the original source – Eaton.

### Vane Pumps

#### VMQ

- The latest state-of-the-art Vickers VMQ fixed displacement vane pumps.
- Set new standards of performance and efficiency for both industrial and mobile applications.
- Features design enhancements in all areas, resulting in a unique combination of higher pressure capabilities and outstandingly low noise levels.



#### V Series Pumps

- Most popular fixed displacement vane pumps for medium pressure industrial applications.

- Lead in operating life, reliability, efficiency and quietness.
- Complete displacement range and pump configuration.

### Filtration

#### Pro Guard Series

- Vickers filters handle flows to 475 USgpm (1800 l/min.) and pressures to 6090 psi (420 bar).
- A wide range of port sizes, bypass valves, pressure drop indicators and media grades facilitate filter installation and achievement of desired system cleanliness levels.
- Inch or metric ports are available.
- Reservoir vent filters feature a visual indicator and corrosion-resistant housing.
- In addition to particle control, these filters also feature water/moisture control.



## Motors



### Spool Valve Hydraulic Motors

Spool valve motors transmit high torque at low speeds by means of a cylindrical valve and a gerotor or Geroler®, which are special drive members that turn the output shaft.

**Applications:** Machine tools, drilling and tapping machines, seed drills, augers, conveyors, textile machinery, sweepers, fans, scissors lifts and commercial mowers.

**Specifications:** Speed Range: Up to 1000 RPM. Torque Range: Up to 565 Nm (5000 lb-in). Options: Variety of optional shafts, ports, mountings and displacements. Output Shafts: Straight with Woodruff key, splined, tapered or straight with cross holes.

### Disc Valve Hydraulic Motors

Disc valve hydraulic motors operate similarly to spool valve motors but use Gerolers® exclusively. They are designed with a flat, disc-shaped valving system and are reversible. These products are effective at very low speeds.

**Applications:** Conveyors, augers, screws, spreaders, mixers, grinders, winches, reel drives, sweepers and various propel applications.

**Specifications:** Speed Range: Up to 900 RPM. Torque Range: Up to 3390 Nm (30,000 lb-in). Options: Wide variety of optional shafts, mountings, ports, displacements, speed sensors- and bolt-on valves. 2-Speed Models: Available in Series 2000 and 10000.



## Motors



### Valve-In-Star™ (VIS) Hydraulic Motors

High performance VIS 30, 40 and 45 motors deliver high torque in a compact envelope, plus superior volumetric and mechanical efficiencies. Patented design reduces leakage by incorporating a flexible, pressure-balanced wear plate. VIS design helps extend the performance life of the motor.

**Applications:** Skid steer loaders, crop sprayers, grape harvesters, specialty harvesting equipment, construction equipment, compactors, augers, forestry equipment, road rollers and trenchers.

**Specifications:** Speed Range: Up to 500 RPM. Torque Range: Up to 5085 Nm (45,000 lb-in).

### ME Series Hydraulic Motors

Double swash plate, opposed-piston, low-speed, high-torque hydraulic motors. These motors operate smoothly at low speed within the maximum ratings and cause very little torque ripple. Available with a brake, counter-balance valve, two speeds and geared motor options.

**Applications:** Swing drives, winches and propel drives for large vehicles.

**Specifications:** Pressure Range: 248 and 276 bar (3600 and 4000 psi). Torque Range: Up to 16136 Nm (11,900 lb-ft).



## Hydrostatic Power Steering Units



### Series 5

The Series 5 steering control unit (SCU) features a compact design and installation flexibility. These units offer a variety of choices in mounting, ports (now available with Snap-To-Connect, STC® direct ports), port locations, configurations and integral valve functionality. Balanced architecture provides smooth, best-in-class steering feel and crisp centering. Series 5 SCUs are affordably designed for low flow, low pressure applications and are more efficient than competitive units.

**Applications:** Lawn, garden and turf equipment, lift trucks, golf course maintenance equipment and compact utility tractors.

**Specifications:** Displacement: 31.5-120 cm³/r (1.92-7.33 in³/rev). Flow: 11-19 l/min (3-5 gpm). Pressure (max.): 140 bar (2030 psi).

### Series 10

The new Series 10 SCU facilitates hydraulic fluid flow like no other unit on the market. Offering an unprecedented, continuous pressure rating of 275 bar (4000 psi). Its robust design, balanced architecture and many options, offer increased performance during transient pressure and high standby conditions. Several optional features and technologies, such as STC® direct ports, Q-Amp, cylinder damping and the new VersaSteer™ (dual "metered" and "quick" steering modes), result in an improved steering experience and reduce system cost.

**Applications:** Heavy-duty equipment, such as construction and agricultural vehicles.

**Specifications:** Displacement: 60-739 cm³/r (3.6-45.1 in³/rev). Flow: 3.8-45 or 8.0-76 (Q-Amp) l/min (1-16 or 2-20 gpm). Pressure (max.): 275 bar (4000 psi).



## Hydrostatic Power Steering Units



### Series 20

The Series 20 SCU continues Eaton's tradition of innovative design and high quality that began with the first Char-Lynn fluid linked power system. The balanced and robust design provides, stability and positive low effort steering feel to ensure excellent vehicle control. Available with optional STC® direct ports, Q-Amp, Wide Angle, cylinder damping and the new VersaSteer™ (dual "metered" and "quick" steering modes) which reduce system cost, improve productivity and increase operator satisfaction.

**Applications:** Articulated vehicles, such as wheel loaders, forestry equipment and dump trucks.

**Specifications:** Displacement: 60-985 cm³/r (3.6-60 in³/rev). Flow: 38-125 l/min (10-33 gpm). Pressure (max.): 241 bar (3500 psi).

### Series 25

The Series 25 SCU includes several optional features and technologies, such as STC direct ports, Q-Amp and Wide Angle, that make it even more responsive, reliable and cost effective. Symmetrical valving provides uniform steering and a high capacity gerotor assembly provides a lot of capacity in a compact package. The Series 25 offers a higher flow rating and lower pressure drop than any competitive unit on the market.

**Applications:** Large articulated and fixed frame vehicles.

**Specifications:** Displacement: 490-1230 cm³/r (30-75 in³/rev). Flow: 95-151 l/min (25-40 gpm). Pressure (max.): 241 bar (3500 psi).





## Hydrostatic Power Steering Units



### Series 40

The Series 40 SCU is designed for the highest flow, highest pressure applications, and is the most capable steering control unit on the market. This SCU features patented Eaton technology and has design attributes that result in responsive, smooth, stable and cost effective steering.

**Applications:** Large articulated vehicles such as, loaders, mining trucks, graders, scrapers, haulers and transporters.

**Specifications:** Displacement: 1230-3030  $\text{cm}^3/\text{r}$  (75-185  $\text{in}^3/\text{rev}$ ). Flow: 151-227  $\text{l}/\text{min}$  (40-60  $\text{gpm}$ ). Pressure (max.): 241 bar (3500 psi).

### Steering Accessories

Eaton offers a complete line of steering columns and wheels to fit every need. Both feature the latest technology that result in superior performance in even the most rugged applications.

The f Series fixed column family features a robust design, increased durability, rugged construction and hundreds of versions. The high performance and ergonomic i Series tilt and telescoping column family provides infinite adjustment and large telescoping travel distance for reduced driver fatigue.

Eaton now also offers a complete line of stylish yet robust Eaton Char-Lynn steering wheels.

In addition to the broad standard offering, we will customize to fit your specific application.



## Vane Pumps



### VMQ

The Vickers VMQ is the world leader in pressure capacity and noise levels and is available in a complete range of singles, doubles, triples and thru-drives. The unique wafer plate design of the VMQ allows for the increase in viscosity and pressure rise during cold start-up — something that competitors do not have. The Vickers VMQ 32nd design is the highest pressure, lowest noise fixed vane pump available.

**Applications:** Marine and railway winches, oil field and drilling equipment, earthmoving and construction equipment, high-pressure plastic injection molding machines, large press machines, trash compactors and large balers.

**Specifications:** Displacements: From 10  $\text{cc}/\text{rev}$  (.60  $\text{in}^3/\text{r}$ ) to 463  $\text{cc}/\text{rev}$  (28.2  $\text{in}^3/\text{rev}$ ) using triple pump combined flow. Pressure Range: Up to 4250 psi (293 bar). Speed Range: Up to 3000  $\text{r}/\text{min}$ .

### V/VQ Vane Pump

The V/VQ series vane pumps are the pioneers of cartridge-design vane pumps. They are well known for long operating life, outstanding efficiency, flexible configuration and easy serviceability. The quiet 12-vane V series pumps are the most popular medium pressure industrial fixed pumps in the world.

For mobile equipment, the unique flex plate in the VQ pumps adds superior start-up capability in cold and harsh outdoor work environment.

That's why the VQ series pumps are widely adopted by world's leading mobile OEMs.

**Specifications:** Max. continuous pressure up to 3000psi/210 bar. Displacement up to 11.8  $\text{in}^3/\text{rev}$  [194  $\text{cc}/\text{rev}$ ]. Speed up to 2700rpm. Available in single, double, triple and thru-drive pump frames.



## Vane Pumps



### V10/V20

Time proven dependable, durable, quiet and most economical vane pumps. They are the premium fixed pump choice as the main system pumps for small industrial and mobile equipment or as pilot and auxiliary pumps for complex systems. They are also the standard steering pump technology for heavy-duty trucks and interstate buses. Optional integrated flow control valves simplify system design and installation.

**Specifications:** Max. continuous pressure up to 2500psi/175 bar. Displacement: Up to 2.59  $\text{in}^3/\text{rev}$  [42  $\text{cc}/\text{rev}$ ]. Speed Range: Up to 4800rpm.

### VVS/VVP

The VVS and VVP series variable vane pumps are cost effective solutions for low to medium pressure industrial applications where a flexible flow and low noise is required. A full range of control options are available from basic pressure compensator to load sensing, torque limiting control. The pumps are designed for long operating life thanks to hydrodynamic lubrication of bearings. You can find them in many high-end sophisticated machine tools.

**Specifications:** Max. continuous pressure up to 2300psi/160 bar. Displacement up to 6.1  $\text{in}^3/\text{rev}$  [100  $\text{cc}/\text{rev}$ ]. Speed up to 1800rpm.



## Open Circuit Piston Pumps



### 420

Eaton's new mobile equipment piston pump design sets the standard for high power in a compact envelope. This cradle swashplate style pump provides key performance enhancements over older designed pumps. The mounting, porting and thru-drive options allow extended flexibility for modern mobile equipment applications.

**Applications:** Refuse Trucks, Utility Boom Trucks, Ag. Tractors, Skid Steer Loaders, Rough Terrain Fork Lifts, Wheel Loaders, Backhoe Loaders, Construction Equipment, Earth Moving Equipment, Hydraulic Generator Drives, Hydraulic Fan Drive Systems.

**Specifications:** Displacements: 41cc, 49cc, 62cc & 80cc. Speed Range: Up to 2650 rpm. Pressure rating 280 bar continuous, 320 bar intermittent.

### PVB

One of the most widely known industrial open circuit piston pumps on the market. The large number of control options provides for extreme flexibility in applications.

**Applications:** Factory automation, hydraulic power supplies, and small mobile equipment auxiliary circuits.

**Specifications:** Displacements: From 10cc to 94cc, 1800 RPM maximum and up to 210 bar.





## Open Circuit Piston Pumps



### PVQ

Based on the industrial versions of PVB and PVE Open Circuit Piston Pumps, the Q Series greatly improves operating noise levels. The design of the PVQ reduces sound levels by 4 dBA. The large number of control options provides for extreme flexibility in applications.

**Applications:** Factory automation, hydraulic power supplies, food processing machines, and machine tools.

**Specifications:** Displacements range from 10cc to 45cc, 1800 RPM maximum and up to 210 bar (3000 psi).

### PVE

The PVE Open Circuit Piston Pump was designed with mobile hydraulics in mind. The robust design often exceeds the life requirements of the machines it is applied in.

**Applications:** Farm tractors, agriculture equipment, utility vehicles, construction equipment, and many other mobile applications.

**Specifications:** Displacements range from 25cc to 45cc, 3000 RPM maximum and up to 210 bar (3000 psi).



## Open Circuit Piston Pumps



### PVH

The H Series Open Circuit Axial Piston Pumps provide power for a wide range of mobile and industrial applications meeting customer requirements for performance. These cradle type swashplate pumps have rapid response to hydraulic circuit dynamics.

**Applications:** Mobile: wheel loaders, graders, scrapers, utility vehicles, dozers, forestry harvesting machines, and rock drills. Industrial: metal-forming equipment, hydraulic power supplies, press, factory automation, and machine tools.

**Specifications:** Displacements from 57cc to 141cc, speeds up to 2600 RPM and pressures up to 250 bar (3600 psi) continuous.

### PVM

The M Series Piston Pump family was designed as a quiet, medium pressure pump for industrial applications. The cradle swashplate design pumps were created with low noise in mind. Design features reduce both the structure-borne and fluid-borne noise levels to market leading levels.

**Applications:** Metal forming, tube bending, machine tools, precision sawing, factory automation, press, and hydraulic power supplies.

**Specifications:** Full 280 bar (4000 psi) continuous, 320 bar (4600 psi) intermittent pressure. Electric motor speeds. Mineral-oil-based and fire-resistant fluid compatibility. Displacements from 18cc to 141cc. Pressure compensation and pressure/flow compensation controls.



## Open Circuit Piston Pumps



### PVXS

The Hydrokraft™ PVXS design pumps are high pressure (350 bar) axial piston pumps designed for industrial markets. The PVXS pumps are widely used where their range of specialized pump controls can optimize circuits.

**Applications:** Metal forming, tube bending, press, marine and off-shore winches, chemical mixing grinding/shredding, and hydraulic power supplies.

**Specifications:** Full 350 bar (5000 psi) continuous pressure. Electric motor speeds. Mineral oil based and fire resistant fluid compatibility. Displacements from 66cc (4.0 in<sup>3</sup>) to 250cc (15/2 in<sup>3</sup>).

### PVWS

The Hydrokraft™ PVWS design pumps are high pressure (350 bar) axial piston pumps. These products are designed for industrial markets and have a perpendicular style control mechanism allowing tandem pump combinations with short lengths. These high displacement pumps have a very long list of optimized control options that allow operation in many unique customer applications.

**Applications:** Metal forming, tube bending, press, marine and off-shore winches, chemical mixing grinding/shredding, and hydraulic power supplies.

**Specifications:** Full 350 bar (5000 psi) continuous pressure. Electric motor speeds. Mineral oil based and fire resistant fluid compatibility. Displacements from 250cc (15.2 in<sup>3</sup>) to 750cc (45.7 in<sup>3</sup>).



## Closed Circuit Piston Pumps & Motors



### Heavy Duty Series 2 Axial Piston Pumps

Series 2 pump meets the market's demands for compact, quiet hydrostatic power. The power-dense, axial-piston design and wide range of controls are suited for mobile and industrial applications. Series 2 offers durability and high power density, plus a variety of options and controls.

**Applications:** Agricultural, crop sprayers, lift trucks, timber harvesters, road rollers, wheel loaders, road building, construction equipment and industrial applications.

**Specifications:** 430 bar (6250 psi), 5 displacements from 54 to 105cc. Speeds up to 4510 RPM. Integral charge pumps. A, B, B-B, C auxiliary through-drives.

### Bent Axis Motors - Fixed & Variable

Eaton's family of Bent Axis Motors offer greater flexibility than ever before. Capable of operation in open or closed circuits, these motors are well suited to a wide range of stationary and mobile applications. Configurations include fixed and variable displacements, flange or gearbox mounts. Can be tailored with controls, ports, and valving to optimize productivity, efficiency, and cost effectiveness.

**Applications:** Earthmoving machines and construction equipment, agricultural and forestry vehicles, marine and off-shore equipment, industrial conveying, mixing and other stationary in-plant uses.

**Specifications:** Eleven fixed displacement options from 11cc (.66 cir) to 225cc (13.73 cir). Five variable displacement options from 55cc (3.34 cir) to 225cc (13.73 cir). Rated pressure 350 bar (5100 psi), peak pressure to 450 bar (6500 psi). Speeds up to 5590 RPM.



## Closed Circuit Piston Pumps & Motors



### Heavy Duty Series 1 Axial Piston Pumps

Series 1 offers durability and high power density, plus a variety of options and controls.

**Applications:** Agricultural, transit mixer drum drives, industrial applications, lift trucks, timber harvesters, road rollers, wheel loaders and construction equipment.

**Specifications:** Six displacements from 54 cc/r (3.34 cir) to 125 cc/r (7.62 cir). Speeds up to 4510 RPM.

### Heavy Duty Axial Piston Motors - Fixed & Variable

Eaton offers a complete line of piston motors for all types of hydrostatic drives. Product range includes fixed and variable displacement, axial and bent axis designs. Complete families of control, shaft, valve block, mounting and porting options offer unparalleled flexibility to systems designers.

**Applications:** Agricultural, construction, lawn and turf, utility equipment.

**Specifications:** Six displacements from 54 cc/r (3.34 cir) to 125 cc/r (7.62 cir). Pressure up to 430 bar (6250 psi). Speeds up to 4510 RPM.



## Closed Circuit Piston Pumps & Motors



### Medium Duty Axial Piston Manual Pumps

Different valve plate options provide a range of control efforts that can closely match your application needs. A square control shaft reduces control linkage wear. A flexible pump design, with single, tandem, and back-to-back versions available. When your application calls for a robust, manually controlled pump this product is the choice.

**Applications:** Agricultural, construction, lawn and turf, utility equipment.

**Specifications:** Model 70360 – Displacement (Max.): 20,3 cc (1.24 cid). Speed (Max.): 3600 RPM. Continuous Rated Pressure: 210 bar (3000 psi). Intermittent Pressure (Max.): 345 bar (5000 psi). Model 70160 Displacement (Max.): 40,6 cc (2.48 cid). Speed (Max.): 3600 RPM. Continuous Rated Pressure: 210 bar (3000 psi). Intermittent Pressure (Max.): 345 bar (5000 psi).

### Medium Duty Axial Piston Servo Pumps

For ease of operation or electronic pump controls this product is the choice. A versatile, pump with many features and options. For example, five different charge pump displacements are available. A flexible design configured to meet your needs with many features and options.

**Applications:** Agricultural, construction, lawn and turf, utility equipment.

**Specifications:** Displacement (Max.): 40,6 cc (2.48 cid). Speed (Max.): 3600 RPM. Continuous Rated Pressure: 210 bar (3000 psi). Intermittent Pressure (Max.): 379 bar (5500 psi).



## Light Duty Hydrostatics



### Medium Duty Axial Piston Motors – Fixed & Variable

Match these motors up with the appropriate pump for a robust hydrostatic transmission. They offer opposite, same and rear port configurations with many optional spline and keyed shafts.

Available with shuttle valve, back pressure valve for improved loop cooling and flushing. Also offer speed sensors and a through-shaft option for brake mounts. Variable motors are available with manual, hydraulic destroke or servo control.

**Applications:** Agricultural, construction, lawn and turf, utility equipment.

**Specifications:** Displacement Range: 1.50, 2.01, 2.48, 3.02 cu. In. Speed (Max.): 3600 RPM. Continuous Rated Pressure: 210 bar (3000 psi). Intermittent Pressure (Max.): 370 bar (5400 psi).

### Light Duty Transaxles

Eaton manufactures Models 751, 771, 778 and 851 transaxles with integral ball piston pumps, motors and axle with planetary gears. This design provides a strong and durable compact drive package. Several gear reduction ratios are available.

**Applications:** Lawn tractors, utility vehicles and ZTR mowers.

**Specifications:** Output Speeds (Max.): Model 751–110 RPM (@ 3600 RPM Input), Model 771–153 RPM (@ 3600 RPM Input), Model 778–121 RPM (@ 3600 RPM Input), Model 851 – 112 RPM (@ 3200 RPM Input).



## Light Duty Hydrostatics



### Light Duty Transmissions

These transmissions combine a variable displacement, radial-ball-piston, and hydraulic pump with a fixed displacement, radial-ball-piston, and hydraulic motor in one housing.

**Applications:** Lawn tractors (8-20 HP) and seeders, commercial mowers, golf course maintenance equipment, concrete saws, utility trucks, garden tractors and ZTR (zero-turn radius) mowers.

**Specifications:** Models 6 & 7 – Speeds (Max.) Input 3600 RPM, Output 2150 RPM. Torque Output: Continuous, 14 Nm (120 lb-in), Intermittent, 20 Nm (180 lb-in), Peak, 27 Nm (240 lb-in). Model 11 – Speeds (Max.): Input 3600 RPM, Output 0 - 1950 RPM. Torque Output: Continuous, 41 Nm (360 lb-in), Intermittent, 61 Nm (540 lb-in), Peak, 81 Nm (720 lb-in).

## Gear Pumps

### Gear Pumps

SAE AA, A, and B mount aluminum pumps in displacements ranging from .2cid [33cc] to 3.4cid [55cc]. A wide range of mount, shaft, and porting options meeting SAE, Metric, and NPTF standards are available.

**Applications:** Garden and utility tractors, backhoes, combines, road graders, hay swathers and industrial power units.

**Specifications:** Speed Range (Max.): 2250 to 4000 RPM. Rated Pressures: 207 – 241 bar (3000 to 3500 psi).



## Valves



### Screw-in Cartridge Valves

Screw-in cartridge valves provide many advantages over traditional hydraulic valves. While offering the same control functions as traditional hydraulic valves, screw-in cartridge valves are compact, reliable, and economical. Combining multiple valves in a common manifold offers the user substantial cost-saving advantages that cannot be achieved with traditional valving.

**Specifications:** Pressure: Up to 6000 psi. Flow: Up to 150 USgpm.

### Slip-in Cartridge Valves

Typically associated with relatively high flows, i.e. 40 USgpm or higher, slip-in cartridge valves are targeted at more efficient, faster and more compact hydraulic systems. Eaton cartridge valve system technology meets the changing needs of new generations of hydraulically operated machinery and equipment. Today's machines need controls that are exceptionally cost effective and energy efficient. Vickers cartridge valves fulfill these needs.

**Applications:** Compatible with computer or programmable controls via electrically modulated pressure and flow control models. Simple on-off solenoid pilot controls, as well as air operated types, are also available.

**Specifications:** Rated pressure 5000 psi (350 bar) ; rated flow up to 1300 USgpm (5000 l/min).



## Valves



### Directional Control Valves

DG valves mount on industry standard surfaces and provide 3 or 4-way control in a broad range of applications, industrial and mobile. Their primary function is to direct fluid flow to a cylinder or to control the direction of rotation of a hydraulic motor. These valves can be actuated by solenoid, hydraulic or pneumatic pilot, lever, or mechanically. A full range of complementary pressure, flow and check valve functions are available in the Eaton SystemStak™ family of sandwich mounted valves. Eaton DG valves are available in 10 different frame sizes.

**Specifications:** Rated pressure up to 5000 psi ( 350bar); rated flow up to 290 USgpm (1100 l/min).

### Flow Controls – Adjustable

Temperature and pressure-compensated flow controls allow precise volumetric control. Suitable for pressures up to 3600 psi, flow controls are available with (bypass type) or without (restrictor type) integral relief valves. Adjustable flow control valves are suited for applications requiring flow regulation without pressure compensation.

**Specifications:** rated pressure up to 3600 psi (250 bar); rated flow up to 28 USgpm (106 lpm).



## Valves



### Flow Divider Valves

Priority-type, pressure-compensated flow divider valves are made in adjustable and non-adjustable models up to 379 L/Min. (100 GPM).

### Pressure Control Valves

Pressure control valves performance pressure relieving, reducing, sequencing, and unloading control. Both subplate and in-line mounting types are available. Both subplate and in-line mounting types are available with various control types including remote, multiple pressure and venting.

**Specifications:** Rated pressure up to 5000 psi (350 bar); rated flow up to 180 USgpm (680 lpm).



## Valves



### Proportional Control Valves

Proportional control valves include directional, flow, and pressure controls driven by separate amplifier/control cards, or on-board amplifier. Directional control valves have three performance levels, standard, high (main stage feedback), and servo performance (two stage feedback).

**Specifications:** Rated pressure up to 5000 psi (350 bar); rated flow up to 190 USgpm (680 lpm).

### Self-Leveling Valves

These linear flow divider valves for automatic leveling of bucket or attachments are used on skid steer or agricultural loaders. Available in single direction (raise only) or new dual direction.

**Specifications:** Rated Flow: 20gpm (75 lpm). Rated Pressure: 3500psi (240 bar).





## Valves



### Servovalves

These two-stage, four-way, flapper nozzle valves provide system closed loop control with exact positional accuracy, repeatable velocity and predictable force or torque regulation.

**Specifications:** rated pressure up to 5000 psi (350 bar); rated flow up to 40 USgpm (151 lpm).

### SystemStak™ Modular Valves

These compact hydraulic systems feature modular valves that are “sandwich” mounted between a directional control valve and a standard mounting surface. All circuit flow paths are contained within the control valve and modules. These valves provide a compact hydraulic circuit at a reduced cost, eliminating interconnecting piping. Each valve “stack” can be configured to provide the specific system functions.

**Specifications:** Rated pressure up to 4500 psi (315 bar); rated flow up to 90 USgpm (340 lpm).



## Valves



### HRCs – Hydraulic Remote Controls

Low effort, precise control means less operator fatigue and more productivity. Excellent pressure metering capability allows precise control and less wear-and-tear. Freedom of system design means single-station control of widely placed directional valves can be readily achieved. In a vehicle, an HRC is easily mountable in the cab or elsewhere because it is compact and eliminates the cumbersome mechanical linkage found in many applications. HRCs are now available with STC Direct Port Options for fast, reliable, one-hand connections.

**Applications:** Wheel loaders, skid steer loaders, backhoeloaders, excavators, cranes, lift trucks and forestry machines.

**Specifications:** Rated Flow: 5.3 gpm (20 lpm). Rated Pressure: 1450psi (100 bar).

### CMX Sectional Valves

CMX sectional valves provide hydraulic or electrical actuation, allowing generous flexibility for location and installation in a vehicle. Phasing between meter-out and meter-in can be pre-selected to easily match valve metering to type of load and cylinder area ratio and permit lowering without using pump flow. Pressure compensated meter-in provides good metering when two or more functions are operated simultaneously and permits priority to be accomplished in pilot circuit.

**Applications:** Forestry equipment, wheel loaders, rough terrain lift trucks and boom man lifts.

**Specifications:** Rated Flow: 26 ans 42gpm (98 & 159 lpm). Rated Pressure: Up to 5075psi (350 bar) depending on port configuration.



## Valves



### Monoblocks™ – 5 & 15 GPM

Excellent monoblock design results in fewer leakage paths. Hardened and plated spools provide superior impact and corrosion resistance. Two-point mounting prevents spool binding.

**Applications:** Trenchers, sweepers/scrubbers, stand-up lift trucks, aerial work platforms, small ag loaders, garden tractors, golf course maintenance equipment and highway mowers.

**Specifications:** Rated Flow: 5 and 15gpm (19 & 56 lpm). Rated Pressure: 2500-3000psi (172-207 bar).

## Hydraulic, Pneumatic & Electrohydraulic Cylinders

A broad range of single and double acting cylinders is available for industrial and mobile markets, with standard and custom design and manufacturing capability to meet every need.

**Applications:** Applications include plastic blow and injection molding equipment, machine tools, steel mills, tube benders, packaging and material handling equipment, food processing, off-shore, planters and pickers.

**Specifications:** Rated Pressures to 4,600 psi (320 bar) Standard, to 10 ksi Custom. Available Sizes: 3/4 to 60 inch (20 to 1500 mm) bore sizes. 5/16 to 50 inch (8 to 1270 mm) rod sizes. Strokes to 65 feet (20 meters).



## Filtration



### Filtration

Vickers filters handle flows to 475 USgpm (1800 l/min) and pressures to 6090 psi (420 bar). A wide range of port sizes, bypass valves, pressure drop indicators and media grades facilitates filter installation and achievement of desired system cleanliness levels. Inch or metric ports are available. Reservoir vent filters feature a visual indicator and corrosion-resistant housing. In addition to particle control, these filters also feature water/moisture control.

### Packaged Systems

The most complete line of Industrial Power Units in the marketplace, including verticals, horizontals, L's, overheads, and JIC. Available in gear, vane and variable piston pump options with flows from 1 gpm to 57 gpm and standard reservoir sizes from 3 gallons up to 150 gallons. Custom Configurations are available upon request.





## Hydraulic Hose Products



### High Pressure Spiral Hose and Fittings

Eaton offers spiral hose and fittings exhibiting Best-In-Class longevity and breadth of product line designed to perform in a wide variety of hydraulic applications.

When coupled with our Global Spiral fittings, featuring micro-alloy steel and no-braze technology, our assemblies provide superior lifecycle performance.

**Applications:** hydrostatic drives, oil rigs, construction equipment, mobile & industrial systems.

**Specifications:** Available in a broad range of cover materials and sizes that meet a variety of applications. Our hoses meet or exceed EN/DIN, Mil-spec and SAE specifications.

### Medium Pressure Braided Hose and Fittings

Medium pressure braided hose and fittings represent the largest market and widest variety of hydraulic applications. Our unsurpassed line of products ensures you can always find the right hose for your application.

**Applications:** General hydraulic systems, mobile equipment, industrial equipment.

**Specifications:** A range of hose styles and sizes that meet a variety of EN/DIN, Mil-spec and SAE specifications. Certifications include ABS, DNV, MSHA, DOT/FMVSS and many more.



## Hydraulic Hose Products



### Thermoplastic

Choose from a full line of hydraulic thermoplastic hose. The versatility of thermoplastics allows for non-conductive hose to be used on utility truck applications.

**Applications:** Forklifts and agricultural equipment.

**Specifications:** Hoses with ID's that range from 1/8" thru 1". Pressures: Up to 10000 psi.

### MatchMate Plus™

Aeroquip's MatchMate Plus "3 Minute Crimp Hose Assembly System" is tailor made for high-speed assembly processes. Hoses are color-coded for the ease of identification. An error-free selection exists for fittings – the number of rings on the fitting sockets matches-up with the number of rings on the hose laylines.

**Applications:** General hydraulic systems, mobile equipment, industrial equipment.

**Specifications:** 6 hose styles; 1/4" thru 2" size range that meet a variety of EN/DIN and SAE specifications.



## Specialty Hose Products



### PTFE

A broad range of hose and matched fittings are available for use in a wide variety of applications. PTFE fits the bill when high temperature meets the entire spectrum of fluid pressures.

**Applications:** Ranging from self-contained breathing apparatus to high temperature engine hose.

**Specifications:** Meet SAE 100R14A and B specifications. Pressures: Up to 5000 psi.

### A/C & Transportation Products

Engineered components and assemblies for a wide range of fluid power systems. Hose materials range from high temperature AQP® to PTFE to nylon veneer products for A/C applications.

**Applications:** Hose and fittings for air conditioning and refrigeration, fuel and lube oil, engine and transmissions, oil cooler lines, airbrake, and power steering applications.

**Specifications:** A/C = multi-refrigerant; Transportation = truck hose for every application.



## Specialty Hose Products



### Performance Products

High performing hose, fittings and adapters for discriminating motorsport enthusiasts and professionals around the world. Aeroquip Performance Products...There is a difference!

**Specifications:** Fuel, oil, coolant, gauge, and brake lines.

### Marine/Military

Wide variety of hose, fittings and adapters that meet many marine, military and government specifications. Aeroquip Marine/Military...there is no equal!

**Specifications:** Lube, fuel, water, and air. A detailed catalog specifically listing the Mil spec part numbers is available for the customer's use.



## Specialty Hose Products



### Fluid Transfer

From low pressure air and water to hazardous chemical transfer, Boston offers a variety of products to meet the exact needs of an application. These products range from 1/4" to 8" ID in size and many are available in either spiral or braided construction.

**Applications:** Air, Water, Cleaning, Material Handling, Food, Chemical, Petroleum, Steam hoses and Specialty Service.

### Low Pressure Hose

Choose from a full range of low pressure hose with push-on connections, including hi-temperature AQP, abrasion resistant covers for demanding service life and color-covered hose for installation identification. A low temperature MIL-DTL-13444 hose is included in the product offering.

**Applications:** Ranging from low pressure machine tools, fuel, oil, air and water. The size range is 1/4"ID through 3/4" ID. (not recommended for hydraulic impulse applications).



## Metal



### Adapters and Tube Fittings

Adapters come in a variety of standard and non-standard configurations to meet every need. Available in carbon, steel, brass, and stainless steel. Tube fittings are designed to match up with tube dimensions that are offered in a variety of configurations — ISO, BSP, and NPT to name a few popular standards.

**Applications:** General hydraulic systems use.

**Specifications:** Available in sizes 1/8" up to 2". Adapters meet dimensional specifications outlined in SAE, J512, J513, J1926, and J1453.

### Couplings

A broad range of products encompassing the simple (air couplings) to the complex (hydraulic applications) to the most complex (SCBA).

**Applications:** Hydraulic attachments, SCBA.

**Specifications:** Full range of pneumatic, hydraulic and fluid transfer. Couplings meet a variety of SAE and ISO specifications.



## Metal



### Swivels

Offering compact and robust designs while offering a wide variety of end configurations with the flexibility to perform in many dynamic hydraulic applications.

**Applications:** Hose reels, scissor lifts.

**Specifications:** Can be used in a full range of pneumatic, hydraulic and fluid transfer applications.

### STC®: Snap-To-Connect

The broadest range of threadless connectors in the industry! Eaton patented technology has been extremely successful in various rigorous mobile applications.

**Applications:** Truck/bus platforms and construction/agricultural equipment.

**Specifications:** Connections are offered in 3/8" up to 1". Pressures: Up to 345 bar (5000 psi).



## Crimp Machines and Accessories



### Tools & Crimp Machines

A wide variety of crimp machines are available for every requirement (low and high volume hose assembly) for both distributors and OEMs. Select from a complete line of popular crimp machines.

**Specifications:** Ability to crimp hose of all sizes (1/8" up to 2").

### Accessories

A full range of clamps, protective sleeves, hose cleaning services and hose routing aids.

**Specifications:** Able to be used with all sizes of hose and metal products.



# Learn from the hydraulics experts with Eaton Fluid Power Training.

Knowledge is power. And nowhere can your team strengthen its knowledge more effectively than with Eaton Fluid Power Training.

Attendees can save their company significant costs by reducing unplanned downtime and maximizing the effectiveness of planned downtime. Each year, more than 2,500 people attend training at Eaton Fluid Power Training Centers in Eden Prairie, Minnesota, Maumee, Ohio, and Wehrheim, Germany, or through customized on-site programs, worldwide.

Our field and industry specialists combine 140 years of experience in fluid power and education, with the impressive legacy of Vickers and Aeroquip Training. Along with the recent addition of Eaton's 18,000 square foot state-of-the-art, world-class training facility in Maumee, Ohio, USA, our training team delivers valuable, practical insight about design, contamination and troubleshooting of hydraulic and pneumatic circuits. The Maumee facility is

furnished with two fully equipped labs, which are complemented by two innovative classrooms for a thoroughly integrated learning experience.

Eaton Fluid Power Training offers more than 15 top-line, hands-on courses for industrial and mobile applications – with other programs and resource materials available for home study. Eaton Fluid Power Training is ideal for maintenance personnel, supervisors, engineers, and even purchasing agents.

### With Eaton Fluid Power Training, you can benefit from:

- Immediate access to Eaton experts
- Focused and consistent training
- Two fully-equipped training facilities

- Small class sizes for focused instruction
- Multi-lingual training and worldwide resources
- INVEST, an electrohydraulics home-study program
- Easy-to-read professional publications



Two full-size classrooms and two hands-on instruction labs certify our Maumee facility as one of most highly respected hydraulics training facilities in the world. For an up-to-date class schedule and list of training materials, visit [www.eatonhydraulics.com/training](http://www.eatonhydraulics.com/training) or call 800-413-8809 (US), or 49 (0)6081 103344 (Germany).

### Courses

- Industrial Hydraulics
- Mobile Hydraulics
- Troubleshooting
- Systemic Contamination Control
- Circuit Design
- Pneumatics
- Electrohydraulics
- Cartridge Valves
- Proportional Valves

- Customized training at your location
- Product Training

### Materials Manuals:

- Industrial Hydraulics
- Mobile Hydraulics
- Electrohydraulics
- Contamination Control

### Videos:

- Aeration/Cavitation Demonstration
- Introduction to Hydraulic Technology Set
- Test and Repair Series

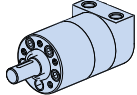
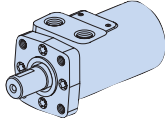
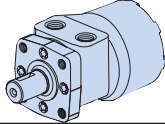
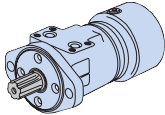
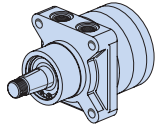
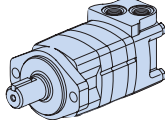
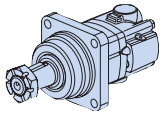
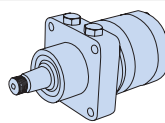
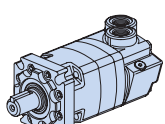
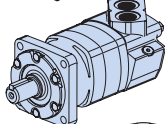
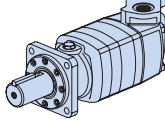
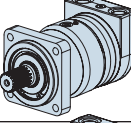
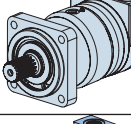
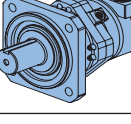
### Cut-aways:

- Pumps
- Valves
- Motors

### Simulators

- FPT-4e: Double-sided workstation, accommodates 4–6
- Desktop: Self-contained, compact
- Electrohydraulic: Single-sided workstation, accommodates 3–4

# Contents

	SECTION	PRODUCT NUMBER PREFIX	PAGE
	Introduction to Eaton Motors		A-3
	J Series	(129-)	B-1-1
	H Series	(101-)	B-2-1
	S Series	(103-)	B-3-1
	T Series & "T" Series w/Parking Brake	(158-) (185-)	B-4-1
	W Series & W Series w/Parking Brake	(162-)	B-5-1
	2000 Series	(104-, 105-, 106-)	C-1-1
	4000 Compact Series	(167-, 169-, 170-)	C-2-1
	Delta Series	(184-)	C-3-1
	4000 Series	(109-, 110-, 111-)	C-4-1
	6000 Series	(112-, 113-, 114-)	C-5-1
	10,000 Series	(119-, 120-, 121-)	C-6-1
	VIS 30 & VIS 30 w/Parking Brake	(159-, 160-, 161-, 171-, 172-, 181-)	D-1-1
	VIS 40 & VIS 40 w/Parking Brake	(168-, 176-, 177-, 178-, 180-, 183-)	D-2-1
	VIS 45 & VIS 45	(155-, 156-, 157-, 173-, 174-, 183-)	D-3-1



## Contents

Char-Lynn, Hydraulic Motors	A-3
Circuits	A-4
Design Flexibility	A-5
Motor Application Information	A-6
Optional Features	A-10
Two Speed Motors	A-11
Seal Guard	A-12
Viton Seals	A-12
High Pressure Seals	A-13
Environmental Protection	A-13
Braking Solution	A-14
Free Running Geroler Sets/ Gerotor Sets	A-15
Speed Sensors	A-16
Shuttle Valve	A-17
Case Porting	A-18
Low Speed Valving	A-19
Vented Two-Stage Seal	A-20
Special Housings Bolt on Solutions	A-22
Dual CBV Package for H&T Series Motors	A-23
Dual POC Package for H&T Series Motors	A-24
Dual Cross-over Relief Package for H&T Series Motors	A-25
Dual Cross-over Relief Package for 2000 Series Disc Valve Motors	A-26
Dual CBV Package for 2000 Series Disc Valve Motors	A-27
Dual POC Package for 2000 Series Disc Valve Motors	A-28
Fluid Recommendations	A-29

# Char-Lynn, Hydraulic Motors

## Introduction...

For the past 45 years, the Char-Lynn®, brand has been recognized as the industry leader in low-speed, high-torque (LSHT) hydraulic motor technology. The name Char-Lynn was coined by one of the original pioneers in the hydraulic industry, the late Mr. Lynn Charlson. The hydraulic motor designs developed by Lynn Charlson and his team use what is termed as the Orbit principle. This principal is the center of the designs pioneered by the Char-Lynn team and is based on the fact that a gerotor or Geroler®, star orbits multiple times (typically 6 to 8 times depending on specific star and ring geometry) for each complete single revolution within the outer ring. This principle is what gives Char-Lynn motors their reliable high power density and extremely compact size. Only three primary moving components are needed to transmit torque through the motor: star, drive and output shaft. Shaft rotation can be instantly reversed by changing inlet / outlet flow while generating equal torque in either direction. A variety of displacement sizes are available in each motor family that provide a wide variety of speeds and torque ranges from any series of motors. The results are compact, modular, economical designs that can be easily customized to suit a wide variety of application needs.

## Motor options include:

- Displacement size (cubic inches or cc's per revolution)
- Output shaft size and type
- Mounting flange type
- Porting interface
- A wide selection of special features such as integrated brakes, sensors, integrated cross-over relief valves, 2-speed capability, manifold valve packages, and environmental protection suited for corrosive environments.

Char-Lynn motors are extremely reliable, compact, and have tremendous power density. They provide a way to meet many needs for cost-effective power transmission requirements. Multiple motors can be driven by a single power source (pump) and controlled using a wide array of valves and variable displacement pump controls. Motors can even be configured with electronic sensors to provide digital feedback for sensing both motor direction and output speed.

The Char-Lynn motor range consists of three major types based on the type of valving used to distribute fluid through the Orbit gear set (geroler or gerotor). These three types are:

- **Spool Valve**
- **Disc Valve**
- **VIS (Valve-in-Star)**

Migration from one valve technology to the next enhances motor performance in terms of efficiency, pressure rating, displacements, and motor output torque capability.

To help guide you to proper product selection, a quick guide is provided below. In addition, you will find product highlights, summaries of motor option features and benefits, application formulas, and detailed specifications for each motor family.

## MOTOR QUICK-GUIDE (BASED ON MAXIMUM CONTINUOUS RATINGS)

Type	Output Torque Nm [lb-in]	Pressure bar [psi]	Flow lpm [gpm]	Side Load kg [lbs]
Spool Valve	441 [3905]	165 [2400]	62 [18]	725 [1600]
Disc Valve	2700 [24000]	205 [3000]	170 [45]	4500 [10000]
VIS (valve-in-star)	4520 [40000]	345 [5000]	170 [45]	8640 [19000]

# Circuits

## Circuit Design Considerations

### Hydraulic Circuit

Hydraulic drives can be divided into two basic types: 1) Traction Drives and 2) Non-Traction drives. Traction drives (also referred to as propel drives) are used to propel a wheeled or track-driven vehicle. Non-traction drives (also referred to as work drives) are used for some other vehicle function such as a winch, auger, conveyor or rotate function for a boom or crane.

These rotary drive systems can also be classified as either open loop or closed-loop circuits.

### Open Loop Circuit

In an open loop circuit, oil is returned to a reservoir before returning to the motor. The motor/pump circuit is open to atmosphere. In an open loop circuit, the drive speed of a motor may be controlled by, varying the flow with a valve, changing pump input speed (engine or pump input speed), or varying flow using a variable displacement pump. Often these circuits use counter-balance valves to accomplish dynamic braking functions, and provide a flow (pressure) source to release a spring-applied, hydraulic release brake. It is common to use a shuttle valve for directing flow to release the spring-applied pressure-release brake. A shuttle valve is basically a double check valve that directs flow from the A or B side of the loop and is often the source of flow to create the pressure to release a brake.

Typical applications using open loop circuits include:

- Truck-Mounted Booms and cranes (boom – rotate function)
- Aerial Work Platforms (boom – rotate function)
- Winches
- Conveyors
- Grapples
- Others

### Closed Loop Circuit

In a closed loop circuit, there is no reservoir between the inlet and outlet of the motor and pump. The pump outlet is connected directly to the motor inlet and the motor outlet is connected directly to the pump inlet. This circuit is, in theory, closed to atmosphere. Motor speed is typically controlled using a variable displacement pump. This pump can also control motor output shaft direction (CW or CCW rotation).

These systems provide dynamic control of flow through the closed loop of the motor/pump circuit. They are, however, subject to some inherent internal leakage that results in the inability of the loop to hold a load over time. This is why a static brake is typically found in such systems to mechanically hold the load. Brakes used include mechanical caliper, disc or ball-ramp type brakes. In addition, spring-applied, hydraulic release brakes are used. The T Series Motor w/Parking Brake meets this need.

Typical applications using closed loop circuits include:

- Vehicle traction drives (propel function)
- Conveyors
- Winches
- Others

# Design Flexibility

Char-Lynn motors are truly built for high torque low speed. A lot of power is derived from this small package. This power advantage provides the designer with a product that can be used for overall compactness in addition to taking full advantage of the high pressure ratings typical of present day hydraulic components.

Char-Lynn hydraulic motors allow the designer to put the power where it is needed. Furthermore, the motors can be mounted directly on the driven device away from the original power source which eliminates the need for other mechanical linkages such as chains, sprockets, belts, pulleys, gears, rotating drive shafts, and universal joints. Several motors can be driven from the same power source and can be connected in series or parallel to each other.

## Durability

The design and method of manufacture of three critical drive train components: valve drive, shaft drive, and output shaft, give these motors durability. Consequently, the motors stand up against high hydraulic pressures.

## Performance Rating

Our method of rating these motors recognizes that at slower speeds and flow, higher pressures and torque are permitted. Hence, our performance data shows the complete flow range (down to 1 liter per minute or 1/4 gallon per minute) and speed range (down to one revolution per minute depending on application).

## Controllable Speeds

Char-Lynn motors operate at low speeds that remain very near constant even when load varies. Shaft speed is varied smoothly, easily and economically using simple inexpensive controls. Also, these motors are reversible. Consequently, direction of shaft rotation can be changed instantly with equal output torque in either direction.

## Dependable Performance

Highly precise manufacturing of parts provide consistent, dependable performance and long life even under varying conditions.

## Reliability

Char-Lynn motors are self contained, with hydraulic fluid providing lubrication. These motors are completely sealed so they can operate safely and reliably in hostile environments such as dust, dirt, steam, water, and heat and provide reliable performance.

## High Efficiencies

Char-Lynn motors efficiently convert the supplied hydraulic fluid's pressure and flow into a low speed high torque rotational output. This efficiency minimizes the rate of hydraulic system heat generation and maximizes shaft horsepower.

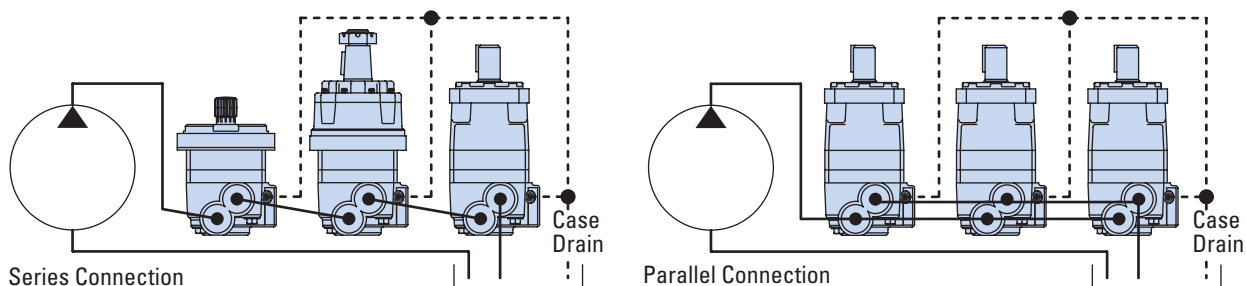
## Case Drain and Shuttle Valve Options

Many hydraulic systems can benefit from the use of a system case drain. Char-Lynn motors provide this

feature built in. One of the advantages for case drain flow is that contamination is flushed from the system. This flushing also aids in cooling the system and lowering the case pressure

which will extend motor seal life. With a case drain line in place, oil pressure in the gear box (Bearingless motor applications) can also be controlled. In applications where more system cooling

and flushing is required, a shuttle valve option is available in W series, 2000, 4000 Compact, 4000, 6000 series, VIS 30, VIS 40 and VIS 45 series motors.





# Motor Application Information

## Vehicle Drive Calculations

### Step One — Calculate Motor Speed (RPM)

$$\text{RPM} = \frac{2.65 \times \text{KPH} \times G}{R_m} \quad \text{RPM} = \frac{168 \times \text{MPH} \times G}{R_i}$$

where KPH = vehicle speed (kilometers per hour)  
 where MPH = vehicle speed (miles per hour)  
 $R_m$  = rolling radius of tires (meter)  
 $R_i$  = rolling radius of tires (inch)  
 G = gear reduction ratio (if any) between motors and wheels. If no gear box or other gear reduction devices are used  $G = 1$ .

If vehicle speed is expressed in m/second, multiply by 3.6 to convert to KPH. If vehicle speed is expressed in ft./second, divide by 1.47 to convert to MPH.

### Step Two — Determine Rolling Resistance

Rolling resistance (RR) is the force required to propel a vehicle over a particular surface. The values in Table 1 are typical of various surfaces per 1000 lb. of vehicle weight.

$$\text{RR} = \text{GVW} \times \rho \text{ (kg) (lb)}$$

where GVW = gross (loaded) vehicle weight lb/Kg  
 $\rho$  = value from Table 1

**TABLE 1- ROLLING RESISTANCE COEFFICIENTS FOR RUBBER TIRES ON VARIOUS SURFACES**

Surface	$\rho$
Concrete, excellent	.010
Concrete, good	.015
Concrete, poor	.020
Asphalt, good	.012
Asphalt, fair	.017
Asphalt, poor	.022
Macadam, good	.015
Macadam, fair	.022
Macadam, poor	.037
Snow, 2 inch	.025
Snow, 4 inch	.037
Dirt, smooth	.025
Dirt, sandy	.040
Mud	.037 to .150
Sand, Gravel	.060 to .150
Sand, loose	.160 to .300

### Step Three — Tractive Effort to Ascend Grade

The largest grade a vehicle can ascend is called its "gradability." Grade is usually expressed as a percent rather than in degrees. A rise of one meter in ten meters or one footrise in ten feet of travel is a 1/10 or 10 percent grade.

$$\text{GR} = \text{GVW} (\sin \theta + \rho \cos \theta)$$

**TABLE 2**

Comparison Grade (%)	Table Slope (Degrees)
1%	0° 35'
2%	1° 9'
5%	2° 51'
6%	3° 26'
8%	4° 35'
10%	5° 43'
12%	6° 5'
15%	8° 31'
20%	11° 19'
25%	14° 3'
32%	18°
60%	31°

### Step Four — Determine Acceleration Force (FA)

The force (FA) required to accelerate from stop to maximum speed (KPH) or (MPH) in time (t) seconds can be obtained from the following equation:

$$\text{FA} = \frac{\text{KPH} \times \text{GVW}(\text{kg})}{3.6 t}$$

FA = Acceleration Force (Newton)  
 t = Time (Seconds)

$$\text{FA} = \frac{\text{MPH} \times \text{GVW} (\text{lb})}{22 t}$$

FA = Acceleration Force (lb)  
 t = Time (Seconds)

### Step Five — Determine Drawbar Pull

Drawbar Pull (DP) is total force available at the drawbar or "hitch" after the above forces have been subtracted from the total propelling force produced by the hydraulic motors. This value is established as either:

1. A goal or objective of the designer.
2. A force required to pull a trailer (Repeat steps two through four above using trailer weight and add the three forces together to obtain DP).

# Motor Application Information

## Vehicle Drive Calculations

### Step Six — Total Tractive Effort

The tractive effort (TE) is the total force required to propel the vehicle and is the sum of the forces determined in Steps 2 through 5.

$$TE = RR + GR + FA + DP \text{ (Kg. or lb.)}$$

$\swarrow$   $\swarrow$   $\swarrow$   $\swarrow$   
 Force required to overcome rolling resistance    Force required to climb a grade    Force required to accelerate    Drawbar pull desired

Wind resistance forces can usually be neglected. However, it may be wise to add 10% to the above total to allow for starting resistances caused by friction in bearings and other mechanical components.

### Step Seven — Calculate Hydraulic Motor Torque (T)

$$T = \frac{TE \times R_m}{N \times G \times E_g} \text{ (Nm / Motor)}$$

$$T = \frac{TE \times R_l}{N \times G \times E_g} \text{ (lb - in/Motor)}$$

Where: N = number of driving motors  
Eg = gear box mechanical efficiency

### Step Eight—Wheel Slip

If the torque required to slip the wheel (TS) is less than the torque calculated in Step 7, the performance objectives cannot be achieved.

$$TS = \frac{W \times f \times R_m}{G \times E_g} \text{ (Nm / Motor)}$$

$$TS = \frac{W \times f \times R_l}{G \times E_g} \text{ (lb - in/Motor)}$$

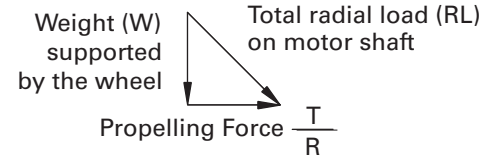
Where: f = coefficient of friction  
W = loaded vehicle weight over drive wheel

	Coefficient of friction (f)
Steel on steel	0.15 to 0.20
Rubber tire on dirt	0.5 to 0.7
Rubber tire on asphalt	0.8 to 1.0
Rubber tire on concrete	0.8 to 1.0
Rubber tire on grass	0.4

It may be desirable to allow the wheel to slip to prevent hydraulic system overheating when excessive loads are imposed should the vehicle stall. In this case TS should be just slightly larger than T.

### Step Nine — Motor Radial Load Carrying Capacity

When a motor is used to drive a vehicle with the wheel mounted directly on the motor shaft or rotating hub, the Total Radial Load (RL) acting on the motor shaft is the vector summation of two forces acting at right angles to each other.



$$RL = \sqrt{W^2 + \left(\frac{T}{R}\right)^2}$$

Refer to radial load rating of each motor series.

### Shaft Torque (T)

$$T = q \frac{\Delta P}{2 \pi}$$

$$\frac{\text{bar} \times \text{cm}^3/\text{rev}}{62.8} = \text{Nm} \quad \frac{\text{PSI} \times \text{in}^3/\text{rev}}{6.28} = \text{lb - in}$$

### Shaft Speed (N)

$$N = \frac{\text{Flow}}{\text{Displacement}}$$

$$\text{RPM} = \frac{1000 \times \text{l/min}}{\text{cm}^3/\text{rev}} \quad \text{RPM} = \frac{231 \times \text{GPM}}{\text{in}^3/\text{rev}}$$

### Power (into motor)

$$\text{Kw} = \frac{\text{bar} \times \text{l/min}}{600} \quad \text{HP} = \frac{\text{PSI} \times \text{GPM}}{1714}$$

### Power (out of motor)

$$\text{Kw} = \frac{\text{Nm} \times \text{RPM}}{9549} \quad \text{HP} = \frac{\text{lb - in} \times \text{RPM}}{63,025}$$

where: Kw = Kilowatt  
HP = Horsepower  
LPM = Liters per Minute  
GPM = Gallons per Minute  
Nm = Newton Meters  
lb-in = Pound inch  
Bar = 10 Newtons per Square Centimeter  
PSI = Pounds per Square Inch  
q = Displacement

# Optional Features

OPTIONAL FEATURE	BENEFIT
2 Speed motors	Allows motor to have two displacements (higher speed has lower torque)
Seal Guard	Prevents physical damage to shaft seal from foreign debris
High pressure Shaft Seal	More robust shaft seal that can withstand high case pressure spikes
Environmental protection	Epoxy coating for demanding application in harsh environment
Nickel Plated Shaft	For highly corrosive environment or food/sanitary applications
Integrated Parking Brake	Spring applied hydraulic release brake
Mechanical Disc Brake	Bolt on caliper brake for wheel motor applications
Free running option	Improved mechanical efficiency at high-speed/high-flow conditions
Speed sensors	To collect speed and/or direction information from a motor and provide electric signal
Shuttle valve	Redirect some low pressure oil for increased cooling in closed loop applications
Case port	To increase lubrication and flushing of the motor and reduce case pressure , extend seal life
Internal check valves	Relieves the case pressure to the low pressure port
Low speed valving	For better efficiency and smooth running at low speed conditions (<200 RPM)
Vented Two-Stage seal	Extends shaft seal life
Viton seals	For higher temperature or chemical resistance applications
Integral cross over valving	Cost effective design that limits the differential pressure across the motor
Metric Shafts, Ports, & Mounts	EU specific threads
Reverse Rotation	Allows clockwise shaft rotation with B port pressurized

# Optional Features

## TYPICAL APPLICATIONS\*

OPTIONAL FEATURES	WINCH	SWING DRIVES	SWEEPER BRUSH DRIVES	AUGER	INDUSTRIAL CONVEYOR	CAR WASH	TURF PROPEL	IRRIGATION REELS	MIXERS/GRINDERS	PLASTIC INJECTION MOLDING	TRACTION DRIVES	TRENCHER CHAIN DRIVES	SALT SAND SPREADER	MARINE WINCHES
2 Speed Motors	x			x				x			x			x
Seal Guard			x				x		x			x		
Viton Seals					x					x				
High Pressure Shaft Seal	x								x					
Environmental protection					x	x							x	x
Nickel Plated Shaft					x	x							x	
Integrated Parking Brake	x	x			x			x			x			x
Mechanical Disc Brake							x				x			
Free running option		x												
Speed sensors					x			x	x	x		x	x	
Shuttle valve							x		x		x	x		
Case port	x	x	x	x	x		x		x		x	x		
Internal check valves					x	x	x							
Low speed valving		x			x		x				x		x	
Vented Two-Stage seal					x	x	x				x			
Integral cross over valving	x	x		x										x
Metric Shafts, Ports, & Mounts	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Reverse Rotation					x									

\* These features are not limited to these applications. Final configuration depends on individual application needs.



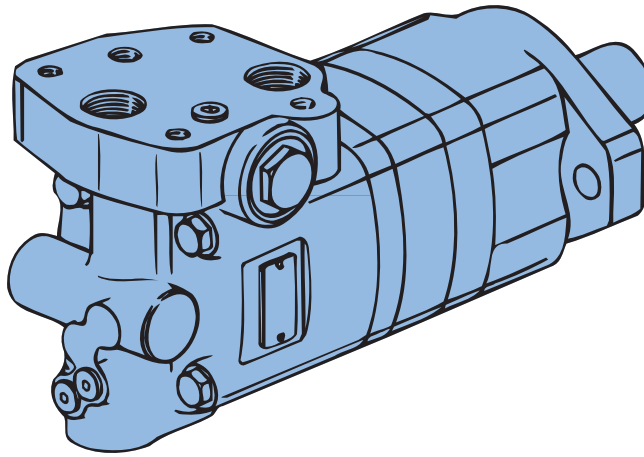
# Optional Features

FEATURE DESCRIPTION	CATALOG PAGE NUMBER	SPOOL VALVE MOTORS					DISC VALVE MOTORS					VIS MOTORS		
		J Series	H Series	S Series	T Series	W series	2000 Series	4000 Compact Series	4000 Series	6000 Series	10000 Series	VIS 30	VIS 40	VIS 45
2 Speed motors	A-11	---	---	---	---	---	0	---	---	---	0	0	0	0
Seal Guard	A-12	---	0	0	0	---	0	0	0	0	0	0	0	0
Viton seals	A-12	0	0	0	0	0	0	0	0	0	0	0	0	0
High pressure Shaft Seal	A-13	---	0	0	0	---	0	0	---	---	---	---	---	---
Environmental protection	A-13	0	0	0	0	0	0	0	0	0	0	0	0	0
Integrated Parking Brake	A-14	---	---	---	0	0	---	---	---	---	---	0	0	0
Mechanical Disc Brake	A-14	---	---	---	---	0	0	0	---	---	---	---	---	---
Free running option	A-15	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed sensors	A-16	0	0	0	0		0	0	0	0	0	0	0	0
Shuttle valve	A-17					0	0	0	0	0	---	0	0	0
Case port	A-18	0	0	0	0	0	S	S	S	S	S	S	S	S
Internal check valves	A-18	S	0	S	0	0	---	---	---	---	---	---	---	---
Low speed valving	A-19	---	0	0	0	S	---	---	---	---	---	---	---	---
Vented Two-Stage seal	A-20	---	0	0	0		---	---	---	---	---	---	---	---
Integral cross over valving	A-21	---	---	---	---		0	0	---	---		---	---	---
Metric Shafts, Ports, & Mounts	—	0	0	0	0	0	0	0	0	0	0	0	0	0
Reverse Rotation	—	0	0	0	0	0	0	0	0	0	0	0	0	0

0 Optional  
 S Standard  
 — Not applicable

## Two Speed Motors

This option is available on all 2000, 10,000, VIS 30, VIS 40 and VIS 45 motors.



### Features:

This option gives the user the ability to switch the displacement of the motor thus providing a different speed at a different torque without changing the input flow or pressure. An external three way valve is required for shifting the pilot pressure port between signal pressure (HSLT) and low pressure (LSHT).

Two speed motors are available with a return line closed center shuttle for closed circuit applications.

### Benefits:

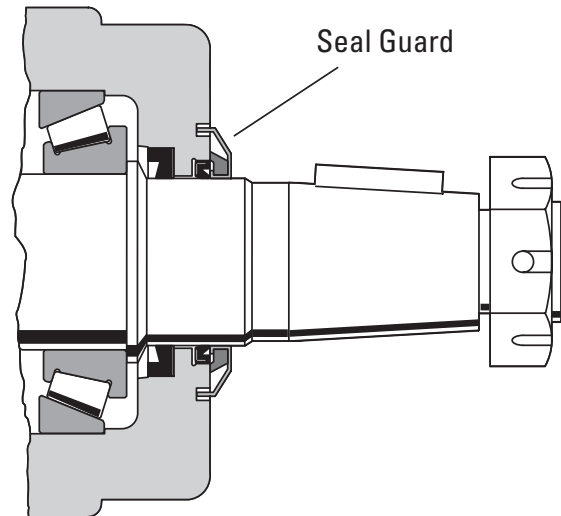
- Two operating speeds and torque levels with one motor
- Two selectable performance ranges in one motor package

### Application:

- Conveyors
- Winches
- Traction drives
- Augers
- Irrigation/utility cable reels

## Seal Guard

This option is available on H, S, T, 2000, 4000, 6000, 10,000, VIS 30, VIS 40 and VIS 45 series motors



### Features:

This option consists of a metal shield that protects an internal wiper seal. The shield is interference-fit on the output shaft and moves with the output shaft. For added protection, the shield is recessed into a groove in the bearing housing face.

### Benefits:

Centrifugal force causes foreign debris to be forced away from the high pressure shaft and dust seal area. The seal does not seal hydraulic fluid, instead it protects the standard seals from damage caused by foreign debris.

### Applications:

- Street sweepers
- Industrial sweepers
- Lawn and turf equipment (ZTR)
- Harvesting machinery
- Mining equipment

## Viton Seals

This option is available on all Char-Lynn motors.

### Features:

Higher chemical compatibility and temperature tolerance make Viton the material of choice for demanding application in extremely corrosive and harsh environments.

### Benefits:

- Longer seal life in chemically aggressive environment

### Applications:

- Industrial conveyors
- Plastic injection molding

## High Pressure Seals

This option is available on H, S, T and 2000 series motors.

### Features:

Eaton has introduced a high-pressure shaft seal option for its H, S, T and 2000 series motors. The seal geometry is optimized for applications that operate under extreme conditions. The seal geometry increases the clamping force of the sealing lip against the output shaft to prevent seal leakage at extreme pressure conditions. Case pressure forces the lip of the seal to clamp more tightly against the output shaft. The result is a seal that handles high pressure spike conditions without failure. The seal is designed to withstand case pressures up to 200 bar [2900 PSI] at 150 rpm.

For reference, the standard seal can withstand case pressure up to:

- 100 bars (1500 PSI) for H, S, T motors
- 140 bars (2000PSI) for 2000 Series
- 100 bars (1500 PSI) for 4000 Series
- 70 bars (1000 PSI) for 6000 Series
- 20 bars (300 PSI) for the 10,000 Series
- 20 bars (300 PSI) for VIS 30, 40, 45

### Benefits:

- Increases ability to handle high-pressure spike conditions.
- Eliminates the use of case port line in application with intermittent extreme operating conditions.
- Can be an effective alternative to additional case port plumbing.

### Special Notes:

1. Intermittent\* operation is defined as 10% of every minute.
2. The standard seal with case port option is preferred for maximum life – especially for continuous duty at high pressure conditions.
3. Seal kits are available to convert motors with the standard shaft seal to the high pressure shaft seal. (complete motor seal kits include high pressure shaft seal).

### Applications:

- Harvesters
- Sweepers
- Turf Equipment
- Wood Chippers
- Stump Grinders
- Skid Steer Loader Attachments (often loaders have no case line available)
- Any application with extreme intermittent operating conditions or where no case return line is available.

### Part Numbers:

H Series – Kit No. 60572-000  
S Series – Kit No. 60578-000  
T Series – Kit No. 60579-000  
Shaft Seal – Part No. 14778-001  
2000 Series – Kit No. 61329-000.  
Shaft Seal – No. 14857-001

## Environmental Protection

(epoxy paint)  
(plated shafts)

This option is available on all Char-Lynn motors.

### Features:

All motors are available with a corrosion resistant coating for use in hostile environments. The Char-Lynn line is also available with the output shaft plated, or with plated shaft and entire motor exterior coating.

### Benefits:

This coating protects the motor from salt water and various chemicals. Motor output shaft plating helps eliminate seal damage caused by caustic or acidic materials.

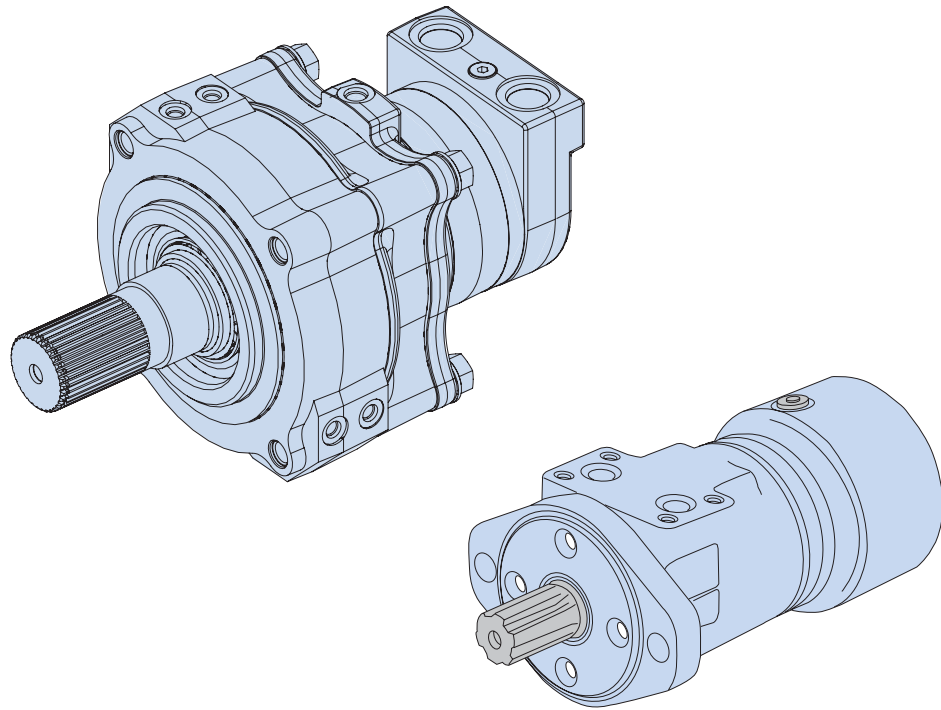
### Applications:

- Marine
- Food processing,
- Cleansing
- Fishing and agricultural applications



# Brake Solutions

Integrated brake options are available for all T, W, VIS 30, and VIS 40 series motors. Mechanical bolt-on packages are available for all W, 2000 and 4000 Compact series motors.



## Features:

Eaton continues to develop and bring new brake solutions to market that are performance matched to each motor series. These include:

- T Series with Integrated Parking Brake
- W Series with Integrated Parking Brake
- VIS Series with Integrated Parking Brake

In addition, Eaton brake motors can be mated with bolt-on valve packages to provide dynamic braking hydraulically using state of the art counter-balance valve technology.

There are also a variety of bolt-on mechanical brake options including Hayes brake system. This compact brake package can be used on 2000 Series and W Series wheel motors.

## Benefits:

- Complete compact system package
- Performance-matched brake / motor solution
- Increases design flexibility
- Reduces assembly costs and simplifies service requirements
- Streamlines inventory and order processing.
- Ability to direct port release pressure (eliminate brake release hose correction)

## Applications:

- Aerial Work Platforms
- Boom Lifts
- Track Cranes
- Forestry Grapples
- Winches
- Traction Drives
- Anywhere load holding is a requirement in a LSHT motor application

---

For 2000 and 4000 Compact Series motors, a mechanical disc brake is available from Hayes Industrial Brake, Inc. They provide up to 1450 lb. of clamping force. These are mechanical parking/service brakes.

## Contact:

Hayes Industrial Brake, Inc  
5800 West Donges Bay Rd  
Mequon, WI 57092  
Phone: (262) 242-4300  
Fax: (262) 242-0524

## Free Running Geroler Sets/ Gerotor Sets

This feature is available in all Char-Lynn motors.

### Features:

The free running option is accomplished using a specially precision-machined gerotor/geroler assembly. This feature increases the clearance between the star and mating ring, allowing the motor to turn more freely with less mechanical drag. The increased clearance also improves lubrication across the wear surfaces of the gerotor star and ring and provides a greater pressure-relieving flow path reducing pressure spikes. Flow is by-passed internally across the star tips, reducing shock loads to the main drive components. This feature provides an effective method for reducing shock loads to the main drive components.

### Benefits:

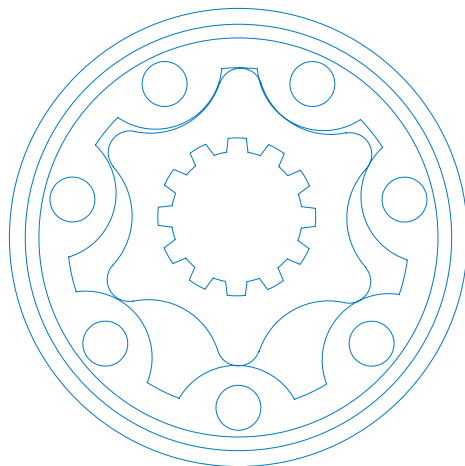
- Suited for applications with rapid stop/start or rapid reversals.
- Reduces starting pressure and increases starting torque efficiency.
- Reduces pressure spikes through the orbit gear set.

### Applications:

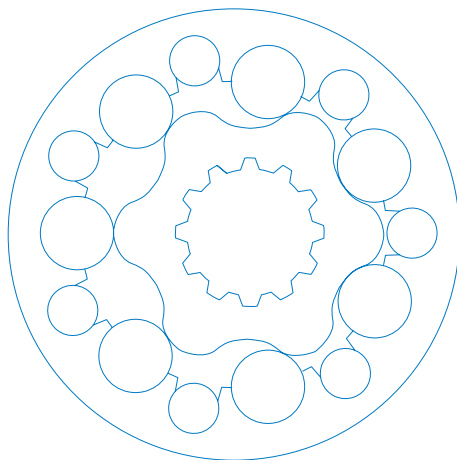
- Harvesters
- Stump Grinders
- Skid Steer Loader Attachments
- Machine Tools
- Especially suited for continuous high speed/ high flow applications.
- Also suited for applications with high-pressure spikes from rapid reversals.

### Special Notes:

Volumetric Efficiency will be reduced with the free-running option.



Gerotor



Geroler

### Gerotor or Geroler?

The H series motor uses a Gerotor while the rest of the Char-Lynn motors use a Geroler. The difference is shown in the picture below:

Essentially a Geroler, has rolls added to the lobes of the outer ring of the Orbit gear set. These rolls act as a roller bearing and reduce friction, increase mechanical efficiency and reduce wear in systems with low fluid viscosity. In addition, the Geroler type typically provides smoother performance at low speed conditions. The basic formula and guideline to determine whether a gerotor or Geroler should be used is as follows:

**20 x psi / RPM = SUS** (use this formula to determine minimum fluid viscosity)

RPM = speed of output shaft in revolutions per minute

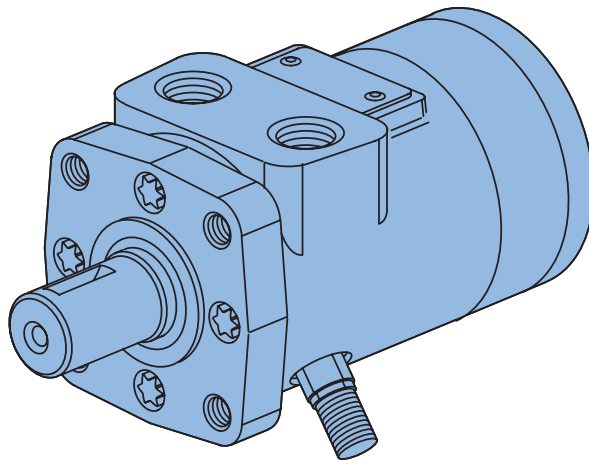
SUS = minimum viscosity measured in SUS.

The recommended viscosity limits are as follows:

- 1) A Gerotor Orbit gear set requires a minimum fluid viscosity of 100 SUS or the value calculated by the formula  $20 \text{ psi/RPM} = \text{SUS}$ .
- 2) A Geroler Orbit gear set requires a minimum fluid viscosity of 70 SUS.

In addition, applications running at less than 100 rpm should consider using a Geroler motor.

# Speed Sensors



## Note:

The speed sensor option does NOT include read-out display. Possible sources for read-out display include:

Eaton Corporation Durant Products 901 South 12 Street Watertown, WI 57094 — Phone 1-800-289-3866.

## Features:

Eaton has developed speed sensors specifically designed for LSHT motors.

### The single output speed sensor:

This design is rugged and fully protected against accidental reverse polarity or short circuit hook up. A built in pull up resistor simplifies installation with control systems. This sensor is fully compatible with the mobile vehicle electrical systems and gives a reliable digital on/off signal over a wide speed range and temperature range. The sensor is field-serviceable; no factory setting or shimming is required.

### The dual output speed sensor:

This sensor provides both speed and direction information. Its design is based on the field proven technology of our standard sensor and is designed for off road environments. The new sensor is based on the principle of quadrature.

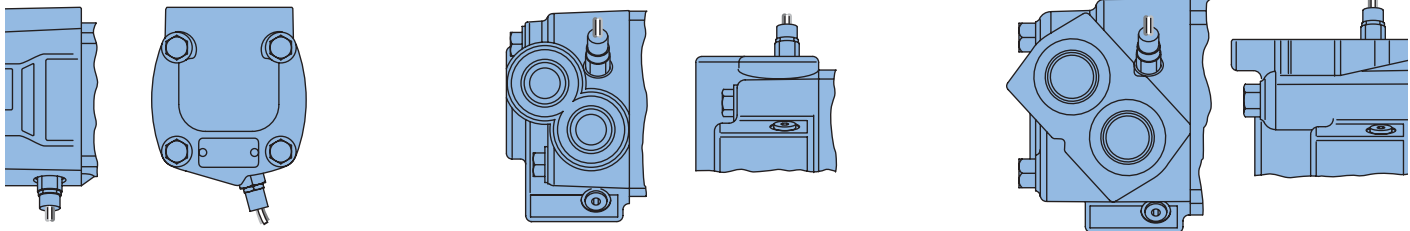
- The first version speed sensor has two output signals 90° out of phase. Each output provides one pulse per target.
- The second version has a speed signal that is twice the output pulses per revolution and it also has a direction signal. (Direction not available on spool motors)

## Benefits:

These speed sensors provide vital information that can be collected and interpreted by a PLC or other device.

## Applications:

- Salt/Sand Spreaders
- Irrigation Drives
- Machine Tools
- Mixers/Grinders
- Industrial Conveyors
- Food Processing Equipment
- Underground Boring Equipment



## TECHNICAL INFORMATION

Motors	Speed Sensor Pulses Per Rev	Quadrature Pulses Per Rev
J,H,S,T,W	15	60
2000 series	30	60
4000 series	30	72
6000 series	30	80
10,000 series	30	60
VIS 30, 40, 45	30	60

### Single and Two Outputs:

Supply Voltage: 8 to 24 Vdc (compatible with 12V vehicle systems)

Supply Current: 20 mA max. (Vs) (including internal pull-up resistor)

Output Voltage: Low < .5 Vdc @ 10 mA; output is open collector with 10kΩ pull-up resistor

### M12 Connector (version 1)

- Pin 1 = Power supply
- Pin 2 = Output one
- Pin 3 = Common
- Pin 4 = Output two

### M12 Connector (version 2)

- Pin 1 = Power Supply
- Pin 2 = Direction
- Pin 3 = Common
- Pin 4 = Speed signal

# Shuttle Valve

## Lubricating Shuttle

The shuttle valve option is available in W, 2000, 4000, 6000, and VIS series motors.

### Features

Case Port allows for hydraulic oil to be flushed and cools the system. In applications where more system cooling and flushing is required.

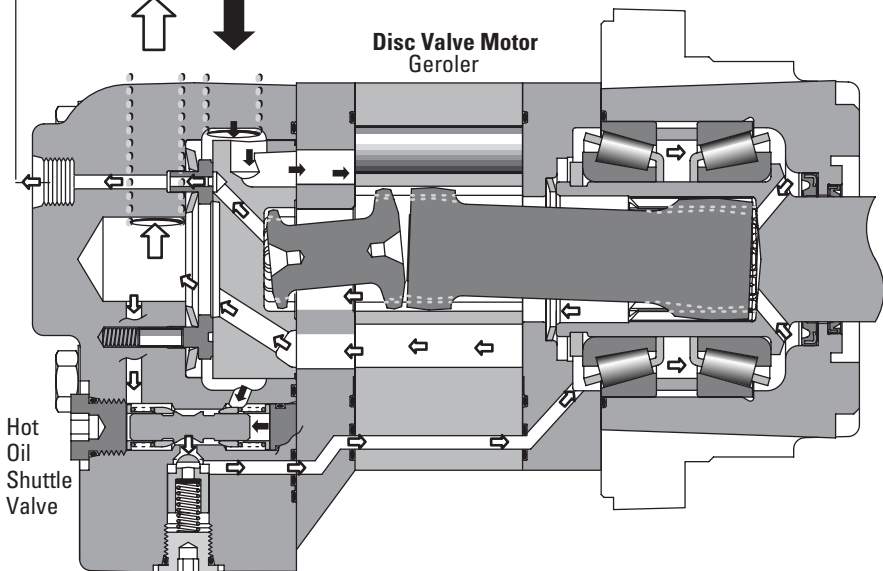
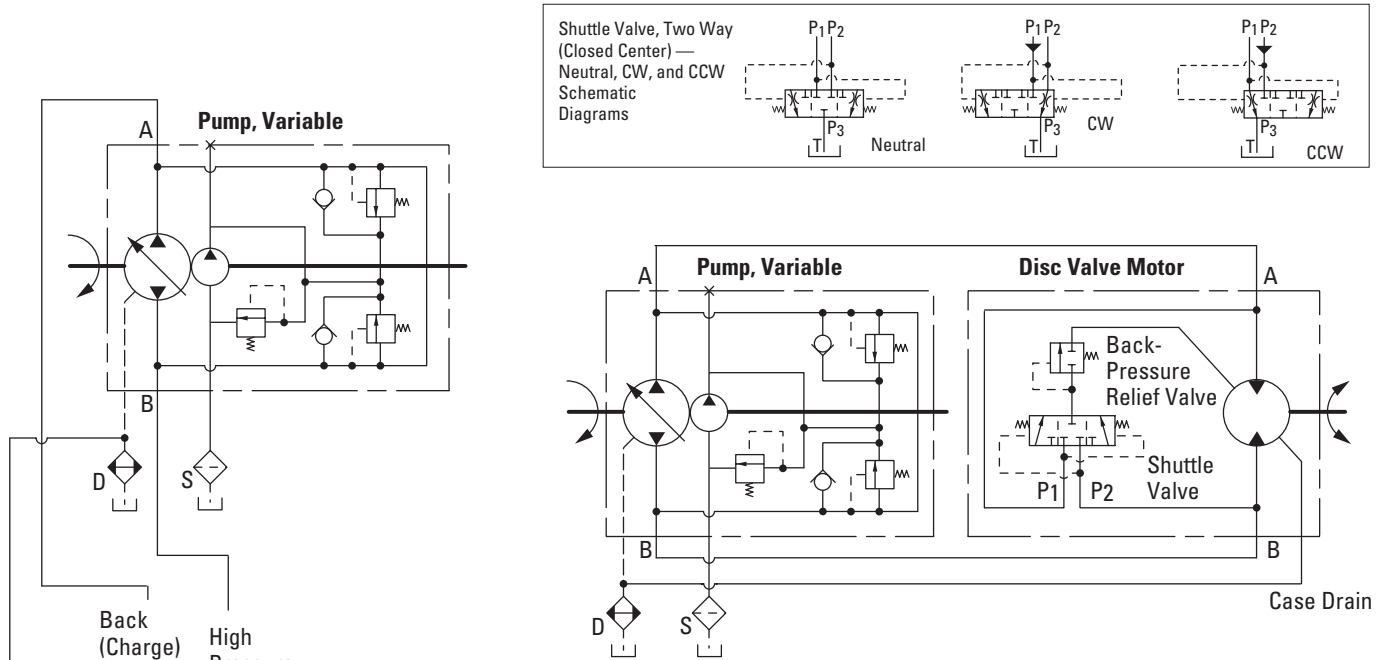
### Benefits

- Flushing
- Cooling
- Longer system life

### Applications

- Turf Propel
- Mixers/Grinders
- Traction drives
- Trencher chain drives

## Closed Loop Circuit

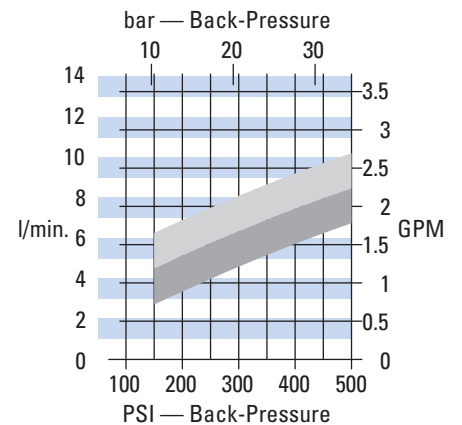


Closed Loop Back-Pressure (Charge) Relief Valve

Motors with shuttle valve must have a case port to tank, without this port line the internal drive splines will not have adequate lubrication.

Low Speed High Torque Hydraulic Motors with Shuttle and Charge Pressure Relief Valve – Patent No. U.S. 4,645,438.

**Typical Disc Valve Motor Shuttle Flow with 4.5 bar [65 PSI] Back-Pressure Relief Valve (Typical Data)**  
Due to Machining Tolerances, Flow May be More or Less

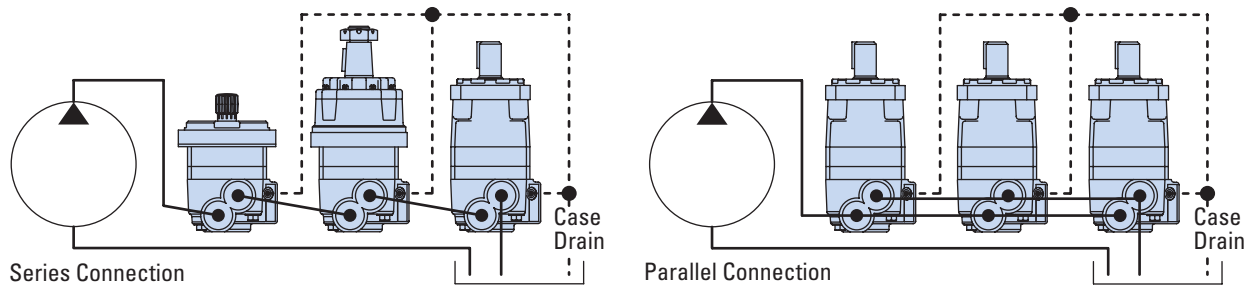


- 4000 Series and 6000 Series
- 2000 Series and 4000 Compact Series



# Case Porting

This option is available on all Char-Lynn Motors.



## Features:

This feature provides for connection of a port line connected to the motor case.

A port is located in the motor direct to motor case pressure that allows the case pressure to be returned directly to tank. Internal leakage to the motor case cavity can be drained directly which reduces case pressure and provides flushing of the system circuit.

## Benefits:

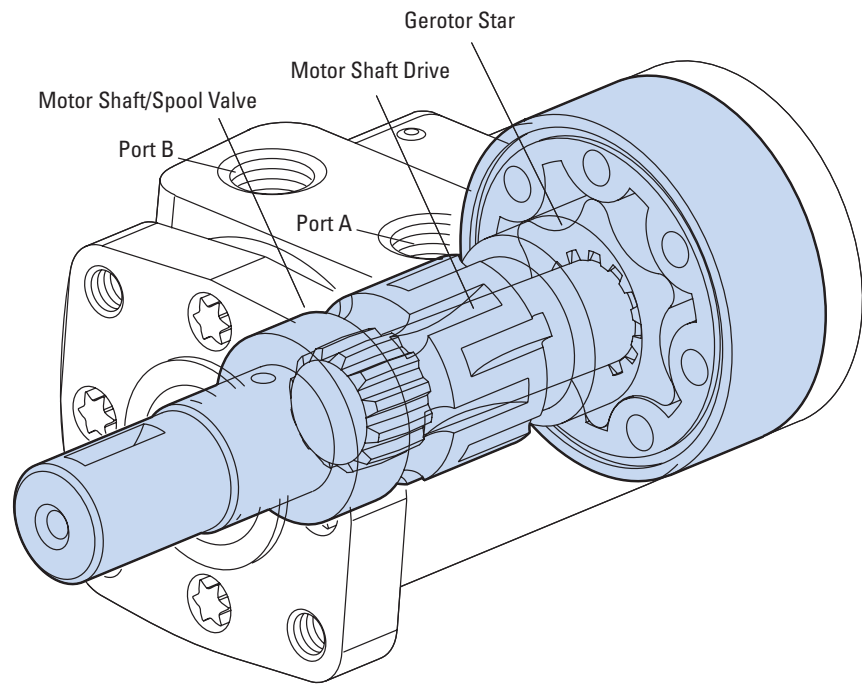
- Extends shaft seal life
- Extends thrust bearing life
- Reduces shaft seal leakage problems
- Improves flushing of the circuit to reduce system contaminates and cooling the system.

## Applications:

- Especially suited for continuous running industrial applications and where motors are operating under high back pressure conditions (e.g. series circuit applications).
- Conveyers
- Car wash
- Harvesters
- Recommended for applications running with high case pressure conditions

## Low Speed Valving

This option is available on H, S, T and W series motors.



### Features:

This feature optimizes the motor for low-speed performance. It greatly improves smooth operation at speeds below 200 rpm. The valving is optimized with increased sealing and tighter clearances. Motors with this feature are designed to run continuously up to 200 rpm at standard rated pressures.

### Benefits:

- Improves smoothness at low speed conditions (less than 200 rpm)
- Improves volumetric efficiency

### Applications:

- Salt-sand spreaders
- Machine tools
- Irrigation drives
- Consider for applications running at low speed conditions below 200 rpm.

### Notes:

Motors with this valving are not intended for low pressure applications (41 bar [600 psi minimum])

## Vented Two-Stage Seal

This option is available on  
H, S and T series motors



### Features:

- Patent-Pending design splits seal requirements into two stages
- Inboard (high-pressure) and outboard (low-pressure) seal designs are optimized for pressure conditions at each stage
- Combines latest low and high pressure sealing technologies into one design
- Vented port connection allows seal lube flow to be returned to system

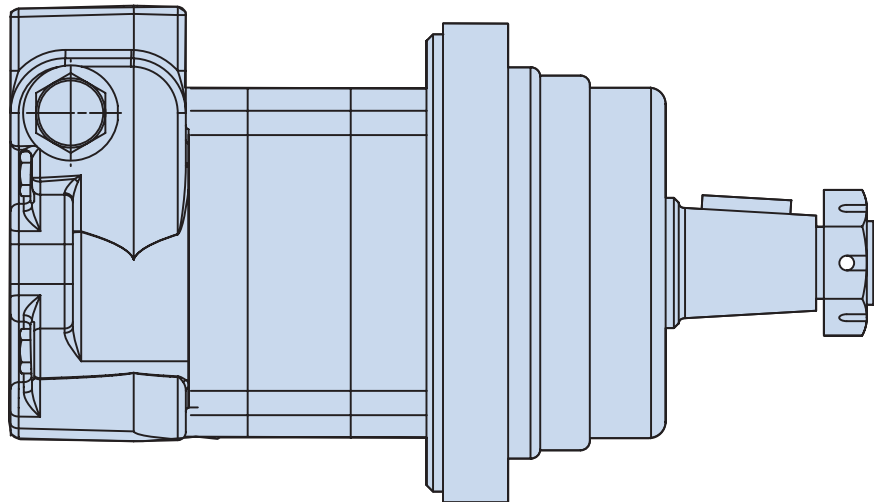
### Benefits:

- Significantly increases seal life
- Higher case-pressure conditions increase motor performance
- Dependable leak free performance

### Applications:

- Harvesters
- Car Washes
- Sweeper Brush drives
- Consider for applications running high case pressures for extending seal life and maximizing efficiency.

# Integral Valves for 2000 Series



## Features:

- Complete packaged system solution, single source for motors with relief valve capability
- Relief valves as close to Geroler as possible, providing added protection
- Eliminate leak points from in-line or bolt-on relief's
- Valves capable of full motor pressure
- Provides added flexibility to system design by allowing motors to have individual relief valve settings
- Simplifies assembly, purchasing and system design requirements

## Benefits:

- This compact and efficient package offers increased value and cost effectiveness to designing Eaton into your applications.
- Minimizing the use of hoses, tubing and fittings will reduce production and assembly time significantly.

## Applications:

- Skid-steer attachments
- Swing motors
- Brush cutters & Mowers
- Harvesting equipment
- Directional boring
- Winch
- Auger

Any place where pressure relief is optimal for system or motor performance and life

Replacement cartridges can be obtained by ordering the Item part number as listed below.

### REPLACEMENT CARTRIDGES

Item part #	Item desc.	Relief valve setting
02-199291	RV5A-10-F-0-35/15	1500 PSI
02-199292	RV5A-10-F-0-35/17.5	1750 PSI
02-199293	RV5A-10-F-0-35/20	2000 PSI
02-199295	RV5A-10-F-0-35/22.5	2250 PSI
02-198563	RV5A-10-F-0-35/25	2500 PSI
02-199294	RV5A-10-F-0-35/27.5	2750 PSI
02-199296	RV5A-10-F-0-35/30	3000 PSI

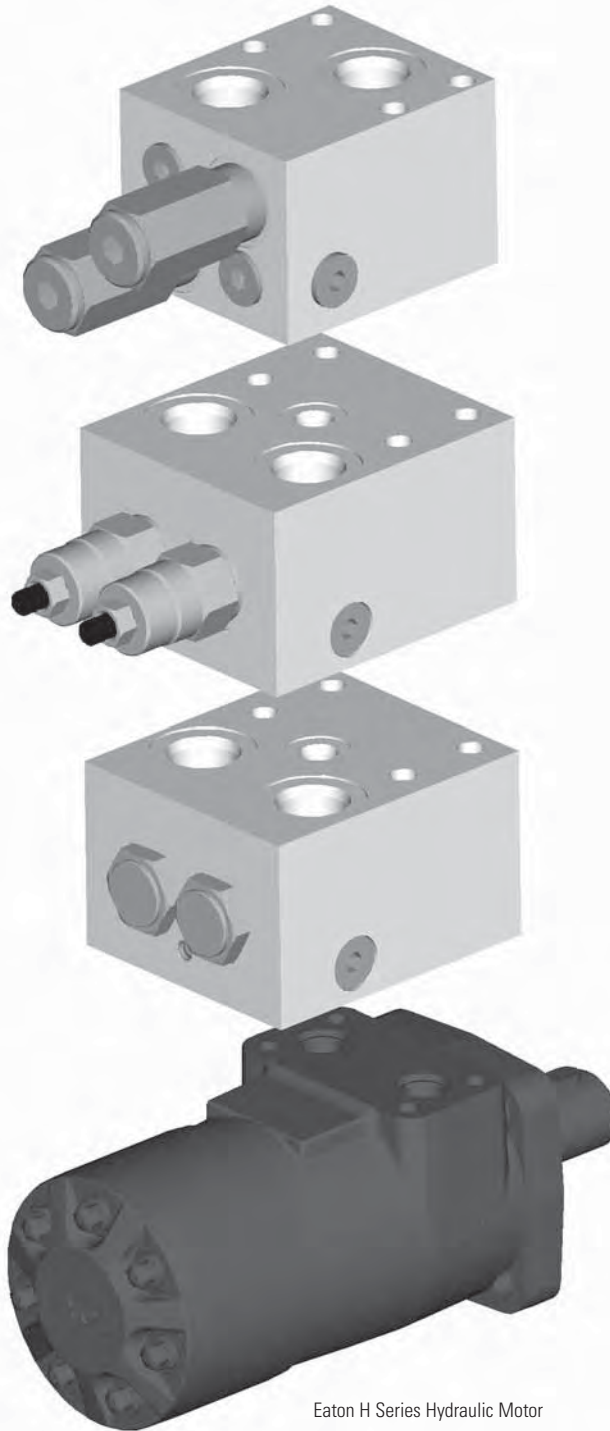


# Special Housings Bolt on Solutions

Cartridge Valves &  
Manifolds for Spool  
& Disk Valve Motors

## We Manufacture Solutions

Designing hydraulic systems with Eaton-Vickers Cartridge Valves & Manifolds is a cost effective way of bringing your design into production well within the most demanding of production schedules. Minimizing the use of hoses, tubing and fittings will reduce production and assembly time significantly.



Eaton H Series Hydraulic Motor

## Features

- Compatible with Eaton H & T series spool valve motors, and most 2000 series disk valve motors
- Aluminum Manifolds Anodized Black
- Pre-set cartridges to your specifications
- 100% production tested assembly
- Wide range of settings available
- Intelligent model code
- Manifolds are available without cartridge valves, or pre-assembled and tested to your specifications
- Manifolds and motors can be supplied as a pre-assembled package
- Dual counterbalance valve (with integral shuttle valve), dual pilot operated check valve and dual cross port relief valve packages are available

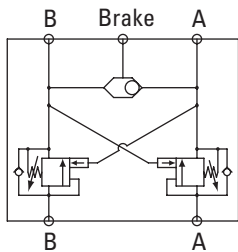
# Dual CBV Package for H & T Series Motors

Cartridge valves & manifolds for spool valve motors

## Dual Counterbalance Valve Assembly with Brake Release Shuttle

When the motor is in a stationary, unpowered mode, this assembly will prevent excessive drift in either direction of rotation. It will also prevent motor overspeed when exposed to an overrunning load, and will control motor deceleration to a stop. A shuttle within the assembly provides a pilot to release a parking or holding brake as either motor port is pressurized. Typical applications are swing drives, winch drives, and vehicle propulsion circuits. If the shuttle is not required the "Brake" port may be plugged.

### Functional Symbol



### How to Order

Complete pre-assembled packages are specified using the CBV\*-10 model code, position 6 of the model code is "H". To order the manifold

sub-assembly, without the two CBV valves, but with integral shuttle valve order 4997072-001.

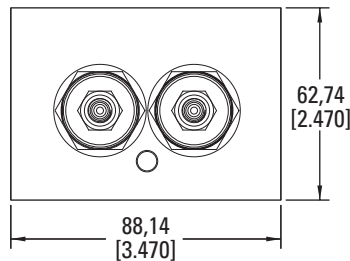
### RATINGS AND SPECIFICATIONS

Rated flow	60L/min(15USgpm)
Rated pressure	210 bar (3000 psi)
Internal leakage (maximum)	5 drops/min max @ 77% of crack pressure
Pilot ratio	4:1 or 10:1
Manifold sub-assembly only	4997072-001
Installation kit (includes cap screws, washers and o-rings)	4997242-001

For detailed specifications refer to the CBV\*-10 data sheet

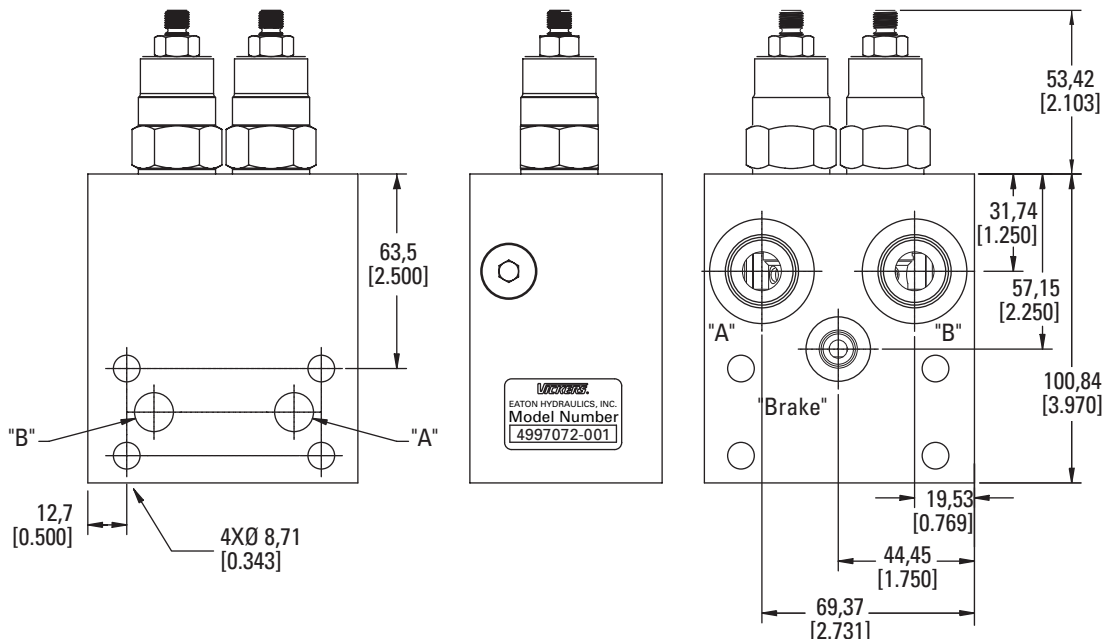
### Dimensions

mm (inch)



### Port Sizes

"A", "B" – SAE10  
"Brake" – SAE4



# Dual POC Package for H & T Series Motors

Cartridge valves and manifolds for spool valve motors

## Dual Pilot Operated Check Valve Assembly

When the motor is in a stationary, unpowered mode, this assembly will prevent excessive drift in either direction of rotation. Although it not designed to modulate the flow of oil to or from the motor, it will also prevent motor runaway if an overrunning load exists in the powered mode. A shuttle within the assembly provides a pilot to release a parking or holding brake as either motor port is pressurized. If the shuttle is not required the "Brake" port may be plugged.

## How to Order

Complete pre-assembled packages are specified using the POC1-10 model code, position 6 of the model code is "H". To order the manifold

sub-assembly, without the two POC1 valves, but with integral shuttle valve order 4997072-001.

## RATINGS AND SPECIFICATIONS

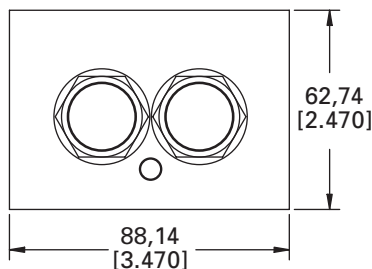
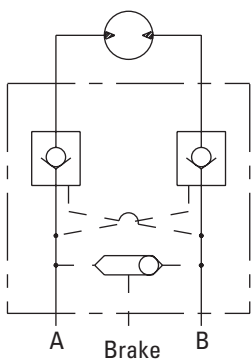
Rated flow	60L/min(15USgpm)
Rated pressure	210 bar(3000psi)
Internal leakage (maximum)	less than 5 drops/min @ 3000psi
Pilot ratio	3:1
Manifold sub-assembly	4997072-001
Installation kit (includes cap screws, washers and o-rings)	4997242-001

For detailed specifications refer to the POC1-10 data sheet

## Dimensions

mm (inch)

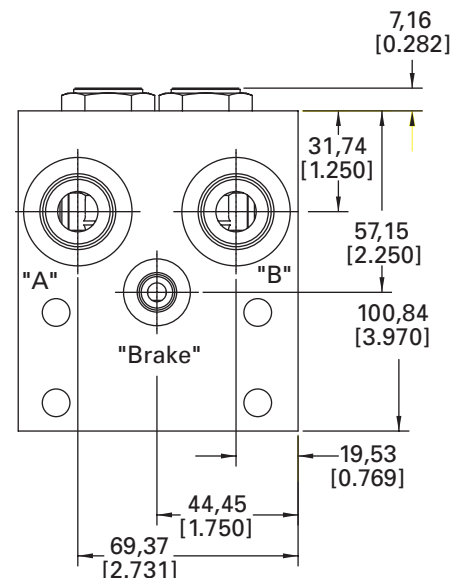
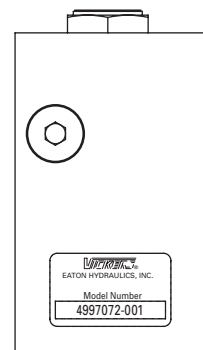
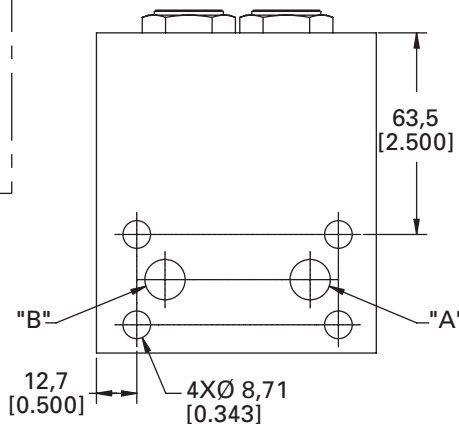
## Functional Symbol



## Port Sizes

"A", "B" – SAE10

"Brake" – SAE4



# Dual Cross-over Relief Package for H & T Series Motors

Cartridge valves & manifolds for spool valve motors

## Dual Crossover Relief Valve Assembly

This valve assembly provides motor over-pressure protection in both directions of rotation, while supplying the return or lower pressure side of the motor with makeup oil. If closed center valving is used, an additional function is controlled braking.

Typical applications are vehicle propulsion and motor work circuits in which pressure limiting is required.

## How to Order

Complete pre-assembled packages are specified using the RV3A-10 model code. Option "A" must be selected for the cage seals,

position 6 of the model code is "H". To order the manifold separately, without the two RV3A cartridges, order the part number 4997062-001.

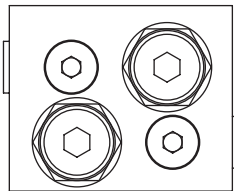
## RATINGS AND SPECIFICATIONS

Rated flow	76 L/min(20USgpm)
Rated pressure	210 bar (3000psi)
Internal leakage (maximum)	less than 5 drops/min @ 85% of nominal setting
Manifold sub-assembly only	4997062-001
Installation kit (includes cap screws, washers and o-rings)	4997242-001

For detailed specifications refer to the RV3A-10 data sheet

## Dimensions

mm (inch)

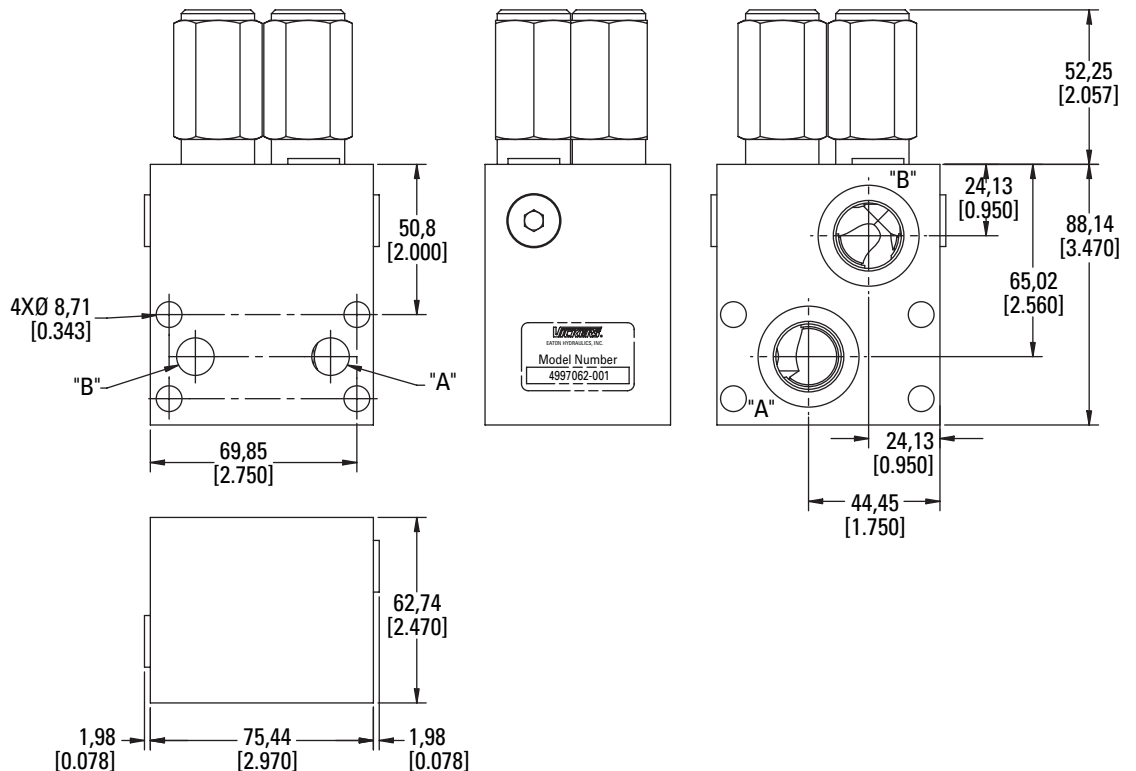
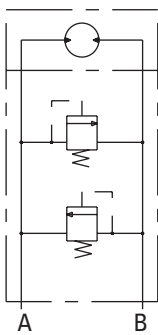


## Port Sizes

"A", "B" – SAE10

"Brake" – SAE4

## Functional Symbol



# Dual Cross-over Relief Package for 2000 Series Disc Valve Motors

Cartridge valves & manifolds for disc valve motors

## Dual Crossover Relief Valve Assembly

This valve assembly provides motor over-pressure protection in both directions of rotation, while supplying the return or lower pressure side of the motor with makeup oil. If closed center valving is used, an additional function is controlled braking.

Typical applications are vehicle propulsion and motor work circuits in which pressure limiting is required.

## How to Order

Complete pre-assembled packages are specified using the RV3A-10 model code. Option "A" must be selected for the cage seals, position 6 of the model code is

"2K". To order the manifold separately, without the two RV3A cartridges, order 4997060-001

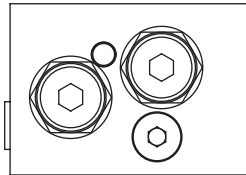
## RATINGS AND SPECIFICATIONS

Rated flow	76 L/min(20USgpm)
Rated pressure	210 bar (3000psi)
Internal leakage (maximum)	less than 5 drops/min @ 85% of nominal setting
Manifold sub-assembly only	4997060-001
Installation kit (includes cap screws, washers and o-rings)	02-372492

For detailed specifications refer to the RV3A-10 data sheet.

## Dimensions

mm (inch)



## Port Sizes

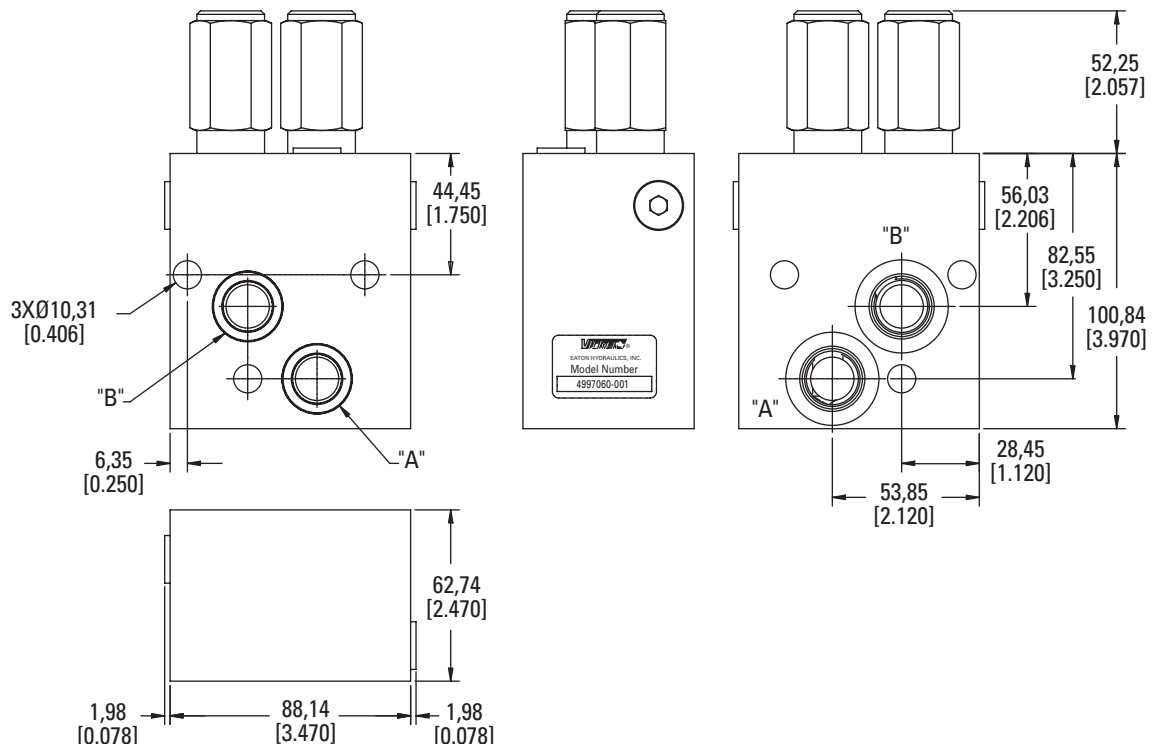
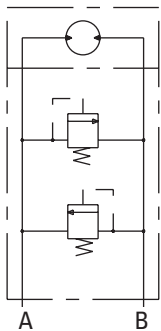
"A", "B" – SAE10  
"Brake" – SAE4



## Warning

This manifold package may not be suitable for application with all 2000 series motors - please check installation dimensions carefully.

## Functional Symbol





# Dual CBV Package for 2000 Series Disc Valve Motors

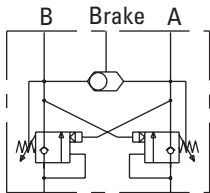
Cartridge valves & manifolds for disc valve motors

## Dual Counterbalance Valve Assembly

When the motor is in a stationary, unpowered mode, this assembly will prevent excessive drift in either direction of rotation. It will also prevent motor overspeed when exposed to an overrunning load, and will control motor deceleration to a stop. A shuttle within the assembly provides a pilot to release a parking or holding brake as either motor port is pressurized.

Typical applications are swing drives, winch drives, and vehicle propulsion circuits. If the shuttle is not required the "Brake" port may be plugged.

## Functional Symbol



## How to Order

Complete pre-assembled packages are specified using the CBV\*-10 model code, position 6 of the model code is "2K". To order the manifold

sub-assembly, without the two CBV valves, but with integral shuttle valve order 4997070-001.

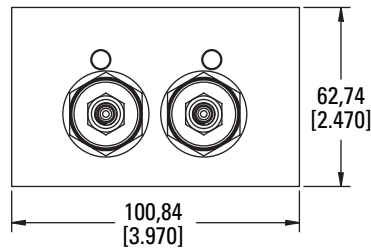
## RATINGS AND SPECIFICATIONS

Rated flow	60L/min(15USgpm)
Rated pressure	210 bar (3000 psi)
Internal leakage (maximum)	5 drops/min max @ 77% of crack pressure
Pilot ratio	4:1 or 10:1
Manifold sub-assembly only	4997070-001
Installation kit (includes cap screws, washers and o-rings)	02-372492

For detailed specifications refer to the CBV\*-10 data sheet.

## Dimensions

mm (inch)



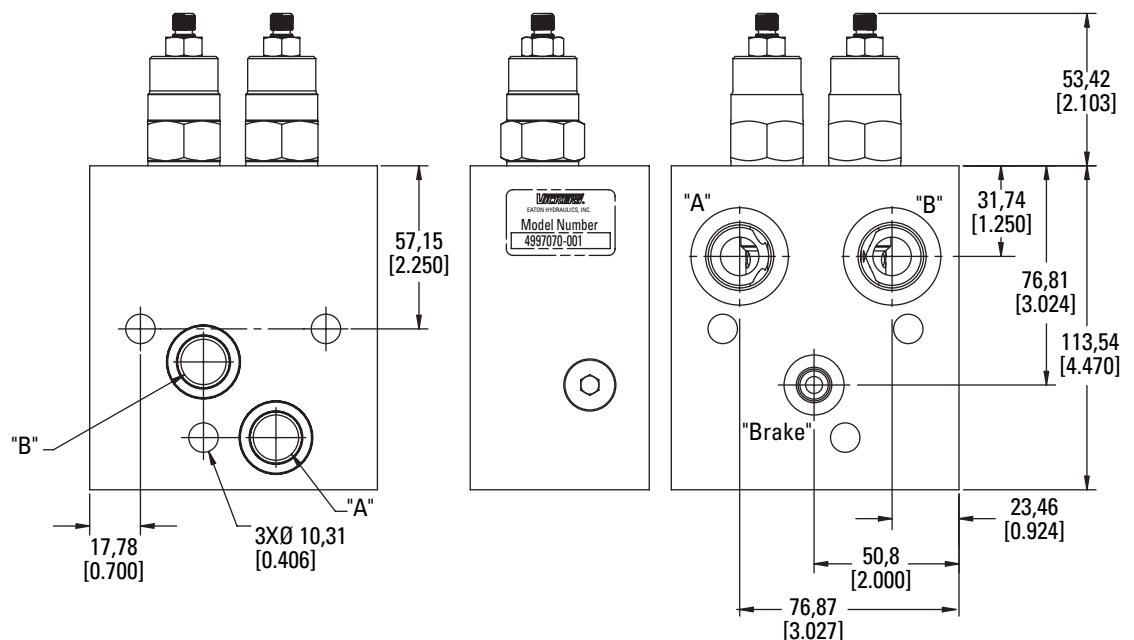
## Port Sizes

"A", "B" – SAE10  
"Brake" – SAE4



## Warning

This manifold package may not be suitable for application with all 2000 series motors - please check installation dimensions carefully.



# Dual POC Package for 2000 Series Disc Valve Motors

Cartridge valves & manifolds for disc valve motors

## Dual Pilot Operated Check Valve Assembly

When the motor is in a stationary, unpowered mode, this assembly will prevent excessive drift in either direction of rotation. Although it not designed to modulate the flow of oil to or from the motor, it will also prevent motor runaway if an overrunning load exists in the powered mode. A shuttle within the assembly provides a pilot to release a parking or holding brake as either motor port is pressurized. If the shuttle is not required the "Brake" port may be plugged.

## How to Order

Complete pre-assembled packages are specified using the POC1-10 model code, position 6 of the model code is "2K". To order the manifold

sub-assembly, without the two POC1 valves, but with integral shuttle valve order 4997070-001.

## RATINGS AND SPECIFICATIONS

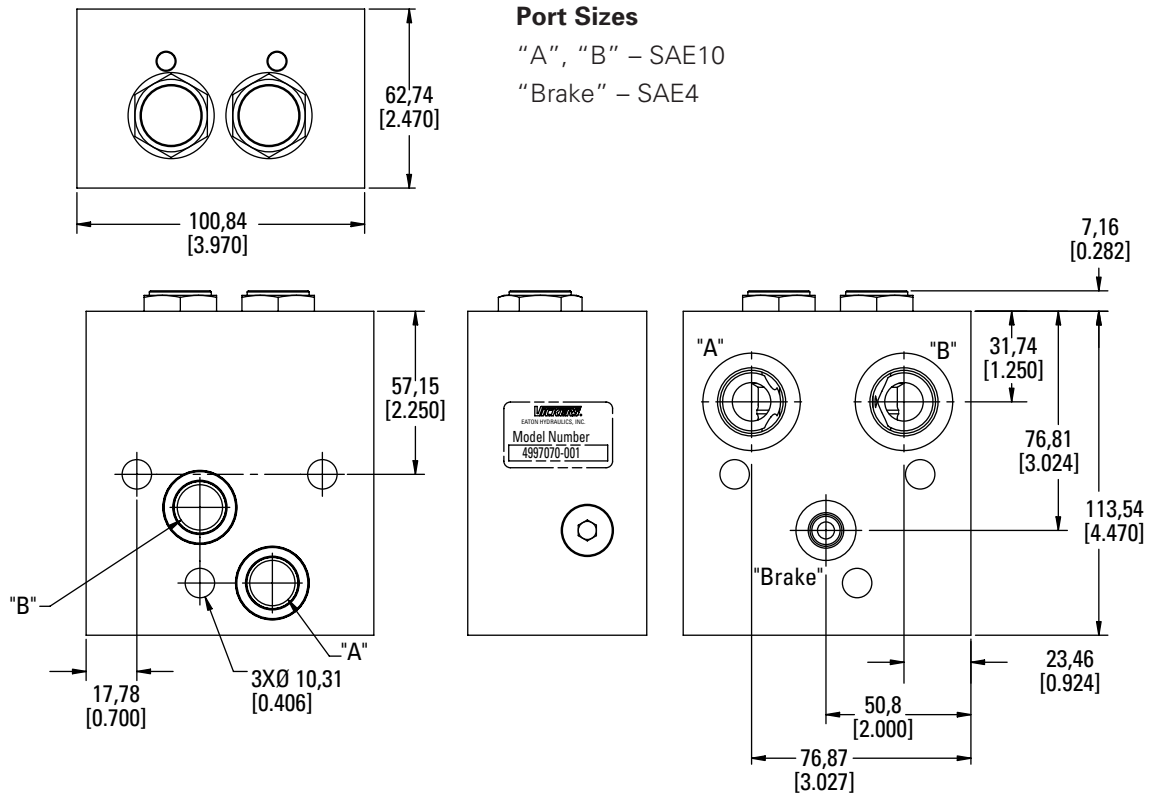
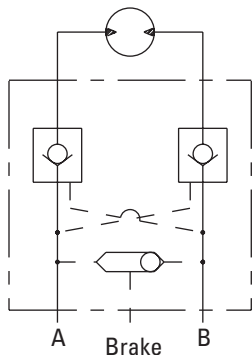
Rated flow	60L/min(15USgpm)
Rated pressure	210 bar(3000psi)
Internal leakage (maximum)	less than 5 drops/min @ 3000psi
Pilot ratio	3:1
Manifold sub-assembly only	4997070-001
Installation kit (includes cap screws, washers and o-rings)	02-372492

For detailed specifications refer to the POC1-10 data sheet

## Dimensions

mm (inch)

## Functional Symbol



# Fluid Recommendations

Product Line	Viscosity Minimum	Viscosity Best Range	ISO Cleanliness Requirements
J-2, S, W, T Series	70 SUS 13 cst	100-200 SUS 20-43 cst	20/18/13
H Series	100 SUS 20 cst	100-200 SUS 20-43 cst	20/18/13
Disc Valve Series	70 SUS 13 cst	100-200 SUS 20-43 cst	20/18/13
VIS Series	70 SUS 13 cst	100-200 SUS 20-43 cst	20/18/13

## Introduction

The ability of Eaton hydraulic components to provide the desired performance and life expectancy depends largely on the fluid used. The purpose of this section is to provide readers with the knowledge required to select the appropriate fluids for use in systems that employ Eaton hydraulic components.

One of the most important characteristic to consider when choosing a fluid to be used in a hydraulic system is viscosity. Viscosity choice is always a compromise; the fluid must be thin enough to flow easily but thick enough to seal and maintain a lubricating film between bearing and sealing surfaces. Viscosity requirements, see chart below.

## Viscosity and Temperature

Fluid temperature affects viscosity. In general, as the fluid warms it gets thinner and its viscosity decreases. The opposite is true when fluid cools. When choosing a fluid, it is important to consider the start-up and operating temperatures of the hydraulic system.

Generally, the fluid is thick when the hydraulic system is started. With movement, the fluid warms to a point where a cooling system begins to operate.

From then on, the fluid is maintained at the temperature for which the hydraulic system was designed. In actual applications this sequence varies; hydraulic systems are used in many environments

from very cold to very hot. Cooling systems also vary from very elaborate to very simple, so ambient temperature may affect operating temperature. Equipment manufacturers who use Eaton hydraulic components in their products should anticipate temperature in their designs and make the appropriate fluid recommendations to their customers.

## Cleanliness

Cleanliness of the fluid in a hydraulic system is extremely important. Eaton recommends that the fluid used in its hydraulic components be maintained at 20/18/13 per ISO Cleanliness Code 4406. This code allows a maximum of: 10,000 particles greater than 2µm per mL fluid, 2500 particles greater than 5µm per mL fluid, and 80 particles greater than 15 µm per mL fluid. Cleanliness requirements for specific products are given in the table below.

OEM's and distributors who use Eaton hydraulic components in their products should provide for these requirements in their designs. A reputable filter supplier can supply filter information.

## Fluid Maintenance

Maintaining correct fluid viscosity and cleanliness level is essential for all hydraulic systems. Since Eaton hydraulic components are used in a wide variety of applications it is impossible for Eaton to publish a fluid maintenance schedule that

would cover every situation. Field testing and monitoring are the only ways to get accurate measurements of system cleanliness. OEM's and distributors who use Eaton hydraulic components should test and establish fluid maintenance schedules for their products. These maintenance schedules should be designed to meet the viscosity and cleanliness requirements laid out in this document.

## Fluid Selection

Premium grade petroleum based hydraulic fluids will provide the best performance in Eaton hydraulic components. These fluids typically contain additives that are beneficial to hydraulic systems. Eaton recommends fluids that contain anti-wear agents, rust inhibitors, anti-foaming agents, and oxidation inhibitors. Premium grade petroleum based hydraulic fluids carry an ISO VG rating.

SAE grade crankcase oils may be used in systems that employ Eaton hydraulic components, but it should be noted that these oils may not contain all of the recommended additives. This means using crankcase oils may increase fluid maintenance requirements.

Hydraulic fluids that contain V.I. (viscosity index) improvers, sometimes called multi-viscosity oils, may be used in systems that employ Eaton hydraulic components. These V.I. improved fluids are known to "shear-down" with use. This means that their actual viscosity drops below the rated value.

Fluid maintenance must be increased if V.I. improved fluids are used. Automotive automatic transmission fluids contain V.I. improvers.

Synthetic fluids may be used in Eaton hydraulic components. A reputable fluid supplier can provide information on synthetic fluids. Review applications that require the use of synthetic fluids with your Eaton representative.

## Additional Notes:

- Fluids too thick to flow in cold weather start-ups will cause pump cavitation and possible damage. Motor cavitation is not a problem during cold start-ups.
- When choosing a hydraulic fluid, all the components in the system must be considered and the best viscosity range adjusted accordingly. For example, when a medium duty piston pump is combined with a Geroler motor the best viscosity range becomes 100 - 150 SUS [20 - 32 cSt] and viscosity should never fall below 70 SUS [13 cSt].
- If the natural color of the fluid has become black it is possible that an overheating problem exists.
- If the fluid becomes milky a water contamination problem may exist.
- Take fluid level reading when the system is cold.
- Contact your Eaton representative if you have specific questions about the fluid requirements of Eaton hydraulic components.

# Notes



## Spool Valve Hydraulic Motors

Spool Valve motors incorporate the proven orbit motor principle to provide high torque at low speeds.





# Spool Valve Motors

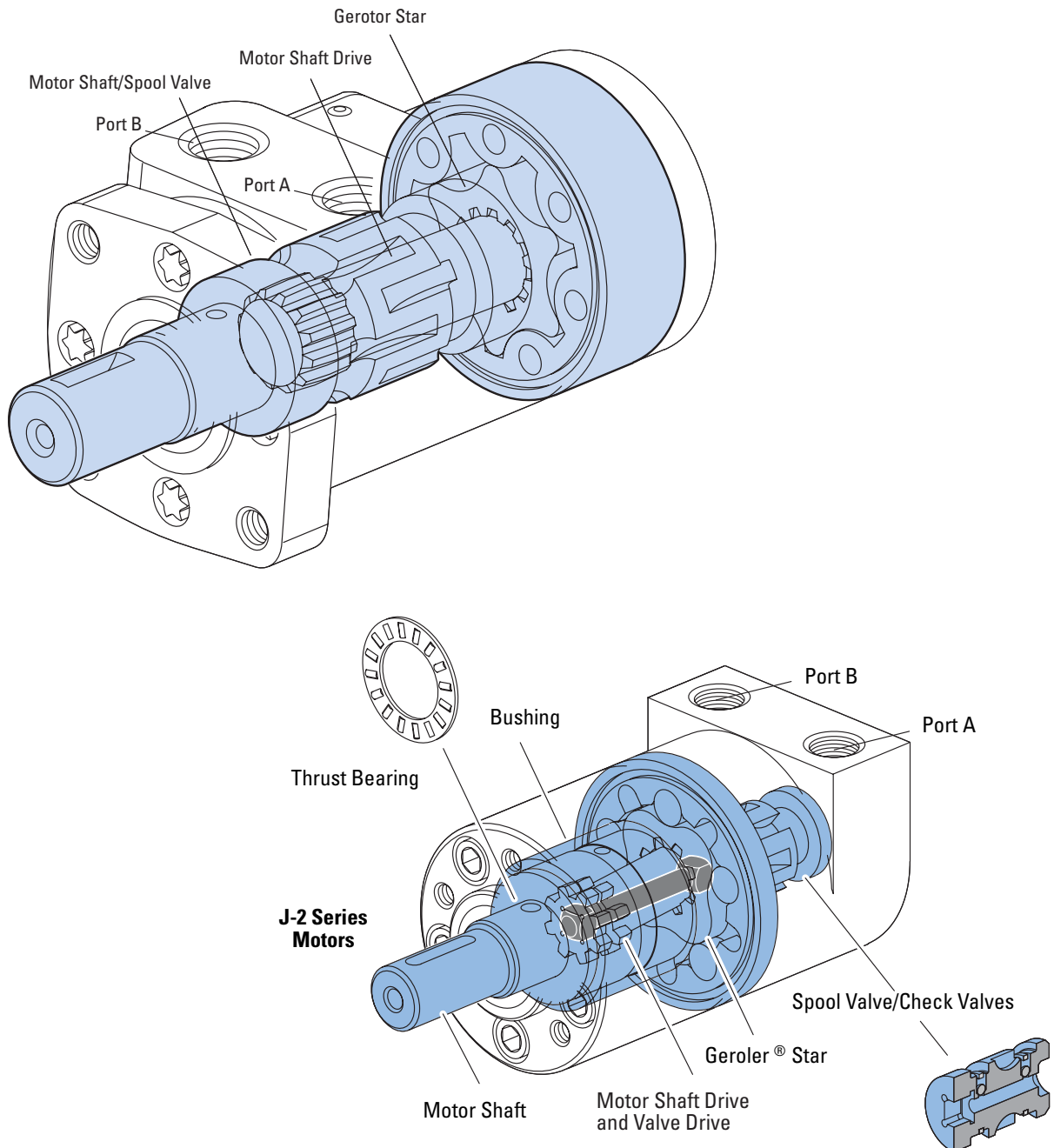
## Highlights

### Product Description

Char-Lynn spool valve motors distribute pressurized fluid into and out of the Orbit gear set (Gerotor or Geroler) via valve slots integrated into the output shaft. The spool valve motors incorporate both valving and hydrodynamic journal bearings into a common shaft design. The valve section (spool valve) can be optimized for low flow, low speed needs using a low speed spool option to enhance smooth running performance.

These motors incorporate the proven orbit motor principle to provide high torque at low speeds.

Motor shaft rotation can be instantly reversed by changing direction of input/output flow while generating equal torque in either direction. The displacements available provide a wide variety of speeds and torques from any spool valve motor series.



# Features, Benefits, and Applications

## Features

- Proven Orbit Motor Principle
- Hydrodynamic Journal Bearings
- Constant Clearance Geroler
- Three-Zone Pressure Design
- Reduced drive running-angle
- High-pressure seals
- Modular design

## Benefits

- Compact, powerful package
- Infinite bearing life (at rated loads)
- High efficiency
- Increases shaft seal & bearing life
- Smooth operation, increases drive life
- Reduces leakage
- Design flexibility
- Economically tailored solutions

## Applications

- Harvesters
- Augers
- Spreaders
- Machine tools
- Conveyors
- Winches
- Turf care equipment
- Food processing
- Aerial Work Platforms
- Anywhere a compact drive with high output torque is needed

## Design Features

Spool valve technology is typically used where compact, economical solutions are most needed. Spool valve motors use a spool valve to precisely time and control flow through the orbit gear set (Gerotor or Geroler). Inlet flow is directed into and out of the orbit set via slots in the spool and passages through the motor housing. The result is a very cost-effective compact package suited to many application requirements. The three

primary components in the motor are the orbit star, drive and output shaft. H, S and T Series incorporate the spool valve and hydrodynamic bearings in the motor shaft. The W series is similar except a ball bearing is used for the front bearing for increased side-load capacity. Due to its compact size and high speed capability, the J Series is unique and utilizes a separate dedicated spool and spool valve drive. All motors utilize Eaton's

constant-clearance Geroler technology except the H Series, which continues to use the time-proven H motor gerotor set. These motors all use a three-zone pressure design consisting of three unique pressure areas: 1) inlet, 2) return, 3) case. This provides the capability to limit motor case pressure and allows the use of several case pressure options for extended shaft seal and thrust bearing life.

Below is a quick-guide to help select the proper motor for your application:

### MOTOR QUICK-GUIDE (BASED ON MAXIMUM CONTINUOUS RATINGS)

Series	Output Torque Nm [lb-in]	Pressure bar [psi]	Flow lpm [gpm]	Side Load kg [lbs]
J Series	62 [550]	140 [2030]	21 [5.5]	196 [430]
H Series	407 [3607]	124 [1800]	57 [15]	635 [1400]
S Series	430 [3800]	135 [2000]	55 [15]	635 [1400]
T Series	450 [4000]	155 [2250]	55 [15]	635 [1400]
W Series	410 [3625]	165 [2400]	68 [18]	845 [1900]

\* The above are provided as guidelines only. Actual ratings vary depending on final motor configuration

# Table of Contents

Highlights	B-ii
Features, Benefits, and Applications	B-iii

## J Series (129-)

Highlights	B-1-1
Specifications	B-1-2
Performance Data	B-1-3
Dimensions	B-1-5
Product Numbers	B-1-9
Shaft Side Load Capacity	B-1-10
Case Pressure and Case Drain	B-1-11
Model Code	B-1-12

## H Series (101-)

Highlights	B-2-1
Specifications	B-2-2
Performance Data	B-2-3
Dimensions	B-2-9
Product Numbers	B-2-10
Model Code	B-2-11

## S Series (103-)

Highlights	B-3-1
Specifications	B-3-2
Performance Data	B-3-3
Dimensions	B-3-8
Product Numbers	B-3-9
S Series with Low Speed Valving	B-3-10
Model Code	B-3-11

## T Series (158-)

Highlights	B-4-1
Specifications	B-4-2
Performance Data	B-4-3
Dimensions	B-4-8
Product Numbers	B-4-9
Model Code	B-4-10

## T Series with Parking Brake (185-)

Highlights	B-4-11
Application Information	B-4-12
Specifications	B-4-13
Dimensions	B-4-14
Brake Release and Motor Case Pressure	B-4-15
Product Numbers	B-4-16
Model Code	B-4-17

## H, S and T Series (101-, 103-, 158-, 185-)

Side Load Capacity	B-4-18
Dimensions	B-4-19
Mounting Options	B-4-21

## W Series (162-)

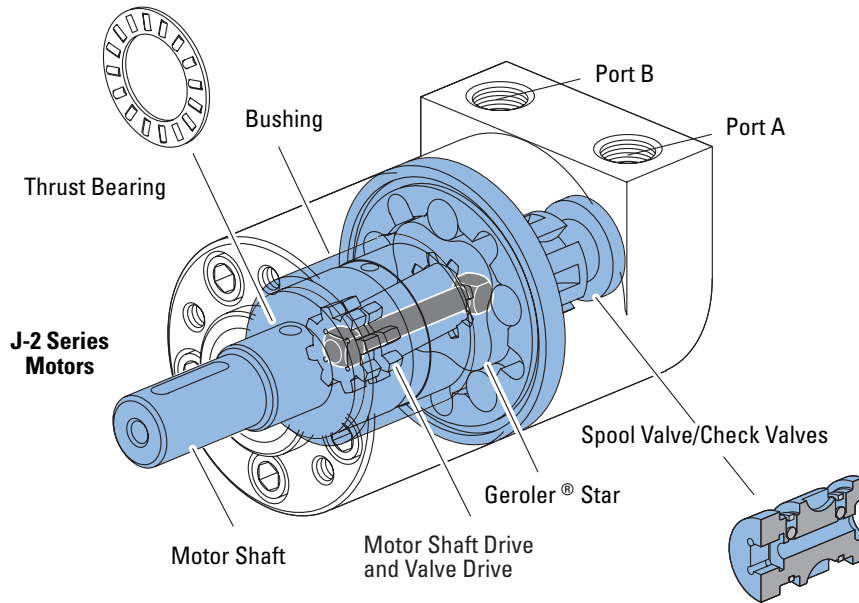
Highlights	B-5-1
Specifications	B-5-2
Performance Data	B-5-3
Dimensions	B-5-5
Dimensions Shafts	B-5-6
Side Load Capacity	B-5-7
Model Code	B-5-8

## W Series with Parking Brake (162-)

Dimensions	B-5-9
Product Numbers	B-5-10
Model Code	B-5-11

# J Series (129-)

## Highlights



### Features:

- Constant clearance Geroler set
- Integrated check valves
- Self-lubricating shaft bushing
- High-strength rigid components
- Increased valve seal lands
- High pressure seals
- Variety of displacements, shafts, mounts and special options

### Benefits:

- High efficiency
- Extended leak-free performance
- Powerful compact package
- Design flexibility

### Applications:

- Agricultural augers, harvesters, seeders
- Car wash tire spray wands and brushes
- Marine bow thrusters
- Food processing
- Railroad maintenance equipment
- Machine tools
- Conveyors
- Snow blower chute rotator
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment reel drives
- Paint stripper
- Many more

### Description

Char-Lynn J Series motors provide a lot of power from a very small package. Up to 5 kW [6 1/2 HP] of power. These motors are 61 mm [2.4 in] in diameter and 104 to 130 mm [4.1 to 5.1 in] in length.

The J Series motor shaft and seal allows high case pressure up to 76 bar [1100 PSI] return line pressure without case drain line. When a case drain line is used a 220 bar [3190 PSI] peak pressure is allowed in the return line.

### Specifications

Geroler Element	5 Displacements
Flow l/min [GPM]	21 [5.5] Continuous*** 25 [6.5] Intermittent**
Speed	Up to 1992 RPM Cont. Up to 2458 RPM Inter.
Pressure bar [PSI]	140 [2030] Cont.*** 165 [2400] Inter.**
Torque Nm [lb-in]	62 [549] Cont.*** 84 [743] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.



Plastic Injection



Metal Forming



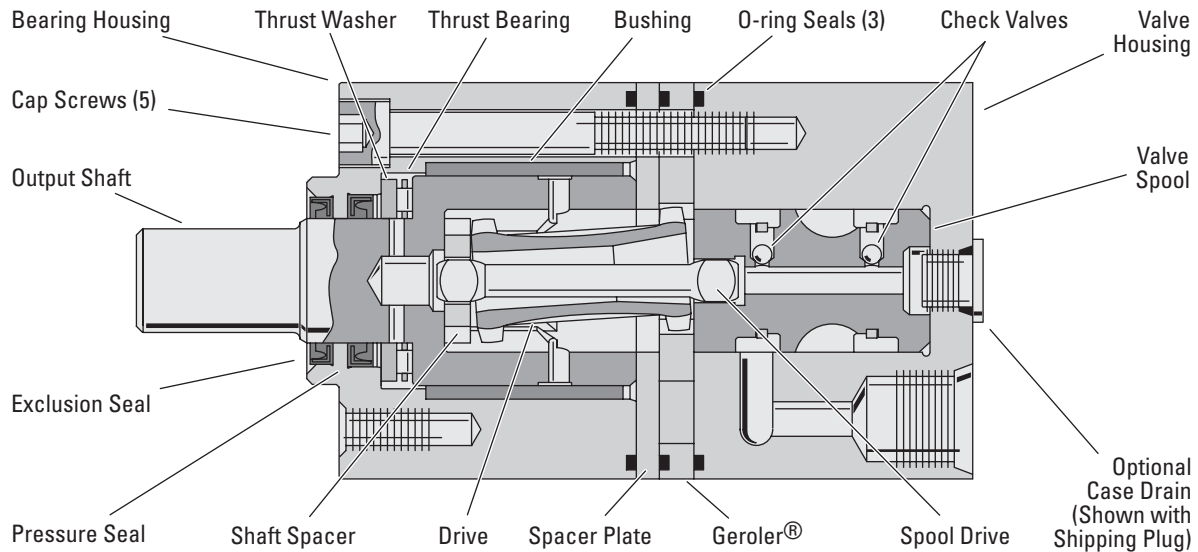
Food Processing



Ship-Boat Building

# J Series (129-)

## Specifications



### SPECIFICATION DATA — J MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		8,2 [.50]	12,9 [.79]	19,8 [1.21]	31,6 [1.93]	50,0 [3.00]
Max. Speed (RPM) @ Continuous Flow		1992	1575	1043	650	393
Flow l/min [GPM]	Continuous	17 [4.5]	21 [5.5]	21 [5.5]	21 [5.5]	21 [5.5]
	Intermittent	21 [5.5]	25 [6.5]	25 [6.5]	25 [6.5]	25 [6.5]
Torque Nm [lb-in]	Continuous	16 [141]	25 [225]	38 [333]	50 [446]	62 [549]
	Intermittent	19 [164]	30 [263]	46 [405]	62 [546]	84 [743]
	Peak	22 [193]	36 [321]	48 [425]	83 [733]	86 [765]
Pressure Δ bar [Δ PSI]	Continuous	140 [2030]	140 [2030]	140 [2030]	121 [1750]	97 [1400]
	Intermittent	165 [2400]	165 [2400]	165 [2400]	150 [2175]	140 [2030]
	Peak	220 [3190]	220 [3190]	220 [3190]	190 [2756]	150 [2175]
Weight kg [lbs]		2 [4.4]	2,1 [4.6]	2,2 [4.8]	2,3 [5.0]	2,4 [5.4]

\* Maximum pressure at motor inlet port is 220 Bar [3190 PSI] without regard to Δ bar [Δ PSI] and/or back pressure ratings or combination thereof.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Δ Pressure:

The true Δ bar [Δ PSI] difference between inlet port and outlet port.

See individual shafts for maximum torque recommendation. Splined shafts are recommended for those applications subject to frequent reversals.

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended System Operating Temp.:

-34°C to 82°C  
[-30°F to 180°F]

#### Recommended Filtration:

per ISO Cleanliness Code 4406, level 20/18/13



# J Series (129-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.



Performance data is typical at 120 SUS. Actual data may vary slightly from motor to motor in production.

8,2 cm<sup>3</sup>/r [0.50 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]  
Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1400]	[1500]	[2000]	[2030]	[2400]
		14	28	34	41	48	55	69	97	103	138	140	165
Flow LPM [GPM]	[1] 3.8	[11] 1 456	[25] 3 444	[33] 4 437	[40] 5 429	[47] 5 422	[55] 6 412	[69] 8 394	[96] 11 347	[102] 12 332	[130] 15 250	[132] 15 239	[146] 16 170
	[2] 7.6	[9] 1 897	[24] 3 886	[31] 4 877	[38] 4 867	[46] 5 860	[53] 6 847	[68] 8 823	[97] 11 768	[105] 12 749	[139] 16 657	[141] 16 647	[163] 18 557
	[3] 11.4	[6] 1 1349	[20] 2 1331	[28] 3 1318	[35] 4 1309	[44] 5 1296	[51] 6 1285	[65] 7 1261	[94] 11 1198	[102] 12 1176	[137] 15 1070	[139] 15 1060	[164] 19 959
	[4.25] 16.0		[16] 2 1902	[23] 3 1885	[30] 3 1873	[36] 4 1858	[44] 5 1846	[60] 7 1817	[90] 11 1750	[97] 11 1721	[133] 15 1599	[135] 15 1585	[160] 18 1475
Max. Continuous 17.0	[4.5]		[16] 2 1992	[23] 3 1979	[29] 3 1964	[36] 4 1947	[43] 5 1929	[59] 7 1900	[89] 10 1833	[96] 11 1808	[131] 15 1684	[134] 15 1673	[160] 18 1553
Max. Intermittent 20.8	[5.5]		[12] 1 2458	[18] 2 2437	[26] 3 2420	[33] 4 2405	[40] 5 2387	[54] 6 2353	[83] 9 2272	[92] 10 2255	[124] 14 2134	[129] 15 2115	[154] 17 1994

 Continuous  
 Intermittent

12,9 cm<sup>3</sup>/r [0.79 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]  
Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1400]	[1450]	[1500]	[2000]	2030	[2400]
		14	28	34	41	48	55	69	97	100	103	138	140	165
Flow LPM [GPM]	[1] 3.8	[19] 2 290	[43] 5 285	[54] 6 281	[65] 7 277	[76] 9 273	[88] 10 268	[109] 12 260	[154] 17 237	[159] 18 234	[164] 19 230	[214] 24 194	[217] 25 189	[250] 28 151
	[2] 7.6	[16] 2 573	[39] 4 566	[51] 6 561	[63] 7 555	[74] 8 549	[86] 10 544	[109] 12 534	[155] 18 501	[160] 19 496	[165] 20 490	[221] 25 442	[225] 25 437	[263] 30 396
	[3] 11.4	[11] 1 859	[35] 4 849	[47] 5 843	[58] 7 838	[70] 8 832	[82] 9 825	[105] 12 810	[152] 17 777	[157] 18 771	[163] 18 763	[219] 25 708	[223] 25 701	[263] 30 652
	[4] 15.1	[6] 1 1153	[30] 3 1140	[41] 5 1135	[53] 6 1129	[64] 7 1124	[76] 9 1117	[99] 11 1101	[146] 16 1060	[152] 17 1051	[157] 18 1044	[214] 24 982	[217] 25 975	[260] 29 924
Max. Continuous 20.8	[5.5]		[19] 2 1575	[30] 3 1566	[42] 5 1556	[54] 6 1547	[65] 7 1539	[89] 10 1521	[136] 15 1473	[142] 16 1466	[148] 17 1457	[205] 23 1396	[209] 24 1387	[251] 28 1330
Max. Intermittent 24.6	[6.5]		[11] 1 1859	[23] 3 1851	[35] 4 1842	[46] 5 1831	[56] 6 1820	[81] 9 1804	[130] 15 1755	[135] 15 1743	[140] 16 1734	[198] 22 1670	[202] 23 1663	[243] 27 1599

[42] Torque [lb-in]  
5 }  
1556 } Speed RPM  
Nm

# J Series (129-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

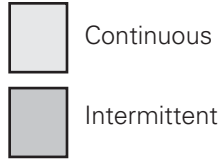
Performance data is typical at 120 SUS. Actual data may vary slightly from motor to motor in production.

### 19.8 cm<sup>3</sup>/r [1.21 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]  
Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1400]	[1450]	[1500]	[2000]	[2030]	[2400]
		14	28	34	41	48	55	69	97	100	103	138	140	165
Flow LPM [GPM]	[1]	[32]	[67]	[85]	[102]	[119]	[136]	[170]	[236]	[244]	[253]	[321]	[325]	[374]
	3.8	4 189	8 187	10 186	12 185	13 183	15 182	19 179	27 172	28 170	29 169	36 141	37 138	42 114
	[2]	[30]	[65]	[83]	[101]	[119]	[136]	[172]	[223]	[248]	[257]	[328]	[333]	[388]
	7.6	3 379	7 375	9 373	11 370	13 368	15 366	19 361	25 351	28 349	29 347	37 312	38 309	44 285
[3]	[21]	[57]	[75]	[93]	[111]	[128]	[163]	[231]	[240]	[248]	[325]	[330]	[405]	
11.4	2 569	6 565	8 563	11 560	13 558	14 556	18 551	26 529	27 526	28 523	37 487	37 484	46 459	
[4]	[12]	[47]	[65]	[83]	[101]	[119]	[154]	[221]	[230]	[239]	[316]	[320]	[382]	
15.1	1 761	5 758	7 754	9 751	11 749	13 746	17 741	25 717	26 711	27 707	36 660	36 656	43 628	
Max. Continuous	[5.5]		[31]	[49]	[67]	[84]	[101]	[137]	[202]	[211]	[218]	[295]	[299]	[365]
20.8		4 1043	6 1040	8 1035	9 1033	9 1028	11 1021	15 997	23 997	24 993	25 990	33 938	34 934	41 899
Max. Intermittent	[6.5]		[21]	[38]	[56]	[74]	[91]	[126]	[189]	[196]	[206]	[278]	[283]	[347]
24.6		2 1226	4 1222	6 1219	8 1215	8 1211	10 1204	14 1179	21 1174	22 1169	23 1169	31 1121	32 1117	39 1079



### 31.6 cm<sup>3</sup>/r [1.93 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]  
Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1400]	[1450]	[1500]	[1750]	[2175]
		14	28	34	41	48	55	69	97	100	103	121	150
Flow LPM [GPM]	[1]	[51]	[106]	[133]	[160]	[187]	[213]	[265]	[362]	[372]	[383]	[439]	
	3.8	6 118	12 116	15 115	18 113	21 112	24 111	30 107	41 91	42 85	43 81	50 70	
	[2]	[46]	[103]	[132]	[159]	[187]	[214]	[269]	[362]	[374]	[387]	[446]	[546]
	7.6	5 236	12 234	15 232	18 230	21 228	24 225	30 221	41 187	42 179	44 175	50 165	62 145
[3]	[36]	[94]	[122]	[149]	[177]	[205]	[259]	[351]	[364]	[377]	[440]	[542]	
11.4	4 355	11 352	14 349	17 347	20 345	23 342	29 336	40 296	41 292	43 287	50 273	61 245	
[4]	[24]	[79]	[107]	[135]	[162]	[190]	[246]	[337]	[349]	[362]	[425]	[528]	
15.1	3 474	9 472	12 469	15 466	18 462	21 460	28 452	38 404	39 397	41 393	48 373	60 346	
Max. Continuous	[5.5]		[55]	[83]	[111]	[139]	[167]	[221]	[307]	[320]	[334]	[400]	[505]
20.8		6 650	9 647	13 645	16 640	19 636	25 629	35 584	36 580	36 575	38 550	45 513	
Max. Intermittent	[6.5]		[35]	[64]	[93]	[121]	[150]	[204]	[279]	[294]	[308]	[378]	[485]
24.6		4 767	7 764	11 760	14 755	17 751	23 742	32 712	33 707	33 701	35 675	43 637	

### 50.0 cm<sup>3</sup>/r [3.00 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]  
Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[500]	[600]	[700]	[800]	[1000]	[1100]	[1200]	[1300]	[1400]	[2030]
		14	28	34	41	48	55	69	76	83	90	97	140
Flow LPM [GPM]	[1]	[82]	[167]	[211]									
	3.8	9 75	19 72	24 72									
	[2]	[70]	[156]	[201]	[243]	[286]	[327]						
	7.6	8 149	18 147	23 145	28 144	32 143	37 142						
[3]	[53]	[140]	[184]	[227]	[271]	[311]	[396]	[441]	[484]	[521]	[549]		
11.4	6 221	16 220	21 218	26 217	31 215	35 213	45 209	50 205	55 201	59 200	62 191		
[4]	[30]	[120]	[162]	[204]	[250]	[292]	[374]	[419]	[460]	[501]	[541]	[743]	
15.1	3 296	14 292	18 289	23 286	28 284	33 282	42 273	47 270	52 265	57 263	61 259	84 213	
Max. Continuous	[5.5]		[81]	[127]	[170]	[214]	[254]	[339]	[379]	[422]	[463]	[506]	[702]
20.8		9 393	14 392	19 389	24 387	29 384	38 377	43 372	48 372	52 369	57 364	61 358	79 302
Max. Intermittent	[6.5]		[47]	[90]	[133]	[176]	[219]	[307]	[345]	[385]	[429]	[467]	[685]
24.6		5 465	10 462	15 460	20 458	25 455	35 448	39 445	43 440	48 435	53 430	57 430	77 364



# J Series (129-)

## Dimensions

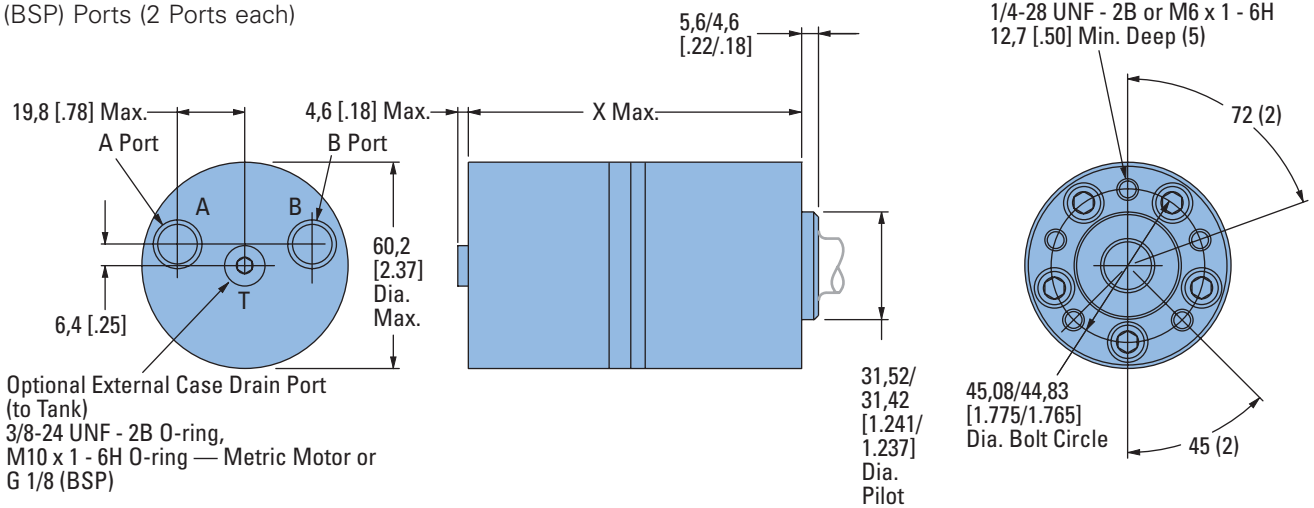
### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

### 9/16 Inch End Port

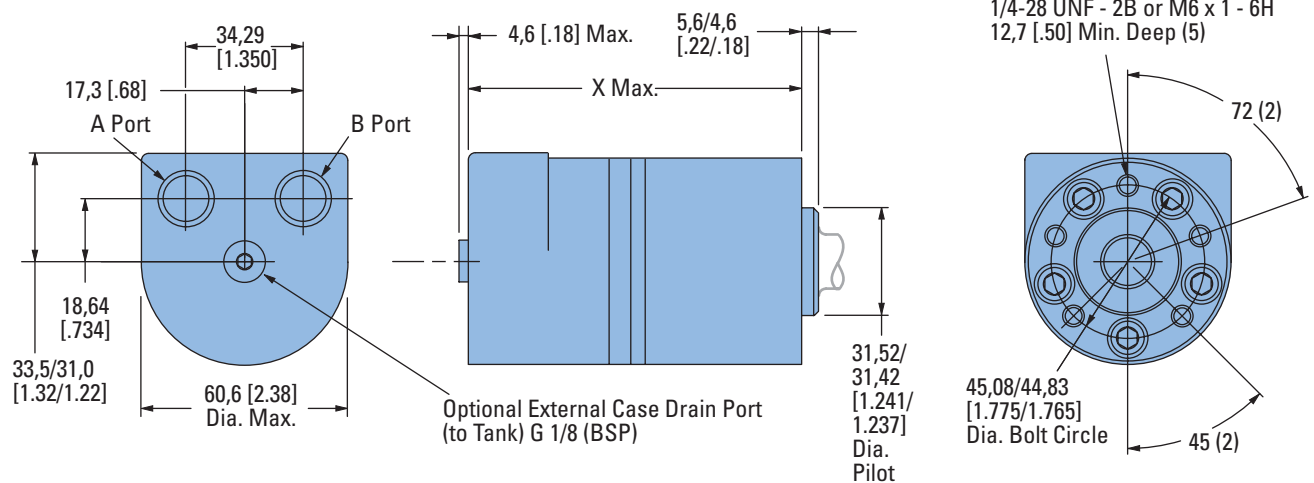
9/16 -18 UNF - 2B O-Ring Ports, M14 x 1,5  
- 6H O-Ring Ports — Metric Motor or  
G 1/4 (BSP) Ports (2 Ports each)



#### END PORT DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]
8,2 [.50]	103,9 [4.09]
12,9 [.79]	106,9 [4.21]
19,8 [1.21]	112,5 [4.38]
31,6 [1.93]	118,9 [4.68]
50,0 [3.00]	130,3 [5.13]

### 3/8 Inch End Port



#### END PORT DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]
8,2 [.50]	103,9 [4.09]
12,9 [.79]	106,9 [4.21]
19,8 [1.21]	112,5 [4.38]
31,6 [1.93]	118,9 [4.68]
50,0 [3.00]	130,0 [5.12]
160,5 [6.32]	132,3 [5.21]

# J Series (129-)

## Dimensions

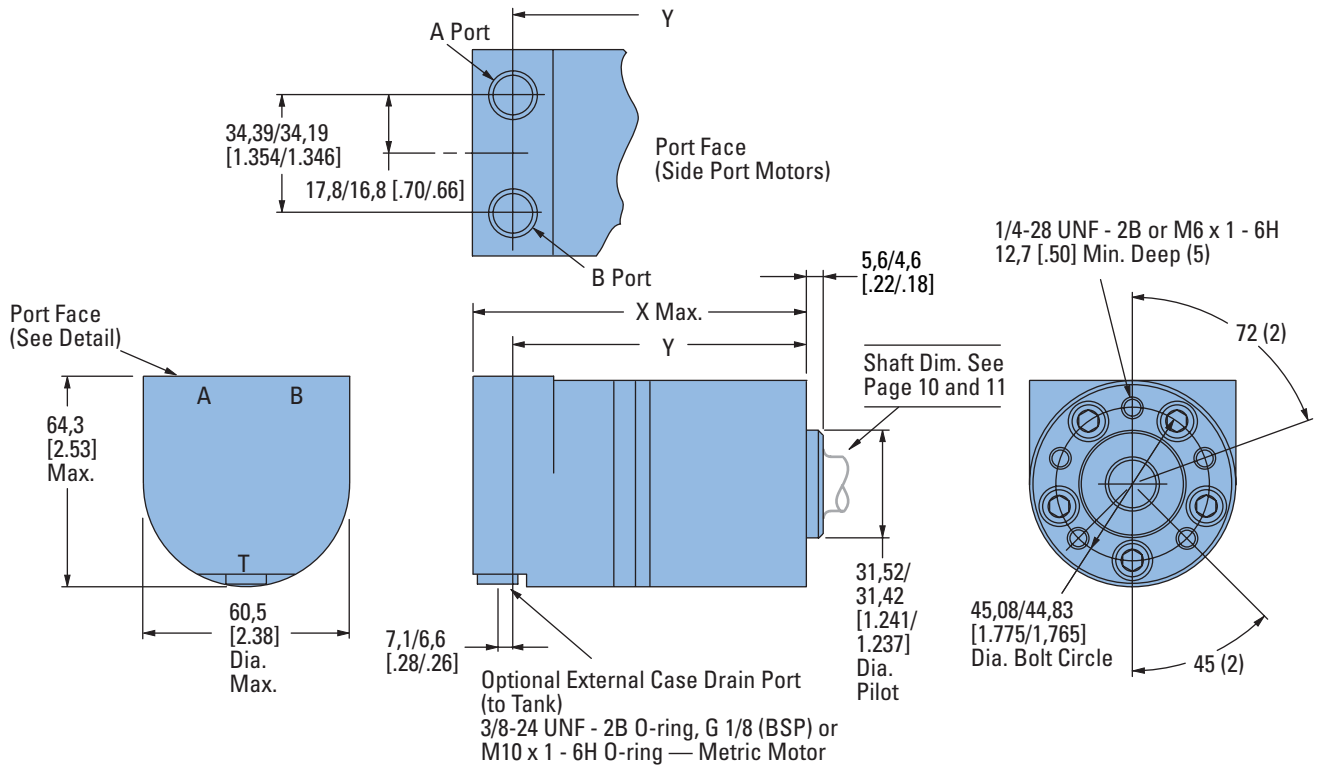
### Ports

9/16 -18 UNF - 2B O-Ring Ports,  
 M14 x 1,5 -6H O-Ring Ports — Metric Motor,  
 G 3/8 or G 1/4 (BSP) Ports (2)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW  
 Port B Pressurized — CCW

### Side Port



### SIDE PORT MOTORS

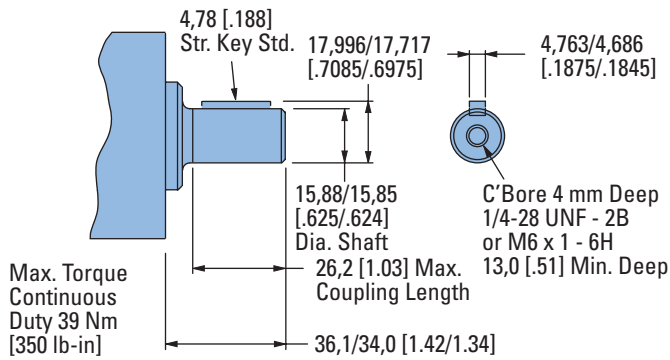
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
8,2 [.50]	103,9 [4.09]	89,4/ 87,4 [3.52/3.44]
12,9 [.79]	106,9 [4.21]	92,5/ 90,4 [3.64/3.56]
19,8 [1.21]	112,5 [4.38]	96,8/ 94,7 [3.81/3.73]
31,6 [1.93]	118,9 [4.68]	104,4/102,4 [4.11/4.03]
50,0 [3.00]	130,0 [5.12]	115,7/113,9 [4.56/4.48]

# J Series (129-)

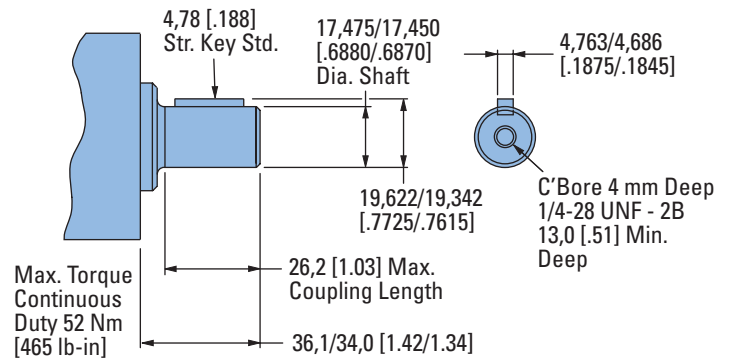
## Dimensions

Shafts

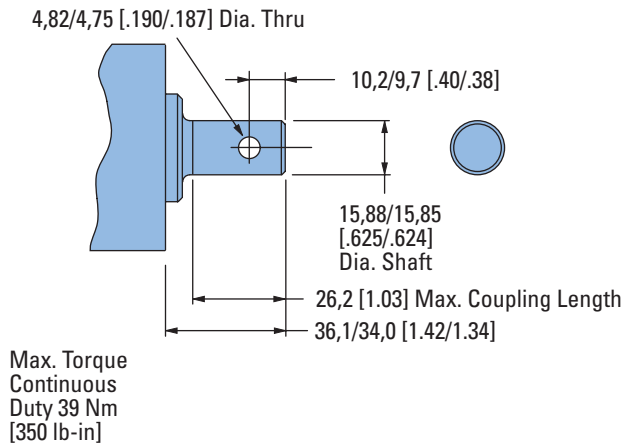
### 5/8 Inch Straight Keyed



### 11/16 Inch Straight Keyed



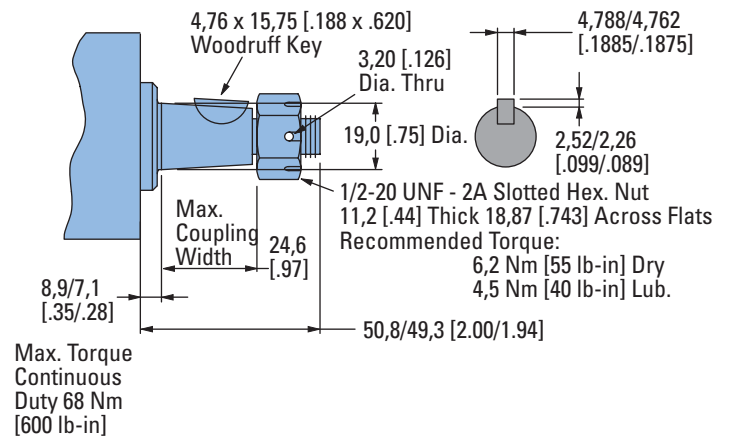
### 5/8 Inch Straight Keyed w/ Crosshole



### 3/4 Inch Tapered

(Tapered Shaft End Per SAE J744)

Except as Specified — 1.5 : 12 Ratio)



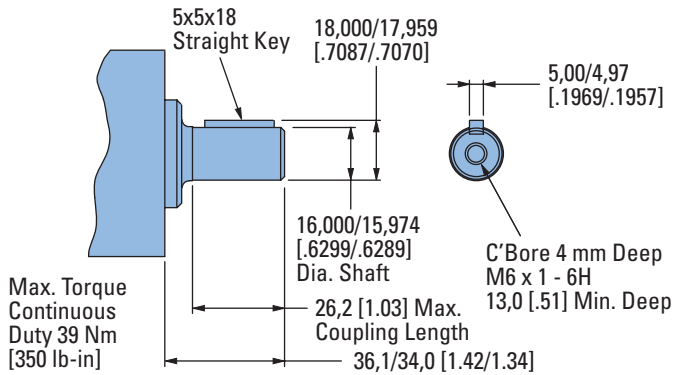


# J Series (129-)

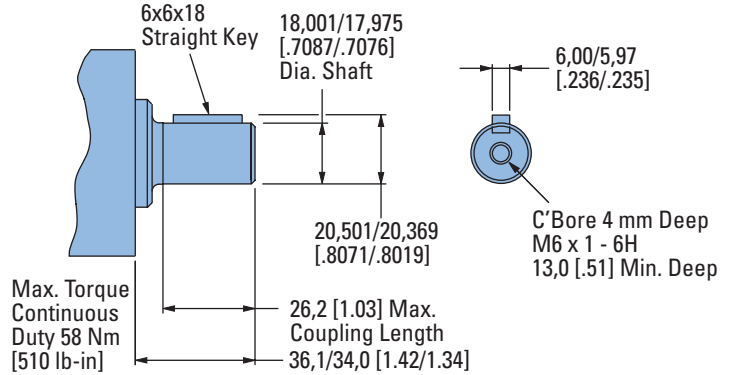
## Dimensions

Shafts and Flange Kit

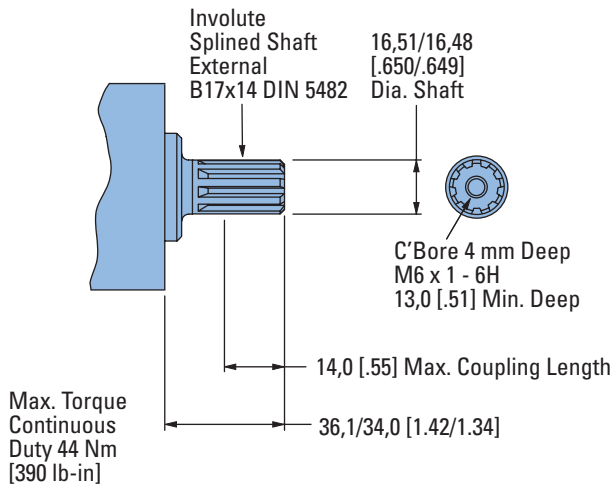
### 16 mm Straight Keyed



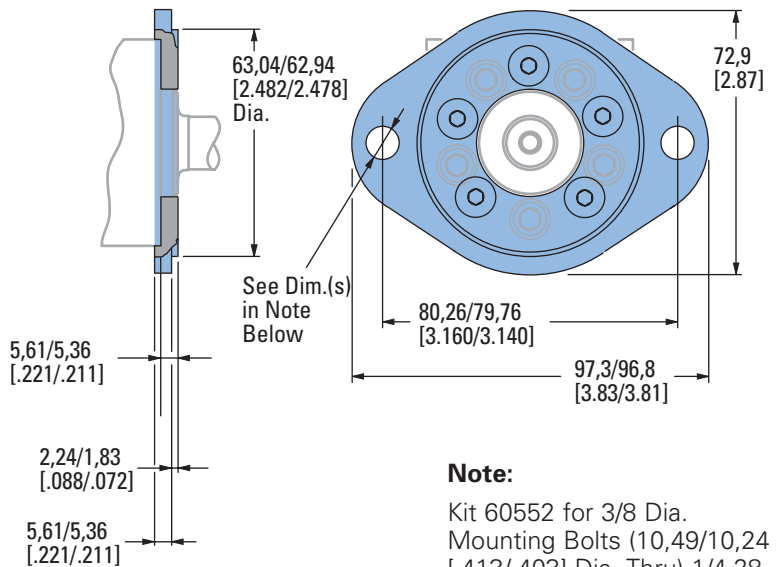
### 18 mm Straight Keyed



### Involute 9T Splined — Metric



### 2 Bolt Flange Kits (2)



#### Note:

Kit 60552 for 3/8 Dia. Mounting Bolts (10,49/10,24 [0.413/0.403] Dia. Thru) 1/4-28 UNF screws for attaching flange to motor (5)

Kit 60553 for M8 Dia. Mounting Bolts (9,12/8,86 [0.359/0.349] Dia. Thru) M6 x 1 - 6H screws for attaching flange to motor (5)

# J Series (129-)

## Product Numbers

Use digit prefix —  
129- plus four digit number  
from charts for complete  
product number—  
Example 129-0479.

**Orders will not be accepted  
without three digit prefix.**

### End Port

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			8,2 [.50]	12,9 [.79]	19,8 [1.21]	31,6 [1.93]	50,0 [3.00]
1/4-28 UNF 2B	5/8 inch Straight		129-0291	-0292	-0293	-0294	-0458
	11/16 inch Straight	9/16 -18 UNF 2B O-Ring (2)	129-0295	-0296	-0297	-0298	-0459
	Splined — Metric		129-0299	-0300	-0301	-0302	-0460
	3/4 inch Tapered		129-0480				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 - 6H O-Ring (2)	129-0303	-0304	-0305	-0306	-0461
	18 mm Straight		129-0307	-0308	-0309	-0310	-0462
	Splined — Metric		129-0311	-0312	-0313	-0314	-0463
	16 mm Straight	G 1/4 (BSP) (2)	129-0315	-0316	-0317	-0318	-0464
	18 mm Straight		129-0319	-0320	-0321	-0322	-0465
	Splined — Metric		129-0323	-0324	-0325	-0326	-0466
	16 mm Straight		129-0327	-0328	-0329	-0330	-0467
	18 mm Straight	G 3/8 (BSP) (2)*	129-0331	-0332	-0333	-0334	-0468
Splined — Metric	129-0335		-0336	-0337	-0338	-0469	

\*Note: The Same Casting used for Side Ports is Required for G 3/8 (BSP) End Ports

129-0336

### Side Port

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			8,2 [.50]	12,9 [.79]	19,8 [1.21]	31,6 [1.93]	50,0 [3.00]
1/4-28 UNF 2B	5/8 inch Straight		129-0339	-0340	-0341	-0342	-0470
	11/16 inch Straight	9/16 -18 UNF 2B O-Ring (2)	129-0343	-0344	-0345	-0346	-0471
	Splined — Metric		129-0347	-0348	-0349	-0350	-0472
	3/4 inch Tapered		129-0481				
M6 x 1 - 6H	16 mm Straight	M14 x 1,5 - 6H O-Ring (2)	129-0351	-0352	-0353	-0354	-0473
	18 mm Straight		129-0355	-0356	-0357	-0358	-0474
	Splined — Metric		129-0359	-0360	-0361	-0362	-0475
	16 mm Straight	G 1/4 (BSP) (2)	129-0363	-0364	-0365	-0366	-0476
	18 mm Straight		129-0367	-0368	-0369	-0370	-0477
	Splined — Metric		129-0371	-0372	-0373	-0374	-0403
	18 mm Straight		G 3/8 (BSP) (2)	129-0375	-0376	-0377	-0378
	Splined — Metric	129-0379		-0380	-0381	-0382	-0479

Two Bolt Mounting Flange Kit (for 3/8 inch Mounting Bolts) — Kit Number 60552 (includes 5 screws — 1/4 -28 UNF-2B)

Two Bolt Mounting Flange Kit (for M8 Mounting Bolts ) — Kit Number 60553 (includes 5 screws — M6 x 1-6H)

# J Series (129-)

## Shaft Side Load Capacity

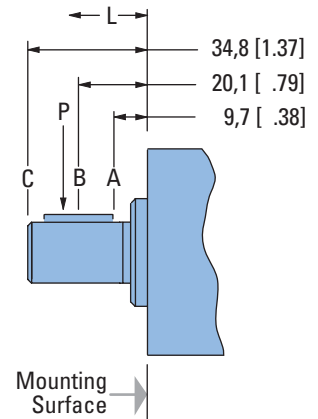
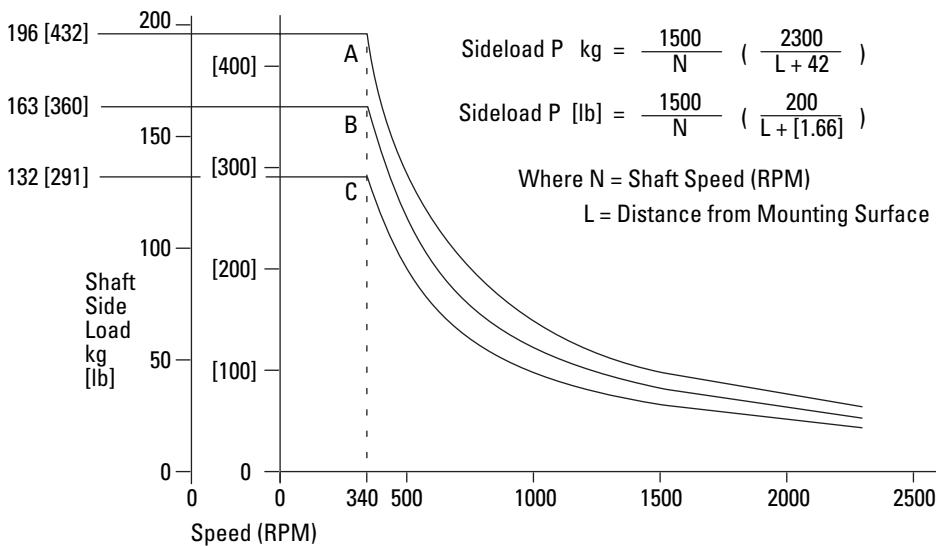
The hydrodynamic bearing has infinite life when shaft load ratings are not exceeded. Hence, the shaft side load capacity is more than adequate to handle most externally applied loads (such as belts, chains, etc.), providing the motor to shaft size is applied within its torque rating.

Allowable side load chart, shaft load location drawing (right) and load curves

(below) are based on the side or radial loads being applied to shaft at locations A, B, and C, to determine the shaft side load capacity at locations other than those shown use the formula (shown below). For more information about shaft side loads on Char-Lynn motors contact your Eaton representative.

**ALLOWABLE SIDE LOAD — KG [LB]**

RPM	A	B	C
2300	29 [ 64]	24 [ 53]	20 [ 43]
1500	44 [ 98]	37 [ 82]	30 [ 66]
1250	54 [118]	44 [ 98]	36 [ 79]
1000	67 [147]	55 [122]	45 [ 99]
750	89 [196]	74 [163]	60 [132]
600	111 [245]	93 [204]	75 [165]
500	133 [294]	111 [245]	90 [198]
400	167 [368]	139 [306]	112 [248]
340	196 [432]	163 [360]	132 [291]



# J Series (129-)

## Case Pressure and Case Drain

The J Series now offers check valves in the motor as a standard feature. This addition reduces the case pressure in the motor to the return pressure of the system when the case drain is not used. For return pressures higher than the rated pressures (see chart) the external case drain can be connected. If the case drain line is needed, connect drain line to assure that the motor will always remain full of fluid.

### Case Drain Advantage

In addition to providing lower case pressures for motors connected in series, there are advantages for adding an external case drain line to motors with normal case pressures as well. These advantages are:

**Contamination Control** — flushing the motor case.

**Motor Cooler** — exiting oil draws motor heat away.

**Extend Motor Seal Life** — maintain low case pressure with a preset restriction installed in the case drain line

### Example:

A 14 Bar case pressure will cause a load of 40 kg, so the allowable thrust load will be 82 kg plus 40 = 120 kg pushing inward on shaft. Tension load is 82 kg under all case pressure conditions.

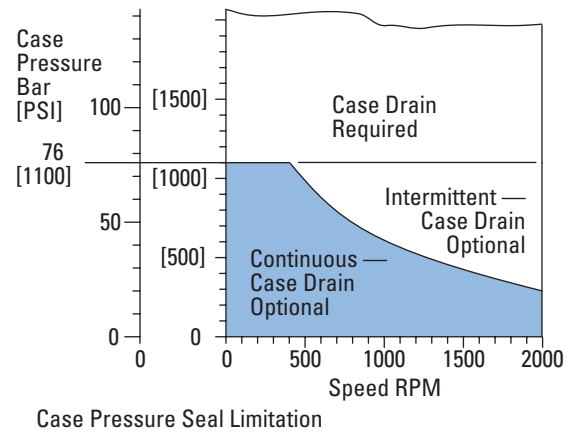
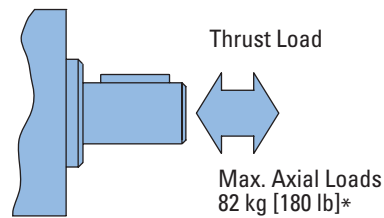
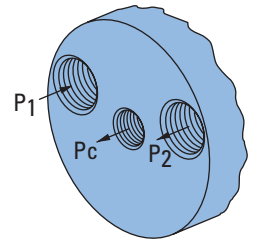
### Example:

A 200 PSI case pressure will cause a load of 88 lbs, so the allowable thrust load will be 180 lbs plus 88 = 268 lbs pushing inward on shaft. Tension load is 180 lb under all case pressure conditions

### Note:

J Series motors can be connected in parallel or in series.

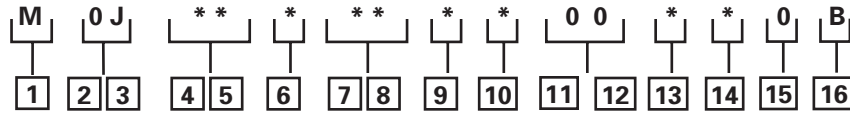
Case pressure will add to the allowable compressive thrust load. Case pressure will push outward on the shaft at 20 kg/7 Bar [44 lb/100 PSI].



# J Series (129-)

## Model Code

The following 16-digit coding system has been developed to identify all of the configuration options for the J motor. Use this model code to specify a motor with the desired features. All 16-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

**M** – Motor

### 2, 3 Series

**0J** – J Series

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**05** – 8,2 [.50]

**08** – 12,9 [.79]

**12** – 19,8 [1.21]

**19** – 31,6 [1.93]

**30** – 50,0 [3.00]

### 6 Mounting Type

**A** – 5 Bolt: Dia. 31,47 [1.239] x 5,1 [.20] Pilot 1/4-28 UNF 2B Mounting Holes on 45 [1.77] Dia. Bolt Circle

**B** – 5 Bolt: Dia. 31,47 [1.239] x 5,1 [.20] Pilot M6 x 1- 6H Mounting Holes on 45 [1.77] Dia. Bolt Circle

**C** – 2 Bolt: Dia. 62,99 [2.480] x 2,0 [.08] Pilot 10,36[.408] Mounting Holes on 80,0 [3.150] Dia. Bolt Circle

**D** – 2 Bolt: Dia. 62,99 [2.480] x 2,0 [.08] Pilot 9,0 [.354] Mounting Holes on 80,0 [3.150] Dia. Bolt Circle

### 7, 8 Output Shaft

**01** – 5/8 inch Dia. Straight with 4,72 [.186] Square Key and 1/4-28 UNF - 2B Threaded Hole

**02** – 16 mm Dia. Straight with 5,00 [.197] Square Key with M6 x 1 - 6H Threaded Hole

**04** – 11/16 inch Dia. Straight with 4,72 [.186] Square Key and 1/4-28 UNF - 2B Threaded Hole

**05** – 18 mm Dia. Straight with 5,92 [.233] Square Key with M6 x 1 - 6H Threaded Hole

**06** – Involute Splined 9T—Metric 16,50 [.650] Dia. (B17 x 14 DIN 5482) M6 x 1 - 6H Threaded Hole

**07** – 5/8 inch Dia. Straight with 4,75 [.187] Dia. Crosshole

**08** – 3/4 inch Tapered with Woodruff Key and Nut

**09** – 5/8 inch Dia. Straight with 4,72 [.186] Sq. Key with 1/4-28 UNF -2B Threaded Hole (Plated for Corrosion Protection)

**14** – 16 mm Dia. Straight with 5,00 [.197] Sq. Key with M6 x 1- 6H Threaded Hole (Plated for Corrosion Protection)

### 9 Ports

**A** – 9/16 -18 UNF - 2B O-Ring End Ported

**B** – G 1/4 (BSP) End Ported

**C** – M14 x 1,5 - 6H O-Ring Port, End Ported

**D** – 9/16 -18 UNF - 2B O-Ring Side Ported

**E** – G 3/8 (BSP) Side Ported

**F** – G 1/4 (BSP) Side Ported

**H** – G 3/8 (BSP) End Ported

### 10 Case Flow Options

**0** – No Case Drain

**1** – 3/8 -24 UNF - 2B O-Ring

**2** – G 1/8 (BSP)

**3** – M10 x 1 - 6H O-Ring

### 11, 12 Special Features (Hardware)

**00** – None

### 13 Special Features (Assembly)

**0** – None

**1** – Reverse Rotation

### 14 Paint/Special Packaging

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black, Individual Box

**B** – No Paint, Bulk Box Option

### 15 Eaton Assigned Code when Applicable

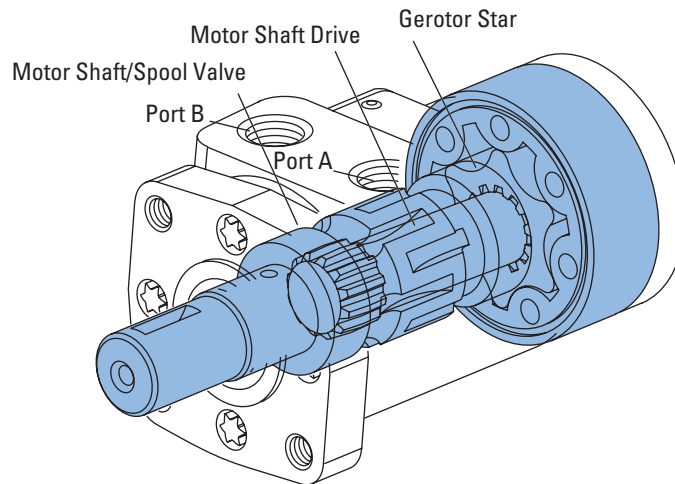
**0** – Assigned Code

### 16 Eaton Assigned Design Code

**B** – Assigned Design Code

# H Series (101-)

## Highlights



### Description

Designed for medium duty applications, these motors use industry-proven spool valve technology combined with state-of-the-art gerotors. In addition, a wide variety of mounting flanges, shafts, Ports and valving options provide design flexibility. Direction of shaft rotation and shaft speed can be controlled easily and smoothly throughout the speed range of the motor, and equipment can be driven direct, eliminating costly mechanical components.

### Specifications

Gerotor Element	13 Displacements
Flow l/min [GPM]	57 [15] Continuous***
	76 [20] Intermittent**
Speed	Up to 1100 RPM
Pressure bar [PSI]	125 [1800] Cont.***
	165 [2400] Inter.**
Torque Nm [lb-in]	407 [3604] Cont.***
	520 [4600] Inter.**

\*\*\* Continuous—(Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent—(Inter.) Intermittent operation, 10% of every minute.

### Features:

- Time-tested Char-Lynn drive set
- Three moving components (gerotor-star, drive, and shaft)
- Optimized drive running angle
- Three-zone pressure design (inlet, return and case)
- Variety of displacements, shafts and mounts
- Special options to meet customer needs

### Benefits:

- High efficiency
- Powerful compact package
- Design flexibility
- Extended leak-free performance

### Applications:

- Agricultural augers, harvesters, seeders
- Car wash brushes
- Food processing
- Railroad maintenance equipment
- Machine tools
- Conveyors
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment
- Concrete and asphalt equipment
- Skid steer attachments
- Many more



Conveyer



Combine



Sweeper

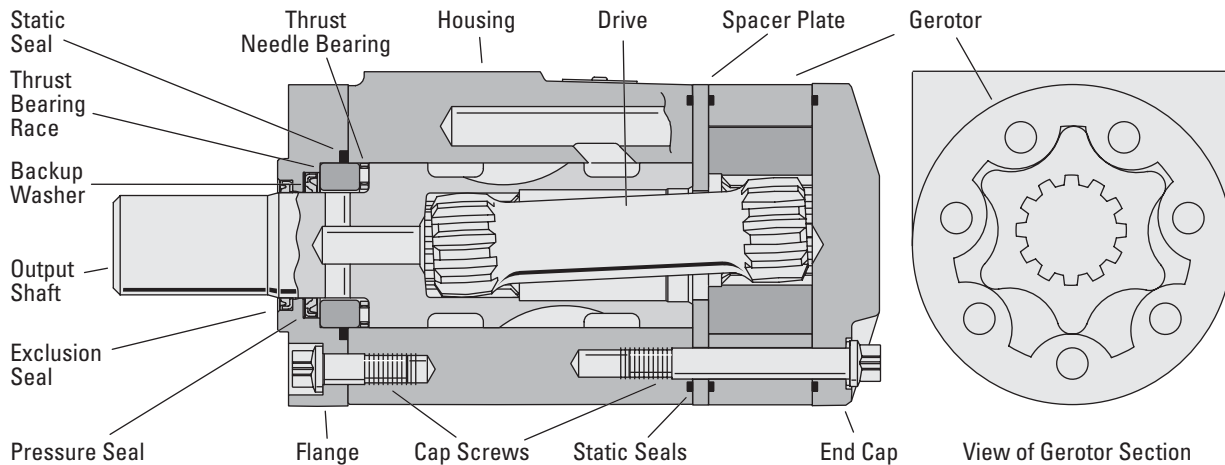


Salt and Sand Spreader



# H Series (101-)

## Specifications



### SPECIFICATION DATA — H MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		36 [2.2]	46 [2.8]	59 [3.6]	74 [4.5]	97 [5.9]	120 [7.3]	146 [8.9]	159 [9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	739 [45.1]	
Max. Speed (RPM) @ Continuous Flow		1021	969	953	760	585	469	385	353	304	243	192	152	74	
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	
	Intermittent	38 [10]	53 [14]	64 [17]	68 [18]	68 [18]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	
Torque Nm [lb-in]	Continuous	56 [497]	73 [650]	91 [802]	118 [1044]	155 [1368]	192 [1699]	221 [1954]	233 [2059]	265 [2343]	302 [2669]	351 [3110]	407 [3604]	389 [3440]	
	Intermittent	75 [668]	99 [876]	122 [1076]	158 [1401]	207 [1829]	257 [2278]	300 [2653]	319 [2824]	356 [3151]	415 [3671]	466 [4121]	484 [4283]	520 [4600]	
Min. Starting Torque @ Int. Pressure Nm [lb-in]	@ Cont. Pressure	46 [410]	59 [520]	76 [670]	95 [840]	124 [1100]	154 [1360]	176 [1560]	186 [1650]	211 [1870]	238 [2110]	282 [2500]	330 [2920]	316 [2800]	
	@ Int. Pressure	63 [560]	81 [720]	104 [920]	130 [1150]	171 [1510]	2102 [1860]	46 [2180]	262 [2320]	293 [2590]	339 [3000]	388 [3430]	408 [3610]	434 [3840]	
Pressure Δ Bar [Δ PSI]	Continuous	124 [1800]	124 [1800]	124 [1800]	124 [1800]	124 [1800]	124 [1800]	117 [1700]	114 [1650]	110 [1600]	100 [1450]	93 [1350]	86 [1250]	41 [600]	
	Intermittent	165 [2400]	165 [2400]	165 [2400]	165 [2400]	165 [2400]	165 [2400]	159 [2300]	155 [2250]	148 [2150]	138 [2000]	124 [1800]	103 [1500]	55 [800]	
End Ported Units Only															
Δ Bar [Δ PSI]	Cont. Pressure	83 [1200]	83 [1200]	76 [1100]	76 [1100]	76 [1100]	69 [1000]	69 [1000]	69 [1000]	62 [900]	55 [800]	48 [700]	57 [825]	27 [396]	
	Intermittent	117 [1700]	117 [1700]	110 [1600]	110 [1600]	110 [1600]	103 [1500]	103 [1500]	103 [1500]	91 [1400]	90 [1300]	83 [1200]	68 [990]	36 [528]	
Weight kg [lb]		5,1 [11.2]	5,1 [11.2]	5,2 [11.5]	5,2 [11.5]	5,4 [11.8]	5,5 [12.1]	5,6 [12.4]	5,7 [12.5]	5,8 [12.8]	6,0 [13.3]	6,3 [14.0]	6,7 [14.7]	8,4 [18.6]	

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Note:

The End Ported Units Only ratings are for Standard Ported Units.

#### Maximum Inlet Pressure:

172 Bar [2500 PSI] without regard to Δ Bar [Δ PSI] and/or back pressure ratings or combination thereof.

6B splined or Tapered shafts are recommended whenever operation above 282 NM [2500 lb-in] of torque, especially for those applications subject to frequent reversals.

#### Δ Pressure:

The true Δ bar [Δ PSI] difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Recommended Fluids:

Recommended Fluids — Premium quality, anti-wear type hydraulic oil. Minimum oil viscosity (at operating-temperature) should be the highest of the following:

$$100 \text{ SUS or } \left[ \frac{300 \times \text{Bar}}{\text{RPM}} = \text{SUS} \right]$$

$$\left[ \frac{20 \times \text{PSI}}{\text{RPM}} = \text{SUS} \right]$$

#### Recommended Maximum System Operating Temp.:

82°C [180°F]

#### Recommended Filtration:



per ISO Cleanliness Code 4406, level 20/18/13

# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

		36 cm <sup>3</sup> /r [2.2 in <sup>3</sup> /r]										Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]											
		Continuous											
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]		
		14	28	41	55	69	83	97	110	124	165		
Flow LPM [GPM]	[2]	[49] 6 204	[103] 12 201	[162] 18 198	[189] 21 194	[270] 31 189	[325] 37 184	[379] 43 177	[432] 49 170	[489] 55 162	[650] 73 122		
	[4]	[47] 5 408	[106] 12 407	[160] 18 402	[191] 22 399	[274] 31 394	[327] 37 387	[384] 43 381	[439] 50 373	[495] 56 365	[654] 74 323		
	[6]	[44] 5 613	[102] 12 612	[158] 18 609	[188] 21 604	[272] 31 599	[328] 37 591	[383] 43 586	[440] 50 576	[496] 56 565	[661] 75 523		
	[8]	[40] 5 817	[97] 11 817	[153] 17 814	[184] 21 807	[270] 31 799	[326] 37 793	[383] 43 785	[440] 50 776	[497] 56 762	[668] 75 721		
	Max. Continuous	[10]	[36] 4 1021	[90] 10 1021	[148] 17 1015	[180] 20 1008	[265] 30 1001	[322] 36 991	[380] 43 981	[438] 49 969	[495] 56 959	[664] 75 920	



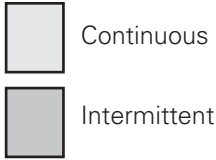
		46 cm <sup>3</sup> /r [2.8 in <sup>3</sup> /r]										Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]											
		Continuous											
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]		
		14	28	41	55	69	83	97	110	124	165		
Flow LPM [GPM]	[2]	[64] 7 161	[136] 15 158	[212] 24 156	[284] 32 153	[355] 40 148	[426] 48 145	[497] 56 139	[567] 64 133	[641] 72 127	[852] 96 95		
	[4]	[61] 7 323	[139] 16 320	[209] 24 316	[286] 32 314	[359] 41 310	[429] 48 304	[503] 57 300	[576] 65 293	[649] 73 287	[857] 97 253		
	[6]	[58] 7 486	[134] 15 481	[207] 23 479	[282] 32 475	[356] 40 471	[430] 49 464	[502] 57 461	[577] 65 453	[650] 73 444	[867] 98 410		
	[8]	[52] 6 648	[128] 14 643	[200] 23 640	[276] 31 635	[354] 40 628	[428] 48 623	[502] 57 617	[577] 65 610	[651] 74 599	[876] 99 566		
	[10]	[47] 5 808	[118] 13 803	[194] 22 798	[269] 30 793	[347] 39 787	[423] 48 779	[498] 56 771	[575] 65 761	[649] 73 753	[871] 98 722		
Max. Continuous	[12]	[36] 4 969	[109] 12 964	[188] 21 960	[260] 29 952	[340] 38 946	[417] 47 938	[492] 56 931	[567] 64 922	[643] 73 914	[864] 98 877		
Max. Intermittent	[14]	[25] 3 1127	[98] 11 1123	[175] 20 1115	[249] 28 1108	[327] 37 1100	[404] 46 1093	[484] 55 1086	[559] 63 1079	[634] 72 1068			

# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



		59 cm <sup>3</sup> /r [3.6 in <sup>3</sup> /r]											
		Δ Pressure Bar [PSI]											
		Continuous										Max. Intermittent	
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]		
		14	28	41	55	69	83	97	110	124	165		
Flow LPM [GPM]	[2]	[79]	[169]	[260]	[305]	[437]	[526]	[616]	[704]	[796]	[1055]		
	7,6	9	19	29	34	49	59	70	80	90	119		
		127	125	123	121	117	114	109	103	96	65		
	[4]	[76]	[168]	[257]	[307]	[441]	[529]	[620]	[710]	[800]	[1065]		
	15,1	9	19	29	35	50	60	70	80	90	120		
		254	254	251	249	246	241	236	230	224	193		
	[6]	[73]	[161]	[252]	[303]	[439]	[529]	[618]	[709]	[802]	[1069]		
	22,7	8	18	28	34	50	60	70	80	91	121		
		381	381	380	377	373	368	364	358	349	319		
	[8]	[64]	[151]	[243]	[294]	[428]	[519]	[609]	[701]	[794]	[1076]		
	30,3	7	17	27	33	48	59	69	79	90	122		
		508	508	508	504	500	496	491	484	476	446		
	[10]	[57]	[141]	[234]	[283]	[419]	[512]	[602]	[693]	[786]	[1071]		
	37,9	6	16	26	32	47	58	68	78	89	121		
		635	635	634	630	626	621	614	608	601	571		
[12]	[45]	[131]	[227]	[274]	[409]	[505]	[593]	[684]	[778]	[1058]			
45,4	5	15	26	31	46	57	67	77	88	120			
	762	762	762	757	753	747	741	734	728	694			
[14]	[33]	[118]	[213]	[266]	[396]	[492]	[583]	[676]	[770]	[1055]			
53,0	4	13	24	30	45	56	66	76	87	119			
	889	889	887	882	877	872	866	860	851	813			
Max. Continuous	[15]	[29]	[111]	[205]	[260]	[389]	[486]	[576]	[670]	[765]	[1055]		
	3	13	23	29	44	55	65	76	86	119			
	56,8	953	953	951	945	940	935	929	921	913	872		
Max. Intermittent	[20]	[17]	[98]	[192]	[252]	[377]	[475]	[567]	[660]	[757]			
	2	11	22	28	43	54	64	75	86				
	75,7	1080	1080	1077	1071	1067	1062	1055	1049	1040			





		74 cm <sup>3</sup> /r [4.5 in <sup>3</sup> /r]											
		Δ Pressure Bar [PSI]											
		Continuous										Max. Intermittent	
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]		
		14	28	41	55	69	83	97	110	124	165		
Flow LPM [GPM]	[2]	[103]	[220]	[339]	[454]	[569]	[685]	[801]	[916]	[1036]	[1373]		
	7,6	12	25	38	51	64	77	91	103	117	155		
		101	99	98	96	93	90	86	81	76	51		
	[4]	[99]	[219]	[335]	[457]	[574]	[689]	[808]	[925]	[1042]	[1386]		
	15,1	11	25	38	52	65	78	91	105	118	157		
		203	201	199	197	194	191	187	182	177	153		
	[6]	[94]	[210]	[328]	[451]	[571]	[689]	[805]	[924]	[1044]	[1392]		
	22,7	11	24	37	51	65	78	91	104	118	157		
		305	303	301	298	296	292	288	283	276	252		
	[8]	[86]	[196]	[319]	[438]	[558]	[676]	[793]	[913]	[1033]	[1401]		
	30,3	10	22	36	49	63	76	90	103	117	158		
		406	404	402	399	396	393	388	383	377	352		
	[10]	[74]	[183]	[310]	[422]	[545]	[667]	[784]	[903]	[1024]	[1394]		
	37,9	8	21	35	48	62	75	89	102	116	158		
		507	505	502	499	496	492	486	482	476	452		
[12]	[58]	[171]	[295]	[408]	[533]	[657]	[773]	[891]	[1013]	[1377]			
45,4	7	19	33	46	60	74	87	101	114	156			
	608	606	603	600	596	591	587	581	576	549			
[14]	[43]	[154]	[277]	[396]	[515]	[640]	[760]	[880]	[1002]	[1374]			
53,0	5	17	31	45	58	72	86	99	113	155			
	709	706	702	698	694	691	686	681	674	643			
Max. Continuous	[15]	[36]	[145]	[268]	[387]	[506]	[632]	[750]	[873]	[996]	[1373]		
	4	16	30	44	57	71	85	99	113	155			
	56,8	760	757	753	749	744	740	735	729	723	690		
Max. Intermittent	[20]	[14]	[121]	[233]	[351]	[482]	[609]	[725]	[856]	[981]			
	2	14	26	40	54	69	82	97	111				
	75,7	904	902	898	895	891	887	882	877	869			

# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

		97 cm <sup>3</sup> /r [5.9 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous									Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]	[1800]
		14	28	41	55	69	83	97	110	124	165	165
Flow LPM [GPM]	[2]	[134]	[292]	[442]	[593]	[746]	[899]	[1054]	[1209]	[1365]	[1806]	[1806]
	7,6	15 78	33 76	50 75	67 73	84 71	102 68	119 65	137 61	154 55	204 33	204 33
	[4]	[131]	[281]	[436]	[596]	[750]	[903]	[1059]	[1212]	[1367]	[1828]	[1828]
	15,1	15 156	32 155	49 153	67 151	85 149	102 147	120 143	137 139	154 134	207 113	207 113
	[6]	[126]	[269]	[425]	[588]	[747]	[900]	[1054]	[1206]	[1368]	[1823]	[1823]
	22,7	14 234	30 233	48 231	66 230	84 228	102 224	119 221	136 217	155 210	206 189	206 189
	[8]	[110]	[246]	[408]	[566]	[718]	[873]	[1023]	[1177]	[1339]	[1829]	[1829]
	30,3	12 312	28 311	46 310	64 308	81 305	99 303	116 300	133 295	151 291	207 269	207 269
	[10]	[96]	[231]	[392]	[539]	[699]	[859]	[1005]	[1156]	[1318]	[1821]	[1821]
	37,9	11 390	26 389	44 387	61 385	79 383	97 380	114 376	131 373	149 368	206 346	206 346
[12]	[77]	[218]	[378]	[522]	[681]	[844]	[990]	[1142]	[1301]	[1792]	[1792]	
45,4	9 468	25 467	43 465	59 463	77 460	95 457	112 453	129 449	147 445	202 421	202 421	
[14]	[60]	[197]	[358]	[513]	[662]	[828]	[973]	[1131]	[1293]	[1776]	[1776]	
53,0	7 546	22 544	40 542	58 539	75 537	94 535	110 531	128 526	146 521	201 499	201 499	
Max. Continuous	[15]	[52]	[189]	[346]	[495]	[651]	[819]	[963]	[1126]	[1286]	[1778]	[1778]
56,8	6 585	21 583	39 581	56 578	74 575	93 573	109 569	127 564	145 559	201 536	201 536	
Max. Intermittent	[20]	[25]	[157]	[311]	[455]	[625]	[790]	[941]	[1110]	[1272]		
75,7	3 701	18 700	35 697	51 694	71 691	89 688	106 684	125 681	144 674			

[189] } Torque [lb-in]  
 21 } Nm  
 583 } Speed RPM



		120 cm <sup>3</sup> /r [7.3 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous									Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2400]	[1800]
		14	28	41	55	69	83	97	110	124	165	165
Flow LPM [GPM]	[2]	[162]	[357]	[544]	[736]	[927]	[1116]	[1305]	[1498]	[1687]	[2231]	[2231]
	7,6	18 62	40 61	61 61	83 59	105 58	126 55	147 53	169 49	191 45	252 26	252 26
	[4]	[160]	[348]	[539]	[736]	[930]	[1119]	[1316]	[1506]	[1698]	[2268]	[2268]
	15,1	18 125	39 124	61 123	83 121	105 120	126 119	149 116	170 114	192 110	256 90	256 90
	[6]	[155]	[338]	[530]	[729]	[923]	[1116]	[1310]	[1500]	[1699]	[2271]	[2271]
	22,7	18 188	38 187	60 186	82 185	104 183	126 180	148 178	169 175	192 170	257 152	257 152
	[8]	[139]	[319]	[515]	[710]	[901]	[1094]	[1283]	[1476]	[1673]	[2278]	[2278]
	30,3	16 250	36 250	58 249	80 247	102 245	124 243	145 241	167 237	189 233	257 216	257 216
	[10]	[121]	[303]	[497]	[686]	[883]	[1081]	[1267]	[1460]	[1655]	[2268]	[2268]
	37,9	14 313	34 312	56 311	78 309	100 308	122 306	143 302	165 300	187 296	256 278	256 278
[12]	[102]	[288]	[480]	[664]	[862]	[1060]	[1246]	[1440]	[1640]	[2232]	[2232]	
45,4	12 375	33 374	54 373	75 371	97 370	120 367	141 365	163 361	185 358	252 338	252 338	
[14]	[78]	[263]	[458]	[652]	[841]	[1041]	[1228]	[1420]	[1616]	[2213]	[2213]	
53,0	9 438	30 437	52 435	74 433	95 431	118 430	139 427	160 423	183 419	250 401	250 401	
Max. Continuous	[15]	[67]	[253]	[446]	[632]	[828]	[1030]	[1214]	[1411]	[1608]	[2205]	[2205]
56,8	8 469	29 468	50 466	71 464	94 462	116 460	137 458	159 454	182 450	249 430	249 430	
Max. Intermittent	[20]	[20]	[202]	[384]	[581]	[778]	[971]	[1169]	[1356]	[1559]		
75,7	2 626	23 624	43 621	66 618	88 617	110 614	132 611	153 609	176 606			

# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

		146 cm <sup>3</sup> /r [8.9 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous									Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1700]	[2300]	
		14	28	41	55	69	83	97	110	117	159	
Flow LPM [GPM]	[2]	[198]	[435]	[664]	[897]	[1130]	[1361]	[1591]	[1827]	[1942]	[2611]	
	7,6	22 51	49 50	75 50	101 49	128 47	154 45	180 43	206 40	219 39	295 24	
	[4]	[196]	[424]	[657]	[898]	[1133]	[1365]	[1604]	[1836]	[1954]	[2648]	
	15,1	22 103	48 102	74 101	101 99	128 99	154 97	181 95	207 93	221 92	299 78	
	[6]	[189]	[412]	[646]	[889]	[1125]	[1361]	[1598]	[1829]	[1951]	[2653]	
	22,7	21 154	47 153	73 152	100 151	127 150	154 148	181 146	207 143	220 141	300 128	
	[8]	[169]	[389]	[628]	[866]	[1098]	[1333]	[1564]	[1799]	[1919]	[2649]	
	30,3	19 205	44 205	71 204	98 203	124 201	151 200	177 197	203 195	217 193	299 180	
	[10]	[148]	[369]	[605]	[836]	[1076]	[1318]	[1544]	[1780]	[1899]	[2789]	
	37,9	17 257	42 256	68 255	94 253	122 252	149 251	174 248	201 246	215 244	315 231	
[12]	[125]	[351]	[586]	[810]	[1051]	[1293]	[1519]	[1756]	[1878]	[2606]		
45,4	14 308	40 307	66 306	92 305	119 303	146 301	172 299	198 296	212 295	294 281		
[14]	[95]	[321]	[558]	[795]	[1026]	[1290]	[1497]	[1731]	[1851]	[2580]		
53,0	11 359	36 358	63 357	90 355	116 354	146 352	169 350	196 347	209 346	292 331		
Max. Continuous	[15]	[82]	[308]	[544]	[771]	[1010]	[1256]	[1480]	[1720]	[1840]	[2569]	
	56,8	9 85	35 384	61 383	87 381	114 379	142 378	167 375	194 373	208 371	290 356	
Max. Intermittent	[20]	[24]	[246]	[468]	[708]	[948]	[1184]	[1425]	[1653]	[1780]		
	75,7	3 513	28 512	53 509	80 507	107 506	134 504	161 501	187 499	201 498		

		159 cm <sup>3</sup> /r [9.7 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous									Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1650]	[2250]	
		14	28	41	55	69	83	97	110	134	155	
Flow LPM [GPM]	[2]	[209]	[465]	[715]	[973]	[1228]	[1478]	[1724]	[1981]	[2046]	[2764]	
	7,6	24 47	53 46	81 46	110 45	139 44	167 42	195 40	224 38	231 37	312 23	
	[4]	[210]	[460]	[710]	[971]	[1229]	[1480]	[1745]	[1996]	[2059]	[2813]	
	15,1	24 94	52 94	80 93	110 91	139 91	167 90	197 89	226 87	233 87	318 76	
	[6]	[205]	[454]	[704]	[965]	[1216]	[1477]	[1738]	[1991]	[2055]	[2824]	
	22,7	23 141	51 141	80 140	109 139	137 138	167 136	196 134	225 132	232 132	319 119	
	[8]	[186]	[440]	[693]	[951]	[1205]	[1461]	[1716]	[1973]	[2038]	[2808]	
	30,3	21 188	50 188	78 187	107 186	136 185	165 183	194 181	223 179	230 178	317 166	
	[10]	[164]	[422]	[671]	[930]	[1189]	[1451]	[1702]	[1965]	[2032]	[2789]	
	37,9	19 235	48 234	76 234	105 232	134 232	164 230	192 228	219 226	230 225	315 213	
[12]	[144]	[404]	[652]	[900]	[1163]	[1421]	[1674]	[1937]	[2004]	[2770]		
45,4	16 282	46 281	74 281	102 279	131 279	161 277	189 275	219 273	226 272	313 260		
[14]	[109]	[374]	[623]	[883]	[1140]	[1396]	[1653]	[1900]	[1963]	[2727]		
53,0	12 330	42 329	70 328	100 327	129 325	158 323	187 322	215 319	222 319	308 306		
Max. Continuous	[15]	[92]	[359]	[612]	[861]	[1123]	[1381]	[1633]	[1886]	[1950]	[2712]	
	56,8	10 353	41 352	69 351	97 350	127 348	156 347	185 345	213 343	220 342	306 330	
Max. Intermittent	[20]	[26]	[268]	[510]	[772]	[1034]	[1290]	[1553]	[1802]	[1865]		
	75,7	3 471	30 470	58 467	87 465	117 464	146 462	175 460	204 458	211 458		



[359] } Torque [lb-in]  
 41 } Nm  
 352 } Speed RPM

# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

		185 cm <sup>3</sup> /r [11.3 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous							Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[2150]
		14	28	41	55	69	83	97	110	148
Flow LPM [GPM]	[2] 7,6	[257] 29 40	[554] 63 40	[847] 96 39	[1150] 130 38	[1447] 163 37	[1739] 196 36	[2035] 230 33	[2320] 262 29	[3103] 351 12
	[4] 15,1	[254] 29 81	[546] 62 81	[845] 95 80	[1145] 129 79	[1448] 164 78	[1744] 197 77	[2049] 232 76	[2343] 265 74	[3147] 356 63
	[6] 22,7	[246] 28 121	[540] 61 121	[834] 94 120	[1137] 128 120	[1434] 162 119	[1736] 196 117	[2036] 230 115	[2337] 264 112	[3151] 356 100
	[8] 30,3	[224] 25 162	[520] 59 162	[820] 93 161	[1117] 126 160	[1414] 160 159	[1716] 194 157	[2014] 228 155	[2315] 262 152	[3133] 354 140
	[10] 37,9	[202] 23 202	[499] 56 202	[793] 90 201	[1095] 124 201	[1394] 158 200	[1699] 192 198	[1997] 226 196	[2299] 260 193	[3112] 352 181
	[12] 45,4	[176] 20 243	[475] 54 242	[767] 87 242	[1063] 120 241	[1368] 155 240	[1664] 188 238	[1969] 222 236	[2268] 256 234	[3088] 349 222
	[14] 53,0	[140] 16 283	[443] 50 283	[735] 83 282	[1035] 117 281	[1340] 151 280	[1637] 185 279	[1936] 219 277	[2227] 252 274	[3051] 345 262
	Max. Continuous 56,8	[120] 14 304	[425] 48 303	[719] 81 302	[1014] 115 301	[1320] 149 300	[1618] 183 299	[1914] 216 297	[2205] 249 294	[3023] 342 283
	Max. Intermittent 75,7	[27] 3 405	[321] 36 404	[612] 69 402	[911] 103 401	[1211] 137 400	[1504] 170 398	[1795] 203 397		

		231 cm <sup>3</sup> /r [14.1 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous							Max. Continuous	Max. Intermittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1450]	[2000]
		14	28	41	55	69	83	97	100	138
Flow LPM [GPM]	[2] 7,6	[338] 38 32	[707] 80 32	[1074] 121 31	[1456] 165 30	[1827] 206 30	[2192] 248 28	[2572] 291 26	[2657] 300 25	
	[4] 15,1	[328] 37 65	[695] 79 65	[1076] 122 64	[1447] 163 63	[1827] 206 62	[2201] 249 62	[2577] 291 60	[2669] 302 60	[3671] 415 50
	[6] 22,7	[317] 36 97	[687] 78 97	[1057] 119 97	[1434] 162 96	[1811] 205 95	[2186] 247 94	[2555] 289 92	[2650] 299 91	[3668] 414 80
	[8] 30,3	[289] 33 130	[659] 74 130	[1038] 117 130	[1406] 159 129	[1777] 201 128	[2160] 244 127	[2531] 286 124	[2625] 297 124	[3644] 412 112
	[10] 37,9	[265] 30 162	[631] 71 162	[1004] 113 162	[1381] 156 162	[1751] 198 160	[2131] 241 158	[2510] 284 156	[2602] 294 156	[3608] 408 145
	[12] 45,4	[230] 26 195	[599] 68 195	[968] 109 194	[1345] 152 194	[1722] 195 193	[2088] 236 192	[2480] 280 189	[2571] 290 189	[3571] 403 178
	[14] 53,0	[191] 22 227	[563] 64 227	[927] 105 227	[1299] 147 226	[1686] 190 226	[2058] 233 224	[2428] 274 222	[2519] 285 221	[3532] 399 212
	Max. Continuous 56,8	[167] 19 243	[538] 61 243	[904] 102 243	[1279] 145 242	[1661] 188 242	[2030] 229 240	[2404] 272 238	[2493] 282 238	[3488] 394 229
	Max. Intermittent 75,7	[29] 3 324	[411] 46 324	[785] 89 323	[1152] 130 322	[1520] 172 322	[1877] 212 320	[2222] 251 319	[2318] 262 318	

[538]  
 61 } Torque [lb-in]  
 243 } Nm  
 Speed RPM

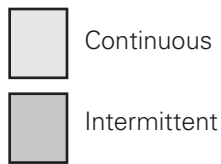


# H Series (101-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



		293 cm <sup>3</sup> /r [17.9 in <sup>3</sup> /r]							Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]								
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1350]	[1800]	
		14	28	41	55	69	83	93	124	
Flow LPM [GPM]	[2]	[427]	[893]	[1361]	[1829]	[2293]	[2672]	[2977]		
	7,6	48 26	101 25	154 25	207 24	259 22	302 16	336 13		
	[4]	[419]	[886]	[1362]	[1833]	[2305]	[2771]	[3110]	[4107]	
	15,1	47 51	100 51	154 51	207 50	260 49	313 47	351 44	464 22	
	[6]	[402]	[872]	[1342]	[1819]	[2291]	[2757]	[3098]	[4121]	
	22,7	45 77	99 77	152 76	206 76	259 74	312 71	350 68	466 54	
	[8]	[367]	[838]	[1316]	[1785]	[2252]	[2723]	[3070]	[4086]	
	30,3	41 102	95 102	149 102	202 101	254 100	308 98	347 95	462 84	
	[10]	[332]	[803]	[1276]	[1749]	[2215]	[2684]	[3034]	[4061]	
	37,9	38 128	91 128	144 128	198 127	250 126	303 123	343 120	459 108	
[12]	[289]	[760]	[1230]	[1706]	[2177]	[2634]	[2989]	[4012]		
45,4	33 153	86 153	139 153	193 153	246 151	298 149	338 146	453 135		
[14]	[241]	[712]	[1176]	[1650]	[2126]	[2592]	[2935]	[3963]		
53,0	27 179	80 179	133 179	186 179	240 177	293 175	332 172	448 161		
Max. Continuous	[15]	[211]	[683]	[1149]	[1623]	[2096]	[2558]	[2905]	[3914]	
	56,8	24 192	77 192	130 192	183 191	237 190	289 188	328 174	442 174	
Max. Intermittent	[20]	[43]	[527]	[1001]	[1463]	[1919]	[2375]	[2720]		
	75,7	5 256	60 256	113 255	165 255	217 254	268 252	307 249		

		370 cm <sup>3</sup> /r [22.6 in <sup>3</sup> /r]							Max. Continuous	Max. Intermittent			739 cm <sup>3</sup> /r [45.1 in <sup>3</sup> /r]			Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]											Δ Pressure Bar [PSI]				
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1250]	[1500]			[200]	[400]	[600]	[800]		
		14	28	41	55	69	83	86	103			14	28	41	55		
Flow LPM [GPM]	[2]	[537]	[1121]	[1715]	[2285]	[2862]						[2]	[1080]	[2250]	[3440]	[4570]	
	7,6	61 20	127 20	194 20	258 19	323 16						7,6	122 10	254 10	389 10	516 9	
	[4]	[532]	[1123]	[1715]	[2308]	[2893]	[3467]	[3604]	[4274]			[4]	[1070]	[2250]	[3440]	[4600]	
	15,1	60 40	127 40	194 40	261 39	327 38	392 36	407 35	483 27			15,1	121 20	254 20	389 19	520 18	
	[6]	[508]	[1100]	[1693]	[2294]	[2884]	[3458]	[3598]	[4283]			[6]	[1020]	[2200]	[3390]	[4590]	
	22,7	57 61	124 61	191 61	259 60	326 58	391 55	407 53	484 47			22,7	115 30	249 30	383 29	519 27	
	[8]	[463]	[1060]	[1661]	[2255]	[2840]	[3414]	[3557]	[4254]			[8]	[ 945]	[2135]	[3330]	[4515]	
	30,3	52 81	120 81	188 81	255 80	321 79	386 76	402 74	481 68			30,3	107 40	241 40	376 39	510 37	
	[10]	[414]	[1017]	[1613]	[2203]	[2788]	[3363]	[3506]	[4212]			[10]	[ 840]	[2050]	[3250]	[4430]	
	37,9	47 101	115 101	182 101	249 101	315 99	380 96	396 94	476 88			37,9	95 50	232 50	367 48	501 46	
[12]	[363]	[960]	[1553]	[2152]	[2737]	[3305]	[3446]	[4152]			[12]	[ 740]	[1945]	[3130]	[4320]		
45,4	41 121	108 121	175 121	243 121	309 119	373 116	389 115	469 109			45,4	84 60	220 59	354 58	488 55		
[14]	[303]	[897]	[1484]	[2086]	[2667]	[3246]	[3386]	[4092]			[14]	[ 630]	[1820]	[3005]	[4195]		
53,0	34 142	101 142	168 142	236 142	301 140	367 137	383 136	462 130			53,0	71 69	206 68	340 68	474 66		
Max. Continuous	[15]	[266]	[862]	[1452]	[2050]	[2630]	[3206]	[3347]	[4054]			Max. Continuous	[ 540]	[1735]	[2905]	[4130]	
	56,8	30 152	97 152	164 152	232 152	297 150	362 148	378 147	458 140			56,8	61 74	196 74	328 73	467 72	
Max. Intermittent	[20]	[61]	[671]	[1269]	[1847]	[2410]	[2987]	[3119]			Max. Intermittent	[ 20]	[ 143]	[1350]	[2565]	[3705]	
	75,7	7 202	76 202	143 202	209 202	272 202	337 199	352 198			75,7	16 99	153 98	290 97	419 96		

[862] Torque [lb-in]  
97 Nm  
152 Speed RPM

# H Series (101-)

## Dimensions

(Refer to pages B-4-19 thru B-4-22 for shaft and port dimensions.)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

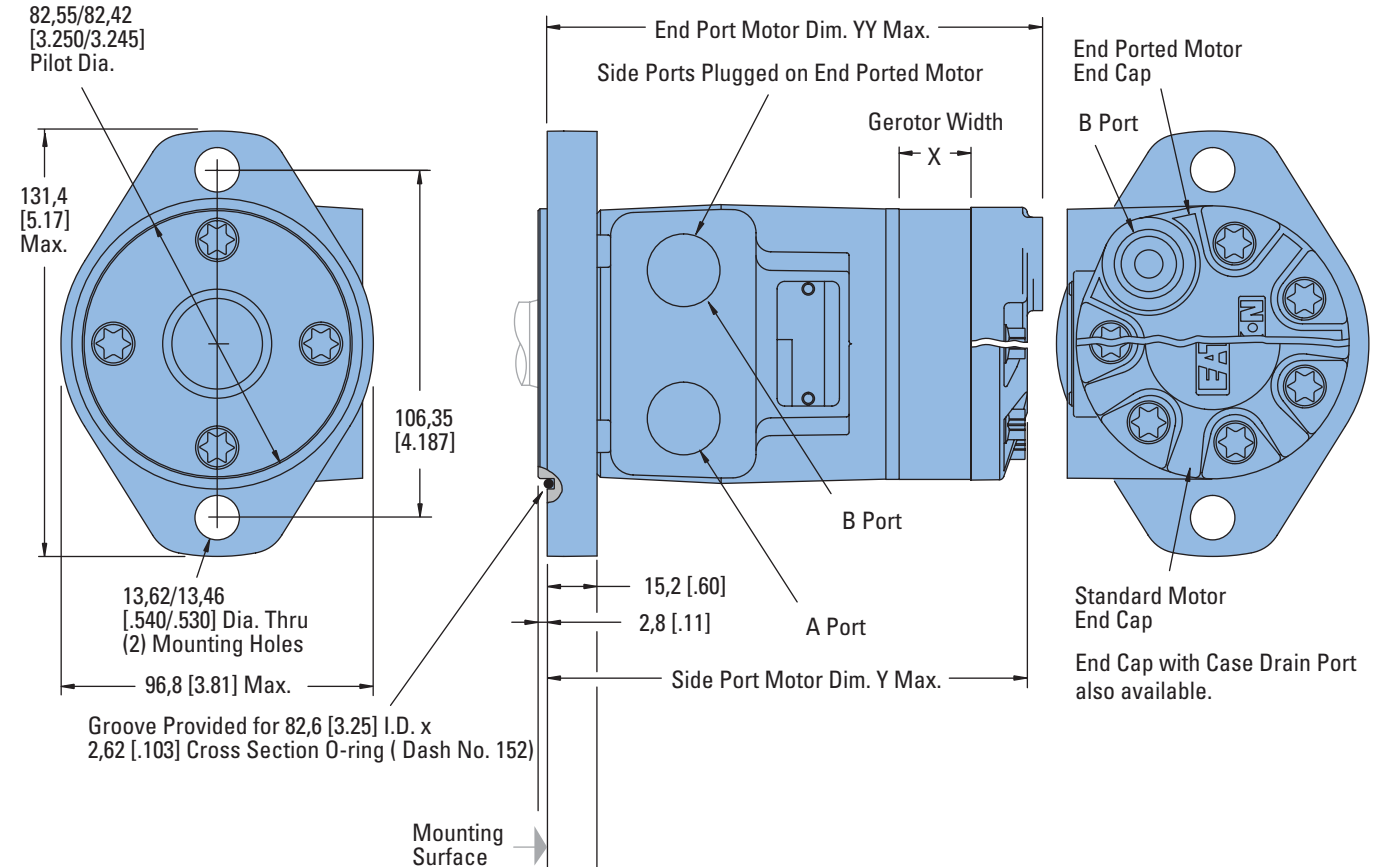
### Note:

Mounting surface flatness requirement is  $\square$ , 13 mm [.005 inch] Max.

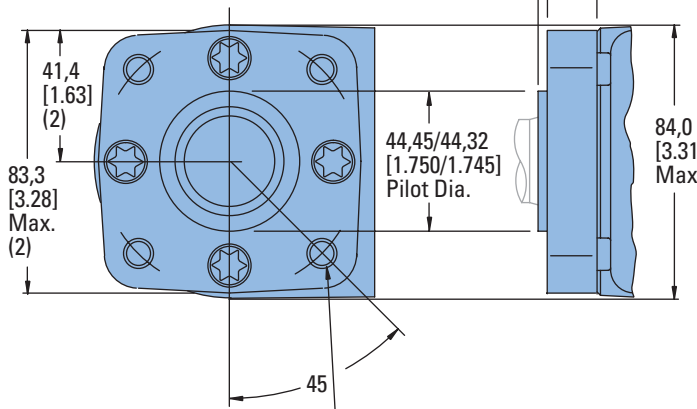
### Note:

End ported motor pressure is derated. Reference page B-2-2 for ratings.

## 2 Bolt Flange



## 4 Bolt Flange



3/8-16 UNC (15,2 [.60] Max. Bolt Thread Engagement ) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle or  
 M10 x 1,5 (15,2 [.60] Max. Bolt Thread Engagement ) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle

### 2 AND 4 BOLT FLANGE

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	YY mm [inch]
36 [ 2.2]	6,4 [ .25]	132,1 [5.20]	138,5 [5.45]
46 [ 2.8]	6,4 [ .25]	132,1 [5.20]	138,5 [5.45]
59 [ 3.6]	10,2 [ .40]	135,9 [5.35]	142,3 [5.60]
74 [ 4.5]	10,2 [ .40]	135,9 [5.35]	142,3 [5.60]
97 [ 5.9]	13,2 [ .52]	139,0 [5.47]	145,3 [5.72]
120 [ 7.3]	16,5 [ .65]	142,3 [5.60]	148,6 [5.85]
146 [ 8.9]	20,1 [ .79]	145,8 [5.74]	152,2 [5.99]
159 [ 9.7]	21,9 [ .86]	147,6 [5.81]	154,0 [6.06]
185 [11.3]	25,4 [1.00]	151,2 [5.95]	157,5 [6.20]
231 [14.1]	31,8 [1.25]	157,5 [6.20]	
293 [17.9]	40,4 [1.59]	166,2 [6.54]	
370 [22.6]	50,8 [2.00]	176,6 [6.95]	
739 [45.1]	101,6 [4.00]	227,4 [8.95]	

# H Series (101-)

## Product Numbers

Use digit prefix —101- plus four digit number from charts for complete product number—Example 101-1001. Orders will not be accepted without three digit prefix.

### 2 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER												
		36 [ 2.2]	46 [ 2.8]	59 [ 3.6]	74 [ 4.5]	97 [ 5.9]	120 [ 7.3]	146 [ 8.9]	159 [ 9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	740 [45.0]
.1 in. Straight 7/8-14 O-Ring	7/8-14 O-Ring	101-1700	-1033	-1701	-1034	-1035	-1702	-1703	-1036	-1037	-1038	-1039	-1040	—
	1/2 NPTF	101-1704	-1025	-1705	-1026	-1027	-1706	-1707	-1028	-1029	-1030	-1031	-1032	—
	Manifold*	101-1708	-1041	-1709	-1042	-1043	-1710	-1711	-1044	-1045	-1046	-1047	-1048	—
1 in. SAE 6B Splined	7/8-14 O-Ring	101-1721	-1081	-1722	-1082	-1083	-1723	-1724	-1084	-1085	-1086	-1087	-1088	—
	1/2 NPTF	101-1725	-1073	-1726	-1074	-1075	-1727	-1728	-1076	-1077	-1078	-1079	-1080	—
	Manifold*	101-1729	-1089	-1730	-1090	-1091	-1731	-1732	-1092	-1093	-1094	-1095	-1096	—
1 in. Straight w/ .31 Dia. Crosshole	7/8-14 O-Ring	101-1796	-1797	-1798	-1799	-1800	-1801	-1802	-1803	—	—	—	—	—
	1/2 NPTF	101-1804	-1805	-1806	-1807	-1808	-1870	-1809	-1810	—	—	—	—	—
	Manifold*	101-1811	-1812	-1813	-1814	-1815	-1816	-1817	-1818	—	—	—	—	—
1 in. Straight w/ .40 Dia. Crosshole	7/8-14 O-Ring	101-1819	-1323	-1820	-1324	-1325	-1821	-1822	-1326	—	—	—	—	—
	1/2 NPTF	101-1823	-1319	-1824	-1320	-1825	-1826	-1827	-1828	—	—	—	—	—
	Manifold*	101-1829	-1463	-1830	-1831	-1832	-1833	-1834	-1871	—	—	—	—	—

101-1834

### 4 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER												
		36 [ 2.2]	46 [ 2.8]	59 [ 3.6]	74 [ 4.5]	97 [ 5.9]	120 [ 7.3]	146 [ 8.9]	159 [ 9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	740 [45.0]
1 in. Straight 7/8-14 O-Ring	7/8-14 O-Ring	101-1749	-1009	-1750	-1010	-1011	-1751	-1752	-1012	-1013	-1014	-1015	-1016	—
	1/2 NPTF	101-1753	-1001	-1754	-1002	-1003	-1755	-1756	-1004	-1005	-1006	-1007	-1008	—
	Manifold*	101-1757	-1017	-1758	-1018	-1019	-1759	-1760	-1020	-1021	-1022	-1023	-1024	—
1 in. SAE 6B Splined	7/8-14 O-Ring	101-1761	-1057	-1762	-1058	-1059	-1872	-1763	-1060	-1061	-1062	-1063	-1064	—
	1/2 NPTF	101-1764	-1049	-1765	-1050	-1051	-1766	-1767	-1052	-1053	-1054	-1055	-1056	—
	Manifold*	101-1768	-1065	-1769	-1066	-1067	-1770	-1771	-1068	-1069	-1070	-1071	-1072	—
1 in. Straight w/ .31 Dia. Crosshole	7/8-14 O-Ring	101-1835	-1836	-1837	-1838	-1839	-1840	-1841	-1842	—	—	—	—	—
	1/2 NPTF	101-1843	-1497	-1844	-1449	-1352	-1845	-1846	-1847	—	—	—	—	—
	Manifold*	101-1848	-1466	-1849	-1459	-1850	-1851	-1852	-1853	—	—	—	—	—
1 in. Straight w/ .40 Dia. Crosshole	7/8-14 O-Ring	101-1854	-1311	-1855	-1856	-1857	-1858	-1859	-1860	—	—	—	—	—
	1/2 NPTF	101-1861	-1313	-1862	-1312	-1314	-1863	-1864	-1315	—	—	—	—	—
	Manifold*	101-1865	-1305	-1866	-1306	-1307	-1867	-1868	-1869	—	—	—	—	—

101-1868

### 4 Bolt Flange with Corrosion Protection

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER												
		36 [ 2.2]	46 [ 2.8]	59 [ 3.6]	74 [ 4.5]	97 [ 5.9]	120 [ 7.3]	146 [ 8.9]	159 [ 9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	740 [45.0]
1 in. Straight w/ Woodruff Key	1/2 NPTF	101-2032	-2014	-2093	-2027	-2013	-2094	-2095	-2015	-2028	-2029	-2030	-2031	—
	Manifold*		-2067							-2068	-2069			

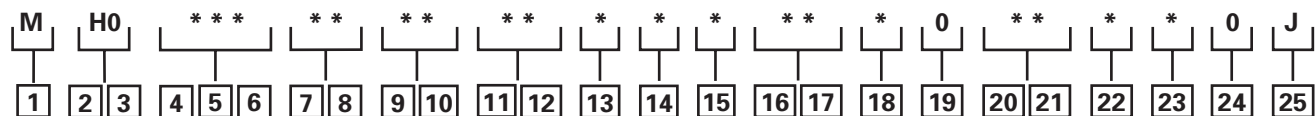
\*Manifold product numbers shown are for motors with four 5/16-18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

For H Series Motors with a configuration Not Shown in the charts above: Use the model code system on page B-2-11 to specify the product in detail.

# H Series (101-)

## Model Code

The following 25-digit coding system has been developed to identify all of the configuration options for the H motor. Use this model code to specify a motor with the desired features. All 25-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

**M** - Motor

### 2, 3 Series

**H0** - H Motor

### 4, 5, 6 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**022** - 36 [2.2]†

**028** - 46 [2.8]

**035** - 58 [3.5]†

**045** - 74 [4.5]

**059** - 96 [5.9]

**073** - 120 [7.3]

**089** - 146 [8.9]

**097** - 159 [9.7]

**113** - 185 [11.3]

**141** - 231 [14.1]

**179** - 294 [17.9]

**226** - 370 [22.6]

**451** - 739 [45.1]

†The H Series motors with displacement code "022" or "035" must also specify free running gerotor (option "AA" in position 11,12).

### 7, 8 Mounting Type

**AA** - 2 Bolt (Standard)  
82.50 [3.248] Dia. x 3.05 [1.20] Pilot, 13.59 [5.35] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

**BA** - 4 Bolt (Standard)  
44.40 [1.748] Dia. x 3.05 [1.20] Pilot, .375-16 UNC-2B Mounting Holes on 82.55 [3.250] Dia. B.C.

**CA** - 2 Bolt (Standard)  
82.50 [3.248] Dia. x 6.10 [2.40] Pilot, 10.41 [4.10] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C. (SAE A)

**DA** - 2 Bolt (Standard)  
101.60 [4.000] Dia. x 6.10 [2.40] Pilot, 14.35 [5.665] Dia. Mounting Holes on 146.05 [5.750] Dia. B.C. (SAE B)

**FA** - 4 Bolt (Standard)  
44.40 [1.748] Dia. x 3.05 [1.20] Pilot, M10 x 1.5-6H Mounting Holes on 82.55 [3.250] Dia. B.C.

**GA** - 4 Bolt (Round) 82.50 [3.248] Dia. x 6.35 [2.50] Pilot, 19.05 [7.50] Dia. Mounting Holes on 109.48 [4.310] Dia. B.C.

### 9, 10 Output Shaft

**01** - 25.4 [1.00] Dia. Straight, Woodruff Key, .250-20 UNC-2B Hole in Shaft End

**02** - 25.4 [1.00] Dia. SAE 6B Spline, .250-20 UNC-2B Hole in Shaft End

**07** - 25.4 [1.00] Dia. Straight, 8.03 [3.16] Dia. Cross Hole 11.2 [4.4] from End, 5.6 [2.2] Extra Length

**08** - 25.4 [1.00] Dia. Straight, 10.31 [4.06] Dia. Cross Hole 15.7 [6.2] from End, .250-20 UNC-2B Hole in Shaft End

**16** - 22.22 [875] Dia. SAE 13 Tooth Spline (SAE B)

**17** - 22.22 [875] Dia. Straight, 6.4 [2.5] x 19.0 [7.5] Square Key (SAE B)

**18** - 25.4 [1.00] Dia. Tapered, Woodruff Key and Nut, 34.92 [1.375] Taper Length

**24** - 25.00 [984] Dia. Straight, 8.00 [3.15] KEY, M8 x 1.25-6H Hole in Shaft End

### 11, 12 Ports

**AA** - .875-14 UNF-2B SAE O-Ring Ports

**AB** - .500-14 NPTF Dry Seal Pipe Thread Ports

**AC** - Manifold Ports (.3125-18 UNC-2B Mounting Holes)

**AD** - Manifold Ports (M8 x 1.25-6H Mounting Holes)

**AF** - G 1/2 BSP Straight Thread Ports

**EB††** - End Ports: .750-16 UNF-2B SAE O-Ring Ports

**EC††** - End Ports: G 1/2 BSP Straight Thread Ports  
†† Note: End ported motor pressure is derated. Reference page B-2-2 for ratings.

### 13 Case Flow Options

**0** - None

**1** - .4375-20 UNF-2B SAE O-Ring Port (End Cap)

**2** - G 1/4 BSP Straight THD Port (End Cap)

**A** - Internal Check Valves

### 14 Gerotor Options

**0** - None

**A** - Free Running

### 15 Shaft Options

**0** - None

**N** - Electroless Nickel Plated

### 16, 17 Seal Options

**00** - Standard Seals

**02** - Seal Guard

**03** - Viton Seals

**04** - Viton Shaft Seal

**05** - Vented Two-Stage Seal

**07** - High Pressure Shaft Seal

### 18 Speed Sensor Options

**0** - None

**A** - Digital Speed Pickup (15 Pulse), No Lead Wire with M12 Connector (A=Power, B=Common, C=Signal)

**B** - Magnetic Speed Pickup (60 Pulse by Quadrature), No Lead Wire with M12 Connector (A=Power, B=Common, C=Signal)

### 19 Manifold Block Options

**0** - None

**\*** - Contact your Eaton Sales Representative for available options.

### 20, 21 Special Features (Hardware)

**00** - None

**AB** - Low Speed Valving

**SS** - Stainless Steel Flange Bolts

### 22 Special Features (Assembly)

**0** - None

**1** - Reverse Rotation

**2** - Flange Rotated 90°

### 23 Paint/ Special Packaging

**0** - No Paint

**A** - Painted Low Gloss Black

**D** - Environmental Coated Gloss White

**F** - Environmental Coated Black

### 24 Eaton Assigned Code when Applicable

**0** - Assigned Code

### 25 Eaton Assigned Design Code

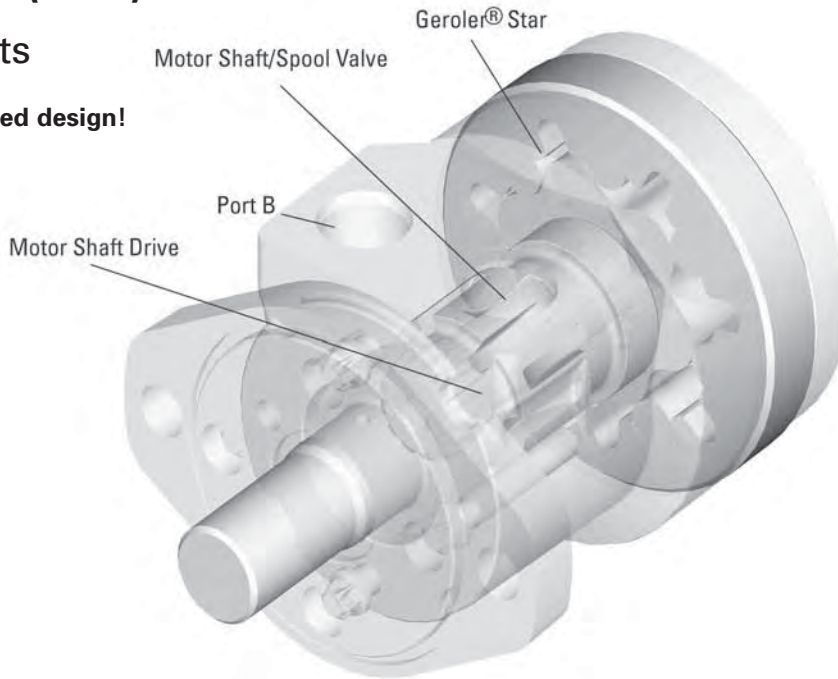
**J** - Nine (9)

# Notes

# S Series (103-)

## Highlights

New, improved design!



### Description

The new improved Char-Lynn S Series motors with optimized Geroler geometry offers enhanced performance with reduced drive-running angle while retaining the overall package size of the original S series. Design improvements include upgraded steel end cap, O-Ring section seals, and optimized Geroler set. The Geroler set has precision-machined rollers in the outer ring which provide support with rolling contact between the star and ring. This improves mechanical efficiency, especially at start-up and at low speed conditions. Improvements incorporated into the latest S Series motor provide reliable leak-free performance and smooth operation at start-up conditions.

### Specifications

Geroler Element	10 Displacements
Flow l/min [GPM]	55 [15] Continuous*** 75 [20] Intermittent**
Speed	Up to 963 RPM
Pressure bar [PSI]	135 [2000] Cont.*** 170 [2500] Inter.**
Torque Nm [lb-in]	528 [4672] Cont.*** 587 [5190] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.

### Features:

- Constant clearance Geroler, design
- Three moving components (gerotor, drive, shaft)
- Optimized drive running angle
- Three-zone pressure design (inlet, return and case)
- Variety of displacements, shafts and mounts
- Special options to meet customer needs!

### Benefits:

- High efficiency
- Smooth low speed operation!
- Extended motor life
- Design flexibility
- Ability to optimize designs for your application needs
- Extended leak-free performance

### Applications:

- Agricultural augers, harvesters, seeders
- Car wash brushes
- Food processing
- Railroad maintenance equipment
- Machine tools
- Conveyors
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment
- Concrete and asphalt equipment
- Skid steer attachments
- Many more



Conveyor



Casting



Amusement ride

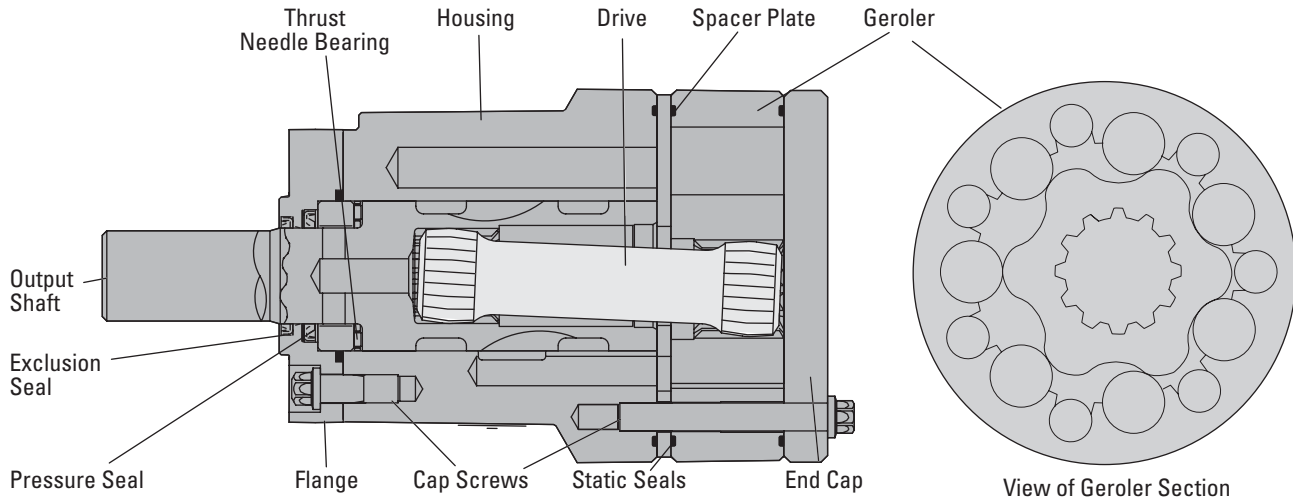


Combine



# S Series (103-)

## Specifications



### SPECIFICATION DATA — S MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		59 [ 3.6]	75 [ 4.6]	97 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [11.4]	225 [13.7]	298 [18.2]	372 [22.7]
Max. Speed (RPM) @ Continuous Flow		963	792	607	472	394	343	304	253	190	153
Flow LPM [GPM]	Continuous	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]
	Intermittent	68 [18]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	115 [1021]	150 [1325]	183 [1623]	237 [2010]	265 [2347]	301 [2662]	333 [2950]	372 [3290]	491 [4345]	528 [4672]
	Intermittent	144 [1271]	186 [1649]	225 [1992]	292 [2582]	324 [2870]	360 [3191]	399 [3533]	434 [3843]	505 [4467]	587 [5200]
Min. Starting Torque Nm[lb-in]	@ Cont. Pressure	90 [ 800]	113 [1000]	148 [1310]	184 [1630]	212 [2050]	232 [2330]	263 [2670]	302 [2990]	338 [3270]	369 [3270]
	@ Int. Pressure	116 [1030]	146 [1290]	190 [1680]	236 [2090]	271 [2400]	289 [2560]	329 [2910]	374 [3310]	417 [3690]	438 [3880]
Pressure Bar [ PSI]	Continuous	138 [2000]	138 [2000]	138 [2000]	138 [2000]	131 [1900]	131 [1900]	128 [1850]	117 [1700]	103 [1500]	90 [1300]
	Intermittent	172 [2500]	172 [2500]	172 [2500]	172 [2500]	162 [2350]	159 [2300]	155 [2250]	141 [2050]	124 [1800]	103 [1500]

**A simultaneous maximum torque and maximum speed NOT recommended.**

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

172 Bar [2500 PSI] without regard to  $\Delta$  Bar [ $\Delta$  PSI] and/or back pressure ratings or combination thereof.

6B Splined or Tapered shafts are recommended whenever operating above 282 NM [2500 lb-in] of torque, especially for those applications subject to frequent reversals.

#### $\Delta$ Pressure:

The true  $\Delta$  bar [ $\Delta$  PSI] between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82°C [180°F]

#### Recommended Filtration:

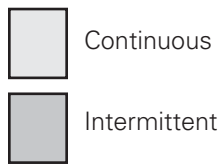
per ISO Cleanliness Code 4406, level 20/18/13

# S Series (103-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production



### S Motor 59 cm<sup>3</sup>/r [3.6 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>138</b>	<b>172</b>
[2]	83	185	288	389	486	580	681	764	849	878	
<b>7,6</b>	<b>128</b>	<b>127</b>	<b>125</b>	<b>122</b>	<b>119</b>	<b>116</b>	<b>112</b>	<b>108</b>	<b>103</b>	<b>96</b>	
[4]	83	189	294	399	502	605	699	804	896	967	1227
<b>15,1</b>	<b>9</b>	<b>21</b>	<b>33</b>	<b>45</b>	<b>57</b>	<b>68</b>	<b>79</b>	<b>91</b>	<b>101</b>	<b>109</b>	<b>139</b>
[6]	76	182	289	395	500	606	691	813	918	1021	1271
<b>22,7</b>	<b>9</b>	<b>21</b>	<b>33</b>	<b>45</b>	<b>57</b>	<b>68</b>	<b>78</b>	<b>92</b>	<b>104</b>	<b>115</b>	<b>144</b>
[8]	70	172	279	386	492	598	676	806	908	1017	1269
<b>30,3</b>	<b>8</b>	<b>19</b>	<b>32</b>	<b>44</b>	<b>56</b>	<b>68</b>	<b>76</b>	<b>91</b>	<b>103</b>	<b>115</b>	<b>143</b>
[10]	52	160	266	373	478	584	652	793	898	1003	1262
<b>37,9</b>	<b>6</b>	<b>18</b>	<b>30</b>	<b>42</b>	<b>54</b>	<b>66</b>	<b>74</b>	<b>90</b>	<b>101</b>	<b>113</b>	<b>143</b>
[12]	41	146	252	359	465	571	628	781	886	991	1253
<b>45,4</b>	<b>5</b>	<b>17</b>	<b>28</b>	<b>41</b>	<b>53</b>	<b>65</b>	<b>71</b>	<b>88</b>	<b>100</b>	<b>112</b>	<b>142</b>
[14]	21	129	234	342	449	556	599	765	871	977	1239
<b>53,0</b>	<b>2</b>	<b>15</b>	<b>26</b>	<b>39</b>	<b>51</b>	<b>63</b>	<b>68</b>	<b>86</b>	<b>98</b>	<b>110</b>	<b>140</b>
[15]	24	121	228	336	442	547	589	758	864	972	1230
<b>56,8</b>	<b>3</b>	<b>14</b>	<b>26</b>	<b>38</b>	<b>50</b>	<b>62</b>	<b>67</b>	<b>86</b>	<b>98</b>	<b>110</b>	<b>139</b>
[18]	39	95	199	304	410	518	533	728	837	941	1206
<b>68,1</b>	<b>4</b>	<b>11</b>	<b>22</b>	<b>34</b>	<b>46</b>	<b>58</b>	<b>60</b>	<b>82</b>	<b>95</b>	<b>106</b>	<b>136</b>

### S Motor 75 cm<sup>3</sup>/r [4.6 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>138</b>	<b>172</b>
[2]	116	248	377	505	627	743	884	930	953	1073	
<b>7,6</b>	<b>13</b>	<b>28</b>	<b>43</b>	<b>57</b>	<b>71</b>	<b>84</b>	<b>100</b>	<b>105</b>	<b>108</b>	<b>121</b>	
[4]	114	251	388	523	656	788	916	1048	1170	1276	1455
<b>15,1</b>	<b>13</b>	<b>28</b>	<b>44</b>	<b>59</b>	<b>74</b>	<b>89</b>	<b>103</b>	<b>118</b>	<b>132</b>	<b>144</b>	<b>164</b>
[6]	110	243	382	518	657	792	906	1059	1196	1325	1631
<b>22,7</b>	<b>12</b>	<b>27</b>	<b>43</b>	<b>59</b>	<b>74</b>	<b>89</b>	<b>102</b>	<b>120</b>	<b>135</b>	<b>150</b>	<b>184</b>
[8]	100	234	371	507	646	780	888	1053	1188	1320	1649
<b>30,3</b>	<b>11</b>	<b>26</b>	<b>42</b>	<b>57</b>	<b>73</b>	<b>88</b>	<b>100</b>	<b>119</b>	<b>134</b>	<b>149</b>	<b>186</b>
[10]	77	216	353	491	626	762	859	1037	1168	1308	1641
<b>37,9</b>	<b>9</b>	<b>24</b>	<b>40</b>	<b>55</b>	<b>71</b>	<b>86</b>	<b>97</b>	<b>117</b>	<b>132</b>	<b>148</b>	<b>185</b>
[12]	63	204	331	473	606	745	828	1015	1153	1288	1626
<b>45,4</b>	<b>7</b>	<b>23</b>	<b>37</b>	<b>53</b>	<b>68</b>	<b>84</b>	<b>94</b>	<b>115</b>	<b>130</b>	<b>146</b>	<b>184</b>
[14]	42	173	324	450	587	723	787	995	1131	1268	1604
<b>53,0</b>	<b>5</b>	<b>20</b>	<b>37</b>	<b>51</b>	<b>66</b>	<b>82</b>	<b>89</b>	<b>112</b>	<b>128</b>	<b>143</b>	<b>181</b>
[15]	41	176	304	442	577	715	774	987	1123	1257	1591
<b>56,8</b>	<b>5</b>	<b>20</b>	<b>34</b>	<b>50</b>	<b>65</b>	<b>81</b>	<b>87</b>	<b>112</b>	<b>127</b>	<b>142</b>	<b>180</b>
[20]	36	107	234	368	506	642	644	916	1053	1187	1527
<b>75,7</b>	<b>4</b>	<b>12</b>	<b>26</b>	<b>42</b>	<b>57</b>	<b>73</b>	<b>73</b>	<b>103</b>	<b>119</b>	<b>134</b>	<b>173</b>

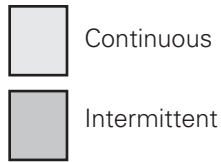
[176] } Torque [lb-in]  
20 } Nm  
737 } Speed RPM

# S Series (103-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production



### S Motor 93 cm<sup>3</sup>/r [5.7 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>138</b>	<b>172</b>
[2]	143	306	463	617	766	876	1080	1020	1129	1182	
	16	35	52	70	87	99	122	115	128	134	
<b>7,6</b>	<b>77</b>	<b>72</b>	<b>65</b>	<b>57</b>	<b>48</b>	<b>36</b>	<b>24</b>	<b>11</b>	<b>9</b>	<b>1</b>	
[4]	150	318	487	652	819	982	1141	1288	1425	1558	1570
	17	36	55	74	92	111	129	146	161	176	177
<b>15,1</b>	<b>157</b>	<b>153</b>	<b>146</b>	<b>138</b>	<b>128</b>	<b>119</b>	<b>105</b>	<b>90</b>	<b>76</b>	<b>64</b>	<b>5</b>
[6]	134	302	473	639	808	977	1119	1306	1466	1623	1980
	15	34	53	72	91	110	126	148	166	183	224
<b>22,7</b>	<b>240</b>	<b>236</b>	<b>230</b>	<b>223</b>	<b>215</b>	<b>207</b>	<b>195</b>	<b>185</b>	<b>167</b>	<b>151</b>	<b>108</b>
[8]	121	286	453	619	786	955	1083	1286	1448	1607	1992
	14	32	51	70	89	108	122	145	164	182	225
<b>30,3</b>	<b>322</b>	<b>317</b>	<b>311</b>	<b>303</b>	<b>294</b>	<b>284</b>	<b>272</b>	<b>260</b>	<b>246</b>	<b>228</b>	<b>187</b>
[10]	97	266	433	600	766	934	1050	1264	1428	1588	1974
	11	30	49	68	87	106	119	143	161	179	223
<b>37,9</b>	<b>403</b>	<b>398</b>	<b>392</b>	<b>383</b>	<b>374</b>	<b>364</b>	<b>352</b>	<b>337</b>	<b>323</b>	<b>307</b>	<b>262</b>
[12]	78	246	412	578	742	913	1012	1240	1402	1563	1952
	9	28	47	65	84	103	114	140	158	177	221
<b>45,4</b>	<b>485</b>	<b>479</b>	<b>473</b>	<b>465</b>	<b>454</b>	<b>444</b>	<b>431</b>	<b>418</b>	<b>401</b>	<b>384</b>	<b>340</b>
[14]	52	217	383	550	711	881	962	1212	1375	1538	1927
	6	24	43	62	80	99	109	137	155	174	218
<b>53,0</b>	<b>566</b>	<b>560</b>	<b>554</b>	<b>545</b>	<b>536</b>	<b>525</b>	<b>512</b>	<b>498</b>	<b>483</b>	<b>466</b>	<b>420</b>
[15]	47	207	372	539	707	867	943	1197	1357	1521	1917
	5	23	42	61	80	98	106	135	153	172	217
<b>56,8</b>	<b>607</b>	<b>602</b>	<b>596</b>	<b>588</b>	<b>580</b>	<b>570</b>	<b>558</b>	<b>545</b>	<b>529</b>	<b>512</b>	<b>467</b>
[20]	10	113	277	444	612	776	776	1111	1276	1445	1844
	1	13	31	50	69	88	88	126	144	163	208
<b>75,7</b>	<b>811</b>	<b>805</b>	<b>800</b>	<b>793</b>	<b>785</b>	<b>775</b>	<b>764</b>	<b>751</b>	<b>736</b>	<b>720</b>	<b>671</b>

### S Motor 120 cm<sup>3</sup>/r [7.3 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2500]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>138</b>	<b>172</b>
[2]	191	402	613	817	1017	1207	1430	1542	1657	1725	
	22	45	69	92	115	136	162	174	187	195	
<b>7,6</b>	<b>57</b>	<b>57</b>	<b>54</b>	<b>49</b>	<b>45</b>	<b>39</b>	<b>34</b>	<b>26</b>	<b>16</b>	<b>7</b>	
[4]	193	411	630	846	1059	1271	1480	1684	1884	2075	2480
	22	46	71	96	120	144	167	190	213	234	280
<b>15,1</b>	<b>124</b>	<b>121</b>	<b>117</b>	<b>114</b>	<b>109</b>	<b>104</b>	<b>97</b>	<b>90</b>	<b>81</b>	<b>72</b>	<b>43</b>
[6]	159	397	616	832	1051	1269	1456	1692	1897	2098	2575
	18	45	70	94	119	143	165	191	214	237	291
<b>22,7</b>	<b>174</b>	<b>183</b>	<b>179</b>	<b>175</b>	<b>170</b>	<b>163</b>	<b>157</b>	<b>149</b>	<b>140</b>	<b>131</b>	<b>102</b>
[8]	156	374	590	808	1026	1242	1414	1670	1879	2085	2582
	18	42	67	91	116	140	160	189	212	236	292
<b>30,3</b>	<b>250</b>	<b>247</b>	<b>243</b>	<b>238</b>	<b>233</b>	<b>227</b>	<b>219</b>	<b>211</b>	<b>202</b>	<b>191</b>	<b>160</b>
[10]	129	345	561	780	997	1214	1364	1637	1847	2056	2560
	15	39	63	88	113	137	154	185	209	232	289
<b>37,9</b>	<b>313</b>	<b>311</b>	<b>307</b>	<b>302</b>	<b>297</b>	<b>291</b>	<b>283</b>	<b>275</b>	<b>266</b>	<b>257</b>	<b>227</b>
[12]	99	319	535	749	968	1184	1312	1609	1820	2031	2536
	11	36	60	85	109	134	148	182	206	230	286
<b>45,4</b>	<b>377</b>	<b>375</b>	<b>370</b>	<b>365</b>	<b>359</b>	<b>353</b>	<b>345</b>	<b>337</b>	<b>328</b>	<b>317</b>	<b>287</b>
[14]	67	285	501	709	934	1150	1240	1578	1789	1995	2512
	8	32	57	80	106	130	140	178	202	225	284
<b>53,0</b>	<b>440</b>	<b>437</b>	<b>434</b>	<b>428</b>	<b>423</b>	<b>416</b>	<b>409</b>	<b>400</b>	<b>390</b>	<b>380</b>	<b>350</b>
[15]	63	272	485	699	912	1128	1224	1552	1764	1969	2487
	7	31	55	79	103	127	138	175	199	222	281
<b>56,8</b>	<b>472</b>	<b>469</b>	<b>464</b>	<b>459</b>	<b>453</b>	<b>445</b>	<b>438</b>	<b>429</b>	<b>419</b>	<b>407</b>	<b>373</b>
[20]	19	159	369	585	801	1018	1024	1444	1657	1867	2386
	2	18	42	66	91	115	116	163	187	211	270
<b>75,7</b>	<b>631</b>	<b>627</b>	<b>624</b>	<b>619</b>	<b>614</b>	<b>607</b>	<b>600</b>	<b>591</b>	<b>582</b>	<b>572</b>	<b>542</b>

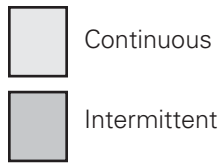
[272] } Torque [lb-in]  
31 } Nm  
469 } Speed RPM

# S Series (103-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production



### S Motor 144 cm<sup>3</sup>/r [8.8 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2350]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>131</b>	<b>162</b>
[2]	219	481	731	975	1214	1437	1707	1726	1815	1925	
<b>7,6</b>	<b>51</b>	<b>48</b>	<b>45</b>	<b>41</b>	<b>36</b>	<b>30</b>	<b>24</b>	<b>20</b>	<b>12</b>	<b>1</b>	
[4]	228	493	750	1011	1263	1512	1770	1994	2223	2320	2659
<b>15,1</b>	<b>26</b>	<b>56</b>	<b>85</b>	<b>114</b>	<b>143</b>	<b>171</b>	<b>200</b>	<b>225</b>	<b>251</b>	<b>262</b>	<b>300</b>
[6]	214	474	730	994	1249	1502	1739	1989	2233	2347	2850
<b>22,7</b>	<b>24</b>	<b>54</b>	<b>82</b>	<b>112</b>	<b>141</b>	<b>170</b>	<b>196</b>	<b>225</b>	<b>252</b>	<b>265</b>	<b>322</b>
[8]	188	448	708	965	1224	1481	1688	1977	2220	2339	2870
<b>30,3</b>	<b>21</b>	<b>51</b>	<b>80</b>	<b>109</b>	<b>138</b>	<b>167</b>	<b>191</b>	<b>223</b>	<b>251</b>	<b>264</b>	<b>324</b>
[10]	156	416	674	934	1195	1449	1635	1947	2194	2316	2845
<b>37,9</b>	<b>18</b>	<b>47</b>	<b>76</b>	<b>106</b>	<b>135</b>	<b>164</b>	<b>185</b>	<b>220</b>	<b>248</b>	<b>262</b>	<b>321</b>
[12]	123	381	639	900	1157	1415	1576	1913	2160	2282	2818
<b>45,4</b>	<b>14</b>	<b>43</b>	<b>72</b>	<b>102</b>	<b>131</b>	<b>160</b>	<b>178</b>	<b>216</b>	<b>244</b>	<b>258</b>	<b>318</b>
[14]	82	339	600	855	1109	1371	1497	1874	2121	2246	2778
<b>53,0</b>	<b>9</b>	<b>38</b>	<b>68</b>	<b>97</b>	<b>125</b>	<b>155</b>	<b>169</b>	<b>212</b>	<b>240</b>	<b>254</b>	<b>314</b>
[15]	79	329	583	837	1094	1346	1465	1849	2100	2230	2758
<b>56,8</b>	<b>9</b>	<b>37</b>	<b>66</b>	<b>95</b>	<b>124</b>	<b>152</b>	<b>166</b>	<b>209</b>	<b>237</b>	<b>252</b>	<b>312</b>
[20]		185	439	694	947	1206	1214	1713	1961	2100	2631
<b>75,7</b>		<b>523</b>	<b>521</b>	<b>518</b>	<b>513</b>	<b>508</b>	<b>502</b>	<b>495</b>	<b>486</b>	<b>475</b>	<b>450</b>

### S Motor 166 cm<sup>3</sup>/r [10.1 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1900]	[2300]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>131</b>	<b>159</b>
[2]	321	643	964	1256	1534	1800	1910	1970	2280	2261	
<b>7,6</b>	<b>36</b>	<b>73</b>	<b>109</b>	<b>142</b>	<b>173</b>	<b>203</b>	<b>216</b>	<b>223</b>	<b>258</b>	<b>255</b>	
[4]	321	643	964	1286	1607	1919	2159	2405	2629	2420	3049
<b>15,1</b>	<b>36</b>	<b>73</b>	<b>109</b>	<b>145</b>	<b>182</b>	<b>217</b>	<b>244</b>	<b>272</b>	<b>297</b>	<b>273</b>	<b>344</b>
[6]	321	643	964	1286	1555	1838	2125	2400	2656	2445	3187
<b>22,7</b>	<b>36</b>	<b>73</b>	<b>109</b>	<b>145</b>	<b>176</b>	<b>208</b>	<b>240</b>	<b>271</b>	<b>300</b>	<b>276</b>	<b>360</b>
[8]	711	892	1026	1222	1564	1907	2159	2398	2401	2448	3191
<b>30,3</b>	<b>80</b>	<b>101</b>	<b>116</b>	<b>138</b>	<b>177</b>	<b>215</b>	<b>244</b>	<b>271</b>	<b>271</b>	<b>277</b>	<b>360</b>
[10]	321	643	964	1260	1536	1862	2037	2333	2296	2413	3168
<b>37,9</b>	<b>36</b>	<b>73</b>	<b>109</b>	<b>142</b>	<b>174</b>	<b>210</b>	<b>230</b>	<b>264</b>	<b>259</b>	<b>273</b>	<b>358</b>
[12]	321	643	894	1198	1476	1813	2060	2353	2548	2662	3132
<b>45,4</b>	<b>36</b>	<b>73</b>	<b>101</b>	<b>135</b>	<b>167</b>	<b>205</b>	<b>233</b>	<b>266</b>	<b>288</b>	<b>301</b>	<b>354</b>
[14]	321	643	927	1190	1420	1752	2054	2326	2535	2305	3085
<b>53,0</b>	<b>36</b>	<b>73</b>	<b>105</b>	<b>134</b>	<b>160</b>	<b>198</b>	<b>232</b>	<b>263</b>	<b>286</b>	<b>260</b>	<b>349</b>
[15]	321	607	854	1112	1333	1675	2022	1950	2204	2268	3059
<b>56,8</b>	<b>36</b>	<b>69</b>	<b>96</b>	<b>126</b>	<b>151</b>	<b>189</b>	<b>228</b>	<b>220</b>	<b>249</b>	<b>256</b>	<b>346</b>
[20]		567	647	954	1239	1409	1740	1851	2072	2181	2911
<b>75,7</b>		<b>64</b>	<b>73</b>	<b>108</b>	<b>140</b>	<b>159</b>	<b>197</b>	<b>209</b>	<b>234</b>	<b>246</b>	<b>329</b>

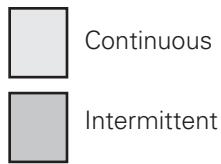
[607] } Torque [lb-in]  
69 } Nm  
343 } Speed RPM

# S Series (103-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production



### S Motor 187 cm<sup>3</sup>/r [11.4 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[1850]	[2250]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>124</b>	<b>128</b>	<b>155</b>
[2]	282	626	950	1267	1582	1879	2217	2407	2591	2541	
	32	71	107	143	179	212	250	272	293	287	
<b>7,6</b>	<b>39</b>	<b>38</b>	<b>36</b>	<b>34</b>	<b>31</b>	<b>27</b>	<b>24</b>	<b>18</b>	<b>11</b>	<b>4</b>	
[4]	304	642	979	1311	1640	1961	2295	2588	2891	2938	3463
	34	73	111	148	185	222	259	292	327	332	391
<b>15,1</b>	<b>80</b>	<b>78</b>	<b>76</b>	<b>74</b>	<b>71</b>	<b>67</b>	<b>63</b>	<b>58</b>	<b>52</b>	<b>44</b>	<b>32</b>
[6]	288	624	959	1294	1625	1949	2264	2584	2889	2950	3533
	33	71	108	146	184	220	256	292	326	333	399
<b>22,7</b>	<b>120</b>	<b>119</b>	<b>117</b>	<b>114</b>	<b>111</b>	<b>107</b>	<b>102</b>	<b>96</b>	<b>90</b>	<b>82</b>	<b>68</b>
[8]	255	591	923	1256	1584	1905	2199	2536	2843	2912	3515
	29	67	104	142	179	215	248	286	321	329	397
<b>30,3</b>	<b>162</b>	<b>160</b>	<b>158</b>	<b>155</b>	<b>152</b>	<b>147</b>	<b>142</b>	<b>135</b>	<b>127</b>	<b>119</b>	<b>104</b>
[10]	218	553	882	1216	1546	1872	2128	2503	2809	2874	3468
	25	62	100	137	175	212	240	283	317	325	392
<b>37,9</b>	<b>203</b>	<b>201</b>	<b>199</b>	<b>196</b>	<b>193</b>	<b>189</b>	<b>183</b>	<b>177</b>	<b>169</b>	<b>160</b>	<b>145</b>
[12]	169	507	837	1165	1491	1817	2039	2431	2736	2802	3390
	19	57	95	132	169	205	230	275	309	317	383
<b>45,4</b>	<b>243</b>	<b>242</b>	<b>240</b>	<b>238</b>	<b>234</b>	<b>231</b>	<b>225</b>	<b>219</b>	<b>212</b>	<b>203</b>	<b>187</b>
[14]	119	455	780	1110	1432	1743	1942	2353	2659	2733	3323
	13	51	88	125	162	197	219	266	300	309	375
<b>53,0</b>	<b>284</b>	<b>283</b>	<b>281</b>	<b>279</b>	<b>276</b>	<b>272</b>	<b>267</b>	<b>261</b>	<b>254</b>	<b>245</b>	<b>229</b>
[15]	105	434	761	1088	1404	1720	1904	2313	2605	2692	3267
	12	49	86	123	159	194	215	261	294	304	369
<b>56,8</b>	<b>304</b>	<b>304</b>	<b>302</b>	<b>299</b>	<b>296</b>	<b>293</b>	<b>288</b>	<b>281</b>	<b>274</b>	<b>266</b>	<b>250</b>
[20]		250	578	909	1230	1548	1590	2178	2470	2548	3122
		28	65	103	139	175	180	246	279	288	353
<b>75,7</b>		<b>405</b>	<b>405</b>	<b>403</b>	<b>400</b>	<b>397</b>	<b>393</b>	<b>386</b>	<b>379</b>	<b>369</b>	<b>354</b>

### S Motor 225 cm<sup>3</sup>/r [13.7 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1700]	[2050]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>110</b>	<b>117</b>	<b>138</b>
[2]	436	842	1156	1592	1884	2251	2787	2846	2845	3359
	49	95	131	180	213	254	315	322	321	379
<b>7,6</b>	<b>32</b>	<b>30</b>	<b>29</b>	<b>26</b>	<b>23</b>	<b>19</b>	<b>16</b>	<b>13</b>	<b>6</b>	<b>2</b>
[4]	554	871	1265	1710	2103	2421	2992	3069	3267	3843
	63	98	143	193	238	274	338	347	369	434
<b>15,1</b>	<b>66</b>	<b>65</b>	<b>63</b>	<b>60</b>	<b>57</b>	<b>54</b>	<b>49</b>	<b>44</b>	<b>38</b>	<b>32</b>
[6]	410	827	1253	1670	2079	2427	2923	3049	3214	3838
	46	93	142	189	235	274	330	344	363	434
<b>22,7</b>	<b>100</b>	<b>99</b>	<b>96</b>	<b>94</b>	<b>91</b>	<b>87</b>	<b>83</b>	<b>77</b>	<b>71</b>	<b>63</b>
[8]	382	853	1292	1724	2131	2433	3017	3155	3290	3835
	43	96	146	195	241	275	341	356	372	433
<b>30,3</b>	<b>134</b>	<b>133</b>	<b>131</b>	<b>128</b>	<b>125</b>	<b>121</b>	<b>116</b>	<b>109</b>	<b>101</b>	<b>94</b>
[10]	436	843	1092	1471	1841	2229	2574	2983	3164	3769
	49	95	123	166	208	252	291	337	358	426
<b>37,9</b>	<b>168</b>	<b>167</b>	<b>166</b>	<b>164</b>	<b>161</b>	<b>157</b>	<b>151</b>	<b>144</b>	<b>135</b>	<b>125</b>
[12]	382	778	1151	1540	1874	2256	2694	2991	3158	3764
	43	88	130	174	212	255	304	338	357	425
<b>45,4</b>	<b>202</b>	<b>201</b>	<b>200</b>	<b>197</b>	<b>194</b>	<b>190</b>	<b>185</b>	<b>178</b>	<b>168</b>	<b>159</b>
[14]	234	646	1059	1471	1899	2250	2575	2951	3165	3777
	26	73	120	166	215	254	291	333	358	427
<b>53,0</b>	<b>236</b>	<b>236</b>	<b>234</b>	<b>232</b>	<b>229</b>	<b>225</b>	<b>220</b>	<b>213</b>	<b>203</b>	<b>192</b>
[15]	287	674	1018	1408	1807	2142	2464	2832	3029	3606
	32	76	115	159	204	242	278	320	342	407
<b>56,8</b>	<b>253</b>	<b>253</b>	<b>252</b>	<b>249</b>	<b>246</b>	<b>242</b>	<b>237</b>	<b>232</b>	<b>222</b>	<b>213</b>
[20]		418	797	1173	1604	1917	2053	2620	2808	3405
		47	90	133	181	217	232	296	317	385
<b>75,7</b>		<b>337</b>	<b>337</b>	<b>336</b>	<b>333</b>	<b>329</b>	<b>325</b>	<b>320</b>	<b>312</b>	<b>303</b>

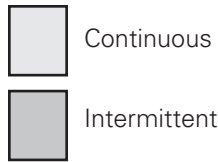
[674] } Torque [lb-in]  
76 } Nm  
253 } Speed RPM

# S Series (103-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed, however for best motor life select a motor to run with a torque and speed range printed in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production



**S Motor 298 cm<sup>3</sup>/r [18.2 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1500]	[1800]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>97</b>	<b>103</b>	<b>124</b>
[2]	529	1069	1711	2210	2515	2924	3867	4143	3843
<b>7,6</b>	<b>60</b>	<b>121</b>	<b>193</b>	<b>250</b>	<b>284</b>	<b>330</b>	<b>437</b>	<b>468</b>	<b>434</b>
[4]	579	1159	1738	2317	2897	3230	4055	4345	4441
<b>15,1</b>	<b>65</b>	<b>131</b>	<b>196</b>	<b>262</b>	<b>327</b>	<b>365</b>	<b>458</b>	<b>491</b>	<b>502</b>
[6]	507	1159	1738	2170	2694	3050	3798	4070	4467
<b>22,7</b>	<b>57</b>	<b>131</b>	<b>196</b>	<b>245</b>	<b>304</b>	<b>345</b>	<b>429</b>	<b>460</b>	<b>505</b>
[8]	567	1158	1721	2144	2516	2994	3752	4020	4424
<b>30,3</b>	<b>64</b>	<b>131</b>	<b>194</b>	<b>242</b>	<b>284</b>	<b>338</b>	<b>424</b>	<b>454</b>	<b>500</b>
[10]	494	1067	1621	2109	2539	3086	3691	3955	4442
<b>37,9</b>	<b>56</b>	<b>121</b>	<b>183</b>	<b>238</b>	<b>287</b>	<b>349</b>	<b>417</b>	<b>447</b>	<b>502</b>
[12]	471	1075	1588	2209	2577	3075	3866	4142	4323
<b>45,4</b>	<b>53</b>	<b>121</b>	<b>179</b>	<b>250</b>	<b>291</b>	<b>347</b>	<b>437</b>	<b>468</b>	<b>488</b>
[14]	334	947	1463	2096	2485	2968	3668	3930	4190
<b>53,0</b>	<b>38</b>	<b>107</b>	<b>165</b>	<b>237</b>	<b>281</b>	<b>335</b>	<b>414</b>	<b>444</b>	<b>473</b>
[15]	329	930	1446	1990	2434	2780	3482	3731	4122
<b>56,8</b>	<b>37</b>	<b>105</b>	<b>163</b>	<b>225</b>	<b>275</b>	<b>314</b>	<b>393</b>	<b>421</b>	<b>466</b>
[20]		598	1113	1650	2169	2533	2888	3094	3890
<b>75,7</b>		<b>68</b>	<b>126</b>	<b>186</b>	<b>245</b>	<b>286</b>	<b>326</b>	<b>350</b>	<b>439</b>
		<b>254</b>	<b>254</b>	<b>252</b>	<b>250</b>	<b>248</b>	<b>244</b>	<b>244</b>	<b>232</b>

**S Motor 372 cm<sup>3</sup>/r [22.7 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]

	[200]	[400]	[600]	[800]	[1000]	[1200]	[1300]	[1500]
	<b>14</b>	<b>28</b>	<b>41</b>	<b>55</b>	<b>69</b>	<b>83</b>	<b>90</b>	<b>103</b>
[2]	723	1445	2168	2822	3447	4045	4383	4599
<b>7,6</b>	<b>82</b>	<b>163</b>	<b>245</b>	<b>319</b>	<b>390</b>	<b>457</b>	<b>495</b>	<b>520</b>
[4]	723	1445	2168	2890	3613	4312	4672	5200
<b>15,1</b>	<b>82</b>	<b>163</b>	<b>245</b>	<b>327</b>	<b>408</b>	<b>487</b>	<b>528</b>	<b>587</b>
[6]	723	1445	2168	2890	3494	4131	4475	5117
<b>22,7</b>	<b>82</b>	<b>163</b>	<b>245</b>	<b>327</b>	<b>395</b>	<b>467</b>	<b>506</b>	<b>578</b>
[8]	723	1445	2168	2746	3516	4286	4643	5199
<b>30,3</b>	<b>82</b>	<b>163</b>	<b>245</b>	<b>310</b>	<b>397</b>	<b>484</b>	<b>525</b>	<b>587</b>
[10]	723	1445	2168	2831	3453	4184	4532	4906
<b>37,9</b>	<b>82</b>	<b>163</b>	<b>245</b>	<b>320</b>	<b>390</b>	<b>473</b>	<b>512</b>	<b>554</b>
[12]	723	1445	2008	2692	3316	4075	4414	4961
<b>45,4</b>	<b>82</b>	<b>163</b>	<b>227</b>	<b>304</b>	<b>375</b>	<b>460</b>	<b>499</b>	<b>561</b>
[14]	723	1445	2084	2675	3192	3938	4266	4946
<b>53,0</b>	<b>82</b>	<b>163</b>	<b>235</b>	<b>302</b>	<b>361</b>	<b>445</b>	<b>482</b>	<b>559</b>
[15]	723	1365	1918	2499	2996	3766	4079	4870
<b>56,8</b>	<b>82</b>	<b>154</b>	<b>217</b>	<b>282</b>	<b>338</b>	<b>425</b>	<b>461</b>	<b>550</b>
[20]		1274	1454	2144	2784	3167	3431	4191
<b>75,7</b>		<b>144</b>	<b>164</b>	<b>242</b>	<b>315</b>	<b>358</b>	<b>388</b>	<b>474</b>
		<b>204</b>	<b>204</b>	<b>204</b>	<b>204</b>	<b>203</b>	<b>203</b>	<b>201</b>





# S Series (103-)

## Dimensions

(Refer to pages B-4-19 thru B-4-22 for shaft and port dimensions.)

### Ports

7/8-14 SAE O-Ring

6-1/2 (BSP) Straight thread manifold

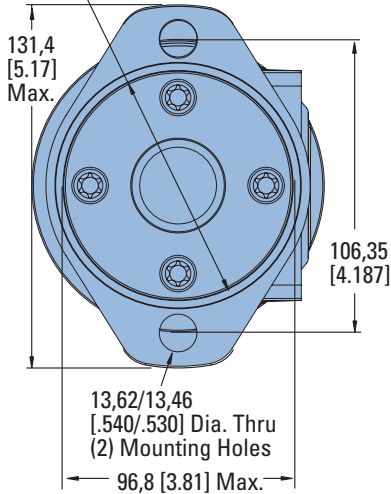
### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

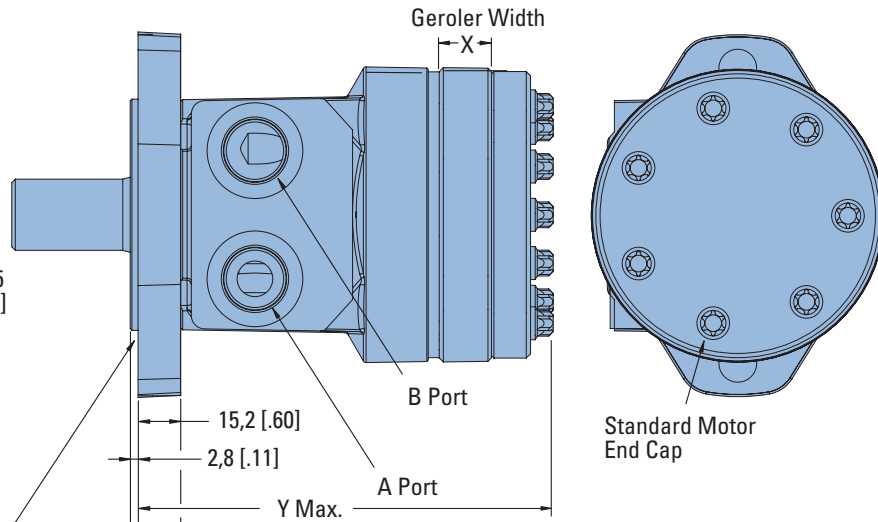
Port B Pressurized — CCW

### 2 Bolt Flange

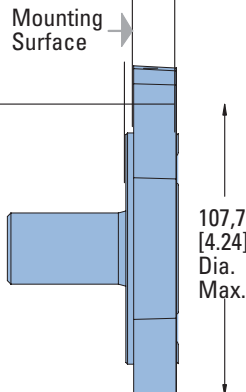
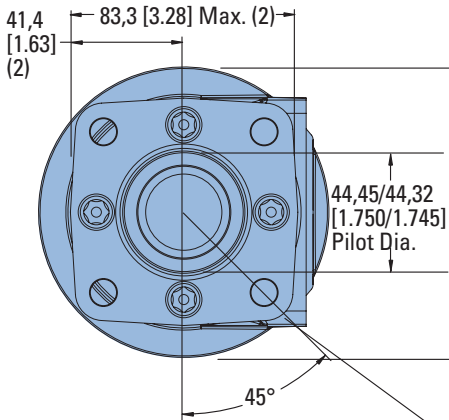
82,55/82,42  
[3.250/3.245]  
Pilot Dia.



Groove Provided for 82,6 [3.25] I.D. x 2,62 [1.103] Cross Section O-ring ( Dash No. 152)



### 4 Bolt Flange



Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
58 [3.6]	7,5 [.30]	138,0 [5.43]
76 [4.6]	9,8 [.39]	140,3 [5.52]
93 [5.7]	12,0 [.47]	142,5 [5.61]
120 [7.3]	15,5 [.61]	146,0 [5.75]
144 [8.8]	18,6 [.73]	149,1 [5.87]
165 [10.1]	21,3 [.84]	151,8 [5.98]
186 [11.4]	24,0 [.94]	154,5 [6.08]
225 [13.7]	28,9 [1.14]	159,4 [6.28]
299 [18.2]	38,5 [1.52]	169,0 [6.66]
371 [22.7]	47,9 [1.88]	178,4 [7.02]

3/8-16 UNC (15,2 [.60] Max. Bolt Thread Engagement) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle or  
M10 x 1,5 (15,2 [.60] Max. Bolt Thread Engagement) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle

# S Series (103-)

## Product Numbers

Use three-digit prefix (103-) plus four-digit number from charts for complete product number (ex: 103-1093). Orders will not be accepted without the three-digit prefix.

### 2 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
		59 [ 3.6]	75 [ 4.6]	93 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [11.4]	225 [13.7]	298 [18.2]	372 [22.7]
1 in. Straight w/Woodruff Key	7/8-14 O-Ring	103-1537	-1034	-1035	-1538	-1539	-1036	-1037	-1038	-1039	-1040
	1/2 NPTF	103-1540	-1026	-1027	-1541	-1542	-1028	-1029	-1030	-1031	-1032
	Manifold	103-1543	-1042	-1043	-1544	-1545	-1044	-1045	-1046	-1047	-1048
1 in. SAE 6B Splined	7/8-14 O-Ring	103-1552	-1082	-1083	-1553	-1554	-1084	-1085	-1086	-1087	-1088
	1/2 NPTF	103-1555	-1074	-1075	-1556	-1557	-1076	-1077	-1078	-1079	-1080
	Manifold	103-1558	-1090	-1091	-1559	-1560	-1092	-1093	-1094	-1095	-1096

103-1093

### 4 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
		59 [ 3.6]	75 [ 4.6]	93 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [11.4]	225 [13.7]	298 [18.2]	372 [22.7]
1 in. Straight w/Woodruff Key	7/8-14 O-Ring	103-1570	-1010	-1011	-1571	-1572	-1012	-1013	-1014	-1015	-1016
	1/2 NPTF	103-1573	-1002	-1003	-1574	-1575	-1004	-1005	-1006	-1007	-1008
	Manifold	103-1576	-1018	-1019	-1577	-1578	-1020	-1021	-1022	-1023	-1024
1 in. SAE 6BSplined	7/8-14 O-Ring	103-1579	-1058	-1059	-1580	-1581	-1060	-1061	-1062	-1063	-1064
	1/2 NPTF	103-1582	-1050	-1051	-1583	-1584	-1052	-1053	-1054	-1055	-1056
	Manifold	103-1585	-1066	-1067	-1586	-1587	-1068	-1069	-1070	-1071	-1072

103-1069

### S Series Motors with Corrosion Protection

SHAFT	MOUNTING	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
			59 [ 3.6]	75 [ 4.6]	93 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [11.4]	225 [13.7]	298 [18.2]	372 [22.7]
1 in. Straight w/ Woodruff Key	2 Bolt Flange	7/8-14 O-Ring	103-1645	-	-	-	-	-	-	-1649	-	-1650
	4 Bolt Flange	1/2 NPTF	-	-	-	-	-	-	-	-1620	-	-1621

\*Manifold product numbers shown are for motors with four 5/16 z-18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

For S Series Motors with a configuration Not Shown in the charts above: Use the model code number system on page B-3-11 to specify the product in detail.

# Product Numbers

## S Series with Low Speed Valving

Motors with the low speed valving option enable very smooth low speed operation while maintaining high torque.

Designed to run continuously at up to 200 RPM at standard rated pressures and reduced flows, this option provides smooth operation at low speeds. Furthermore, they resist slippage and have

more momentary load holding ability than the standard H and S Series motors. Motors with this valving are not intended for low pressure applications (41 Bar [600 PSI] Minimum). Shaft side / radial load ratings are not affected by this valving.

Use digit prefix—103- plus four digit number from charts for complete product number—Example: 103-2678.

**Orders will not be accepted without the three-digit prefix.**

### 2 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER										
		59 [ 3.6]	75 [ 4.6]	93 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [ 11.4]	225 [ 13.7]	298 [ 18.2]	372 [ 22.7]	
1 in. Straight w/Woodruff Key	7/8 -14 O-Ring		103- —	-1427	-1428	—	—	-1429	-1430	-1431	-1432	-1433
	1/2 NPTF	103- —	-1419	-1420	—	—	-1421	-1422	-1423	-1424	-1425	
	Manifold*	103- —	—	—	—	—	—	—	—	—	—	—
1 in. SAE 6B Splined	7/8 -14 O-Ring		103- —	-1525	—	—	-2692	—	—	-1675	—	—
	1/2 NPTF	103- —	—	-1634	—	—	—	—	—	—	—	—
	Manifold*	103- —	-1522	-2678	—	—	—	—	—	—	-1527	—

### 4 Bolt Flange

SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER										
		59 [ 3.6]	75 [ 4.6]	93 [ 5.7]	120 [ 7.3]	144 [ 8.8]	166 [ 10.1]	187 [ 11.4]	225 [ 13.7]	298 [ 18.2]	372 [ 22.7]	
1 in. Straight w/Woodruff Key	7/8 -14 O-Ring		103-1625	-1410	-1411	-1626	-2531	-1412	-1413	-1414	-1415	-1416
	1/2 NPTF	103-1644	-1402	-1403	—	—	-1404	-1405	-1406	-1407	-1408	

103-1404

103-1527

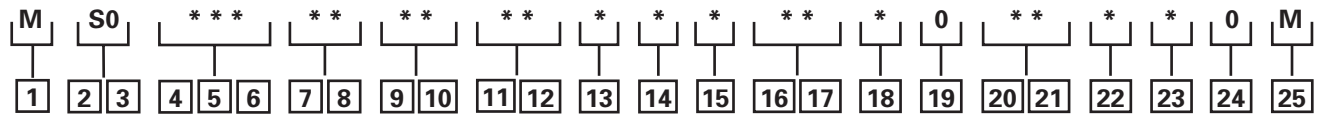
\*Manifold product numbers shown are for motors with four 5/16 -18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

For S Series Motors with Low Speed Valving Not Shown in the chart above: Use the model code number system on page B-3-11 to specify the product in detail.

# S Series (103-)

## Model Code

The following 25-digit coding system has been developed to identify all of the configuration options for the S motor. Use this model code to specify a motor with the desired features. All 25-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

M – Motor

### 2, 3 Series

S0 – S Series Motor

### 4, 5, 6 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

036 – 58 [3.6]

046 – 76 [4.6]

057 – 93 [5.7]

073 – 120 [7.3]

088 – 144 [8.8]

101 – 165 [10.1]

114 – 186 [11.4]

137 – 224 [13.7]

182 – 299 [18.2]

227 – 371 [22.7]

### 7, 8 Mounting Type

**AA** – 2 Bolt Std: 82.50 [3.248] Dia. x 3.05 [1.20] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

**BA** – 4 Bolt Std: 44.40 [1.748] Dia. x 3.05 [1.20] Pilot, .375-16 Unc-2b Mounting Holes on 82.55 [3.250] Dia. B.C.

**CA** – 2 Bolt Std: 82.50 [3.248] Dia. x 6.10 [.240] Pilot, 10.41 [.410] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C. (SAE A)

**DD** – 2 Bolt Std: 101.60 [4.000] Dia. x 6.10 [.240] Pilot, 14.35 [.565] Dia. Mounting Holes on 146.05 [5.750] Dia. B.C. (SAE B) (Ductile)

**EA** – 4 Bolt Magneto: 82.50 [3.248] Dia. x 3.05 [1.20] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

**FA** – 4 Bolt Std: 44.40 [1.748] Dia. x 3.05 [1.20]

Pilot, M10 x 1.5-6h Mounting Holes on 82.55 [3.250] Dia. B.C.

**LA** – 2 Bolt Std: 44.45 [1.750] Dia. x 3.05 [1.20] Pilot, 13.59 [.535] Dia. Mounting Holes on 106.35 [4.187] Dia. B.C.

### 9, 10 Output Shaft

**01** – 25.4 [1.00] Dia. Straight, Woodruff Key, .250-20 UNC-2B Hole in Shaft End

**02** – 25.4 [1.00] Dia. SAE 6B Spline, .250-20 UNC-2B Hole in Shaft End

**07** – 25.4 [1.00] Dia. Straight, 8.03 [.316] Dia. Crosshole 11.2 [.44] From End, 5.6 [.22] Extra Length

**08** – 25.4 [1.00] Dia. Straight, 10.31 [.406] Dia. Crosshole 15.7 [.62] From End, .250-20 UNC-2B Hole in Shaft End

**16** – 22.22 [.875] Dia. SAE 13 Tooth Spline (SAE B)

**17** – 22.22 [.875] Dia. Straight, 6.4 [.25] x 19.0 [.75] Square Key (SAE B)

**18** – 25.4 [1.00] Dia. Tapered, Woodruff Key and Nut, 34.92 [1.375] Taper Length

**24** – 25.00 [.984] Dia. Straight, 8.00 [.315] Key, M8 x 1.25-6H Hole in Shaft End

### 11, 12 Port Type

**AA** – .875-14 UNF-2B SAE O-Ring Ports

**AB** – .500-14 NPTF Dryseal Pipe Thread Ports

**AC** – Manifold Ports (.3125-18 UNC-2B Mounting Holes)

**AD** – Manifold Ports (M8 x 1.25-6H Mounting Holes)

**AF** – G 1/2 BSP Straight Thread Ports

### 13 Case Flow Options ††

0 – None Specified

**1** – 4375-20 UNF-2B SAE O-Ring Port (End Cap)

**2** – G 1/4 BSP Straight THD Port (End Cap)

**3** – Manifold Case Drain

†† – Internal check valves are standard fetures.

### 14 Geroler Options

0 – None Specified

### 15 Shaft Options

0 – None Specified

**N** – Electroless Nickel Plated

### 16, 17 Seal Options

**00** – Standard Seals

**02** – Seal Guard

**03** – Viton Seals

**04** – Viton Shaft Seal

**05** – Vented Two-Stage Seal

**07** – High Pressure Shaft Seal

### 18 Speed Sensor Options

0 – None

**A** – Speed Sensor Options 12mm Digital Speed Pickup (15 pulse) without lead wire

**B** – Magnetic Speed Pickup (60 Pulse by Quadrature), No lead wire with M12 connector

(A=Power, B=Common, C=Signal)

### 19 Manifold Block Options

0 – None

\* Contact your Eaton sales representatitve for available options.

### 20, 21 Special Features (Hardware)

**00** – None Specified

**AB** – Low Speed Valving

**SS** – Stainless Steel Flange Bolts

### 22 Special Assembly Instructions

0 – None

**1** – Reverse Rotation

**2** – Flange Rotated 90°

**3** – Reverse Rotation, Flange Rotated 90°

### 23 Paint/Packaging Options

0 – No Paint

**A** – Painted Low Gloss Black

**D** – Environmental Coated Gloss White

**F** – Environmental Coated Black

### 24 Eaton Assigned Code When Applicable

0 – Assigned Code

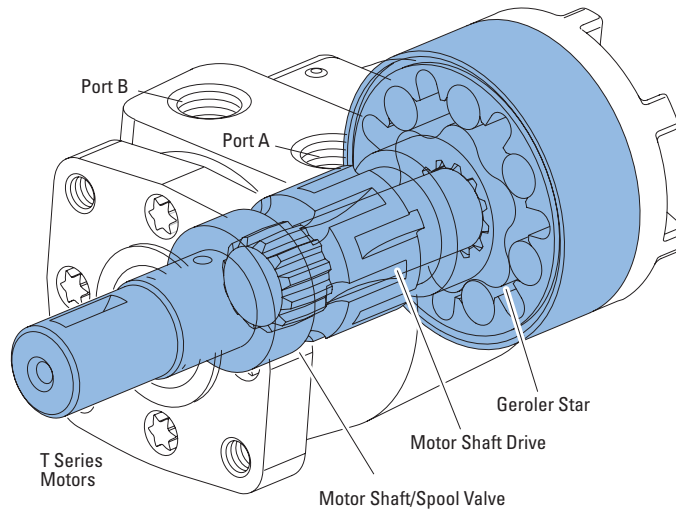
### 25 Eaton Assigned Design Code

**M** – Twelve (12)

# Notes

# T Series (158-)

## Highlights



### Description

The newest Geroler motor, the “T Series, features the latest innovations in Geroler technology. These innovations include optimized Geroler geometry with lower drive running angle for improved life and improved low speed performance. In addition, the improved housing and smaller diameter end cap results in increased envelope rigidity which improves efficiency under high pressure loads. All of these innovations come together to make the T Series motor the highest performing motor in its class.

### Specifications for T Series Motors

Geroler Element	11 Displacements
Flow l/min [GPM]	55 [15] Continuous*** 75 [20] Intermittent**
Speed	Up to 1021 RPM
Pressure bar [PSI]	155 [2250] Cont.*** 190 [2750] Inter.**
Torque Nm [lb-in]	441 [3905] Cont.*** 486 [4300] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.

### Features:

- Constant clearance Geroler, geometry
- Optimized drive system with reduced running angle
- Three-pressure zone design (ability to reduce case pressure)
- Variety of displacements, shafts and mounts
- Special options to meet customer needs

### Benefits:

- High efficiency
- Smooth low-speed operation
- Extended motor life (especially at low speed conditions)
- Design flexibility
- Ability to optimize designs for your application needs
- Extends leak-free performance

### Applications:

- Agricultural augers, harvesters, seeders
- Car wash brushes
- Food processing
- Railroad maintenance equipment
- Machine tools
- Conveyors
- Industrial sweepers and floor polishers
- Saw mill works
- Turf equipment
- Concrete and asphalt equipment
- Skid steer attachments
- Many more



Crane (winch)



Paving



Harvester

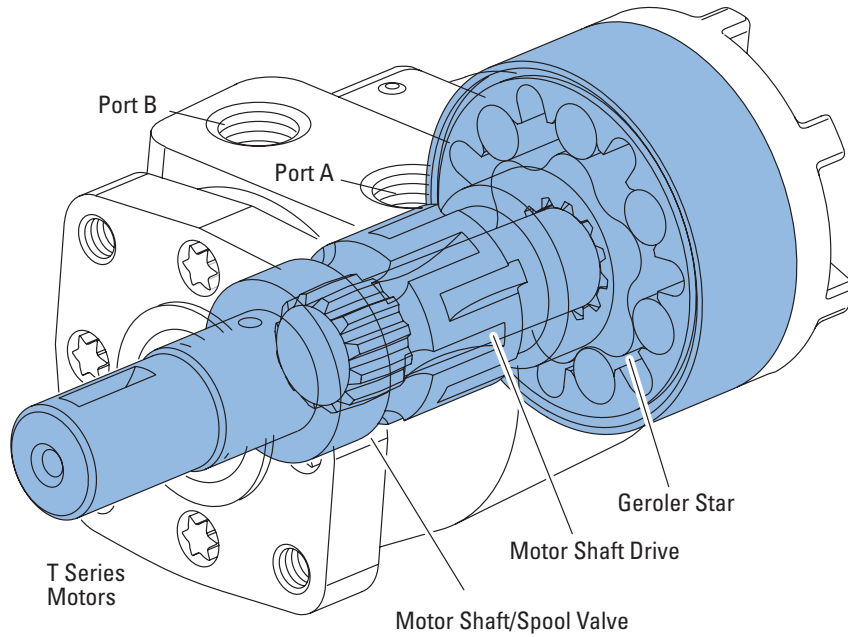


Crane and winches



# T Series (158-)

## Specifications



### SPECIFICATION DATA — T MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		36 [2.2]	49 [3.0]	66 [4.0]	80 [4.9]	102 [6.2]	131 [8.0]	157 [9.6]	195 [11.9]	244 [14.9]	306 [18.7]	370 [22.6]
Max. Speed (RPM) @ Continuous Flow		1021	906	849	694	550	426	355	287	229	183	152
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]
	Intermittent	38 [10]	57 [15]	68 [18]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	76 [672]	105 [928]	138 [1222]	174 [1541]	219 [1936]	251 [2226]	297 [2628]	359 [3178]	410 [3633]	441 [3905]	430 [3811]
	Intermittent **	93 [824]	118 [1131]	168 [1488]	212 [1872]	264 [2339]	307 [2718]	359 [3178]	437 [3864]	485 [4290]	483 [4275]	486 [4300]
Pressure Δ Bar Δ PSI]	Continuous*	155 [2250]	155 [2250]	155 [2250]	155 [2250]	155 [2250]	138 [2000]	138 [2000]	138 [2000]	127 [1850]	110 [1600]	90 [1300]
	Intermittent***	190 [2750]	190 [2750]	190 [2750]	190 [2750]	190 [2750]	172 [2500]	172 [2500]	172 [2500]	155 [2250]	124 [1800]	103 [1500]

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

190 Bar [2750 PSI] without regard to Δ Bar [D PSI] and/or back pressure ratings or combination thereof.

6B splined or Tapered shafts are recommended whenever operation above 282 NM [2500 lb-in] of torque, especially for those applications subject to frequent reversals.

#### Δ Pressure:

The true Δ bar [Δ PSI] between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82°C [180°F]

#### Recommended Filtration:



per ISO Cleanliness Code 4406, level 20/18/13

# T Series (158-, 185-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

**36 cm<sup>3</sup>/r [2.2 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]  
Continuous

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	Max. Continuous	Max. Intermittent
		14	28	41	55	69	83	97	110	124	138	152	155		
Flow LPM [GPM]	[2]	[50]	[110]	[172]	[233]	[291]	[348]	[401]	[455]	[501]	[546]	[590]	[596]	[635]	
	7,6	6 209	12 203	19 197	26 191	33 189	39 181	45 167	51 164	57 153	62 139	67 122	67 116	72 64	
	[4]	[50]	[109]	[172]	[233]	[296]	[355]	[414]	[475]	[534]	[584]	[646]	[659]	[786]	
	15,1	6 415	12 411	19 398	26 388	33 384	40 381	47 368	54 357	60 354	66 323	73 304	74 302	89 283	
	[6]	[43]	[108]	[171]	[233]	[298]	[361]	[420]	[479]	[538]	[595]	[657]	[672]	[824]	
22,7	5 617	12 613	19 602	26 595	34 585	41 570	47 563	54 558	61 534	67 520	74 504	76 496	93 425		
[8]	[39]	[101]	[164]	[226]	[292]	[354]	[415]	[475]	[538]	[592]	[656]	[670]	[819]		
30,3	4 821	11 815	19 803	26 797	33 784	40 774	47 758	54 747	61 732	67 707	74 688	76 680	92 607		
[10]	[30]	[93]	[155]	[214]	[278]	[342]	[406]	[473]	[532]	[590]	[650]	[668]	[805]		
37,9	3 1021	11 1014	18 1002	24 999	31 981	39 965	46 953	53 937	60 921	67 903	73 880	75 873	91 799		

[93] } Torque [lb-in]  
 11 } Nm  
 1014 } Speed RPM

**49 cm<sup>3</sup>/r [3.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]  
Continuous

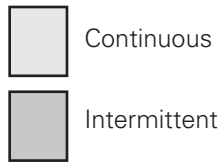
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	Max. Continuous	Max. Intermittent
		14	28	41	55	69	83	97	110	124	138	152	155		
Flow LPM [GPM]	[2]	[73]	[161]	[245]	[327]	[408]	[486]	[563]	[641]	[710]	[786]	[849]	[866]	[1023]	
	7,6	8 152	18 152	28 148	37 147	46 142	55 141	64 134	72 124	80 115	89 109	96 95	98 92	116 58	
	[4]	[72]	[160]	[246]	[329]	[416]	[500]	[584]	[668]	[746]	[825]	[901]	[922]	[1123]	
	15,1	8 303	18 298	28 294	37 290	47 276	56 273	66 265	75 261	84 245	93 243	102 235	104 228	127 152	
	[6]	[58]	[148]	[234]	[326]	[413]	[500]	[583]	[663]	[746]	[827]	[909]	[928]	[1131]	
22,7	7 461	17 450	26 445	37 438	47 434	56 421	66 419	75 410	84 407	93 389	103 376	105 373	128 344		
[8]	[44]	[127]	[216]	[306]	[392]	[480]	[566]	[652]	[734]	[815]	[897]	[917]	[1125]		
30,3	5 607	14 603	24 600	35 590	44 583	54 576	64 564	74 554	83 545	92 536	101 522	104 520	127 503		
[10]	[39]	[128]	[213]	[302]	[391]	[477]	[562]	[647]	[731]	[815]	[897]	[917]	[1121]		
37,9	4 755	14 750	24 745	34 738	44 732	54 719	63 713	73 702	83 696	92 682	101 663	104 661	127 638		
[12]	[33]	[119]	[203]	[291]	[378]	[464]	[551]	[635]	[719]	[802]	[883]	[900]	[1061]		
45,4	4 906	13 902	23 895	33 883	43 875	52 862	62 859	72 844	81 835	91 819	100 806	102 804	120 788		
Max. Intermittent	[15]	[26]	[86]	[172]	[256]	[342]	[430]	[505]	[591]	[674]	[745]	[830]	[851]		
56,8	3 1132	10 1124	19 1113	29 1115	39 1106	49 1106	57 1098	67 1093	76 1079	84 1070	94 1058	96 1056			

# T Series (158-, 185-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



		66 cm <sup>3</sup> /r [4.0 in <sup>3</sup> /r]											Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]												
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2750]
		14	28	41	55	69	83	97	110	124	138	152	155	190
Flow LPM [GPM]	[2]	[78]	[191]	[303]	[414]	[522]	[625]	[706]	[804]	[898]	[991]	[1081]	[1103]	[1318]
	7,6	9 114	22 111	34 110	47 107	59 105	71 101	80 96	91 92	101 87	112 81	122 73	125 72	149 48
	[4]	[97]	[209]	[325]	[441]	[548]	[657]	[766]	[873]	[972]	[1077]	[1181]	[1205]	[1437]
	15,1	11 229	24 229	37 217	50 216	62 212	74 205	87 194	99 190	110 186	122 183	133 181	136 178	162 170
	[6]	[79]	[192]	[309]	[426]	[534]	[649]	[760]	[874]	[984]	[1090]	[1190]	[1218]	[1488]
	22,7	9 344	22 343	35 335	48 334	60 321	73 320	86 319	99 315	111 291	123 288	134 279	138 276	168 270
	[8]	[75]	[191]	[304]	[419]	[532]	[645]	[759]	[871]	[982]	[1092]	[1197]	[1222]	[1458]
	30,3	8 456	22 451	34 447	47 442	60 431	73 426	86 419	98 415	111 412	123 401	135 391	138 386	165 339
	[10]	[49]	[163]	[283]	[398]	[509]	[623]	[742]	[856]	[971]	[1080]	[1186]	[1209]	[1425]
	37,9	6 569	18 565	32 560	45 552	58 547	70 541	84 532	97 525	110 512	122 504	134 498	137 496	161 475
[12]	[24]	[156]	[270]	[385]	[502]	[614]	[729]	[845]	[963]	[1067]	[1182]	[1209]	[1472]	
45,4	3 681	18 678	31 671	43 665	57 658	69 651	82 641	95 635	109 623	121 612	134 604	137 601	166 571	
[14]	[19]	[143]	[261]	[370]	[485]	[602]	[718]	[837]	[948]	[1064]	[1175]	[1199]	[1436]	
53,0	2 793	16 788	29 787	42 778	55 771	68 762	81 753	95 746	107 733	120 723	133 715	135 711	162 677	
[15]	[13]	[120]	[236]	[352]	[471]	[590]	[707]	[823]	[939]	[1052]	[1165]	[1192]	[1462]	
Max. Continuous	56,8	1 849	14 844	27 839	40 832	53 826	67 819	80 806	93 800	106 786	119 779	132 770	135 766	165 725
Max. Intermittent	68,1	[18]	[107]	[215]	[326]	[442]	[555]	[669]	[786]	[900]	[1016]	[1123]	[1152]	
		12 1006	24 1003	37 998	50 988	63 976	76 975	89 965	102 952	115 940	127 924	130 919		

		80 cm <sup>3</sup> /r [4.9 in <sup>3</sup> /r]											Max. Continuous	Max. Intermittent
		Δ Pressure Bar [PSI]												
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]	[2750]
		14	28	41	55	69	83	97	110	124	138	152	155	190
Flow LPM [GPM]	[2]	[123]	[265]	[405]	[544]	[680]	[804]	[934]	[1052]	[1181]	[1079]	[937]	[895]	
	7,6	14 93	30 90	46 86	61 83	77 80	91 75	106 70	119 63	133 57	122 43	106 24	101 20	
	[4]	[120]	[264]	[406]	[551]	[689]	[828]	[965]	[1101]	[1237]	[1369]	[1505]	[1537]	[1857]
	15,1	14 187	30 185	46 183	62 179	78 175	94 171	109 166	124 162	140 156	155 150	170 142	174 140	210 121
	[6]	[113]	[255]	[398]	[542]	[682]	[823]	[963]	[1101]	[1239]	[1373]	[1508]	[1541]	[1868]
	22,7	13 279	29 275	45 271	61 267	77 265	93 258	109 253	124 248	140 240	155 232	170 223	174 221	211 198
	[8]	[99]	[243]	[386]	[528]	[669]	[812]	[954]	[1094]	[1233]	[1368]	[1503]	[1537]	[1872]
	30,3	11 372	27 367	44 364	60 359	76 354	92 351	108 343	124 338	139 333	155 324	170 315	174 313	212 289
	[10]	[84]	[228]	[371]	[514]	[655]	[798]	[941]	[1080]	[1219]	[1357]	[1496]	[1530]	[1870]
	37,9	9 463	26 460	42 456	58 450	74 446	90 441	106 435	122 428	138 420	153 412	169 403	173 399	211 368
[12]	[63]	[209]	[354]	[498]	[638]	[782]	[926]	[1067]	[1208]	[1346]	[1484]	[1520]	[1864]	
45,4	7 557	24 552	40 547	56 543	72 537	88 530	105 523	121 515	136 509	152 500	168 489	172 487	211 470	
[14]	[55]	[185]	[331]	[476]	[620]	[762]	[904]	[1046]	[1188]	[1327]	[1467]	[1502]	[1842]	
53,0	6 649	21 646	37 642	54 635	70 630	86 622	102 616	118 609	134 599	150 592	166 581	170 578	208 550	
[15]	[51]	[176]	[316]	[463]	[609]	[748]	[891]	[1037]	[1177]	[1316]	[1457]	[1491]	[1844]	
Max. Continuous	56,8	6 694	20 691	36 687	52 680	69 673	85 668	101 660	117 650	133 642	149 634	165 622	168 619	208 598
Max. Intermittent	75,7	[20]	[160]	[305]	[455]	[578]	[737]	[857]	[968]	[1144]	[1277]	[1412]	[1446]	
		18 916	34 910	51 893	65 893	83 875	97 866	109 877	129 843	144 833	160 839	163 836		





# T Series (158-, 185-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

 Continuous  
 Intermittent

		102 cm <sup>3</sup> /r [6.2 in <sup>3</sup> /r]											Max. Contin-uous	Max. Inter-mittent	
		Δ Pressure Bar [PSI]													
		Continuous													
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2250]		
		14	28	41	55	69	83	97	110	124	138	152	155	[2750]	
Flow LPM [GPM]	[2]	[161]	[341]	[519]	[697]	[871]	[1030]	[1193]	[1349]	[1511]	[1496]	[1441]	[1421]		
	7,6	18 73	39 71	59 68	79 66	98 63	116 60	135 56	152 51	171 46	169 36	163 23	161 20		
	[4]	[157]	[340]	[520]	[702]	[879]	[1056]	[1229]	[1401]	[1567]	[1727]	[1889]	[1925]	[2271]	
	15,1	18 149	38 146	59 144	79 141	99 138	119 135	139 131	158 128	177 124	195 118	213 111	217 109	257 92	
	[6]	[147]	[329]	[510]	[692]	[871]	[1050]	[1227]	[1401]	[1571]	[1731]	[1895]	[1936]	[2339]	
	22,7	17 221	37 217	58 214	78 211	98 208	119 204	139 199	158 195	178 190	196 184	214 176	219 174	264 154	
	[8]	[132]	[315]	[497]	[675]	[857]	[1038]	[1216]	[1392]	[1564]	[1725]	[1891]	[1932]	[2326]	
	30,3	15 294	36 290	56 287	76 284	97 280	117 277	137 271	157 267	177 262	195 255	214 247	218 245	263 220	
	[10]	[109]	[293]	[477]	[657]	[839]	[1018]	[1198]	[1374]	[1542]	[1711]	[1878]	[1918]	[2326]	
	37,9	12 367	33 363	54 360	74 355	95 351	115 347	135 343	155 337	174 332	193 325	212 318	217 315	263 287	
[12]	[84]	[271]	[457]	[638]	[818]	[999]	[1179]	[1354]	[1527]	[1697]	[1858]	[1901]	[2323]		
45,4	9 440	31 436	52 432	72 429	92 424	113 419	133 414	153 409	173 402	192 395	210 386	215 384	262 364		
[14]	[59]	[242]	[428]	[611]	[794]	[974]	[1151]	[1328]	[1502]	[1674]	[1841]	[1883]	[2301]		
53,0	7 513	27 510	48 506	69 501	90 497	110 492	130 487	150 482	170 475	189 469	208 458	213 456	260 428		
Max. Contin-uous	[15]	[39]	[227]	[411]	[595]	[780]	[957]	[1136]	[1314]	[1486]	[1658]	[1828]	[1869]	[2285]	
	56,8	4 550	26 545	46 542	67 537	88 532	108 528	128 522	148 516	168 510	187 502	207 492	211 490	258 463	
Max. Inter-mittent	[20]		[154]	[328]	[515]	[710]	[874]	[1060]	[1243]	[1405]	[1579]	[1763]	[1803]		
	75,7		17 724	37 718	58 720	80 709	99 707	120 696	140 684	159 683	178 670	199 659	204 660		

		131 cm <sup>3</sup> /r [8.0 in <sup>3</sup> /r]										Max. Contin-uous	Max. Inter-mittent
		Δ Pressure Bar [PSI]											
		Continuous											
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]		
		14	28	41	55	69	83	97	110	124	138	[2500]	
Flow LPM [GPM]	[2]	[219]	[450]	[682]	[915]	[1144]	[1348]	[1561]	[1771]	[1979]	[2159]		
	7,6	25 57	51 55	77 53	103 51	129 49	152 47	176 43	200 40	224 36	244 30		
	[4]	[212]	[449]	[681]	[917]	[1148]	[1376]	[1600]	[1822]	[2025]	[2221]	[2629]	
	15,1	24 115	51 113	77 110	104 109	130 107	155 105	181 102	206 99	229 96	251 91	297 75	
	[6]	[197]	[435]	[669]	[903]	[1139]	[1370]	[1600]	[1818]	[2032]	[2226]	[2718]	
	22,7	22 171	49 168	76 166	102 163	129 160	155 157	181 154	205 150	230 147	252 142	307 125	
	[8]	[181]	[417]	[657]	[886]	[1122]	[1359]	[1589]	[1812]	[2022]	[2215]	[2699]	
	30,3	20 227	47 225	74 222	100 219	127 217	154 213	180 209	205 206	228 202	250 196	305 175	
	[10]	[144]	[389]	[631]	[859]	[1098]	[1330]	[1562]	[1783]	[1993]	[2198]	[2687]	
	37,9	16 284	44 281	71 278	97 275	124 271	150 267	176 265	201 261	225 258	248 252	304 231	
[12]	[114]	[361]	[605]	[838]	[1075]	[1307]	[1532]	[1755]	[1965]	[2177]	[2671]		
45,4	13 341	41 338	68 334	95 332	121 328	148 325	173 321	198 318	222 312	246 307	302 285		
[14]	[82]	[327]	[569]	[803]	[1042]	[1273]	[1498]	[1722]	[1935]	[2147]	[2655]		
53,0	9 397	37 394	64 391	91 387	118 384	144 361	169 378	195 374	219 370	243 365	300 339		
Max. Contin-uous	[15]	[66]	[302]	[550]	[785]	[1025]	[1254]	[1480]	[1704]	[1915]	[2119]	[2648]	
	56,8	7 426	34 423	62 422	89 415	116 412	142 409	167 405	193 402	216 398	239 392	299 367	
Max. Inter-mittent	[20]		[177]	[429]	[678]	[908]	[1143]	[1375]	[1596]	[1811]	[2017]		
	75,7		20 565	48 560	77 556	103 553	129 549	155 546	180 541	205 536	228 527		

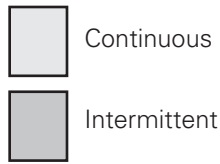
[302] } Torque [lb-in]  
34 } Nm  
423 } Speed RPM

# T Series (158-, 185-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



		157 cm <sup>3</sup> /r [9.6 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous										Max. Contin- uous	Max. Inter- mittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2000]	[2500]
		14	28	41	55	69	83	97	110	124	138	138	172
[2]		[264]	[541]	[819]	[1092]	[1357]	[1605]	[1847]	[2084]	[2311]	[1858]		
	7,6	30 47	61 45	93 44	123 42	153 40	181 37	209 34	235 30	261 25	210 16		
[4]		[259]	[541]	[822]	[1101]	[1373]	[1638]	[1890]	[2145]	[2383]	[2613]	[3063]	
	15,1	29 96	61 95	93 92	124 91	155 90	185 88	189 85	214 82	242 78	269 73	295 60	
[6]		[241]	[526]	[808]	[1090]	[1368]	[1638]	[1900]	[2150]	[2399]	[2628]	[3169]	
	22,7	27 142	59 140	91 138	123 136	155 134	185 132	215 129	243 125	271 121	297 114	358 99	
[8]		[219]	[506]	[789]	[1068]	[1348]	[1625]	[1885]	[2140]	[2388]	[2619]	[3178]	
	30,3	25 189	57 187	89 185	121 183	152 181	184 178	213 175	242 172	270 166	296 159	359 140	
[10]		[180]	[472]	[759]	[1037]	[1319]	[1590]	[1853]	[2111]	[2355]	[2594]	[3170]	
	37,9	20 237	53 234	86 232	117 230	149 227	180 224	209 222	239 218	266 211	293 203	358 183	
[12]		[141]	[436]	[728]	[1010]	[1292]	[1561]	[1821]	[2079]	[2331]	[2573]	[3162]	
	45,4	16 284	49 282	82 279	114 277	146 274	176 272	206 269	235 265	263 257	291 248	357 225	
[14]		[101]	[397]	[687]	[969]	[1252]	[1519]	[1778]	[2040]	[2295]	[2539]	[3147]	
	53,0	11 332	45 329	78 326	109 323	141 321	172 319	201 316	230 311	259 305	287 296	356 274	
Max. Contin- uous	[15]	[81]	[367]	[665]	[944]	[1231]	[1497]	[1755]	[2018]	[2273]	[2512]	[3136]	
	56,8	9 355	41 353	75 350	107 347	139 344	169 342	198 339	228 334	257 327	284 318	354 300	
Max. Inter- mittent	[20]		[221]	[519]	[814]	[1095]	[1368]	[1631]	[1891]	[2149]	[2396]		
	75,7		25 472	59 467	92 464	124 462	155 459	184 455	214 450	243 443	271 433		

		195 cm <sup>3</sup> /r [11.9 in <sup>3</sup> /r] Δ Pressure Bar [PSI] Continuous										Max. Contin- uous	Max. Inter- mittent
		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1750]	[1800]	[2000]	[2500]
		14	28	41	55	69	83	97	110	121	125	138	172
[2]		[330]	[671]	[1016]	[1345]	[1654]	[1969]	[2242]	[2507]	[2689]	[2748]	[2973]	
	7,6	37 38	76 36	115 34	152 33	187 31	222 28	253 25	283 20	304 16	310 14	336 8	
[4]		[328]	[675]	[1026]	[1366]	[1692]	[2010]	[2289]	[2586]	[2799]	[2867]	[3144]	[3797]
	15,1	37 77	76 77	116 75	154 73	191 73	227 71	259 68	292 65	316 62	324 61	355 55	429 40
[6]		[306]	[658]	[1011]	[1360]	[1698]	[2021]	[2324]	[2604]	[2829]	[2901]	[3178]	[3831]
	22,7	35 115	74 113	114 111	154 110	192 109	228 107	263 104	294 100	320 97	328 95	359 87	433 68
[8]		[272]	[634]	[980]	[1331]	[1675]	[2003]	[2300]	[2592]	[2815]	[2888]	[3174]	[3864]
	30,3	31 153	72 151	111 150	150 148	189 146	226 144	260 142	293 139	318 134	326 132	359 123	437 99
[10]		[238]	[596]	[945]	[1296]	[1637]	[1960]	[2255]	[2565]	[2786]	[2857]	[3140]	[3816]
	37,9	27 192	67 189	107 188	146 186	185 184	221 183	255 181	290 176	315 168	323 166	355 156	431 133
[12]		[181]	[545]	[908]	[1260]	[1607]	[1924]	[2223]	[2529]	[2759]	[2836]	[3121]	[3807]
	45,4	20 230	62 228	103 226	142 224	182 222	217 221	251 219	286 213	312 207	320 204	353 192	430 160
[14]		[154]	[500]	[860]	[1211]	[1556]	[1869]	[2175]	[2483]	[2713]	[2792]	[3080]	[3778]
	53,0	17 268	56 266	97 264	137 261	176 259	211 259	246 256	281 251	307 244	315 242	348 229	427 199
Max. Contin- uous	[15]	[140]	[465]	[832]	[1179]	[1525]	[1835]	[2144]	[2459]	[2693]	[2768]	[3061]	[3764]
	56,8	16 287	53 285	94 283	133 281	172 279	207 278	242 275	278 269	304 262	313 260	346 247	425 220
Max. Inter- mittent	[20]		[291]	[653]	[1013]	[1366]	[1689]	[1987]	[2298]	[2540]	[2622]	[2928]	
	75,7		33 382	74 378	114 375	154 373	191 372	225 368	260 363	287 356	296 353	331 342	



# T Series (158-, 185-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

Continuous  
 Intermittent

**244 cm<sup>3</sup>/r [14.9 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]  
 Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1650]	[1800]	[1850]	[2250]
		14	28	41	55	69	83	97	110	114	125	127	155
Flow LPM [GPM]	[2]	[406]	[833]	[1260]	[1655]	[2038]	[2403]	[2707]	[2597]	[2552]	[2373]	[2299]	
	7,6	46 30	94 29	142 27	187 26	230 24	272 22	306 17	293 12	288 11	268 7	260 6	
	[4]	[404]	[843]	[1277]	[1695]	[2083]	[2468]	[2820]	[3177]	[3261]	[3509]	[3589]	[4194]
	15,1	46 62	95 62	144 60	192 59	235 59	279 55	319 50	359 50	368 49	396 46	406 44	474 35
	[6]	[382]	[823]	[1261]	[1687]	[2088]	[2477]	[2843]	[3196]	[3285]	[3547]	[3633]	[4290]
	22,7	43 92	93 91	142 90	191 89	236 88	280 86	321 82	361 78	371 76	401 72	410 71	485 60
	[8]	[341]	[787]	[1220]	[1651]	[2059]	[2454]	[2820]	[3177]	[3265]	[3530]	[3615]	[4285]
	30,3	39 123	89 122	138 121	187 120	233 119	277 116	319 113	359 108	369 106	399 101	408 99	484 85
	[10]	[297]	[744]	[1177]	[1611]	[2017]	[2412]	[2774]	[3151]	[3241]	[3504]	[3593]	[4269]
	37,9	34 154	84 152	133 151	182 150	228 148	273 146	313 143	356 136	366 134	396 127	406 125	482 107
[12]	[225]	[687]	[1132]	[1553]	[1967]	[2360]	[2734]	[3105]	[3194]	[3466]	[3554]	[4237]	
45,4	25 184	78 183	128 181	175 180	222 179	267 177	309 173	351 166	361 163	392 156	402 153	479 134	
[14]	[154]	[628]	[1072]	[1498]	[1910]	[2298]	[2674]	[3052]	[3148]	[3419]	[3510]	[4226]	
53,0	17 214	71 213	121 212	169 211	216 209	260 207	302 202	345 195	356 193	386 186	397 182	477 161	
[15]	[119]	[586]	[1035]	[1458]	[1872]	[2261]	[2637]	[3022]	[3116]	[3389]	[3488]	[4220]	
56,8	13 229	66 228	117 227	165 226	212 224	255 222	298 217	341 209	352 207	383 200	394 197	477 174	
Max. Continuous	[20]	[372]	[816]	[1251]	[1663]	[2067]	[2448]	[2832]	[2928]	[3214]	[3312]		
Max. Intermittent	75,7	42 305	92 303	141 301	188 300	234 297	277 292	320 284	331 281	363 273	374 270		

**306 cm<sup>3</sup>/r [18.7 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]  
 Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1500]	[1600]	[1800]
		14	28	41	55	69	83	97	103	110	124
Flow LPM [GPM]	[2]	[499]	[1035]	[1560]	[2034]	[2501]	[2912]	[3239]	[2859]	[2400]	
	7,6	56 24	117 23	176 22	230 21	283 19	329 16	366 11	323 8	271 5	
	[4]	[497]	[1052]	[1590]	[2101]	[2561]	[3023]	[3464]	[3680]	[3886]	[4221]
	15,1	56 49	119 49	180 48	237 48	289 47	342 47	391 44	416 41	439 38	477 30
	[6]	[480]	[1031]	[1578]	[2096]	[2564]	[3023]	[3464]	[3689]	[3905]	[4275]
	22,7	54 74	116 74	178 72	237 72	290 71	342 69	391 64	417 62	441 60	483 51
	[8]	[427]	[975]	[1520]	[2051]	[2525]	[2998]	[3448]	[3667]	[3881]	[4264]
	30,3	48 99	110 98	172 97	232 97	285 96	339 94	390 89	414 86	438 83	482 73
	[10]	[370]	[930]	[1467]	[2001]	[2477]	[2955]	[3406]	[3631]	[3852]	[4264]
	37,9	42 123	105 122	166 121	226 120	280 120	334 117	385 112	410 108	435 104	482 92
[12]	[281]	[871]	[1410]	[1908]	[2400]	[2887]	[3352]	[3573]	[3790]	[4189]	
45,4	32 147	98 146	159 145	216 145	271 142	326 136	379 131	404 131	428 127	473 112	
[14]	[192]	[791]	[1338]	[1851]	[2338]	[2816]	[3281]	[3511]	[3743]	[4135]	
53,0	22 171	89 171	151 170	209 170	264 169	318 165	371 159	397 154	423 150	467 133	
[15]	[148]	[738]	[1288]	[1803]	[2287]	[2773]	[3243]	[3475]	[3705]	[4098]	
56,8	17 183	83 183	146 182	204 182	258 181	313 177	366 171	393 165	419 160	463 146	
Max. Continuous	[20]	[476]	[1020]	[1544]	[2010]	[2519]	[3010]	[3243]	[3495]		
Max. Intermittent	75,7	54 243	115 242	174 242	227 241	285 238	340 231	366 226	395 209		

[738] } Torque [lb-in]  
 83 } Nm  
 183 } Speed RPM

**370 cm<sup>3</sup>/r [22.6 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]  
 Continuous

Max. Continuous  
Max. Intermittent

		[200]	[400]	[600]	[800]	[1000]	[1200]	[1300]	[1500]
		14	28	41	55	69	83	90	103
Flow LPM [GPM]	[2]	[590]	[1237]	[1858]	[2406]	[2953]	[3388]	[3586]	
	7,6	67 20	140 19	210 18	272 17	334 15	383 12	405 11	
	[4]	[588]	[1263]	[1906]	[2506]	[3029]	[3557]	[3811]	[4252]
	15,1	66 41	143 41	215 40	283 40	342 39	402 38	431 37	480 36
	[6]	[580]	[1245]	[1899]	[2506]	[3029]	[3544]	[3788]	[4300]
	22,7	66 61	141 60	215 59	283 58	342 57	400 56	428 56	486 54
	[8]	[514]	[1164]	[1824]	[2452]	[2975]	[3518]	[3783]	[4284]
	30,3	58 82	132 81	206 80	277 79	336 78	397 77	427 77	484 75
	[10]	[444]	[1119]	[1759]	[2391]	[2928]	[3479]	[3750]	[4275]
	37,9	50 102	126 102	199 101	270 101	331 100	393 97	424 96	483 93
[12]	[337]	[1062]	[1690]	[2256]	[2813]	[3393]	[3685]	[4273]	
45,4	38 122	120 121	191 120	255 119	318 119	383 118	416 116	483 112	
[14]	[231]	[958]	[1608]	[2201]	[2748]	[3319]	[3610]	[4198]	
53,0	26 142	108 141	182 140	249 139	310 138	375 137	408 134	474 129	
[15]	[178]	[896]	[1543]	[2147]	[2683]	[3272]	[3572]	[4187]	
56,8	20 152	101 152	174 151	243 150	303 149	370 147	404 146	473 140	
Max. Continuous	[20]	[587]	[1228]	[1833]	[2331]	[2948]	[3273]		
Max. Intermittent	75,7	66 202	139 201	207 201	263 200	333 198	370 196		



# T Series (158-)

## Dimensions

(Refer to pages B-4-19 thru B-4-22 for shaft and port dimensions.)

### Ports

- 7/8 -14 INF O-Ring Ports (2)
- 1/2 -14 NPTF (2)
- G 1/2 BSP (2)
- Manifold Ports (5/16-18 mounting threads)

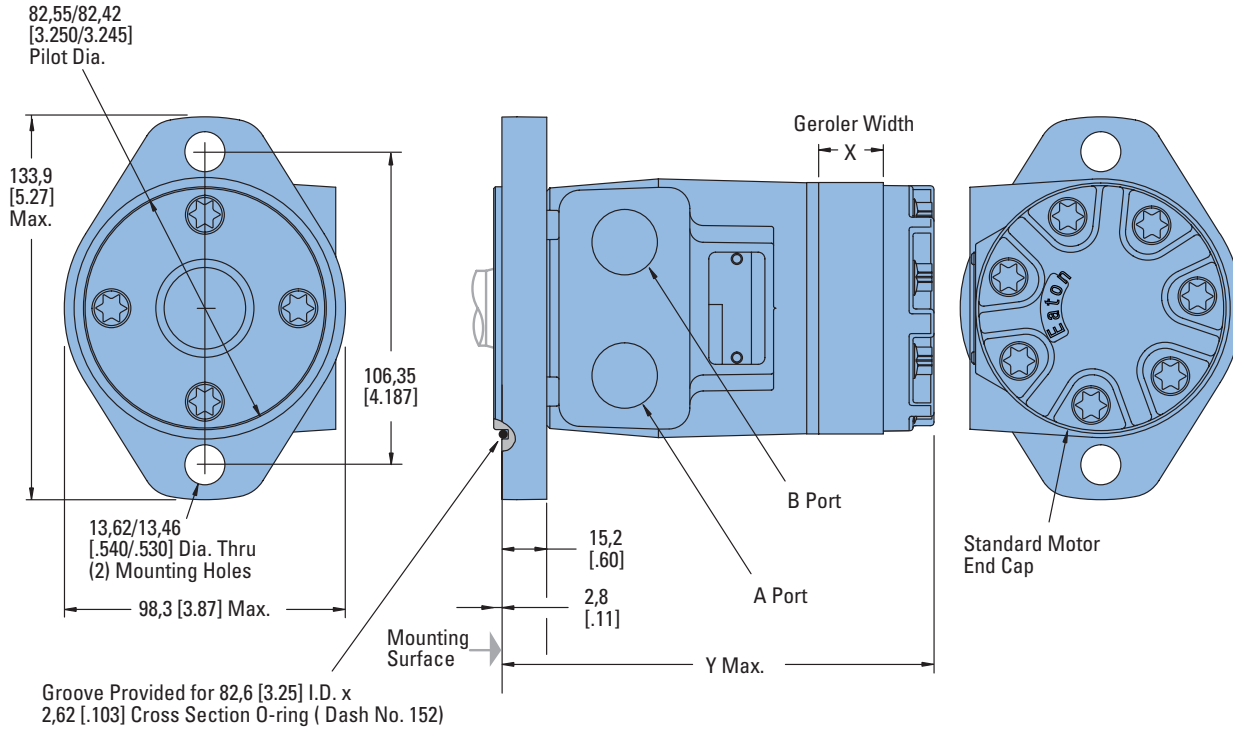
### Note:

Mounting Surface Flatness Requirement is  $\nabla$ , 13 mm [.005 inch] Max.

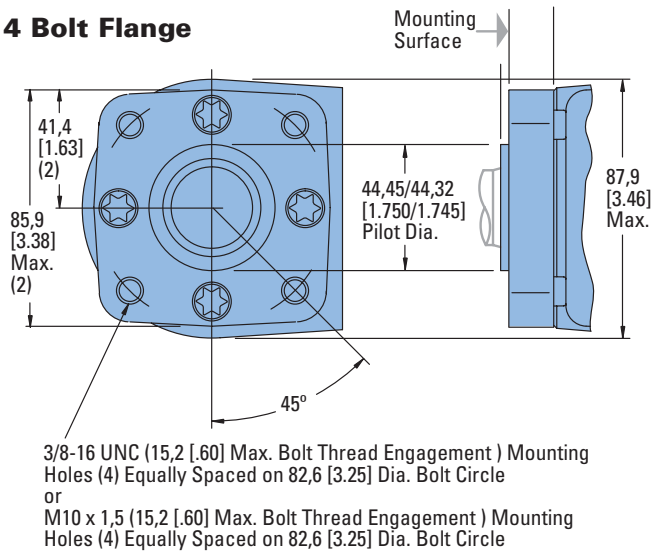
### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

## 2 Bolt Flange



## 4 Bolt Flange



### 2 AND 4 BOLT FLANGE PORT DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
36 [2.2]	6,6 [.26]	132,2 [5.21]
49 [3.0]	9,1 [.36]	134,6 [5.30]
66 [4.0]	12,2 [.48]	137,7 [5.42]
80 [4.9]	14,7 [.58]	140,3 [5.53]
102 [6.2]	18,5 [.73]	144,3 [5.68]
131 [8.0]	24,1 [.95]	149,6 [5.89]
157 [9.6]	29,0 [1.14]	154,5 [6.09]
195 [11.9]	35,6 [1.40]	161,3 [6.35]
244 [14.9]	44,7 [1.76]	170,3 [6.71]
306 [18.7]	56,1 [2.21]	181,6 [7.16]
370 [22.6]	72,1 [2.84]	197,9 [7.79]

# T Series (158-)

## Product Numbers

Use digit prefix—158- plus four digit number from charts for complete product number—Example: 158-1067.

**Orders will not be accepted without the three-digit prefix.**

### Standard

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER											
			36 [2.2]	49 [3.0]	66 [4.0]	80 [4.9]	102 [6.2]	131 [8.0]	157 [9.6]	195 [11.9]	244 [14.9]	306 [18.7]	370 [22.6]	
2 Bolt Flange	1 in. Straight w/Woodruff Key	7/8 -14 O-Ring	158-	—	—	-1537	-1034	-1035	-1538	-1036	-1037	-1038	-1039	-1040
		1/2 NPTF	158-	—	—	-1540	-1026	-1027	-1541	-1028	-1029	-1030	-1031	-1032
		Manifold*	158-	—	—	-1543	-1042	-1043	-1544	-1044	-1045	-1046	-1047	-1048
	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	-1552	-1082	-1083	-1553	-1084	-1085	-1086	-1087	-1088
		1/2 NPTF	158-	—	—	-1555	-1074	-1075	-1556	-1076	-1077	-1078	-1079	-1080
		Manifold*	158-	—	—	-1558	-1090	-1091	-1559	-1092	-1093	-1094	-1095	-1096
4 Bolt Flange	1 in. Straight w/Woodruff Key	7/8 -14 O-Ring	158-	—	—	-1570	-1010	-1011	-1571	-1012	-1013	-1014	-1015	-1016
		1/2 NPTF	158-	—	—	-1573	-1002	-1003	-1574	-1004	-1005	-1006	-1007	-1008
		Manifold*	158-	—	—	-1576	-1018	-1019	-1577	-1020	-1021	-1022	-1023	-1024
	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	-1579	-1058	-1059	-1580	-1060	-1061	-1062	-1063	-1064
		1/2 NPTF	158-	—	—	-1582	-1050	-1051	-1583	-1052	-1053	-1054	-1055	-1056
		Manifold*	158-	—	—	-1585	-1066	-1067	-1586	-1068	-1069	-1070	-1071	-1072

158-1067

### T Series Motors with Corrosion Protection

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER											
			36 [2.2]	49 [3.0]	66 [4.0]	80 [4.9]	102 [6.2]	131 [8.0]	157 [9.6]	195 [11.9]	244 [14.9]	306 [18.7]	370 [22.6]	
2 Bolt Flange	1 in. Straight w/ Woodruff Key	7/8 -14 O-Ring	158-	—	—	—	1645	—	—	—	—	-1649	—	-1650
4 Bolt Flange		1/2 NPTF	158-	—	—	—	—	—	—	—	—	-1620	—	-1621

158-1620

### T Series Motors with Low Speed Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER											
			36 [2.2]	49 [3.0]	66 [4.0]	80 [4.9]	102 [6.2]	131 [8.0]	157 [9.6]	195 [11.9]	244 [14.9]	306 [18.7]	370 [22.6]	
2 Bolt Flange	1 in. Straight w/Woodruff Key	7/8 -14 O-Ring	158-	—	—	—	-1427	-1428	—	—	-1430	-1431	-1432	-1433
		1/2 NPTF	158-	—	—	—	-1419	-1420	—	—	-1422	-1423	-1424	-1425
		Manifold*	158-	—	—	—	—	—	—	—	—	—	—	—
4 Bolt Flange	1 in. SAE 6B Splined	7/8 -14 O-Ring	158-	—	—	—	-1525	—	—	—	—	-1675	—	—
		1/2 NPTF	158-	—	—	—	—	-1634	—	—	—	—	—	—
		Manifold*	158-	—	—	—	-1522	-2678	—	—	—	—	—	-1527
4 Bolt Flange	1 in. Straight w/ Woodruff Key	7/8 -14 O-Ring	158-	—	—	-1625	-1410	-1411	-1626	-1412	-1413	-1414	-1415	-1416
		1/2 NPTF	158-	—	—	-1644	-1402	-1403	—	-1404	-1405	-1406	-1407	-1408

158-1403

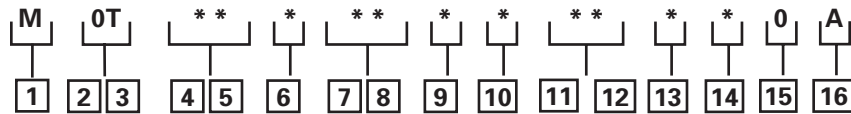
\*Manifold product numbers shown are for motors with four 5/16-18 port face mounting threads. Manifold, manifold mounting O-Rings and bolts are NOT included.

For T Series Motors with a configuration Not Shown in the charts above: Use the model code system on page B-4-10 to specify the product in detail.

# T Series (158-)

## Model Code

The following 16-digit coding system has been developed to identify all of the configuration options for the T motor. Use this model code to specify a motor with the desired features. All 16-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

M – Motor

### 2, 3 Product Series

OT – T Series

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

02 – 36 [2.2]

03 – 49 [3.0]

04 – 66 [4.0]

05 – 80 [4.9]

06 – 102 [6.2]

08 – 131 [8.0]

10 – 157 [9.6]

12 – 195 [11.9]

15 – 244 [14.9]

19 – 306 [18.7]

23 – 370 [22.6]

### 6 Mounting Type

A – 2 Bolt (Standard) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 106,2 [4.18] Dia. B.C.

B – 4 Bolt (Standard) 44,4 [1.75] Pilot Dia. and 3/8 -16 Mounting Holes 82,6 [3.25] Dia. B.C.

E – 4 Bolt (Standard) 44,4 [1.75] Pilot Dia. and M10 x 1,5 Mounting Holes 82,6 [3.25] Dia. B.C.

H – 2 Bolt (Std.) 101,6 [4.00] Pilot Dia. and 14,35 [.565] Dia. Mounting Holes 146,0 [5.75] Dia. B.C. (SAE B)

K – 4 Bolt Magneto 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 106,2 [4.18] Dia. B.C.

### 7, 8 Output Shaft

01 – 1 inch Dia. Straight with Woodruff Key and 1/4 -20 Threaded Hole

02 – 1 inch Dia. SAE 6B Splined with 1/4 -20 Threaded Hole

07 – 1 inch Dia. Straight with 7,9 [.31] Dia. Crosshole 11,2 [.44] from End

08 – 1 inch Dia. Straight with 10,2 [.40] Dia. Crosshole 15,7 [.62] from End and 1/4 -20 Threaded Hole

16 – 7/8 inch Dia. SAE B 13T Splined

17 – 7/8 inch Dia. SAE B Straight with Square Key

18 – 1 inch Dia. Tapered with Woodruff Key and Nut

24 – 25mm Dia. Straight with 8mm Key and 8mm x 1.2 Threaded Hole

27 – 1 inch Dia. Straight with Woodruff Key and 1/4 -20 Threaded Hole (Plated for Corrosion Protection)

### 9 Ports

A – 7/8 -14 O-Ring

B – 1/2 -14 NPTF

C – Manifold (5/16-18 Mounting Threads)

D – Manifold (M8 x 1,25 Mounting Threads)

E – G 1/2 (BSP) End Cap

### 10 Case Flow Options

0 – No Case Drain

1 – 7/16 -20 O-Ring Port End Cap

2 – G 1/4 (BSP) End Cap

### 11, 12 Special Features (Hardware)

00 – None

AB – Low Speed Valve

AC – Viton Shaft Seal

BZ – Speed Sensor

DS – High Pressure Shaft Seal

### 13 Special Features (Assembly)

0 – None

1 – Reverse Rotation

2 – Flange Rotated 90°

### 14 Paint/ Special Packaging

0 – No Paint, Individual Box

A – Painted Low Gloss Black, Individual Box

B – No Paint, Bulk Box Option

C – Painted Low Gloss Black, Bulk Box Option

### 15 Eaton Assigned Code when Applicable

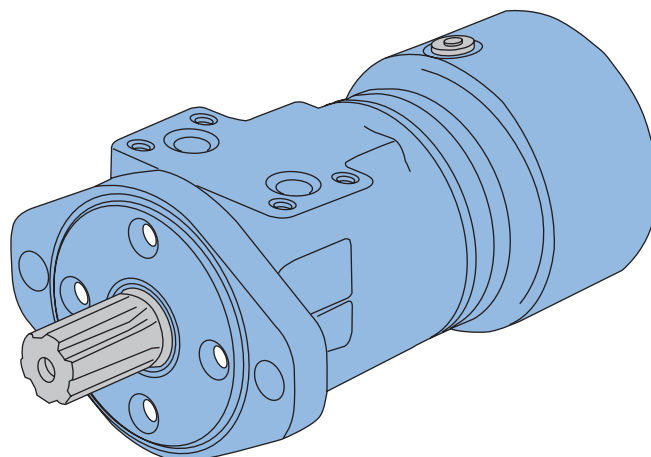
0 – Assigned Code

### 16 Eaton Assigned Design Code

A – Assigned Design Code

# T Series with Parking Brake (185-)

## Highlights



### Description

Eaton's latest offering in LSHT motor technology is the new T Series Motor with Parking Brake.

T Series Motor with Parking Brake utilizes brake pads that rotate at 6 times the speed of the output shaft, thereby giving the brake a 6-to-1 mechanical advantage. The T Series Motor with Parking Brake utilizes the same Geroler, and Spool Valve technologies as the standard Char-Lynn motors. Therefore, in addition to providing dependable, load-holding capability, T Series Motor with Parking Brake provides the same smooth, reliable and efficient performance as the T Series Motor.

### Specifications

Geroler Element	11 Displacements
Flow l/min [GPM]	55 [15] Continuous*** 75 [20] Intermittent**
Speed	Up to 1055 RPM
Pressure bar [PSI]	155 [2250] Cont.*** 190 [2750] Inter.**
Torque Nm [lb-in]	441 [3905] Cont.*** 486 [4300] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.

### Features

- Integrated, Compact, Patented Design
- Capability of Combining 4 inventory items into a single assembly (motor, brake, counter-balance valve, brake release line)
- Rear-mounted integrated brake with 6:1 torque advantage
- Access port for manual brake release (for over-riding brake in the event of loss of release pressure.)

### Benefits

- Cost-effective Packaged System Solution
- Simplifies ordering and inventory requirements
- Reduces assembly labor
- Design Flexibility
- Wet brake is environmentally protected and provides long life

### Applications

- Truck-Mounted Equipment (boom rotate and winch)
- Conveyors – Positioners – Indexers
- Marine Cranes (boom rotate and winch)
- Fishing Winches
- Recycling and Refuse Equipment
- Vehicle Recovery Winches
- Mining Equipment
- Specialty Utility Vehicles/ Machines
- Forestry Grapples
- Agricultural Equipment
- Railroad Equipment
- Airport Support Vehicles
- Lawn & Turf Equipment
- Anywhere Load-Holding is Needed in a Low-Speed High-Torque Drive System



Crane and winches



Boom Lift (Swing)



Maintenance Equipment

# T Series with Parking Brake (185-)

## Application Information

### Principle of Operation

The wet brake is a spring-applied / pressure release design. Load-holding is applied by a mechanical spring and released by hydraulic pressure. The spring force holds the brake on when hydraulic pressure is absent.

### Release Pressure

Release pressure is defined as the amount of pressure required to fully release the brake. The brake pressure cavity is common (shared) with the motor case. As a result, maximum release pressure is constrained by the motor case-pressure capability. The T Series Motor with Parking Brake incorporates a shaft seal capable up to 1500 psi (see page B-4-15). However, seal life is reduced at higher case pressure.

### Residual Pressure

Residual pressure is the pressure trapped in the system by restrictions or long return lines.

Residual pressure in the motor case will lower the rated load holding torque of the brake.

Therefore, special attention needs to be given when applying this product. Keep in mind that long return lines create higher pressure that will reduce brake holding torque. In applications with high system pressures, the use of a pressure reducing valve to limit case and release pressure is recommended.

### Holding Torque and Motor Output Torque

Holding torque is based on grade holding requirements for a vehicle or other load holding requirements in the application. System pressure and motor displacement are the factors in determining motor output torque. Motor displacement, measured in cubic centimeters or cubic inches, is the volume of fluid required to make one revolution. Motor output torque is the rotary force and is usually measured in inch pounds, newton meters or foot pounds. Maximum motor torque depends on pressure and motor displacement. Both output shaft size and shaft type can also affect motor torque. The T Series Motor with Parking Brake load holding capacity is factory set to match any limiting factor in each specific motor configuration (e.g. displacement, output shaft, etc).

### Note:

Eaton Corporation does not approve any products for customer applications. It is the sole responsibility of the customer to qualify and verify the correct operation of products in their systems.

### Note:

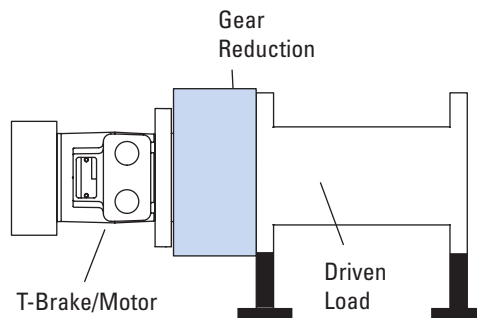
Special attention should be given to system back pressure. System back pressure directly affects brake release pressure and can cause the brake to release at undesired conditions.

### Note:

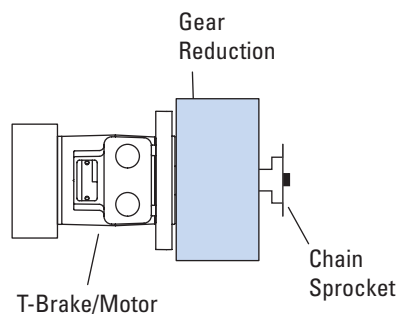
The T Series with parking brake is not compatible with water based fluids.

### Typical Applications

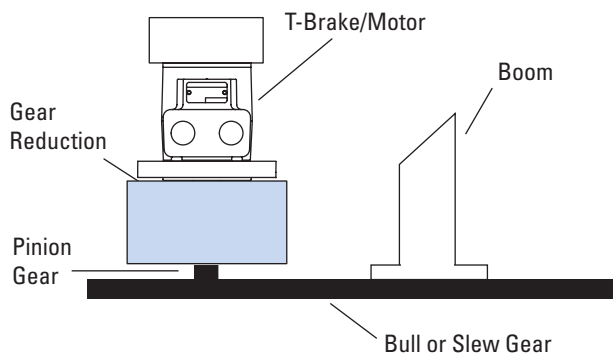
#### Winch



#### Machine Drive

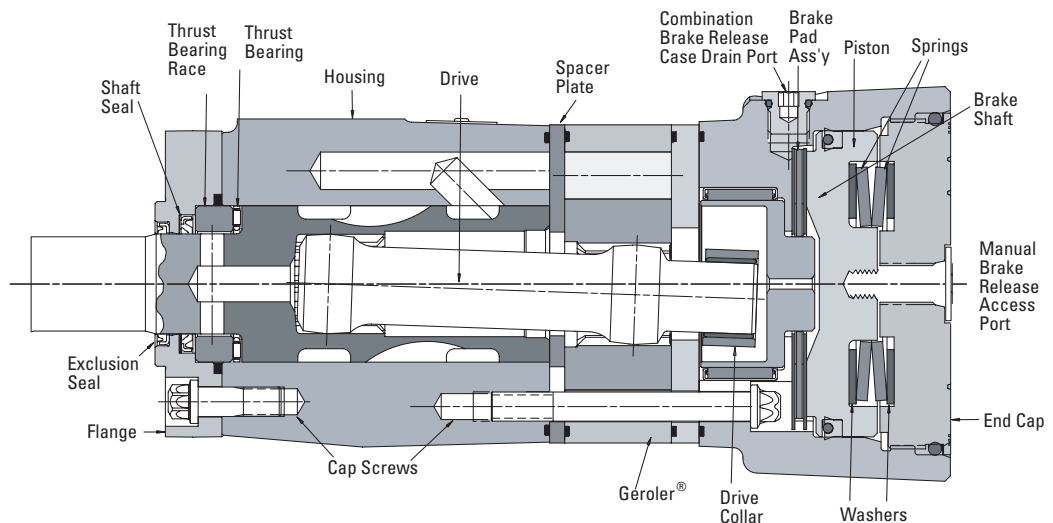


#### Swing Boom



# T Series with Parking Brake (185-)

## Specifications



### SPECIFICATION DATA — T SERIES WITH PARKING BRAKE MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		36 [2.2]	49 [3.0]	66 [4.0]	80 [4.9]	102 [6.2]	131 [8.0]	157 [9.6]	195 [11.9]	244 [14.9]	306 [18.7]	370 [22.6]
Max. Speed (RPM) @ Continuous Flow		1021	906	849	694	550	426	355	287	229	183	152
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]
	Intermittent	38 [10]	57 [15]	68 [18]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	76 [672]	105 [928]	138 [1222]	174 [1541]	219 [1936]	251 [2226]	297 [2628]	359 [3178]	410 [3633]	441 [3905]	430 [3811]
	Intermittent **	93 [824]	118 [1131]	168 [1488]	212 [1872]	264 [2339]	307 [2718]	359 [3178]	437 [3864]	485 [4290]	483 [4275]	486 [4300]
Pressure Δ Bar [Δ PSI]	Continuous *	155 [2250]	155 [2250]	155 [2250]	155 [2250]	155 [2250]	138 [2000]	138 [2000]	138 [2000]	127 [1850]	110 [1600]	90 [1300]
	Intermittent * **	190 [2750]	190 [2750]	190 [2750]	190 [2750]	190 [2750]	172 [2500]	172 [2500]	172 [2500]	155 [2250]	124 [1800]	103 [1500]

### Note:

See page B-4-2 for additional motor specification notes and definitions. The T Series with Parking Brake performance is similar to the standard T Series motor. High speed conditions may reduce performance on T Series with Parking Brake.

### T SERIES BRAKE HOLDING TORQUE SETTINGS:

Shaft Code	Output Shaft Description	[in <sup>3</sup> /r]	2.2	3.0	4.0	4.9	6.2	8.0	9.6	11.9	14.9	18.7	22.6
18	1 Tapered w/key and nut		2,000	2,000	2,000	3,500	3,500	3,500	5,000	5,000	5,000	5,000	5,000
02	1 SAE 6B Splined		2,000	2,000	2,000	3,500	3,500	3,500	5,000	5,000	5,000	5,000	5,000
24	25mm Straight w/key		2,000	2,000	2,000	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
01	1 Straight w/key		2,000	2,000	2,000	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
07	1 Straight w/.31 dia. crosshole		2,000	2,000	2,000	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
08	1 Straight w/.40 dia. crosshole		2,000	2,000	2,000	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
16	7/8 SAE B 13T Splined		2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
17	7/8 SAE B Straight w/key		2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000

**in-lbs** Full Capacity Brake

**in-lbs** Limited Capacity Brake

### Note:

The factory setting values are used for each motor based on motor displacement and shaft type.



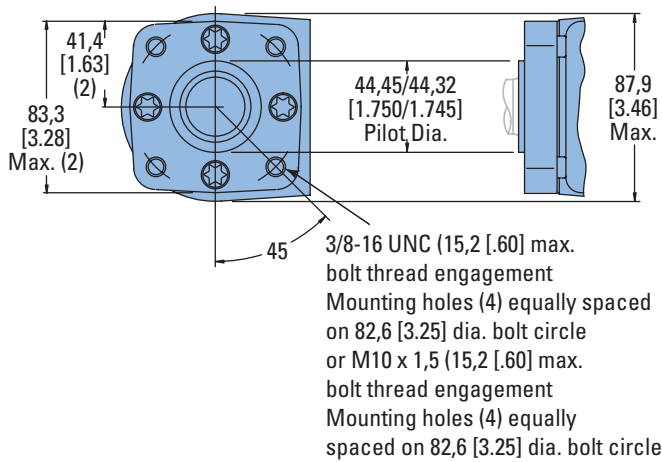
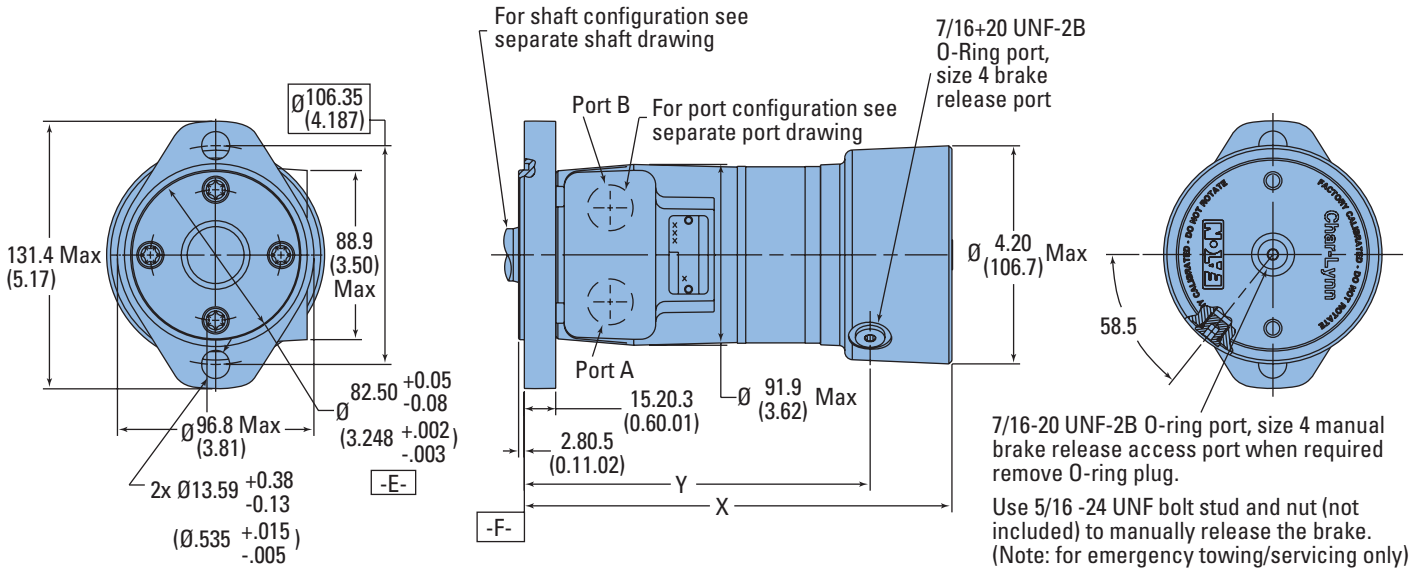
# T Series with Parking Brake (185-)

## Standard Rotation Viewed from Shaft End

Port A Pressurized — CW  
 Port B Pressurized — CCW

## Dimensions

(Refer to pages B-4-19 thru B-4-22 for shaft and port dimensions.)



### T-SERIES WITH PARKING BRAKE DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X		Y	
	mm [inch]	mm [inch]	mm [inch]	mm [inch]
02	190.2 [7.49]	145.8±0.9 [5.74±0.3]		
A2	190.8 [7.51]	146.4±0.9 [5.76±0.3]		
03	192.5 [7.58]	148.2±0.9 [5.84±0.3]		
A3	194.3 [7.65]	150.0±0.9 [5.90±0.3]		
04	195.6 [7.70]	151.2±0.9 [5.95±0.3]		
05	198.4 [7.81]	153.9±0.9 [6.06±0.3]		
06	202.2 [7.96]	157.8±0.9 [6.21±0.3]		
08	207.5 [8.17]	163.2±0.9 [6.42±0.3]		
10	212.6 [8.37]	168.1±0.9 [6.62±0.3]		
12	219.2 [8.63]	174.8±0.9 [6.88±0.3]		
15	228.3 [8.99]	183.8±0.9 [7.24±0.3]		
19	239.5 [9.43]	195.2±0.9 [7.69±0.3]		
23	251.2 [9.89]	206.9±0.9 [8.14±0.3]		

### Note:

#### Standard Rotation

When facing shaft end of motor shaft to rotate clockwise when port "A" is pressurized, counterclockwise when port "B" is pressurized

#### Reverse Rotation

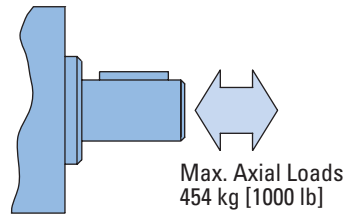
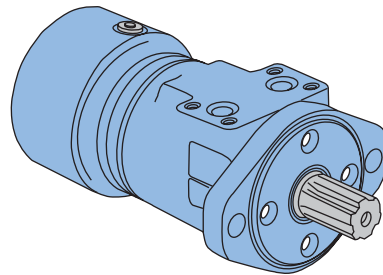
When facing shaft end of motor shaft will rotate clockwise when port "B" is pressurized, counterclockwise when port "A" is pressurized

# T Series with Parking Brake (185-)

## Brake Release and Motor Case Pressure

The T Series Motor with Parking Brake is durable and has long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Motor life will be shortened if case pressure exceeds recommended ratings (acceptability may vary with application).

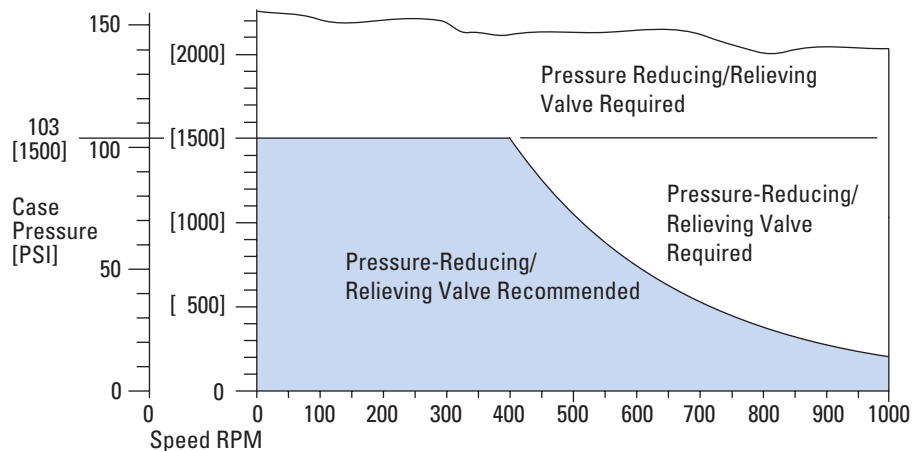
Refer to the Case Pressure/ Shaft Seal chart below. This chart is based on case pressure and motor shaft speed. A minimum release pressure of 17 Bar [250 PSI] must be maintained to fully release the brake.



$$P_C \approx 6 DP + P_2$$

$P_C$  = Case Pressure  
 $P_1$  = Inlet Line Pressure  
 $P_2$  = Back Pressure  
 $DP = P_1 - P_2$

### Case Pressure/Shaft Seal



# T Series with Parking Brake (185-)

## Product Numbers

Use digit prefix —  
185 plus four digit number  
from charts for complete  
product number —  
Example 185-2068.

**Orders will not be accepted  
without three digit prefix.**

### Standard Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
			3.0	4.0	4.9	6.2	8.0	9.6	11.9	14.9	18.7	22.6
2-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2000 185-2010	2001 2011	2002 2012	2003 2013	2004 2014	2005 2015	2006 2016	2007 2017	2008 2018	2009 2019
		6B Splined	7/8-14 O-Ring Manifold	185-2020 185-2030	2021 2031	2022 2032	2023 2033	2024 2034	2025 2035	2026 2036	2027 2037	2028 2038
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2040 185-2050	2041 2051	2042 2052	2043 2053	2044 2054	2045 2055	2046 2056	2047 2057	2048 2058	2049 2059
4-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2060 185-2070	2061 2071	2062 2072	2063 2073	2064 2074	2065 2075	2066 2076	2067 2077	2068 2078	2069 2079
		6B Splined	7/8-14 O-Ring Manifold	185-2080 185-2090	2081 2091	2082 2092	2083 2093	2084 2094	2085 2095	2086 2096	2087 2097	2088 2098
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2100 185-2110	2101 2111	2102 2112	2103 2113	2104 2114	2105 2115	2106 2116	2107 2117	2108 2118	2109 2119
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring Manifold	185-2120 185-2130	2121 2131	2122 2132	2123 2133	2124 2134	2125 2135	2126 2136	2127 2137	2128 2138	2129 2139
		6B Splined	7/8-14 O-Ring Manifold	185-2140 185-2150	2141 2151	2142 2152	2143 2153	2144 2154	2145 2155	2146 2156	2147 2157	2148 2158
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2160 185-2170	2161 2171	2162 2172	2163 2173	2164 2174	2165 2175	2166 2176	2167 2177	2168 2178	2169 2179

### Low Speed Valving

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
			3.0	4.0	4.9	6.2	8.0	9.6	11.9	14.9	18.7	22.6
2-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2180 185-2190	2181 2191	2182 2192	2183 2193	2184 2194	2185 2195	2186 2196	2187 2197	2188 2198	2189 2199
		6B Splined	7/8-14 O-Ring Manifold	185-2200 185-2210	2201 2211	2202 2212	2203 2213	2204 2214	2205 2215	2206 2216	2207 2217	2208 2218
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2220 185-2230	2221 2231	2222 2232	2223 2233	2224 2234	2225 2235	2226 2236	2227 2237	2228 2238	2229 2239
4-Bolt	1 Keyed	7/8-14 O-Ring Manifold	185-2240 185-2250	2241 2251	2242 2252	2243 2253	2244 2254	2245 2255	2246 2256	2247 2257	2248 2258	2249 2259
		6B Splined	7/8-14 O-Ring Manifold	185-2260 185-2270	2261 2271	2262 2272	2263 2273	2264 2274	2265 2275	2266 2276	2267 2277	2268 2278
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2280 185-2290	2281 2291	2282 2292	2283 2293	2284 2294	2285 2295	2286 2296	2287 2297	2288 2298	2289 2299
2-Bolt SAE B	1 Keyed	7/8-14 O-Ring Manifold	185-2300 185-2310	2301 2311	2302 2312	2303 2313	2304 2314	2305 2315	2306 2316	2307 2317	2308 2318	2309 2319
		6B Splined	7/8-14 O-Ring Manifold	185-2320 185-2330	2321 2331	2322 2332	2323 2333	2324 2334	2325 2335	2326 2336	2327 2337	2328 2338
	13T Splined 16/32 pitch	7/8-14 O-Ring Manifold	185-2340 185-2350	2341 2351	2342 2352	2343 2353	2344 2354	2345 2355	2346 2356	2347 2357	2348 2358	2349 2359

185-2357

Motors with the low speed valving option enable very smooth low speed operation while maintaining high torque.

Designed to run continuously at up to 200 RPM at standard rated

pressures and reduced flows, this option provides smooth operation at low speeds. Furthermore, they resist slippage and have more momentary load holding ability than the standard standard motors.

**Motors with this valving are not intended for low pressure applications (41 Bar [600 PSI] Minimum).**

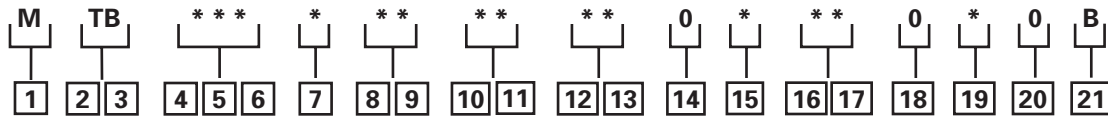
Shaft side / radial load ratings are not affected by this valving.

For a T Series motor with parking brake configuration not shown in the charts above use the model code system on page B-4-17 to specify the product in detail.

# T Series with Parking Brake (185-)

## Model Code

The following 21-digit coding system has been developed to identify all of the configuration options for the T Series Motor with Parking Brake. Use this model code to specify a motor with the desired features. All 21-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

**M** – Motor

### 2, 3 Series

**T B** – T Series Motor with Parking Brake

### 4, 5, 6 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**022** – 36 [2.2]  
**030** – 49 [3.0]  
**040** – 66 [4.0]  
**049** – 80 [4.9]  
**062** – 102 [6.2]  
**080** – 131 [8.0]  
**096** – 157 [9.6]  
**119** – 195 [11.9]  
**149** – 244 [14.9]  
**187** – 306 [18.7]  
**226** – 370 [22.6]

### 7 Gerotor/Geroler Options

**A** – Standard  
**B** – Free Running

### 8, 9 Mounting Type

**AA** – 2 Bolt (Standard) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 106,4 [4.19] Dia. B.C.  
**BA** – 4 Bolt (Standard) 44,4 [1.75] Pilot Dia. and 3/8-16 Mounting Holes on 82,6 [3.25] Dia. B.C.  
**DA** – 2 Bolt (Standard) 101,6 [4.00] Pilot Dia. and 14,35 [.565] Dia. Mounting Holes on 146,0 [5.75] Dia. B.C. (SAE B)  
**EA** – 4 Bolt Magneto 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 106,4 [4.19] Dia. B.C.  
**FA** – 4 Bolt (Standard) 44,4 [1.75] Pilot Dia. and M10 x 1,5-6H Mounting Holes on 82,6 [3.25] Dia. B.C.

### 10, 11 Output Shaft

**01** – 25.4 [1.00] Dia. Straight with Woodruff Key and 1/4-20 Threaded Hole  
**02** – 25.4 [1.00] Dia. SAE 6B Spline with 1/4-20 Threaded Hole  
**16** – 21,74 [.856] Dia. SAE B 13 T Spline  
**18** – 25.4 [1.00] Dia. Tapered with Woodruff Key and Nut  
**24** – 25 [.98] Dia. Straight with 8mm Key and 8mm x 1.2 Threaded Hole  
**27** – 25.4 [1.00] Dia. Straight with Woodruff Key and 1/4-20 Threaded Hole (Plated for Corrosion Pr)

### 12, 13 Port Type

**AA** – 7/8 - 14 O-Ring  
**AC** – Manifold (5/16-18 Mounting Threads)  
**AE** – G 1/2 (BSP) Straight Thread

### 14 Case Flow Options

**0** – None

### 15 Seal Options

**0** – Standard  
**7** – High Pressure Shaft Seal

### 16, 17 Special Features (Hardware)

**00** – None Specified  
**AB** – Low Speed Valve

### 18 Special Features (Assembly)

**0** – None Specified

### 19 Paint/Packaging Options

**0** – No Paint  
**A** – Painted Low Gloss Black

### 20 Eaton Assigned Code When Applicable

**0** – Assigned Code

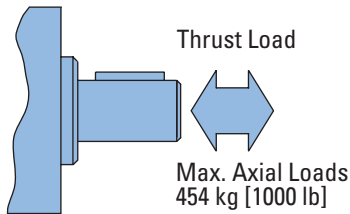
### 21 Design Code

**B** – Two (2)

# Case Pressure and Case Drain — H, S, and T Series

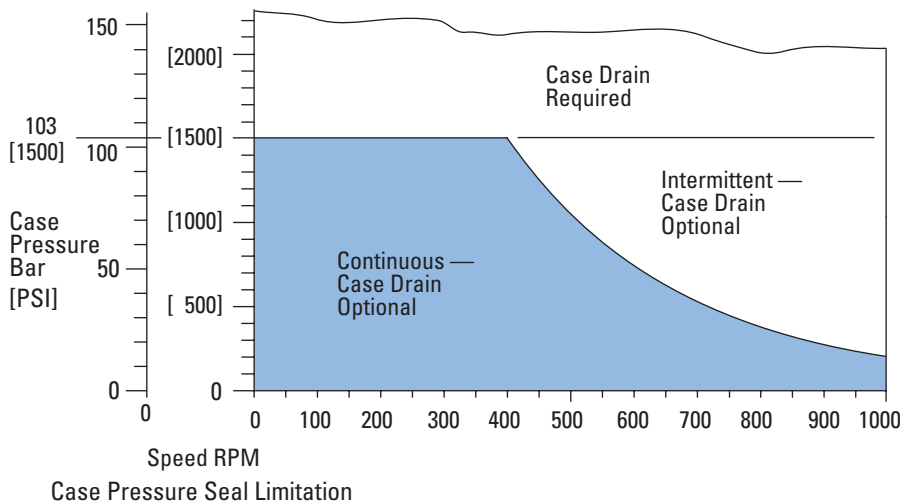
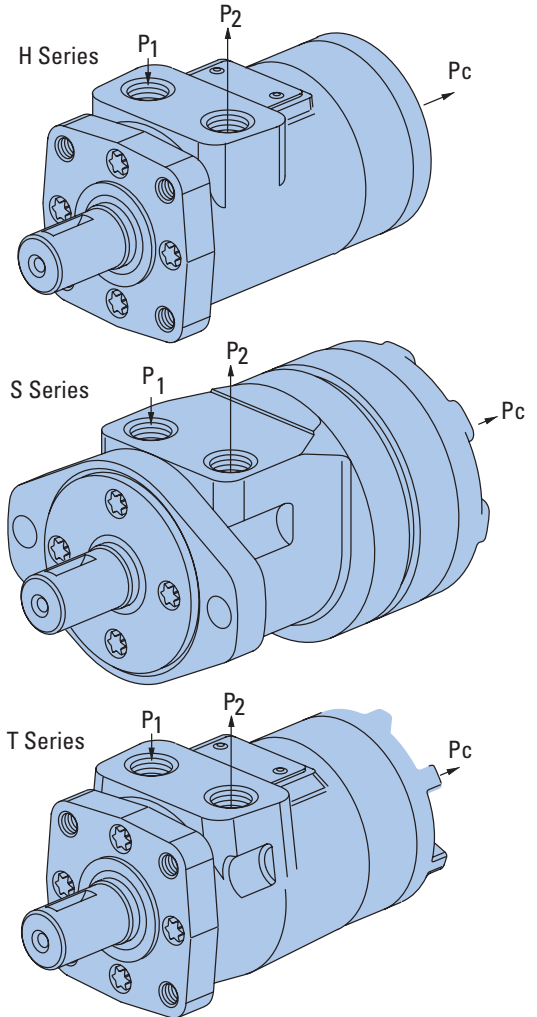
Char-Lynn H Series, S Series and T Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case

drain is required from the case pressure seal limitation chart below — chart based on case pressure and shaft speed. If a case drain line is needed, connect drain line to assure that the motor will always remain full of fluid. A pressure restriction should be added to the case drain line, during which a motor case pressure of 3,5 Bar [50 PSI] is maintained.



$$P_C \approx 6 \cdot P + P_2$$

$P_C$  = Case Pressure  
 $P_1$  = Inlet Line Pressure  
 $P_2$  = Back Pressure  
 $P = P_1 - P_2$



# H, S and T Series (101-, 103-, 158-, 185-)

## Side Load Capacity

The hydrodynamic bearing has infinite life when shaft load ratings are not exceeded. Hence, the shaft side load capacity is more than adequate to handle most externally applied loads (such as belts, chains, etc.), providing the motor to shaft size is applied within its torque rating.

Allowable side load chart, shaft load location drawing and load curves (below) are based on the side / radial loads being applied to shaft at locations A, B, and C, to

determine the shaft side load capacity at locations other than those shown use the formula (shown below).

For more information about shaft side loads on Char-Lynn motors contact your Eaton representative.

**Note:**

When the speed sensor option is used, side load ratings are reduced 25%.

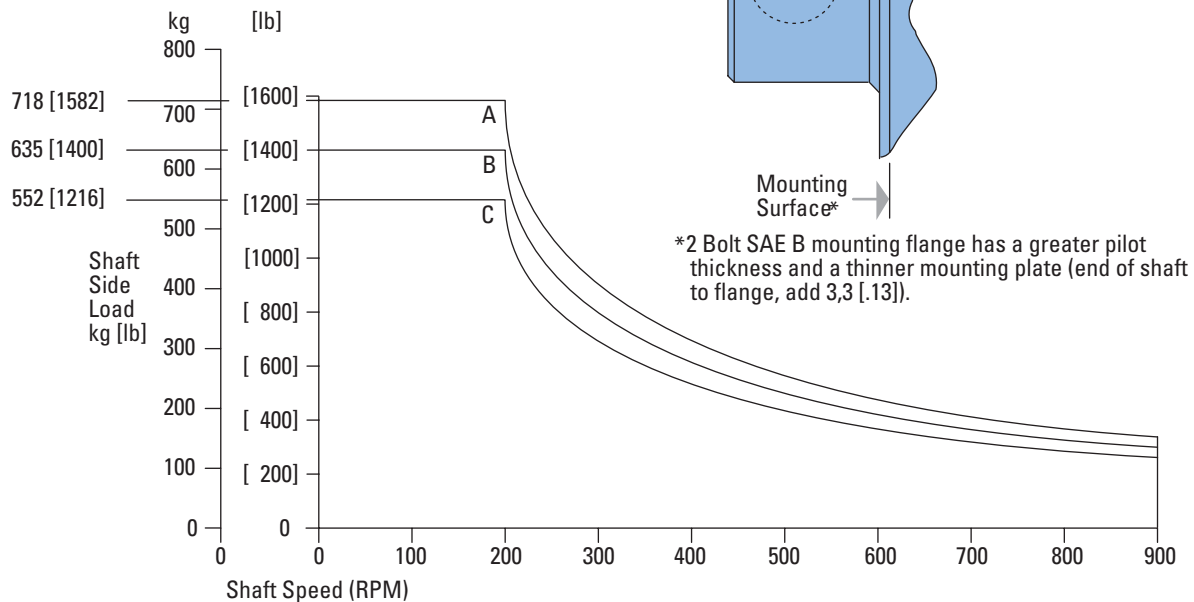
RPM	ALLOWABLE SHAFT SIDE LOAD — KG [LB]		
	A	B	C
900	154 [ 339]	136 [ 300]	118 [ 261]
625	205 [ 452]	181 [ 400]	158 [ 348]
500	256 [ 565]	227 [ 500]	197 [ 435]
400	307 [ 678]	272 [ 600]	237 [ 522]
300	410 [ 904]	363 [ 800]	316 [ 696]
200	718 [1582]	635 [1400]	552 [1216]

$$\text{Sideload } P \text{ kg} = \frac{900}{N} \left( \frac{16800}{L + 96,3} \right) \text{ for 200-900 RPM}$$

$$\text{Sideload } P \text{ [lb]} = \frac{900}{N} \left( \frac{1460}{L + [3.79]} \right) \text{ for 200-900 RPM}$$

Where N = Shaft Speed (RPM)

L = Distance from Mounting Surface



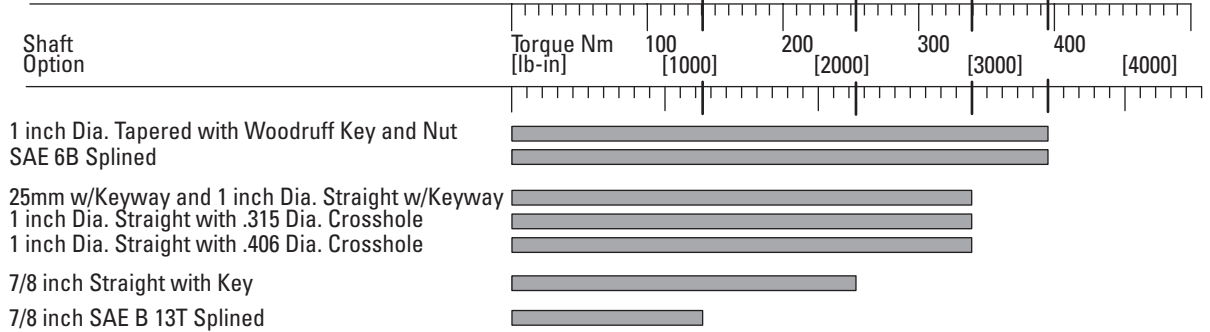


# H, S and T Series (101, 103- 158, 185)

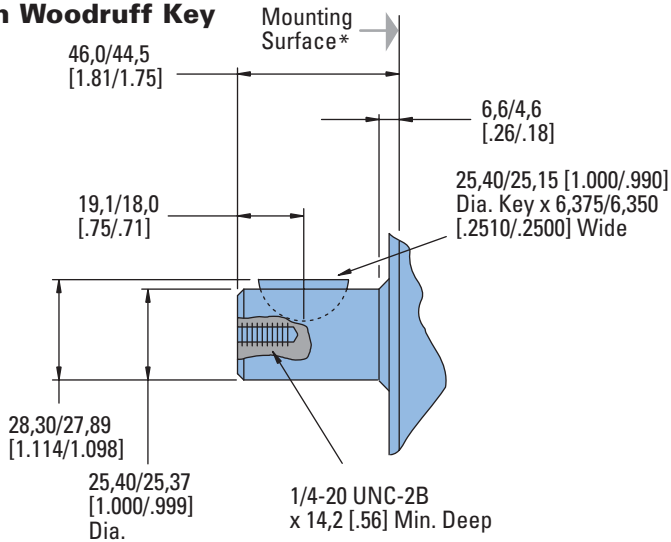
## Dimensions

Shafts

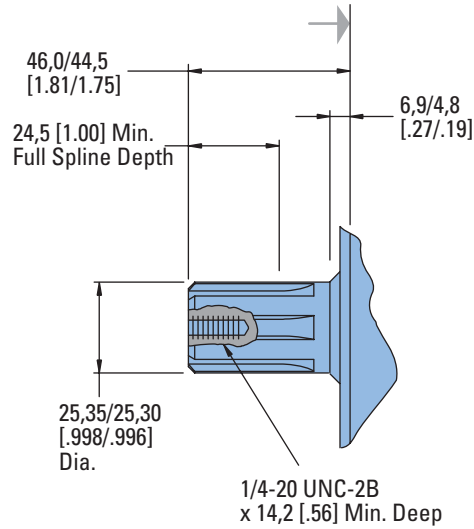
### Shaft Size Motor Torque Combination Limit Guide



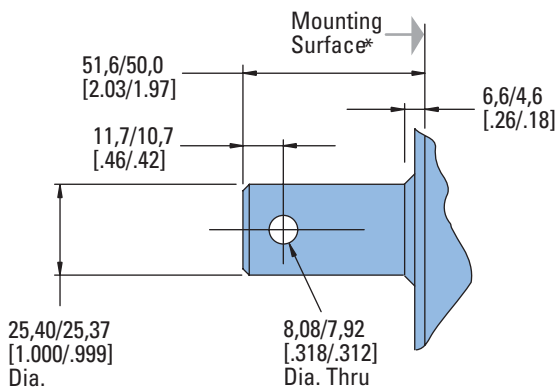
### 1 in. Dia. Straight with Woodruff Key



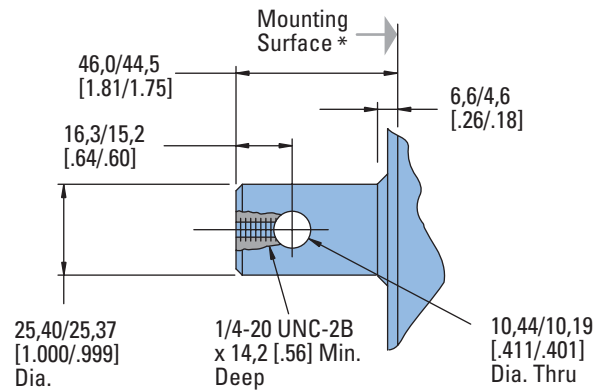
### SAE 6B Splined Shaft



### 1 in. Dia. Straight Shaft with .315 Dia. Crosshole



### 1 in. Dia. Straight Shaft with .406 Dia. Crosshole



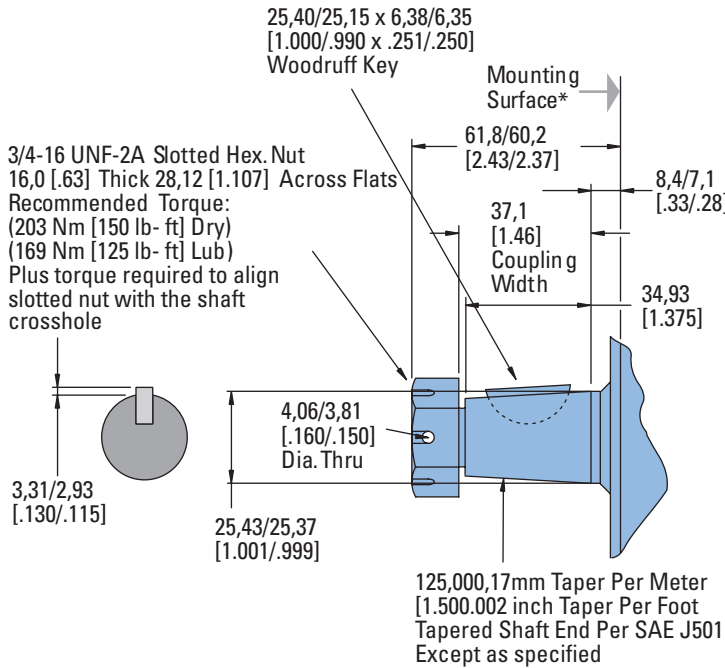
\* 2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate (end of shaft to flange, add 3,3 [.13]).

# H, S and T Series (101-, 103- 158-, 185-)

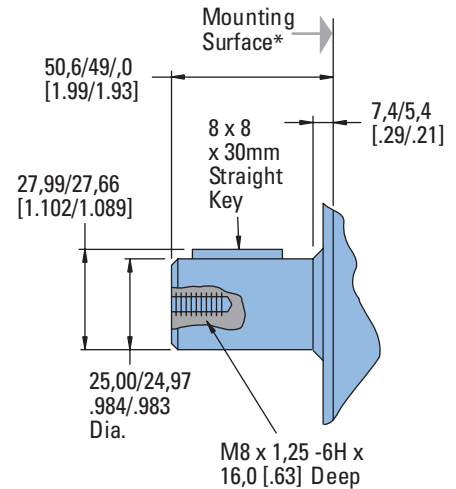
## Dimensions

Shafts

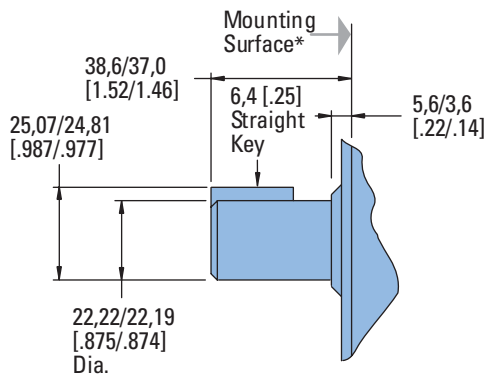
### 1 in. Dia. Tapered Shaft with Woodruff Key and Nut



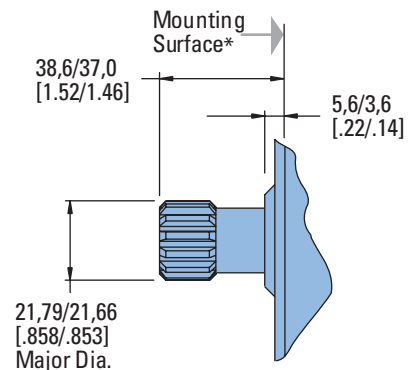
### 25mm Dia. Straight Shaft with 8mm Keyway



### 7/8 in. Dia. Straight Shaft with Key



### 7/8 in. Dia. SAE B Shaft 13 T Spline d



\* 2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate (end of shaft to flange, add 3,3 [.13]).

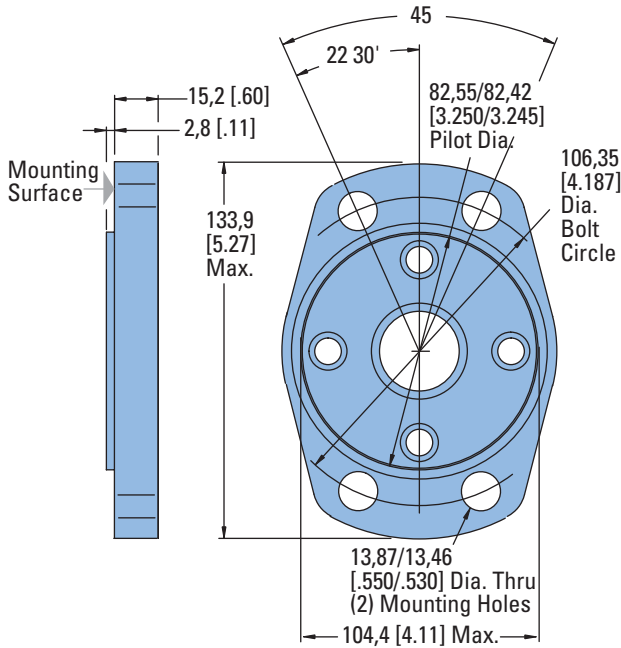
# H, S and T Series (101-, 103- 158-, 185-)

## Mounting Options

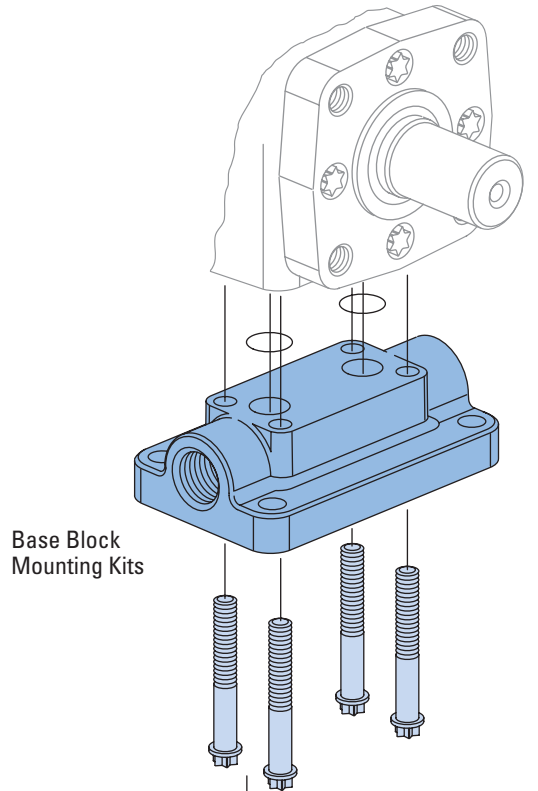
**Note:**

Mounting Surface Flatness Requirement is ,13 mm [.005 inch] Max.

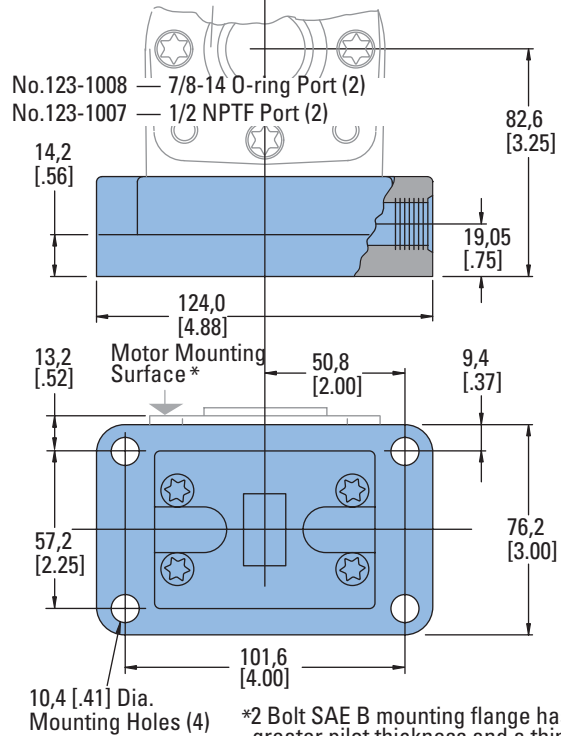
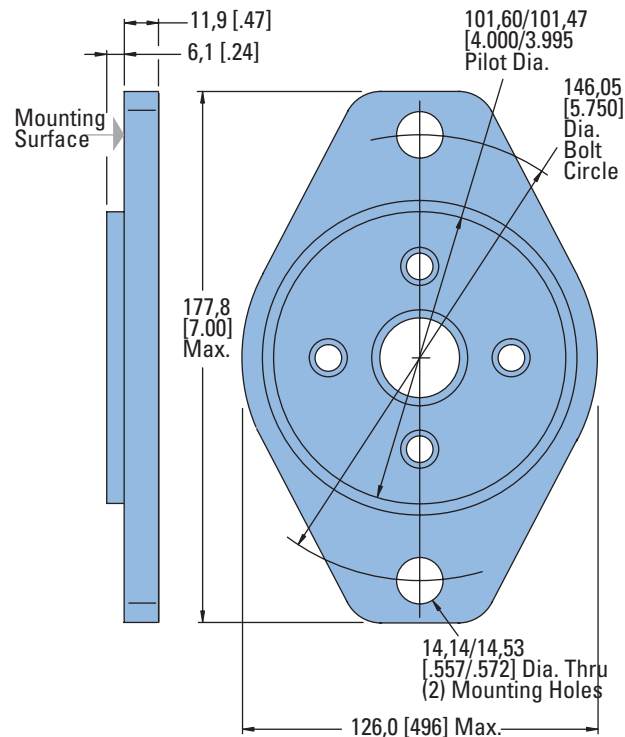
### 4 Bolt Magneto



### Base Block Mounting Kits



### 2 Bolt SAE B



\*2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate.

# H, S and T Series (101-, 103-, 158-, 185-)

## Dimensions

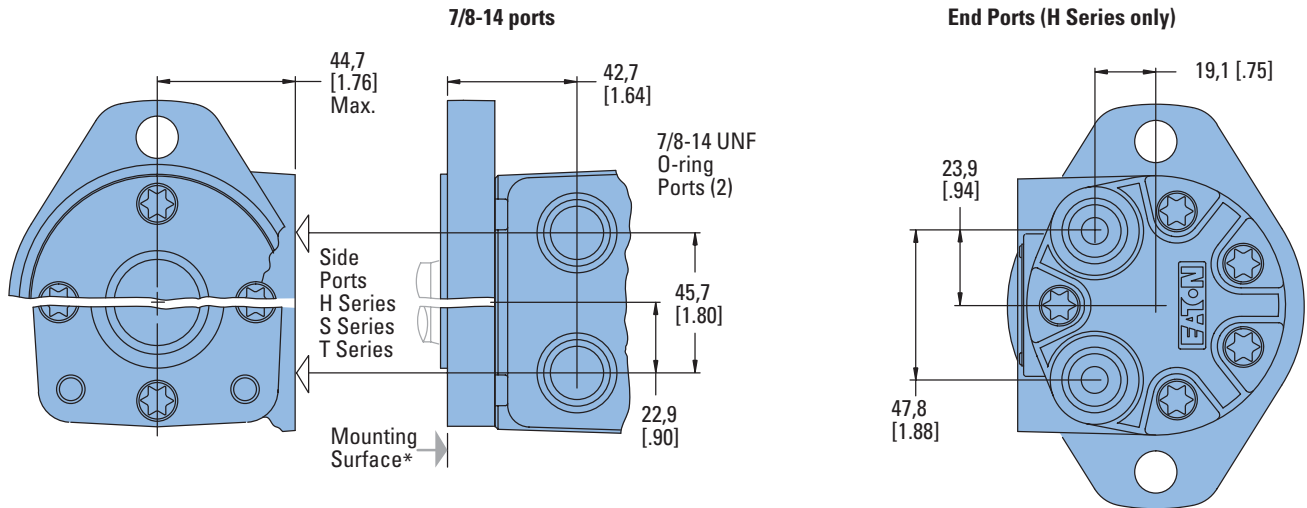
Ports

### Ports

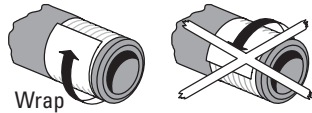
End Ports — H Series only  
G 1/2 (BSP) (2)  
or 3/4-16 O-Ring (2)

### Standard Rotation Viewed from Drive End

Port A Pressurized — CW  
Port B Pressurized — CCW



Use of Teflon Tape Sealant/  
Lubricant (with 1/2 14 NPTF  
Port Connectors only).

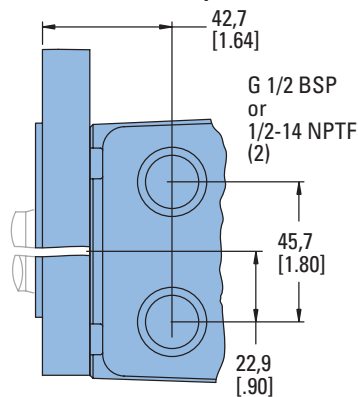


When using fittings with  
Teflon tape, be careful when  
taping and tightening. Over  
tightening or improperly  
taped fittings can cause  
damage to housing or  
leakage.

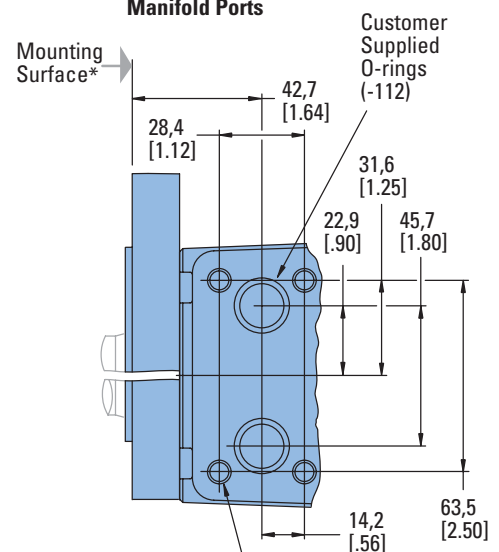
### Use the following procedures:

- Wrap approx. 1 1/2 Turns of 13 mm [1/2 in.] wide Teflon Tape around fitting threads — start tape 2 threads up from end of fitting.
- Tighten threads to a Maximum of 34 Nm [25 lb-ft]. — Do Not Tighten Further —
- If fittings leak when tightened to maximum torque, either retape, reseal, or replace fittings.

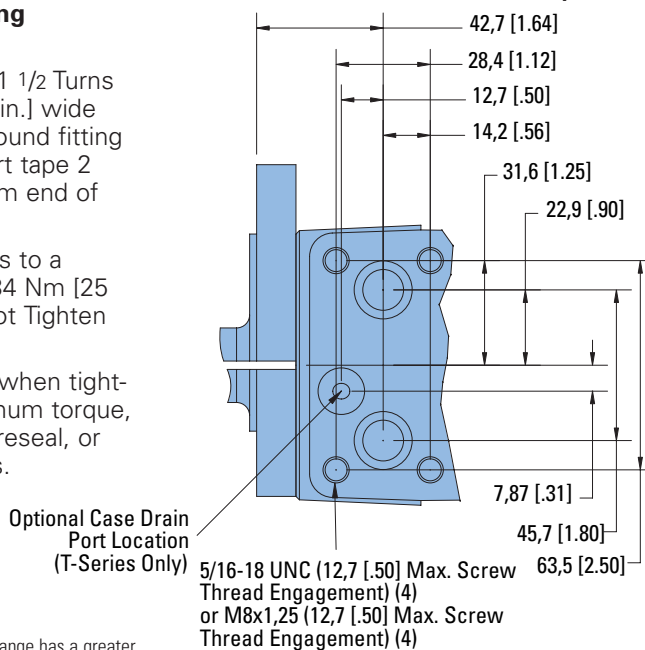
### 6-1/2 or 1/2 NPTF ports



### Manifold Ports



### Manifold Ports w/manifold case port



### Note:

End ported motor option is derated to 1400 continuous, 1700 psi intermittent.

### Note:

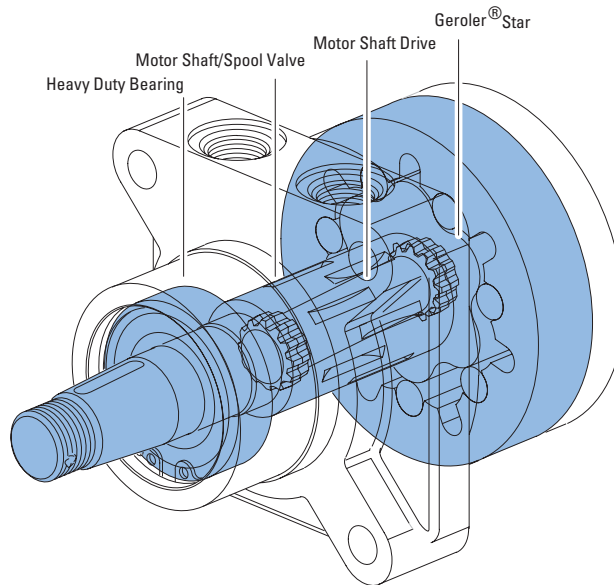
End ported motor pressure is derated. Reference page B-2-2 for ratings.

\*2 Bolt SAE B mounting flange has a greater pilot thickness and a thinner mounting plate.

# Notes

# W Series (162-)

## Highlights



### Features:

- Heavy duty bearing
- Wheel drive interface
- Three-pressure zone design (ability to reduce case pressure)
- Variety of displacements, shafts, mounts and special options
- Special options to meet customer needs

### Benefits:

- High side-load capacity
- High shock load capability
- Wheel mount interface
- Compact powerful package
- High efficiency
- Smooth low-speed operation
- Extended leak-free performance

### Applications:

- Scissors lifts
- Boom lifts
- Mid-size ZTR mowers
- Turf equipment
- Greens mowers
- Sand trap rakes
- Railroad maintenance equipment
- Industrial sweepers and floor polishers
- Skid steer attachments
- Many more

### Description

Char-Lynn W Series motors with the Geroler displacement element offer the same low friction and long-life advantages as the S and T Series.

The W Series features the simplicity of Eaton's proven spool valve and a Geroler element that provides superior drive life and smooth performance. In addition, this motor has a rugged housing with an extra large capacity side load bearing.

### W Series Motors

Geroler Element	7 Displacements
Flow l/min [GPM]	68 [18] Continuous*** 76 [20] Intermittent**
Speed	288 RPM
Pressure bar [PSI]	165 [2400] Cont.*** 179 [2600] Inter.**
Torque Nm [lb-in]	410 [3624] Cont.*** 562 [4970] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.



Scissor Lift



Sweeper



Trencher

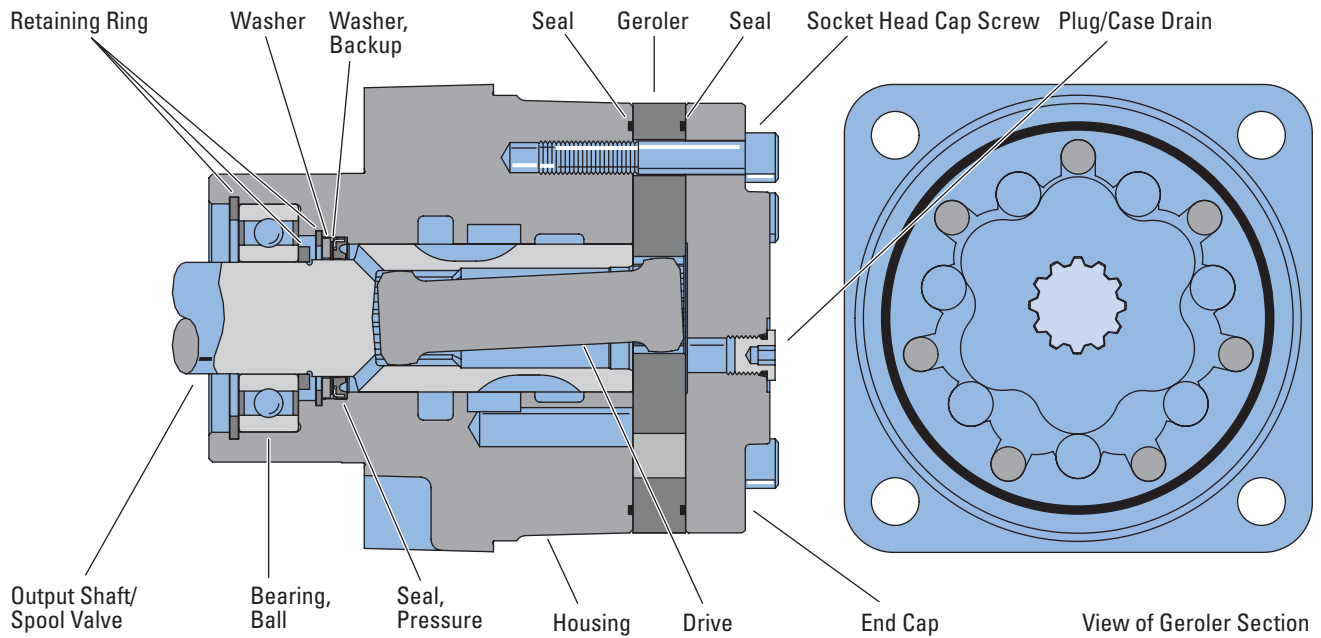


Boom Lift



# W Series (162-)

## Specifications



### SPECIFICATION DATA — W SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Max. Speed (RPM)		267	288	214	200	200	200	200
Flow l/min [GPM]	Continuous	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	68 [18]
	Intermittent	23 [6]	30 [8]	34 [9]	38 [10]	53 [14]	62 [16.5]	76 [20]
Theo. Torque	Continuous	176 [1555]	279 [2470]	318 [2813]	318 [2816]	375 [3319]	387 [3429]	410 [3624]
	Intermittent	189 [1676]	298 [2640]	373 [3301]	439 [3882]	548 [4849]	539 [4769]	562 [4970]
Pressure	Continuous	165 [2400]	165 [2400]	152 [2200]	124 [1800]	110 [1600]	97 [1400]	83 [1200]
$\Delta$ bar [ $\Delta$ PSI]	Intermittent	179 [2600]	179 [2600]	179 [2600]	179 [2600]	165 [2400]	138 [2000]	124 [1800]

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

179 bar [2600 PSI]  
Do Not Exceed  $\Delta$  Pressure Rating (for displacement size see chart above).

#### Return Pressure (Back-Pressure):

Do not exceed  $\Delta$  pressure rating (see chart above). Case drain required.

#### Note:

Optional version can be used without case drain.

#### Case Pressure:

Minimum – No Pressure  
Maximum – 103 bar [1500 PSI] without case drain.

#### Note:

The case must be flooded when the motor is operating.

#### $\Delta$ Pressure:

The true  $\Delta$  bar [ $\Delta$  PSI] between inlet port and return port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82°C [180°F]

#### Recommended Filtration:

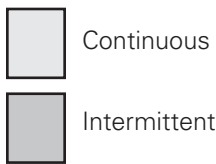
per ISO Cleanliness Code, level 20/18/13

# W Series (162-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from motor to motor in production.



### 80 cm<sup>3</sup>/r [4.9 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow l/min [GPM]	[2]	[204]	[337]	[474]	[612]	[748]	[883]	[1019]	[1149]	[1281]	[1412]	[1540]	[1610]
	7.6	23 93	38 89	54 88	69 84	85 83	100 79	115 73	130 69	145 69	160 61	174 56	182 39
	[4]	[223]	[357]	[489]	[627]	[769]	[902]	[1035]	[1169]	[1295]	[1424]	[1555]	[1676]
15.1	25 178	40 172	55 170	71 168	87 165	102 159	117 157	132 154	146 146	161 142	176 131	189 117	
[6]	[255]	[342]	[477]	[612]	[749]	[879]	[1014]	[1154]	[1286]	[1408]	[1533]	[1648]	
22.7	29 267	39 265	54 262	69 258	85 257	99 252	115 248	130 241	145 235	159 229	173 219	186 206	

### 126 cm<sup>3</sup>/r [7.7 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow l/min [GPM]	[2]	[390]	[605]	[817]	[1032]	[1248]	[1448]	[1656]	[1871]	[2069]	[2243]	[2414]	[2513]
	7.6	44 58	68 56	92 55	117 51	141 49	164 45	187 43	211 41	234 33	253 32	273 26	284 17
	[4]	[382]	[605]	[817]	[1036]	[1252]	[1463]	[1694]	[1908]	[2113]	[2306]	[2470]	[2640]
15.1	43 113	68 106	92 106	117 104	141 93	165 97	191 94	216 88	239 82	261 79	279 74	298 60	
[6]	[367]	[587]	[802]	[1017]	[1236]	[1444]	[1668]	[1882]	[2091]	[2284]	[2459]	[2637]	
22.7	41 172	66 167	91 164	115 161	140 156	163 152	188 147	213 141	236 134	258 130	278 120	298 103	
[8]	[346]	[561]	[769]	[981]	[1203]	[1419]	[1634]	[1849]	[2039]	[2217]	[2432]	[2633]	
30.3	39 228	63 225	87 220	111 216	136 213	160 208	185 201	209 195	230 188	250 174	275 163	297 149	

### 154 cm<sup>3</sup>/r [9.4 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow l/min [GPM]	[2]	[450]	[723]	[989]	[1249]	[1512]	[1769]	[2021]	[2269]	[2502]	[2714]	[2904]	[3019]
	7.6	51 47	82 47	112 46	141 44	171 40	200 39	228 36	256 33	283 30	307 26	328 19	341 10
	[4]	[470]	[737]	[1009]	[1276]	[1540]	[1802]	[2064]	[2323]	[2570]	[2813]	[3019]	[3242]
15.1	53 94	83 93	114 90	144 89	174 87	204 84	233 81	262 78	290 73	318 67	341 65	366 52	
[6]	[435]	[715]	[984]	[1252]	[1513]	[1787]	[2020]	[2274]	[2521]	[2812]	[3042]	[3301]	
22.7	49 143	81 140	111 138	141 137	171 134	202 131	228 128	257 124	285 117	318 112	344 103	373 91	
[8]	[407]	[677]	[945]	[1214]	[1477]	[1740]	[2005]	[2260]	[2503]	[2735]	[2964]	[3206]	
30.3	46 190	76 188	107 186	137 184	167 182	197 179	227 176	255 171	283 166	309 158	335 148	361 137	
[9]	[380]	[648]	[914]	[1183]	[1452]	[1714]	[1981]	[2243]	[2499]	[2733]	[2964]	[3195]	
34	43 214	73 212	103 210	134 207	164 206	194 202	224 200	253 196	282 191	309 182	335 173	361 162	

### 195 cm<sup>3</sup>/r [11.9 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

		[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]	[2600]
		28	41	55	69	83	97	110	124	138	152	165	179
Flow l/min [GPM]	[2]	[478]	[827]	[1171]	[1511]	[1839]	[2153]	[2452]	[2756]	[3027]	[3275]	[3513]	[3673]
	7.6	54 38	93 38	132 37	171 36	208 35	243 34	277 34	311 30	342 29	370 26	397 22	415 16
	[4]	[515]	[872]	[1220]	[1558]	[1886]	[2206]	[2518]	[2816]	[3107]	[3382]	[3647]	[3882]
15.1	58 75	99 73	138 73	176 71	213 70	249 69	284 66	318 64	351 62	382 56	412 52	439 44	
[6]	[524]	[878]	[1214]	[1551]	[1875]	[2199]	[2518]	[2824]	[3113]	[3389]	[3666]		
22.7	59 114	99 111	137 111	175 110	212 108	248 106	284 105	319 103	352 99	383 95	414 91		
[8]	[518]	[856]	[1187]	[1524]	[1861]	[2187]	[2499]	[2782]	[3064]	[3334]			
30.3	59 151	97 150	134 150	172 149	210 147	247 145	282 144	314 143	346 141	377 136			
[10]	[462]	[797]	[1133]	[1468]	[1799]	[2118]	[2442]	[2739]	[3023]	[3281]			
38	52 190	90 188	128 187	166 186	203 184	239 184	276 182	309 179	342 176	371 160			



[3673]  
415 } Torque [lb-in]  
16 } Speed RPM  
Nm

# W Series (162-)

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from motor to motor in production.

 Continuous  
 Intermittent

### 251 cm<sup>3</sup>/r [15.3 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]	[2200]	[2400]
	28	41	55	69	83	97	110	124	140	152	165
[2]	[759]	[1194]	[1683]	[2122]	[2535]	[2928]	[3319]	[3634]	[3946]	[4242]	[4553]
<b>7.6</b>	86 30	135 29	190 29	240 28	286 27	331 27	375 25	411 22	446 17	479 15	514 14
[4]	[806]	[1257]	[1691]	[2130]	[2563]	[2988]	[3381]	[3799]	[4147]	[4515]	[4849]
<b>15.1</b>	91 59	142 58	191 58	241 56	290 55	338 55	382 52	429 48	469 47	510 41	548 40
[6]	[780]	[1219]	[1646]	[2084]	[2515]	[2933]	[3336]	[3716]			
<b>22.7</b>	88 90	138 88	186 87	235 86	284 85	331 83	377 83	420 79			
[8]	[720]	[1148]	[1590]	[2029]	[2449]	[2861]	[3236]	[3627]			
<b>30.3</b>	81 120	130 118	180 117	229 117	277 114	323 112	366 111	410 108			
[10]	[645]	[1080]	[1513]	[1947]	[2371]	[2779]	[3151]	[3515]			
<b>37.9</b>	73 148	122 147	171 147	220 145	268 145	314 143	356 141	397 137			
[12]	[557]	[992]	[1428]	[1864]	[2292]	[2697]	[3087]				
<b>45.4</b>	63 178	112 177	161 176	211 174	259 174	305 172	349 169				
[14]	[460]	[888]	[1330]	[1761]	[2191]	[2615]	[3035]				
<b>53.0</b>	52 208	100 206	150 206	199 203	248 202	295 200	343 197				

### 303 cm<sup>3</sup>/r [18.5 in<sup>3</sup>/r]

Δ Pressure bar [PSI]

Continuous

	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]	[2000]
	28	41	55	69	83	97	110	124	140
[2]	[920]	[1454]	[1974]	[2480]	[2969]	[3429]	[3859]	[4230]	[4583]
<b>7.6</b>	104 24	164 24	223 24	280 23	335 22	387 22	436 20	478 18	518 16
[4]	[960]	[1487]	[2007]	[2513]	[3006]	[3457]	[3905]	[4338]	[4769]
<b>15.1</b>	108 49	168 49	227 47	284 47	340 46	391 45	441 44	490 41	539 39
[6]	[911]	[1445]	[1961]	[2473]	[2952]	[3411]	[3842]	[4276]	
<b>22.7</b>	103 73	163 73	222 72	279 71	334 71	385 69	434 68	483 66	
[8]	[843]	[1375]	[1888]	[2393]	[2886]	[3350]	[3763]		
<b>30.3</b>	95 99	155 98	213 97	270 96	326 95	379 94	425 93		
[10]	[752]	[1274]	[1789]	[2303]	[2792]	[3274]	[3650]		
<b>37.9</b>	85 123	144 122	202 122	260 120	316 119	370 119	412 118		
[12]	[652]	[1170]	[1691]	[2199]	[2691]	[3123]			
<b>45</b>	74 148	132 147	191 146	248 145	304 145	353 144			
[14]	[526]	[1039]	[1560]	[2064]	[2548]	[2999]			
<b>53</b>	59 172	117 172	176 171	233 170	288 169	339 168			
[16.5]	[353]	[864]	[1367]	[1876]	[2369]				
<b>62</b>	40 203	98 203	154 201	212 200	268 200				

{4583}  
 518 } Torque [lb-in]  
 Nm  
 16 } Speed RPM

### 374 cm<sup>3</sup>/r [22.8 in<sup>3</sup>/r]

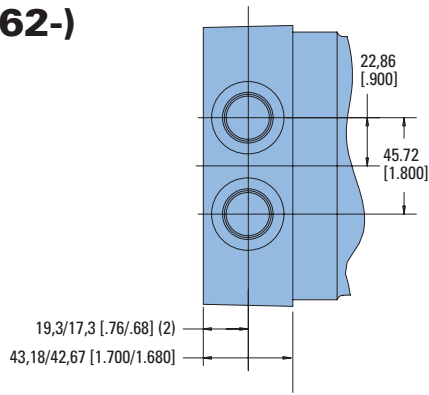
Δ Pressure bar [PSI]

Continuous

	[400]	[600]	[800]	[1000]	[1200]	[1400]	[1600]	[1800]
	28	41	55	69	83	97	110	124
[2]	[1086]	[1753]	[2365]	[2960]	[3533]	[4025]	[4484]	[4970]
<b>7.6</b>	123 20	198 19	267 17	334 16	399 14	455 12	507 12	562 11
[4]	[1152]	[1797]	[2431]	[3048]	[3624]	[4129]	[4599]	
<b>15.1</b>	130 39	203 39	275 38	344 36	409 34	467 33	520 31	
[6]	[1099]	[1749]	[2377]	[2996]	[3557]	[4077]		
<b>22.7</b>	124 60	198 58	269 57	339 56	402 54	461 53		
[8]	[1018]	[1662]	[2290]	[2894]	[3440]	[3952]		
<b>30.3</b>	115 80	188 79	259 78	327 76	389 75	447 74		
[10]	[940]	[1582]	[2210]	[2812]	[3346]	[3816]		
<b>37.9</b>	106 100	179 99	250 97	318 96	378 95	431 95		
[12]	[809]	[1454]	[2077]	[2677]	[3216]			
<b>45.4</b>	91 120	164 119	235 117	302 116	363 115			
[14]	[648]	[1284]	[1907]	[2506]	[3033]			
<b>53.0</b>	73 141	145 139	215 138	283 137	343 137			
[16]	[485]	[1107]	[1722]	[2315]	[2838]			
<b>60.6</b>	55 160	125 159	195 157	262 157	321 157			
[18]	[307]	[930]	[1543]	[2133]				
<b>68.1</b>	35 180	105 179	174 178	241 178				
[20]	[111]	[730]	[1342]	[1939]				
<b>75.7</b>	13 201	82 199	152 198	219 197				

# W Series (162-)

## Dimensions

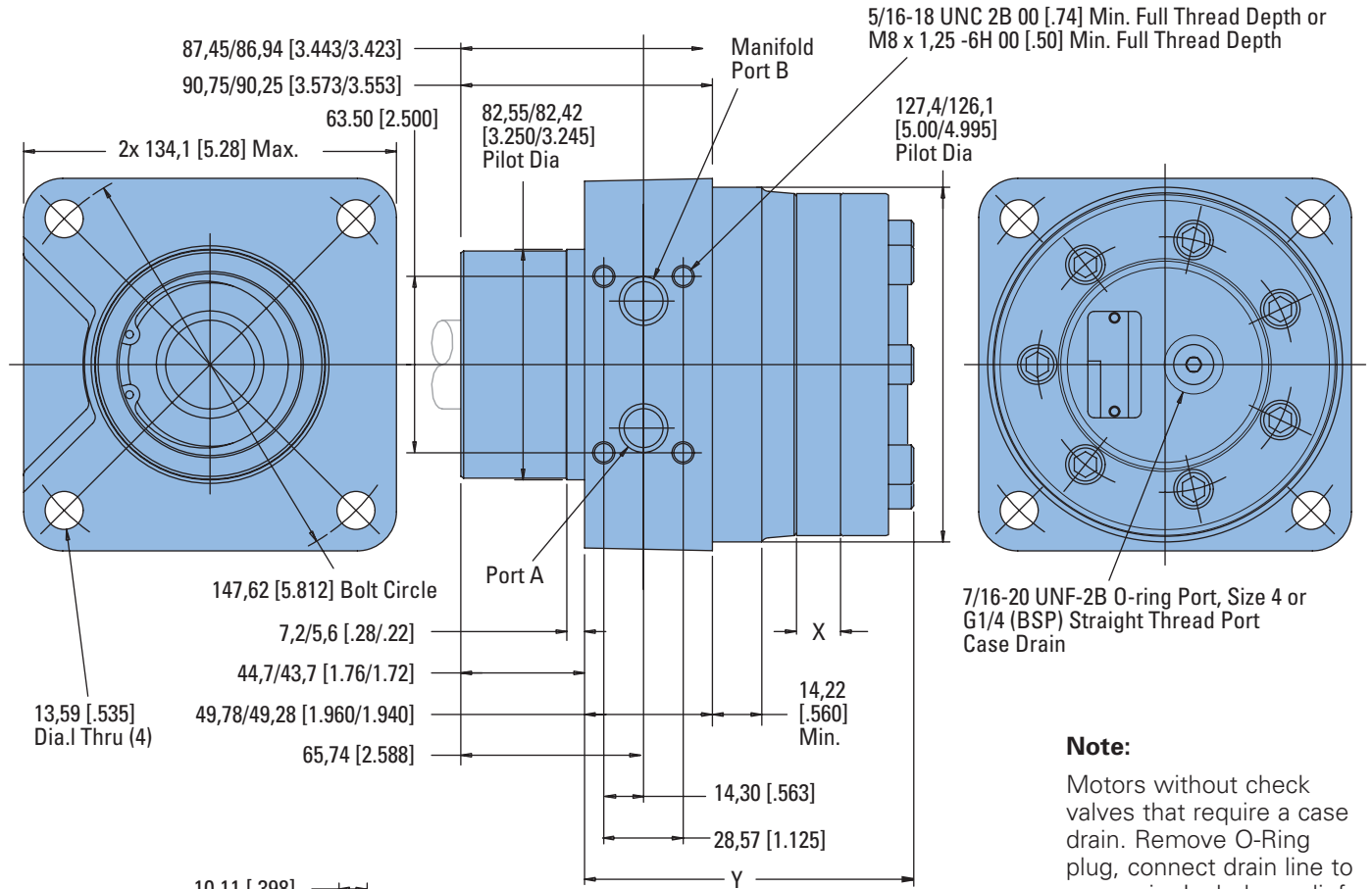


### Ports

- 7/8-14 SAE O-Ring Ports
- G1/2 BSP Straight Thread Port
- Manifold (15/16-18 Mounting Threads)

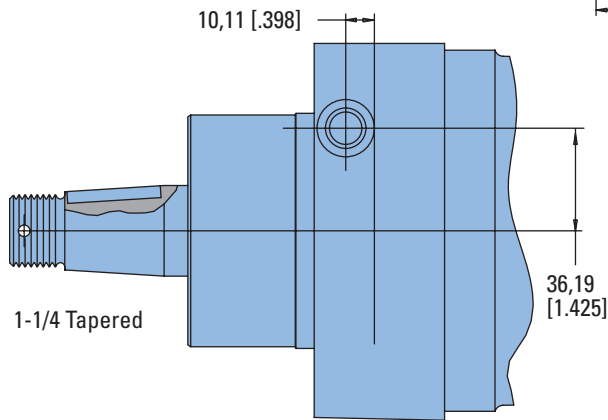
### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



### Note:

Motors without check valves that require a case drain. Remove O-Ring plug, connect drain line to reservoir. Include a relief valve (in the drain line) set to maintain 3,4 bar [50 PSI] motor case pressure.



### W SERIES DIMENSIONS

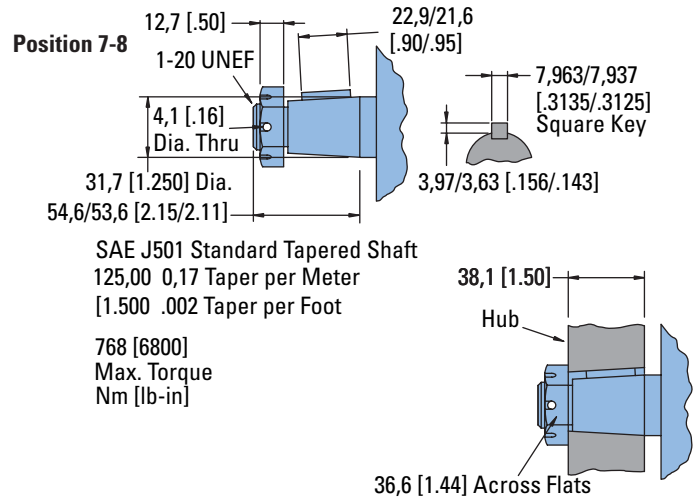
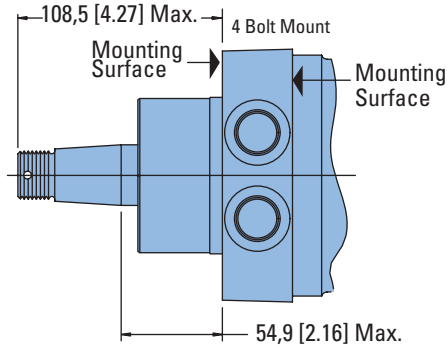
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	9,1 [.36]	116,6 [4.59]
126 [7.7]	11,9 [.47]	119,6 [4.71]
154 [9.4]	14,7 [.58]	122,2 [4.81]
195 [11.9]	18,5 [.73]	126,2 [4.97]
251 [15.3]	23,9 [.94]	131,6 [5.18]
303 [18.5]	29,0 [1.14]	136,4 [5.37]
374 [22.8]	35,6 [1.40]	143,3 [5.64]

# W Series (162-)

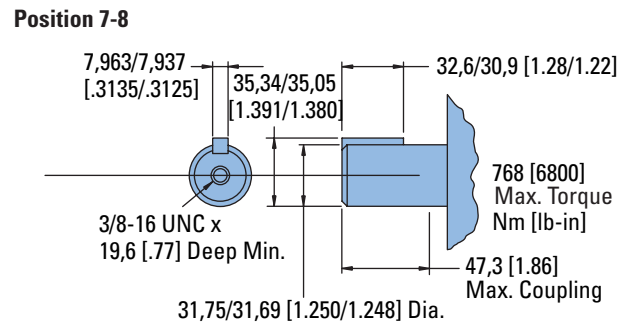
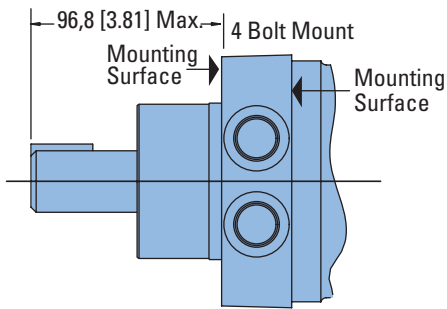
## Dimensions Shafts

Recommended Torque:  
(373 Nm [275 lb-ft] Dry)  
(305 Nm [225 lb-ft] Lub) Plus  
Torque required to align the  
slotted nut with the Shaft  
Crosshole.

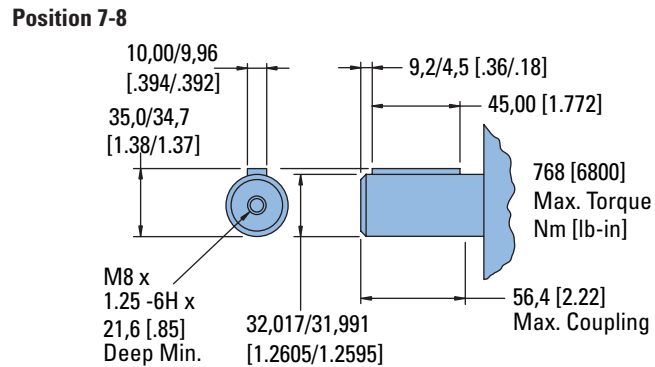
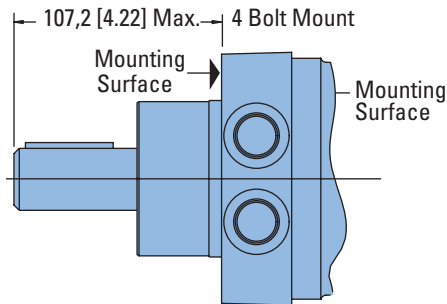
### 1 1/4 Tapered



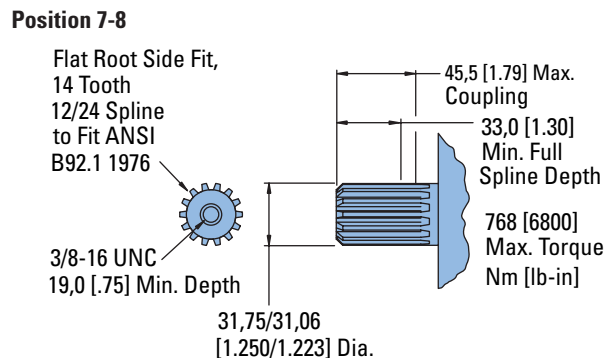
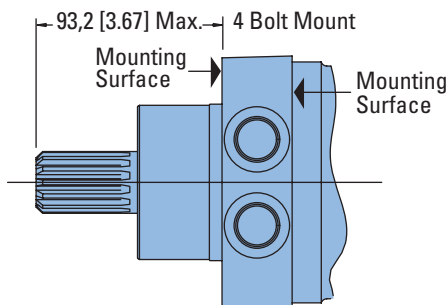
### 1 1/4 Inch Straight



### 32 mm Straight




### 1 1/4 14 Tooth Splined



# W Series (162-)

## Shaft Side Load Capacity

- Case pressure needs to be added to the outward axial thrust load and subtracted from inward axial thrustload – Case Pressure bar x 87, 1 [PSI x 1.35]
- Life values in Chart A can be adjusted for speeds up to 200 rpm.  

$$\frac{\text{Life value} \times 100 \text{ rpm}}{\text{application rpm}}$$
- Shaded areas  are intermittent loading.
- To convert application radial load at any load location to side load at the center of keyway multiply load by the application factor from Chart B.

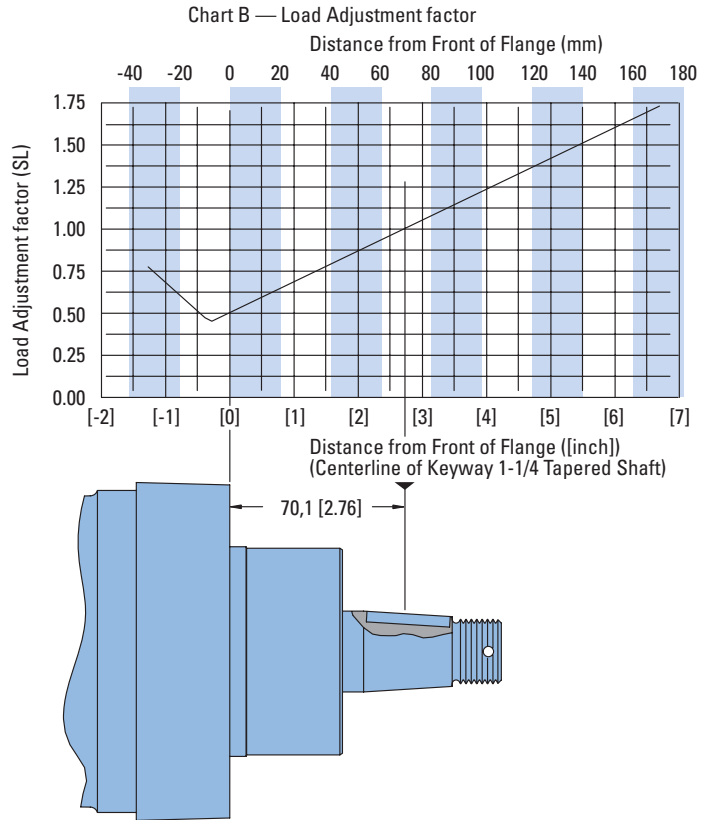
**Example:**

Side Load: 4849 N @ 120 mm [1090 lbf @ 4.75 inch] from flange.  
 Average Thrust Load: 890 N [200 lbf] inward (toward motor).  
 Case Pressure: 66 bar [960 PSI].  
 Average Speed: 150 rpm.

Expected Life Calculation: Adjust side load value (due to load variation): from Chart B look at 120mm [4.75 inch] read at angled curve for load adjustment factor of 1.38.  
 Adjusted load is: (4849 N [1090 lbf]) x (1.38) = 6690 N [1504 lbf]  
 Thrust Load Value (due to case pressure): (960 PSI) x (1.35) = [1296 lbf] (66 bar) x (87,1) = 5750 N  
 Average thrust load found to be 890 N [200 lbf] inwards so subtract from thrust load due from case pressure:  
 5750 N - 890 N = 4860 N or [1296 lbf] - 200 lbf = [1096 lbf]

Read Life Expectancy from Chart A: Value from chart reading across top to 6672 [1500] (6090 N [1504 lbf]) and down left side to 4895 [1100] (4875 N [1096 lbf])  
 Life = 1800 Hours  
 Speed Adjustment for over 100 rpm:  

$$\frac{(1800 \text{ hrs}) \times (100 \text{ rpm})}{150 \text{ rpm}} = 1200 \text{ Hours}$$



**CHART A — EXPECTED B10 LIFE (HOURS) OF BEARING UNDER VARIOUS LOADS**

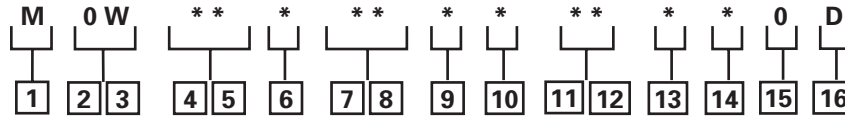
Axial Thrust		Radial Load at Centerline of keyway at 100 RPM									
		1110 [250]	2225 [500]	3335 [750]	4450 [1000]	4560 [1250]	6670 [1500]	7785 [1750]	8895 [2000]	11120 N [2500lbf]	13345 N [3000lbf]
N	lbf]										
445	[100]	410 600	66 000	19 600	8 300	4 200	2 400	1 500	1 000	530	310
1335	[300]	92 700	40 900	19 600	8 300	4 200	2 400	1 500	1 000	530	310
2225	[500]	39 400	20 900	12 400	7 900	4 200	2 400	1 500	1 000	530	310
3115	[700]	21 400	12 600	8 100	5 500	3 900	2 400	1 500	1 000	530	
4005	[900]	13 300	8 400	5 700	4 000	2 900	2 200	1 500	1 000	530	
4895	[1100]	9 000	6 000	4 200	3 100	2 300	1 800	1 400	1 000		
5785	[1300]	6 500	4 500	3 200	2 400	1 900	1 500	1 200	900		
6670	[1500]	4 800	3 500	2 600	2 000	1 500	1 200	1 000			
7560	[1700]	3 700	2 800	2 100	1 600	1 300					
8450	[1900]	3 000	2 200								
8895	[2000]	Max. Thrust									



# W Series (162-)

## Model Code

The following 16-digit coding system has been developed to identify all of the configuration options for the W Series motor. Use this model code to specify a motor with the desired features. All 16-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

**M** – Motor

### 2, 3 Series

**0W** – W Series

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**05** – 30 [4.9]

**08** – 126 [7.7]

**09** – 154 [9.4]

**12** – 195 [11.9]

**15** – 251 [15.3]

**19** – 303 [18.5]

**23** – 374 [22.8]

### 6 Mounting Type

**B** – 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia., B.C., 127,0 [5.00] rear pilot

### 7, 8 Output Shaft

**02** – 1 1/4 inch Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline with 3/8-16 UNC-2B Thread in End, 33,0 [1.30] Min. Full Spline

**03** – 1 1/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1–20 UNEF -2A Threaded Shaft End and Slotted Hex Nut, 7,938 [.3125] Square x 22,22 [.875] Straight Key

**04** – 32mm Dia. Straight Shaft with M8 x 1, 25-6H Thread in End, 9,982 [.3930] Wide x 7,995 [.3132] High x 45,00 [1.772] Long Key

**06** – 1 1/4 inch Dia. Straight Shaft with 3/8 – 16 UNC 2B Thread in End, 7,938 [.3125] Square x 34,92 [1.375] Straight Key

### 9 Ports

**A** – 7/8 -14 UNF - 2B SAE O-Ring Port

**B** – G 1/2 (BSP) Straight Thread Port

### 10 Case Flow Options

**A** – 7/16 - 20 UNF - 2B SAE O-Ring Port

**B** – G 1/4 (BSP) Straight Thread Port

**C** – Internal Check Valve

### 11, 12 Special Features (Hardware)

**00** – None

**01** – Viton Seals

### 13 Special Features (Assembly)

**0** – None

**1** – Reverse Rotation

### 14 Paint/Special Packaging

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black, Bulk Box Option

### 15 Eaton Assigned Code when Applicable

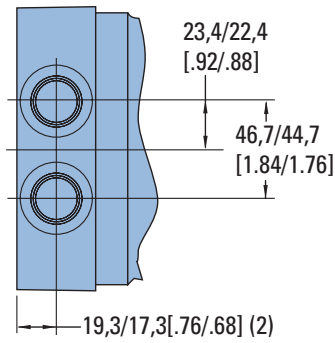
**0** – Assigned Code

### 16 Eaton Assigned Design Code

**D** – Assigned Design Code

# W Series with Parking Brake (162-)

## Dimensions



## Ports

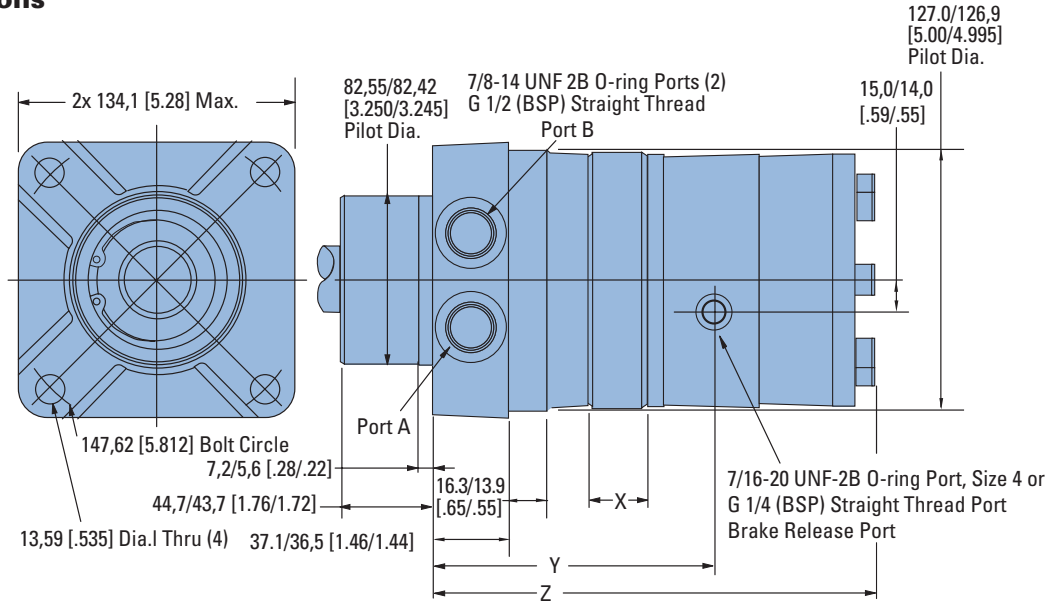
7/8 -14 UNF 2B SAE O-Ring Ports (2) or G 1/2 (BSP) Straight Thread

## Standard Rotation Viewed from Shaft End

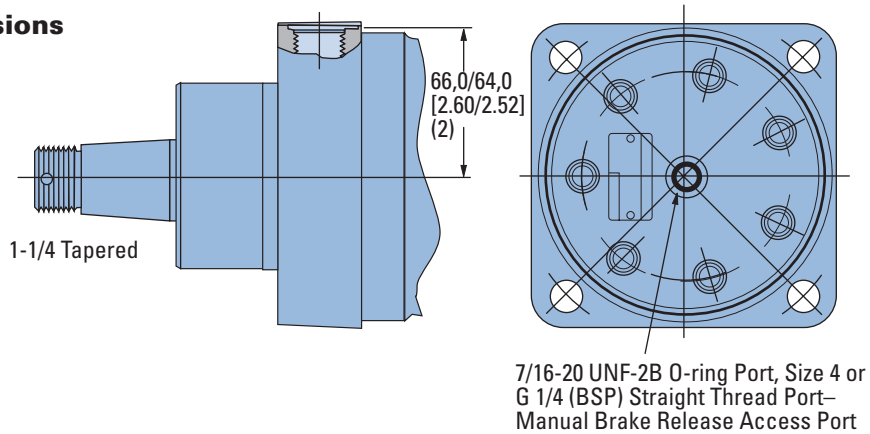
Port A Pressurized — CW

Port B Pressurized — CCW

## Port Dimensions



## Mounting Dimensions



## PORTING AND MOUNTING DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
80 [4.9]	9,1 [0.36]	119,9 [4.72]	198,4 [7.81]
126 [7.7]	11,9 [0.47]	122,9 [4.84]	201,2 [7.92]
154 [9.4]	14,7 [0.58]	125,5 [4.94]	204,0 [8.03]
195 [11.9]	18,5 [0.73]	129,6 [5.10]	207,8 [8.18]
251 [15.3]	23,9 [0.94]	134,9 [5.31]	213,4 [8.40]
303 [18.5]	29,0 [1.14]	139,7 [5.50]	217,7 [8.59]
374 [22.8]	35,6 [1.40]	146,6 [5.77]	226,8 [8.85]

## SPECIFICATIONS

Brake Release Pressure 205 bar [3000 PSI] Max.; 15 bar [250 PSI] Min.

# W Series, W Series with Parking Brake (162-)

## Product Numbers

Use digit prefix —  
162 plus four digit number  
from charts for complete  
product number —  
Example 162-1153.

**Orders will not be accepted  
without three digit prefix.**

### Standard

SHAFT	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER						
	80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Standard	162-1016	-1017	-1018	-1019	-1020	-1021	-1022
w/Case Drain	162-1023	-1024	-1025	-1009	-1008	-1026	-1027

162-1009

### W Series with Parking Brake

SHAFT	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER						
	80 [4.9]	126 [7.7]	154 [9.4]	195 [11.9]	251 [15.3]	303 [18.5]	374 [22.8]
Standard	162-1143	-1044	-1045	-1046	-1034	-1048	-1049

162-1046

#### Note:

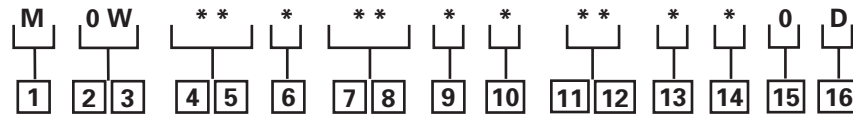
All above motors have 1 1/4  
inch tapered output shaft,  
7/8 inch O-Ring Ports.

For W Series Motors with  
a configuration not shown  
in the chart above: Use the  
model code number system  
to specify the product in  
detail. (see page B-5-8  
and use the model code  
supplement shown on page  
B-5-11 for spring-applied  
hydraulic-release parking  
brake).

# W Series with Parking Brake (162-)

## Model Code

The following 16-digit coding system has been developed to identify all of the configuration options for the W motor. Use this model code to specify a motor with the desired features. All 16-digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product

**M** – Motor

### 2, 3 Series

**0W** – W Series with Parking Brake

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**05** – 30 [4.9]

**08** – 126 [7.7]

**09** – 154 [9.4]

**12** – 195 [11.9]

**15** – 251 [15.3]

**19** – 303 [18.5]

**23** – 374 [22.8]

### 6 Mounting Type

**B** – 4 Bolt (Wheel) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes 147,6 [5.81] Dia., B.C., 127,0 [5.00] rear pilot

### 7, 8 Output Shaft

**02** – 1 1/4 inch Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline with 3/8-16 UNC-2B Thread in End, 33,0 [1.30] Min. Full Spline

**03** – 1 1/4 inch Dia. .125:1 Tapered Shaft Per SAE J501 with 1– 20 UNEF -2A Threaded Shaft End and Slotted Hex Nut, 7,938 [.3125] Square x 22,22 [.875] Straight Key

**04** – 32mm Dia. Straight Shaft with M8 x 1, 25-6H Thread in End, 9,982 [.3930] Wide x 7,995 [.3132] High x 45,00 [1.772] Long Key

**06** – 1 1/4 inch Dia. Straight Shaft with 3/8 – 16 UNC 2B Thread in End, 7,938 [.3125] Square x 34,92 [1.375] Straight Key

### 9 Ports

**A** – 7/8 -14 UNF - 2B SAE O-Ring Port

**B** – G 1/2 (BSP) Straight Thread Port

### 10 Case Flow Options

**A** – 7/16 - 20 UNF - 2B SAE O-Ring Port

**B** – G 1/4 (BSP) Straight Thread Port

**C** – Internal Check Valve

### 11, 12 Special Features (Hardware)

**00** – None

**01** – Viton Seals

**06** – Spring-applied hydraulic-release brake

### 13 Special Features (Assembly)

**0** – None

**1** – Reverse Rotation

### 14 Paint/Special Packaging

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black - Individual Box

### 15 Eaton Assigned Code when Applicable

**0** – Assigned Code

### 16 Eaton Assigned Design Code

**D** – Assigned Design Code



# Char-Lynn

## Disc Valve Hydraulic Motors

State of the art motors benefiting from 45 years of experience and innovating constantly to fit your demands.



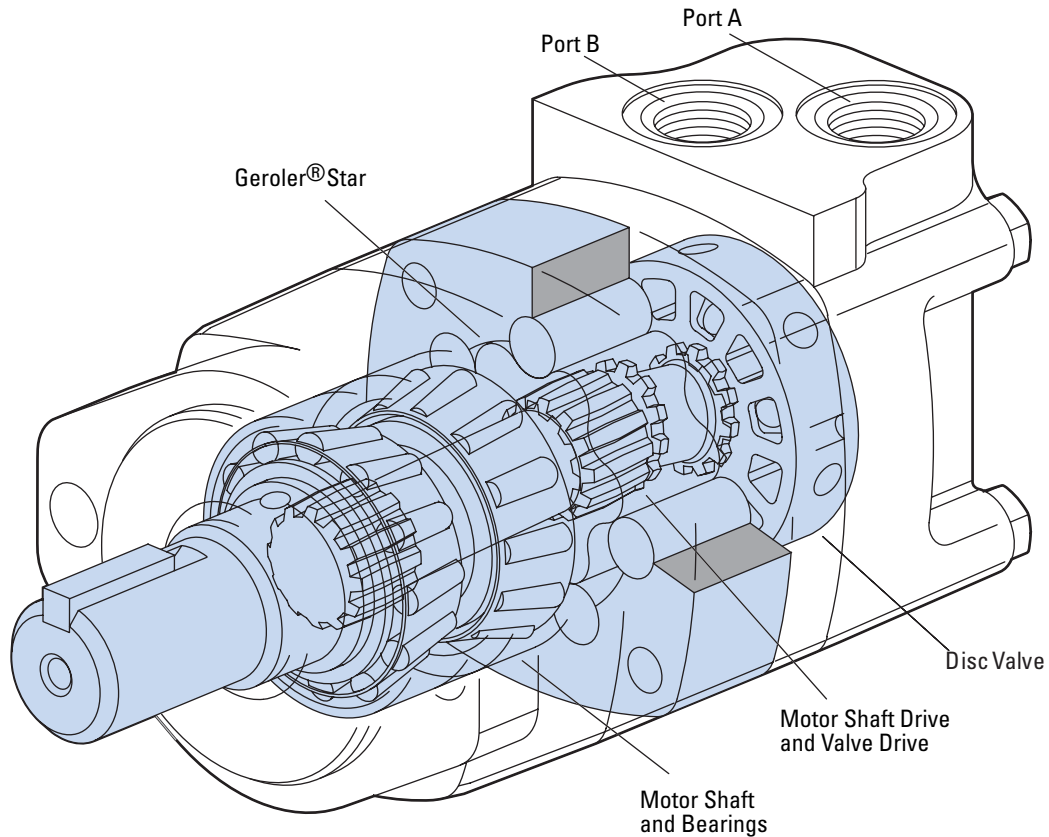
# Disc Valve Hydraulic Motors

## Highlights

### Product Description

In the late 1950's the original low speed, high torque hydraulic motor was developed from a pump Geroler element consisting of an internal gear ring and a mating gear or star. While attaching the internal gear ring to the housing as a non moving part, oil was ported to pressurize and turn the internal star in an orbit around a center point. This slow turning star coupled with a splined drive to the output shaft became the Char-Lynn Orbit® motor.

A few years after this original Char-Lynn Orbit motor was introduced another original motor concept went into production. This motor had rolls incorporated into the internal gear ring, this element was identified by the name Geroler and is a registered trade name of Eaton Hydraulics. From these early years the Geroler motor has seen many design changes to make these Geroler motors the best the industry has to offer. Examine the simplicity of these Geroler disc valve motors shown below. Also examine all the following pages for high value Char-Lynn disc valve motors from Eaton Hydraulics.





# Features, Benefits, and Applications

## Features

Char-Lynn Hydraulic motors provide design flexibility. All disc valve motors are available with various configurations consisting of:

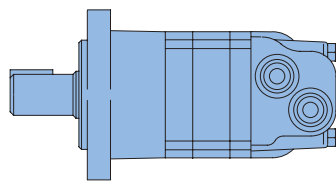
- Displacement (Geroler size)
- Output Shaft
- No Shaft and Bearing Assembly (Bearingless Motor)
- Port Configuration
- Mounting Flange
- Other Special Features

## Benefits

- Lowest pressure drop motor in the industry
- Widest range of options
- The most experienced manufacturer of LSHT motors

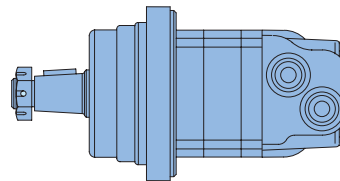
## Applications

- Swing motor
- Brush Cutters & mowers
- Harvesting equipment
- Directional boring
- Turf equipment
- Skid Steer loaders
- Fairway mowers
- Harvesters
- Mowing
- Snow removal
- Sprayers
- Trencher
- Wood products
- Grinders and mixers
- Forestry equipment
- Irrigation reels



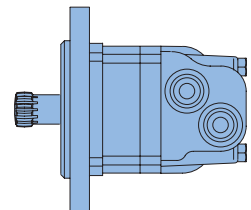
### Standard Motor

The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.



### Wheel Motor

The wheel motor mounting flange is located near the center of the motor which permits part or all of the motor to be located inside the wheel or roller hub. In traction drive applications, loads can be positioned over the motor bearings for best bearing life. This wheel motor mounting flange provides design flexibility in many applications.



### Bearingless Motor

The bearingless motor has the same drive components as the standard and wheel motors (with the exception that the motor is assembled without the output shaft, bearings and bearing housing). The bearingless motor is especially suited for applications such as gear boxes, winch drives, reel and roll drives. Bearingless motor applications must be designed with a bearing supported internal spline to mate with the bearingless motor drive. Product designs using these hydraulic motors provide considerable cost savings.

# Table of Contents

Highlights	C-ii
Features, Benefits, and Applications	C-iii
Table of Contents	C-iv

## 2000 Series

Highlights	C-1-1
Specifications	C-1-2
Performance Data	C-1-3
Dimensions	C-1-8
Installation Information	C-1-14
Shaft Side Load Capacity	C-1-18
Case Pressure and Case Porting	C-1-19
Product Numbers	C-1-23
Model Code	C-1-24

## 2000 Series Two-Speed

Description	C-1-25
Typical Hydraulic Circuit	C-1-26
Specifications	C-1-27
Dimensions	C-1-28
Product Numbers	C-1-30

## 4000 Compact Series

Highlights	C-2-1
Specifications	C-2-2
Performance Data	C-2-3
Dimensions	C-2-9
Installation Information	C-2-12
4000 Compact Series	C-2-13
Mounting Options	C-2-13
Dimensions	C-2-14
Mounting Options for use with Enhanced Bearings	C-2-14
Shaft Side Load Capacity	C-2-17
Case Pressure and Case Port	C-2-18
Model Code	C-2-22

## Delta Series

Highlights	C-3-1
Specifications	C-3-2
Performance Data	C-3-3
Dimension Data	C-3-4
Model Code	C-3-5

## 4000 Series

Highlights	C-4-1
Specifications	C-4-6
Performance Data	C-4-7
Dimensions	C-4-12
Installation Information	C-4-15
Shaft Side Load Capacity	C-4-17
Case Pressure and Case Port	C-4-18
Product Numbers	C-4-20
Model Code	C-4-21

## 6000 Series

Highlights	C-5-1
Specifications	C-5-2
Performance Data	C-5-3
Dimensions	C-5-8
Installation Information	C-5-12
Shaft Side Load Capacity	C-5-14
Case Pressure and Case Port	C-5-15
Dimensions Ports	C-5-16
Product Numbers	C-5-17
Model Code	C-5-18

## 10,000 Series

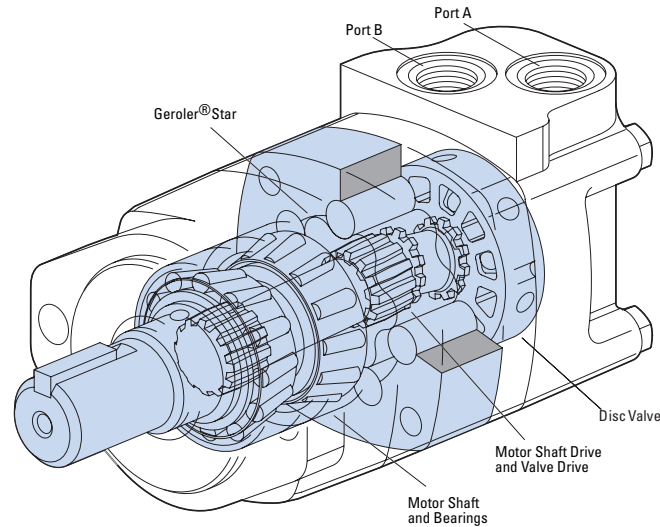
Highlights	C-5-1
Specifications	C-5-2
Performance Data	C-5-3
Dimensions	C-5-5
Installation Information	C-5-8
Side Shaft Load Capacity	C-5-10
Product Numbers	C-5-12
Model Code	C-5-13

## 10,000 Series Two-Speed

Description	C-6-14
Performance Data	C-6-14
Typical Hydraulic Circuit	C-6-15
Specifications	C-6-16
Dimensions	C-6-17
Product Numbers	C-6-19

# 2000 Series

## Highlights



### Features

- Three zone design for longer life and true bi-directionality.
- Bearings that meet the highest standards of the industry
- Options to optimize performance in every application
- Integrated cross-over relief valve option

### Benefits

- Easy to design in a system
- Reliability and performance in tough application
- Compact design of the integrated cross-over relief valve option

### Applications

- Skid Steer Attachments
- Swing Motor
- Brush Cutters & Mowers
- Harvesting Equipment
- Directional Boring any place pressure relief protection is optimal for system or motor performance and life
- Turf equipment

### Description

The popular 2000 Series provides torque up to 7500 lb-in. This proven design is reliable and durable. Eaton has added options that make the motor more flexible to use in a wide variety of applications. The integral cross-over relief valve is the latest innovation in the 2000 series motors.

### 2000 Series

Geroler Element	10 Displacements
Flow l/min [GPM]	75 [20] Continuous** 115 [30] Intermittent*
Speed RPM	908 Cont.** 1042 Inter.*
Pressure bar [PSI]	200 [3000] Cont.** 300 [4500] Inter.*
Torque Nm [lb-in]	845 [7470] Cont.** 930 [8225] Inter.*

\*\* Continuous—(Cont.) Continuous rating, motor may be run continuously at these ratings.

\* Intermittent—(Inter.) Intermittent operation, 10% of every minute.



Auger



Boring



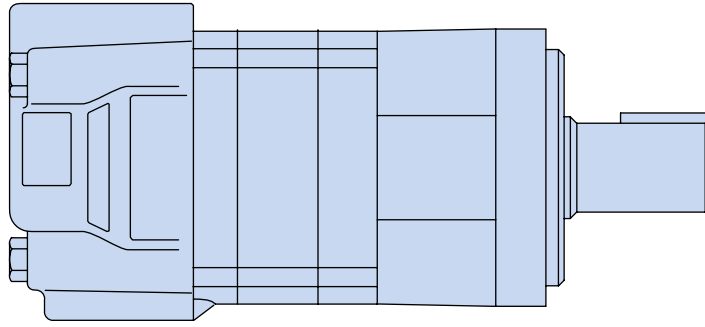
Plastic Injection



Oil and Gas Equipment

# 2000 Series

## Specifications



### SPECIFICATION DATA — 2000 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		80 [4.9]	90 [5.5]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
Max. Speed (RPM)	Continuous	908	836	742	576	477	385	308	246	191	153
	Intermittent	908	1042	924	720	713	577	462	365	287	230
@ Flow											
Flow l/min [GPM]	Continuous	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
	Intermittent	75 [20]	95 [25]	95 [25]	95 [25]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque* Nm [lb-in]	Continuous	235 [2065]	265 [2326]	295 [2630]	385 [3420]	455 [4040]	540 [4780]	660 [5850]	765 [6750]	775 [6840]	845 [7470]
	Intermittent	345 [3035]	390 [3458]	445 [3950]	560 [4970]	570 [5040]	665 [5890]	820 [7250]	885 [7820]	925 [8170]	930 [8225]
Pressure $\Delta$ bar [ $\Delta$ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	260 [3700]	170 [2750]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	205 [3250]	170 [2500]
Weight kg [lb]	Standard or Wheel Mount	9.3 [20.5]	9.3 [20.5]	9.5 [21.0]	9.8 [21.5]	10.0 [22.0]	10.4 [23.0]	10.9 [24.0]	11.3 [25.0]	11.8 [26.0]	12.2 [27.0]
	Bearingless	7.3 [16.0]	7.3 [16.0]	7.5 [16.5]	7.7 [17.0]	7.9 [17.5]	8.4 [18.5]	8.8 [18.5]	9.3 [20.5]	9.8 [21.5]	10.2 [22.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

310 bar [4500 PSI]  
Do not exceed  $\Delta$  pressure rating (see chart above).

#### Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.  
Do not exceed  $\Delta$  pressure rating (see chart above).

#### $\Delta$ bar [ $\Delta$ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:





per ISO Cleanliness Code, 4406: 20/18/13

# 2000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No Operation

### 90 cm<sup>3</sup>/r [5.5 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.25] .95	[124] 5	[233] 26	[471] 53							
[.5] 1.9	[133] 15	[273] 31	[555] 63	[832] 94						
[1] 3.8	[151] 17	[358] 40	[744] 84	[1091] 123	[1424] 161	[1697] 192	[1952] 221	[2189] 247	[2368] 268	
[2] 7.5	[151] 17	[358] 40	[744] 84	[1099] 124	[1439] 163	[1737] 196	[2015] 228	[2293] 259	[2570] 290	[2855] 323
[4] 15	[151] 17	[350] 40	[899] 102	[1113] 126	[1473] 166	[1800] 203	[2132] 241	[2454] 277	[2775] 314	[3100] 350
[6] 23	[142] 16	[348] 39	[736] 83	[613] 69	[1492] 169	[1851] 209	[2208] 249	[2552] 288	[2898] 327	[3249] 367
[8] 30	[133] 15	[338] 38	[729] 82	[1128] 127	[1509] 170	[1890] 214	[2269] 256	[2635] 298	[3000] 339	[3367] 380
[10] 38	[124] 14	[331] 37	[724] 82	[1130] 128	[1521] 172	[1912] 216	[2309] 261	[2670] 302	[3036] 343	[3398] 384
[12] 45	[106] 12	[315] 36	[714] 81	[1127] 127	[1525] 172	[1924] 217	[2326] 263	[2704] 306	[3082] 348	[3458] 391
[14] 53	[98] 11	[298] 34	[706] 80	[1115] 126	[1525] 172	[1924] 217	[2326] 263	[2707] 306	[3080] 348	[3450] 390
[16] 61	[80] 9	[285] 32	[688] 78	[1107] 125	[1510] 171	[1907] 215	[2311] 261	[2697] 305	[3070] 347	[3432] 388
[18] 68	[62] 7	[262] 30	[673] 76	[1087] 123	[1490] 168	[1892] 214	[2281] 258	[2662] 301	[3030] 342	[3381] 382
[20] 76	[53] 6	[242] 27	[644] 73	[1045] 118	[1447] 163	[1850] 209	[2246] 254	[2617] 296	[2988] 338	[3301] 373
[22] 83	[35] 4	[231] 26	[639] 72	[1047] 118	[1437] 162	[1836] 207	[2218] 251	[2599] 294	[2981] 337	
[24] 91	[18] 2	[204] 23	[612] 69	[1011] 114	[1366] 154	[1792] 202	[2182] 247	[2573] 291	[2963] 335	
[25] 95		[195] 22	[594] 67	[994] 112	[1384] 156	[1765] 199	[2173] 246	[2564] 290		

### 80 cm<sup>3</sup>/r [4.9 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.25] .95	[210] 25	[420] 45							
[.5] 1.9	[250] 30	[500] 50	[740] 85						
[1] 3.8	[330] 35	[670] 75	[990] 110	[1300] 145	[1550] 175	[1800] 205	[1950] 220	[2110] 240	
[2] 7.5	[330] 35	[670] 75	[995] 110	[1310] 150	[1580] 180	[1840] 210	[2100] 235	[2365] 265	[2630] 295
[4] 15	[325] 35	[670] 75	[1005] 115	[1330] 150	[1620] 185	[1920] 215	[2200] 250	[2480] 280	[2765] 310
[6] 23	[320] 35	[665] 75	[1010] 115	[1340] 150	[1655] 185	[1975] 225	[2270] 255	[2570] 290	[2880] 325
[8] 30	[310] 35	[660] 75	[1015] 115	[1345] 150	[1685] 190	[2020] 230	[2330] 265	[2640] 300	[2960] 335
[10] 38	[300] 35	[650] 75	[1010] 115	[1350] 155	[1700] 190	[2050] 230	[2370] 270	[2690] 305	[3010] 340
[12] 45	[285] 30	[640] 70	[1005] 115	[1350] 155	[1705] 195	[2065] 235	[2390] 270	[2715] 305	[3035] 345
[14] 53	[270] 30	[625] 70	[990] 110	[1340] 150	[1705] 195	[2065] 235	[2395] 270	[2720] 305	[3030] 340
[16] 61	[255] 30	[610] 70	[975] 110	[1330] 150	[1690] 190	[2055] 230	[2385] 270	[2700] 305	[2995] 340
[18] 68	[230] 25	[590] 65	[955] 110	[1310] 150	[1680] 190	[2025] 230	[2355] 265	[2660] 300	[2935] 330
[20] 76	[210] 25	[570] 65	[930] 105	[1290] 145	[1645] 185	[1985] 225	[2305] 260	[2600] 295	[2845] 320





[570]  
65 } Torque [lb-in]  
901 } Nm  
Speed RPM

# 2000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No Operation

**100 cm<sup>3</sup>/r [6.2 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

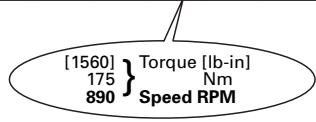
[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
-------------	-------------	--------------	---------------	---------------	---------------	---------------	---------------	---------------	---------------

[.25] <b>.95</b>	[140] 15 4	[260] 30 2							
[.5] <b>1.9</b>	[150] 15 13	[300] 35 9	[620] 70 5	[940] 105 2					
[1] <b>3.8</b>	[170] 20 35	[390] 45 34	[830] 95 31	[1210] 135 28	[1570] 175 23	[1870] 210 15	[2130] 240 6		
[2] <b>7.5</b>	[170] 20 73	[390] 45 71	[830] 95 68	[1220] 140 63	[1590] 180 59	[1920] 215 51	[2220] 250 38	[2520] 285 24	[2810] 315 14
[4] <b>15</b>	[170] 20 148	[380] 45 145	[820] 90 141	[1240] 140 136	[1640] 185 131	[2010] 225 121	[2380] 270 104	[2750] 310 94	[3120] 355 80
[6] <b>23</b>	[160] 20 222	[380] 45 219	[820] 90 215	[1260] 140 209	[1670] 190 202	[2080] 235 192	[2480] 280 172	[2880] 325 163	[3280] 370 149
[8] <b>30</b>	[150] 15 297	[370] 40 294	[810] 90 288	[1260] 140 281	[1700] 190 273	[2130] 240 261	[2560] 290 243	[2990] 340 231	[3420] 385 216
[10] <b>38</b>	[140] 15 371	[368] 40 367	[810] 90 362	[1270] 145 354	[1720] 195 344	[2160] 245 330	[2610] 295 316	[3020] 340 300	[3440] 390 283
[12] <b>45</b>	[120] 15 445	[350] 40 442	[800] 90 436	[1270] 145 427	[1730] 195 415	[2180] 245 399	[2630] 295 389	[3070] 345 369	[3510] 395 350
[14] <b>53</b>	[110] 10 519	[330] 35 516	[800] 90 509	[1260] 140 500	[1740] 195 486	[2180] 245 469	[2630] 295 463	[3070] 345 437	[3500] 395 417
[16] <b>61</b>	[90] 10 594	[320] 35 591	[780] 90 583	[1260] 140 573	[1720] 195 558	[2160] 245 540	[2610] 295 537	[3060] 345 506	[3500] 395 485
[18] <b>68</b>	[70] 10 668	[300] 35 665	[770] 85 657	[1240] 140 646	[1700] 190 630	[2140] 240 611	[2580] 290 609	[3020] 340 574	[3460] 390 552
[20] <b>76</b>	[60] 5 742	[280] 30 739	[730] 80 731	[1180] 135 715	[1630] 185 703	[2090] 235 684	[2550] 290 662	[2980] 335 643	[3440] 390 619
[22] <b>83</b>	[40] 5 816	[260] 30 813	[720] 80 805	[1180] 135 794	[1620] 185 777	[2070] 235 758	[2500] 280 749	[2930] 330 712	[3360] 380 687
[24] <b>91</b>	[20] 1,0 890	[230] 230 887	[690] 80 879	[1140] 130 868	[1540] 175 852	[2020] 230 834	[2460] 280 814	[2900] 330 782	[3340] 375 754
[25] <b>95</b>		[220] 25 924	[670] 75 916	[1120] 125 905	[1560] 175 890	[1990] 225 873	[2450] 275 846	[2890] 325 817	

**130 cm<sup>3</sup>/r [8.0 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
-------------	-------------	--------------	---------------	---------------	---------------	---------------	---------------	---------------	---------------

[.25] <b>.95</b>	[170] 20 3								
[.5] <b>1.9</b>	[190] 20 12	[410] 45 8	[870] 100 2						
[1] <b>3.8</b>	[230] 25 28	[510] 60 27	[1070] 120 23	[1580] 180 19	[2050] 230 16	[2520] 285 13	[2920] 330 9	[3310] 375 3	
[2] <b>7.5</b>	[230] 25 56	[510] 60 56	[1080] 120 53	[1600] 180 47	[2090] 235 42	[2580] 290 39	[2930] 330 36	[3320] 375 28	[3640] 410 21
[4] <b>15</b>	[220] 25 114	[500] 55 113	[1080] 120 111	[1620] 185 104	[2150] 245 97	[2660] 300 95	[3100] 350 92	[3540] 400 85	[3980] 450 77
[6] <b>23</b>	[220] 25 172	[490] 55 171	[1080] 120 169	[1640] 185 161	[2190] 245 153	[2740] 310 149	[3260] 370 146	[3770] 425 132	[4280] 485 118
[8] <b>30</b>	[200] 25 230	[480] 55 224	[1080] 120 222	[1650] 185 219	[2220] 250 210	[2780] 315 204	[3310] 375 201	[3840] 435 192	[4360] 495 184
[10] <b>38</b>	[180] 20 287	[470] 55 286	[1070] 120 282	[1650] 185 276	[2230] 250 269	[2800] 315 261	[3420] 385 255	[3940] 445 243	[4450] 505 231
[12] <b>45</b>	[160] 20 345	[460] 50 344	[1060] 120 338	[1640] 185 333	[2230] 250 327	[2800] 315 317	[3350] 380 307	[3910] 440 295	[4440] 500 284
[14] <b>53</b>	[150] 15 403	[440] 50 402	[1030] 115 395	[1620] 185 391	[2220] 250 385	[3000] 340 373	[3350] 380 360	[3910] 440 348	[4440] 500 336
[16] <b>61</b>	[130] 15 461	[420] 45 460	[1010] 115 452	[1600] 180 447	[2200] 250 443	[2780] 315 430	[3330] 375 411	[3890] 440 397	[4440] 500 384
[18] <b>68</b>	[110] 10 518	[400] 45 517	[990] 110 509	[1580] 180 504	[2160] 245 500	[2750] 310 484	[3300] 375 471	[3860] 435 456	[4410] 500 440
[20] <b>76</b>	[90] 10 576	[380] 45 575	[960] 110 568	[1550] 175 560	[2130] 240 551	[2710] 305 539	[3280] 370 524	[3840] 435 508	
[22] <b>83</b>	[60] 5 634	[350] 40 633	[940] 105 624	[1520] 170 619	[2100] 235 604	[2680] 305 597	[3250] 365 579	[3820] 430 560	
[24] <b>91</b>	[40] 5 692	[325] 35 691	[920] 105 682	[1490] 170 676	[2070] 235 665	[2650] 300 651	[3220] 365 633	[3780] 425 616	
[25] <b>95</b>	[20] 1,0 720	[310] 35 719	[900] 100 712	[1480] 165 705	[2050] 230 692	[2630] 295 679	[3200] 360 682	[3700] 420 656	





# 2000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No Operation

**195 cm<sup>3</sup>/r [11.9 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.25]	[240] 25 4	[590] 65 2													
[.5]	[290] 35 8	[640] 70 6	[990] 110 5	[1340] 150 2											
[1]	[380] 45 17	[730] 80 16	[1100] 125 15	[1430] 160 14	[1790] 200 13	[2120] 200 11	[2450] 275 9	[2720] 305 7	[2990] 340 5	[3260] 370 4	[3540] 400 3	[3810] 430 2	[4080] 460 2	[4350] 490 1	[4620] 520 1
[2]	[390] 45 37	[755] 85 35	[1135] 130 34	[1470] 165 33	[1860] 210 32	[2195] 250 31	[2535] 285 28	[2880] 325 26	[3120] 355 24	[3680] 415 21	[4090] 450 16	[4500] 510 19	[4800] 540 17	[5100] 575 14	[5400] 610 14
[4]	[405] 45 76	[1185] 90 74	[1540] 135 73	[1970] 175 72	[2310] 225 70	[2675] 260 66	[3040] 345 62	[3420] 385 61	[3790] 430 61	[4160] 470 55	[4520] 510 50	[4890] 550 55	[5260] 595 51	[5630] 635 51	[5900] 665 45
[6]	[405] 45 115	[815] 90 113	[1220] 140 111	[1590] 180 109	[2035] 230 108	[2395] 270 104	[2780] 315 102	[3170] 360 100	[3560] 400 99	[3940] 445 96	[4320] 480 94	[4700] 530 91	[5070] 570 87	[5450] 615 87	[5830] 660 81
[8]	[400] 45 154	[820] 90 151	[1230] 140 149	[1625] 185 148	[2065] 235 147	[2450] 275 146	[2850] 320 143	[3260] 370 140	[3670] 415 137	[4040] 455 135	[4410] 500 132	[4780] 540 130	[5150] 580 127	[5520] 625 123	[5890] 665 117
[10]	[380] 45 193	[810] 95 190	[1230] 140 188	[1645] 185 187	[2095] 235 186	[2480] 280 184	[2895] 325 181	[3310] 375 177	[3730] 420 175	[4100] 465 173	[4470] 505 170	[4840] 545 168	[5210] 590 164	[5590] 630 160	
[12]	[355] 40 231	[790] 90 229	[1215] 135 227	[1650] 185 226	[2100] 235 224	[2485] 280 221	[2915] 330 219	[3340] 375 218	[3760] 425 215	[4120] 465 211	[4480] 505 208	[4850] 550 204			
[14]	[320] 35 269	[765] 85 267	[1190] 135 267	[1645] 185 264	[2090] 235 261	[2475] 280 260	[2915] 330 257	[3350] 380 254	[3770] 425 250	[4130] 465 248	[4480] 505 245	[4860] 550 241			
[16]	[290] 30 308	[730] 80 306	[1160] 130 305	[1625] 185 303	[2070] 235 299	[2455] 275 296	[2900] 330 294	[3340] 375 290	[3760] 425 286	[4130] 465 283	[4490] 505 279	[4860] 550 276			
[18]	[290] 30 346	[690] 80 345	[1120] 125 345	[1590] 180 342	[2035] 230 337	[2420] 270 334	[2870] 325 333	[3310] 375 327	[3730] 420 321	[4100] 465 315	[4480] 505 308				
[20]	[210] 25 385	[650] 75 384	[1080] 120 383	[1550] 175 380	[1995] 225 375	[2380] 270 372	[2830] 320 371	[3270] 370 367	[3690] 415 363	[4070] 460 359	[4450] 500 355				
[22]	[170] 20 424	[610] 70 423	[1040] 120 422	[1500] 170 418	[1955] 220 414	[2340] 265 410	[2785] 315 408	[3220] 365 404	[3640] 410 399	[4050] 460 395					
[24]	[135] 15 462	[570] 65 461	[1000] 115 460	[1440] 165 457	[1910] 215 453	[2300] 260 449	[2740] 310 446	[3170] 360 441	[3590] 405 436	[3980] 450 432					
[25]	[120] 15 484	[550] 60 482	[980] 110 479	[1410] 160 476	[1890] 215 473	[2280] 260 469	[2720] 305 464	[3150] 355 459	[3570] 405 454	[3960] 445 449					
[30]		[420] 45 577	[860] 95 575	[1290] 145 571	[1700] 190 567	[2120] 240 562	[2530] 285 556	[2940] 330 550	[3400] 385 542						

**160 cm<sup>3</sup>/r [9.6 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[3750] 260
[.25]	[200] 25 3								
[.5]	[240] 25 9	[490] 55 7	[990] 110 5	[1570] 175 3	[2140] 240 1				
[1]	[280] 30 23	[590] 65 21	[1170] 130 19	[1730] 195 17	[2290] 260 13	[2830] 320 8	[3330] 375 3	[3820] 430 2	[4070] 460 1
[2]	[300] 35 46	[610] 70 45	[1210] 135 42	[1790] 200 39	[2350] 265 35	[2920] 330 34	[3480] 395 33	[4050] 460 28	[4330] 490 22
[4]	[320] 35 93	[630] 70 92	[1260] 140 89	[1890] 215 85	[2530] 285 79	[3170] 360 77	[3820] 430 73	[4460] 505 59	[4780] 540 43
[6]	[320] 35 142	[650] 75 140	[1300] 145 137	[1960] 220 131	[2620] 295 124	[3280] 370 118	[3940] 445 113	[4600] 520 104	[4930] 560 96
[8]	[310] 35 190	[650] 75 187	[1330] 150 184	[2010] 225 178	[2670] 300 170	[3330] 375 166	[4000] 450 164	[4660] 525 153	[4990] 565 142
[10]	[290] 35 237	[640] 70 235	[1340] 150 231	[2030] 230 226	[2850] 320 217	[3410] 385 212	[4030] 455 205	[4700] 530 193	[5030] 570 187
[12]	[270] 30 286	[620] 70 283	[1320] 150 279	[2030] 230 265	[2700] 305 254	[3370] 380 254	[4040] 455 246	[4710] 530 235	[5040] 570 224
[14]	[240] 25 334	[590] 65 331	[1300] 145 326	[2020] 230 323	[2690] 305 312	[3360] 380 305	[4030] 455 305	[4700] 530 297	
[16]	[220] 25 382	[570] 65 378	[1300] 145 374	[2020] 225 369	[2660] 300 360	[3330] 375 349	[4010] 455 339	[4680] 530 326	
[18]	[190] 20 429	[540] 60 426	[1240] 140 422	[1960] 220 416	[2640] 300 407	[3320] 375 394	[3990] 450 387		
[20]	[170] 20 477	[510] 60 474	[1210] 135 469	[1920] 215 462	[2630] 300 451	[3310] 375 440	[3940] 445 430		
[22]	[150] 15 525	[480] 55 522	[1170] 130 517	[1880] 210 510	[2600] 295 501	[3290] 370 484	[3920] 445 473		
[24]	[120] 15 572	[450] 50 569	[1150] 130 564	[1860] 210 556	[2570] 290 546	[3260] 370 531	[3900] 440 522		
[25]	[90] 10 596	[440] 50 593	[1140] 130 587	[1840] 210 580	[2560] 290 566	[3230] 365 553	[3880] 440 544		
[30]		[330] 35 713	[1040] 120 706	[1750] 200 696	[2470] 280 682	[3140] 355 672	[3800] 430 658		

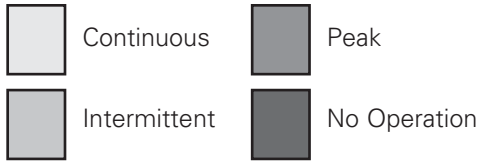
[330]  
35  
713 } Torque [lb-in]  
                      Nm  
                      Speed RPM

# 2000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



245 cm³/r [14.9 in³/r]  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5] <b>1.9</b>	[410] 45 4	[850] 95 2													
[1] <b>3.8</b>	[450] 50 14	[930] 105 13	[1420] 160 12	[1850] 210 11	[2320] 260 10	[2780] 315 9	[3250] 365 8	[3650] 410 6	[4100] 465 5	[4540] 515 4	[4980] 560 4	[5430] 615 3	[5870] 665 2	[6310] 715 1	
[2] <b>7.5</b>	[460] 50 29	[960] 110 28	[1460] 165 27	[1900] 215 26	[2400] 270 25	[2860] 325 23	[3340] 375 22	[3780] 425 20	[4320] 490 19	[4770] 540 18	[5210] 590 17	[5660] 640 15	[6110] 690 14	[6570] 740 12	[6950] 785 10
[4] <b>15</b>	[470] 55 60	[1000] 115 59	[1540] 175 58	[1980] 225 56	[2510] 285 54	[3010] 340 53	[3480] 395 51	[3980] 450 49	[4450] 505 48	[4910] 555 47	[5380] 610 46	[5850] 660 46	[6320] 715 45	[6780] 765 44	[7250] 820 42
[6] <b>23</b>	[460] 50 91	[1020] 115 90	[1550] 175 89	[2040] 230 87	[2580] 290 84	[3110] 350 83	[3590] 405 81	[4120] 465 78	[4580] 515 76	[5050] 570 73	[5520] 625 71	[5980] 675 69	[6440] 730 67	[6910] 780 65	
[8] <b>30</b>	[460] 50 122	[1010] 115 121	[1560] 175 120	[2080] 235 118	[2630] 295 115	[3170] 360 111	[3670] 415 108	[4210] 475 106	[4680] 530 104	[5160] 585 102	[5630] 635 100	[6110] 690 99	[6590] 745 99		
[10] <b>38</b>	[440] 50 153	[1000] 115 152	[1550] 175 150	[2110] 240 148	[2650] 300 146	[3200] 360 144	[3730] 420 142	[4250] 480 139	[4730] 535 137	[5210] 580 135	[5720] 635 133	[6230] 705 133			
[12] <b>45</b>	[410] 45 184	[960] 105 183	[1530] 175 182	[2100] 235 180	[2640] 295 177	[3190] 360 175	[3760] 425 173	[4260] 480 170	[4740] 535 168	[5220] 600 165	[5730] 645 162				
[14] <b>53</b>	[380] 40 215	[910] 105 214	[1500] 170 213	[2080] 235 211	[2600] 295 209	[3160] 360 207	[3760] 425 204	[4230] 480 201	[4710] 530 198	[5190] 585 195					
[16] <b>61</b>	[340] 40 246	[860] 95 245	[1460] 165 244	[2040] 230 242	[2570] 290 240	[3120] 355 238	[3740] 425 235	[4180] 475 232	[4660] 525 227	[5140] 575 223					
[18] <b>68</b>	[290] 30 277	[810] 90 276	[1420] 160 275	[2000] 225 273	[2520] 285 271	[3060] 345 269	[3700] 420 266	[4130] 465 263	[4610] 520 258	[5090] 575 253					
[20] <b>76</b>	[250] 30 308	[800] 90 306	[1350] 155 304	[1910] 215 302	[2460] 280 300	[3010] 340 298	[3630] 410 295	[4110] 465 291	[4610] 520 288						
[22] <b>83</b>	[200] 25 339	[710] 80 337	[1300] 145 337	[1870] 210 334	[2390] 270 332	[2940] 330 330	[3560] 400 327	[4010] 455 323	[4510] 510 318						
[24] <b>91</b>	[150] 15 370	[670] 75 369	[1240] 140 367	[1790] 200 364	[2330] 265 362	[2880] 325 360	[3460] 390 357	[3960] 445 353	[4460] 505 344						
[25] <b>95</b>	[120] 15 385	[660] 75 384	[1210] 135 382	[1750] 200 379	[2300] 260 377	[2860] 325 375	[3410] 385 372	[3950] 445 367	[4470] 505 363						
[30] <b>114</b>		[520] 60 462	[1080] 120 460	[1620] 185 458	[2180] 245 456	[2720] 305 453	[3260] 370 450	[3790] 430 447							

305 cm³/r [18.7 in³/r]  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[.5] <b>1.9</b>	[500] 55 4	[1050] 120 2												
[1] <b>3.8</b>	[610] 70 12	[1180] 135 11	[1750] 200 11	[2330] 260 10	[2870] 325 10	[3440] 390 9	[3930] 445 8	[4410] 500 6	[4900] 555 3	[5380] 610 1				
[2] <b>7.5</b>	[620] 70 24	[1210] 135 24	[1800] 205 23	[2400] 270 22	[2970] 335 22	[3510] 395 20	[4050] 460 19	[4600] 520 18	[5140] 580 17	[5680] 640 15	[6220] 705 13	[6750] 765 11	[7290] 825 8	[7820] 885 6
[4] <b>15</b>	[680] 75 49	[1250] 140 49	[1880] 210 48	[2500] 280 47	[3120] 355 47	[3690] 415 45	[4260] 480 43	[4840] 545 42	[5410] 610 40	[5980] 675 38	[6550] 740 36	[7120] 805 34	[7690] 870 33	
[6] <b>23</b>	[620] 70 74	[1270] 145 74	[1920] 215 72	[2560] 290 72	[3230] 365 71	[3810] 430 69	[4390] 495 66	[4970] 560 64	[5560] 630 61	[6130] 695 58	[6710] 760 55	[7290] 825 52		
[8] <b>30</b>	[600] 70 98	[1270] 145 98	[1940] 220 97	[2600] 295 96	[3290] 370 95	[3880] 440 93	[4470] 505 90	[5070] 575 86	[5660] 640 83	[6250] 705 80	[6840] 775 77			
[10] <b>38</b>	[570] 65 123	[1250] 140 122	[1940] 220 121	[2610] 295 120	[3310] 375 119	[3920] 440 117	[4530] 510 113	[5150] 580 110	[5760] 650 106	[6370] 720 102				
[12] <b>45</b>	[530] 60 148	[1220] 140 147	[1920] 215 145	[2600] 295 144	[3300] 375 143	[3920] 440 142	[4530] 510 138	[5150] 580 133	[5760] 650 128	[6370] 720 124				
[14] <b>53</b>	[480] 55 172	[1180] 135 172	[1870] 210 170	[2560] 290 168	[3260] 360 167	[3900] 440 165	[4510] 510 160	[5120] 580 156	[5730] 645 152					
[16] <b>61</b>	[430] 50 196	[1120] 125 196	[1820] 205 194	[2500] 280 192	[3210] 365 191	[3870] 440 188	[4480] 505 183	[5080] 575 178	[5690] 645 174					
[18] <b>68</b>	[370] 40 221	[1060] 120 221	[1760] 200 218	[2440] 275 217	[3140] 355 215	[3800] 440 212	[4420] 500 207	[5050] 570 202						
[20] <b>76</b>	[320] 35 246	[980] 110 245	[1680] 190 243	[2360] 265 241	[3050] 345 239	[3710] 420 236	[4370] 495 231	[5020] 565 226						
[22] <b>83</b>	[240] 25 271	[920] 105 270	[1620] 185 268	[2300] 260 266	[2990] 340 263	[3650] 400 260	[4310] 475 258	[4920] 545 255						
[24] <b>91</b>	[180] 20 296	[870] 100 294	[1550] 175 293	[2240] 255 290	[2920] 330 288	[3420] 385 285	[4020] 455 283	[4630] 525 280						
[25] <b>95</b>	[150] 15 308	[840] 95 307	[1520] 170 305	[2200] 250 303	[2890] 325 300	[3340] 375 298	[3930] 445 295	[4520] 510 293						
[30] <b>114</b>		[680] 75 365	[1360] 155 362	[2040] 230 360	[2720] 305 357	[3140] 355 356	[3810] 430 352							

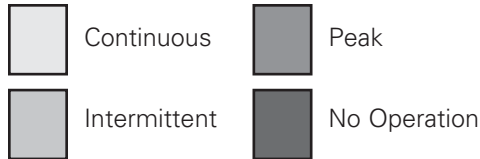
[3260] Torque [lb-in]  
[370] Nm  
[450] Speed RPM

# 2000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

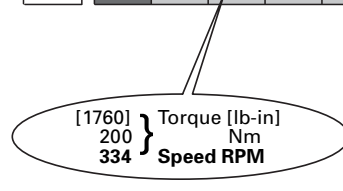


**490 cm<sup>3</sup>/r [29.8 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140
[.5]	[670] 75 2	[1600] 180 1						
<b>1.9</b>								
[1]	[920] 105 7	[2000] 225 6	[2990] 340 5	[3900] 440 4	[4880] 550 2			
<b>3.8</b>								
[2]	[950] 105 14	[2060] 235 13	[3110] 350 12	[4080] 460 10	[5110] 575 9	[6320] 715 7		
<b>7.5</b>								
[4]	[980] 110 30	[2130] 240 29	[3230] 365 28	[4270] 480 27	[5350] 605 26	[6370] 720 24	[7380] 835 22	[7980] 900 20
<b>15</b>								
[6]	[980] 110 45	[2120] 240 44	[3230] 365 43	[4300] 485 42	[5370] 605 41	[6420] 725 39	[7470] 845 37	[8225] 930 35
<b>23</b>								
[8]	[980] 110 61	[2110] 240 60	[3220] 365 59	[4330] 490 58	[5400] 610 57	[6470] 730 55	[7550] 855 52	
<b>30</b>								
[10]	[920] 105 76	[2050] 230 75	[3170] 360 74	[4300] 485 73	[5390] 610 72	[6460] 730 70	[7550] 855 68	
<b>38</b>								
[12]	[860] 95 91	[1990] 225 90	[3120] 355 90	[4260] 480 89	[5370] 605 87	[6460] 730 85	[7560] 855 84	
<b>45</b>								
[14]	[790] 90 106	[1930] 220 105	[3055] 345 105	[4185] 475 104	[5300] 600 102	[6400] 725 100		
<b>53</b>								
[16]	[720] 80 122	[1870] 210 121	[2990] 340 120	[4110] 465 119	[5230] 590 118	[6340] 715 116		
<b>61</b>								
[18]	[630] 70 137	[1770] 200 136	[2890] 325 135	[4020] 455 134	[5140] 580 133	[6260] 705 131		
<b>68</b>								
[20]	[550] 60 153	[1670] 190 152	[2800] 315 151	[3940] 445 150	[5060] 570 149	[6180] 700 146		
<b>76</b>								
[22]	[450] 50 168	[1570] 175 168	[2700] 305 167	[3830] 435 165	[4960] 560 164	[6070] 685 161		
<b>83</b>								
[24]	[360] 40 184	[1480] 165 184	[2600] 295 183	[3730] 420 181	[4860] 550 179	[5970] 675 177		
<b>91</b>								
[26]	[270] 30 199	[1390] 155 195	[2510] 285 194	[3640] 410 192	[4770] 540 190			
<b>98</b>								
[28]		[1260] 140 212	[2370] 270 211	[3520] 400 209	[4630] 525 207			
<b>106</b>								
[30]		[1130] 125 230	[2240] 255 229	[3400] 385 277	[4500] 510 224			
<b>114</b>								

**395 cm<sup>3</sup>/r [24.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

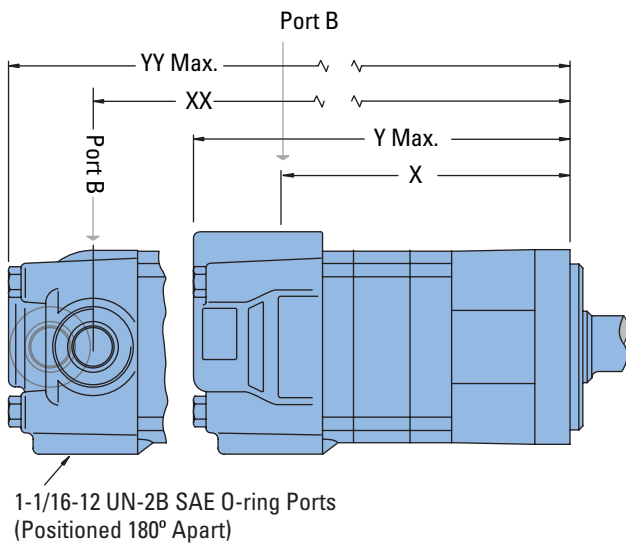
	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190
[.5]	[560] 65 4	[1310] 150 3									
<b>1.9</b>											
[1]	[770] 85 9	[1540] 175 9	[2290] 260 9	[3080] 350 8	[3780] 430 8	[4480] 505 7	[5170] 585 7	[5880] 665 6	[6580] 745 5	[7270] 820 4	[7980] 900 3
<b>3.8</b>											
[2]	[790] 90 18	[1580] 180 18	[2360] 265 18	[3180] 360 17	[3930] 445 17	[4680] 530 16	[5430] 615 15	[6180] 700 14	[6840] 775 13	[7500] 845 11	[8170] 925 10
<b>7.5</b>											
[4]	[810] 90 37	[1660] 190 37	[2480] 280 37	[3320] 375 36	[4130] 465 36	[4940] 560 35	[5740] 650 34	[6550] 740 33	[7230] 815 31	[7880] 890 28	
<b>15</b>											
[6]	[820] 90 57	[1700] 190 56	[2550] 290 56	[3420] 385 55	[4250] 480 54	[5080] 575 52	[5920] 670 50	[6750] 765 49	[7420] 840 47	[8000] 905 45	
<b>23</b>											
[8]	[820] 90 76	[1700] 190 75	[2580] 290 75	[3460] 390 74	[4300] 485 73	[5130] 580 71	[5960] 675 69	[6800] 770 68			
<b>30</b>											
[10]	[800] 90 95	[1700] 190 94	[2590] 295 94	[3480] 395 93	[4320] 490 92	[5160] 590 90	[6000] 680 88	[6840] 775 86			
<b>38</b>											
[12]	[770] 85 114	[1680] 190 113	[2570] 290 113	[3470] 390 112	[4310] 485 111	[5150] 590 109	[5990] 675 106	[6830] 770 103			
<b>45</b>											
[14]	[740] 85 133	[1640] 185 132	[2530] 285 132	[3430] 390 131	[4280] 485 129	[5120] 580 127	[5960] 675 124				
<b>53</b>											
[16]	[690] 80 153	[1590] 180 152	[2480] 280 152	[3370] 380 150	[4220] 475 149	[5060] 570 146	[5910] 670 144				
<b>61</b>											
[18]	[640] 70 172	[1530] 170 171	[2420] 275 171	[3310] 375 170	[4160] 470 169	[5010] 565 167	[5870] 665 164				
<b>68</b>											
[20]	[580] 65 191	[1470] 165 190	[2370] 270 190	[3260] 370 189	[4110] 465 188	[4960] 560 186	[5820] 660 184				
<b>76</b>											
[22]	[510] 60 210	[1390] 155 209	[2290] 260 209	[3170] 360 208	[4030] 455 207	[4880] 550 206					
<b>83</b>											
[24]	[440] 50 230	[1330] 150 229	[2220] 250 228	[3100] 350 227	[3950] 445 225	[4800] 540 224					
<b>91</b>											
[26]	[350] 40 249	[1240] 140 248	[2130] 240 247	[3020] 340 246	[3880] 440 244	[4730] 535 242					
<b>98</b>											
[28]	[270] 30 268	[1150] 130 267	[2050] 230 265	[2930] 330 264	[3790] 430 261	[4650] 525 259					
<b>106</b>											
[30]	[180] 20 287	[1060] 120 286	[1960] 220 284	[2850] 320 283	[3710] 420 281	[4570] 515 277					
<b>114</b>											
[35]		[840] 95 335	[1760] 200 334	[2640] 300 333	[3480] 395 332						
<b>132</b>											



# 2000 Series

## Dimensions

### Standard Mount

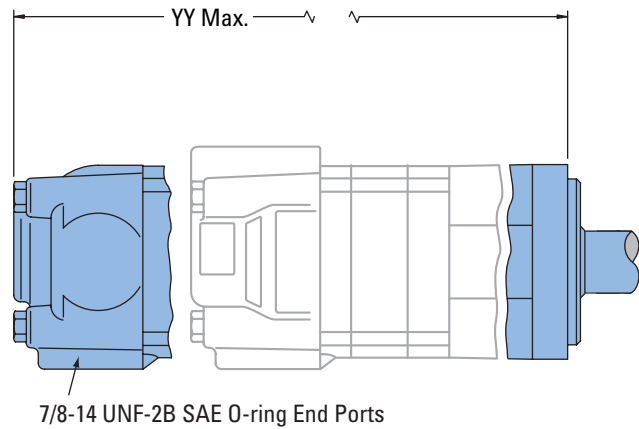


### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
80 [4.9]	136,9 [5.39]	184,2 [7.25]	139,2 [5.48]	185,4 [7.30]
100 [6.2]	141,5 [5.57]	189,0 [7.44]	143,8 [5.66]	190,3 [7.49]
130 [8.0]	147,9 [5.83]	195,4 [7.69]	150,2 [5.92]	196,6 [7.74]
160 [9.6]	147,9 [5.83]	195,4 [7.69]	150,2 [5.92]	196,6 [7.74]
195 [11.9]	154,7 [6.09]	202,2 [7.96]	157,0 [6.18]	203,2 [8.00]
245 [14.9]	163,7 [6.45]	211,1 [8.31]	166,0 [6.54]	212,4 [8.36]
305 [18.7]	175,1 [6.90]	222,3 [8.75]	177,4 [6.99]	223,5 [8.80]
395 [24.0]	191,0 [7.52]	238,6 [9.39]	193,3 [7.61]	239,8 [9.44]
490 [29.8]	208,4 [8.21]	255,8 [10.07]	210,7 [8.30]	270,1 [10.12]

# 2000 Series

## Dimensions

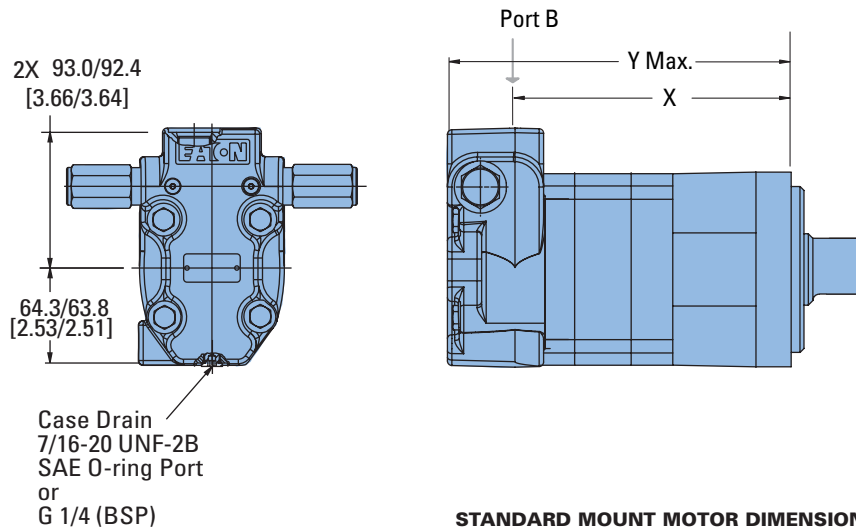
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Standard Mount with Integral Relief Valve



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	137,0 [5.40]	184,5 [7.26]
100 [6.2]	141,6 [5.58]	189,0 [7.44]
130 [8.0]	147,9 [5.83]	195,4 [7.69]
160 [9.6]	147,9 [5.83]	195,4 [7.69]
195 [11.9]	154,8 [6.10]	202,2 [7.96]
245 [14.9]	163,7 [6.45]	211,1 [8.31]
305 [18.7]	175,1 [6.90]	222,6 [8.76]
395 [24.0]	191,1 [7.53]	238,6 [9.39]
490 [29.8]	208,4 [8.21]	255,8 [10.07]

# 2000 Series

## Dimensions

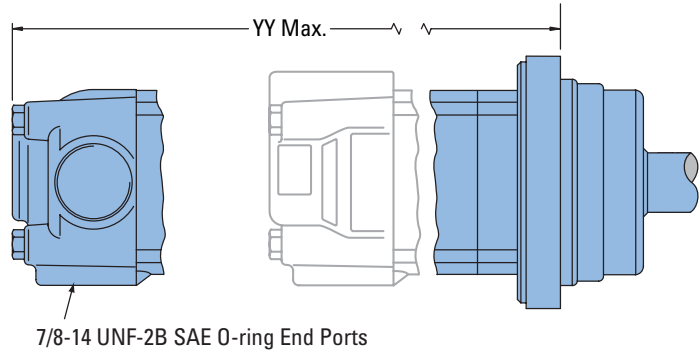
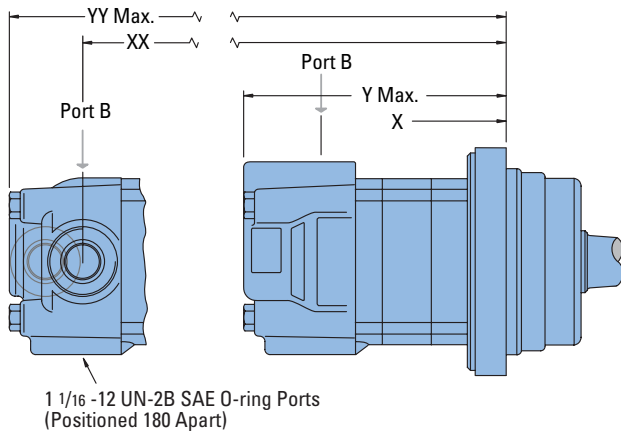
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Wheel Mount



### WHEEL MOUNT MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
80 [4.9]	96,8 [3.81]	144,0 [5.67]	99,1 [3,90]	145,3 [5.72]
100 [6.2]	101,3 [3.99]	148,9 [5.86]	103,6 [4.08]	150,2 [5.91]
130 [8.0]	107,8 [4.25]	155,2 [6.11]	110,1 [4.34]	156,5 [6.16]
160 [9.6]	107,8 [4.25]	155,2 [6.11]	110,1 [4.34]	156,5 [6.16]
195 [11.9]	114,6 [4.51]	161,8 [6.37]	116,8 [4.60]	163,1 [6.42]
245 [14.9]	123,5 [4.87]	171,0 [6.73]	125,8 [4.96]	172,3 [6.78]
305 [18.7]	135,0 [5.32]	182,1 [7.17]	137,4 [5.41]	183,4 [7.22]
395 [24.0]	150,9 [5.94]	198,4 [7.81]	153,2 [6.03]	199,7 [7.86]
490 [29.8]	168,2 [6.63]	215,7 [8.49]	170,7 [6.72]	217,0 [8.54]



# 2000 Series

## Dimensions

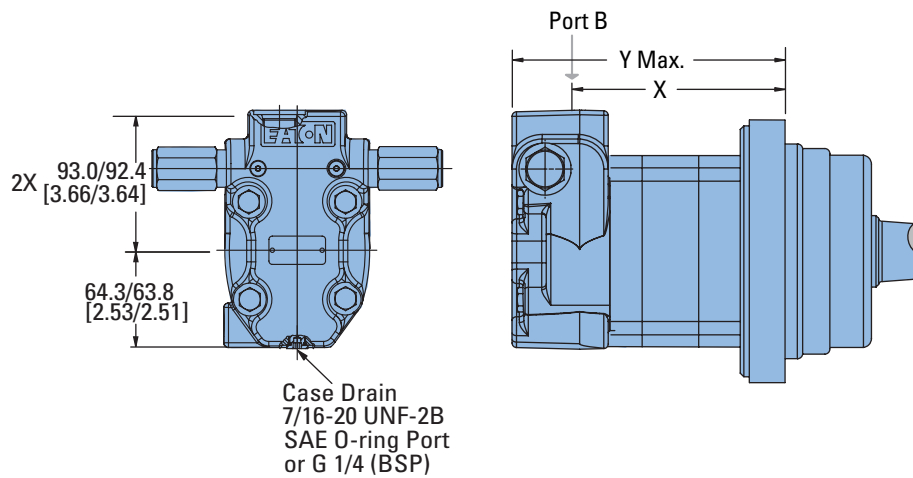
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Wheel Mount with Integral Relief Valve



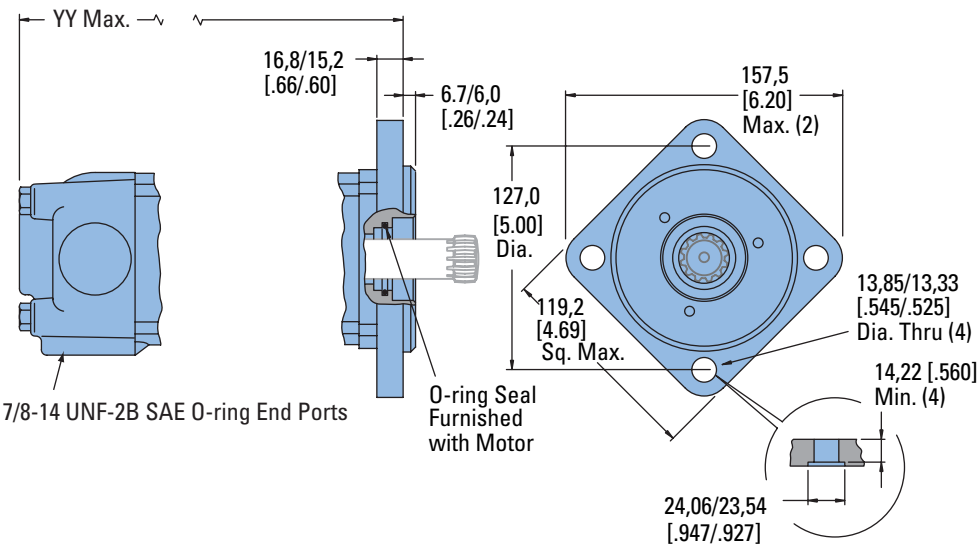
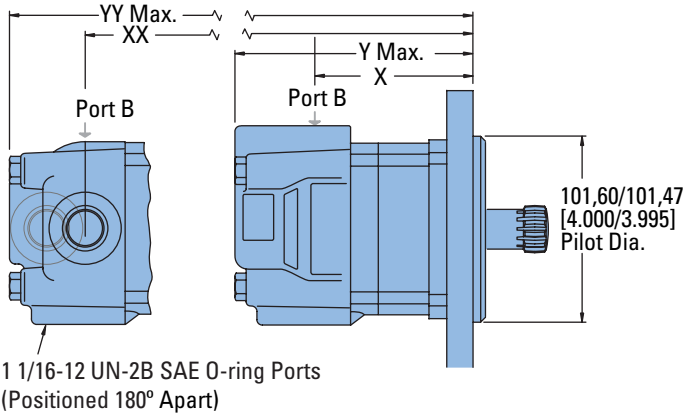
#### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	96,9 [3.82]	144,3 [5.68]
100 [6.2]	101,4 [4.00]	148,9 [5.86]
130 [8.0]	107,8 [4.25]	155,2 [6.11]
160 [9.6]	107,8 [4.25]	155,2 [6.11]
195 [11.9]	114,6 [4.52]	162,1 [6.38]
245 [14.9]	123,5 [4.87]	171,0 [6.73]
305 [18.7]	135,0 [5.32]	182,4 [7.18]
395 [24.0]	151,0 [5.95]	198,4 [7.81]
490 [29.8]	168,2 [6.63]	215,7 [8.49]

# 2000 Series

## Dimensions

### Bearingless



### Ports

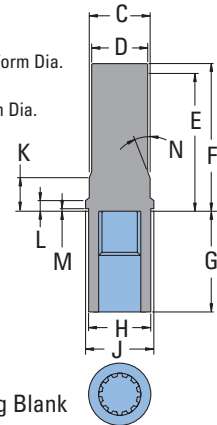
- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### MAT'L

- C 35,86 [1.412] Dia.
- D 34,04 [1.340] Dia.
- E 81,0 [3.19] Min. Full Form Dia.
- F 86,1 [3.39] Max.
- G 62,10 [2.445] Full Form Dia.
- H 38,40 [1.512] Dia.
- J 43,7 [1.72] Dia.
- K 25,91 [1.020]
- L 8,25 [.325]
- M 0,89 [.035]
- N 15°



Mating Coupling Blank  
Eaton Part No. 13307-003

For 2000 Series Bearingless Motor application information contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

### Note:

After machining blank, part must be hardened per Eaton specification.

### BEARINGLESS MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
80 [4.9]	79,0 [3.11]	126,5 [4.98]	81,3 [3.20]	127,8 [5.03]
100 [6.2]	83,5 [3.29]	131,4 [5.17]	85,8 [3.38]	132,6 [5.22]
130 [8.0]	89,9 [3.54]	137,7 [5.42]	92,2 [3.63]	139,0 [5.47]
160 [9.6]	89,9 [3.54]	137,7 [5.42]	92,2 [3.63]	139,0 [5.47]
195 [11.9]	96,8 [3.81]	144,3 [5.68]	99,0 [3.90]	145,5 [5.73]
245 [14.9]	105,6 [4.16]	153,5 [6.04]	107,9 [4.25]	154,7 [6.09]
305 [18.7]	117,1 [4.61]	164,6 [6.48]	119,4 [4.70]	165,9 [6.53]
395 [24.0]	133,1 [5.24]	180,9 [7.12]	135,4 [5.33]	182,1 [7.17]
490 [29.8]	150,3 [5.92]	198,2 [7.80]	152,7 [6.01]	199,3 [7.85]

# 2000 Series

## Dimensions

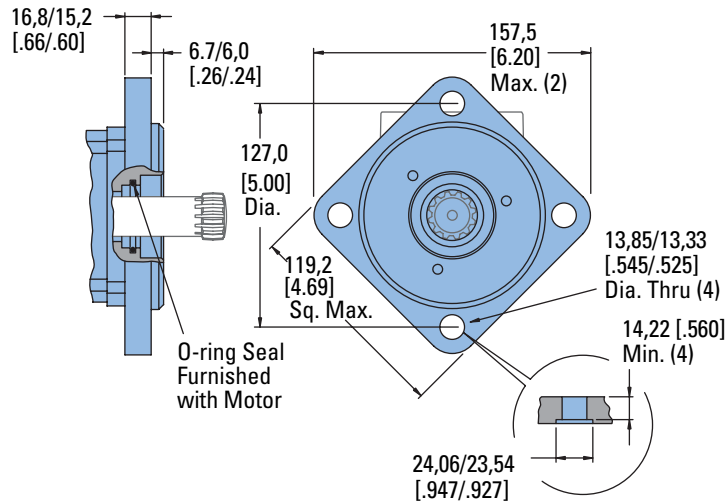
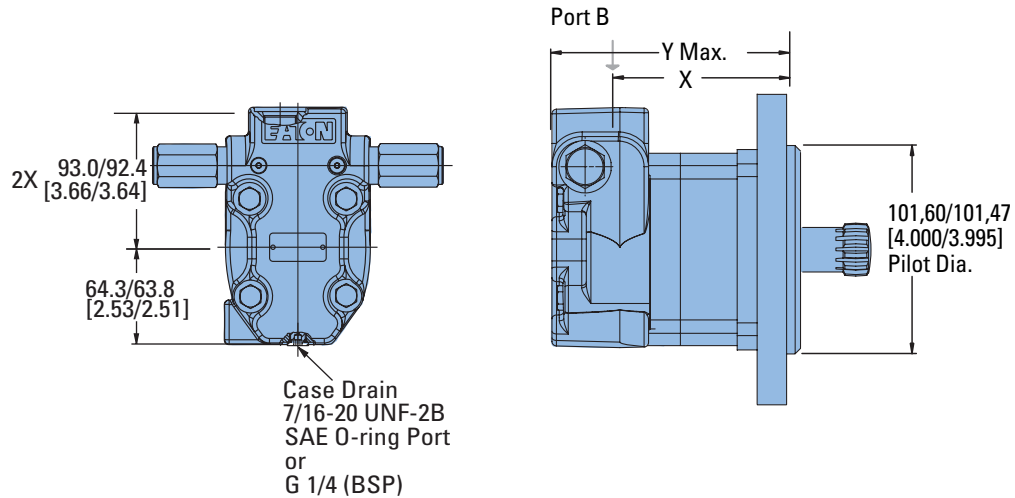
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Bearingless with Integral Relief Valve



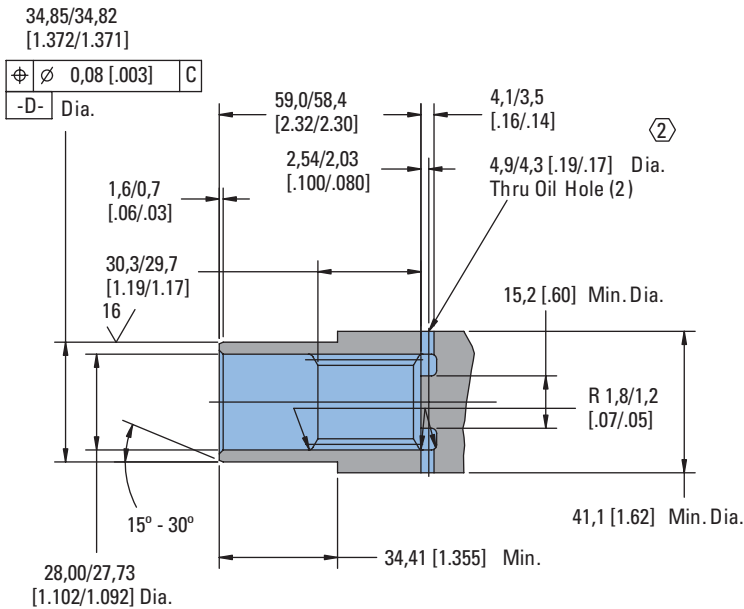
### BEARINGLESS MOTORS DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	79,0 [3.11]	126,8 [4.99]
100 [6.2]	83,5 [3.29]	131,4 [5.17]
130 [8.0]	89,9 [3.54]	137,7 [5.42]
160 [9.6]	89,9 [3.54]	137,7 [5.42]
195 [11.9]	96,8 [3.81]	144,6 [5.69]
245 [14.9]	105,6 [4.16]	153,5 [6.04]
305 [18.7]	117,1 [4.61]	164,9 [6.49]
395 [24.0]	133,1 [5.24]	180,9 [7.12]
490 [29.8]	150,3 [5.92]	198,2 [7.80]

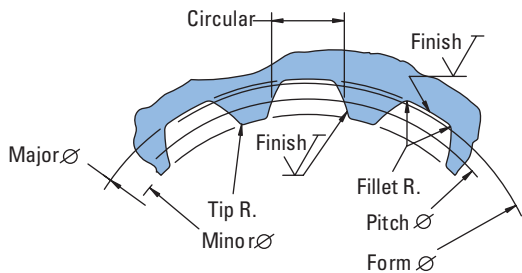
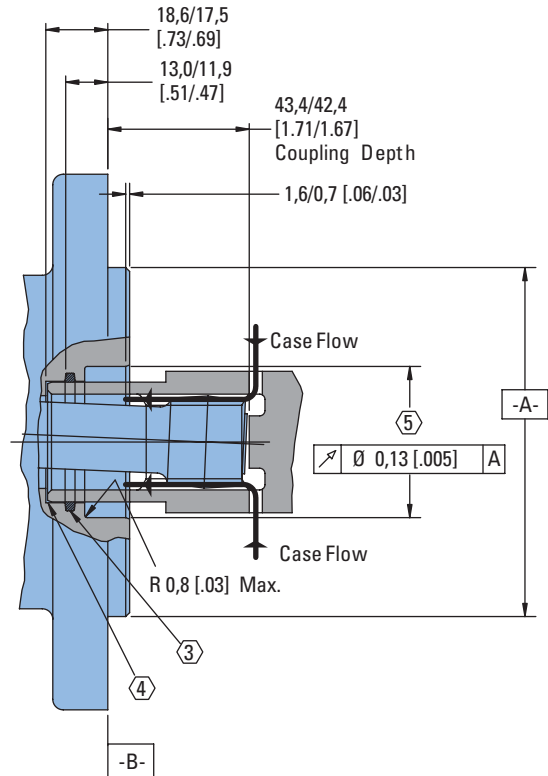
# 2000 Series

## Installation Information

### Bearingless



- ① Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H vacuum degassed alloy steel carbonize to a hardness of 59-62 HRc with case depth (to 50HRc) of 0,076 -1,02 [.030 -.040]. Dimensions apply after heat treat.
- ② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- ③ Seal to be furnished with motor for proper oil circulation thru splines.
- ④ Some means of maintaining clearance between shaft and mounting flange must be provided.
- ⑤ Counterbore designed to adapt a standard sleeve bearing 35,010 -35,040 [1.3784 -1.3795] I.D. by 44,040 -44,070 [1.7339 -1.7350] O.D. (Oilite Bronze Sleeve Bearing AAM3544-22).



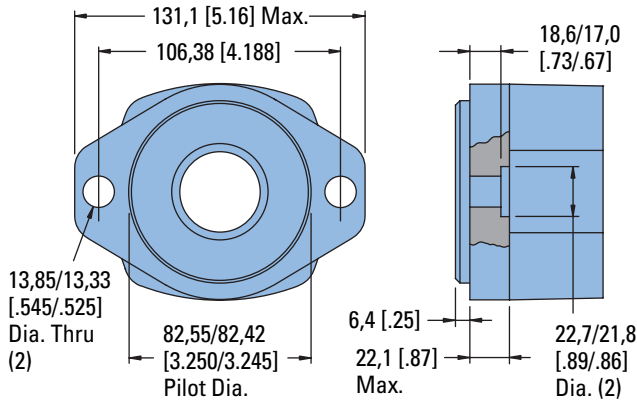
Spline Pitch.....	12/24
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 25,400000 [1.0000000]
Base Diameter.....	Ref. 21,997045 [8660254] $\text{C} \varnothing 0,21 [0.008] D$
Major Diameter.....	(27,74 [1.092] Max. 27,59 [1.086] Min.)
Minor Diameter.....	23,097 - 23,224 [.9093 - .9143]
Form Diameter, Min.....	29,93 [1.060]
Fillet Radius.....	0,64 - 0,76 [.025 - .030]
Tip Radius.....	0,25 - 0,38 [.010 - .015]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.000 -0.010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	4,318 [1.700]
Minimum Effective.....	4,216 [1.660]
Maximum Effective.....	Ref. 4,270 [1.681]
Minimum Actual.....	Ref. 4,247 [1.672]
Dimension Between Two Pins.....	Ref. 19,020 - 19,190 [7.488 - 7.555]
Pin Diameter.....	4,496 [1.770] Pins to Have 3,38 [1.33]
	Wide Flat for Root Clearance

# 2000 Series

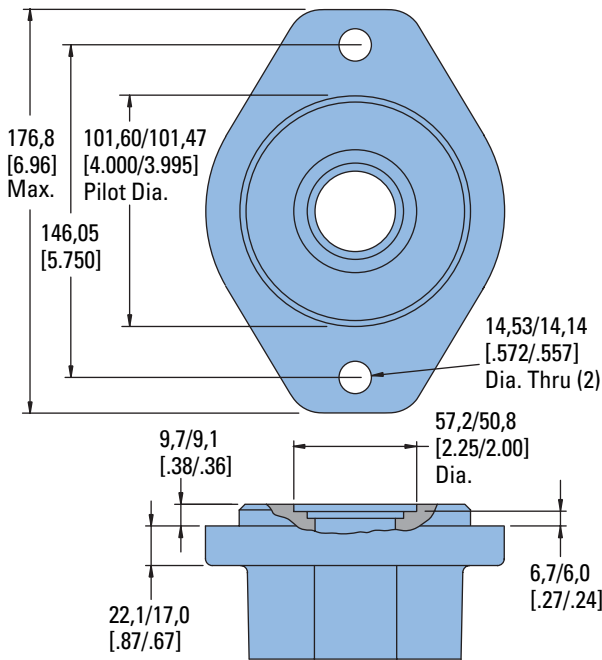
## Dimensions

### Mounting Options

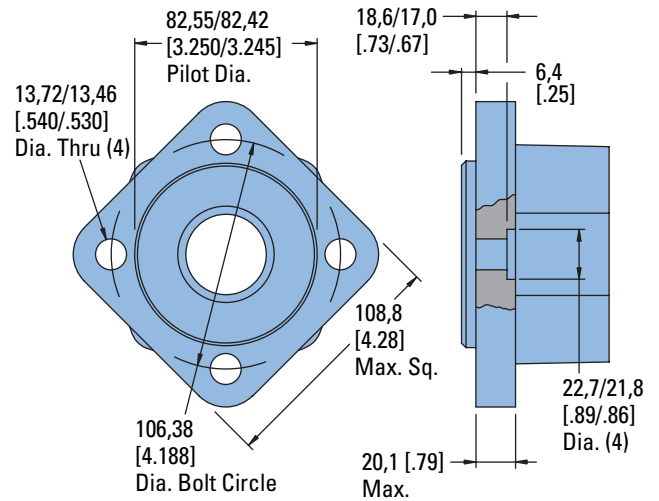
#### SAE A — Two Bolt (Standard Motor)



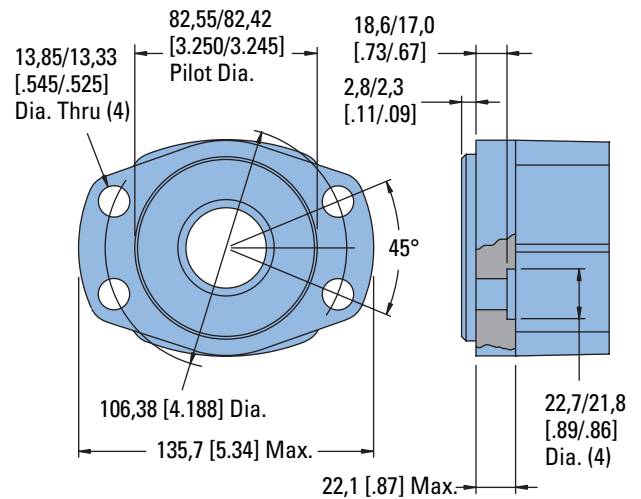
#### SAE B — Two Bolt



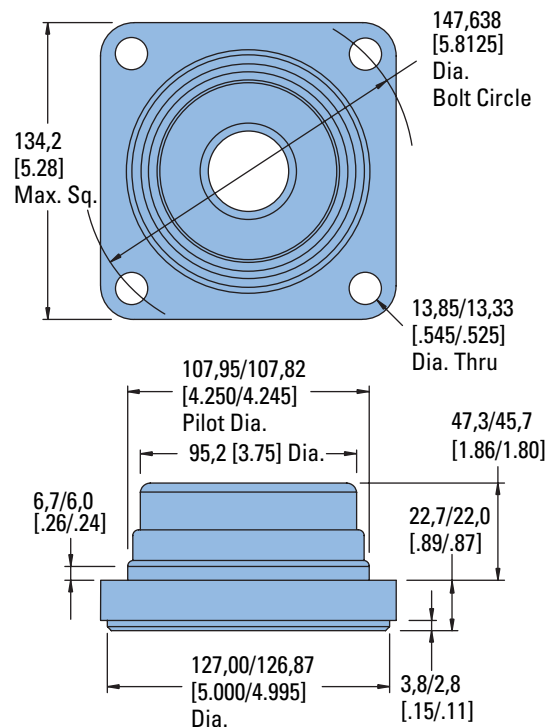
#### Four Bolt



#### Four Bolt Magneto



#### Four Bolt (Wheel Motor)

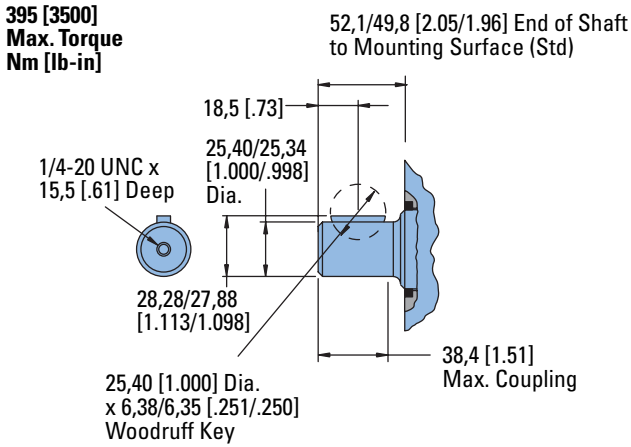


# 2000 Series

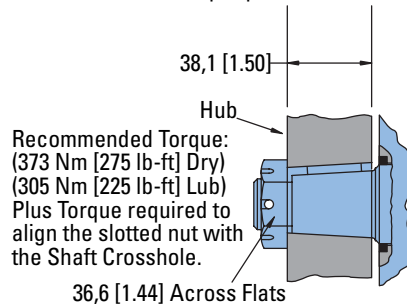
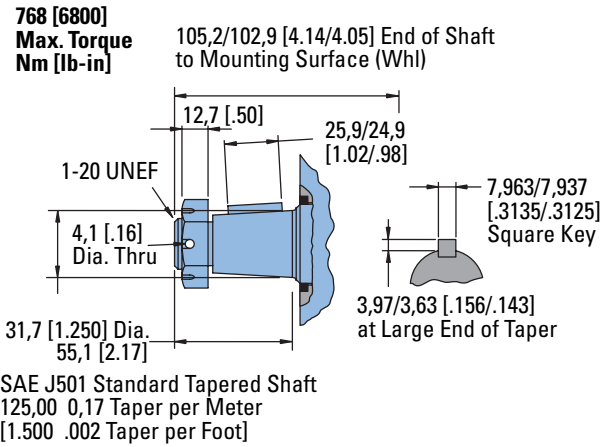
## Dimensions

Shafts

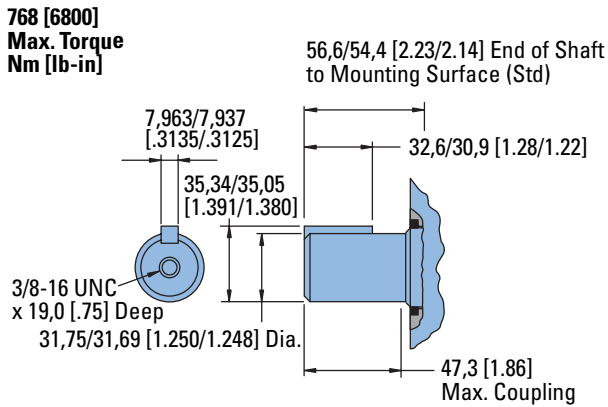
### 1 Inch Straight



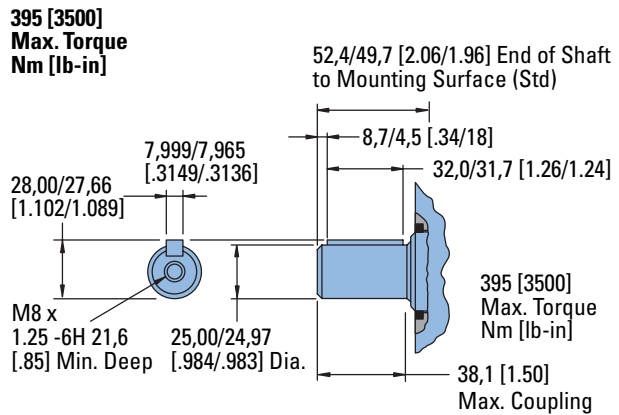
### 1 1/4 Inch Tapered



### 1 1/4 Inch Straight



### 25 mm Straight





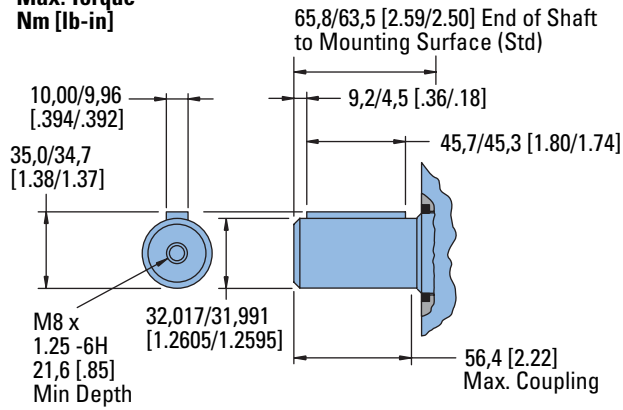
# 2000 Series

## Dimensions

Shafts

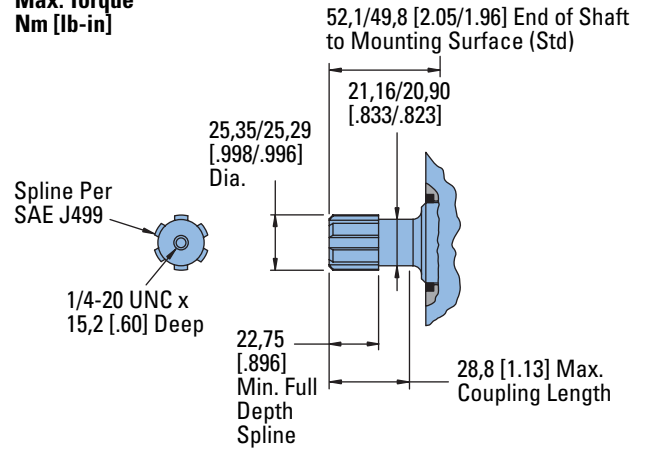
### 32 mm Straight

**768 [6800]**  
**Max. Torque**  
**Nm [lb-in]**



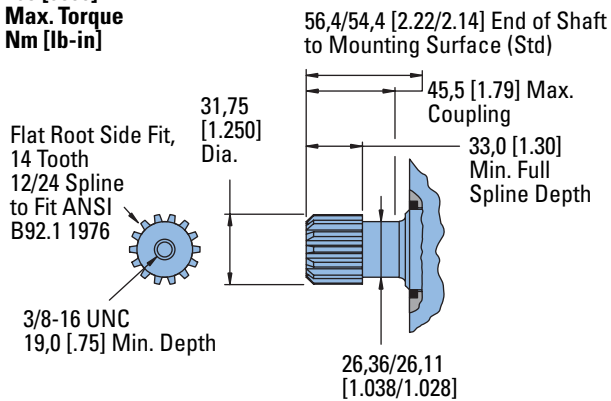
### SAE 6B Splined

**395 [3500]**  
**Max. Torque**  
**Nm [lb-in]**



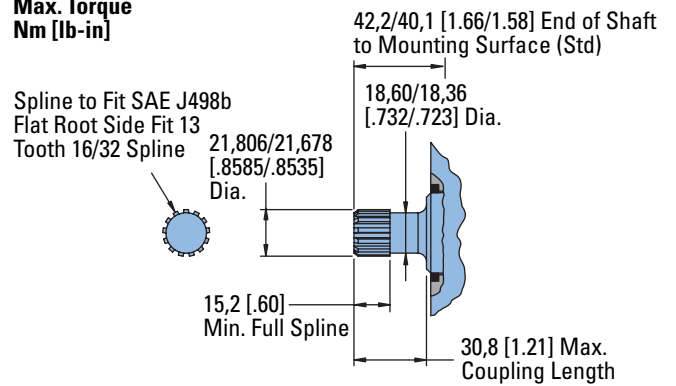
### 1 1/4 -14 Tooth Splined

**768 [6800]**  
**Max. Torque**  
**Nm [lb-in]**



### 13 Tooth Splined

**141 [1250]**  
**Max. Torque**  
**Nm [lb-in]**



# 2000 Series

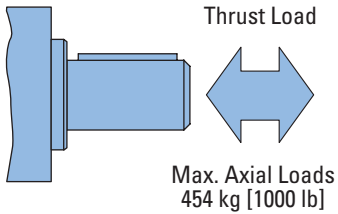
## Shaft Side Load Capacity

These curves indicate the radial load capacity on the motor shaft at various locations with an allowable external thrust load of 454 kg [1000 lb].

**Note:**

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 61 kg/7 Bar [135 lb/100 PSI].

Each curve is based on



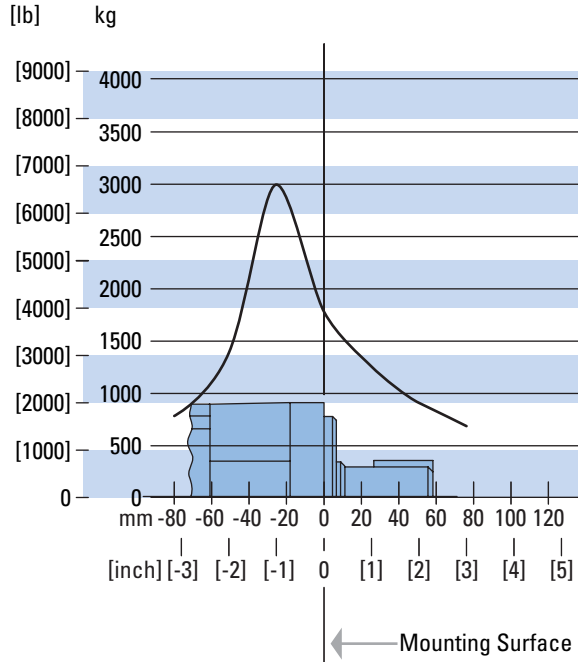
**B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

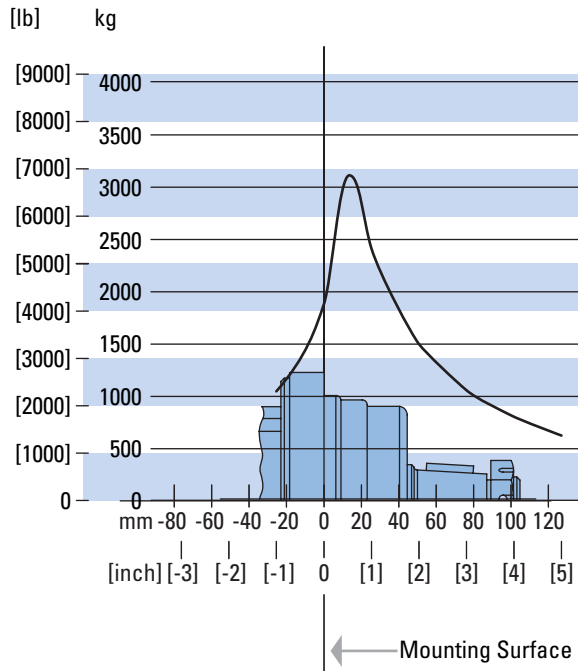
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

**Standard Motor  
Straight and Splined Shafts**



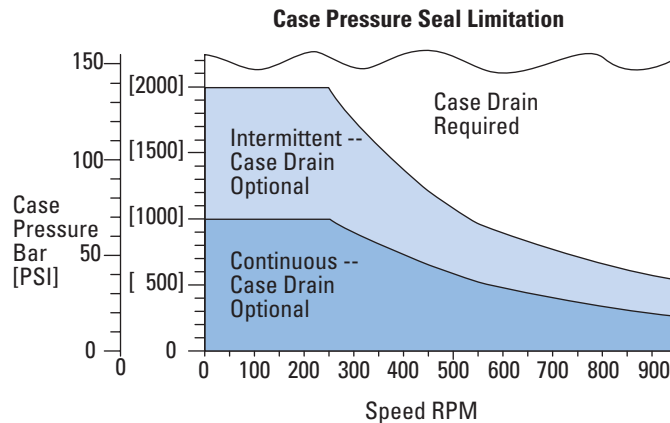
**Wheel Motor  
Tapered Shaft**



## 2000 Series

### Case Pressure and Case Porting

Char-Lynn 2000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.



#### Case Porting Advantage

**Contamination Control** — flushing the motor case.

**Cooler Motor** — exiting oil draws motor heat away.

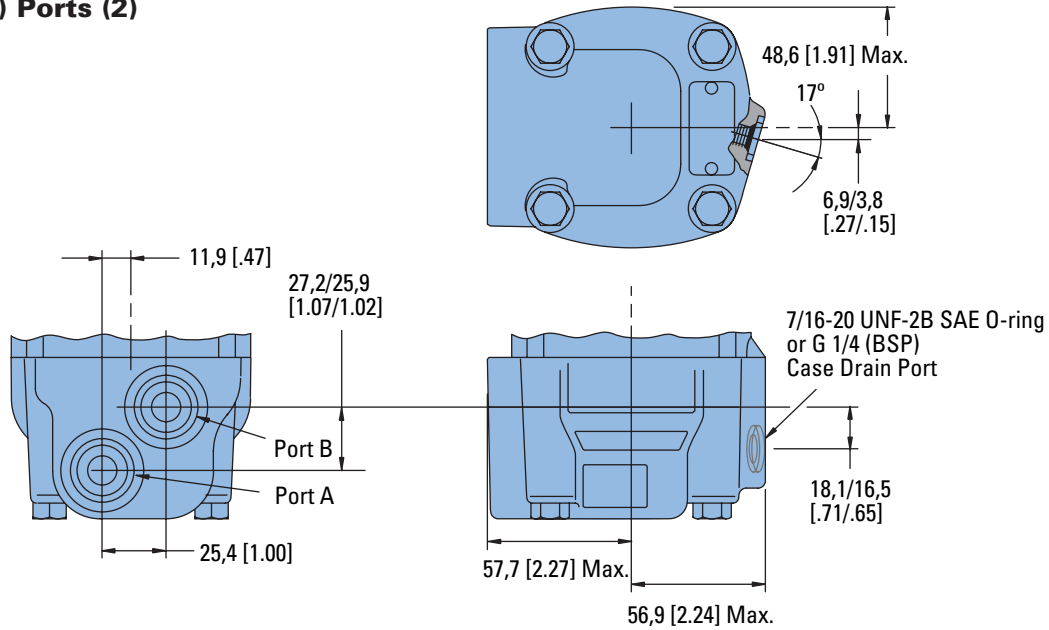
**Extend Motor Seal Life** — maintain low case pressure with a preset restriction in the case drain line.

# 2000 Series

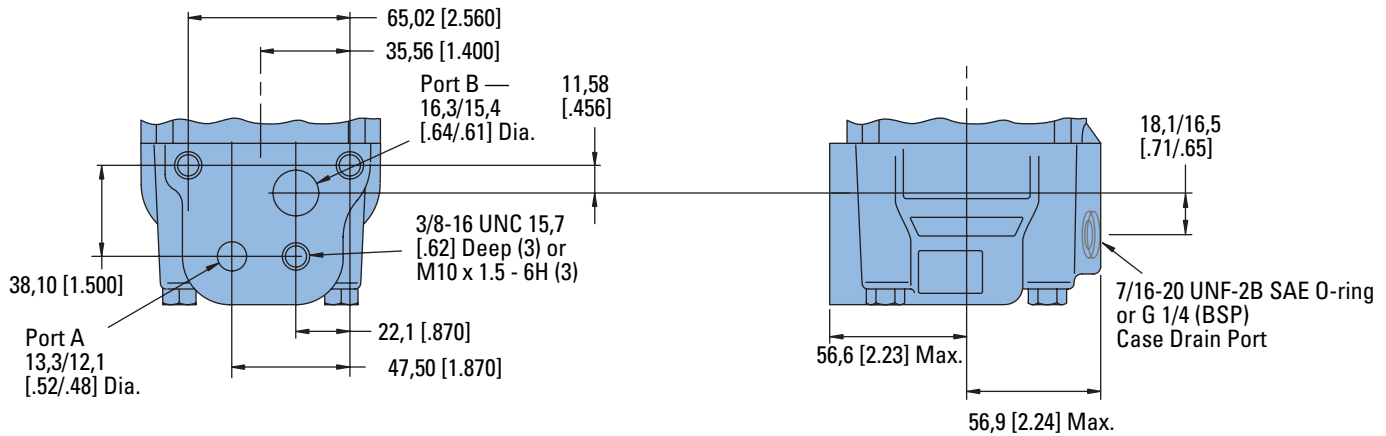
## Dimensions

Ports

### 7/8-14 UNF-2B SAE O-ring Ports (2) or G 1/2 (BSP) Ports (2)



### Manifold Mount

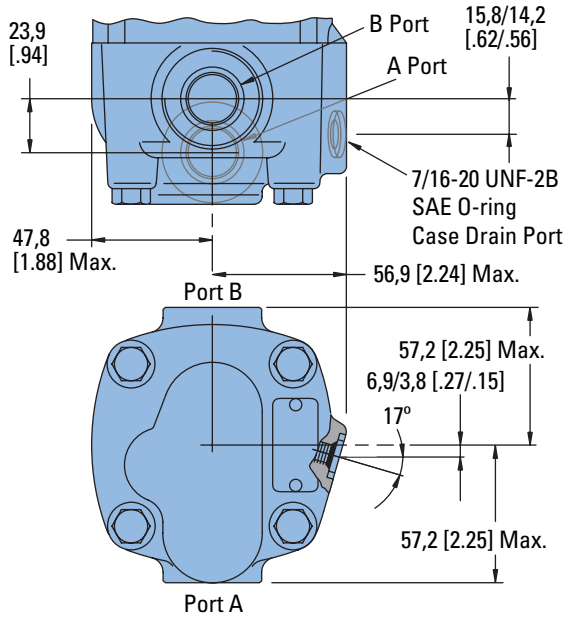


# 2000 Series

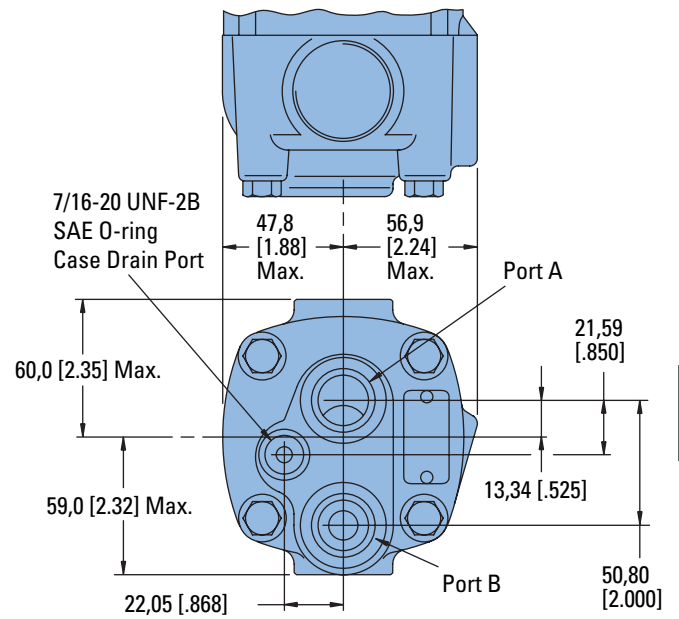
## Dimensions

Ports

### 1-1/16-12 UN-2B SAE O-ring Ports (2) Positioned 180° Apart



### 7/8-14 UNF-2B SAE O-ring End Ports (2)

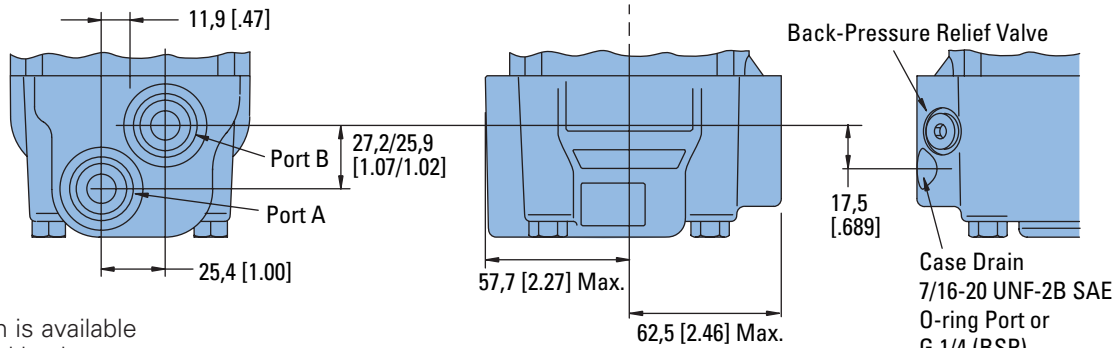


# 2000 Series

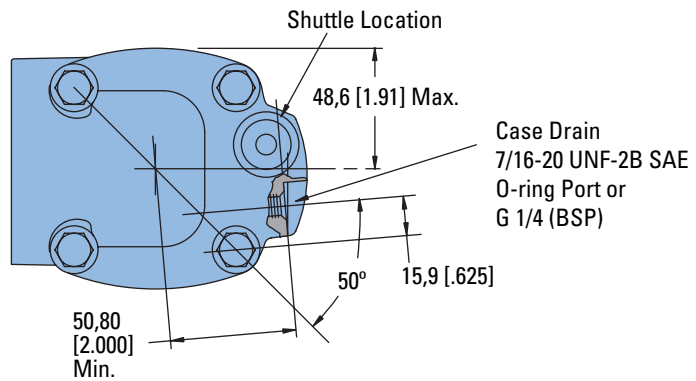
## Dimensions

Ports with Shuttle

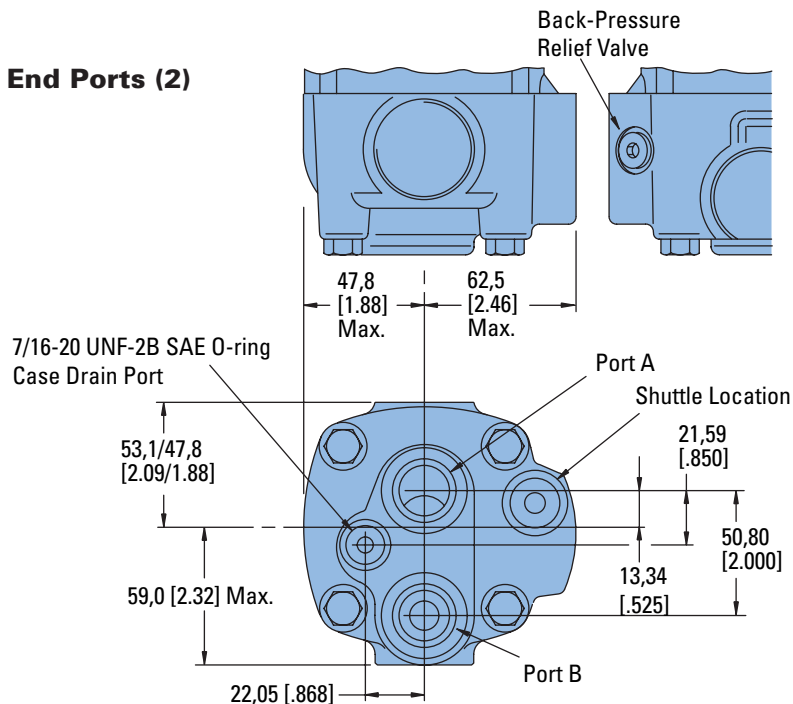
### 7/8 -14 UNF-2B SAE O-ring Ports (2) or G 1/2 (BSP) Ports (2)



This port option is available with shuttle and back pressure relief valve for closed loop applications.



### 7/8 -14 UNF-2B SAE O-ring End Ports (2)



This port option is available with shuttle and back pressure relief valve for closed loop applications.



# 2000 Series

## Product Numbers

### Note:

For 2000 Series Motors with a configuration **Not Shown** in the charts below: Use model code number system on the next page to specify product in detail.

Use digit prefix — 104-, 105-, or 106- plus four digit number from charts for complete product number— Example 106-1043.

**Orders will not be accepted without three digit prefix.**

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
			80 [4.9]	90* [5.5]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 Inch Straight	7/8 -14 O-ring Staggered	104-1001	—	-1002	-1003	-1004	-1005	-1006	-1007	-1143	—
		1 1/16 -12 O-ring 180° Apart	104-1037	—	-1038	-1039	-1040	-1041	-1042	-1043	-1044	—
	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	104-1022	—	-1023	-1024	-1025	-1026	-1027	-1028	-1228	-1420
		1 1/16 -12 O-ring 180° Apart	104-1061	—	-1062	-1063	-1064	-1065	-1066	-1067	-1068	-1421
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	104-1029	—	-1030	-1031	-1032	-1033	-1034	-1035	-1229	-1422
		1 1/16 -12 O-ring 180° Apart	104-1087	—	-1088	-1089	-1090	-1091	-1092	-1093	-1094	-1423
2 Bolt SAE B Flange	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	104-1200	—	-1201	-1202	-1203	-1204	-1205	-1206	-1207	—
	1 1/4 Inch Involute SAE C Splined	7/8 -14 O-ring Staggered	104-1208	—	-1209	-1210	-1211	-1212	-1213	-1214	-1215	—
	1 Inch SAE 6B Splined	7/8 -14 O-ring Staggered	104-1193	—	-1194	-1195	-1196	-1197	-1198	-1199	—	—
	7/8 Inch SAE B Splined	7/8 -14 O-ring Staggered	104-1216	—	-1217	-1218	-1219	-1220	—	—	—	—
Standard with 4 Bolt Flange	32 mm Straight	G 1/2 (BSP)	104-1384	—	-1385	-1386	-1387	-1388	-1389	-1390	-1391	—
	1 1/4 Inch 14 T Splined	G 1/2 (BSP)	104-1376	—	-1377	-1378	-1379	-1380	-1381	-1382	-1383	—
Wheel Motor	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	105—	—	—	—	—	—	—	—	—	-1148
		1 1/16 -12 O-ring 180° Apart	105—	—	—	—	—	—	—	—	—	-1149
	32 mm Straight	G 1/2 (BSP)	105-1134	—	-1135	-1136	-1137	-1138	-1139	-1140	-1141	—
	1 1/4 Inch Tapered	7/8 -14 O-ring Staggered	105-1001	—	-1002	-1003	-1004	-1005	-1006	-1007	-1060	-1152
		1 1/16 -12 O-ring 180° Apart	105-1071	—	-1072	-1073	-1074	-1075	-1076	-1077	-1078	—
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	105-1029	—	-1030	-1031	-1032	-1033	-1034	-1035	-1096	—
1 1/16 -12 O-ring 180° Apart		105-1079	—	-1080	-1081	-1082	-1083	-1084	-1085	-1086	—	
<b>Bearingless</b>	G 1/2 (BSP)	7/8 -14 O-ring Staggered	106-1008	—	-1009	-1010	-1011	-1012	-1013	-1014	-1015	-1047
		106-1038	—	-1039	-1040	-1041	-1042	-1043	-1044	-1045	—	

\*New Release

106-1044

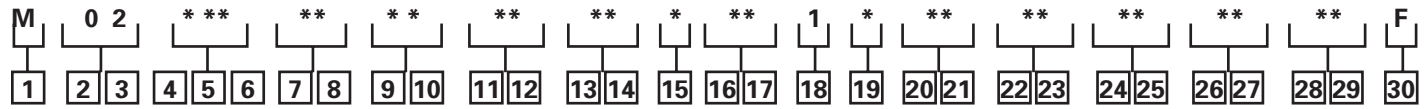
### Motors with Corrosion Protection

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER									
			80 [4.9]	90* [5.5]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 inch Straight	7/8 -14 O-ring Staggered	104-1528	—	-1529	-1530	-1531	-1532	-1533	-1534	-1519	-1535
	1 1/4 Inch Straight	7/8 -14 O-ring	104-1516	—	-1536	-1537	-1538	-1539	-1452	-1479	-1509	-1489

\*New Release

# 2000 Series

## Model Code



The following 30-digit coding system has been developed to identify all of the configuration options for the 2000 Series motor. Use this model code to specify a motor with the desired features. All 30 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

**1** **Product**  
M – 2000 Series Motor

**2**, **3** **Product Series**  
02 – 2000 Series Motor

**4**, **5**, **6** **Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]**  
05 – 80.6 [4.92]  
A5 – 90.6 [5.53]  
06 – 101.6 [6.20]  
08 – 130.6 [7.97]  
10 – 158.1 [9.65]  
12 – 194.8 [11.89]  
15 – 244.3 [14.91]  
19 – 306.6 [18.71]  
24 – 393.8 [24.03]  
30 – 489.0 [29.84]

**7**, **8** **Mounting Type**  
AB – Wheel, 4 Bolt: 108.0 [4-1/8] Pilot Dia. 13.59 [.535] Dia. Holes On 147.6 [5.81] Dia. Bolt Circle. 127.0 [5.00] Dia. Rear Mount Pilot  
AC – Standard, 2 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle. SAE A  
AD – Bearingless (w/ Leakage Slots), 4 Bolt: 101.6 [4.00] Pilot Dia. 13.59 [.535] Dia. Holes on 127.0 [5.00] Dia. Bolt Circle  
AF – Standard, 2 Bolt: 101.6 [4.00] Pilot Dia. 14.35 [.565] Dia. Holes on 146.0 [5.75] Dia. Bolt Circle. SAE B  
AH – Standard, 4 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle  
AJ – Standard (Magneto), 4 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle. 2.79 [.110] Pilot Length  
AP – Wheel, 4 Bolt: 108.0 [4.25] Pilot Dia. 13.59 [.535] Dia. Holes on 147.6 [5.81] Dia. Bolt Circle. 127.0 [5.00] Dia. Rear Mount Pilot. Spigot Reduced to 88.9 [3.50] Dia. by 25.4 [1.00] Depth.  
AZ – Bearingless (w/ Leakage Slots), 4 Bolt: 100.0 [3.94] Pilot Dia. 11.0 [.43] Dia. Holes on 125.0 [4.92] Dia Bolt Circle (European)

**9**, **10** **Output Shaft**  
00 – None (Bearingless)

**01** – 25.40 [1.000] Dia. Straight Shaft with 1/4-20UNC-2B Thread in End, 6.35 [.250] Wide x 25.40 [1.000] Dia. Woodruff Key  
**02** – 31.75 [1.250] Dia. Straight Shaft with 3/8-16UNC-2B Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Straight Key  
**03** – 31.75 [1.250] Dia. .125:1 Tapered Shaft Per SAE J501 w/ 1.000-20 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.0] Straight Key  
**04** – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline w/ .375-16UNC-2B Thread in End, 33.0 [1.30] Min. Full Spline Length  
**05** – 25.40 [1.000] Dia. 6B Spline per SAE J499 with .250-20UNC-2B Thread in End, 22.76 [.896] Min. Full Spline Length  
**07** – 22.22 [.875] Dia. Flat Root Side Fit, 13 Tooth, 16/32 DP 30° SAE B Involute Spline, 15.2 [.60] Min. Full Spline Length  
**16** – 32.00 [1.260] Dia. Straight Shaft with M8 x 1.25-6H Thread in End, 9.982 [.3930]W x 7.995 [.3132]H x 45.00 [1.772]L Key  
**17** – 31.75 [1.250] Dia. Straight Shaft With 3/8-16UNC-2B Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Straight Key, Corrosion Resistant (Seal area to shaft end)  
**18** – 31.75 [1.250] Dia. .125:1 Tapered Shaft per SAE J501 with 1.000-20UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.000] Straight Key, Corrosion Resistant (Under seal area only)  
**19** – 25.00 [.984] Dia. Straight Shaft with M8 x 1.25-6h Thread in End, 7.982 [.3142]W x 6.954 [.2738]H x 31.82 [1.254]L Key  
**28** – 32.00 [1.260] Dia. 10:1 Tapered Shaft Per ISO R775 with M10 X 1.50-6H Thread in End, 6.00 [.236] Sq. x 50.00

[1.968] Key  
**39** – None (Bearingless) European Spline  
**41** – 35.00 [1.378] Dia. 10:1 Tapered Shaft Per ISO R775 with M20 x 1.5-6g Threaded Shaft End and Slotted Hex Nut, 6.00 [.236] Sq. X 20.00 [.787] Key  
**42** – 35.00 [1.378] Dia. Straight Shaft with M8 x 1.25-6h Thread in End, 9.982 [.3930]W x 7.995 [.3132]H x 45.00 [1.772]L Key

**11**, **12** **Ports**  
AA – .875-14 UNF-2B SAE O-ring Ports - Staggered Ports  
AB – 12.70 [.500] and 15.88 [.625] Dia. Manifold Ports with 3 x .375-16 UNC-2B Port Block Mounting Holes  
AC – .875-14 UNF-2B SAE O-ring Ports - Ports Oriented 180° to each other  
AE – 12.70 [.500] And 15.88 [.625] Dia. Manifold Ports with 3 x M10 x 1.5-6H Port Block Mounting Holes  
AF – 1.0625-12 UN-2B SAE O-ring Ports - Ports Oriented 180° to each other  
AG – G 1/2 BSP Straight THD Ports - Staggered Ports  
AN – G 1/2 BSP Straight Thd Ports - End Ported  
AR – .875-14 UNF-2B SAE O-ring Ports - End Ported, Cast Boss Removed  
AS – G 1/2 Bsp Straight THD Ports - Staggered Port with 2 x M10 x 1.5-6H Port Block Mounting Holes - European

**13**, **14** **Case Flow Options**  
Shuttles available with port code AA or AD only  
00 – None  
**01** – .4375-20 UNF-2B SAE O-Ring Port  
**02** – G 1/4 BSP Straight THD Port  
**09** – Reverse Flow Shuttle Valve w/ G 1/4 BSP Straight THD Port, .062 Dia. Shuttle Flow Orifice  
**13** – Reverse Flow Shuttle Valve w/ .4375-20 UNF-2B SAE O-Ring Port, .062 Dia. Shuttle Flow Orifice

**15** **Low Pressure Relief**  
0 – None  
A – Set at 4.5 bar [65 lbf/in<sup>2</sup>]  
B – Set at 15.2 bar [220 lbf/in<sup>2</sup>]  
C – Set at 20.7 bar [300 lbf/in<sup>2</sup>]  
D – Set at 13.1 bar [190 lbf/in<sup>2</sup>]

**16**, **17** **Pressure/Flow Option**  
Integral Cross-Over Relief Valve:  
00 – None  
30 – Set at 103.4 bar [1500 lbf/in<sup>2</sup>]  
31 – Set at 120.6 bar [1750 lbf/in<sup>2</sup>]  
32 – Set at 137.9 bar [2000 lbf/in<sup>2</sup>]  
33 – Set at 155.1 bar [2250 lbf/in<sup>2</sup>]  
34 – Set at 172.4 bar [2500 lbf/in<sup>2</sup>]  
35 – Set at 189.6 bar [2750 lbf/in<sup>2</sup>]  
36 – Set at 206.8 bar [3000 lbf/in<sup>2</sup>]

**18** **Geroler Option**  
1 – Standard

**19** **Seal Options**  
0 – Standard  
1 – Viton  
2 – Viton Shaft Seal  
4 – Seal Guard

**20**, **21** **Accessories**  
0 – None  
AD – M 12 Threaded Connector, Digital Speed Pickup (30 Pulse)  
AE – M 12 Threaded Connector, Long Body Digital Speed and Direction Pickup

**22**, **23** **Special Features (Hardware)**  
0 – None

**24**, **25** **Special Features (Assembly)**  
00 – None  
AB – Reverse Rotation

**26**, **27** **Paint/Packaging**  
AA – No Paint, Individ. Box  
AB – Painted, Low Gloss Black, Individ. Box  
AC – Epoxy Coated (Frost Gray) Individ. Box

**28**, **29** **Customer Identification**  
AA – None

**30** **Design Code**  
F – Sixth

# 2000 Series Two-Speed

## Description

The Eaton 2000 Series motors are available with an integral two speed feature that changes the displacement in a ratio of 1 to 2 and shifts the motor from a low speed high torque (LSHT) mode to a high speed low torque (HSLT) mode. The open center selector valve shifts the speed mode from low to high speed when pilot pressure of 6.9  $\Delta$  Bar [100  $\Delta$  PSI] minimum is applied to the pilot port (6.9 Bar [100 PSI] higher than case pressure). In the high speed mode torque values are approximately one half with twice the speed of the conventional 2000 Series single speed motors.

An external two position three way valve is required for shifting the pilot pressure port between signal pressure (HSLT) and low pressure (LSHT)

Two speed motors are available with a return line closed center shuttle for closed circuit applications. Low speed high torque mode is the normal position of the speed selector valve. When a differential pressure is supplied to the pilot port and 6,9 Bar [100 PSI] is reached, the selector valve overcomes the return spring force and the spool shifts to the high speed mode. The oil in the opposite side of the spool is drained internally. Pressure between the pilot supply and case drain or return line (depending on open or closed circuit system) must be maintained to keep the motor in the high speed mode.

When pilot pressure is removed from the pilot port the pressure in the pilot end of the spool valve is relieved and drained back through

this three way valve, the spring force returns the spool valve to LSHT position. Pilot pressure may come from any source that will provide uninterrupted pressure during the high speed mode operation. Pilot pressure 6,9  $\Delta$  Bar [100  $\Delta$  PSI] minimum, up to the full operating pressure of the motor.

In normal LSHT operation the Char-Lynn two speed motor will function with equal shaft output in either direction (CW or CCW), the same as the single speed Char-Lynn disc valve motors. However, to prevent cavitation in the HSLT mode, the preferred direction of shaft rotation is counter clockwise (port B pressurized). This unique disc valve is not symmetrical in porting the fluid for the HSLT mode. Consequently, when the pressure is reversed for

HSLT CW rotation, cavitation can occur. Installing a restriction (200 psi or more depending on flow) in the hydraulic line that connects port B will prevent cavitation.

If you are operating in a critical area and a restriction in the hydraulic line causes concern, these two speed motors can be ordered timed with CW preferred HSLT shaft rotation. Hence, with this option port B will have to be pressurized for CW preferred HSLT shaft rotation. The restriction recommended for the line connecting port B remains unchanged.

Finally in closed circuit applications a hydraulic line restriction is not required. Instead, the charge pump can be used to supply and maintain a minimum pressure of 14 Bar [200 PSI].

**Be certain in closed loop applications that the charge pump when used for back pressure on the B port, has sufficient displacement to maintain charge pressure especially in dynamic braking or overrunning load conditions.**

**Important!**

**Due to potential problems in maintaining charge pump pressure at port B for uninterrupted back pressure during dynamic braking, Eaton does not recommend the two speed motor where overrunning conditions may exist.**

### Performance Data

**In the high speed mode torque values are approximately one half with twice the speed** of the conventional 2000 Series single speed motors.

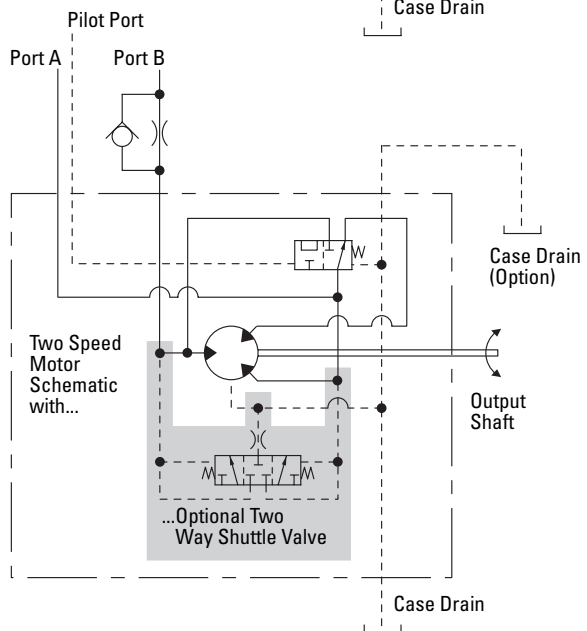
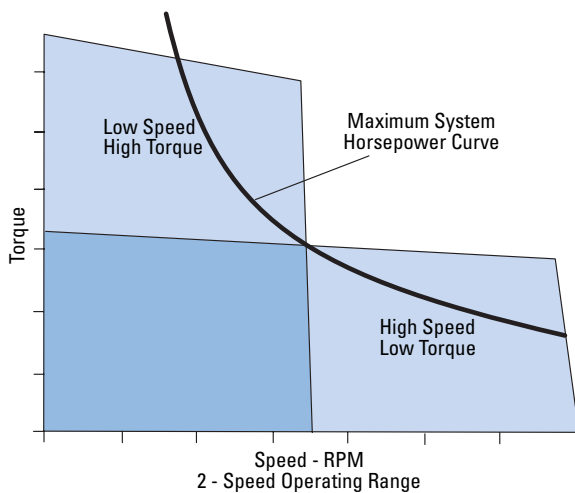
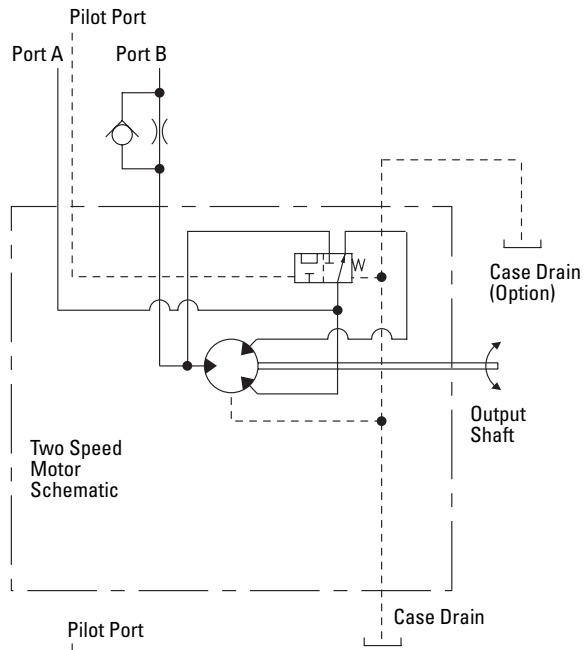
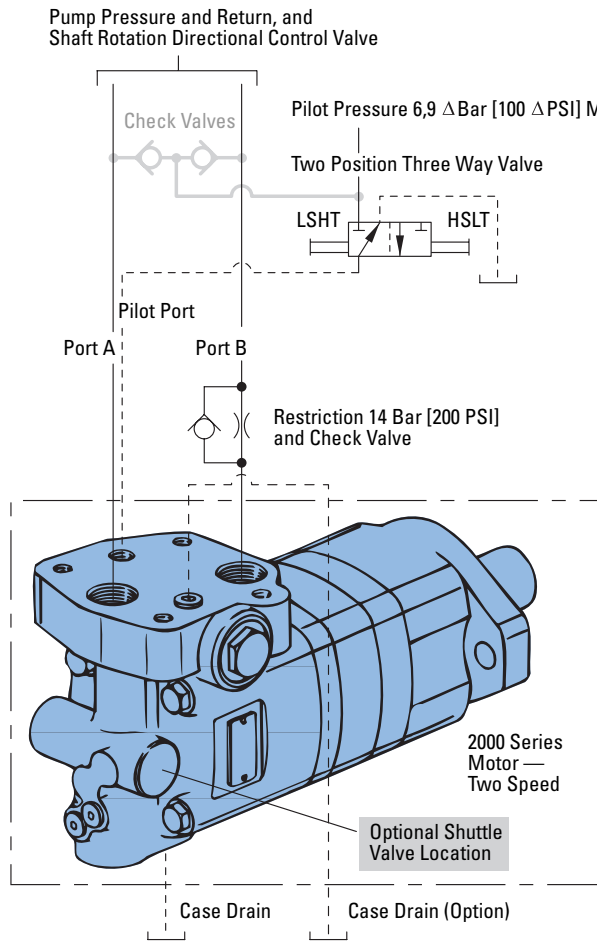
**In the low speed mode torque and speed values are the same as the conventional 2000 Series motors.**

### Note:

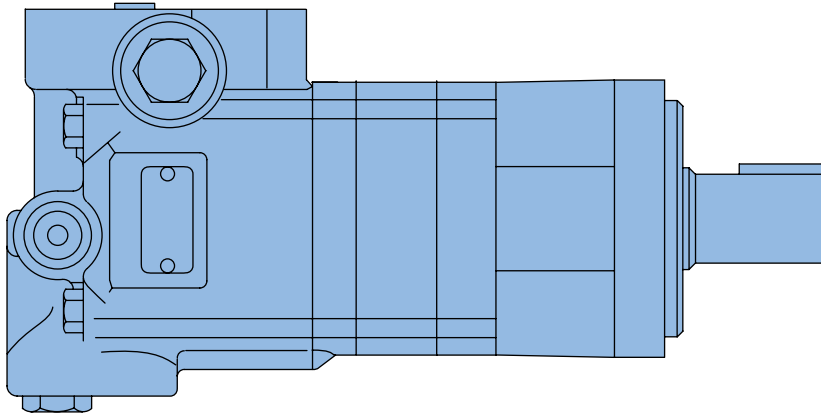
Low displacement (4.9 to 8.0 CID) motors have limited starting torque when started in high speed mode.

# 2000 Series Two-Speed

## Typical Hydraulic Circuit



# 2000 Series Two-Speed Specifications



## SPECIFICATION DATA — 2000 SERIES TWO-SPEED MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]	High Speed Mode	40 [2.45]	50 [3.1]	65 [4.0]	80 [4.8]	95 [5.95]	120 [7.45]	155 [9.35]	195 [12.0]	245 [14.9]
	Low Speed Mode	80 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
Max. Speed (RPM) @ Continuous Flow	High Speed Mode	1000	1000	990	860	700	560	450	350	230
	Low Speed Mode	500	500	495	430	350	280	225	175	115
Flow l/min [GPM]	High Speed Mode	45 [12]	55 [15]	70 [19]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
	Low Speed Mode	45 [12]	55 [15]	70 [19]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
Torque* Nm [lb-in]	High Speed Mode									
	Continuous	100 [880]	125 [1115]	165 [1450]	195 [1725]	240 [2150]	300 [2675]	380 [3350]	365 [3225]	448 [3970]
Torque* Nm [lb-in]	Intermittent	145 [1300]	185 [1660]	240 [2150]	240 [2150]	300 [2650]	375 [3330]	440 [3900]	445 [3940]	486 [4300]
	Low Speed Mode									
Torque* Nm [lb-in]	Continuous	235 [2065]	295 [2630]	385 [3420]	455 [4040]	540 [4780]	660 [5850]	765 [6750]	775 [6840]	845 [7470]
	Intermittent	345 [3035]	445 [3950]	560 [4970]	570 [5040]	665 [5890]	820 [7250]	885 [7820]	925 [8170]	930 [8225]
Pressure $\Delta$ bar [ $\Delta$ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	155 [2250]	120 [1750]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	260 [3750]	260 [3750]	260 [3750]	260 [3750]	190 [2750]	140 [2000]
Weight kg [lb]	Standard or Wheel Mount	13,8 [30.5]	14,1 [31.0]	14,3 [31.5]	14,5 [32.0]	15,0 [33.0]	15,4 [34.0]	15,9 [35.0]	16,3 [36.0]	16,8 [37.0]
	Bearingless	11,8 [26.0]	12,0 [26.5]	12,2 [27.0]	12,5 [27.5]	12,9 [28.5]	13,4 [29.5]	13,8 [30.5]	14,3 [31.5]	14,7 [32.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations.

### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

### High Speed Mode

(Reduced Motor Displacement)

### Low Speed Mode

(Full Motor Displacement)

### Maximum Inlet Pressure:

310 bar [4500 PSI]

Do not exceed  $\Delta$  pressure rating (see chart above).

### Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.

Do not exceed  $\Delta$  pressure rating (see chart above).

### $\Delta$ bar [ $\Delta$ PSI] :

The true pressure difference between inlet port and outlet port

### Continuous Rating:

Motor may be run continuously at these ratings

### Intermittent Operation:

10% of every minute

### Peak Operation:

1% of every minute

### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

### Recommended Maximum System Operating Temp.:

82° C [180° F]

### Recommended Filtration:

per ISO Cleanliness Code, 4406: 20/18/13

# 2000 Series Two-Speed

## Dimensions

Standard and Wheel

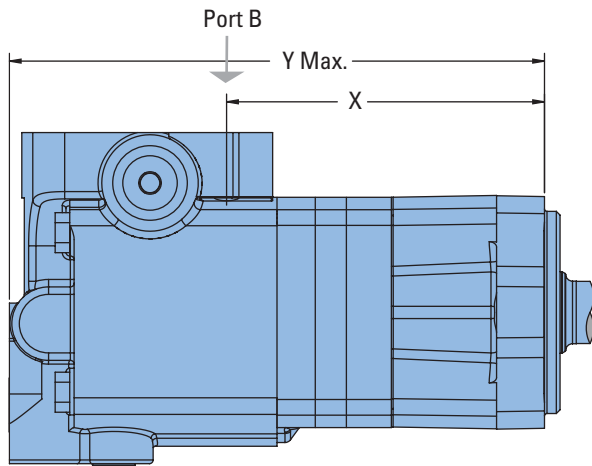
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)
- G 1/4 (BSP) Pilot Control Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

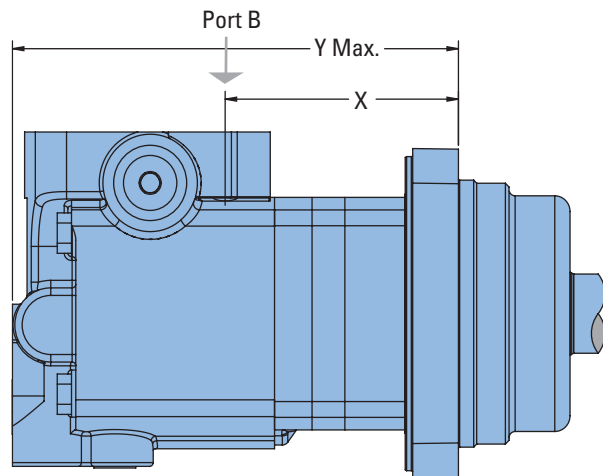
### Two-Speed Standard Motors



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	137,4 [5.41]	231,6 [9.12]
100 [6.2]	142,0 [5.59]	236,5 [9.31]
130 [8.0]	148,5 [5.85]	242,9 [9.56]
160 [9.6]	148,5 [5.85]	242,9 [9.56]
195 [11.9]	155,2 [6.11]	249,4 [9.82]
245 [14.9]	164,2 [6.47]	258,6 [10.18]
305 [18.7]	175,7 [6.92]	270,1 [10.63]
395 [24.0]	191,5 [7.54]	286,1 [11.26]
490 [29.8]	209,0 [8.23]	303,3 [11.94]

### Two-Speed Wheel Motors



### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	97,2 [3.83]	191,5 [7.54]
100 [6.2]	101,8 [4.01]	196,4 [7.73]
130 [8.0]	108,3 [4.27]	202,7 [7.98]
160 [9.6]	108,3 [4.27]	202,7 [7.98]
195 [11.9]	115,0 [4.53]	209,3 [8.24]
245 [14.9]	124,2 [4.89]	218,5 [8.60]
305 [18.7]	135,5 [5.34]	229,9 [9.05]
395 [24.0]	151,4 [5.96]	245,9 [9.68]
490 [29.8]	168,9 [6.65]	263,1 [10.36]



# 2000 Series Two-Speed

## Dimensions

Bearingless

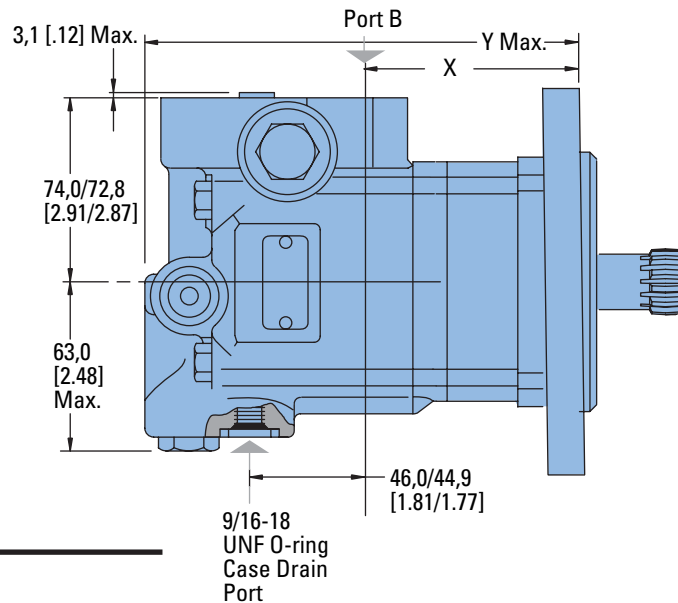
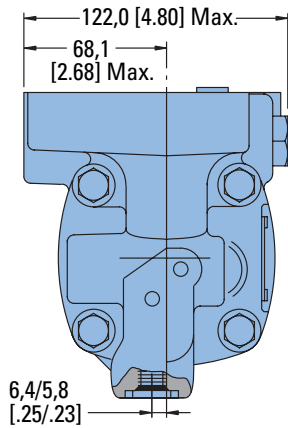
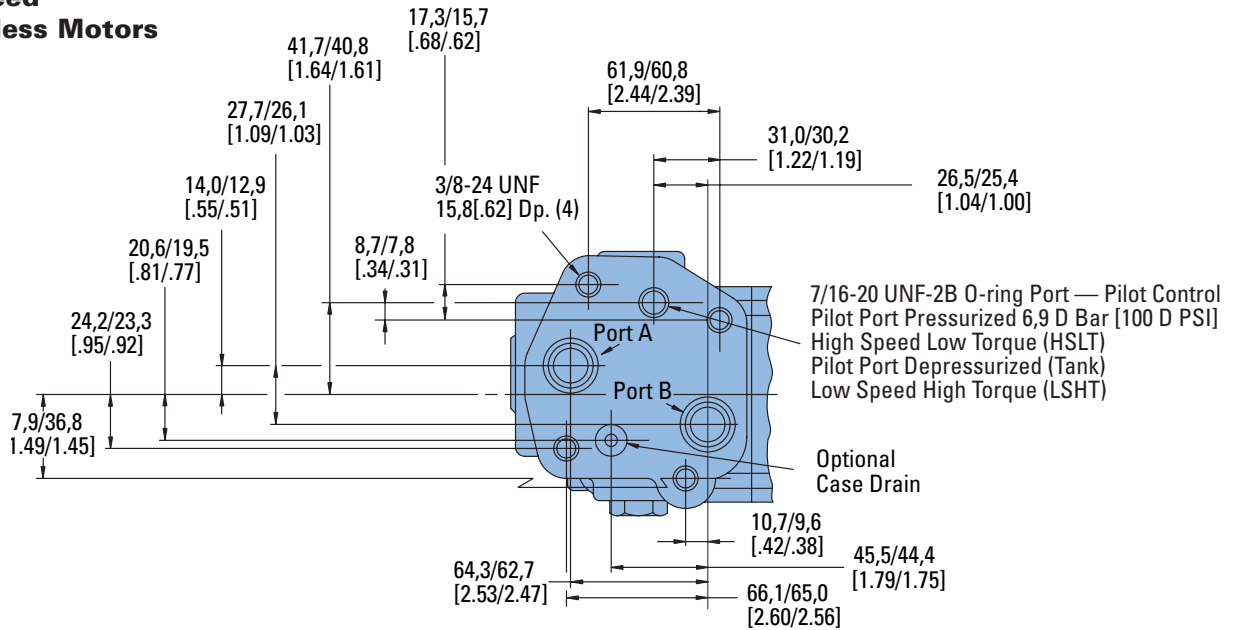
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)
- G 1/4 (BSP) Pilot Control Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Two-Speed Bearingless Motors



### BEARINGLESS MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
80 [4.9]	79,3 [3.13]	174,0 [6.85]
100 [6.2]	84,1 [3.31]	178,9 [7.04]
130 [8.0]	90,7 [3.57]	185,2 [7.29]
160 [9.6]	90,7 [3.57]	185,2 [7.29]
195 [11.9]	97,3 [3.83]	191,8 [7.55]
245 [14.9]	106,4 [4.19]	201,0 [7.91]
305 [18.7]	117,8 [4.64]	212,4 [8.36]
395 [24.0]	133,6 [5.26]	228,4 [8.99]
490 [29.8]	151,1 [5.95]	245,6 [9.67]

# 2000 Series Two-Speed

## Product Numbers

### Note:

For 2000 Series Motors with a configuration **Not Shown** in the charts below, contact your Eaton Representative.

Use digit prefix — 104-, 105-, or 106- plus four digit number from charts for complete product number— Example 106-2007.

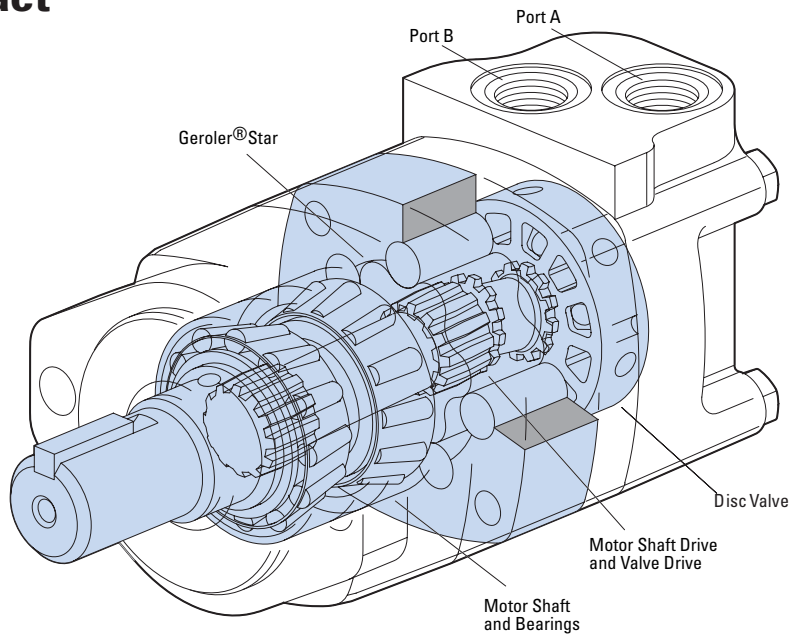
**Orders will not be accepted without three digit prefix.**

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER								
			80 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 Inch Straight	7/8 -14 O-ring Staggered	104-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—
	1 1/4 Inch Straight	7/8 -14 O-ring Staggered	104-2009	-2010	-2011	-2012	-2013	-2014	-2015	-2016	-2219
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	104-2017	-2018	-2019	-2020	-2021	-2022	-2023	-2024	—
Wheel Motor	1 1/4 Inch Tapered	7/8 -14 O-ring Staggered	105-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—
	1 1/4 Inch 14 T Splined	7/8 -14 O-ring Staggered	105-2009	-2010	-2011	-2012	-2013	-2014	-2015	-2016	—
Bearingless		7/8 -14 O-ring Staggered	106-2001	-2002	-2003	-2004	-2005	-2006	-2007	-2008	—

106-2007

# 4000 Compact Series

## Highlights



### Features

- Shuttle Valve with Back-Pressure Relief Valve
- Speed Sensors
- End Ports.

### Benefits

- Higher bearing capacity than 2000 Series
- Torque of 4000 Series

### Applications

- Skid Steer Loaders
- Fairway Mowers
- Harvesters
- Vehicles where space may be at a premium.

### Description

This new compact addition in a family of disc valve hydraulic motors produces the same amount of torque as the current 4000 Series. Yet, it is housed in an envelope similar to its smaller counterpart, the 2000 Series. The unit's intermittent torque rating is 1220 Nm [10800 lb-in]. A variety of mounting options include two 2 bolt mounts (SAE A, SAE B), and four 4 bolt mounts (magneto, standard and wheel mounts.) For added flexibility, the motor can be specified with either the larger size shafts of the 2000 Series or standard output shaft sizes of the 4000 Series, plus one new 1-1/2 inch straight (the small envelope and optional shaft sizes make this motor ideal for vehicles like skid-steer loaders whose hallmark is high power and productivity in a small frame.)

### Specifications

Geroler Element	6 Displacements
Flow l/min [GPM]	75 [20] Continuous**
	115 [30] Intermittent*
Speed RPM	464 Cont.**
	699 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	300 [4500] Inter.*
Torque Nm [lb-in]	975 [8627] Cont.**
	1218 [10788] Inter.*

\*\* Continuous—(Cont.) Continuous rating, motor may be run continuously at these ratings.

\* Intermittent—(Inter.) Intermittent operation, 10% of every minute.



Lawn and Turf



Skid Steer



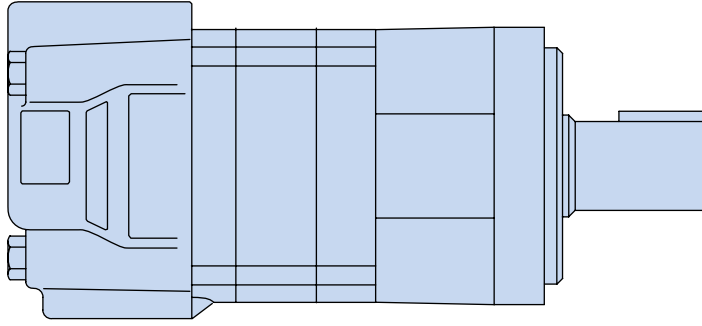
Boom Lift



Harvester

# 4000 Compact Series

## Specifications



### SPECIFICATION DATA — 4000 COMPACT SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		160 [9.8]	200 [12.3]	250 [15.4]	325 [19.8]	405 [24.6]	490 [29.8]
Max. Speed (RPM) @ Flow	Continuous	464	375	300	234	188	155
	Intermittent	699	562	450	351	282	232
Flow l/min [GPM]	Continuous	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
	Intermittent	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]	115 [30]
Torque* Nm [lb-in]	Continuous	510 [4514]	758 [5715]	734 [6500]	793 [7021]	800 [7079]	975 [8627]
	Intermittent	690 [6108]	840 [7436]	935 [8272]	1053 [9320]	921 [8153]	1218 [10778]
Pressure Δ bar [Δ PSI]	Continuous	225 [3000]	225 [3000]	205 [3000]	170 [2500]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	295 [4250]	260 [3750]	240 [3500]	170 [2500]	171 [2500]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	275 [4000]	260 [3750]
Weight kg [lb]	Standard or Wheel Mount	10,4 [23.0]	10,9 [24.0]	11,3 [25.0]	11,8 [26.0]	12,2 [27.0]	12,2 [27.0]
	Bearingless	8,4 [18.5]	8,8 [19.5]	9,3 [20.5]	9,8 [21.5]	10,2 [22.5]	10,2 [22.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

310 bar [4500 PSI]  
Do not exceed Δ pressure rating (see chart above).

#### Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.  
Do not exceed Δ pressure rating (see chart above).

#### Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

per ISO Cleanliness Code, 4406: 20/18/13

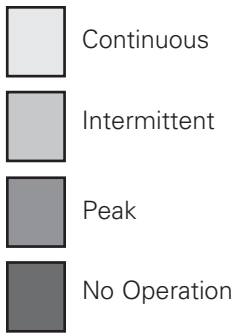
# 4000 Compact Series

## Performance Data

160 cm<sup>3</sup>/r [9.8 in<sup>3</sup>/r]  
 Δ Pressure Bar [PSI]

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260	[4000] 275	[4250] 295
[0.25] <b>0.95</b>	244 28 4	543 61 3															
[0.5] <b>1.9</b>	274 31 10	554 63 8	854 96 7														
[1] <b>3.8</b>	274 31 22	593 67 21	899 102 20	1210 137 19	1513 171 17	1816 205 14	2092 236 12	2361 267 10	2621 296 9	2874 325 7	3088 349 6						
[2] <b>7.5</b>	301 34 40	623 70 39	940 106 38	1261 143 36	1579 178 35	1898 214 33	2197 248 31	2492 282 28	2766 313 24	3033 343 20	3270 369 17	3496 395 14	3761 425 10	4022 454 6			
[4] <b>15</b>	305 27 87	662 75 85	1004 113 83	1354 153 81	1699 192 79	2046 231 77	2386 270 74	2725 308 72	3049 344 67	3368 381 63	3693 417 59	4016 454 55	4319 488 49	4618 522 44	4828 545 35	5022 567 27	
[6] <b>23</b>	293 33 133	659 74 131	1003 113 129	1357 153 127	1705 193 124	2056 232 121	2399 271 118	2741 310 114	3074 347 109	3405 385 104	3751 424 99	4098 463 93	4417 499 87	4732 535 80	5023 568 71	5308 600 63	
[8] <b>30</b>	280 32 181	656 74 179	1002 113 177	1360 154 175	1711 193 172	2066 233 169	2412 273 166	2758 312 162	3100 350 157	3442 389 152	3809 430 145	4180 472 133	4514 510 127	4846 548 120	5218 590 113	5593 632 113	5856 662 104
[10] <b>38</b>	259 29 228	630 71 225	978 110 223	1348 152 220	1701 192 217	2061 233 213	2408 272 209	2755 311 204	3102 351 199	3450 390 193	3806 430 186	4163 470 179	4500 508 172	4835 546 165	5191 586 157	5547 627 150	5784 653 141
[12] <b>45</b>	238 27 275	604 68 272	954 108 269	1336 151 266	1692 191 262	2056 232 258	2403 272 253	2752 311 247	3105 351 241	3458 391 235	3802 430 229	4146 468 223	4485 507 214	4824 545 205	5163 583 197	5501 622 189	
[14] <b>53</b>	210 24 322	577 65 319	923 104 316	1308 148 313	1665 188 308	2034 230 304	2385 269 298	2739 310 293	3092 349 286	3447 390 279	3796 429 272	4144 468 265	4487 507 256	4830 546 247			
[16] <b>61</b>	182 21 370	550 62 367	893 101 363	1280 145 360	1638 185 356	2012 227 351	2367 267 345	2727 308 339	3080 348 332	3436 388 324	3789 428 317	4143 468 301	4489 507 292	4836 546 247			
[18] <b>68</b>	143 16 417	514 58 414	853 96 410	1247 141 406	1601 181 401	1973 223 397	2329 263 390	2692 304 383	3045 344 375	3401 384 366	3756 424 358	4114 465 350					
[20] <b>76</b>	105 12 464	478 54 461	814 92 457	1213 137 453	1564 177 448	1935 219 442	2291 259 435	2658 300 428	3010 340 418	3366 380 409	3724 421 400	4085 462 390					
[22] <b>83</b>		433 49 508	762 86 504	1167 132 500	1518 172 495	1893 214 489	2252 254 482	2623 296 474	2973 336 465	3328 376 456	3682 416 446	4040 456 436					
[24] <b>91</b>		387 44 556	711 80 552	1121 127 548	1472 166 542	1851 209 537	2212 250 529	2589 292 521	2937 332 513	3291 372 504	3641 411 493	3995 451 483					
[25] <b>95</b>		363 41 580	683 77 576	1095 124 572	1445 163 566	1824 206 560	2184 247 552	2561 289 544	2910 329 535	3266 369 526							
[30] <b>114</b>		244 28 699	546 62 695	967 109 692	1308 148 685	1689 191 678	2045 231 669	2421 274 660	2777 314 648	3144 355 637							

[2777]  
 314 } Torque [lb-in]  
       } Nm  
 648 } Speed RPM

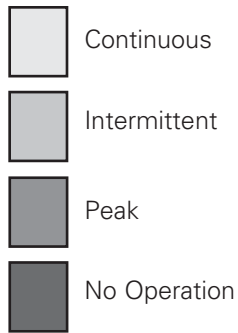
# 4000 Compact Series

## Performance Data

200 cm<sup>3</sup>/r [12.3 in<sup>3</sup>/r]  
 Δ Pressure Bar [PSI]

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260	[4000] 275	[4250] 295
[0.25] <b>0,95</b>	115 13 4	504 57 3															
[0.5] <b>1,9</b>	268 30 8	584 66 7	963 109 4	1274 144 3													
[1] <b>3,8</b>	306 35 17	721 81 16	1104 125 14	1516 171 13	1913 216 12	2243 253 10	2397 271 9	2772 313 6									
[2] <b>7,5</b>	402 45 35	841 95 34	1218 138 32	1647 186 31	2107 238 30	2478 280 28	2826 319 27	3238 366 24	3954 447 29	4451 503 26	4755 537 23	5127 579 21	5407 622 17	5569 664 11	5855 662 8		
[4] <b>15</b>	403 46 72	896 101 70	1361 154 69	1780 201 68	2247 254 66	2649 299 65	3068 347 62	3513 397 60	3947 446 56	4367 493 53	4710 532 50	5125 597 46	5509 622 42	5880 664 37	6249 706 31	6547 740 24	6753 763 19
[6] <b>23</b>	385 44 109	863 98 107	1354 153 106	1785 202 104	2260 255 102	2657 300 100	3087 349 97	3547 401 93	3965 448 90	4389 496 86	4793 542 81	5218 590 77	5610 634 72	6015 680 66	6408 724 60	6754 763 52	7436 840 47
[8] <b>30</b>	368 42 147	831 94 146	1347 152 144	1790 202 142	2273 257 140	2665 301 137	3106 351 134	3581 405 130	3982 450 127	4398 498 122	4876 551 117	5311 600 113	5712 645 108	6151 695 103	6567 742 98	6961 786 91	7334 829 83
[10] <b>38</b>	353 40 185	822 93 184	1319 149 181	1774 200 179	2212 250 177	2642 299 174	3086 349 170	3556 402 165	3974 449 161	4410 498 156	4839 547 151	5297 598 146	5715 646 140	6147 695 134	6563 742 129		
[12] <b>45</b>	339 38 223	813 92 222	1291 146 219	1758 199 217	2151 243 214	2620 296 211	3067 346 207	3530 399 202	3965 448 197	4408 498 192	4802 543 186	5283 597 180	5718 646 174	6144 694 167	6568 742 164		
[14] <b>53</b>	282 32 261	762 86 260	1237 140 257	1693 191 255	2121 240 252	2601 294 248	2968 335 244	3504 396 238	3953 447 233	4368 493 227	4832 546 221	5261 594 214	5690 643 208				
[16] <b>61</b>	224 25 299	712 80 298	1183 134 296	1629 184 293	2091 236 290	2581 292 286	2870 324 282	3477 393 275	3940 445 269	4328 489 263	4861 549 256	5240 592 249	5661 640 243				
[18] <b>68</b>	200 23 337	667 75 336	1148 130 334	1619 183 331	2053 232 328	2520 285 324	2899 328 320	3442 389 314	3906 441 307	4337 490 301	4819 544 293	5245 593 285	5644 638 278				
[20] <b>76</b>	176 20 375	623 70 374	1112 126 372	1609 182 369	2014 228 366	2458 278 363	2929 331 358	3407 385 353	3872 437 346	4347 491 339	4777 540 331	5250 593 322	5627 636 315				
[22] <b>83</b>		565 64 412	1053 119 410	1530 173 407	1934 219 404	2387 270 401	2868 324 396	3347 378 390	3804 430 383	4254 481 375	4698 531 367						
[24] <b>91</b>		507 57 449	994 112 448	1450 164 446	1855 210 443	2316 262 439	2806 317 434	3287 371 427	3737 422 420	4162 470 412	4618 522 403						
[25] <b>95</b>		465 53 468	950 107 467	1411 159 464	1820 206 462	2276 257 458	2768 313 453	3233 365 446	3688 417 439	4116 465 431	4493 508 423						
[30] <b>114</b>		259 29 562	726 82 563	1214 137 559	1645 186 555	2072 234 556	2577 291 550	2961 335 545	3443 389 536	3889 439 527	3866 437 521						

[2072] } Torque [lb-in]  
 234 } Nm  
 556 } Speed RPM







# 4000 Compact Series

## Performance Data

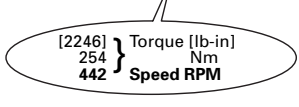
250 cm<sup>3</sup>/r [15.4 in<sup>3</sup>/r]  
 Δ Pressure Bar [PSI]

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous
	Intermittent
	Peak
	No Operation

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[0.5] <b>1.9</b>	384 43 6	833 94 5													
[1] <b>3.8</b>	438 49 14	904 102 14	1403 158 13	1887 213 12	2359 267 11	2798 316 9	3221 364 8	3657 413 7	3822 432 4	4326 489 3					
[2] <b>7.5</b>	492 56 28	1054 119 27	1563 177 26	2081 235 25	2623 296 24	3160 357 23	3717 420 21	4147 469 17	4585 518 16	5070 573 13	5470 618 9	5721 646 7	5962 674 5		
[4] <b>15</b>	603 68 58	1183 134 56	1771 200 55	2275 257 54	2817 318 52	3364 380 50	3895 440 47	4495 508 44	5005 565 42	5496 621 38	5982 676 35	6500 734 32	7054 797 28	7519 850 24	7941 897 17
[6] <b>23</b>	587 66 88	1159 131 86	1741 197 84	2329 263 82	2815 318 80	3369 381 77	3951 446 74	4483 506 71	5021 567 67	5555 628 63	6068 686 59	6557 741 55	7131 806 50	7641 863 45	8107 916 38
[8] <b>30</b>	571 65 118	1135 128 116	1710 193 114	2384 269 112	2813 318 110	3375 381 107	4008 453 103	4471 505 100	5038 569 96	5613 634 92	6154 695 87	6614 747 83	7209 815 78	7763 877 73	8272 935 67
[10] <b>38</b>	552 62 148	1138 129 146	1671 189 144	2304 260 142	2804 317 139	3361 380 136	3950 446 131	4452 503 127	5006 566 123	5587 631 119	6123 692 113	6612 747 109	7201 814 102		
[12] <b>45</b>	532 60 178	1140 129 177	1631 184 175	2224 251 173	2796 316 170	3347 378 166	3892 440 161	4434 501 157	4974 562 151	5561 628 146	6093 688 141	6610 747 136	7193 813 129		
[14] <b>53</b>	441 50 209	1072 121 207	1600 181 205	2207 249 202	2754 311 199	3320 375 195	3888 439 190	4433 501 185	4958 560 179	5529 625 174	6066 685 168	6590 745 162			
[16] <b>61</b>	349 39 239	1003 113 237	1568 177 235	2190 247 233	2711 306 229	3292 372 225	3884 439 220	4431 501 214	4941 558 208	5496 621 202	6039 682 195	6570 742 189			
[18] <b>68</b>	306 35 269	940 106 267	1513 171 265	2114 239 263	2653 300 259	3251 367 255	3830 433 250	4380 495 243	4904 554 236	5446 615 230	5984 676 223	6518 736 214			
[20] <b>76</b>	263 30 300	876 99 298	1458 165 296	2038 230 293	2595 293 290	3210 363 285	3777 427 280	4328 489 272	4867 550 265	5395 610 259	5928 670 251	6471 731 241			
[22] <b>83</b>		826 93 328	1414 160 326	1991 225 323	2528 286 320	3144 355 315	3709 419 309	4262 482 302	4806 543 295	5354 605 288	5915 668 279				
[24] <b>91</b>		776 88 359	1370 155 356	1945 220 354	2462 278 350	3079 348 345	3642 411 339	4196 474 332	4745 536 325	5313 600 317	5901 667 308				
[25] <b>95</b>		732 83 374	1322 149 371	1959 221 369	2426 274 365	3026 342 360	3594 406 354	4153 469 347	4696 531 340	5152 582 333					
[30] <b>114</b>		509 57 450	1082 122 449	2029 229 445	2246 254 442	2761 312 437	3358 379 430	3939 445 423	4450 503 414	4347 491 413					



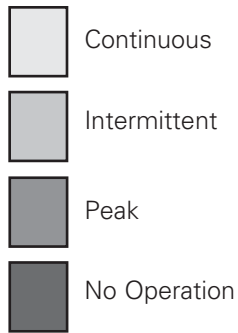
# 4000 Compact Series

## Performance Data

**325 cm<sup>3</sup>/r [19.8 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[0.5] <b>1.9</b>	536 61 <b>5</b>	1152 130 <b>4</b>												
[1] <b>3.8</b>	555 63 <b>11</b>	1220 138 <b>10</b>	1900 215 <b>10</b>	2559 289 <b>9</b>	3222 364 <b>9</b>	3862 436 <b>8</b>	4522 511 <b>7</b>	5061 572 <b>5</b>	5580 630 <b>3</b>	6106 690 <b>3</b>				
[2] <b>7.5</b>	643 73 <b>22</b>	1349 152 <b>21</b>	2025 229 <b>20</b>	2712 306 <b>19</b>	3378 382 <b>19</b>	4051 458 <b>17</b>	4696 531 <b>15</b>	5335 603 <b>13</b>	5889 665 <b>10</b>	6366 719 <b>5</b>	6876 777 <b>3</b>			
[4] <b>15</b>	679 77 <b>45</b>	1420 160 <b>44</b>	2140 242 <b>43</b>	2852 322 <b>42</b>	3557 402 <b>40</b>	4259 481 <b>38</b>	4947 559 <b>36</b>	5628 636 <b>33</b>	6300 712 <b>30</b>	6960 786 <b>26</b>	7596 858 <b>23</b>	8201 927 <b>19</b>	8767 991 <b>14</b>	9320 1053 <b>11</b>
[6] <b>23</b>	654 74 <b>68</b>	1400 158 <b>67</b>	2132 241 <b>66</b>	2859 323 <b>64</b>	3575 404 <b>62</b>	4281 484 <b>59</b>	4977 562 <b>56</b>	5668 640 <b>53</b>	6346 717 <b>49</b>	7021 793 <b>44</b>	7678 868 <b>40</b>	8244 931 <b>38</b>	8792 993 <b>35</b>	
[8] <b>30</b>	629 71 <b>92</b>	1379 156 <b>90</b>	2125 240 <b>89</b>	2866 324 <b>87</b>	3592 406 <b>85</b>	4304 486 <b>82</b>	5007 566 <b>79</b>	5707 645 <b>75</b>	6392 722 <b>71</b>	7082 800 <b>66</b>	7760 877 <b>61</b>	8400 949 <b>56</b>		
[10] <b>38</b>	587 66 <b>115</b>	1337 151 <b>114</b>	2082 235 <b>112</b>	2827 319 <b>110</b>	3556 402 <b>107</b>	4272 483 <b>103</b>	4976 562 <b>100</b>	5672 641 <b>94</b>	6362 719 <b>90</b>	7053 797 <b>85</b>				
[12] <b>45</b>	546 62 <b>139</b>	1295 146 <b>137</b>	2040 230 <b>136</b>	2787 315 <b>134</b>	3520 398 <b>130</b>	4240 479 <b>125</b>	4944 559 <b>121</b>	5638 637 <b>115</b>	6332 715 <b>110</b>	7023 794 <b>105</b>				
[14] <b>53</b>	489 55 <b>162</b>	1238 140 <b>161</b>	1984 224 <b>159</b>	2729 308 <b>157</b>	3467 392 <b>153</b>	4193 474 <b>148</b>	4903 554 <b>143</b>	5600 633 <b>136</b>	6293 711 <b>131</b>					
[16] <b>61</b>	431 49 <b>186</b>	1182 134 <b>185</b>	1929 218 <b>183</b>	2671 302 <b>181</b>	3415 386 <b>177</b>	4145 468 <b>171</b>	4861 549 <b>165</b>	5562 628 <b>159</b>	6254 707 <b>153</b>					
[18] <b>68</b>	360 41 <b>210</b>	1110 125 <b>208</b>	1856 210 <b>206</b>	2600 294 <b>204</b>	3343 378 <b>200</b>	4073 460 <b>195</b>	4794 542 <b>189</b>	5499 621 <b>183</b>						
[20] <b>76</b>	288 33 <b>234</b>	1038 117 <b>232</b>	1784 202 <b>230</b>	2529 286 <b>228</b>	3271 370 <b>224</b>	4001 452 <b>220</b>	4726 534 <b>214</b>	5436 614 <b>207</b>						
[22] <b>83</b>		958 108 <b>256</b>	1706 193 <b>254</b>	2451 277 <b>251</b>	3194 361 <b>248</b>	3926 444 <b>243</b>	4650 525 <b>237</b>	5360 606 <b>229</b>						
[24] <b>91</b>		878 99 <b>279</b>	1628 184 <b>277</b>	2373 268 <b>275</b>	3116 352 <b>271</b>	3850 435 <b>266</b>	4574 517 <b>260</b>	5285 597 <b>252</b>						
[25] <b>95</b>		826 93 <b>291</b>	1576 178 <b>289</b>	2320 262 <b>287</b>	3063 346 <b>283</b>	3798 429 <b>277</b>	4523 511 <b>271</b>							
[30] <b>114</b>		566 64 <b>351</b>	1314 148 <b>349</b>	2056 232 <b>346</b>	2799 316 <b>342</b>	3536 399 <b>337</b>	4268 482 <b>332</b>							





[2799] } Torque [lb-in]  
 316 } Nm  
 342 } Speed RPM

# 4000 Compact Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Peak
-  No Operation

405 cm<sup>3</sup>/r [24.6 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
[0.5] <b>1.9</b>	719 81 <b>3</b>	1458 165 <b>2</b>								
[1] <b>3.8</b>	777 88 <b>8</b>	1631 184 <b>7</b>	2423 274 <b>5</b>	3148 356 <b>4</b>	3690 417 <b>3</b>					
[2] <b>7.5</b>	853 96 <b>17</b>	1812 205 <b>15</b>	2596 293 <b>14</b>	3375 381 <b>12</b>	4179 472 <b>11</b>	4845 547 <b>9</b>	5375 607 <b>8</b>	5841 660 <b>3</b>	6501 735 <b>2</b>	
[4] <b>15</b>	878 99 <b>35</b>	1859 210 <b>34</b>	2687 304 <b>32</b>	3667 414 <b>30</b>	4554 515 <b>28</b>	5388 609 <b>25</b>	6232 704 <b>23</b>	7004 791 <b>19</b>	7660 865 <b>16</b>	8153 921 <b>11</b>
[6] <b>23</b>	882 100 <b>54</b>	1836 207 <b>52</b>	2716 307 <b>51</b>	3680 416 <b>48</b>	4577 517 <b>46</b>	5388 609 <b>42</b>	6269 708 <b>39</b>	7079 800 <b>35</b>	7856 888 <b>31</b>	
[8] <b>30</b>	885 100 <b>73</b>	1813 205 <b>72</b>	2746 310 <b>70</b>	3694 417 <b>68</b>	4600 520 <b>65</b>	5388 609 <b>62</b>	6307 713 <b>58</b>	7153 808 <b>55</b>	8052 910 <b>50</b>	
[10] <b>38</b>	810 92 <b>92</b>	1736 196 <b>90</b>	2693 304 <b>89</b>	3639 411 <b>86</b>	4540 513 <b>84</b>	5390 609 <b>80</b>	6310 713 <b>75</b>	7151 808 <b>71</b>	7994 903 <b>67</b>	
[12] <b>45</b>	735 83 <b>111</b>	1660 188 <b>110</b>	2640 298 <b>108</b>	3584 405 <b>106</b>	4480 506 <b>103</b>	5391 609 <b>98</b>	6314 713 <b>93</b>	7149 808 <b>88</b>		
[14] <b>53</b>	661 75 <b>130</b>	1622 183 <b>128</b>	2560 289 <b>127</b>	3512 397 <b>124</b>	4412 498 <b>121</b>	5330 602 <b>117</b>	6242 705 <b>112</b>	7059 798 <b>108</b>		
[16] <b>61</b>	587 66 <b>149</b>	1585 179 <b>147</b>	2480 280 <b>146</b>	3440 389 <b>143</b>	4343 491 <b>141</b>	5268 595 <b>137</b>	6170 697 <b>131</b>			
[18] <b>68</b>	492 56 <b>168</b>	1472 166 <b>167</b>	2379 269 <b>165</b>	3333 377 <b>162</b>	4270 482 <b>160</b>	5190 586 <b>156</b>	6084 687 <b>150</b>			
[20] <b>76</b>	397 45 <b>188</b>	1359 153 <b>186</b>	2279 257 <b>184</b>	3226 365 <b>182</b>	4197 474 <b>179</b>	5112 578 <b>175</b>	5999 678 <b>170</b>			
[22] <b>83</b>		1264 143 <b>205</b>	2194 248 <b>203</b>	3124 353 <b>201</b>	4093 462 <b>198</b>	5008 566 <b>193</b>	5904 667 <b>188</b>			
[24] <b>91</b>		1169 132 <b>224</b>	2110 238 <b>222</b>	3023 342 <b>220</b>	3989 451 <b>216</b>	4904 554 <b>212</b>	5810 656 <b>207</b>			
[25] <b>95</b>		1106 125 <b>233</b>	2049 231 <b>232</b>	2961 335 <b>229</b>	3929 444 <b>226</b>	4851 548 <b>222</b>	5766 651 <b>217</b>			
[30] <b>114</b>		790 89 <b>282</b>	1744 197 <b>280</b>	2655 300 <b>277</b>	3634 411 <b>274</b>	4587 518 <b>270</b>	5543 626 <b>266</b>			





[2655] } Torque [lb-in]  
300 } Nm  
227 } Speed RPM

# 4000 Compact Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Peak
-  No Operation

490 cm<sup>3</sup>/r [29.8 in<sup>3</sup>/r]  
 $\Delta$  Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
[0.5] <b>1,9</b>	375 42 <b>3</b>	1669 189 <b>3</b>								
[1] <b>3,8</b>	525 59 <b>7</b>	1762 199 <b>7</b>	2945 333 <b>6</b>	3965 448 <b>6</b>	5099 576 <b>6</b>	5926 670 <b>5</b>	6715 759 <b>4</b>	7503 848 <b>3</b>		
[2] <b>7,5</b>	639 72 <b>14</b>	2108 238 <b>14</b>	3287 371 <b>13</b>	4169 471 <b>13</b>	5416 612 <b>11</b>	6570 742 <b>11</b>	7188 812 <b>9</b>	8295 937 <b>6</b>	8959 1012 <b>5</b>	
[4] <b>15</b>	981 111 <b>30</b>	2201 249 <b>29</b>	3333 377 <b>29</b>	4574 517 <b>28</b>	5558 628 <b>27</b>	6634 750 <b>26</b>	7694 869 <b>24</b>	8627 975 <b>21</b>	9567 1081 <b>18</b>	10399 1175 <b>13</b>
[6] <b>23</b>	1049 119 <b>45</b>	2218 251 <b>45</b>	3332 376 <b>44</b>	4584 518 <b>43</b>	5604 633 <b>42</b>	6670 754 <b>40</b>	7711 871 <b>38</b>	8713 984 <b>35</b>	9698 1096 <b>31</b>	10588 1196 <b>26</b>
[8] <b>30</b>	1118 126 <b>61</b>	2236 253 <b>60</b>	3331 376 <b>60</b>	4593 519 <b>59</b>	5650 638 <b>58</b>	6705 758 <b>56</b>	7727 873 <b>54</b>	8798 994 <b>51</b>	9828 1110 <b>48</b>	10778 1218 <b>44</b>
[10] <b>38</b>	1060 120 <b>76</b>	2230 252 <b>76</b>	3304 373 <b>75</b>	4503 509 <b>75</b>	5607 633 <b>73</b>	6693 756 <b>72</b>	7721 872 <b>69</b>	8836 998 <b>66</b>		
[12] <b>45</b>	1003 113 <b>92</b>	2223 251 <b>91</b>	3276 370 <b>91</b>	4413 499 <b>90</b>	5564 629 <b>89</b>	6680 755 <b>88</b>	7715 872 <b>85</b>	8874 1003 <b>82</b>		
[14] <b>53</b>	858 97 <b>108</b>	2127 240 <b>107</b>	3136 354 <b>107</b>	4320 488 <b>106</b>	5496 621 <b>105</b>	6542 739 <b>103</b>	7653 865 <b>100</b>			
[16] <b>61</b>	713 81 <b>124</b>	2030 229 <b>123</b>	2997 339 <b>122</b>	4226 477 <b>122</b>	5428 613 <b>121</b>	6403 723 <b>119</b>	7590 858 <b>115</b>			
[18] <b>68</b>	631 71 <b>139</b>	1907 215 <b>139</b>	2935 332 <b>138</b>	4133 467 <b>137</b>	5330 602 <b>136</b>	6339 716 <b>134</b>	7431 840 <b>130</b>			
[20] <b>76</b>	548 62 <b>155</b>	1784 202 <b>154</b>	2872 325 <b>153</b>	4041 457 <b>153</b>	5232 591 <b>152</b>	6275 709 <b>150</b>	7362 832 <b>148</b>			
[22] <b>83</b>		1669 189 <b>170</b>	2704 306 <b>169</b>	3928 444 <b>169</b>	5048 570 <b>168</b>	6124 692 <b>166</b>	7208 814 <b>164</b>			
[24] <b>91</b>		1553 175 <b>186</b>	2536 287 <b>185</b>	3816 431 <b>185</b>	4864 550 <b>184</b>	5972 675 <b>182</b>	7055 797 <b>179</b>			
[25] <b>95</b>		1469 166 <b>193</b>	2475 280 <b>193</b>	3737 422 <b>193</b>	4810 543 <b>192</b>	5909 668 <b>190</b>	6959 786 <b>187</b>			
[30] <b>114</b>		1047 118 <b>232</b>	2172 245 <b>232</b>	3341 378 <b>232</b>	4538 513 <b>231</b>	5592 632 <b>229</b>	6482 732 <b>227</b>			

[3341]  
378 } Torque [lb-in]  
232 } Nm  
Speed RPM

# 4000 Compact Series

## Dimensions

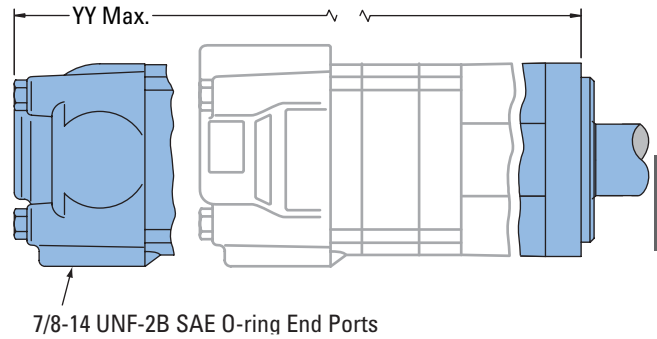
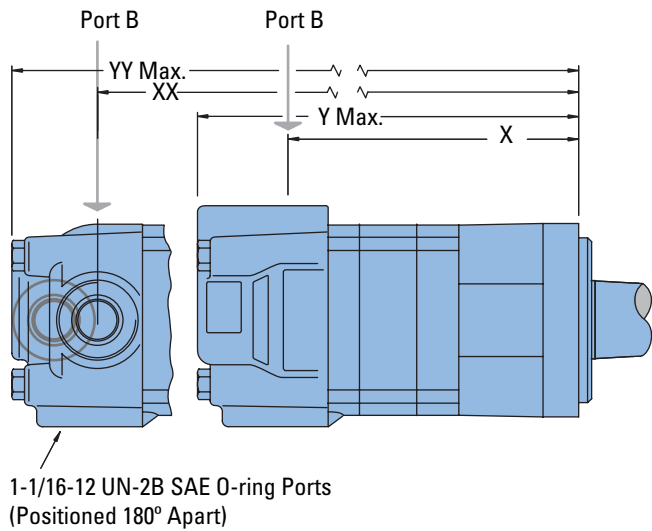
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Standard Mount



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [9.8]	154,7 [6.09]	201,9 [7.95]	157,0 [6.18]	203,3 [8.00]
200 [12.3]	163,8 [6.45]	211,1 [8.31]	166,1 [6.54]	212,3 [8.36]
250 [15.4]	175,3 [6.90]	222,5 [8.76]	177,5 [6.99]	223,8 [8.81]
325 [19.8]	191,0 [7.52]	238,5 [9.39]	193,3 [7.61]	239,8 [9.44]
405 [24.6]	208,5 [8.21]	255,8 [10.07]	210,8 [8.30]	257,0 [10.12]
490 [29.8]	208,5 [8.21]	255,8 [10.07]	210,8 [8.30]	257,0 [10.12]

# 4000 Compact Series

## Dimensions

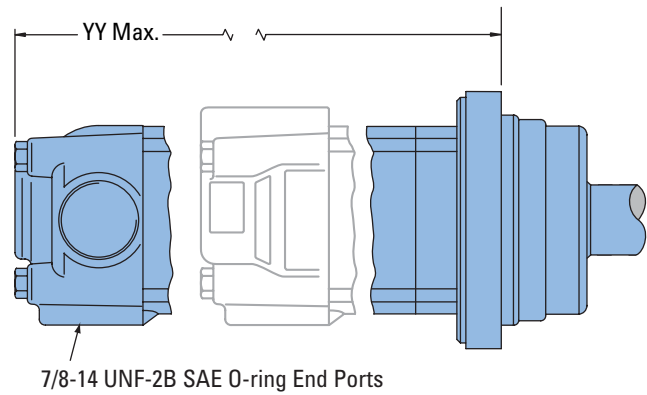
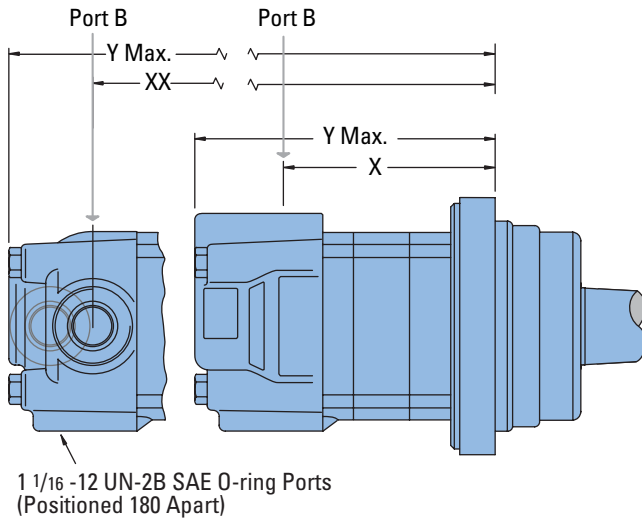
### Ports

- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Wheel Mount



### WHEEL MOUNT MOTOR DIMENSIONS

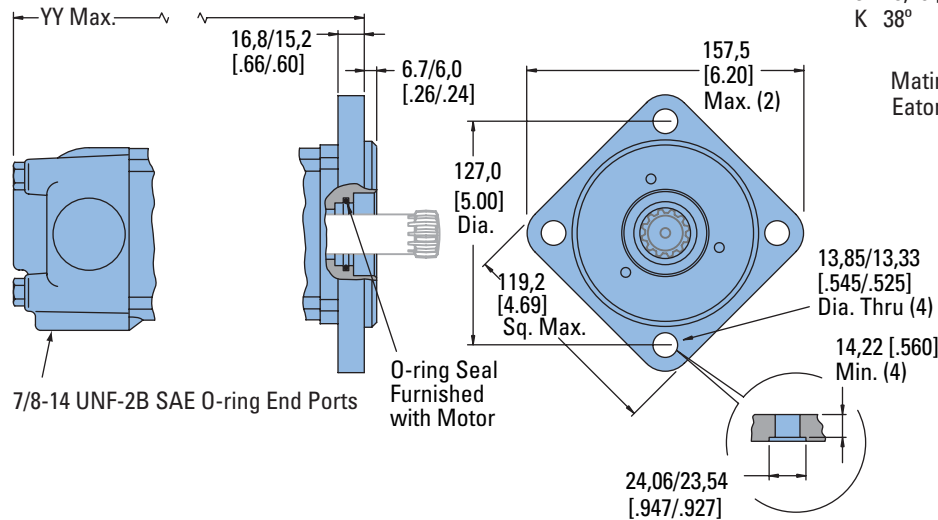
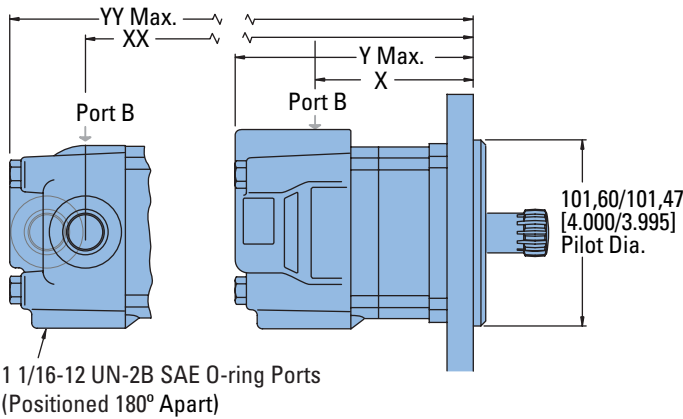
Displacement	X	Y	XX	YY
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [ 9.8]	114,6 [4.51]	161,8 [6.37]	114,6 [4.51]	161,8 [6.37]
200 [12.3]	123,7 [4.87]	170,9 [6.73]	123,7 [4.87]	170,9 [6.73]
250 [15.4]	135,1 [5.32]	182,4 [7.18]	135,1 [5.32]	182,4 [7.18]
325 [19.8]	150,9 [5.94]	198,4 [7.81]	150,9 [5.94]	198,4 [7.81]
405 [24.6]	168,4 [6.63]	215,6 [8.49]	168,4 [6.63]	215,6 [8.49]
490 [29.8]	168,4 [6.63]	215,6 [8.49]	168,4 [6.63]	215,6 [8.49]



# 4000 Compact Series

## Dimensions

### Bearingless



### Ports

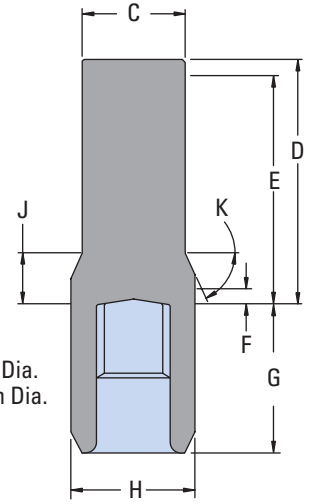
- 7/8 -14 UNF-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or 1 1/16 -12 UN-2B SAE O-ring Ports (Positioned 180° Apart) (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or 7/8 -14 UNF-2B SAE O-ring End Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or G 1/2 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or Manifold Mount
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW  
 Port B Pressurized — CCW  
 For 4000 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

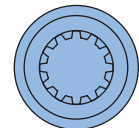
### Note:

After machining blank, part must be hardened per Eaton specification.



- C 47,2 [1.86] Dia.
- D 112,5 [4.43] Max.
- E 107,4 [4.23] Full Form Dia.
- F 7,4 [.29] Min. Full Form Dia.
- G 68,8 [2.71] Max.
- H 56,9 [2.24] Dia.
- J 18,29 [.720]
- K 38°

Mating Coupling Blank  
 Eaton Part No. 12745-003



### BEARINGLESS MOTOR DIMENSIONS

Displacement	X	Y	XX	YY
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]	mm [inch]
160 [9.8]	96,8 [3.81]	144,3 [5.68]	99,1 [3.90]	145,5 [5.73]
200 [12.3]	105,7 [4.16]	153,4 [6.04]	108,0 [4.25]	154,7 [6.09]
250 [15.4]	117,1 [4.61]	164,8 [6.49]	119,4 [4.70]	166,1 [6.54]
325 [19.8]	133,1 [5.24]	180,8 [7.12]	135,4 [5.33]	182,1 [7.17]
405 [24.6]	150,4 [5.92]	198,1 [7.80]	152,7 [6.01]	199,4 [7.85]
490 [29.8]	150,4 [5.92]	198,1 [7.80]	152,7 [6.01]	199,4 [7.85]

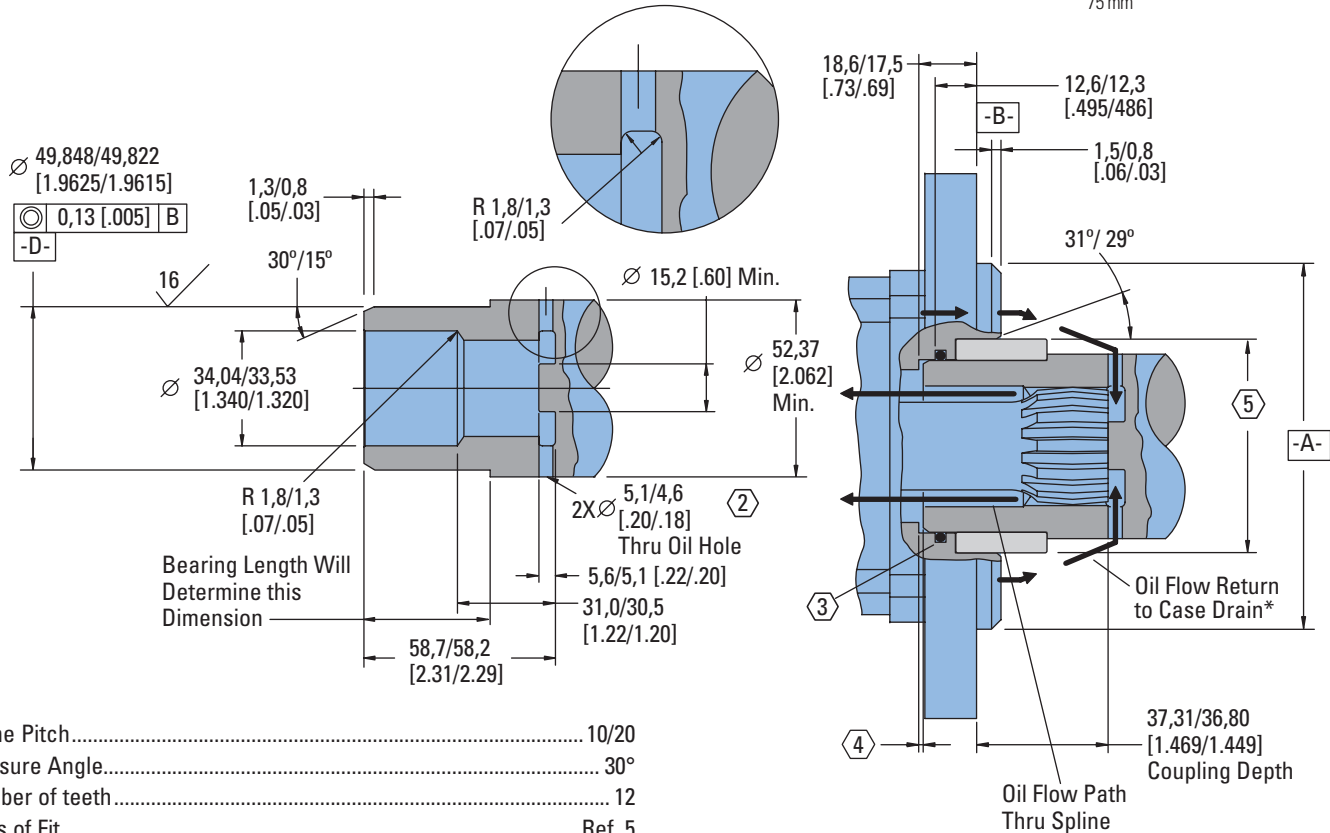
# 4000 Compact Series

## Installation Information

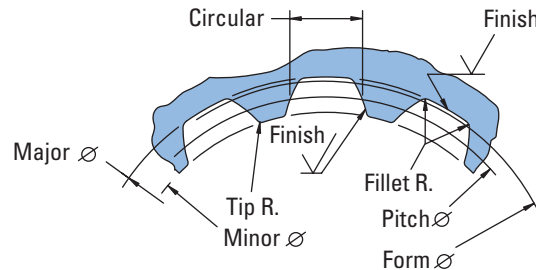
Bearingless

- 1 Internal spline in mating part to be per spline data specification. Material to be ASTM A304, 8620H vacuum degassed alloy steel carbonize to a hardness of 59-62 HRC with case depth (to 50HRC) of 0,76 - 1,02 [.030 - .040] dimensions apply after heat treat.
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.

- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,040 [1.9689 - 1.9700] ID by 60,050 - 60,080 [2.3642 - 2.3653] (Oilite bronze sleeve bearing) Source: Beemer Precision Inc. www.oilite.com, 1-800-836-2340 AAM 50 mm ID - 60 mm OD Length Determined by the Customer.  
Stock Bearing Lengths:  
35 mm  
50 mm  
60 mm  
70 mm  
75 mm



Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 30,480000 [1.2000000] $\nearrow 0,20$ [.008] <b>D</b>
Base Diameter.....	Ref. 26,396455 [1.0392305]
Major Diameter.....	(33,43 [1.316] Max. 33,23 [1.308] Min.)
Minor Diameter.....	28,40 - 25,58 [1.118 - 1.125]
Form Diameter, Min.....	32,59 [1.283]
Fillet Radius.....	0,63 - 0,76 [.025 - .030]
Tip Radius.....	0,26 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 - 0,025 [+ .0000 - .0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,045 [.1986]
Minimum Effective.....	4,995 [.1951]
Maximum Effective.....	Ref. 5,009 [.1972]
Minimum Actual.....	Ref. 4,986 [.1963]
Dimension Between Two Pins.....	Ref. 22,783 - 22,929 [.8970 - .9027]
Pin Diameter.....	5,334 [.2100] Pins to Have 3,73 [.147]
	Wide Flat for Root Clearance

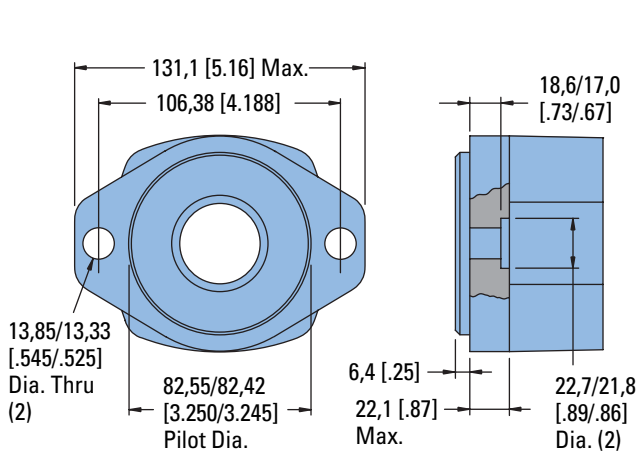


# 4000 Compact Series

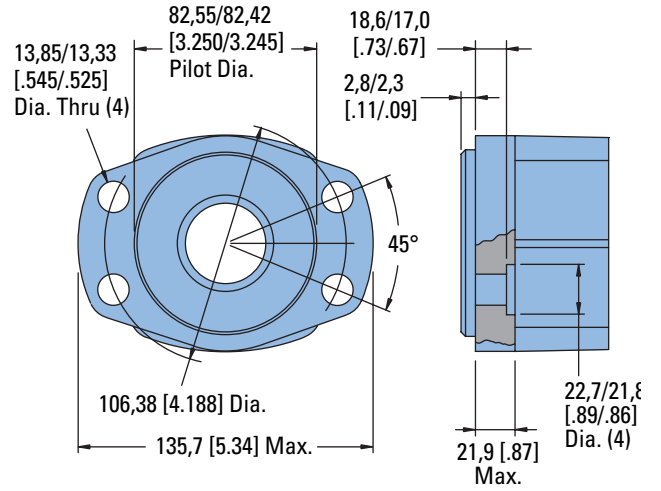
## Dimensions

Mounting Options

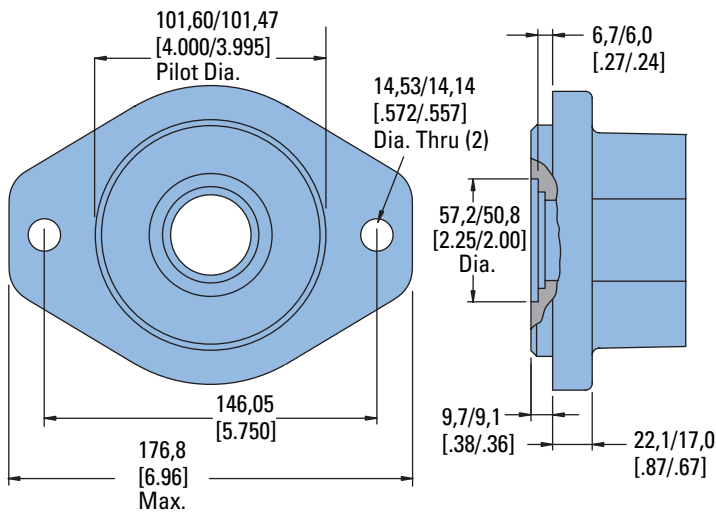
### SAE A — Two Bolt (Standard Motor)



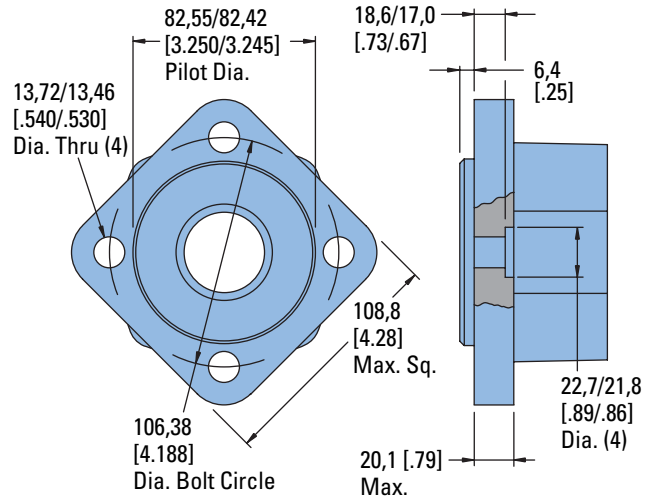
### Four Bolt Magneto



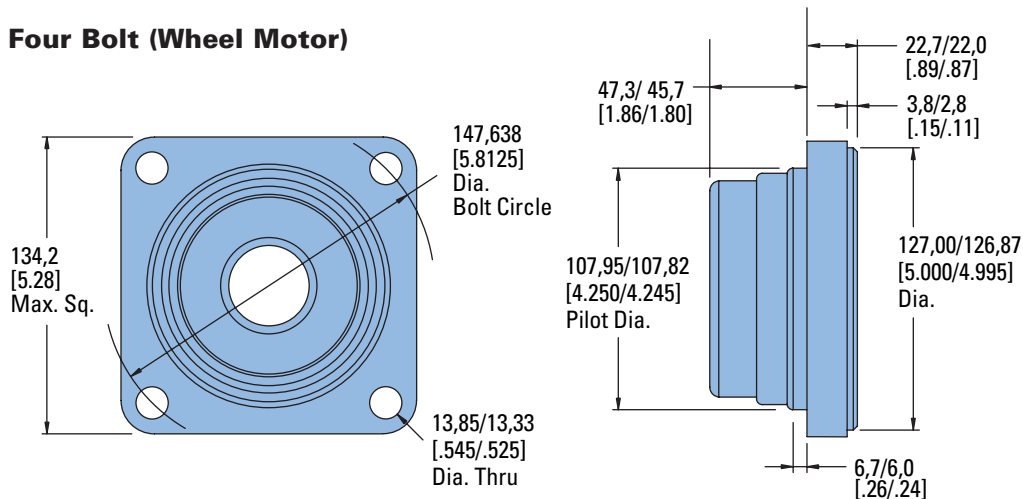
### Two Bolt SAE B



### Four Bolt



### Four Bolt (Wheel Motor)

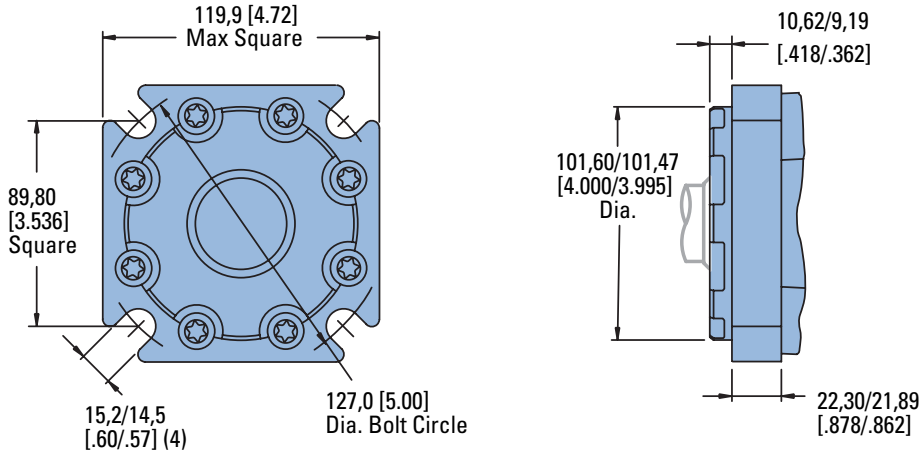


# 4000 Compact Series

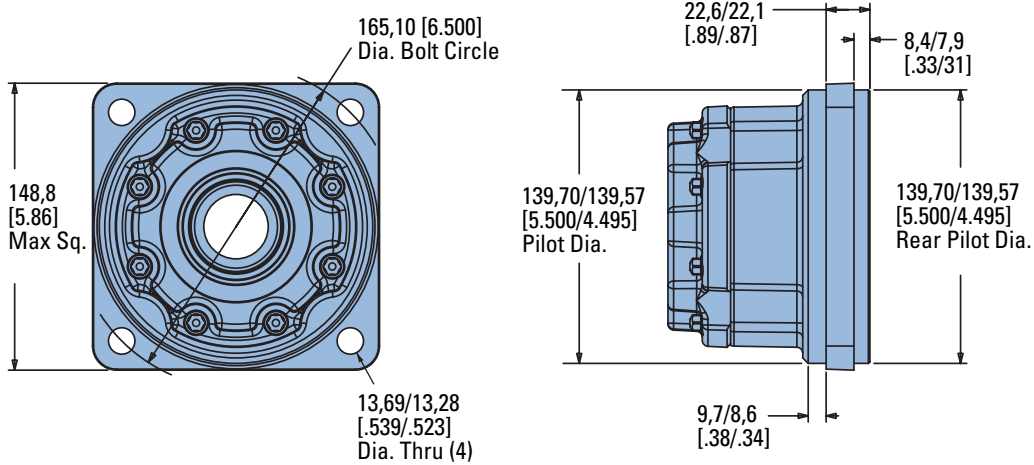
## Dimensions

Mounting Options for use with Enhanced Bearings

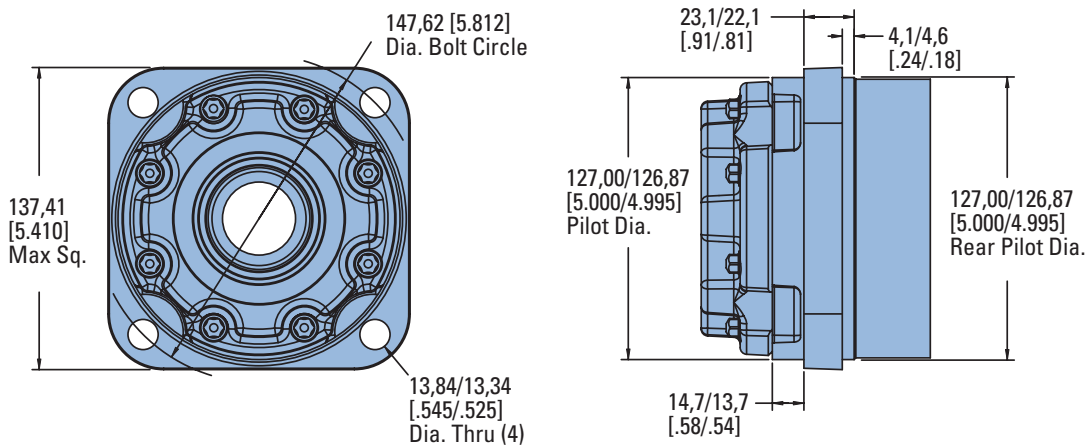
### Standard Flange- Similar to SAE B type



### Four Bolt (Wheel Motor)



### Four Bolt (Wheel Motor- Short)

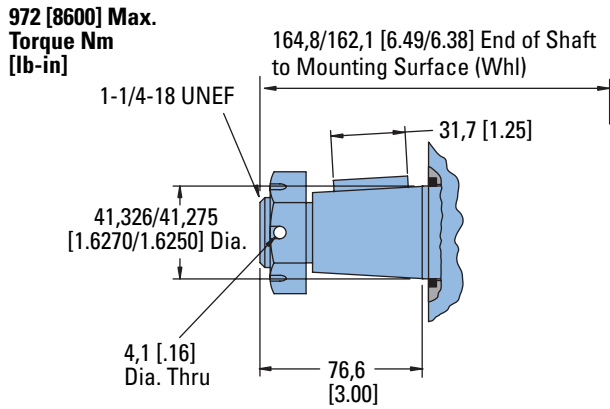


# 4000 Compact Series

## Dimensions

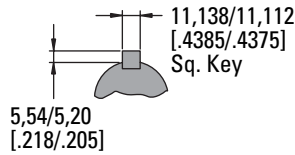
Shafts

### 1-5/8 Inch Tapered

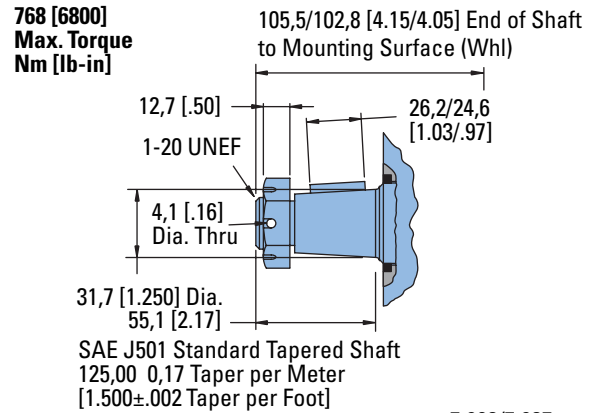


972 [8600] Max. Torque Nm [lb-in]

SAE J501 Standard Tapered Shaft  
125,00 0,17 Taper per Meter  
[1.500±.002 Taper per Foot]

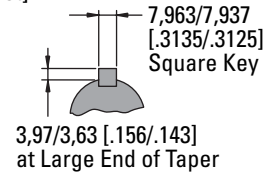


### 1-1/4 Inch Tapered

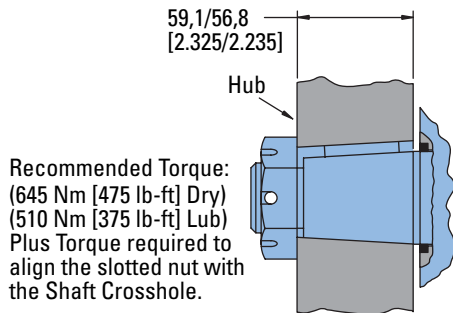


768 [6800] Max. Torque Nm [lb-in]

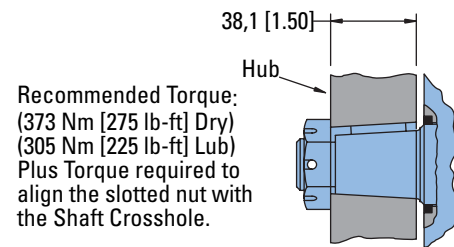
SAE J501 Standard Tapered Shaft  
125,00 0,17 Taper per Meter  
[1.500±.002 Taper per Foot]



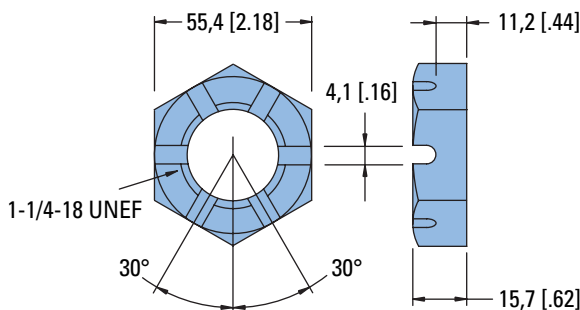
### Tapered Shaft Hub Data



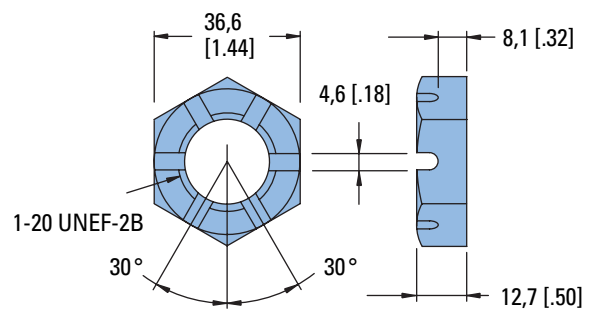
### Tapered Shaft Hub Data



### Slotted Hexagon Nut



### Slotted Hexagon Nut

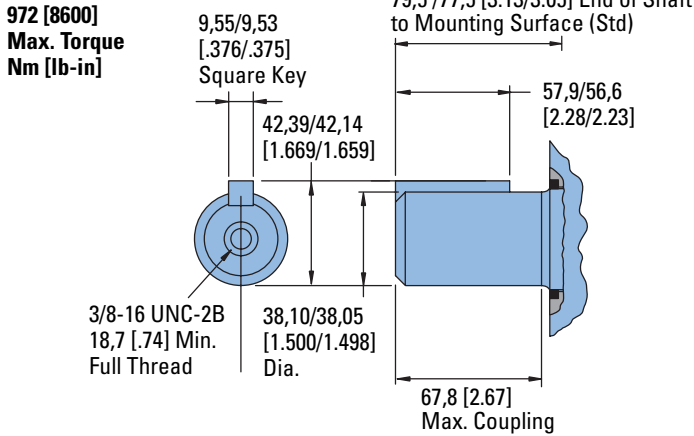


# 4000 Compact Series

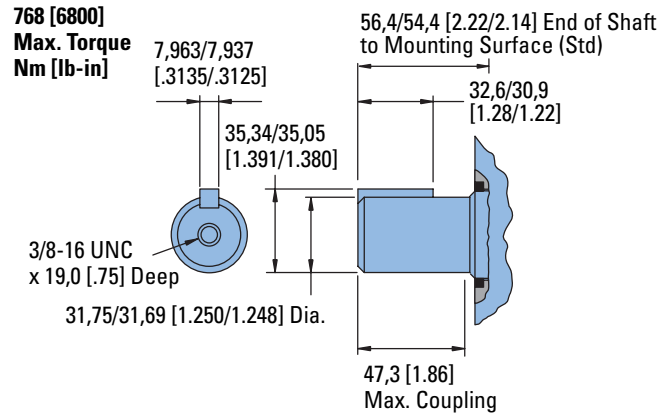
## Dimensions

Shafts

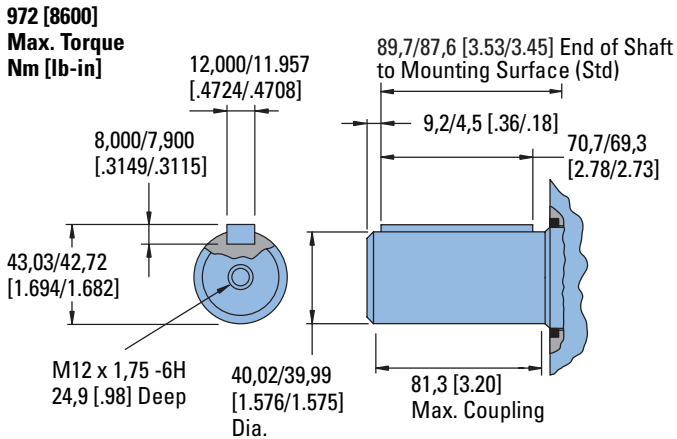
### 1-1/2 Inch Straight



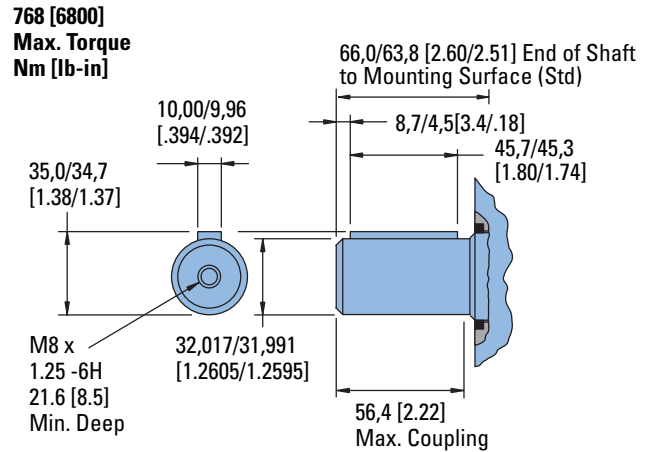
### 1-1/4 Inch Straight



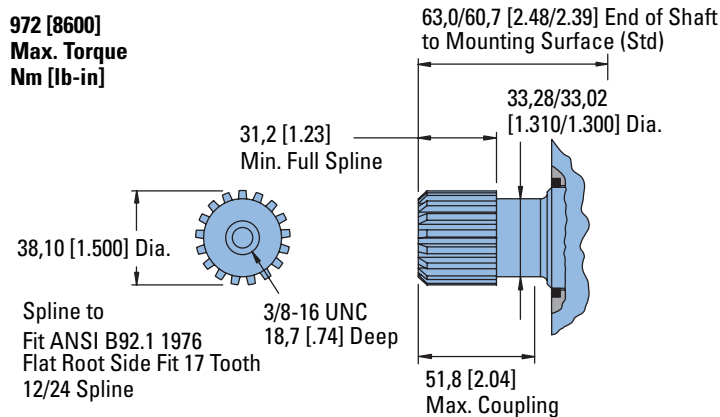
### 40 mm Straight



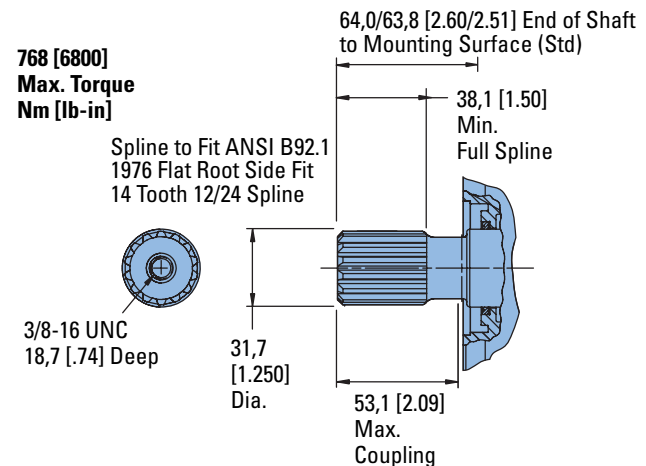
### 32 mm Straight



### 1-1/2 Inch 17 Tooth Straight



### 1-1/4 Inch 14 Tooth Splined



# 4000 Compact Series

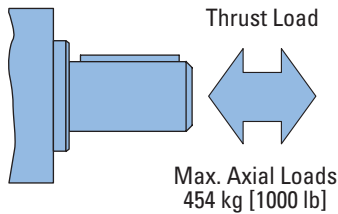
## Shaft Side Load Capacity

These curves indicate the radial load capacity on the motor shafts) at various locations with an allowable external thrust load of 454 kg [1000 lb].

**Note:**

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 94 kg/7 Bar [208 lb/100 PSI].

**Each curve is based on**



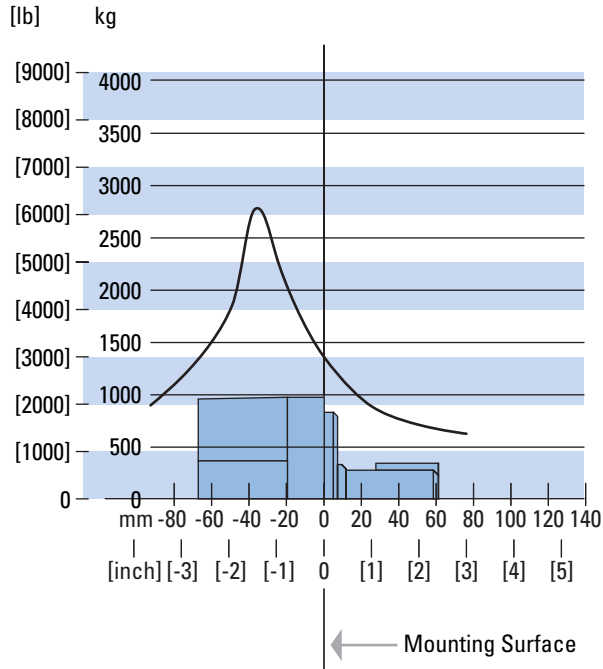
**B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

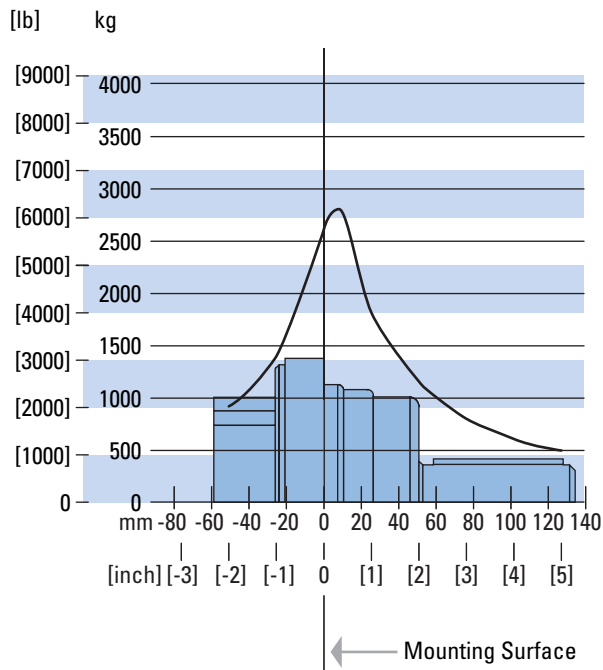
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

Standard Mount- All shaft options 1-1/4 inch and larger



Wheel Mount- All shaft options 1-1/4 inch and larger





# 4000 Compact Series

## Case Pressure and Case Port

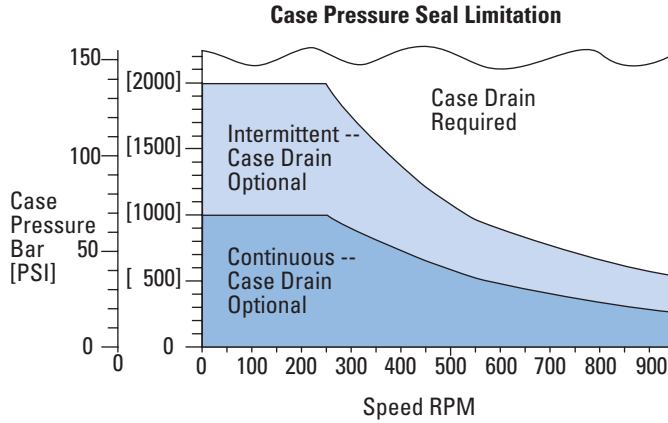
Char-Lynn 4000 Compact Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation charts.

### Case Porting Advantage

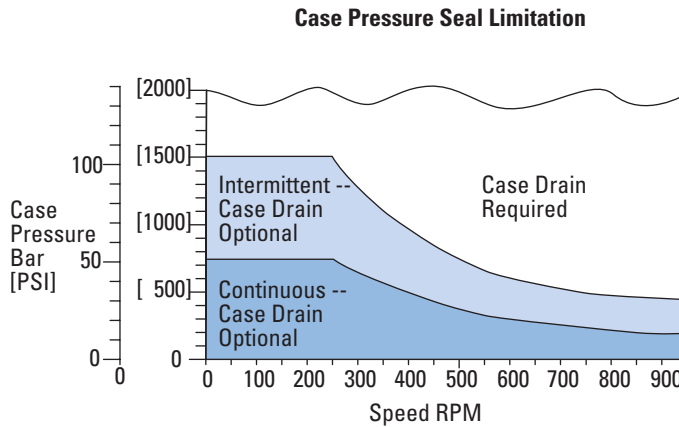
**Contamination Control** — flushing the motor case.

**Cooler Motor** — exiting oil draws motor heat away.

**Extend Motor Seal Life** — maintain low case pressure with a preset restriction in the case drain line.



All Shaft options 1-1/4 inch and smaller.



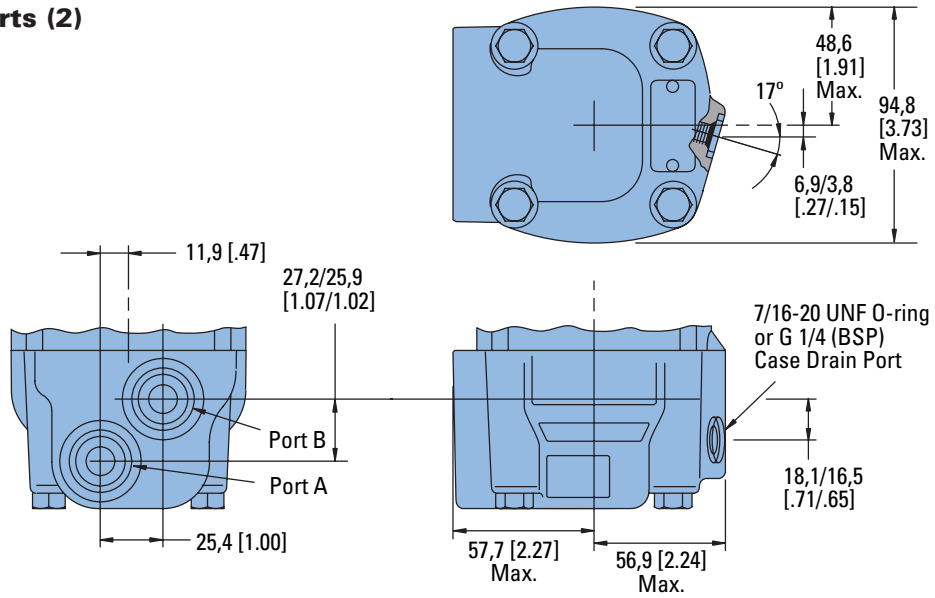
All Shaft options larger than 1-1/4 inch.

# 4000 Compact Series

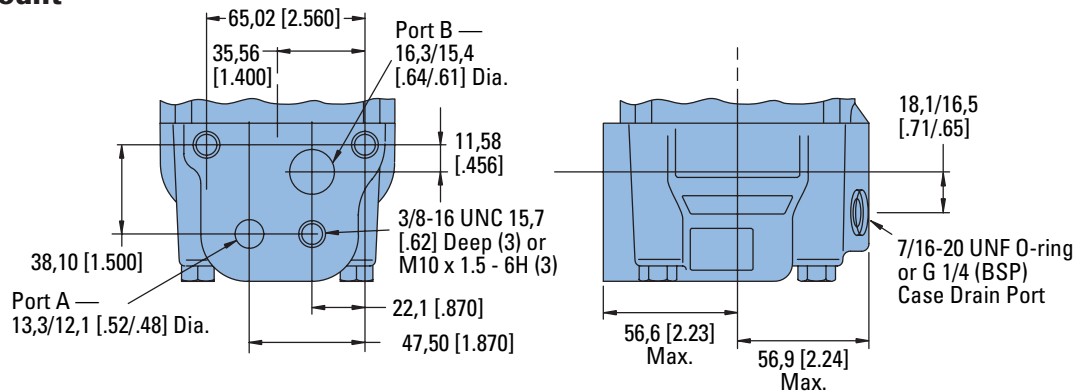
## Dimensions

Ports

### 7/8-14 O-ring Ports (2) or G 1/2 (BSP) Ports (2)



### Manifold Mount

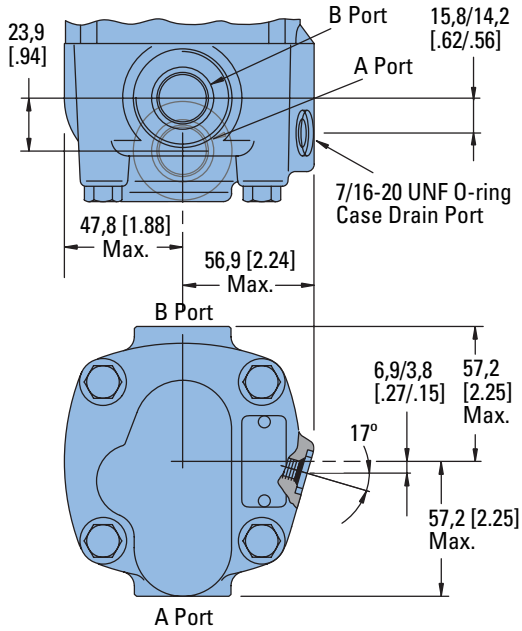


# 4000 Compact Series

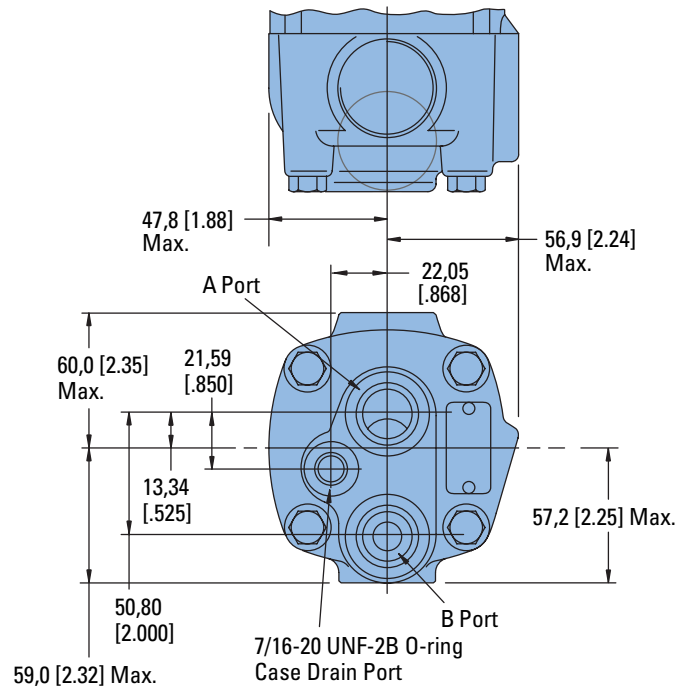
## Dimensions

Ports

### 1-1/16-12 O-ring Ports (2) Positioned 180° Apart



### 7/8-14 O-ring End Ports (2)

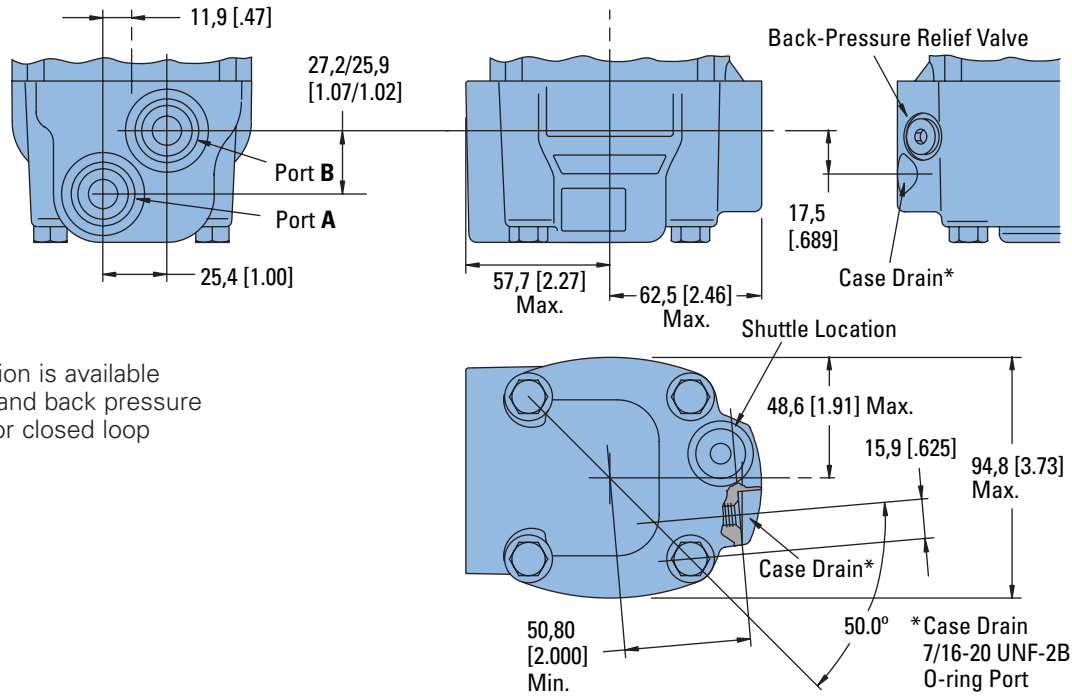


# 4000 Compact Series

## Dimensions

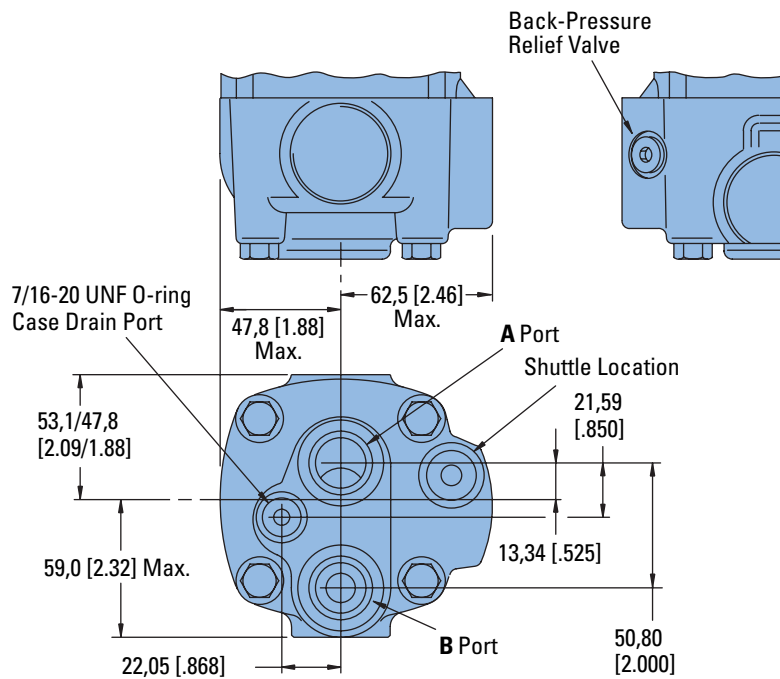
Ports with Shuttle

### 7/8-14 O-ring Ports (2) or G 1/2 (BSP) Ports (2)



This port option is available with shuttle and back pressure relief valve for closed loop applications.

### 7/8-14 O-ring End Ports (2)

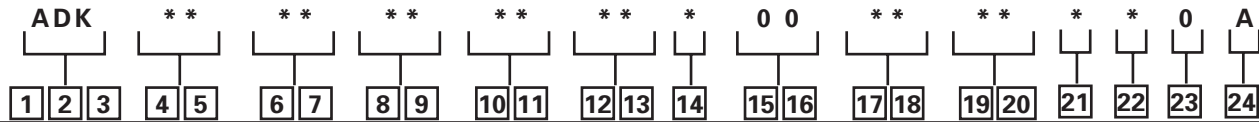


This port option is available with shuttle and back pressure relief valve for closed loop applications.

# 4000 Compact Series

## Model Code

The following 24-digit coding system has been developed to identify all of the configuration options for the 4000 Compact Series motor. Use this model code to specify a motor with the desired features. All 24 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



**1, 2, 3 Product Series**  
**ADK** – 4000 Compact Series Motor

**4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]**

- 10** – 160 [ 9.8]
- 12** – 200 [12.3]
- 15** – 250 [15.4]
- 20** – 325 [19.8]
- 25** – 405 [24.6]
- 30** – 490 [29.8]

**6, 7 Mounting Type**

- AB** – 4 Bolt (Wheel) 108,0 [4.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 147,6 [5.81] Dia. B.C. 127,0 [5.00] Dia. Rear Mount Pilot
- AC** – 2 Bolt SAE A (Std.) 82,5 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mtg. Holes on 106,4 [4.19] Dia. B.C.
- AE** – 4 Bolt (Bearingless) 101,6 [4.00] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 127,0 [5.00] Dia. B.C.
- AF** – 2 Bolt SAE B (Std.) 101,6 [4.00] Pilot Dia. and 14,35 [.565] Dia. Mtg. Holes on 146,0 [5.75] Dia. B.C.
- AH** – 4 Bolt (Standard) 82,5 [3.25] Pilot Dia. and 14,59 [.535] Dia. Mounting Holes on 106,4 [4.19] Dia. B.C.
- AJ** – 4 Bolt Magneto (Std.) 82,6 [3.25] Pilot Dia. and 13,59 [.535] Dia. Mtg. Holes on 106,4 [4.19] Dia. B.C. 2,79 [1.10] Pilot Length
- AP** – 4 Bolt (wheel compatible for Hayes Brake) 107,9 [4.25] Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 147,6 [5.81] Dia. B.C. with Turned Down Housing to 88,9 [3.50] Dia.

**BB\*** – 4 Bolt (SAE B) (Standard) 101,6 [4.00] Pilot Dia. and 14,7 [.58] Dia. Mounting Slots on 127,0 [5.00] Dia. B.C.

**BE\*** – 4 Bolt (Wheel) 139,7 [5.50] Front and Rear Pilot Dia. and 13,49 [.531] Dia. Mounting Holes on 165,1 [6.50] Dia. B.C.

**BG\*** – 4 Bolt (Wheel- Short) 127,0 [5.00] Front and Rear Pilot Dia. and 13,59 [.535] Dia. Mounting Holes on 147,62 [5.812] Dia. B.C.

**8, 9 Output Shaft**

- 00** – None (Bearingless)
- 02** – 1 1/4 inch Dia. Straight with 3/8-16 Thread in end, 7,938 [.3125] Sq. x 31,75 [1.250] Straight Key
- 03** – 1 1/4 inch Dia. .125 : 1 Tapered Shaft Per SAE J501 with 1-20 UNEF -2A Threaded Shaft end, and slotted Hex Nut, 7,938 [.3125] Sq. x 25,40 [1.000] Straight Key
- 06** – 1 1/4 inch Dia. Splined 14T with 38,1 [1.50] Min. Full Spline Length and 53,1 [2.09] Max. Coupling Length
- 08** – 40 mm Dia. Straight (with Straight Key) M12 x 1,75 -6H Thread in end
- 10** – 32 mm dia. Straight (with Straight Key) M8 x 1,25 -6H Thread in end, and 56,4 [2.22] Max. Coupling Length
- 11** – 1 1/2 inch Dia. Straight (with Straight Key) 3/8-16 Thread in end
- 98** – 1 5/8 inch Dia. Tapered with Straight Key and 1 1/4 -18 UNEF Slotted Hex. Nut
- 99** – 1 1/2 inch Dia. Splined 17T with 31,2 [1.23] Min. Full Spline Length

**10, 11 Ports**

**AA** – 7/8-14 UNF –2B SAE O-ring (Staggered)

**AB** – 12,70 [.500] and 15,88 [.625] Dia. Ports (Manifold) and 3x 3/8-16 UNC Port Block Mounting Holes

**AD** – 7/8-14 UNF –2B SAE O-ring (End Ports)

**AE** – 12,70 [.500] and 15,88 [.625] Dia. Ports (Manifold) and 3 x M10 x 1,5-6H Port Block Mounting Holes

**AG** – G 1/2 BSP Straight Thread ports (Staggered)

**AH** – 1 1/16 - 12 UN-2B O-Ring ports (Positioned 180° Apart)

**12, 13 Case Flow Options**

- 00** – None
- 01** – 7/16-20 UNF –2B SAE O-ring Port (Case Drain)
- 02** – G 1/4 (BSP) Straight Thread Port (Case Drain)
- 14** – Reverse Flow Shuttle Valve with G 1/4 (BSP) Straight Thread Port (Case Drain)

**14 Back-Pressure Relief Valve**

- 0** – None
- A** – Set at 4,5 bar [65 PSI] (for Manual Pumps)

**15, 16 Valve Options**

- 00** – None

**17, 18 Accessories**

- 00** – None
- AA** – Seal Guard
- AF** – M12 Threaded Connector Digital Speed Sensor (Two 30 Pulse per rev. signals in quadrature)
- AG** – M12 Threaded Connector Digital Speed Sensor (One 60 Pulse per rev. speed signal and one directional signal)

**19, 20 Special Features (Hardware)**

- 00** – None
- 01** – Viton Seals

**21 Special Features (Assembly)**

- 0** – None
- A** – Flange Rotated 90°
- B** – Reverse Rotation

**22 Paint/ Special Packaging**

- 0** – No Paint, Individual Box
- A** – Painted Low Gloss Black, Individual Box
- B** – Corrosion Protected

**23 Eaton Assigned Code when Applicable**

- 0** – Assigned Code

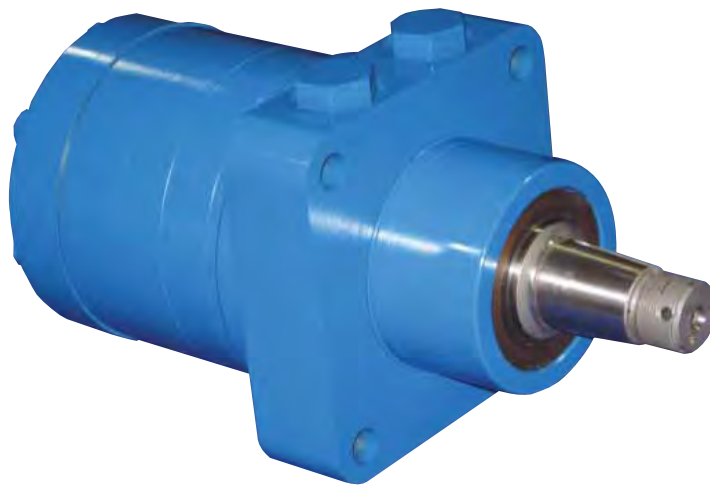
**24 Eaton Assigned Design Code**

- A** – Assigned Design Code

\* These mounting options are available with shaft options 08, 11, 98 and 99.

# Delta Series

## Highlights



### Description

This wheel motor is the latest addition to the Char Lynn product line. The Delta motor provides torques up to 11,500 in-lbs. Eaton has packed this motor with many “best in class” features: the optimized geroler profile ensures smooth operation; the disc valve technology has the best performance and the bearing capacity is the highest in the industry for very demanding applications.

### Delta Series

Geroler Element	12 Displacements
Flow l/min [GPM]	75 [20] Continuous**
	115 [30] Intermittent*
Speed RPM	670 Cont.**
	837 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	275 [4000] Inter.*
Torque Nm [lb-in]	1015 [9000] Cont**.
	1185 [10500] Inter.*

\*\* Continuous—(Cont.) Continuous rating, motor may be run continuously at these ratings.

\* Intermittent—(Inter.) Intermittent operation, 10% of every minute.

### Features:

- Excellent reliability with time proven Char-Lynn components
- Proven disc valve technology with the highest efficiencies in its class
- Leak resistant motor with the front bearing protecting the shaft seal
- Torque up to 10,500 lb-in intermittent duty / Flow up to 30 GPM intermittent
- 12 displacements available from 6.9 to 46 CID
- Shaft sizes up to 1-5/8 inch
- 3-1/4 inch front pilot and 5 inch rear pilot
- STC ports available

### Benefits:

- Perfect replacement for Parker® TF-TG and White™ RE motors
- Lowest no load pressure drop which leads to longer life and lower temperature operation
- Highest overall efficiency: more available HP to the system than competitive motors
- The highest side load capacity with 4,500 lbs standard at 3" from the mount face

### Applications:

- Scissor Lift
- Boom Lift
- Industrial Sweeper
- Mower

Parker is a registered trademark of Parker Intangibles LLC.

White is a trademark of White Drive Products, Inc.



Boom Lift



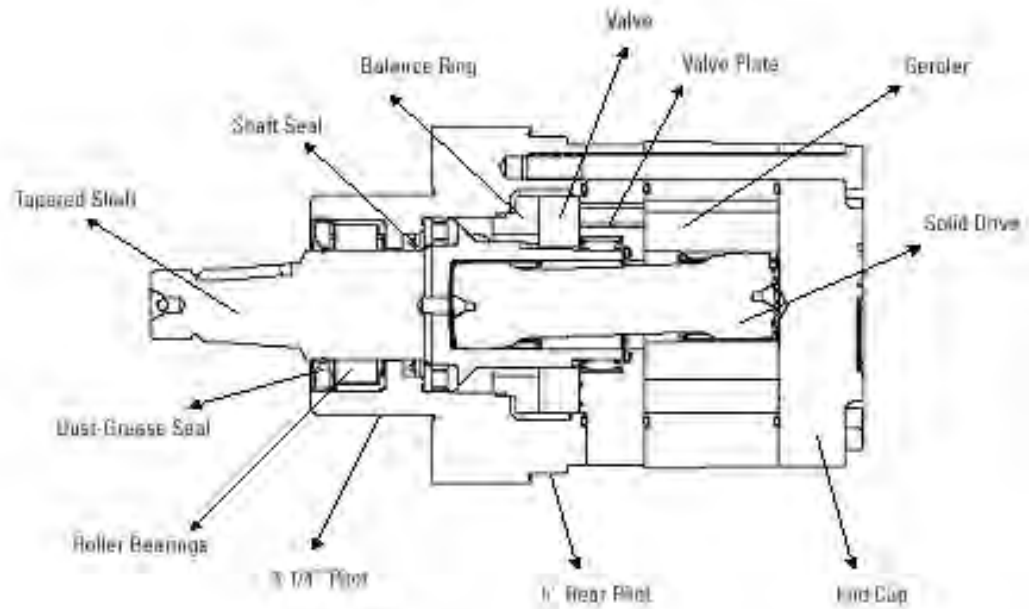
Sweeper



Mower

# Delta Series

## Performance Data



DISPLACEMENT	CONTINUOUS FLOW CAPACITY	INTERMITTENT FLOW CAPACITY	CONTINUOUS PRESSURE RATING	INTERMITTENT PRESSURE RATING
cm <sup>3</sup> /r (in <sup>3</sup> /rev)	gpm	gpm	psid	psid
110 (6.9)	20	25	3000	4000
142 (8.9)	20	30	3000	4000
194 (12.1)	20	30	3000	4000
229 (14.3)	20	30	3000	4000
246 (15.4)	20	30	3000	4000
293 (18.3)	20	30	3000	4000
340 (21.2)	20	30	3000	4000
386 (24.1)	20	30	2750	3500
459 (28.7)	20	30	2500	3000
530 (33.1)	20	30	2000	2500
634 (39.6)	20	30	1750	2250
736 (46)	20	30	1500	2000

**Note:**  
Top assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

**Maximum Inlet Pressure:**  
310 bars (4500 PSI)  
Do not exceed "delta sign" pressure rating (see chart above).

**Recommended Fluids:**  
Premium quality, anti wear type hydraulic oil with a viscosity of no less than 70 SUS at operating temperature.

**Recommended Maximum System Operating Temp.:**  
82°C (180°F)

**Recommended Filtration:**  
Per ISO cleanliness Code 4406: 20/18/13

MOUNTING	SHAFT	PORTS	TIMING	DISPLACEMENT			
				6.9 CID 113 cm <sup>3</sup>	8.9 CID 146 cm <sup>3</sup>	12.1 CID 198 cm <sup>3</sup>	14.3 CID 234 cm <sup>3</sup>
Wheel Motor	1-1/4" Tapered	7/8" O-ring	Standard -CCW	184-0005-001	184-0006-001	184-0002-001	184-0001-001
			Standard -CW	184-0025-001	184-0026-001	184-0027-001	184-0028-001
Wheel Motor	1-1/2" 17 T Splined	7/8" O-ring	Standard -CCW	184-0013-001	184-0014-001	184-0015-001	184-0016-001
			Standard -CW	184-0037-001	184-0038-001	184-0039-001	184-0040-001

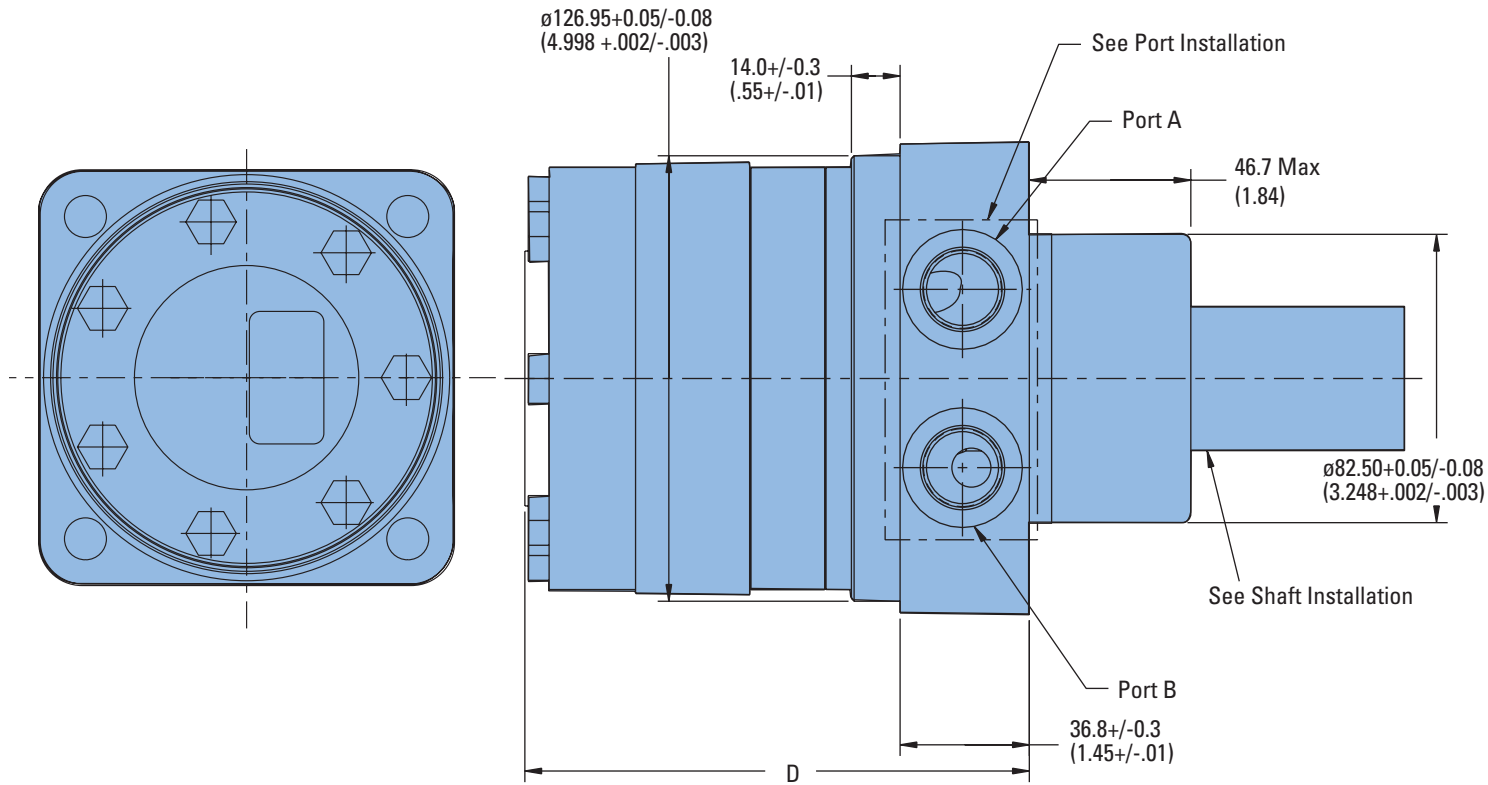
MOUNTING	SHAFT	PORTS	TIMING	DISPLACEMENT			
				15.4 CID 252 cm <sup>3</sup>	18.3 CID 300 cm <sup>3</sup>	21.2 CID 347 cm <sup>3</sup>	24.1 CID 395 cm <sup>3</sup>
Wheel Motor	1-1/4" Tapered	7/8" O-ring	Standard -CCW	184-0003-001	184-0004-001	184-0007-001	184-0008-001
			Standard -CW	184-0029-001	184-0030-001	184-0031-001	184-0032-001
Wheel Motor	1-1/2" 17 T Splined	7/8" O-ring	Standard -CCW	184-0017-001	184-0018-001	184-0019-001	184-0020-001
			Standard -CW	184-0041-001	184-0042-001	184-0043-001	184-0044-001

MOUNTING	SHAFT	PORTS	TIMING	DISPLACEMENT			
				28.7 CID 470 cm <sup>3</sup>	33.1 CID 542 cm <sup>3</sup>	39.6 CID 649 cm <sup>3</sup>	46.0 CID 754 cm <sup>3</sup>
Wheel Motor	1-1/4" Tapered	7/8" O-ring	Standard -CCW	184-0009-001	184-0010-001	184-0011-001	184-0012-001
			Standard -CW	184-0033-001	184-0034-001	184-0035-001	184-0036-001
Wheel Motor	1-1/2" 17 T Splined	7/8" O-ring	Standard -CCW	184-0021-001	184-0022-001	184-0023-001	184-0024-001
			Standard -CW	184-0045-001	184-0046-001	184-0047-001	184-0048-001

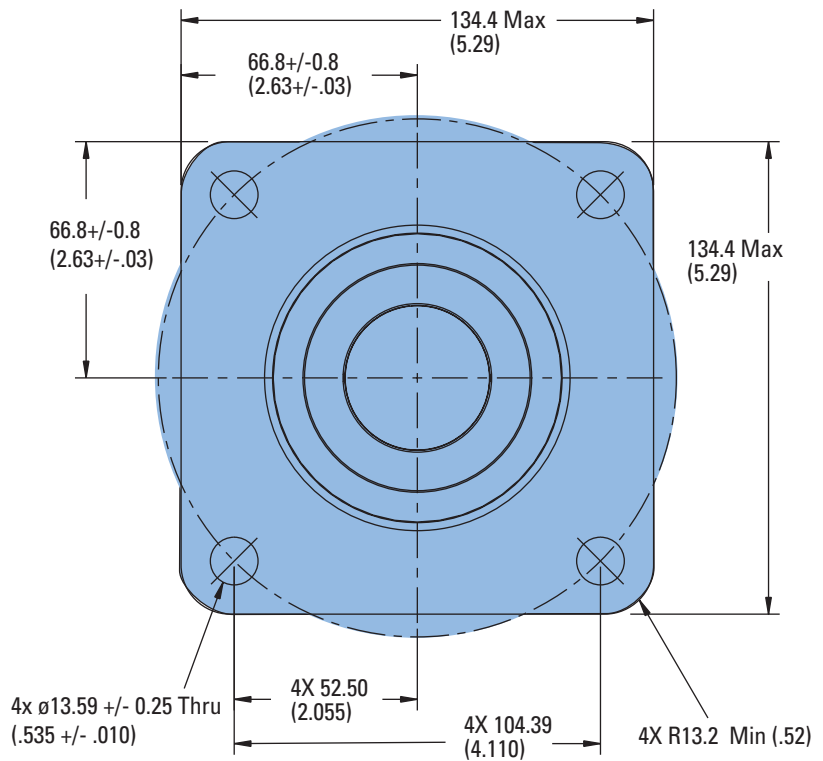


# Delta Series

## Dimensional Data



DISPLACEMENT CODE	D MAX
069	130.6 (5.14)
089	135.9 (5.35)
121	144.3 (5.68)
143	150.4 (5.92)
154	153.2 (6.03)
183	150.4 (5.92)
212	156.5 (6.16)
241	162.6 (6.40)
287	172.5 (6.79)
331	181.9 (7.16)
396	195.6 (7.70)
460	209.0 (8.23)

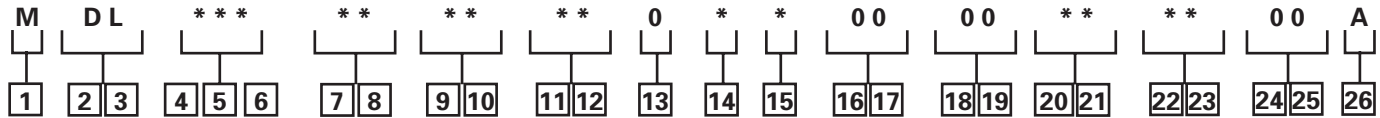


# Delta Series

## Model Code

The following 26-digit coding system has been developed to identify all of the configuration options for the Delta Low Speed High Torque motor. Use this model code to specify a motor with the desired features. All 26 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.

Item not in bold are not standard and may have a longer lead time.



### 1 Product

**M** – Motor

### 2, 3 Series

**DL** – Delta Series

### 4, 5, 6 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**069** – 113 [ 6.9]

**089** – 146 [ 8.9]

**121** – 198 [12.1]

**143** – 234 [14.3]

**154** – 252 [15.4]

**183** – 300 [18.3]

**212** – 347 [21.2]

**241** – 395 [24.1]

**287** – 470 [28.7]

**331** – 542 [33.1]

**396** – 649 [39.6]

**460** – 754 [46.0]

### 7, 8 Mounting Type

**AA** – Wheel, 4 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes On 147.6 [5.81] Dia. Bolt Circle. 127.0 [5.00] Dia. Rear Mount Pilot

**AB** – Standard, 6 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle. .100 [2.54] Pilot Length. Sae A, Magneto

**AC** – Standard, 6 Bolt: 82.6 [3.25] Pilot Dia. 13.59 [.535] Dia. Holes on 106.4 [4.19] Dia. Bolt Circle. .250 [6.35] Pilot Length. SAE A, Magneto

### 9, 10 Output Shaft

**01** – 38.10 [1.500] Dia. Straight with .375-16 UNC-2B Thread, and 9.52 [.375] Sq x 25.40 [1.000] Straight Key

**02** – 31.75 [1.250] Dia. .125:1 Tapered Shaft per SAE J501 with 1.000-20 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 7.938 [.3125] Sq x 25.40 [1.000] Straight Key

**03** – 41.30 [1.626] Dia. .125:1 Tapered Shaft per SAE J501 with 1.250-18 UNEF-2A Threaded Shaft End and Slotted Hex Nut, 11.125 [.4380] Sq x 34.04 [1.340] Straight Key

**04** – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30 Deg. Involute Spline with .375-16 UNC-2B Thread in End, 33.0 [1.30] Minimum Full Spline Length

**05** – 38.10 [1.500] Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Deg. Involute Spline, 31.8 [1.25] Minimum Full Spline Length, with .375-16 UNC-2B Thread in End

**06** – 38.10 [1.500] Dia. Tapered Shaft per SAE J501 with 1.250-18 UNEF-2A Thread in End, 7.938 [.3125] Sq x 31.75 [1.250] Key

### 11, 12 Ports

**AA** – .875-14 UNF-2B SAE O-Ring

**AB** – Dash 10 STC Type II+ (Snap to Connect)

**AC** – G 1/2 BSP Straight Thread

### 13 Pressure/Flow Option

**0** – None

### 14 Geroler Option

**0** – Standard

**B** – Tight Fitting Geroler

### 15 Seal Option

**0** – Standard

1 – Viton

4 – Seal Guard

### 16, 17 Accessories

**00** – None

### 18, 19 Special Features (Hardware)

**00** – None

### 20, 21 Special Features (Assembly)

**00** – Standard Rotation - CCW

**01** – Standard Rotation - CW

### 22, 23 Paint/Packaging

**AA** - No Paint, Individual Box

**AB** - Painted Low Gloss Black, Individual Box

**AC** - Epoxy Coated (Frost Gray), Individual Box

**AE** - No Paint, Bulk Box

**AF** - Painted Low Gloss Black, Bulk Box

### 24, 25 Customer Identification

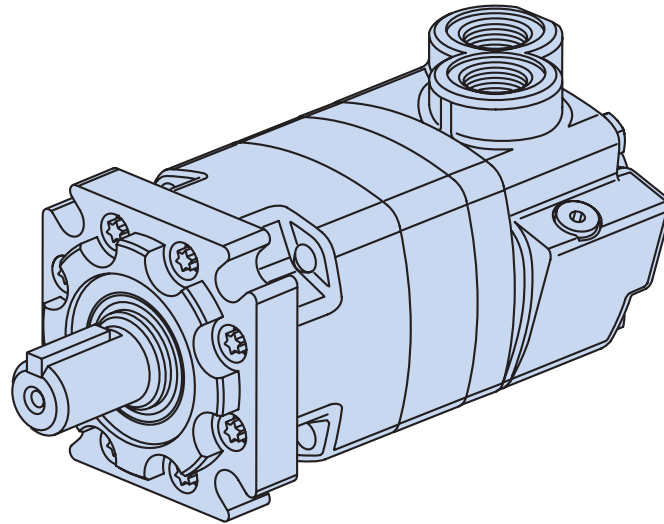
**00** – None

### 26 Design Code

**A** – One (1)

# 4000 Series

## Highlights



### Features

- 10 displacements, a variety of mounting flanges and output shafts
- Reliable, proven design
- High efficiency
- Environmental protection options

### Benefits

- Flexibility in designing this motor into a system
- Options that fit well into tough applications

### Applications

- Mowing
- Snow Removal
- Sprayer
- Trencher
- Wood Products

### Description

The 4000 Series offers up to 8600 in-lb of torque and 25 gpm (continuous ratings). This is the corner stone of the Char-Lynn line.

### 4000 Series Motors

Geroler Element	10 Displacements
Flow l/min [GPM]	95 [25] Continuous**
	150 [40] Intermittent*
Speed RPM	722 Cont.**
	868 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	300 [4500] Inter.*
Torque Nm [lb-in]	970 [8600] Cont.**
	1180 [10450] Inter.*

\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings

\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.



Mowing



Snow Removal



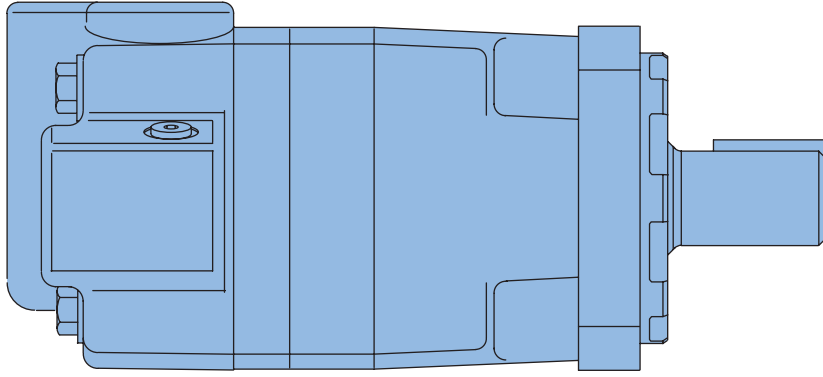
Sprayer



Trencher

# 4000 Series

## Specifications



### 4000 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		110 [ 6.7]	130 [ 7.9]	160 [ 9.9]	205 [12.5]	245 [15.0]	280 [17.1]	310 [19.0]	395 [24.0]	495 [30.0]	625 [38.0]
Max. Speed (RPM)	Continuous	697	722	582	459	383	336	303	239	191	151
	Intermittent @ Flow	868	862	693	546	532	488	422	376	305	241
Flow l/min [GPM]	Continuous	75 [20]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]	95 [25]
	Intermittent	95 [25]	115 [30]	115 [30]	115 [30]	130 [35]	130 [35]	130 [35]	150 [40]	150 [40]	150 [40]
Torque* Nm [lb-in]	Continuous	320 [2850]	375 [3330]	485 [4290]	600 [5300]	705 [6240]	753 [6666]	850 [7530]	930 [8240]	945 [8375]	970 [8605]
	Intermittent	470 [4160]	560 [4940]	705 [6240]	800 [7100]	845 [7470]	957 [8471]	1065 [9420]	1185 [10470]	1170 [10350]	1180 [10450]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	190 [2750]	140 [2000]	115 [1700]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	260 [3750]	310 [4500]	260 [3750]	260 [3750]	240 [3500]	170 [2500]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	295 [4250]	230 [3300]	180 [2600]
Weight kg [lb]	Standard or Wheel Mount	17.9 [39.5]	18.1 [40.0]	18.1 [40.0]	18.4 [40.5]	18.6 [41.0]	19.1 [42.0]	19.5 [43.0]	20.4 [45.0]	21.8 [48.0]	23.1 [51.0]
	Bearingless	14.1 [31.0]	14.3 [31.5]	14.1 [31.0]	14.5 [32.0]	14.7 [32.5]	15.2 [33.5]	15.6 [34.5]	16.6 [36.5]	17.9 [39.5]	19.3 [42.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations..

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

310 bar [4500 PSI]  
Do not exceed Δ pressure rating (see chart above).

#### Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.  
Do not exceed Δ pressure rating (see chart above).

#### Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

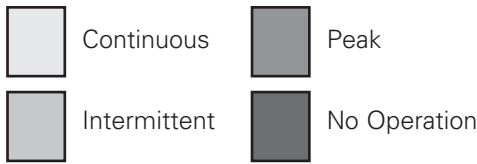
per ISO Cleanliness Code, 4406: 20/18/13

# 4000 Series

## Performance Data

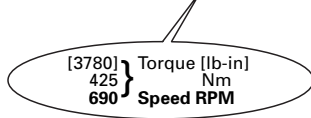
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



**110 cm<sup>3</sup>/r [6.7 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1,9</b>	[150] 15 <b>14</b>	[390] 45 <b>10</b>	[850] 95 <b>5</b>	[1290] 145 <b>2</b>						
[1] <b>3,8</b>	[170] 20 <b>34</b>	[440] 50 <b>33</b>	[900] 100 <b>31</b>	[1380] 155 <b>28</b>	[1860] 210 <b>25</b>	[2270] 255 <b>22</b>	[2680] 305 <b>18</b>	[3110] 350 <b>11</b>		
[2] <b>7,5</b>	[180] 20 <b>68</b>	[450] 50 <b>67</b>	[910] 105 <b>62</b>	[1390] 155 <b>56</b>	[1860] 210 <b>50</b>	[2280] 260 <b>44</b>	[2700] 305 <b>36</b>	[3120] 355 <b>28</b>	[3450] 390 <b>18</b>	
[4] <b>15</b>	[190] 20 <b>138</b>	[460] 50 <b>136</b>	[940] 105 <b>123</b>	[1400] 160 <b>110</b>	[1870] 210 <b>97</b>	[2310] 260 <b>84</b>	[2730] 310 <b>70</b>	[3140] 355 <b>56</b>	[3560] 400 <b>42</b>	[3880] 440 <b>28</b>
[6] <b>23</b>	[200] 25 <b>207</b>	[470] 55 <b>204</b>	[960] 110 <b>200</b>	[1420] 160 <b>193</b>	[1880] 210 <b>184</b>	[2320] 260 <b>174</b>	[2760] 310 <b>163</b>	[3200] 360 <b>150</b>	[3640] 410 <b>136</b>	[3950] 455 <b>121</b>
[8] <b>30</b>	[190] 20 <b>277</b>	[460] 50 <b>274</b>	[950] 105 <b>270</b>	[1420] 160 <b>262</b>	[1880] 210 <b>253</b>	[2340] 265 <b>241</b>	[2790] 315 <b>228</b>	[3230] 365 <b>213</b>	[3670] 415 <b>196</b>	[4010] 455 <b>179</b>
[10] <b>38</b>	[180] 20 <b>347</b>	[460] 50 <b>344</b>	[950] 105 <b>340</b>	[1420] 160 <b>331</b>	[1890] 215 <b>322</b>	[2350] 265 <b>308</b>	[2820] 320 <b>292</b>	[3260] 370 <b>274</b>	[3700] 420 <b>255</b>	[4070] 460 <b>236</b>
[12] <b>45</b>	[160] 20 <b>417</b>	[450] 50 <b>414</b>	[940] 105 <b>410</b>	[1420] 160 <b>400</b>	[1880] 210 <b>390</b>	[2350] 265 <b>374</b>	[2820] 320 <b>355</b>	[3260] 370 <b>335</b>	[3710] 420 <b>313</b>	[4080] 460 <b>292</b>
[14] <b>53</b>	[140] 15 <b>487</b>	[440] 50 <b>484</b>	[930] 105 <b>480</b>	[1420] 160 <b>469</b>	[1880] 210 <b>458</b>	[2350] 265 <b>440</b>	[2830] 320 <b>419</b>	[3280] 370 <b>446</b>	[3730] 420 <b>471</b>	[4110] 465 <b>348</b>
[16] <b>61</b>	[130] 15 <b>556</b>	[440] 50 <b>553</b>	[920] 105 <b>549</b>	[1410] 160 <b>537</b>	[1870] 210 <b>525</b>	[2350] 265 <b>505</b>	[2840] 320 <b>482</b>	[3300] 375 <b>455</b>	[3750] 425 <b>428</b>	[4120] 465 <b>404</b>
[18] <b>68</b>	[100] 10 <b>626</b>	[440] 50 <b>622</b>	[910] 105 <b>618</b>	[1400] 160 <b>606</b>	[1870] 210 <b>593</b>	[2350] 265 <b>570</b>	[2840] 320 <b>545</b>	[3300] 375 <b>516</b>	[3770] 425 <b>485</b>	[4140] 465 <b>460</b>
[20] <b>76</b>	[80] 10 <b>697</b>	[430] 50 <b>694</b>	[900] 100 <b>690</b>	[1370] 155 <b>677</b>	[1860] 210 <b>664</b>	[2350] 265 <b>638</b>	[2850] 320 <b>611</b>	[3320] 375 <b>579</b>	[3790] 430 <b>545</b>	[4160] 470 <b>518</b>
[25] <b>95</b>		[400] 45 <b>868</b>	[860] 95 <b>861</b>	[1350] 155 <b>838</b>	[1850] 210 <b>816</b>	[2320] 260 <b>792</b>	[2830] 320 <b>767</b>	[3300] 375 <b>729</b>	[3780] 425 <b>690</b>	



**130 cm<sup>3</sup>/r [7.9 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

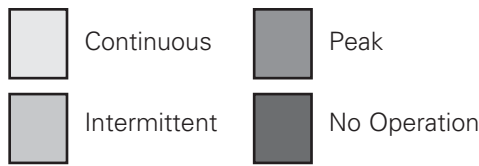
	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1,9</b>	[310] 35 <b>12</b>	[510] 60 <b>9</b>	[1060] 120 <b>5</b>	[1590] 180 <b>2</b>						
[1] <b>3,8</b>	[290] 35 <b>30</b>	[530] 60 <b>28</b>	[1080] 120 <b>25</b>	[1600] 180 <b>19</b>	[2110] 240 <b>14</b>	[2640] 300 <b>13</b>	[3060] 345 <b>12</b>	[3450] 390 <b>4</b>		
[2] <b>7,5</b>	[280] 30 <b>57</b>	[530] 60 <b>56</b>	[1100] 125 <b>53</b>	[1620] 185 <b>47</b>	[2140] 240 <b>42</b>	[2660] 300 <b>40</b>	[3180] 360 <b>38</b>	[3600] 405 <b>29</b>	[4020] 455 <b>20</b>	[4080] 460 <b>12</b>
[4] <b>15</b>	[260] 30 <b>116</b>	[520] 60 <b>114</b>	[1100] 125 <b>111</b>	[1650] 185 <b>105</b>	[2200] 250 <b>100</b>	[2700] 305 <b>95</b>	[3210] 365 <b>90</b>	[3660] 415 <b>70</b>	[4100] 465 <b>50</b>	[4560] 515 <b>37</b>
[6] <b>23</b>	[240] 25 <b>173</b>	[510] 60 <b>170</b>	[1100] 125 <b>167</b>	[1650] 185 <b>161</b>	[2200] 250 <b>156</b>	[2720] 305 <b>149</b>	[3240] 365 <b>142</b>	[3710] 420 <b>123</b>	[4180] 470 <b>104</b>	[4660] 525 <b>91</b>
[8] <b>30</b>	[230] 25 <b>228</b>	[510] 60 <b>225</b>	[1080] 120 <b>222</b>	[1640] 185 <b>216</b>	[2210] 250 <b>210</b>	[2740] 310 <b>202</b>	[3270] 370 <b>194</b>	[3770] 425 <b>176</b>	[4270] 480 <b>158</b>	[4750] 535 <b>145</b>
[10] <b>38</b>	[210] 25 <b>283</b>	[510] 60 <b>281</b>	[1080] 120 <b>278</b>	[1640] 185 <b>272</b>	[2210] 250 <b>266</b>	[2750] 310 <b>256</b>	[3300] 375 <b>246</b>	[3820] 430 <b>229</b>	[4350] 490 <b>212</b>	[4840] 545 <b>189</b>
[12] <b>45</b>	[200] 25 <b>341</b>	[500] 55 <b>338</b>	[1070] 120 <b>335</b>	[1640] 185 <b>329</b>	[2220] 250 <b>323</b>	[2750] 310 <b>312</b>	[3300] 375 <b>300</b>	[3840] 435 <b>282</b>	[4370] 495 <b>263</b>	[4870] 550 <b>237</b>
[14] <b>53</b>	[180] 20 <b>400</b>	[490] 55 <b>396</b>	[1060] 120 <b>392</b>	[1640] 185 <b>386</b>	[2220] 250 <b>380</b>	[2750] 310 <b>368</b>	[3310] 375 <b>355</b>	[3860] 435 <b>335</b>	[4390] 495 <b>315</b>	[4890] 550 <b>286</b>
[16] <b>61</b>	[160] 20 <b>457</b>	[490] 55 <b>453</b>	[1050] 120 <b>449</b>	[1630] 185 <b>443</b>	[2220] 250 <b>437</b>	[2760] 310 <b>424</b>	[3310] 375 <b>410</b>	[3860] 435 <b>388</b>	[4400] 495 <b>366</b>	[4920] 555 <b>335</b>
[18] <b>68</b>	[130] 15 <b>516</b>	[480] 55 <b>511</b>	[1050] 120 <b>506</b>	[1630] 185 <b>500</b>	[2220] 250 <b>494</b>	[2760] 310 <b>480</b>	[3320] 375 <b>465</b>	[3870] 435 <b>442</b>	[4420] 500 <b>418</b>	[4940] 560 <b>384</b>
[20] <b>76</b>	[110] 10 <b>574</b>	[470] 55 <b>569</b>	[1040] 120 <b>564</b>	[1620] 185 <b>559</b>	[2210] 250 <b>551</b>	[2760] 310 <b>536</b>	[3330] 375 <b>520</b>	[3890] 440 <b>495</b>	[4440] 500 <b>470</b>	
[22] <b>83</b>	[70] 10 <b>633</b>	[450] 50 <b>628</b>	[1020] 115 <b>624</b>	[1610] 180 <b>615</b>	[2190] 245 <b>606</b>	[2750] 310 <b>590</b>	[3320] 375 <b>573</b>	[3880] 440 <b>547</b>	[4440] 500 <b>520</b>	
[25] <b>95</b>	[50] 5 <b>722</b>	[430] 50 <b>718</b>	[1000] 115 <b>714</b>	[1580] 180 <b>702</b>	[2160] 245 <b>690</b>	[2720] 305 <b>672</b>	[3300] 375 <b>653</b>	[3860] 435 <b>625</b>	[4430] 500 <b>595</b>	
[30] <b>114</b>		[400] 45 <b>862</b>	[940] 105 <b>855</b>	[1500] 170 <b>842</b>	[2080] 235 <b>827</b>	[2670] 300 <b>806</b>	[3200] 360 <b>783</b>	[3740] 425 <b>749</b>		

# 4000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



### 205 cm<sup>3</sup>/r [12.5 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1.9</b>	[400] 45 8	[810] 90 5	[1500] 170 1							
[1] <b>3.8</b>	[410] 45 17	[830] 95 17	[1590] 180 16	[2220] 250 15	[2860] 325 14	[3860] 435 12	[4560] 515 11	[5390] 610 9	[5510] 625 3	
[2] <b>7.5</b>	[420] 45 36	[850] 95 35	[1680] 190 34	[2410] 270 32	[3140] 355 29	[4060] 460 27	[4800] 540 25	[5420] 610 22	[6000] 680 16	[6210] 700 8
[4] <b>15</b>	[430] 50 73	[870] 100 73	[1770] 200 71	[2590] 295 70	[3410] 385 68	[4260] 480 61	[5040] 570 57	[5730] 645 45	[6340] 715 35	[6740] 760 23
[6] <b>23</b>	[430] 50 107	[880] 100 106	[1800] 205 105	[2620] 295 103	[3530] 400 101	[4370] 495 98	[5170] 585 90	[5900] 665 81	[6590] 745 74	[7100] 800 65
[8] <b>30</b>	[410] 45 144	[870] 100 143	[1820] 205 142	[2660] 300 138	[3560] 400 136	[4410] 500 132	[5240] 590 125	[6020] 680 116	[6770] 765 109	
[10] <b>38</b>	[390] 45 182	[860] 95 180	[1820] 205 179	[2700] 305 174	[3580] 405 170	[4460] 505 166	[5300] 600 160	[6110] 690 152	[6890] 780 143	
[12] <b>45</b>	[350] 40 217	[850] 95 216	[1810] 205 215	[2690] 305 211	[3570] 405 202	[4440] 500 200	[5300] 600 194	[6120] 690 185		
[14] <b>53</b>	[330] 35 256	[840] 95 254	[1790] 200 252	[2670] 300 248	[3560] 400 243	[4430] 500 237	[5290] 600 229	[6120] 690 219		
[16] <b>61</b>	[290] 35 291	[820] 95 290	[1770] 200 289	[2650] 300 284	[3540] 400 280	[4410] 500 272	[5280] 595 264	[6120] 690 253		
[18] <b>68</b>	[270] 30 329	[810] 90 327	[1750] 200 325	[2640] 300 321	[3520] 400 316	[4400] 495 308	[5270] 595 298	[6120] 690 287		
[20] <b>76</b>	[230] 25 366	[800] 90 364	[1730] 195 362	[2620] 295 358	[3510] 395 353	[4380] 495 345	[5270] 595 334	[6120] 690 321		
[22] <b>83</b>	[190] 20 402	[780] 90 400	[1690] 190 398	[2600] 295 394	[3500] 395 389	[4370] 495 380	[5260] 595 368			
[25] <b>95</b>	[150] 15 459	[750] 85 456	[1640] 185 453	[2560] 290 448	[3480] 395 442	[4360] 495 434	[5240] 590 421			
[30] <b>114</b>		[710] 80 546	[1540] 175 542	[2510] 285 537	[3350] 380 529	[4190] 475 520	[5030] 570 504			

### 160 cm<sup>3</sup>/r [9.9 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1.9</b>	[300] 35 8	[680] 75 7	[1320] 150 5	[2050] 230 3	[2750] 310 1					
[1] <b>3.8</b>	[320] 35 23	[700] 80 22	[1350] 155 20	[2070] 235 19	[2780] 315 18	[3300] 375 16	[3940] 445 15	[4410] 500 8	[4950] 560 2	
[2] <b>7.5</b>	[330] 35 46	[700] 80 45	[1360] 155 41	[2080] 235 40	[2790] 315 37	[3340] 375 32	[3970] 450 29	[4530] 510 27	[5090] 575 25	[5590] 630 13
[4] <b>15</b>	[320] 35 93	[710] 80 92	[1400] 160 90	[2100] 240 88	[2820] 320 84	[3420] 385 76	[4020] 455 73	[4620] 520 62	[5220] 590 51	[5730] 645 35
[6] <b>23</b>	[300] 35 137	[710] 80 135	[1420] 160 134	[2140] 240 131	[2850] 320 126	[3510] 395 120	[4180] 470 114	[4760] 540 90	[5340] 605 75	[5870] 665 57
[8] <b>30</b>	[280] 30 184	[720] 80 182	[1450] 165 180	[2180] 245 176	[2900] 330 171	[3560] 400 163	[4230] 480 154	[4850] 550 138	[5470] 620 122	[6010] 680 100
[10] <b>38</b>	[260] 30 232	[720] 80 229	[1480] 165 226	[2220] 250 221	[2950] 335 216	[3610] 410 206	[4290] 485 194	[4920] 555 182	[5560] 630 169	[6160] 695 142
[12] <b>45</b>	[240] 25 277	[700] 80 274	[1450] 165 272	[2190] 245 266	[2920] 330 260	[3590] 405 250	[4280] 485 238	[4920] 555 224	[5570] 630 209	[6180] 700 182
[14] <b>53</b>	[220] 25 321	[680] 75 319	[1420] 160 318	[2160] 245 311	[2890] 325 304	[3570] 405 294	[4270] 480 282	[4920] 555 266	[5580] 630 249	[6200] 700 222
[16] <b>61</b>	[200] 25 366	[670] 75 364	[1400] 160 362	[2130] 240 356	[2860] 325 348	[3550] 400 338	[4260] 480 326	[4920] 555 308	[5590] 630 289	[6220] 705 262
[18] <b>68</b>	[180] 20 410	[650] 75 409	[1360] 155 407	[2100] 235 401	[2830] 320 392	[3530] 400 382	[4250] 480 370	[4910] 555 350	[5600] 635 329	[6240] 705 302
[20] <b>76</b>	[150] 15 460	[630] 70 458	[1340] 150 456	[2070] 235 448	[2800] 315 440	[3510] 395 429	[4240] 480 417	[4910] 555 396	[5610] 635 373	
[22] <b>83</b>	[120] 15 509	[620] 70 506	[1330] 150 502	[2060] 235 494	[2790] 315 484	[3500] 395 473	[4220] 475 461	[4910] 555 438	[5600] 635 413	
[25] <b>95</b>	[70] 10 582	[600] 70 578	[1320] 150 573	[2050] 230 563	[2780] 315 552	[3480] 395 540	[4210] 475 526	[4900] 555 501	[5590] 630 474	
[30] <b>114</b>		[560] 65 693	[1280] 145 687	[1990] 225 675	[2700] 305 661	[3430] 390 647	[3970] 450 630	[4640] 525 600		





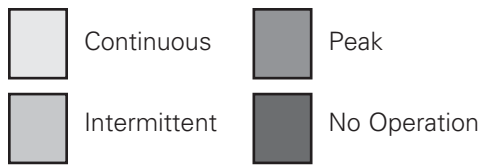
# 4000 Series

**245 cm³/r [15.0 in³/r]**  
 Δ Pressure Bar [PSI]

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5]	[460] 50 5	[980] 110 2													
[1]	[480] 55 14	[990] 110 14	[1490] 170 14	[1990] 225 13	[2480] 280 13	[2970] 335 12	[3400] 385 12	[3830] 435 11	[4250] 480 11	[4680] 530 10	[5020] 565 4				
[2]	[500] 55 30	[1000] 115 30	[1520] 170 29	[2040] 230 29	[2540] 285 28	[3050] 345 27	[3420] 385 26	[3930] 445 24	[4440] 500 23	[4900] 555 22	[5320] 600 20	[5740] 650 18	[6160] 695 16	[6640] 750 14	[7150] 810 11
[4]	[510] 60 61	[1030] 115 61	[1560] 175 60	[2080] 235 60	[2600] 295 59	[3130] 355 59	[3630] 410 58	[4130] 465 56	[4630] 525 53	[5120] 580 49	[5570] 645 47	[6030] 705 44	[6480] 770 42	[6970] 830 39	[7340] 890 36
[6]	[510] 60 91	[1040] 120 90	[1570] 175 90	[2100] 235 89	[2620] 295 88	[3160] 355 88	[3660] 415 86	[4200] 475 83	[4710] 540 80	[5220] 595 75	[5690] 645 72	[6150] 695 70	[6620] 750 67	[7050] 800 63	[7430] 850 59
[8]	[500] 55 121	[1020] 115 121	[1520] 175 120	[2100] 240 119	[2630] 295 118	[3150] 355 115	[3680] 415 113	[4210] 475 111	[4740] 535 109	[5250] 595 106	[5720] 645 103	[6200] 700 99	[6670] 755 96	[7090] 800 91	[7470] 845 87
[10]	[470] 55 152	[1000] 115 151	[1540] 175 150	[2100] 235 148	[2620] 295 148	[3150] 355 147	[3690] 415 145	[4230] 480 143	[4770] 545 141	[5290] 600 137	[5760] 655 133	[6240] 710 129	[6710] 765 125	[7140] 805 120	
[12]	[450] 50 183	[980] 110 182	[1530] 175 180	[2080] 235 179	[2610] 295 178	[3140] 355 178	[3680] 415 176	[4220] 475 173	[4760] 540 170	[5280] 595 166	[5750] 650 161	[6230] 705 157	[6700] 755 152		
[14]	[420] 45 213	[960] 110 212	[1520] 170 211	[2060] 235 210	[2600] 295 209	[3130] 355 208	[3670] 415 206	[4200] 475 203	[4740] 535 200	[5260] 595 195	[5740] 645 190	[6220] 705 185			
[16]	[400] 45 244	[950] 110 243	[1500] 170 242	[2040] 230 241	[2580] 290 240	[3120] 355 239	[3660] 415 236	[4190] 475 232	[4730] 540 229	[5250] 595 225	[5730] 650 219	[6210] 700 213			
[18]	[380] 45 275	[930] 105 274	[1480] 165 273	[2020] 230 272	[2560] 290 270	[3110] 350 269	[3650] 415 266	[4180] 475 262	[4730] 540 259	[5230] 595 254	[5720] 645 248	[6200] 700 241			
[20]	[350] 40 305	[910] 105 305	[1460] 165 304	[2000] 225 303	[2550] 290 302	[3100] 350 300	[3640] 410 296	[4170] 470 292	[4700] 530 288	[5220] 590 283	[5710] 645 276				
[22]	[310] 35 337	[870] 100 336	[1420] 160 335	[1970] 225 334	[2500] 280 332	[3050] 345 330	[3590] 405 326	[4140] 465 323	[4680] 525 319	[5200] 590 313	[5680] 640 306				
[25]	[260] 30 383	[820] 95 382	[1380] 155 381	[1930] 220 380	[2460] 280 378	[2980] 335 376	[3540] 400 372	[4090] 460 369	[4640] 525 365	[5180] 585 357					
[30]		[680] 75 457	[1250] 140 456	[1860] 210 455	[2390] 270 454	[2900] 330 450	[3430] 390 445	[3960] 445 442	[4460] 505 437	[4950] 560 427					
[35]			[1110] 125 532	[1740] 195 531	[2270] 255 528	[2790] 315 525	[3340] 375 519	[3910] 440 515	[4400] 495 509						

**280 cm³/r [17.1 in³/r]**  
 Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5]	[533] 60 4	[1074] 121 2													
[1]	[553] 62 12	[1136] 128 12	[1714] 194 12	[2287] 258 11	[2841] 321 11	[3394] 384 10	[3868] 437 10	[4389] 496 10	[4895] 553 8	[6080] 685 6	[5870] 663 6	[368] 720 6	[6811] 770 6	[7239] 818 5	[7654] 865 4
[2]	[568] 64 26	[1146] 130 26	[1740] 197 25	[2328] 263 25	[2902] 328 24	[3461] 391 24	[3955] 447 23	[4524] 511 22	[2922] 330 21	[5630] 636 20	[6146] 694 19	[6666] 753 17	[7191] 813 17	[7749] 876 15	[8323] 940 13
[4]	[579] 65 53	[1167] 132 53	[1771] 200 52	[2374] 268 52	[2962] 335 51	[3557] 402 51	[4139] 468 50	[4712] 532 49	[5285] 597 47	[5848] 661 45	[6395] 722 44	[6946] 785 42	[7502] 848 41	[8020] 906 40	[8471] 957 38
[6]	[583] 66 79	[1177] 133 79	[1781] 201 78	[2395] 271 77	[2987] 338 77	[3601] 407 77	[4193] 474 76	[4793] 542 74	[5395] 607 72	[5959] 673 69	[6521] 737 66	[7082] 800 66	[7607] 859 65	[8097] 915 64	
[8]	[573] 65 106	[167] 132 106	[1780] 201 105	[2404] 272 105	[3007] 340 104	[3610] 408 104	[4218] 477 102	[4812] 544 101	[5411] 611 99	[5994] 677 96	[6556] 741 94	[7022] 793 92	[7518] 849 90		
[10]	[547] 62 134	[1146] 130 133	[1765] 199 133	[2395] 271 131	[2997] 339 131	[3629] 410 130	[4238] 479 129	[4837] 547 127	[5442] 615 126	[6035] 682 122	[6601] 746 119	[7022] 793 115	[7518] 849 111		
[12]	[527] 60 161	[1126] 127 160	[1745] 197 186	[2369] 268 158	[2991] 338 157	[3609] 408 157	[4228] 478 156	[4832] 546 154	[5441] 615 152	[6034] 682 148	[6586] 744 144	[6940] 784 141			
[14]	[497] 56 187	[1106] 125 187	[1730] 195 186	[2344] 265 186	[2972] 336 185	[3585] 405 184	[4213] 476 182	[4816] 544 180	[5430] 614 178	[6028] 681 174	[6511] 736 170	[6940] 784 166			
[16]	[472] 53 214	[1096] 124 214	[1715] 194 213	[2324] 263 212	[2947] 333 211	[3565] 403 210	[4203] 475 208	[4811] 544 206	[5420] 612 203	[5919] 669 199	[6436] 727 195				
[18]	[437] 39 241	[1075] 121 241	[1690] 191 240	[2299] 260 239	[2917] 330 237	[3541] 400 236	[4188] 473 234	[4801] 542 231	[5400] 610 229	[5919] 669 224	[6362] 719 219				
[20]	[402] 45 268	[1055] 119 268	[1669] 189 268	[2274] 257 267	[2898] 327 266	[3521] 398 264	[4178] 472 261	[4791] 541 258	[5394] 609 255	[5851] 661 249					
[22]	[366] 41 296	[1005] 114 295	[1629] 184 295	[2257] 255 294	[2856] 323 292	[3480] 393 290	[4136] 467 288	[4756] 537 285	[5205] 588 279						
[25]	[301] 34 336	[940] 106 336	[1588] 179 335	[2231] 252 334	[2825] 319 333	[3419] 386 331	[4086] 462 328	[4710] 532 325	[5205] 588 314						
[30]		[845] 96 402	[1480] 167 401	[2151] 243 400	[2759] 312 398	[3328] 376 396	[3984] 450 392	[4573] 517 389	[5021] 567 377						
[35]			[1348] 152 468	[2057] 232 466	[2623] 296 464	[3183] 360 463	[3883] 439 457	[4354] 492 449							

[3340] } Torque [lb-in]  
 375 } Nm  
 519 } Speed RPM

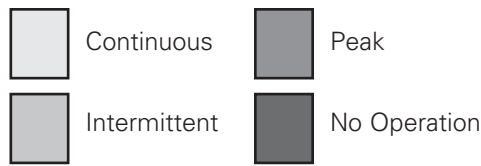


# 4000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



**310 cm<sup>3</sup>/r [19.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[.5] <b>1.9</b>	[600] 70 4	[1150] 130 2													
[1] <b>3.8</b>	[620] 70 11	[1270] 145 11	[1920] 215 11	[2560] 290 10	[3170] 360 10	[3780] 425 10	[4290] 485 9	[4900] 555 9	[5490] 620 9	[6080] 685 8	[6670] 755 8	[7270] 820 7	[7880] 890 7	[8490] 960 6	[9080] 1025 5
[2] <b>7.5</b>	[630] 70 23	[1280] 145 23	[1940] 220 22	[2590] 295 22	[3230] 365 21	[3830] 435 21	[4450] 505 20	[5070] 575 20	[5680] 640 19	[6300] 710 18	[6910] 780 18	[7530] 850 17	[8160] 920 17	[8790] 995 16	[9420] 1065 15
[4] <b>15</b>	[640] 70 47	[1290] 145 47	[1960] 220 46	[2640] 300 46	[3290] 370 45	[3940] 445 45	[4600] 520 44	[5240] 590 43	[5880] 665 43	[6510] 735 42	[7150] 810 42	[7790] 880 41	[8450] 955 41	[9100] 1030 40	
[6] <b>23</b>	[650] 75 71	[1300] 145 71	[1970] 225 70	[2660] 300 70	[3320] 375 69	[4000] 450 69	[4680] 530 68	[5330] 600 67	[5980] 675 66	[6630] 750 64	[7280] 825 64	[7940] 895 63			
[8] <b>30</b>	[640] 70 96	[1300] 145 96	[1980] 225 95	[2670] 300 95	[3350] 380 94	[4030] 455 94	[4710] 530 93	[5360] 605 92	[6020] 680 91	[6670] 755 89	[7320] 825 88				
[10] <b>38</b>	[620] 70 121	[1280] 145 120	[1970] 225 120	[2660] 300 119	[3340] 375 119	[4070] 460 118	[4740] 535 117	[5390] 610 116	[6050] 685 115	[6710] 760 112	[7370] 835 109				
[12] <b>45</b>	[600] 70 145	[1260] 140 144	[1940] 220 144	[2630] 295 143	[3340] 375 142	[4040] 455 142	[4730] 535 141	[5390] 610 140	[6060] 685 139	[6730] 760 135					
[14] <b>53</b>	[570] 65 169	[1240] 140 169	[1920] 215 168	[2600] 295 168	[3310] 375 167	[4000] 450 167	[4710] 530 165	[5380] 610 164	[6060] 685 163	[6730] 760 159					
[16] <b>61</b>	[540] 60 193	[1230] 140 193	[1900] 215 192	[2580] 290 192	[3280] 370 190	[3970] 450 189	[4700] 530 188	[5380] 610 187	[6050] 685 185						
[18] <b>68</b>	[490] 55 217	[1210] 135 217	[1880] 210 216	[2550] 290 216	[3240] 365 214	[3930] 445 213	[4680] 530 211	[5370] 605 209	[6040] 680 207						
[20] <b>76</b>	[450] 50 242	[1190] 135 242	[1860] 210 242	[2520] 285 241	[3210] 365 240	[3900] 440 238	[4670] 530 236	[5360] 605 234	[6030] 680 232						
[22] <b>83</b>	[420] 45 267	[1130] 130 266	[1820] 205 266	[2520] 285 265	[3180] 360 264	[3870] 440 262	[4640] 525 260	[5320] 600 258							
[25] <b>95</b>	[340] 40 303	[1050] 120 303	[1780] 200 302	[2510] 285 301	[3160] 355 300	[3820] 430 299	[4590] 520 296	[5280] 595 293							
[30] <b>114</b>		[1010] 115 363	[1700] 190 362	[2420] 275 360	[3100] 350 359	[3720] 420 358	[4500] 510 354	[5140] 580 351							
[35] <b>132</b>			[1580] 180 422	[2360] 265 420	[2950] 335 419	[3540] 400 418	[4390] 495 413								

**395 cm<sup>3</sup>/r [24.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[.5] <b>1.9</b>	[700] 80 4	[1340] 150 2												
[1] <b>3.8</b>	[750] 85 9	[1430] 160 9	[2110] 240 8	[2770] 315 8	[3460] 390 8	[4170] 470 7	[4890] 550 7	[5610] 635 7	[6310] 715 5	[7010] 790 4	[7700] 870 2			
[2] <b>7.5</b>	[800] 90 18	[1500] 170 18	[2290] 260 17	[3030] 340 16	[3850] 435 16	[4620] 520 15	[5310] 600 15	[6000] 680 14	[6750] 765 13	[7490] 845 13	[8240] 930 12	[8990] 1015 11	[9730] 1100 10	[10470] 1185 8
[4] <b>15</b>	[860] 95 38	[1630] 185 38	[2470] 280 37	[3310] 375 36	[4120] 465 36	[4900] 555 35	[5640] 635 35	[6390] 720 34	[7190] 810 34	[7890] 890 33	[8780] 990 32			
[6] <b>23</b>	[860] 95 57	[1690] 190 57	[2540] 285 56	[3410] 385 55	[4180] 470 54	[4980] 565 53	[5780] 655 52	[6580] 745 50	[7400] 835 49	[8220] 930 47				
[8] <b>30</b>	[840] 95 76	[1680] 190 76	[2550] 290 75	[3400] 385 74	[4260] 480 73	[5090] 575 72	[5870] 665 70	[6650] 750 68	[7480] 845 66					
[10] <b>38</b>	[800] 90 95	[1680] 190 95	[2550] 290 94	[3400] 385 93	[4260] 480 92	[5100] 575 91	[5920] 670 89	[6730] 760 86	[7560] 855 84					
[12] <b>45</b>	[760] 85 114	[1660] 190 114	[2520] 285 113	[3380] 380 112	[4270] 480 111	[5110] 575 110	[5900] 665 108	[6690] 755 105						
[14] <b>53</b>	[740] 85 133	[1640] 185 133	[2490] 280 132	[3370] 380 131	[4260] 480 130	[5100] 575 129	[5880] 665 127	[6650] 750 124						
[16] <b>61</b>	[710] 80 153	[1620] 185 153	[2460] 280 152	[3350] 380 151	[4240] 480 149	[5080] 575 147	[5840] 660 145							
[18] <b>68</b>	[680] 75 172	[1600] 180 172	[2430] 275 171	[3340] 375 170	[4220] 475 168	[5060] 570 166	[5810] 655 164							
[20] <b>76</b>	[610] 70 192	[1580] 180 191	[2400] 270 190	[3320] 375 189	[4210] 475 187	[5040] 570 185	[5780] 655 183							
[22] <b>83</b>	[570] 65 211	[1490] 170 210	[2340] 265 209	[3220] 365 208	[4160] 470 206	[5010] 565 204	[5740] 650 201							
[25] <b>95</b>	[490] 55 239	[1350] 155 238	[2250] 255 237	[3080] 350 236	[4070] 460 235	[4960] 560 233	[5700] 645 230							
[30] <b>114</b>		[1080] 120 285	[1650] 185 284	[2270] 255 282	[3020] 340 281	[3850] 435 279								
[35] <b>132</b>			[1520] 170 331	[2120] 240 330	[2870] 325 328	[3760] 425 325								
[40] <b>151</b>				[2050] 230 376	[2790] 315 374	[3620] 410 371								

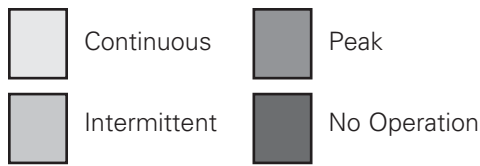
[4390] Torque [lb-in]  
495 Nm  
413 Speed RPM

# 4000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

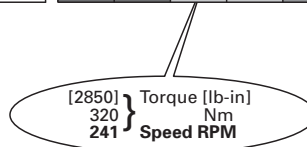


**625 cm<sup>3</sup>/r [38.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1600] 100	[1700] 115	[1800] 125	[2000] 140
[.5] <b>1.9</b>	[1000] 115 2									
[1] <b>3.8</b>	[1080] 120 5	[2340] 265 5	[3600] 405 5	[4850] 550 4	[6100] 690 4	[7350] 830 3	[7820] 885 3	[8290] 935 2	[8760] 990 2	
[2] <b>7.5</b>	[1085] 125 14	[2380] 270 14	[3675] 415 14	[5010] 565 13	[6350] 715 12	[7625] 860 11	[8115] 915 10	[8605] 970 9	[9095] 1030 8	[10075] 1140 7
[4] <b>15</b>	[1090] 125 23	[2420] 275 23	[3750] 425 23	[5175] 585 22	[6600] 745 21	[7900] 895 19	[8410] 950 18	[9000] 1015 17	[9590] 1085 16	[10450] 1180 14
[6] <b>23</b>	[1095] 125 35	[2460] 280 35	[3825] 430 35	[5220] 590 34	[6620] 750 33	[7950] 900 31	[8430] 950 30	[8910] 1005 29	[9490] 1070 28	
[8] <b>30</b>	[1100] 125 48	[2500] 280 48	[3900] 440 47	[5270] 595 46	[6640] 750 45	[7990] 905 43	[8460] 955 43	[8925] 1010 42		
[10] <b>38</b>	[1130] 130 60	[2550] 290 60	[3975] 450 59	[5320] 600 58	[6670] 755 57	[8045] 910 54	[8595] 970 53	[9150] 1035 52		
[12] <b>45</b>	[1160] 130 72	[2600] 295 72	[4050] 460 71	[5375] 605 70	[6700] 755 69	[8100] 915 65	[8660] 980 64			
[14] <b>53</b>	[1105] 125 84	[2535] 285 84	[3965] 450 83	[5325] 600 82	[6685] 755 81	[8065] 910 77	[8620] 975 76			
[16] <b>61</b>	[1050] 120 96	[2465] 280 95	[3880] 440 95	[5275] 595 94	[6670] 755 93	[8035] 910 89	[8580] 970 88			
[18] <b>68</b>	[990] 110 108	[2405] 270 107	[3825] 430 107	[5240] 590 105	[6655] 750 104	[7345] 830 100				
[20] <b>76</b>	[930] 105 121	[2350] 265 120	[3770] 425 120	[5205] 590 118	[6640] 750 116					
[25] <b>95</b>	[750] 85 151	[2175] 245 150	[3600] 405 149	[5000] 565 147	[6400] 725 146					
[30] <b>114</b>	[550] 60 181	[1975] 225 180	[3400] 385 179	[4800] 530 177	[6200] 700 176					
[35] <b>132</b>			[3125] 355 210	[4545] 515 208						
[40] <b>151</b>			[2850] 320 241	[4295] 485 239						

**495 cm<sup>3</sup>/r [30.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
[.5] <b>1.9</b>	[800] 90 3	[1750] 200 1								
[1] <b>3.8</b>	[880] 100 7	[1875] 210 6	[2875] 325 6	[3825] 430 5	[4775] 540 4	[5720] 645 3	[6670] 755 2	[7600] 860 1		
[2] <b>7.5</b>	[905] 100 18	[1940] 220 17	[2975] 335 17	[3990] 450 16	[5010] 565 15	[6010] 680 12	[7010] 790 11	[8000] 905 10	[8980] 1015 8	
[4] <b>15</b>	[935] 105 30	[2005] 225 29	[3075] 345 28	[4160] 470 27	[5245] 595 26	[6300] 710 23	[7355] 830 21	[8375] 945 19	[9400] 1060 17	[10350] 1170 14
[6] <b>23</b>	[920] 105 45	[2010] 225 44	[3100] 350 43	[4185] 475 42	[5265] 595 40	[6345] 715 37	[7420] 840 35	[8445] 955 32	[9465] 1070 30	
[8] <b>30</b>	[905] 100 61	[2015] 230 60	[3125] 355 59	[4205] 475 57	[5290] 600 55	[6385] 720 52	[7485] 845 49	[8510] 960 46		
[10] <b>38</b>	[880] 100 76	[1995] 225 75	[3095] 350 74	[4205] 475 72	[5295] 600 70	[6390] 720 66	[7480] 845 63	[8525] 960 59		
[12] <b>45</b>	[860] 95 91	[1975] 225 90	[3095] 350 89	[4200] 475 87	[5305] 600 85	[6390] 720 81	[7475] 845 77			
[14] <b>53</b>	[830] 95 106	[1945] 220 105	[3055] 345 104	[4165] 470 102	[5275] 595 100	[6360] 720 96	[7445] 840 92			
[16] <b>61</b>	[805] 90 122	[1910] 215 120	[3020] 340 119	[4130] 465 117	[5245] 595 115	[6330] 715 111	[7420] 840 107			
[18] <b>68</b>	[740] 85 137	[1860] 210 136	[2980] 335 134	[4105] 465 132	[5235] 590 130	[6305] 715 125	[7380] 835 121			
[20] <b>76</b>	[680] 75 153	[1810] 205 152	[2940] 330 150	[4085] 460 147	[5225] 590 145	[6285] 710 140				
[25] <b>95</b>	[570] 65 191	[1665] 190 189	[2800] 315 187	[4005] 455 184	[5210] 590 182	[6135] 695 177				
[30] <b>114</b>		[1520] 170 228	[2645] 300 226	[3765] 425 223	[4885] 550 220	[5985] 675 215				
[35] <b>132</b>			[2400] 270 265	[3510] 395 263						
[40] <b>151</b>				[2155] 245 305	[3260] 370 303					



# 4000 Series

## Dimensions

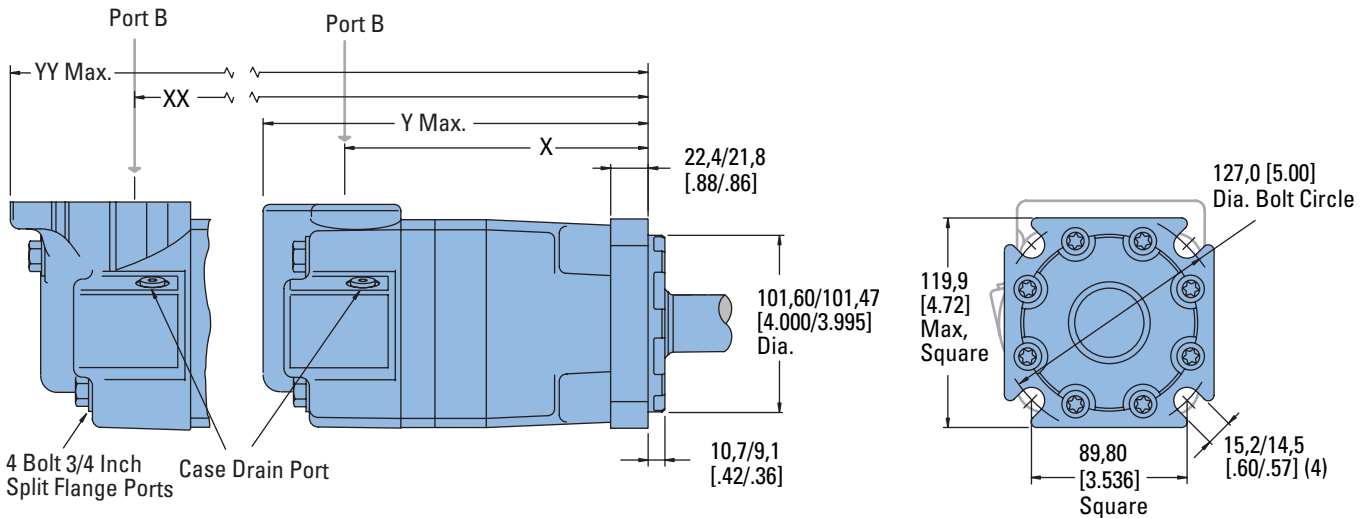
### Ports

- 1 1/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 3/4 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

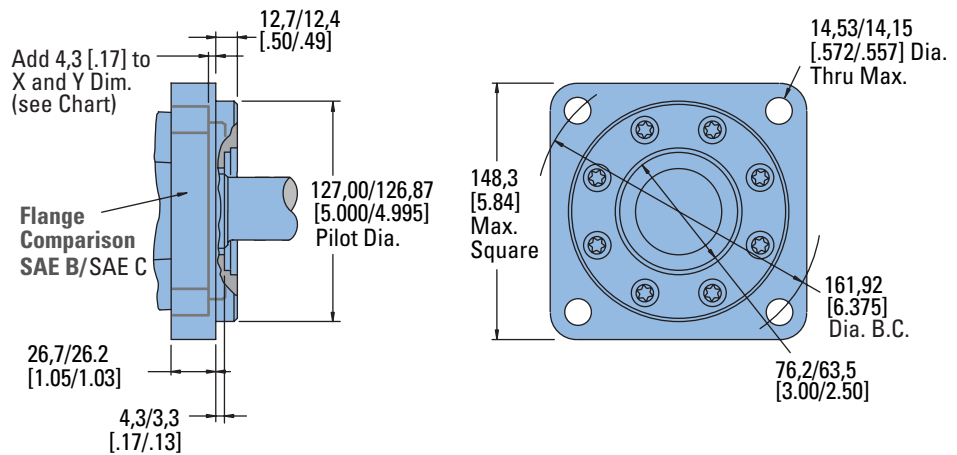
### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Standard Mount



### SAE C Flange



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
110 [6.7]	158,3 [6.23]	214,4 [8.44]	167,3 [6.59]	246,3 [9.70]
130 [7.9]	162,3 [6.39]	218,4 [8.60]	171,3 [6.75]	250,4 [9.86]
160 [9.9]	168,7 [6.64]	224,7 [8.85]	177,7 [7.00]	256,7 [10.11]
205 [12.5]	177,2 [6.98]	233,2 [9.18]	186,2 [7.33]	265,2 [10.44]
245 [15.0]	168,7 [6.64]	224,7 [8.85]	177,7 [7.00]	256,7 [10.11]
310 [19.0]	177,2 [6.98]	233,2 [9.18]	186,2 [7.33]	265,2 [10.44]
395 [24.0]	187,9 [7.40]	243,9 [9.60]	196,9 [7.75]	275,9 [10.86]
495 [30.0]	200,7 [7.90]	256,8 [10.11]	209,7 [8.26]	288,8 [11.37]
625 [38.0]	217,8 [8.58]	273,9 [10.78]	226,7 [8.93]	305,9 [12.04]

# 4000 Series

## Dimensions

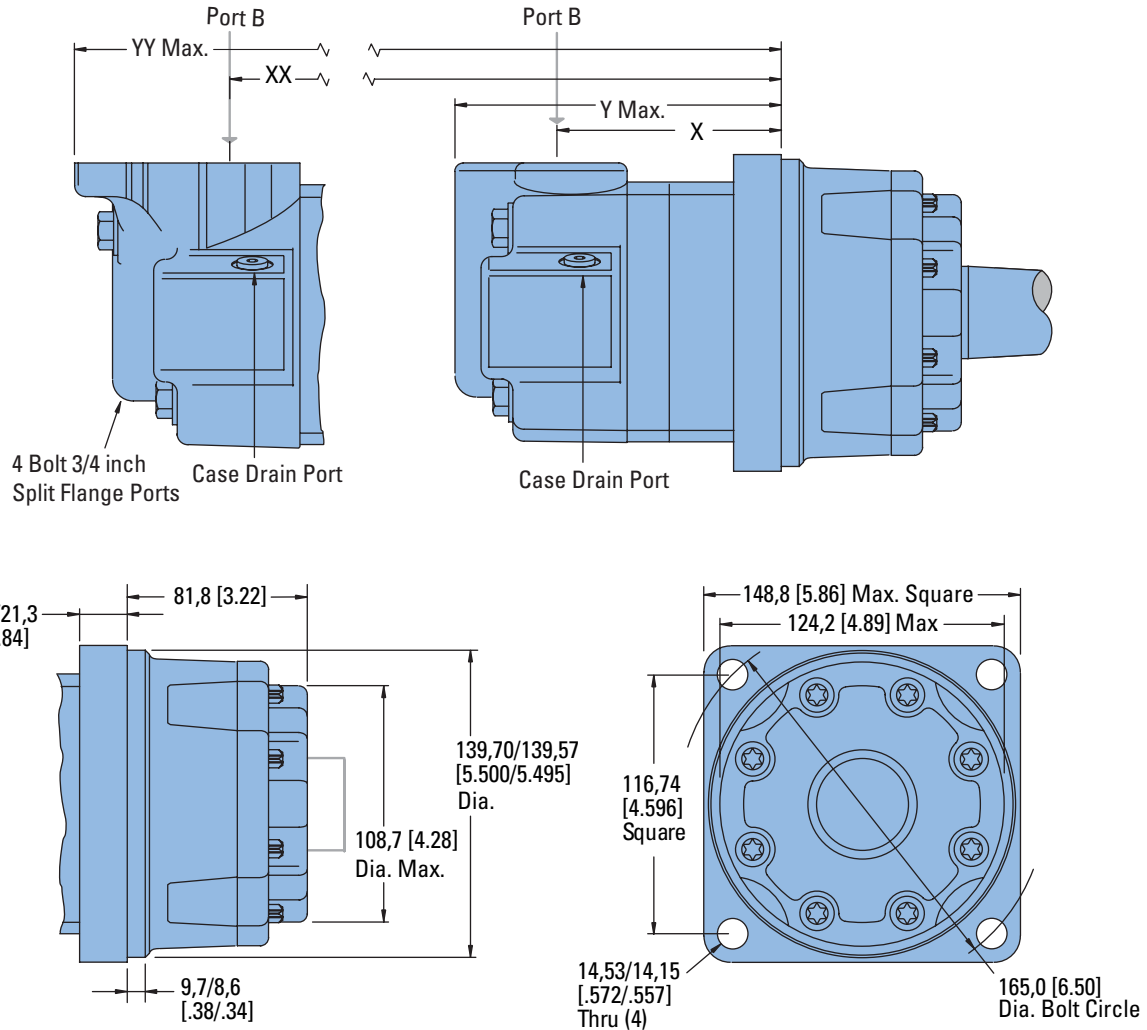
### Wheel Mount

### Ports

- 1 1/16-12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16-20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16-20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 3/4 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
110 [6.7]	87,5 [3.45]	143,3 [5.64]	96,4 [3.80]	175,3 [6.90]
130 [7.9]	91,6 [3.61]	147,3 [5.80]	100,5 [3.96]	179,3 [7.06]
160 [9.9]	97,8 [3.85]	153,7 [6.05]	106,8 [4.21]	185,7 [7.31]
205 [12.5]	106,4 [4.19]	162,3 [6.39]	115,4 [4.55]	194,3 [7.65]
245 [15.0]	97,8 [3.85]	153,7 [6.05]	106,8 [4.21]	185,7 [7.31]
310 [19.0]	106,4 [4.19]	162,3 [6.39]	115,4 [4.55]	194,3 [7.65]
395 [24.0]	117,1 [4.61]	173,0 [6.81]	126,1 [4.97]	205,0 [8.07]
495 [30.0]	129,9 [5.12]	185,7 [7.31]	138,8 [5.47]	217,7 [8.57]
625 [38.0]	146,9 [5.79]	202,9 [7.99]	156,0 [6.14]	235,0 [9.25]

# 4000 Series

## Dimensions

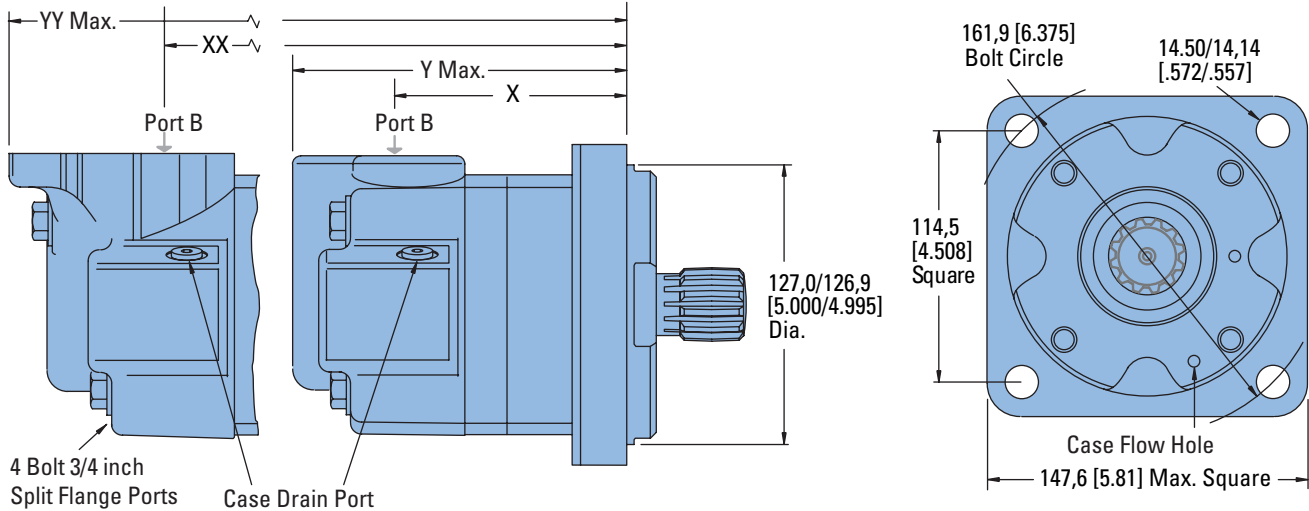
### Bearingless

### Ports

- 1 1/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 3/4 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

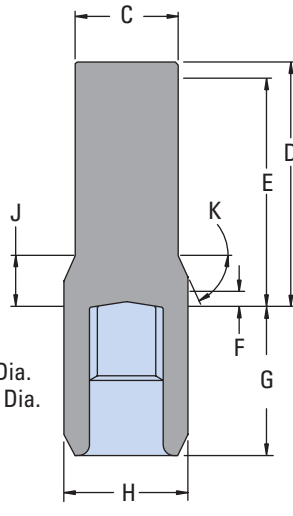
- Port A Pressurized — CW
- Port B Pressurized — CCW



For 4000 Series Bearingless Motor application information contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

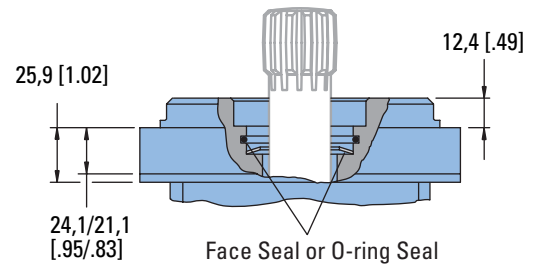
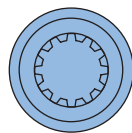
#### Note:

After machining blank, part must be hardened per Eaton specification.



- C 47,2 [1.86] Dia.
- D 112,5 [4.43] Max.
- E 107,4 [4.23] Full Form Dia.
- F 7,4 [.29] Min. Full Form Dia.
- G 68,8 [2.71] Max.
- H 56,9 [2.24] Dia.
- J 18,29 [.720]
- K 38°

Mating Coupling Blank  
Eaton Part No. 12745-003



### BEARINGLESS MOTOR DIMENSIONS

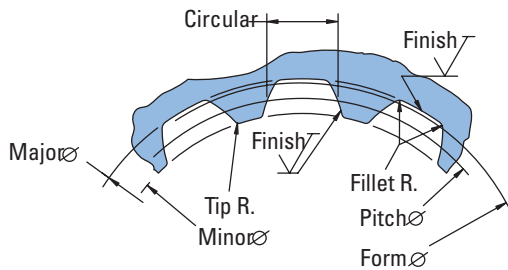
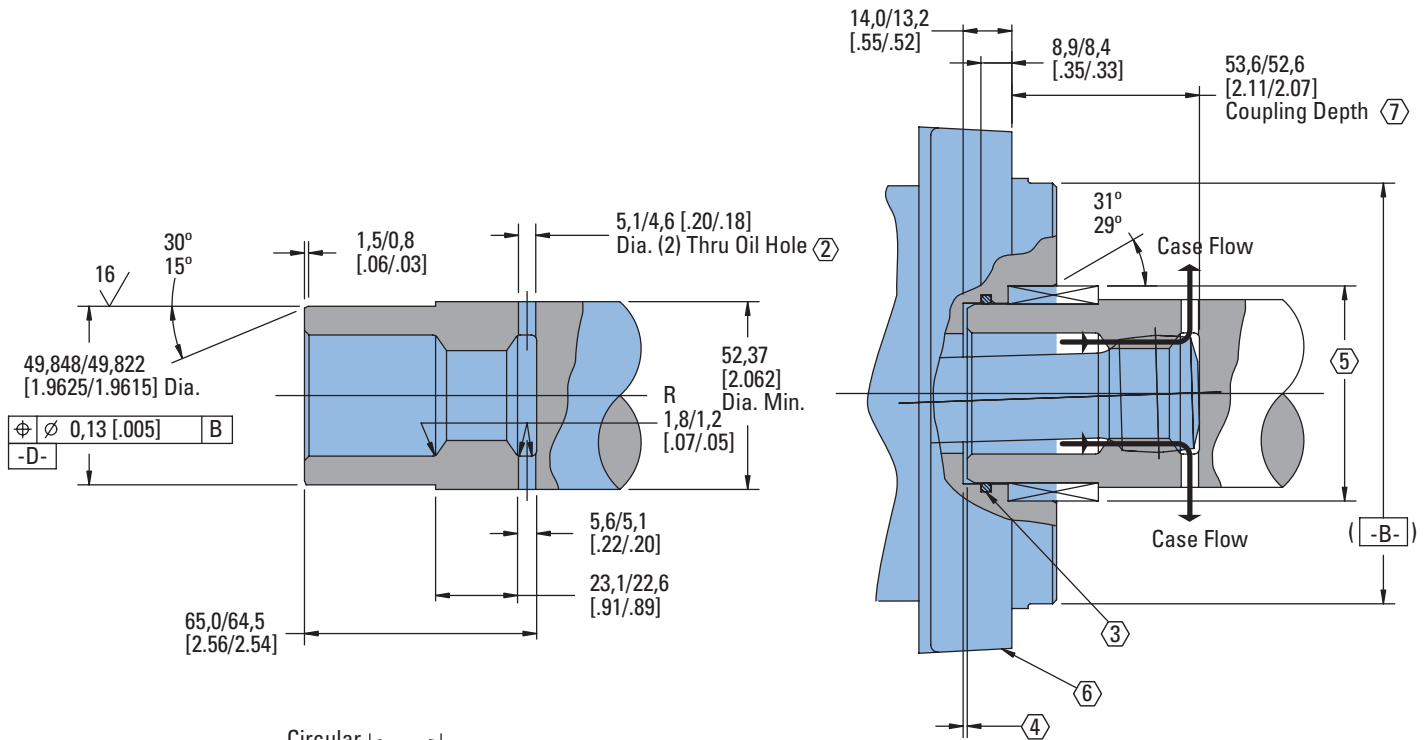
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	XX mm [inch]	YY mm [inch]
110 [6.7]	91,0 [3.58]	146,8 [5.78]	100,1 [3.94]	178,8 [7.04]
130 [7.9]	95,0 [3.74]	150,8 [5.94]	104,1 [4.10]	182,9 [7.20]
160 [9.9]	101,4 [4.00]	157,1 [6.19]	110,5 [4.35]	189,2 [7.45]
205 [12.5]	109,9 [4.33]	165,7 [6.52]	118,9 [4.68]	197,6 [7.78]
245 [15.0]	101,4 [4.00]	157,1 [6.19]	110,5 [4.35]	189,2 [7.45]
310 [19.0]	109,9 [4.33]	165,7 [6.52]	118,9 [4.68]	197,6 [7.78]
395 [24.0]	120,6 [4.75]	176,3 [6.94]	129,5 [5.10]	208,3 [8.20]
495 [30.0]	133,5 [5.26]	189,2 [7.45]	142,5 [5.61]	221,2 [8.71]
625 [38.0]	150,5 [5.93]	206,3 [8.12]	159,5 [6.28]	238,3 [9.38]

# 4000 Series

## Installation Information

Bearingless

- 1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 - 1,27 [.030 - .050] (dimensions apply after heat treat).
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,040 [1.9689 - 1.9700] ID by 60,050 - 60,080 [2.3642 - 2.3653] (Oilite bronze sleeve bearing).
- 6 Similar to SAE "C" Four Bolt Flange.
- 7 52,8 [2.08] Max. dimension to be maintained when assembling shipping and installing unit to insure valve drive engagement with valve (this is required on displacement code number 24 only).



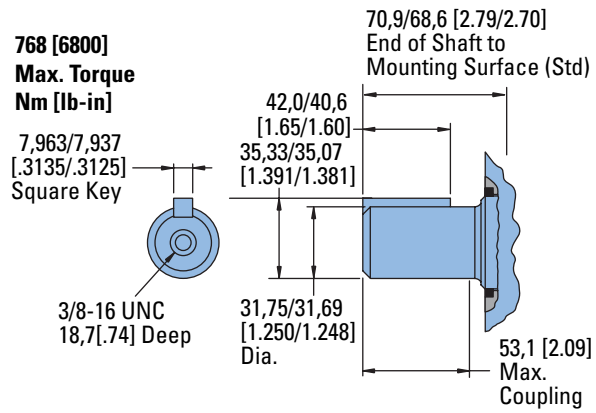
Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 30,480000 [1.2000000] $\begin{matrix} \nearrow \\ \searrow \end{matrix}$ 0,20 [.008]   D
Base Diameter.....	Ref. 26,396455 [1.0392305]
Major Diameter.....	33,43 [1.316] Max. 33,23 [1.308] Min.
Min. Minor Diameter.....	28,40 - 28,58 [1.118 - 1.125]
Form Diameter, Min.....	32,59 [1.283]
Fillet Radius.....	0,63 - 0,76 [.025 - .030]
Tip Radius.....	0,26 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+ .0000 - .0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,045 [1.986]
Minimum Effective.....	4,995 [1.951]
Maximum Effective.....	Ref. 5,009 [1.972]
Minimum Actual.....	Ref. 4,986 [1.963]
Dimension Between Two Pins.....	Ref. 22,783 - 22,929 [.8970 - .9027]
Pin Diameter.....	5,334 [.2100] Pins to Have 3,73 [.147]
	Wide Flat for Root Clearance

# 4000 Series

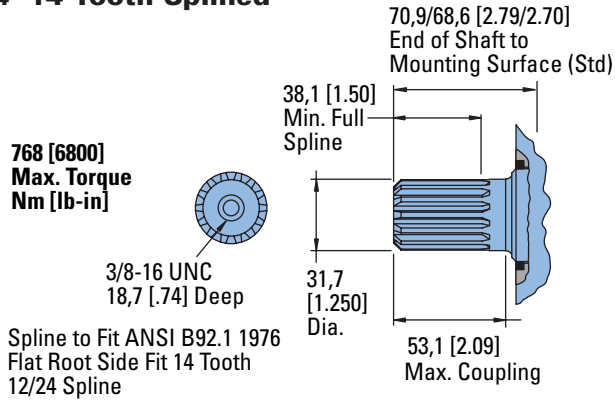
## Dimensions

Shafts

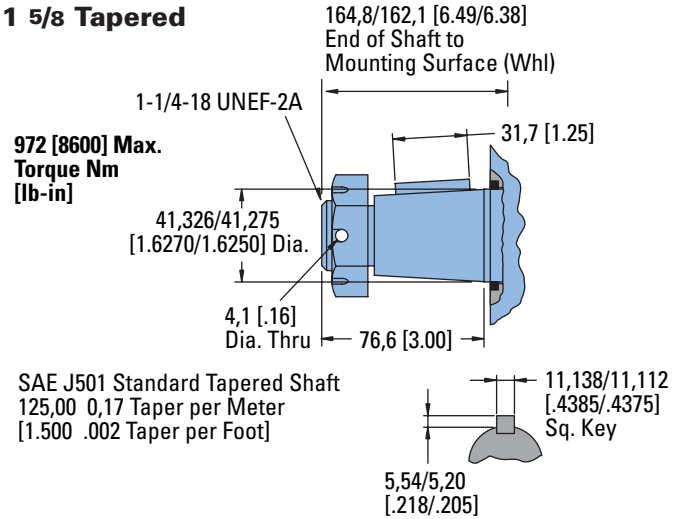
### 1 1/4 Inch Straight



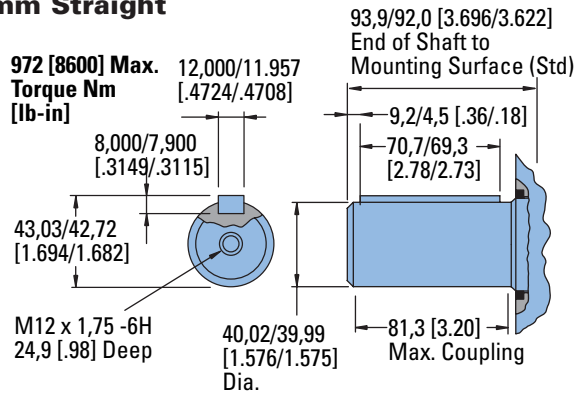
### 1 1/4 -14 Tooth Splined



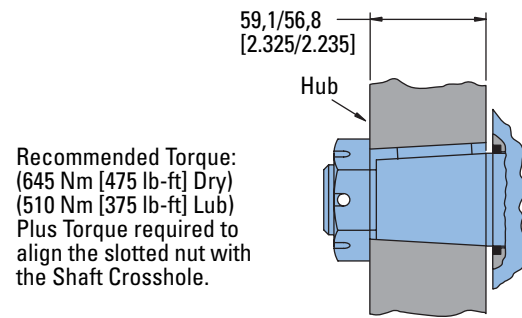
### 1 5/8 Tapered



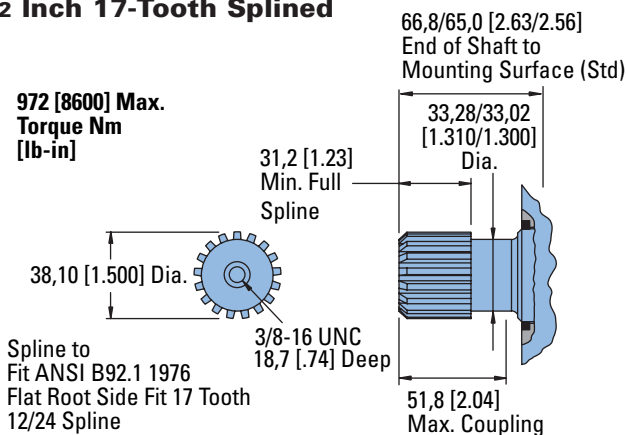
### 40 mm Straight



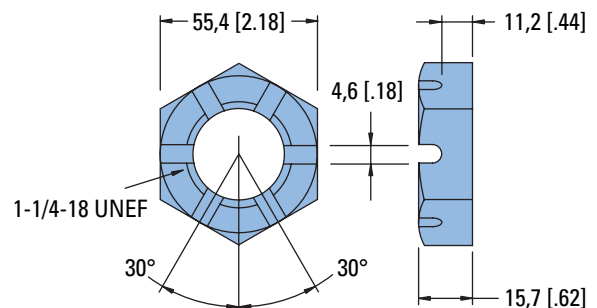
### Tapered Shaft Hub Data



### 1 1/2 Inch 17-Tooth Splined



### Slotted Hexagon Nut





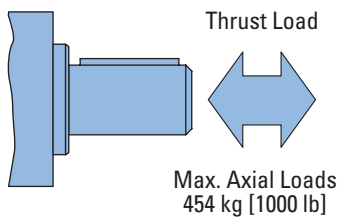
# 4000 Series

## Shaft Side Load Capacity

These curves indicate the radial load capacity on the motor shaft(s) at various locations with an allowable external thrust load of 454 kg [1000 lb].

**Note:**

Case pressure will increase the allowable Inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 94 kg/7 Bar [208 lb/100 PSI].



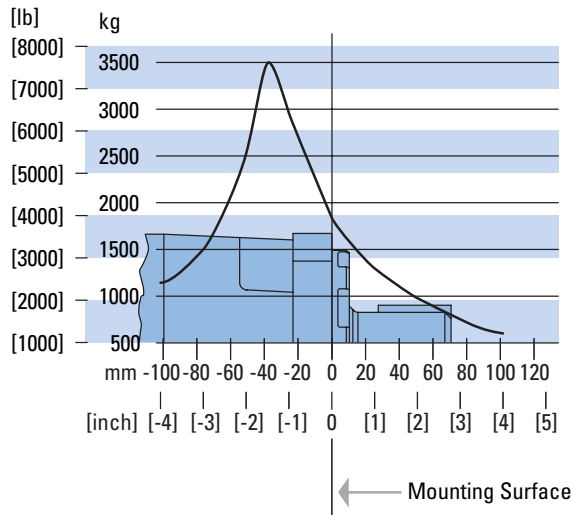
**Each curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

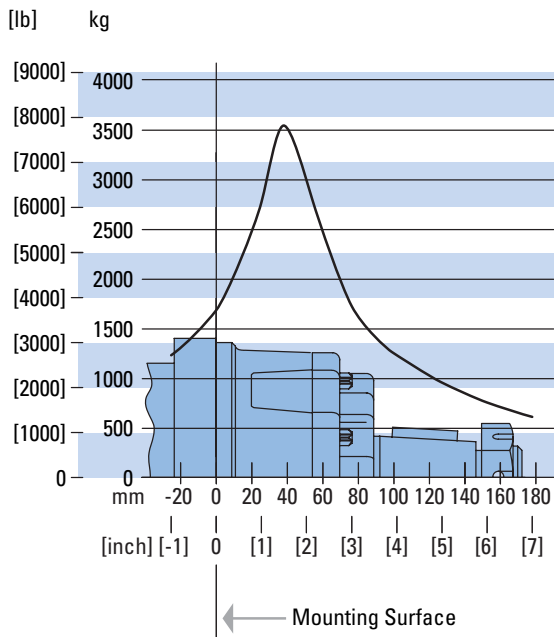
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

**Standard Motor  
Straight and Splined Shafts**



**Wheel Motor Tapered Shaft**



# 4000 Series

## Case Pressure and Case Port

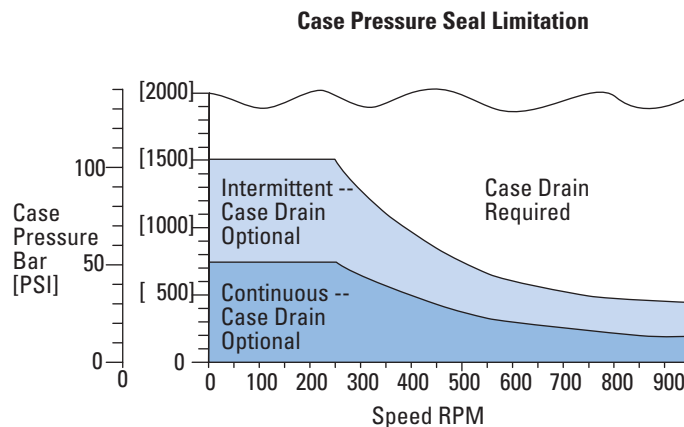
Char-Lynn 4000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.

### Case Porting Advantage

**Contamination Control** — flushing the motor case.

**Cooler Motor** — exiting oil draws motor heat away.

**Extend Motor Seal Life** — maintain low case pressure with a preset restriction in the case drain line.

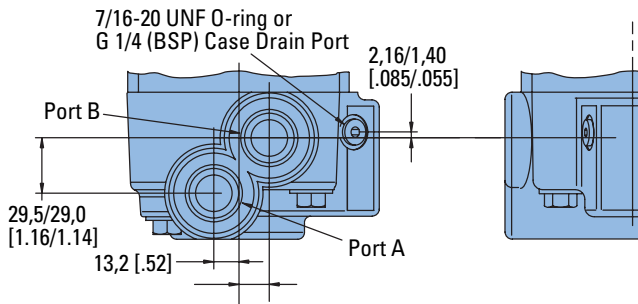


# 4000 Series

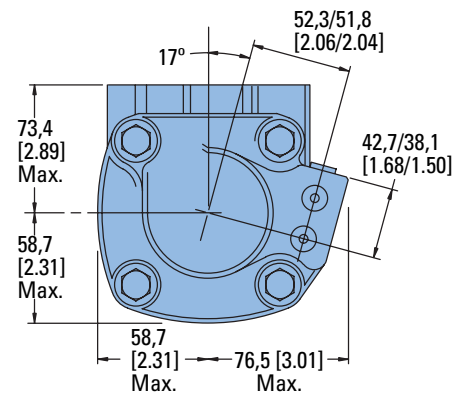
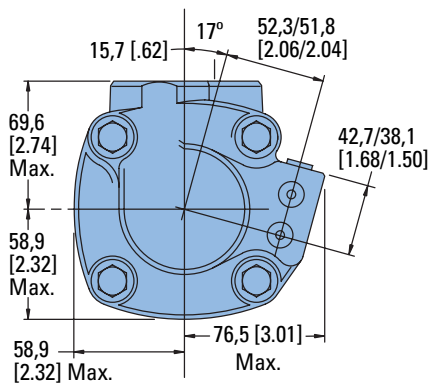
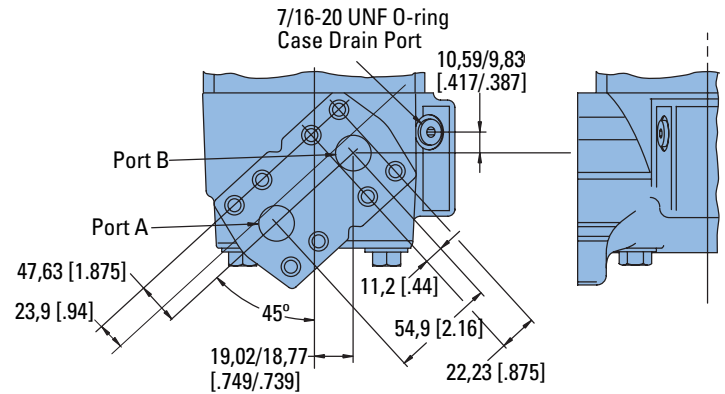
## Dimensions

Ports

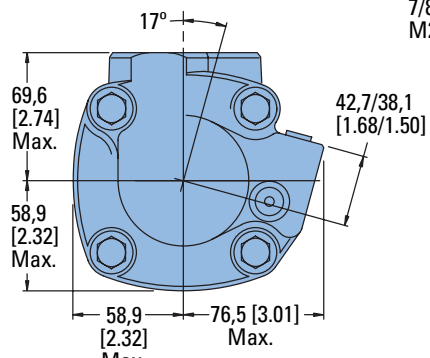
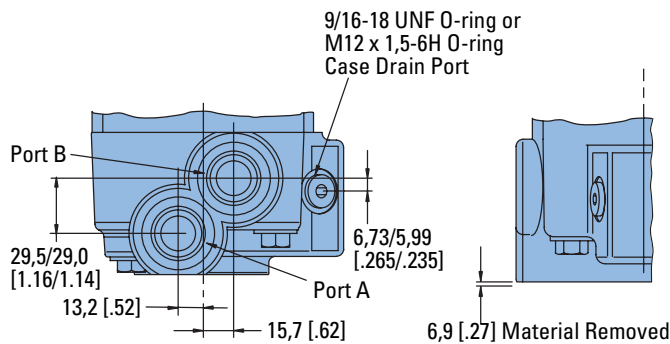
### 1-1/16-12 O-ring Ports (2) or G 3/4 (BSP) Ports (2)



### 4 Bolt 3/4 Inch Split Flange Ports to Fit SAE J518 c (2)



### 7/8-14 O-ring Ports (2) or M22 x 1,5-6H Ports (2)



# 4000 Series

## Product Numbers

### Note:

For 4000 Series Motors with a configuration **Not Shown** in the charts below: Use model code number system on the next page to specify product in detail.

Use digit prefix —109-, 110-, or 111- plus four digit number from charts for complete product number— Example 111-1057.

**Orders will not be accepted without three digit prefix.**

MOUNTING	SHAFT	PORT SIZEDISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER										
		110 [ 6.7]	130 [ 7.9]	160 [ 9.9]	205 [12.5]	245 [15.0]	280* [17.1]	310 [19.0]	395 [24.0]	495 [30.0]	625 [38.0]	
Standard SAE B-Mount	1 1/4 Inch Straight	1 1/16 O-ring	109-1100	-1101	-1102	-1103	-1104	-1094	-1105	-1106	-1212	-1215
		3/4 inch Split Flange	109-1001	-1054	-1002	-1003	-1055	—	-1056	-1057	—	—
	1 5/8 Inch Tapered	1 1/16 O-ring	109-1107	-1108	-1109	-1110	-1111	—	-1112	-1113	-1479	-1455
		3/4 inch Split Flange	109-1006	-1058	-1007	-1008	-1059	—	-1402	-1061	—	—
	1 1/4 Inch 14 T Splined	1 1/16 O-ring	109-1114	-1115	-1116	-1117	-1118	—	-1119	-1120	—	—
		3/4 inch Split Flange	109-1011	-1062	-1012	-1013	-1063	—	-1064	-1065	—	—
Standard SAE C-Mount	40 mm Straight	G 3/4 (BSP)	109-1184	-1185	-1227	-1224	-1225	—	-1189	-1190	—	—
	1 1/4 Inch 17 T Splined	G 3/4 (BSP)	109-1191	-1192	-1193	-1194	-1195	—	-1196	-1197	—	—
Wheel Motor	1 1/4 Inch Straight	1 1/16 O-ring	110-1074	-1075	-1076	-1077	-1078	—	-1079	-1080	—	-1122
		3/4 inch Split Flange	110-1001	-1040	-1002	-1003	-1041	—	-1042	-1043	—	—
	40 mm Straight	G 3/4 (BSP)	110-1108	-1109	-1110	-1111	-1112	—	-1113	-1125	—	—
	1 5/8 Inch Tapered	1 1/16 O-ring	110-1081	-1082	-1083	-1084	-1085	—	-1086	-1087	1116	-1117
		3/4 inch Split Flange	110-1006	-1044	-1007	-1008	-1045	—	-1046	-1047	—	—
	1 1/4 Inch 14 T Splined	1 1/16 O-ring	110-1088	-1089	-1090	-1091	-1092	—	-1093	-1094	—	—
3/4 inch Split Flange		110-1011	-1048	-1012	-1013	-1049	—	-1050	-1051	—	—	
Bearingless	1 1/4 Inch Straight	1 1/16 O-ring	111-1033	-1034	-1035	-1036	-1037	—	-1038	-1039	-1062	-1063
		3/4 inch Split Flange	111-1044	-1015	-1045	-1046	-1016	—	-1017	-1018	—	—
		G 3/4 (BSP)	111-1052	-1053	-1054	-1055	-1056	—	-1057	-1058	—	—

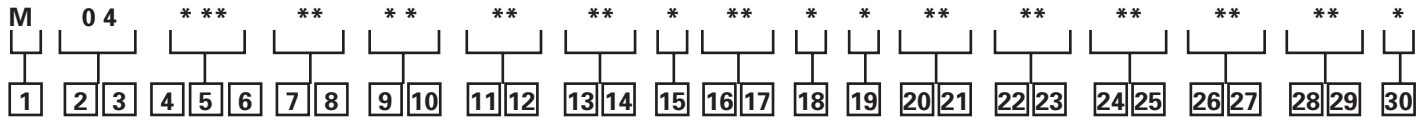
\* New Release

111-1057

# 4000 Series

## Model Code

The following 30-digit coding system has been developed to identify all of the configuration options for the 4000 Series motor. Use this model code to specify a motor with the desired features. All 30 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1 Product M

### 2, 3 Series

04 – 4000 Series

### 4, 5, 6 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

067 – 109.8  
080 – 130.3  
099 – 162.2  
125 – 205.5  
150 – 246.3  
171 – 280.1  
190 – 311.8  
225 – 369.0  
240 – 393.9  
301 – 492.6  
342 – 560.2  
381 – 623.9

### 7, 8 Mounting Type

**AA** – Bearingless, 4 Bolt: 127.00 [5.000] Pilot Dia. 14.27 [.562] Dia. Holes on 161.92 [6.375] Dia. Bolt Circle

**AB** – Standard, 4 Bolt: 101.60 [4.000] Pilot Dia. 14.7 [.58] Slots on 127.00 [5.000] Dia. Bolt Circle. (SAE B)

**AC** – Wheel, 4 Bolt: 139.70 [5.500] Pilot Dia. 14.27 [.562] Dia. Holes on 165.10 [6.500] Dia. Bolt Circle.

**AF** – Standard, 4 Bolt: 127.00 [5.000] Pilot Dia. 14.27 [.562] Dia. Holes on 161.92 [6.375] Dia. Bolt Circle. (SAE C)

**AH** – Standard: ISO Flange 125 B4hw (ISO 3019/2) 124.97 [4.920] Pilot Dia. 14.27 [.562] Dia. Holes on 160.00 [6.299] Dia. Bolt Circle

**AP** – Wheel, 4 Bolt: 160.0 [6.30] Pilot Dia. with 5.8 [.23] Pilot Length and 18.00 [.709] Dia Holes on 200.00 [7.874] Bolt Circle (ISO Compatible)

### 9, 10 Output Shaft

**00** – None (Bearingless)  
**01** – 31.75 [1.250] Dia. Straight With .375-16UNC-2B Thread, 53.1 [2.09] Max Coupling Length, 7.938 [.3125] Sq x 41.27 [1.625] Straight Key

**02** – 41.28 [1.625] Dia. Tapered with 11.112 [.4375] Sq x 31.75 [1.250] Straight Key, 1.250-18UNEF-2A Thread with Slotted Hex Nut  
**03** – 31.75 [1.250] Dia. Flat Root Side Fit, 14 Tooth, 12/24 DP 30° Involute Spline, 38.1 [1.50] Minimum Full Spline Length with .375-16unc-2b Thread

**10** – 38.10 [1.500] Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30°. Involute Spline, 31.2 [1.23] Minimum Full Spline Length, with .375-16 UNC-2B Thread in End

**11** – 40.00 [1.575] Dia. Straight with M12 x 1.75-6H Thread, 7.955 [.3132] x 11.979 [.4716] Wide X 69.98 [2.755] Straight Key

**21** – 40.00 [1.575] Dia. 10:1 Tapered Shaft per ISO R775 with .750-16 UNF-2B Threaded in End, 12W x 8H 70L [.472W x .313H x 2.76L] Key

**22** – None (Bearingless) European Spline

**25** – 42.00 [1.654] Dia. 10:1 Tapered Shaft per ISO R775 with .750-16 UNF-2B Thread in End, 12W x 8H X 63L [.472W X .313H X 2.48L] Key

### 11, 12 Ports

**AA** – .875-14 UNF-2B SAE O-Ring Ports - Staggered Ports

**AB** – 1.0625-12 UN-2B SAE O-Ring Ports - Staggered Ports

**AC** – G 3/4 Ports - Staggered Ports

**AD** – 19.05 [.750] 4 Bolt Split Flange Staggered Ports Standard Pressure Series (Code 61)

**AE** – M22 X 1.5-6H O-Ring Port - Staggered Ports

**AG** – 12.70 [.500] Dia. Manifold Ports

**AJ** – Dash 12 Stc Type II+ (Snap to Connect) Ports - Staggered Ports

### 13, 14 Case Flow Options

**00** – None

**02** – .4375-20 UNF-2B SAE O-ring Port with Check Valve

**03** – G 1/4 BSP Straight Thread with Check Valve

**06** – .4375-20 UNF-2B SAE O-ring Port with Reverse Flow Shuttle

**10** – Dash 6 Stc Type II + (Snap to Connect) Port

### 15 Low Pressure Relief

**00** – None

**A** – Set at 4.5 Bar [65 Lbf/In<sup>2</sup>]

**B** – Set at 15.2 Bar [220 Lbf/In<sup>2</sup>]

**C** – Set at 13.1 Bar [190 Lbf/In<sup>2</sup>]

### 16, 17 Pressure/Flow Option

**00** – None

### 18 Geroler Option

**0** – Standard

### 19 Seal Option

**0** – Standard

**1** – Viton

**4** – Seal Guard

### 20, 21 Accessories

**00** – None

**AC** – M 12 Threaded Connector, Long Body Digital Speed and Direction Pickup (Two 36 Pulse Signals in Quadrature per Revolution Pin 1=Power Supply, Pin 2=Output Signal 1, Pin 3=Common, Pin 4=Output Signal 2)

**AD** – M 12 Threaded Connector, Digital Speed And Direction Pickup (One 72 Pulse per Rev Speed Signal and One Directional Signal (Pin 1=Power, Pin 2=Common, Pin 4=Speed))

### 22, 23 Special Features (Hardware)

**00** – None

**17** – Low Noise Valve Plate

### 24, 25 Special Features (Assembly)

**0** – No Paint, Individual Box

### 26, 27 Paint/Packaging

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black, Individual Box

**C** – Epoxy Coated (Frost Gray), Individual Box

### 28, 29 Customer Identification

**0** – None

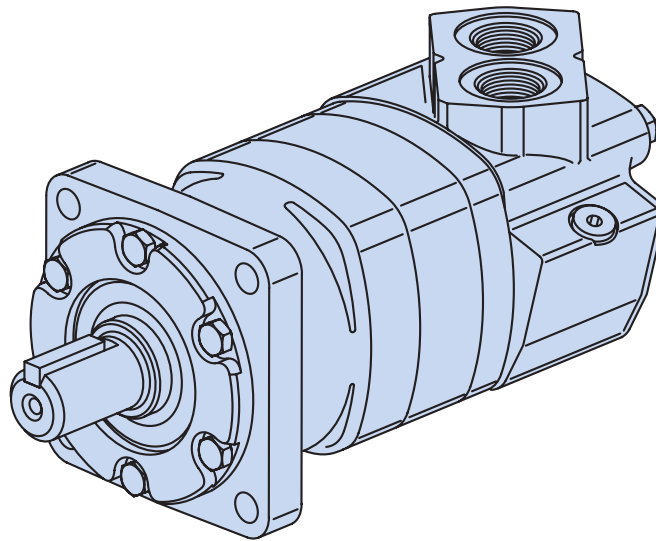
### 30 Design Code

**F** – Sixth

# Notes

# 6000 Series

## Highlights



### Features

- 9 displacements available
- Presents a multitude of options that make this motor very “smart” and flexible to apply

### Benefits

- Very tough motor for demanding applications
- Can be used in a multitude of industries
- Very easy/flexible to integrate in a system

### Applications

- Mobile equipment
- Snow Removal, mowing
- Spayer, trencher
- Wood products

### Description

With torque up to 15,000 in-lb and 40 gpm continuous, this motor is packed with power operates very smoothly.

### Specifications

Geroler Element	9 Displacements
Flow l/min [GPM]	150 [40] Continuous**
	225 [60] Intermittent*
Speed RPM	775 Cont.**
	866 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	300 [4500] Inter.*
Torque Nm [lb-in]	1685 [14920] Cont.**
	1875 [16580] Inter.*

\*\* Continuous — (Cont.) Continuous rating, motor may be run continuously at these ratings.

\* Intermittent — (Inter.) Intermittent operation, 10% of every minute.



Mowing



Snow Removal



Sprayer

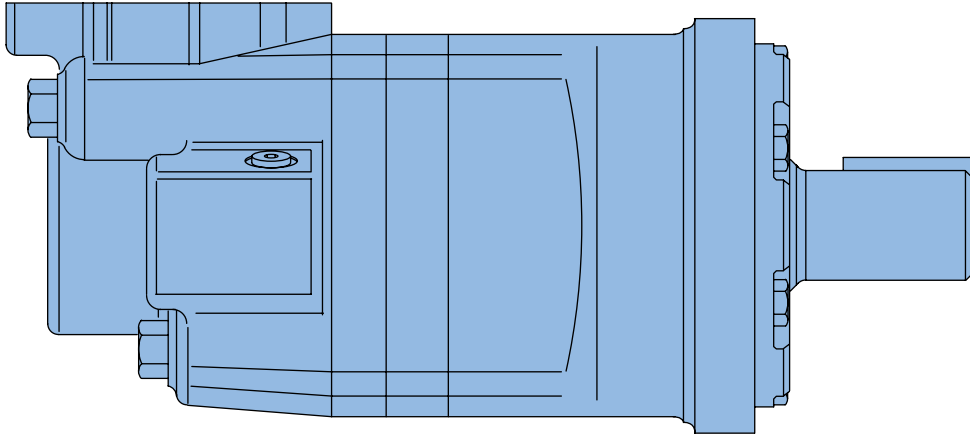


Trencher



# 6000 Series

## Specifications



### 6000 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		195 [11.9]	245 [15.0]	310 [19.0]	390 [23.9]	490 [30.0]	625 [38.0]	735 [45.0]	805 [49.0]	985 [60.0]
Max. Speed (RPM)	Continuous	775	615	485	387	307	241	203	187	153
	Intermittent	866	834	698	570	454	355	303	280	230
@ Flow										
Flow l/min [GPM]	Continuous	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
	Intermittent	170 [45]	210 [55]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]	225 [60]
Torque* Nm [lb-in]	Continuous	575 [5100]	735 [6510]	930 [8230]	1155 [10230]	1445 [12800]	1480 [13100]	1378 [12192]	1582 [14004]	1685 [14920]
	Intermittent	860 [7620]	1100 [9740]	1355 [11990]	1635 [14490]	1885 [16670]	1898 [16800]	1699 [15040]	1850 [16377]	1875 [16580]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	205 [3000]	205 [3000]	170 [2500]	140 [2000]	140 [2000]	140 [2000]
	Intermittent	310 [4500]	310 [4500]	310 [4500]	310 [4500]	275 [4000]	221 [3200]	170 [2500]	170 [2500]	140 [2000]
	Peak	310 [4500]	310 [4500]	310 [4500]	310 [4500]	310 [4500]	240 [3500]	205 [3000]	170 [2500]	170 [2250]
Weight kg [lb]	Standard or Wheel Mount	24,9 [55.0]	25,2 [55.5]	25,6 [56.5]	26,3 [58.0]	27,0 [59.5]	27,9 [61.5]	28,6 [63.0]	29 [64.0]	30,4 [67.0]
	Bearingless	20,2 [44.5]	20,4 [45.0]	20,9 [46.0]	21,5 [47.5]	22,2 [49.0]	23,1 [51.0]	28,3 [52.5]	28,8 [53.5]	30,2 [56.5]

Maximum Case Pressure: See case pressure seal limitation graph.

\*See shaft torque ratings for limitations..

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

310 bar [4500 PSI]  
Do not exceed Δ pressure rating (see chart above).

#### Maximum Return Pressure:

310 bar [4500 PSI] with case drain line installed.  
Do not exceed Δ pressure rating (see chart above).

#### Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

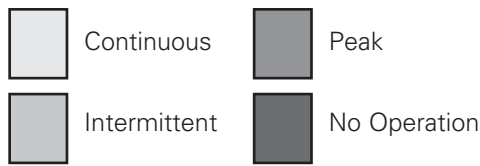
per ISO Cleanliness Code, 4406: 20/18/13

# 6000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

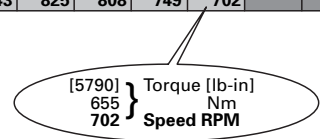


**195 cm<sup>3</sup>/r [11.9 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1,9</b>	[280] 30 9	[650] 75 7	[1450] 165 5	[2290] 260 2						
[2] <b>7,5</b>	[290] 35 38	[680] 75 37	[1500] 170 35	[2340] 265 34	[3100] 350 30	[3880] 440 26	[4140] 470 18			
[4] <b>15</b>	[300] 35 77	[710] 80 76	[1500] 175 74	[2390] 270 72	[3210] 365 66	[4030] 455 62	[4600] 520 46	[5200] 590 32	[5790] 655 18	
[8] <b>30</b>	[310] 35 154	[740] 85 153	[1590] 180 148	[2450] 275 144	[3280] 370 131	[4120] 465 119	[4810] 545 116	[5530] 625 99	[6250] 705 83	[6900] 780 65
[12] <b>45</b>	[320] 35 232	[750] 85 230	[1610] 180 225	[2480] 280 221	[3330] 375 212	[4190] 475 203	[4990] 565 186	[5810] 655 167	[6630] 750 148	[7320] 825 118
[16] <b>61</b>	[300] 35 309	[730] 80 307	[1600] 180 303	[2470] 280 300	[3340] 375 291	[4210] 475 283	[5090] 575 258	[5900] 665 236	[6710] 760 214	[7470] 845 181
[20] <b>76</b>	[270] 30 387	[720] 80 384	[1590] 180 379	[2460] 280 374	[3350] 380 365	[4240] 480 356	[5100] 575 332	[5950] 670 306	[6800] 770 280	[7620] 860 247
[24] <b>91</b>	[240] 25 465	[700] 80 462	[1570] 175 456	[2440] 275 450	[3330] 375 440	[4220] 475 429	[5080] 575 413	[5940] 670 388	[6810] 770 363	
[28] <b>106</b>	[190] 20 542	[660] 75 539	[1530] 175 532	[2400] 270 526	[3300] 375 514	[4200] 475 502	[5060] 570 476	[5940] 670 448	[6810] 770 421	
[32] <b>121</b>	[160] 20 620	[630] 70 617	[1500] 170 609	[2370] 270 602	[3270] 370 589	[4160] 470 576	[5040] 570 542	[5920] 670 511	[6790] 765 480	
[36] <b>136</b>	[120] 15 697	[620] 70 692	[1480] 165 683	[2350] 265 674	[3240] 365 659	[4130] 465 645	[5000] 565 601	[5880] 665 564	[6760] 765 527	
[40] <b>151</b>	[80] 10 775	[610] 70 770	[1450] 165 759	[2320] 260 749	[3210] 365 733	[4100] 465 718	[4960] 560 666	[5840] 660 624		
[45] <b>170</b>		[590] 65 866	[1410] 160 854	[2280] 260 843	[3170] 360 825	[4060] 460 808	[4920] 555 749	[5790] 655 702		

**245 cm<sup>3</sup>/r [15.0 in<sup>3</sup>/r]**  
 Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1,9</b>	[430] 50 7	[860] 95 4	[1890] 215 1							
[2] <b>7,5</b>	[440] 50 30	[900] 100 29	[1940] 220 26	[2990] 340 24	[3960] 445 21	[4920] 555 17	[5040] 570 11	[5930] 670 6		
[4] <b>15</b>	[460] 50 61	[940] 105 60	[2000] 225 56	[3060] 345 54	[4080] 460 48	[5090] 575 42	[5680] 640 39	[6630] 750 30	[7570] 855 12	[8520] 965 6
[8] <b>30</b>	[470] 55 122	[960] 110 120	[2060] 235 116	[3150] 355 113	[4210] 475 104	[5260] 595 95	[6180] 700 81	[7100] 800 67	[8020] 905 53	[9020] 1020 37
[12] <b>45</b>	[480] 55 183	[970] 110 182	[2080] 235 178	[3180] 360 174	[4270] 480 165	[5360] 605 157	[6390] 720 141	[7420] 840 125	[8450] 955 109	[9510] 1075 92
[16] <b>61</b>	[450] 50 245	[960] 110 244	[2070] 235 240	[3180] 360 236	[4290] 485 228	[5420] 610 221	[6480] 730 202	[7490] 845 184	[8480] 960 165	[9540] 1180 145
[20] <b>76</b>	[420] 45 307	[940] 105 306	[2050] 230 301	[3160] 355 297	[4290] 485 287	[5440] 615 277	[6510] 735 257	[7580] 855 238	[8660] 980 218	[9740] 1100 197
[24] <b>91</b>	[380] 45 368	[920] 105 365	[2020] 230 361	[3120] 355 358	[4260] 480 348	[5400] 610 338	[6490] 735 316	[7590] 860 294	[8680] 980 271	
[28] <b>106</b>	[330] 35 430	[870] 100 426	[1980] 225 421	[3100] 350 416	[4240] 480 404	[5380] 610 376	[6480] 730 358	[7580] 855 340	[8670] 980 322	
[32] <b>121</b>	[290] 35 491	[800] 90 489	[1920] 215 481	[3050] 345 475	[4170] 470 461	[5290] 600 448	[6410] 725 423	[7520] 850 398	[8640] 975 373	
[36] <b>136</b>	[250] 30 556	[730] 80 549	[1850] 210 543	[2980] 335 537	[4060] 460 524	[5150] 580 509	[6300] 710 482	[7440] 840 456		
[40] <b>151</b>	[200] 25 615	[690] 80 612	[1790] 200 606	[2940] 330 599	[4010] 455 585	[5130] 580 570	[6190] 700 540	[7100] 800 510		
[45] <b>170</b>		[570] 65 688	[1760] 200 682	[2860] 325 674	[3960] 445 658	[5070] 575 641	[6080] 685 608	[6690] 755 574		
[50] <b>189</b>			[1720] 195 758	[2800] 315 749	[3890] 440 731	[4920] 555 712	[5940] 670 676			
[55] <b>208</b>			[1670] 190 834	[2740] 310 824	[3820] 430 804	[4890] 550 783	[5880] 665 744			







# 6000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No Operation

**310 cm<sup>3</sup>/r [19.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[.5] <b>1.9</b>	[530] 60 6	[1120] 125 4	[2440] 275 1							
[2] <b>7.5</b>	[540] 60 24	[1150] 130 23	[2460] 280 22	[3620] 410 20	[4780] 540 17	[5690] 645 14	[6670] 755 10	[7780] 880 4		
[4] <b>15</b>	[550] 60 48	[1180] 135 47	[2560] 290 45	[3800] 430 42	[5030] 570 38	[6050] 685 32	[7070] 800 24	[8260] 935 17	[9070] 1025 10	[9530] 1075 3
[8] <b>30</b>	[560] 65 96	[1250] 140 95	[2650] 300 91	[3970] 450 87	[5280] 595 81	[6480] 730 73	[7710] 870 64	[8740] 985 55	[9770] 1105 46	[10990] 1240 35
[12] <b>45</b>	[570] 65 144	[1260] 140 143	[2690] 305 140	[4050] 460 135	[5420] 610 129	[6730] 760 121	[8040] 910 111	[9260] 1045 99	[10490] 1185 88	[11800] 1335 76
[16] <b>61</b>	[540] 60 193	[1230] 140 192	[2660] 300 188	[4060] 460 184	[5450] 615 178	[6800] 770 167	[8150] 920 156	[9400] 1060 141	[10660] 1205 126	[11990] 1355 109
[20] <b>76</b>	[510] 60 242	[1200] 135 241	[2630] 295 236	[4040] 455 232	[5450] 615 226	[6820] 770 216	[8190] 925 201	[9520] 1075 184	[10840] 1225 167	
[24] <b>91</b>	[480] 55 290	[1160] 130 289	[260] 295 282	[4020] 455 279	[5440] 615 273	[6840] 775 260	[8230] 930 248	[9560] 1080 232	[10900] 1230 215	
[28] <b>106</b>	[420] 45 339	[1130] 130 336	[2570] 290 333	[3990] 450 328	[5420] 610 320	[6820] 770 308	[8220] 930 295	[9520] 1075 276	[10840] 1225 257	
[32] <b>121</b>	[360] 40 388	[1100] 125 384	[2510] 285 381	[3920] 445 375	[5330] 600 368	[6750] 765 354	[8170] 920 341	[9440] 1065 320		
[36] <b>136</b>	[300] 35 436	[1060] 120 430	[2440] 275 421	[3830] 435 416	[5220] 590 410	[6660] 750 396	[8100] 915 383	[9330] 1055 360		
[40] <b>151</b>	[270] 30 485	[1020] 115 478	[2400] 270 466	[3780] 425 461	[5150] 580 456	[6580] 745 441	[8020] 905 427	[9220] 1040 403		
[50] <b>189</b>		[982] 110 597	[2180] 245 582	[3420] 385 576	[4660] 525 570	[6050] 685 551	[7440] 840 534			
[60] <b>227</b>			[1960] 220 698	[3250] 365 691	[4540] 515 684	[5750] 650 661	[7080] 800 641			

**390 cm<sup>3</sup>/r [23.9 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275	[4500] 310
[1] <b>3.8</b>	[760] 85 4	[1570] 175 2	[3230] 365 1							
[2] <b>7.5</b>	[780] 90 19	[1610] 180 18	[3270] 370 17	[4910] 555 16	[6440] 730 14	[7760] 875 12	[9080] 1025 9	[10590] 1195 4		
[4] <b>15</b>	[800] 90 38	[1640] 185 38	[3300] 375 37	[4970] 560 35	[6570] 740 33	[8160] 920 29	[9570] 1080 22	[11270] 1275 14	[12120] 1370 5	[14490] 1635 1
[8] <b>30</b>	[810] 90 77	[1650] 185 76	[3370] 380 74	[5080] 575 72	[6740] 760 68	[8430] 950 65	[10050] 1135 55	[11620] 1315 45	[12880] 1455 33	[14480] 1635 21
[12] <b>45</b>	[800] 90 115	[1620] 185 115	[3390] 385 112	[5130] 580 109	[6810] 770 105	[8520] 965 100	[10190] 1150 91	[11860] 1340 81	[13640] 1540 79	
[16] <b>61</b>	[750] 85 154	[1600] 180 154	[3380] 380 151	[5120] 580 147	[6820] 770 143	[8560] 965 132	[10230] 1155 126	[11920] 1345 116		
[20] <b>76</b>	[680] 75 193	[1580] 180 193	[3360] 380 189	[5120] 580 187	[6840] 775 182	[8590] 970 175	[10280] 1160 162	[11980] 1355 152		
[24] <b>91</b>	[620] 70 232	[1520] 170 230	[3280] 370 229	[5060] 570 225	[6780] 765 220	[8530] 965 212	[10240] 1155 204			
[28] <b>106</b>	[570] 65 270	[1460] 165 268	[3210] 365 266	[5000] 565 261	[6730] 760 256	[8480] 960 248	[10200] 1150 236			
[32] <b>121</b>	[530] 60 309	[1420] 160 306	[3140] 355 304	[4930] 555 299	[6640] 750 292	[8380] 945 282	[10120] 1145 269			
[36] <b>136</b>	[450] 50 348	[1370] 155 346	[3010] 340 340	[4840] 545 336	[6500] 730 329	[8250] 930 317	[10000] 1130 301			
[40] <b>151</b>	[380] 45 387	[1320] 150 386	[2880] 325 380	[4740] 535 375	[6460] 730 368	[8120] 915 359				
[50] <b>189</b>		[1140] 130 482	[2650] 300 475	[4540] 515 469	[6440] 730 460	[8050] 910 449				
[60] <b>227</b>			[2460] 280 570	[4430] 500 562	[6360] 720 552	[7860] 890 538				

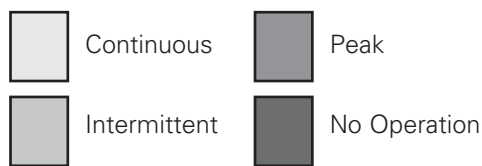
[5750]  
650  
661 } Torque [lb-in]  
Nm  
Speed RPM

# 6000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



**490 cm<sup>3</sup>/r [30.0 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
[1] <b>3,8</b>	[1010] 115 7	[1200] 235 7	[4260] 480 5	[6140] 695 3					
[2] <b>7,5</b>	[1020] 115 15	[2110] 240 14	[4270] 480 13	[6280] 710 12	[8350] 945 11	[10420] 1175 8	[12140] 1370 3		
[4] <b>15</b>	[1030] 115 30	[2100] 235 30	[4280] 485 29	[6410] 725 28	[8500] 960 27	[10590] 1195 25	[12500] 1410 21	[14580] 1645 17	[16670] 1885 12
[8] <b>30</b>	[1020] 115 60	[2090] 235 60	[4290] 485 59	[6490] 735 57	[8620] 975 54	[10740] 1215 51	[12800] 1445 45	[14930] 1685 38	
[12] <b>45</b>	[1000] 115 91	[2080] 235 91	[4290] 485 89	[6500] 735 87	[8650] 975 84	[10800] 1220 79	[12890] 1455 71		
[16] <b>61</b>	[110] 960 122	[2060] 235 122	[4260] 480 121	[6480] 730 118	[8650] 975 114	[10820] 1220 109	[12900] 1460 100		
[20] <b>76</b>	[900] 100 153	[1980] 225 152	[4180] 470 150	[6420] 725 147	[8620] 975 144	[10820] 1220 139			
[24] <b>91</b>	[850] 95 184	[1930] 220 184	[4150] 470 181	[6390] 720 180	[8580] 970 176	[10770] 1215 171			
[28] <b>106</b>	[740] 85 215	[1840] 210 214	[4070] 460 211	[6290] 710 208	[8500] 960 204	[10720] 1210 198			
[32] <b>121</b>	[690] 80 245	[1710] 195 244	[3970] 450 241	[6190] 700 237	[8420] 950 232	[10660] 1205 226			
[36] <b>136</b>	[670] 75 276	[1560] 175 275	[3860] 435 272	[6080] 685 265	[8340] 940 260	[10420] 1175 255			
[40] <b>151</b>	[570] 65 307	[1400] 160 306	[3750] 425 303	[5970] 675 295	[8140] 920 290	[10180] 1150 284			
[50] <b>189</b>		[1140] 130 382	[3240] 365 379	[5220] 590 369	[7620] 860 362				
[60] <b>227</b>			[2860] 325 454	[4860] 550 442	[7140] 805 435				

Flow LPM [GPM]

**625 cm<sup>3</sup>/r [38.0 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3200] 221
[1] <b>3,8</b>	[1060] 120 5	[2205] 250 5	[4515] 510 4	[6690] 755 2				
[2] <b>7,5</b>	[1090] 125 12	[2300] 260 12	[4720] 535 13	[7025] 795 10	[9360] 1060 6			
[4] <b>15</b>	[1145] 130 24	[2450] 275 24	[5052] 570 24	[7520] 850 21	[9410] 1065 16	[12700] 1434 13		
[8] <b>30</b>	[1195] 135 45	[2600] 295 45	[5350] 605 44	[8195] 925 42	[11220] 1270 37	[13100] 1480 35	[15800] 1785 32	[16800] 1898 30
[12] <b>45</b>	[1200] 135 72	[2600] 295 72	[5390] 610 71	[8145] 920 68	[11770] 1330 64	[13000] 1469 60	[15700] 1774 56	
[16] <b>61</b>	[1120] 125 94	[2530] 285 94	[5340] 605 92	[8105] 915 89	[11740] 1325 85	[13000] 1469 83		
[20] <b>76</b>	[1050] 120 120	[2465] 280 119	[5285] 595 117	[8080] 915 115	[11725] 1325 110			
[24] <b>91</b>	[950] 105 144	[2365] 265 143	[5180] 585 140	[7990] 905 138	[11705] 1320 132			
[28] <b>106</b>	[855] 95 169	[2255] 255 168	[5080] 575 165	[7915] 895 162	[11640] 1315 156			
[32] <b>121</b>	[730] 80 193	[2140] 240 192	[4960] 560 188	[7775] 880 185	[11505] 1300 179			
[36] <b>136</b>	[555] 65 217	[1965] 220 216	[4780] 540 213	[7585] 855 210				
[40] <b>151</b>	[380] 45 241	[1790] 200 240	[4600] 520 238	[7395] 835 236				
[50] <b>189</b>			[4180] 470 296	[6985] 790 290				
[60] <b>227</b>			[3800] 430 353	[6600] 745 345				

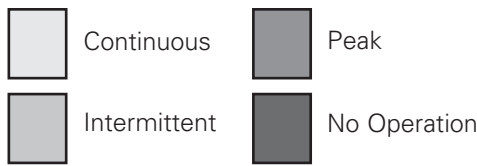


# 6000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



### 805 cm<sup>3</sup>/r [49.0 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

### 735 cm<sup>3</sup>/r [45.0 in<sup>3</sup>/r] Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
[1] <b>3,8</b>	[1455] 164 4	[3100] 350 4	[4680] 529 2	[6031] 681 2	[7799] 881 1					
[2] <b>7,5</b>	[1483] 168 9	[3173] 359 9	[5121] 579 9	[6432] 727 8	[8510] 961 7	[9633] 1088 6	[11319] 1279 5	[12127] 1370 5		
[4] <b>15</b>	[1547] 175 19	[3331] 376 19	[5292] 598 18	[6744] 762 17	[8714] 984 16	[10075] 1138 15	[11352] 1283 14	[12539] 1417 12	[14564] 1645 11	[16377] 1850 10
[8] <b>30</b>	[1599] 181 35	[3473] 392 35	[5415] 612 34	[7039] 795 33	[8934] 1009 32	[10629] 1201 31	[11842] 1338 29	[14004] 1582 29	[15441] 1745 28	
[12] <b>45</b>	[1599] 181 56	[3469] 392 56	[5415] 612 55	[7093] 801 53	[9024] 1020 53	[10658] 1204 52	[12283] 1388 50	[13726] 1551 50		
[16] <b>61</b>	[1543] 174 73	[3395] 384 73	[5357] 605 72	[7032] 794 70	[8983] 1015 69	[10640] 1202 68	[12010] 1357 67			
[20] <b>76</b>	[1457] 165 93	[3312] 374 92	[5292] 598 91	[6968] 787 89	[8943] 1010 88	[10583] 1196 87	[12146] 1372 86			
[24] <b>91</b>	[1352] 153 112	[3183] 360 112	[5088] 575 111	[6811] 769 110	[8812] 996 108	[10411] 1176 106				
[28] <b>106</b>	[1213] 137 131	[3055] 345 131	[5047] 570 131	[6713] 758 129	[8681] 981 128	[10411] 1176 127				
[32] <b>121</b>	[1075] 121 150	[2907] 328 149	[4884] 552 149	[6546] 740 146	[8395] 949 145	[10060] 1137 144				
[36] <b>136</b>	[823] 93 168	[2692] 304 168	[4663] 527 168	[6320] 714 167	[8118] 917 165					
[40] <b>151</b>	[592] 67 187	[2477] 280 186	[4426] 500 186	[6085] 688 185	[7832] 885 184					
[50] <b>189</b>		[2730] 308 234	[4214] 476 233	[5849] 661 231	[7603] 859 230					
[60] <b>227</b>			[3806] 430 280	[5459] 617 277	[7407] 837 275					

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170
[1] <b>3,8</b>	[1311] 148 4	[2775] 314 4	[4200] 475 3	[5480] 619 3	[7000] 791 2					
[2] <b>7,5</b>	[1340] 151 10	[2856] 323 10	[4535] 512 10	[5809] 656 10	[7551] 853 9	[8685] 981 7	[10182] 1150 6	[11121] 1257 5		
[4] <b>15</b>	[1253] 142 20	[2854] 322 20	[4363] 493 19	[5813] 657 18	[7272] 822 17	[8714] 985 16	[10135] 1145 14	[11537] 1303 13	[12970] 1465 11	[15040] 1699 11
[8] <b>30</b>	[1290] 146 40	[2889] 326 39	[4540] 513 38	[6130] 693 38	[7703] 870 37	[9202] 1040 37	[10666] 1205 35	[12192] 1378 33	[13713] 1549 32	
[12] <b>45</b>	[1277] 144 61	[2821] 319 60	[4528] 512 59	[6180] 698 58	[7795] 881 57	[9338] 1055 56	[10877] 1229 54	[12419] 1403 52		
[16] <b>61</b>	[1196] 135 82	[2753] 311 80	[4478] 506 79	[6148] 695 78	[7768] 878 77	[9376] 1059 76	[10984] 1241 74			
[20] <b>76</b>	[1092] 123 102	[2794] 316 101	[4320] 488 101	[6021] 680 99	[7697] 870 97	[9311] 1052 96	[10907] 1232 93			
[24] <b>91</b>	[1206] 136 123	[2556] 289 122	[4162] 470 120	[5871] 663 119	[7564] 855 118	[9289] 1049 116				
[28] <b>106</b>	[1083] 122 145	[2338] 264 142	[4040] 456 141	[5666] 640 139	[7365] 832 137	[9022] 1019 135				
[32] <b>121</b>	[950] 107 163	[2110] 238 162	[3795] 429 162	[5457] 617 159	[7122] 805 159	[8828] 997 156				
[36] <b>136</b>	[726] 82 184	[1845] 208 183	[3517] 397 182	[5223] 590 181	[6853] 774 179					
[40] <b>151</b>	[515] 58 203	[2227] 252 202	[3270] 369 202	[4965] 561 201	[6672] 754 199					
[50] <b>189</b>			[3869] 437 254	[4148] 469 252	[5850] 661 250					
[60] <b>227</b>				[4856] 549 303	[6604] 746 301					







# 6000 Series

## Performance Data

985 cm<sup>3</sup>/r [60.0 in<sup>3</sup>/r]  
D Pressure Bar [PSI]

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous		Peak
	Intermittent		No Operation

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140
[1] <b>3,8</b>	[1890] 215 3	[4110] 465 3	[5730] 645 2	[7640] 865 2	[9550] 1080 1			
[2] <b>7,5</b>	[1910] 215 8	[4140] 470 8	[6270] 710 7	[8300] 940 7	[10420] 1175 6	[12500] 1410 5	[13860] 1565 4	[14920] 1685 3
[4] <b>15</b>	[1980] 225 15	[4290] 485 15	[6480] 775 15	[8540] 965 14	[10670] 1205 14	[12800] 1445 13	[13900] 1570 13	[15850] 1790 12
[8] <b>30</b>	[2030] 230 30	[4400] 495 30	[6630] 750 30	[8790] 995 29	[10940] 1235 28	[13090] 1480 27	[14500] 1640 26	[16580] 1875 25
[12] <b>45</b>	[2020] 230 45	[4390] 495 45	[6630] 750 45	[8860] 1000 44	[11050] 1250 43	[13240] 1495 42	[15040] 1700 41	
[16] <b>61</b>	[2010] 225 61	[4320] 490 61	[6560] 740 61	[8790] 995 60	[11000] 1245 59	[13260] 1500 58		
[20] <b>76</b>	[1910] 215 77	[4220] 475 77	[6480] 730 76	[8720] 985 76	[10950] 1235 75	[13160] 1485 74		
[24] <b>91</b>	[1810] 205 92	[4060] 460 92	[6230] 705 92	[8500] 960 91	[10790] 1220 90	[12990] 1470 89		
[28] <b>106</b>	[1620] 185 107	[3920] 445 107	[6180] 700 107	[8420] 950 106	[10630] 1200 105	[12820] 1450 103		
[32] <b>121</b>	[1480] 165 123	[3740] 425 123	[5980] 675 122	[8200] 925 121	[10280] 1160 120			
[36] <b>136</b>	[1140] 130 138	[3490] 395 138	[5710] 645 138	[7930] 895 137	[9940] 1125 135			
[40] <b>151</b>	[850] 95 153	[3240] 365 153	[5420] 610 152	[7640] 865 151	[9590] 1085 150			
[50] <b>189</b>		[2960] 325 191	[5160] 585 190	[7350] 830 189	[9310] 1050 188			
[60] <b>227</b>			[4660] 525 230	[7160] 810 229	[9070] 1025 226			

[7160]  
810  
229 } Torque [lb-in]  
Nm  
Speed RPM

# 6000 Series

## Dimensions

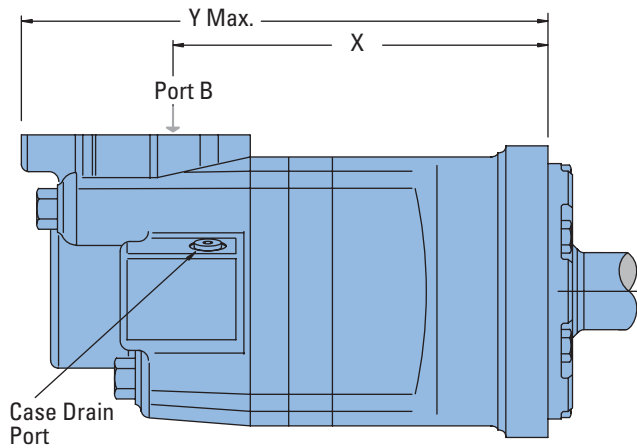
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

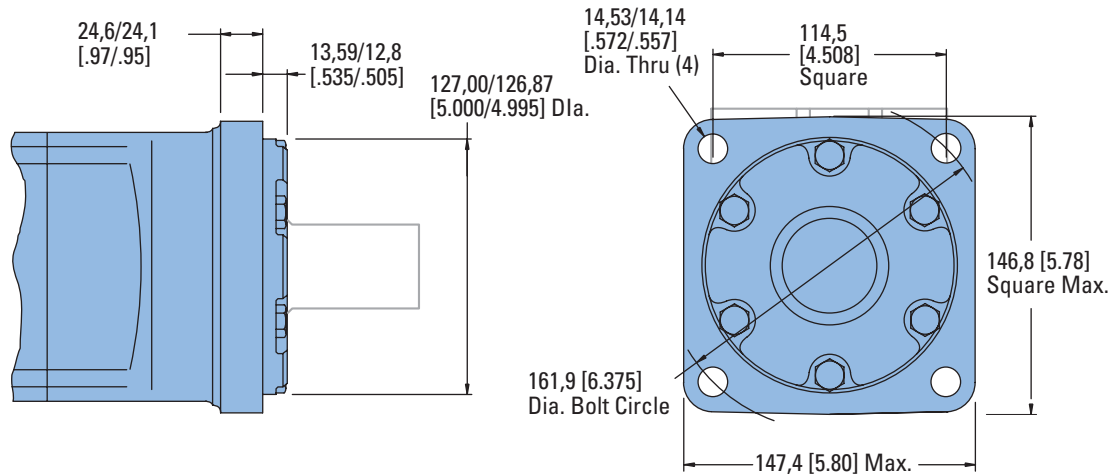
### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Standard Mount



### Standard SAE CC Flange



### STANDARD MOTOR MOUNT DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
195 [11.9]	187,5 [ 7.38]	270,0 [10.63]
245 [15.0]	193,0 [ 7.60]	275,6 [10.85]
310 [19.0]	200,4 [ 7.89]	283,0 [11.14]
390 [23.9]	209,0 [ 8.23]	291,6 [11.48]
490 [30.0]	220,2 [ 8.67]	302,8 [11.92]
625 [38.0]	235,0 [ 9.25]	317,5 [12.50]
985 [60.0]	274,6 [10.81]	357,1 [14.06]



# 6000 Series

## Dimensions

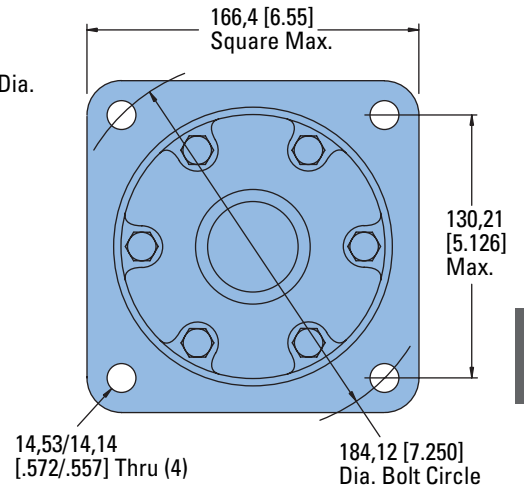
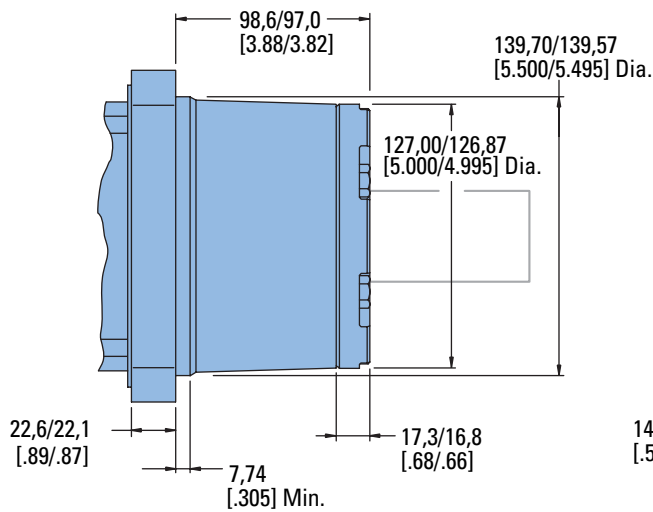
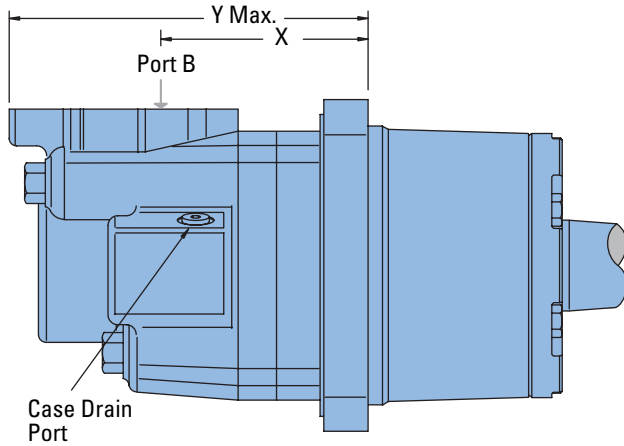
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Wheel Mount



### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
195 [11.9]	102,6 [4.04]	185,2 [7.29]
245 [15.0]	108,2 [4.26]	190,8 [7.51]
310 [19.0]	115,6 [4.55]	198,1 [7.80]
390 [23.9]	124,5 [4.90]	207,1 [8.15]
490 [30.0]	135,4 [5.33]	217,9 [8.58]
625 [38.0]	150,1 [5.91]	232,7 [9.16]
985 [60.0]	189,7 [7.47]	272,5 [10.73]

# 6000 Series

## Dimensions

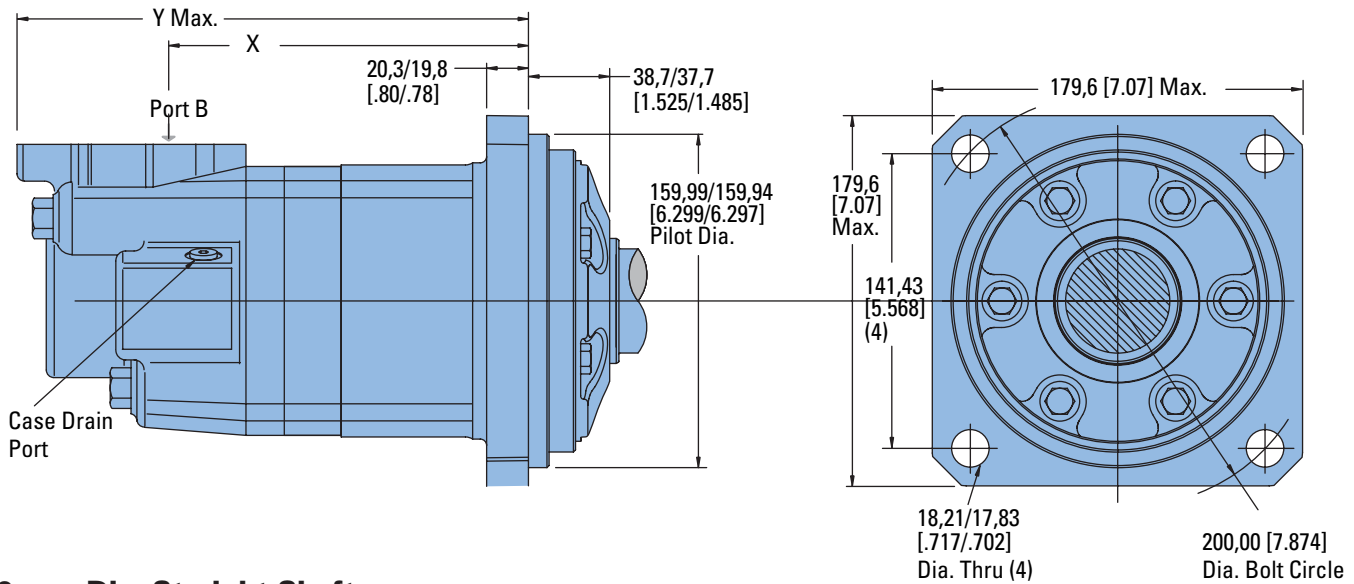
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

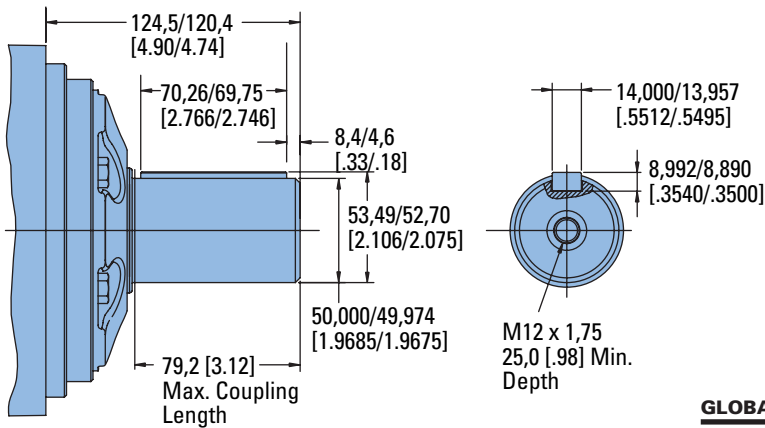
### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Global Mount (ISO)



### 50 mm Dia. Straight Shaft



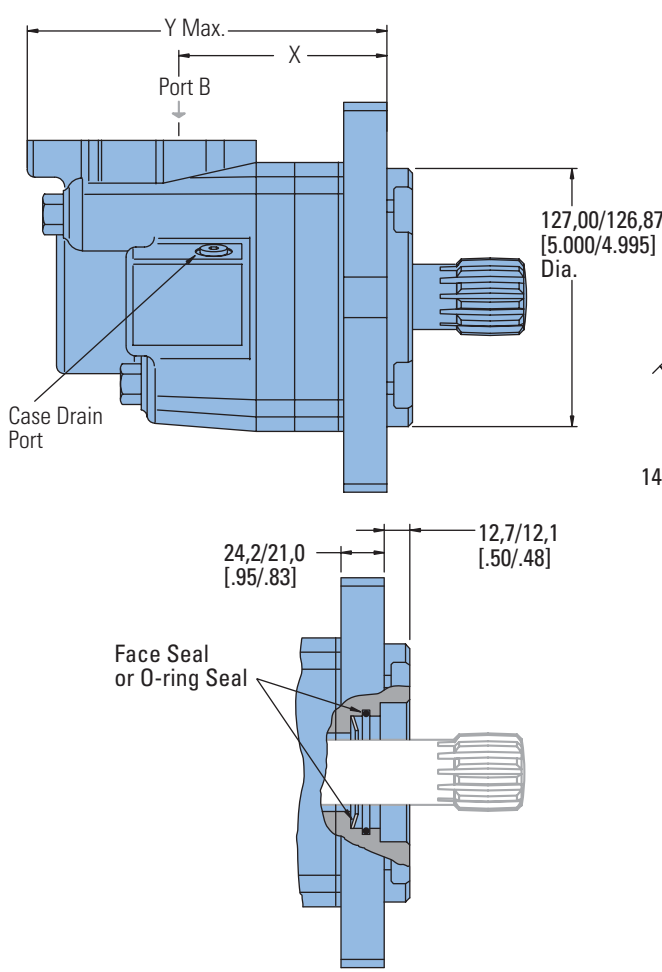
### GLOBAL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
310 [19.0]	182,4 [ 7.18]	264,9 [10.43]
390 [24.0]	191,0 [ 7.52]	273,6 [10.77]
490 [30.0]	202,2 [ 7.96]	284,7 [11.21]
625 [38.0]	216,9 [ 8.54]	299,5 [11.79]
800 [45.0]	229,4 [ 9.03]	312,2 [12.29]
800 [49.0]	236,7 [ 9.32]	319,3 [12.57]
985 [60.0]	256,5 [10.10]	339,1 [13.35]

# 6000 Series

## Dimensions

### Bearingless

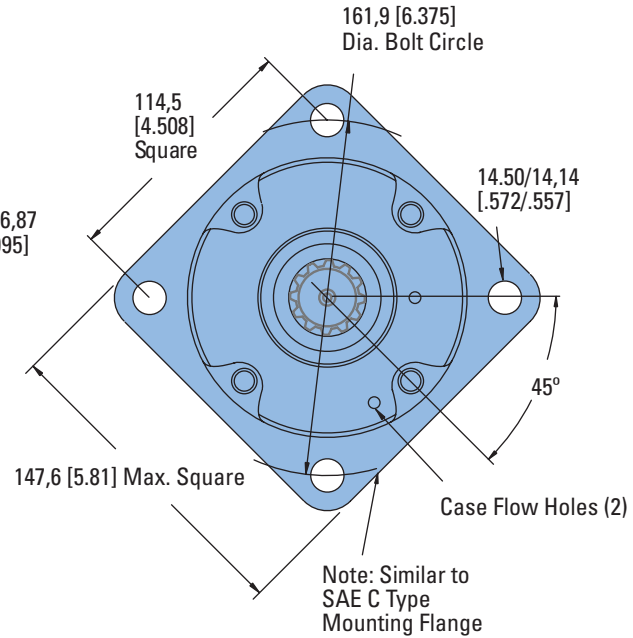


### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 3/4 inch Split Flange Ports (2)
- 7/16 -20 UNF-2B SAE O-ring Case Drain Port (1) or
- G 1 (BSP) Staggered Ports (2)
- G 1/4 (BSP) Case Drain Port (1) or
- 1 5/16 UN-2B SAE O-ring Staggered Ports (2) with Shuttle
- 9/16 -20 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

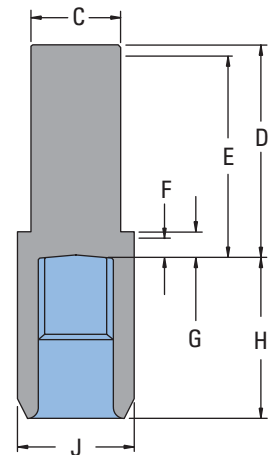


For 6000 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

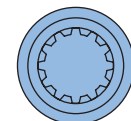
### Note:

After machining blank, part must be hardened per Eaton specification.

- C 47,2 [1.86] Dia.
- D 111,5 [4.39] Max.
- E 106,4 [4.19] Full Form Dia.
- F 6,9 [.27] Min. Full Form Dia.
- G 10,2 [.40] Min.
- H 86,1 [3.39] Max.
- J 66,5 [2.62] Dia.



Mating Coupling Blank  
Eaton Part No. 12778-002



### BEARINGLESS MOTOR DIMENSIONS

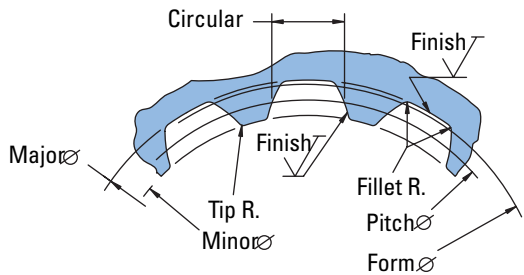
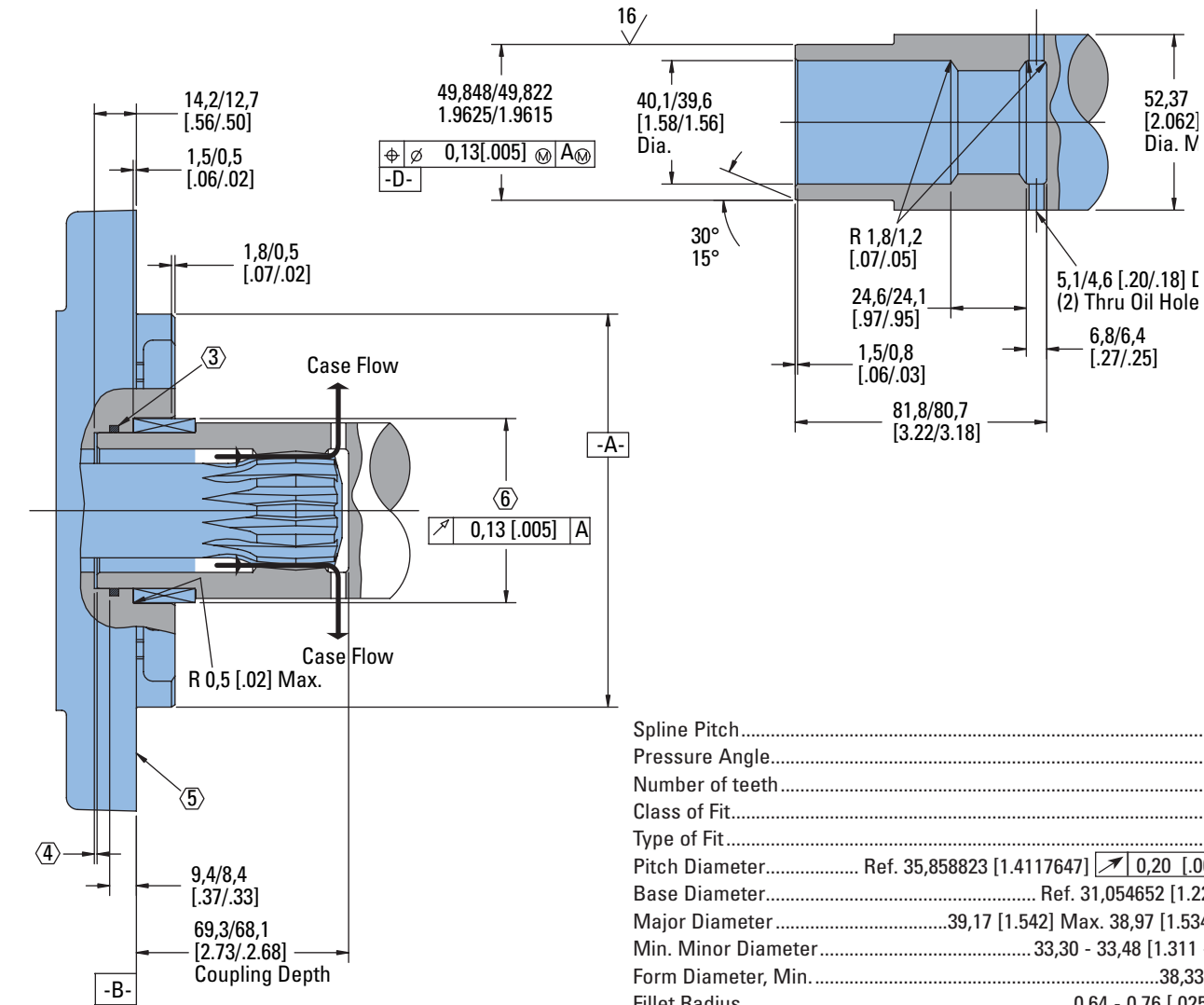
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
195 [11.9]	105,4 [4.15]	188,0 [7.40]
245 [15.0]	111,0 [4.37]	193,5 [7.62]
310 [19.0]	118,4 [4.66]	200,9 [7.91]
390 [23.9]	127,3 [5.01]	209,6 [8.25]
490 [30.0]	138,2 [5.44]	220,7 [8.69]
625 [38.0]	152,9 [6.02]	235,5 [9.27]
985 [60.0]	192,8 [7.59]	275,1 [10.83]

# 6000 Series

## Installation Information

Bearingless

- 1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 - 1,02 [.030 - .040] (dimensions apply after heat treat).
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Some means of maintaining clearance between shaft and mounting flange must be provided.
- 5 Similar to SAE "C" Four Bolt Flange..
- 6 Counterbore designed to adapt to a standard sleeve bearing 50,010 - 50,038 [1.9689 - 1.9700] ID by 60,051 - 60,079 [2.3642 - 2.3653] O.D. (Oilite bronze sleeve bearing).



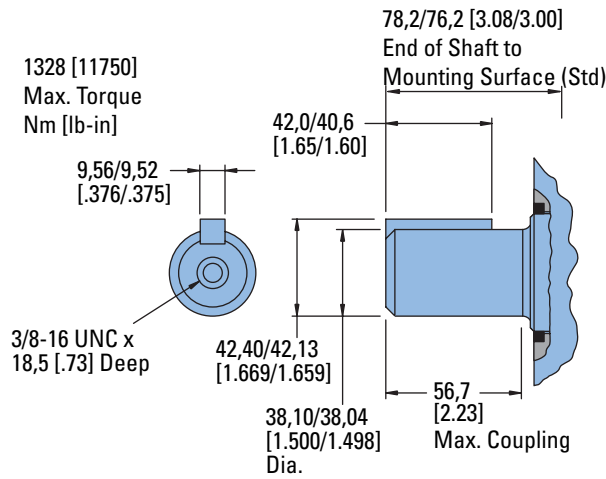
Spline Pitch.....	8.5/17
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 35,858823 [1.4117647] $\begin{matrix} \nearrow & 0,20 & [.008] &   & D \end{matrix}$
Base Diameter.....	Ref. 31,054652 [1.2226241]
Major Diameter.....	39,17 [1.542] Max. 38,97 [1.534] Min..
Min. Minor Diameter.....	33,30 - 33,48 [1.311 - 1.318]
Form Diameter, Min.....	38,33 [1.509]
Fillet Radius.....	0,64 - 0,76 [.025 - .030]
Tip Radius.....	0,25 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 - .0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,898 [.2322]
Minimum Effective.....	5,804 [.2285]
Maximum Effective.....	Ref. 5,857 [.2306]
Minimum Actual.....	Ref. 5,834 [.2297]
Dimension Between Two Pins.....	Ref. 26,929 - 27,084 [1.0602 - 1.0663]
Pin Diameter.....	6,223 [.2450] Pins to Have 4,0 [.160]
	Wide Flat for Root Clearance

# 6000 Series

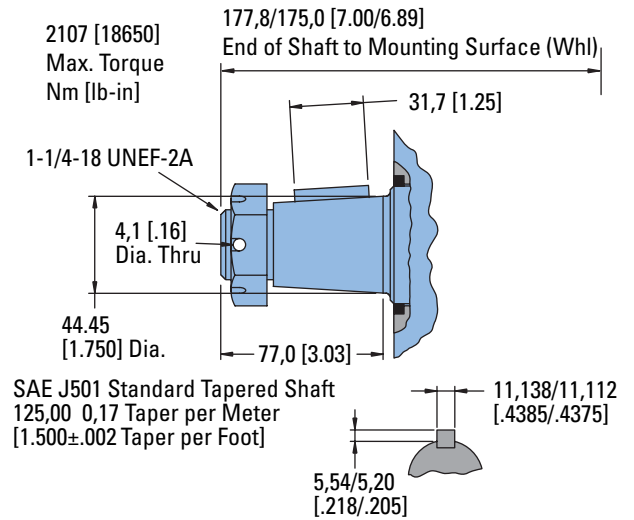
## Dimensions

Shafts Splined

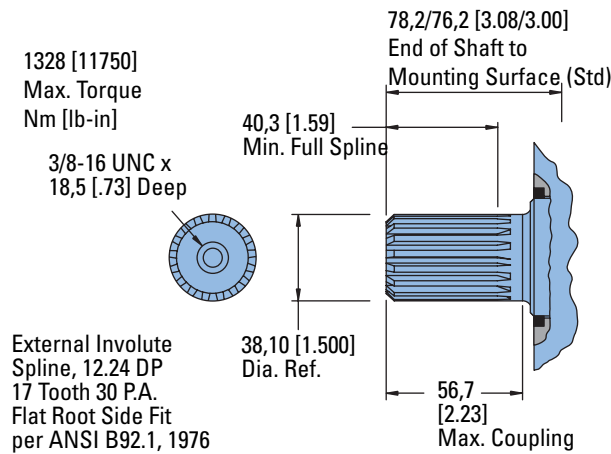
### 1 1/2 Inch Straight



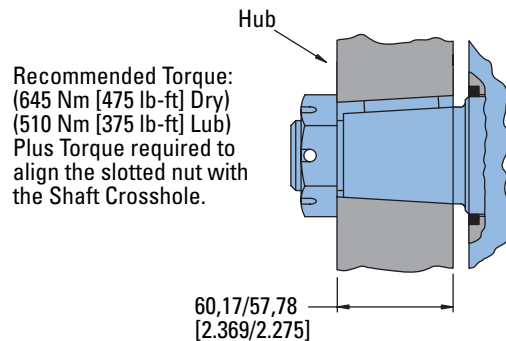
### 1 3/4 Inch Tapered



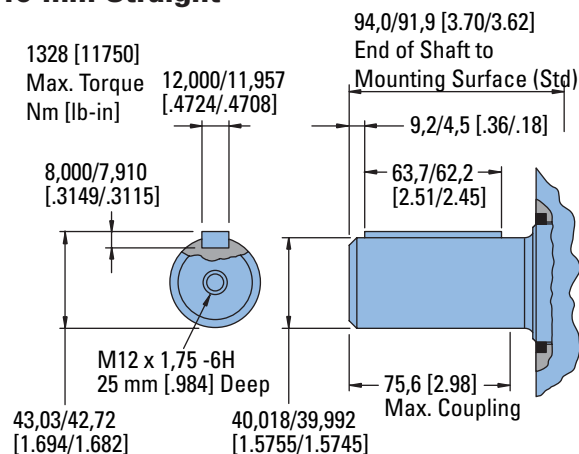
### 1 1/2 Inch 17 Tooth Splined



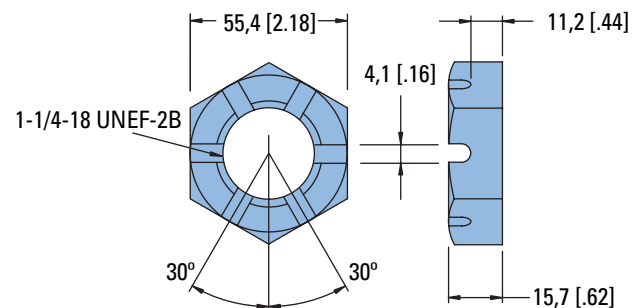
### Tapered Shaft Hub Data



### 40 mm Straight



### Slotted Hexagon Nut



# 6000 Series

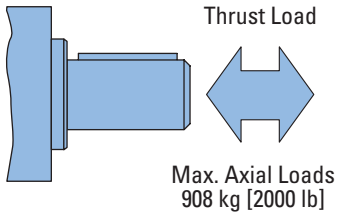
## Shaft Side Load Capacity

These curves indicate the radial load capacity on the motor shaft(s) at various locations with an external thrust load of 454 kg [1000 lb]. The maximum allowable thrust load is 908 kg [2000 lb].

**Note:**

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 109 kg/7 Bar [241 lb/100 PSI].

**Each curve is based on**



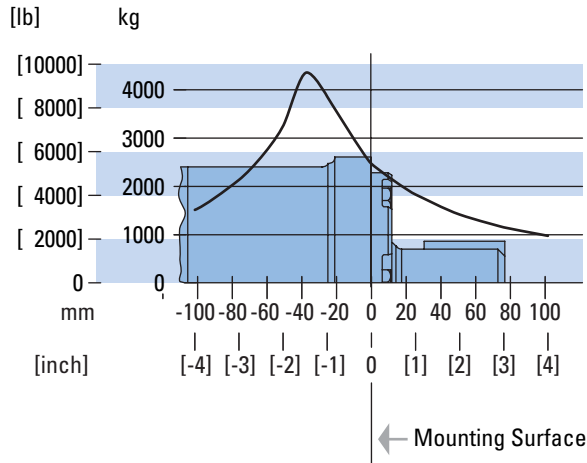
**B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

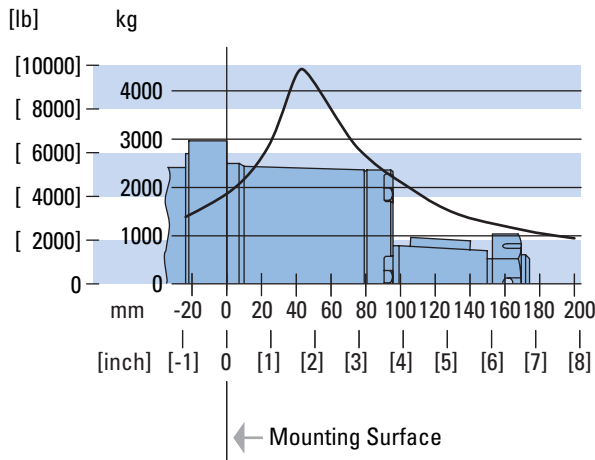
RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

**Standard Motor  
Straight and Splined Shafts**



**Wheel Motor Tapered Shaft**



# 6000 Series

## Case Pressure and Case Port

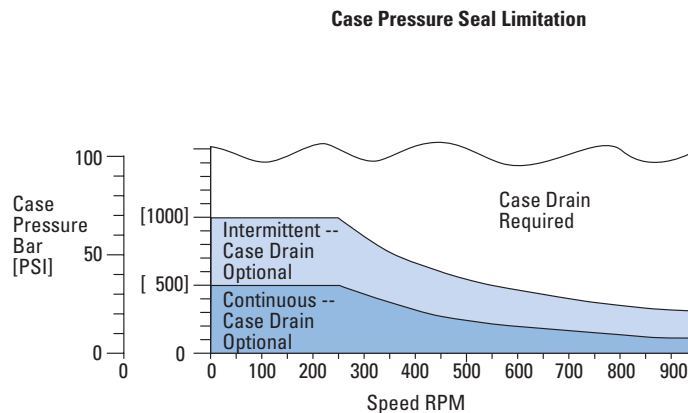
Char-Lynn 6000 Series motors are durable and have long life as long as the recommended case pressure is not exceeded. Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.

### Case Porting Advantage

**Contamination Control** — flushing the motor case.

**Cooler Motor** — exiting oil draws motor heat away.

**Extend Motor Seal Life** — maintain low case pressure with a preset restriction in the case drain line.

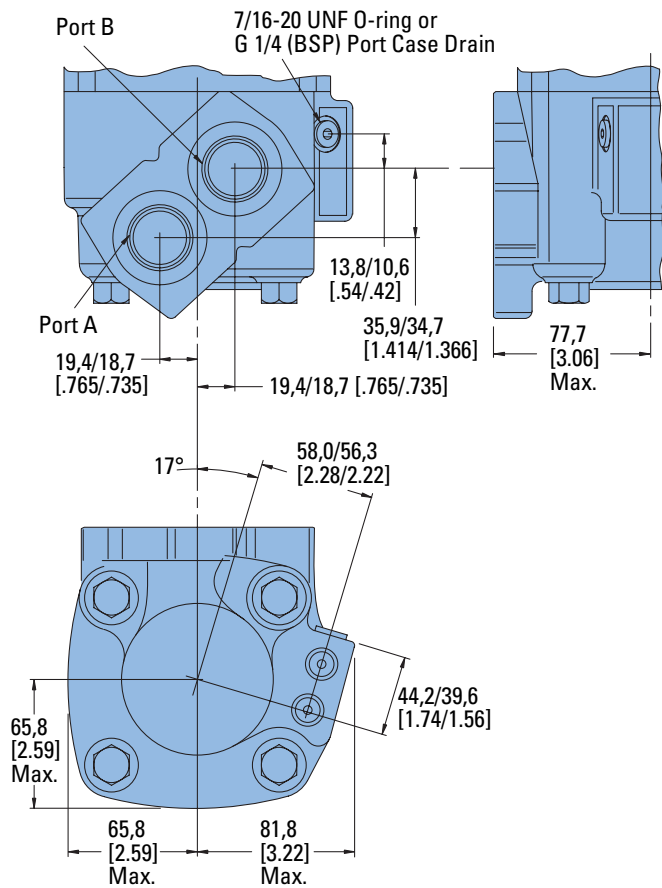




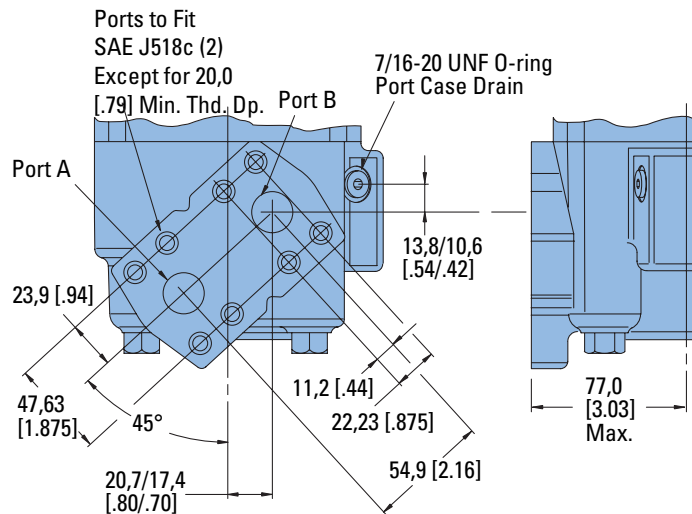
# 6000 Series

## Dimensions Ports

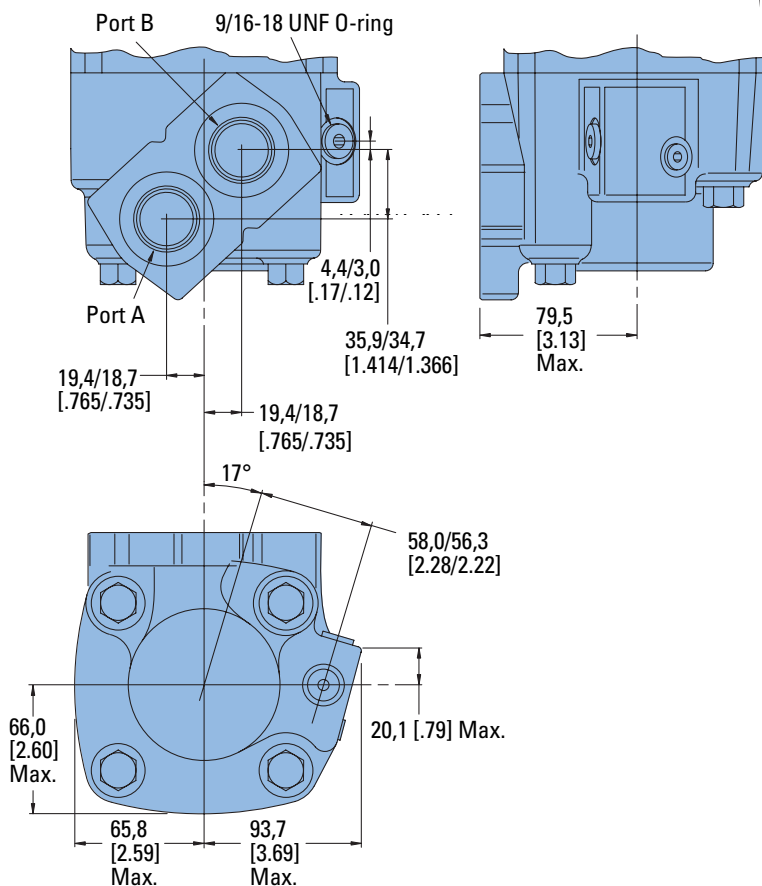
### 1 5/16 -12 O-ring Ports (2) or G 1 (BSP) Ports (2)



### 4 Bolt 3/4 Inch Split Flange



### 1 5/16 -12 O-ring Ports (2) with Shuttle



# 6000 Series

## Product Numbers

### Note:

For 6000 Series Motors with a configuration **Not Shown** in the charts above: Use model code number system on the next page to specify product in detail.

Use digit prefix — 112-, 113-, or 114 - plus four digit number from charts for complete product number— Example 114-1047.

**Orders will not be accepted without three digit prefix.**

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER								
			195 [11.9]	245 [15.0]	310 [19.0]	390 [23.9]	490 [30.0]	625 [38.0]	735* [45.0]	805* [49.0]	985 [60.0]
Standard	1 1/2 inch Straight	1 5/16 O-ring	112-1064	-1065	-1066	-1067	-1068	-1107	-1145	—	-1069
	40 mm Straight	G 1 (BSP)	112-1094	-1095	-1096	-1097	-1098	—	—	—	-1099
	1 1/2 Inch 17 T Splined	1 5/16 O-ring	112-1058	-1059	-1060	-1061	-1062	-1109	1163	—	-1063
G 1 (BSP)		112-1088	-1089	-1090	-1091	-1092	—	—	—	-1093	
Wheel Motor	40 mm Straight	G 1 (BSP)	113-1082	-1083	-1084	-1085	-1086	-1100	—	—	-1087
	1-3/4 Inch Tapered	1 5/16 O-ring	113-1070	-1071	-1072	-1073	-1074	-1093	—	—	-1075
Bearingless		1 5/16 O-ring	114-1031	-1032	-1033	-1034	-1035	-1055	—	—	-1036
		G 1 (BSP)	114-1043	-1044	-1045	-1046	-1047	—	—	—	-1048

\*New release

114-1047

### Mounting Type - Standard (Code H), 4 Bolt:

- 160,0 [6.30] Pilot Dia.
- 18,01 [.709] Dia. Mounting Holes
- 200,0 [7.87] Dia. Bolt Circle

Output Shaft - Straight (Code 21)

Ports - G1 (BSP) Staggered G 1/4 Case Drain (Code C)

Paint - Low Gloss Black (Code A)

Use digit prefix — 112- plus four digit number from charts for complete product number— Example 112-1215.

**Orders will not be accepted without three digit prefix.**

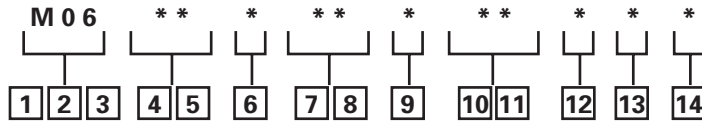
MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER						
			310 [19.0]	390 [23.9]	490 [30.0]	625 [38.0]	735 [45.0]	805 [49.0]	985 [60.0]
Standard	50 mm Straight	G 1 (BSP)	112-1217	-1218	-1215	-1216	-1247	-1219	-1220

112-1215

# 6000 Series

## Model Code

The following 14-digit coding system has been developed to identify all of the configuration options for the 6000 Series motor. Use this model code to specify a motor with the desired features. All 14 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1, 2, 3 Product Series

**M06** – 6000 Motor

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

- 07** – 110 [6.7]
- 12** – 195 [11.9]
- 15** – 245 [15.0]
- 19** – 310 [19.0]
- 24** – 390 [23.9]
- 30** – 490 [30.0]
- 38** – 625 [38.0]
- 45** – 740 [45.0]
- 49** – 805 [49.0]
- 60** – 985 [60.0]

### 6 Mounting Type

- A** – 4 Bolt (Bearingless 127,0 [5.00] Pilot Dia. and 14,3 [.56] Dia. Mounting Holes 161,9 [6.38] Dia. B.C.
- B** – 4 Bolt (SAE CC) (Standard) 127,0 [5.00] Pilot Dia. and 14,3 [.56] Mounting Holes on 161,9 [6.38] Dia. B.C.
- C** – 4 Bolt (Wheel) 139,7 [5.50] Pilot Dia. and 14,3 [.56] Dia. Mounting Holes on 184,1 [7.25] Dia. B.C.
- H** – 4 Bolt (Global) (Standard) 160,0 [6.30] Pilot Dia. and 18,0 [.709] Dia. Mounting Holes on 200,0 [7.87] Dia. Bolt Circle

### 7, 8 Output Shaft

- 00** – None (Bearingless)
- 01** – 1 1/2 inch Dia. Straight with Straight Key, 3/8-16 Threaded Hole and 56,7 [2.23] Max. Coupling Length
- 02** – 1 3/4 inch Dia. Tapered with Straight Key and 1-1/4 18 UNEF Slotted Hex. Nut
- 03** – 1 1/2 inch Dia. Splined 17T with 40,3 [1.59] Min. Full Spline Length and 3/8 -16 Threaded Hole
- 10** – 40 mm Dia. Straight with Straight Key, M12 x 1,75- 6H Threaded Hole
- 21** – 50 mm Dia. Straight with Straight Key, 14W x 9H x 70L, M12 x 1,75-6H Thread in End (Available with Mounting Flange Code H Only)
- 24** – 60 mm Dia. 10:1 Tapered Shaft with M42 x 3-6H Threaded End (Available with Mounting Flange Code H Only)
- 25** – 2 1/8 inch Dia. Splined 16 Tooth, 55,9 mm [2.20] Min. Full Spline Length (Available with Mounting Flange Code H Only)

### 9 Ports

- A** – 1 5/16 - 12 O-ring with 7/16-20 O-ring Case Drain and Check Valve
- B** – 3/4 inch 4 Bolt Split Flange with 7/16-20 O-ring Case Drain and Check Valve
- C** – G 1 (BSP) O-ring with G 1/4 (BSP) O-ring Case Drain and Check Valve
- D** – 1 5/16-12 O-ring with (2) 9/16-18 O-ring Case Drain Ports and Hot Oil Shuttle Valve
- R** – 1 5/16-12 O-ring with (2) 9/16-18 O-ring Ports for External Lubrication Circuit (both case ports must be connected)

### 10, 11 Special Features (Hardware)

- 00** – None
- 10** – Viton Shaft Seal
- 07** – Viton Seals
- 13** – Reverse Rotation
- 14** – Seal Guard
- 21** – Speed Sensor (Std.)

### 12 Paint/ Special Packaging

- 0** – No Paint, Individual Box
- A** – Painted Low Gloss Black, Individual Box
- B** – Corrosion Protected

### 13 Eaton Assigned Code when Applicable

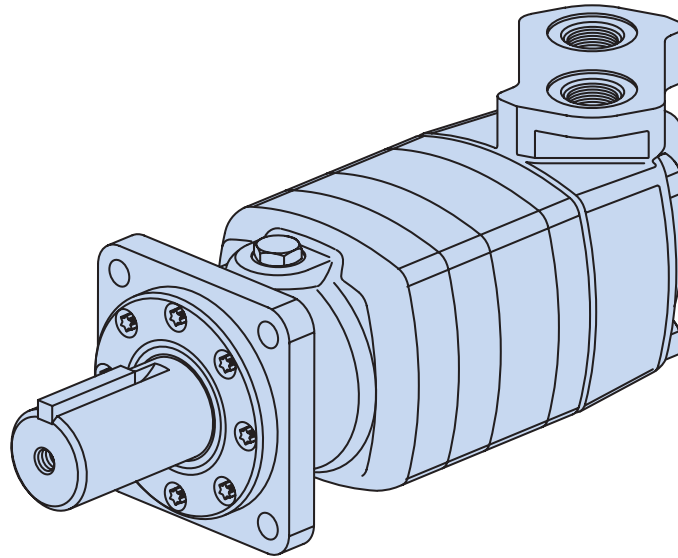
- 0** – Assigned Code

### 14 Eaton Assigned Design Code

- F** – Assigned Design Code

# 10,000 Series

## Highlights



### Features

- High torque and flow
- Many options like 2 speed and speed sensors make this motor “smart”
- Low pressure loss even in higher flows

### Benefits

- High power density for demanding mobile and industrial applications
- Many options to draw from

### Applications

- Boring
- Industrial
- Metal Forming
- Port Equipment
- Saw Mill

### Description

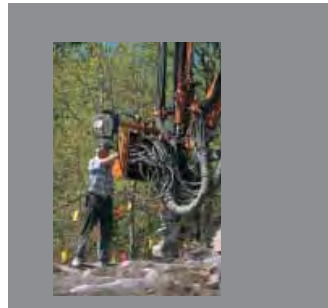
This is the biggest disc valve motor of our line with up to 45 GPM and 24,000 in-lb of torque in continuous mode, this motor is powerful and yet provides good efficiency.

### Specifications

Geroler Element	4 Displacements
Flow l/min [GPM]	170 [45] Continuous**
	265 [70] Intermittent*
Speed RPM	501 Cont.**
	784 Inter.*
Pressure bar [PSI]	200 [3000] Cont.**
	270 [4000] Inter.*
Torque Nm [lb-in]	2700 [23910] Cont.**
	3440 [30460] Inter.*

\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.



Boring



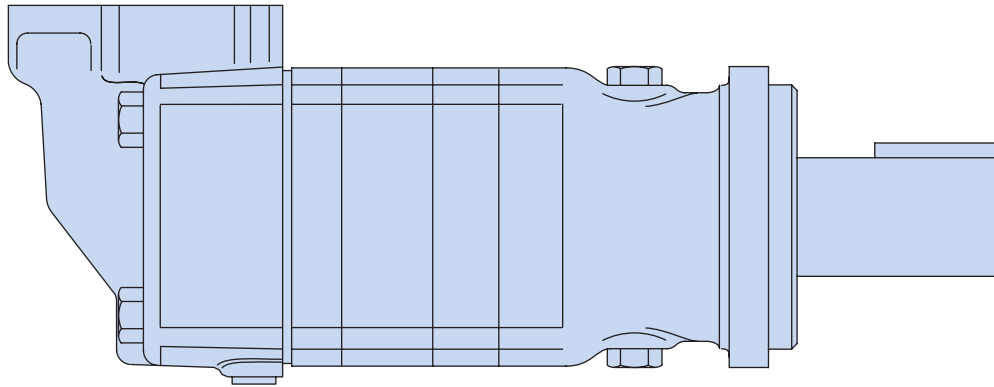
Metal Forming



Port Equipment

# 10,000 Series

## Specifications



### 10,000 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		345 [21.0]	480 [29.3]	665 [40.6]	940 [57.4]
Max. Speed (RPM) @ Flow	Continuous	501	354	254	179
	Intermittent	784	552	396	279
Flow l/min [GPM]	Continuous	170 [45]	170 [45]	170 [45]	170 [45]
	Intermittent	265 [70]	265 [70]	265 [70]	265 [70]
Torque* Nm [lb-in]	Continuous	1040 [ 9220]	1475 [13050]	2085 [18450]	2700 [23910]
	Intermittent	1390 [12310]	1965 [17410]	2610 [23080]	3440 [30460]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	190 [2750]
	Intermittent	275 [4000]	275 [4000]	260 [3750]	240 [3500]
	Peak	275 [4000]	275 [4000]	275 [4000]	260 [3750]
Weight kg [lb]	Standard or Wheel Mount	43,5 [96.0]	45,4 [100.0]	46,3 [100.0]	47,2 [104.0]
	Bearingless	31,3 [69.0]	33,1 [73.0]	33,1 [73.0]	34,9 [77.0]

\*See shaft torque ratings for limitations..

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

275 bar [4000 PSI]  
Do not exceed Δ pressure rating (see chart above).

#### Maximum Return Pressure:

275 bar [4000 PSI] with case drain line installed.  
Do not exceed Δ pressure rating (see chart above).

#### Maximum Case Pressure:

20 bar [300 PSI]

#### Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

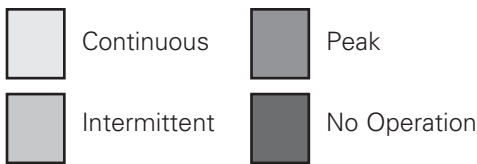
per ISO Cleanliness Code, 4406: 20/18/13

# 10,000 Series

## Performance Data

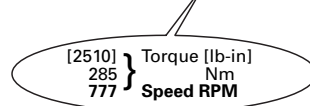
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



**345 cm<sup>3</sup>/r [21.0 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
[1] <b>3,8</b>	[600] 70 3	[1310] 150 1							
[2] <b>7,5</b>	[740] 85 21	[1510] 170 19	[3050] 345 15	[4600] 520 11	[6140] 695 8	[7680] 865 4			
[4] <b>15</b>	[730] 80 43	[1500] 170 41	[3040] 345 37	[4590] 520 33	[6140] 695 30	[7680] 870 26	[9220] 1040 22	[10770] 1215 18	[12310] 1390 14
[8] <b>30</b>	[720] 80 87	[1490] 170 86	[3030] 340 82	[4580] 515 78	[6120] 690 74	[7670] 865 70	[9210] 1040 66	[10750] 1215 62	[12300] 1390 58
[12] <b>45</b>	[700] 80 131	[1470] 165 130	[3020] 340 127	[4560] 515 123	[6100] 690 118	[7650] 865 114	[9190] 1040 110	[10740] 1215 106	[12280] 1385 102
[16] <b>61</b>	[680] 75 176	[1450] 165 175	[3000] 340 172	[4540] 515 167	[6080] 685 163	[7630] 860 158	[9170] 1035 154	[10720] 1210 149	[12260] 1385 145
[20] <b>76</b>	[660] 75 221	[1430] 160 220	[2970] 335 217	[4520] 510 212	[6060] 685 207	[7600] 860 202	[9150] 1035 198	[10690] 1210 193	[12230] 1380 189
[24] <b>91</b>	[630] 70 266	[1400] 160 265	[2950] 335 261	[4490] 505 256	[6030] 680 252	[7580] 855 246	[9120] 1030 242	[10660] 1205 237	[12210] 1380 232
[28] <b>106</b>	[600] 70 310	[1370] 155 309	[2920] 330 306	[4460] 505 301	[6000] 680 296	[7550] 855 291	[9090] 1025 286	[10640] 1200 280	[12180] 1375 275
[32] <b>121</b>	[570] 65 356	[1340] 150 355	[2890] 325 351	[4430] 500 346	[5970] 675 340	[7520] 850 335	[9060] 1025 329	[10610] 1200 324	[12150] 1370 319
[36] <b>136</b>	[540] 60 400	[1310] 150 399	[2850] 320 396	[4400] 495 390	[5940] 670 384	[7480] 845 379	[9030] 1020 373	[10570] 1195 368	[12120] 1370 362
[40] <b>151</b>	[500] 55 445	[1270] 145 444	[2820] 320 441	[4360] 495 435	[5910] 670 429	[7450] 840 423	[8990] 1015 417	[10540] 1190 412	
[45] <b>170</b>	[460] 50 501	[1220] 140 500	[2760] 310 498	[4300] 485 492	[5840] 660 486	[7380] 835 480	[8910] 1005 473	[10450] 1180 467	
[60] <b>227</b>		[1080] 130 668	[2620] 295 665	[4160] 470 658	[5710] 645 651	[7250] 820 644	[8800] 995 637		
[70] <b>265</b>		[960] 110 784	[2510] 285 777	[4050] 460 769	[5590] 630 761	[7140] 805 754	[8680] 980 746		



**480 cm<sup>3</sup>/r [29.3 in<sup>3</sup>/r]**  
 $\Delta$  Pressure Bar [PSI]

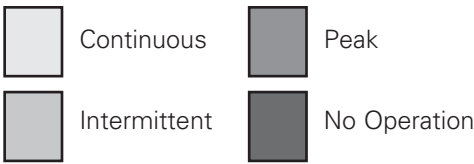
	[250] 15	[500] 35	[1000] 70	[1500] 105	[2000] 140	[2500] 170	[3000] 205	[3500] 240	[4000] 275
[1] <b>3,8</b>	[760] 85 6	[1540] 175 5	[3120] 355 4	[4640] 525 2					
[2] <b>7,5</b>	[1040] 120 15	[2140] 240 13	[4320] 490 11	[6500] 735 8	[8690] 980 5	[10870] 1230 2			
[4] <b>15</b>	[1040] 120 31	[2130] 240 29	[4310] 485 27	[6490] 735 24	[8680] 980 21	[10860] 1225 18	[13050] 1475 16	[15230] 1720 13	[17410] 1965 10
[8] <b>30</b>	[1020] 115 62	[2110] 240 61	[4290] 485 58	[6480] 730 55	[8660] 980 53	[10840] 1225 50	[13030] 1470 47	[15210] 1720 44	[17390] 1965 42
[12] <b>45</b>	[990] 110 94	[2080] 235 93	[4270] 480 90	[6450] 730 87	[8630] 975 84	[10820] 1220 81	[13000] 1470 78	[15180] 1715 75	[17370] 1965 73
[16] <b>61</b>	[960] 110 125	[2060] 235 124	[4240] 480 122	[6420] 725 119	[8600] 970 116	[10790] 1220 113	[12970] 1465 110	[15150] 1710 107	[17340] 1960 104
[20] <b>76</b>	[930] 105 157	[2020] 230 156	[4200] 475 154	[6390] 720 150	[8570] 970 147	[10750] 1215 144	[12940] 1460 141	[15120] 1710 138	[17300] 1955 135
[24] <b>91</b>	[890] 100 189	[1980] 225 188	[4170] 470 185	[6350] 715 182	[8530] 965 179	[10720] 1210 175	[12900] 1460 172	[15080] 1705 169	
[28] <b>106</b>	[850] 95 221	[1940] 220 220	[4130] 465 217	[6310] 715 214	[8490] 960 210	[10680] 1205 207	[12860] 1455 203	[15040] 1700 200	
[32] <b>121</b>	[810] 90 252	[1900] 215 251	[4080] 460 249	[6270] 710 245	[8450] 955 242	[10630] 1200 238	[12820] 1450 235	[15000] 1695 231	
[36] <b>136</b>	[760] 85 282	[1850] 210 281	[4040] 455 280	[6220] 705 277	[8400] 950 273	[10590] 1195 270	[12770] 1445 266		
[40] <b>151</b>	[710] 80 318	[1800] 205 316	[3990] 450 312	[6170] 695 308	[8350] 945 305	[10540] 1190 301	[12720] 1440 297		
[45] <b>170</b>	[647] 75 354	[1740] 195 353	[3920] 445 351	[6110] 690 348	[8290] 935 344	[10470] 1185 340	[12660] 1430 336		
[60] <b>227</b>	[430] 50 474	[1520] 170 473	[3710] 420 471	[5890] 665 467	[8070] 910 462	[10260] 1160 458	[12440] 1405 454		
[70] <b>265</b>		[1360] 155 552	[3540] 400 550	[5730] 645 546	[7910] 895 541	[10100] 1140 536	[12280] 1385 532		

# 10,000 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



665 cm<sup>3</sup>/r [40.6 in<sup>3</sup>/r]  
Δ Pressure Bar [PSI]

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240	[3750] 260
[1] <b>3.8</b>	[1470] 165 4	[3010] 340 3	[4550] 515 3	[6100] 690 2	[7630] 860 1										
[2] <b>7.5</b>	[1480] 165 10	[3020] 340 9	[4560] 515 8	[6110] 690 7	[7650] 865 7	[9200] 1040 6	[10740] 1215 5	[12280] 1385 4	[13830] 1565 3	[15370] 1735 2	[16910] 1910 1				
[4] <b>15</b>	[1470] 165 22	[3010] 340 21	[4550] 515 20	[6100] 690 19	[7640] 865 18	[9190] 1040 17	[10730] 1210 16	[12270] 1385 15	[13820] 1560 14	[15360] 1735 13	[16900] 1910 12	[18450] 2085 11	[19990] 2260 10	[21540] 2435 9	[23080] 2610 8
[8] <b>30</b>	[1440] 165 44	[2980] 335 43	[4530] 510 42	[6070] 685 41	[7610] 860 40	[9160] 1035 39	[10700] 1210 38	[12250] 1385 37	[13790] 1560 36	[15330] 1730 35	[16880] 1905 34	[18420] 2080 33	[19960] 2255 32	[21510] 2430 31	[23050] 2605 30
[12] <b>45</b>	[1400] 160 67	[2950] 335 66	[4490] 505 65	[6040] 680 64	[7580] 855 63	[9120] 1030 62	[10670] 1205 61	[12210] 1380 60	[13750] 1555 59	[15300] 1730 58	[16840] 1905 57	[18380] 2075 56	[19920] 2250 55	[21470] 2425 54	[23020] 2600 53
[16] <b>61</b>	[1380] 155 89	[2910] 330 88	[4450] 505 87	[6000] 675 86	[7540] 850 85	[9080] 1025 84	[10620] 1200 83	[12170] 1375 82	[13710] 1550 81	[15260] 1725 80	[16800] 1900 79	[18340] 2070 78	[19880] 2245 77	[21430] 2420 76	
[20] <b>76</b>	[1310] 150 112	[2860] 315 111	[4400] 495 110	[5940] 670 109	[7490] 845 108	[9030] 1020 107	[10580] 1195 106	[12120] 1370 105	[13660] 1545 103	[15210] 1710 102	[16750] 1890 101	[18300] 2070 100	[19840] 2240 99		
[24] <b>91</b>	[1260] 140 135	[2800] 315 134	[4350] 490 132	[5890] 665 131	[7440] 840 130	[8980] 1015 129	[10520] 1190 128	[12070] 1365 127	[13610] 1540 126	[15150] 1710 124	[16700] 1885 123	[18240] 2060 122			
[28] <b>106</b>	[1200] 135 157	[2750] 310 156	[4290] 485 155	[5840] 660 154	[7380] 835 153	[8920] 1010 151	[10470] 1185 150	[12010] 1355 149	[13550] 1530 148	[15100] 1705 147	[16640] 1880 146				
[32] <b>121</b>	[1140] 130 180	[2690] 305 179	[4230] 480 177	[5770] 650 176	[7320] 825 175	[8860] 1000 174	[10400] 1175 173	[11950] 1350 172	[13490] 1525 170	[15040] 1700 169	[16580] 1875 168				
[36] <b>136</b>	[1080] 120 202	[2620] 295 201	[4160] 470 200	[5710] 645 199	[7250] 820 198	[8800] 995 196	[10340] 1170 195	[11880] 1340 194	[13430] 1515 193	[14970] 1690 191	[16510] 1865 190				
[40] <b>151</b>	[1010] 115 225	[2550] 290 224	[4100] 465 222	[5640] 635 221	[7180] 810 220	[8730] 985 219	[10270] 1160 217	[11810] 1335 216	[13360] 1510 215	[14900] 1685 214	[16440] 1855 212				
[45] <b>170</b>	[920] 105 254	[2460] 280 252	[4000] 450 251	[5550] 625 249	[7090] 800 248	[8630] 975 247	[10180] 1150 245	[11720] 1325 244	[13260] 1500 243	[14810] 1675 242					
[60] <b>227</b>	[610] 70 338	[2150] 245 336	[3700] 420 335	[5240] 590 334	[6780] 765 332	[8330] 940 331	[9870] 1115 329	[11420] 1290 328	[12960] 1465 327						
[70] <b>265</b>	[380] 45 396	[1930] 220 393	[3470] 390 391	[5010] 565 390	[6560] 740 388	[8100] 915 387	[9640] 1090 385	[11190] 1265 384							

940 cm<sup>3</sup>/r [57.4 in<sup>3</sup>/r]  
Δ Pressure Bar [PSI]

[3470] Torque [lb-in]  
390 Nm  
391 Speed RPM

	[250] 15	[500] 35	[750] 50	[1000] 70	[1250] 85	[1500] 105	[1750] 120	[2000] 140	[2250] 155	[2500] 170	[2750] 190	[3000] 205	[3250] 225	[3500] 240
[1] <b>3.8</b>	[2080] 235 3	[4260] 480 2	[6440] 730 1											
[2] <b>7.5</b>	[2090] 235 7	[4270] 480 6	[6450] 730 5	[8640] 975 4	[10820] 1220 3	[13000] 1470 2	[15190] 1715 1	[17370] 1965 0						
[4] <b>15</b>	[2080] 235 15	[4260] 480 14	[6440] 730 13	[8620] 975 12	[10810] 1215 11	[12990] 1470 10	[15170] 1715 9	[17360] 1960 8	[19540] 2210 7	[21720] 2455 6	[23910] 2700 5	[26090] 2950 4	[28270] 3195 3	[30460] 3440 2
[8] <b>30</b>	[2040] 230 31	[4220] 475 30	[6400] 725 29	[8590] 970 28	[10770] 1215 27	[12950] 1465 26	[15140] 1710 25	[17320] 1955 24	[19500] 2200 23	[21690] 2450 22	[23870] 2695 21			
[12] <b>45</b>	[1990] 225 47	[4170] 470 46	[6350] 715 45	[8540] 965 44	[10720] 1210 43	[12900] 1460 42	[15090] 1705 41	[17270] 1950 40	[19450] 2200 39	[21640] 2445 38				
[16] <b>61</b>	[1930] 220 63	[4110] 465 62	[6290] 710 61	[8480] 960 60	[10660] 1205 59	[12840] 1450 58	[15030] 1700 57	[17210] 1945 56	[19390] 2190 55					
[20] <b>76</b>	[1860] 210 79	[4040] 455 78	[6220] 705 77	[8410] 950 76	[10590] 1195 75	[12770] 1445 74	[14960] 1690 73	[17140] 1935 72	[19320] 2185 71					
[24] <b>91</b>	[1780] 200 95	[3970] 450 94	[6150] 695 93	[8330] 940 92	[10520] 1190 91	[12700] 1435 90	[14880] 1680 89	[17070] 1930 88						
[28] <b>106</b>	[1700] 190 111	[3890] 440 110	[6070] 685 109	[8250] 930 108	[10440] 1180 107	[12620] 1425 106	[14800] 1675 105	[16990] 1920 104						
[32] <b>121</b>	[1620] 185 127	[3800] 430 126	[5980] 675 125	[8160] 920 124	[10350] 1170 123	[12530] 1415 122	[14720] 1665 121							
[36] <b>136</b>	[1520] 170 143	[3710] 420 142	[5890] 665 141	[8070] 910 140	[10260] 1160 139	[12440] 1405 138	[14620] 1650 137							
[40] <b>151</b>	[1420] 160 159	[3610] 410 158	[5790] 655 157	[7970] 900 156	[10160] 1150 155	[12340] 1395 154	[14520] 1640 153							
[45] <b>170</b>	[1290] 145 179	[3480] 395 178	[5660] 640 177	[7840] 885 176	[10020] 1130 174	[12210] 1380 173	[14400] 1625 172							
[60] <b>227</b>	[860] 95 239	[3040] 345 238	[5230] 590 236	[7410] 835 235	[9600] 1085 234	[11780] 1330 233								
[70] <b>265</b>	[540] 60 279	[2720] 305 278	[4910] 555 276	[7090] 800 275	[9270] 1045 274	[11460] 1295 273								



# 10,000 Series

## Dimensions

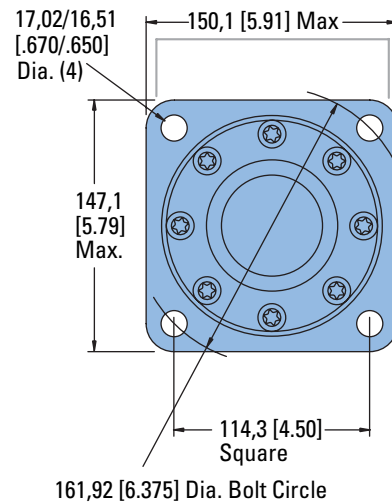
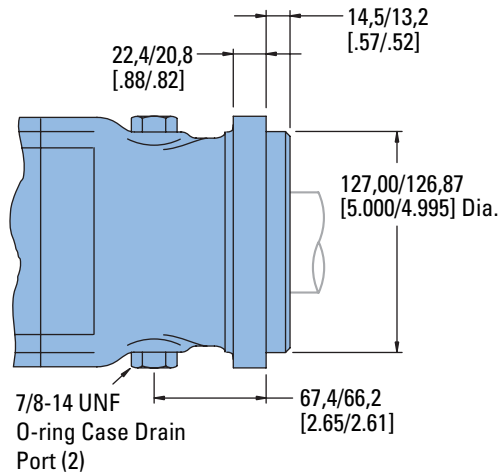
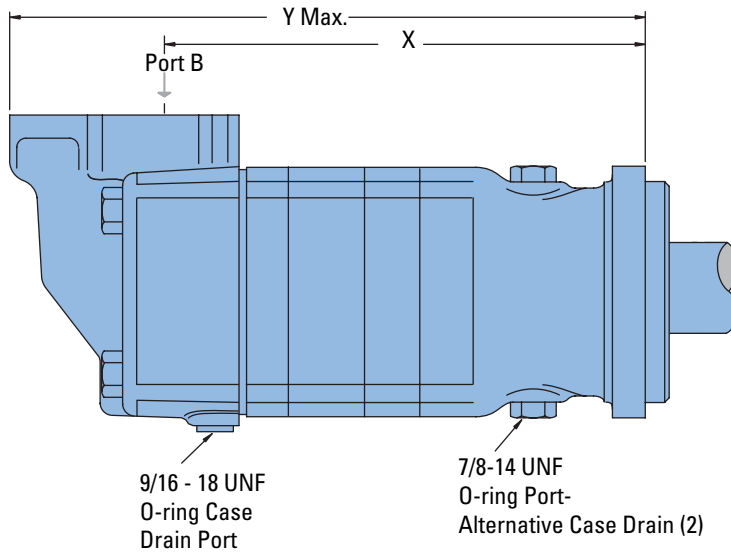
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Standard Mount



### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	282,4 [11.12]	380,7 [14.99]
480 [29.2]	295,1 [11.62]	393,4 [15.49]
665 [40.6]	295,1 [11.62]	393,4 [15.49]
940 [57.4]	313,4 [12.34]	411,7 [16.21]

# 10,000 Series

## Dimensions

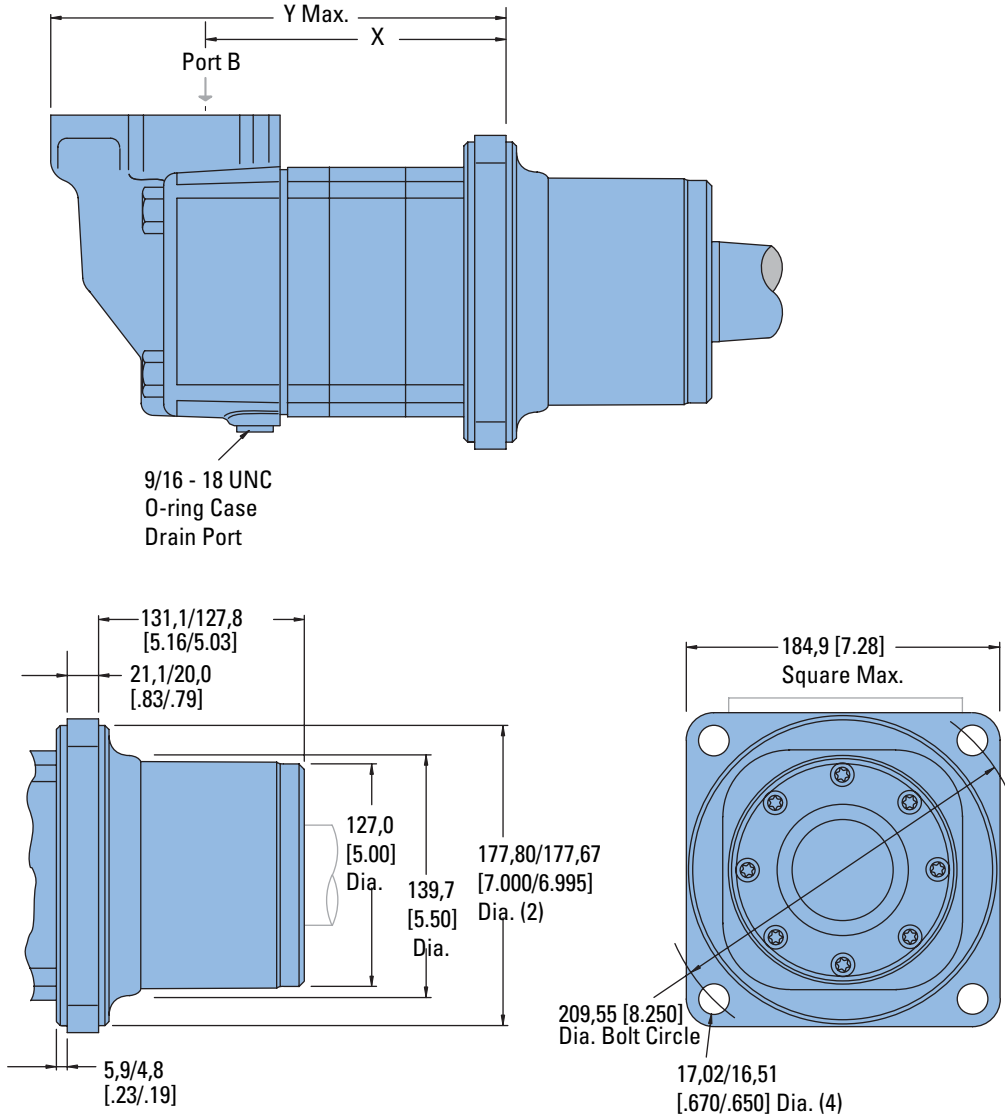
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

## Wheel Mount



### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	166,9 [6.57]	265,9 [10.47]
480 [29.2]	179,6 [7.07]	278,6 [10.97]
665 [40.6]	179,6 [7.07]	278,6 [10.97]
940 [57.4]	197,8 [7.79]	297,2 [11.70]

# 10,000 Series

## Dimensions

Bearingless

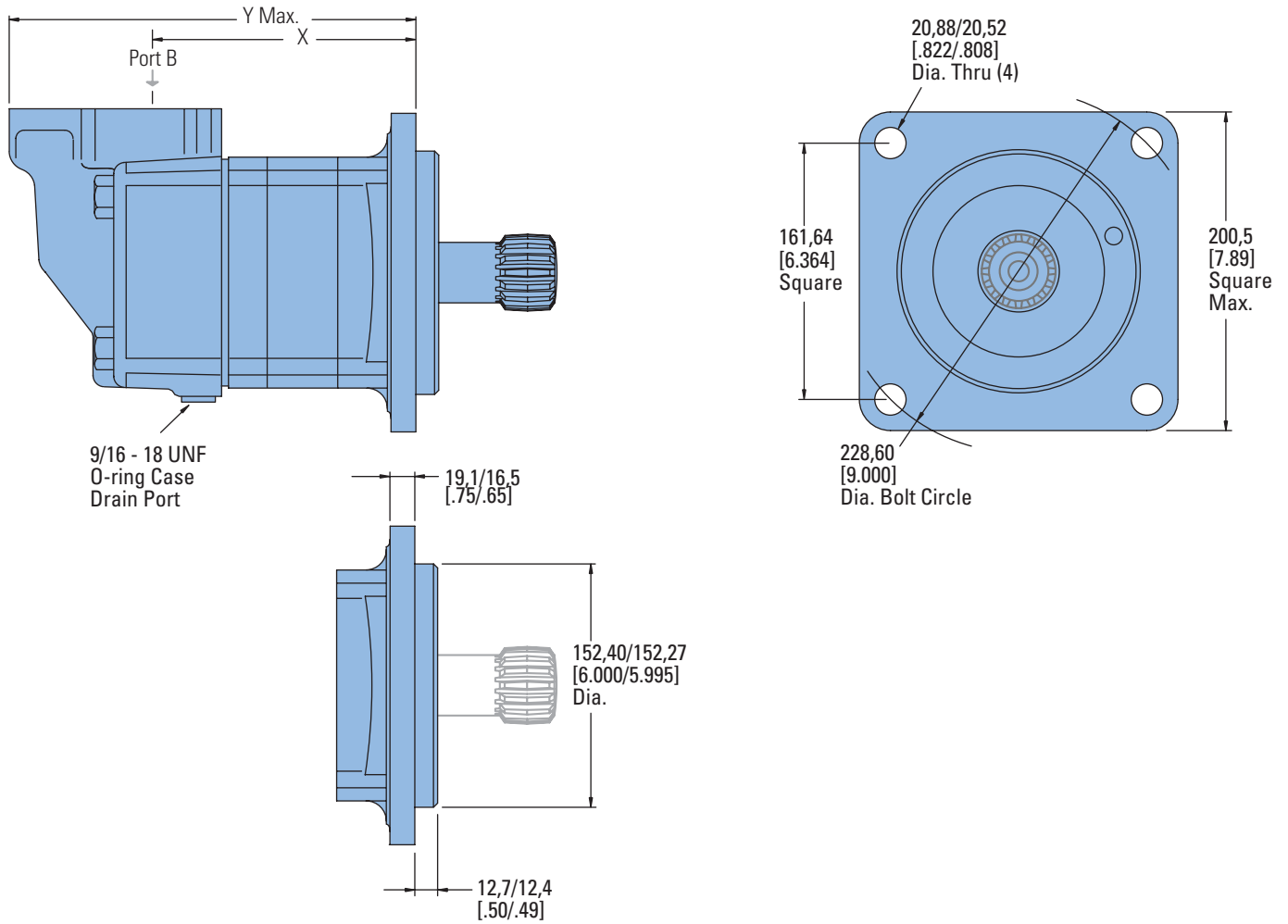
### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1) or
- 4 Bolt 1 1/4 inch Split Flange Ports (2)
- 9/16 -18 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Bearingless



#### BEARINGLESS MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	158,0 [6.22]	256.3 [10.09]
480 [29.2]	170,7 [6.72]	269,0 [10.59]
665 [40.6]	170,7 [6.72]	269,0 [10.59]
940 [57.4]	189,0 [7.44]	287,5 [11.32]

#### Mating Coupling Blank

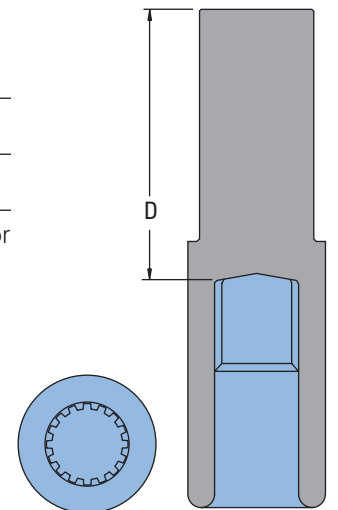
Dimension D mm [inch]  
Eaton Part No.

13280-001	133,6/128,5 [5.26/5.06]
13280-002	156,0/150,9 [6.14/5.94]

For 10,000 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

#### Note:

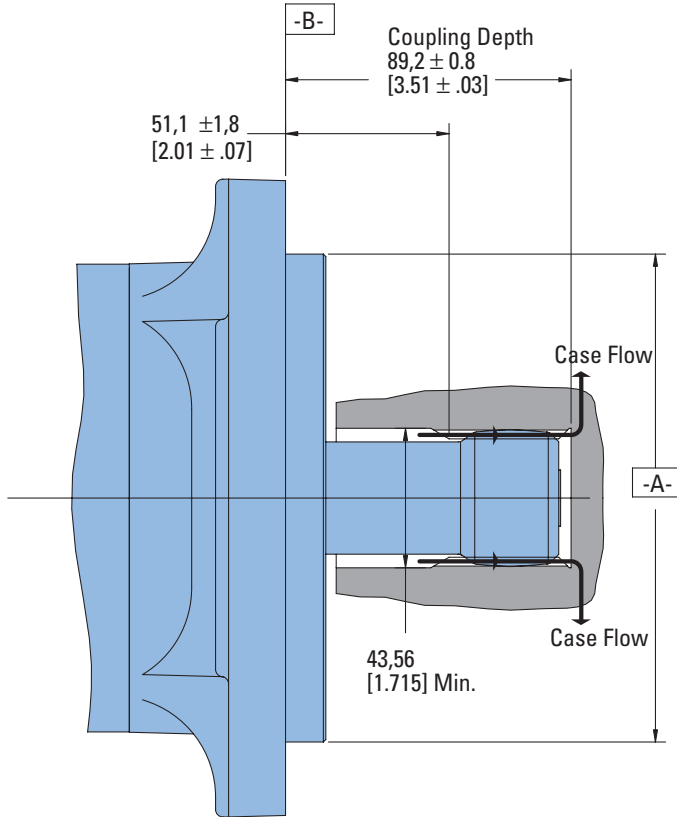
After machining blank, part must be hardened per Eaton specification.



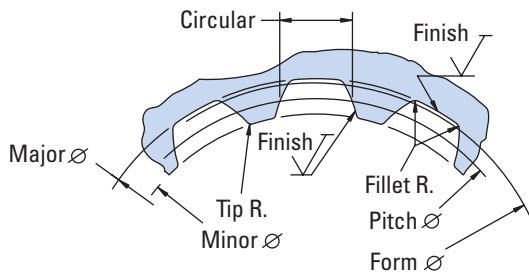
# 10,000 Series

## Installation Information

Bearingless



1 Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 - 1,02 [.030 - .040] (dimensions apply after heat treat).



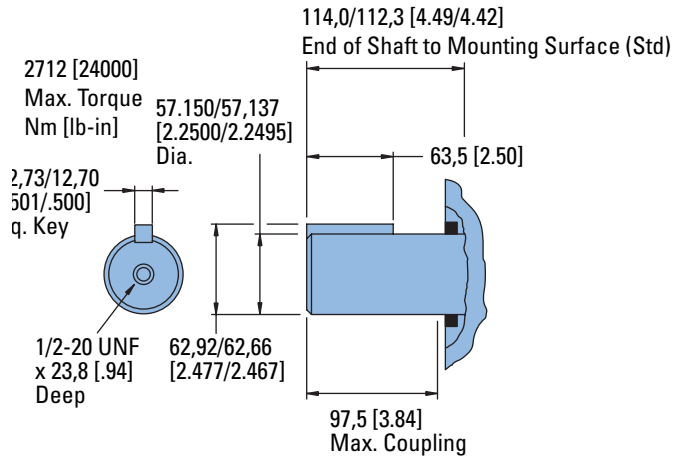
Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter .....	Ref. 40,640000 [1.6000000] $\text{Ⓢ}$ 0,25 [.010]   D
Base Diameter.....	Ref. 35,195272 [1.3856406]
Major Diameter.....	43,56 [1.715] Max. 43,18 [1.700] Min.
Min. Minor Diameter.....	36,83 - 37,08 [1.450 - 1.460]
Form Diameter, Min.....	42,47 [1.672]
Fillet Radius.....	0,64 - 0,76 [.025 - .030]
Tip Radius.....	0,25 - 0,51 [.010 - .020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,028 [+0.0000 -0.0011]
Total Index Variation .....	0,041 [.0016]
Lead Variation .....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	4,105 [.1616]
Minimum Effective.....	3,995 [.1573]
Maximum Effective.....	Ref. 4,056 [.1597]
Minimum Actual.....	Ref. 4,018 [.1582]
Dimension Between Two Pins .....	Ref. 26,929 - 27,084 [1.0602 - 1.0663]
Pin Diameter.....	Ref. 34,272 - 34,450 [1.3493 - 1.3563]
	Wide Flat for Root Clearance

# 10,000 Series

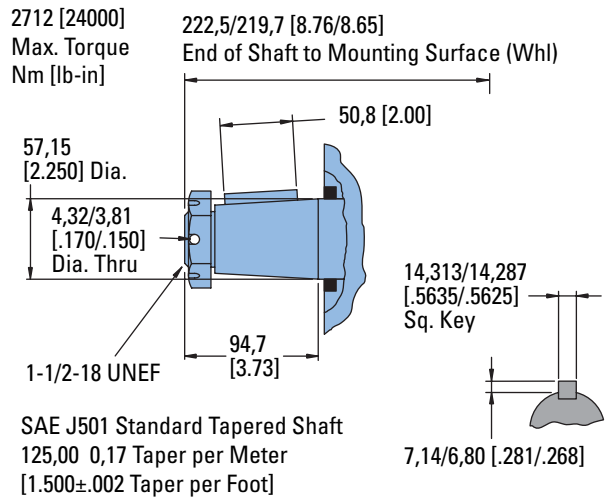
## Dimensions

Shafts

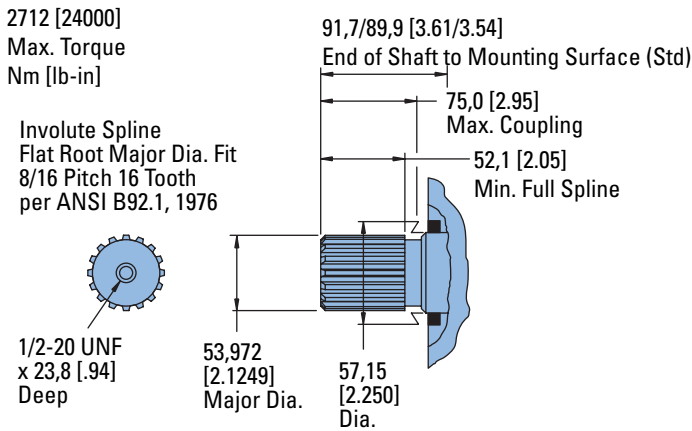
### 2 1/4 Inch Straight



### 2 1/4 Inch Tapered

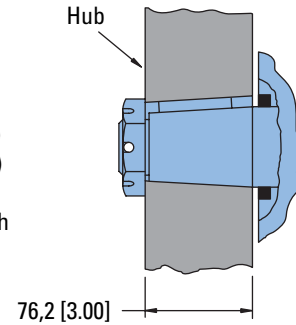


### 2 1/8 Inch 16 Tooth Splined

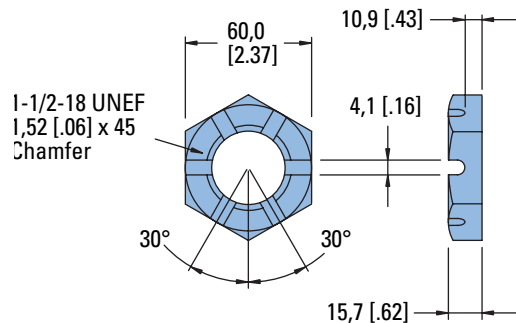


### Tapered Shaft Hub Data

Recommended Torque:  
(1150 Nm [850 lb-ft] Dry)  
( 880 Nm [650 lb-ft] Lub)  
Plus Torque required to  
align the slotted nut with  
the Shaft Crosshole.



### Slotted Hexagon Nut



# 10,000 Series

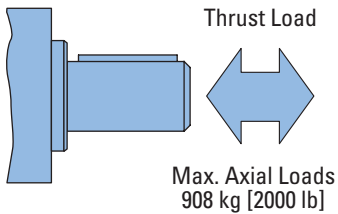
## Side Shaft Load Capacity

These curves indicate the radial load capacity on the motor shaft at various locations with an external thrust load of 454 kg [1000 lb]. The maximum allowable thrust load is 908 kg [2000 lb].

**Note:**

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 200 kg/7 Bar [441 lb/100 PSI].

**Each curve is based on**

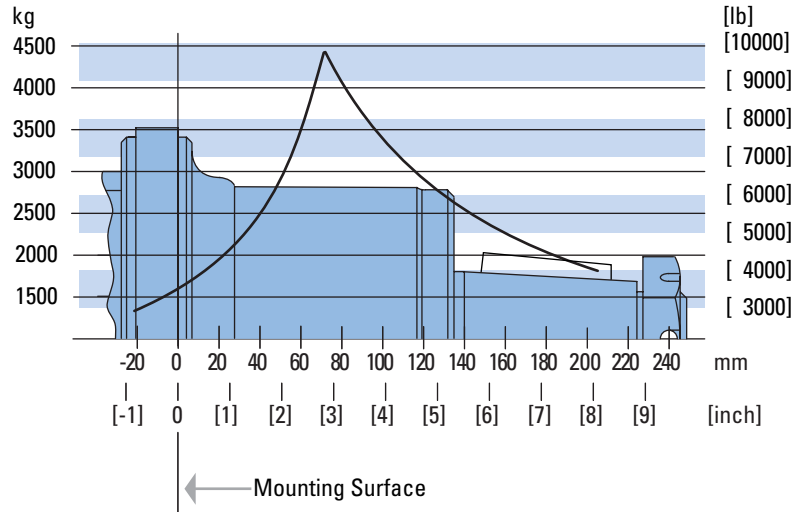
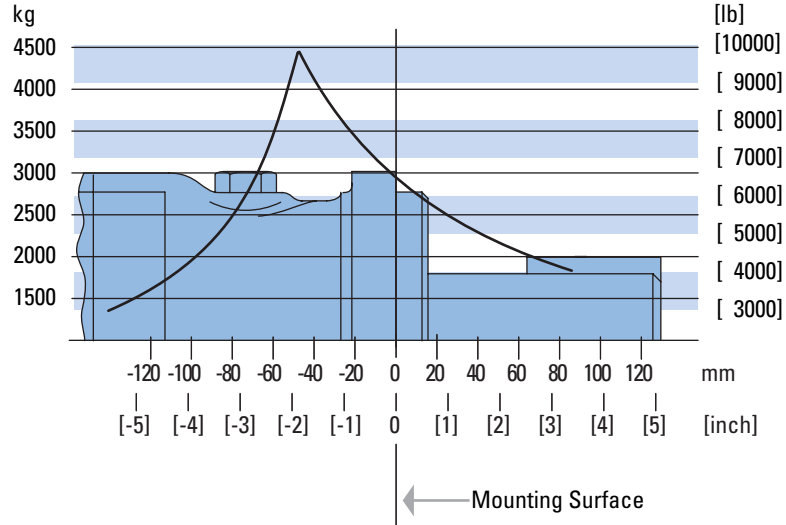


**B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours—Increase these shaft loads 52%.

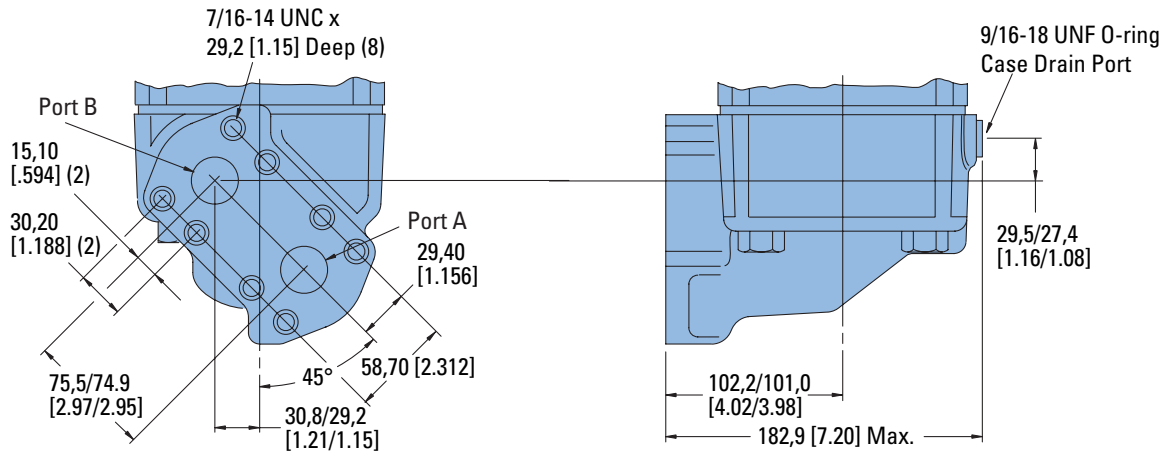


# 10,000 Series

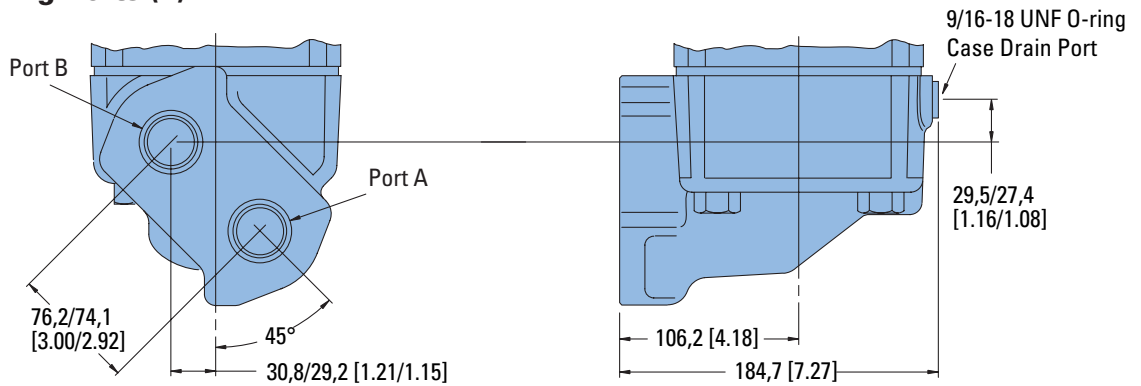
## Dimensions

Ports

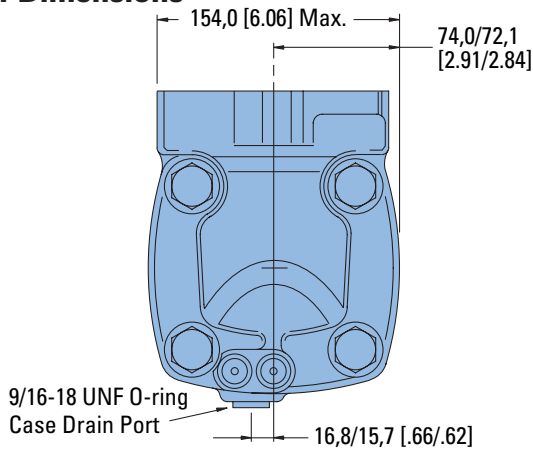
### 1 1/4 Inch Split Flange Ports (2)



### 1 5/16 -12 O-ring Ports (2)



### End View Common Dimensions





# 10,000 Series

## Product Numbers

**Note:**  
For 10,000 Series Motors with a configuration **Not Shown** in the chart below: Use model code number system on the next page to specify product in detail.

Use digit prefix — 119-, 120-, or 121 - plus four digit number from charts for complete product number— Example 121-1014.  
**Orders will not be accepted without three digit prefix.**

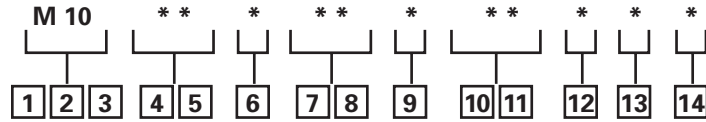
MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			345 [21.0]	480 [29.3]	665 [40.6]	940 [57.4]
Standard SAE C-Mount	2 1/4 Inch Straight	1 5/16 O-ring	119-1028	-1029	-1030	-1031
		1 1/4 inch Split Flange	119-1040	-1041	-1042	-1043
	2 1/8 Inch 16 T Splined	1 5/16 O-ring	119-1032	-1033	-1034	-1035
		1 1/4 inch Split Flange	119-1044	-1045	-1046	-1047
	2 1/4 Inch Tapered	1 5/16 O-ring	119-1036	-1037	-1038	-1039
		1 1/4 inch Split Flange	119-1048	-1049	-1050	-1051
Wheel Motor	2 1/4 Inch Straight	1 5/16 O-ring	120-1005	-1006	-1007	-1008
		1 1/4 inch Split Flange	120-1017	-1018	-1019	-1020
	2 1/8 Inch 16 T Splined	1 5/16 O-ring	120-1009	-1010	-1011	-1012
		1 1/4 inch Split Flange	120-1021	-1022	-1023	-1024
	2 1/4 Inch Tapered	1 5/16 O-ring	120-1013	-1014	-1015	-1016
		1 1/4 inch Split Flange	120-1025	-1026	-1027	-1028
Bearingless		1 5/16 O-ring	121-1007	-1008	-1009	-1010
		1 1/4 inch Split Flange	121-1011	-1012	-1013	-1014

121-1014

# 10,000 Series

## Model Code

The following 14-digit coding system has been developed to identify all of the configuration options for the 10,000 Series motor. Use this model code to specify a motor with the desired features. All 14 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1, 2, 3 Product Series

**M10** – 10,000 Motor

### 4, 5 Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

**20** – 345 [21.0]

**29** – 480 [29.2]

**40** – 665 [40.6]

**57** – 940 [57.4]

### 6 Mounting Type

**A** – 4 Bolt (Std.): Dia. 127,0 [5.00] Pilot 16,76 [.660] Mounting Holes on 161,92 [6.375] Dia. Bolt Circle

**B** – 4 Bolt (Whl.): Dia. 177,8 [7.00] Pilot 16,76 [.660] Mounting Holes on 209,55 [8.250] Dia. Bolt Circle

**C** – 4 Bolt (Brgl.): Dia. 152,4 [6.00] Pilot 20,70 [.815] Mounting Holes on 228,60 [9.000] Dia. Bolt Circle

### 7, 8 Output Shaft

**00** – None (Bearingless)

**01** – 2 1/4 inch Dia. Straight with 12,7 [.50] Square Key x 63,5 [2.50] and 1/2 - 20 Threaded Hole

**02** – 2 1/4 inch Dia. Tapered with 14,3 [.56] Square Key x 50,8 [2.00] and 1 1/2 - 18 UNEF -2A Threaded Shaft End and Slotted Hex Nut

**03** – 2 1/8 inch 16 Tooth Splined with 52,1 [2.05] Min. Full Spline Length 1/2 - 20 UNF Threaded Hole

### 9 Ports

**A** – 1 5/16 -12 UN O-ring End Ports (Size -16), 9/16 - 18 UNF O-ring Case Drain Port (Size - 6)

**B** – 1 1/4 Inch Split Flange Ports, 9/16 - 18 UNF O-ring Case Drain Port (Size - 6)

### 10, 11 Special Features (Hardware)

**00** – None

**01** – Free Running Geroler

**03** – Reverse Rotation

### 12 Paint/ Special Packaging

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black, Individual Box

### 13 Eaton Assigned Code when Applicable

**0** – Assigned Code

### 14 Eaton Assigned Design Code

**C** – Standard and Wheel Mounts

**D** – Bearingless Mount

# 10,000 Series Two-Speed

## Description

The Eaton 10,000 Series motors are available with an integral two speed feature that changes the displacement in a ratio of 1 to 2 and shifts the motor from a low speed high torque (LSHT) mode to a high speed low torque (HSLT) mode. The open center selector valve shifts the speed mode from low to high speed when pilot pressure of 6.9  $\Delta$  Bar [100  $\Delta$  PSI] minimum is applied to the pilot port (6.9 Bar [100 PSI] higher than case pressure). In the high speed mode torque values are approximately one half with twice the speed of the conventional 10,000 Series single speed motors.

An external two position three way valve is required for shifting the pilot pressure port between signal pressure (HSLT) and low pressure (LSHT)

Two speed motors are available with a return line closed center shuttle for closed circuit applications.

Low speed high torque mode is the normal position of the speed selector valve. When a differential pressure is supplied to the pilot port and 6,9 Bar [100 PSI] is reached, the selector valve overcomes the return spring force and the spool shifts to the high speed mode. The oil in the opposite side of the spool is drained internally. Pressure between the pilot supply and case drain or return line (depending on open or closed circuit system) must be maintained to keep the motor in the high speed mode.

When pilot pressure is removed from the pilot port the pressure in the pilot end of the spool valve is relieved and drained back through this three way valve, the spring force returns the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high speed mode operation. Pilot pressure 6,9  $\Delta$  Bar [100  $\Delta$  PSI] minimum, up to the full operating pressure of the motor.

In normal LSHT operation the Char-Lynn two speed motor will function with equal shaft output in either direction (CW or CCW), the same as the single speed Char-Lynn disc valve motors.

However, to prevent cavitation in the HSLT mode, the preferred direction of shaft rotation is counter clockwise (port B pressurized). This unique disc valve is not symmetrical in porting the fluid for the HSLT mode. Consequently, when the pressure is reversed for HSLT CW rotation, cavitation can occur. Installing a restriction (200 PSI or more depending on flow) in the hydraulic line that connects port B will prevent cavitation.

If you are operating in a critical area and a restriction in the hydraulic line causes concern, these two speed motors can be ordered timed with CW preferred HSLT shaft rotation. Hence, with this option port B will have to be pressurized for CW preferred HSLT shaft rotation. The restriction recommended for the line connecting port B remains unchanged. Finally in closed circuit applications a hydraulic line restriction is not required. Instead, the charge pump can be used to supply and maintain a minimum pressure of 14 Bar [200 PSI].

### Note:

Be certain in closed loop applications that the charge pump when used for back pressure on the B port, has sufficient displacement to maintain charge pressure especially in dynamic braking or overrunning load conditions.

### Important!

**Due to potential problems in maintaining charge pump pressure at port B for uninterrupted back pressure during dynamic braking, Eaton does not recommend the two speed motor where overrunning conditions may exist.**

## Performance Data

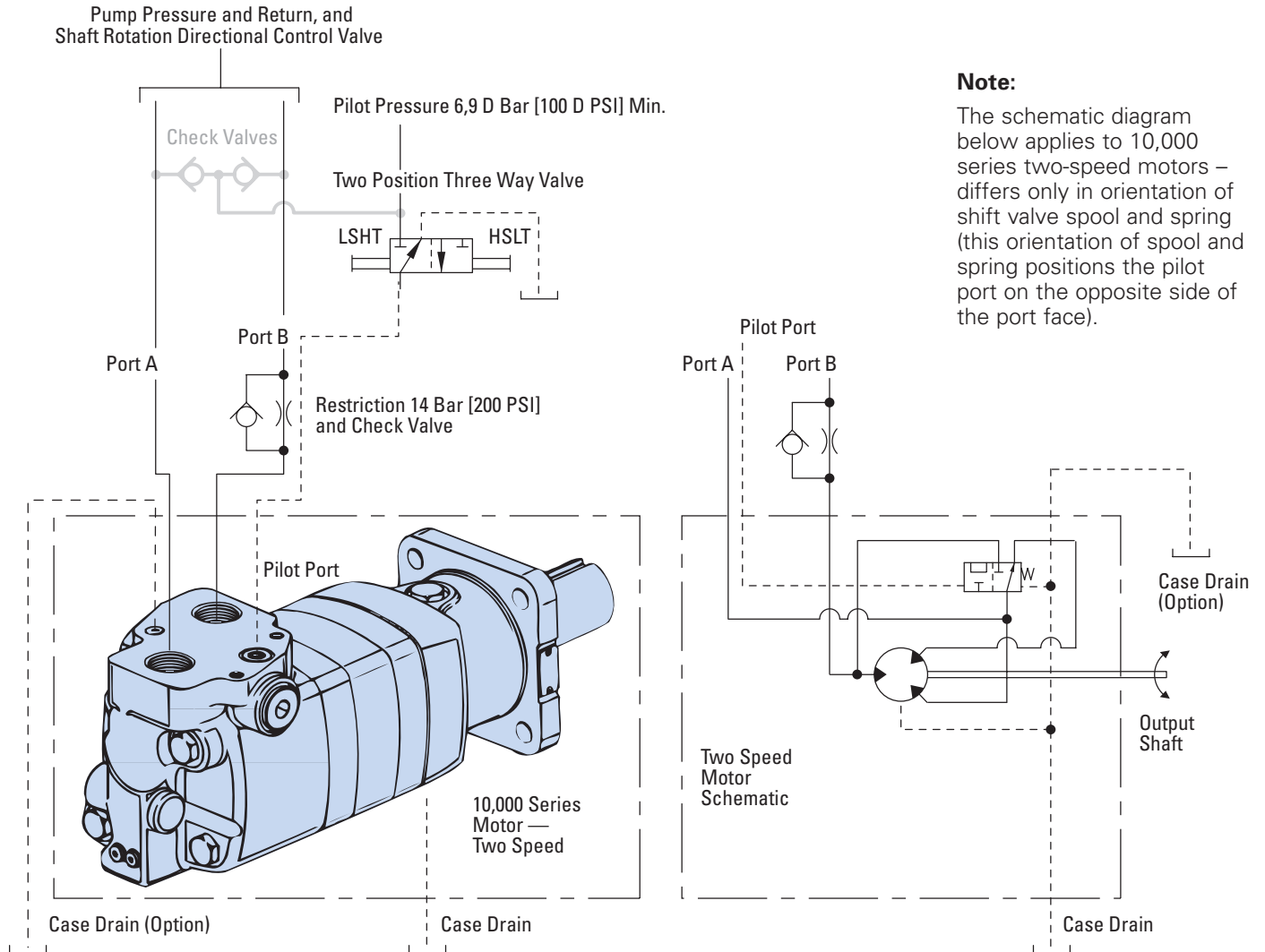
### 10,000 Series Two-Speed

**In the high speed mode torque values are approximately one half with twice the speed** of the conventional 10,000 Series single speed motors.

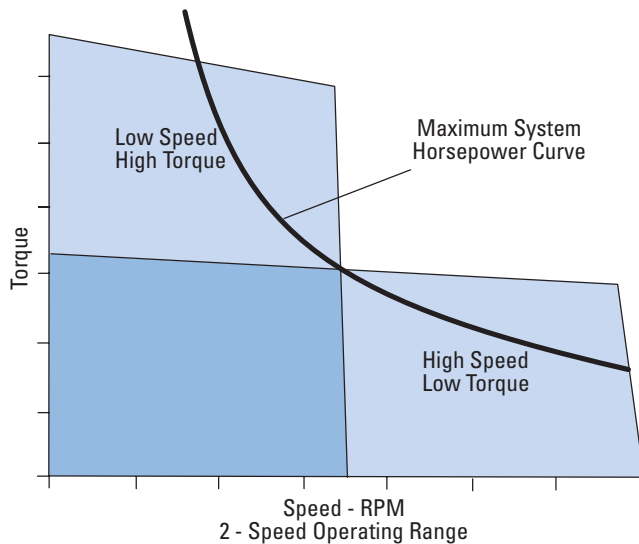
**In the low speed mode torque and speed values are the same as the conventional 10,000 series single speed motors.**

# 10,000 Series Two-Speed

## Typical Hydraulic Circuit

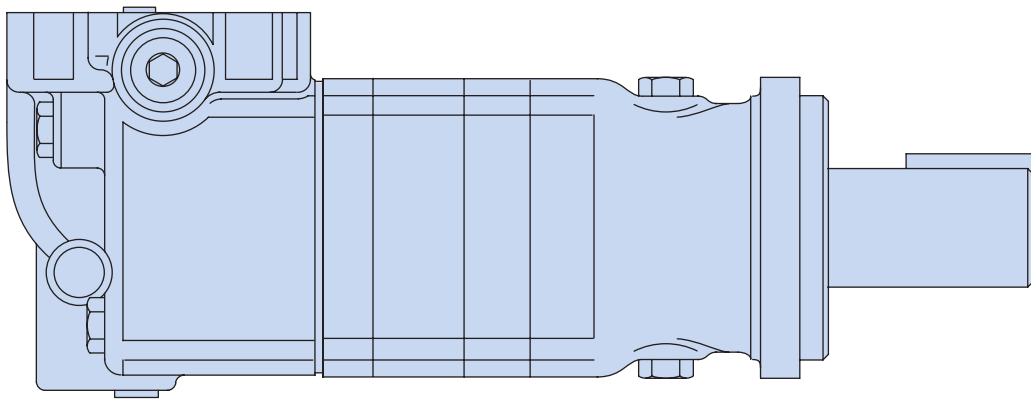


**Note:**  
The schematic diagram below applies to 10,000 series two-speed motors – differs only in orientation of shift valve spool and spring (this orientation of spool and spring positions the pilot port on the opposite side of the port face).



# 10,000 Series Two-Speed

## Specifications



### 10,000 SERIES TWO-SPEED MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]	High Speed Mode	169 [10.3]	239 [14.6]	332,7 [20.3]	470 [28.7]
	Low Speed Mode	345 [21.0]	480 [29.3]	665 [40.6]	940 [57.4]
Max. Speed (RPM) @ Continuous Flow	High Speed Mode	750	630	500	400
	Low Speed Mode	375	315	250	200
Flow l/min [GPM]	High Speed Mode	130 [35]	170 [45]	170 [45]	170 [45]
	Low Speed Mode	130 [35]	170 [45]	170 [45]	170 [45]
Torque* Nm [lb-in]	High Speed Mode				
	Continuous	440 [3900]	630 [5600]	905 [8000]	1175 [10400]
	Intermittent	585 [5200]	845 [7500]	1130 [10000]	1470 [13000]
Torque* Nm [lb-in]	Low Speed Mode				
	Continuous	1015 [9000]	1470 [13000]	2090 [18500]	2710 [24000]
	Intermittent	1355 [12000]	1965 [17400]	2600 [23000]	3445 [30500]
Pressure Δ bar [Δ PSI]	Continuous	205 [3000]	205 [3000]	205 [3000]	190 [2750]
	Intermittent	275 [4000]	275 [4000]	260 [3750]	240 [3500]
Weight kg [lb]	Standard or Wheel Mount	50,3 [111.0]	52,2 [115.0]	52,2 [115.0]	54,0 [119.0]
	Bearingless	38,1 [84.0]	39,9 [88.0]	39,9 [88.0]	41,7 [92.0]

\*See shaft torque ratings for limitations..

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### High Speed Mode

(Reduced Motor Displacement)

#### Low Speed Mode

(Full Motor Displacement)

#### Maximum Inlet Pressure:

275 bar [4000 PSI]

Do not exceed Δ pressure rating (see chart above).

#### Maximum Return Pressure:

275 bar [4000 PSI] with case drain line installed.

Do not exceed Δ pressure rating (see chart above).

#### Δ bar [Δ PSI] :

The true pressure difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

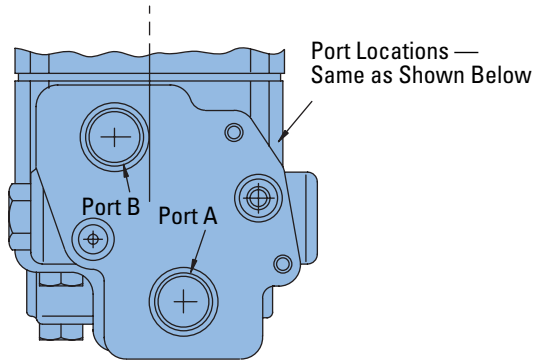
per ISO Cleanliness Code, 4406: 20/18/13

# 10,000 Series Two-Speed

## Dimensions

Standard and Wheel

### 1 5/16 -12 O-ring Staggered Ports



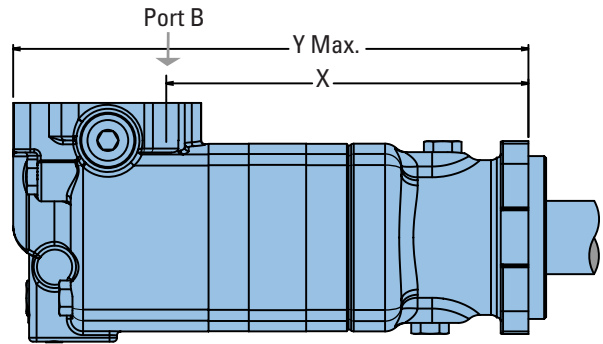
### Ports

- 1 5/16 -12 UNF-2B SAE O-ring Staggered Ports (2)
- 3/4 -16 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- 4 bolt 1 1/4 inch Split Flange Ports (2)
- 3/4 -16 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

### Two-Speed Standard Motors



#### STANDARD MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	270,8 [10.66]	392,7 [15.46]
480 [29.2]	283,5 [11.16]	405,4 [15.96]
665 [40.6]	283,5 [11.16]	405,4 [15.96]
940 [57.4]	301,8 [11.88]	423,7 [16.68]

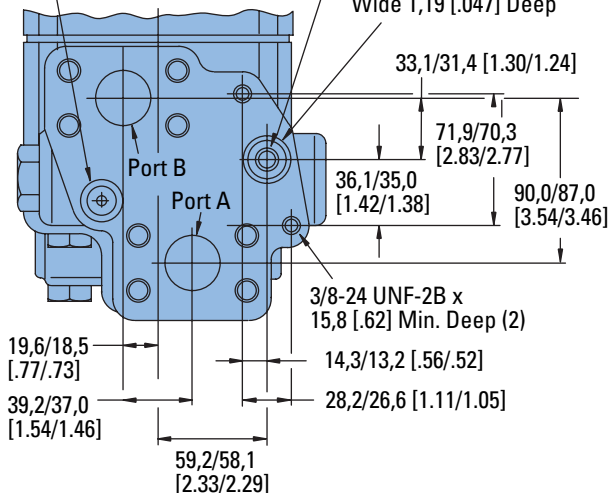
### 4 Bolt 1 1/4 Inch Split Flange Ports

7/16-20 UNF-2B O-ring Port — Pilot Control  
Pilot Port Pressurized 6,9 Δ Bar [100 Δ PSI]  
High Speed Low Torque (HSLT)

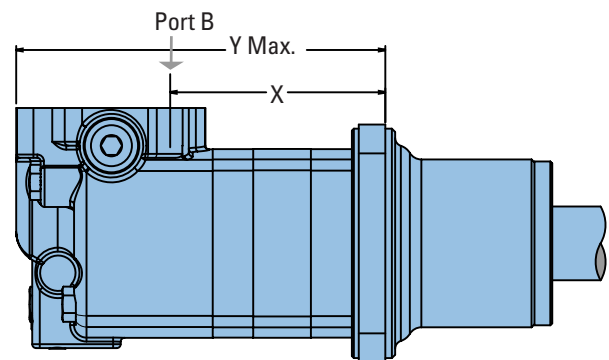
Pilot Port Depressurized (Tank)  
Low Speed High Torque (LSHT)

1/2-20 UNF-2B  
O-ring Case Drain Option  
Port Size 5

Groove Provided for Seal  
25,38 [.999] OD x 2,41 [.095]  
Wide 1,19 [.047] Deep



### Two-Speed Wheel Motors



#### WHEEL MOUNT MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	155,2 [6.11]	277,9 [10.94]
480 [29.2]	167,9 [6.61]	290,6 [11.44]
665 [40.6]	167,9 [6.61]	290,6 [11.44]
940 [57.4]	186,2 [7.33]	309,1 [12.17]

# 10,000 Series Two-Speed

## Dimensions

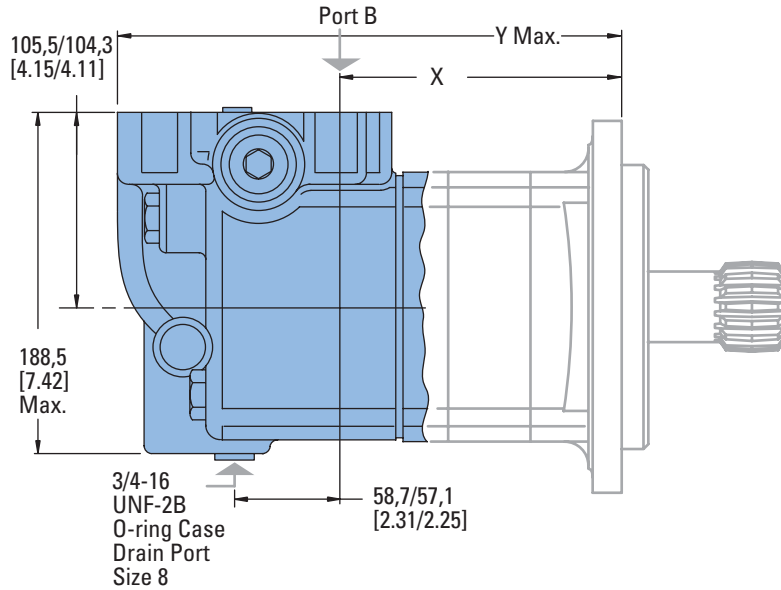
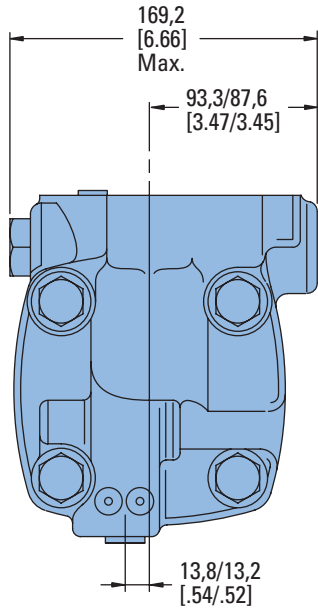
### Bearingless

### Ports

- 1 5/16 -12 UN-2B SAE O-ring Staggered Ports (2)
- 3/4 -16 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1) or
- 4 bolt 1 1/4 inch Split Flange Ports (2)
- 3/4 -16 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF-2B SAE O-ring Pilot Control Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



### BEARINGLESS MOTOR DIMENSIONS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
345 [21.0]	146,3 [5.76]	268,2 [10.56]
480 [29.2]	159,0 [6.26]	280,9 [11.06]
665 [40.6]	159,0 [6.26]	280,9 [11.06]
940 [57.4]	177,3 [6.98]	299,5 [11.79]



# 10,000 Series Two-Speed

## Product Numbers

**Note:**

For 10,000 Series Motors with a configuration **Not Shown** in the chart below: Use model code number system on the page C-5-13 to specify product in detail.

Use digit prefix — 119-, 120-, or 121 - plus four digit number from charts for complete product number— Example 121-2002.

**Orders will not be accepted without three digit prefix.**

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			345 [21.0]	480 [29.3]	665 [40.6]	940 [57.4]
Standard	2 1/4 Inch Straight	1 5/16 O-ring	119-2013	-2014	-2015	-2016
		1 1/4 inch Split Flange	119-2001	-2002	-2003	-2004
	2 1/8 Inch 16 T Splined	1 5/16 O-ring	119-2021	-2022	-2023	-2024
		1 1/4 inch Split Flange	119-2009	-2010	-2011	-2012
	2 1/4 Inch Tapered	1 5/16 O-ring	119-2017	-2018	-2019	-2020
		1 1/4 inch Split Flange	119-2005	-2006	-2007	-2008
Wheel Motor	2 1/4 Inch Straight	1 1/4 inch Split Flange	120-2005	-2006	-2007	-2008
	2 1/8 Inch 16 T Splined	1 1/4 inch Split Flange	120-2009	-2010	-2011	-2012
	2 1/4 Inch Tapered	1 5/16 O-ring	120-2013	-2014	-2015	-2016
		1 1/4 inch Split Flange	120-2001	-2002	-2003	-2004
Bearingless		1 5/16 O-ring	121-2005	-2006	-2007	-2008
		1 1/4 inch Split Flange	121-2001	-2002	-2003	-2004

121-2002

# Notes



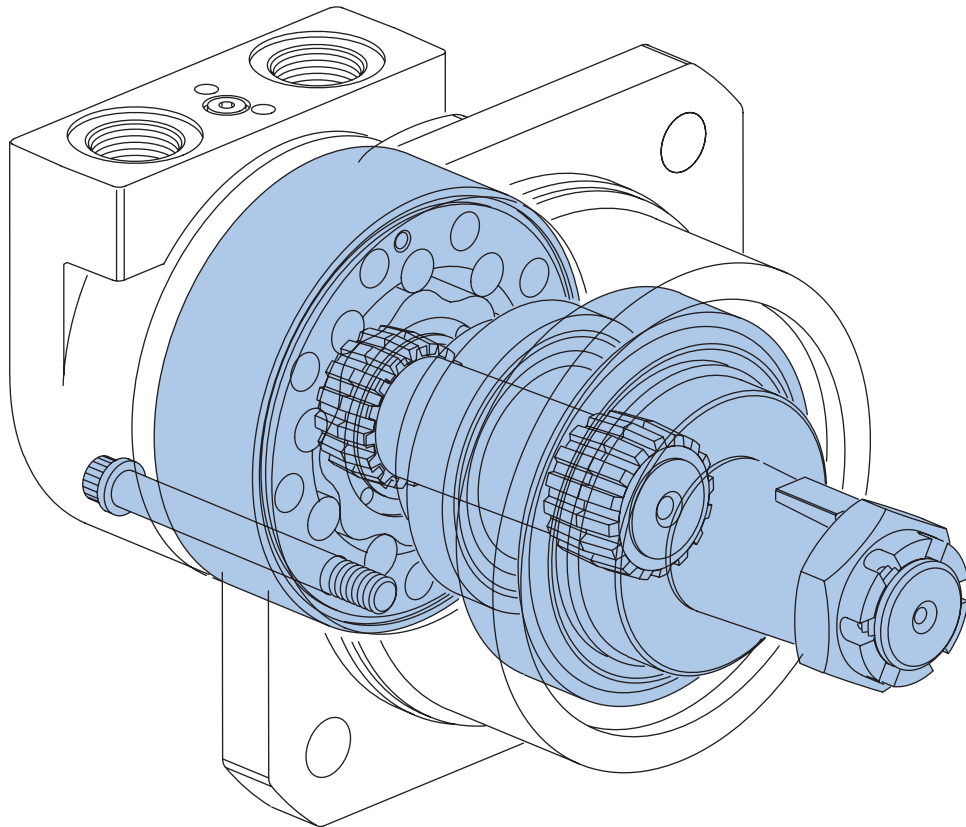
## **VIS (Valve-In-Star) Hydraulic Motors**

The next step in the evolution of low speed high torque (LSHT) hydraulic motors.

VIS 30 Series

VIS 40 Series

VIS 45 Series



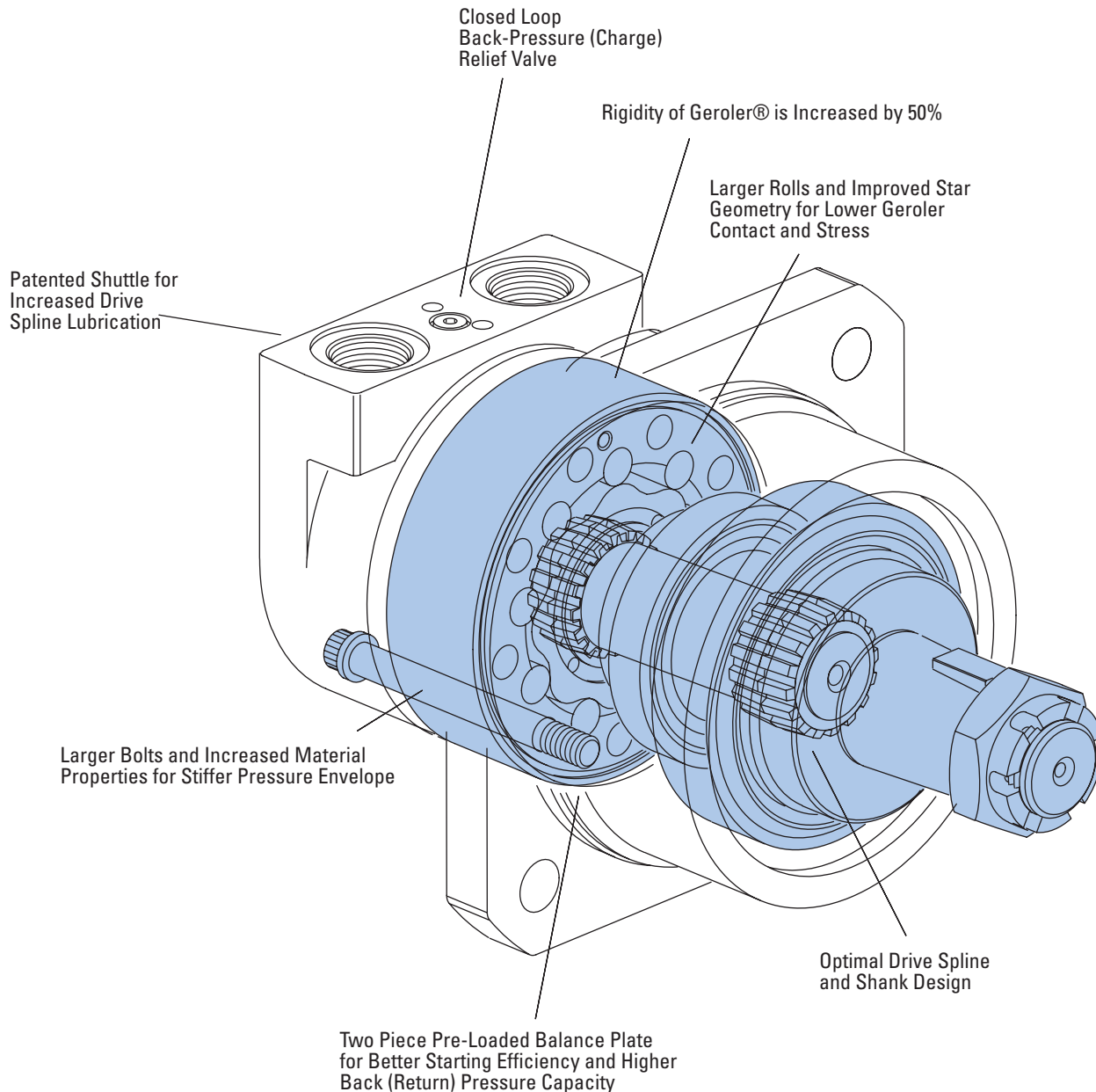
# VIS Motors

## Highlights

### Product Description

The VIS (Valve-in-Star) Motors are the next step in the evolution of the low speed high torque (LSHT) hydraulic motors. The VIS design provides design advantages over other types of LSHT hydraulic motor valving resulting in a more compact package with better efficiency and higher pressure capability. These improvements have shown significant packaging and performance advantages in applications such as skid steer loaders, mini excavators, trenchers and logging equipment.

VIS motors are primarily intended for use in closed loop circuit applications. Consult your Eaton representative for assistance on open loop circuit applications.



# Features, Benefits, and Applications

## Features

- Patented VIS Geroler technology
- Simplified design - only three moving components:
  - geroler star
  - drive
  - output shaft
- Pressure-balance Geroler - improves efficiency
- Shuttle valve option for reliable internal drive lubrication
- Variety of optional features

## Benefits

- Extremely compact powerful package
- Highest output torque in its class
- High efficiency
- Reduced system temperatures
- High horsepower density
- Design flexibility
- Reliable and dependable performance

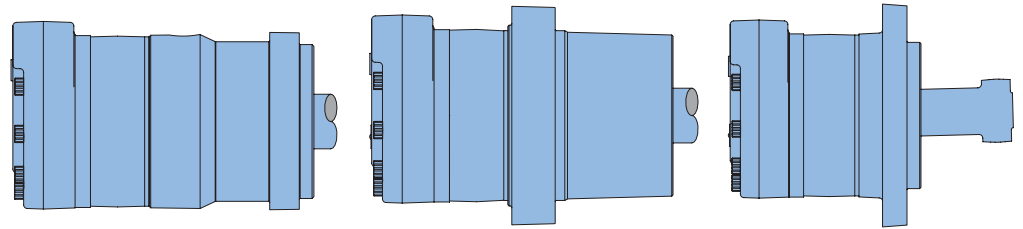
## Applications

- Skid steer loaders
- Sprayers
- Underground boring equipment
- Forestry equipment
- Irrigation reels
- Grinders/Mixers
- Material handling equipment
- Augers and skid steer attachments
- Large turf care equipment

## Design Features

Eaton hydraulic motors provide design flexibility. All VIS motors are available with various configurations consisting of:

- Displacement (Geroler)
- Output Shaft
- No Shaft (Bearingless Motor)
- Port Configuration
- Mounting Flange
- Park brake
- Other Special Features



### Standard Motor

The standard motor mounting flange is located as close to the output shaft as possible. This type of mounting supports the motor close to the shaft load. This mounting flange is also compatible with many standard gear boxes.

### Wheel Motor

The wheel motor mounting flange is located near the center of the motor which permits part or all of the motor to be located inside the wheel or roller hub. In traction drive applications, loads can be positioned over the motor bearings for best bearing life. This wheel motor mounting flange provides design flexibility in many applications.

### Bearingless Motor

The bearingless motor has the same drive components as the standard and wheel motors with the exception that the motor is assembled without the output shaft, bearings and bearing housing. The bearingless motor is especially suited for applications such as gear boxes, winch drives, reel and roll drives. Bearingless motor applications must be designed with a bearing supported internal spline to mate with the bearingless motor drive. Product designs using these hydraulic motors provide considerable cost savings.

# Table of Contents

Highlights	D-ii
Features, Benefits, and Applications	D-iii
Table of Contents	D-iv
Typical Hydraulic Circuit	D-v

## **VIS 30 Series**

Highlights	D-1-1
Specifications	D-1-2
Performance Data	D-1-3
Dimensions	D-1-5
Installation Information	D-1-8
Dimensions Shafts	D-1-9
Shaft Side Load Capacity	D-1-10
Product Numbers	D-1-13
Model Code	D-1-15

### *VIS 30 Series Two-speed*

Specifications	D-1-16
Performance Data	D-1-16
Dimensions	D-1-17
Installation Information	D-1-20
Product Numbers	D-1-21
Model Code	D-1-22
Brake Description	D-1-23
Brake Dimensions	D-1-24
Brake Shaft Dimensions and Sideload Curves	D-1-25

## **VIS 40 Series**

Highlights	D-2-1
Specifications	D-2-2
Performance Data	D-2-3
Dimensions	D-2-6
Installation Information	D-2-10
Dimensions Shafts	D-2-11

Side Load Capacity	D-2-12
Oversize Flange 224,0 [8.82] B.C.	D-2-14
Product Numbers	D-2-17
Model Code	D-2-19

### *VIS 40 Series Two-speed*

Specifications	D-2-20
Performance Data	D-2-20
Dimensions	D-2-21
Installation Information	D-2-25
Product Numbers	D-2-26
Model Code	D-2-27
Brake Description	D-2-28
Brake Shaft Dimensions/ Sideload Curves	D-2-30

## **VIS 45 Series**

Highlights	D-3-1
Specifications	D-3-2
Performance Data	D-3-3
Dimensions	D-3-6
Installation Information	D-3-9
Dimensions Shafts	D-3-10
Side Load Capacity	D-3-12
Product Numbers	D-3-13
Model Code	D-3-15

### *VIS 45 Series Two-speed*

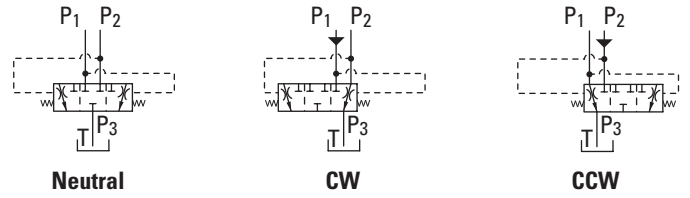
Specifications	D-3-16
Performance Data	D-3-16
Dimensions	D-3-17
Product Numbers	D-3-20
Model Code	D-3-21

# Typical Hydraulic Circuit

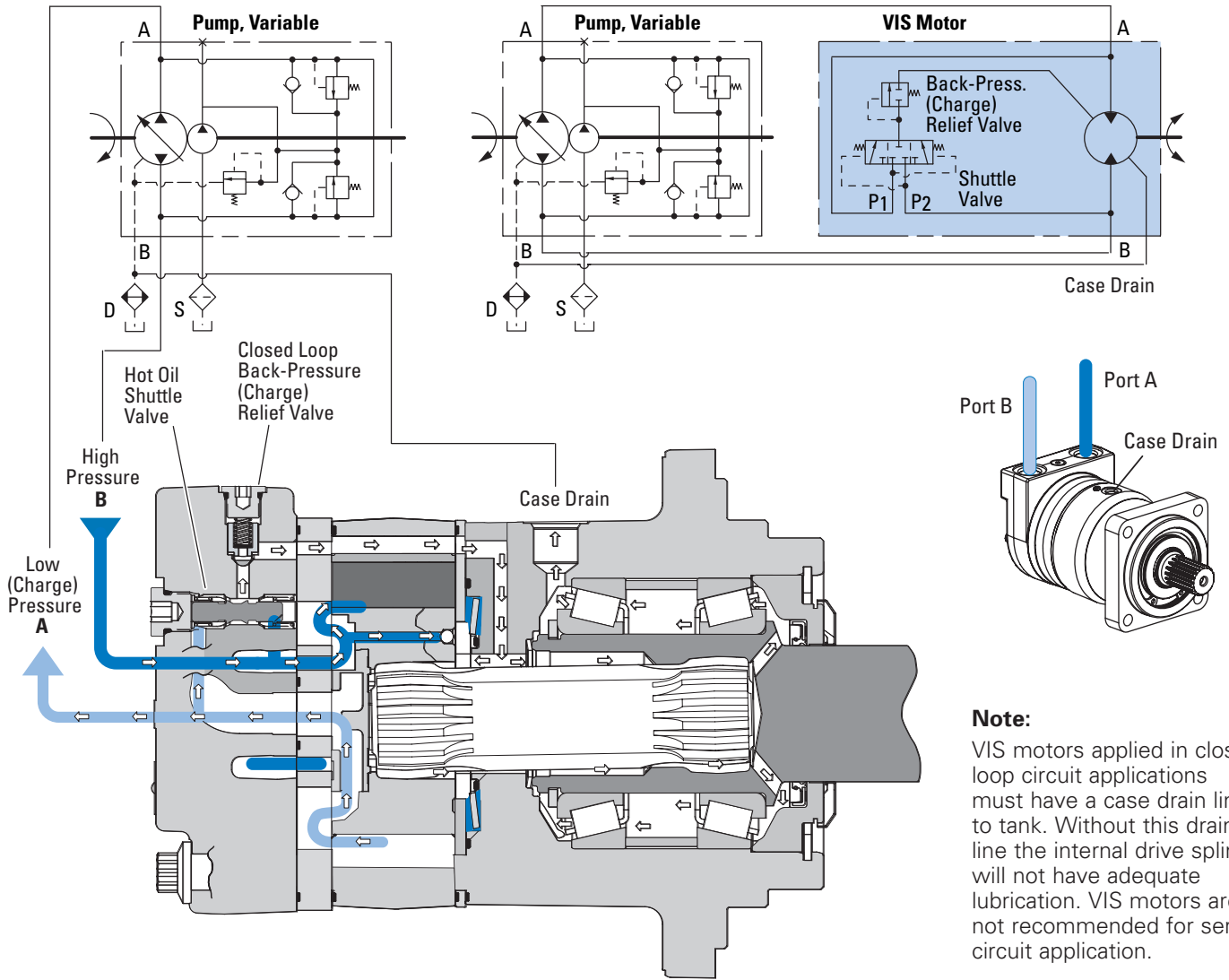
VIS 30, 40 and 45 Series

## Shuttle Valve, Two Way (Closed Center) —

Schematic Diagrams

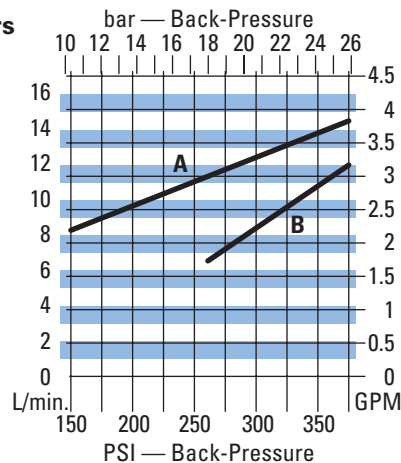


## Closed Loop Circuit



**Note:**  
VIS motors applied in closed loop circuit applications must have a case drain line to tank. Without this drain line the internal drive spline will not have adequate lubrication. VIS motors are not recommended for series circuit application.

## VIS 30, 40 and 45 Motors Shuttle Flow Charts



**A**  
4,5 bar [65 PSI] @ 60° C [140° F]  
Δ Between Back-Pressure and Case Pressure (Typical Data)

**B**  
15,2 bar [220 PSI] @ 60° C [140° F]  
Δ Between Back-Pressure and Case Pressure (Typical Data)

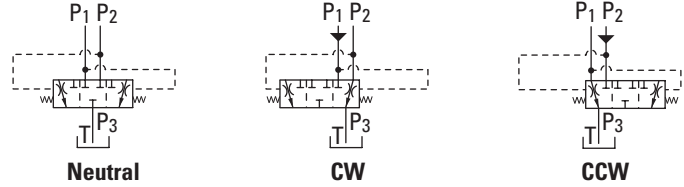
Due to Machining Tolerances, Flow May be More or Less



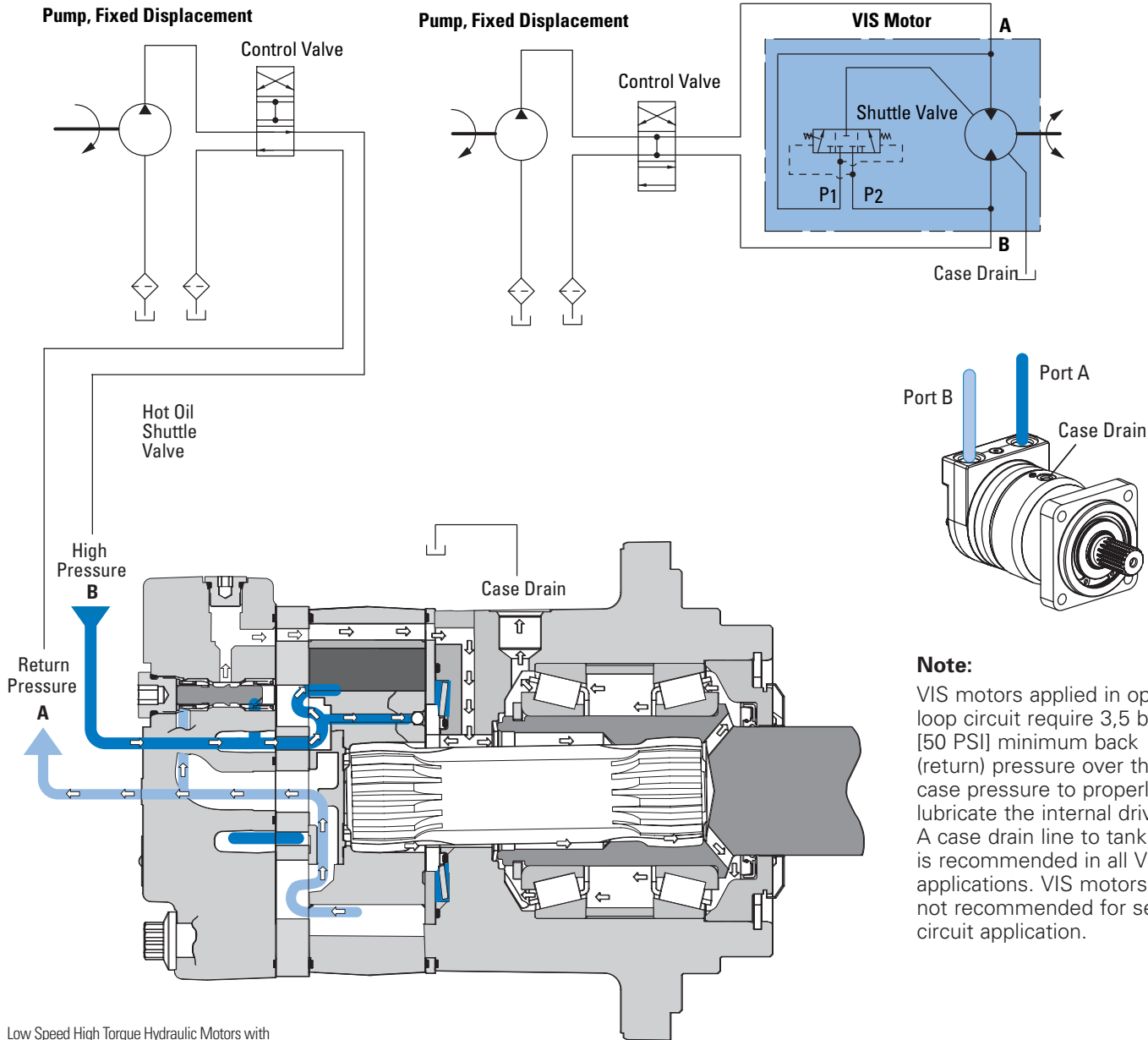
# Typical Hydraulic Circuit

VIS 30, 40 and 45 Series

## Shuttle Valve, Two Way (Closed Center) — Schematic Diagrams



## Open Loop Circuit

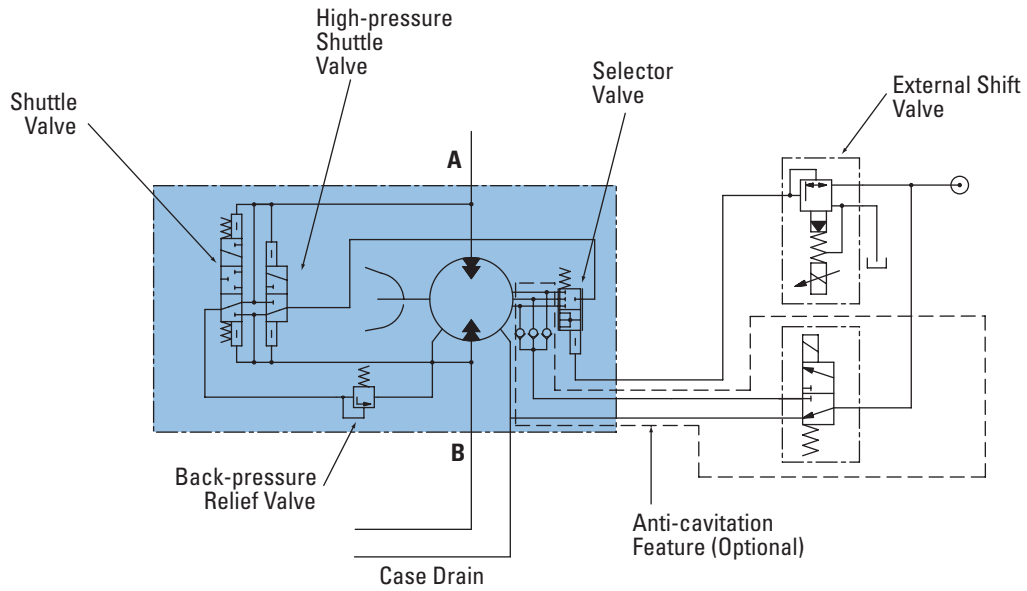


Low Speed High Torque Hydraulic Motors with Shuttle – Patent No. U.S. 4,645,438

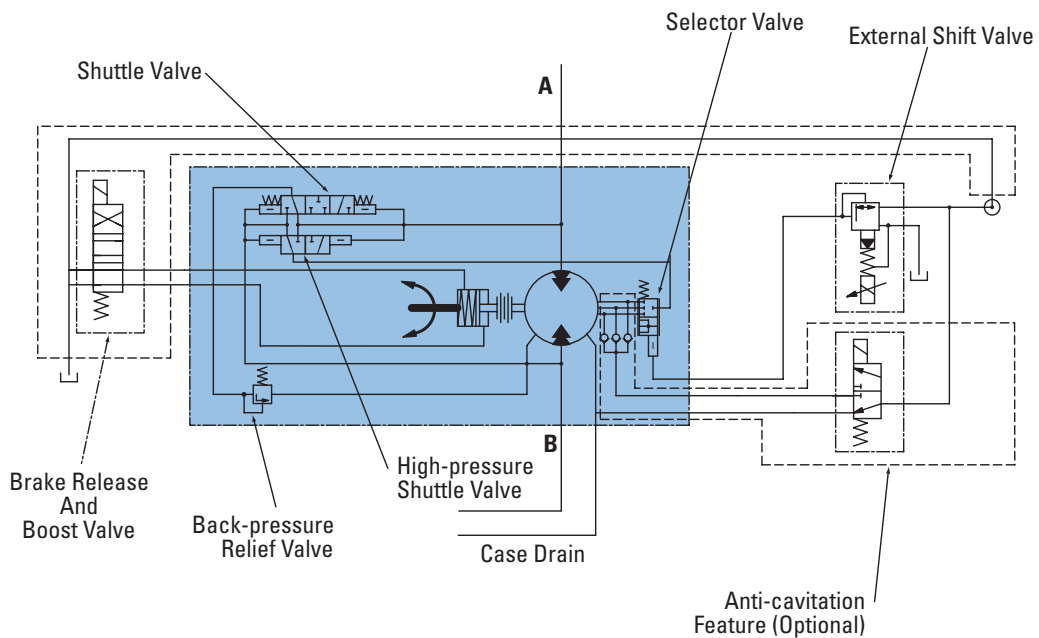
# Typical Hydraulic Circuit

VIS 30, 40 and 45 Series

## Two-speed Circuit



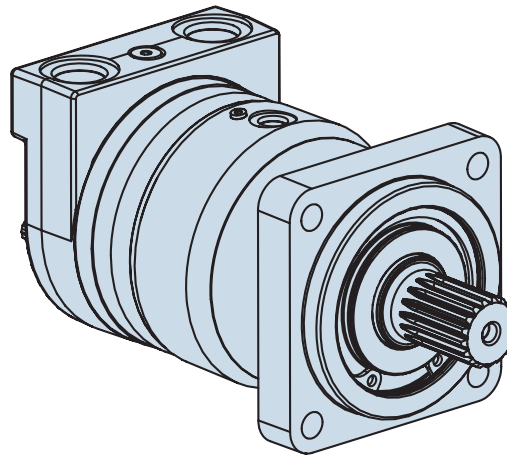
## Two-Speed Brake Motor Circuit



# Notes

# VIS 30 Series

## Highlights



### Features

- Patented VIS Geroler technology
- Three moving components: (Geroler, star, drive, and output shaft)
- Two-piece pre-loaded pressure balance plate
- Shuttle valve option for reliable internal drive lubrication
- High-pressure capability – ratings compatible with high-pressure piston pumps
- Variety of optional features including two-speed option, brake packages, and case flow solutions for both closed-loop and open-loop applications.

### Description

The Eaton VIS 30 motor is the most compact motor in the VIS motor line. It is rated at 151LPM [40 GPM] and pressures to 310 bar [4500 PSI]. Maximum continuous output torque capability is rated to 1632 Nm [14,400 lb-in.]. This motor provides high torque with high efficiency, smooth performance, and quiet operation. The motor utilizes patented VIS technology with improved high-strength Geroler, optimized drive geometry, and two-piece pre-loaded balance plate for increased starting efficiency, reduced leakage and higher back pressure capacity. A wide variety of options are available including two-speed option, brake options and case flow options for both closed-loop and open-loop applications

### Specifications

Geroler Element	4 Displacements
Flow l/min [GPM]	151 [40] Continuous*** 170 [45] Intermittent**
Speed	Up to 454 RPM
Pressure bar [PSI]	310 [4500] Cont.*** 345 [5000] Inter.** 380 [5500] Peak.*
Torque Nm [lb - in]	1632 [14440] Cont.*** 2034 [18000] Inter.**

\*\*\* Continuous—(Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent—(Inter.) Intermittent operation, 10% of every minute.

\* Peak—(Peak) Peak operation, 1% of every minute.

### Benefits

- Extremely Compact Powerful Package
- Highest Output Torque in its Class
- High Efficiency
- Reliable performance
- Reduced System Temperatures
- Quiet, Smooth Operation
- High Horsepower Density
- Design Flexibility

### Applications

- Skid Steer Loaders
- Sprayers
- Underground Boring Equipment
- Forestry Equipment
- Irrigation Reels
- Grinders / Mixers
- Material Handling Equipment
- Augers



Skid Steer



Sprayer



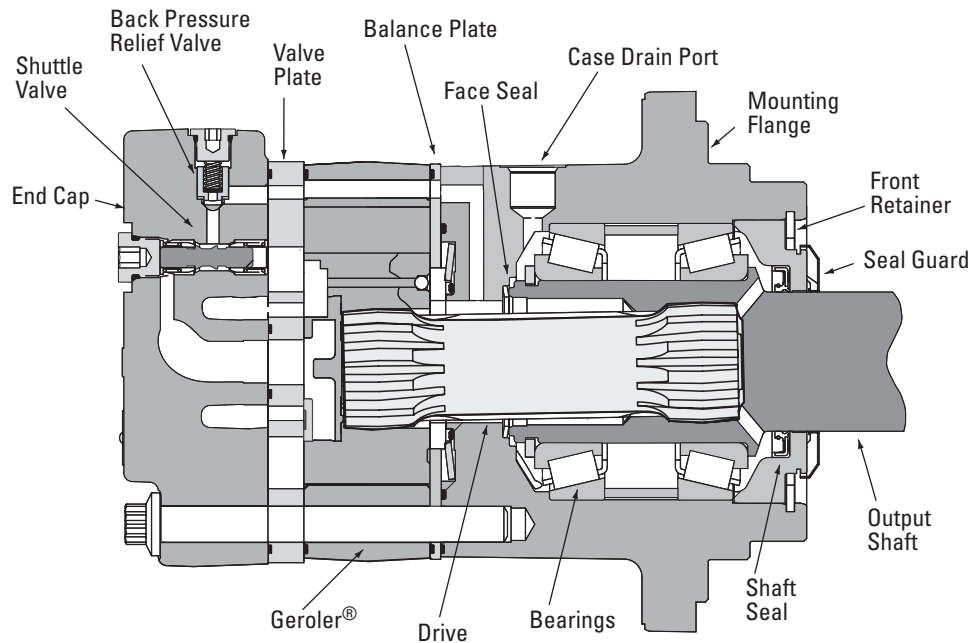
Boring



Injection Molding

# VIS 30 Series

## Specifications



### SPECIFICATION DATA — VIS 30 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Max. Speed (RPM) @ Flow	Continuous	440	357	284	249
	Intermittent	454	368	293	257
Flow l/min [GPM]	Continuous	151 [40]	151 [40]	151 [40]	151 [40]
	Intermittent	170 [45]	170 [45]	170 [45]	170 [45]
Torque Nm [lb-in]	Continuous	1445 [12789]	1589 [14063]	1632 [14440]	1632 [14440]
	Intermittent	1597 [14137]	1968 [17421]	2034 [18000]	2034 [18000]
Pressure $\Delta$ bar [ $\Delta$ PSI]	Continuous	310 [4500]	255 [3700]	203 [2950]	179 [2600]
	Intermittent	345 [5000]	320 [4635]	254 [3685]	223 [3240]
	Peak	380 [5500]	380 [5500]	305 [4420]	268 [3890]
Weight kg [lb]	Standard or Wheel Mount	28,5 [62.9]	29,1 [64.2]	29,9 [66.0]	30,5 [67.2]
	Bearingless	16,3 [36.0]	16,9 [37.3]	17,7 [39.1]	18,3 [40.3]
Weight kg [lb]	Two-speed Standard or Wheel Mount	32,1 [70.8]	32,7 [72.1]	33,5 [73.9]	34,1 [75.1]
	Two-speed Bearingless	19,9 [43.9]	20,5 [45.2]	21,3 [47.0]	21,9 [48.2]

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

400 bar [5800 PSI]  
Do Not Exceed Pressure Rating (for displacement size see chart above).

#### Return Pressure (Back-Pressure):

Minimum – 3,5 bar [50 PSI]  
Maximum – 21 bar [300 PSI]

#### Note:

Return (back-pressure) must be 3,5 bar [50 PSI] greater than the case pressure.

#### Case Pressure:

Minimum – No Pressure  
Maximum – 3,5 bar [50 PSI]

#### Note:

The case must be full when the motor is operating. A case drain is recommended.

#### $\Delta$ Pressure:

The true  $\Delta$  bar [ $\Delta$  PSI] between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

Per ISO Cleanliness Code, 4406: 20/18/13

#### Shuttle:

Standard

#### Back-Pressure Relief Valve:




Required for closed loop circuit.

# VIS 30 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

**325 cm<sup>3</sup>/r [19.8 in<sup>3</sup>/r]**

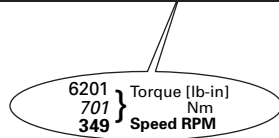
$\Delta$  Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	668	1399	2834	4251	5583	6924	8258	9528	10387	11637	12659	
	75	158	320	480	631	782	933	1076	1174	1315	1430	
15	46	46	46	44	43	43	42	42	39	37	36	
8	680	1419	2867	4303	5711	7126	8530	9876	11269	12460	13782	14840
	77	160	324	486	645	805	964	1116	1273	1408	1557	1677
8	9	91	90	87	85	84	83	81	78	74	70	66
12	647	1412	2879	4340	5768	7195	8619	10010	11360	12672	14029	15246
	73	160	325	490	652	813	974	1131	1284	1432	1585	1723
45	139	137	133	132	129	129	129	127	126	124	113	109
16	690	1420	2852	4316	5741	7191	8621	10014	11412	12736	14081	15435
	78	160	322	488	649	812	974	1131	1289	1439	1591	1744
61	186	184	181	179	174	170	168	168	166	161	154	151
20	657	1250	2774	4407	5695	7170	8741	9952	11392	12789	14137	15339
	74	141	313	498	643	810	988	1124	1287	1445	1597	1733
76	233	229	226	223	217	214	211	209	208	203	200	197
25	544	1266	2814	4154	5858	7220	8518	9936	11269	12654	14037	15334
	61	143	318	469	662	816	962	1123	1273	1430	1586	1732
95	291	287	283	280	277	269	266	264	260	256	254	248
30	146	1177	2605	3968	5401	6882	8315	9678	11092	12536	13960	15321
	16	133	294	448	610	778	939	1094	1253	1416	1577	1731
114	341	345	340	336	333	325	323	320	316	312	307	303
35	114	1144	2532	3960	5322	6768	8232	9589	11019	12228	13298	15023
	13	129	286	447	601	765	930	1083	1245	1382	1503	1697
132	396	402	396	392	387	378	377	372	369	363	353	354
40	92	557	2047	3574	5032	6507	7944	9282	10687	12112	13439	14938
	10	63	231	404	569	735	898	1049	1207	1368	1518	1688
151	454	452	440	433	430	429	430	428	425	420	413	408

**400 cm<sup>3</sup>/r [24.4 in<sup>3</sup>/r]**

$\Delta$  Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	823	1724	3493	5239	6880	8532	10177	11741	12800	14340	15600	
	93	195	395	592	777	964	1150	1327	1446	1620	1763	
15	37	37	37	36	35	35	34	34	32	30	29	
8	838	1749	3533	5302	7038	8781	10511	12171	13887	15354	16983	18288
	95	198	399	599	795	992	1188	1375	1569	1735	1919	2066
30	75	74	73	71	69	68	67	66	63	60	57	53
12	797	1740	3548	5349	7108	8866	10622	12335	13999	15616	17289	18788
	90	197	401	604	803	1002	1200	1394	1582	1764	1953	2123
45	113	111	108	107	105	105	105	103	102	101	92	88
16	850	1750	3515	5319	7074	8862	10624	12341	14063	15695	17353	19021
	96	198	397	601	799	1001	1200	1394	1589	1773	1961	2149
61	151	149	147	145	141	138	136	136	135	131	125	123
20	810	1540	3419	5431	7018	8836	10771	12264	14039	15760	17421	18902
	92	174	386	614	793	998	1217	1386	1586	1781	1968	2136
76	189	186	183	181	176	174	171	170	169	165	163	160
25	670	1560	3467	5118	7219	8897	10497	12244	13887	15594	17299	18896
	76	176	392	578	816	1005	1186	1383	1569	1762	1954	2135
95	236	233	230	227	225	218	216	215	211	208	206	202
30	180	1450	3210	4890	6656	8480	10246	11927	13669	15448	17203	18881
	20	164	363	552	752	958	1158	1348	1544	1745	1944	2133
114	277	280	276	273	270	264	262	259	256	253	250	246
35	140	1410	3120	4880	6559	8341	10144	11817	13579	15068	16388	18514
	16	159	353	551	741	942	1146	1335	1534	1702	1852	2092
132	321	326	321	318	314	307	306	302	299	295	287	287
40	113	687	2522	4405	6201	8019	9789	11438	13170	14926	16561	18409
	13	78	285	498	701	906	1106	1292	1488	1686	1871	2080
151	368	367	357	352	349	348	348	349	347	345	341	335






# VIS 30 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

**505 cm<sup>3</sup>/r [30.7 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310	5000 345
4	1035 117	2169 245	4395 497	6592 745	8656 978	10735 1213	12804 1447	14773 1669	16105 1820	18043 2039	19628 2218
15	29	29	29	29	28	28	27	27	25	24	23
8	1055 119	2200 249	4445 502	6671 754	8855 1000	11049 1248	13225 1494	15313 1730	17473 1974	19319 2183	21368 2414
30	60	59	58	56	55	54	53	52	50	48	45
12	1003 113	2190 247	4464 504	6730 760	8944 1011	11155 1260	13364 1510	15520 1754	17614 1990	19648 2220	21753 2458
45	90	88	86	85	83	83	83	82	81	80	73
16	1069 121	2202 249	4422 500	6692 756	8901 1006	11150 1260	13367 1510	15527 1754	17694 1999	19747 2231	21833 2467
61	120	118	117	115	112	110	108	108	107	104	100
20	1019 115	1938 219	4301 486	6833 772	8830 998	11117 1256	13552 1531	15431 1743	17663 1996	19829 2240	21919 2476
76	150	148	145	144	140	138	136	135	134	131	129
25	843 95	1963 222	4363 493	6440 728	9083 1026	11194 1265	13207 1492	15406 1741	17473 1974	19620 2217	21765 2459
95	188	185	183	180	179	173	172	171	168	165	164
30	226 26	1824 206	4039 456	6153 695	8375 946	10670 1206	12892 1457	15006 1695	17199 1943	19437 2196	21645 2446
114	220	223	219	217	215	210	208	206	204	201	198
35	176 20	1774 200	3926 444	6140 694	8252 932	10494 1186	12763 1442	14868 1680	17086 1930	18959 2142	20619 2330
132	255	259	255	253	250	244	243	240	238	234	228
40	142 16	864 98	3174 359	5542 626	7803 882	10089 1140	12317 1392	14391 1626	16570 1872	18779 2122	20837 2354
151	293	292	284	279	277	277	277	276	274	271	267

**570 cm<sup>3</sup>/r [34.9 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250 15	500 35	1000 70	1500 105	2000 140	2500 170	3000 205	3500 240	4000 275	4500 310
4	1177 133	2466 279	4996 564	7494 847	9841 1112	12204 1379	14556 1645	16794 1897	18308 2069	20511 2317
15	26	26	26	25	24	24	24	24	22	21
8	1199 135	2501 283	5053 571	7584 857	10067 1137	12560 1419	15034 1699	17408 1967	19864 2244	21962 2481
30	52	52	51	50	48	48	47	46	44	42
12	1140 129	2489 281	5074 573	7650 864	10167 1149	12681 1433	15193 1717	17644 1993	20024 2262	22336 2524
45	79	78	76	75	73	73	73	72	71	71
16	1216 137	2503 283	5027 568	7608 860	10119 1143	12675 1432	15195 1717	17652 1994	20115 2273	22449 2536
61	106	104	103	101	99	96	95	95	94	92
20	1159 131	2203 249	4890 552	7768 878	10038 1134	12638 1428	15407 1741	17542 1982	20080 2269	22542 2547
76	132	130	128	127	123	121	120	119	118	115
25	958 108	2231 252	4960 560	7321 827	10325 1167	12725 1438	15014 1696	17513 1979	19863 2244	22305 2520
95	165	163	161	159	157	152	151	150	148	145
30	257 29	2074 234	4591 519	6994 790	9520 1076	12130 1370	14656 1656	17059 1927	19552 2209	22096 2496
114	193	196	193	191	189	184	183	181	179	177
35	200 23	2017 228	4463 504	6980 789	9381 1060	11930 1348	14509 1639	16902 1910	19423 2195	21553 2435
132	225	228	224	222	220	214	214	211	209	206
40	162 18	983 111	3608 408	6300 712	8870 1002	11469 1296	14002 1582	16360 1848	18837 2128	21348 2412
151	257	257	249	246	244	243	244	243	241	238

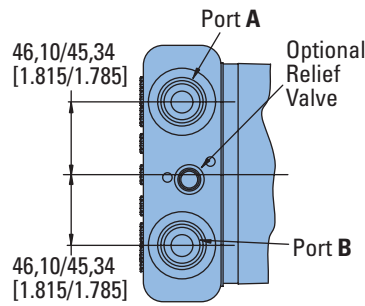
8870 } Torque [lb-in]  
1002 } Nm  
244 } Speed RPM



# VIS 30 Series

## Dimensions

Standard and Wheel Mount  
- SAE



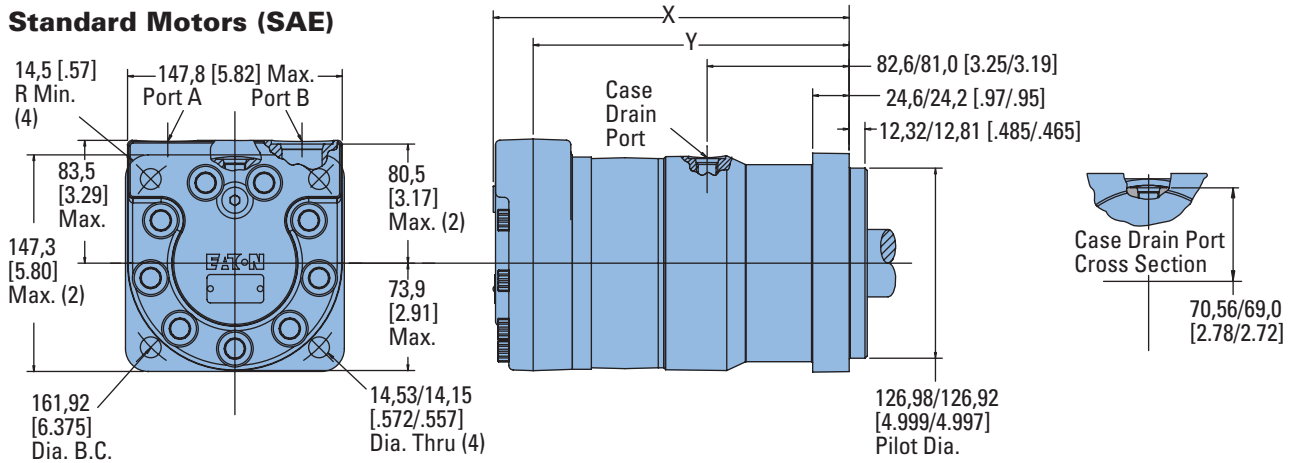
### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

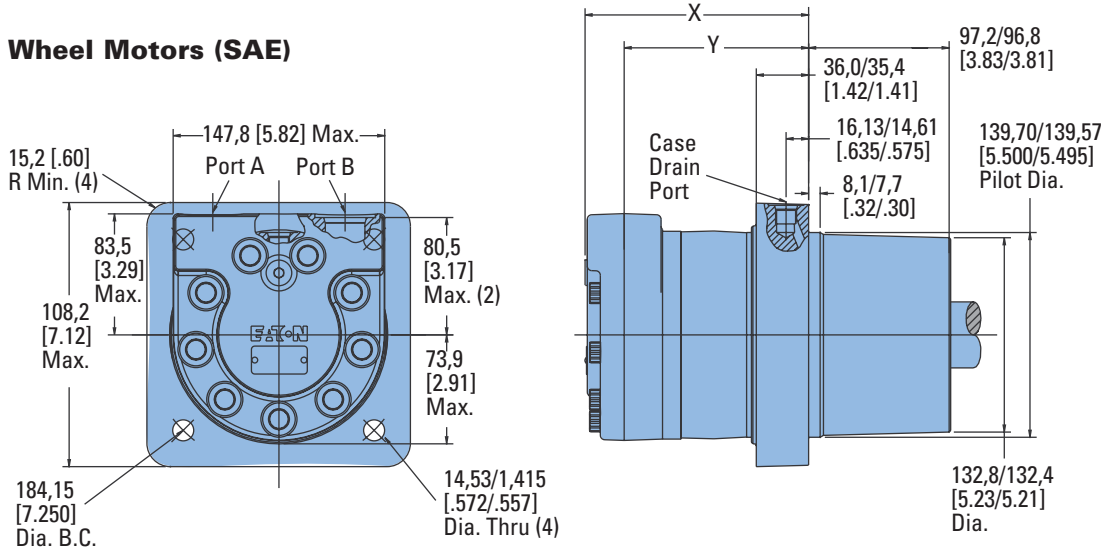
### Standard Motors (SAE)



#### STANDARD MOTORS (SAE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
325 [19.8]	223,5 [8.80]	195,3 [7.69]
400 [24.4]	230,4 [9.07]	201,9 [7.95]
505 [30.7]	239,3 [9.42]	211,1 [8.31]
570 [34.9]	245,4 [9.66]	217,2 [8.55]

### Wheel Motors (SAE)



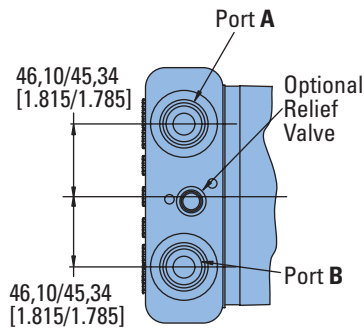
#### WHEEL MOTORS (SAE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
325 [19.8]	138,7 [5.46]	110,5 [4.35]
400 [24.4]	145,5 [5.73]	117,1 [4.61]
505 [30.7]	154,5 [6.08]	126,2 [4.97]
570 [34.9]	160,5 [6.32]	132,3 [5.21]

# VIS 30 Series

## Dimensions

Standard and Wheel Mount  
- ISO



### Ports

G 3/4 (BSP) O-ring Ports (2)

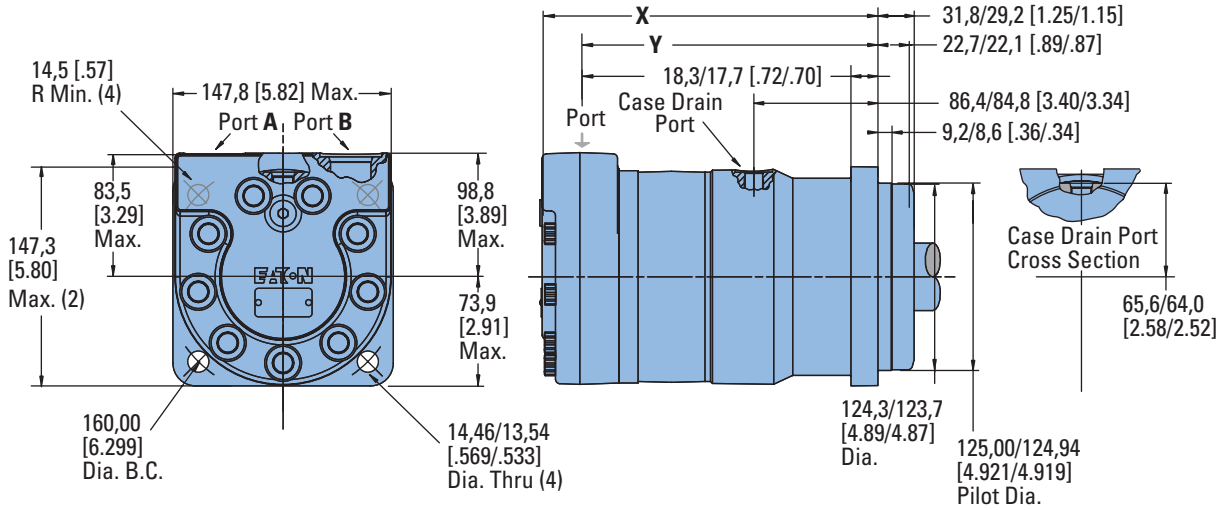
G 1/4 (BSP) O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

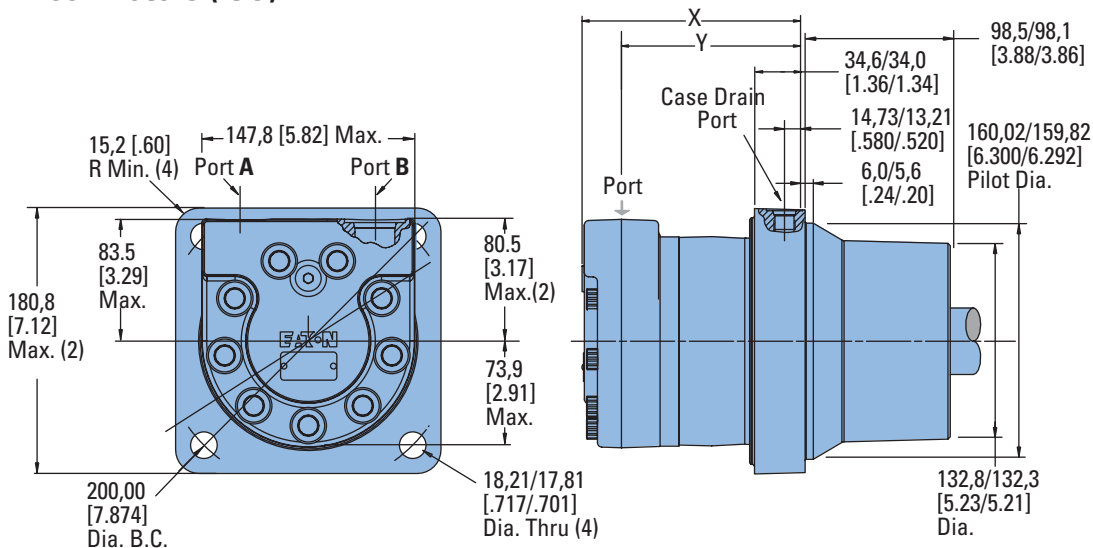
## Standard Motors (ISO)



### STANDARD MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
325 [19.8]	211,6 [8.33]	183,1 [7.21]
400 [24.4]	218,2 [8.59]	190,0 [7.48]
505 [30.7]	227,3 [8.95]	198,9 [7.83]
570 [34.9]	233,4 [9.19]	205,2 [8.08]

## Wheel Motors (ISO)



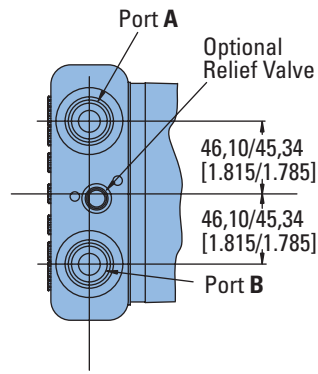
### WHEEL MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
325 [19.8]	137,4 [5.41]	109,0 [4.29]
400 [24.4]	144,0 [5.67]	115,8 [4.56]
505 [30.7]	153,2 [6.03]	124,7 [4.91]
570 [34.9]	159,3 [6.27]	131,1 [5.16]

# VIS 30 Series

## Dimensions

Bearingless

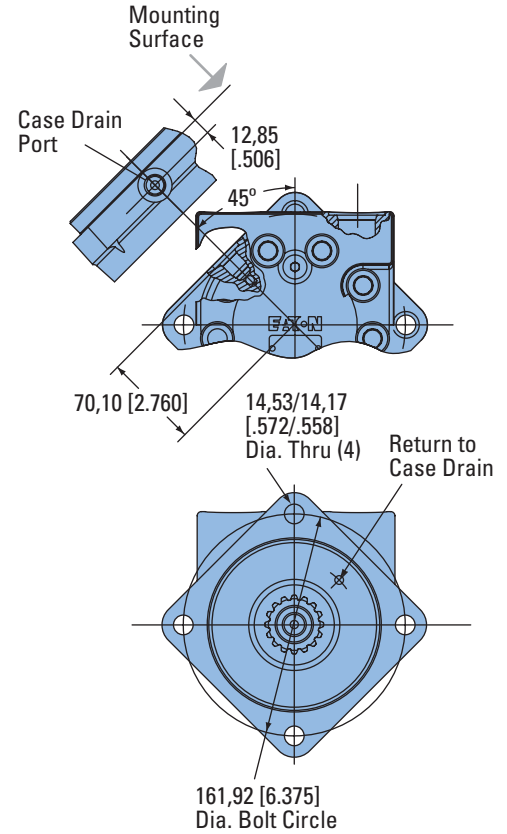
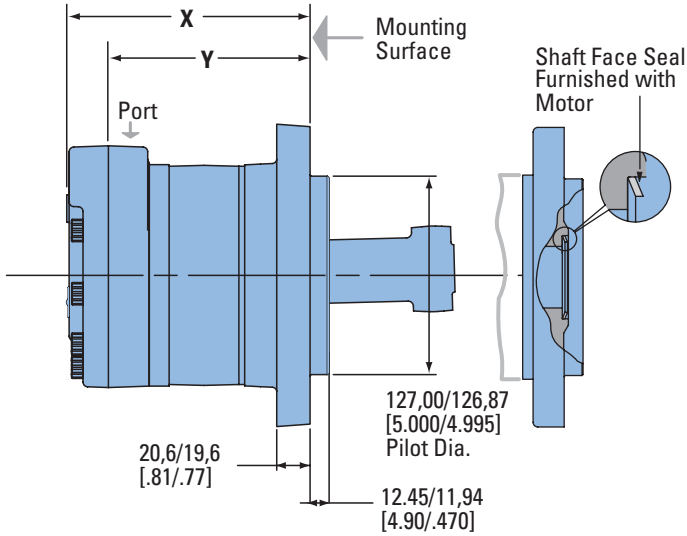


### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW

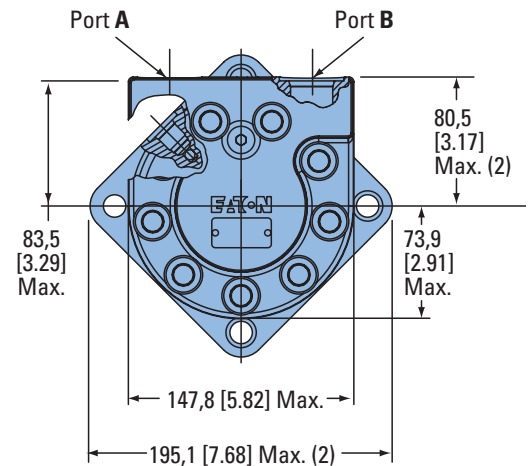
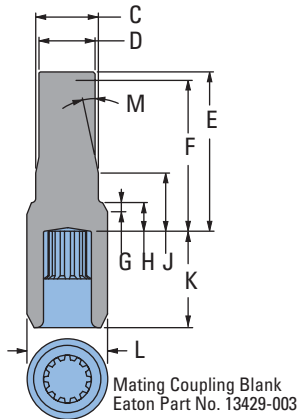


For VIS 30 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

### Note:

After machining blank, part must be hardened per Eaton specification.

- C 52,80 [2.08] Dia.
- D 49,00 [1.93] Dia.
- E 147,57 [5.81] Max.
- F 142,49 [5.61] Min.
- Full Form Dia.
- G 7,87 [.310] Max.
- H 17,27 [.680]
- J 33,30 [1.31]
- K 84,20 [3.315]
- Full Form Dia.
- L 69,60 [2.74]
- M 15



### BEARINGLESS MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
325 [19.8]	141,2 [5.56]	113,3 [4.46]
400 [24.4]	148,1 [5.83]	120,1 [4.73]
505 [30.7]	157,2 [6.19]	129,0 [5.08]
570 [34.9]	163,3 [6.43]	135,1 [5.32]

# VIS 30 Series

## Installation Information

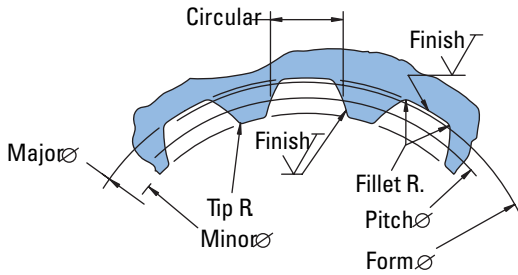
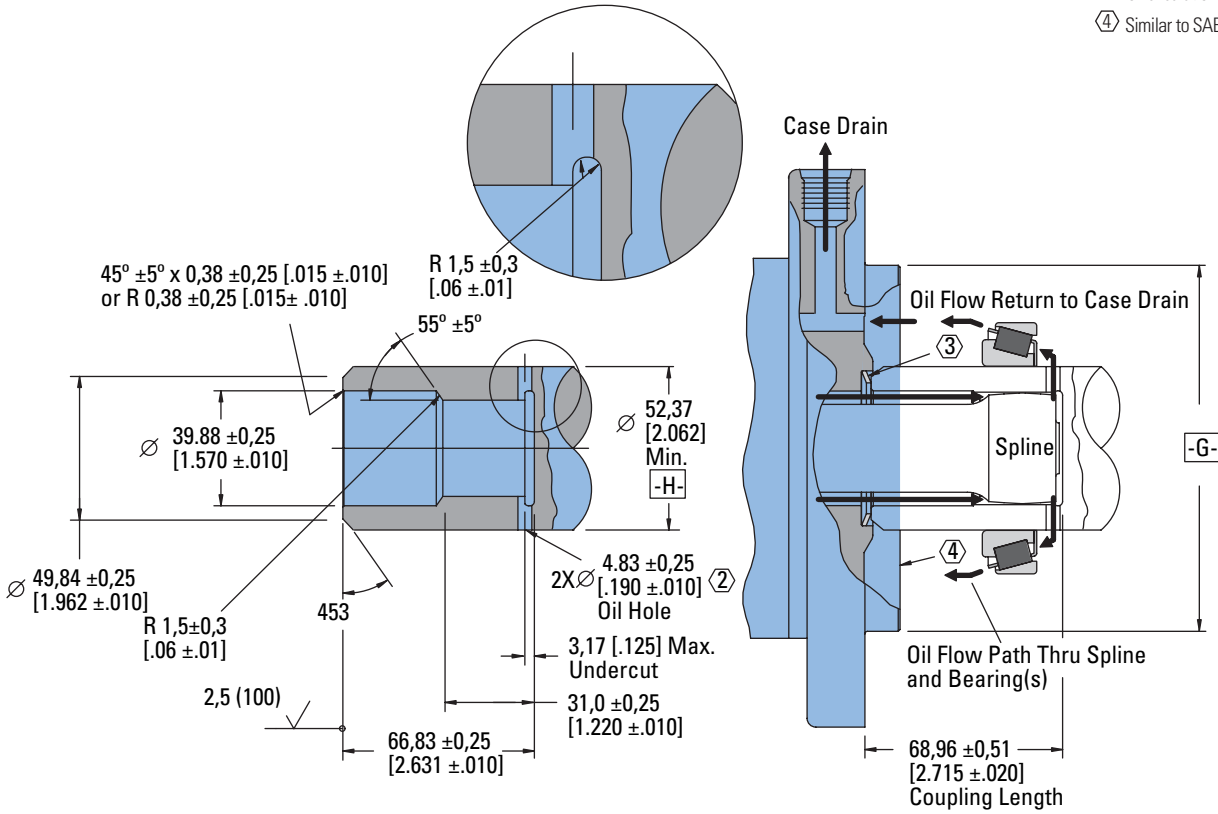
Bearingless

1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 -1,27 [.030 -.050]. Dimensions apply after heat treat.

② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.

③ Seal to be furnished with motor for proper oil circulation thru splines.

④ Similar to SAE "C" Four Bolt Flange.



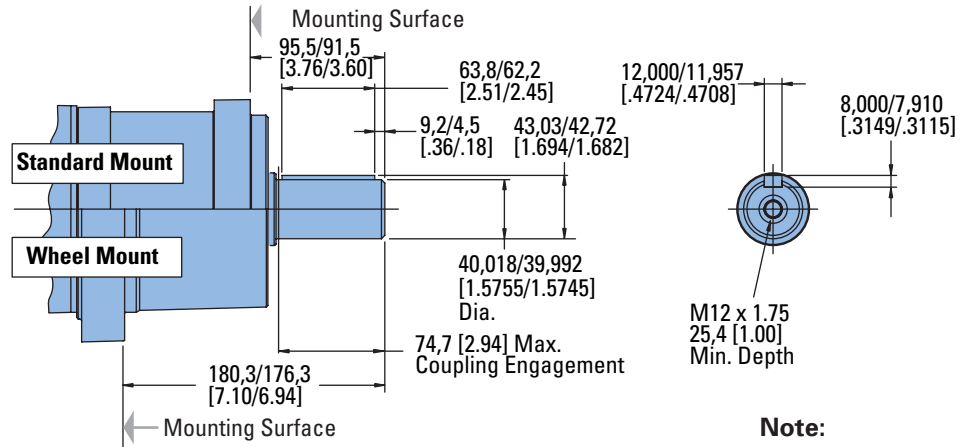
Spline Pitch.....	8.5/17
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 35,858823 [1.4117647] $\text{Ⓞ}0,20$ [.008]   H
Base Diameter.....	Ref. 31,054652 [1.2226241]
Major Diameter.....	39,17 [1.542] Max. 38,97 [1.534] Min.
Minor Diameter.....	33,30 -33,48 [1.311 -1.318]
Form Diameter, Min.....	38,33 [1.509]
Fillet Radius.....	0,64 -0,76 [.025 -.030]
Tip Radius.....	0,25 -0,51 [.010 -.020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -.0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,898 [.2322]
Minimum Effective.....	5,804 [.2285]
Maximum Effective.....	Ref. 5,857 [.2306]
Minimum Actual.....	Ref. 5,834 [.2297]
Dimension Between Two Pins.....	Ref. 26,929 -27,084 [1.0602 -1.0663]
Pin Diameter.....	6,223 [.2450] Pins to Have 4,0 [.160]
Wide Flat for Root Clearance	

# VIS 30 Series

## Dimensions Shafts

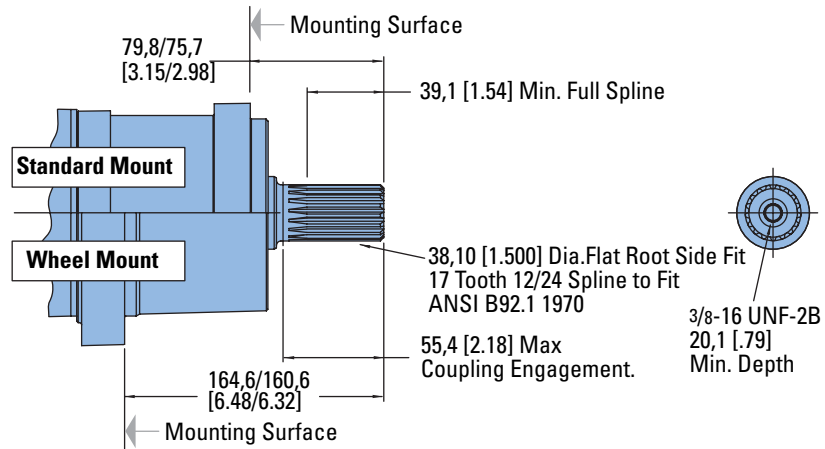
SAE

### 40 mm Straight

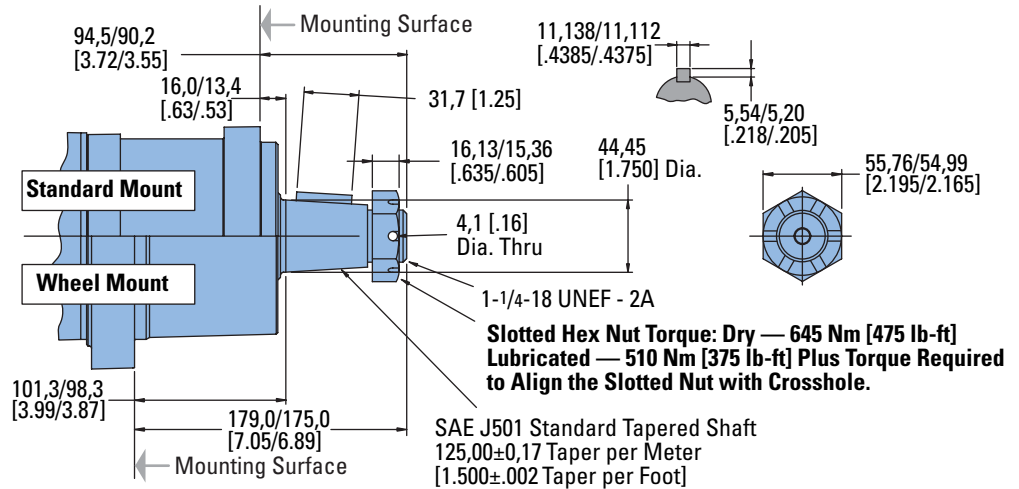


**Note:**  
For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

### 1-1/2 Inch 17 Tooth Splined



### 1-3/4 Inch Tapered



# VIS 30 Series

## Shaft Side Load Capacity

SAE

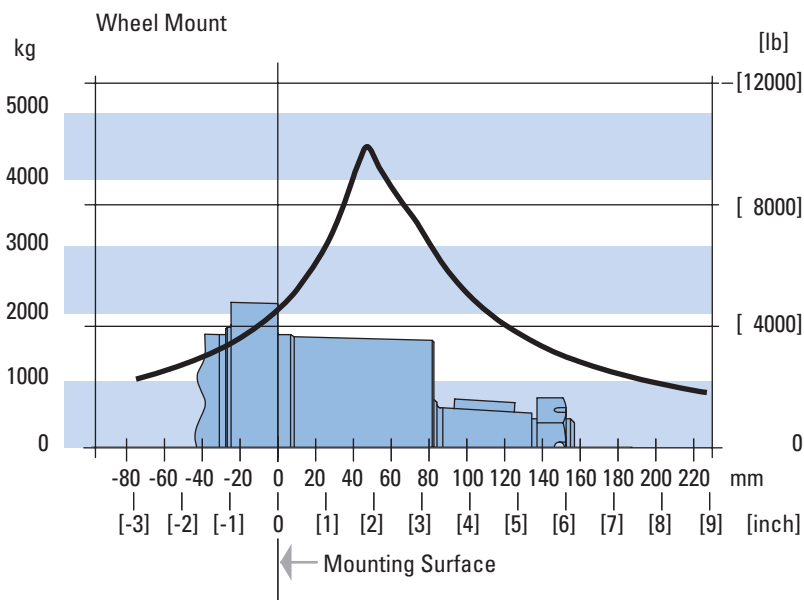
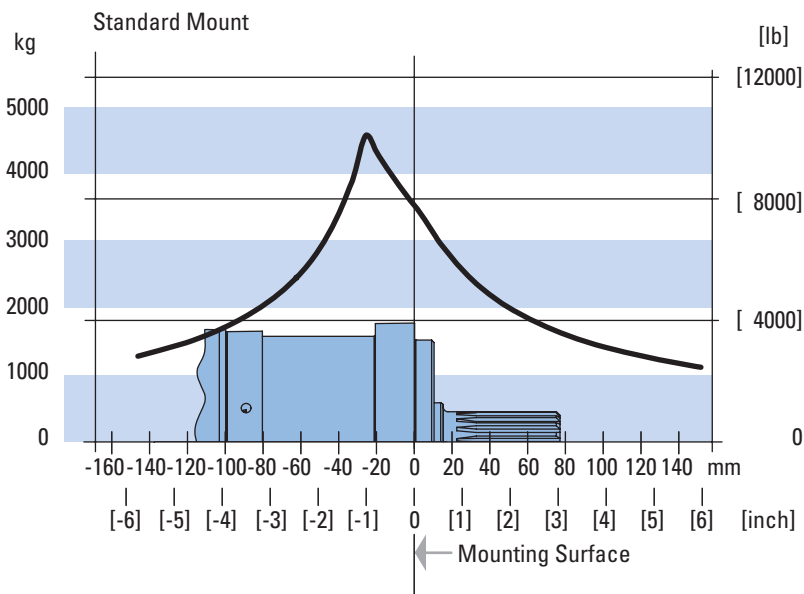
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

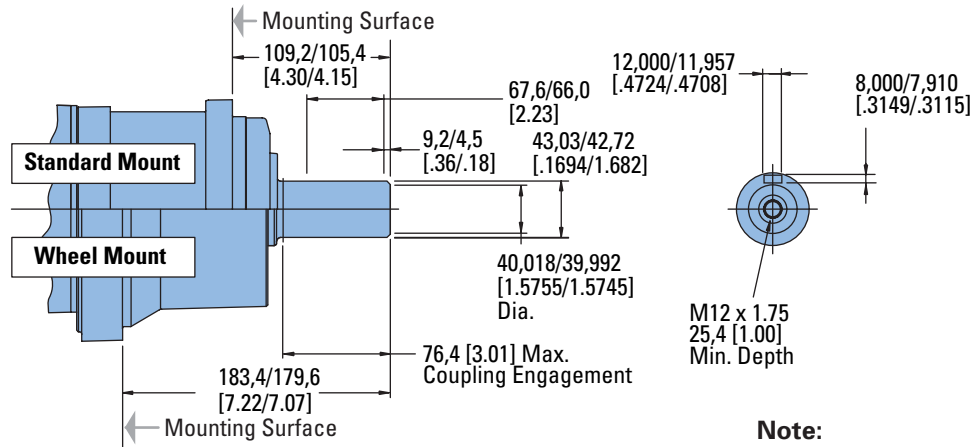


# VIS 30 Series

## Dimensions Shafts

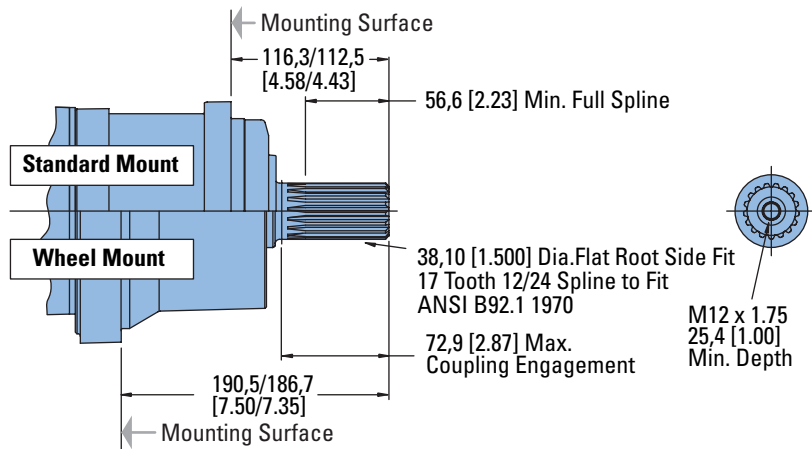
ISO

### 40 mm Straight

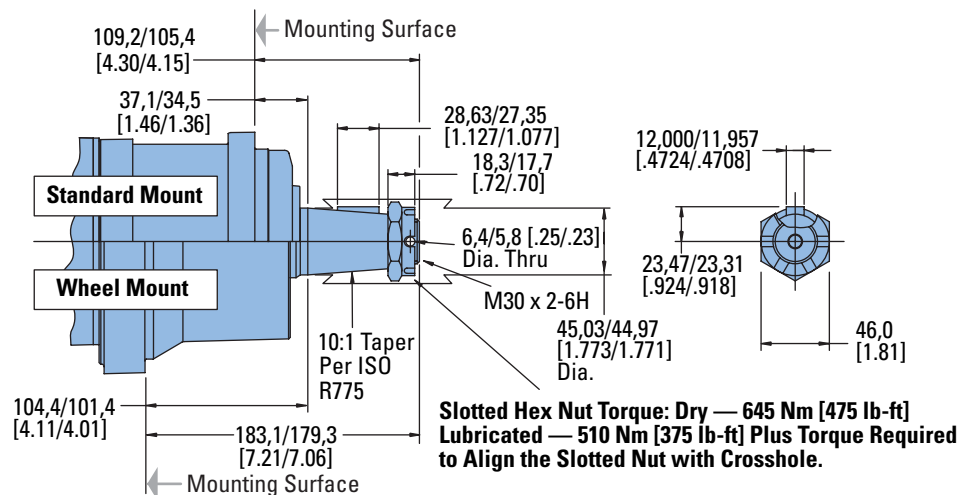


**Note:**  
For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

### 38,1 mm [1-1/2 Inch] 17 Tooth Splined



### 45 mm Tapered





# VIS 30 Series

## Shaft Side Load Capacity

ISO

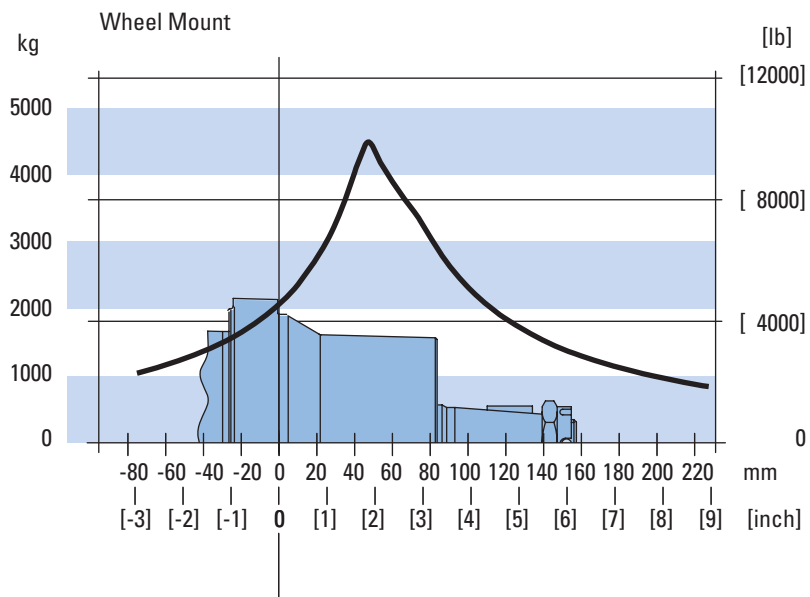
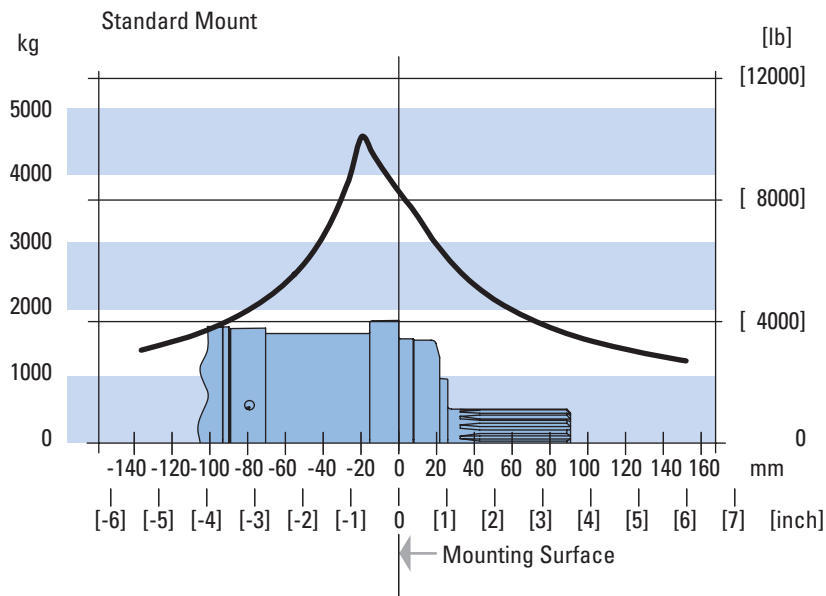
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



# VIS 30 Series

## Product Numbers

Closed Loop

Use digit prefix — 159-, 160-, or 161- plus four digit number from charts for complete product number— Example 161-0064.

**Orders will not be accepted without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0103	-0094	-0104	-0105
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0107	-0108	-0109	-0110
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0112	-0113	-0114	-0115
Wheel	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0054	-0055	-0056	-0057
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0059	-0060	-0061	-0062
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0064	-0065	-0066	-0067
Bearingless		1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	161-0045	-0064	-0065	-0090

161-0064

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0117	-0118	-0119	-0120
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0122	-0123	-0124	-0125
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0127	-0128	-0129	-0130
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0069	-0070	-0071	-0072
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0074	-0075	-0076	-0077
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0079	-0080	-0081	-0092
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	161-0067	-0068	-0069	-0070

161-0068

#### Note:

The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

# VIS 30 Series

## Product Numbers

Open Loop

Use digit prefix — 159-, 160-, or 161- plus four digit number from charts for complete product number— Example 161-0064.

**Orders will not be accepted without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0035	-0038	-0041	-0131
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0036	-0039	-0042	-0132
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	159-0034	-0037	-0040	-0133
Wheel	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0021	-0024	-0027	-0083
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0022	-0025	-0028	-0084
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	160-0020	-0023	-0026	-0085
Bearingless		1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	161-0030	-0034	-0020	-0077

161-0034

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0051	-0054	-0057	-0134
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0050	-0053	-0056	-0135
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	159-0049	-0052	-0055	-0136
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0037	-0040	-0043	-0086
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0036	-0039	-0042	-0087
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	160-0035	-0038	-0041	-0088
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	161-0035	-0036	-0037	-0078

161-0036

#### Note:

All product numbers in the charts (above) are for motors **without** a back-pressure relief valve. These motors would generally be used in open loop circuits.

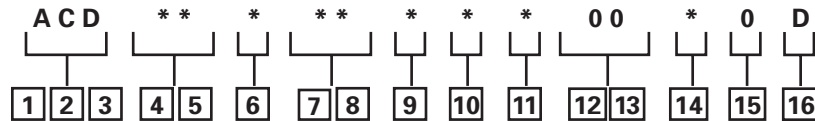
For closed loop circuits a motor **with** a back-pressure relief valve is required.

- A case drain is recommended for all VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].
- In open loop circuits, return pressure must be 3,5 bar [50 PSI] greater than case pressure to properly lubricate the internal drive.

# VIS 30 Series

## Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 30 motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



**1, 2, 3 Product Series**  
ACD – VIS 30 Motor

**4, 5 Displacement**  
cm<sup>3</sup>/r [in<sup>3</sup>/r]

- 20 – 325 [19.8]
- 24 – 400 [24.4]
- 31 – 505 [30.7]
- 35 – 570 [34.9]

**6 Mounting Type**

**A** – 4 Bolt Bearingless  
127,00 [5.000] Pilot Dia.  
with 12,19 [.480] Pilot  
Length and 14,35 [.565] Dia.  
Holes on 161,92 [6.375] Dia.  
Bolt Circle

**B** – 4 Bolt Wheel Mount  
160 [6.3] Pilot Dia. with 5,8  
[.23] Pilot Length and 18,00  
[.709] Dia. Holes on 200,00  
[7.874] Dia. Bolt Circle (ISO  
Compatible)

**F** – 4 Bolt Standard Mount  
(SAE CC) 127,00 [5.000]  
Pilot Dia. with 12,2 [.48]  
Pilot Length and 14,32 [.564]  
Dia. Holes on 161,92 [6.375]  
Dia. Bolt Circle

**G** – 4 Bolt Wheel Mount  
139,7 [5.50] Pilot Dia. with  
7,9 [.31] Pilot Length and  
14,32 [.564] Dia. Holes on  
184,15 [7.250] Dia. Bolt  
Circle (SAE Compatible)

**H** – 4 Bolt Standard Mount  
125,0 [4.92] Pilot Dia. with  
8,9 [.35] Pilot Length and  
14,00 [.551] Dia. Holes on  
160,00 [6.299] Dia. Bolt  
Circle (ISO Compatible)

**7, 8 Output Shaft**

**00** – None (Bearingless)

**01** – 45 mm Dia. 10:1  
Tapered Shaft Per ISO R775  
with M30 x 2- 6H Threaded  
Shaft End, 12W x 8H x 28L  
[.472W x .313H x 1.102L]  
Key

**02** – 1-3/4 inch Dia. .125:1  
Tapered Shaft Per SAE J  
501 with 1-1/4-18 UNEF - 2A  
Threaded Shaft End, 11,11  
[.4375] Square x 31,8 [1.25]  
Straight Key

**07** – 40 mm Dia. Straight  
Shaft with M12 x 1,75 - 6H  
Thread in End, 12W x 8H  
x 63L [.472W x .313H x  
2.480L] Key  
(SAE Compatible)

**08** – 1-1/2 inch Dia. Flat  
Root Side Fit, 17 Tooth,  
12/24 DP 30 Degree  
Involute Spline, 39,1 [1.54]  
Minimum Full Spline with  
3/8 -16 UNC - 2B Thread in  
End  
(SAE Compatible)

**09** – 1-1/2 inch Dia. Flat  
Root Side Fit, 17 Tooth,  
12/24 DP30 Degree Involute  
Spline, 56,6 [2.23] Minimum  
Full Spline with M12 x 1,75  
- 6H Thread in End  
(ISO Compatible)

**10** – 40 mm Dia. Straight  
Shaft with M12 x 1,75 - 6H  
Thread in End, 12W x 8H  
x 67L [.472W x .313H x  
2.630L] Key  
(ISO Compatible)

**9 Ports**

**A** – 1-1/16-12 UN-2B Size 12  
O-ring Port, Accepts Fittings  
for SAE J1926

**B** – G 3/4 (BSP) Straight

Thread Port

**10 Case Flow Options**

**A** – Shuttle Valve with 9/16-  
18 UNF-2B, Size 6 O-ring  
Port Case Drain, Accepts  
Fittings for SAE J1926

**B** – Shuttle Valve with G 1/4  
(BSP) Straight Thread Port  
Case Drain

**11 Back-Pressure Relief**

**0** – None (for Open Loop  
Only)

**1** – Set at 4,5 bar [65 PSI]  
(for Manual Pumps)

**2** – Set at 15,2 bar [220 PSI]  
(for Servo Pumps)

**4** – Set at 15,2 bar [300 PSI]  
(for high charge Servo Pumps)

**12, 13 Special Features**

**00** – None

**14 Paint/ Special  
Packaging**

**0** – No Paint, Individual Box

**A** – Painted Low Gloss  
Black, Individual Box

**B** – No Paint, Bulk Box  
Option

**C** – Painted Low Gloss  
Black, Bulk Box Option

**15 Eaton Assigned  
Code when Applicable**

**0** – Assigned Code

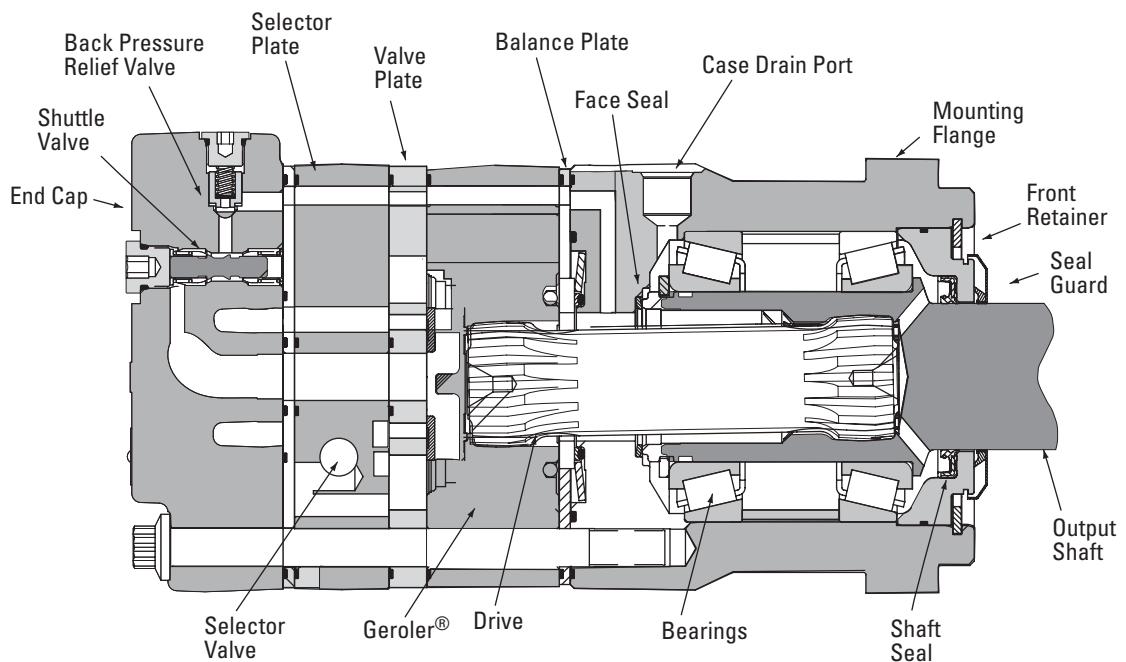
**16 Eaton Assigned  
Design Code**

**E** – Assigned Design Code

- A case drain is recommended for all VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].
- In open loop circuits, return pressure must be 3,5 bar [50 PSI] greater than case pressure to properly lubricate the internal drive.

# VIS 30 Series Two-speed

## Specifications



VIS 30 Series motors are available with an integral two-speed feature that allows the operator to shift the motor between low speed high torque (LSHT) mode and high speed low torque (HSLT) mode.

In the LSHT mode, output torque and rotation speed values are equal to those of the conventional VIS 30 motor. In the HSLT mode motor displacement is reduced by one third, resulting in a fifty percent increase in rotation speed and a torque output reduction of one third.

The VIS 30 two-speed motor is bidirectional. It will function with equal shaft

output in either rotation direction (CW or CCW) in both LSHT and HSLT modes. Shift on the fly technology allows full-power operation throughout the full duration of the shift.

Changing between modes is accomplished by changing the displacement in a ratio of 1 to 1.5. An external two-position three-way control valve is required for shifting pressure to the pilot port between low pressure (LSHT mode) and pilot signal pressure (HSLT mode).

An integral selector valve shifts the motor from LSHT mode to HSLT mode. Initially, low pressure is supplied to the pilot port. The selector valve is biased to LSHT mode by a return

spring. When pilot signal pressure is supplied to the pilot port and 3,5  $\Delta$ bar [50 PSI] is reached, the selector valve overcomes return spring force and the shifts the spool to select HSLT mode.

Oil on the opposite side of the spool is drained to tank via the drain port. The pressure difference between the pilot port and drain port must be maintained to keep the motor in the high speed mode. When pilot pressure is removed from the pilot port, the pressure in the pilot end of the spool valve is relieved and drained back through the control valve and the return spring forces the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high-speed mode operation. Allowable pilot pressure must be at least 3,5  $\Delta$ bar [50 PSI] and may be as high as full operating pressure of the motor.

All VIS 30 Series two-speed motors are equipped with a return line shuttle for closed circuit applications as standard equipment. All options available on the conventional VIS 30 are also available on VIS 30 two-speed motors.

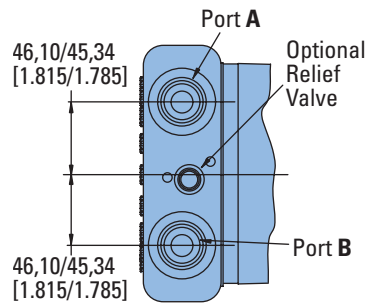
## Performance Data

In the LSHT mode, torque and speed values are equal to those of the conventional VIS 30 motor (refer to single speed motor performance data.) In the HSLT mode, rotation speed is increased by fifty percent and torque output is reduced by one third. The VIS 30 Two-speed motor will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes.

# VIS 30 Series Two-speed

## Dimensions

Standard and Wheel Mount  
– SAE



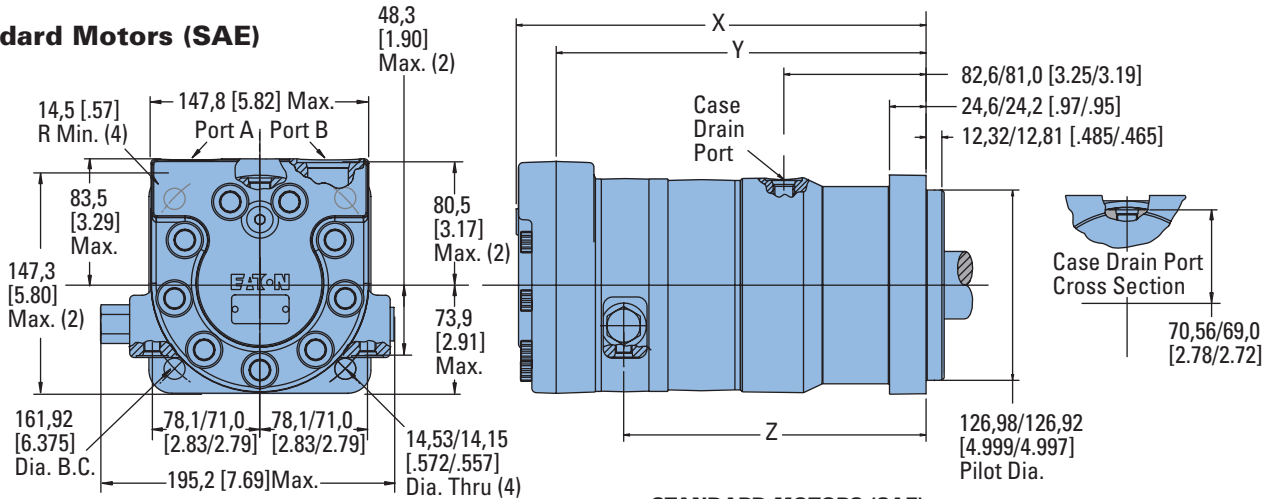
### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF -2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

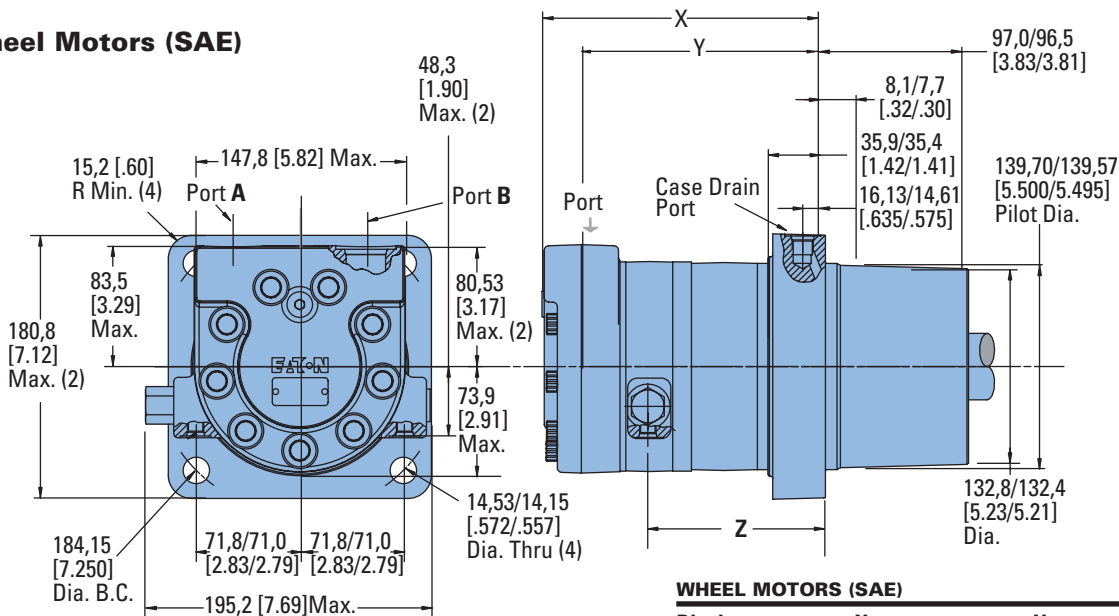
### Standard Motors (SAE)



#### STANDARD MOTORS (SAE)

Displacement	X	Y	Z
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]
325 [19.8]	259,3 [10.21]	231,4 [9.11]	186,2 [7.33]
400 [24.4]	265,9 [10.47]	238,0 [9.37]	193,0 [7.60]
505 [30.7]	275,1 [10.83]	246,9 [9.72]	201,7 [7.94]
570 [34.9]	281,2 [11.07]	253,0 [9.96]	208,0 [8.19]

### Wheel Motors (SAE)



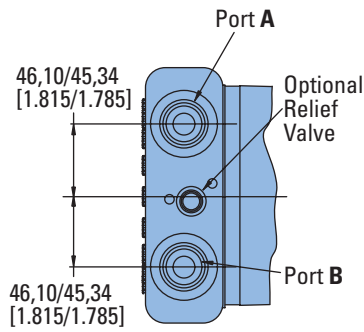
#### WHEEL MOTORS (SAE)

Displacement	X	Y	Z
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]
325 [19.8]	174,5 [6.87]	146,6 [5.77]	101,3 [3.99]
400 [24.4]	181,1 [7.13]	153,2 [6.03]	108,2 [4.26]
505 [30.7]	190,2 [7.49]	162,1 [6.38]	116,8 [4.60]
570 [34.9]	196,3 [7.73]	168,1 [6.62]	123,2 [4.85]

# VIS 30 Series Two-speed

## Dimensions

Standard and Wheel Mount  
- ISO



### Ports

G 3/4 (BSP) O-ring Ports (2)

G 1/4 (BSP) O-ring Case Drain Port (1)

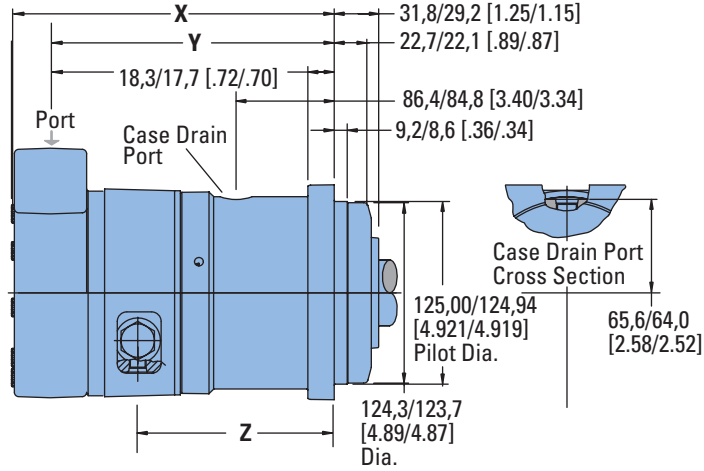
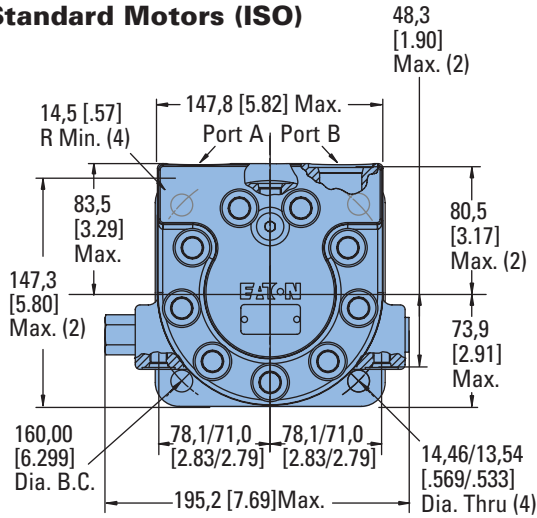
7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

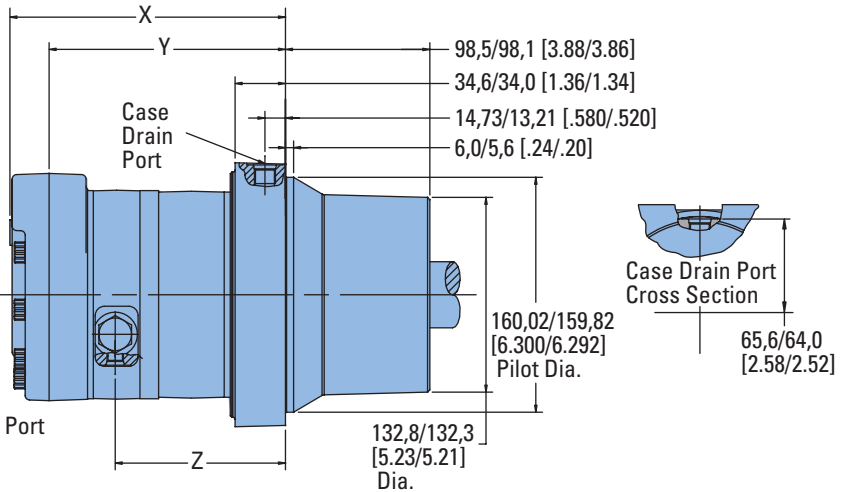
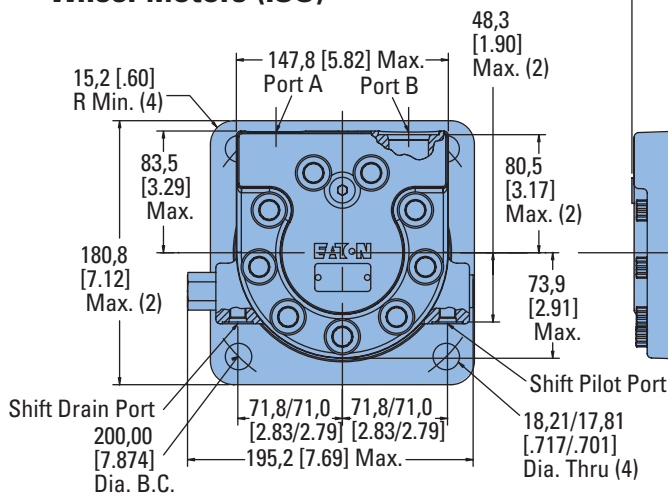
### Standard Motors (ISO)



### STANDARD MOTORS (ISO)

Displacement	X	Y	Z
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]
325 [19.8]	247,4 [9.74]	219,5 [8.64]	174,2 [6.86]
400 [24.4]	253,7 [9.99]	225,8 [8.89]	180,8 [7.12]
505 [30.7]	263,1 [10.36]	235,0 [9.25]	189,7 [7.47]
570 [34.9]	269,2 [10.60]	241,0 [9.49]	196,1 [7.72]

### Wheel Motors (ISO)



### WHEEL MOTORS (ISO)

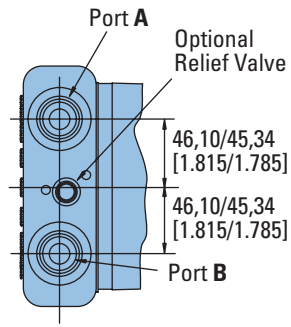
Displacement	X	Y	Z
cm <sup>3</sup> /r [in <sup>3</sup> /r]	mm [inch]	mm [inch]	mm [inch]
325 [19.8]	173,2 [6.82]	145,3 [5.72]	100,1 [3.94]
400 [24.4]	179,6 [7.07]	151,6 [5.97]	106,7 [4.20]
505 [30.7]	189,0 [7.44]	160,8 [6.33]	115,6 [4.55]
570 [34.9]	195,1 [7.68]	166,9 [6.57]	121,9 [4.80]



# VIS 30 Series Two-speed

## Dimensions

Bearingless

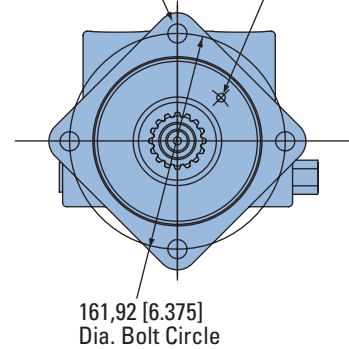
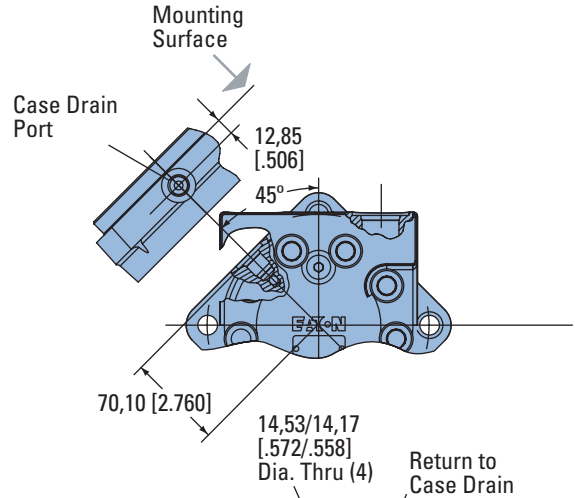
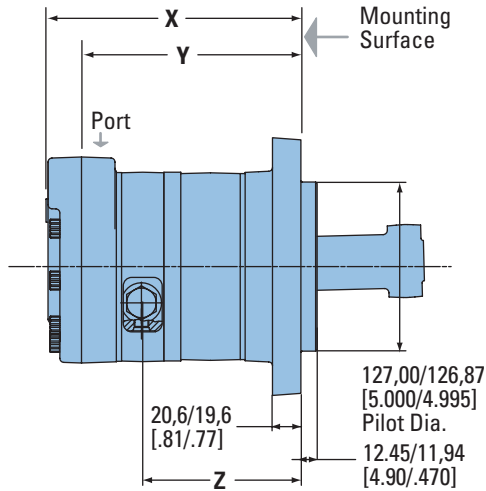


### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

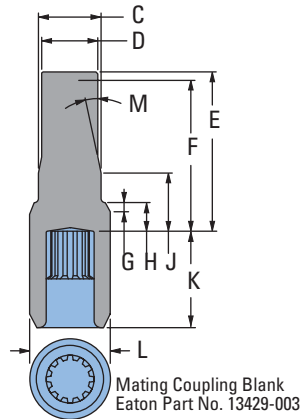
### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW



For VIS 30 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

- C 52,80 [2.08 ] Dia.
- D 49,00 [1.93 ] Dia.
- E 147,57 [5.81 ] Max.
- F 142,49 [5.61 ] Min.  
Full Form Dia.
- G 7,87 [ .310 ] Max.
- H 17,27 [ .680 ]
- J 33,30 [1.31 ]
- K 84,20 [3.315]
- L 69,60 [2.74 ]  
Full Form Dia.
- M 15

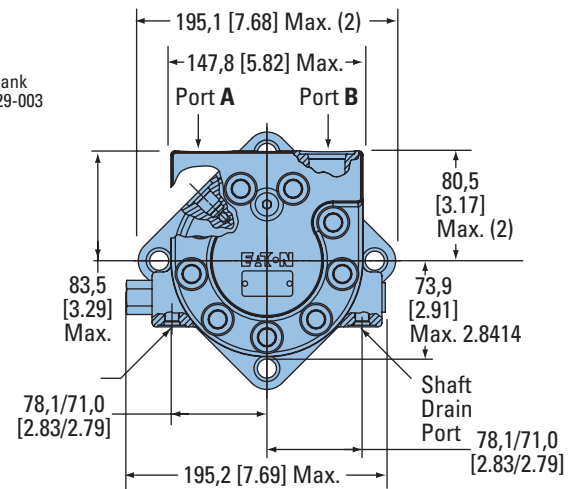


### Note:

After machining blank, part must be hardened per Eaton specification.

### BEARINGLESS MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	177,0 [6.97]	149,1 [5.87]	103,9 [4.09]
400 [24.4]	183,6 [7.23]	155,7 [6.13]	110,7 [4.36]
505 [30.7]	193,0 [7.60]	164,8 [6.49]	119,6 [4.71]
570 [34.9]	199,1 [7.84]	170,9 [6.73]	126,0 [4.96]



# VIS 30 Series Two-speed

## Installation Information

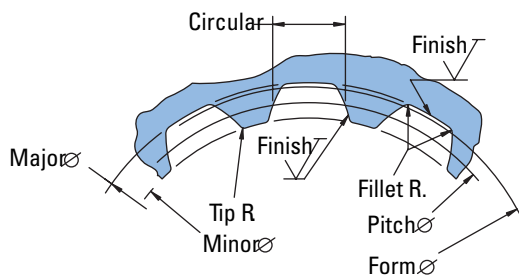
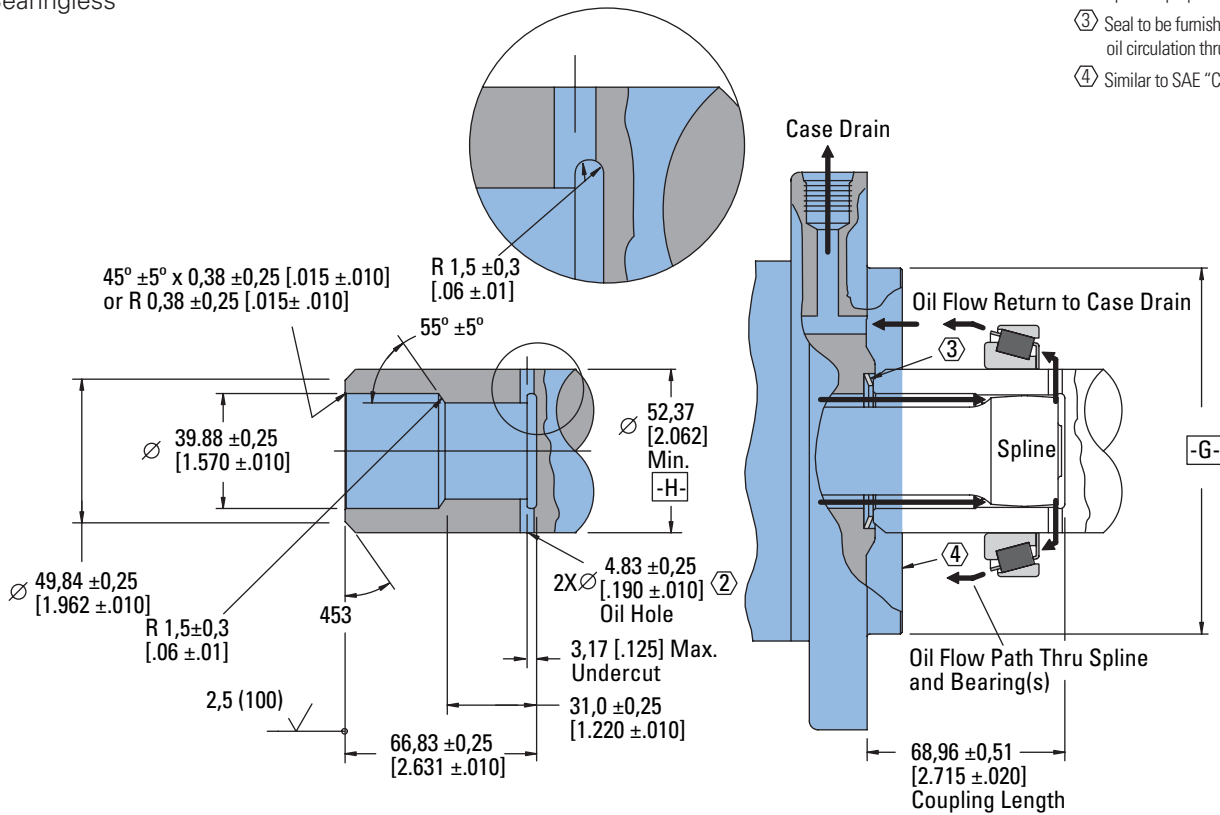
Bearingless

1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRC with case depth (to 50HRC) of 0,076 -1,27 [.030 -.050]. Dimensions apply after heat treat.

② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.

③ Seal to be furnished with motor for proper oil circulation thru splines.

④ Similar to SAE "C" Four Bolt Flange.



Spline Pitch.....	8.5/17
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 35,858823 [1.4117647] $\text{H}$
Base Diameter.....	Ref. 31,054652 [1.2226241]
Major Diameter.....	39,17 [1.542] Max. 38,97 [1.534] Min.
Minor Diameter.....	33,30 -33,48 [1.311 -1.318]
Form Diameter, Min.....	38,33 [1.509]
Fillet Radius.....	0,64 -0,76 [.025 -.030]
Tip Radius.....	0,25 -0,51 [.010 -.020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -.0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,898 [.2322]
Minimum Effective.....	5,804 [.2285]
Maximum Effective.....	Ref. 5,857 [.2306]
Minimum Actual.....	Ref. 5,834 [.2297]
Dimension Between Two Pins.....	Ref. 26,929 -27,084 [1.0602 -1.0663]
Pin Diameter.....	6,223 [.2450] Pins to Have 4,0 [.160]
Wide Flat for Root Clearance	

# VIS 30 Series Two-speed

## Product Numbers

Closed Loop

Use digit prefix —  
171-, 172-, or 181- plus four  
digit number from charts for  
complete product number—  
Example 171-0016.

**Orders will not be accepted  
without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	172-0017	-0018	-0019	-0020
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	172-0021	-0022	-0023	-0024
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	172-0025	-0026	-0027	-0028
Wheel	40 mm Straight	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	181-0001	-0002	-0003	-0004
	1-1/2 inch 17 Tooth Splined	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	181-0005	-0006	-0007	-0008
	1-3/4 inch Tapered	1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	181-0009	-0010	-0011	-0012
Bearingless		1-1/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	171-0015	-0016	-0017	-0018

171-0016

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER			
			325 [19.8]	400 [24.4]	505 [30.7]	570 [34.9]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	172-0029	-0030	-0031	-0032
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	172-0033	-0034	-0035	-0036
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	172-0037	-0038	-0039	-0040
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	181-0013	-0014	-0015	-0016
	1-1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	181-0017	-0018	-0019	-0020
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	181-0021	-0022	-0023	-0024
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	171-0019	-0020	-0021	-0022

171-0020

#### Note:

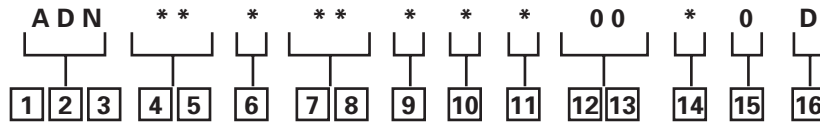
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

# VIS 30 Series Two-speed

## Model Code

The following 16-digit coding system has been developed to identify all of the configuration options for the VIS 30 two-speed motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



**1, 2, 3 Product Series**  
ADN – VIS 30- Two-speed Motor

**4, 5 Displacement**  
cm<sup>3</sup>/r [in<sup>3</sup>/r]

20 – 325 [19.8]  
24 – 400 [24.4]  
31 – 505 [30.7]  
35 – 570 [34.9]

**6 Mounting Type**

**A** – 4 Bolt Bearingless 127,00 [5.000] Pilot Dia. with 12,19 [.480] Pilot Length and 14,35 [.565] Dia. Holes on 161,92 [6.375] Dia. Bolt Circle

**B** – 4 Bolt Wheel Mount 160 [6.3] Pilot Dia. with 5,8 [.23] Pilot Length and 18,00 [.709] Dia. Holes on 200,00 [7.874] Dia. Bolt Circle (ISO Compatible)

**F** – 4 Bolt Standard Mount (SAE CC) 127,00 [5.000] Pilot Dia. with 12,2 [.48] Pilot Length and 14,32 [.564] Dia. Holes on 161,92 [6.375] Dia. Bolt Circle

**G** – 4 Bolt Wheel Mount 139,7 [5.50] Pilot Dia. with 7,9 [.31] Pilot Length and 14,32 [.564] Dia. Holes on 184,15 [7.250] Dia. Bolt Circle (SAE Compatible)

**H** – 4 Bolt Standard Mount 125,0 [4.92] Pilot Dia. with 8,9 [.35] Pilot Length and 14,00 [.551] Dia. Holes on 160,00 [6.299] Dia. Bolt Circle (ISO Compatible)

**7, 8 Output Shaft**

**00** – None (Bearingless)

**01** – 45 mm Dia. 10:1 Tapered Shaft Per ISO R775 with M30 x 2- 6H Threaded Shaft End, 12W x 8H x 28L [.472W x .313H x 1.102L] Key

**02** – 1-3/4 inch Dia. .125:1 Tapered Shaft Per SAE J 501 with 1-1/4-18 UNEF - 2A Threaded Shaft End, 11,11 [.4375] Square x 31,8 [1.25] Straight Key

**07** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 63L [.472W x .313H x 2.480L] Key (SAE Compatible)

**08** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 39,1 [1.54] Minimum Full Spline with 3/8-16 UNC - 2B Thread in End (SAE Compatible)

**09** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP30 Degree Involute Spline, 56,6 [2.23] Minimum Full Spline with M12 x 1,75 - 6H Thread in End (ISO Compatible)

**10** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 67L [.472W x .313H x 2.630L] Key (ISO Compatible)

**9 Ports**

**A** – 1-1/16-12 UN-2B Size 12 O-ring Port, Accepts Fittings for SAE J1926

**B** – G 3/4 (BSP) Straight Thread Port

**10 Case Flow Options**

**A** – Shuttle Valve with 9/16-18 UNF-2B, Size 6 O-ring Port Case Drain, Accepts Fittings for SAE J1926

**B** – Shuttle Valve with G 1/4 (BSP) Straight Thread Port Case Drain

**11 Back-Pressure Relief**

**1** – Set at 4,5 bar [65 PSI] (for Manual Pumps)

**2** – Set at 15,2 bar [220 PSI] (for Servo Pumps)

**4** – Set at 15,2 bar [300 PSI] (for high charge Servo Pumps)

**12, 13 Special Features**

**00** – None

**14 Paint/ Special Packaging**

**0** – No Paint, Individual Box

**A** – Painted Low Gloss Black, Individual Box

**B** – No Paint, Bulk Box Option

**C** – Painted Low Gloss Black, Bulk Box Option

**15 Eaton Assigned Code when Applicable**

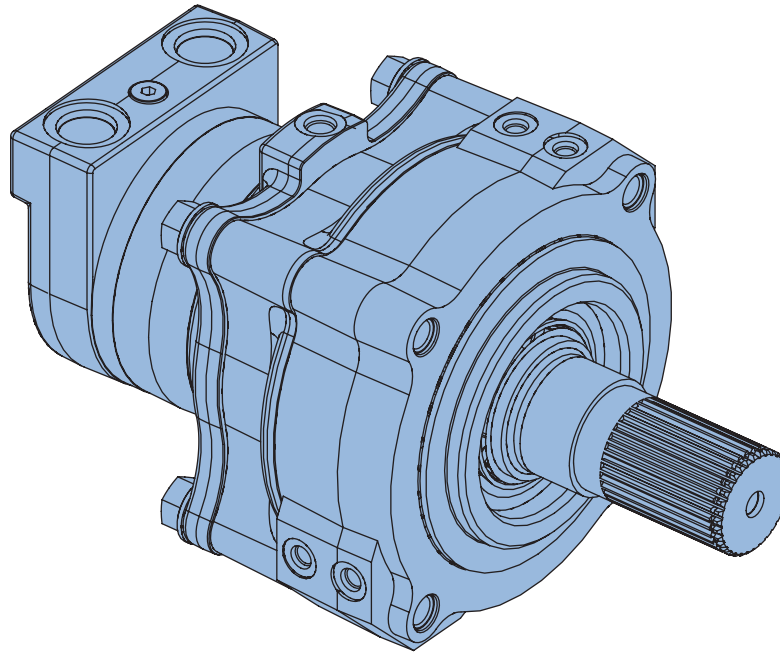
**0** – Assigned Code

**16 Eaton Assigned Design Code**

**E** – Assigned Design Code

# VIS 30 Series

## Brake Description



### Features

- Spring-Applied/ Hydraulically Released Multi-Disc Brake
- Spring automatically applies brake when hydrostatic pressure is absent
- Environmentally Protected
- Integral Design – Motor and brake as a single package to minimize length and cost.
- Infinite Braking – Eliminates machine creep associated with park pawl mechanisms
- Boost Feature – Increases holding capacity to match full motor output torque
- No adjustments needed
- Two Sets of Release and Boost Ports – Allows for multiple plumbing options and facilitates bleeding

### Applications

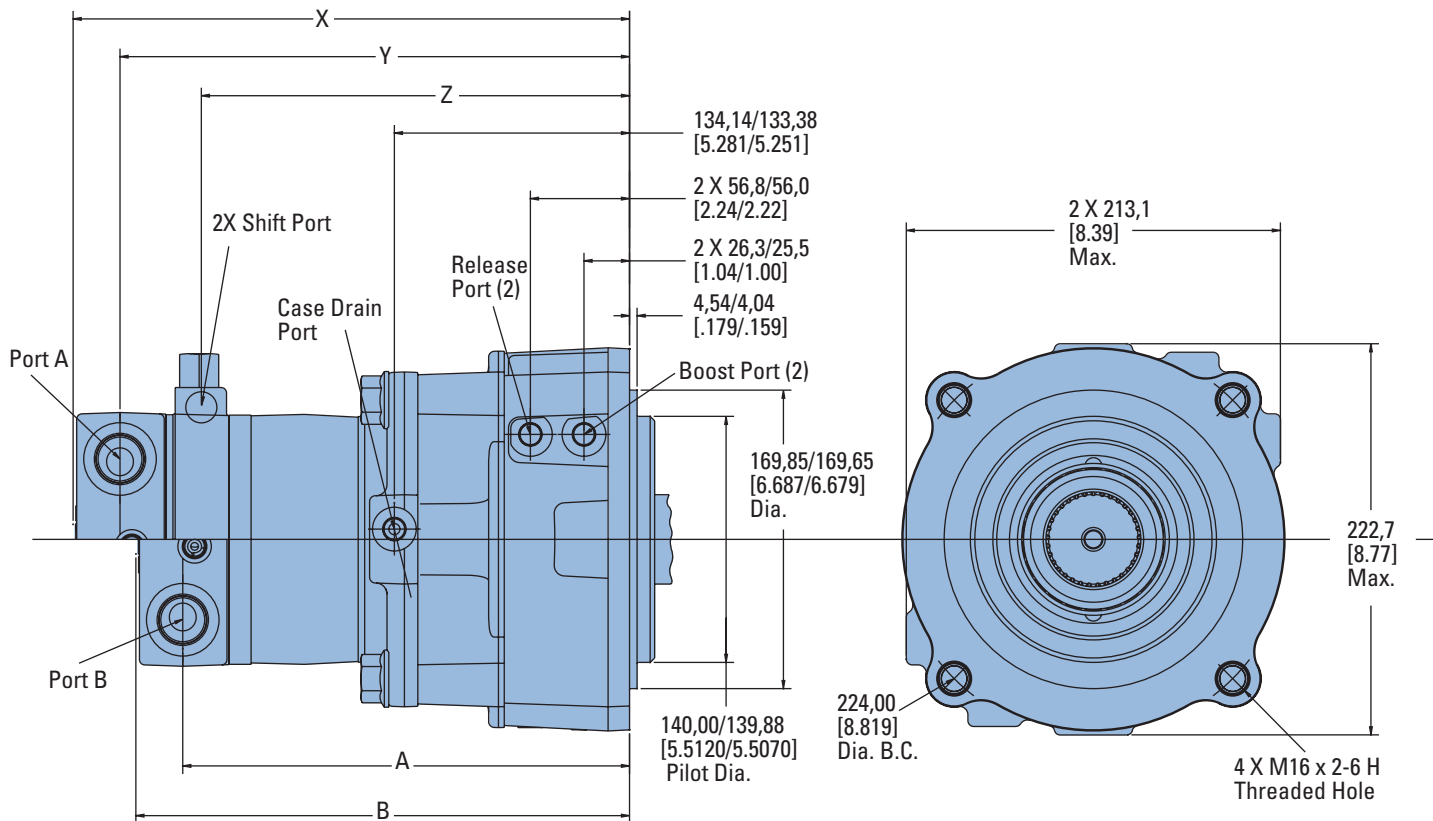
- Skid Steer Loaders
- Mini Excavators
- Trenchers
- Road Rollers
- Anywhere load-holding is needed on a Low-Speed High-Torque drive system

### Specifications

- Static Holding Torque – 780 N-m [6900 lb-in] minimum (spring only - no boost) 2621 N-m [23200 lb-in] minimum (@ 10,3 bar [150 PSI] boost) 3570 N-m [31600 lb-in] minimum (@ 15,2 bar [220 PSI] boost)
- Release Pressure – 10,3 bar [150 PSI] minimum for full release 68,9 bar [1000 PSI] maximum allowed at release port
- Case Pressure – 1,4 bar [20 PSI] continuous 3,5 bar [50 PSI] maximum
- Boost Pressure – 15,2 bar [220 PSI] continuous 34,5 bar [500 PSI] maximum
- Speed – 360 RPM maximum
- Emergency – After 3 consecutive stops, brake to still meet parking requirement

# VIS 30 Series

## Brake Dimensions



### BRAKE MOTORS (SINGLE-SPEED)

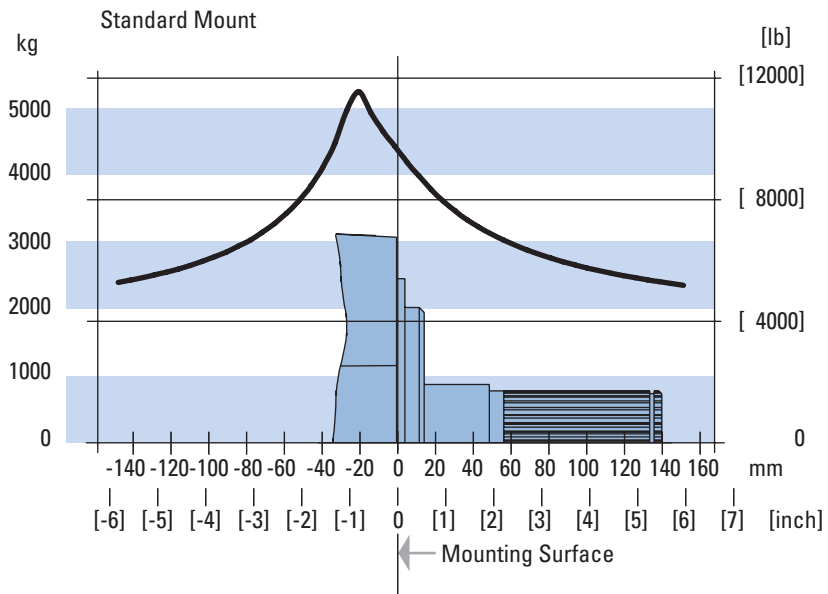
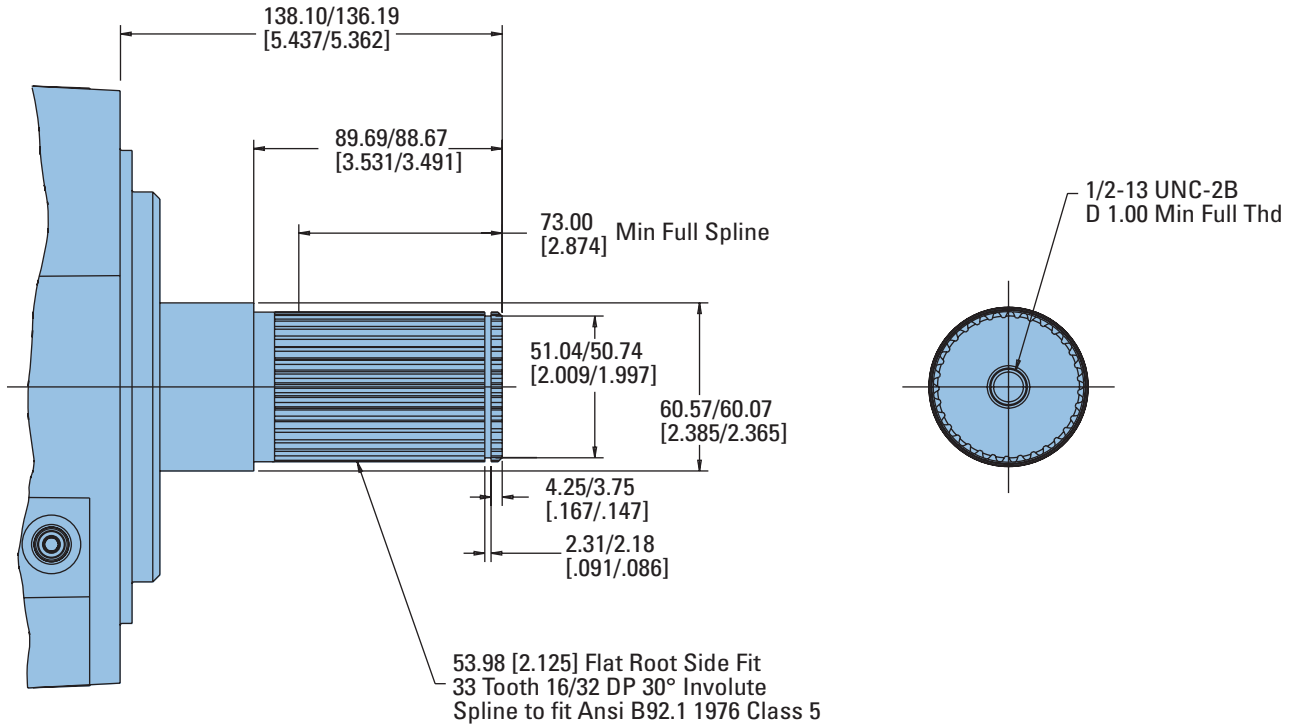
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	A mm [inch]	B mm [inch]
325 [19.8]	220,9 [8.78]	250,2 [9.85]
400 [24.4]	229,7 [9.05]	256,9 [10.11]
505 [30.7]	238,7 [9.40]	265,9 [10.47]
570 [34.9]	244,9 [9.64]	272,1 [10.71]

### BRAKE MOTORS (TWO-SPEED)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
325 [19.8]	286,1 [11.26]	258,9 [10.20]	213,5 [8.41]
400 [24.4]	292,7 [11.52]	265,7 [10.46]	220,3 [8.67]
505 [30.7]	301,9 [11.88]	274,7 [10.82]	229,3 [9.03]
570 [34.9]	308,0 [12.12]	280,9 [11.06]	235,5 [9.27]

# VIS 30 Series

## Brake Shaft Dimensions and Sideload Curves

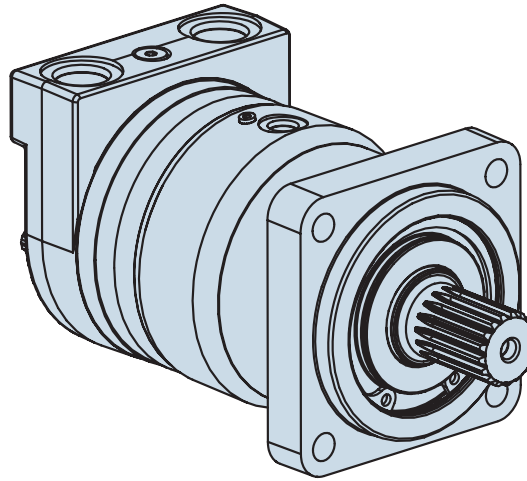




# Notes

# VIS 40 Series

## Highlights



### Features

- Patented VIS Geroler technology
- Three moving components: (Geroler, star, drive, and output shaft)
- Maximized drive strength in compact package size
- Compact package size similar to VIS 30 Series.
- Two-piece pre-loaded pressure balance plate
- Variety of optional features including two-speed option, brake packages, and case flow solutions for both closed-loop and open-loop applications.

### Description

The VIS 40 Series is the newest addition to the VIS product line. The VIS 40 is very close in size to the VIS 30, but with increased drive train strength, it has even greater torque capability. Maximum continuous output torque capability is rated to 2531 Nm [22,400 lb-in] with a displacement range from 505cc to 940cc per revolution. VIS 40 motors can be run up to 151 LPM [40 GPM] with pressure capability up to 310 bar (4500 PSI). The motor utilizes patented VIS technology with improved high-strength Geroler, optimized drive geometry, and two-piece pre-loaded balance plate for increased starting efficiency, reduced leakage and higher back pressure capacity. A wide variety of options are available including two-speed option, brake options and case flow options for both closed-loop and open loop applications.

### Specifications

Geroler Element	6 Displacements
Flow l/min [GPM]	151 [40] Continuous*** 170 [45] Intermittent**
Speed	Up to 293 RPM
Pressure bar [PSI]	310 [4500] Cont.*** 345 [5000] Inter.** 380 [5500] Peak.*
Torque Nm [lb - in]	2531 [22400] Cont.*** 3165 [28000] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.

\* Peak— (Peak) Peak operation, 1% of every minute.

### Benefits

- Extremely compact powerful package
- Increased torque capability
- Greatest horsepower density in the VIS motor line
- High efficiency
- Quiet, smooth operation
- Reliable, trouble-free performance
- Design Flexibility

### Applications

- Skid Steer Loaders and Attachments
- Snow Removal Equipment
- Trenchers
- Grapples
- Rough Terrain Forklifts
- Wood Processing – Saw Mills & Chippers
- Metal Forming
- Entertainment / Amusement Rides
- Industrial Processing
- Harvesters



Skid Steer



Trencher



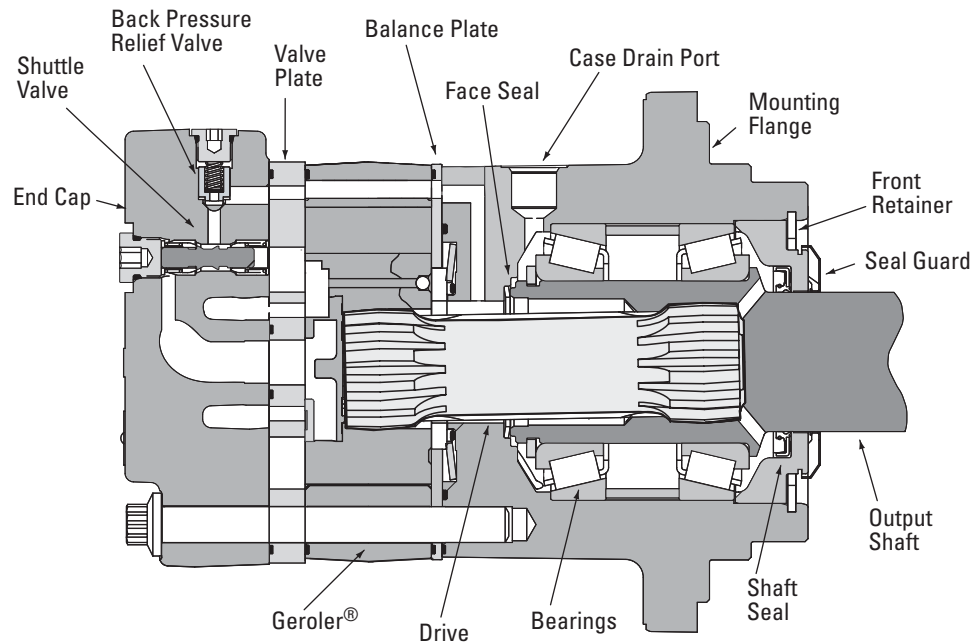
Digger



Port Equipment

# VIS 40 Series

## Specifications



### SPECIFICATION DATA — VIS 40 MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Max. Speed (RPM) @ Flow	Continuous	279	244	221	204	177	148
	Intermittent	293	257	233	215	187	148
Flow l/min [GPM]	Continuous	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]	151 [40]
	Intermittent	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]
Torque Nm [lb - in]	Continuous	2240 [19829]	2531 [22400]	2531 [22400]	2531 [22400]	2531 [22400]	2531 [22400]
	Intermittent	2746 [21919]	2815 [24918]	3165 [28000]	3165 [28000]	3165 [28000]	3165 [28000]
Pressure $\Delta$ bar [ $\Delta$ PSI]	Continuous	310 [4500]	279 [4040]	254 [3686]	235 [3389]	208 [3012]	171 [2489]
	Intermittent	345 [5000]	309 [4486]	315 [4574]	290 [4212]	254 [3682]	214 [3100]
	Peak	380 [5500]	380 [5500]	380 [5500]	380 [5500]	300 [4355]	250 [3621]
Weight kg [lb]	Standard or Wheel Mount	29,9 [66.0]	30,5 [67.2]	31,4 [68.2]	31,4 [69.2]	32,2 [71.0]	33,4 [73.6]
	Bearingless	17,7 [39.1]	18,3 [40.3]	18,7 [41.3]	19,2 [42.3]	20,0 [44.1]	21,2 [46.7]
Weight kg [lb]	Two-speed Standard or Wheel Mount	33,5 [73.9]	34,1 [75.1]	34,5 [76.1]	35,0 [77.1]	35,8 [78.9]	37,0 [81.5]
	Two-speed Bearingless	21,3 [47.0]	21,9 [48.2]	22,3 [49.2]	22,8 [50.2]	23,6 [52]	24,8 [54.6]

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

400 bar [5800 PSI]  
Do Not Exceed A Pressure Rating (for displacement size see chart above).

#### Return Pressure (Back-Pressure):

Minimum – 3,5 bar [50 PSI]  
Maximum – 21 bar [300 PSI]

#### Note:

Return (back-pressure) must be 3,5 bar [50 PSI] greater than the case pressure.

#### $\Delta$ Pressure:

The true  $\Delta$  bar [ $\Delta$  PSI] between inlet port and outlet port

#### Case Pressure:

Minimum – No Pressure  
Maximum – 3,5 bar [50 PSI]

#### Note:

The case must be full when the motor is operating. A case drain is recommended.

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

Per ISO Cleanliness Code, 4406: 20/18/13

#### Shuttle:

Standard

#### Back-Pressure Relief Valve:

Required for closed loop circuit.

# VIS 40 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

	Continuous
	Intermittent
	Will Operate at Reduced Life

505 cm<sup>3</sup>/r [30.7 in<sup>3</sup>/r]

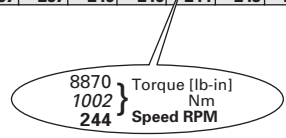
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	1035	2169	4395	6592	8656	10735	12804	14773	16105	18043	19628	
	117	245	497	745	978	1213	1447	1669	1820	2039	2218	
	15	29	29	29	28	28	27	27	25	24	23	
8	1055	2200	4445	6671	8855	11049	13225	15313	17473	19319	21368	23010
	119	249	502	754	1000	1248	1494	1730	1974	2183	2414	2600
	30	60	59	58	56	55	54	53	52	50	48	45
12	1003	2190	4464	6730	8944	11155	13364	15520	17614	19648	21753	23640
	113	247	504	760	1011	1260	1510	1754	1990	2220	2458	2671
	45	90	88	86	85	83	83	82	81	80	73	70
16	1069	2202	4422	6692	8901	11150	13367	15527	17694	19747	21833	23932
	121	249	500	756	1006	1260	1510	1754	1999	2231	2467	2704
	61	120	118	117	115	112	110	108	108	107	104	100
20	1019	1938	4301	6833	8830	11117	13552	15431	17663	19829	21919	23783
	115	219	486	772	998	1256	1531	1743	1996	2240	2476	2687
	76	150	148	145	144	140	138	136	135	134	131	129
25	843	1963	4363	6440	9083	11194	13207	15406	17473	19620	21765	23775
	95	222	493	728	1026	1265	1492	1741	1974	2217	2459	2686
	95	188	185	183	180	179	173	172	171	168	165	164
30	226	1824	4039	6153	8375	10670	12892	15006	17199	19437	21645	23756
	26	206	456	695	946	1206	1457	1695	1943	2196	2446	2684
	114	220	223	219	217	215	210	208	206	204	201	198
35	176	1774	3926	6140	8252	10494	12763	14868	17086	18959	20619	23294
	20	200	444	694	932	1186	1442	1680	1930	2142	2330	2632
	132	255	259	255	253	250	244	243	240	238	234	228
40	142	864	3174	5542	7803	10089	12317	14391	16570	18779	20837	23162
	16	98	359	626	882	1140	1392	1626	1872	2122	2354	2617
	151	293	292	284	279	277	277	277	276	274	271	267

570 cm<sup>3</sup>/r [34.9 in<sup>3</sup>/r]

Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	1177	2466	4996	7494	9841	12204	14556	16794	18308	20511	22313	
	133	279	564	847	1112	1379	1645	1897	2069	2317	2521	
	15	26	26	26	25	24	24	24	24	22	21	20
8	1199	2501	5053	7584	10067	12560	15034	17408	19864	21962	24292	26158
	135	283	571	857	1137	1419	1699	1967	2244	2481	2745	2955
	30	52	52	51	50	48	48	47	46	44	42	37
12	1140	2489	5074	7650	10167	12681	15193	17644	20024	22336	24729	26874
	129	281	573	864	1149	1433	1717	1993	2262	2524	2794	3036
	45	79	78	76	75	73	73	72	71	71	64	62
16	1216	2503	5027	7608	10119	12675	15195	17652	20115	22449	24820	27206
	137	283	568	860	1143	1432	1717	1994	2273	2536	2804	3074
	61	106	104	103	101	99	96	95	95	94	92	88
20	1159	2203	4890	7768	10038	12638	15407	17542	20080	22542	24918	27037
	131	249	552	878	1134	1428	1741	1982	2269	2547	2815	3055
	76	132	130	128	127	123	121	120	119	118	115	114
25	958	2231	4960	7321	10325	12725	15014	17513	19863	22305	24743	27027
	108	252	560	827	1167	1438	1696	1979	2244	2520	2796	3054
	95	165	163	161	159	157	152	151	150	148	145	144
30	257	2074	4591	6994	9520	12130	14656	17059	19552	22096	24606	27006
	29	234	519	790	1076	1370	1656	1927	2209	2496	2780	3051
	114	193	196	193	191	189	184	183	181	179	177	174
35	200	2017	4463	6980	9381	11930	14509	16902	19423	21553	23440	26481
	23	228	504	789	1060	1348	1639	1910	2195	2435	2648	2992
	132	225	228	224	222	220	214	214	211	209	206	201
40	162	983	3608	6300	8870	11469	14002	16360	18837	21348	23688	26331
	18	111	408	712	1002	1296	1582	1848	2128	2412	2676	2975
	151	257	257	249	246	244	243	244	243	241	238	234






# VIS 40 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

**630 cm<sup>3</sup>/r [38.5 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	1298	2720	5511	8267	10856	13463	16058	18526	20197	22627	24615	
	147	307	623	934	1227	1521	1814	2093	2282	2556	2781	
	15	23	23	23	22	22	22	22	20	19	18	
8	1323	2759	5575	8366	11105	13856	16585	19204	21913	24227	26797	28856
	149	312	630	945	1255	1565	1874	2170	2476	2737	3028	3260
	30	48	47	46	45	44	43	42	40	38	36	34
12	1257	2746	5598	8439	11216	13990	16760	19464	22089	24640	27279	29646
	142	310	632	954	1267	1581	1894	2199	2496	2784	3082	3350
	45	72	70	68	68	67	67	67	65	65	64	58
16	1341	2761	5546	8393	11163	13982	16763	19472	22190	24765	27381	30012
	152	312	627	948	1261	1580	1894	2200	2507	2798	3094	3391
	61	96	94	93	92	89	87	86	86	83	79	78
20	1278	2430	5394	8569	11073	13942	16996	19352	22151	24867	27488	29825
	144	275	609	968	1251	1575	1920	2186	2503	2810	3106	3370
	76	120	118	116	115	112	110	108	108	107	104	103
25	1057	2461	5471	8076	11390	14038	16563	19320	21912	24605	27295	29815
	119	278	618	912	1287	1586	1871	2183	2476	2780	3084	3369
	95	150	148	146	144	143	138	137	136	134	132	130
30	283	2288	5065	7716	10502	13381	16167	18819	21569	24375	27145	29792
	32	258	572	872	1187	1512	1827	2126	2437	2754	3067	3366
	114	175	177	175	173	171	167	166	164	163	160	158
35	221	2225	4923	7700	10349	13160	16006	18646	21427	23776	25858	29212
	25	251	556	870	1169	1487	1808	2107	2421	2686	2922	3301
	132	204	207	203	202	199	194	194	191	190	187	182
40	178	1084	3980	6950	9785	12652	15446	18048	20780	23551	26132	29047
	20	122	450	785	1106	1430	1745	2039	2348	2661	2952	3282
	151	233	233	226	223	221	221	221	220	219	216	213

**685 cm<sup>3</sup>/r [41.7 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
	15	35	70	105	140	170	205	240	275	310	345	380
4	1406	2947	5969	8954	11758	14582	17392	20066	21875	24507	26661	
	159	333	674	1012	1328	1647	1965	2267	2472	2769	3012	
	15	22	22	22	21	20	20	20	20	19	18	17
8	1433	2989	6038	9062	12028	15007	17964	20800	23734	26241	29025	31254
	162	338	682	1024	1359	1696	2030	2350	2682	2965	3279	3531
	30	44	43	43	42	40	40	39	39	37	35	33
12	1362	2974	6063	9141	12148	15152	18153	21082	23925	26688	29547	32110
	154	336	685	1033	1373	1712	2051	2382	2703	3015	3338	3628
	45	66	65	63	63	61	61	61	60	60	59	54
16	1453	2991	6007	9090	12090	15145	18156	21091	24034	26823	29656	32506
	164	338	679	1027	1366	1711	2051	2383	2715	3031	3351	3673
	61	88	87	86	85	83	81	80	80	79	77	73
20	1384	2632	5842	9281	11994	15100	18408	20960	23992	26934	29773	32304
	156	297	660	1049	1355	1706	2080	2368	2711	3043	3364	3650
	76	111	109	107	106	103	102	100	99	99	96	95
25	1145	2666	5926	8748	12337	15205	17939	20926	23733	26650	29563	32293
	129	301	670	988	1394	1718	2027	2364	2681	3011	3340	3649
	95	138	136	135	133	132	128	126	126	124	122	120
30	307	2478	5486	8357	11375	14493	17511	20383	23361	26401	29401	32268
	35	280	620	944	1285	1637	1978	2303	2639	2983	3322	3646
	114	162	164	161	160	158	154	153	152	150	148	146
35	239	2410	5332	8340	11209	14254	17337	20196	23207	25752	28007	31640
	27	272	602	942	1266	1610	1959	2282	2622	2910	3164	3575
	132	188	191	188	186	184	179	179	177	175	172	168
40	193	1174	4311	7527	10598	13704	16730	19548	22507	25508	28304	31461
	22	133	487	850	1197	1548	1890	2209	2543	2882	3198	3555
	151	215	215	209	206	204	204	204	203	202	199	196

10598 } Torque [lb-in]  
1197 } Nm  
204 } Speed RPM




# VIS 40 Series

785 cm<sup>3</sup>/r [48.0 in<sup>3</sup>/r]  
 Δ Pressure Bar [PSI]

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

-  Continuous
-  Intermittent
-  Will Operate at Reduced Life

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	<b>15</b>	<b>35</b>	<b>70</b>	<b>105</b>	<b>140</b>	<b>170</b>	<b>205</b>	<b>240</b>	<b>275</b>	<b>310</b>	<b>345</b>
4	1618	3392	6871	10306	13535	16784	20020	23097	25180	28210	30689
	183	383	776	1164	1529	1896	2262	2610	2845	3187	3467
<b>15</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>17</b>	<b>17</b>	<b>16</b>	<b>15</b>	<b>15</b>
8	1649	3440	6950	10431	13845	17275	20678	23942	27320	30205	33410
	186	389	785	1178	1564	1952	2336	2705	3087	3413	3775
<b>30</b>	<b>38</b>	<b>38</b>	<b>37</b>	<b>36</b>	<b>35</b>	<b>35</b>	<b>34</b>	<b>34</b>	<b>32</b>	<b>31</b>	<b>29</b>
12	1568	3423	6979	10522	13984	17441	20895	24267	27540	30720	34011
	177	387	789	1189	1580	1971	2361	2742	3112	3471	3843
<b>45</b>	<b>57</b>	<b>56</b>	<b>55</b>	<b>54</b>	<b>53</b>	<b>53</b>	<b>53</b>	<b>52</b>	<b>52</b>	<b>51</b>	<b>47</b>
16	1672	3443	6914	10464	13917	17433	20899	24277	27665	30876	34137
	189	389	781	1182	1572	1970	2361	2743	3126	3488	3857
<b>61</b>	<b>77</b>	<b>76</b>	<b>75</b>	<b>74</b>	<b>72</b>	<b>70</b>	<b>69</b>	<b>69</b>	<b>69</b>	<b>67</b>	<b>64</b>
20	1593	3030	6725	10683	13805	17382	21190	24127	27617	31003	34271
	180	342	760	1207	1560	1964	2394	2726	3120	3503	3872
<b>76</b>	<b>96</b>	<b>95</b>	<b>93</b>	<b>92</b>	<b>89</b>	<b>88</b>	<b>87</b>	<b>86</b>	<b>86</b>	<b>84</b>	<b>83</b>
25	1318	3069	6821	10069	14201	17502	20649	24087	27319	30677	34030
	149	347	771	1138	1604	1977	2333	2721	3087	3466	3845
<b>95</b>	<b>120</b>	<b>118</b>	<b>117</b>	<b>115</b>	<b>114</b>	<b>111</b>	<b>110</b>	<b>109</b>	<b>107</b>	<b>106</b>	<b>105</b>
30	353	2852	6315	9620	13094	16683	20157	23463	26891	30390	33843
	40	322	713	1087	1479	1885	2277	2651	3038	3434	3824
<b>114</b>	<b>141</b>	<b>142</b>	<b>140</b>	<b>139</b>	<b>137</b>	<b>134</b>	<b>133</b>	<b>132</b>	<b>130</b>	<b>129</b>	<b>127</b>
35	275	2774	6138	9600	12903	16408	19956	23247	26714	29643	32238
	31	313	693	1085	1458	1854	2255	2627	3018	3349	3642
<b>132</b>	<b>163</b>	<b>166</b>	<b>163</b>	<b>162</b>	<b>160</b>	<b>156</b>	<b>155</b>	<b>154</b>	<b>152</b>	<b>150</b>	<b>146</b>
40	222	1351	4962	8665	12200	15774	19257	22501	25908	29362	32580
	25	153	561	979	1378	1782	2176	2542	2927	3317	3681
<b>151</b>	<b>187</b>	<b>187</b>	<b>181</b>	<b>179</b>	<b>177</b>	<b>177</b>	<b>177</b>	<b>177</b>	<b>175</b>	<b>173</b>	<b>170</b>

940 cm<sup>3</sup>/r [57.4 in<sup>3</sup>/r]  
 Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000
	<b>15</b>	<b>35</b>	<b>70</b>	<b>105</b>	<b>140</b>	<b>170</b>	<b>205</b>	<b>240</b>	<b>275</b>
4	1935	4056	8216	12325	16185	20071	23940	27620	30111
	219	458	928	1393	1829	2268	2705	3121	3402
<b>15</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>14</b>	<b>14</b>
8	1972	4114	8311	12473	16557	20658	24727	28631	32670
	223	465	939	1409	1871	2334	2794	3235	3691
<b>30</b>	<b>32</b>	<b>31</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>29</b>	<b>28</b>	<b>28</b>	<b>27</b>
12	1875	4094	8346	12582	16722	20857	24987	29019	32933
	212	463	943	1422	1889	2357	2823	3279	3721
<b>45</b>	<b>48</b>	<b>47</b>	<b>46</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>45</b>	<b>44</b>	<b>43</b>
16	2000	4117	8268	12513	16642	20846	24992	29032	33083
	226	465	934	1414	1880	2355	2824	3280	3738
<b>61</b>	<b>64</b>	<b>63</b>	<b>62</b>	<b>62</b>	<b>60</b>	<b>59</b>	<b>58</b>	<b>58</b>	<b>57</b>
20	1905	3623	8042	12776	16509	20786	25339	28851	33025
	215	409	909	1443	1865	2348	2863	3260	3731
<b>76</b>	<b>80</b>	<b>79</b>	<b>78</b>	<b>77</b>	<b>75</b>	<b>74</b>	<b>73</b>	<b>72</b>	<b>72</b>
25	1576	3670	8157	12041	16982	20929	24693	28804	32669
	178	415	922	1360	1919	2365	2790	3254	3691
<b>95</b>	<b>100</b>	<b>99</b>	<b>98</b>	<b>96</b>	<b>96</b>	<b>93</b>	<b>92</b>	<b>91</b>	<b>90</b>
30	423	3411	7551	11504	15658	19950	24104	28057	32157
	48	385	853	1300	1769	2254	2723	3170	3633
<b>114</b>	<b>118</b>	<b>119</b>	<b>117</b>	<b>116</b>	<b>115</b>	<b>112</b>	<b>111</b>	<b>110</b>	<b>109</b>
35	329	3317	7340	11480	15429	19621	23864	27799	31945
	37	375	829	1297	1743	2217	2696	3141	3609
<b>132</b>	<b>137</b>	<b>139</b>	<b>136</b>	<b>135</b>	<b>133</b>	<b>130</b>	<b>130</b>	<b>128</b>	<b>127</b>
40	266	1616	5934	10361	14589	18863	23029	26907	30982
	30	183	670	1171	1648	2131	2602	3040	3500
<b>151</b>	<b>156</b>	<b>156</b>	<b>152</b>	<b>149</b>	<b>148</b>	<b>148</b>	<b>148</b>	<b>148</b>	<b>147</b>

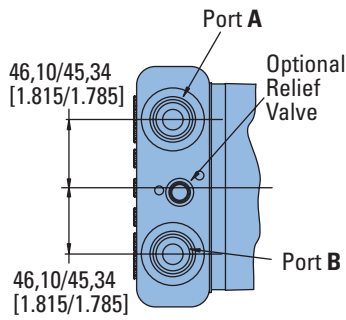
5934 } Torque [lb-in]  
 670 } Nm  
 152 } Speed RPM



# VIS 40 Series

## Dimensions

Standard and Wheel Mount  
- SAE



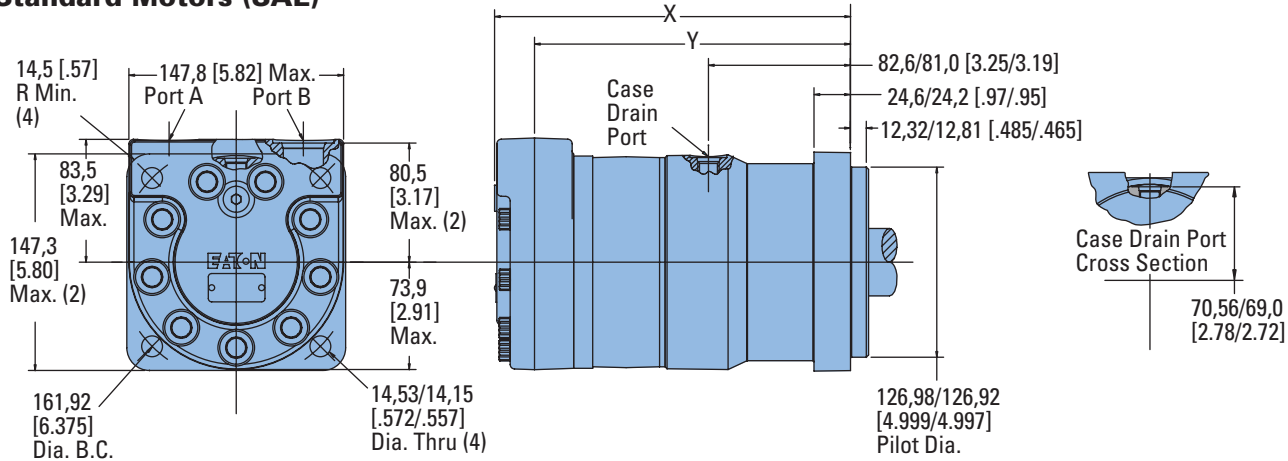
## Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)

## Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

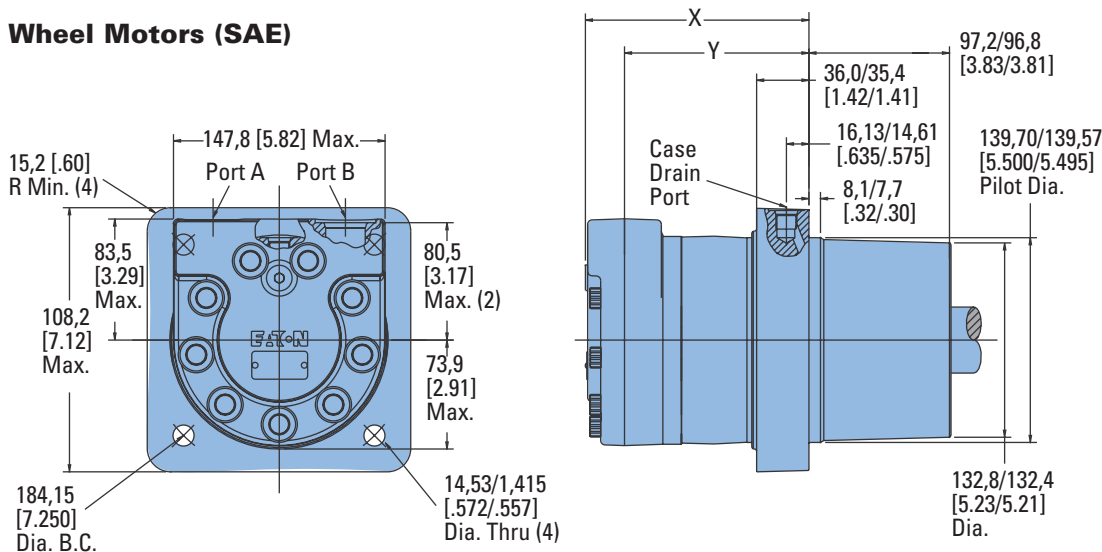
## Standard Motors (SAE)



### STANDARD MOTORS (SAE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	239,3 [9.42]	211,1 [8.31]
570 [34.9]	245,4 [9.66]	217,2 [8.55]
630 [38.5]	250,7 [9.87]	222,5 [8.76]
685 [41.7]	255,3 [10.05]	227,1 [8.94]
785 [48.0]	264,7 [10.42]	236,2 [9.30]
940 [57.4]	278,4 [10.96]	249,9 [9.84]

## Wheel Motors (SAE)



### WHEEL MOTORS (SAE)

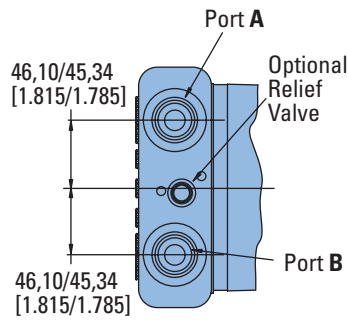
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	154,4 [6.08]	126,2 [4.97]
570 [34.9]	160,5 [6.32]	132,3 [5.21]
630 [38.5]	165,9 [6.53]	137,7 [5.42]
685 [41.7]	170,4 [6.71]	142,2 [5.60]
785 [48.0]	179,8 [7.08]	151,4 [5.96]
940 [57.4]	193,5 [7.62]	165,1 [6.50]



# VIS 40 Series

## Dimensions

Oversize Flange  
224,0 [8.82] B.C.

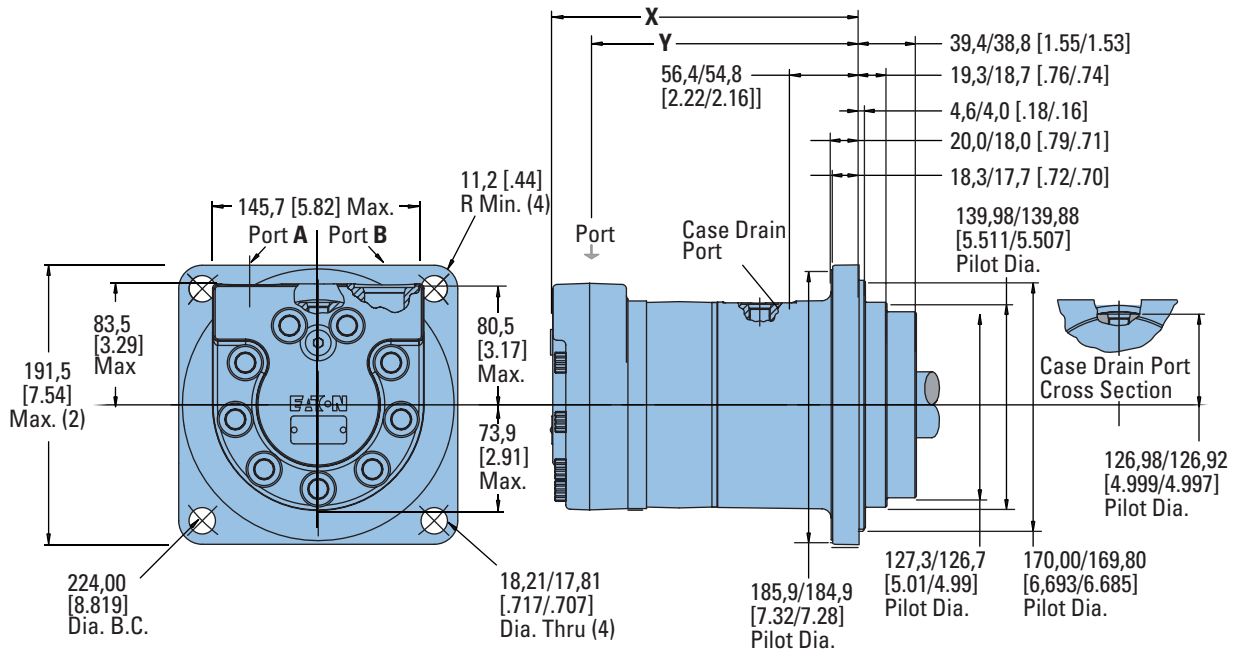


## Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)

## Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



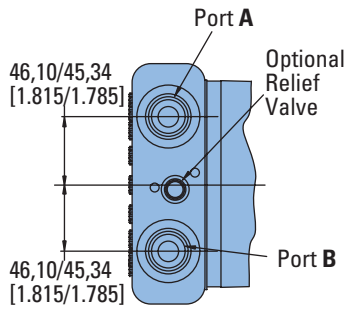
## STANDARD MOTORS (OVERSIZE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	213,1 [8.39]	181,4 [8.36]
570 [34.9]	219,2 [8.63]	187,4 [8.60]
630 [38.5]	224,5 [8.84]	192,5 [8.81]
685 [41.7]	229,1 [9.02]	197,6 [8.99]
785 [48.0]	238,5 [9.39]	206,8 [9.35]
940 [57.4]	252,0 [9.92]	220,5 [9.89]

# VIS 40 Series

## Dimensions

Standard and Wheel Mount  
- ISO



### Ports

G 3/4 (BSP) O-ring Ports (2)

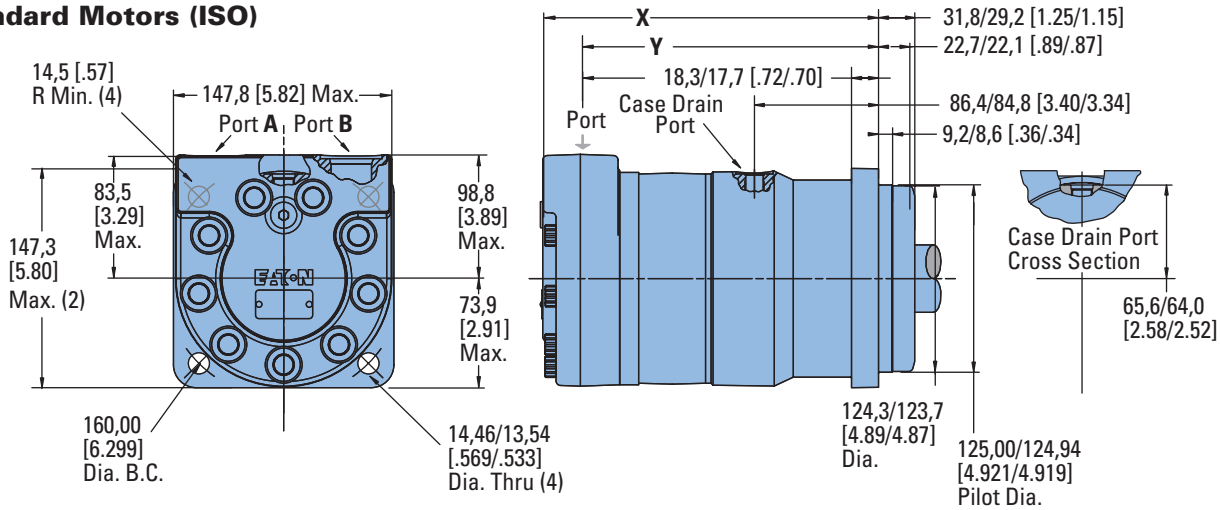
G 1/4 (BSP) O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

Port A Pressurized — CW

Port B Pressurized — CCW

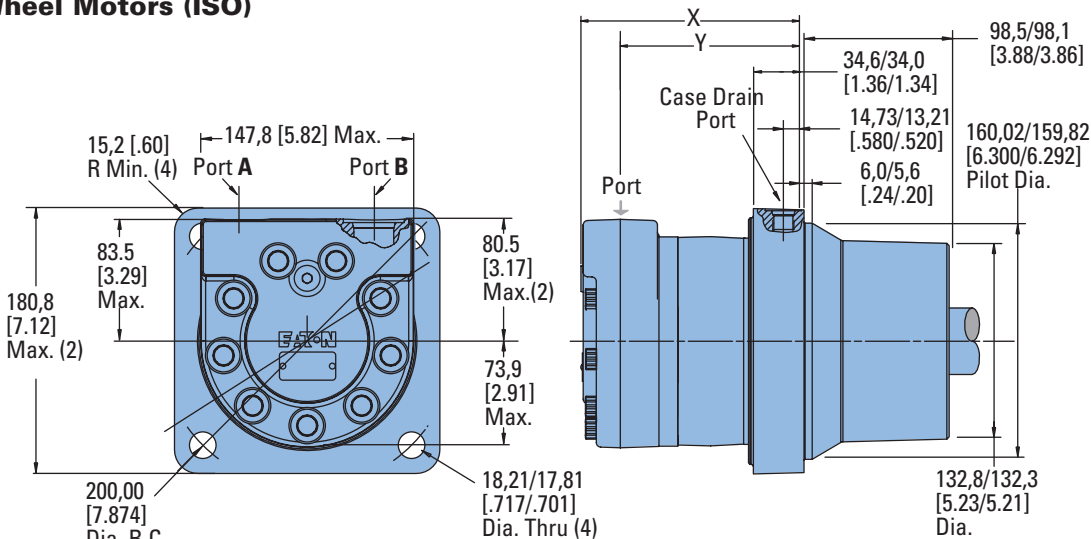
### Standard Motors (ISO)



#### STANDARD MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	227,3 [8.95]	198,9 [7.83]
570 [34.9]	233,4 [9.19]	205,2 [8.08]
630 [38.5]	238,8 [9.40]	210,3 [8.28]
685 [41.7]	243,3 [9.58]	214,9 [8.46]
785 [48.0]	252,5 [9.94]	224,3 [8.83]
940 [57.4]	266,2 [10.48]	238,0 [9.37]

### Wheel Motors (ISO)



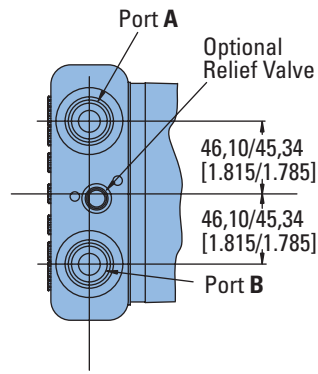
#### WHEEL MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	153,2 [6.03]	124,7 [4.91]
570 [34.9]	159,3 [6.27]	131,1 [5.16]
630 [38.5]	164,6 [6.48]	136,1 [5.36]
685 [41.7]	169,2 [6.66]	140,7 [5.54]
785 [48.0]	178,3 [7.02]	150,1 [5.91]
940 [57.4]	192,0 [7.56]	163,8 [6.45]

# VIS 40 Series

## Dimensions

Bearingless

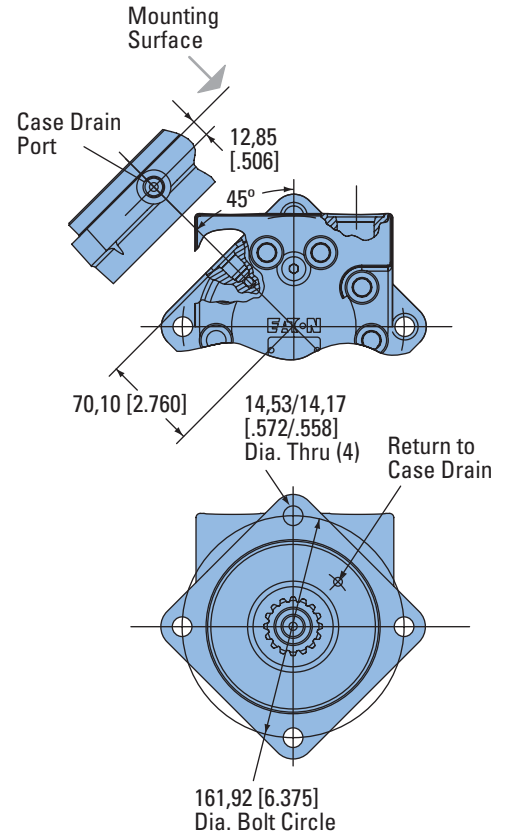
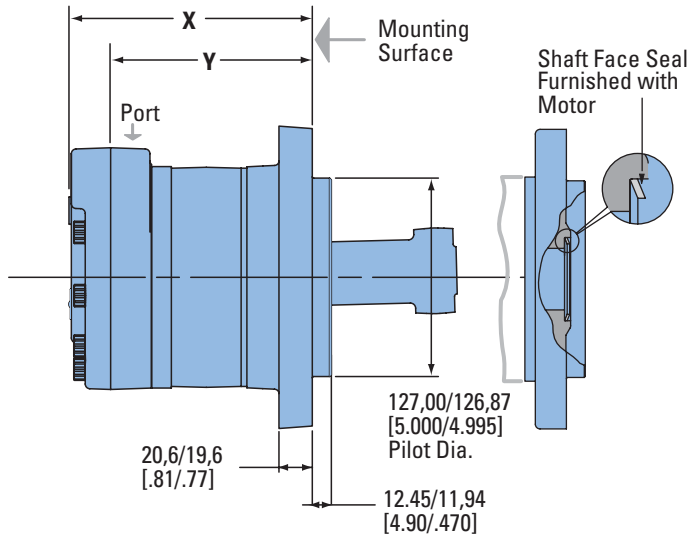


### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

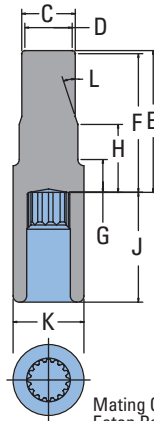
### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW



For VIS 40 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

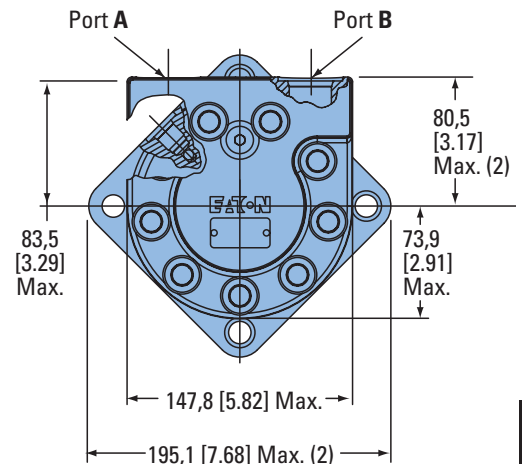
- C 59,94 [2.36] Dia.
- D 49,00 [1.93] Dia.
- E 155,86 [6.14] Max.
- F 150,88 [5.94] Min.
- Full Form Dia.
- G 26,92 [1.06]
- H 33,30 [1.21]
- J 106,43 [4.19]
- Full Form Dia.
- K 72,64 [2.86]
- L 15



Mating Coupling Blank  
Eaton Part No. 13280-002

### Note:

After machining blank, part must be hardened per Eaton specification.



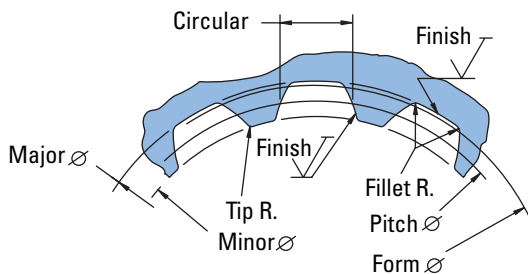
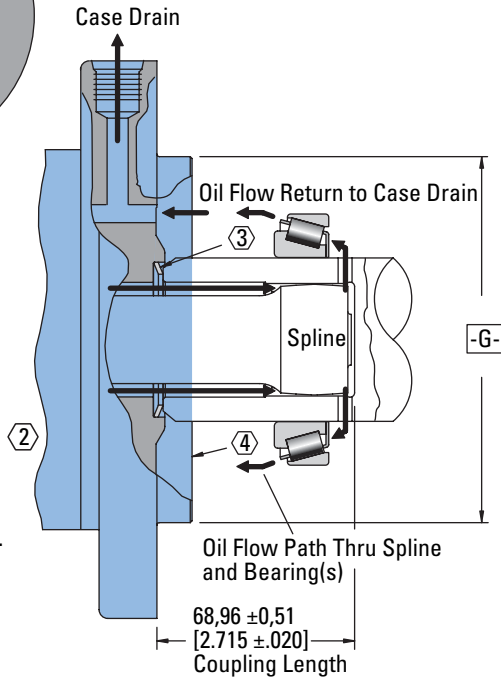
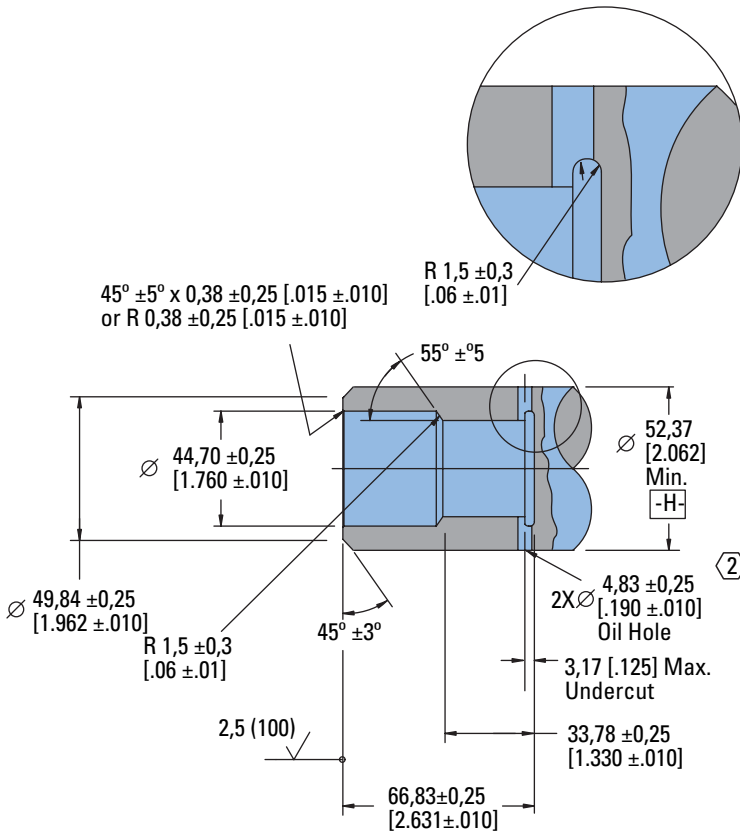
### BEARINGLESS MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
505 [30.7]	157,2 [6.19]	129,0 [5.08]
570 [34.9]	163,3 [6.43]	135,1 [5.32]
630 [38.5]	168,4 [6.63]	140,5 [5.53]
685 [41.7]	173,2 [6.82]	145,3 [5.72]
785 [48.0]	182,2 [7.18]	154,4 [6.08]
940 [57.4]	196,1 [7.72]	168,1 [6.62]

# VIS 40 Series

## Installation Information

Bearingless



Spline Pitch.....	10/20
Pressure Angle.....	30°
Number of teeth.....	16
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Pitch Diameter.....	Ref. 40,640000 [1.6000000] $\text{Ⓢ} 0,20 [0.008]   H$
Base Diameter.....	Ref. 35,195272 [1.3856406]
Major Diameter.....	43,56 [1.715] Max. 43,18 [1.700]
Min. Minor Diameter.....	36,83 -37,08 [1.450 -1.460]
Form Diameter, Min. ....	42.47 [1.672]
Fillet Radius.....	0,64 -0,76 [0.025 -0.030]
Tip Radius.....	0,25 -0,51 [0.010 -0.020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -0.0010]
Total Index Variation.....	0,040 [0.0016]
Lead Variation.....	0,013 [0.0005]
Circular Space Width:	
Maximum Actual.....	4.105 [0.1616]
Minimum Effective.....	3,995 [0.1573]
Maximum Effective.....	Ref. 4,056 [0.1597]
Minimum Actual.....	Ref. 4,081 [0.1582]
Dimension Between Two Pins.....	Ref. 34,272 -34,450 [1.3493 -1.3563]
Pin Diameter.....	4,389 [0.1728]

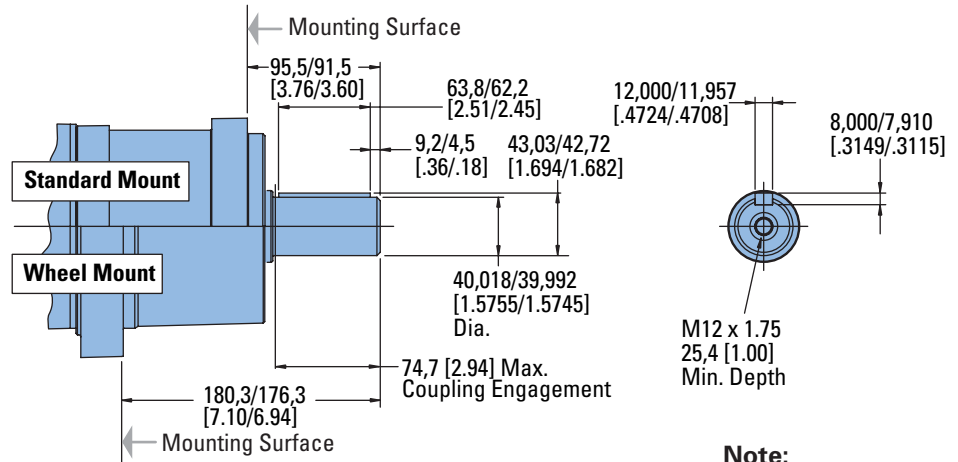
- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 -1,27 [0.030 -0.050]. Dimensions apply after heat treat.
- ② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- ③ Seal to be furnished with motor for proper oil circulation thru splines.
- ④ Similar to SAE "C" Four Bolt Flange.

# VIS 40 Series

## Dimensions Shafts

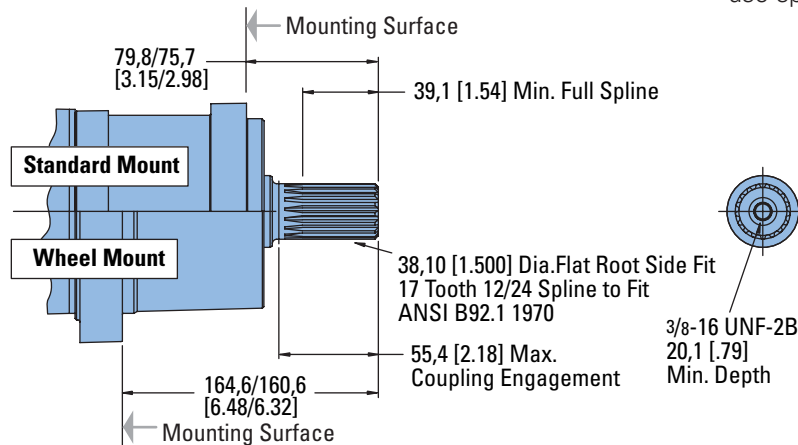
SAE

### 40 mm Straight

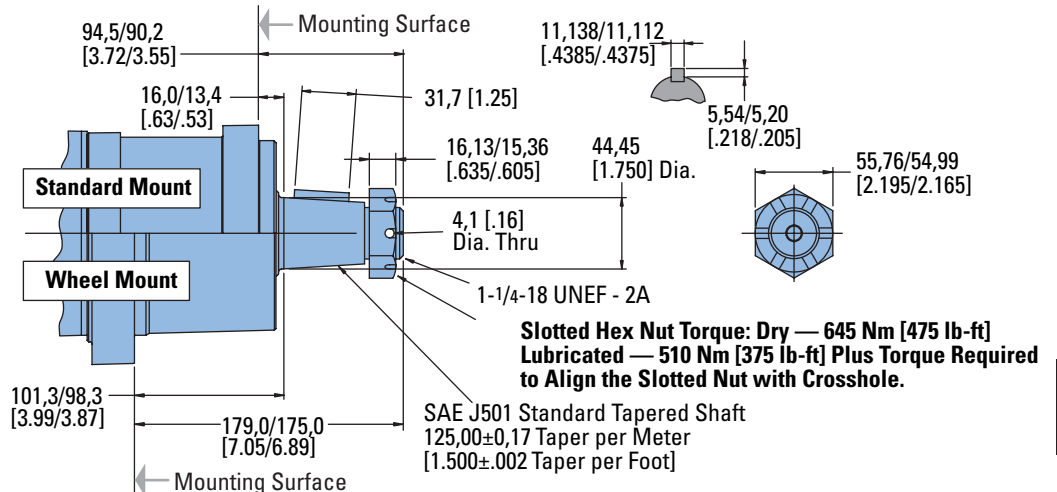


**Note:**  
For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

### 1-1/2 Inch 17 Tooth Splined



### 1-3/4 Inch Tapered



# VIS 40 Series

## Side Load Capacity

SAE

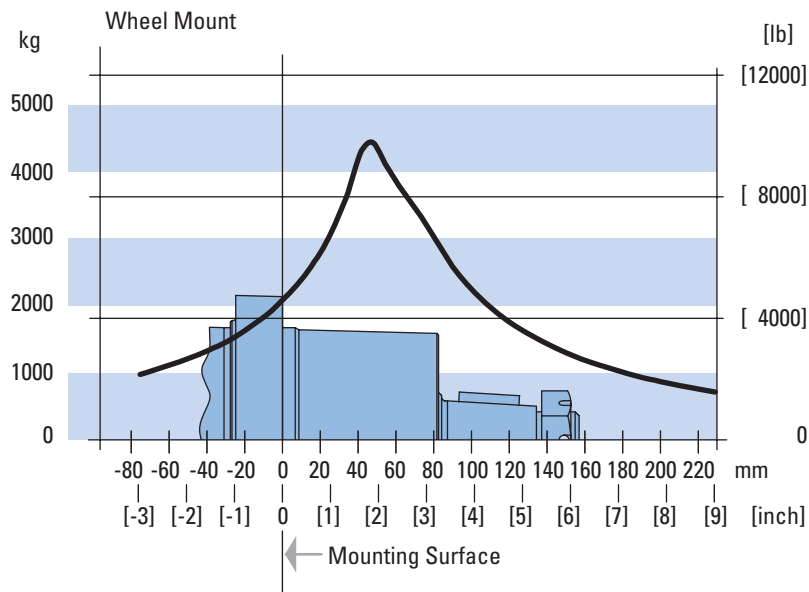
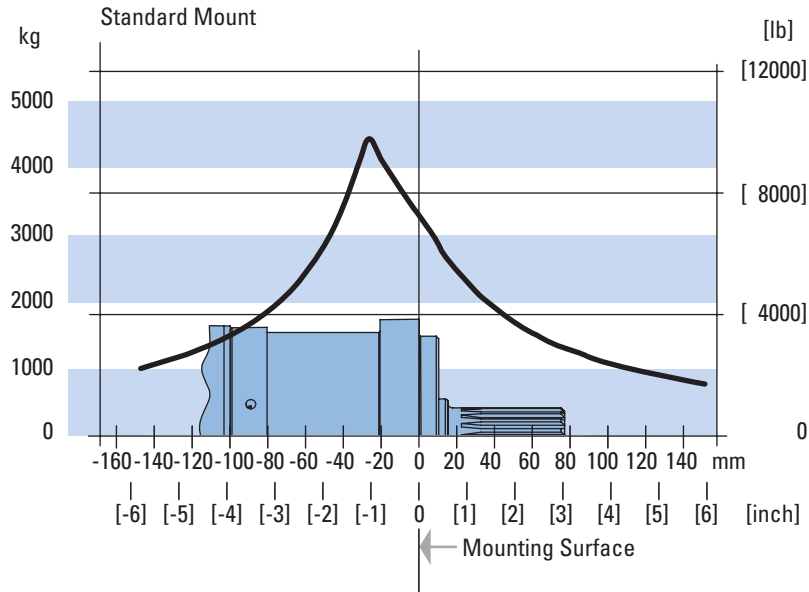
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

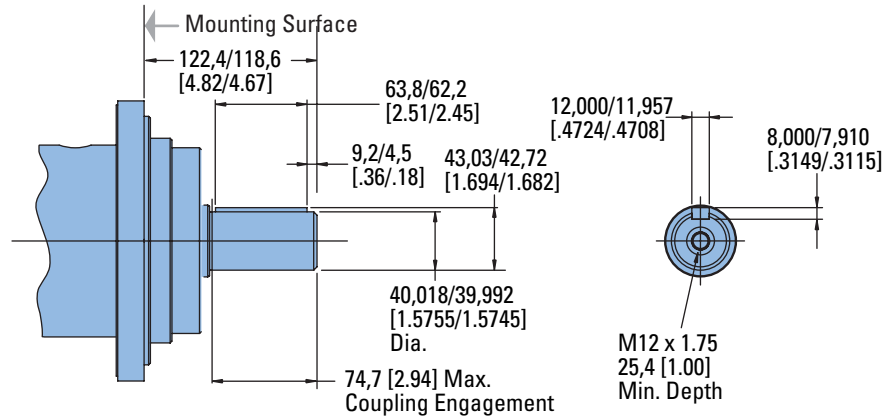


# VIS 40 Series

## Dimensions Shafts

Oversize Flange  
224,0 [8.82] B.C.

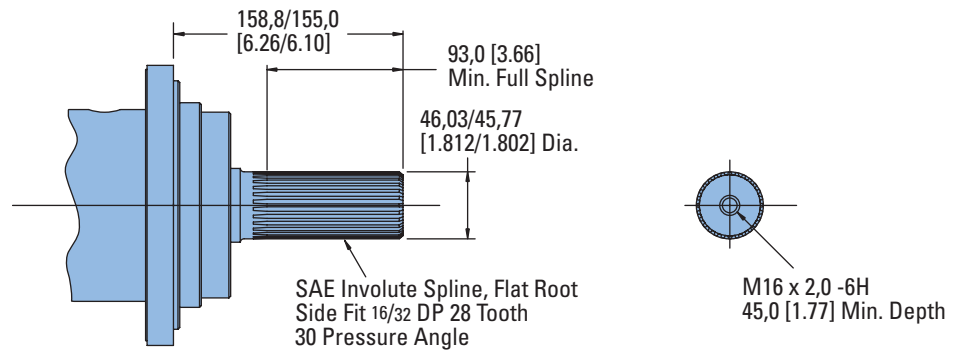
### 40 mm Straight



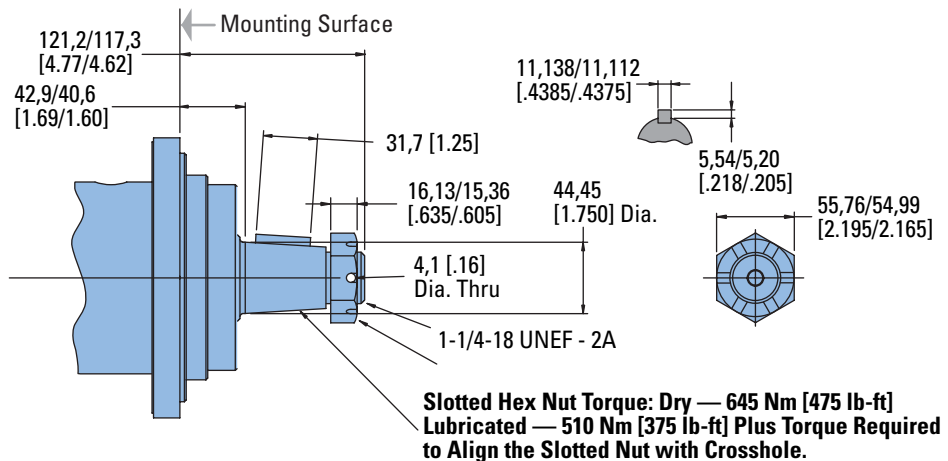
**Note:**

For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

### 46 mm 28 Tooth Splined



### 1-3/4 Inch Tapered



SAE J501 Standard Tapered Shaft  
125,00±0,17 Taper per Meter  
[1.500±.002 Taper per Foot]



# VIS 40 Series

## Side Load Capacity

Oversize Flange  
224,0 [8.82] B.C.

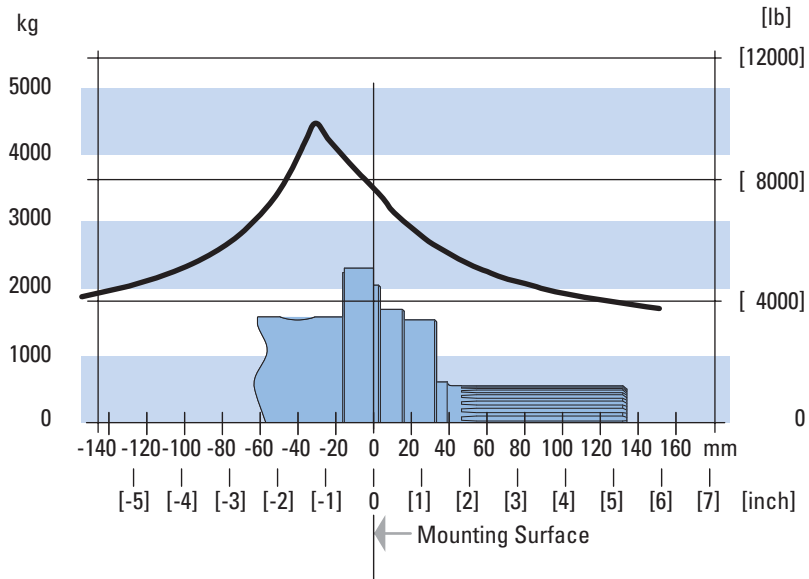
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.

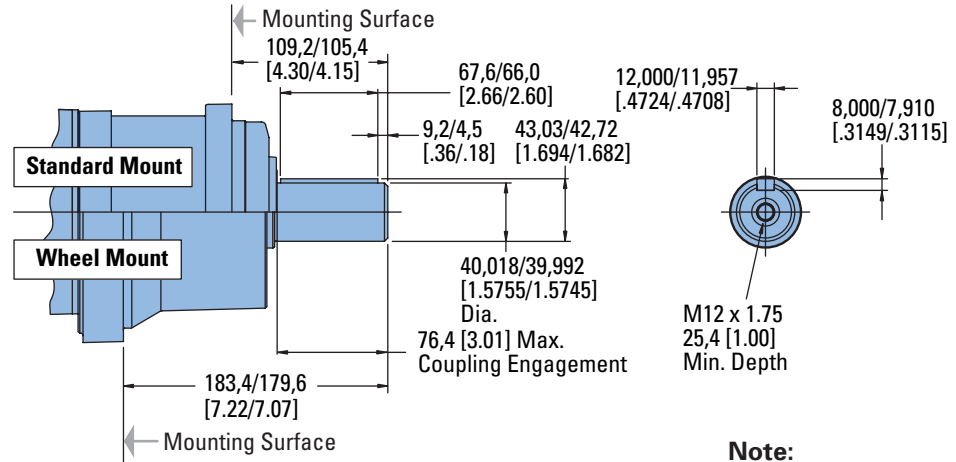


# VIS 40 Series

## Dimensions Shafts

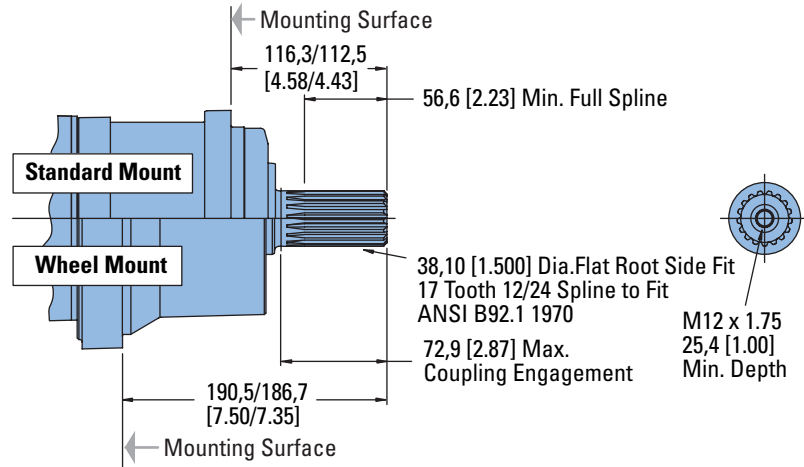
ISO

### 40 mm Straight

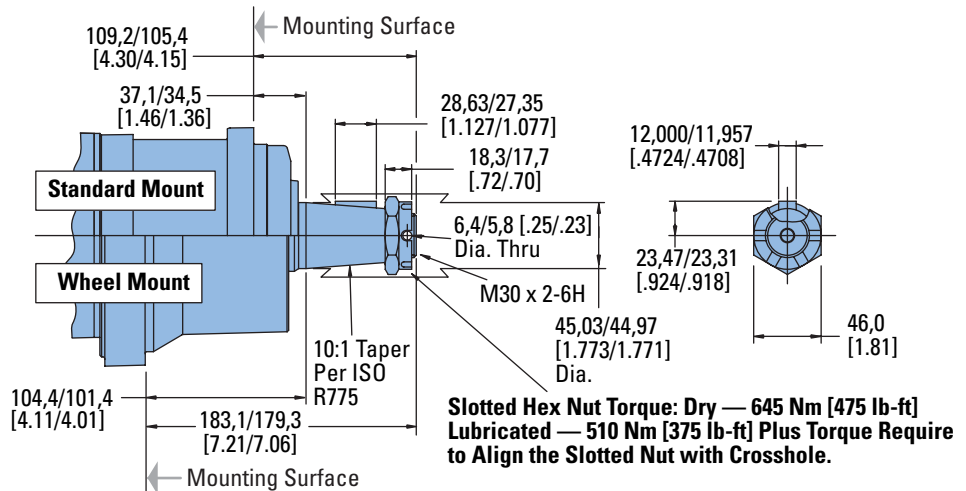


**Note:**  
For motor torque ratings above 875 Nm [7750 lb - in] use split coupler.

### 38,1 mm [1-1/2 inch] 17 Tooth Splined



### 45 mm Tapered



# VIS 40 Series

## Side Load Capacity

ISO

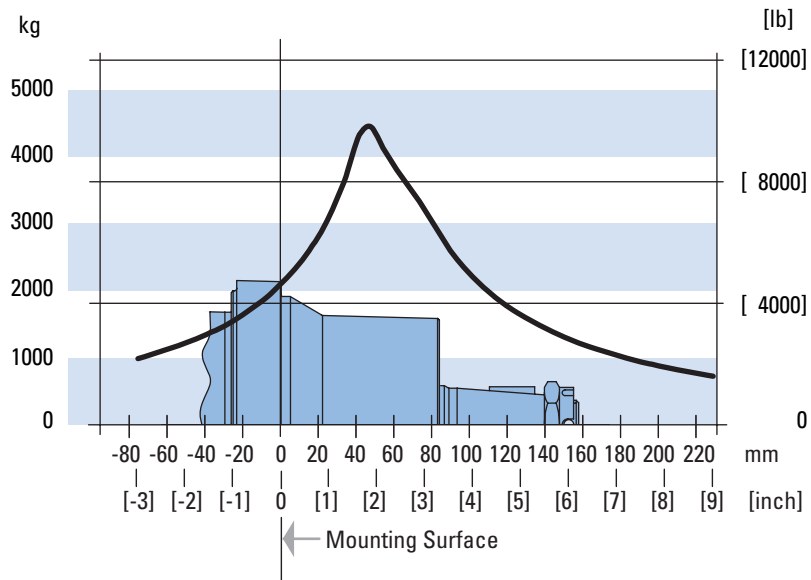
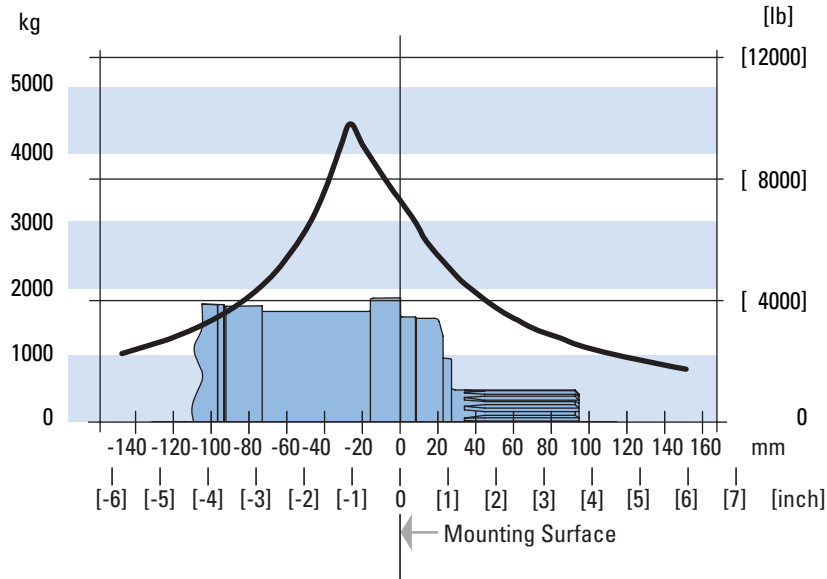
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours of 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



# VIS 40 Series

## Product Numbers

Closed Loop

Use digit prefix — 168-, 177-, or 180- plus four digit number from charts for complete product number— Example: 168-0018.

**Orders will not be accepted without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0032	-0022	-0033	-0034	-0035	-0036
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0024	-0026	-0037	-0038	-0039	-0040
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0041	-0042	-0043	-0044	-0045	-0046
Wheel	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0007	-0008	-0009	-0010	-0011	-0012
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0013	-0014	-0015	-0016	-0017	-0018
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0019	-0020	-0021	-0022	-0023	-0024
Bearingless		1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	168-0015	-0016	-0017	-0018	-0019	-0020

168-0018

### Oversize

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0047	-0048	-0049	-0050	-0051	-0052
	46 mm 28 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0053	-0054	-0055	-0056	-0057	-0058
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0059	-0060	-0061	-0062	-0063	-0064

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0065	-0066	-0067	-0068	-0069	-0070
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0071	-0072	-0073	-0074	-0075	-0076
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0077	-0078	-0079	-0080	-0081	-0082
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0025	-0026	-0027	-0028	-0029	-0030
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0031	-0032	-0033	-0034	-0035	-0036
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0037	-0038	-0039	-0040	-0041	-0042
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	168-0021	-0022	-0023	-0024	-0025	-0026

168-0024

#### Note:

The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

# VIS 40 Series

## Product Numbers

Open Loop

Use digit prefix —  
168-, 177-, or 180- plus four  
digit number from charts for  
complete product number—  
Example 168-0029.

**Orders will not be accepted  
without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0083	-0084	-0085	-0086	-0087	-0088
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0089	-0090	-0091	-0092	-0093	-0094
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0095	-0096	-0097	-0098	-0099	-0100
Wheel	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0043	-0044	-0045	-0046	-0047	-0048
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0049	-0050	-0051	-0052	-0053	-0054
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	180-0055	-0056	-0006	-0057	-0058	-0059
Bearingless		1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	168-0027	-0028	-0010	-0029	-0030	-0031

168-0029

### Oversize

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0101	-0102	-0103	-0104	-0105	-0106
	46 mm 28 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0107	-0108	-0109	-0110	-0111	-0112
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	177-0113	-0114	-0115	-0116	-0117	-0118

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0119	-0120	-0121	-0122	-0029	-0124
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0125	-0126	-0127	-0128	-0129	-0130
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	177-0131	-0132	-0133	-0134	-0135	-0136
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0060	-0061	-0062	-0063	-0064	-0065
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0066	-0067	-0068	-0069	-0070	-0071
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	180-0072	-0073	-0074	-0075	-0076	-0077
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	168-0032	-0033	-0034	-0035	-0036	-0037

168-0035

### Note:

All product numbers in the charts (above) are for motors **without** a back-pressure relief valve. These motors would generally be used in open loop circuits.

For closed loop circuits a motor with a back-pressure relief valve is required.

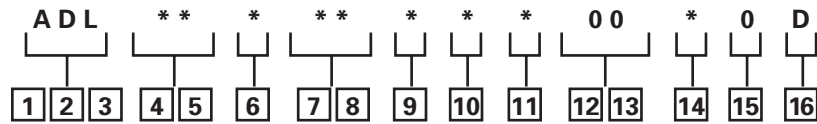
- A case drain is recommended for all VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

- In open loop circuits, return pressure must be 3,5 bar [50 PSI] greater than case pressure to properly lubricate the internal drive.

# VIS 40 Series

## Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 40 motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### 1, 2, 3 Product Series

**ADL** – VIS 40 Motor

### 4, 5 Displacement

**cm<sup>3</sup>/r [in<sup>3</sup>/r]**

- 31** – 505 [30.7]
- 35** – 570 [34.9]
- 38** – 630 [38.5]
- 42** – 685 [41.7]
- 48** – 785 [48.0]
- 57** – 940 [57.4]

### 6 Mounting Type

**A** – 4 Bolt Bearingless 127,00 [5.000] Pilot Dia. with 12,19 [.480] Pilot Length and 14,35 [.565] Dia holes on 161,92 [6.375] Dia. Bolt Circle

**B** – 4 Bolt Wheel Mount 160,00 [6.3] Pilot Dia. With 5,8 [.23] Pilot Length and 18,00 [.709] Dia. Holes on 200,00 [7.874] Dia. Bolt Circle (ISO Compatible)

**C** – 4 Bolt Oversize Flange 185,4 [7.30] Rear Pilot Dia., 169,90 [6.689], 139,93 [5.509], 127,0 [5.00] Dia (Front Pilots) and 18,01 [.709] Dia. Holes on 224,00 [8.819] Dia. Bolt Circle

**F** – 4 Bolt Standard Mount (SAE CC) 127,00 [5.000] Pilot Dia. With 12,2 [.48] Pilot Length and 14,32 [.564] Dia. Holes on 161,92 [6.375] Dia. Bolt Circle

**G** – 4 Bolt Wheel Mount 139,7 [5.50] Pilot Dia. with 7,9 [.31] Pilot Length and 14,32 [.564] Dia. Holes on 184,15 [7.250] Dia. Bolt Circle (SAE Compatible)

**H** – 4 Bolt Standard Mount 125,00 [4.92] Pilot Dia. with 8,9 [.35] Pilot Length and 14,00 [.551] Dia. Holes on 160,00 [6.299] Dia. Bolt Circle (ISO Compatible)

### 7, 8 Output Shaft

- 00** – None (Bearingless)
- 01** – 45 mm Dia. 10:1 Tapered Shaft Per ISO R775 with M30 x 2- 6H Threaded Shaft End, 12W x 8H X 28L [.472W x .313H x 1.102L] Key
- 02** – 1-3/4 inch Dia. .125:1 Tapered Shaft Per SAE J 501 with 1 1/4 - 18 UNEF - 2A Threaded Shaft End, 11,11 [.4375] Square x 31,8 [1.25] Straight Key
- 04** – 46 mm Dia. Flat Root Side Fit, 28 Tooth, 16/32 DP 30 Degree Involute Spline, 93,0 [3.66] Minimum Full Spline with M16 X 2,0-6H Thread in End
- 07** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 63L [.472W x .313H x 2.480L] Key (SAE Compatible)
- 08** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 39,1 [1.54] Minimum Full Spline with 3/8-16 UNC - 2B Thread in End (SAE Compatible)
- 09** – 1-1/2 inch Dia. Flat Root Side Fit, 17 Tooth, 12/24 DP 30 Degree Involute Spline, 56,6 [2.23] Minimum Full Spline with M12 x 1.75 - 6H Thread in End (ISO Compatible)
- 10** – 40 mm Dia. Straight Shaft with M12 x 1,75 - 6H Thread in End, 12W x 8H x 67L [.472W x .313H x 2.630L] Key (ISO Compatible)

### 9 Ports

- A** – 1-1/16-12 UN-2B Size 12 O-ring Port, Accepts Fittings for SAE J1926
- B** – G 3/4 (BSP) Straight Thread Port

### 10 Case Flow Options

- A** – Shuttle Valve with 9/16-18 UNF-2B, Size 6 O-ring Port Case Drain, Accepts Fittings for SAE J1926
- B** – Shuttle Valve with G 1/4 (BSP) Straight Thread Port Case Drain

### 11 Back-Pressure Relief

- 0** – None (for Open Loop Only)
- 1** – Set at 4,5 bar [65 PSI] (for Manual Pumps)
- 2** – Set at 15,2 bar [220 PSI] (for Servo Pumps)
- 4** – Set at 15,2 bar [300 PSI] (for high charge Servo Pumps)

### 12, 13 Special Features

- 00** – None

### 14 Paint/ Special Packaging

- 0** – No Paint, Individual Box
- A** – Painted Low Gloss Black, Individual Box
- B** – No Paint, Bulk Box Option
- C** – Painted Low Gloss Black, Bulk Box Option

### 15 Eaton Assigned Code when Applicable

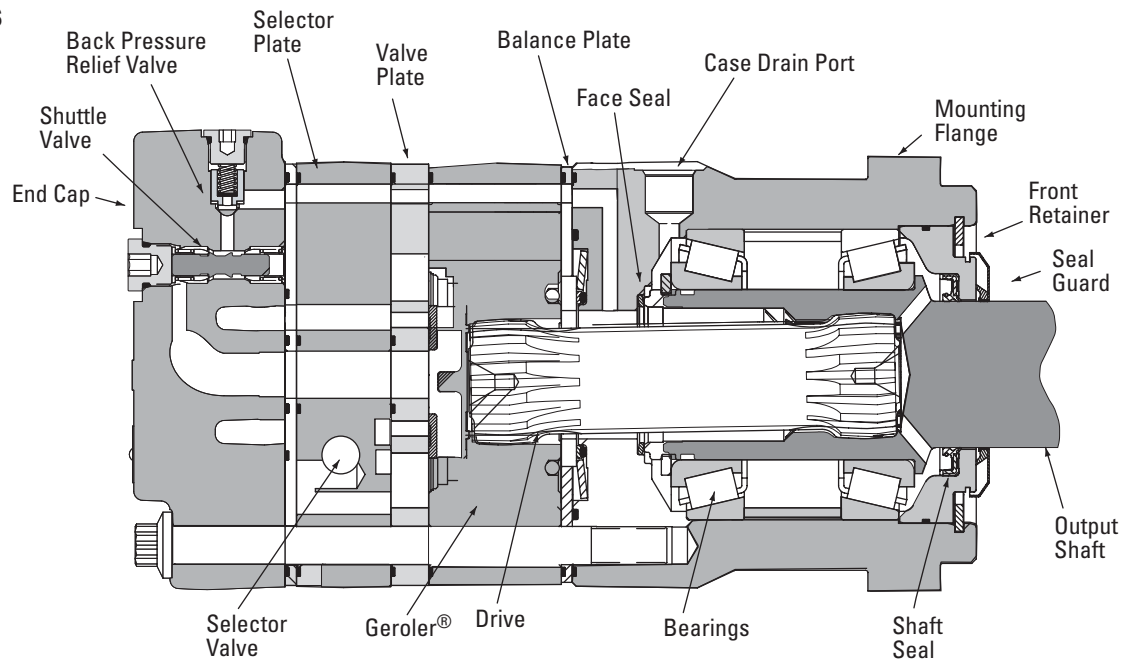
- 0** – Assigned Code

### 16 Eaton Assigned Design Code

- D** – Assigned Design Code

# VIS 40 Series Two-speed

## Specifications



VIS 40 Series motors are available with an integral two-speed feature that allows the operator to shift the motor between low speed high torque (LSHT) mode and high speed low torque (HSLT) mode.

In the LSHT mode, output torque and rotation speed values are equal to those of the conventional VIS 40 motor. In the HSLT mode motor displacement is reduced by one third, resulting in a fifty percent increase in rotation speed and a torque output reduction of one third.

The VIS 40 two-speed motor is bidirectional. It will function with equal shaft output in either rotation

direction (CW or CCW) in both LSHT and HSLT modes. Shift on the fly technology allows full-power operation throughout the full duration of the shift.

Changing between modes is accomplished by changing the displacement in a ratio of 1 to 1.5. An external two-position three-way control valve is required for shifting pressure to the pilot port between low pressure (LSHT mode) and pilot signal pressure (HSLT mode).

An integral selector valve shifts the motor from LSHT mode to HSLT mode. Initially, low pressure is supplied to the pilot port. The selector valve is biased to LSHT mode by a return spring. When pilot signal pressure is supplied to the

pilot port and 3,5  $\Delta$ bar [50 PSI] is reached, the selector valve overcomes return spring force and the shifts the spool to select HSLT mode.

Oil on the opposite side of the spool is drained to tank via the drain port. The pressure difference between the pilot port and drain port must be maintained to keep the motor in the high speed mode. When pilot pressure is removed from the pilot port, the pressure in the pilot end of the spool valve is relieved and drained back through the control valve and the return spring forces the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high-speed mode operation. Allowable pilot pressure must be at least 3,5  $\Delta$ bar [50 PSI] and may be as high as full operating pressure of the motor.

All VIS 40 Series two-speed motors are equipped with a return line shuttle for closed circuit applications as standard equipment. All options available on the conventional VIS 40 are also available on VIS 40 two-speed motors.

## Performance Data

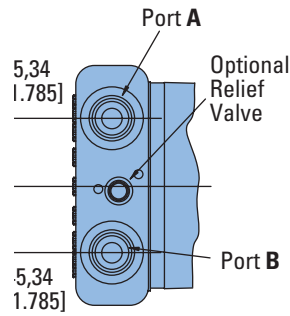
In the LSHT mode, torque and speed values are equal to those of the conventional VIS 40 motor. In the HSLT mode, rotation speed is increased by fifty percent and torque output is reduced by one third. The VIS 40 two-speed motor will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes.



# VIS 40 Series Two-speed

## Dimensions

Standard and Wheel Mount  
– SAE



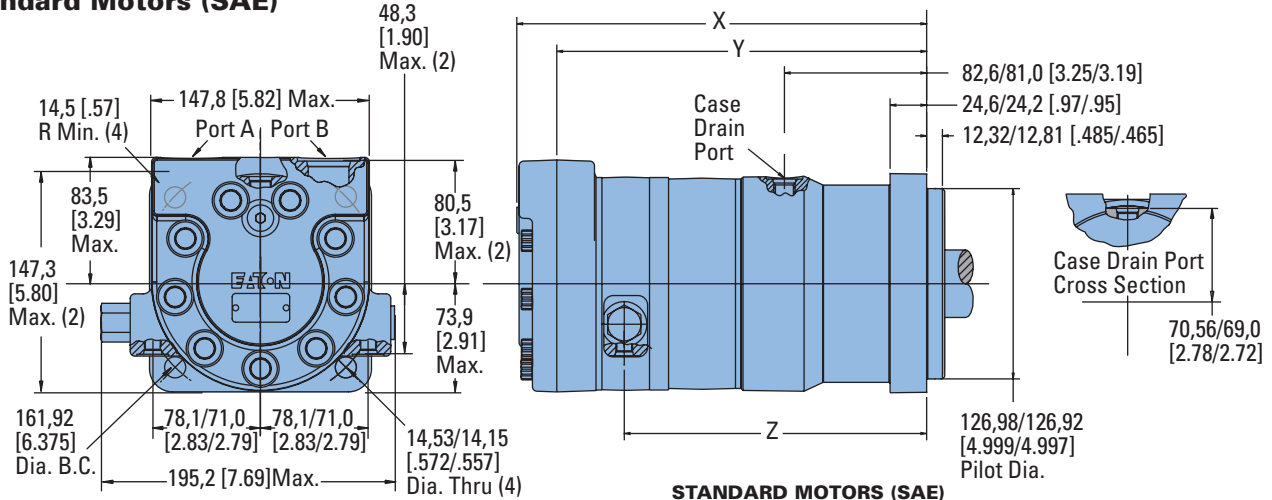
### Ports

- 1–1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

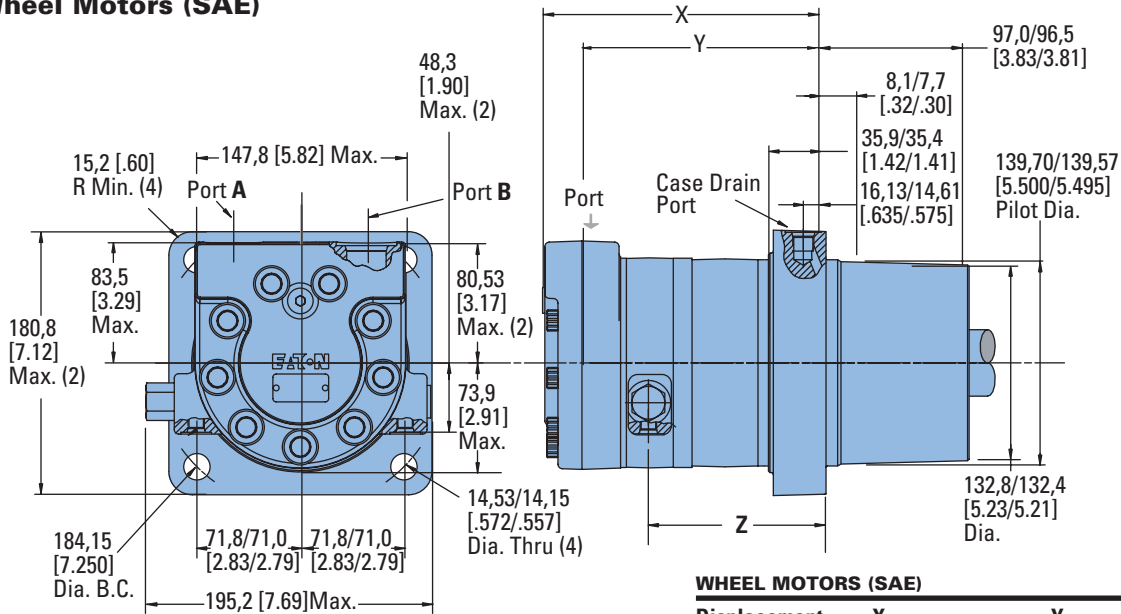
### Standard Motors (SAE)



#### STANDARD MOTORS (SAE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	275,1 [10.83]	246,9 [9.72]	201,7 [7.94]
570 [34.9]	281,2 [11.07]	253,0 [9.96]	208,0 [8.19]
630 [38.5]	286,3 [11.27]	258,3 [10.17]	213,4 [8.40]
685 [41.7]	290,8 [11.45]	262,9 [10.35]	217,7 [8.57]
785 [48.0]	300,2 [11.82]	272,3 [10.72]	227,3 [8.95]
940 [57.4]	313,9 [12.36]	286,0 [11.26]	241,0 [9.49]

### Wheel Motors (SAE)



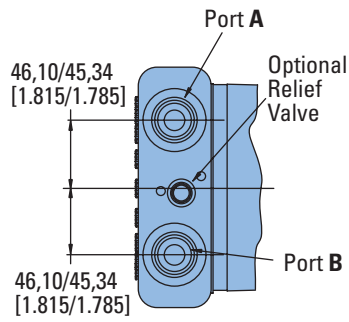
#### WHEEL MOTORS (SAE)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	190,2 [7.49]	162,1 [6.38]	116,8 [4.60]
570 [34.9]	196,3 [7.73]	168,1 [6.62]	123,2 [4.85]
630 [38.5]	201,4 [7.93]	173,5 [6.83]	128,5 [5.06]
685 [41.7]	206,0 [8.11]	178,1 [7.01]	132,8 [5.23]
785 [48.0]	215,4 [8.48]	187,5 [7.38]	142,5 [5.61]
940 [57.4]	229,1 [9.02]	201,2 [7.92]	156,2 [6.15]

# VIS 40 Series Two-speed

## Dimensions

Oversize Flange  
224,0 [8.82] B.C.

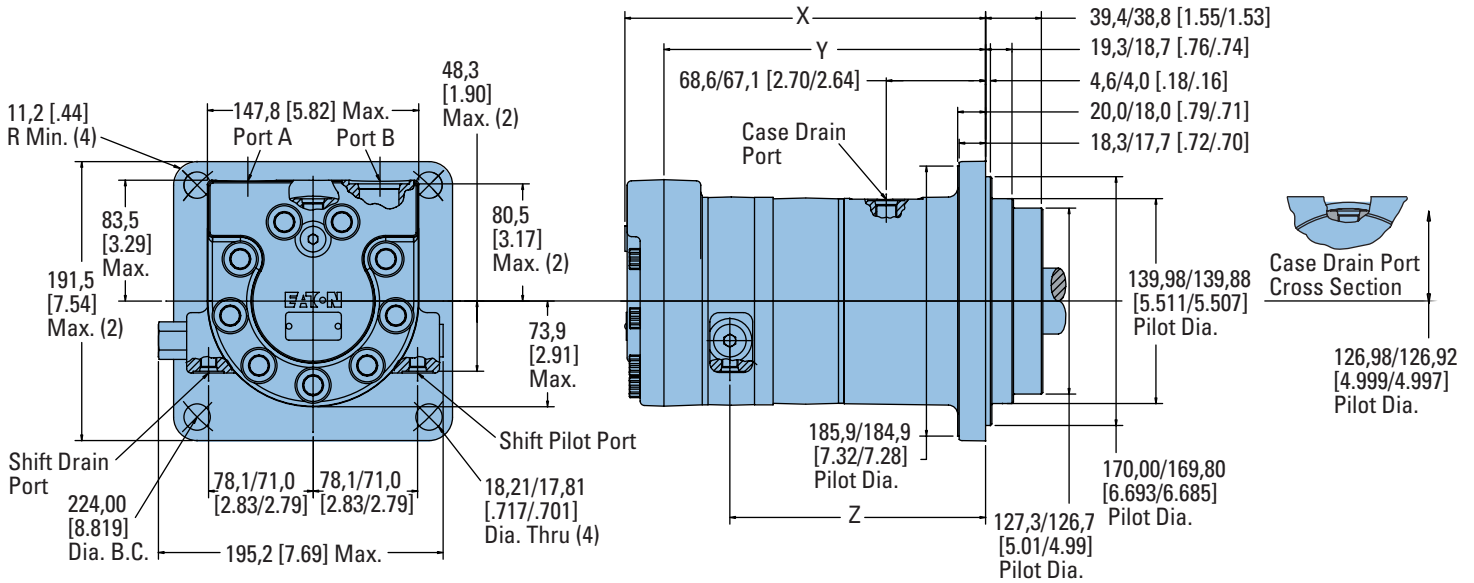


### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



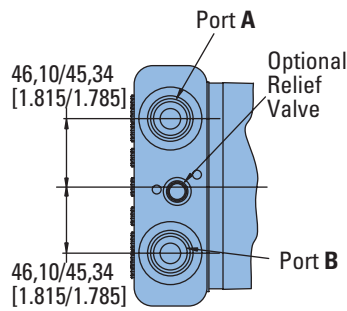
### OVERSIZE MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	248,2 [9.77]	220,0 [8.66]	174,8 [6.88]
570 [34.9]	254,3 [10.01]	226,1 [8.90]	181,1 [7.13]
630 [38.5]	259,3 [10.21]	231,4 [9.11]	186,4 [7.34]
685 [41.7]	263,9 [10.39]	236,0 [9.29]	190,8 [7.51]
785 [48.0]	273,1 [10.75]	245,1 [9.65]	200,2 [7.88]
940 [57.4]	286,8 [11.29]	258,8 [10.19]	213,9 [8.42]

# VIS 40 Series Two-speed

## Dimensions

Standard and Wheel Mount  
– ISO



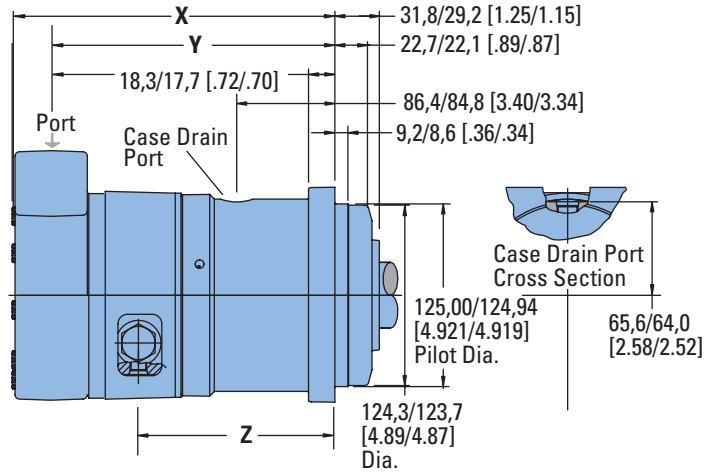
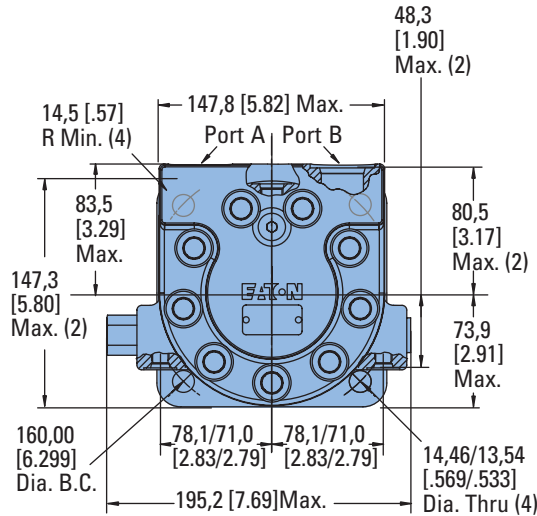
### Ports

- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

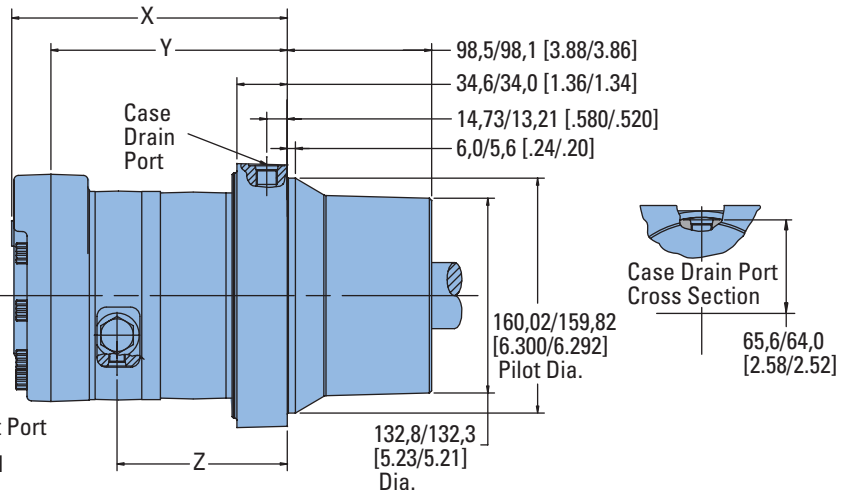
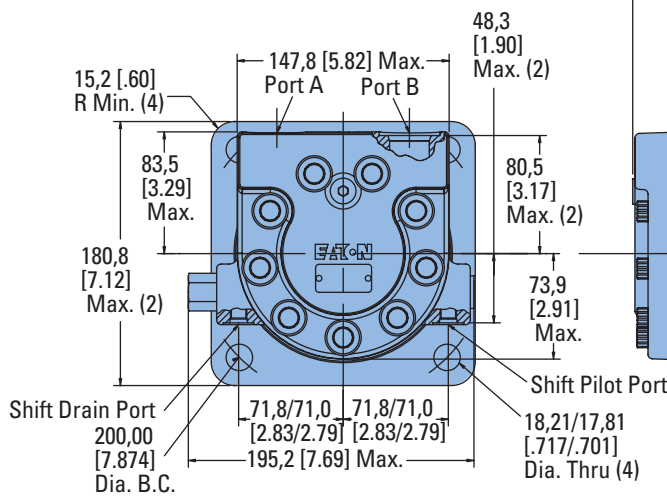
### Standard Motors (ISO)



### STANDARD MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	263,1 [10.36]	235,0 [9.25]	189,7 [7.47]
570 [34.9]	269,2 [10.60]	241,0 [9.49]	196,1 [7.72]
630 [38.5]	274,3 [10.80]	246,4 [9.70]	201,4 [7.93]
685 [41.7]	278,9 [10.98]	251,0 [9.88]	205,7 [8.10]
785 [48.0]	288,0 [11.34]	260,1 [10.24]	215,1 [8.47]
940 [57.4]	301,8 [11.88]	273,8 [10.78]	228,9 [9.01]

### Wheel Motors (ISO)



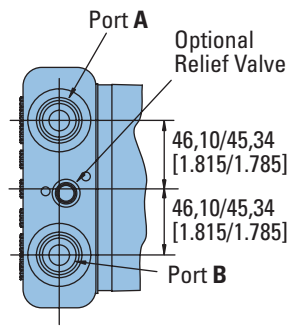
### WHEEL MOTORS (ISO)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	189,0 [7.44]	160,8 [6.33]	115,6 [4.55]
570 [34.9]	195,1 [7.68]	166,9 [6.57]	121,9 [4.80]
630 [38.5]	200,2 [7.88]	172,2 [6.78]	127,3 [5.01]
685 [41.7]	204,7 [8.06]	176,8 [6.96]	131,6 [5.18]
785 [48.0]	213,9 [8.42]	185,9 [7.32]	141,0 [5.55]
940 [57.4]	227,6 [8.96]	199,6 [7.86]	154,7 [6.09]

# VIS 40 Series Two-speed

## Dimensions

Bearingless

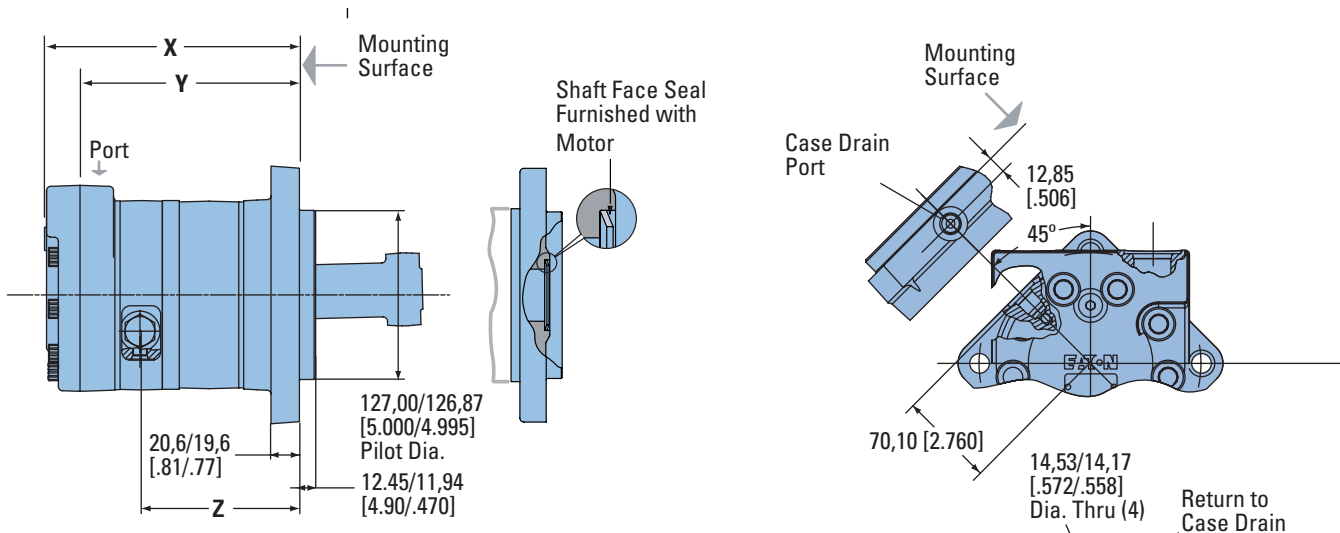


### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)
- or G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16 -20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW

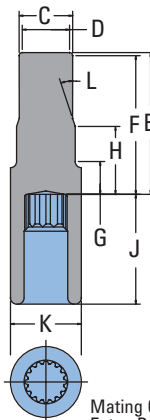


For VIS 40 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

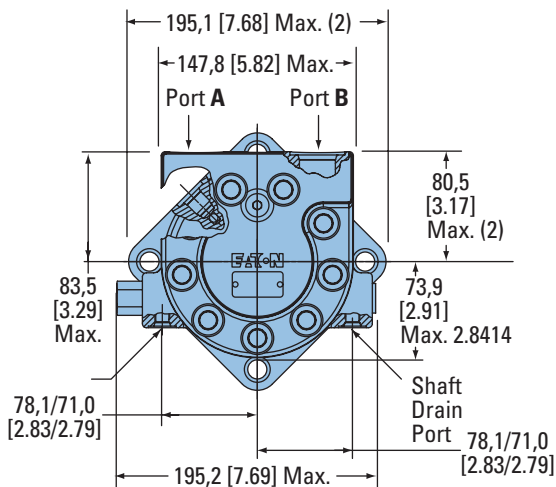
### Note:

After machining blank, part must be hardened per Eaton specification.

- C 59,94 [2.36 ] Dia.
- D 49,00 [1.93 ] Dia.
- E 155,86 [6.14 ] Max.
- F 150,88 [5.94 ] Min.
- G 26,92 [1.06 ] Full Form Dia.
- H 33,30 [1.21 ]
- J 106,43 [4.19 ] Full Form Dia.
- K 72,64 [2.86 ]
- L 15



Mating Coupling Blank  
Eaton Part No. 13280-002



### BEARINGLESS MOTORS

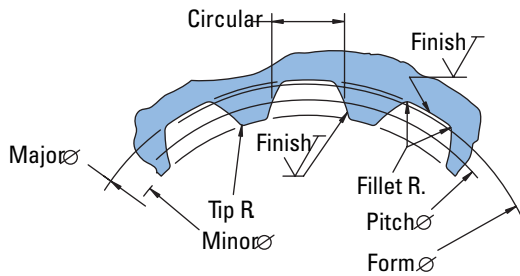
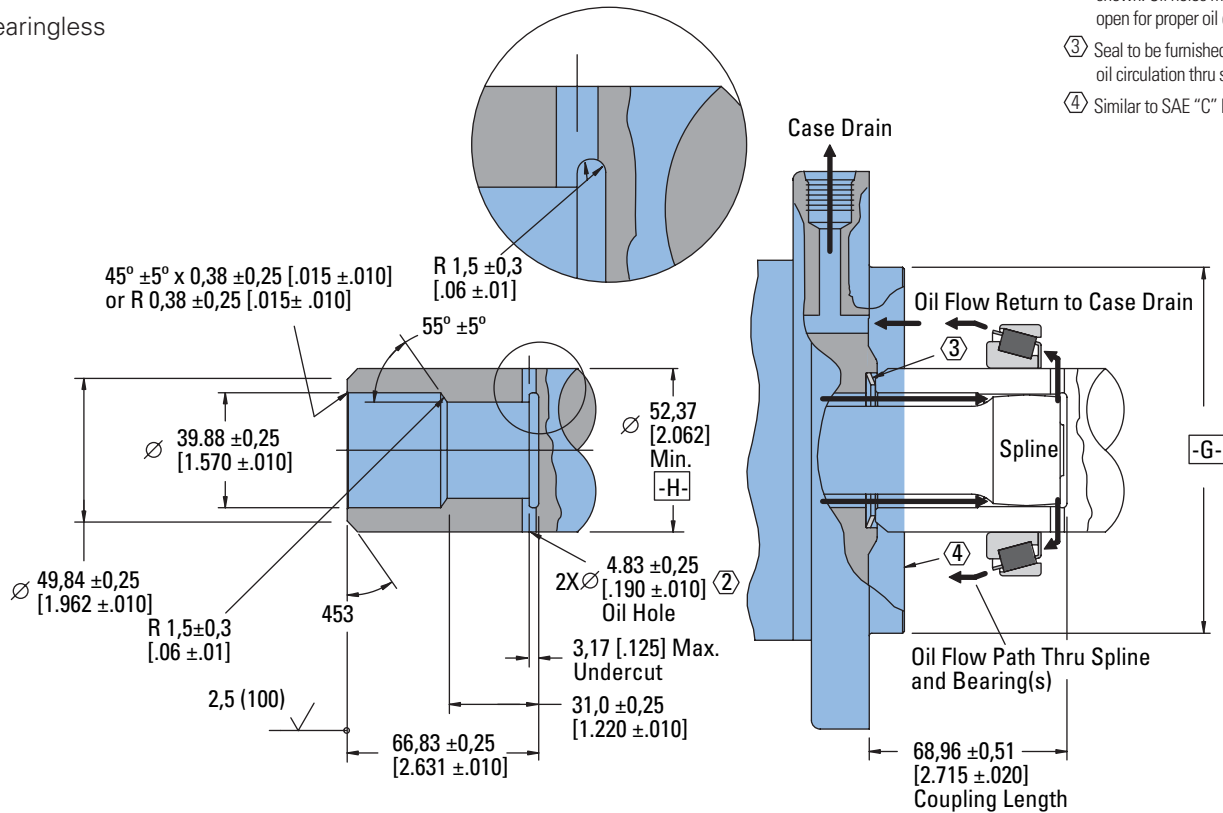
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	193,0 [7.60]	164,8 [6.49]	119,6 [4.71]
570 [34.9]	199,1 [7.84]	170,9 [6.73]	126,0 [4.96]
630 [38.5]	204,0 [8.03]	176,0 [6.93]	131,1 [5.16]
685 [41.7]	208,8 [8.22]	180,8 [7.12]	135,6 [5.34]
785 [48.0]	217,9 [8.58]	190,0 [7.48]	145,0 [5.71]
940 [57.4]	231,6 [9.12]	203,7 [8.02]	158,8 [6.25]

# VIS 40 Series Two-speed

## Installation Information

Bearingless

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0,076 -1,27 [.030 -.050]. Dimensions apply after heat treat.
- ② Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- ③ Seal to be furnished with motor for proper oil circulation thru splines.
- ④ Similar to SAE "C" Four Bolt Flange.



Spline Pitch.....	8.5/17
Pressure Angle.....	30°
Number of teeth.....	12
Class of Fit.....	Ref. 5
Type of Fit.....	Side
Side Pitch Diameter.....	Ref. 35,858823 [1.4117647] $\text{Ⓞ} 0,20 [.008]   H$
Base Diameter.....	Ref. 31,054652 [1.2226241]
Major Diameter.....	39,17 [1.542] Max. 38,97 [1.534] Min.
Minor Diameter.....	33,30 -33,48 [1.311 -1.318]
Form Diameter, Min.....	38,33 [1.509]
Fillet Radius.....	0,64 -0,76 [.025 -.030]
Tip Radius.....	0,25 -0,51 [.010 -.020]
Finish.....	1,6 (63)
Involute Profile Variation.....	+0,000 -0,025 [+0.0000 -.0010]
Total Index Variation.....	0,038 [.0015]
Lead Variation.....	0,013 [.0005]
Circular Space Width:	
Maximum Actual.....	5,898 [.2322]
Minimum Effective.....	5,804 [.2285]
Maximum Effective.....	Ref. 5,857 [.2306]
Minimum Actual.....	Ref. 5,834 [.2297]
Dimension Between Two Pins.....	Ref. 26,929 -27,084 [1.0602 -1.0663]
Pin Diameter.....	6,223 [.2450] Pins to Have 4,0 [.160]
Wide Flat for Root Clearance	

# VIS 40 Series Two-speed

## Product Numbers

Closed Loop

Use digit prefix —  
176-, 178-, or 182- plus four  
digit number from charts for  
complete product number—  
Example 176-0022.

**Orders will not be accepted  
without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r[in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0021	-0022	-0023	-0024	-0025	-0026
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0027	-0028	-0029	-0030	-0031	-0032
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0033	-0034	-0035	-0036	-0037	-0038
Wheel	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	182-0002	-0003	-0004	-0005	-0006	-0007
	1 1/2 inch 17 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	182-0008	-0009	-0010	-0011	-0012	-0013
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	182-0014	-0015	-0016	-0017	-0018	-0019
Bearingless		1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	176-0019	-0020	-0021	-0022	-0023	-0024

176-0022

### Oversize

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r[in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0039	-0040	-0041	-0042	-0043	-0044
	46 mm 28 Tooth Splined	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	1178-0045	-0046	-0047	-0048	-0049	-0050
	1 3/4 inch Tapered	1 1/16 -12 UNF O-ring (2) 9/16 -18 UNC Drain Port (1)	178-0051	-0052	-0053	-0054	-0055	-0056

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r[in <sup>3</sup> /r] / PRODUCT NUMBER					
			505 [30.7]	570 [34.9]	630 [38.5]	685 [41.7]	785 [48.0]	940 [57.4]
Standard	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	178-0057	-0058	-0059	-0060	-0061	-0062
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	178-0063	-0064	-0065	-0066	-0067	-0068
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	178-0069	-0070	-0071	-0072	-0073	-0074
Wheel	40 mm Straight	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	182-0020	-0021	-0022	-0023	-0024	-0025
	45 mm Tapered	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	182-0026	-0027	-0028	-0029	-0030	-0031
	1 1/2 inch 17 Tooth Splined	G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	182-0032	-0033	-0034	-0035	-0036	-0037
Bearingless		G 3/4 (BSP) (2) G 1/4 (BSP) Drain Port (1)	176-0025	-0026	-0027	-0028	-0029	-0030

176-0028

#### Note:

The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 4,5 bar [65 PSI].

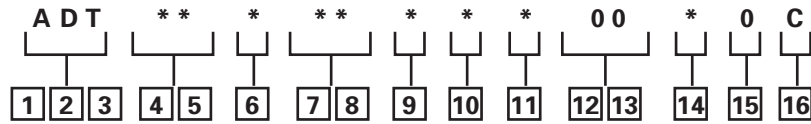
- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].



# VIS 40 Series Two-speed

## Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 40 two-speed motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



**1, 2, 3 Product Series**  
**ADT** – VIS 40- Two-speed Motor

**4, 5 Displacement**  
 – cm<sup>3</sup>/r [in<sup>3</sup>/r]

- 20** – 325 [19.8]
- 31** – 505 [30.7]
- 35** – 570 [34.9]
- 38** – 630 [38.5]
- 42** – 685 [41.7]
- 48** – 785 [48.0]
- 57** – 940 [57.4]

**6 Mounting Type**

**A** – 4 Bolt Bearingless  
 127,00 [5.000] Pilot Dia. with  
 12,19 [.480] Pilot Length  
 and 14,35 [.565] Dia holes  
 on 161,92 [6.375] Dia. Bolt  
 Circle

**B** – 4 Bolt Wheel Mount  
 160,00 [6.3] Pilot Dia. With  
 5,8 [.23] Pilot Length and  
 18,00 [.709] Dia. Holes on  
 200,00 [7.874] Dia. Bolt  
 Circle (ISO Compatible)

**C** – 4 Bolt Oversize Flange  
 185,4 [7.30] Rear Pilot Dia.,  
 169,90 [6.689], 139,93  
 [5.509], 127,0 [5.00] Dia  
 (Front Pilots) and 18,01  
 [.709] Dia. Holes on 224,00  
 [8.819] Dia. Bolt Circle

**F** – 4 Bolt Standard Mount  
 (SAE CC) 127,00 [5.000]  
 Pilot Dia. With 12,2 [.48]  
 Pilot Length and 14,32 [.564]  
 Dia. Holes on 161,92 [6.375]  
 Dia. Bolt Circle

**G** – 4 Bolt Wheel Mount  
 139,7 [5.50] Pilot Dia. with  
 7,9 [.31] Pilot Length and  
 14,32 [.564] Dia. Holes on  
 184,15 [7.250] Dia. Bolt  
 Circle (SAE Compatible)

**H** – 4 Bolt Standard Mount  
 125,00 [4.92] Pilot Dia. With  
 8,9 [.35] Pilot Length and  
 14,00 [.551] Dia. Holes on  
 160,00 [6.299] Dia. Bolt  
 Circle (ISO Compatible)

**7, 8 Output Shaft**

**00** – None (Bearingless)

**01** – 45 mm Dia. 10:1  
 Tapered Shaft Per ISO R775  
 with M30X2-6H Threaded  
 Shaft End, 12W X 8H X 28L  
 [.472W X .313H X 1.102L]  
 Key

**02** – 1-3/4 inch Dia. .125:1  
 Tapered Shaft Per SAE J501  
 with 1-1/4 - 18 UNEF-2A  
 Threaded Shaft End, 11,11  
 [.4375] Square X 31,8 [1.25]  
 Straight Key

**04** – 46 mm Dia. Flat Root  
 Side Fit, 28 Tooth, 16/32 DP  
 30 Degree Involute Spline,  
 93,0 [3.66] Minimum Ful  
 Spline with M16 X 2,0-6H  
 Thread in End

**07** – 40 mm Dia. Straight  
 Shaft with M12 X 1,75-  
 6H Thread in End, 12W  
 X 8H X 63L [.472W X  
 .313H X 2.480L] Key (SAE  
 Compatible)

**08** – 1-1/2 inch Dia. Flat  
 Root Side Fit, 17 Tooth,  
 12/24 DP 30 Degree  
 Involute Spline, 39,1 [1.54]  
 Minimum Full Spline with  
 3/8-16 UNC-2B Thread in  
 End (SAE Compatible)

**09** – 1-1/2 inch Dia. Flat  
 Root Side Fit, 17 Tooth,  
 12/24 DP 30 Degree  
 Involute Spline, 56,6 [2.23]  
 Minimum Full Spline with  
 M12 X 1.75-6H Thread in  
 End (ISO Compatible)

**10** – 40 mm Dia. Straight  
 Shaft with M12 X 1,75-  
 6H Thread in End, 12W  
 X 8H X 67L [.472W X  
 .313H X 2.630L] Key (ISO  
 Compatible)

**9 Ports**

**A** – 1-1/16-12 UN-2B Size 12  
 O-ring Port, Accepts Fittings  
 for SAE J1926

**B** – G 3/4 (BSP) Straight  
 Thread Port

**10 Case Flow Options**

**A** – Shuttle Valve with 9/16-  
 18 UNF-2B, Size 6 O-ring  
 Port Case Drain, Accepts  
 Fittings for SAE J1926

**B** – Shuttle Valve with G 1/4  
 (BSP) Straight Thread Port  
 Case Drain

**11 Back-Pressure Relief**

**1** – Set at 4,5 bar [65 PSI]  
 (for Manual Pumps)

**2** – Set at 15,2 bar [220 PSI]  
 (for Servo Pumps)

**4** – Set at 15,2 bar [300 PSI]  
 (for high charge Servo Pumps)

**12, 13 Special Features**

**00** – None

**14 \_ Paint/ Special  
 Packaging**

**0** – No Paint, Individual Box

**A** – Painted Low Gloss  
 Black, Individual Box

**B** – No Paint, Bulk Box  
 Option

**C** – Painted Low Gloss  
 Black, Bulk Box Option

**15 \_ Eaton Assigned  
 Code when Applicable**

**0** – Assigned Code

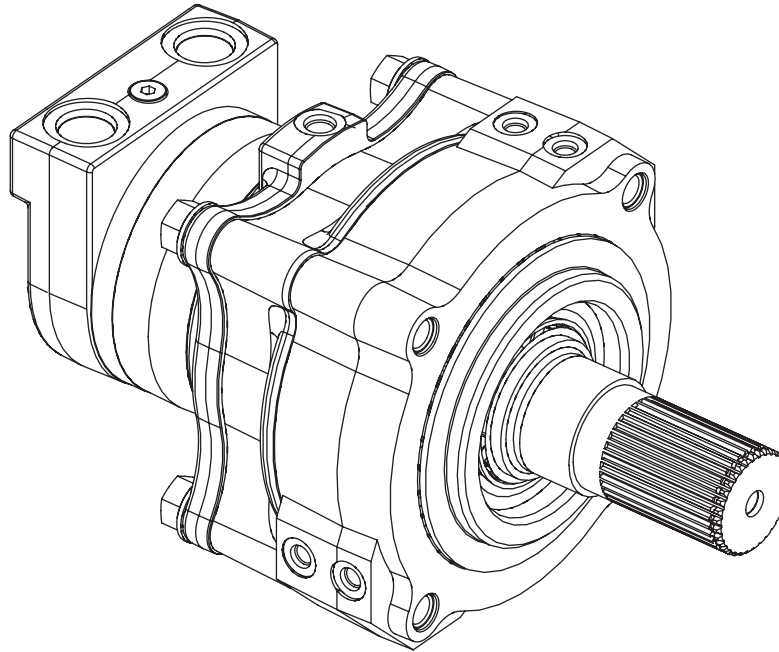
**16 \_ Eaton Assigned  
 Design Code**

**C** – Assigned Design Code



# VIS 40 Series

## Brake Description



### Features

- Spring-Applied/  
Hydraulically Released  
Multi-Disc Brake
- Spring automatically  
applies brake when hydro-  
static pressure is absent
- Environmentally Protected
- Integral Design –  
Motor and brake as a sin-  
gle package to minimize  
length and cost.
- Infinite Braking –  
Eliminates machine creep  
associated with park pawl  
mechanisms
- Boost Feature –  
Increases holding capacity  
to match full motor output  
torque
- No adjustments needed
- Two Sets of Release  
and Boost Ports –  
Allows for multiple plumb-  
ing options and facilitates  
bleeding

### Applications

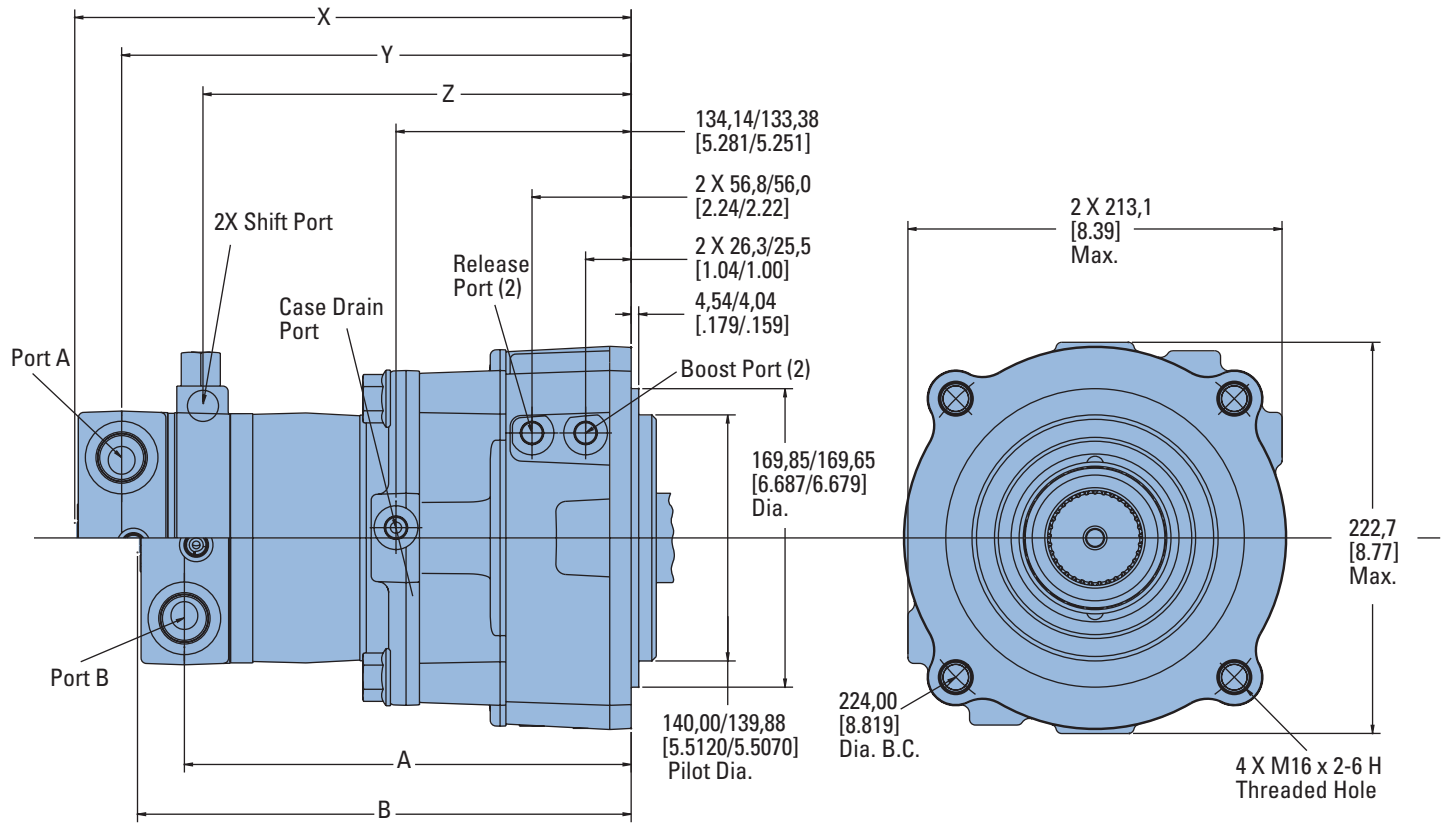
- Skid Steer Loaders
- Mini Excavators
- Trenchers
- Road Rollers
- Anywhere load-holding is  
needed on a Low-Speed  
High-Torque drive system

### Specifications

- Static Holding Torque – 780 N-m [6900 lb-in] minimum  
(spring only - no boost)  
2621 N-m [23200 lb-in] minimum  
(@ 10,3 bar [150 PSI] boost)  
3570 N-m [31600 lb-in] minimum  
(@ 15,2 bar [220 PSI] boost)
- Release Pressure – 10,3 bar [150 PSI] minimum  
for full release  
68,9 bar [1000 PSI] maximum  
allowed at release port
- Case Pressure – 1,4 bar [20 PSI] continuous  
3,5 bar [50 PSI] maximum
- Boost Pressure – 15,2 bar [220 PSI] continuous  
34,5 bar [500 PSI] maximum
- Speed – 360 RPM maximum
- Emergency – After 3 consecutive stops,  
brake to still meet parking  
requirement

# VIS 40 Series

## Brake Dimensions



### BRAKE MOTORS (SINGLE-SPEED)

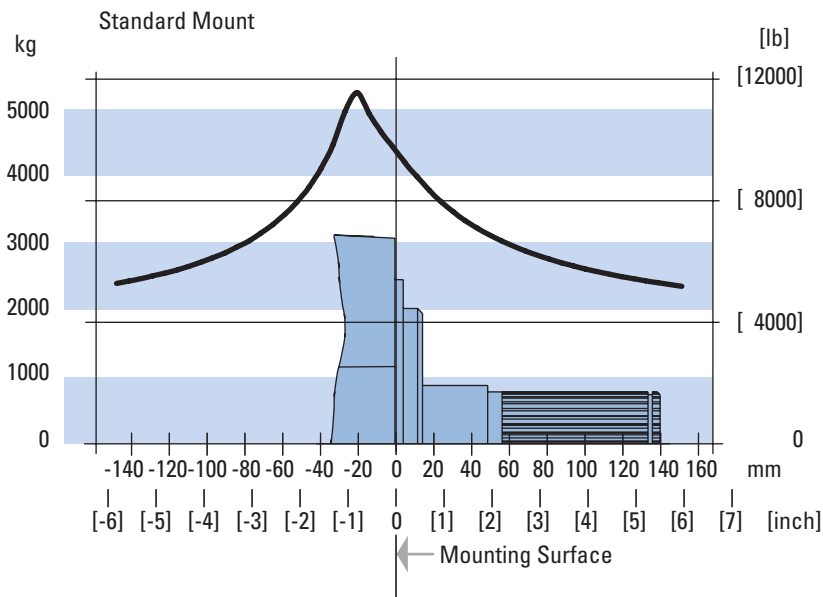
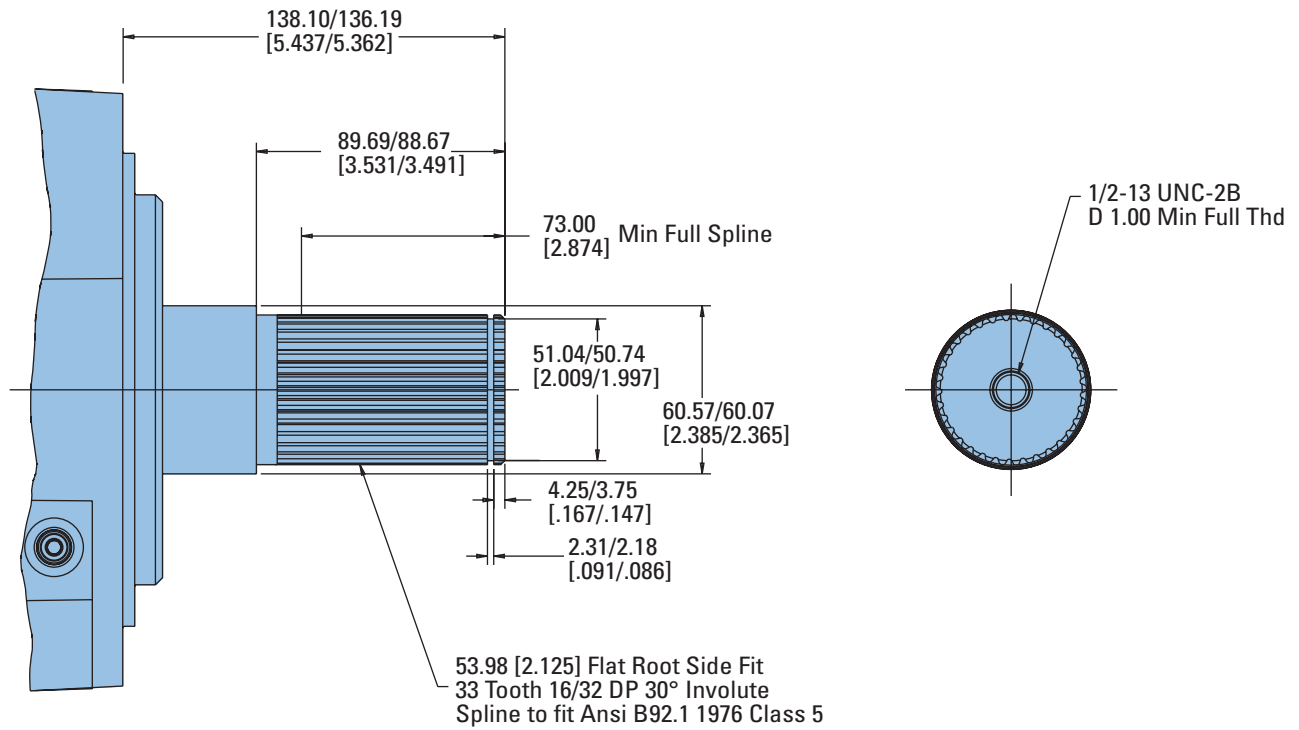
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	A mm [inch]	B mm [inch]
505 [30.7]	238,7 [9.40]	265,9 [10.47]
570 [34.9]	244,9 [9.64]	272,1 [10.71]
630 [38.5]	250,1 [9.85]	277,3 [10.92]
685 [41.7]	254,7 [10.04]	281,9 [11.10]
785 [48.0]	264,0 [10.40]	291,2 [11.46]
940 [57.4]	277,7 [10.94]	304,9 [12.00]

### BRAKE MOTORS (TWO-SPEED)

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
505 [30.7]	301,9 [11.88]	274,7 [10.82]	229,3 [9.03]
570 [34.9]	308,0 [12.12]	280,9 [11.06]	235,5 [9.27]
630 [38.5]	313,1 [12.32]	285,9 [11.27]	238,5 [9.27]
685 [41.7]	317,9 [12.52]	290,7 [11.45]	245,3 [9.66]
785 [48.0]	327,0 [12.88]	300,0 [11.80]	254,6 [10.02]
940 [57.4]	340,7 [13.42]	313,7 [12.35]	268,3 [10.56]

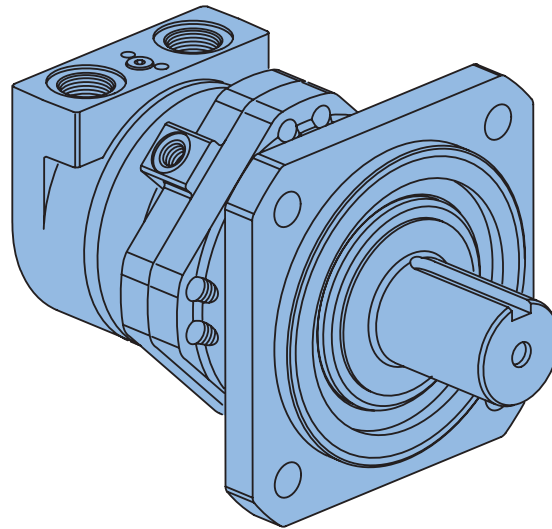
# VIS 40 Series

## Brake Shaft Dimensions/ Sideload Curves



# VIS 45 Series

## Highlights



### Description

The VIS 45 is the most powerful motor in the VIS Series product line. Maximum continuous output torque capability is rated to 4520 Nm [40,000 lb-in.] with a displacement range from 630cc to 1560cc per revolution. VIS 45 motors can be run up to 170 LPM [45 GPM] with pressure capability up to 310 bar [4500 PSI]. The motor utilizes patented VIS technology with improved high-strength Geroler, optimized drive geometry, and two-piece pre-loaded balance plate for increased starting efficiency, reduced leakage and higher back pressure capacity.

### VIS 45 Motors

Geroler Element	5 Displacements
Flow l/min [GPM]	170 [45] Continuous*** 189 [50] Intermittent**
Speed	Up to 284 RPM
Pressure bar [PSI]	310 [4500] Cont.*** 345 [5000] Inter.** 380 [5500] Peak*
Torque Nm [lb - in]	4520 [40000] Cont.*** 5650 [50000] Inter.**

\*\*\* Continuous— (Cont.) Continuous rating, motor may be run continuously at these ratings.

\*\* Intermittent— (Inter.) Intermittent operation, 10% of every minute.

\* Peak— (Peak) Peak operation, 1% of every minute.

### Features

- Patented VIS Geroler technology
- Three moving components: (Geroler, star, drive, and output shaft)
- Two-piece pre-loaded pressure balance plate
- Variety of optional features including two-speed option, and case flow solutions for both closed-loop and open-loop applications.

### Benefits

- Extremely compact powerful package
- Increased torque capability
- Greatest horsepower density in the VIS motor line
- High efficiency
- Quiet, smooth operation
- Reliable performance
- Design Flexibility

### Applications

- Traction Drives
- Skid Steer loaders
- Grapples
- Excavator Swing Drives
- Marine & Military Winches
- Utility Reels
- Harvesters
- Snow Grooming Equipment
- Trenchers
- Piggy-back Forklifts
- Industrial Machine Tools
- Truck Grapples
- Wood Processing – Saw Mills
- Augers



Auger



Skid Steer



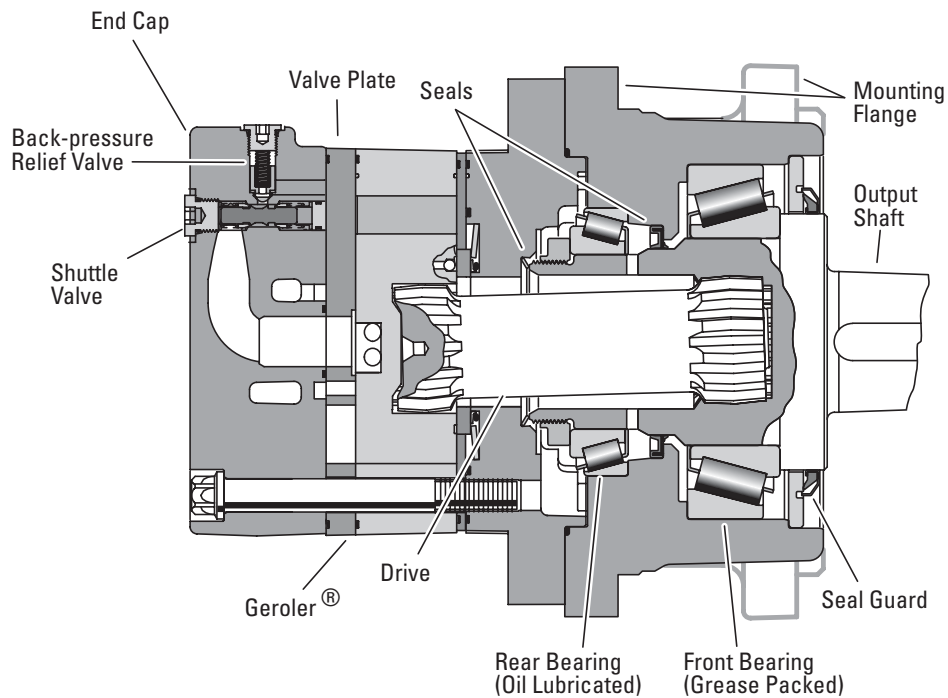
Injector



Port Equipment

# VIS 45 Series

## Specifications



### SPECIFICATION DATA — VIS 45 SERIES MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Max. Speed (RPM)	Continuous	256	198	164	129	104
	Intermittent	284	220	183	143	115
@ Flow						
Flow l/min [GPM]	Continuous	170 [45]	170 [45]	170 [45]	170 [45]	170 [45]
	Intermittent	189 [50]	189 [50]	189 [50]	189 [50]	189 [50]
Torque Nm [lb-in]	Continuous	2963 [26080]	3555 [31460]	4052 [35860]	4520 [40000]	4520 [40000]
	Intermittent	3111 [27530]	3722 [32940]	4549 [40269]	5376 [47592]	5650 [50000]
Pressure $\Delta$ bar [ $\Delta$ PSI]	Continuous	310 [4500]	310 [4500]	258 [3740]	205 [2975]	164 [2380]
	Intermittent	345 [5000]	345 [5000]	322 [4675]	256 [3720]	205 [2975]
	Peak	379 [5500]	379 [5500]	379 [5500]	308 [4465]	246 [3570]
Weight kg [lb]	Standard or Wheel Mount	53,8 [118.7]	55,2 [121.6]	56,7 [125.0]	58,7 [129.4]	61,2 [134.9]
	Bearingless	28,3 [62.3]	29,6 [65.2]	31,1 [68.6]	33,1 [73.0]	35,6 [78.5]
Weight kg [lb]	Two-speed Standard or Wheel Mount	58,5 [128.9]	59,8 [131.8]	61,3 [135.2]	63,3 [139.6]	65,8 [145.1]
	Two-speed Bearingless	32,9 [72.5]	34,2 [75.4]	35,7 [78.8]	37,7 [83.2]	40,2 [88.7]

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Maximum Inlet Pressure:

400 bar [5800 PSI]  
Do Not Exceed A Pressure Rating (for displacement size see chart above).

#### Return Pressure (Back-Pressure):

Minimum – 3,5 bar [50 PSI]  
Maximum – 21 bar [300 PSI]

#### Note:

Return (back-pressure) must be 3,5 bar [50 PSI] greater than the case pressure.

#### $\Delta$ Pressure:

The true  $\Delta$  bar [ $\Delta$  PSI] between inlet port and outlet port

#### Case Pressure:

Minimum – No Pressure  
Maximum – 3,5 bar [50 PSI]

#### Note:

The case must be full when the motor is operating. A case drain is recommended.

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Peak Operation:

1% of every minute

#### Recommended Fluids:

Premium quality, anti-wear type hydraulic oil with a viscosity of not less than 70 SUS at operating temperature.

#### Recommended Maximum System Operating Temp.:

82° C [180° F]

#### Recommended Filtration:

Per ISO Cleanliness Code, 4406: 20/18/13

#### Shuttle:

Standard

#### Back-Pressure Relief Valve:

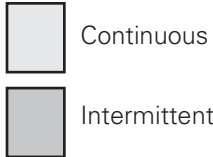
Required for closed loop circuit.

# VIS 45 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.

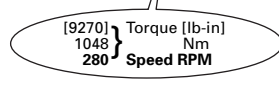


**805 cm<sup>3</sup>/r [48.6 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	15	35	70	105	140	170	205	240	275	310	345
4	1600	3350	7180	10670	13480	16640	19680	21740	25860	28500	31720
15	181	379	811	1206	1523	1880	2224	2457	2922	3221	3584
8	1620	3380	7240	10730	13740	16920	19950	22160	25920	28970	32200
30	183	382	818	1212	1553	1912	2254	2504	2929	3274	3639
12	1640	3310	7180	10770	14170	17290	20730	23270	26340	29420	32470
45	185	374	811	1217	1601	1954	2342	2630	2976	3324	3669
16	1660	3220	7010	10680	14290	17710	21240	24170	26830	30340	32940
61	188	364	792	1207	1615	2001	2400	2731	3032	3428	3722
20	1600	3110	6840	10380	14000	17290	20990	24490	27270	31390	
76	181	351	773	1173	1582	1954	2372	2767	3082	3547	
24	1560	3030	6750	10250	13830	17340	21110	24450	27620	31460	
91	176	342	763	1158	1563	1959	2385	2763	3121	3555	
28		2720	6560	10190	13780	17390	21090	24360	27420	31238	
106		307	741	1151	1557	1965	2383	2753	3098	3529	
32		2620	6330	10000	13480	17070	20730	24180	27270	31064	
121		296	715	1130	1523	1929	2342	2732	3082	3509	
36		2620	5910	9480	13140	16640	20200	23570	26910	30646	
136		296	668	1071	1485	1880	2283	2663	3041	3462	
40			5390	9220	12790	16120	19700	23080	26343	30019	
151			609	1042	1445	1822	2226	2608	2976	3391	
45			5150	8970	12450	15780	19420	22650	25848	29462	
170			582	1014	1407	1783	2194	2559	2920	3328	
50			4770	8610	12140	15380	19180	22440			
189			539	973	1372	1738	2167	2536			
			220	217	215	215	212	212			

**630 cm<sup>3</sup>/r [38.6 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	15	35	70	105	140	170	205	240	275	310	345
4	1270	2710	5530	8250	10300	12900	15540	17720	20820	23640	25740
15	144	306	625	932	1164	1458	1756	2002	2353	2671	2909
8	1290	2720	5580	8290	10490	13110	15760	18070	21000	24100	26070
30	146	307	631	937	1185	1481	1781	2042	2373	2723	2946
12	1310	2670	5440	8320	10820	13400	16370	18970	21230	24540	26840
45	148	302	615	940	1223	1514	1850	2144	2399	2773	3033
16	1320	2600	5400	8250	10910	13730	16780	19710	21970	24870	27530
61	149	294	610	932	1233	1551	1896	2227	2483	2810	3111
20	1290	2500	5270	8020	10690	13400	16730	20020	22320	25420	
76	146	283	596	906	1208	1514	1890	2262	2522	2872	
24	1240	2440	5200	7920	10560	13430	16700	19970	22610	25730	
91	140	276	588	895	1193	1518	1887	2257	2555	2907	
28		2190	5050	7870	10520	13480	16660	19860	22450	26080	
106		247	571	889	1189	1523	1883	2244	2537	2963	
32		2110	4870	7720	10300	13230	16370	19720	22320	25986	
121		238	550	872	1164	1495	1850	2228	2522	2936	
36		2090	4550	7330	10030	12890	15960	19220	22040	25655	
136		236	514	828	1133	1457	1803	2172	2491	2898	
40			4150	7120	9760	12490	15560	18820	21600	25185	
151			469	805	1103	1411	1758	2127	2441	2845	
45			3970	6930	9500	12230	15340	18470	21207	24742	
170			449	783	1074	1382	1733	2087	2396	2795	
50			3680	6660	9270	11920	15150	18300			
189			416	753	1048	1347	1712	2068			
			284	280	280	276	268	259			



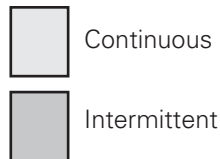


# VIS 45 Series

## Performance Data

Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



**1245 cm<sup>3</sup>/r [76.0 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4250
	15	35	70	105	140	170	205	240	275	295
4	2160	4800	9960	15150	20200	26450	30670	39180	42800	43220
15	244	542	1125	1712	2283	2989	3466	4427	4836	4884
8	2250	4830	10370	15760	22010	27180	33330	39840	43660	44400
30	254	546	1172	1781	2487	3071	3766	4502	4934	5017
12	2400	5390	10910	17290	22780	28470	34170	40140	44160	47220
45	271	609	1233	1954	2574	3217	3861	4536	4990	5336
16	2410	5150	10930	16970	22880	28600	33900	39500	44510	47592
61	272	582	1235	1918	2585	3232	3831	4464	5030	5376
20	2350	4890	10650	16470	21960	27450	33130	37710	43890	46933
76	266	553	1203	1861	2481	3102	3744	4261	4960	5302
24	2190	4760	10460	15920	21230	26530	32320	37680	42670	45673
91	247	538	1182	1799	2399	2998	3652	4258	4822	5156
28	1990	4260	10070	15860	21200	26420	32480	37500	42464	45418
106	225	481	1138	1792	2396	2985	3670	4238	4797	5131
32		4100	9770	15410	20770	26300	31920	37240	42167	45103
121		463	1104	1741	2347	2972	3607	4208	4764	5095
36		4090	9060	14650	20060	25670	31110	36295	41087	43955
136		462	1024	1655	2267	2901	3515	4100	4642	4966
40			8300	14150	19570	24900	30320	35373	40034	42836
151			938	1599	2211	2814	3426	3996	4523	4839
45			8100	13970	19310	24610	29972	34967	39570	42343
170			915	1579	2182	2781	3686	3950	4470	4783
50			7900	13790	19050	24310				
189			893	1558	2153	2747				

**990 cm<sup>3</sup>/r [60.5 in<sup>3</sup>/r]**  
Δ Pressure Bar [PSI]

	250	500	1000	1500	2000	2500	3000	3500	4000	4500	4750
	15	35	70	105	140	170	205	240	275	310	330
4	2000	4100	8630	12620	16050	20080	24150	28320	32590	35150	37040
15	226	463	975	1426	1814	2269	2729	3200	3683	3972	4186
8	2020	4130	8700	12740	16350	20420	24480	28400	32850	35670	37250
30	228	467	983	1440	1848	2307	2766	3209	3712	4031	4209
12	2050	4050	8630	12780	16870	20860	25440	28550	32920	35860	37630
45	232	458	975	1444	1906	2357	2875	3226	3720	4052	4252
16	2070	3940	8420	12680	17010	21380	26070	29660	33020	36620	38439
61	234	445	951	1433	1922	2416	2946	3352	3731	4138	4342
20	2000	3800	8220	12330	16660	20860	25760	30060	33550	37880	39766
76	226	429	929	1393	1883	2357	2911	3397	3791	4280	4492
24	1950	3700	8120	12180	16460	20890	25820	30090	33990	38366	40269
91	220	418	918	1376	1860	2361	2918	3400	3841	4334	4549
28		3320	7880	12100	16400	20990	25890	29900	33750	39106	39995
106		375	890	1367	1853	2372	2926	3379	3814	4280	4518
32		3210	7610	11870	16050	20600	25440	29680	33550	37890	39766
121		363	860	1341	1814	2328	2875	3354	3791	4280	4492
36		3200	7100	11260	15640	20080	24800	28930	32716	36936	38759
136		362	802	1272	1767	2269	2802	3269	3696	4173	4379
40			6480	10950	15220	19460	24170	28330	32023	36155	37935
151			732	1237	1720	2199	2731	3201	3618	4084	4286
45			6190	10650	14810	19040	23830	27952	31599	35679	37432
170			699	1203	1674	2152	2693	3158	3570	4031	4229
50			5740	10230	14450	18570	23540				
189			649	1156	1633	2098	2660				

[18570] Torque [lb-in]  
2098 } Nm  
178 Speed RPM



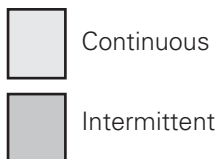
# VIS 45 Series

1560 cm<sup>3</sup>/r [95.0 in<sup>3</sup>/r]

## Performance Data

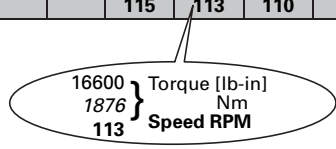
Motors run with high efficiency in all areas designated with a number for torque and speed. For best motor life select a motor to run with a torque and speed range shown in the light shaded area.

Performance data is typical at 120 SUS. Actual data may vary slightly from unit to unit in production.



Δ Pressure Bar [PSI]

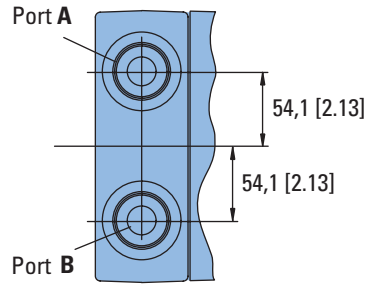
	250	500	1000	1500	2000	2500	3000	3500	4000
	15	35	70	105	140	170	205	240	275
4	2700	5670	11910	18520	24910	30860	37610	42320	48366
15	305	641	1346	2093	2815	3487	4250	4782	5464
8	2810	5910	12400	19260	25590	31740	39310	44150	50457
30	318	668	1401	2176	2892	3587	4442	4989	5700
12	3010	6300	13040	20490	26600	33070	39880	46670	53337
45	340	712	1474	2315	3006	3737	4506	5274	6025
16	3020	6300	13360	20740	27270	33950	40450	48630	55577
61	341	712	1510	2344	3082	3836	4571	5495	6279
20	2930	6150	13200	20490	27110	34830	39820	47662	54470
76	331	695	1492	2315	3063	3936	4500	5384	6154
24	2780	5910	12880	19750	26930	34390	39310	47300	54057
91	314	668	1455	2232	3043	3886	4442	5343	6107
28		5310	12500	19630	26600	33950	38740	46635	53297
106		600	1413	2218	3006	3836	4378	5268	6021
32		5120	12070	19260	26260	33510	38180	45982	52550
121		579	1364	2176	2967	3787	4314	5195	5937
36		5100	11270	18270	25590	33070	37652	45366	
136		576	1274	2065	2892	3737	4254	5125	
40			10280	17760	24910	32630	37124	44750	
151			1162	2007	2815	3687	4194	5055	
45			9820	17280	24240	31793	36119	43577	
170			1110	1953	2739	3592	4080	4923	
50			9100	16600	23650				
189			1028	1876	2672				



# VIS 45 Series

## Dimensions

Standard Mount

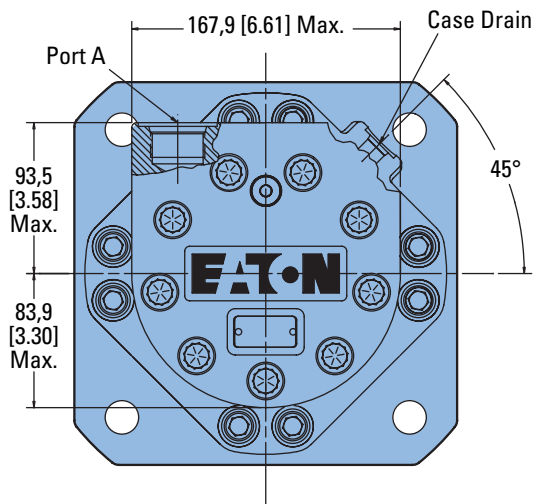
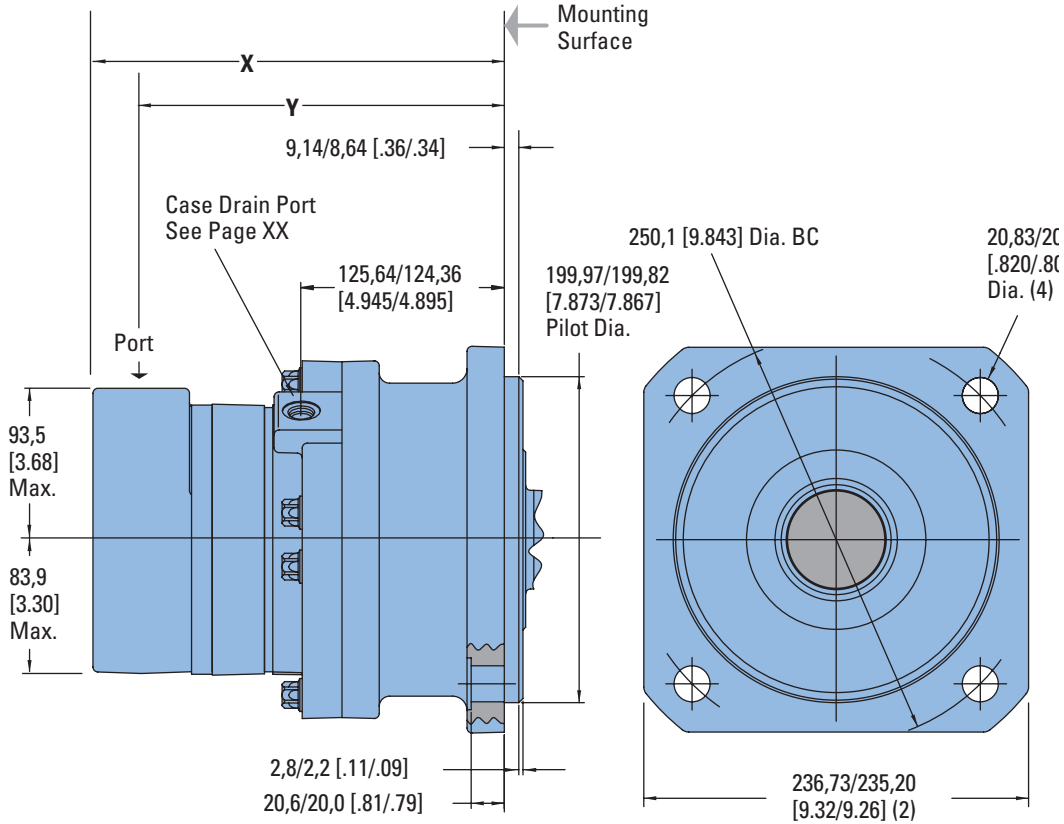


### Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



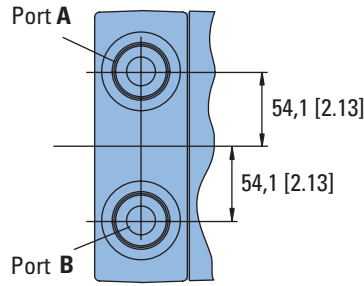
### STANDARD MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X Max. mm [inch]	Y mm [inch]
630 [38.6]	260,9 [10.27]	228,6 [ 9.00]
805 [48.6]	271,3 [10.68]	239,0 [ 9.41]
990 [60.5]	283,7 [11.17]	251,5 [ 9.90]
1245 [76.0]	299,7 [11.80]	267,7 [10.54]
1560 [95.0]	319,5 [12.58]	287,5 [11.32]

# VIS 45 Series

## Dimensions

Wheel Mount

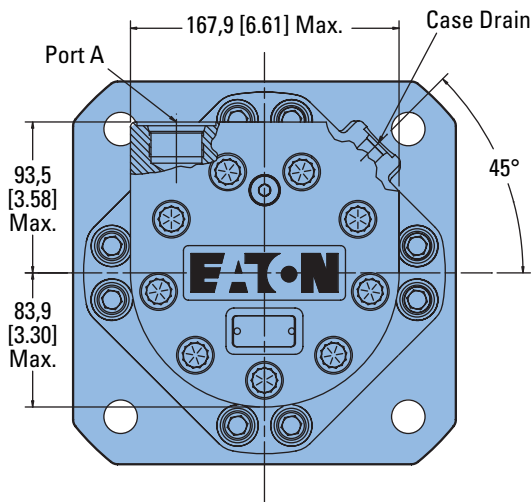
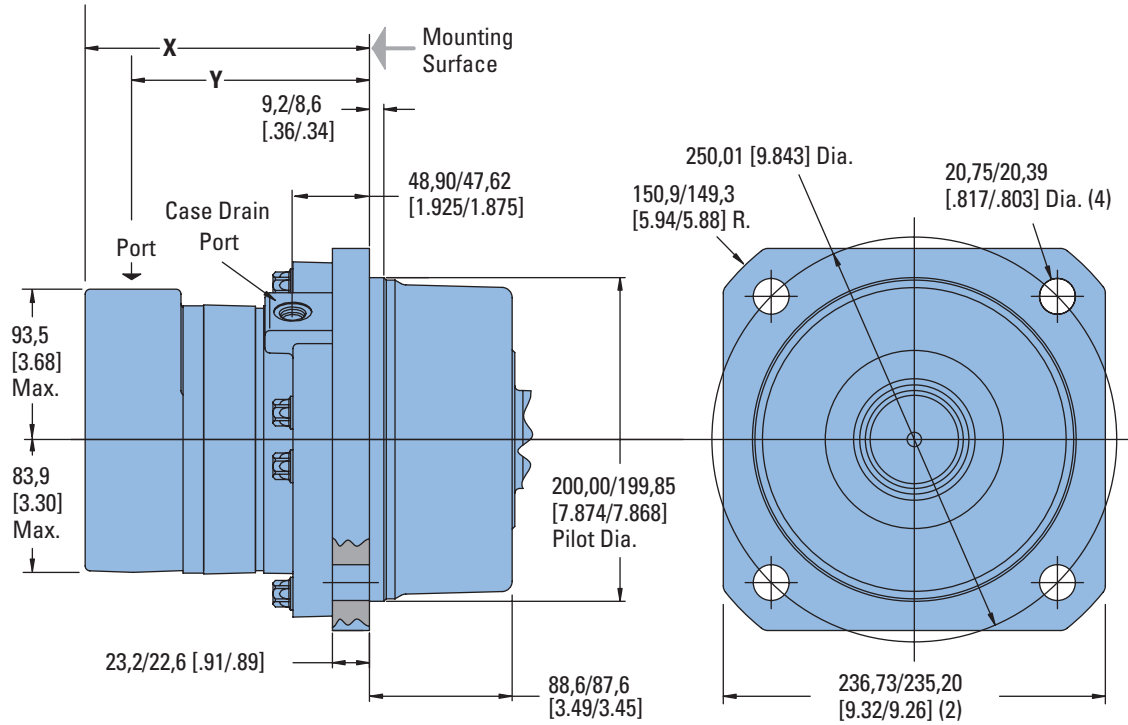


### Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



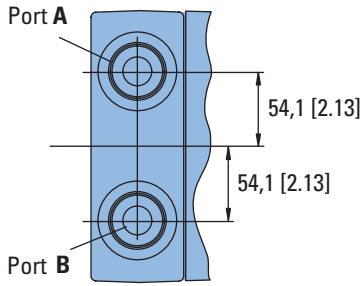
### WHEEL MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X Max. mm [inch]	Y mm [inch]
630 [38.6]	184,2 [7.25]	151,9 [5.98]
805 [48.6]	194,6 [7.66]	162,3 [6.39]
990 [60.5]	207,0 [8.15]	174,8 [6.88]
1245 [76.0]	223,0 [8.78]	191,0 [7.52]
1560 [95.0]	242,8 [9.56]	210,8 [8.30]

# VIS 45 Series

## Dimensions

Bearingless



### Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- Or G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)

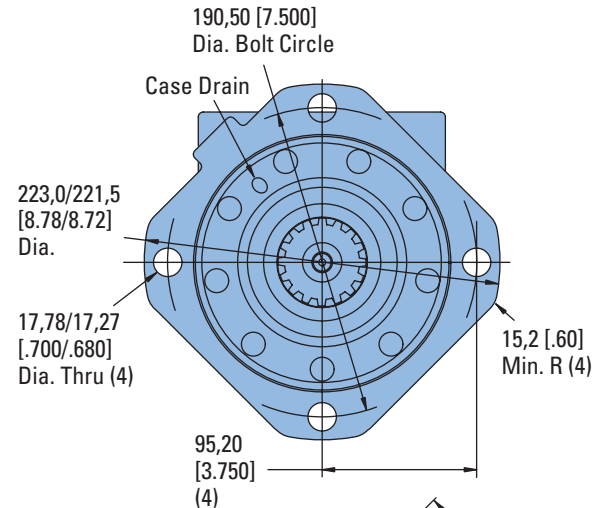
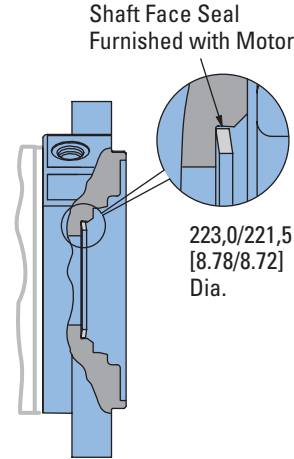
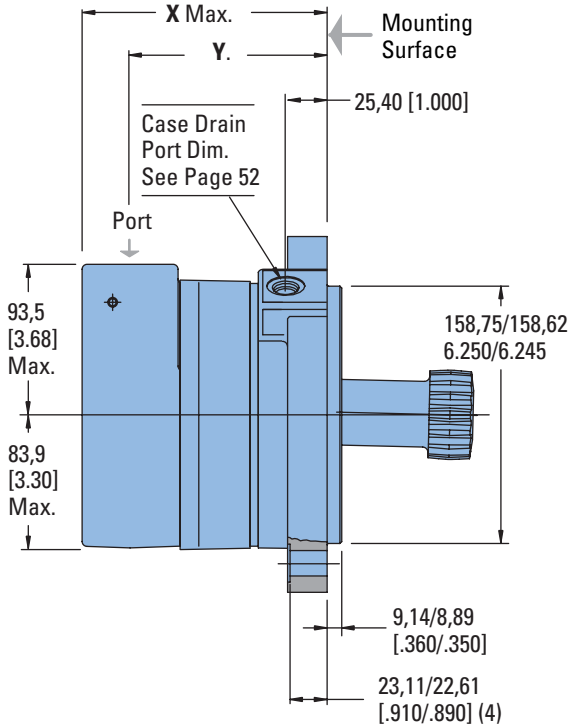
### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW

For VIS 45 bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

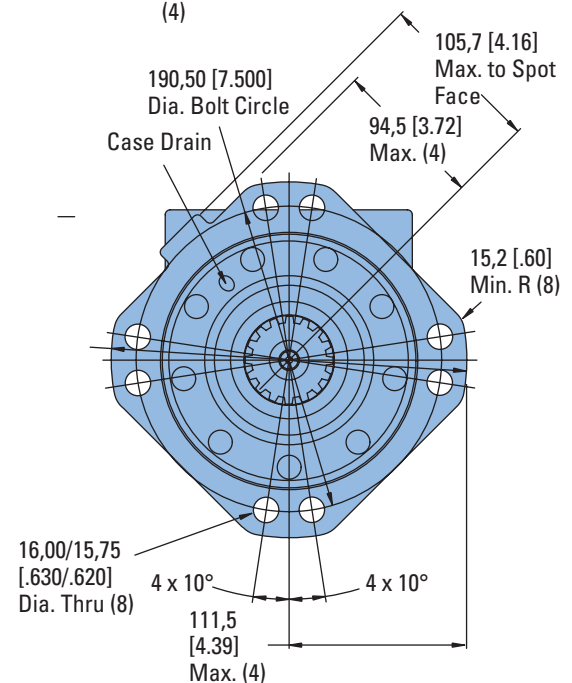
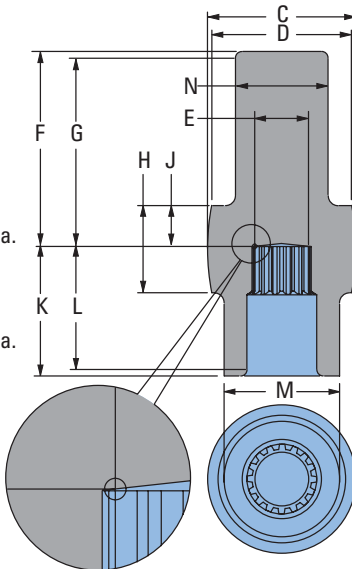
### Note:

After machining blank, part must be hardened per Eaton specification.



Mating Coupling Blank  
Eaton Part No. 13521-003

- C 116,3 [ 4.58 ] Dia. Max.
- D 111,8 [ 4.40 ] Dia. Min.
- E 37,64 [ 1.482 ] Dia.
- F 136,7 [ 5.38 ] Max.
- G 131,6 [ 5.18 ] Min. Full Form Dia.
- H 64,8 [ 2.55 ]
- J 26,4 [ 1.04 ]
- K 109,7 [ 4.32 ] Max.
- L 104,6 [ 4.12 ] Min. Full Form Dia.
- M 92,58 [ 3.645 ] Dia.
- N 73,28 [ 2.885 ] Dia.



### BEARINGLESS MOTORS

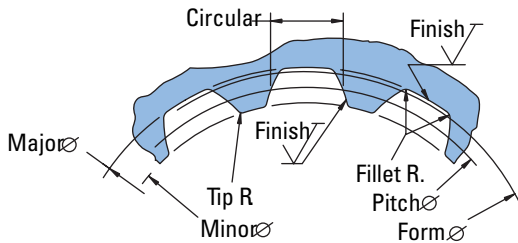
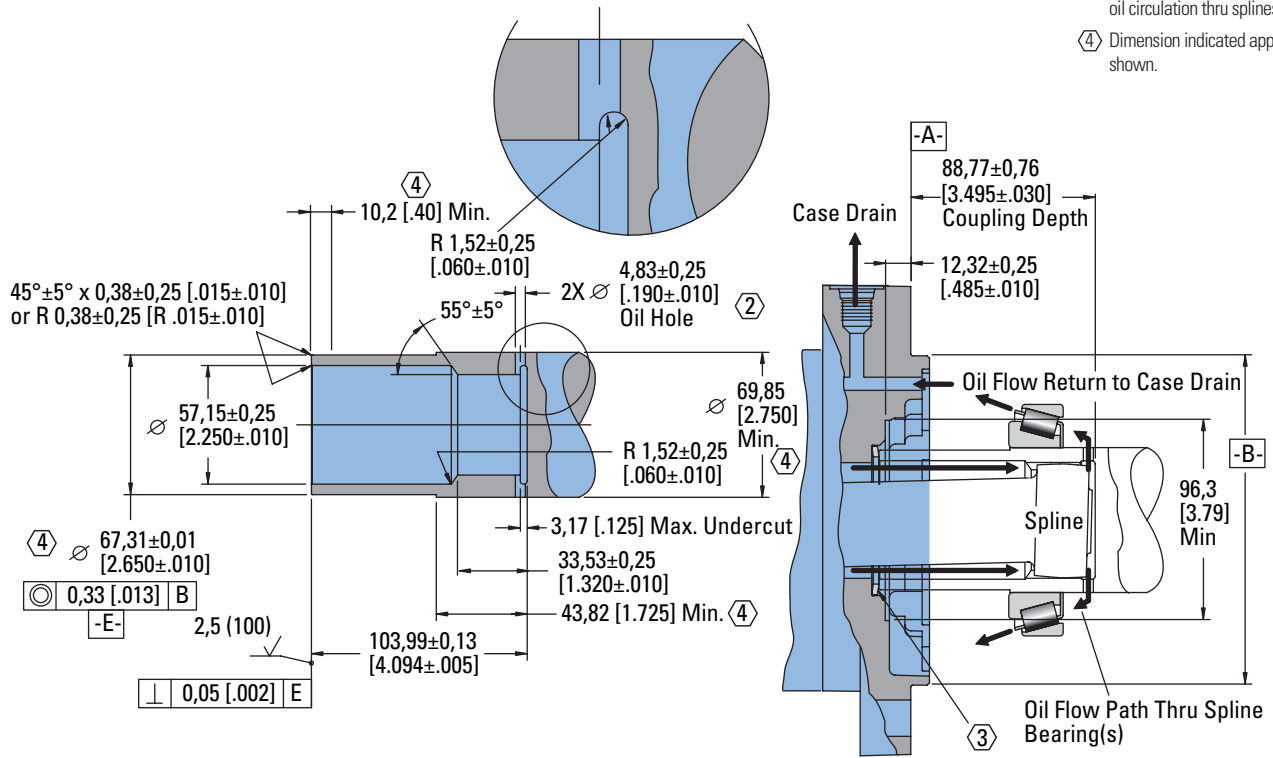
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]
630 [38.6]	161,5 [6.36]	130,3 [5.13]
805 [48.6]	172,5 [6.79]	141,2 [5.56]
990 [60.5]	184,4 [7.26]	153,4 [6.04]
1245 [76.0]	200,7 [7.90]	169,7 [6.68]
1560 [95.0]	220,5 [8.68]	189,5 [7.46]

# VIS 45 Series

## Installation Information

Bearingless

- 1 Internal spline in mating part to be per spline data. Specification material to be ASTM A304, 8620H carburize to a hardness of 59-62 HRC with case depth (to 50HRC) of 0,76 -1,27 [.030 -.050]. Dimensions apply after heat treat.
- 2 Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- 3 Seal to be furnished with motor for proper oil circulation thru splines.
- 4 Dimension indicated applies within area shown.



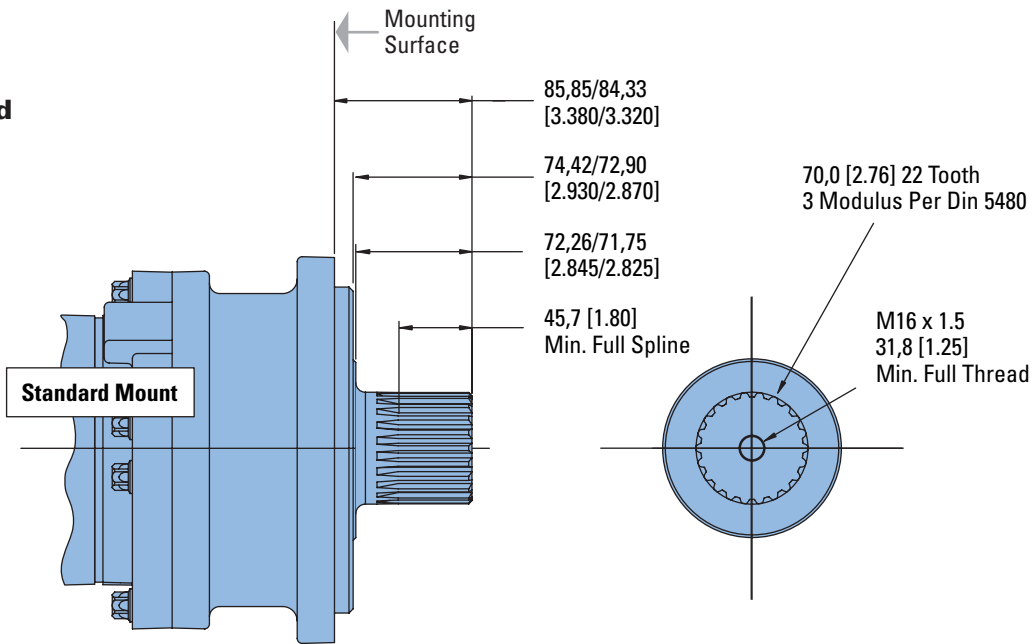
Spline Pitch	.....	8/16
Pressure Angle	.....	30°
Number of teeth	.....	16
Class of Fit	.....	Ref. 5
Type of Fit	.....	Side
Pitch Diameter	.....	Ref. 50,80000 [2.0000000] $\varnothing 0,33$ [.013] B
Base Diameter	.....	Ref. 43,994090032 [1.7320508]
Major Diameter	.....	56,34±0,15 [2.218±.006]
Min. Minor Diameter	.....	48,44±0,08 [1.907±.003]
Form Diameter, Min.	.....	55,22 [2.174]
Fillet Radius	.....	1,02±0,25 [.040±.010]
Tip Radius	.....	0,38±0,13 [.015±.005]
Finish	.....	1,6 (63)
Involute Profile Variation	.....	+0,000 -0,025 [+ .0000 - .0010]
Total Index Variation	.....	0,041 [.0016]
Lead Variation	.....	0,015 [.0006]
Circular Space Width:		
Maximum Actual	.....	6,180 [.2433]
Minimum Effective	.....	6,048 [.2381]
Maximum Effective	.....	Ref. 6,099 [.2401]
Minimum Actual	.....	Ref. 6,114 [.2407]
Dimension Between Two Pins	.....	Ref. 42,659 ±0,05 [1.6795±.0020]
Pin Diameter	.....	6,223 [.2450]

# VIS 45 Series

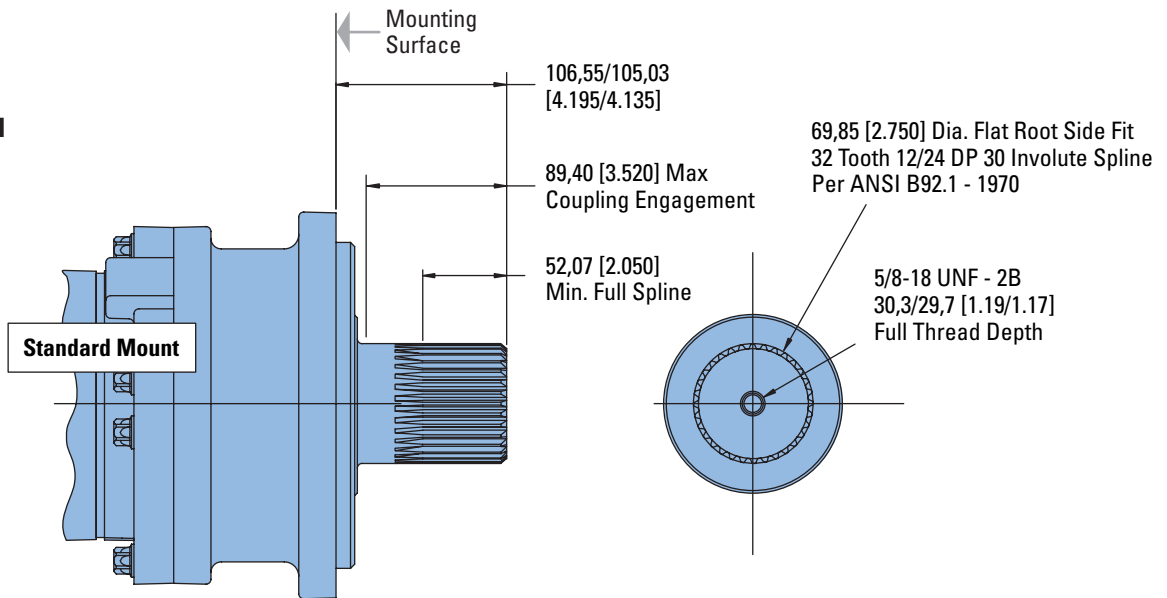
## Dimensions Shafts

Splined

### 70 mm 22 Tooth Splined



### 2-3/4 Inch 32 Tooth Splined

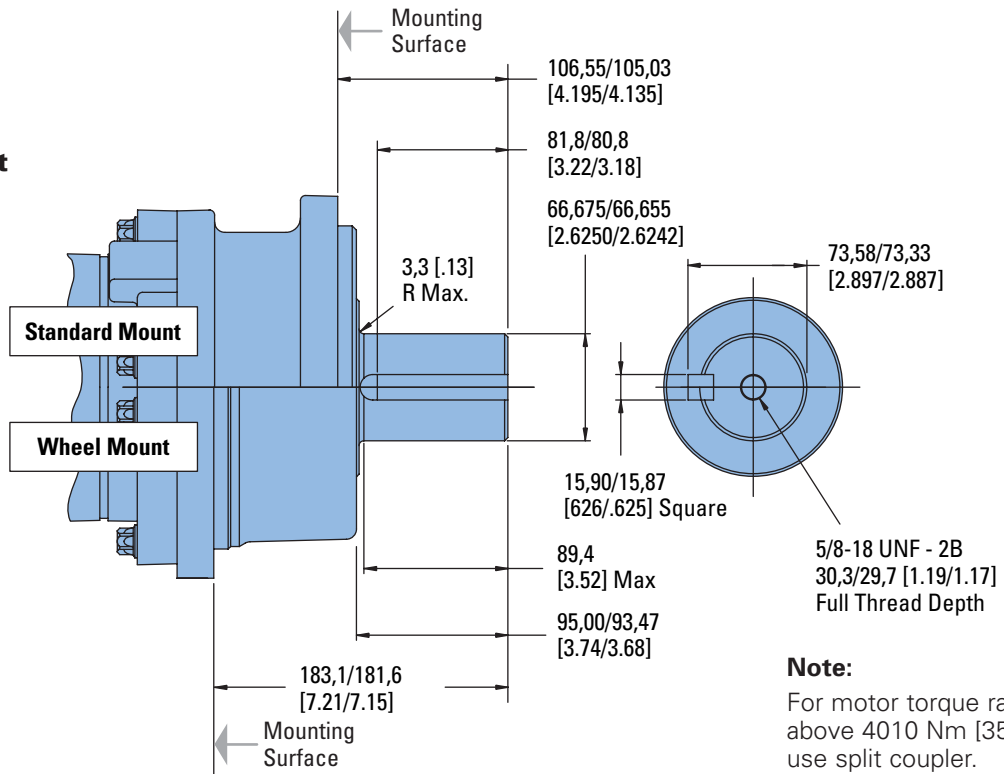


# VIS 45 Series

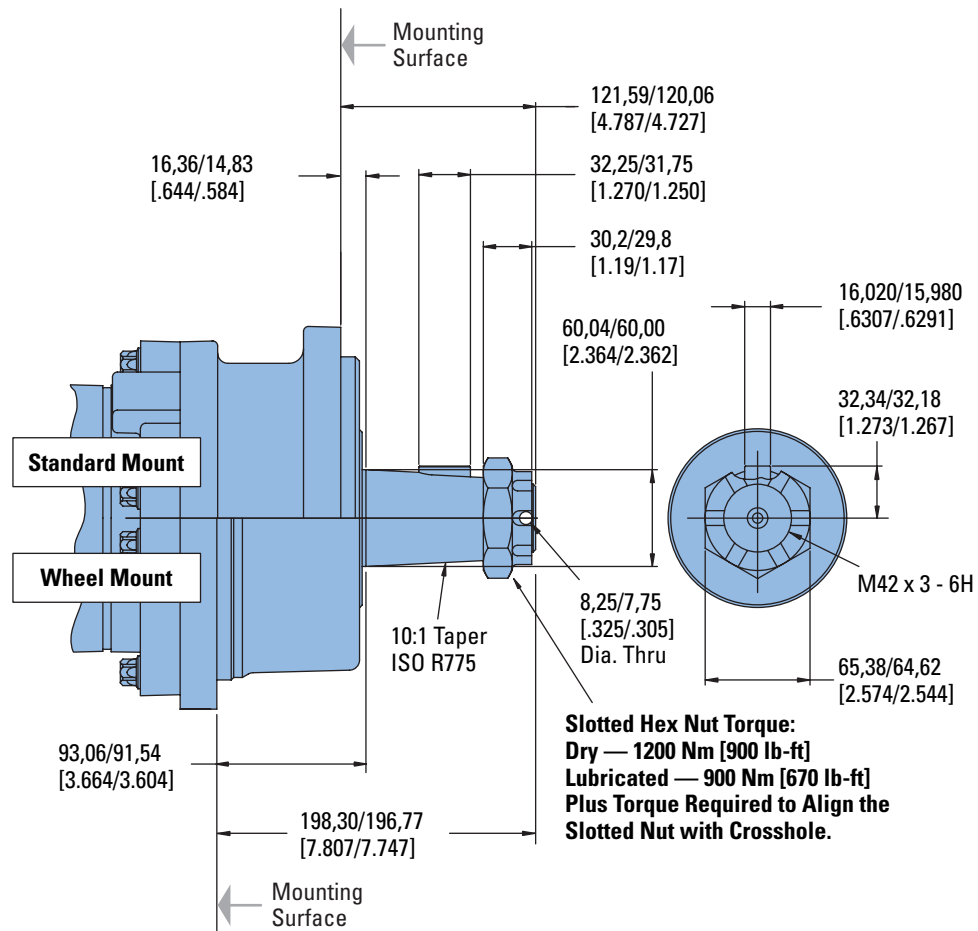
## Dimensions Shafts

Keyed

### 2-5/8 Inch Straight



### 60 mm Tapered





# VIS 45 Series

## Side Load Capacity

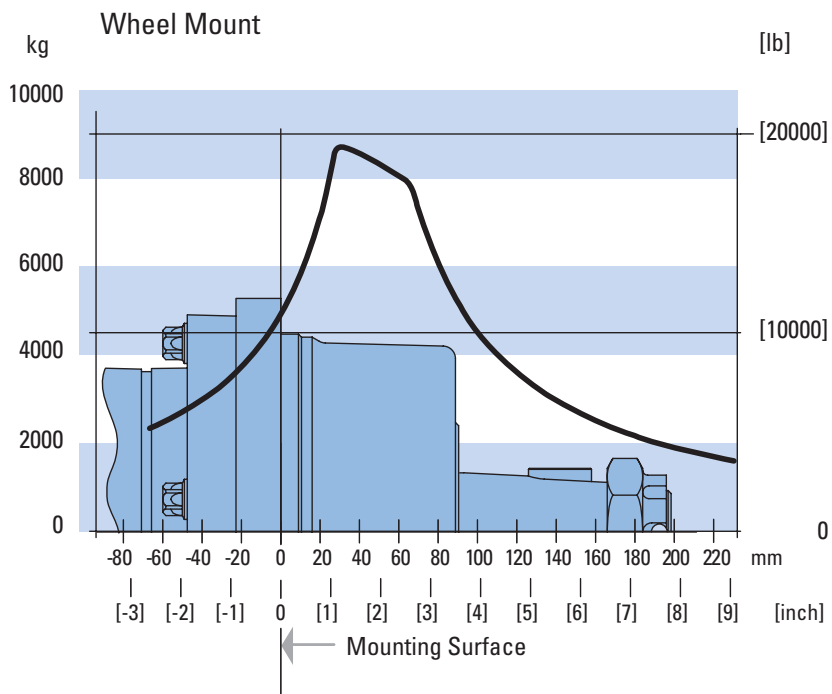
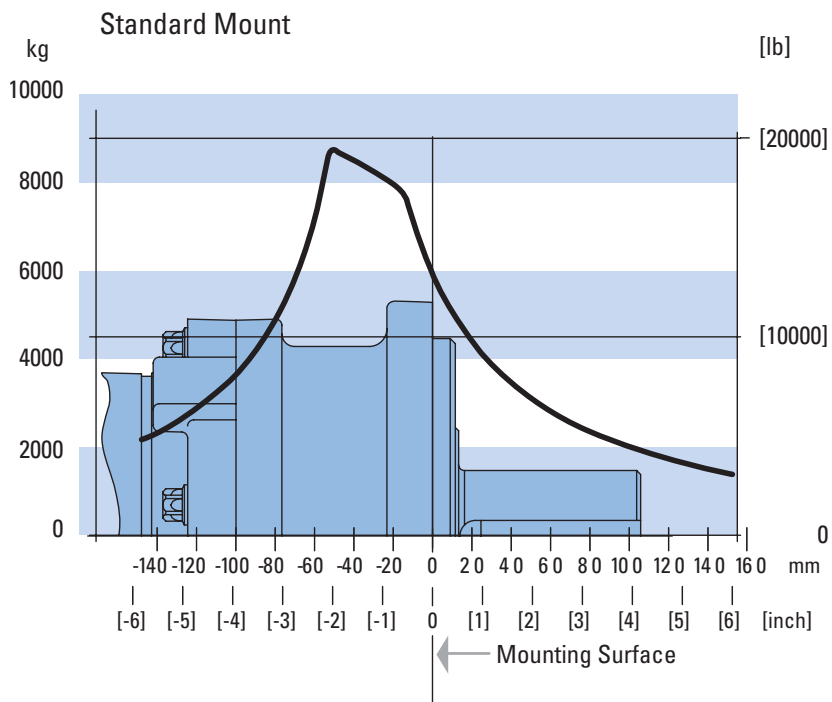
These curves indicate the radial load capacity on the motor shaft(s) at various locations.

**The curve is based on B 10 bearing life (2000 hours or 12,000,000 shaft revolutions at 100 RPM) at rated output torque.**

To determine radial load at speeds other than 100 RPM, multiply the load values given on the bearing curve by the factors in the chart below.

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

For 3,000,000 shaft revolutions or 500 hours — Increase these shaft loads 52%.



# VIS 45 Series

## Product Numbers

Closed Loop

Use three-digit prefix (155-, 156-, or 157-) plus four-digit number from charts for complete product number (ex: 157-0034).

**Orders will not be accepted without the three-digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0107	-0108	-0109	-0110	-0111
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0114	-0115	-0116	-0117	-0118
	70 mm 22 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0121	-0122	-0123	-0124	-0125
Wheel	2-3/4 inch 32 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0128	-0085	-0129	-0130	-0131
	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	156-0039	-0040	-0041	-0042	-0043
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	156-0046	-0047	-0048	-0049	-0050
Bearingless	(8 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0066	-0067	-0068	-0069	-0070
	(4 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0004	-	-	-	-

157-0004

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0134	-0135	-0136	-0137	-0138
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0141	-0142	-0143	-0144	-0145
	70 mm 22 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0148	-0149	-0150	-0151	-0152
Wheel	2-3/4 inch 32 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0155	-0156	-0157	-0158	-0159
	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0053	-0054	-0055	-0056	-0057
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0060	-0061	-0062	-0063	-0064
Bearingless	(8 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	157-0074	-0075	-0076	-0077	-0078
	(4 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	157-0081	-	-	-	-

157-0081

#### Note:

The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 15,2 bar [220 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

# VIS 45 Series

## Product Numbers

Open Loop

Use three-digit prefix (155-, 156-, or 157-) plus four-digit number from charts for complete product number (ex: 157-0038).

**Orders will not be accepted without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0029	-0030	-0031	-0032	-0033
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0043	-0044	-0045	-0046	-0047
	70 mm 22 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0014	-0057	-0058	-0059	-0060
	2-3/4 inch 32 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0070	-0071	-0072	-0073	-0074
Wheel	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	156-0011	-0012	-0013	-0014	-0015
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	155-0025	-0026	-0027	-0028	-0029
Bearingless	(8 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0050	-0040	-0042	-0044	-0046
	(4 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	157-0038	-	-	-	-

157-0038

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0036	-0037	-0038	-0039	-0040
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0050	-0051	-0052	-0053	-0054
	70 mm 22 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0063	-0064	-0065	-0066	-0067
	2-3/4 inch 32 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0077	-0078	-0079	-0080	-0081
Wheel	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0018	-0019	-0020	-0021	-0022
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	156-0032	-0033	-0034	-0035	-0036
Bearingless	(8 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	155-0053	-0041	-0043	-0045	-0047
	(4 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	157-0039	-0036	-0037	-0078	

157-0036

### Note:

All product numbers in the charts (above) are for motors **without** a back-pressure relief valve. These motors would generally be used in open loop circuits.

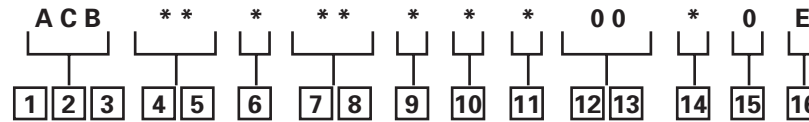
For closed loop circuits a motor **with** a back-pressure relief valve is required.

- A case drain is recommended for all VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].
- In open loop circuits, return pressure must be 3,5 bar [50 PSI] greater than case pressure to properly lubricate the internal drive.

# VIS 45 Series

## Model Code

The following 16 - digit coding system has been developed to identify all of the configuration options for the VIS 45 motor. Use this model code to specify a motor with the desired features. All 16 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



### **1, 2, 3** Product Series ACB – VIS 45 Motor

### **4, 5** Displacement cm<sup>3</sup>/r [in<sup>3</sup>/r]

- 31** – 520 [31.7]\*
- 35** – 572 [34.9]\*
- 39** – 630 [38.6]
- 44** – 720 [43.9]\*
- 49** – 805 [48.6]
- 60** – 990 [60.5]
- 76** – 1245 [76.0]
- 95** – 1560 [95.0]

\* For performance and dimension data contact your Eaton Hydraulics representative.

### **6** Mounting Type

- A** – 4 Bolt Bearingless 158,70 [6.250] Pilot Dia. With 9,07 [.355] Pilot Length and 17,53 [.690] Dia holes on 190,50 [7.500] Dia. B. C. - Max. Torque Allowed 3615 Nm [32000 lb - in] (Displ. Code 32, 35, 39 Only)
- C** – 8 Bolt Bearingless 158,70 [6.250] Pilot Dia. With 9,07 [.355] Pilot Length and 17,53 [.690] Dia holes on 190,50 [7.500] Dia. Bolt Circle
- D** – 4 Bolt Wheel Mount 200,0 [7.87] Pilot Dia. With 9,0 [.35] Pilot Length and 20,57 [.810] Dia. Holes on 250,0 [9.84] Dia. Bolt Circle
- H** – 4 Bolt Standard Mount 200,0 [7.87] Pilot Dia. With 9,0 [.35] Pilot Length and 20,57 [.810] Dia. Holes on 250,00 [9.84] Dia. Bolt Circle

### **7, 8** Output Shaft

- 00** – None (Bearingless)
- 05** – 2-5/8 inch Dia. Straight Shaft with 5/8-18 UNF-2B Thread in End and 15,88 [.625] Sq. X 81,3 [3.20] Straight Key
- 06** – 70 mm Dia. 22 Tooth 3 Modulus Splined Shaft Per DIN 5480 with M16 X 1,5 Thread in End
- 08** – 2-3/4 inch Dia. Flat Root Side Fit 32 Tooth 12/24 DP 30°. Involute Spline with 5/8-18 UNF-2B Thread in End
- 09** – 60 mm Dia. 10:1 Tapered Shaft Per ISO R775 with M42 x 3 - 6H Threaded Shaft End, 16W x 10H x 32L [.630W x .394H x 1.260L]

### **9** Ports

- A** – 1-5/16-12 UN-2B O-ring Port, Accepts Fittings for SAE J1926/1
- B** – G 1 (BSP) Ports, Accepts Fittings with Elastomeric or Deformable Metallic Sealing Member Per DIN 3852

### **10** Case Flow Options

- A** – Shuttle Valve with Side Facing 9/16-18 UNF-2B, O-ring Port Case Drain, Accepts Fittings for SAE J1926/1, Case Drain Required
- B** – Shuttle Valve with Side Facing G 1/4 (BSP) Port Case Drain, Case Drain Required

### **11** Back-Pressure Relief

- 0** – None (for Open Loop Only)
- 1** – Set at 15,2 bar [220 psi] (for Servo Pumps)
- 3** – Set at 4,5 bar [65 psi] (for Manual Pumps)
- 4** – Set at 20,7 bar [300 PSI] (for High Pressure Servo Pumps)

### **12, 13** Special Features

- 00** – None

### **14** Paint/ Special Packaging

- 0** – No Paint, Individual Box
- A** – Painted Low Gloss Black, Individual Box
- B** – No Paint, Bulk Box Option
- C** – Painted Low Gloss Black, Bulk Box Option

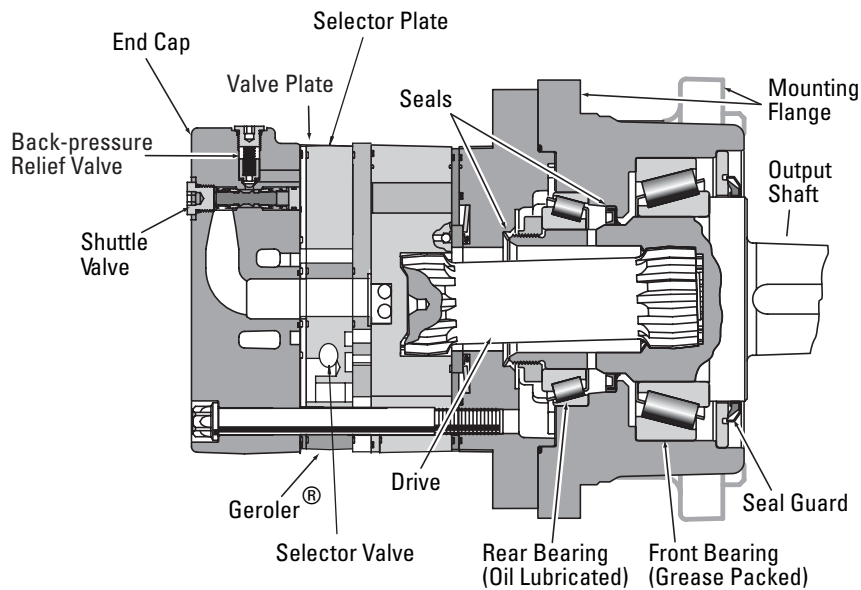
### **15** Eaton Assigned Code when Applicable

- 0** – Assigned Code

### **16** Eaton Assigned Design Code

- E** – Assigned Design Code

# VIS 45 Series Two-speed



## Specifications

VIS 45 Series motors are available with an integral two-speed feature that allows the operator to shift the motor between low speed high torque (LSHT) mode and high speed low torque (HSLT) mode. In the LSHT mode, output torque and rotation speed values are equal to those of the conventional VIS 45 motor. In the HSLT mode motor displacement is reduced by one third, resulting in a fifty percent increase in rotation speed and a torque output reduction of one third. The VIS 45 two speed motor is bidirectional. It will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes. Shift on the fly technology allows full-power operation throughout the full duration of the shift.

Changing between modes is accomplished by changing the displacement in a ratio of 1 to 1.5. An external two-position three-way control valve is required for shifting pressure to the pilot port (LSHT mode) and pilot signal pressure (HSLT mode). An integral selector valve shifts the motor from LSHT mode to HSLT mode. Initially, low pressure is supplied to the pilot port. The selector valve is biased to LSHT mode by a return spring. When pilot signal pressure is supplied to the pilot port and 3,5 Δbar [50 ΔPSI] is reached, the selector valve overcomes return spring force and the shifts the spool to select HSLT mode. Oil on the opposite side of the spool is drained to tank via the drain port. The pressure difference between the pilot port and drain port must be maintained to keep the motor in the high speed mode. When pilot pressure

is removed from the pilot port, the pressure in the pilot end of the spool valve is relieved and drained back through the control valve and the return spring forces the spool valve to LSHT position.

Pilot pressure may come from any source that will provide uninterrupted pressure during the high-speed mode operation. Allowable pilot pressure must be at least 3,5 Δbar [50 ΔPSI] and may be as high as full operating pressure of the motor.

All VIS 45 Series two speed motors are equipped with a return line shuttle for closed circuit applications as standard equipment. All options available on the conventional VIS 45 are also available on VIS 45 two speed motors.

## Performance Data

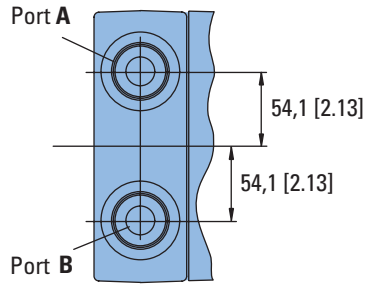
In the LSHT mode, torque and speed values are equal to those of the conventional VIS 45 motor. In the HSLT mode, rotation speed is increased by fifty percent and torque output is reduced by one third.

The VIS 45 two speed motor will function with equal shaft output in either rotation direction (CW or CCW) in both LSHT and HSLT modes.

# VIS 45 Series Two-speed

## Dimensions

Standard Mount

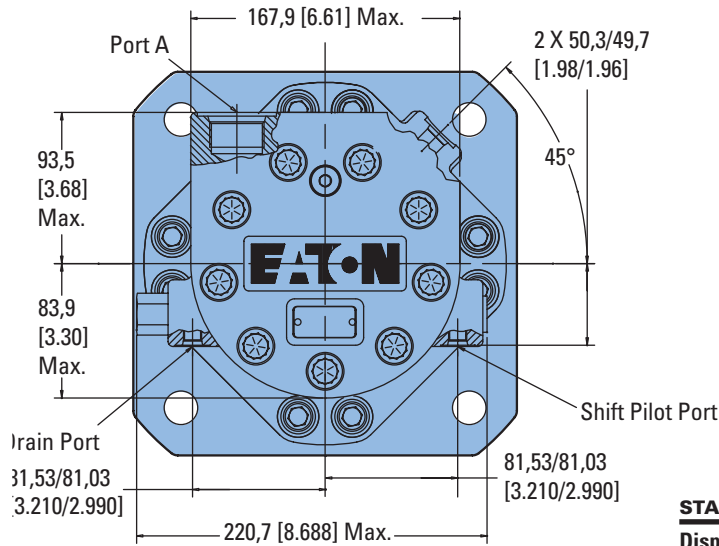
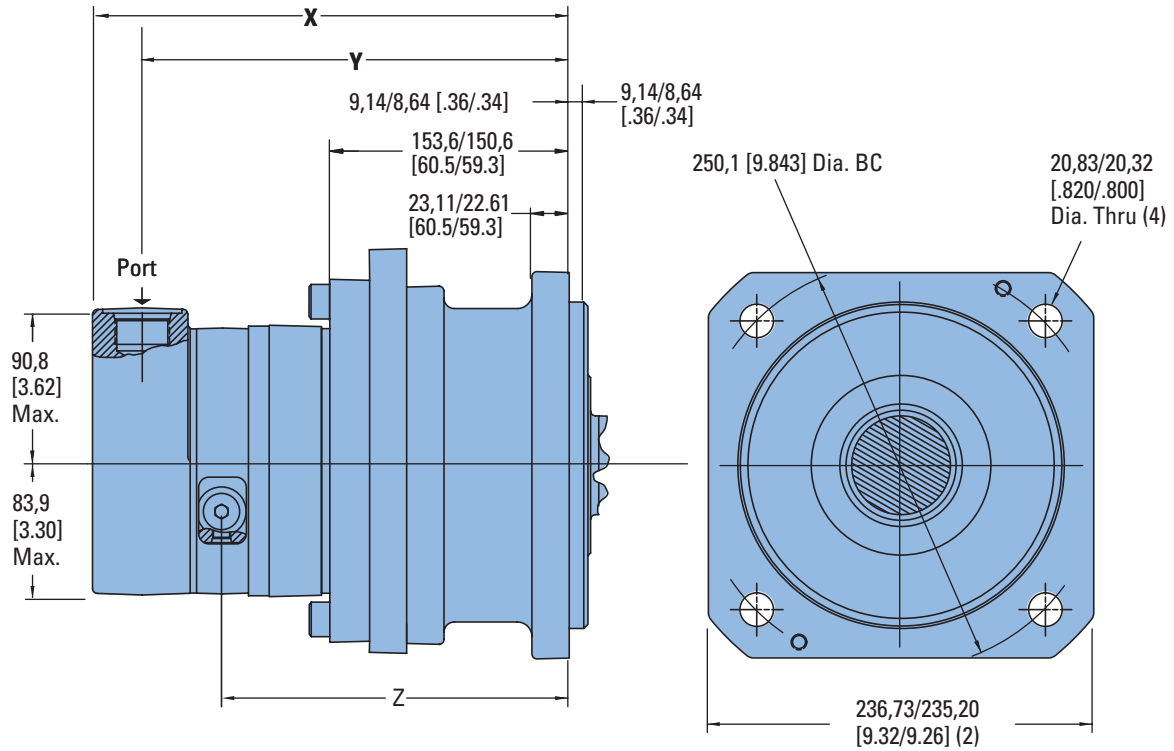


### Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)
- or
- G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



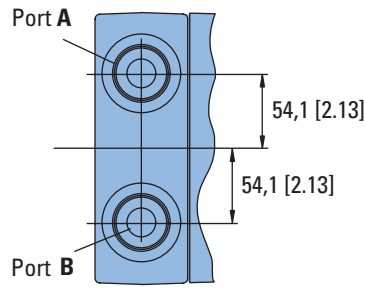
### STANDARD MOUNT

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	295,5 [11.63]	263,2 [10.36]	216,3 [8.51]
805 [48.6]	305,9 [12.04]	273,6 [10.77]	226,7 [8.92]
990 [60.5]	318,3 [12.53]	286,0 [11.26]	239,1 [9.41]
1245 [76.0]	334,3 [13.16]	302,0 [11.89]	255,1 [10.04]
1560 [95.0]	353,3 [13.94]	321,0 [12.67]	274,1 [10.82]

# VIS 45 Series Two-speed

## Dimensions

Wheel Mount

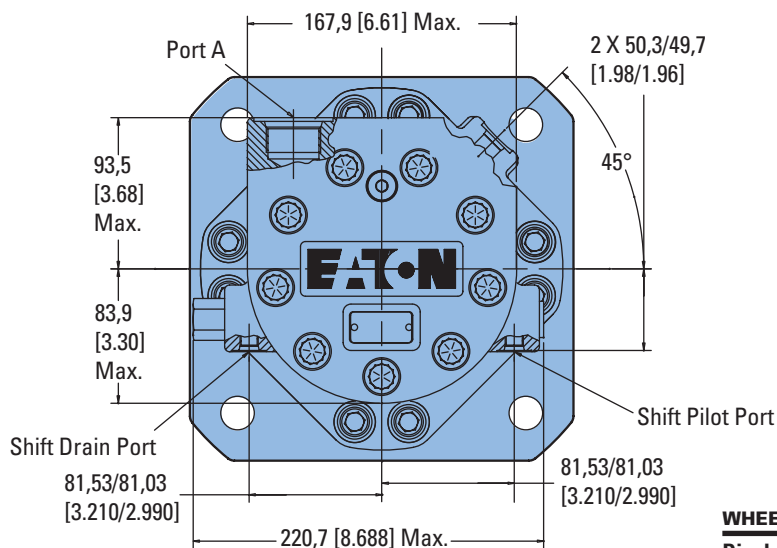
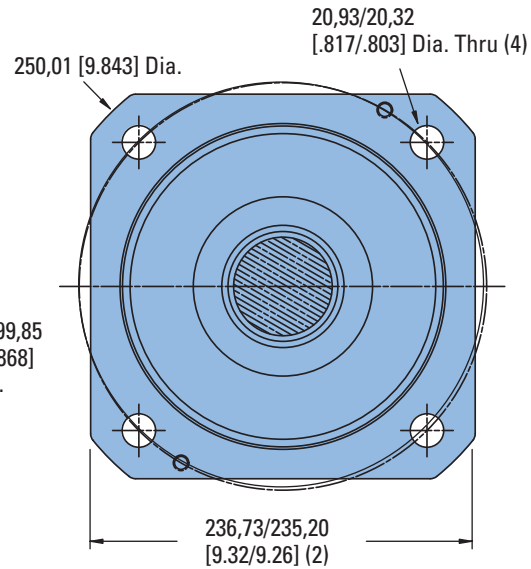
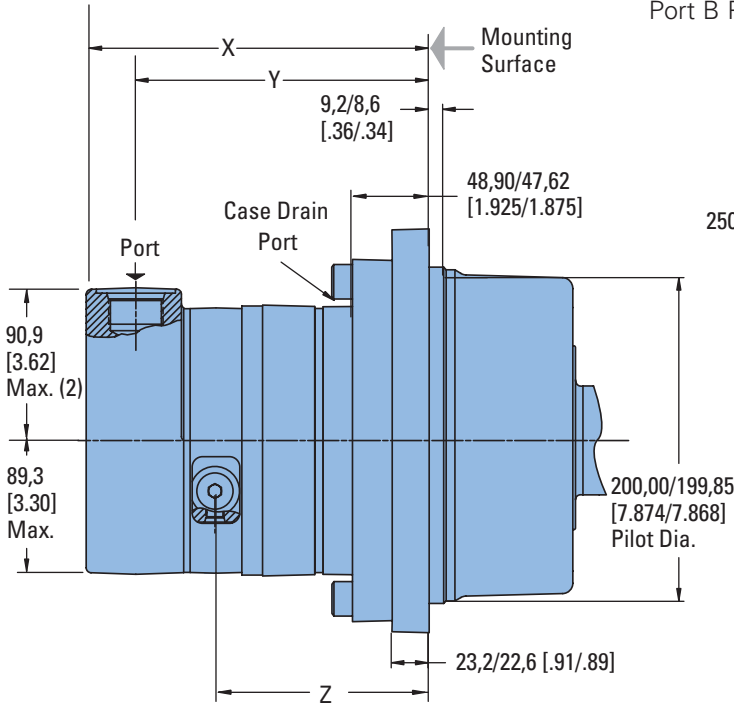


### Ports

- 1-5/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)
- or
- G 1 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW



### WHEEL MOUNT

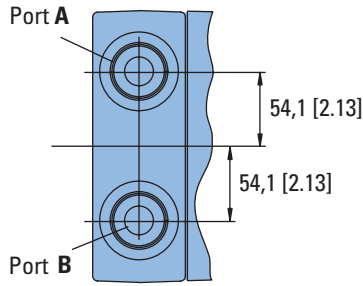
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	218,8 [8.61]	186,5 [7.34]	139,6 [5.49]
805 [48.6]	229,2 [9.02]	196,9 [7.75]	150,0 [5.90]
990 [60.5]	241,6 [9.51]	209,4 [8.24]	162,4 [6.39]
1245 [76.0]	257,6 [10.14]	225,6 [8.88]	178,4 [7.02]
1560 [95.0]	276,6 [10.92]	245,4 [9.66]	197,4 [7.80]



# VIS 45 Series Two-speed

## Dimensions

Bearingless



### Ports

- 1-1/16-12 UN-2B SAE O-ring Ports (2)
- 9/16-18 UNF-2B SAE O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)
- Or
- G 3/4 (BSP) O-ring Ports (2)
- G 1/4 (BSP) O-ring Case Drain Port (1)
- 7/16-20 UNF -2B SAE O-ring Shift Ports (2)

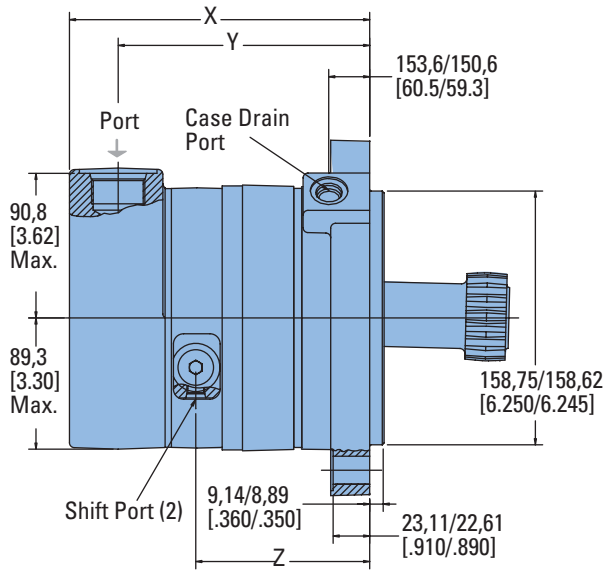
### Standard Rotation Viewed from Drive End

- Port A Pressurized — CW
- Port B Pressurized — CCW

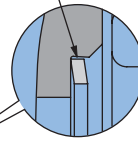
For VIS 45 two-speed bearingless motor application information, contact your Eaton representative (mating coupling blanks available from Eaton Hydraulics).

### Note:

After machining blank, part must be hardened per Eaton specification.



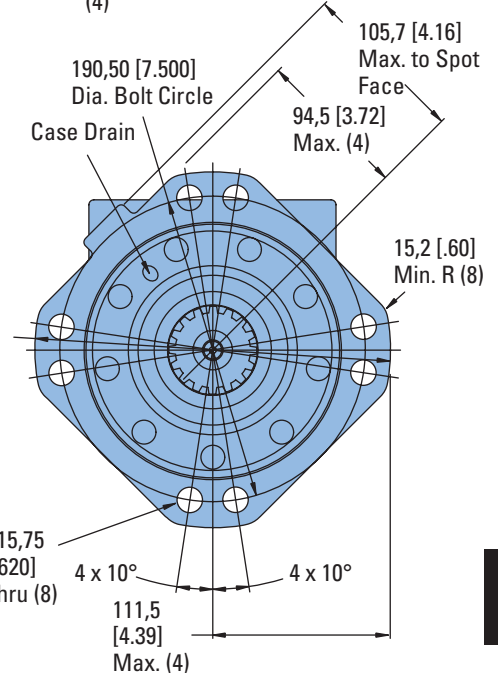
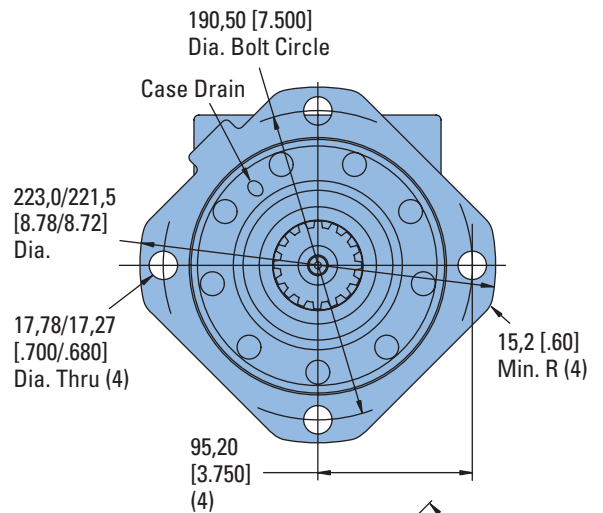
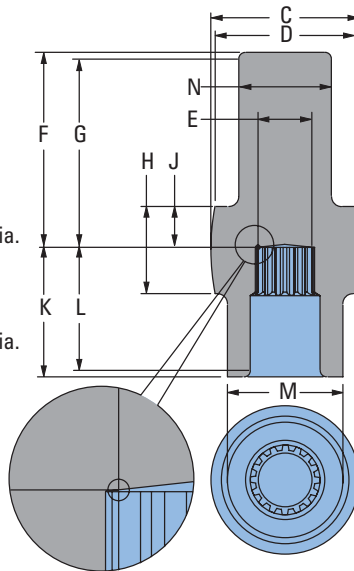
Shaft Face Seal  
Furnished with Motor



223,0/221,5  
[8.78/8.72]  
Dia.

Mating Coupling Blank  
Eaton Part No. 13521-003

- C 116,3 [ 4.58 ] Dia. Max.
- D 111,8 [ 4.40 ] Dia. Min.
- E 37,64 [ 1.482 ] Dia.
- F 136,7 [ 5.38 ] Max.
- G 131,6 [ 5.18 ] Min. Full Form Dia.
- H 64,8 [ 2.55 ]
- J 26,4 [ 1.04 ]
- K 109,7 [ 4.32 ] Max.
- L 104,6 [ 4.12 ] Min. Full Form Dia.
- M 92,58 [ 3.645 ] Dia.
- N 73,28 [ 2.885 ] Dia.



### BEARINGLESS MOTORS

Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	Z mm [inch]
630 [38.6]	196,1 [7.72]	165,9 [6.53]	116,9 [4.60]
805 [48.6]	206,5 [8.13]	176,3 [6.94]	127,3 [5.01]
990 [60.5]	218,9 [8.62]	188,8 [7.43]	139,7 [5.50]
1245 [76.0]	235,2 [9.26]	205,0 [8.07]	156,0 [6.14]
1560 [95.0]	255,0 [10.04]	224,8 [8.85]	175,8 [6.92]

# VIS 45 Series Two-speed

## Product Numbers

(Closed Loop)

Use digit prefix—173-,174- or 183- plus four digit number from charts for complete product number—

Example: 173-0013.

**Orders will not be accepted without three digit prefix.**

### SAE

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0006	-0007	-0008	-0009	-0010
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0011	-0012	-0013	-0014	-0015
	70 mm 22 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0016	-0017	-0018	-0019	-0020
Wheel	2-3/4 inch 32 Tooth Splined	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	174-0021	-0022	-0023	-0024	-0025
	2-5/8 inch Straight	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	183-0006	-0007	-0008	-0009	-0010
	60 mm Tapered	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	183-0011	-0012	-0013	-0014	-0015
Bearingless	(8 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	173-0008	-0009	-0010	-0011	-0012
	(4 Bolt)	1-5/16-12 UNF O-ring (2) 9/16-18 UNC Drain Port (1)	173-0013	-	-	-	-

173-0013

### ISO

MOUNTING	SHAFT	PORT SIZE	DISPL. cm <sup>3</sup> /r [in <sup>3</sup> /r] / PRODUCT NUMBER				
			630 [38.6]	805 [48.6]	990 [60.5]	1245 [76.0]	1560 [95.0]
Standard	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0026	-0027	-0028	-0029	-0030
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0031	-0032	-0033	-0034	-0035
	70 mm 22 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0036	-0037	-0038	-0039	-0040
Wheel	2-3/4 inch 32 Tooth Splined	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	174-0041	-0042	-0043	-0044	-0045
	2-5/8 inch Straight	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	183-0016	-0017	-0018	-0019	-0020
	60 mm Tapered	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	183-0021	-0022	-0023	-0024	-0025
Bearingless	(8 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	173-0014	-0015	-0016	-0017	-0018
	(4 Bolt)	G 1 (BSP) (2) G 1/4 (BSP) Drain Port (1)	173-0019	-	-	-	-

173-0019

#### Note:

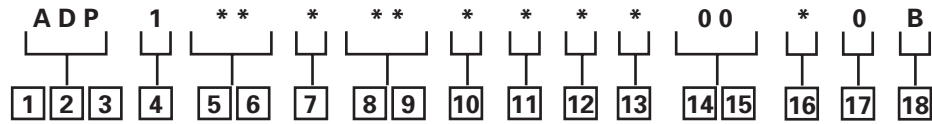
The product numbers on this page are for motors used in closed loop circuits. They include a back-pressure relief valve that is set at 15,2 bar [220 PSI].

- A case drain is required for all closed loop VIS motor applications.
- The maximum case pressure for the VIS motor is 3,5 bar [50 PSI].

# VIS 45 Series Two-speed

## Model Code

The following 18-digit coding system has been developed to identify all of the configuration options for the VIS 45 Two-Speed motor. Use this model code to specify a motor with the desired features. All 18 digits of the code must be present when ordering. You may want to photocopy the matrix below to ensure that each number is entered in the correct box.



**1, 2, 3 Product Series**  
ADP – VIS 45 Two-speed Motor

**4 Eaton Assigned Code**  
1 – Assigned Code

**5, 6 Displacement**  
**cm<sup>3</sup>/r [in<sup>3</sup>/r]**

**32** – 520 [31.7]\*  
**35** – 572 [34.9]\*  
**39** – 630 [38.6]  
**44** – 720 [43.9]\*  
**49** – 805 [48.6]  
**60** – 990 [60.5]  
**76** – 1245 [76.0]

**95** – 1560 [95.0]

\* For performance and dimension data, contact your Eaton Hydraulics representative.

**7 Mounting Type**

**A** – 4 Bolt Bearingless  
158,70 [6.250] Pilot Dia.  
With 9,07 [.355] Pilot Length  
and 17,53 [.690] Dia holes  
on 190,50 [7.500] Dia. B. C.  
- Max. Torque Allowed 3615  
Nm [32000 lb-in] (Displ.  
Code 32, 35, 39 Only)

**C** – 8 Bolt Bearingless  
158,70 [6.250] Pilot Dia.  
With 9,07 [.355] Pilot Length  
and 17,53 [.690] Dia holes  
on 190,50 [7.500] Dia. Bolt  
Circle

**D** – 4 Bolt Wheel Mount  
200,0 [7.87] Pilot Dia. With  
9,0 [.35] Pilot Length and  
20,57 [.810] Dia. Holes on  
250,0 [9.84] Dia. Bolt Circle

**H** – 4 Bolt Standard Mount  
200,0 [7.87] Pilot Dia. With  
9,0 [.35] Pilot Length and  
20,57 [.810] Dia. Holes on  
250,00 [9.84] Dia. Bolt Circle

**8, 9 Output Shaft**

**00** – None (Bearingless)

**05** – 2-5/8 inch Dia. Straight  
Shaft with 5/8-18 UNF-2B  
Thread in End and 15,88  
[.625] Sq. X 81,3 [3.20]  
Straight Key

**06** – 70 mm Dia. 22 Tooth  
3 Modulus Splined Shaft Per  
DIN 5480 with M16 X 1,5  
Thread in End

**08** – 2-3/4 inch Dia. Flat  
Root Side Fit 32 Tooth 12/24  
DP 30°. Involute Spline with  
5/8-18 UNF-2B Thread in End

**09** – 60 mm Dia. 10:1  
Tapered Shaft Per ISO R775  
with M42 x 3 - 6H Threaded  
Shaft End, 16W x 10H x 32L  
[.630W x .394H x 1.260L]

**10 Ports**

**A** – 1-5/16-12 UN-2B O-ring  
Port, Accepts Fittings for  
SAE J1926/1

**B** – G 1 (BSP) Straight  
Thread Ports

**11 Case Flow Options**

**D** – Shuttle Valve with  
Side Facing 9/16-18 UNF-  
2B, O-ring Port Case  
Drain, Accepts Fittings for  
SAE J1926/1, Case Drain  
Required

**F** – Shuttle Valve with Side  
Facing G 1/4 (BSP) Port  
Case Drain, Case Drain  
Required

**12 Back-Pressure Relief**

**1** – Set at 15,2 bar [220 psi]  
(for Servo Pumps)

**3** – Set at 4,5 bar [65 psi]  
(for Manual Pumps)

**4** – Set at 20,7 bar [300 PSI]  
(for High Pressure Servo  
Pumps)

**13 Eaton Assigned Code**

**0** – Assigned Code

**14, 15 Special Features**  
**00** – None

**16 Paint/ Special  
Packaging**

**0** – No Paint, Individual Box

**A** – Painted Low Gloss  
Black, Individual Box

**B** – No Paint, Bulk Box  
Option

**C** – Painted Low Gloss  
Black, Bulk Box Option

**17 Eaton Assigned  
Code when Applicable**

**0** – Assigned Code

**18 Eaton Assigned  
Design Code**

**B** – Assigned Design Code

**Eaton**  
14615 Lone Oak Road  
Eden Prairie, MN 55344  
USA  
Tel: 952 937-9800  
Fax: 952 974-7722  
[www.hydraulics.eaton.com](http://www.hydraulics.eaton.com)

**Eaton**  
20 Rosamond Road  
Footscray  
Victoria 3011  
Australia  
Tel: (61) 3 9319 8222  
Fax: (61) 3 9318 5714

**Eaton**  
Dr.-Reckeweg-Str. 1  
D-76532 Baden-Baden  
Germany  
Tel: (49) 7221 682-0  
Fax: (49) 7221 682-788

